

16-CHARACTER 6-LINE LCD DRIVER with JAPANESE KANJI ROM

■ GENERAL DESCRIPTION

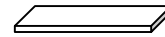
The NJU6645 is a 16-character 6-line (16x16dots size Japanese Kanji) or 96 x 256 dots LCD driver with Japanese Kanji ROM.

It contains 8-bit parallel or serial interface, instruction decoder, character generator ROM/RAM, common and segment drivers, bleeder resistor and voltage booster.

The NJU6645 supports the character font of JIS level-1 and level-2, non-kanji and half-size character and symbol.

It is suitable for the low operation voltage and low power applications by low operating voltage 2.4 to 3.6V.

■ PACKAGE OUTLINE

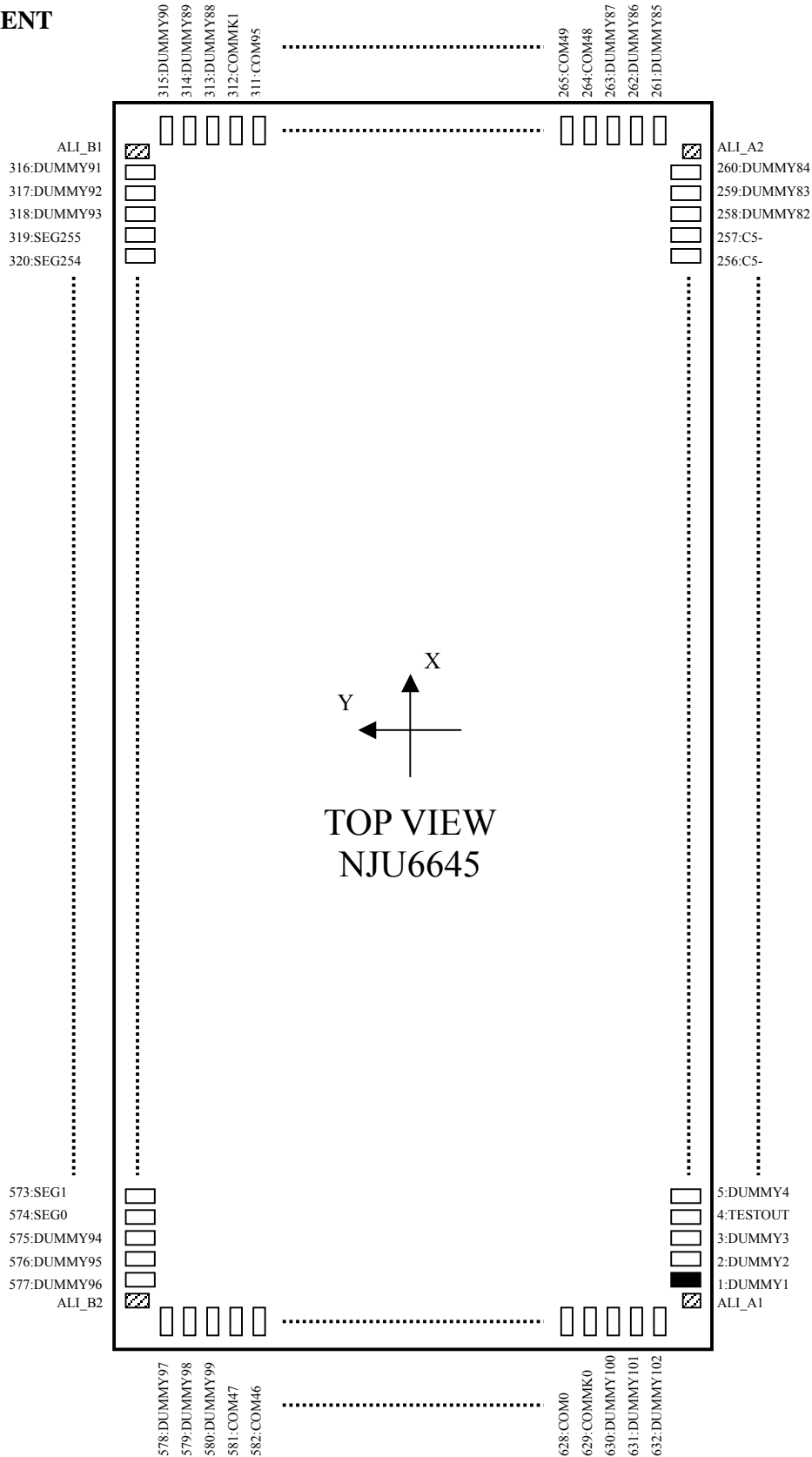


NJU6645CJ

■ FEATURES

- 16-character 6-line Kanji Character Display or 96 x 256 dots Graphic Display LCD controller driver
- LCD Driver Output : 96-common x 256-segment + 2-icon com
- 8-bit Parallel Interface
- Serial Interface
- Display Data RAM 1,536 bits at Full-size 96 Characters
- Character Generator ROM
 - :JIS Level-1 Kanji 16 x 16 dots 2,965 fonts
 - :JIS Level-2 Kanji 16 x 16 dots 3,388 fonts
 - :JIS Non-Kanji 16 x 16 dots 524 fonts
 - :Half Size Display 8 x 16 dots 256 fonts
- Character Generator RAM 24,576 bits 8 x 16 dots 192 fonts
- Icon Display RAM 512 bits Maximum 512 icons
- Duty Ratio 1/18, 1/34, 1/50, 1/66, 1/82, 1/98 (Programmable)
- Bias Ratio 1/4 ~ 1/11 (Programmable)
- Common and Segment driver Location order Select Function (Programmable)
- Common Wiring Select Function
- Useful Instruction Set RE Flag Set, Status Read, Display Clear, Cursor Home, Display Control, Stand-by, Cursor Control, Display / Entry Mode, Scroll Start Line, Scroll Start Row, Display Start Line, Display Duty Ratio, N-line inversion, Driver Output Control, Oscillation Control, Discharge, Boost Level, Bias Ratio, Electrical Volume, Power Control, RAM Address Set, Address Shift, RAM Data Writing / Reading
- Built-in Voltage Boost 2 to 6-time
- Built-in Electrical Volume 128-step
- Oscillation Circuit External Resistor Required
- Built-in Bleeder Resistor
- Operating Voltage +2.4 to 3.6V
- LCD Driving Voltage +4.5 to 17.0V
- Operation Temperature Range -40 to +85°C
- C-MOS Technology (P-sub)
- Package Outline Bump Chip

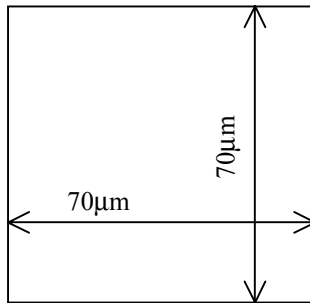
■ PAD ALIGNMENT



| | | | |
|----------------|--------------------------------|-------------|----------------------------|
| Chip Size | : 14.16mm x 3.16mm (T.B.D.) | Chip Center | : X=0 μ m, Y=0 μ m |
| Chip Thickness | : 625 μ m \pm 25 μ m | Pad Pitch | : 50 μ m pitch |
| Bump Size | : 31 μ m x 130 μ m | Bump Height | : 17.5 μ m(Typ.) |
| Bump Material | : Au | | |

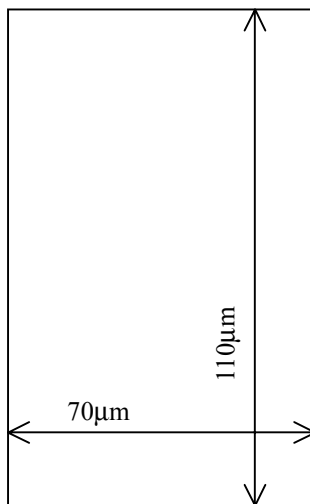
Alignment Mark

- Type A



Center Coordinates : ALI_A1 (X, Y) = (-6682, -1447)
: ALI_A2 (X, Y) = (6682, -1447)

- Type B



Center Coordinates : ALI_B1 (X, Y) = (6710, 1427)
: ALI_B2 (X, Y) = (-6710, 1427)

■ PAD COORDINATES 1

Chip Size 14.16mm x 3.16mm (Chip Center X=0μm, Y=0μm)

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|-------|---------|
| 1 | DUMMY1 | -6475 | -1412.5 |
| 2 | DUMMY2 | -6425 | -1412.5 |
| 3 | DUMMY3 | -6375 | -1412.5 |
| 4 | TESTOUT | -6325 | -1412.5 |
| 5 | DUMMY4 | -6275 | -1412.5 |
| 6 | DUMMY5 | -6225 | -1412.5 |
| 7 | SEL68 | -6175 | -1412.5 |
| 8 | DUMMY6 | -6125 | -1412.5 |
| 9 | VPUP | -6075 | -1412.5 |
| 10 | DUMMY7 | -6025 | -1412.5 |
| 11 | PS | -5975 | -1412.5 |
| 12 | DUMMY8 | -5925 | -1412.5 |
| 13 | VPUP | -5875 | -1412.5 |
| 14 | DUMMY9 | -5825 | -1412.5 |
| 15 | CSEL | -5775 | -1412.5 |
| 16 | DUMMY10 | -5725 | -1412.5 |
| 17 | DUMMY11 | -5675 | -1412.5 |
| 18 | RSTb | -5625 | -1412.5 |
| 19 | RSTb | -5575 | -1412.5 |
| 20 | DUMMY12 | -5525 | -1412.5 |
| 21 | DUMMY13 | -5475 | -1412.5 |
| 22 | CSb | -5425 | -1412.5 |
| 23 | CSb | -5375 | -1412.5 |
| 24 | DUMMY14 | -5325 | -1412.5 |
| 25 | DUMMY15 | -5275 | -1412.5 |
| 26 | RS | -5225 | -1412.5 |
| 27 | RS | -5175 | -1412.5 |
| 28 | DUMMY16 | -5125 | -1412.5 |
| 29 | VPDN | -5075 | -1412.5 |
| 30 | DUMMY17 | -5025 | -1412.5 |
| 31 | WRb/RW | -4975 | -1412.5 |
| 32 | WRb/RW | -4925 | -1412.5 |
| 33 | DUMMY18 | -4875 | -1412.5 |
| 34 | DUMMY19 | -4825 | -1412.5 |
| 35 | RDb/E | -4775 | -1412.5 |
| 36 | RDb/E | -4725 | -1412.5 |
| 37 | DUMMY20 | -4675 | -1412.5 |
| 38 | VPUP | -4625 | -1412.5 |
| 39 | DUMMY21 | -4575 | -1412.5 |
| 40 | D0 | -4525 | -1412.5 |
| 41 | D0 | -4475 | -1412.5 |
| 42 | DUMMY22 | -4425 | -1412.5 |
| 43 | DUMMY23 | -4375 | -1412.5 |
| 44 | D1 | -4325 | -1412.5 |
| 45 | D1 | -4275 | -1412.5 |
| 46 | DUMMY24 | -4225 | -1412.5 |
| 47 | DUMMY25 | -4175 | -1412.5 |
| 48 | D2 | -4125 | -1412.5 |
| 49 | D2 | -4075 | -1412.5 |
| 50 | DUMMY26 | -4025 | -1412.5 |

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|-------|---------|
| 51 | DUMMY27 | -3975 | -1412.5 |
| 52 | D3 | -3925 | -1412.5 |
| 53 | D3 | -3875 | -1412.5 |
| 54 | DUMMY28 | -3825 | -1412.5 |
| 55 | DUMMY29 | -3775 | -1412.5 |
| 56 | D4 | -3725 | -1412.5 |
| 57 | D4 | -3675 | -1412.5 |
| 58 | DUMMY30 | -3625 | -1412.5 |
| 59 | DUMMY31 | -3575 | -1412.5 |
| 60 | D5 | -3525 | -1412.5 |
| 61 | D5 | -3475 | -1412.5 |
| 62 | DUMMY32 | -3425 | -1412.5 |
| 63 | DUMMY33 | -3375 | -1412.5 |
| 64 | D6/SCL | -3325 | -1412.5 |
| 65 | D6/SCL | -3275 | -1412.5 |
| 66 | DUMMY34 | -3225 | -1412.5 |
| 67 | DUMMY35 | -3175 | -1412.5 |
| 68 | D7/SDA | -3125 | -1412.5 |
| 69 | D7/SDA | -3075 | -1412.5 |
| 70 | DUMMY36 | -3025 | -1412.5 |
| 71 | OSC2 | -2975 | -1412.5 |
| 72 | OSC2 | -2925 | -1412.5 |
| 73 | DUMMY37 | -2875 | -1412.5 |
| 74 | VDD | -2825 | -1412.5 |
| 75 | VDD | -2775 | -1412.5 |
| 76 | VDD | -2725 | -1412.5 |
| 77 | VDD | -2675 | -1412.5 |
| 78 | VDD | -2625 | -1412.5 |
| 79 | VDD | -2575 | -1412.5 |
| 80 | DUMMY38 | -2525 | -1412.5 |
| 81 | OSC1 | -2475 | -1412.5 |
| 82 | OSC1 | -2425 | -1412.5 |
| 83 | DUMMY39 | -2375 | -1412.5 |
| 84 | VSS | -2325 | -1412.5 |
| 85 | VSS | -2275 | -1412.5 |
| 86 | VSS | -2225 | -1412.5 |
| 87 | VSS | -2175 | -1412.5 |
| 88 | VSS | -2125 | -1412.5 |
| 89 | VSS | -2075 | -1412.5 |
| 90 | DUMMY40 | -2025 | -1412.5 |
| 91 | DUMMY41 | -1975 | -1412.5 |
| 92 | VLCD | -1925 | -1412.5 |
| 93 | VLCD | -1875 | -1412.5 |
| 94 | VLCD | -1825 | -1412.5 |
| 95 | VLCD | -1775 | -1412.5 |
| 96 | VLCD | -1725 | -1412.5 |
| 97 | VLCD | -1675 | -1412.5 |
| 98 | DUMMY42 | -1625 | -1412.5 |
| 99 | DUMMY43 | -1575 | -1412.5 |
| 100 | V1 | -1525 | -1412.5 |

■ PAD COORDINATES 2

Chip Size 14.16mm x 3.16mm (Chip Center X=0μm, Y=0μm)

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|-------|---------|
| 101 | V1 | -1475 | -1412.5 |
| 102 | V1 | -1425 | -1412.5 |
| 103 | V1 | -1375 | -1412.5 |
| 104 | V1 | -1325 | -1412.5 |
| 105 | DUMMY44 | -1275 | -1412.5 |
| 106 | DUMMY45 | -1225 | -1412.5 |
| 107 | V2 | -1175 | -1412.5 |
| 108 | V2 | -1125 | -1412.5 |
| 109 | V2 | -1075 | -1412.5 |
| 110 | V2 | -1025 | -1412.5 |
| 111 | V2 | -975 | -1412.5 |
| 112 | DUMMY46 | -925 | -1412.5 |
| 113 | DUMMY47 | -875 | -1412.5 |
| 114 | V3 | -825 | -1412.5 |
| 115 | V3 | -775 | -1412.5 |
| 116 | V3 | -725 | -1412.5 |
| 117 | V3 | -675 | -1412.5 |
| 118 | V3 | -625 | -1412.5 |
| 119 | DUMMY48 | -575 | -1412.5 |
| 120 | DUMMY49 | -525 | -1412.5 |
| 121 | V4 | -475 | -1412.5 |
| 122 | V4 | -425 | -1412.5 |
| 123 | V4 | -375 | -1412.5 |
| 124 | V4 | -325 | -1412.5 |
| 125 | V4 | -275 | -1412.5 |
| 126 | DUMMY50 | -225 | -1412.5 |
| 127 | DUMMY51 | -175 | -1412.5 |
| 128 | VREG | -125 | -1412.5 |
| 129 | VREG | -75 | -1412.5 |
| 130 | VREG | -25 | -1412.5 |
| 131 | VREG | 25 | -1412.5 |
| 132 | VREG | 75 | -1412.5 |
| 133 | DUMMY52 | 125 | -1412.5 |
| 134 | DUMMY53 | 175 | -1412.5 |
| 135 | VREF | 225 | -1412.5 |
| 136 | VREF | 275 | -1412.5 |
| 137 | VREF | 325 | -1412.5 |
| 138 | VREF | 375 | -1412.5 |
| 139 | DUMMY54 | 425 | -1412.5 |
| 140 | DUMMY55 | 475 | -1412.5 |
| 141 | VBA | 525 | -1412.5 |
| 142 | VBA | 575 | -1412.5 |
| 143 | VBA | 625 | -1412.5 |
| 144 | VBA | 675 | -1412.5 |
| 145 | DUMMY56 | 725 | -1412.5 |
| 146 | DUMMY57 | 775 | -1412.5 |
| 147 | VSS | 825 | -1412.5 |
| 148 | VSS | 875 | -1412.5 |
| 149 | VSS | 925 | -1412.5 |
| 150 | VSS | 975 | -1412.5 |

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|-------|---------|
| 151 | VSS | 1025 | -1412.5 |
| 152 | VSS | 1075 | -1412.5 |
| 153 | DUMMY58 | 1125 | -1412.5 |
| 154 | DUMMY59 | 1175 | -1412.5 |
| 155 | VOUT | 1225 | -1412.5 |
| 156 | VOUT | 1275 | -1412.5 |
| 157 | VOUT | 1325 | -1412.5 |
| 158 | VOUT | 1375 | -1412.5 |
| 159 | VOUT | 1425 | -1412.5 |
| 160 | VOUT | 1475 | -1412.5 |
| 161 | DUMMY103 | 1525 | -1412.5 |
| 162 | DUMMY104 | 1575 | -1412.5 |
| 163 | VDCOUT | 1625 | -1412.5 |
| 164 | VDCOUT | 1675 | -1412.5 |
| 165 | VDCOUT | 1725 | -1412.5 |
| 166 | VDCOUT | 1775 | -1412.5 |
| 167 | VDCOUT | 1825 | -1412.5 |
| 168 | VDCOUT | 1875 | -1412.5 |
| 169 | VDCOUT | 1925 | -1412.5 |
| 170 | DUMMY60 | 1975 | -1412.5 |
| 171 | DUMMY61 | 2025 | -1412.5 |
| 172 | VEE | 2075 | -1412.5 |
| 173 | VEE | 2125 | -1412.5 |
| 174 | VEE | 2175 | -1412.5 |
| 175 | VEE | 2225 | -1412.5 |
| 176 | VEE | 2275 | -1412.5 |
| 177 | VEE | 2325 | -1412.5 |
| 178 | DUMMY62 | 2375 | -1412.5 |
| 179 | DUMMY63 | 2425 | -1412.5 |
| 180 | C1+ | 2475 | -1412.5 |
| 181 | C1+ | 2525 | -1412.5 |
| 182 | C1+ | 2575 | -1412.5 |
| 183 | C1+ | 2625 | -1412.5 |
| 184 | C1+ | 2675 | -1412.5 |
| 185 | C1+ | 2725 | -1412.5 |
| 186 | DUMMY64 | 2775 | -1412.5 |
| 187 | DUMMY65 | 2825 | -1412.5 |
| 188 | C1- | 2875 | -1412.5 |
| 189 | C1- | 2925 | -1412.5 |
| 190 | C1- | 2975 | -1412.5 |
| 191 | C1- | 3025 | -1412.5 |
| 192 | C1- | 3075 | -1412.5 |
| 193 | C1- | 3125 | -1412.5 |
| 194 | DUMMY66 | 3175 | -1412.5 |
| 195 | DUMMY67 | 3225 | -1412.5 |
| 196 | C2+ | 3275 | -1412.5 |
| 197 | C2+ | 3325 | -1412.5 |
| 198 | C2+ | 3375 | -1412.5 |
| 199 | C2+ | 3425 | -1412.5 |
| 200 | C2+ | 3475 | -1412.5 |

■ PAD COORDINATES 3

Chip Size 14.16mm x 3.16mm (Chip Center X=0μm, Y=0μm)

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|-------|---------|
| 201 | C2+ | 3525 | -1412.5 |
| 202 | DUMMY68 | 3575 | -1412.5 |
| 203 | DUMMY69 | 3625 | -1412.5 |
| 204 | C2- | 3675 | -1412.5 |
| 205 | C2- | 3725 | -1412.5 |
| 206 | C2- | 3775 | -1412.5 |
| 207 | C2- | 3825 | -1412.5 |
| 208 | C2- | 3875 | -1412.5 |
| 209 | C2- | 3925 | -1412.5 |
| 210 | DUMMY70 | 3975 | -1412.5 |
| 211 | DUMMY71 | 4025 | -1412.5 |
| 212 | C3+ | 4075 | -1412.5 |
| 213 | C3+ | 4125 | -1412.5 |
| 214 | C3+ | 4175 | -1412.5 |
| 215 | C3+ | 4225 | -1412.5 |
| 216 | C3+ | 4275 | -1412.5 |
| 217 | C3+ | 4325 | -1412.5 |
| 218 | DUMMY72 | 4375 | -1412.5 |
| 219 | DUMMY73 | 4425 | -1412.5 |
| 220 | C3- | 4475 | -1412.5 |
| 221 | C3- | 4525 | -1412.5 |
| 222 | C3- | 4575 | -1412.5 |
| 223 | C3- | 4625 | -1412.5 |
| 224 | C3- | 4675 | -1412.5 |
| 225 | C3- | 4725 | -1412.5 |
| 226 | DUMMY74 | 4775 | -1412.5 |
| 227 | DUMMY75 | 4825 | -1412.5 |
| 228 | C4+ | 4875 | -1412.5 |
| 229 | C4+ | 4925 | -1412.5 |
| 230 | C4+ | 4975 | -1412.5 |
| 231 | C4+ | 5025 | -1412.5 |
| 232 | C4+ | 5075 | -1412.5 |
| 233 | C4+ | 5125 | -1412.5 |
| 234 | DUMMY76 | 5175 | -1412.5 |
| 235 | DUMMY77 | 5225 | -1412.5 |
| 236 | C4- | 5275 | -1412.5 |
| 237 | C4- | 5325 | -1412.5 |
| 238 | C4- | 5375 | -1412.5 |
| 239 | C4- | 5425 | -1412.5 |
| 240 | C4- | 5475 | -1412.5 |
| 241 | C4- | 5525 | -1412.5 |
| 242 | DUMMY78 | 5575 | -1412.5 |
| 243 | DUMMY79 | 5625 | -1412.5 |
| 244 | C5+ | 5675 | -1412.5 |
| 245 | C5+ | 5725 | -1412.5 |
| 246 | C5+ | 5775 | -1412.5 |
| 247 | C5+ | 5825 | -1412.5 |
| 248 | C5+ | 5875 | -1412.5 |
| 249 | C5+ | 5925 | -1412.5 |
| 250 | DUMMY80 | 5975 | -1412.5 |

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|--------|---------|
| 251 | DUMMY81 | 6025 | -1412.5 |
| 252 | C5- | 6075 | -1412.5 |
| 253 | C5- | 6125 | -1412.5 |
| 254 | C5- | 6175 | -1412.5 |
| 255 | C5- | 6225 | -1412.5 |
| 256 | C5- | 6275 | -1412.5 |
| 257 | C5- | 6325 | -1412.5 |
| 258 | DUMMY82 | 6375 | -1412.5 |
| 259 | DUMMY83 | 6425 | -1412.5 |
| 260 | DUMMY84 | 6475 | -1412.5 |
| 261 | DUMMY85 | 6918.5 | -1352 |
| 262 | DUMMY86 | 6918.5 | -1302 |
| 263 | DUMMY87 | 6918.5 | -1252 |
| 264 | COM48 | 6918.5 | -1202 |
| 265 | COM49 | 6918.5 | -1152 |
| 266 | COM50 | 6918.5 | -1102 |
| 267 | COM51 | 6918.5 | -1052 |
| 268 | COM52 | 6918.5 | -1002 |
| 269 | COM53 | 6918.5 | -952 |
| 270 | COM54 | 6918.5 | -902 |
| 271 | COM55 | 6918.5 | -852 |
| 272 | COM56 | 6918.5 | -802 |
| 273 | COM57 | 6918.5 | -752 |
| 274 | COM58 | 6918.5 | -702 |
| 275 | COM59 | 6918.5 | -652 |
| 276 | COM60 | 6918.5 | -602 |
| 277 | COM61 | 6918.5 | -552 |
| 278 | COM62 | 6918.5 | -502 |
| 279 | COM63 | 6918.5 | -452 |
| 280 | COM64 | 6918.5 | -402 |
| 281 | COM65 | 6918.5 | -352 |
| 282 | COM66 | 6918.5 | -302 |
| 283 | COM67 | 6918.5 | -252 |
| 284 | COM68 | 6918.5 | -202 |
| 285 | COM69 | 6918.5 | -152 |
| 286 | COM70 | 6918.5 | -102 |
| 287 | COM71 | 6918.5 | -52 |
| 288 | COM72 | 6918.5 | -2 |
| 289 | COM73 | 6918.5 | 48 |
| 290 | COM74 | 6918.5 | 98 |
| 291 | COM75 | 6918.5 | 148 |
| 292 | COM76 | 6918.5 | 198 |
| 293 | COM77 | 6918.5 | 248 |
| 294 | COM78 | 6918.5 | 298 |
| 295 | COM79 | 6918.5 | 348 |
| 296 | COM80 | 6918.5 | 398 |
| 297 | COM81 | 6918.5 | 448 |
| 298 | COM82 | 6918.5 | 498 |
| 299 | COM83 | 6918.5 | 548 |
| 300 | COM84 | 6918.5 | 598 |

■ PAD COORDINATES 4

Chip Size 14.16mm x 3.16mm (Chip Center X=0μm, Y=0μm)

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|--------|--------|
| 301 | COM85 | 6918.5 | 648 |
| 302 | COM86 | 6918.5 | 698 |
| 303 | COM87 | 6918.5 | 748 |
| 304 | COM88 | 6918.5 | 798 |
| 305 | COM89 | 6918.5 | 848 |
| 306 | COM90 | 6918.5 | 898 |
| 307 | COM91 | 6918.5 | 948 |
| 308 | COM92 | 6918.5 | 998 |
| 309 | COM93 | 6918.5 | 1048 |
| 310 | COM94 | 6918.5 | 1098 |
| 311 | COM95 | 6918.5 | 1148 |
| 312 | COMMK1 | 6918.5 | 1198 |
| 313 | DUMMY88 | 6918.5 | 1248 |
| 314 | DUMMY89 | 6918.5 | 1298 |
| 315 | DUMMY90 | 6918.5 | 1348 |
| 316 | DUMMY91 | 6525 | 1412.5 |
| 317 | DUMMY92 | 6475 | 1412.5 |
| 318 | DUMMY93 | 6425 | 1412.5 |
| 319 | SEG255 | 6375 | 1412.5 |
| 320 | SEG254 | 6325 | 1412.5 |
| 321 | SEG253 | 6275 | 1412.5 |
| 322 | SEG252 | 6225 | 1412.5 |
| 323 | SEG251 | 6175 | 1412.5 |
| 324 | SEG250 | 6125 | 1412.5 |
| 325 | SEG249 | 6075 | 1412.5 |
| 326 | SEG248 | 6025 | 1412.5 |
| 327 | SEG247 | 5975 | 1412.5 |
| 328 | SEG246 | 5925 | 1412.5 |
| 329 | SEG245 | 5875 | 1412.5 |
| 330 | SEG244 | 5825 | 1412.5 |
| 331 | SEG243 | 5775 | 1412.5 |
| 332 | SEG242 | 5725 | 1412.5 |
| 333 | SEG241 | 5675 | 1412.5 |
| 334 | SEG240 | 5625 | 1412.5 |
| 335 | SEG239 | 5575 | 1412.5 |
| 336 | SEG238 | 5525 | 1412.5 |
| 337 | SEG237 | 5475 | 1412.5 |
| 338 | SEG236 | 5425 | 1412.5 |
| 339 | SEG235 | 5375 | 1412.5 |
| 340 | SEG234 | 5325 | 1412.5 |
| 341 | SEG233 | 5275 | 1412.5 |
| 342 | SEG232 | 5225 | 1412.5 |
| 343 | SEG231 | 5175 | 1412.5 |
| 344 | SEG230 | 5125 | 1412.5 |
| 345 | SEG229 | 5075 | 1412.5 |
| 346 | SEG228 | 5025 | 1412.5 |
| 347 | SEG227 | 4975 | 1412.5 |
| 348 | SEG226 | 4925 | 1412.5 |
| 349 | SEG225 | 4875 | 1412.5 |
| 350 | SEG224 | 4825 | 1412.5 |

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|-------|--------|
| 351 | SEG223 | 4775 | 1412.5 |
| 352 | SEG222 | 4725 | 1412.5 |
| 353 | SEG221 | 4675 | 1412.5 |
| 354 | SEG220 | 4625 | 1412.5 |
| 355 | SEG219 | 4575 | 1412.5 |
| 356 | SEG218 | 4525 | 1412.5 |
| 357 | SEG217 | 4475 | 1412.5 |
| 358 | SEG216 | 4425 | 1412.5 |
| 359 | SEG215 | 4375 | 1412.5 |
| 360 | SEG214 | 4325 | 1412.5 |
| 361 | SEG213 | 4275 | 1412.5 |
| 362 | SEG212 | 4225 | 1412.5 |
| 363 | SEG211 | 4175 | 1412.5 |
| 364 | SEG210 | 4125 | 1412.5 |
| 365 | SEG209 | 4075 | 1412.5 |
| 366 | SEG208 | 4025 | 1412.5 |
| 367 | SEG207 | 3975 | 1412.5 |
| 368 | SEG206 | 3925 | 1412.5 |
| 369 | SEG205 | 3875 | 1412.5 |
| 370 | SEG204 | 3825 | 1412.5 |
| 371 | SEG203 | 3775 | 1412.5 |
| 372 | SEG202 | 3725 | 1412.5 |
| 373 | SEG201 | 3675 | 1412.5 |
| 374 | SEG200 | 3625 | 1412.5 |
| 375 | SEG199 | 3575 | 1412.5 |
| 376 | SEG198 | 3525 | 1412.5 |
| 377 | SEG197 | 3475 | 1412.5 |
| 378 | SEG196 | 3425 | 1412.5 |
| 379 | SEG195 | 3375 | 1412.5 |
| 380 | SEG194 | 3325 | 1412.5 |
| 381 | SEG193 | 3275 | 1412.5 |
| 382 | SEG192 | 3225 | 1412.5 |
| 383 | SEG191 | 3175 | 1412.5 |
| 384 | SEG190 | 3125 | 1412.5 |
| 385 | SEG189 | 3075 | 1412.5 |
| 386 | SEG188 | 3025 | 1412.5 |
| 387 | SEG187 | 2975 | 1412.5 |
| 388 | SEG186 | 2925 | 1412.5 |
| 389 | SEG185 | 2875 | 1412.5 |
| 390 | SEG184 | 2825 | 1412.5 |
| 391 | SEG183 | 2775 | 1412.5 |
| 392 | SEG182 | 2725 | 1412.5 |
| 393 | SEG181 | 2675 | 1412.5 |
| 394 | SEG180 | 2625 | 1412.5 |
| 395 | SEG179 | 2575 | 1412.5 |
| 396 | SEG178 | 2525 | 1412.5 |
| 397 | SEG177 | 2475 | 1412.5 |
| 398 | SEG176 | 2425 | 1412.5 |
| 399 | SEG175 | 2375 | 1412.5 |
| 400 | SEG174 | 2325 | 1412.5 |

■ PAD COORDINATES 5

Chip Size 14.16mm x 3.16mm (Chip Center X=0μm, Y=0μm)

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|-------|--------|
| 401 | SEG173 | 2275 | 1412.5 |
| 402 | SEG172 | 2225 | 1412.5 |
| 403 | SEG171 | 2175 | 1412.5 |
| 404 | SEG170 | 2125 | 1412.5 |
| 405 | SEG169 | 2075 | 1412.5 |
| 406 | SEG168 | 2025 | 1412.5 |
| 407 | SEG167 | 1975 | 1412.5 |
| 408 | SEG166 | 1925 | 1412.5 |
| 409 | SEG165 | 1875 | 1412.5 |
| 410 | SEG164 | 1825 | 1412.5 |
| 411 | SEG163 | 1775 | 1412.5 |
| 412 | SEG162 | 1725 | 1412.5 |
| 413 | SEG161 | 1675 | 1412.5 |
| 414 | SEG160 | 1625 | 1412.5 |
| 415 | SEG159 | 1575 | 1412.5 |
| 416 | SEG158 | 1525 | 1412.5 |
| 417 | SEG157 | 1475 | 1412.5 |
| 418 | SEG156 | 1425 | 1412.5 |
| 419 | SEG155 | 1375 | 1412.5 |
| 420 | SEG154 | 1325 | 1412.5 |
| 421 | SEG153 | 1275 | 1412.5 |
| 422 | SEG152 | 1225 | 1412.5 |
| 423 | SEG151 | 1175 | 1412.5 |
| 424 | SEG150 | 1125 | 1412.5 |
| 425 | SEG149 | 1075 | 1412.5 |
| 426 | SEG148 | 1025 | 1412.5 |
| 427 | SEG147 | 975 | 1412.5 |
| 428 | SEG146 | 925 | 1412.5 |
| 429 | SEG145 | 875 | 1412.5 |
| 430 | SEG144 | 825 | 1412.5 |
| 431 | SEG143 | 775 | 1412.5 |
| 432 | SEG142 | 725 | 1412.5 |
| 433 | SEG141 | 675 | 1412.5 |
| 434 | SEG140 | 625 | 1412.5 |
| 435 | SEG139 | 575 | 1412.5 |
| 436 | SEG138 | 525 | 1412.5 |
| 437 | SEG137 | 475 | 1412.5 |
| 438 | SEG136 | 425 | 1412.5 |
| 439 | SEG135 | 375 | 1412.5 |
| 440 | SEG134 | 325 | 1412.5 |
| 441 | SEG133 | 275 | 1412.5 |
| 442 | SEG132 | 225 | 1412.5 |
| 443 | SEG131 | 175 | 1412.5 |
| 444 | SEG130 | 125 | 1412.5 |
| 445 | SEG129 | 75 | 1412.5 |
| 446 | SEG128 | 25 | 1412.5 |
| 447 | SEG127 | -25 | 1412.5 |
| 448 | SEG126 | -75 | 1412.5 |
| 449 | SEG125 | -125 | 1412.5 |
| 450 | SEG124 | -175 | 1412.5 |

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|-------|--------|
| 451 | SEG123 | -225 | 1412.5 |
| 452 | SEG122 | -275 | 1412.5 |
| 453 | SEG121 | -325 | 1412.5 |
| 454 | SEG120 | -375 | 1412.5 |
| 455 | SEG119 | -425 | 1412.5 |
| 456 | SEG118 | -475 | 1412.5 |
| 457 | SEG117 | -525 | 1412.5 |
| 458 | SEG116 | -575 | 1412.5 |
| 459 | SEG115 | -625 | 1412.5 |
| 460 | SEG114 | -675 | 1412.5 |
| 461 | SEG113 | -725 | 1412.5 |
| 462 | SEG112 | -775 | 1412.5 |
| 463 | SEG111 | -825 | 1412.5 |
| 464 | SEG110 | -875 | 1412.5 |
| 465 | SEG109 | -925 | 1412.5 |
| 466 | SEG108 | -975 | 1412.5 |
| 467 | SEG107 | -1025 | 1412.5 |
| 468 | SEG106 | -1075 | 1412.5 |
| 469 | SEG105 | -1125 | 1412.5 |
| 470 | SEG104 | -1175 | 1412.5 |
| 471 | SEG103 | -1225 | 1412.5 |
| 472 | SEG102 | -1275 | 1412.5 |
| 473 | SEG101 | -1325 | 1412.5 |
| 474 | SEG100 | -1375 | 1412.5 |
| 475 | SEG99 | -1425 | 1412.5 |
| 476 | SEG98 | -1475 | 1412.5 |
| 477 | SEG97 | -1525 | 1412.5 |
| 478 | SEG96 | -1575 | 1412.5 |
| 479 | SEG95 | -1625 | 1412.5 |
| 480 | SEG94 | -1675 | 1412.5 |
| 481 | SEG93 | -1725 | 1412.5 |
| 482 | SEG92 | -1775 | 1412.5 |
| 483 | SEG91 | -1825 | 1412.5 |
| 484 | SEG90 | -1875 | 1412.5 |
| 485 | SEG89 | -1925 | 1412.5 |
| 486 | SEG88 | -1975 | 1412.5 |
| 487 | SEG87 | -2025 | 1412.5 |
| 488 | SEG86 | -2075 | 1412.5 |
| 489 | SEG85 | -2125 | 1412.5 |
| 490 | SEG84 | -2175 | 1412.5 |
| 491 | SEG83 | -2225 | 1412.5 |
| 492 | SEG82 | -2275 | 1412.5 |
| 493 | SEG81 | -2325 | 1412.5 |
| 494 | SEG80 | -2375 | 1412.5 |
| 495 | SEG79 | -2425 | 1412.5 |
| 496 | SEG78 | -2475 | 1412.5 |
| 497 | SEG77 | -2525 | 1412.5 |
| 498 | SEG76 | -2575 | 1412.5 |
| 499 | SEG75 | -2625 | 1412.5 |
| 500 | SEG74 | -2675 | 1412.5 |

■ PAD COORDINATES 6

Chip Size 14.16mm x 3.16mm (Chip Center X=0μm, Y=0μm)

| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|-------|--------|
| 501 | SEG73 | -2725 | 1412.5 |
| 502 | SEG72 | -2775 | 1412.5 |
| 503 | SEG71 | -2825 | 1412.5 |
| 504 | SEG70 | -2875 | 1412.5 |
| 505 | SEG69 | -2925 | 1412.5 |
| 506 | SEG68 | -2975 | 1412.5 |
| 507 | SEG67 | -3025 | 1412.5 |
| 508 | SEG66 | -3075 | 1412.5 |
| 509 | SEG65 | -3125 | 1412.5 |
| 510 | SEG64 | -3175 | 1412.5 |
| 511 | SEG63 | -3225 | 1412.5 |
| 512 | SEG62 | -3275 | 1412.5 |
| 513 | SEG61 | -3325 | 1412.5 |
| 514 | SEG60 | -3375 | 1412.5 |
| 515 | SEG59 | -3425 | 1412.5 |
| 516 | SEG58 | -3475 | 1412.5 |
| 517 | SEG57 | -3525 | 1412.5 |
| 518 | SEG56 | -3575 | 1412.5 |
| 519 | SEG55 | -3625 | 1412.5 |
| 520 | SEG54 | -3675 | 1412.5 |
| 521 | SEG53 | -3725 | 1412.5 |
| 522 | SEG52 | -3775 | 1412.5 |
| 523 | SEG51 | -3825 | 1412.5 |
| 524 | SEG50 | -3875 | 1412.5 |
| 525 | SEG49 | -3925 | 1412.5 |
| 526 | SEG48 | -3975 | 1412.5 |
| 527 | SEG47 | -4025 | 1412.5 |
| 528 | SEG46 | -4075 | 1412.5 |
| 529 | SEG45 | -4125 | 1412.5 |
| 530 | SEG44 | -4175 | 1412.5 |
| 531 | SEG43 | -4225 | 1412.5 |
| 532 | SEG42 | -4275 | 1412.5 |
| 533 | SEG41 | -4325 | 1412.5 |
| 534 | SEG40 | -4375 | 1412.5 |
| 535 | SEG39 | -4425 | 1412.5 |
| 536 | SEG38 | -4475 | 1412.5 |
| 537 | SEG37 | -4525 | 1412.5 |
| 538 | SEG36 | -4575 | 1412.5 |
| 539 | SEG35 | -4625 | 1412.5 |
| 540 | SEG34 | -4675 | 1412.5 |
| 541 | SEG33 | -4725 | 1412.5 |
| 542 | SEG32 | -4775 | 1412.5 |
| 543 | SEG31 | -4825 | 1412.5 |
| 544 | SEG30 | -4875 | 1412.5 |
| 545 | SEG29 | -4925 | 1412.5 |
| 546 | SEG28 | -4975 | 1412.5 |
| 547 | SEG27 | -5025 | 1412.5 |
| 548 | SEG26 | -5075 | 1412.5 |
| 549 | SEG25 | -5125 | 1412.5 |
| 550 | SEG24 | -5175 | 1412.5 |

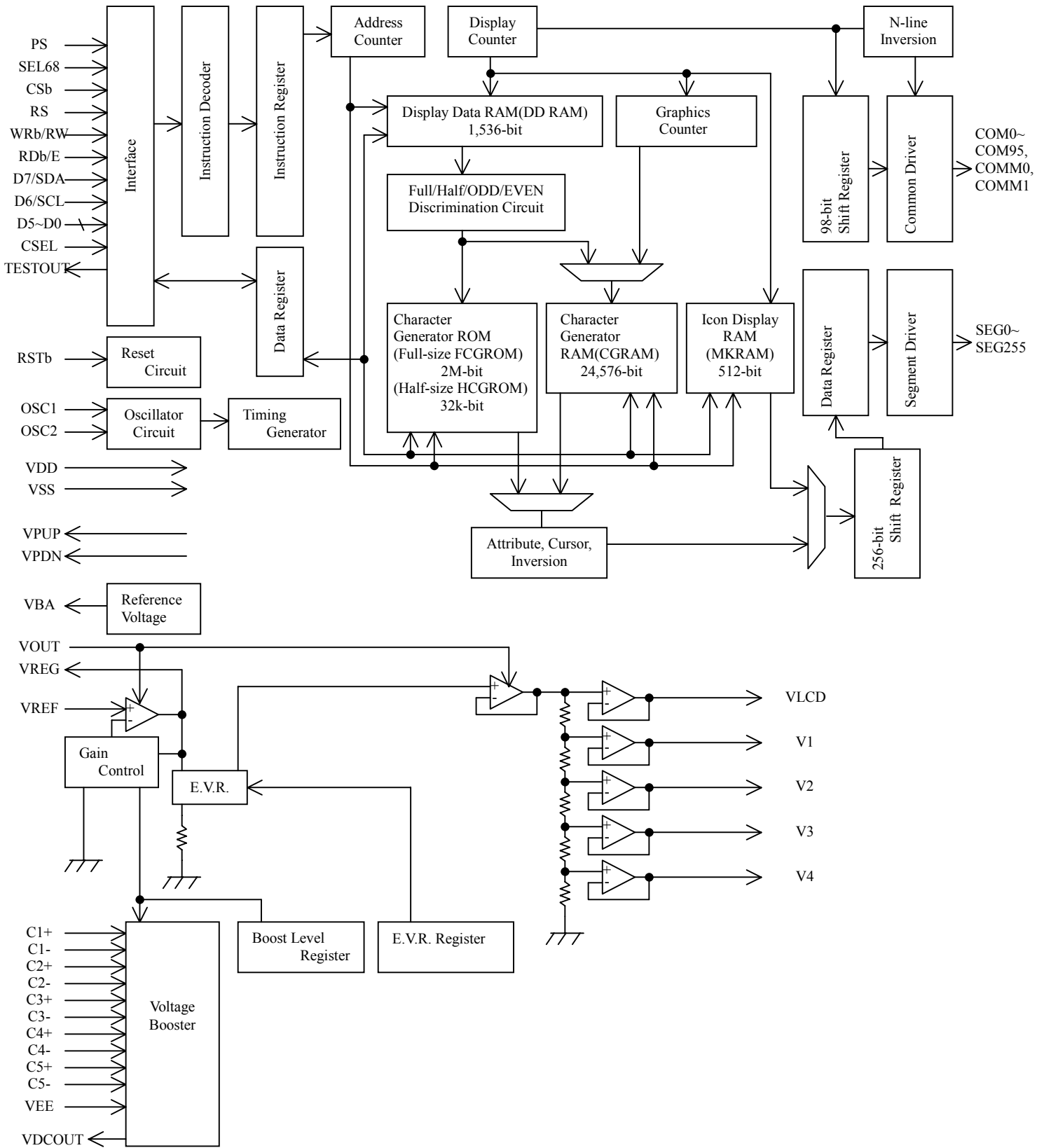
| PAD No. | PAD name | X= μm | Y= μm |
|---------|----------|---------|--------|
| 551 | SEG23 | -5225 | 1412.5 |
| 552 | SEG22 | -5275 | 1412.5 |
| 553 | SEG21 | -5325 | 1412.5 |
| 554 | SEG20 | -5375 | 1412.5 |
| 555 | SEG19 | -5425 | 1412.5 |
| 556 | SEG18 | -5475 | 1412.5 |
| 557 | SEG17 | -5525 | 1412.5 |
| 558 | SEG16 | -5575 | 1412.5 |
| 559 | SEG15 | -5625 | 1412.5 |
| 560 | SEG14 | -5675 | 1412.5 |
| 561 | SEG13 | -5725 | 1412.5 |
| 562 | SEG12 | -5775 | 1412.5 |
| 563 | SEG11 | -5825 | 1412.5 |
| 564 | SEG10 | -5875 | 1412.5 |
| 565 | SEG9 | -5925 | 1412.5 |
| 566 | SEG8 | -5975 | 1412.5 |
| 567 | SEG7 | -6025 | 1412.5 |
| 568 | SEG6 | -6075 | 1412.5 |
| 569 | SEG5 | -6125 | 1412.5 |
| 570 | SEG4 | -6175 | 1412.5 |
| 571 | SEG3 | -6225 | 1412.5 |
| 572 | SEG2 | -6275 | 1412.5 |
| 573 | SEG1 | -6325 | 1412.5 |
| 574 | SEG0 | -6375 | 1412.5 |
| 575 | DUMMY94 | -6425 | 1412.5 |
| 576 | DUMMY95 | -6475 | 1412.5 |
| 577 | DUMMY96 | -6525 | 1412.5 |
| 578 | DUMMY97 | -6918.5 | 1348 |
| 579 | DUMMY98 | -6918.5 | 1298 |
| 580 | DUMMY99 | -6918.5 | 1248 |
| 581 | COM47 | -6918.5 | 1198 |
| 582 | COM46 | -6918.5 | 1148 |
| 583 | COM45 | -6918.5 | 1098 |
| 584 | COM44 | -6918.5 | 1048 |
| 585 | COM43 | -6918.5 | 998 |
| 586 | COM42 | -6918.5 | 948 |
| 587 | COM41 | -6918.5 | 898 |
| 588 | COM40 | -6918.5 | 848 |
| 589 | COM39 | -6918.5 | 798 |
| 590 | COM38 | -6918.5 | 748 |
| 591 | COM37 | -6918.5 | 698 |
| 592 | COM36 | -6918.5 | 648 |
| 593 | COM35 | -6918.5 | 598 |
| 594 | COM34 | -6918.5 | 548 |
| 595 | COM33 | -6918.5 | 498 |
| 596 | COM32 | -6918.5 | 448 |
| 597 | COM31 | -6918.5 | 398 |
| 598 | COM30 | -6918.5 | 348 |
| 599 | COM29 | -6918.5 | 298 |
| 600 | COM28 | -6918.5 | 248 |

■ LCD DISPLAY EXAMPLE

- Mix display (Full-size / Half-size / Graphics)



■ BLOCK DIAGRAM



■ TERMINAL DESCRIPTION

| No. | SYMBOL | I/O | FUNCTION |
|-------------------------|--------|------------------|---|
| 74 to 79 | VDD | Power | Power Supply (Logic, I/F) VDD=2.4 to 3.6V |
| 84 to 89, 147 to 152 | VSS | Power | GND (Logic, I/F, High voltage) VSS=0V |
| 141 to 144 | VBA | Output | Reference-Voltage Generator Output |
| 135 to 138 | VREF | Input | Voltage Regulator Input |
| 128 to 132 | VREG | Output | Voltage Regulator Output |
| 172 to 177 | VEE | Power | Voltage Booster Input VEE is normally connected to VDD. |
| 155 to 160 | VOUT | Power | High Voltage Power Supply Input (External supply) Input of LCD power supply circuit. |
| 163 to 169 | VDCOUT | Output | Voltage Booster Output Output of voltage booster circuit. |
| 92 to 97 | VLCD | Power/ Output | LCD Bias Voltages When the internal LCD power supply is used, internal LCD bias voltages (VLCD and V1~V4) are activated by the "Power Control" instruction. Stabilizing capacitors are required between each bias voltage and VSS. When the external LCD power supply is used, LCD bias voltages are externally supplied on VLCD, V1, V2, V3 and V4 individually, with the following relation maintained : $VSS < V4 < V3 < V2 < V1 < VDD$ |
| 100 to 104 | V1 | | |
| 107 to 111 | V2 | | |
| 114 to 118 | V3 | | |
| 121 to 125 | V4 | | |
| 9,13,38 | VPUP | Power/ Output | VPUP is internally connected to VDD to fix SEL68 or PS or CSEL to "H" if necessary, and cannot be used as main power supply. VPUP should be open if not used. |
| 29 | VPDN | Power/ Output | VPDN is internally connected to VSS to fix SEL68 or PS or CSEL to "L" if necessary, and cannot be used as main GND. VPDN should be open if not used. |
| 180 to 185 | C1+ | Output | Capacitor Connection for Voltage Booster |
| 188 to 193 | C1- | | |
| 196 to 201 | C2+ | | |
| 204 to 209 | C2- | | |
| 212 to 217 | C3+ | | |
| 220 to 225 | C3- | | |
| 228 to 233 | C4+ | | |
| 236 to 241 | C4- | | |
| 244 to 249 | C5+ | | |
| 252 to 257 | C5- | | |
| 81,82 | OSC1 | Input | Resistor Connection for Oscillation Circuit When the internal oscillator is used, connect OSC1 and VDD with an external resistor. And fix OSC2 to "H" or "L". |
| 71,72 | OSC2 | Input | External Clock Input When the internal oscillator is not used, input external clock to OSC2 and leave OSC1 open. |
| 18,19 | RSTb | Input | Reset Active "L" |
| 15 | CSEL | Input | COM Output Select "L" : Both sides wiring "H" : Comb wiring |

| No. | SYMBOL | I/O | FUNCTION |
|-------|--------|------------------|--|
| 11 | PS | Input | Parallel / Serial Interface Mode Select "L" : Serial Interface "H" : Parallel Interface *In the serial interface mode (PS="L") D5 to D0 should be fixed to "H" or "L". |
| 7 | SEL68 | Input | MPU Mode Select <u>Parallel Interface (PS="H")</u> "L" : 80-series "H" : 68-series <u>Serial Interface (PS="L")</u> Not used. SEL68 should be fixed to "H" or "L". |
| 22,23 | CSb | Input | Chip Select Active "L" |
| 26,27 | RS | Input | Register Select This signal interprets transferred data as display data or instruction. "L" : Instruction "H" : Display Data |
| 31,32 | WRb/RW | Input | <u>80-series MPU Interface (PS="H", SEL68="L")</u> Data Write (WRb) Signal Active "L" <u>68-series MPU Interface (PS="H", SEL68="H")</u> Data Read or Write (RW) Signal "L" : Write "H" : Read <u>Serial Interface (PS="L")</u> Data Read or Write (RW) Signal |
| 35,36 | RDb/E | Input | <u>80-series MPU Interface (PS="H", SEL68="L")</u> Data Read (RDb) Signal Active "L" <u>68-series MPU Interface (PS="H", SEL68="H")</u> Enable Signal Active "H" <u>Serial Interface (PS="L")</u> Not used. RDb/E should be fixed to "H" or "L". |
| 68,69 | D7/SDA | Input/ Output | Parallel Interface (PS="H") In the parallel interface mode (PS="H"), D7 to D0 are connected to 8-bit bi-directional MPU bus. D7 to D0 : 8-bit Bi-directional Bus <u>Serial Interface (PS="L")</u> D7 : Serial Data (SDA) D6 : Serial Clock (SCL) D5 to D0 should be fixed to "H" or "L". |
| 64,65 | D6/SCL | | |
| 60,61 | D5 | | |
| 56,57 | D4 | | |
| 52,53 | D3 | | |
| 48,49 | D2 | | |
| 44,45 | D1 | | |
| 40,41 | D0 | | |

| No. | SYMBOL | I/O | FUNCTION |
|---------------------------|-------------------|--------|---|
| 319 to 574 | SEG0~ SEG255 | Output | Segment Drivers Segment drivers output an one level from VLCD, V2, V3 and VSS. |
| 264 to 311, 581 to 628 | COM0~ COM95 | Output | Common Drivers Common drivers output an one level from VLCD, V1, V4 and VSS. |
| 629,312 | COMMK0, COMMK1 | Output | Common Drivers for Icons |
| 4 | TESTOUT | Output | For Testing |
| - | DUMMYx | - | Dummy PAD Dummy x is normally open. |

■ FUNCTION DESCRIPTION

(1) MPU INTERFACE

(1-1) Selection of Parallel / Serial Interface Mode

The PS selects a parallel or a serial interface mode, as shown in Table 1.

Table 1 Selection of Parallel / Serial Interface Mode

| PS | I/F Mode | CSb | RS | RDb | WRb | SEL68 | SDA | SCL | Data |
|----|--------------|-----|----|-----|-----|-------|-----|-----|-------|
| H | Parallel I/F | CSb | RS | RDb | WRb | SEL68 | / | / | D7~D0 |
| L | Serial I/F | CSb | RS | - | WRb | - | SDA | SCL | - |

Note) “-“ : Fix to ”H” or ”L”

(1-2) Data Recognition

The data from MPU is interpreted as display data or instruction according to the combination of the RS, RDb and WRb(RW) signals, as shown in Table 2.

Table 2 Data Recognition

| Function | RS | 68-series | 80-series | | Serial |
|--------------------|----|-----------|-----------|-----|--------|
| | | RW | RDb | WRb | RW |
| Read Instruction | 0 | 1 | 0 | 1 | 1 |
| Write Instruction | 0 | 0 | 1 | 0 | 0 |
| Read Display Data | 1 | 1 | 0 | 1 | 1 |
| Write display Data | 1 | 0 | 1 | 0 | 0 |

(1-3) Selection of MPU Mode

In the parallel interface mode, the SEL68 selects 68 or 80-series MPU mode, as shown in Table 3.

Table 3 Selection of MPU Mode

| SEL68 | MPU Mode | CSb | RS | RDb | WRb | Data |
|-------|---------------|-----|----|-----|-----|-------|
| H | 68-series MPU | CSb | RS | E | RW | D7~D0 |
| L | 80-series MPU | CSb | RS | RDb | WRb | D7~D0 |

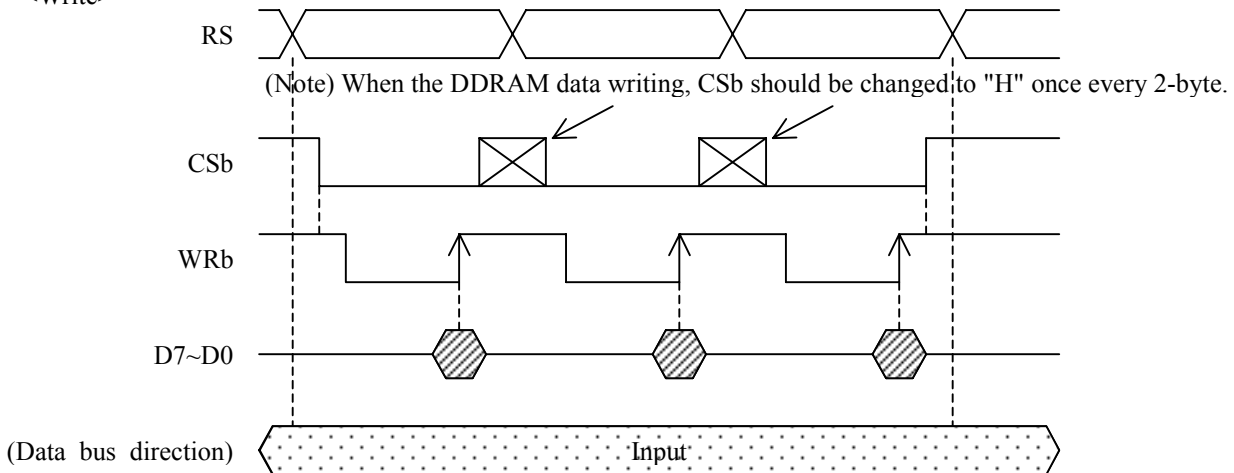
When the CSb signal is “H”, the interface is reset. The data of one character is processed by writing two times. In the DDRAM data writing, CSb is required to change to “H” once every two times. Because, it is recognized as upper 1-byte after CSb is changed from “H” to “L”.

The data is latched at the rising edge of the WRb signal in the 80-series MPU mode, or at the falling edge of the E signal in the 68-series MPU mode.

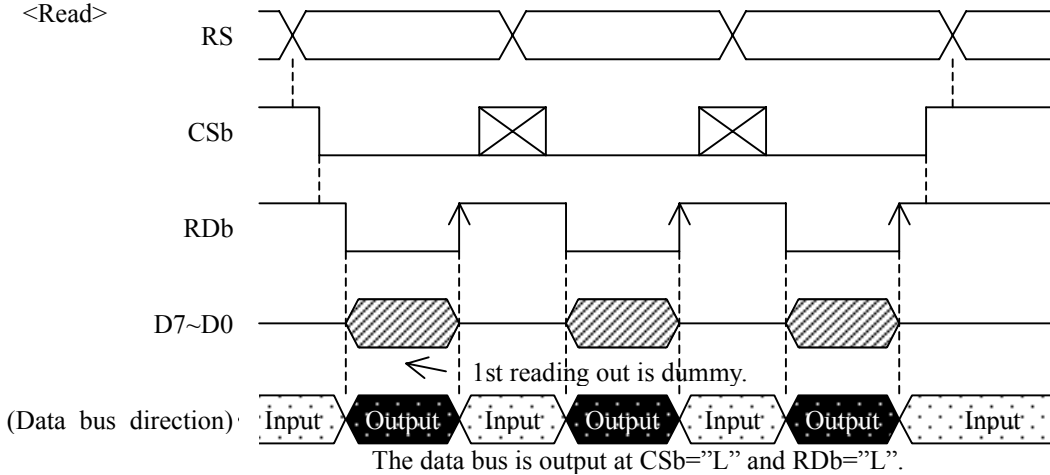
In the DDRAM read sequence, be sure to execute a dummy read right after setting an address or right after writing display data or instruction. Therefore a dummy data is read out by the 1st “Display Data Read” instruction. After that, the display data is read out from a specified address by the 2nd instruction. When the RS switches, it should be CSb=“H”.

- 80-series parallel data transmission (PS=“H”, SEL68=“L”)

<Write>

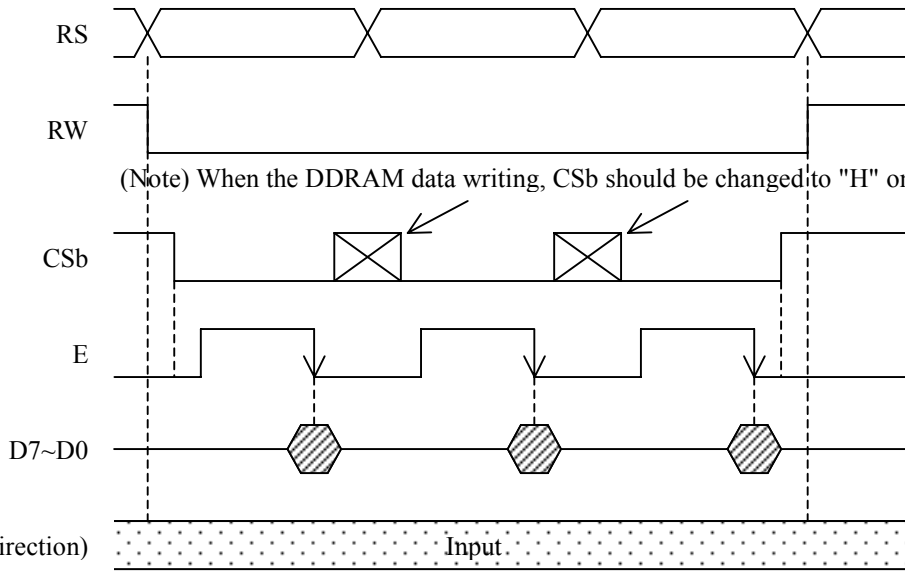


<Read>



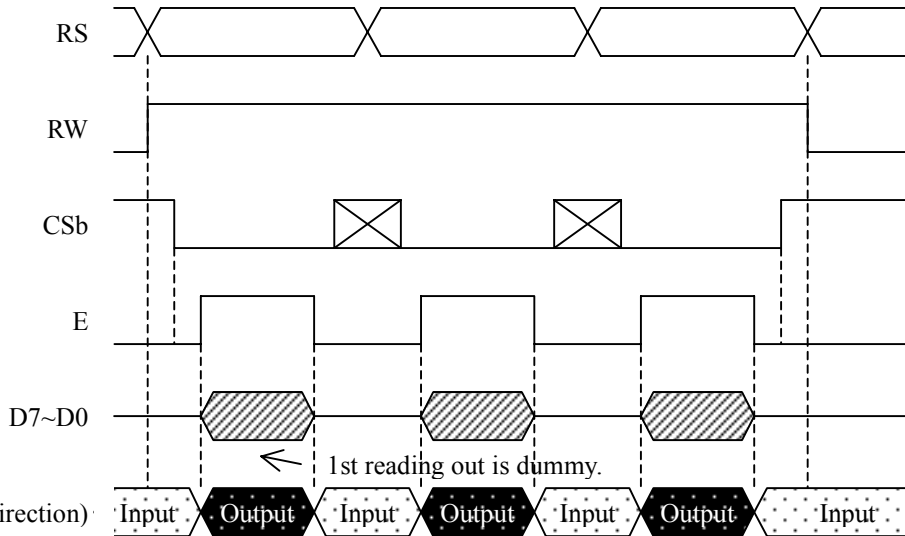
- 68-series parallel data transmission (PS="H", SEL68="H")

<Write>



(Note) When the DDRAM data writing, CSb should be changed to "H" once every 2-byte.

<Read>



1st reading out is dummy.

The data bus is output at RW="H", CSb="L" and E="H".

(1-4) Serial Interface

The serial interface is transmitted with 5-line. While the chip select is active (CSb="L"), the SDA and SCL are enabled. While the chip select is inactive (CSb="H"), the SDA and SCL are disabled, and the internal shift register and the internal counter are being initialized. The data is interpreted as writes or reads according to the RS.

8-bit serial data on the SDA is latched at the rising edge of the SCL signal in order of D7, D6, ..., and D0, and converted into 8-bit parallel data at the timing of the internal signal produced from the 8th SCL signal. The data on the SDA is interpreted as display data or instruction according to the RS.

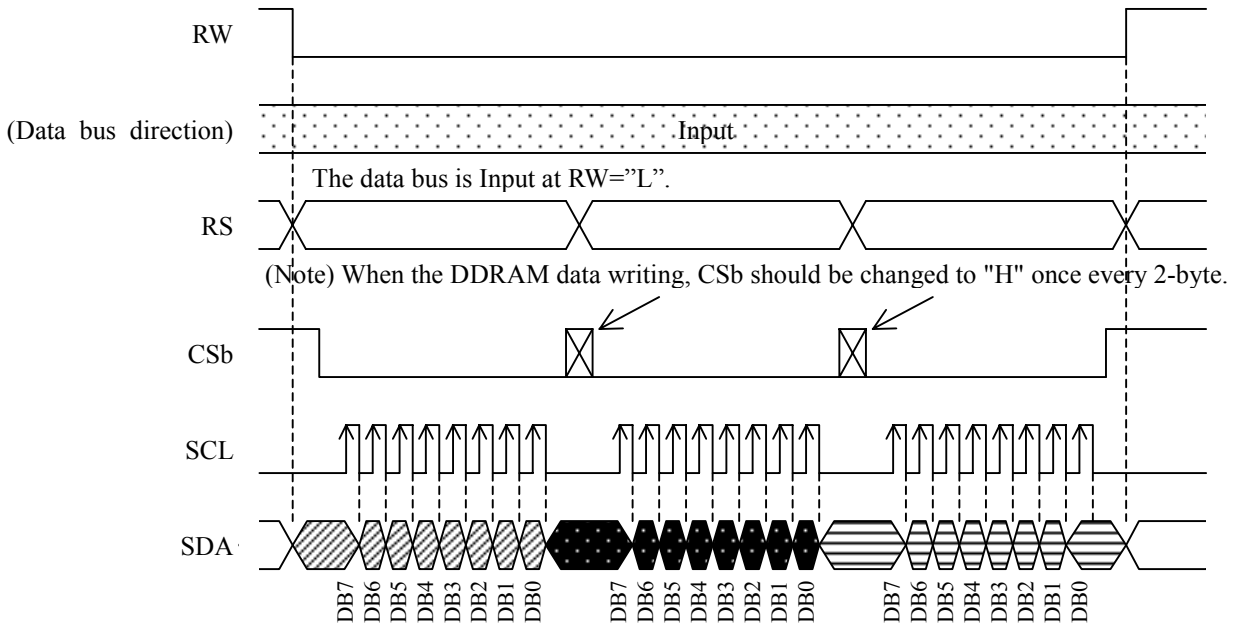
When the CSb signal is "H", the interface is reset. The data of 1-character is processed by writing 2-byte. In the DDRAM data writing, CSb is required to change to "H" once every 2-bytes. Because, it is recognized as 1-byte after CSb is changed from "H" to "L".

Note that the SCL should be set to "L" right after data transmission or during non-access because the serial interface is susceptible to external noises which may cause malfunctions.

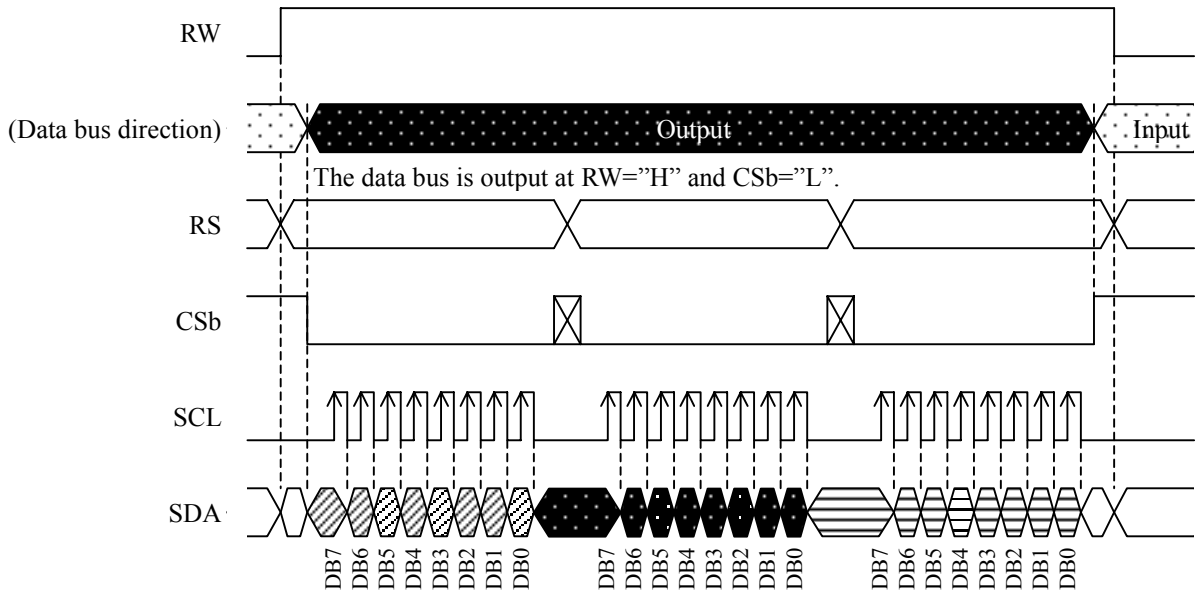
In the read mode, selected address RAM data is read out after 1-dummy as for parallel interface. When the RS and RW switches, it should be CSb="H".

- Serial data transmission (PS="L")

<Write>



<Read>



(2) ADDRESS COUNTER

The NJU6645 has the address counter of 12-bit for read/write of RAM data. The address is set by "RAM address set" instruction. In case of the RDM="0", the address is incremented after the RAM data writing and reading. In case of the RDM="1", the address is incremented only after the RAM data writing. The address doesn't change after the RAM data reading.

The address shifts as follows within range of the address DDRAM, MKRAM, and CGRAM. The DDRAM address shifts in each line.

| | |
|----------------|---|
| DDRAM (1-line) | : (000)H → (001)H → --- → (01F)H → (000)H |
| DDRAM (2-line) | : (020)H → (021)H → --- → (03F)H → (020)H |
| DDRAM (3-line) | : (040)H → (041)H → --- → (05F)H → (040)H |
| DDRAM (4-line) | : (060)H → (061)H → --- → (07F)H → (060)H |
| DDRAM (5-line) | : (080)H → (081)H → --- → (09F)H → (080)H |
| DDRAM (6-line) | : (0A0)H → (0A1)H → --- → (0BF)H → (0A0)H |
| MKRAM | : (100)H → (101)H → --- → (13F)H → (100)H |
| CGRAM | : (200)H → (201)H → --- → (DFE)H → (200)H |

The address is shifted to +1 or -1 by "address shift (ARL)" instruction. When ARL="0" is input, whenever it is input the address is shifted -1. When ARL="1" is input, whenever it is input the address is shifted +1. The address shifts as follows within range of the address DDRAM, MKRAM and CGRAM.

| | |
|----------------|---|
| DDRAM (1-line) | : (000)H ↔ (001)H ↔ --- ↔ (01F)H ↔ (000)H |
| DDRAM (2-line) | : (020)H ↔ (021)H ↔ --- ↔ (03F)H ↔ (020)H |
| DDRAM (3-line) | : (040)H ↔ (041)H ↔ --- ↔ (05F)H ↔ (040)H |
| DDRAM (4-line) | : (060)H ↔ (061)H ↔ --- ↔ (07F)H ↔ (060)H |
| DDRAM (5-line) | : (080)H ↔ (081)H ↔ --- ↔ (09F)H ↔ (080)H |
| DDRAM (6-line) | : (0A0)H ↔ (0A1)H ↔ --- ↔ (0BF)H ↔ (0A0)H |
| MKRAM | : (100)H ↔ (101)H ↔ --- ↔ (13F)H ↔ (100)H |
| CGRAM | : (200)H ↔ (201)H ↔ --- ↔ (DFE)H ↔ (200)H |

(3) DATA RAM

(3-1) RAM Address Map

Display Data RAM (DDRAM), Character Generator RAM(CGRAM), and Icon Data RAM(MKRAM) are stored at the following addresses. The address is set in the address counter by "RAM address set" instruction.

RAM Address Map

| | | RAM ADDRESS – UPPER 4bit | | | | | | | | | | | | | | | | | | | | | | | | | | | | EH | FH | | | | | | | |
|--------------------------|-----|--------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|
| | | 0H | | | | | | | | | | | 1H | | | | | | | 2H | | | | | | | | --- | DH | | | | | | | | | |
| | | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | -- | | | D7 | D6 | D5 | D4 | D3 | D2 | D1 |
| RAM ADDRESS – LOWER 8bit | 00H | --- | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | | | | | |
| | 01H | --- | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | | | | | |
| | 02H | --- | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | | | | | |
| | 03H | --- | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | | | | | |
| | ⋮ | --- | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | | | | | |
| | 3EH | --- | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | | | | | |
| | 3FH | --- | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | | | | | |
| | 40H | --- | | | | | | | | | | | * | * | * | * | * | * | * | * | --- | | | | | | | | | | | | | | | | * | * |
| | ⋮ | --- | | | | | | | | | | | * | * | * | * | * | * | * | * | --- | | | | | | | | | | | | | | | | * | * |
| | BEH | --- | | | | | | | | | | | * | * | * | * | * | * | * | * | --- | | | | | | | | | | | | | | | | * | * |
| | BFH | --- | | | | | | | | | | | * | * | * | * | * | * | * | * | --- | | | | | | | | | | | | | | | | * | * |
| | C0H | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | --- | | | | | | | | * | * | | | | | | | | |
| | ⋮ | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | --- | | | | | | | | * | * | | | | | | | | |
| | FEH | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | --- | | | | | | | | * | * | | | | | | | | |
| | FFH | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | --- | | | | | | | | * | * | | | | | | | | |

DDRAM address
(1 address = 11-bit)

MKRAM address
(1 address = 7-bit)

CGRAM address
(1 address = 8-bit)

- DDRAM (Display Data RAM)
 - MKRAM (Icon RAM)
 - CGRAM (Character Generator RAM)
- * : Invalid Data

(3-2) DDRAM

Display Data RAM (DDRAM) is RAM that memorizes the attribute display data, data for the capital letters and small letters distinction, and the character-code data. RAM address uses "000H" ~ "0BFH". The RAM Capacity has 192 addresses of 11-bit/address. At this time, the full-size data is using 2 addresses for a character, and the half-size data is using one address for a character. In the DDRAM address and the position where the panel is displayed, there are relations of the following.

Correspondence of display position on panel and DDRAM address (SEL1="0", SEL2="0")

| | 1-digit | | 2-digit | | 3-digit | | 4-digit | | 5-digit | | 6-digit | | 7-digit | | 8-digit | | 9-digit | | 10-digit | | 11-digit | | 12-digit | | 13-digit | | 14-digit | | 15-digit | | 16-digit | |
|--------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|
| 1-line | 000 | 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 | 009 | 00A | 00B | 00C | 00D | 00E | 00F | 010 | 011 | 012 | 013 | 014 | 015 | 016 | 017 | 018 | 019 | 01A | 01B | 01C | 01D | 01E | 01F |
| 2-line | 020 | 021 | 022 | 023 | 024 | 025 | 026 | 027 | 028 | 029 | 02A | 02B | 02C | 02D | 02E | 02F | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 | 03A | 03B | 03C | 03D | 03E | 03F |
| 3-line | 040 | 041 | 042 | 043 | 044 | 045 | 046 | 047 | 048 | 049 | 04A | 04B | 04C | 04D | 04E | 04F | 050 | 051 | 052 | 053 | 054 | 055 | 056 | 057 | 058 | 059 | 05A | 05B | 05C | 05D | 05E | 05F |
| 4-line | 060 | 061 | 062 | 063 | 064 | 065 | 066 | 067 | 068 | 069 | 06A | 06B | 06C | 06D | 06E | 06F | 070 | 071 | 072 | 073 | 074 | 075 | 076 | 077 | 078 | 079 | 07A | 07B | 07C | 07D | 07E | 07F |
| 5-line | 080 | 081 | 082 | 083 | 084 | 085 | 086 | 087 | 088 | 089 | 08A | 08B | 08C | 08D | 08E | 08F | 090 | 091 | 092 | 093 | 094 | 095 | 096 | 097 | 098 | 099 | 09A | 09B | 09C | 09D | 09E | 09F |
| 6-line | 0A0 | 0A1 | 0A2 | 0A3 | 0A4 | 0A5 | 0A6 | 0A7 | 0A8 | 0A9 | 0AA | 0AB | 0AC | 0AD | 0AE | 0AF | 0B0 | 0B1 | 0B2 | 0B3 | 0B4 | 0B5 | 0B6 | 0B7 | 0B8 | 0B9 | 0BA | 0BB | 0BC | 0BD | 0BE | 0BF |

Correspondence of display position on panel and DDRAM address (SEL1="1", SEL2="0")

| | 1-digit | | 2-digit | | 3-digit | | 4-digit | | 5-digit | | 6-digit | | 7-digit | | 8-digit | | 9-digit | | 10-digit | | 11-digit | | 12-digit | | 13-digit | | 14-digit | | 15-digit | | 16-digit | |
|--------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|
| 1-line | 0A0 | 0A1 | 0A2 | 0A3 | 0A4 | 0A5 | 0A6 | 0A7 | 0A8 | 0A9 | 0AA | 0AB | 0AC | 0AD | 0AE | 0AF | 0B0 | 0B1 | 0B2 | 0B3 | 0B4 | 0B5 | 0B6 | 0B7 | 0B8 | 0B9 | 0BA | 0BB | 0BC | 0BD | 0BE | 0BF |
| 2-line | 080 | 081 | 082 | 083 | 084 | 085 | 086 | 087 | 088 | 089 | 08A | 08B | 08C | 08D | 08E | 08F | 090 | 091 | 092 | 093 | 094 | 095 | 096 | 097 | 098 | 099 | 09A | 09B | 09C | 09D | 09E | 09F |
| 3-line | 060 | 061 | 062 | 063 | 064 | 065 | 066 | 067 | 068 | 069 | 06A | 06B | 06C | 06D | 06E | 06F | 070 | 071 | 072 | 073 | 074 | 075 | 076 | 077 | 078 | 079 | 07A | 07B | 07C | 07D | 07E | 07F |
| 4-line | 040 | 041 | 042 | 043 | 044 | 045 | 046 | 047 | 048 | 049 | 04A | 04B | 04C | 04D | 04E | 04F | 050 | 051 | 052 | 053 | 054 | 055 | 056 | 057 | 058 | 059 | 05A | 05B | 05C | 05D | 05E | 05F |
| 5-line | 020 | 021 | 022 | 023 | 024 | 025 | 026 | 027 | 028 | 029 | 02A | 02B | 02C | 02D | 02E | 02F | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 | 03A | 03B | 03C | 03D | 03E | 03F |
| 6-line | 000 | 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 | 009 | 00A | 00B | 00C | 00D | 00E | 00F | 010 | 011 | 012 | 013 | 014 | 015 | 016 | 017 | 018 | 019 | 01A | 01B | 01C | 01D | 01E | 01F |

Correspondence of display position on panel and DDRAM address (SEL1="0", SEL2="1")

| | 1-digit | | 2-digit | | 3-digit | | 4-digit | | 5-digit | | 6-digit | | 7-digit | | 8-digit | | 9-digit | | 10-digit | | 11-digit | | 12-digit | | 13-digit | | 14-digit | | 15-digit | | 16-digit | |
|--------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|
| 1-line | 01F | 01E | 01D | 01C | 01B | 01A | 019 | 018 | 017 | 016 | 015 | 014 | 013 | 012 | 011 | 010 | 00F | 00E | 00D | 00C | 00B | 00A | 009 | 008 | 007 | 006 | 005 | 004 | 003 | 002 | 001 | 000 |
| 2-line | 03F | 03E | 03D | 03C | 03B | 03A | 039 | 038 | 037 | 036 | 035 | 034 | 033 | 032 | 031 | 030 | 02F | 02E | 02D | 02C | 02B | 02A | 029 | 028 | 027 | 026 | 025 | 024 | 023 | 022 | 021 | 020 |
| 3-line | 05F | 05E | 05D | 05C | 05B | 05A | 059 | 058 | 057 | 056 | 055 | 054 | 053 | 052 | 051 | 050 | 04F | 04E | 04D | 04C | 04B | 04A | 049 | 048 | 047 | 046 | 045 | 044 | 043 | 042 | 041 | 040 |
| 4-line | 07F | 07E | 07D | 07C | 07B | 07A | 079 | 078 | 077 | 076 | 075 | 074 | 073 | 072 | 071 | 070 | 06F | 06E | 06D | 06C | 06B | 06A | 069 | 068 | 067 | 066 | 065 | 064 | 063 | 062 | 061 | 060 |
| 5-line | 09F | 09E | 09D | 09C | 09B | 09A | 099 | 098 | 097 | 096 | 095 | 094 | 093 | 092 | 091 | 090 | 08F | 08E | 08D | 08C | 08B | 08A | 089 | 088 | 087 | 086 | 085 | 084 | 083 | 082 | 081 | 080 |
| 6-line | 0BF | 0BE | 0BD | 0BC | 0BB | 0BA | 0B9 | 0B8 | 0B7 | 0B6 | 0B5 | 0B4 | 0B3 | 0B2 | 0B1 | 0B0 | 0AF | 0AE | 0AD | 0AC | 0AB | 0AA | 0A9 | 0A8 | 0A7 | 0A6 | 0A5 | 0A4 | 0A3 | 0A2 | 0A1 | 0A0 |

Correspondence of display position on panel and DDRAM address (SEL1="1", SEL2="1")

| | 1-digit | | 2-digit | | 3-digit | | 4-digit | | 5-digit | | 6-digit | | 7-digit | | 8-digit | | 9-digit | | 10-digit | | 11-digit | | 12-digit | | 13-digit | | 14-digit | | 15-digit | | 16-digit | |
|--------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|
| 1-line | 0BF | 0BE | 0BD | 0BC | 0BB | 0BA | 0B9 | 0B8 | 0B7 | 0B6 | 0B5 | 0B4 | 0B3 | 0B2 | 0B1 | 0B0 | 0AF | 0AE | 0AD | 0AC | 0AB | 0AA | 0A9 | 0A8 | 0A7 | 0A6 | 0A5 | 0A4 | 0A3 | 0A2 | 0A1 | 0A0 |
| 2-line | 09F | 09E | 09D | 09C | 09B | 09A | 099 | 098 | 097 | 096 | 095 | 094 | 093 | 092 | 091 | 090 | 08F | 08E | 08D | 08C | 08B | 08A | 089 | 088 | 087 | 086 | 085 | 084 | 083 | 082 | 081 | 080 |
| 3-line | 07F | 07E | 07D | 07C | 07B | 07A | 079 | 078 | 077 | 076 | 075 | 074 | 073 | 072 | 071 | 070 | 06F | 06E | 06D | 06C | 06B | 06A | 069 | 068 | 067 | 066 | 065 | 064 | 063 | 062 | 061 | 060 |
| 4-line | 05F | 05E | 05D | 05C | 05B | 05A | 059 | 058 | 057 | 056 | 055 | 054 | 053 | 052 | 051 | 050 | 04F | 04E | 04D | 04C | 04B | 04A | 049 | 048 | 047 | 046 | 045 | 044 | 043 | 042 | 041 | 040 |
| 5-line | 03F | 03E | 03D | 03C | 03B | 03A | 039 | 038 | 037 | 036 | 035 | 034 | 033 | 032 | 031 | 030 | 02F | 02E | 02D | 02C | 02B | 02A | 029 | 028 | 027 | 026 | 025 | 024 | 023 | 022 | 021 | 020 |
| 6-line | 01F | 01E | 01D | 01C | 01B | 01A | 019 | 018 | 017 | 016 | 015 | 014 | 013 | 012 | 011 | 010 | 00F | 00E | 00D | 00C | 00B | 00A | 009 | 008 | 007 | 006 | 005 | 004 | 003 | 002 | 001 | 000 |

Note) The DDRAM is not initialized after the power supply turns on, therefore it is necessary to execute the "Display Clear instruction" at first.

(3-3) CGRAM

The character generator RAM (CG RAM) stores any kinds of character pattern written by the user program to display user's original character pattern. RAM address uses "200H" to "DFFH". The CG RAM is able to store character of 5 x 8 dot for 4 kinds. Data "1" correspond to selection as a display, and Data "0" correspond to non-selection as a display. When the character pattern stored in CGRAM is displayed, "0100H" to "015FH" of the character-code is written in DDRAM. The following tables show the relation between the CGRAM address, data, and the displayed pattern.

Correspondence of character code and CGRAM address

| | | | | | | | | | | | | | | | | |
|------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | "0100" | "0101" | "0102" | "0103" | "0104" | "0105" | "0106" | "0107" | "0108" | "0109" | "010A" | "010B" | "010C" | "010D" | "010E" | "010F" |
| CG Address | 200 210 : : 20F 21F | 220 230 : : 22F 23F | 240 250 : : 24F 25F | 260 270 : : 26F 27F | 280 290 : : 28F 29F | 2A0 2B0 : : 2AF 2BF | 2C0 2D0 : : 2CF 2DF | 2E0 2F0 : : 2EF 2FF | 300 310 : : 30F 31F | 320 330 : : 32F 33F | 340 350 : : 34F 35F | 360 370 : : 36F 37F | 380 390 : : 38F 39F | 3A0 3B0 : : 3AF 3BF | 3C0 3D0 : : 3CF 3DF | 3E0 3F0 : : 3EF 3FF |
| | "0110" | "0111" | "0112" | "0113" | "0114" | "0115" | "0116" | "0117" | "0118" | "0119" | "011A" | "011B" | "011C" | "011D" | "011E" | "011F" |
| CG Address | 400 410 : : 40F 41F | 420 430 : : 42F 43F | 440 450 : : 44F 45F | 460 470 : : 46F 47F | 480 490 : : 48F 49F | 4A0 4B0 : : 4AF 4BF | 4C0 4D0 : : 4CF 4DF | 4E0 4F0 : : 4EF 4FF | 500 510 : : 50F 51F | 520 530 : : 52F 53F | 540 550 : : 54F 55F | 560 570 : : 56F 57F | 580 590 : : 58F 59F | 5A0 5B0 : : 5AF 5BF | 5C0 5D0 : : 5CF 5DF | 5E0 5F0 : : 5EF 5FF |
| | "0120" | "0121" | "0122" | "0123" | "0124" | "0125" | "0126" | "0127" | "0128" | "0129" | "012A" | "012B" | "012C" | "012D" | "012E" | "012F" |
| CG Address | 600 610 : : 60F 61F | 620 630 : : 62F 63F | 640 650 : : 64F 65F | 660 670 : : 66F 67F | 680 690 : : 68F 69F | 6A0 6B0 : : 6AF 6BF | 6C0 6D0 : : 6CF 6DF | 6E0 6F0 : : 6EF 6FF | 700 710 : : 70F 71F | 720 730 : : 72F 73F | 740 750 : : 74F 75F | 760 770 : : 76F 77F | 780 790 : : 78F 79F | 7A0 7B0 : : 7AF 7BF | 7C0 7D0 : : 7CF 7DF | 7E0 7F0 : : 7EF 7FF |
| | "0130" | "0131" | "0132" | "0133" | "0134" | "0135" | "0136" | "0137" | "0138" | "0139" | "013A" | "013B" | "013C" | "013D" | "013E" | "013F" |
| CG Address | 800 810 : : 80F 81F | 820 830 : : 82F 83F | 840 850 : : 84F 85F | 860 870 : : 86F 87F | 880 890 : : 88F 89F | 8A0 8B0 : : 8AF 8BF | 8C0 8D0 : : 8CF 8DF | 8E0 8F0 : : 8EF 8FF | 900 910 : : 90F 91F | 920 930 : : 92F 93F | 940 950 : : 94F 95F | 960 970 : : 96F 97F | 980 990 : : 98F 99F | 9A0 9B0 : : 9AF 9BF | 9C0 9D0 : : 9CF 9DF | 9E0 9F0 : : 9EF 9FF |
| | "0140" | "0141" | "0142" | "0143" | "0144" | "0145" | "0146" | "0147" | "0148" | "0149" | "014A" | "014B" | "014C" | "014D" | "014E" | "014F" |
| CG Address | A00 A10 : : A0F A1F | A20 A30 : : A2F A3F | A40 A50 : : A4F A5F | A60 A70 : : A6F A7F | A80 A90 : : A8F A9F | AA0 AB0 : : AAF ABF | AC0 AD0 : : ACF ADF | AE0 AF0 : : AEF AFF | B00 B10 : : B0F B1F | B20 B30 : : B2F B3F | B40 B50 : : B4F B5F | B60 B70 : : B6F B7F | B80 B90 : : B8F B9F | BA0 BB0 : : BAF BBF | BC0 BD0 : : BCF BDF | BE0 BF0 : : BEF BFF |
| | "0150" | "0151" | "0152" | "0153" | "0154" | "0155" | "0156" | "0157" | "0158" | "0159" | "015A" | "015B" | "015C" | "015D" | "015E" | "015F" |
| CG Address | C00 C10 : : C0F C1F | C20 C30 : : C2F C3F | C40 C50 : : C4F C5F | C60 C70 : : C6F C7F | C80 C90 : : C8F C9F | CA0 CB0 : : CAF CBF | CC0 CD0 : : CCF CDF | CE0 CF0 : : CEF CFF | D00 D10 : : D0F D1F | D20 D30 : : D2F D3F | D40 D50 : : D4F D5F | D60 D70 : : D6F D7F | D80 D90 : : D8F D9F | DA0 DB0 : : DAF DBF | DC0 DD0 : : DCF DDF | DE0 DF0 : : DEF DFF |

(3-4) MKRAM

The icon display generator RAM (MK RAM) is RAM that stores 512 output ON/OFF settings. RAM address uses "100H" to "13FH". By storing data in this RAM, ON/OFF of each icon is set. Data "1" correspond to selection as a display, and Data "0" correspond to non-selection as a display.

Correspondence of SEG/COM terminals and MKRAM address (SEL1="0", SEL2="0")

| | SEG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 200 | 208 | 216 | 224 | 232 | 240 | 248 |
| MK COM0 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 10A | 10B | 10C | 10D | 10E | 10F | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 11A | 11B | 11C | 11D | 11E | 11F |
| MK COM1 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 12A | 12B | 12C | 12D | 12E | 12F | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 13A | 13B | 13C | 13D | 13E | 13F |

Correspondence of SEG/COM terminals and each bit of MKRAM address (SEL1="0", SEL2="0")

| | SEG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|--------------|-----|----|----|--------------|----|----|----|--------------|----|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|--------------|--|--|--|
| | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | --- | --- | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MK COM0 | Address=100H | | | | Address=101H | | | | Address=102H | | | | Address=103H | | | | Address=104H | | | | Address=105H | | | | Address=106H | | | | Address=107H | | | | Address=108H | | | | Address=109H | | | | Address=10AH | | | | Address=10BH | | | | Address=10CH | | | | Address=10DH | | | | Address=10EH | | | | Address=10FH | | | | Address=110H | | | | Address=111H | | | | Address=112H | | | | Address=113H | | | | Address=114H | | | | Address=115H | | | | Address=116H | | | | Address=117H | | | | Address=118H | | | | Address=119H | | | | Address=11AH | | | | Address=11BH | | | | Address=11CH | | | | Address=11DH | | | | Address=11EH | | | | Address=11FH | | | |
| MK COM1 | Address=120H | | | | Address=121H | | | | Address=122H | | | | Address=123H | | | | Address=124H | | | | Address=125H | | | | Address=126H | | | | Address=127H | | | | Address=128H | | | | Address=129H | | | | Address=12AH | | | | Address=12BH | | | | Address=12CH | | | | Address=12DH | | | | Address=12EH | | | | Address=12FH | | | | Address=130H | | | | Address=131H | | | | Address=132H | | | | Address=133H | | | | Address=134H | | | | Address=135H | | | | Address=136H | | | | Address=137H | | | | Address=138H | | | | Address=139H | | | | Address=13AH | | | | Address=13BH | | | | Address=13CH | | | | Address=13DH | | | | Address=13EH | | | | Address=13FH | | | |

- Note) The MKRAM is not initialized after the power supply turns on, therefore it is necessary to write data into CGRAM before display on.
- Note) Correspondence to the SEG/COM terminals are changed by the "Driver Output Control instruction" (SEL1, SEL2). Refer to "(9) COMMON SHIFT DIRECTION / SEGMENT OUTPUT DIRECTION" for details.
- Note) When the "Display Control instruction" is ALLON="1", display is all ON regardless of the content of RAM.

(3-5) FCGROM (Full-size font ROM)

Full-size font character generator ROM (FCGROM) generates 16 x 16 dots character pattern represented in 14-bit character codes. The NJU6645 has the Full-size font pattern of 8,128-font such as the JIS level-1, level-2 and non-kanji. Refer to "(14) Full-size / Half-size Font Mix Display" for the correspondence of the JIS code and the character code set to DDRAM.

(3-6) HCGROM (Half-size font ROM)

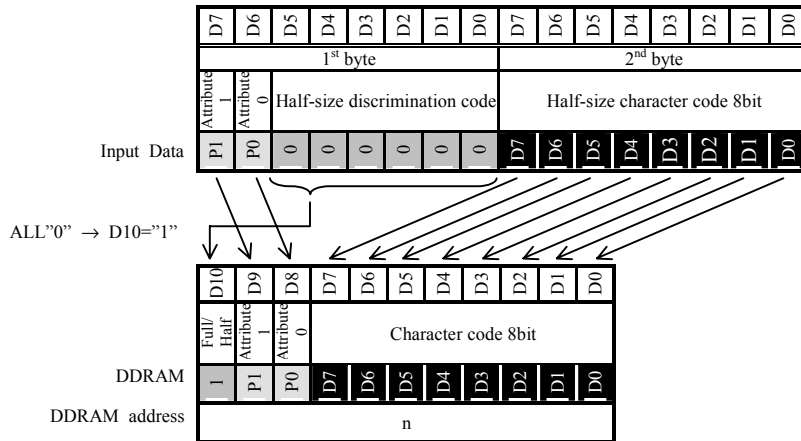
Half-size font character generator ROM (FCGROM) generates 8 x 16 dots character pattern represented in 8-bit character codes. The NJU6645 has the Half-size font pattern of 256-font. Refer to "(14) Full-size / Half-size Font Mix Display" for the correspondence of the character code set to DDRAM.

(3-7) Correspondence of the JIS Code, Input Data, RAM Data and RAM Address

(3-7-1) Write Data to DDRAM

(i) Half-size font character

The half-size data becomes the data of one character by the input data of 2-byte, and it is stored at one RAM address. When the lower 6-bit of 1st byte is all "0", it is recognized as half-size data. The attribute data is allocated in upper 2-bit in the 1st input byte. When the half-size font, "1" is stored in the MSB of RAM data as full-size/half-size discrimination bit.



Note) When the full-size character is overwritten by half-size character, the character is displayed unexpected. Therefore, when the full-size character is overwritten by half-size character, it must write two character's equivalent or rewrite all character.

- Prohibited matter

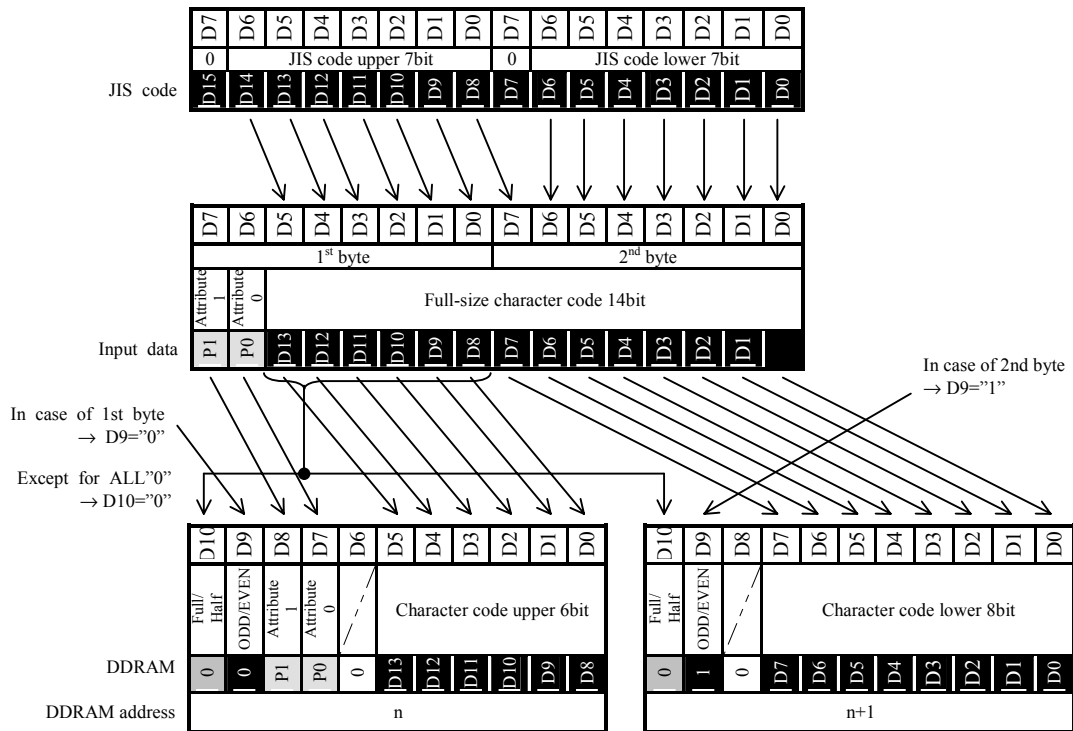
- (1) In the 32nd half-size character of each line (right edge) prohibit overwriting the full-size character.
- (2) In the only half left of full-size character prohibit overwriting the half-size character.
- (3) In the only half right of full-size character prohibit overwriting the half-size (full-size) character.

(ii) Full-size font character

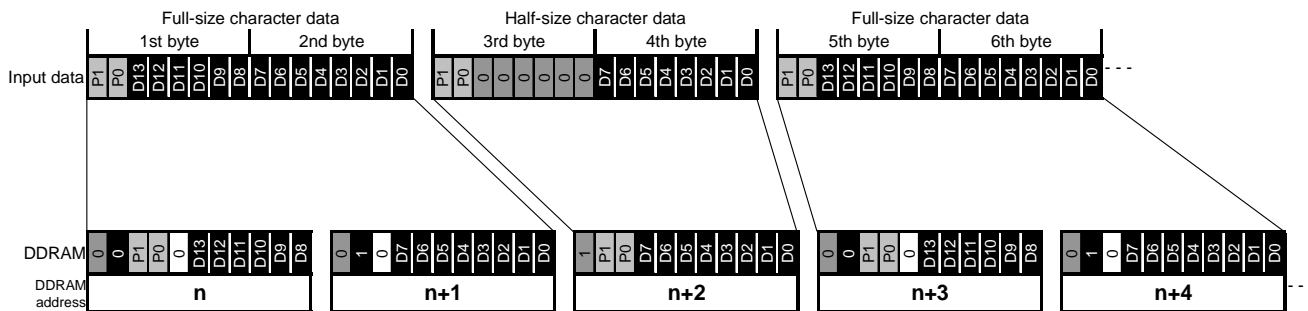
The full-size data becomes the data of 1-character by the input data of 2-byte, and it is stored at two RAM address. The attribute data is allocated in upper 2-bit in the 1st input byte. When the full-size font, "0" is stored in the MSB of RAM data as Full-size/half-size discrimination bit. And, "0" or "1" is stored in the 2nd bit of RAM as 1st byte/2nd byte discrimination data. (1st bit : "0", 2nd bit : "1")

The character code is 14-bit stuffed into the lower bit excluding 1-bit (code : "0") and 9-bit (code : "0") of JIS codes (16-bit).

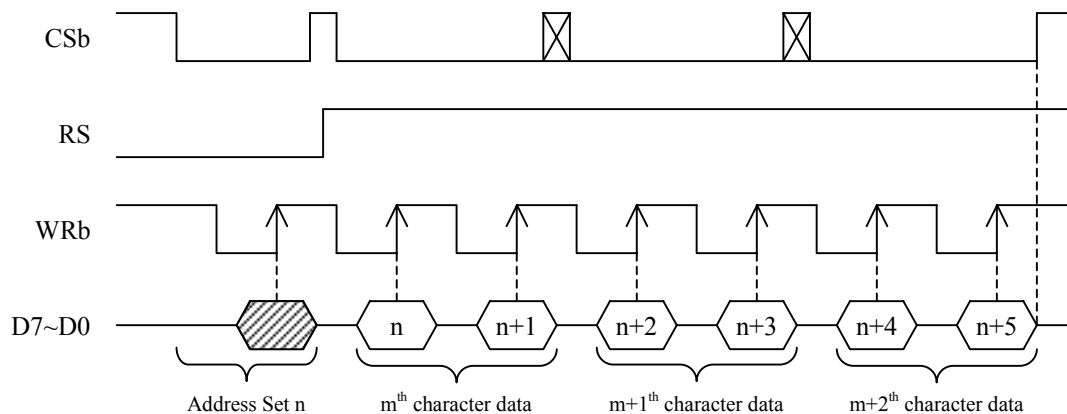
The relation between each bit allocation of JIS code and input data and the RAM is as follows.



When the DDRAM is written, the address is incremented as follows once a 1-byte in case of the full-size data, and once a 2-byte in case of the half-size data.



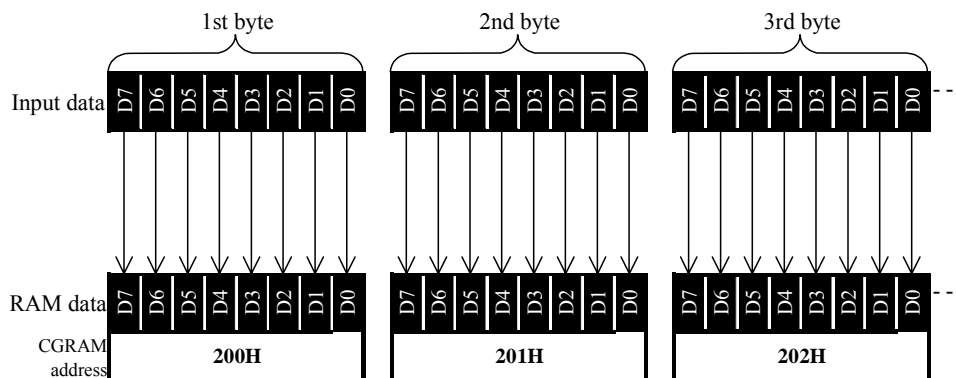
The data is recognized without fail as the first byte, immediately after CSb becomes "L". Therefore, when the DDRAM data is written, it is necessary to make CSb = "H" after it finishes writing the 2nd byte.



(3-7-2) Write Data to CGRAM

The CGRAM has 8-bit per an address, and the input value is stored in each bit as follows. The address is incremented once a 1-byte at the data writing.

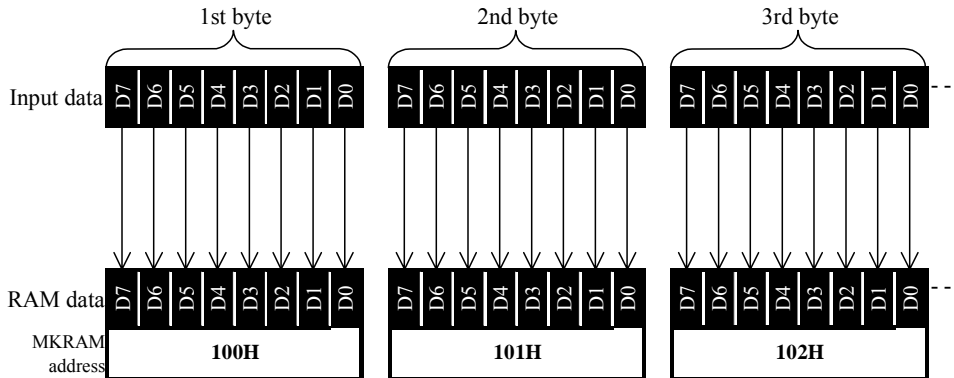
Relation between the interface, RAM data, and RAM address, in the CGRAM data writing



(3-7-3) Write Data to MKRAM

The CGRAM has 8-bit per an address, and the input value is stored in each bit as follows. The address is incremented once a 1-byte at the data writing.

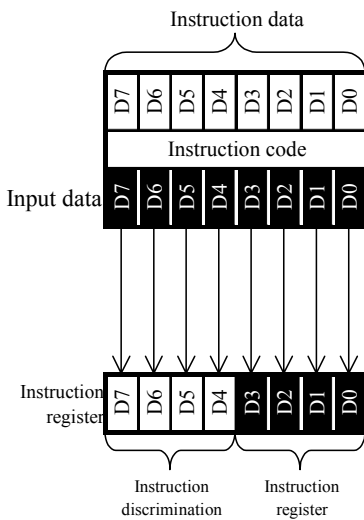
Relation between the interface, RAM data, and RAM address, in the MKRAM data writing



(3-7-4) Write to Instruction Register

The instruction set is stored in the internal instruction register by the 8-bit input in the state of RS="0", RW="0". The instruction code is applied to the item corresponding to the RE register set beforehand. Refer to "(20) Instruction table" for the correspondence of input data and the instruction.

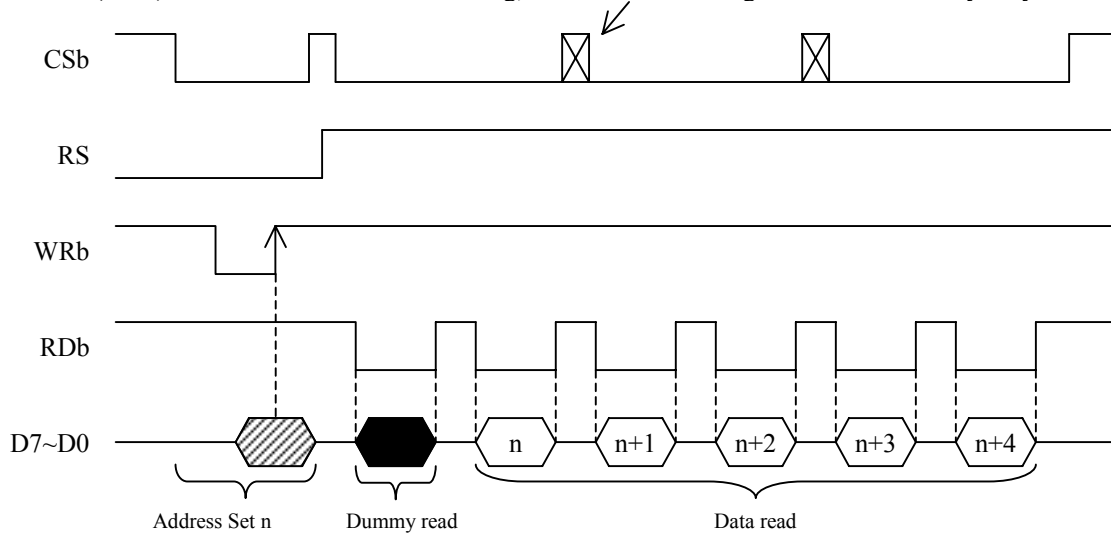
Write to instruction Register



(3-8) Read Data from RAM

The data is read out from DDRAM, CGRAM, and MKRAM. When reading data from the RAM, it is necessary to read after the address setting. The dummy reading is necessary right after the address setting. After read out, the address is incremented automatically according to the entry mode.

(Note) When the DDRAM data reading, CSb should be changed to "H" once every 2-byte.

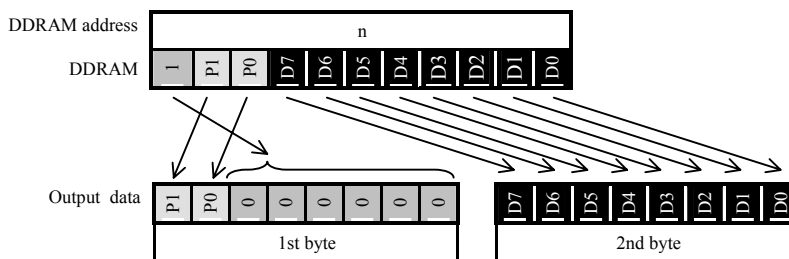


(3-8-1) Read Data from DDRAM

The DDRAM reading discriminates whether the content of the DDRAM data is full-size/half-size, and is output by an input and the same format. The data is recognized without fail as the 1st byte, immediately after CSb becomes "L". Therefore, when the DDRAM data is read, it is necessary to make CSb = "H" after it finishes reading the 2nd byte.

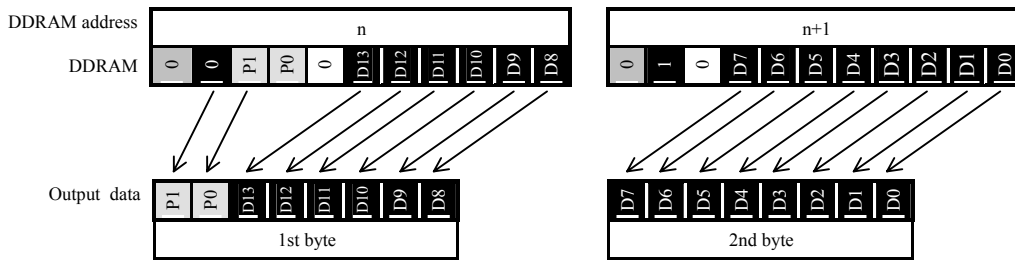
(i) Half-size font character

When the content of DDRAM data is half-size character code, the address data of one address is divided 2-byte. And after read the 2nd byte, the address is incremented according to the entry mode. The 3rd to 8th bit in 1st byte is all output "0".



(ii) Full-size font character

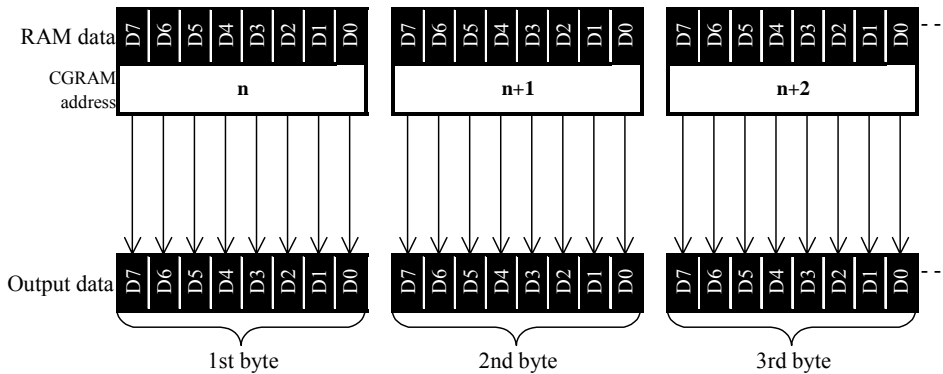
When the content of DDRAM data is full-size character code, the address data of 1-address is read by 1-byte. And after read, the address is incremented according to the entry mode.



(3-8-2) Read Data from CGRAM and MKRAM

The CGRAM and MKRAM read the address data of one address by 1-byte as follows. And after read, the address is incremented according to the entry mode.

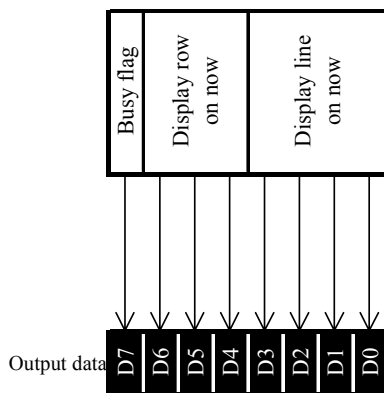
Relation between the interface, RAM data, and RAM address, in the CGRAM and MKRAM data reading



(3-9) Status Read

The status reading is output to the following bits. The dummy reading is not necessary for the status reading. However, the dummy reading is necessary for the status reading at the serial interface.

Status Read



Correspondence Table of Character code and JIS code (ROM version "00")

- 0000 ~ 00FF : Half-size character code (256-character)
- 0100 ~ 015F : CGRAM character code (96-character)
- 10A1 ~ 3A7F : Full-size character code (8064-character)

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 000 | | | | | | | | | | | | | | | | | |
| 001 | | | | | | | | | | | | | | | | | |
| 002 | | | | | | | | | | | | | | | | | |
| 003 | | | | | | | | | | | | | | | | | |
| 004 | | | | | | | | | | | | | | | | | |
| 005 | | | | | | | | | | | | | | | | | |
| 006 | | | | | | | | | | | | | | | | | |
| 007 | | | | | | | | | | | | | | | | | |
| 008 | | | | | | | | | | | | | | | | | |
| 009 | | | | | | | | | | | | | | | | | |
| 00A | | | | | | | | | | | | | | | | | |
| 00B | | | | | | | | | | | | | | | | | |
| 00C | | | | | | | | | | | | | | | | | |
| 00D | | | | | | | | | | | | | | | | | |
| 00E | | | | | | | | | | | | | | | | | |
| 00F | | | | | | | | | | | | | | | | | |
| 010 | | | | | | | | | | | | | | | | | |
| 011 | | | | | | | | | | | | | | | | | |
| 012 | | | | | | | | | | | | | | | | | |
| 013 | | | | | | | | | | | | | | | | | |
| 014 | | | | | | | | | | | | | | | | | |
| 015 | | | | | | | | | | | | | | | | | |
| 10A | 212 | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ |
| 10B | 213 | ・ | ー | ゚ | ゛ | ゞ | ゝ | ゞ | 全 | 々 | 〇 | ー | ー | ー | ／ | | |
| 10C | 214 | ＼ | ゝ | 〃 | ゝ | ゝ | ゝ | ゝ | ゝ | ゝ | ゝ | ゝ | ゝ | ゝ | ゝ | ゝ | ゝ |
| 10D | 215 | (|) | (|) | 〔 | 〕 | 〔 | 〕 | 〔 | 〕 | 〔 | 〕 | 〔 | 〕 | 〔 | 〕 |
| 10E | 216 | + | = | ≠ | < | > | ≦ | ≧ | ∞ | △ | ▽ | △ | ▽ | △ | ▽ | △ | ▽ |
| 10F | 217 | \$ | ¢ | £ | % | # | & | * | @ | § | ☆ | ★ | ○ | ● | ◎ | ◇ | ☒ |
| 112 | 222 | ☒ | ◆ | □ | ■ | △ | ▲ | ▼ | ※ | 〒 | → | ← | ↑ | ↓ | ＝ | ・ | |
| 113 | 223 | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ |
| 114 | 224 | U | Π | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | Λ | V | → | → | ⇄ | Y |
| 115 | 225 | ヨ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ |
| 116 | 226 | ▽ | ≡ | ≡ | ≡ | ≡ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |
| 117 | 227 | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ |
| 11A | 232 | ☒ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ |
| 11B | 233 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ・ | ・ | ・ | ・ | ・ | ・ |
| 11C | 234 | ・ | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 11D | 235 | P | Q | R | S | T | U | V | W | X | Y | Z | ・ | ・ | ・ | ・ | ・ |
| 11E | 236 | ・ | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| 11F | 237 | p | q | r | s | t | u | v | w | x | y | z | ・ | ・ | ・ | ・ | ☒ |
| 122 | 242 | ☒ | あ | あ | い | い | う | う | え | え | お | お | か | が | き | ぎ | く |
| 123 | 243 | く | け | げ | こ | こ | さ | さ | し | し | ず | ず | せ | ぜ | そ | そ | た |
| 124 | 244 | だ | ち | ち | っ | っ | づ | づ | て | て | ど | ど | な | に | ぬ | ぬ | の |
| 125 | 245 | ぼ | ぼ | ひ | ひ | ひ | ふ | ふ | ふ | へ | べ | べ | ほ | ぼ | ぼ | ま | み |
| 126 | 246 | む | め | め | ゃ | ゃ | ゃ | ゃ | ょ | ょ | ら | り | る | れ | ろ | わ | わ |
| 127 | 247 | あ | ゑ | を | ん | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ☒ |
| 12A | 252 | ☒ | ア | ア | イ | イ | ウ | ウ | エ | エ | オ | オ | カ | ガ | キ | ク | |
| 12B | 253 | グ | ケ | ゲ | コ | ゴ | サ | ザ | シ | ジ | ス | ズ | セ | ゼ | ソ | ゾ | タ |
| 12C | 254 | ダ | チ | チ | ッ | ツ | ツ | テ | デ | ト | フ | ナ | ニ | ヌ | ネ | ノ | ハ |
| 12D | 255 | バ | パ | ピ | ピ | ピ | フ | ブ | ブ | ヘ | ベ | ベ | ホ | ボ | ボ | マ | ミ |
| 12E | 256 | ム | メ | モ | ャ | ャ | ュ | ュ | ョ | ョ | ラ | リ | ル | レ | ロ | ワ | |
| 12F | 257 | 牛 | エ | ヲ | ン | ヅ | カ | ケ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ・ | ☒ |

Note) Refer to "Correspondence Table of Half-size character code and Character pattern" for the half-size character.

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|-----|----|----|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 132 | 262 | ☒ | Α | Β | Γ | Δ | Ε | Ζ | Η | Θ | Ι | Κ | Λ | Μ | Ν | Ξ | Ο |
| 133 | 263 | Π | Ρ | Σ | Τ | Υ | Φ | Χ | Ψ | Ω | . | . | . | . | . | . | . |
| 134 | 264 | . | α | β | γ | δ | ε | ζ | η | θ | ι | κ | λ | μ | ν | ξ | ο |
| 135 | 265 | π | ρ | σ | τ | υ | φ | χ | ψ | ω | . | . | . | . | . | . | . |
| 136 | 266 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 137 | 267 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | ☒ |
| 13A | 272 | ☒ | Α | Β | Γ | Δ | Ε | Ε | Ζ | Ζ | Ι | Й | К | Л | М | Н | |
| 13B | 273 | Ο | Π | Ρ | С | Т | У | Ф | Х | Ц | Ч | Ш | Щ | Ъ | Ы | Ь | Э |
| 13C | 274 | Ю | Я | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 13D | 275 | . | а | б | в | г | д | е | ё | ж | з | и | й | к | л | м | н |
| 13E | 276 | о | п | р | с | т | у | ф | х | ц | ч | ш | щ | ъ | ы | ь | э |
| 13F | 277 | ю | я | . | . | . | . | . | . | . | . | . | . | . | . | . | ☒ |
| 142 | 282 | ☒ | — | | Г | γ | ┘ | └ | ┌ | ┐ | └ | ┌ | ┐ | └ | ┌ | ┐ | └ |
| 143 | 283 | ┘ | └ | ┌ | ┐ | ┘ | └ | ┌ | ┐ | ┘ | └ | ┌ | ┐ | ┘ | └ | ┌ | ┐ |
| 144 | 284 | ┘ | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 145 | 285 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 146 | 286 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 147 | 287 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | ☒ |
| 14A | 292 | ☒ | ! | " | # | \$ | % | & | ' | (|) | * | + | , | - | . | / |
| 14B | 293 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | : | < | = | > | ? |
| 14C | 294 | @ | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 14D | 295 | P | Q | R | S | T | U | V | W | X | Y | Z | [| ¥ |] | ~ | _ |
| 14E | 296 | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| 14F | 297 | p | q | r | s | t | u | v | w | x | y | z | { | | } | ~ | ☒ |
| 152 | 2A2 | ☒ | 。 | 「 | 」 | 、 | ・ | ヲ | ア | イ | ウ | エ | オ | ト | ナ | ニ | ノ |
| 153 | 2A3 | ー | ア | イ | ウ | エ | オ | カ | キ | ク | ケ | コ | サ | シ | ス | セ | ソ |
| 154 | 2A4 | タ | チ | ツ | テ | ト | ナ | ニ | ノ | ハ | ヒ | フ | ヘ | ホ | マ | | |
| 155 | 2A5 | ミ | ム | メ | モ | ト | ヨ | リ | ル | レ | ロ | リ | シ | フ | | | |
| 156 | 2A6 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 157 | 2A7 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | ☒ |
| 15A | 2B2 | ☒ | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 15B | 2B3 | . | | | . | . | . | . | . | . | . | . | . | | | . | . |
| 15C | 2B4 | . | . | ? | = | - | : | : | . | . | . | . | ∪ | ∩ | ∪ | ∩ | ∪ |
| 15D | 2B5 | ∪ | ∩ | ∪ | ∩ | ∪ | ∩ | ∪ | ∩ | ∪ | ∩ | ∪ | ∩ | ∪ | ∩ | . | . |
| 15E | 2B6 | ∥ | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 15F | 2B7 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | ☒ |
| 162 | 2C2 | ☒ | ↓ | ↑ | → | ← | ■ | | — | ┘ | └ | ┌ | ┐ | └ | ┌ | ┐ | └ |
| 163 | 2C3 | ┘ | └ | ┌ | ┐ | ┘ | └ | ┌ | ┐ | ┘ | └ | ┌ | ┐ | ┘ | └ | ┌ | ┐ |
| 164 | 2C4 | ┘ | └ | ┌ | ┐ | ┘ | └ | ┌ | ┐ | ┘ | └ | ┌ | ┐ | ┘ | └ | ┌ | ┐ |
| 165 | 2C5 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 166 | 2C6 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 167 | 2C7 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | ☒ |
| 16A | 2D2 | ☒ | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ | ⑫ | ⑬ | ⑭ | ⑮ |
| 16B | 2D3 | ⑯ | ⑰ | ⑱ | ⑲ | ⑳ | ㉑ | ㉒ | ㉓ | ㉔ | ㉕ | ㉖ | ㉗ | ㉘ | ㉙ | ㉚ | . |
| 16C | 2D4 | ㉛ | ㉜ | ㉝ | ㉞ | ㉟ | ㊱ | ㊲ | ㊳ | ㊴ | ㊵ | ㊶ | ㊷ | ㊸ | ㊹ | ㊺ | ㊻ |
| 16D | 2D5 | ㊼ | ㊽ | ㊾ | ㊿ | ㋀ | ㋁ | ㋂ | ㋃ | ㋄ | ㋅ | ㋆ | ㋇ | ㋈ | ㋉ | ㋊ | ㋋ |
| 16E | 2D6 | . | . | No. | KK | IL | ⊕ | ⊖ | ⊗ | ⊘ | ⊙ | ⊚ | ⊛ | ⊜ | ⊝ | ⊞ | ⊟ |
| 16F | 2D7 | ≡ | ≡ | ≡ | ≡ | Σ | √ | ∟ | ∠ | ∠ | ∠ | ∠ | ∠ | ∠ | ∠ | ∠ | ∠ |

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|----------------|---|---|---|---|----------------|----------------|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 172 | 2E2 | × | あ | . | い | . | う | . | え | . | お | . | . | . | . | . | . |
| 173 | 2E3 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 174 | 2E4 | . | . | . | う | . | . | う ² | o ⁴ | ち | 計 | 号 | ソ | 竹 | 計 | 計 | 号 |
| 175 | 2E5 | 留 | あ ² | ち | 計 | 号 | 計 | . | . | . | . | . | . | . | . | . | . |
| 176 | 2E6 | . | . | . | や | . | ゆ | . | よ | . | . | . | . | . | . | . | あ |
| 177 | 2E7 | . | . | . | . | . | か | け | . | . | . | . | . | . | . | . | 隠 |
| 17A | 2F2 | × | ア | . | イ | . | ウ | . | エ | . | オ | . | . | . | . | . | . |
| 17B | 2F3 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 17C | 2F4 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 17D | 2F5 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 17E | 2F6 | . | . | . | ヤ | . | ユ | . | ヨ | . | . | . | . | . | . | . | ワ |
| 17F | 2F7 | . | . | . | . | . | カ | ケ | . | . | . | . | . | . | . | . | × |
| 182 | 302 | × | 更 | 唾 | 娃 | 阿 | 哀 | 愛 | 挨 | 始 | 逢 | 莠 | 莠 | 輪 | 惠 | 攝 | 渾 |
| 183 | 303 | 旭 | 羞 | 芦 | 勝 | 梓 | 庄 | 朝 | 扱 | 宛 | 逢 | 鉦 | 鉦 | 輪 | 總 | 黏 | 或 |
| 184 | 304 | 夏 | 裕 | 安 | 慶 | 菘 | 暗 | 案 | 聞 | 鞆 | 杏 | 以 | 伊 | 位 | 依 | 像 | 田 |
| 185 | 305 | 萬 | 委 | 威 | 尉 | 惟 | 意 | 對 | 易 | 楊 | 為 | 畏 | 鳳 | 移 | 維 | 獲 | 費 |
| 186 | 306 | 葵 | 衣 | 沃 | 譚 | 遼 | 迪 | 醫 | 井 | 亥 | 城 | 育 | 郁 | 礦 | 一 | 巷 | 溢 |
| 187 | 307 | 稻 | 茨 | 芋 | 綱 | 允 | 印 | 咽 | 右 | 姻 | 引 | 引 | 涇 | 鳳 | 陸 | 陸 | × |
| 18A | 312 | × | 院 | 院 | 院 | 院 | 院 | 院 | 院 | 院 | 院 | 院 | 院 | 院 | 院 | 院 | 院 |
| 18B | 313 | 確 | 白 | 滴 | 唾 | 唾 | 唾 | 唾 | 唾 | 唾 | 唾 | 唾 | 唾 | 唾 | 唾 | 唾 | 唾 |
| 18C | 314 | 雲 | 雀 | 鏡 | 鏡 | 宮 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 |
| 18D | 315 | 鐘 | 英 | 衛 | 詠 | 詠 | 詠 | 詠 | 詠 | 詠 | 詠 | 詠 | 詠 | 詠 | 詠 | 詠 | 詠 |
| 18E | 316 | 園 | 燈 | 電 | 宴 | 延 | 怨 | 掩 | 揚 | 沿 | 濱 | 炎 | 焰 | 煙 | 煙 | 煙 | 煙 |
| 18F | 317 | 艶 | 苑 | 菴 | 遠 | 給 | 驚 | 墟 | 於 | 汚 | 鴉 | 凹 | 央 | 與 | 往 | 店 | × |
| 192 | 322 | × | 押 | 旺 | 橋 | 歐 | 歐 | 王 | 翁 | 被 | 蒸 | 鷓 | 當 | 岡 | 沖 | 荻 | 億 |
| 193 | 323 | 屋 | 世 | 融 | 橋 | 社 | 乙 | 億 | 卸 | 恩 | 溫 | 億 | 音 | 下 | 化 | 飯 | 何 |
| 194 | 324 | 伽 | 信 | 佳 | 加 | 可 | 嘉 | 夏 | 嫁 | 家 | 荷 | 科 | 喇 | 果 | 榮 | 歌 | 河 |
| 195 | 325 | 火 | 阿 | 過 | 禾 | 稼 | 園 | 花 | 奇 | 茄 | 荷 | 華 | 蝦 | 菓 | 課 | 嘩 | 貨 |
| 196 | 326 | 火 | 迦 | 過 | 森 | 蚊 | 蝦 | 我 | 牙 | 快 | 怪 | 怪 | 怪 | 怪 | 怪 | 怪 | 怪 |
| 197 | 327 | 介 | 会 | 解 | 回 | 俄 | 俄 | 俄 | 俄 | 俄 | 俄 | 俄 | 俄 | 俄 | 俄 | 俄 | 俄 |
| 19A | 332 | × | 魁 | 瑞 | 棟 | 海 | 灰 | 界 | 昔 | 松 | 芥 | 蟹 | 開 | 階 | 貝 | 凱 | 幼 |
| 19B | 333 | 外 | 咳 | 青 | 產 | 價 | 假 | 涯 | 娟 | 蕭 | 街 | 該 | 該 | 該 | 該 | 該 | 該 |
| 19C | 334 | 垣 | 栢 | 斬 | 鈞 | 創 | 嘩 | 各 | 蔚 | 拉 | 瓊 | 格 | 核 | 核 | 核 | 核 | 核 |
| 19D | 335 | 覺 | 角 | 替 | 較 | 郭 | 闊 | 隔 | 革 | 學 | 岳 | 樂 | 額 | 額 | 額 | 額 | 額 |
| 19E | 336 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 | 糧 |
| 19F | 337 | 叶 | 杭 | 樟 | 靴 | 株 | 兜 | 電 | 蒲 | 釜 | 隸 | 鳩 | 鳩 | 梧 | 茅 | 萱 | × |
| 1A2 | 342 | × | 粥 | 川 | 苜 | 瓦 | 乾 | 假 | 冠 | 寒 | 刊 | 勘 | 勘 | 卷 | 喚 | 堪 | 齊 |
| 1A3 | 343 | 充 | 官 | 寬 | 干 | 幹 | 患 | 感 | 慎 | 管 | 換 | 敢 | 敢 | 相 | 相 | 款 | 款 |
| 1A4 | 344 | 汗 | 漢 | 瀾 | 港 | 塚 | 甘 | 監 | 看 | 竿 | 管 | 簡 | 簡 | 鈕 | 鈕 | 肝 | 款 |
| 1A5 | 345 | 莞 | 觀 | 讓 | 貴 | 還 | 葭 | 間 | 開 | 閑 | 隨 | 隨 | 隨 | 企 | 企 | 九 | 岸 |
| 1A6 | 346 | 嚴 | 玩 | 際 | 眼 | 岩 | 散 | 廣 | 羅 | 種 | 醜 | 醜 | 醜 | 企 | 企 | 危 | 器 |
| 1A7 | 347 | 基 | 奇 | 際 | 寄 | 賦 | 希 | 幾 | 忌 | 擇 | 機 | 旗 | 既 | 期 | 棋 | 栗 | × |
| 1AA | 352 | × | 樹 | 掃 | 祭 | 氣 | 汽 | 嶽 | 折 | 季 | 稀 | 紀 | 繼 | 規 | 記 | 食 | 起 |
| 1AB | 353 | 軌 | 彈 | 軌 | 輪 | 鬼 | 車 | 偽 | 儀 | 鼓 | 宜 | 鼓 | 技 | 技 | 欺 | 騙 | 戲 |
| 1AC | 354 | 詭 | 義 | 鑄 | 諱 | 謙 | 拘 | 苟 | 吉 | 吃 | 喫 | 桂 | 桂 | 桂 | 粘 | 粘 | 杆 |
| 1AD | 355 | 套 | 却 | 客 | 脚 | 處 | 迷 | 丘 | 久 | 仇 | 休 | 及 | 吸 | 宮 | 弓 | 急 | 款 |
| 1AE | 356 | 朽 | 求 | 汲 | 泣 | 炎 | 球 | 究 | 窮 | 筮 | 級 | 糾 | 給 | 旧 | 午 | 去 | 居 |
| 1AF | 357 | 巨 | 拒 | 奧 | 攀 | 渠 | 虛 | 許 | 距 | 繩 | 漁 | 栗 | 魚 | 亨 | 亨 | 亨 | 亨 |

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 1B2 | 362 | × | 供 | 供 | 供 | 兒 | 共 | 共 | 凶 | 協 | 匡 | 脚 | 叫 | 喬 | 境 | 峽 | 強 |
| 1B3 | 363 | 彈 | 怯 | 恐 | 恭 | 扶 | 教 | 構 | 泥 | 狂 | 狹 | 矯 | 胸 | 會 | 興 | 審 | 僻 |
| 1B4 | 364 | 鏡 | 響 | 響 | 驚 | 仰 | 瀝 | 克 | 曉 | 業 | 局 | 曲 | 極 | 玉 | 桐 | 杆 | 僅 |
| 1B5 | 365 | 勤 | 均 | 巾 | 錦 | 斤 | 欣 | 欽 | 琴 | 禁 | 禽 | 筋 | 擊 | 芹 | 苗 | 冷 | 裡 |
| 1B6 | 366 | 謹 | 近 | 金 | 吟 | 銀 | 九 | 俱 | 句 | 區 | 狗 | 玖 | 矩 | 苦 | 鉅 | 鉅 | 販 |
| 1B7 | 367 | 物 | 具 | 愚 | 庚 | 噴 | 空 | 偶 | 寓 | 遇 | 隅 | 串 | 柳 | 誦 | 屑 | 屈 | × |
| 1BA | 372 | × | 据 | 慮 | 香 | 靴 | 曹 | 寇 | 麻 | 隕 | 彙 | 乘 | 縉 | 桑 | 隕 | 勳 | 名 |
| 1BB | 373 | 董 | 訓 | 群 | 軍 | 郡 | 針 | 認 | 祁 | 係 | 傾 | 刑 | 兄 | 營 | 走 | 球 | 系 |
| 1BC | 374 | 契 | 形 | 憲 | 憲 | 翠 | 翠 | 翹 | 掃 | 携 | 敬 | 景 | 桂 | 淡 | 哇 | 櫻 | 櫻 |
| 1BD | 375 | 經 | 維 | 禁 | 野 | 豎 | 前 | 宜 | 計 | 詣 | 警 | 輕 | 頭 | 雞 | 莖 | 迎 | 稜 |
| 1BE | 376 | 劇 | 就 | 禁 | 激 | 險 | 衍 | 保 | 欠 | 決 | 潔 | 穴 | 結 | 血 | 訣 | 月 | 伴 |
| 1BF | 377 | 侯 | 德 | 健 | 兼 | 券 | 刺 | 垣 | 圍 | 豎 | 孀 | 建 | 憲 | 魁 | 拳 | 捲 | × |
| 1C2 | 382 | × | 悅 | 悅 | 幸 | 犬 | 獻 | 碩 | 現 | 緝 | 場 | 屏 | 兒 | 謙 | 賢 | 軒 | 遠 |
| 1C3 | 383 | 總 | 陝 | 顯 | 駛 | 蘇 | 元 | 原 | 顯 | 幻 | 弦 | 漢 | 源 | 玄 | 現 | 炫 | 炫 |
| 1C4 | 384 | 言 | 諄 | 限 | 乎 | 個 | 古 | 呼 | 固 | 站 | 孤 | 己 | 塵 | 強 | 戶 | 故 | 枯 |
| 1C5 | 385 | 湖 | 現 | 糊 | 務 | 股 | 胡 | 獲 | 虎 | 誇 | 跨 | 茲 | 麗 | 韻 | 鈇 | 五 | 互 |
| 1C6 | 386 | 伍 | 午 | 典 | 吾 | 娛 | 後 | 御 | 惜 | 梧 | 槐 | 瑚 | 吾 | 語 | 誤 | 讓 | 闕 |
| 1C7 | 387 | 乞 | 裡 | 文 | 仗 | 候 | 候 | 俾 | 光 | 孝 | 宏 | 工 | 巧 | 巷 | 口 | 向 | × |
| 1CA | 392 | × | 后 | 悞 | 坑 | 垢 | 好 | 孔 | 孝 | 宏 | 工 | 巧 | 巷 | 幸 | 慮 | 庚 | 廣 |
| 1CB | 393 | 弘 | 悞 | 抗 | 垢 | 控 | 攻 | 攻 | 昂 | 昂 | 見 | 更 | 杭 | 校 | 慮 | 江 | 洪 |
| 1CC | 394 | 浩 | 港 | 溝 | 甲 | 皇 | 璽 | 籍 | 籍 | 紅 | 紅 | 絃 | 綫 | 綫 | 考 | 青 | 監 |
| 1CD | 395 | 腔 | 膏 | 航 | 荒 | 行 | 商 | 講 | 貢 | 睛 | 郊 | 群 | 絃 | 絃 | 綫 | 蘭 | 陸 |
| 1CE | 396 | 項 | 香 | 高 | 鴻 | 剛 | 劫 | 考 | 合 | 燈 | 持 | 濛 | 蒙 | 轟 | 輕 | 克 | 刻 |
| 1CF | 397 | 告 | 國 | 鞍 | 飽 | 諷 | 黑 | 獄 | 滙 | 腰 | 輓 | 忽 | 惚 | 骨 | 伯 | 込 | × |
| 1D2 | 3A2 | × | 此 | 頃 | 今 | 因 | 坤 | 璧 | 婿 | 恨 | 懸 | 昏 | 昆 | 根 | 棚 | 混 | 痕 |
| 1D3 | 3A3 | 紺 | 良 | 曉 | 些 | 佐 | 又 | 峻 | 左 | 蒼 | 查 | 查 | 沙 | 瑾 | 鈇 | 詐 | 鎖 |
| 1D4 | 3A4 | 誠 | 坐 | 煙 | 控 | 儀 | 催 | 兩 | 最 | 蘇 | 妻 | 妻 | 宰 | 彩 | 才 | 採 | 載 |
| 1D5 | 3A5 | 鹿 | 濟 | 財 | 采 | 犀 | 碎 | 齒 | 祭 | 薪 | 菜 | 菜 | 裁 | 裁 | 陸 | 則 | 在 |
| 1D6 | 3A6 | 材 | 罪 | 罪 | 訝 | 癩 | 駭 | 駭 | 神 | 神 | 神 | 神 | 世 | 世 | 世 | 作 | 削 |
| 1D7 | 3A7 | 昨 | 擇 | 昨 | 朝 | 率 | 率 | 策 | 策 | 策 | 策 | 策 | 世 | 世 | 世 | 削 | × |
| 1DA | 3B2 | × | 察 | 抄 | 操 | 操 | 札 | 我 | 我 | 我 | 我 | 我 | 我 | 我 | 我 | 我 | 晒 |
| 1DB | 3B3 | 三 | 傘 | 參 | 山 | 餐 | 撒 | 數 | 棧 | 察 | 察 | 察 | 察 | 察 | 察 | 察 | 贊 |
| 1DC | 3B4 | 豔 | 宴 | 斬 | 誓 | 絲 | 仕 | 仔 | 伺 | 使 | 刺 | 司 | 司 | 司 | 司 | 士 | 始 |
| 1DD | 3B5 | 姉 | 姿 | 子 | 麗 | 市 | 師 | 志 | 思 | 指 | 支 | 致 | 致 | 致 | 致 | 止 | 止 |
| 1DE | 3B6 | 死 | 氏 | 體 | 址 | 私 | 糸 | 紙 | 業 | 肢 | 脂 | 至 | 至 | 至 | 至 | 試 | 試 |
| 1DF | 3B7 | 誇 | 資 | 驕 | 謹 | 鈞 | 齒 | 事 | 似 | 伴 | 兒 | 字 | 寺 | 寺 | 時 | 時 | × |
| 1E2 | 3C2 | × | 次 | 滋 | 治 | 爾 | 董 | 壽 | 磁 | 示 | 而 | 耳 | 自 | 時 | 時 | 沙 | 鹿 |
| 1E3 | 3C3 | 式 | 滋 | 曉 | 竺 | 輪 | 吉 | 榮 | 七 | 叱 | 執 | 失 | 飯 | 室 | 悉 | 濕 | 津 |
| 1E4 | 3C4 | 疾 | 贊 | 實 | 都 | 錄 | 德 | 榮 | 榮 | 芝 | 履 | 翁 | 翁 | 寫 | 射 | 接 | 歌 |
| 1E5 | 3C5 | 斜 | 兼 | 社 | 紗 | 者 | 謝 | 車 | 進 | 宛 | 邪 | 借 | 勺 | 尺 | 約 | 灼 | 麴 |
| 1E6 | 3C6 | 酌 | 狀 | 錫 | 若 | 寂 | 部 | 雪 | 主 | 取 | 守 | 手 | 朱 | 殊 | 狩 | 珠 | 種 |
| 1E7 | 3C7 | 腫 | 趣 | 潘 | 首 | 僅 | 受 | 吼 | 壽 | 授 | 射 | 緩 | 需 | 囚 | 取 | 周 | × |
| 1EA | 3D2 | × | 宗 | 就 | 州 | 修 | 怒 | 拾 | 洲 | 秀 | 秋 | 終 | 績 | 習 | 臭 | 舟 | 萬 |
| 1EB | 3D3 | 慶 | 襲 | 贊 | 獸 | 解 | 湖 | 首 | 醜 | 美 | 醜 | 什 | 住 | 充 | 十 | 從 | 戎 |
| 1EC | 3D4 | 委 | 汁 | 洪 | 獸 | 重 | 重 | 武 | 披 | 風 | 富 | 潔 | 祝 | 福 | 書 | 壘 | 熱 |
| 1ED | 3D5 | 出 | 術 | 述 | 俊 | 峻 | 春 | 輪 | 竣 | 舞 | 駿 | 准 | 滿 | 旬 | 糖 | 狗 | 浮 |
| 1EE | 3D6 | 準 | 潛 | 厝 | 純 | 運 | 運 | 薛 | 漸 | 處 | 初 | 所 | 磨 | 磨 | 活 | 底 | 緒 |
| 1EF | 3D7 | 署 | 書 | 署 | 請 | 請 | 助 | 叔 | 女 | 序 | 徐 | 恕 | 磨 | 除 | 係 | 價 | × |

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 1F2 | 3E2 | × | 勝 | 匠 | 舟 | 百 | 哨 | 商 | 喝 | 管 | 婆 | 委 | 婦 | 育 | 符 | 小 | 少 |
| 1F3 | 3E3 | 尚 | 庄 | 床 | 筋 | 彭 | 承 | 抄 | 招 | 罕 | 建 | 鼻 | 晶 | 唱 | 晶 | 松 | 精 |
| 1F4 | 3E4 | 橙 | 棋 | 温 | 濱 | 涉 | 湘 | 煥 | 焦 | 照 | 症 | 省 | 嶺 | 嶺 | 祥 | 称 | 章 |
| 1F5 | 3E5 | 笑 | 紙 | 組 | 尚 | 葛 | 蔣 | 蕪 | 衡 | 冢 | 訟 | 証 | 詔 | 詳 | 象 | 賞 | 據 |
| 1F6 | 3E6 | 錠 | 鐘 | 鐘 | 障 | 輪 | 上 | 丈 | 丞 | 乘 | 兀 | 刺 | 嶺 | 場 | 邊 | 線 | 常 |
| 1F7 | 3E7 | 情 | 撥 | 桑 | 杖 | 淨 | 狀 | 疊 | 穩 | 蒸 | 疎 | 疎 | 錠 | 囉 | 植 | 飾 | × |
| 1FA | 3F2 | × | 拭 | 植 | 殖 | 濁 | 痛 | 聯 | 色 | 舐 | 食 | 疎 | 尋 | 尻 | 伸 | 信 | 侵 |
| 1FB | 3F3 | 腎 | 播 | 神 | 審 | 心 | 情 | 振 | 新 | 胥 | 棧 | 進 | 深 | 申 | 宥 | 真 | |
| 1FC | 3F4 | 管 | 奉 | 臣 | 芯 | 薪 | 薪 | 視 | 診 | 身 | 辛 | 進 | 針 | 人 | 仁 | 刃 | |
| 1FD | 3F5 | 應 | 王 | 尋 | 甚 | 尽 | 腎 | 調 | 迅 | 陣 | 鞞 | 胃 | 騰 | 許 | 回 | 厨 | |
| 1FE | 3F6 | 運 | 吹 | 垂 | 帥 | 獲 | 水 | 炊 | 種 | 許 | 翠 | 哀 | 迷 | 醉 | 鍾 | 鍾 | |
| 1FF | 3F7 | 瑞 | 髓 | 崇 | 嵩 | 敷 | 柜 | 担 | 翅 | 掘 | 杉 | 梧 | 菅 | 蘇 | 雀 | 裾 | × |
| 202 | 402 | × | 澄 | 澄 | 寸 | 世 | 淋 | 欽 | 是 | 淒 | 制 | 勢 | 姓 | 征 | 性 | 成 | 政 |
| 203 | 403 | 禁 | 星 | 晴 | 櫻 | 碩 | 正 | 清 | 性 | 生 | 盛 | 積 | 聖 | 声 | 製 | 西 | 紙 |
| 204 | 404 | 馨 | 諸 | 逝 | 蘭 | 香 | 靜 | 齊 | 稅 | 腕 | 塵 | 虐 | 惜 | 戚 | 斥 | 替 | 折 |
| 205 | 405 | 石 | 積 | 鐘 | 積 | 督 | 書 | 赤 | 跡 | 跡 | 頓 | 切 | 措 | 措 | 措 | 折 | 設 |
| 206 | 406 | 竊 | 節 | 說 | 雪 | 絕 | 舌 | 揮 | 仙 | 先 | 干 | 占 | 宣 | 專 | 尖 | 川 | 對 |
| 207 | 407 | 屬 | 撰 | 柱 | 栢 | 泉 | 淡 | 洗 | 染 | 潛 | 煎 | 煎 | 旋 | 穿 | 箭 | 線 | × |
| 20A | 412 | × | 嶽 | 嶽 | 然 | 全 | 神 | 粉 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 |
| 20B | 413 | 前 | 善 | 漸 | 然 | 全 | 神 | 粉 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 | 鷓 |
| 20C | 414 | 祖 | 疏 | 疎 | 嶽 | 祖 | 祖 | 祖 | 祖 | 祖 | 祖 | 祖 | 祖 | 祖 | 祖 | 祖 | 祖 |
| 20D | 415 | 双 | 叢 | 會 | 喪 | 壯 | 委 | 與 | 宋 | 層 | 匠 | 想 | 想 | 想 | 想 | 想 | 想 |
| 20E | 416 | 揀 | 早 | 曹 | 舉 | 桃 | 槽 | 漕 | 煉 | 爭 | 瘦 | 相 | 窓 | 槽 | 絳 | 絳 | |
| 20F | 417 | 草 | 莊 | 葬 | 巷 | 蓬 | 裝 | 走 | 迷 | 連 | 鏡 | 霜 | 穉 | 穉 | 增 | 增 | × |
| 212 | 422 | × | 驢 | 箭 | 輪 | 遠 | 促 | 側 | 則 | 即 | 息 | 捉 | 束 | 測 | 足 | 速 | 俗 |
| 213 | 423 | 屬 | 駝 | 族 | 統 | 卒 | 袖 | 其 | 攝 | 存 | 孫 | 尊 | 捐 | 村 | 遊 | 他 | 多 |
| 214 | 424 | 太 | 汰 | 詫 | 唾 | 望 | 妥 | 情 | 打 | 花 | 舵 | 槽 | 陀 | 駝 | 駝 | 推 | |
| 215 | 425 | 封 | 耐 | 恣 | 帶 | 待 | 忘 | 態 | 黏 | 替 | 第 | 滿 | 胎 | 腿 | 苔 | 袋 | 袋 |
| 216 | 426 | 封 | 通 | 拆 | 黛 | 調 | 代 | 台 | 大 | 第 | 鬪 | 闊 | 淹 | 窮 | 窮 | 卓 | |
| 217 | 427 | 宅 | 托 | 斥 | 拓 | 濯 | 球 | 託 | 託 | 湧 | 話 | 寬 | 風 | 窮 | 窮 | 只 | × |
| 21A | 432 | × | 叩 | 但 | 達 | 辰 | 奪 | 脫 | 蕪 | 擊 | 過 | 翻 | 谷 | 理 | 睛 | 得 | 維 |
| 21B | 433 | 丹 | 單 | 曉 | 坦 | 担 | 探 | 旦 | 歎 | 淡 | 港 | 炭 | 短 | 確 | 確 | 綻 | 歌 |
| 21C | 434 | 胆 | 運 | 誼 | 銀 | 團 | 壇 | 彈 | 斷 | 囉 | 禮 | 陸 | 男 | 談 | 值 | 知 | 地 |
| 21D | 435 | 弛 | 駝 | 智 | 池 | 廂 | 推 | 置 | 致 | 御 | 運 | 馳 | 鬪 | 鬪 | 竹 | 氣 | 蓋 |
| 21E | 436 | 透 | 秩 | 空 | 茶 | 鍾 | 著 | 中 | 伸 | 宙 | 思 | 抽 | 壘 | 柱 | 注 | 虫 | 更 |
| 21F | 437 | 註 | 討 | 誘 | 駐 | 鴉 | 滿 | 猪 | 宇 | 奢 | 行 | 丁 | 兆 | 滿 | 囉 | 電 | × |
| 222 | 442 | × | 帖 | 帳 | 斤 | 弔 | 張 | 影 | 邀 | 邀 | 携 | 楊 | 朝 | 滿 | 囉 | 町 | 眺 |
| 223 | 443 | 聽 | 賬 | 帳 | 僕 | 調 | 諱 | 超 | 跳 | 跳 | 長 | 頂 | 鳥 | 動 | 抄 | 遠 | 跌 |
| 224 | 444 | 聽 | 珍 | 貨 | 舖 | 陳 | 津 | 壁 | 推 | 推 | 遠 | 錦 | 遠 | 塔 | 得 | 得 | 拍 |
| 225 | 445 | 櫻 | 佃 | 清 | 拓 | 辻 | 葛 | 羅 | 鏡 | 橋 | 濃 | 坪 | 靈 | 嬌 | 袖 | 爪 | 吊 |
| 226 | 446 | 釣 | 鶴 | 亭 | 低 | 停 | 偵 | 刺 | 貞 | 量 | 規 | 定 | 帝 | 底 | 庭 | 廷 | 弟 |
| 227 | 447 | 佛 | 抵 | 拒 | 提 | 佛 | 汀 | 錠 | 補 | 程 | 磅 | 艇 | 訂 | 請 | 請 | 遞 | × |
| 22A | 452 | × | 邸 | 鄭 | 訂 | 鼎 | 泥 | 拖 | 撮 | 敲 | 滴 | 約 | 笛 | 連 | 插 | 溜 | 替 |
| 22B | 453 | 徽 | 徽 | 徽 | 透 | 鉄 | 典 | 堆 | 天 | 展 | 店 | 添 | 續 | 甜 | 貼 | 乾 | 顏 |
| 22C | 454 | 点 | 佞 | 照 | 照 | 田 | 電 | 兎 | 吐 | 堵 | 達 | 姑 | 麗 | 徒 | 斗 | 杜 | 達 |
| 22D | 455 | 壹 | 菟 | 臨 | 途 | 都 | 運 | 馳 | 獸 | 野 | 度 | 土 | 奴 | 怒 | 倒 | 莞 | 冬 |
| 22E | 456 | 凍 | 刀 | 唐 | 塔 | 糖 | 妾 | 宕 | 島 | 嶋 | 悼 | 投 | 惑 | 東 | 桃 | 桃 | 棟 |
| 22F | 457 | 盜 | 淘 | 滿 | 滿 | 灯 | 燈 | 當 | 燈 | 構 | 等 | 答 | 簡 | 糖 | 統 | 到 | × |

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | |
| 232 | 462 | ⊗ | 董 | 蕩 | 蕙 | 討 | 贈 | 豆 | 踴 | 透 | 透 | 窺 | 陶 | 頤 | 櫻 | 嗣 | 傲 | |
| 233 | 463 | 勳 | 同 | 堂 | 蕙 | 討 | 贈 | 豆 | 踴 | 透 | 透 | 窺 | 陶 | 頤 | 櫻 | 嗣 | 傲 | |
| 234 | 464 | 得 | 德 | 澆 | 特 | 留 | 禿 | 罵 | 毒 | 性 | 誦 | 拆 | 棉 | 凸 | 突 | 唇 | 屈 | |
| 235 | 465 | 罵 | 苦 | 寘 | 西 | 滯 | 噴 | 毛 | 倅 | 敦 | 沌 | 豚 | 通 | 頓 | 吞 | 唇 | 屈 | |
| 236 | 466 | 奈 | 那 | 內 | 乍 | 風 | 蔬 | 註 | 澗 | 探 | 錫 | 錫 | 馴 | 繩 | 哪 | 南 | 筋 | |
| 237 | 467 | 軟 | 難 | 汝 | 二 | 尼 | 武 | 述 | 句 | 際 | 肉 | 虹 | 甘 | 日 | 乳 | 入 | ⊗ | |
| 23A | 472 | ⊗ | 如 | 尿 | 董 | 任 | 好 | 忍 | 認 | 滿 | 捕 | 沐 | 寧 | 惹 | 拖 | 熱 | 年 | |
| 23B | 473 | 念 | 控 | 照 | 然 | 把 | 乃 | 類 | 之 | 滯 | 滯 | 留 | 滯 | 納 | 能 | 腦 | 購 | |
| 23C | 474 | 轟 | 曠 | 巴 | 把 | 播 | 播 | 把 | 派 | 派 | 派 | 派 | 派 | 派 | 派 | 派 | 馬 | |
| 23D | 475 | 併 | 龐 | 揮 | 抹 | 敗 | 杆 | 孟 | 背 | 肺 | 肺 | 肺 | 配 | 倍 | 培 | 煤 | 拍 | |
| 23E | 476 | 煤 | 煤 | 借 | 實 | 禿 | 皓 | 陸 | 遠 | 鬼 | 群 | 羽 | 寂 | 伯 | 制 | 博 | 拍 | |
| 23F | 477 | 柏 | 泊 | 白 | 箔 | 粘 | 粘 | 薄 | 迫 | 嘆 | 漢 | 爆 | 精 | 英 | 駁 | 麥 | ⊗ | |
| 242 | 482 | ⊗ | 函 | 箱 | 箱 | 著 | 聖 | 苦 | 苦 | 苦 | 肌 | 加 | 車 | 八 | 肆 | 深 | 免 | |
| 243 | 483 | 靛 | 髮 | 伐 | 罰 | 悲 | 茂 | 關 | 鳩 | 嘯 | 鳩 | 拾 | 集 | 伴 | 判 | 半 | 反 | |
| 244 | 484 | 飯 | 帆 | 飯 | 班 | 飯 | 汎 | 汎 | 飯 | 犯 | 班 | 鮮 | 繁 | 般 | 蓬 | 販 | 範 | |
| 245 | 485 | 采 | 翅 | 翅 | 飯 | 飯 | 晚 | 番 | 盤 | 盤 | 盤 | 盤 | 匪 | 卑 | 否 | 紀 | 庇 | |
| 246 | 486 | 彼 | 悲 | 扉 | 批 | 披 | 斐 | 比 | 泌 | 疲 | 皮 | 碑 | 秘 | 緹 | 罷 | 肥 | 被 | |
| 247 | 487 | 排 | 費 | 遊 | 非 | 飛 | 德 | 比 | 備 | 尾 | 彼 | 世 | 罷 | 罷 | 層 | 美 | ⊗ | |
| 24A | 492 | ⊗ | 梟 | 梟 | 梟 | 匹 | 匹 | 匹 | 匹 | 匹 | 匹 | 匹 | 匹 | 匹 | 匹 | 匹 | 匹 | |
| 24B | 493 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 | 梟 |
| 24C | 494 | 願 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 |
| 24D | 495 | 實 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 | 箱 |
| 24E | 496 | 芳 | 香 | 浮 | 父 | 符 | 庸 | 庸 | 庸 | 庸 | 庸 | 庸 | 庸 | 庸 | 庸 | 庸 | 庸 | 庸 |
| 24F | 497 | 武 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 | 舞 |
| 252 | 4A2 | ⊗ | 福 | 福 | 福 | 福 | 福 | 福 | 福 | 福 | 福 | 福 | 福 | 福 | 福 | 福 | 福 | 福 |
| 253 | 4A3 | 惜 | 扮 | 焚 | 黨 | 粉 | 黨 | 粉 | 黨 | 粉 | 黨 | 粉 | 黨 | 粉 | 黨 | 粉 | 黨 | 粉 |
| 254 | 4A4 | 群 | 扮 | 並 | 蔽 | 閉 | 陛 | 米 | 頁 | 辭 | 壁 | 嬌 | 嬌 | 別 | 當 | 當 | 當 | |
| 255 | 4A5 | 偏 | 夾 | 片 | 鑰 | 編 | 迎 | 返 | 遷 | 便 | 勉 | 嬌 | 嬌 | 母 | 保 | 舖 | 舖 | |
| 256 | 4A6 | 園 | 捕 | 步 | 甫 | 補 | 寶 | 峰 | 華 | 劇 | 庖 | 抱 | 捧 | 放 | 方 | 朋 | ⊗ | |
| 257 | 4A7 | 傳 | 包 | 呆 | 報 | 奉 | 峰 | 華 | 劇 | 庖 | 抱 | 捧 | 放 | 方 | 朋 | ⊗ | | |
| 25A | 4B2 | ⊗ | 法 | 泡 | 支 | 魂 | 絳 | 危 | 芳 | 噴 | 蓬 | 怪 | 索 | 訪 | 慶 | 邦 | 鋒 | |
| 25B | 4B3 | 風 | 風 | 聽 | 乏 | 亡 | 儂 | 割 | 坊 | 妨 | 妨 | 帽 | 忘 | 仕 | 屨 | 望 | 某 | |
| 25C | 4B4 | 種 | 冒 | 紡 | 紡 | 影 | 謀 | 統 | 管 | 管 | 管 | 防 | 味 | 精 | 北 | 僕 | 墨 | |
| 25D | 4B5 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 | 撲 |
| 25E | 4B6 | 摩 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 | 磨 |
| 25F | 4B7 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 | 轉 |
| 262 | 4C2 | ⊗ | 漫 | 蔓 | 味 | 未 | 魅 | 已 | 茅 | 呼 | 密 | 蜜 | 蜜 | 蜜 | 蜜 | 蜜 | 蜜 | 蜜 |
| 263 | 4C3 | 耗 | 民 | 眠 | 孫 | 夢 | 無 | 年 | 北 | 派 | 免 | 棉 | 繡 | 繡 | 繡 | 繡 | 繡 | 繡 |
| 264 | 4C4 | 明 | 盟 | 迷 | 絲 | 鳴 | 盲 | 網 | 網 | 網 | 網 | 網 | 網 | 網 | 網 | 網 | 網 | 網 |
| 265 | 4C5 | 茂 | 妄 | 孟 | 毛 | 猛 | 盲 | 網 | 網 | 網 | 網 | 網 | 網 | 網 | 網 | 網 | 網 | 網 |
| 266 | 4C6 | 尤 | 畏 | 初 | 實 | 簡 | 簡 | 紋 | 門 | 為 | 也 | 治 | 夜 | 疑 | 耶 | 野 | 狎 | |
| 267 | 4C7 | 矢 | 厄 | 役 | 約 | 藥 | 訊 | 躍 | 樂 | 柳 | 荻 | 穩 | 偷 | 愈 | 油 | 瘡 | ⊗ | |
| 26A | 4D2 | ⊗ | 論 | 論 | 唯 | 佑 | 優 | 勇 | 友 | 有 | 有 | 有 | 有 | 有 | 有 | 有 | 有 | 有 |
| 26B | 4D3 | 涌 | 瀾 | 獻 | 由 | 祐 | 裕 | 該 | 遊 | 島 | 郵 | 儲 | 儲 | 夕 | 子 | 余 | 涌 | |
| 26C | 4D4 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 | 響 |
| 26D | 4D5 | 燈 | 用 | 靈 | 羊 | 羶 | 樂 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 |
| 26E | 4D6 | 沃 | 浴 | 翌 | 翼 | 淀 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 |
| 26F | 4D7 | 亂 | 卵 | 崩 | 權 | 產 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 | 靈 |

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 272 | 4E2 | 雨 | 英 | 裡 | 里 | 裡 | 裡 | 裡 | 裡 | 裡 | 裡 | 裡 | 裡 | 裡 | 裡 | 裡 | 裡 |
| 273 | 4E3 | 址 | 留 | 留 | 留 | 留 | 留 | 留 | 留 | 留 | 留 | 留 | 留 | 留 | 留 | 留 | 留 |
| 274 | 4E4 | 察 | 料 | 梁 | 梁 | 梁 | 梁 | 梁 | 梁 | 梁 | 梁 | 梁 | 梁 | 梁 | 梁 | 梁 | 梁 |
| 275 | 4E5 | 綠 | 倫 | 匯 | 匯 | 匯 | 匯 | 匯 | 匯 | 匯 | 匯 | 匯 | 匯 | 匯 | 匯 | 匯 | 匯 |
| 276 | 4E6 | 類 | 令 | 仲 | 例 | 冷 | 勵 | 穎 | 仲 | 玲 | 禮 | 禮 | 禮 | 禮 | 禮 | 禮 | 禮 |
| 277 | 4E7 | 齡 | 曆 | 歷 | 列 | 劣 | 烈 | 裂 | 廉 | 戀 | 營 | 滄 | 滄 | 滄 | 滄 | 滄 | 滄 |
| 27A | 4F2 | 蓮 | 連 | 鍊 | 呂 | 魯 | 魯 | 魯 | 魯 | 魯 | 魯 | 魯 | 魯 | 魯 | 魯 | 魯 | 魯 |
| 27B | 4F3 | 樓 | 都 | 滬 | 滬 | 滬 | 滬 | 滬 | 滬 | 滬 | 滬 | 滬 | 滬 | 滬 | 滬 | 滬 | 滬 |
| 27C | 4F4 | 樓 | 僂 | 和 | 話 | 歪 | · | · | · | · | · | · | · | · | · | · | · |
| 27D | 4F5 | 樓 | 灣 | 晚 | · | · | · | · | · | · | · | · | · | · | · | · | · |
| 27E | 4F6 | · | · | · | · | · | · | · | · | · | · | · | · | · | · | · | · |
| 27F | 4F7 | · | · | · | · | · | · | · | · | · | · | · | · | · | · | · | · |
| 282 | 502 | 式 | 巧 | 丕 | 个 | 非 | 、 | 井 | ノ | 又 | 垂 | 垂 | 亂 | 丿 | 豫 | 事 | 仗 |
| 283 | 503 | 紆 | 式 | 干 | 亞 | 亞 | 一 | 亢 | 京 | 毫 | 寬 | 从 | 仍 | 仄 | 什 | 仇 | 仗 |
| 284 | 504 | 仰 | 俛 | 任 | 佞 | 佞 | 佞 | 佞 | 佞 | 佞 | 佞 | 佞 | 佞 | 佞 | 佞 | 佞 | 佞 |
| 285 | 505 | 佩 | 伯 | 侑 | 佯 | 佯 | 佯 | 佯 | 佯 | 佯 | 佯 | 佯 | 佯 | 佯 | 佯 | 佯 | 佯 |
| 286 | 506 | 傳 | 倚 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 |
| 287 | 507 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 |
| 28A | 512 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 |
| 28B | 513 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 | 僂 |
| 28C | 514 | 兩 | 俞 | 兮 | 號 | 門 | 回 | 回 | 回 | 回 | 回 | 回 | 回 | 回 | 回 | 回 | 回 |
| 28D | 515 | 寫 | 寫 | 、 | 決 | 涇 | 冲 | 冰 | 泥 | 測 | 測 | 涼 | 涼 | 几 | 處 | 風 | 凭 |
| 28E | 516 | 鳳 | 山 | 函 | 又 | 刊 | 刊 | 刊 | 刊 | 刊 | 刊 | 刊 | 刊 | 刊 | 刊 | 刊 | 刊 |
| 28F | 517 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 | 刺 |
| 292 | 522 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 |
| 293 | 523 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 | 勳 |
| 294 | 524 | 卒 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 | 卅 |
| 295 | 525 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 | 厥 |
| 296 | 526 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 |
| 297 | 527 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 |
| 29A | 532 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 | 呀 |
| 29B | 533 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 |
| 29C | 534 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 |
| 29D | 535 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 |
| 29E | 536 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 |
| 29F | 537 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 | 啞 |
| 2A2 | 542 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 |
| 2A3 | 543 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 |
| 2A4 | 544 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 | 圉 |
| 2A5 | 545 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 |
| 2A6 | 546 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 | 壘 |
| 2A7 | 547 | 天 | 本 | 亨 | 火 | 奇 | 實 | 實 | 實 | 實 | 實 | 實 | 實 | 實 | 實 | 實 | 實 |
| 2AA | 552 | 奸 | 的 | 的 | 的 | 的 | 的 | 的 | 的 | 的 | 的 | 的 | 的 | 的 | 的 | 的 | 的 |
| 2AB | 553 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 | 婆 |
| 2AC | 554 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 | 媽 |
| 2AD | 555 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 | 孃 |
| 2AE | 556 | 它 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 | 宦 |
| 2AF | 557 | 實 | 魁 | 將 | 專 | 對 | 爾 | 爾 | 爾 | 爾 | 爾 | 爾 | 爾 | 爾 | 爾 | 爾 | 爾 |

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 2B2 | 562 | × | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 | 巖 |
| 2B3 | 563 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 | 岬 |
| 2B4 | 564 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 | 峯 |
| 2B5 | 565 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 | 嶽 |
| 2B6 | 566 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 | 岳 |
| 2B7 | 567 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 | 嶺 |
| 2BA | 572 | × | 原 | 原 | 原 | 原 | 原 | 原 | 原 | 原 | 原 | 原 | 原 | 原 | 原 | 原 | 原 |
| 2BB | 573 | 升 | 升 | 升 | 升 | 升 | 升 | 升 | 升 | 升 | 升 | 升 | 升 | 升 | 升 | 升 | 升 |
| 2BC | 574 | 立 | 立 | 立 | 立 | 立 | 立 | 立 | 立 | 立 | 立 | 立 | 立 | 立 | 立 | 立 | 立 |
| 2BD | 575 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 |
| 2BE | 576 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 | 往 |
| 2BF | 577 | 協 | 協 | 協 | 協 | 協 | 協 | 協 | 協 | 協 | 協 | 協 | 協 | 協 | 協 | 協 | 協 |
| 2C2 | 582 | × | 情 | 情 | 情 | 情 | 情 | 情 | 情 | 情 | 情 | 情 | 情 | 情 | 情 | 情 | 情 |
| 2C3 | 583 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 | 悵 |
| 2C4 | 584 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 | 懸 |
| 2C5 | 585 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 |
| 2C6 | 586 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 | 慚 |
| 2C7 | 587 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 | 憑 |
| 2CA | 592 | × | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 | 憂 |
| 2CB | 593 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 | 狂 |
| 2CC | 594 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 | 拈 |
| 2CD | 595 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 |
| 2CE | 596 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 |
| 2CF | 597 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 | 搨 |
| 2D2 | 5A2 | × | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 |
| 2D3 | 5A3 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 | 撥 |
| 2D4 | 5A4 | 收 | 收 | 收 | 收 | 收 | 收 | 收 | 收 | 收 | 收 | 收 | 收 | 收 | 收 | 收 | 收 |
| 2D5 | 5A5 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 |
| 2D6 | 5A6 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 | 劇 |
| 2D7 | 5A7 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 | 鼻 |
| 2DA | 5B2 | × | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 |
| 2DB | 5B3 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 | 噀 |
| 2DC | 5B4 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 | 恣 |
| 2DD | 5B5 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 |
| 2DE | 5B6 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 | 柞 |
| 2DF | 5B7 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 | 梵 |
| 2E2 | 5C2 | × | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 |
| 2E3 | 5C3 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 |
| 2E4 | 5C4 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 |
| 2E5 | 5C5 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 |
| 2E6 | 5C6 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 |
| 2E7 | 5C7 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 |
| 2EA | 5D2 | × | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 |
| 2EB | 5D3 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 | 榎 |
| 2EC | 5D4 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 |
| 2ED | 5D5 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 | 款 |
| 2EE | 5D6 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 | 慶 |
| 2EF | 5D7 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 | 汾 |

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 2F2 | 5E2 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2F3 | 5E3 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2F4 | 5E4 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2F5 | 5E5 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2F6 | 5E6 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2F7 | 5E7 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2FA | 5F2 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2FB | 5F3 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2FC | 5F4 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2FD | 5F5 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2FE | 5F6 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 2FF | 5F7 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 302 | 602 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 303 | 603 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 304 | 604 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 305 | 605 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 306 | 606 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 307 | 607 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 30A | 612 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 30B | 613 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 30C | 614 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 30D | 615 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 30E | 616 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 30F | 617 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 312 | 622 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 313 | 623 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 314 | 624 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 315 | 625 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 316 | 626 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 317 | 627 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 31A | 632 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 31B | 633 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 31C | 634 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 31D | 635 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 31E | 636 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 31F | 637 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 322 | 642 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 323 | 643 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 324 | 644 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 325 | 645 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 326 | 646 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 327 | 647 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 32A | 652 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 32B | 653 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 32C | 654 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 32D | 655 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 32E | 656 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |
| 32F | 657 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 | 涸 |

| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 332 | 662 | × | 珠 | 翠 | 壹 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 333 | 663 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 334 | 664 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 335 | 665 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 336 | 666 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 337 | 667 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 33A | 672 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 33B | 673 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 33C | 674 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 33D | 675 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 33E | 676 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 33F | 677 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 342 | 682 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 343 | 683 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 344 | 684 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 345 | 685 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 346 | 686 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 347 | 687 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 34A | 692 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 34B | 693 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 34C | 694 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 34D | 695 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 34E | 696 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 34F | 697 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 352 | 6A2 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 353 | 6A3 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 354 | 6A4 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 355 | 6A5 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 356 | 6A6 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 357 | 6A7 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 35A | 6B2 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 35B | 6B3 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 35C | 6B4 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 35D | 6B5 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 35E | 6B6 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 35F | 6B7 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 362 | 6C2 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 363 | 6C3 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 364 | 6C4 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 365 | 6C5 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 366 | 6C6 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 367 | 6C7 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 36A | 6D2 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 36B | 6D3 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 36C | 6D4 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 36D | 6D5 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 36E | 6D6 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |
| 36F | 6D7 | × | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 | 翠 |

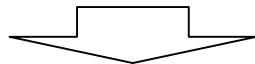
| Upper BIT | | Lower BIT | | | | | | | | | | | | | | | |
|-------------|----------|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chara. code | JIS code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 372 | 6E2 | × | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 373 | 6E3 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 374 | 6E4 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 375 | 6E5 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 376 | 6E6 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 377 | 6E7 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 37A | 6F2 | × | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 37B | 6F3 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 37C | 6F4 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 37D | 6F5 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 37E | 6F6 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 37F | 6F7 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 | 過 |
| 382 | 702 | × | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 | 陝 |
| 383 | 703 | 求 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 | 隸 |
| 384 | 704 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 | 雲 |
| 385 | 705 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 | 靜 |
| 386 | 706 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 | 鞋 |
| 387 | 707 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 |
| 38A | 712 | × | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 | 認 |
| 38B | 713 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 |
| 38C | 714 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 | 綸 |
| 38D | 715 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 38E | 716 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 38F | 717 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 392 | 722 | × | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 393 | 723 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 394 | 724 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 395 | 725 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 396 | 726 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 397 | 727 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 39A | 732 | × | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 39B | 733 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 39C | 734 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 39D | 735 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 39E | 736 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 39F | 737 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 3A2 | 742 | × | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 | 駁 |
| 3A3 | 743 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 3A4 | 744 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 3A5 | 745 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 3A6 | 746 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| 3A7 | 747 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | × |

Correspondence Table of Half-size character code and Character pattern (ROM version "00")

| | | LOWER 4bit(HEX) | | | | | | | | | | | | | | | | |
|-------------------|---|-----------------|---|---|----|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | |
| UPPER 10bit (HEX) | 0 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | |
| | 1 | ▶ | ■ | ✦ | ✧ | ✪ | ○ | ☆ | ✧ | ◊ | ▲ | △ | ▽ | ▼ | | | | |
| | 2 | | " | # | \$ | % | & | ' | (| * | + | , | - | . | / | | | |
| | 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > | ? | |
| | 4 | @ | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | |
| | 5 | P | Q | R | S | T | U | V | W | X | Y | Z | [| ¥ |] | ^ | _ | |
| | 6 | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | |
| | 7 | o | q | r | s | t | u | v | w | x | y | z | { | | } | ~ | + | + |
| | 8 | 士 | 嵐 | う | え | 嵐 | き | く | け | さ | し | せ | て | て | | | | |
| | 9 | ち | ち | て | て | な | な | ぬ | ぬ | の | の | の | の | の | の | の | の | の |
| | A | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て |
| | B | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て |
| | C | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て |
| | D | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て |
| | E | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て |
| | F | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て | て |

(4) FULL SCREEN REVERSE DISPLAY FUNCTION

This function reverses the full character and graphic display part except the icon display part. It is possible to reverse display easily without the RAM rewriting by this function. The cursor and the attribute display part are reversed too.



} The icon part doesn't change.

} Character/graphic part is reversed.

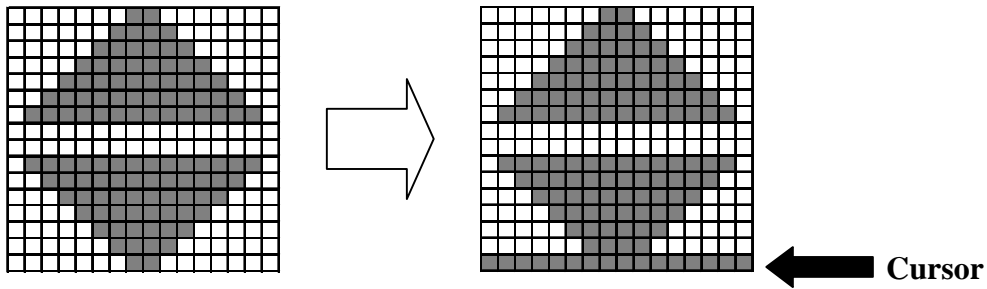
(5) CURSOR CONTROL

The method of displaying the cursor has 3-kind that are the reversing blink (BW="1") and the underline blinks of 16th row (C="1") and the black blink (B="1"). The "LC" register is possible to switch the cursor display of 1-character corresponding to the DDRAM address set in the address counter and the cursor display of the entire line including the setting address.

(5-1) Character Cursor

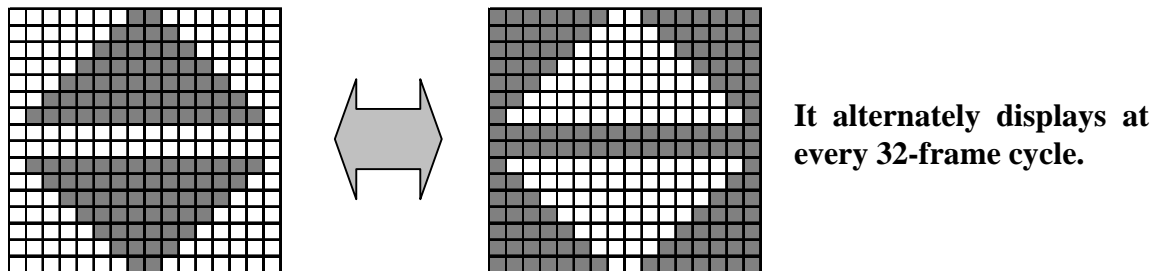
(5-1-1) Underline <C="1", LC="0", B="0", BW="0">

The underline is displayed to the 16th row. When there is ON data in the 16th row, the data displays the logical add with original data.



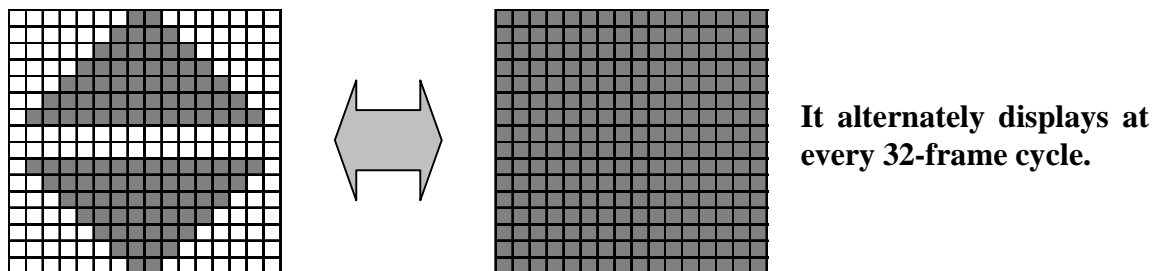
(5-1-2) Reverse Blink <C="1", LC="0", B="0", BW="1">

The character at the cursor position is blinking with the reversing display. And then, the reversing switches at every 32-frame cycle.



(5-1-3) Black Blink <C="1", LC="0", B="1", BW="0">

The character at the cursor position is blinking with the black pattern display. The blinking switches the all black pattern and the character pattern at every 32-frame cycle.



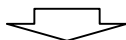
(5-2) Line Cursor

(5-2-1) Line Unit Underline <C="1", LC="1", B="0", BW="0">

The 16th row of the line including the DDRAM address setting in the address counter is all ON. When there is character data, the data displays the logical add.

```

新日本無線株式会社
  専用IC事業部 商品企画部
NJU6645 漢字ROM内蔵
          LCDドライバ
TEL:XX-1234-XXXXFAX:XX-1234-XXXX
◆12月 1日(金) AM12:34 2006年 ◆
    
```



```

新日本無線株式会社
  専用IC事業部 商品企画部
NJU6645 漢字ROM内蔵
          LCDドライバ
TEL:XX-1234-XXXXFAX:XX-1234-XXXX
◆12月 1日(金) AM12:34 2006年 ◆
    
```

← **Line Unit Underline**

(5-2-2) Line Unit Reverse <C="1", LC="1", B="0", BW="1">

The line including the DDRAM address setting in the address counter is reversed display.

```

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◆12月 1日(金) AM12:34 2006年 ◆
    
```



```

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  専用IC事業部 商品企画部
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◆12月 1日(金) AM12:34 2006年 ◆
    
```

← **Line Unit Reverse**

(5-2-3) Line Unit White Blink <C="1", LC="1", B="1", BW="0">

The line including the DDRAM address setting in the address counter is blinking with the white pattern display. The blinking switches the all white pattern and the character data at every 32-frame cycle.

```

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◆12月 1日(金) AM12:34 2006年 ◆
    
```



```

新日本無線株式会社
  専用IC事業部 商品企画部
          LCDドライバ
TEL:XX-1234-XXXXFAX:XX-1234-XXXX
◆12月 1日(金) AM12:34 2006年 ◆
    
```

← **Line Unit White Blink**

(6) DISPLAY ATTRIBUTE SETTING

NJU6645 is set the Reverse Display, the White Blink Display and the Reverse Blink Display by the display attribute code of each character in 2-bit. This display is applied in matrix unit of the 16 x 16 dots in the full-size data and the 8 x 16 dots in the half-size data. The White Blink Display and the Reverse Blink Display are switching at every 32-frame cycle.

< Relation between the input data at the data writing to DDRAM and the bit >

The attribute code of full-size / half-size character is allocated the 1st bit and 2nd bit in the 1st byte. When the DDRAM data is written, it is necessary to select the attribute code of this bit and to input the attribute of each character.

[Full-size character data]

| 1st byte | | 2nd byte | | | | | | | | | | | | | |
|-------------|-------------|--------------------------------|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|
| D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| Attribute 1 | Attribute 0 | Full-size character code 14bit | | | | | | | | | | | | | |
| P1 | P0 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |

[Half-size character data]

| 1st byte | | 2nd byte | | | | | | | | | | | | | |
|-------------|-------------|--------------------------|----|----|----|-------------------------------|----|----|----|----|----|----|----|----|----|
| D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| Attribute 1 | Attribute 0 | Half-size attribute code | | | | Half-size character code 8bit | | | | | | | | | |
| P1 | P0 | 0 | 0 | 0 | 0 | 0 | 0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |

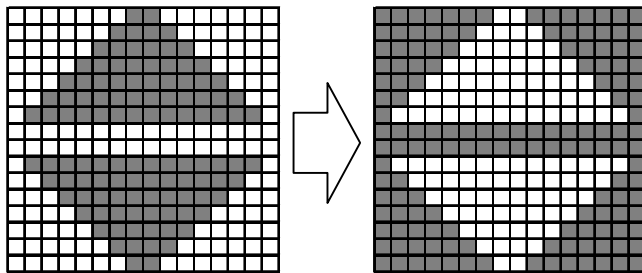
< Correspondence of the attribute code and the display status >

The display status changes according to the following tables.

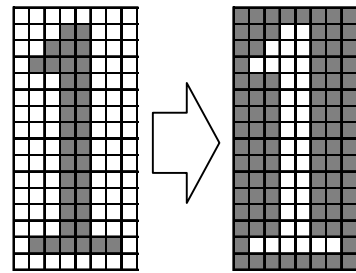
| P1 | P0 | Display Status |
|----|----|----------------|
| 0 | 0 | Normal |
| 0 | 1 | Reverse |
| 1 | 0 | White blink |
| 1 | 1 | Reverse blink |

< Example of display when the display attribute is selected >

(i) Reverse

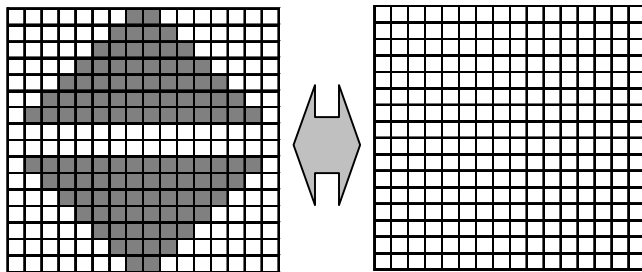


<Full-size character display>



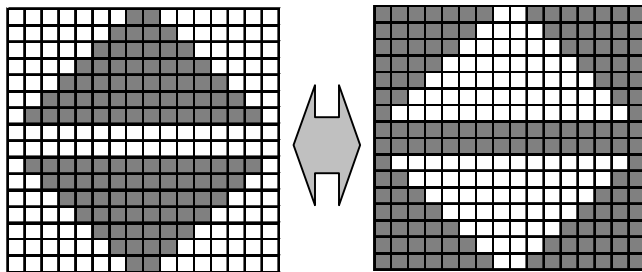
<Half-size character display>

(ii) White blink



It alternately displays at every 32-frame cycle.

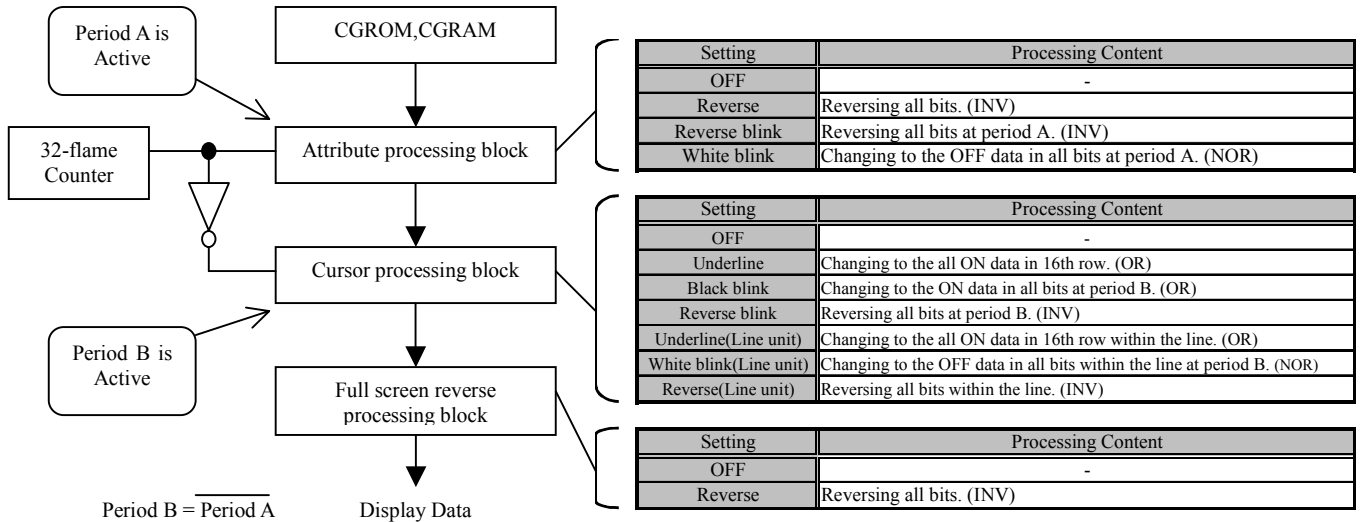
(iii) Reverse blink



It alternately displays at every 32-frame cycle.

(7) RELATION BETWEEN ATTRIBUTE, BLINK and FULL SCREEN REVERSE DISPLAY

The attribute display, the cursor display, and full screen reverse display are sequentially processed as shown in the following figures. The period that the data of various blinks is converted is reversed in the attribute display processing block and the cursor display processing block. Therefore, when the part where the attribute of the blink was selected and the cursor position of the blink overlap, the attribute display and the cursor display are alternately displayed. The full screen reverse display reverses the data after the attribute display processing and the cursor display processing are done.



< Method of display when attribute selection overlaps with cursor display >

| Attribute | | | Cursor | | Attribute + Cursor display | |
|-----------|---------------|---|-------------------------|---------------------------------------|----------------------------|---------------------------------------|
| Nomal | A B C D E F G | + | OFF | A B C D E F G | = | A B C D E F G |
| | | | Underline | A B C D E F G | = | A B C D E F G |
| | | | Black blink | A B C D E F G ⇕ A B C ■ E F G | = | A B C D E F G ⇕ A B C ■ E F G |
| | | | Reverse blink | A B C D E F G ⇕ A B C D E F G | = | A B C D E F G ⇕ A B C D E F G |
| | | | Underline (Line unit) | A B C D E F G | = | A B C D E F G |
| | | | White blink (Line unit) | A B C D E F G ⇕ □ □ □ □ □ □ □ □ | = | A B C D E F G ⇕ □ □ □ □ □ □ □ □ |
| | | | Reverse (Line unit) | A B C D E F G | = | A B C D E F G |

| Attribute | | Cursor | | Attribute + Cursor display | |
|-----------|---|-------------------------|---------------------------|----------------------------|-----------------------------|
| Reverse | ABCDEFG Reverse attribute selection part | OFF | ABCDEFGFG | = | ABCDEF FG |
| | | Underline | ABCDEFGFG | = | ABCDEF FG |
| | | Black blink | ABCDEFG ⇕ ABC█EFG | = | ABCDEF FG ⇕ ABC█EFG |
| | | Reverse blink | ABCDEFG ⇕ ABCDEF FG | = | ABCDEF FG ⇕ ABCDEF FG |
| | | Underline (Line unit) | ABCDEFGFG | = | ABCDEF FG |
| | | White blink (Line unit) | ABCDEFG ⇕ □□□□□□ | = | ABCDEF FG ⇕ □□□□□□ |
| | | Reverse (Line unit) | ABCDEFGFG | = | ABCDEF FG |

| Attribute | | Cursor | | Attribute + Cursor display | |
|---------------|---|-------------------------|---------------------------|----------------------------|-----------------------------|
| Reverse blink | ABCDEFG ⇕ ABCDEF FG Reverse blink attribute selection part | OFF | ABCDEFGFG | = | ABCDEF FG ⇕ ABCDEF FG |
| | | Underline | ABCDEFGFG | = | ABCDEF FG ⇕ ABCDEF FG |
| | | Black blink | ABCDEFG ⇕ ABC█EFG | = | ABCDEF FG ⇕ ABCDEF FG |
| | | Reverse blink | ABCDEFG ⇕ ABCDEF FG | = | ABCDEF FG ⇕ ABCDEF FG |
| | | Underline (Line unit) | ABCDEFGFG | = | ABCDEF FG ⇕ ABCDEF FG |
| | | White blink (Line unit) | ABCDEFG ⇕ □□□□□□ | = | ABCDEF FG ⇕ ABCDEF FG |
| | | Reverse (Line) | ABCDEFGFG | = | ABCDEF FG ⇕ ABCDEF FG |

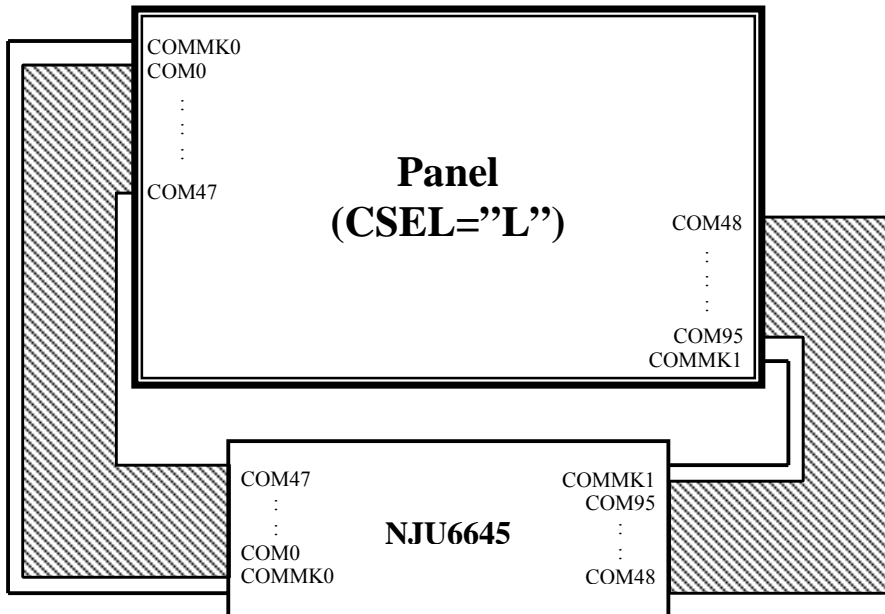
| Attribute | | Cursor | | Attribute + Cursor display | |
|----------------|--------------------------------------|-------------------------|---------------|----------------------------|---------------|
| White blink | White blink attribute selection part | OFF | A B C D E F G | = | A B C D E F G |
| | | Underline | A B C D E F G | = | A B C D E F G |
| | | Black blink | A B C D E F G | = | A B C D E F G |
| | | Reverse blink | A B C D E F G | = | A B C D E F G |
| | | Underline (Line unit) | A B C D E F G | = | A B C D E F G |
| | | White blink (Line unit) | A B C D E F G | = | A B C D E F G |
| | | Reverse (Line) | A B C D E F G | = | A B C D E F G |

(8) COMMON DRIVER OUTPUT SWITCHING

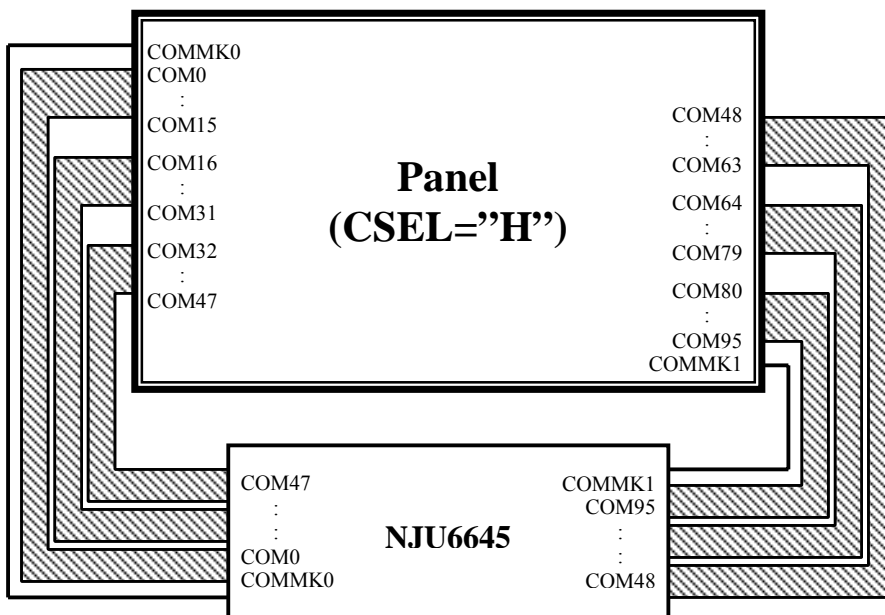
The common output order of NJU6645 is selected by CSEL terminal (Both sides wiring or Comb wiring). When the CSEL="L", the COM0 to 47 connects on the upper half of the panel and the COM48 to 95 connects on the lower half. When the CSEL="H", the COM is divided by 16, that is connected to the panel by the comb pattern.

< Wiring image >

(i) CSEL="L" Both sides wiring mode



(ii) CSEL="H" Comb wiring mode

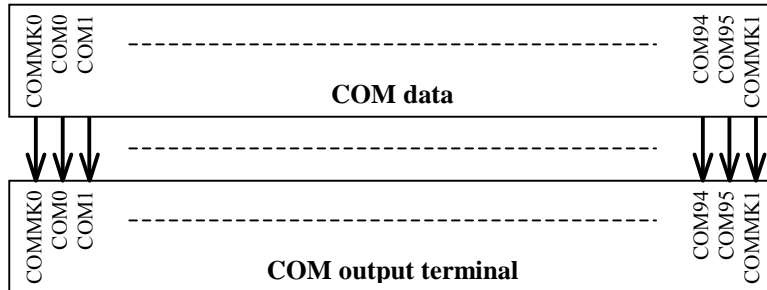


(9) COMMON SHIFT DIRECTION / SEGMENT OUTPUT DIRECTION

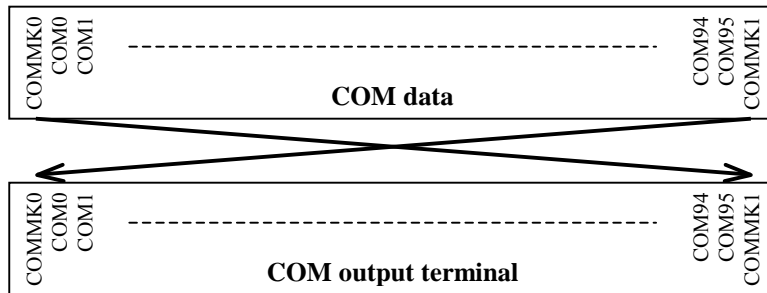
The direction of COM scan and SEG output of the dot matrix part and icon part is changed by "Driver Output Control" instruction (SEL1, SEL2). The output data of SEG and COM changes as follows.

COM output direction switching

< SEL1="0" >

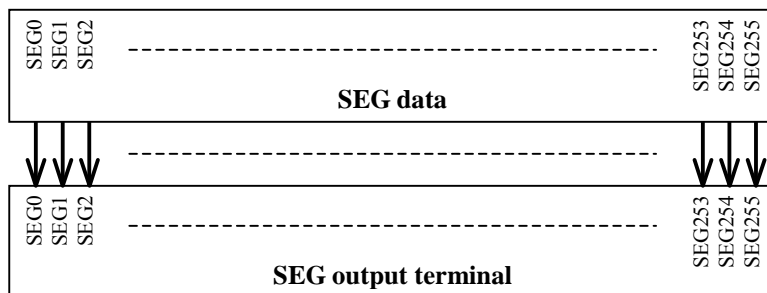


< SEL1="1" >

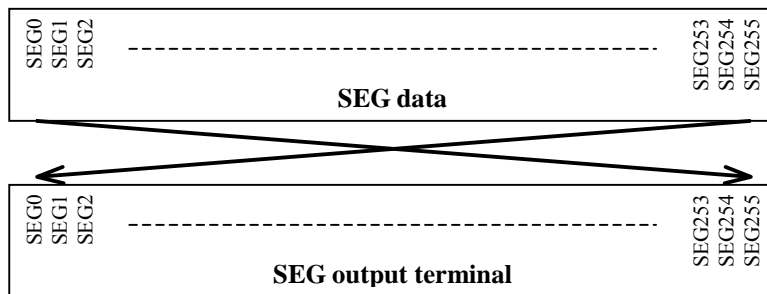


SEG output direction switching

< SEL2="0" >



< SEL2="1" >

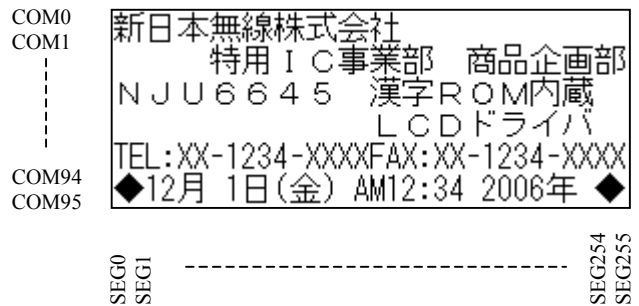


The correspondence of the display position on the panel and the DDRAM address is changed as follows.

SEL1="0", SEL2="0"

The correspondence of the display position on the panel and the DDRAM address (SEL1="0", SEL2="0")

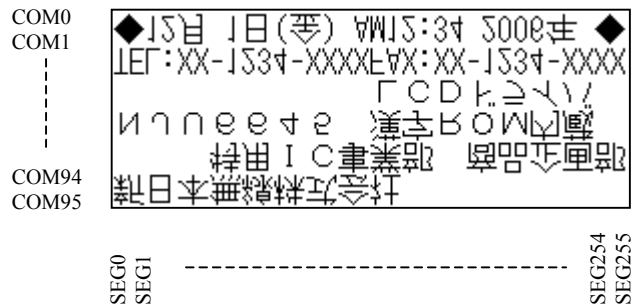
| | 1-digit | 2-digit | 3-digit | 4-digit | 5-digit | 6-digit | 7-digit | 8-digit | 9-digit | 10-digit | 11-digit | 12-digit | 13-digit | 14-digit | 15-digit | 16-digit | | | | | | | | | | | | | | | | |
|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1-line | 000 | 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 | 009 | 00A | 00B | 00C | 00D | 00E | 00F | 010 | 011 | 012 | 013 | 014 | 015 | 016 | 017 | 018 | 019 | 01A | 01B | 01C | 01D | 01E | 01F |
| 2-line | 020 | 021 | 022 | 023 | 024 | 025 | 026 | 027 | 028 | 029 | 02A | 02B | 02C | 02D | 02E | 02F | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 | 03A | 03B | 03C | 03D | 03E | 03F |
| 3-line | 040 | 041 | 042 | 043 | 044 | 045 | 046 | 047 | 048 | 049 | 04A | 04B | 04C | 04D | 04E | 04F | 050 | 051 | 052 | 053 | 054 | 055 | 056 | 057 | 058 | 059 | 05A | 05B | 05C | 05D | 05E | 05F |
| 4-line | 060 | 061 | 062 | 063 | 064 | 065 | 066 | 067 | 068 | 069 | 06A | 06B | 06C | 06D | 06E | 06F | 070 | 071 | 072 | 073 | 074 | 075 | 076 | 077 | 078 | 079 | 07A | 07B | 07C | 07D | 07E | 07F |
| 5-line | 080 | 081 | 082 | 083 | 084 | 085 | 086 | 087 | 088 | 089 | 08A | 08B | 08C | 08D | 08E | 08F | 090 | 091 | 092 | 093 | 094 | 095 | 096 | 097 | 098 | 099 | 09A | 09B | 09C | 09D | 09E | 09F |
| 6-line | 0A0 | 0A1 | 0A2 | 0A3 | 0A4 | 0A5 | 0A6 | 0A7 | 0A8 | 0A9 | 0AA | 0AB | 0AC | 0AD | 0AE | 0AF | 0B0 | 0B1 | 0B2 | 0B3 | 0B4 | 0B5 | 0B6 | 0B7 | 0B8 | 0B9 | 0BA | 0BB | 0BC | 0BD | 0BE | 0BF |



SEL1="1", SEL2="0"

The correspondence of the display position on the panel and the DDRAM address (SEL1="1", SEL2="0")

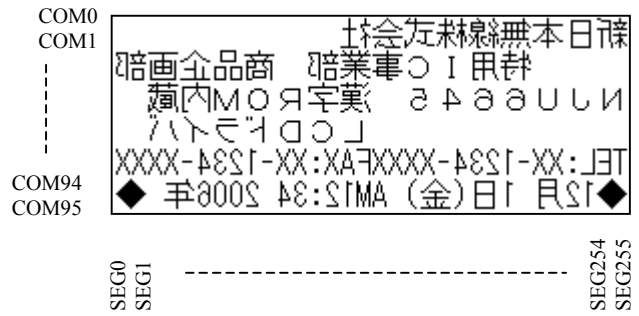
| | 1-digit | 2-digit | 3-digit | 4-digit | 5-digit | 6-digit | 7-digit | 8-digit | 9-digit | 10-digit | 11-digit | 12-digit | 13-digit | 14-digit | 15-digit | 16-digit | | | | | | | | | | | | | | | | |
|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1-line | 0A0 | 0A1 | 0A2 | 0A3 | 0A4 | 0A5 | 0A6 | 0A7 | 0A8 | 0A9 | 0AA | 0AB | 0AC | 0AD | 0AE | 0AF | 0B0 | 0B1 | 0B2 | 0B3 | 0B4 | 0B5 | 0B6 | 0B7 | 0B8 | 0B9 | 0BA | 0BB | 0BC | 0BD | 0BE | 0BF |
| 2-line | 080 | 081 | 082 | 083 | 084 | 085 | 086 | 087 | 088 | 089 | 08A | 08B | 08C | 08D | 08E | 08F | 090 | 091 | 092 | 093 | 094 | 095 | 096 | 097 | 098 | 099 | 09A | 09B | 09C | 09D | 09E | 09F |
| 3-line | 060 | 061 | 062 | 063 | 064 | 065 | 066 | 067 | 068 | 069 | 06A | 06B | 06C | 06D | 06E | 06F | 070 | 071 | 072 | 073 | 074 | 075 | 076 | 077 | 078 | 079 | 07A | 07B | 07C | 07D | 07E | 07F |
| 4-line | 040 | 041 | 042 | 043 | 044 | 045 | 046 | 047 | 048 | 049 | 04A | 04B | 04C | 04D | 04E | 04F | 050 | 051 | 052 | 053 | 054 | 055 | 056 | 057 | 058 | 059 | 05A | 05B | 05C | 05D | 05E | 05F |
| 5-line | 020 | 021 | 022 | 023 | 024 | 025 | 026 | 027 | 028 | 029 | 02A | 02B | 02C | 02D | 02E | 02F | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 | 03A | 03B | 03C | 03D | 03E | 03F |
| 6-line | 000 | 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 | 009 | 00A | 00B | 00C | 00D | 00E | 00F | 010 | 011 | 012 | 013 | 014 | 015 | 016 | 017 | 018 | 019 | 01A | 01B | 01C | 01D | 01E | 01F |



SEL1="0", SEL2="1"

The correspondence of the display position on the panel and the DDRAM address (SEL1="0", SEL2="1")

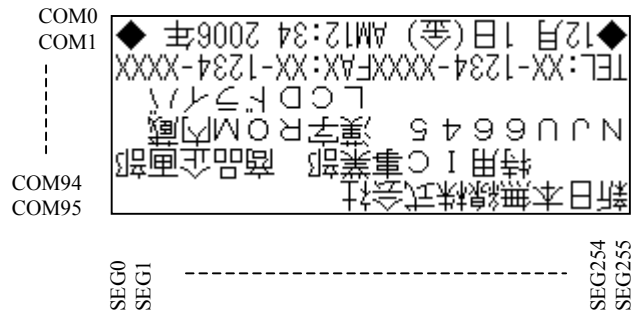
| | 1-digit | 2-digit | 3-digit | 4-digit | 5-digit | 6-digit | 7-digit | 8-digit | 9-digit | 10-digit | 11-digit | 12-digit | 13-digit | 14-digit | 15-digit | 16-digit | | | | | | | | | | | | | | | | |
|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1-line | 01F | 01E | 01D | 01C | 01B | 01A | 019 | 018 | 017 | 016 | 015 | 014 | 013 | 012 | 011 | 010 | 00F | 00E | 00D | 00C | 00B | 00A | 009 | 008 | 007 | 006 | 005 | 004 | 003 | 002 | 001 | 000 |
| 2-line | 03F | 03E | 03D | 03C | 03B | 03A | 039 | 038 | 037 | 036 | 035 | 034 | 033 | 032 | 031 | 030 | 02F | 02E | 02D | 02C | 02B | 02A | 029 | 028 | 027 | 026 | 025 | 024 | 023 | 022 | 021 | 020 |
| 3-line | 05F | 05E | 05D | 05C | 05B | 05A | 059 | 058 | 057 | 056 | 055 | 054 | 053 | 052 | 051 | 050 | 04F | 04E | 04D | 04C | 04B | 04A | 049 | 048 | 047 | 046 | 045 | 044 | 043 | 042 | 041 | 040 |
| 4-line | 07F | 07E | 07D | 07C | 07B | 07A | 079 | 078 | 077 | 076 | 075 | 074 | 073 | 072 | 071 | 070 | 06F | 06E | 06D | 06C | 06B | 06A | 069 | 068 | 067 | 066 | 065 | 064 | 063 | 062 | 061 | 060 |
| 5-line | 09F | 09E | 09D | 09C | 09B | 09A | 099 | 098 | 097 | 096 | 095 | 094 | 093 | 092 | 091 | 090 | 08F | 08E | 08D | 08C | 08B | 08A | 089 | 088 | 087 | 086 | 085 | 084 | 083 | 082 | 081 | 080 |
| 6-line | 0BF | 0BE | 0BD | 0BC | 0BB | 0BA | 0B9 | 0B8 | 0B7 | 0B6 | 0B5 | 0B4 | 0B3 | 0B2 | 0B1 | 0B0 | 0AF | 0AE | 0AD | 0AC | 0AB | 0AA | 0A9 | 0A8 | 0A7 | 0A6 | 0A5 | 0A4 | 0A3 | 0A2 | 0A1 | 0A0 |



SEL1="1", SEL2="1"

The correspondence of the display position on the panel and the DDRAM address (SEL1="1", SEL2="1")

| | 1-digit | 2-digit | 3-digit | 4-digit | 5-digit | 6-digit | 7-digit | 8-digit | 9-digit | 10-digit | 11-digit | 12-digit | 13-digit | 14-digit | 15-digit | 16-digit | | | | | | | | | | | | | | | | |
|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1-line | 0BF | 0BE | 0BD | 0BC | 0BB | 0BA | 0B9 | 0B8 | 0B7 | 0B6 | 0B5 | 0B4 | 0B3 | 0B2 | 0B1 | 0B0 | 0AF | 0AE | 0AD | 0AC | 0AB | 0AA | 0A9 | 0A8 | 0A7 | 0A6 | 0A5 | 0A4 | 0A3 | 0A2 | 0A1 | 0A0 |
| 2-line | 09F | 09E | 09D | 09C | 09B | 09A | 099 | 098 | 097 | 096 | 095 | 094 | 093 | 092 | 091 | 090 | 08F | 08E | 08D | 08C | 08B | 08A | 089 | 088 | 087 | 086 | 085 | 084 | 083 | 082 | 081 | 080 |
| 3-line | 07F | 07E | 07D | 07C | 07B | 07A | 079 | 078 | 077 | 076 | 075 | 074 | 073 | 072 | 071 | 070 | 06F | 06E | 06D | 06C | 06B | 06A | 069 | 068 | 067 | 066 | 065 | 064 | 063 | 062 | 061 | 060 |
| 4-line | 05F | 05E | 05D | 05C | 05B | 05A | 059 | 058 | 057 | 056 | 055 | 054 | 053 | 052 | 051 | 050 | 04F | 04E | 04D | 04C | 04B | 04A | 049 | 048 | 047 | 046 | 045 | 044 | 043 | 042 | 041 | 040 |
| 5-line | 03F | 03E | 03D | 03C | 03B | 03A | 039 | 038 | 037 | 036 | 035 | 034 | 033 | 032 | 031 | 030 | 02F | 02E | 02D | 02C | 02B | 02A | 029 | 028 | 027 | 026 | 025 | 024 | 023 | 022 | 021 | 020 |
| 6-line | 01F | 01E | 01D | 01C | 01B | 01A | 019 | 018 | 017 | 016 | 015 | 014 | 013 | 012 | 011 | 010 | 00F | 00E | 00D | 00C | 00B | 00A | 009 | 008 | 007 | 006 | 005 | 004 | 003 | 002 | 001 | 000 |



The correspondence of the SEG/COM terminals and the MKRAM address is changed as follows.

The correspondence of the SEG/COM terminals and MKRAM address (SEL1="0", SEL2="0")

| | SEG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 200 | 208 | 216 | 224 | 232 | 240 | 248 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | 7 | 15 | 23 | 31 | 39 | 47 | 55 | 63 | 71 | 79 | 87 | 95 | 103 | 111 | 119 | 127 | 135 | 143 | 151 | 159 | 167 | 175 | 183 | 191 | 199 | 207 | 215 | 223 | 231 | 239 | 247 | 255 |
| MK COM0 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 10A | 10B | 10C | 10D | 10E | 10F | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 11A | 11B | 11C | 11D | 11E | 11F |
| MK COM1 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 12A | 12B | 12C | 12D | 12E | 12F | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 13A | 13B | 13C | 13D | 13E | 13F |

The correspondence of the SEG/COM terminals and MKRAM address (SEL1="1", SEL2="0")

| | SEG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 200 | 208 | 216 | 224 | 232 | 240 | 248 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | 7 | 15 | 23 | 31 | 39 | 47 | 55 | 63 | 71 | 79 | 87 | 95 | 103 | 111 | 119 | 127 | 135 | 143 | 151 | 159 | 167 | 175 | 183 | 191 | 199 | 207 | 215 | 223 | 231 | 239 | 247 | 255 |
| MK COM0 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 12A | 12B | 12C | 12D | 12E | 12F | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 13A | 13B | 13C | 13D | 13E | 13F |
| MK COM1 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 10A | 10B | 10C | 10D | 10E | 10F | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 11A | 11B | 11C | 11D | 11E | 11F |

The correspondence of the SEG/COM terminals and MKRAM address (SEL1="0", SEL2="1")

| | SEG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 200 | 208 | 216 | 224 | 232 | 240 | 248 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | 7 | 15 | 23 | 31 | 39 | 47 | 55 | 63 | 71 | 79 | 87 | 95 | 103 | 111 | 119 | 127 | 135 | 143 | 151 | 159 | 167 | 175 | 183 | 191 | 199 | 207 | 215 | 223 | 231 | 239 | 247 | 255 |
| MK COM0 | 11F | 11E | 11D | 11C | 11B | 11A | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 10F | 10E | 10D | 10C | 10B | 10A | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 |
| MK COM1 | 13F | 13E | 13D | 13C | 13B | 13A | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 12F | 12E | 12D | 12C | 12B | 12A | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 |

The correspondence of the SEG/COM terminals and MKRAM address (SEL1="1", SEL2="1")

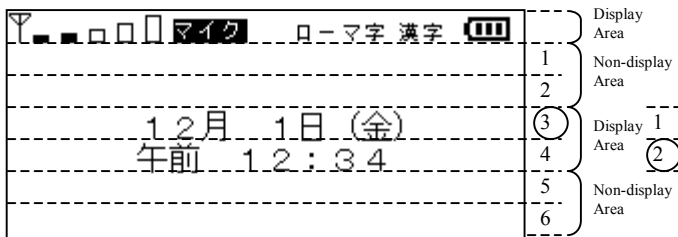
| | SEG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 | 168 | 176 | 184 | 192 | 200 | 208 | 216 | 224 | 232 | 240 | 248 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | 7 | 15 | 23 | 31 | 39 | 47 | 55 | 63 | 71 | 79 | 87 | 95 | 103 | 111 | 119 | 127 | 135 | 143 | 151 | 159 | 167 | 175 | 183 | 191 | 199 | 207 | 215 | 223 | 231 | 239 | 247 | 255 |
| MK COM0 | 13F | 13E | 13D | 13C | 13B | 13A | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 12F | 12E | 12D | 12C | 12B | 12A | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 |
| MK COM1 | 11F | 11E | 11D | 11C | 11B | 11A | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 10F | 10E | 10D | 10C | 10B | 10A | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 |

(10) PARTIAL DISPLAY

The partial display is executed by combining the Display Duty Ratio instruction "DN2, 1, 0" with the Display Start Position instruction "DST2, 1, 0". This function reduces the LCD driving voltage and the power consumption when the duty set low like the clock display of stand-by.



Display Duty Ratio = 6th line



Display Duty Ratio = 2nd line
Display Start Position = 3rd line

When the Display Start Position is set to the 3rd line, the character data of the first line of the DDRAM address is displayed from the 3rd line (33 to 48 rows). When the Display Duty Ratio is set to the 2nd line, the duty corresponds to 2-line (16 rows x 2 + 2 rows of icon part).

(11) VERTICAL SMOOTH SCROLL

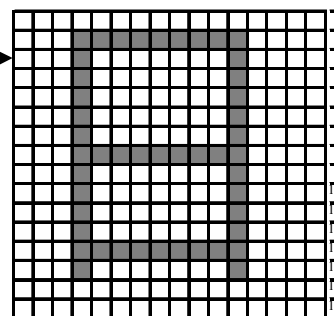
NJU6645 is executed to the vertical smooth scroll display of 1-dot unit by combining the Scroll Start Row with the Scroll Start Line. The display scroll is set by the “Scroll Start Line” instruction (0,1,2,3,4, and 5-line scroll) at the unit of line (16-dot units). The display scroll is set by the “Scroll Start Row” instruction (0,1,2, --- 14, and 15-dot scroll) at the 1 dot unit. The display shifts to the upside only the amount of “Scroll Start Line” + “Scroll Start Row”. When it is made to scroll by Display Duty Ratio = 6-line, the display that pushed outside the screen appears from the other side.

< Example of smooth scroll display >

(i) Scroll Start Line = "0-line"

Scroll Start Row = "0-dot"

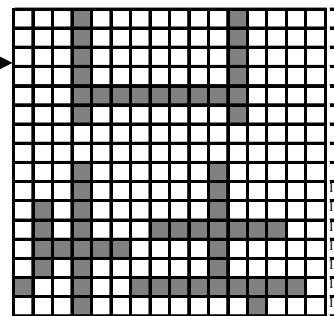
| | |
|---|-------------------------|
| 1 | 新日本無線株式会社 |
| 2 | 専用 I C 事業部 商品企画部 |
| 3 | NJU6645 漢字 ROM 内蔵 |
| 4 | LCD ドライバ |
| 5 | TEL:XX-1234-XXXX |
| 6 | 12月 1日(金) AM12:34 2006年 |



(ii) Scroll Start Line = "0-line"

Scroll Start Row = "8-dot"

| | |
|---|-------------------------|
| 1 | 新日本無線株式会社 |
| 2 | 専用 I C 事業部 商品企画部 |
| 3 | NJU6645 漢字 ROM 内蔵 |
| 4 | LCD ドライバ |
| 5 | TEL:XX-1234-XXXX |
| 6 | 12月 1日(金) AM12:34 2006年 |
| 1 | 新日本無線株式会社 |



(iii) Scroll Start Line = "1-line"

Scroll Start Row = "0-dot"

| | |
|---|-------------------------|
| 2 | 専用 I C 事業部 商品企画部 |
| 3 | NJU6645 漢字 ROM 内蔵 |
| 4 | LCD ドライバ |
| 5 | TEL:XX-1234-XXXX |
| 6 | 12月 1日(金) AM12:34 2006年 |
| 1 | 新日本無線株式会社 |

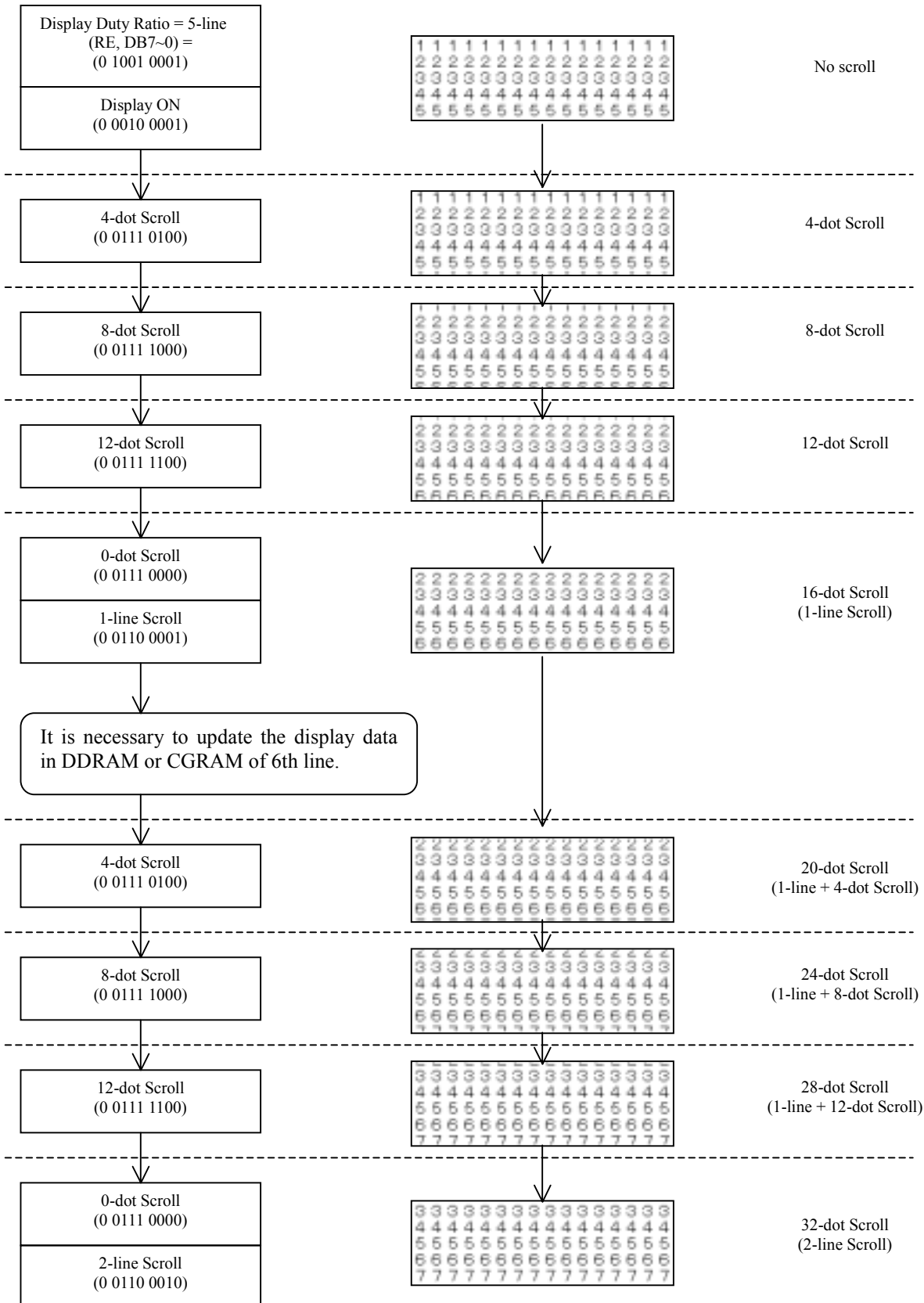
(iv) Scroll Start Line = "2-line"

Scroll Start Row = "8-dot"

| | |
|---|-------------------------|
| 3 | NJU6645 漢字 ROM 内蔵 |
| 4 | LCD ドライバ |
| 5 | TEL:XX-1234-XXXX |
| 6 | 12月 1日(金) AM12:34 2006年 |
| 1 | 新日本無線株式会社 |
| 2 | 専用 I C 事業部 商品企画部 |
| 3 | NJU6645 漢字 ROM 内蔵 |

< Example of 4-dot smooth scroll display >

When the scroll operation to above by 4-dot of the 5-line display, the sequence and the panel image are shown below.

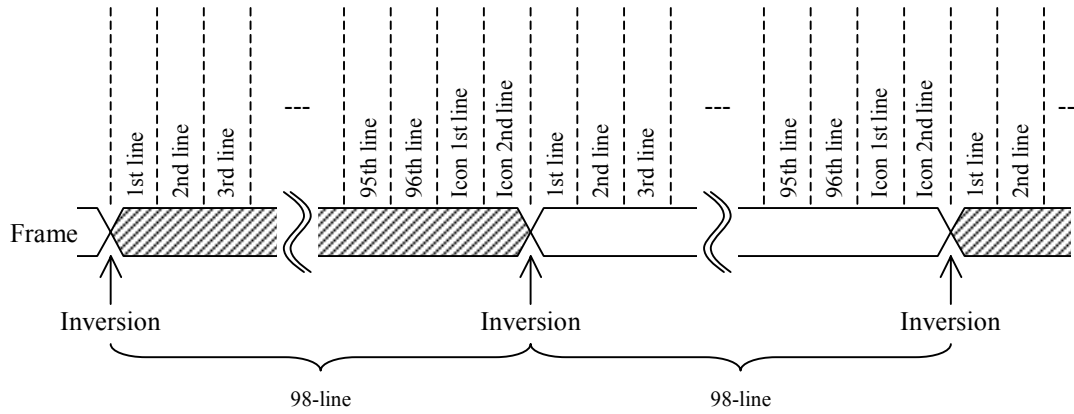


(12) N-LINE INVERSION

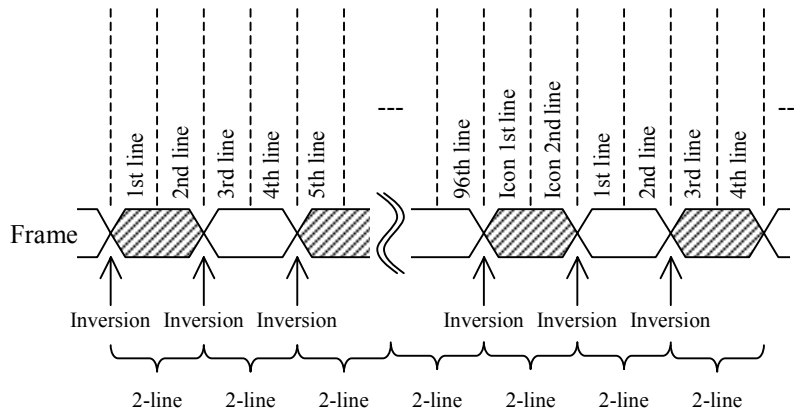
NJU6645 sets the number of inversion line of the alternating signal for LCD to the optional values from 2 ~ 98.

< Setting example >

- N-line inversion = 98-line



- N-line inversion = 2-line



(13) DISPLAY MODE

NJU6645 sets the 3 kinds display mode by the SPR and GR instructions.

(13-1) Character Mode (SPR="0", GR="0")

In the character mode, the font pattern that uses the CGROM and CGRAM is displayed. The font pattern is displayed at the position that corresponds to the DDRAM address by the character code written in DDRAM.

| |
|-----------------------------------|
| 新日本無線株式会社 |
| 特用IC事業部 商品企画部 |
| NJU6645 漢字ROM内蔵 |
| LCDドライバ |
| TEL:XX-1234-XXXX FAX:XX-1234-XXXX |
| ◆12月1日(金) AM12:34 2006年◆ |

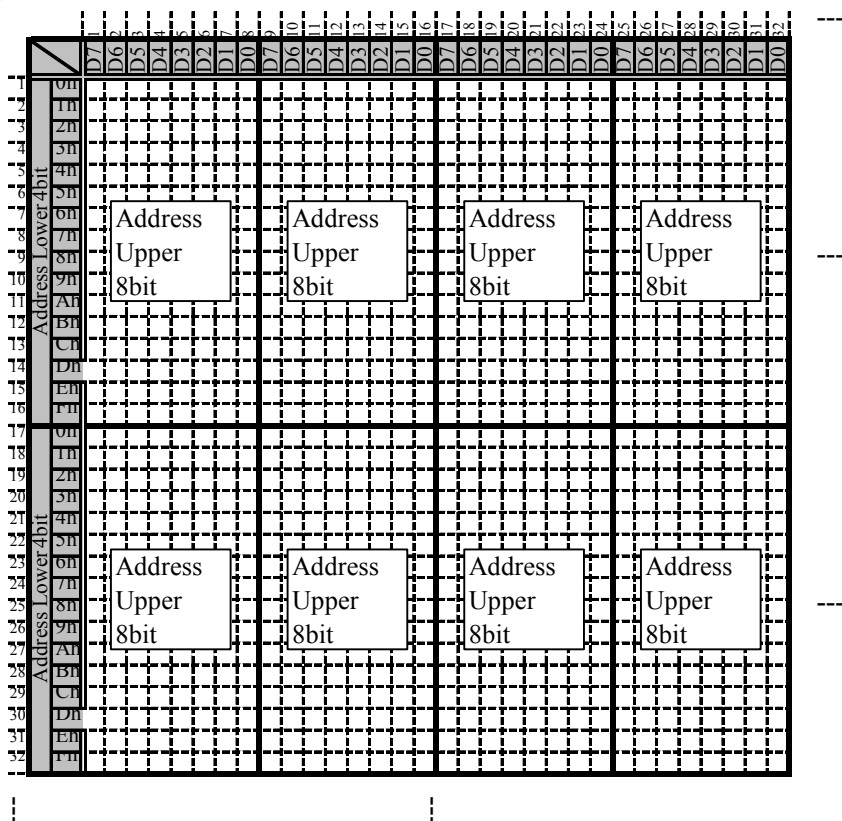
(13-2) Graphics Mode (SPR="0", GR="1")

In the graphics mode, the graphics of maximum 256x96 dots is displayed by using only CGRAM. At this time, the relation between the CGRAM address and the position of display is shown in the following tables. Because all CGRAM is used for graphics, it is not possible to use it as a user font.

Besides, the setting of "Scroll Start Line" and "Scroll Start Row" instructions is not reflected in the graphics mode.

Correspondence of display position on panel and CGRAM address. (In the graphics mode)

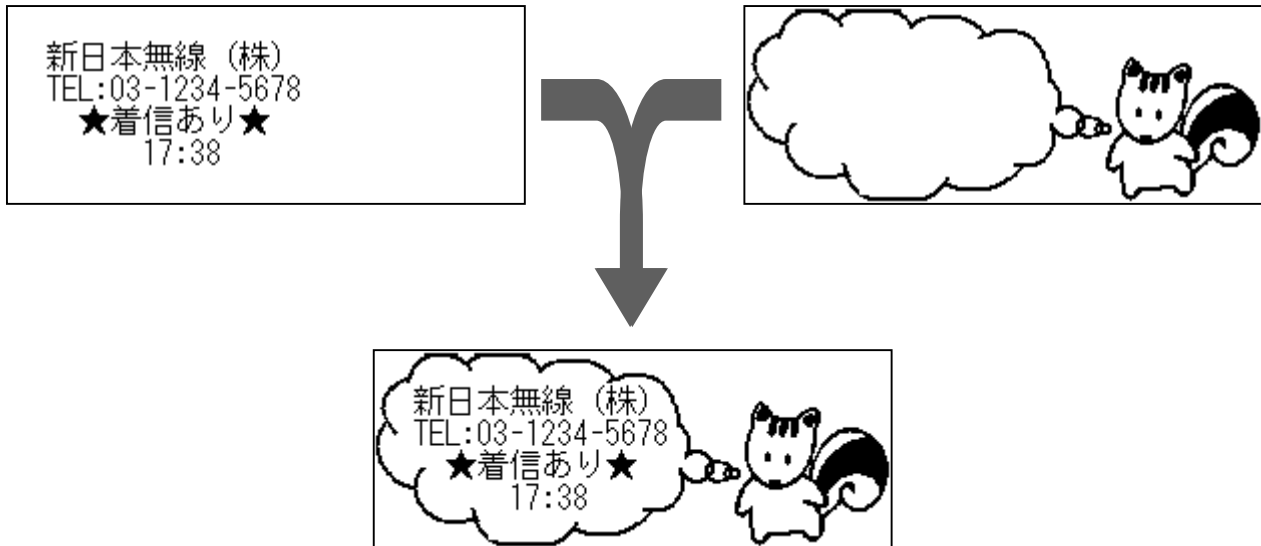
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 200 | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 | 2A0 | 2B0 | 2C0 | 2D0 | 2E0 | 2F0 | 300 | 310 | 320 | 330 | 340 | 350 | 360 | 370 | 380 | 390 | 3A0 | 3B0 | 3C0 | 3D0 | 3E0 | 3F0 |
| ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ |
| 20F | 21F | 22F | 23F | 24F | 25F | 26F | 27F | 28F | 29F | 2AF | 2BF | 2CF | 2DF | 2EF | 2FF | 30F | 31F | 32F | 33F | 34F | 35F | 36F | 37F | 38F | 39F | 3AF | 3BF | 3CF | 3DF | 3EF | 3FF |
| 400 | 410 | 420 | 430 | 440 | 450 | 460 | 470 | 480 | 490 | 4A0 | 4B0 | 4C0 | 4D0 | 4E0 | 4F0 | 500 | 510 | 520 | 530 | 540 | 550 | 560 | 570 | 580 | 590 | 5A0 | 5B0 | 5C0 | 5D0 | 5E0 | 5F0 |
| ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ |
| 40F | 41F | 42F | 43F | 44F | 45F | 46F | 47F | 48F | 49F | 4AF | 4BF | 4CF | 4DF | 4EF | 4FF | 50F | 51F | 52F | 53F | 54F | 55F | 56F | 57F | 58F | 59F | 5AF | 5BF | 5CF | 5DF | 5EF | 5FF |
| 600 | 610 | 620 | 630 | 640 | 650 | 660 | 670 | 680 | 690 | 6A0 | 6B0 | 6C0 | 6D0 | 6E0 | 6F0 | 700 | 710 | 720 | 730 | 740 | 750 | 760 | 770 | 780 | 790 | 7A0 | 7B0 | 7C0 | 7D0 | 7E0 | 7F0 |
| ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ |
| 60F | 61F | 62F | 63F | 64F | 65F | 66F | 67F | 68F | 69F | 6AF | 6BF | 6CF | 6DF | 6EF | 6FF | 70F | 71F | 72F | 73F | 74F | 75F | 76F | 77F | 78F | 79F | 7AF | 7BF | 7CF | 7DF | 7EF | 7FF |
| 800 | 810 | 820 | 830 | 840 | 850 | 860 | 870 | 880 | 890 | 8A0 | 8B0 | 8C0 | 8D0 | 8E0 | 8F0 | 900 | 910 | 920 | 930 | 940 | 950 | 960 | 970 | 980 | 990 | 9A0 | 9B0 | 9C0 | 9D0 | 9E0 | 9F0 |
| ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ |
| 80F | 81F | 82F | 83F | 84F | 85F | 86F | 87F | 88F | 89F | 8AF | 8BF | 8CF | 8DF | 8EF | 8FF | 90F | 91F | 92F | 93F | 94F | 95F | 96F | 97F | 98F | 99F | 9AF | 9BF | 9CF | 9DF | 9EF | 9FF |
| A00 | A10 | A20 | A30 | A40 | A50 | A60 | A70 | A80 | A90 | AA0 | AB0 | AC0 | AD0 | AE0 | AF0 | B00 | B10 | B20 | B30 | B40 | B50 | B60 | B70 | B80 | B90 | BA0 | BB0 | BC0 | BD0 | BE0 | BF0 |
| ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ |
| A0F | A1F | A2F | A3F | A4F | A5F | A6F | A7F | A8F | A9F | AAF | ABF | ACF | ADF | AEF | AFF | B0F | B1F | B2F | B3F | B4F | B5F | B6F | B7F | B8F | B9F | BAF | BBF | BCF | BDF | BEF | BFF |
| C00 | C10 | C20 | C30 | C40 | C50 | C60 | C70 | C80 | C90 | CA0 | CB0 | CC0 | CD0 | CE0 | CF0 | D00 | D10 | D20 | D30 | D40 | D50 | D60 | D70 | D80 | D90 | DA0 | DB0 | DC0 | DD0 | DE0 | DF0 |
| ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ |
| C0F | C1F | C2F | C3F | C4F | C5F | C6F | C7F | C8F | C9F | CAF | CBF | CCF | CDF | CEF | CFF | D0F | D1F | D2F | D3F | D4F | D5F | D6F | D7F | D8F | D9F | DAF | DBF | DCF | DDF | DEF | DFF |



(13-3) Superimpose mode (SPR="1", GR="**")

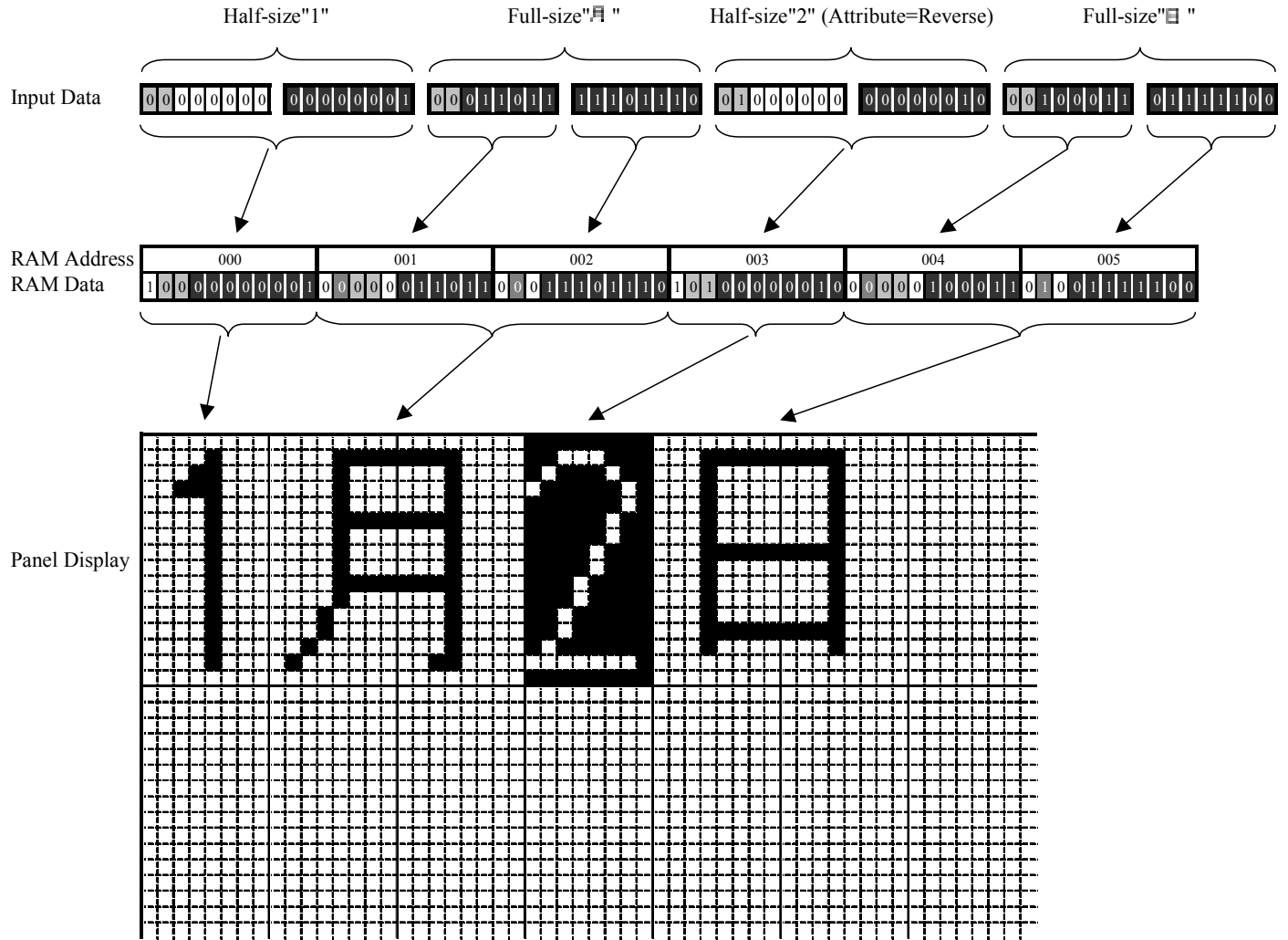
The superimpose mode overlaps and displays the character mode and the graphics mode. The displayed data is a logical addition of the character mode data and the graphics mode data. Because all CGRAM is used for graphics, it is not possible to use it as a user font.

Besides, the setting of "Scroll Start Line" and "Scroll Start Row" instructions is reflected only in the character part, and not reflected in the graphics part.



(14) FULL-SIZE and HALF-SIZE MIXED DISPLAY

NJU6645 displays from the left end of the screen with mixing the full-size character (16 x 16 dots) and the half-size character (8 x 16 dots). The distinction between full-size and half-size is decided by 1st bit of DDRAM data writing of the 2-byte format. In case of the "0", it is the full-size character. In case of the "1", it is the half-size character. 1-character of the full-size character is composed of two DDRAM addresses, and 1-character of the half-size character is composed of one DDRAM address. The corresponding example of that input data, DDRAM data, and display are shown below.



Note) When the Full-size character is written to the half-size address of the end of line, the character is displayed unexpected. The number of writing characters must become just 32-character at half-size by 1-line.

(15) RESET FUNCTION

The reset function initializes the LSI by setting the RSTb terminal to "L". The reset operation is always required after the power supply is turned on.

The reset status is as follows.

| Item | Register | Initial Value |
|--|-----------------|---------------|
| RE Flag : 1st page | RE | 0 |
| Address Counter : DDRAM left end of the 1st line | AC | 000h |
| Dot Matrix Display : OFF | D | 0 |
| Icon Display : OFF | M | 0 |
| Full Screen Reverse Display : OFF | REV | 0 |
| Standby mode : OFF | HALT | 0 |
| Cursor Display : OFF | C | 0 |
| Line Cursor Setting : OFF | LC | 0 |
| Blink Setting : OFF | B | 0 |
| Reverse Cursor Setting : OFF | BW | 0 |
| Display Mode : Character Mode | SPR / GR | 0 / 0 |
| Read Modify Write Mode : OFF | RDM | 0 |
| Scroll Start Line : 1st line | SSN2,1,0 | 0,0,0 |
| Scroll Start Row : 1st row | SSL3,2,1,0 | 0,0,0,0 |
| Display Start Line : 1st line | DST2,1,0 | 0,0,0 |
| Display Duty Ratio : 6-line | DN2,1,0 | 0,0,0 |
| N-line Inversion : 98 | NL6,5,4,3,2,1,0 | 1,1,0,0,0,0,1 |
| Driver Output Control : Forward Direction | SEL1,SEL2 | 0,0 |
| Internal Oscillation / External Clock : Internal OSC | INTCK | 0 |
| Internal Capacitance Adjust : Reference Value | OC2,1,0 | 0,0,0 |
| Discharge : OFF | DIS | 0 |
| Voltage Boost Circuit : OFF | DCON | 0 |
| Internal Power Circuit : OFF | AMPON | 0 |
| Boost Level : No Boost | VU2,1,0 | 0,0,0 |
| Bias Ratio: 1/11 Bias | BS3,2,1,0 | 0,0,0,0 |
| Electrical Volume : Low (Minimum value) | EV6,5,4,3,2,1,0 | 0,0,0,0,0,0,0 |

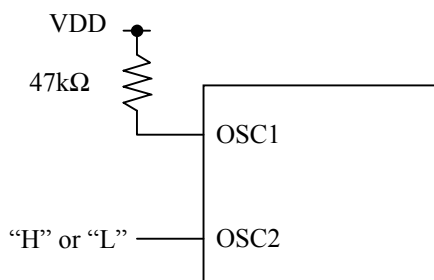
Note) After the resetting, the DDRAM, CGRAM, and MKRAM are not initialized. After the data is written, it is necessary to turn on the display.

(16) OSCILLATION CIRCUIT

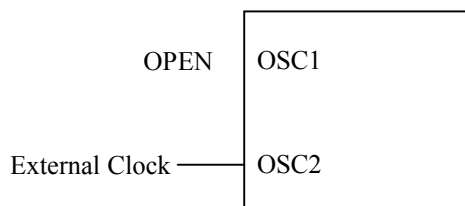
NJU6645 is equipped with the CR oscillation circuit with the external resistor used, and generates internal clocks used for the display timing. The generating method of the clock selects by the internal oscillation or external clock. When the internal oscillation circuit is used, connect OSC1 and VDD with an external resistor. At this time, it is necessary to fix the OSC2 to "H" or "L". The internal capacity value of the internal oscillation circuit is set by the instruction (0.7/0.8/0.9/1/1.1/1.2/1/3 times.). The oscillation frequency is adjusted by setting the internal capacity value.

When the external clock is used, INTCK="1" and the external clock is supplied from the OSC2. At this time, the OSC1 opens.

< Using Internal Oscillation >



< Using External Clock >



(17) POWER SUPPLY CIRCUIT

(17-1) LCD power supply

The internal LCD power supply is organized into the voltage converter and the voltage booster. The voltage converter consists of the reference voltage generator, the voltage regulator with EVR and the LCD bias voltage generator.

If the internal LCD power supply doesn't have enough capability to drive the particular LCD panel, use the external LCD power supply. Otherwise, it may affect display quality.

The configuration of the LCD power supply is arranged by setting the D1 (AMPON) and D0 (DCON) bits of the "Power Control" instruction. For this configuration, the internal LCD power supply can be partially used in combination with an external supply voltage, as shown below.

| DCON | AMPON | Voltage Booster | Voltage Converter | External Supply Voltage | Note |
|------|-------|-----------------|-------------------|-----------------------------|-------|
| 0 | 0 | Inactive | Inactive | VOUT, VLCD, V1, V2, V3, V4 | *1, 3 |
| 0 | 1 | Inactive | Active | VOUT | *2, 3 |
| 1 | 1 | Active | Active | VDCOUT is supplied to VOUT. | - |

Note 1) No internal LCD power supply is used. The LCD bias voltages are externally supplied, and the C1+, C1-, C2+, C2-, C3+, C3-, C4+, C4-, C5+, C5-, VREF, VREG and VEE are open.

Note 2) Only the voltage converter is used. The VOUT is externally supplied, and the C1+, C1-, C2+, C2-, C3+, C3-, C4+, C4-, C5+, C5- and VEE are open. The reference voltage is supplied on the VREF.

Note 3) The following relation among each LCD bias voltages must be maintained.

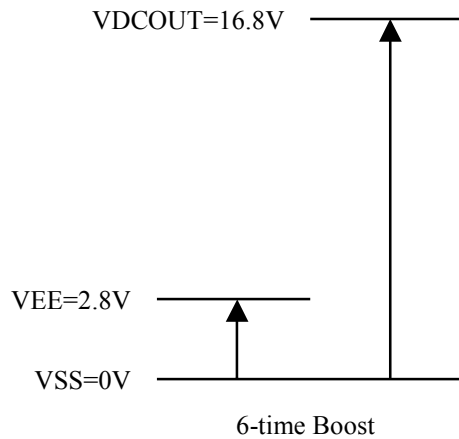
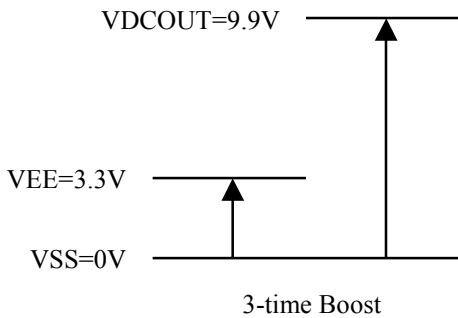
$$VOUT \geq VLCD \geq V1 \geq V2 \geq V3 \geq V4 \geq VSS$$

(17-2) Voltage booster

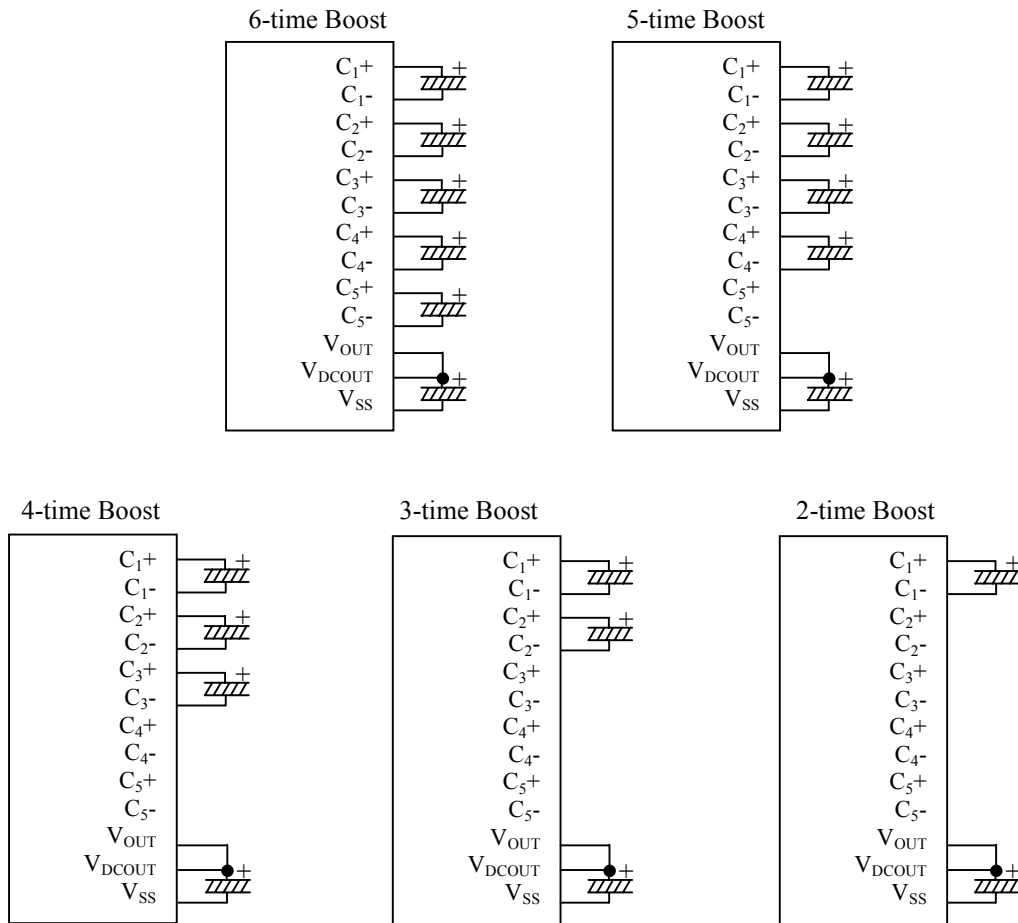
The internal voltage booster generates up to 6xVEE voltage. The boost level is selected from 2x, 3x, 4x, 5x or 6x by setting the D2 to D0 (VU2 to VU0) bits of the “Boost Level” instruction. VDCOUT terminal and VOUT terminal are connected on the outside and used.

The boost voltage VDCOUT must not exceed 17.0V, otherwise the voltage stress may cause a permanent damage to the LSI.

Boost Voltage VDCOUT = VEE x N [V]
 (N : Boost Level =2~6)



- External Capacitor Connection of Voltage Booster



(17-3) Reference voltage generator

The reference voltage generator produces the reference voltage.

$$\text{Reference Voltage : } V_{BA} = 0.75 \times V_{EE}$$

When using the internal LCD power supply, connect the VBA and the VREF, or supply 0.75xVEE or lower voltage on the VREF. When using an external LCD power supply, the VBA should be open.

(17-4) Voltage regulator

The voltage regulator consists of an operational amplifier with gain control and EVR. The VREF voltage is multiplied to obtain the VREG voltage, and its multiple (boost level) is set by the D2 to D0 (VU2 to VU0) bits of the “Boost Level” instruction. The formula is shown below.

$$\begin{aligned} V_{REG} &= V_{REF} \times N \text{ [V]} \\ (N : \text{Boost Level} &= 2\sim 6) \end{aligned}$$

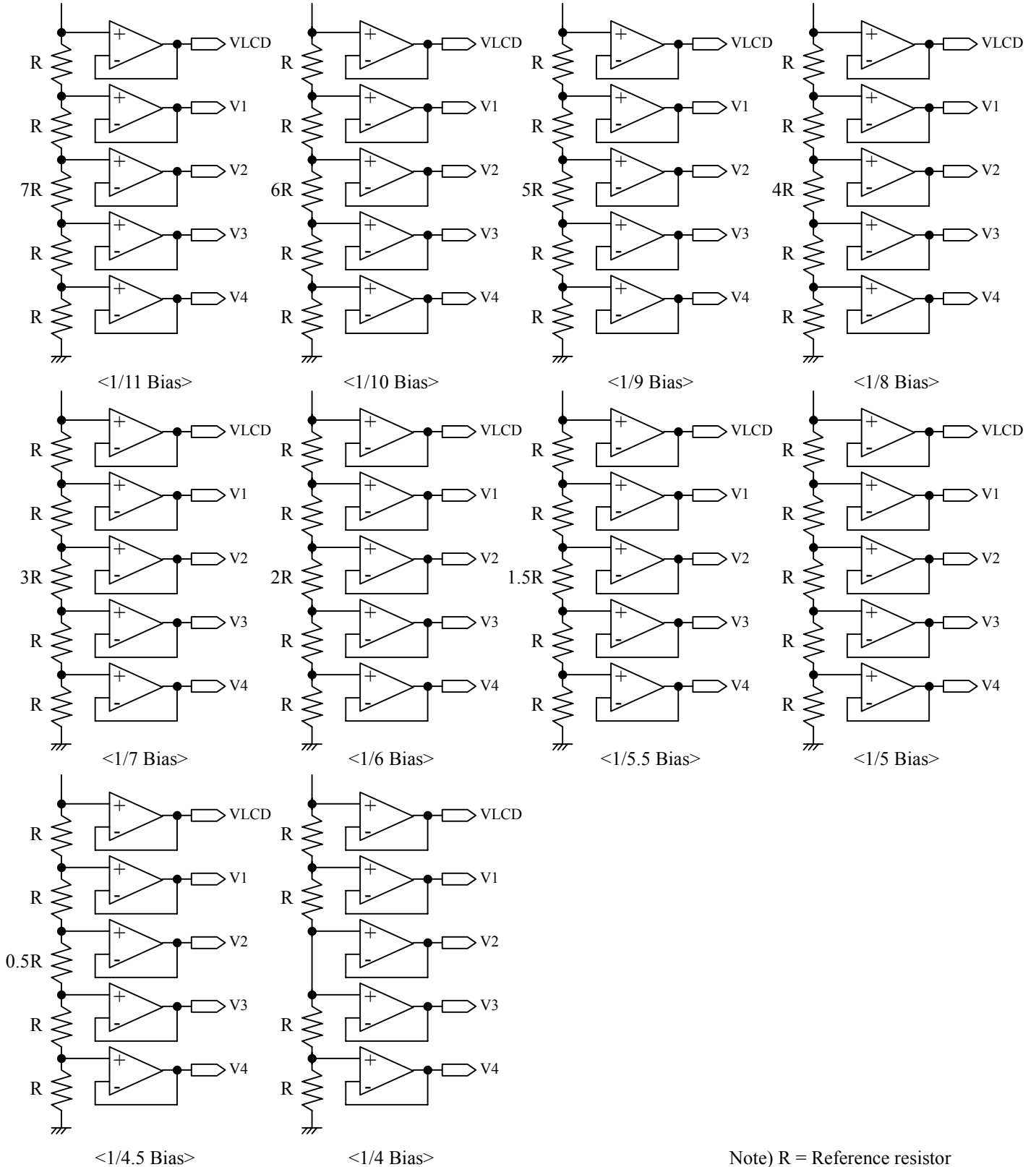
(17-5) Electrical variable Resistor (EVR)

The EVR is used to fine-tune the V LCD voltage to optimize display contrast. The EVR value is controlled in 128 steps by setting the D3 to D0 (DV6 to DV0) bits of the “EVR Control” instruction. The formula is shown below.

$$\begin{aligned} V_{LCD} &= 0.5 \times V_{REG} + M(V_{REG} - 0.5V_{REG}) / 127 \text{ [V]} \\ (M : \text{EVR Value} &= 0 \text{ to } 127) \end{aligned}$$

(17-6)LCD bias circuit

The suitable bias is set by the bias register (BS3 to 0) according to the display duty. When the VLCD voltage is close to minimum (nearly equal: 4.5V), it is recommended not to use it because there is a possibility of not operating in 1/11 bias setting.



(17-7) Discharge circuit

The LSI incorporates a discharge circuit for the VLCD and V1 to V4 and for the VOUT. The VLCD and V1 to V4 are discharged by setting "1" at the D0 (DIS) bit of the "Discharge ON/OFF" instruction or the reset by the RESb. Be sure to turn off the internal or external LCD power supply when this instruction is executed, otherwise it may function as a current load and affect an operating current. Refer to "(r) Discharge ON/OFF".

(17-8) Power ON/OFF

To protect the LSI from overcurrent, the following sequences must be maintained to turn on and off the power supply. In addition to the following discussions, refer to "(21) TYPICAL INSTRUCTION SEQUENCES".

(i) Power ON/OFF in using external LCD supply

-Power ON

First "VDD and VEE ON", next "Reset by RSTb", then "External LCD power supply ON". When using only external VOUT, first "VDD ON", next "Reset by RSTb", then "External VOUT ON", as well.

-Power OFF

First "Reset by RSTb or "HALT" instruction" to isolate external LCD bias voltage, next "VDD OFF". For more safety, placing a resistor in series on the VLCD line (or the VOUT line in using only the external VOUT) is recommended. That resistance is usually between 50Ω and 100Ω.

(ii) Power ON/OFF in using internal LCD supply

-Power ON

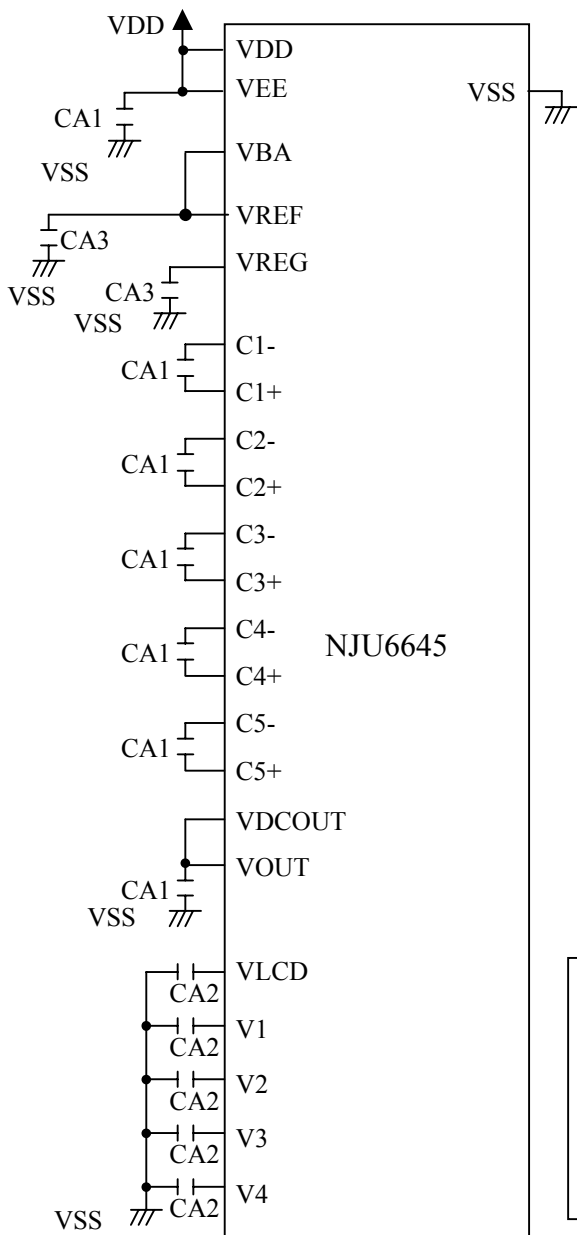
First "VDD and VEE ON", next "Reset by RSTb", then "Internal LCD power supply ON". Be sure to execute the "Display ON" instruction later than the completion of this power ON sequence. Otherwise, unexpected pixels may be turned on instantly.

-Power OFF

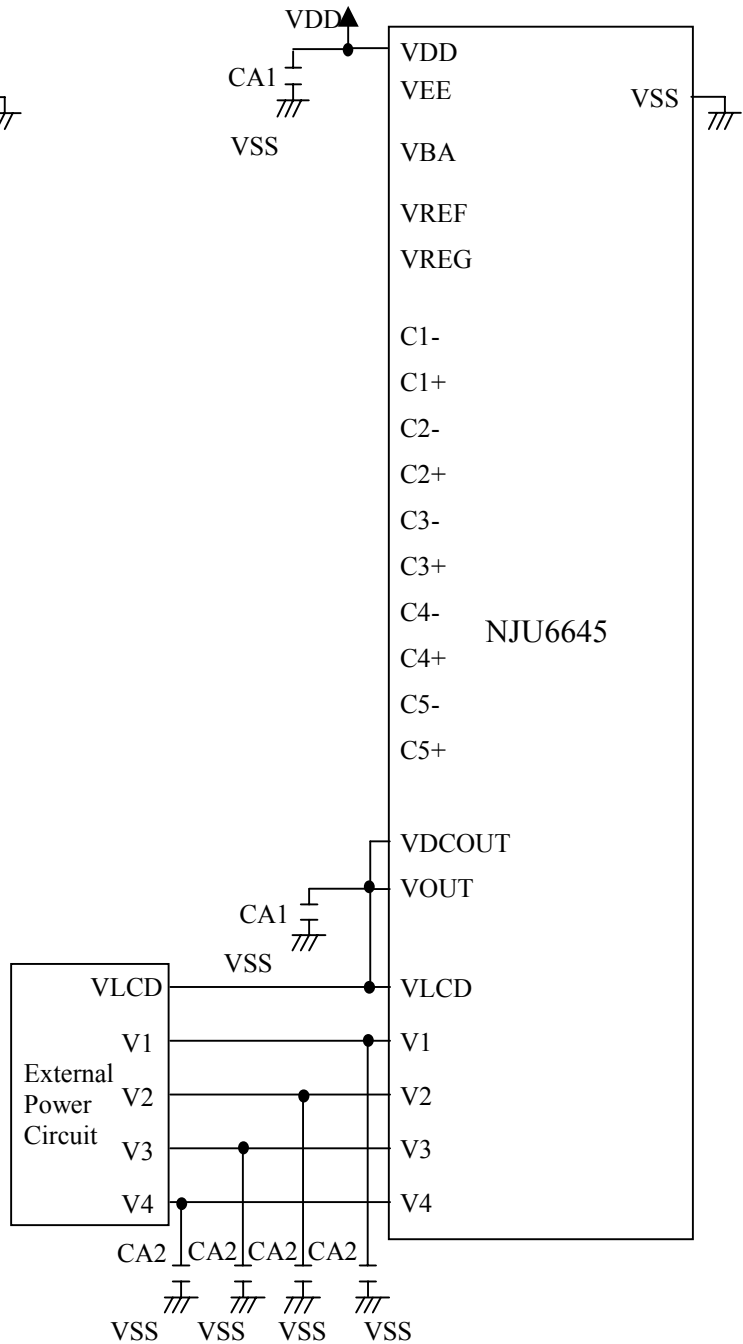
First "Reset by RSTb or "HALT" instruction", next "VDD and VEE OFF". If using different power sources for the VDD and the VEE individually, the VEE must be turned off after the reset or the "HALT". After that, the VDD can be turned off, waiting until the LCD bias voltages (VLCD, V1, V2, V3 and V4) drop below the threshold level of LCD pixels.

- External Components for LCD Power Supply

Using Only Internal LCD Power Supply (6x boost)



Using Only External LCD Power Supply



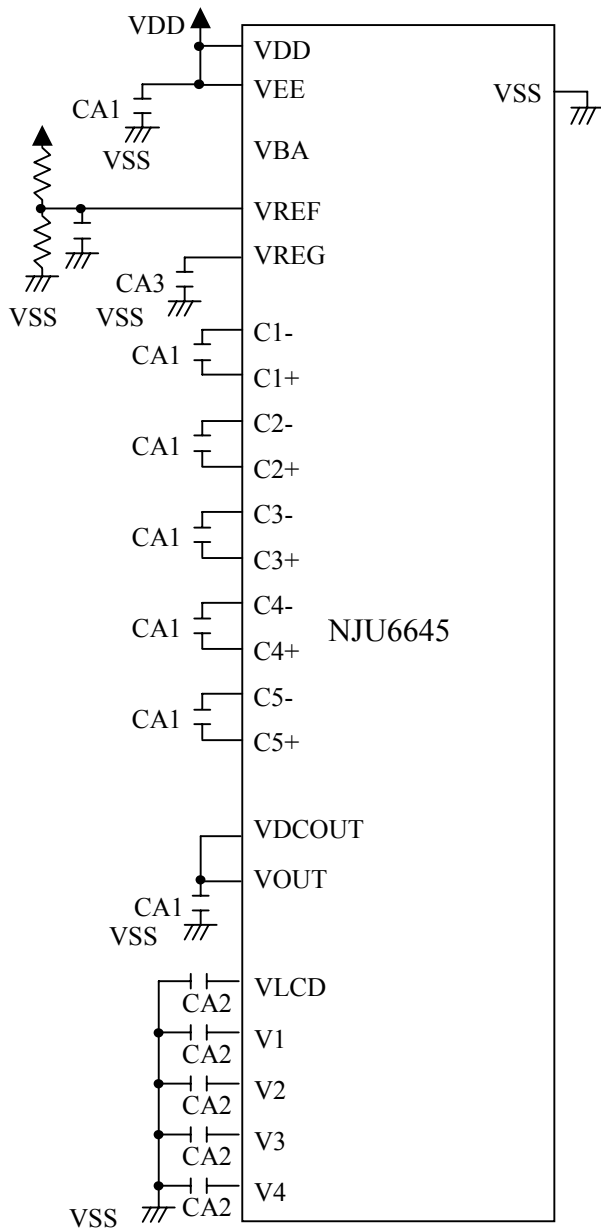
Reference Values

| | |
|-----|--------------------|
| CA1 | 1.0 to 4.7 μ F |
| CA2 | 1.0 to 2.2 μ F |
| CA3 | 0.1 μ F |

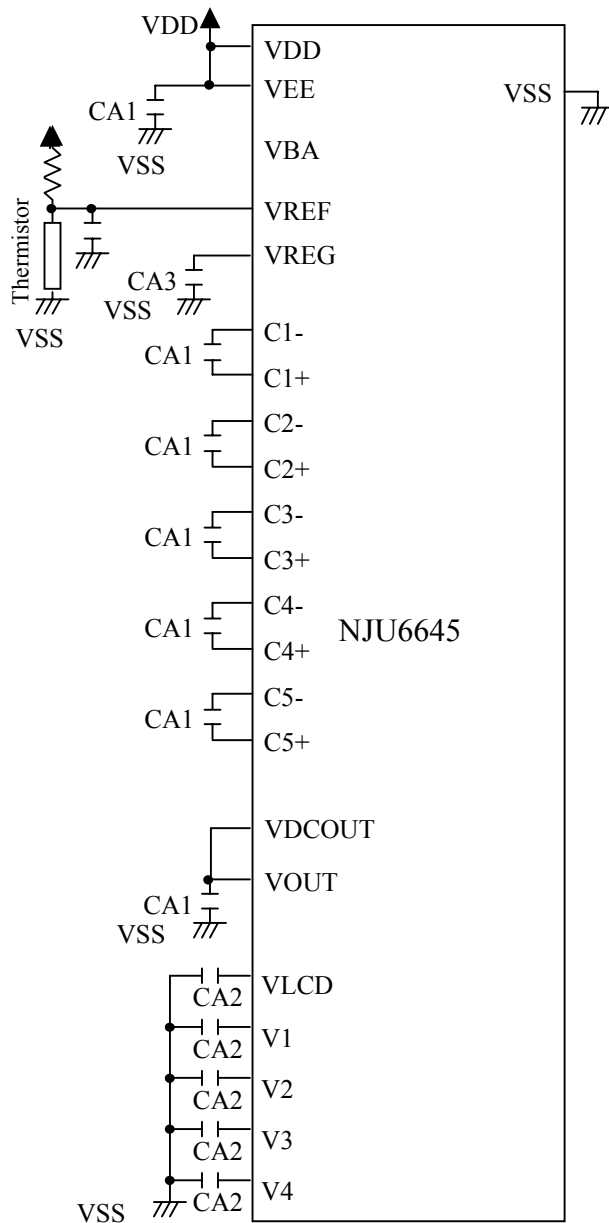
Note 1) B grade capacitor is recommended for CA1 to CA3. Make sure what is the best capacitor value in the particular application.

Note 2) Parasitic resistance on the power supply lines (VDD, VSS, VEE, VOUT, VLCD, V1, V2, V3 and V4) reduces step-up efficiency of the voltage booster, and may have an impact on the LSI's operation and display quality. To minimize this impact, be sure to lay out the shortest wires and place capacitors as close to the LSI as possible.

Using Internal LCD Power Supply Without Reference Voltage Generator (1)
(6x boost)



Using Internal LCD Power Supply Without Reference Voltage Generator (2)
(6x boost)



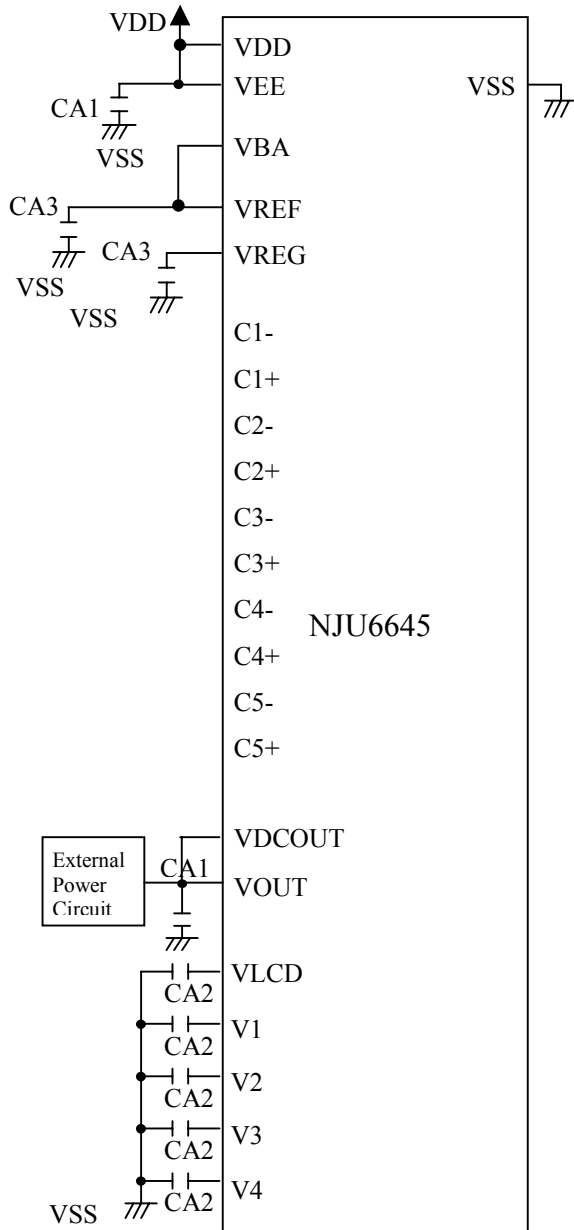
Reference Values

| | |
|-----|--------------------|
| CA1 | 1.0 to 4.7 μ F |
| CA2 | 1.0 to 2.2 μ F |
| CA3 | 0.1 μ F |

Note 1) B grade capacitor is recommended for CA1 to CA3. Make sure what is the best capacitor value in the particular application.

Note 2) Parasitic resistance on the power supply lines (VDD, VSS, VEE, VOUT, VLCD, V1, V2, V3 and V4) reduces step-up efficiency of the voltage booster, and may have an impact on the LSI's operation and display quality. To minimize this impact, be sure to lay out the shortest wires and place capacitors as close to the LSI as possible.

Using Internal LCD Power Supply Without Voltage Booster



Reference Values

| | |
|-----|--------------------|
| CA1 | 1.0 to 4.7 μ F |
| CA2 | 1.0 to 2.2 μ F |
| CA3 | 0.1 μ F |

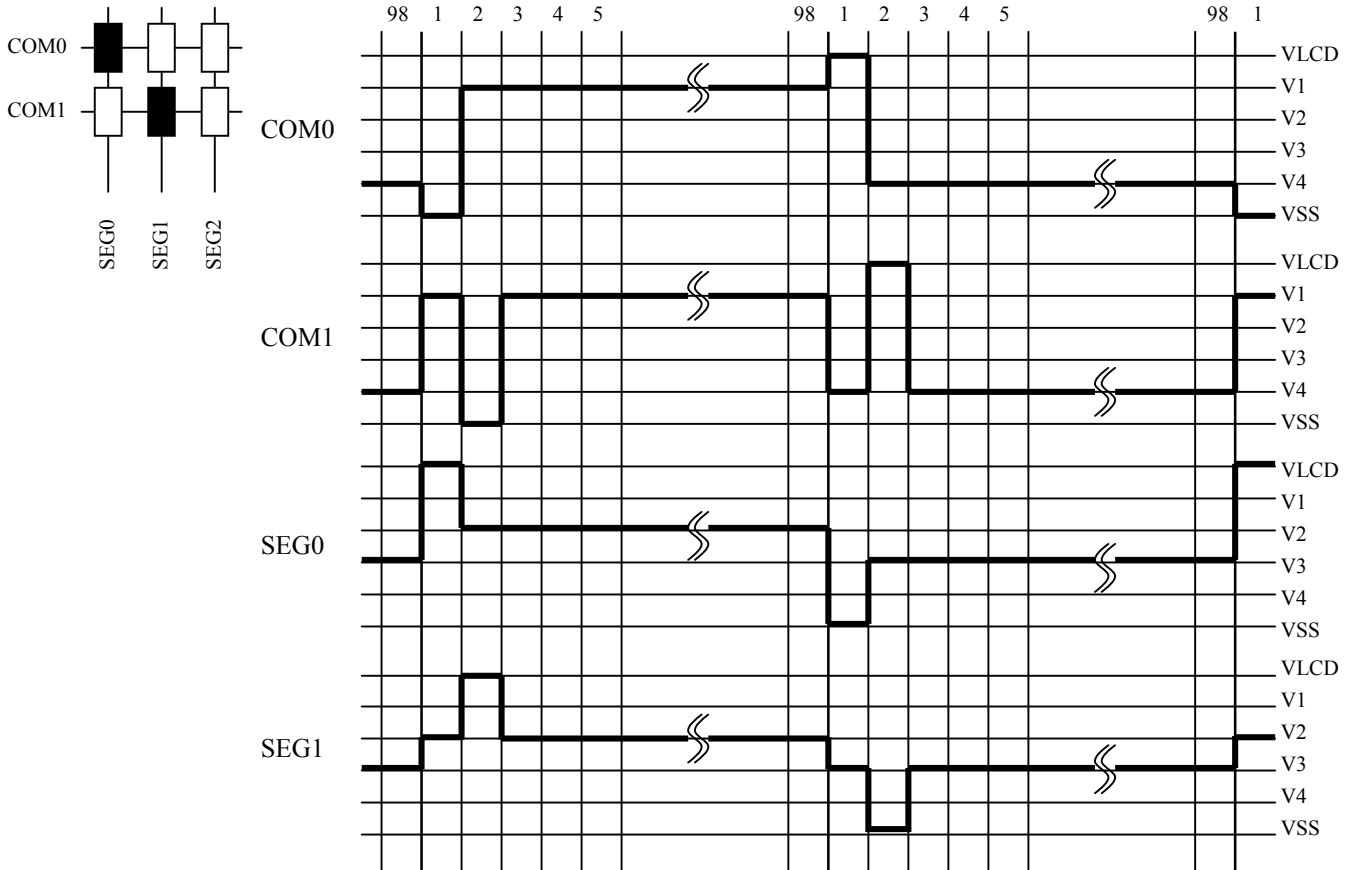
Note 1) B grade capacitor is recommended for CA1 to CA3. Make sure what is the best capacitor value in the particular application.

Note 2) Parasitic resistance on the power supply lines (VDD, VSS, VEE, VOUT, VLCD, V1, V2, V3 and V4) reduces step-up efficiency of the voltage booster, and may have an impact on the LSI's operation and display quality. To minimize this impact, be sure to lay out the shortest wires and place capacitors as close to the LSI as possible.

(18) COMMON DRIVERS AND SEGMENT DRIVERS

The LSI includes 256-segment drivers and 98-common drivers. 2 out of 98-common drivers are assigned to the COMMK0 and COMMK1 for an icon display. The common drivers generates LCD driving waveforms formed on the VLCD, V1, V4 and VSS levels. The segment drivers generates waveforms formed on the VLCD, V2, V3 and VSS levels.

(19) LCD DRIVING WAVEFORMS



(20) INSTRUCTION
Instruction Tables (1/2)

| Instruction | | | | Code | | | | | | | | Default | Description | |
|-------------|----------------|----|----|------|--------------------------|-----|-----|-----|-----|-----|-----|---------|-------------|--|
| | RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | | | |
| a | RAM Data Write | * | 1 | 0 | DDRAM, CGRAM, MKRAM Data | | | | | | | | - | |
| b | RAM Data Read | * | 1 | 1 | DDRAM, CGRAM, MKRAM Data | | | | | | | | - | |
| c | Status Read | * | 0 | 1 | BF | NF2 | NF1 | NF0 | LF3 | LF2 | LF1 | LF0 | - | BF: Busy Flag NF: Display Line at present LF: Display Row at present |

* : Don't care

| Instruction | | | | Code | | | | | | | | Default | Description | |
|-------------|--------------------------|----|----|------|----|----|----|----|--------|------|------|---------|-------------|---|
| | RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | | | |
| d | Display Clear | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | - | Writing the half-size space code "0020h" into all DDRAM. Setting the DDRAM address "000h" into address counter. |
| e | Cursor Home | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | - | Setting the DDRAM address "000h" into address counter. Initialization the Scroll Start Line and the Scroll Start Row. |
| f | Display Control | 0 | 0 | 0 | 0 | 0 | 1 | 0 | ALL ON | REV | M | D | 000 | ALLON: All pixels ON/OFF REV: Full Screen Reverse Display ON/OFF M: Icon Display ON/OFF D: Dot Matrix Display ON/OFF |
| g | Standby | 0 | 0 | 0 | 0 | 0 | 1 | 1 | * | * | * | HALT | 0 | |
| h | Cursor Display | 0 | 0 | 0 | 0 | 1 | 0 | 0 | BW | B | LC | C | 0000 | BW: Reverse Cursor B: Blink LC: Line Cursor C: Cursor |
| i | Display / Entry Mode | 0 | 0 | 0 | 0 | 1 | 0 | 1 | * | SPR | GR | RDM | 000 | SPR: Superimpose Mode GR: Graphics Mode RDM: Read Modify Write |
| j | Scroll Start Line | 0 | 0 | 0 | 0 | 1 | 1 | 0 | * | SSN2 | SSN1 | SSN0 | 000 | |
| k | Scroll Start Row | 0 | 0 | 0 | 0 | 1 | 1 | 1 | SSL3 | SSL2 | SSL1 | SSL0 | 0000 | |
| l | Display Start Line | 0 | 0 | 0 | 1 | 0 | 0 | 0 | * | DST2 | DST1 | DST0 | 000 | |
| m | Display Duty Ratio | 0 | 0 | 0 | 1 | 0 | 0 | 1 | * | DN2 | DN1 | DN0 | 000 | |
| n | N-line Inversion (Upper) | 0 | 0 | 0 | 1 | 0 | 1 | 0 | * | NL6 | NL5 | NL4 | 110 | |
| | N-line Inversion (Lower) | 0 | 0 | 0 | 1 | 0 | 1 | 1 | NL3 | NL2 | NL1 | NL0 | 0001 | |
| o | Driver Output Control | 0 | 0 | 0 | 1 | 1 | 0 | 0 | * | * | SEL1 | SEL2 | 00 | SEL1: COM Shift Direction Set SEL2: SEG Output Direction Set |
| p | Oscillation Control | 0 | 0 | 0 | 1 | 1 | 0 | 1 | INT CK | OC2 | OC1 | OC0 | 0000 | INTCK: Internal OSC / External Clock OC2,1,0: Internal Capacitance Adjust |
| q | RE Flag | * | 0 | 0 | 1 | 1 | 1 | 1 | * | * | * | RE | 0 | RE Flag Set |

* : Don't care

Instruction Tables (2/2)

| Instruction | | | | Code | | | | | | | | Default | Description | |
|-------------|---------------------------|----|----|------|----|----|----|----|------|------|--------|---------|-------------|--|
| | RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | | | |
| r | Discharge | 1 | 0 | 0 | 0 | 0 | 0 | 0 | * | * | * | DIS | 0 | |
| s | Boost Level | 1 | 0 | 0 | 0 | 0 | 0 | 1 | * | VU2 | VU1 | VU0 | 000 | VU2,1,0: Boost Level |
| t | Bias Ratio | 1 | 0 | 0 | 0 | 0 | 1 | 0 | BS3 | BS2 | BS1 | BS0 | 0000 | |
| u | Electrical Volume (Upper) | 1 | 0 | 0 | 0 | 0 | 1 | 1 | * | EV6 | EV5 | EV4 | 000 | |
| | Electrical Volume (Lower) | 1 | 0 | 0 | 0 | 1 | 0 | 0 | EV3 | EV2 | EV1 | EV0 | 0000 | |
| v | Power Control | 1 | 0 | 0 | 0 | 1 | 0 | 1 | * | * | AMP ON | DC ON | 00 | AMPON: Internal Operational Amplifier ON/OFF DCON: Voltage Boost Circuit ON/OFF |
| w | RAM Address Set 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | AD3 | AD2 | AD1 | AD0 | 0000 | RAM Address 4bit (AD3 to AD0) |
| | RAM Address Set 2 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | AD7 | AD6 | AD5 | AD4 | 0000 | RAM Address 4bit (AD7 to AD4) |
| | RAM Address Set 3 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | AD11 | AD10 | AD9 | AD8 | 0000 | RAM Address 4bit (AD11 to AD8) |
| x | Address Shift | 1 | 0 | 0 | 1 | 0 | 0 | 1 | * | * | * | ARL | - | ARL="0" Address -1 ARL="1" Address +1 |
| y | Maker Test 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | TS3 | TS2 | TS1 | TS0 | - | Maker Test Instruction (Not used usually.) |
| | Maker Test 2 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | TS7 | TS6 | TS5 | TS4 | - | |
| | Maker Test 3 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | TS11 | TS10 | TS9 | TS8 | - | |
| | Maker Test 4 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | * | * | TS13 | TS12 | - | |
| | Maker Test 5 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | TSM3 | TSM2 | TSM1 | TSM0 | - | |
| q | RE Flag | * | 0 | 0 | 1 | 1 | 1 | 1 | * | * | * | RE | 0 | RE Flag Set |

* : Don't care

< Instruction Descriptions >

(a) RAM Data Write

The "RAM Data Write" instruction writes display data on a specified address. The address is incremented automatically by "Display / Entry Mode" instruction.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|------------|----|----|----|----|----|----|----|
| * | 1 | 0 | WRITE DATA | | | | | | | |

(b) RAM Data Read

The "RAM Data Read" instruction reads out display data from a specified address. The address is incremented automatically by "Display / Entry Mode" instruction.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|-----------|----|----|----|----|----|----|----|
| * | 1 | 1 | READ DATA | | | | | | | |

(c) Status Read

The "Status Read" instruction reads out the busy flag (BF) that indicates the internal operation and the line / row that displayed at present. The BF="1" indicates that internal operation is in progress. When the BF="1", the next instruction is disabled. Check the busy flag status (BF="0") before the next write operation.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| * | 0 | 1 | BF | NF2 | NF1 | NF0 | LF3 | LF2 | LF1 | LF0 |

- Busy Flag Read

| BF | Internal Operation |
|----|-------------------------------------|
| 0 | Instruction is enable |
| 1 | Operating (Instruction is disabled) |

- Display Line Read

| NF | Display Line |
|-----|--------------|
| 000 | 1st line |
| 001 | 2nd line |
| 010 | 3rd line |
| 011 | 4th lint |
| 100 | 5th line |
| 101 | 6th line |
| 110 | - |
| 111 | - |

- Display Row Read

| LF | Display Row |
|------|-------------|
| 0000 | 1st row |
| 0001 | 2nd row |
| 0010 | 3rd row |
| 0011 | 4th row |
| 0100 | 5th row |
| 0101 | 6th row |
| 0110 | 7th row |
| 0111 | 8th row |
| 1000 | 9th row |
| 1001 | 10th row |
| 1010 | 11th row |
| 1011 | 12th row |
| 1100 | 13th row |
| 1101 | 14th row |
| 1110 | 15th row |
| 1111 | 16th row |

(d) Display Clear

When the "Display Clear" instruction is executed, the Half-size space code "0020h" is written into every DD RAM address, the DD RAM address "000h" is set into the address counter. The MK RAM / CG RAM data is unchanged.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

(e) Cursor Home

When the "Cursor Home" instruction is executed, the DD RAM address "000h" is set into the address counter. The Scroll Start Line and the Scroll Start Row are set to default. The DD RAM contents are unchanged.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |

(f) Display Control

The "Display Control" instruction controls the Dot Matrix Display ON/OFF, the Icon Display ON/OFF, the Full Screen Reverse Display ON/OFF and All Pixels ON/OFF. The Icon Display ON/OFF and the Dot Matrix Display ON/OFF are controlled separately. When the M="0" and D="0", common / segment drivers are turning OFF and output VSS level.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|-------|-----|----|----|
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | ALLON | REV | M | D |

- All Pixels ON/OFF

| ALLON | Display |
|-------|---|
| 0 | Normal display |
| 1 | All ON display (Both dot matrix and Icon display) |

- Full Screen Reverse Display ON/OFF

| REV | Display |
|-----|-----------------------------|
| 0 | Normal display |
| 1 | Full screen reverse display |

- Icon Display ON/OFF

| M | Icon Display |
|---|--------------|
| 0 | OFF |
| 1 | ON |

- Dot Matrix Display ON/OFF

| D | Dot Matrix Display |
|---|--------------------|
| 0 | OFF |
| 1 | ON |

(g) Standby

The "Standby" instruction controls the Standby mode ON/OFF.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|----|------|
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | * | * | * | HALT |

| HALT | Function |
|------|-------------------|
| 0 | OFF (Normal mode) |
| 1 | ON (Standby mode) |

During the standby ON, operating current is down to the standby level. The internal state of the LSI in the standby mode is listed below.

- Internal oscillator and internal LCD power supply are halted.
- All segment and common drivers are fixed at VSS level.
- External clock to the OSC2 cannot be accepted.
- Voltage booster is halted.
- Display data in the DDRAM and data in the instruction registers are being maintained.
- VLCD, V1, V2, V3 and V4 are in high impedance.

In the standby ON sequence, execute the "Display OFF" prior to the "Standby ON". In the standby OFF sequence, execute the "Standby OFF" prior to the "Display ON". If the "Standby ON/OFF" instruction is executed during the "Display ON", unexpected pixels may be turned on instantly.

(h) Cursor Display

The "Cursor Display" instruction controls the Cursor ON/OFF, the Line Cursor ON/OFF and display method.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | BW | B | LC | C |

| BW | B | LC | C | Display State |
|----|---|----|---|---------------------------------------|
| * | * | * | 0 | Cursor OFF |
| 0 | 0 | 0 | 1 | Underline cursor (Character unit) |
| 0 | 1 | 0 | 1 | Black blink cursor (Character unit) |
| 1 | 0 | 0 | 1 | Reverse blink cursor (Character unit) |
| 1 | 1 | 0 | 1 | Inhibited |
| 0 | 0 | 1 | 1 | Underline cursor (Line unit) |
| 0 | 1 | 1 | 1 | White blink cursor (Line unit) |
| 1 | 0 | 1 | 1 | Reverse cursor (Line unit) |
| 1 | 1 | 1 | 1 | Inhibited |

(i) Display Mode / Entry Mode

The "Display Mode / Entry Mode" instruction controls the Display Mode and Entry Mode.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|-----|----|-----|
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | * | SPR | GR | RDM |

- Display Mode

| SPR | GR | Display state |
|-----|----|------------------|
| 0 | 0 | Character Mode |
| 0 | 1 | Graphics Mode |
| 1 | * | Superimpose Mode |

- Read Modify Write Mode

| RDM | Function |
|-----|--|
| 0 | OFF (Auto increment in writing and reading display data) |
| 1 | ON (Auto increment in writing display data only) |

(j) Scroll Start Line

The "Scroll Start Line" instruction controls the Display Line from COM0 output.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|------|------|------|
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | * | SSN2 | SSN1 | SSN0 |

| SSN2 | SSN1 | SSN0 | Scroll Start Line |
|------|------|------|-------------------|
| 0 | 0 | 0 | 1st line |
| 0 | 0 | 1 | 2nd line |
| 0 | 1 | 0 | 3rd line |
| 0 | 1 | 1 | 4th line |
| 1 | 0 | 0 | 5th line |
| 1 | 0 | 1 | 6th line |
| 1 | 1 | * | Inhibited |

- Example of Display

SSN="000"
(Default)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |



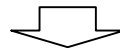
SSN="001"

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |



SSN="010"

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |



SSN="011"

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |



SSN="100"

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |



SSN="101"

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

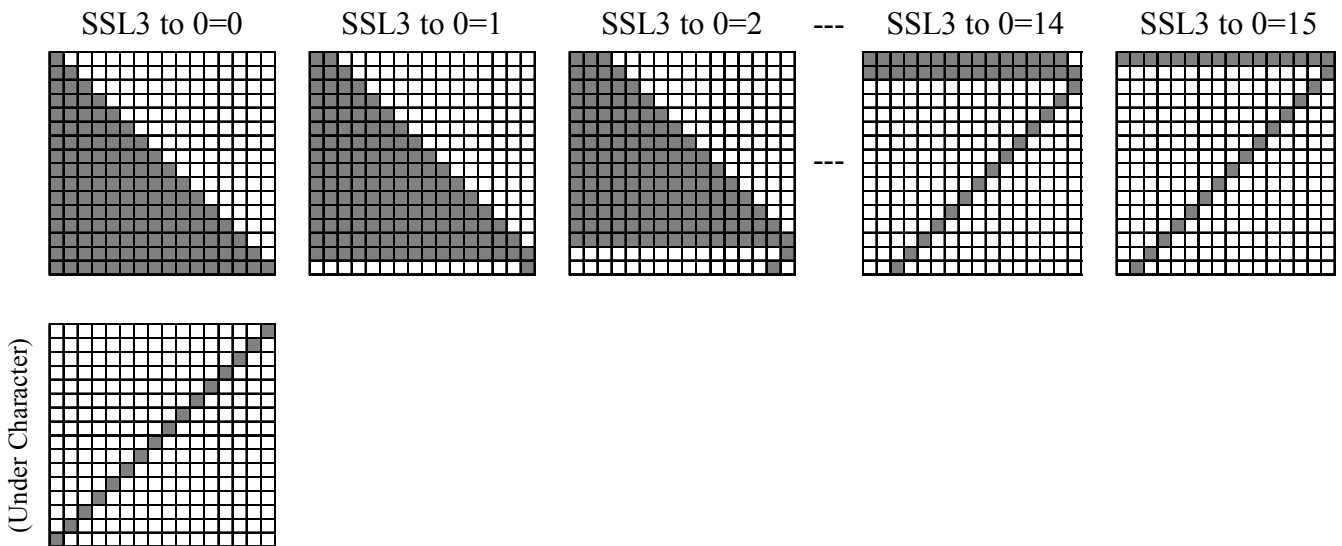
(k) Scroll Start Row

The "Scroll Start Row" instruction controls number of the Scroll Start Row.

| | | | | | | | | | | |
|----|----|----|----|----|----|----|------|------|------|------|
| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | SSL3 | SSL2 | SSL1 | SSL0 |

| SSL3 | SSL2 | SSL1 | SSL0 | Scroll Start Row |
|------|------|------|------|------------------|
| 0 | 0 | 0 | 0 | 1st row |
| 0 | 0 | 0 | 1 | 2nd row |
| 0 | 0 | 1 | 0 | 3rd row |
| 0 | 0 | 1 | 1 | 4th row |
| ⋮ | | | | ⋮ |
| 1 | 1 | 1 | 1 | 16th row |

- Example of Display



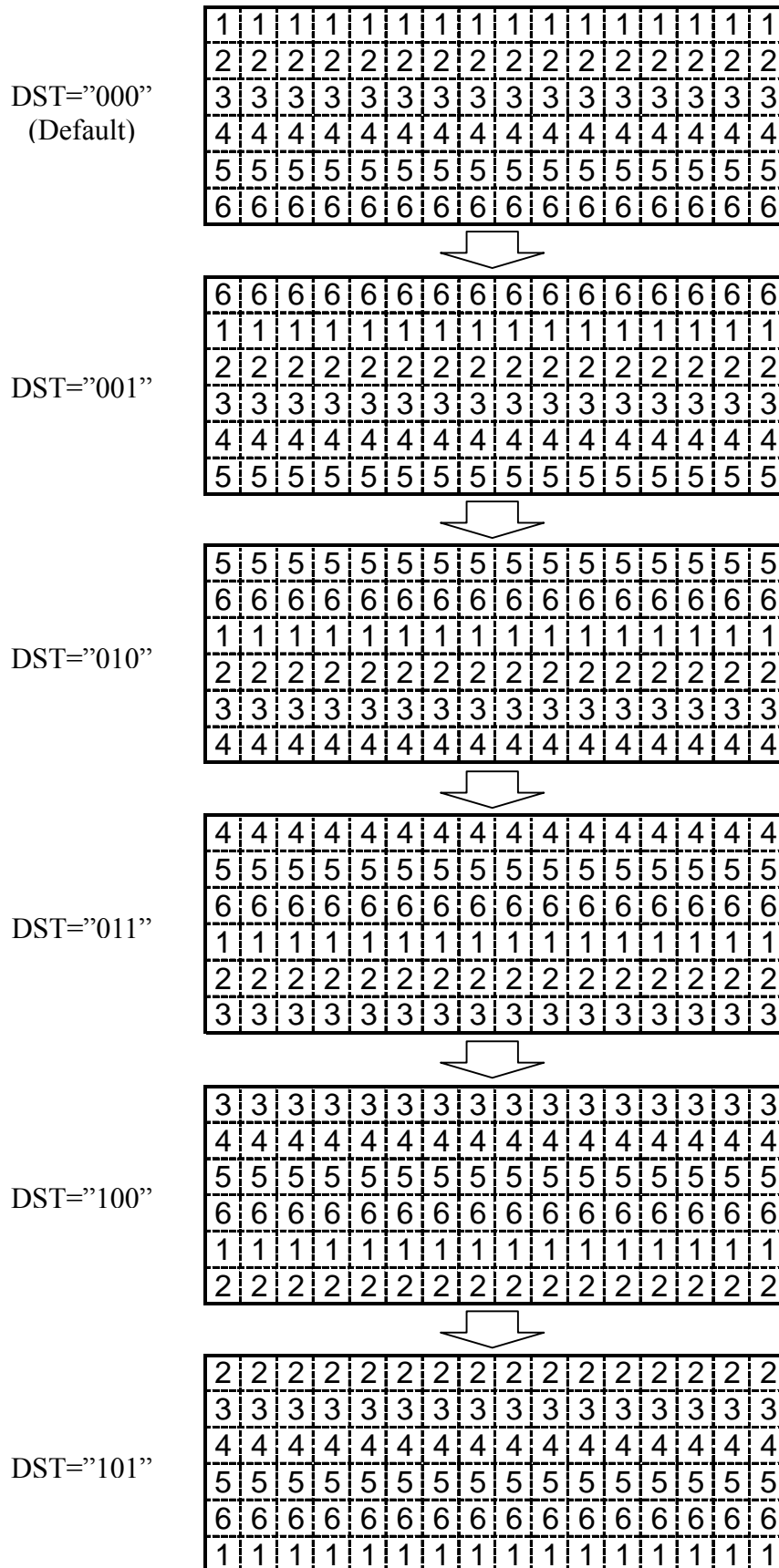
(l) Display Start Line

The "Display Start Line" instruction controls the Display Start Line. The displayed data of the 1st line shifts to the setting line.

| | | | | | | | | | | |
|----|----|----|----|----|----|----|----|------|------|------|
| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | * | DST2 | DST1 | DST0 |

| DST2 | DST1 | DST0 | Display Start Line |
|------|------|------|--------------------|
| 0 | 0 | 0 | 1st line |
| 0 | 0 | 1 | 2nd line |
| 0 | 1 | 0 | 3rd line |
| 0 | 1 | 1 | 4th line |
| 1 | 0 | 0 | 5th line |
| 1 | 0 | 1 | 6th line |
| 1 | 1 | * | Inhibited |

- Example of Display



(m) Display Duty Ratio

The "Display Duty Ratio" instruction controls the number of display line, and is used to carry out the partial display.

| | | | | | | | | | | |
|----|----|----|----|----|----|----|----|-----|-----|-----|
| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | * | DN2 | DN1 | DN0 |

| DN2 | DN1 | DN0 | Display Line (Duty) |
|-----|-----|-----|---------------------|
| 0 | 0 | 0 | 6-line (1/98 Duty) |
| 0 | 0 | 1 | 5-line (1/82 Duty) |
| 0 | 1 | 0 | 4-line (1/66 Duty) |
| 0 | 1 | 1 | 3-line (1/50 Duty) |
| 1 | 0 | 0 | 2-line (1/34 Duty) |
| 1 | 0 | 1 | 1-line (1/18 Duty) |
| 1 | 1 | * | Inhibited |

(n) N-line Inversion

The "N-line Inversion" instruction controls the number of inversion line. The setting range are 2 to 98 lines, and is alternated by setting (N+1).

| | | | | | | | | | | |
|----|----|----|----|----|----|----|----|-----|-----|-----|
| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 0 | 0 | 0 | 1 | 0 | 1 | 0 | * | NL6 | NL5 | NL4 |

| | | | | | | | | | | |
|----|----|----|----|----|----|----|-----|-----|-----|-----|
| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | NL3 | NL2 | NL1 | NL0 |

| NL6 | NL5 | NL4 | NL3 | NL2 | NL1 | NL0 | Inversion Line |
|-----|-----|-----|-----|-----|-----|-----|----------------|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | Inhibited |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 |
| : | | | | | | | : |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 97 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 98 |
| : | | | | | | | Inhibited |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | |

(o) Driver Output Control

The "Driver Output Control" instruction controls the SEG / COM driver output direction.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|------|------|
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | * | * | SEL1 | SEL2 |

| SEL1 | Function |
|------|-----------------------------|
| 0 | COM scan forward direction |
| 1 | COM scan backward direction |

| SEL2 | Function |
|------|-------------------------------|
| 0 | SEG output forward direction |
| 1 | SEG output backward direction |

(p) Oscillation Control

The "Oscillation Control" instruction controls the system clock type and the internal capacitance of internal oscillation circuits. The frame frequency is adjusted by internal capacitance setting. When the frame frequency is set by this instruction, make sure what is the best setting in the particular application.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|-------|-----|-----|-----|
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | INTCK | OC2 | OC1 | OC0 |

| INTCK | Function |
|-------|------------------------------|
| 0 | Internal oscillation circuit |
| 1 | External oscillation input |

| OC2 | OC1 | OC0 | Internal Capacitance |
|-----|-----|-----|-----------------------------|
| 0 | 0 | 0 | Reference capacitance |
| 0 | 0 | 1 | 0.7 x Reference capacitance |
| 0 | 1 | 0 | 0.8 x Reference capacitance |
| 0 | 1 | 1 | 0.9 x Reference capacitance |
| 1 | 0 | 0 | 1.1 x Reference capacitance |
| 1 | 0 | 1 | 1.2 x Reference capacitance |
| 1 | 1 | 0 | 1.3 x Reference capacitance |
| 1 | 1 | 1 | Inhibited |

(q) RE Flag Set

The "RE Flag Set" instruction controls the access to the expanded register. When it accesses each instruction, it is necessary to set the RE flag in advance.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|----|----|
| * | 0 | 0 | 1 | 1 | 1 | 1 | * | * | * | RE |

(r) Discharge

Discharge circuit is used to discharge out of the stabilizing capacitors placed on the VLCD, V1, V2, V3, V4 and VSS. This instruction prevents the unknown display at the power supply off.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|----|-----|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | * | * | * | DIS |

| DIS | Function |
|-----|---------------|
| 0 | Discharge OFF |
| 1 | Discharge ON |

(s) Boost Level

The "Boost Level" instruction controls the level of Voltage Boost Circuit..

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|-----|-----|-----|
| 1 | 0 | 0 | 0 | 0 | 0 | 1 | * | VU2 | VU1 | VU0 |

| VU2 | VU1 | VU0 | Boost Level |
|-----|-----|-----|-------------------|
| 0 | 0 | 0 | 1 time (No boost) |
| 0 | 0 | 1 | 2 times |
| 0 | 1 | 0 | 3 times |
| 0 | 1 | 1 | 4 times |
| 1 | 0 | 0 | 5 times |
| 1 | 0 | 1 | 6 times |
| 1 | 1 | 0 | Inhibited |
| 1 | 1 | 1 | |

(t) Bias Ratio

The "Bias Ratio" instruction controls the Bias Ratio.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|-----|-----|-----|-----|
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | BS3 | BS2 | BS1 | BS0 |

| BS3 | BS2 | BS1 | BS0 | Bias Ratio |
|-----|-----|-----|-----|------------|
| 0 | 0 | 0 | 0 | 1/11 |
| 0 | 0 | 0 | 1 | 1/10 |
| 0 | 0 | 1 | 0 | 1/9 |
| 0 | 0 | 1 | 1 | 1/8 |
| 0 | 1 | 0 | 0 | 1/7 |
| 0 | 1 | 0 | 1 | 1/6 |
| 0 | 1 | 1 | 0 | 1/5.5 |
| 0 | 1 | 1 | 1 | 1/5 |
| 1 | 0 | 0 | 0 | 1/4.5 |
| 1 | 0 | 0 | 1 | 1/4 |
| 1 | 0 | 1 | 0 | Inhibited |
| : | | | | |
| 1 | 1 | 1 | 1 | |

(u) Electrical Volume

The "Electrical Volume" instruction adjusts VLCD to optimize display contrast. The voltage divided into 127 is set. The setting order requires upper byte first.

| | | | | | | | | | | |
|----|----|----|----|----|----|----|----|-----|-----|-----|
| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | * | EV6 | EV5 | EV4 |

| | | | | | | | | | | |
|----|----|----|----|----|----|----|-----|-----|-----|-----|
| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | EV3 | EV2 | EV1 | EV0 |

| | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|----------------|
| EV6 | EV5 | EV4 | EV3 | EV2 | EV1 | EV0 | Output Voltage |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | ⋮ |
| ⋮ | | | | | | | |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | High |

This instruction is finally effective when both upper and lower bytes are transmitted in order to prevent high VLCD. The setting order is upper byte first, then lower byte.

Note) When the electrical volume setting is changed to wide range at keeping display on, there is possibility that the unknown display appears. In this case, add waiting time and change the electrical volume value gradually.

< Example of the changing from EV=80 to EV=110 at keeping display on >

EV=80 → Wait (~ms) → EV=90 → Wait (~ms) → EV=100 → Wait (~ms) → EV=110

* The wait time and electrical volume setting range is different depending on the capacitance value of V1 to V4 and the panel size. Please make sure what is the best setting in the particular application.

(v) Power Control

| | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|-------|------|
| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 1 | 0 | 0 | 0 | 1 | 0 | 1 | * | * | AMPON | DCON |

AMPON : This instruction controls ON/OFF of the operational amplifier parts of the internal power supply circuits (Voltage regulator, electrical variable resistor, and voltage converter).

| | |
|-------|------------------------------------|
| AMPON | Function |
| 0 | Internal operational amplifier OFF |
| 1 | Internal operational amplifier ON |

DCON : This instruction controls Internal Voltage Booster ON/OFF,

| | |
|------|---------------------|
| DCON | Function |
| 0 | Voltage booster OFF |
| 1 | Voltage booster ON |

(w) RAM Address Set

The "RAM Address Set" instruction specifies the DDRAM, CGRAM, and MKRAM address. The RAM address should set lower 4-bit (AD3 to AD0) at first. This instruction is finally effective when upper 4-bit (AD11 to AD8) are transmitted.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|-----|-----|-----|-----|
| 1 | 0 | 0 | 0 | 1 | 1 | 0 | AD3 | AD2 | AD1 | AD0 |

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|-----|-----|-----|-----|
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | AD7 | AD6 | AD5 | AD4 |

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|------|------|-----|-----|
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | AD11 | AD10 | AD9 | AD8 |

(x) Address Shift

The "Address Shift" instruction controls increment (+1) or decrement (-1) of the address. The address moves whenever this instruction is executed.

| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|----|-----|
| 1 | 0 | 0 | 1 | 0 | 0 | 1 | * | * | * | ARL |

| ARL | Function |
|-----|------------|
| 0 | Address -1 |
| 1 | Address +1 |

(y) Maker Test

This instruction is using for device testing mode. Please do not use this instruction usually.

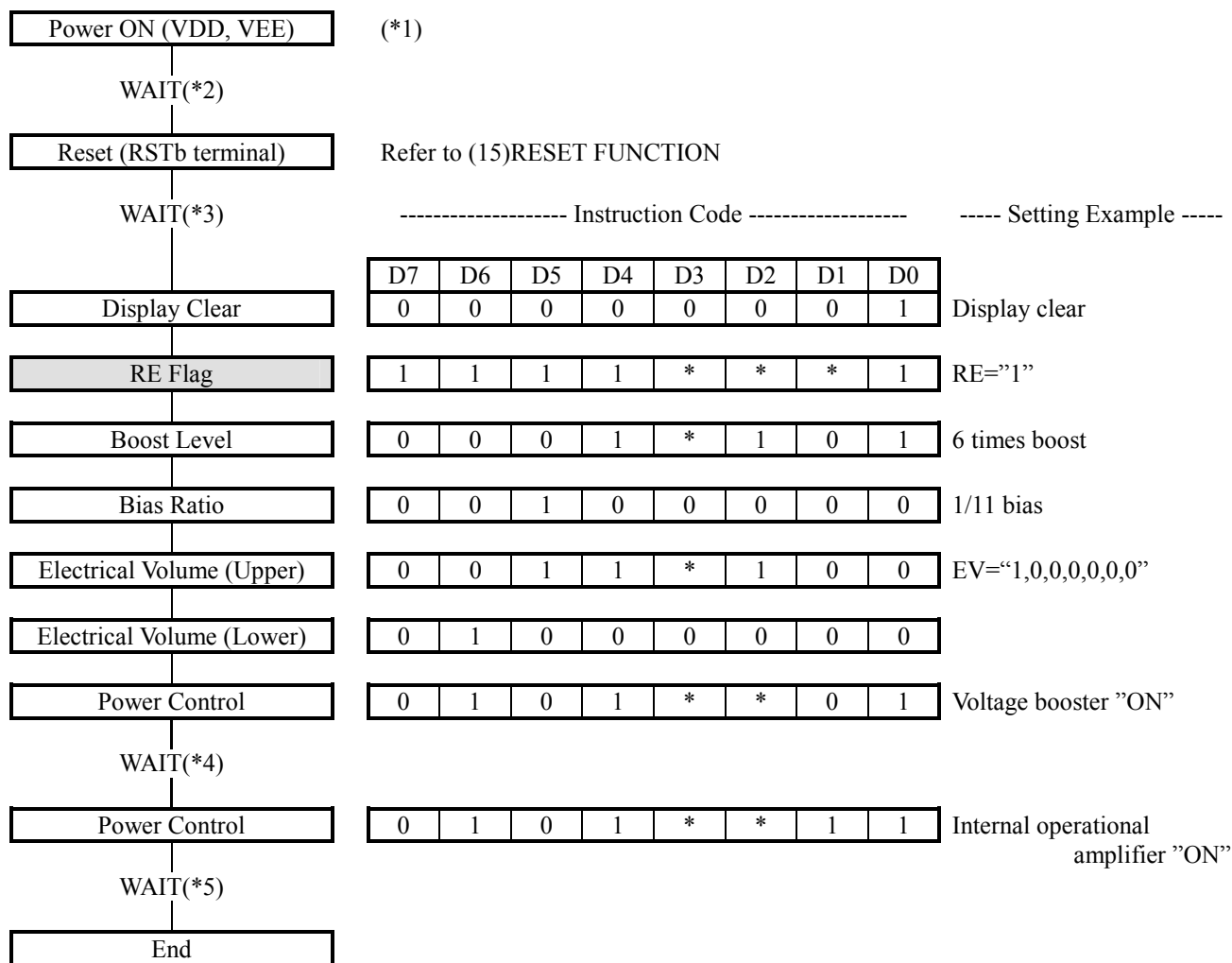
| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 0 | 0 | 1 | 0 | 1 | 0 | * | * | * | * |



| RE | RS | RW | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 0 | 0 | 1 | 1 | 1 | 0 | * | * | * | * |

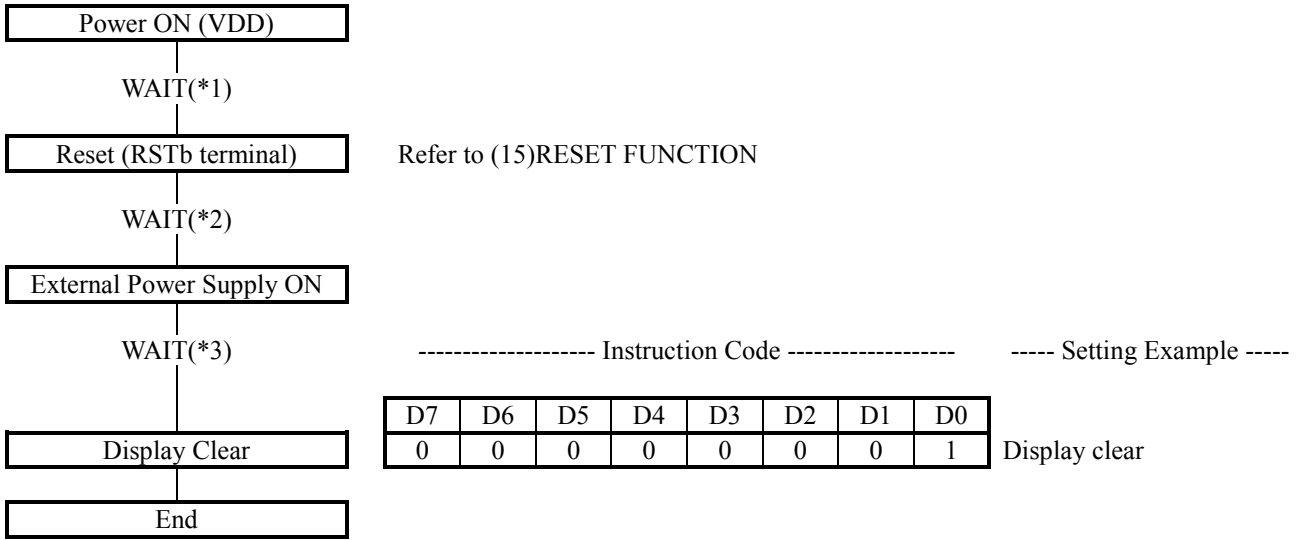
(21) TYPICAL INSTRUCTION SEQUENCE

(21-1) Initialization Sequence in Using Internal LCD Power Supply



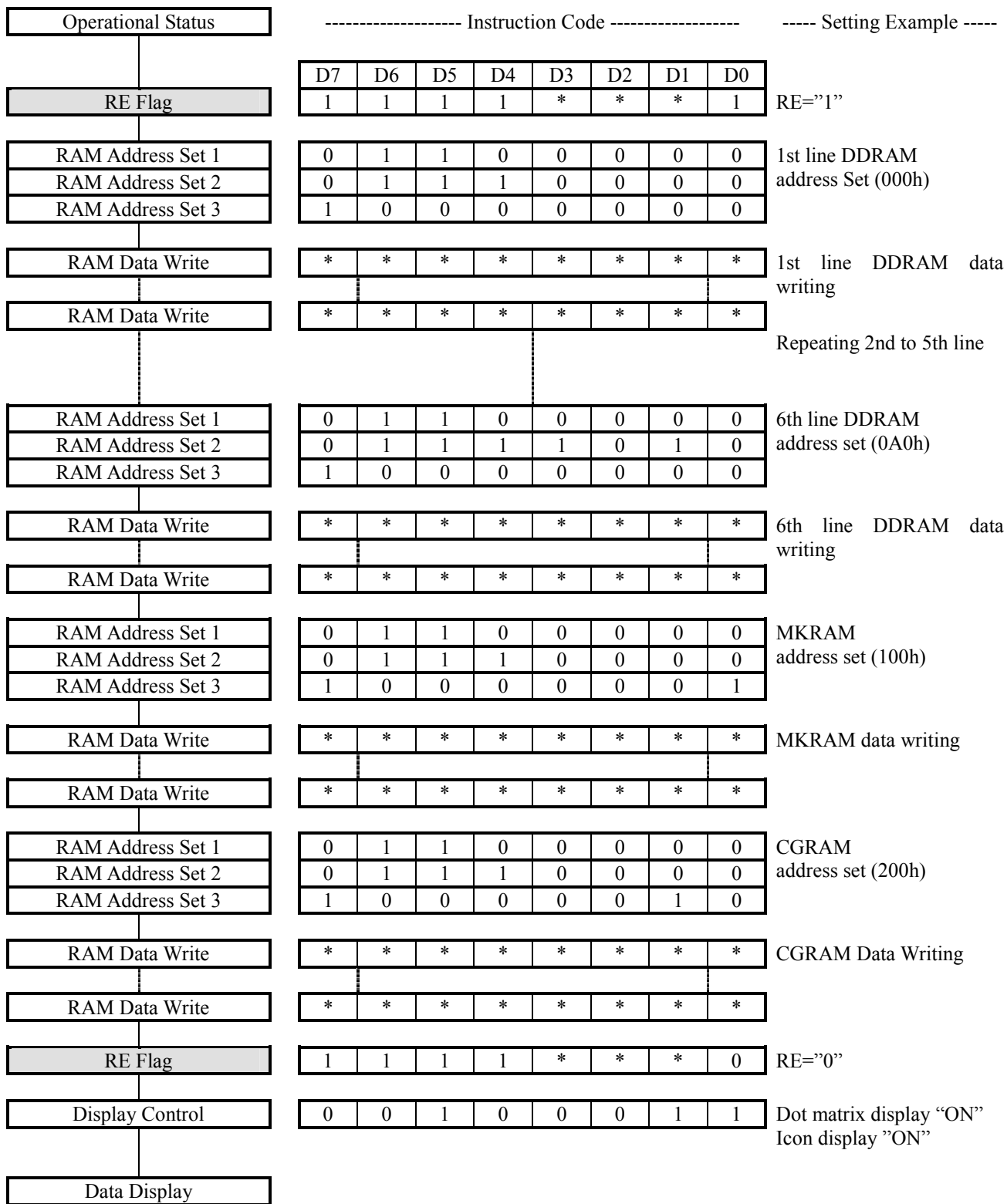
- *1 If different power sources are applied to the VDD and the VEE, turn ON the VDD first.
- *2 Wait until the VDD and VEE are stabilized.
- *3 Wait 1.5ms or more.
- *4 Wait until the VDCOUT (VOUT) is stabilized.
- *5 Wait until the VLCD and V1 to V4 are stabilized.

(21-2) Initialization Sequence in Using External LCD Power Supply

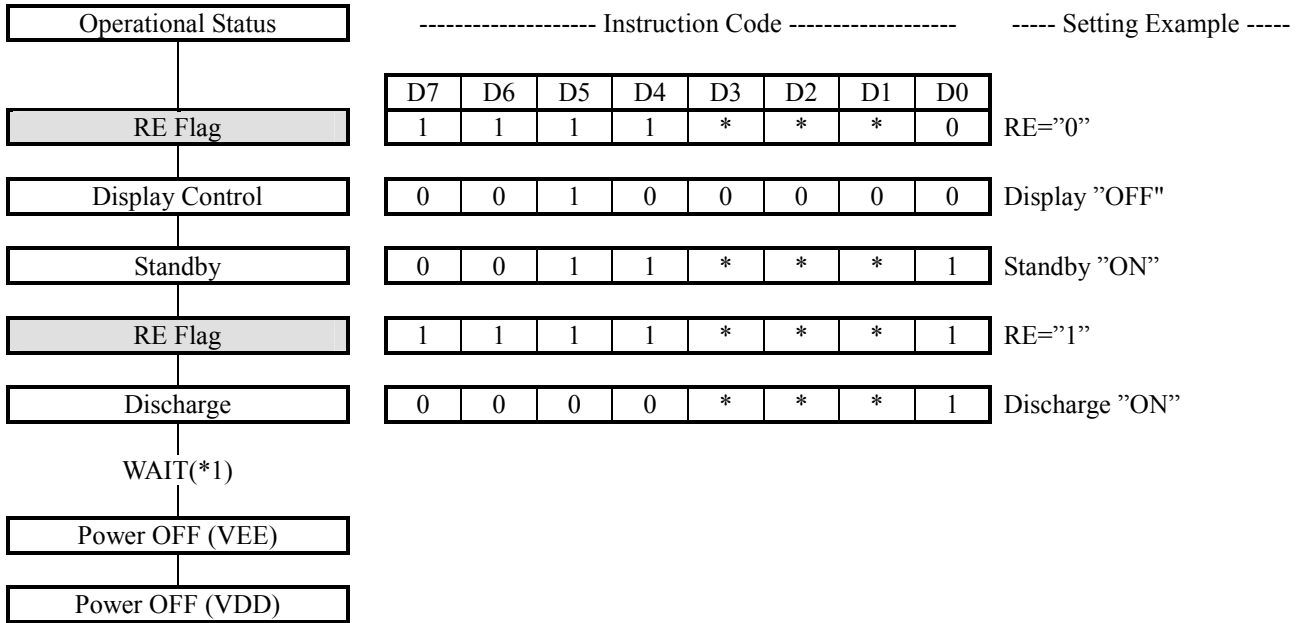


- *1 Wait until the VDD is stabilized.
- *2 Wait 1.5ms or more.
- *3 Wait until the external LCD power supply (VOUT, VLCD, V1 to V4) are stabilized.

(21-3) Display Data Write Sequence

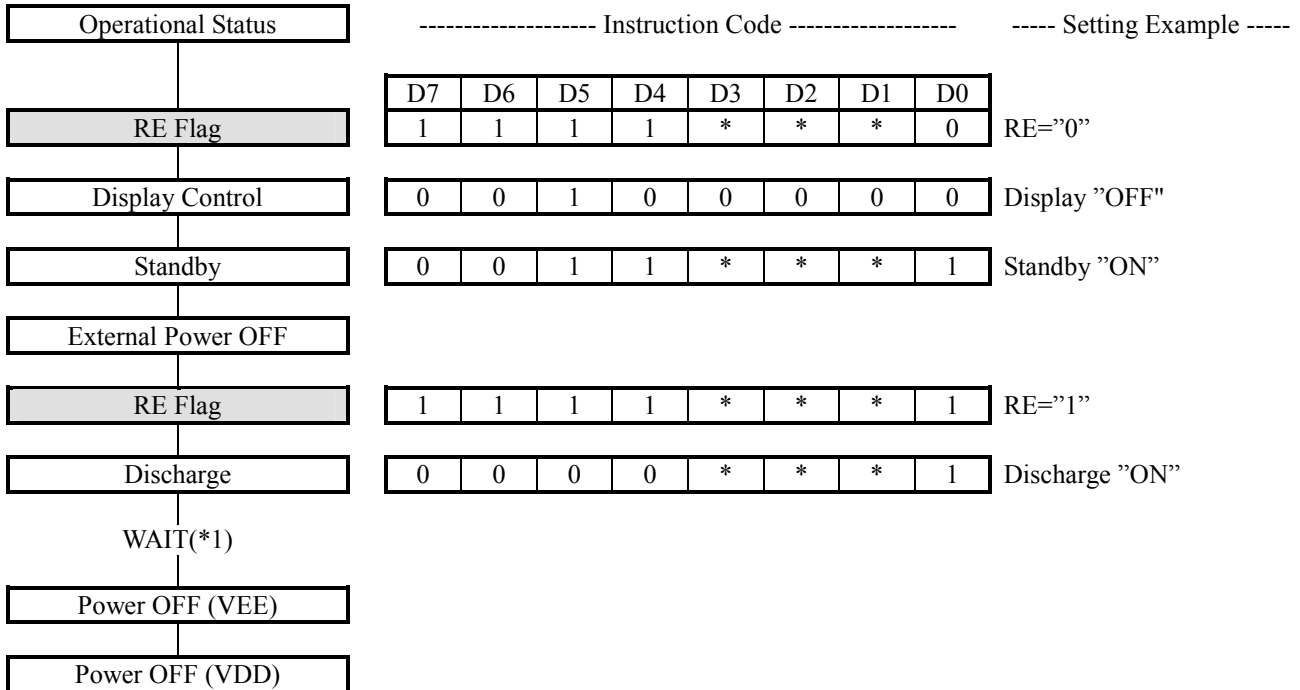


(21-4)Power OFF Sequence in Using Internal LCD Power Supply



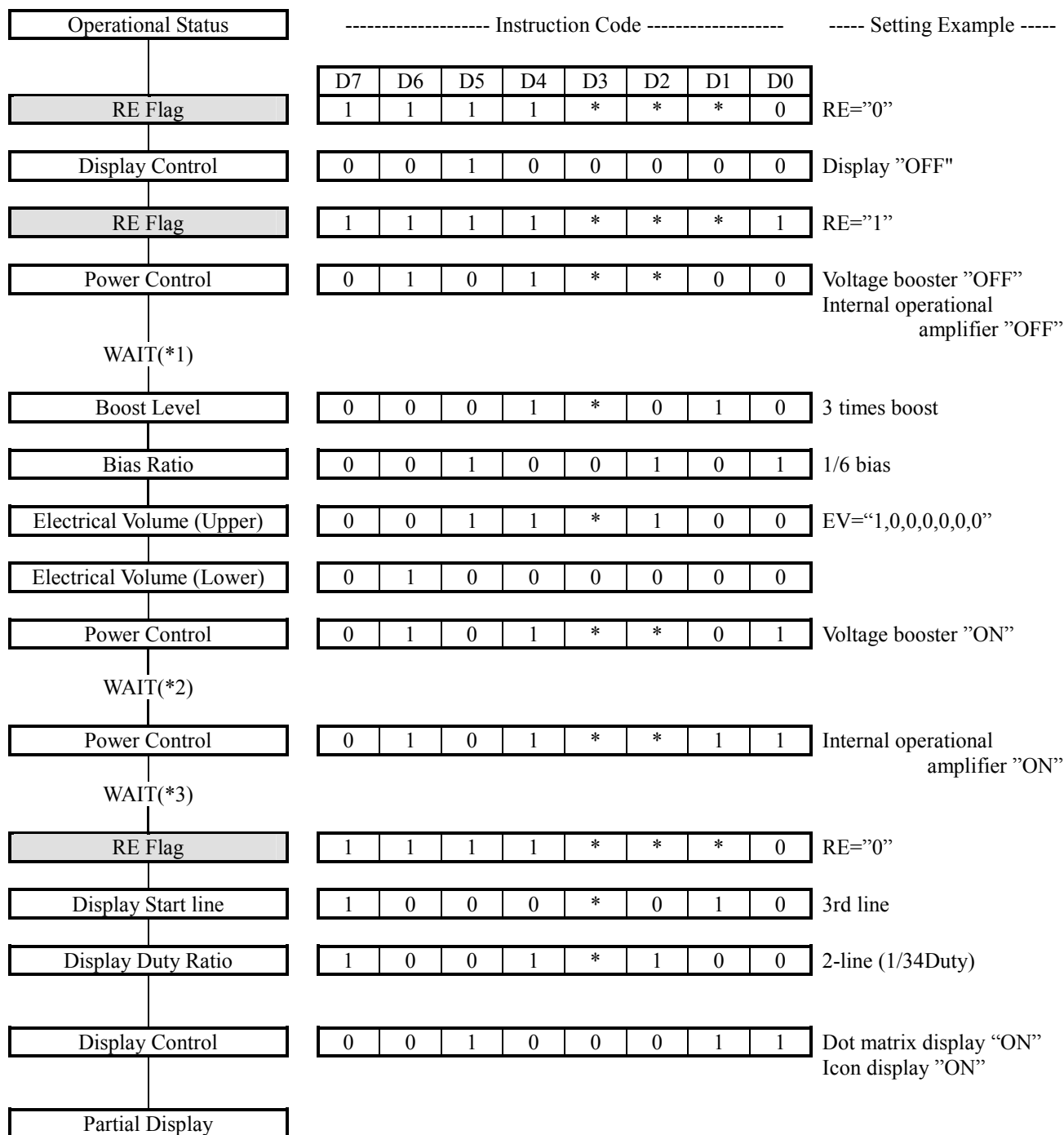
*1 Wait until the discharge is completed.

(21-5)Power OFF Sequence in Using External LCD Power Supply



*1 Wait until the discharge is completed.

(21-6)Partial Display Sequence [Example : Display Duty Ratio = 2-line (1/34 Duty), Display Start Line = 3rd line]



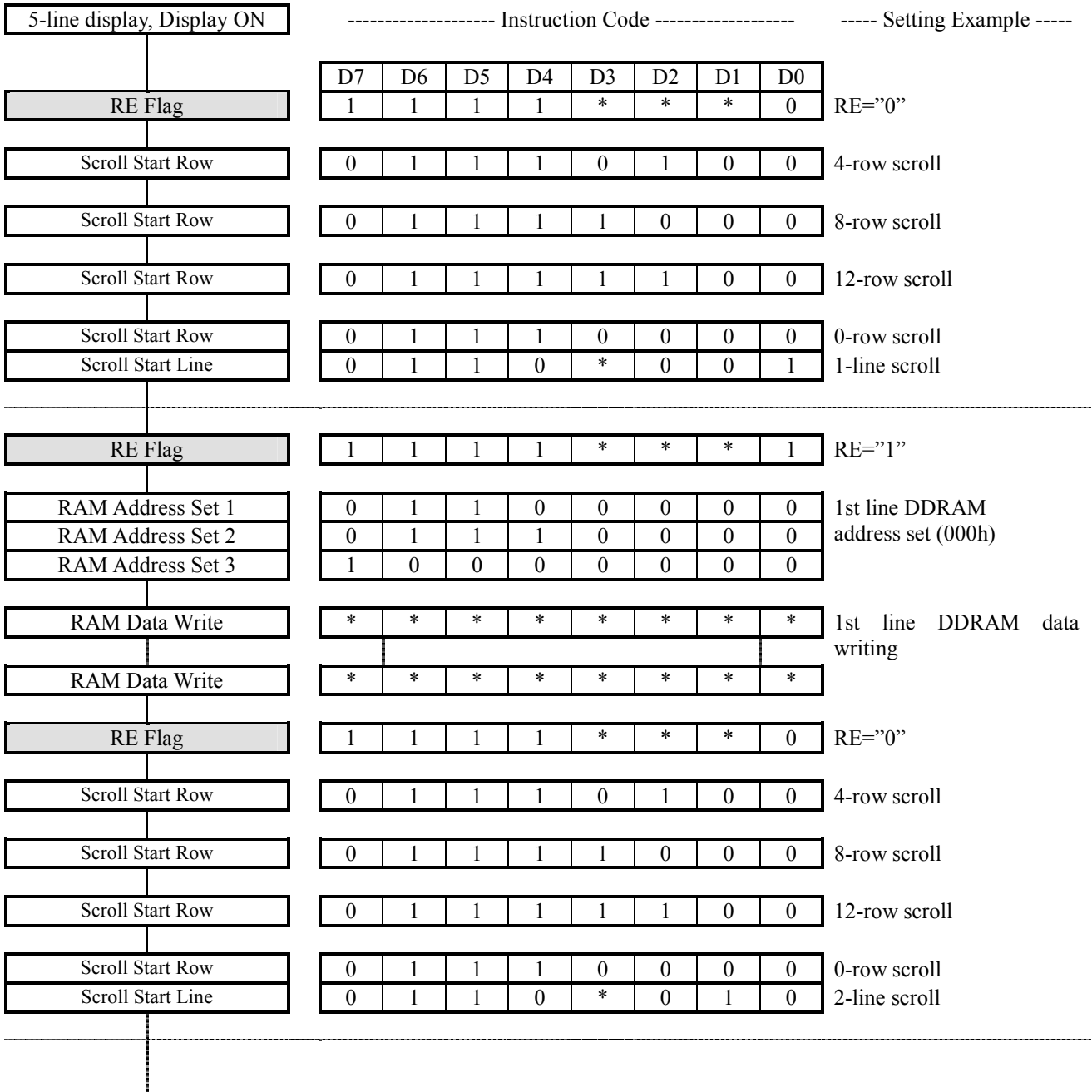
*1 Wait until the discharge is completed.

*2 Wait until the VDCOUT (VOUT) is stabilized.

*3 Wait until the external LCD power supply (VOUT, VLCD, V1 to V4) are stabilized.

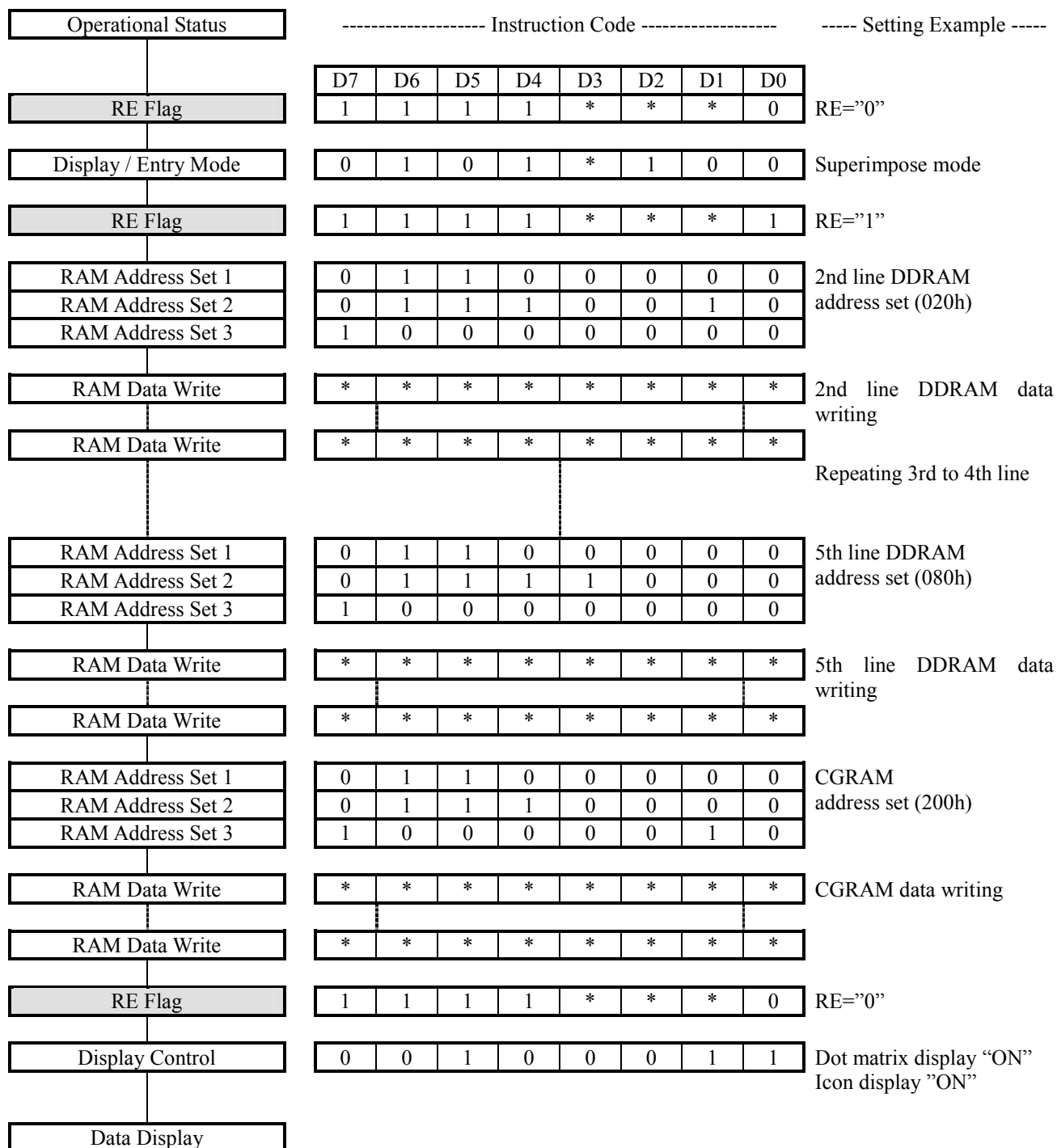
Refer to (10) PARTIAL DISPLAY .

(21-7)Smooth Scroll Display Sequence [Example : 5-line display, 4-dot scroll]



Refer to (11) VERTICAL SMOOTH S SCROLL.

(21-8) Superimpose Mode Display Sequence [Example : Character display on 2nd ~ 5th line]



Refer to (13-3) Superimpose Mode.

■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | CONDITION | TERMINAL | RATING | UNIT |
|-----------------------|----------------|------------------------------|----------------|------------------|-----------------|
| Supply Voltage (1) | VDD | VSS=0V Common Ta=+25°C | VDD | -0.3 to +4.0 | V |
| Supply Voltage (2) | VEE | | VEE | -0.3 to +4.0 | V |
| Supply Voltage (3) | VOUT, VDCOUT | | VOUT, VDCOUT | -0.3 to +19.0 | V |
| Supply Voltage (4) | VREG | | VREG | -0.3 to +19.0 | V |
| Supply Voltage (5) | VLCD | | VLCD | -0.3 to +19.0 | V |
| Supply Voltage (6) | V1, V2, V3, V4 | | V1, V2, V3, V4 | -0.3 to VLCD+0.3 | V |
| Input Voltage (1) | VI | | | | -0.3 to VDD+0.3 |
| Operating Temperature | Topr | | | -40 to +85 | °C |
| Storage Temperature | Tstg | Bump Chip | | -55 to +125 | °C |

- *1 If the LSI is used on condition beyond the absolute maximum rating, the LSI may be destroyed. Using LSI within electrical characteristics is strongly recommended for normal operation. Use beyond the electric characteristics conditions will cause malfunction and poor reliability.
- *2 The order of turning on the power supply should turn on VDD earlier than other power supplies. When the power supply is turned off, that requires turning off VDD at the last.

■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | TERMINAL | MIN | TYP | MAX | UNIT | NOTE |
|-------------------|--------|----------|-----|-----|----------|------|------|
| Supply Voltage | VDD1 | VDD | 2.4 | - | 3.6 | V | *1 |
| | VDD2 | | 2.4 | - | 3.6 | V | *2 |
| | VEE | VEE | 2.4 | - | 3.6 | V | *3 |
| Operating Voltage | VLCD | VLCD | 4.5 | - | 17.0 | V | *4 |
| | VOUT | VOUT | - | - | 17.0 | V | |
| | VDCOUT | VDCOUT | - | - | 17.0 | V | |
| | VREG | VREG | - | - | VOUTx0.9 | V | *5 |
| | VREF | VREF | 1.8 | - | 3.6 | V | *6 |

- *1 Applied to the condition when the reference voltage generator (VBA) is not used. (VSS common)
- *2 Applied to the condition when the reference voltage generator (VBA) is used. (VSS common)
- *3 Applied to the condition when the voltage booster is used.
- *4 The following relation among the LCD bias voltages must be maintained.
 $VSS < V4 < V3 < V2 < V1 < VLCD \leq VOUT$
- *5 When the voltage booster is used, there is possibility that the VDCOUT is changing by the ITO resistance and the panel load. The setting of the VREG voltage is recommended to become a voltage that is lower than the lowest value of the changing VOUT.
- *6 Relation : $VREF < VEE$ must be maintained.
- *7 To stabilize the LSI operation, place decoupling capacitors between VDD and VSS, between VEE and VSS, between VBA and VSS, between VREF and VSS, between VREG and VSS, between VLCD and VSS, and between V1 to V4 and VSS.

DC CHARACTERISTICS

VDD=+2.4 to 3.6V, VSS=0V, Ta=-40 to +85°C

| PARAMETER | SYM BOL | CONDITION | MIN | TYP | MAX | UNIT | NOTE |
|--------------------------------|---------|---|--------------------|----------|--------------------|------|------|
| "H" Level Input Voltage | VIH | | 0.8VDD | - | VDD | V | *1 |
| "L" Level Input Voltage | VIL | | VSS | - | 0.2VDD | V | *1 |
| "H" Level Output Voltage | VOH | IOH=-0.1mA | VDD-0.2 | - | - | V | *2 |
| "L" Level Output Voltage | VOL | IOL= 0.1mA | - | - | 0.2 | V | *2 |
| Input Leakage Current | ILI | VI=VSS or VDD | -1 | - | 1 | μA | *3 |
| Output Leakage Current | ILO | VI=VSS or VDD | -1 | - | 1 | μA | *4 |
| Driver ON-resistance | RON1 | ΔVON =0.5V, VLCD=10V | - | 1 | 2 | kΩ | *5 |
| | RON2 | ΔVON =0.5V, VLCD=6V | - | 2 | 4 | kΩ | |
| Oscillation Frequency | fOSC | VDD=3V, Ta=25°C, Rf=47kΩ | 0.82 | 1 | 1.18 | MHz | *6 |
| Voltage Booster Output Voltage | VOUT | N-time boost (N=2 to 6) RL=500kΩ (VDCOUT-VSS) | NxVEE x0.95 | - | - | V | *7 |
| Operating Current (1) | IDD1 | Ta=25°C, 6-time boost, All pixels ON, VEE=2.4V, VREF=1.8V | - | 1.5 | 3.6 | mA | *8 |
| Operating Current (2) | IDD2 | Ta=25°C, 5-time boost, All pixels ON, VEE=3.0V, VREF=2.25V | - | 1.5 | 3.6 | mA | |
| Operating Current (3) | IDD3 | Ta=25°C, 4-time boost, All pixels ON, VEE=3.6V, VREF=2.7V | - | 1.5 | 3.6 | mA | |
| Operating Current (4) | ISTB | Ta=25°C, CSb=VDD, HALT="1" | - | - | 10 | μA | *9 |
| VBA Output Voltage | VBA | VEE=2.4 to 3.6V | (0.75VEE)x 0.98 | 0.75VEE | (0.75VEE)x 1.02 | V | *10 |
| VREG Output Voltage | VREG | VEE=2.4 to 3.6V N-time boost (N=2 to 6) | (VREFxN)x 0.95 | (VREFxN) | (VREFxN)x 1.05 | V | *11 |
| LCD Bias Voltages | VLCD | VEE=3.0V, VREF=2.25V, | -0.1 | - | +0.1 | V | |
| | V1 | VOUT=15V, Bias=1/4 to 1/11, | -0.1 | - | +0.1 | V | |
| | V2 | Electrical Volume=MAX., DCON="0", | -0.1 | - | +0.1 | V | |
| | V3 | Display OFF, No-load, AMPON="1", | -0.1 | - | +0.1 | V | |
| | V4 | Boost Level=5-time | -0.1 | - | +0.1 | V | |

*1 D7 to D0, CSb, RS, WRb, RDb, SEL68, PS, CSEL, and RSTb terminals.

*2 D7 to D0 terminals.

*3 D7 to D0, CSb, RS, WRb, RDb, SEL68, PS, CSEL, RSTb, and OSC2 terminals.

*4 D7 to D0 in high impedance.

*5 SEG0 to SEG255, COM0 to COM95, and COMMK0 to COMMK1 terminals.

This parameter defines the resistance between each COM/SEG and each LCD bias (VLCD, V1, V2, V3, V4).
0.5V difference / 1/11 LCD bias

*6 Oscillation frequency of using the internal oscillation circuit.

(OS2, OS1, OS0) = "0, 0, 0"

*7 VDCOUT terminal.

This parameter is applied to the condition that the internal LCD power supply and the internal oscillator are used. N-time boost (N=2 to 6).

VEE=2.4V to 3.6V / Electrical Volume : Max = "1, 1, 1, 1, 1, 1" / 1/11 LCD Bias / 1/98 Duty / No-load on COM/SEG / RL=500kΩ between VDCOUT and VSS / CA1=CA2=1.0uF / CA3=0.1uF / DCON="1" / AMPON="1"

*8 VSS terminal.

This parameter is applied to the condition that the internal LCD power supply and the internal oscillator are used, and the no accessing from MPU.

Electrical Volume : Max = "1, 1, 1, 1, 1, 1" / All pixels ON or Checker Flag Display / No-load on COM/SEG / VDD=VEE / VREF=0.75VEE / CA1=CA2=1.0uF / CA3=0.1uF / DCON="1" / AMPON="1" / NL6 to 0="1, 1, 0, 0, 0, 0, 1" (98-line) / 1/98 Duty / Ta=25°C

*9 VDD terminal.

Internal oscillator is halted. / CSb=VDD (No active) / No-load

*10 VBA terminal.

VBA=VREF / Boost Level (N)="1" / DCON="0" / VOUT=13.5V

*11 VREG terminal.

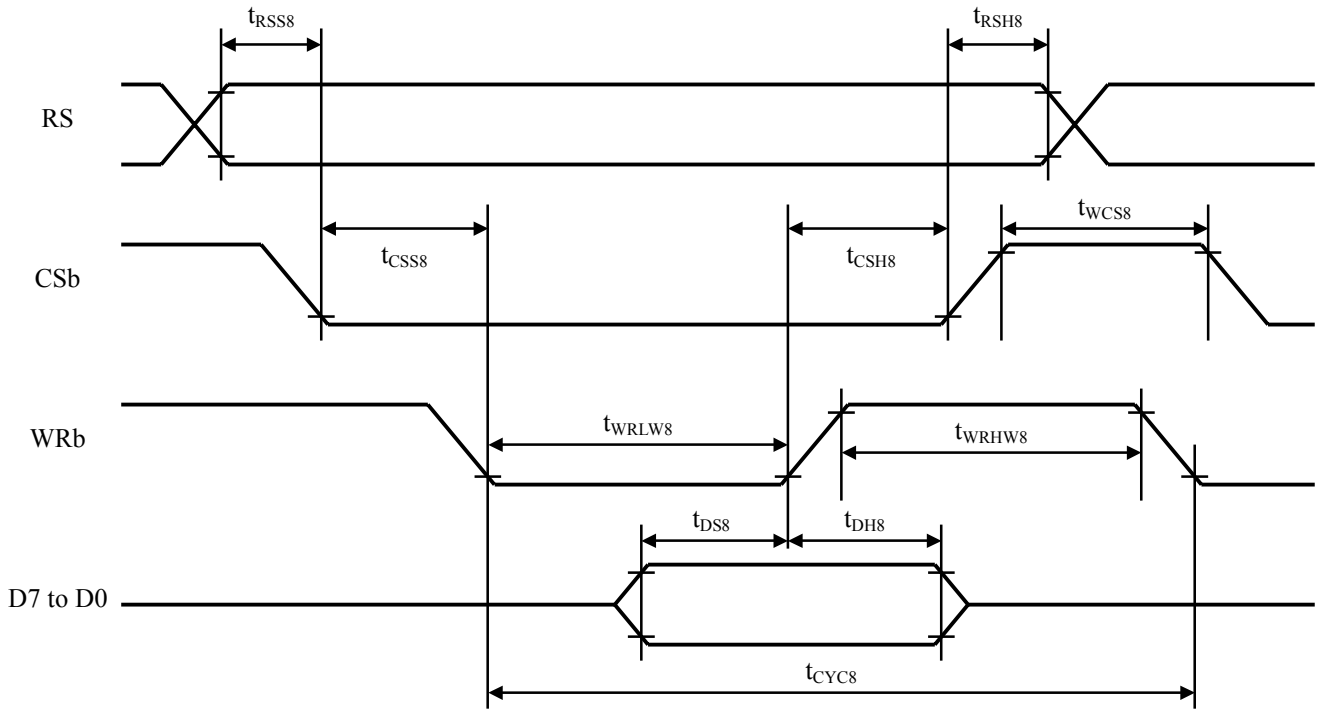
VEE=2.4V to 3.6V / VOUT=17V / 1/11 LCD Bias / 1/98 Duty / Electrical Volume : Max = "1, 1, 1, 1, 1, 1, 1" / Checker Flag Display / No-load on COM/SEG / Boost Level (N)="2 to 6" / CA1=CA2=1.0uF / CA3=0.1uF / DCON="0" / AMPON="1" / NL6 to 0="1, 1, 0, 0, 0, 0, 1" (98-line)

■ OSCILLATION FREQUENCY AND FRAME FREQUENCY

| OSCILLATOR /EXTERNAL CLOCK | DISPLAY DUTY (1/D) | | | | | |
|----------------------------------|--------------------|-------------------|-------------------|-----------------------|-----------------------|-----------------------|
| | 98 | 82 | 66 | 50 | 34 | 18 |
| Using Internal Oscillator | $f_{osc}/(128xD)$ | $f_{osc}/(128xD)$ | $f_{osc}/(128xD)$ | $f_{osc}/((128xD)/2)$ | $f_{osc}/((128xD)/3)$ | $f_{osc}/((128xD)/6)$ |
| Using External Clock | $f_{ck}/(128xD)$ | $f_{ck}/(128xD)$ | $f_{ck}/(128xD)$ | $f_{ck}/((128xD)/2)$ | $f_{ck}/((128xD)/3)$ | $f_{ck}/((128xD)/6)$ |

■ AC CHARACTERISTICS

(1) Write Operation (Parallel Interface / 80-series MPU)

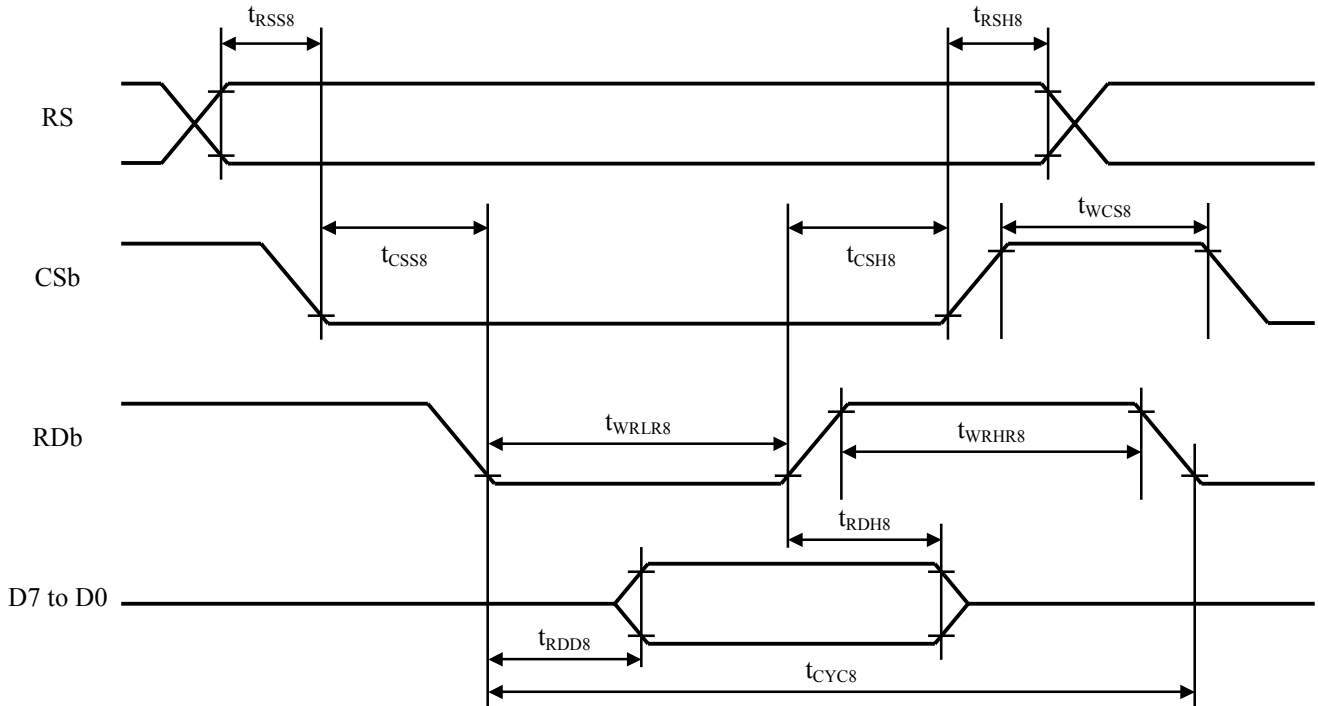


(VDD=2.4 to 3.6V, Ta=-40 to +85°C)

| PARAMETER | SYMBOL | CONDITION | MIN. | MAX. | UNIT | TERMINAL |
|-----------------------------|-------------|-----------|------|------|------|----------|
| RS Hold Time | t_{RSH8} | | 30 | - | ns | RS |
| RS Setup Time | t_{RSS8} | | 30 | - | ns | RS |
| CSb Hold Time | t_{CSH8} | | 30 | - | ns | CSb |
| CSb Setup Time | t_{CSS8} | | 30 | - | ns | CSb |
| CSb "H" Level Pulse Width | t_{WCS8} | | 180 | - | ns | CSb |
| System Cycle Time | t_{CYC8} | | 180 | - | ns | WRb |
| Enable "L" Level Pulse Time | t_{WRLW8} | | 80 | - | ns | WRb |
| Enable "H" Level Pulse Time | t_{WRHW8} | | 80 | - | ns | WRb |
| Data Setup Time | t_{DS8} | | 70 | - | ns | D7 to D0 |
| Data Hold Time | t_{DH8} | | 40 | - | ns | D7 to D0 |

Note) Each timing is specified based on 20% and 80% of VDD.

(2) Read Operation (Parallel Interface / 80-series MPU)

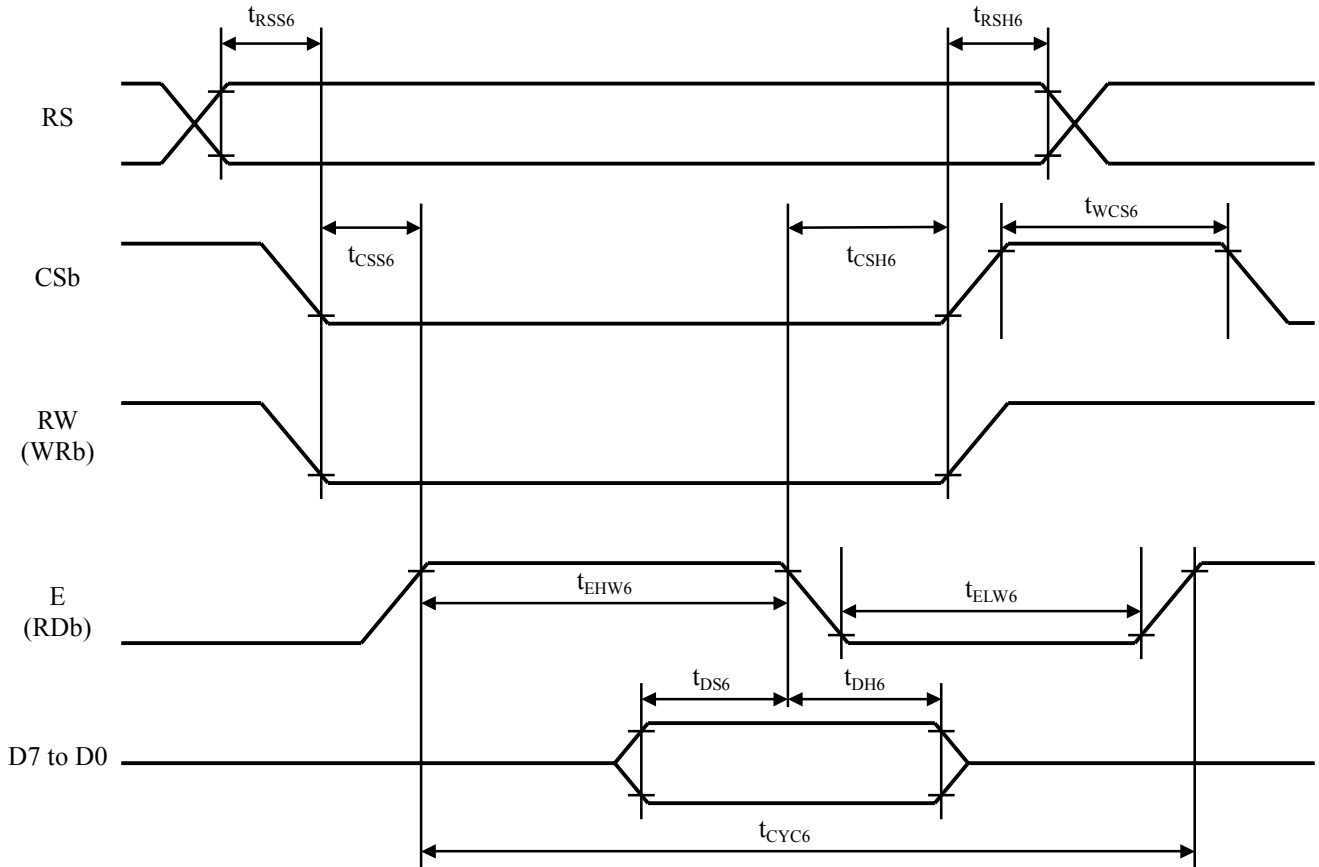


(VDD=2.4 to 3.6V, Ta=-40 to +85°C)

| PARAMETER | SYMBOL | CONDITION | MIN. | MAX. | UNIT | TERMINAL |
|-----------------------------|--------------------|-----------|------|------|------|----------|
| RS Hold Time | t _{RSH8} | | 40 | - | ns | RS |
| RS Setup Time | t _{RSS8} | | 40 | - | ns | |
| CSb Hold Time | t _{CSH8} | | 40 | - | ns | |
| CSb Setup Time | t _{CSS8} | | 40 | - | ns | CSb |
| CSb "H" Level Pulse Width | t _{WCS8} | | 140 | - | ns | |
| System Cycle Time | t _{CYC8} | | 250 | - | ns | |
| Enable "L" Level Pulse Time | t _{WRLR8} | | 120 | - | ns | RDb |
| Enable "H" Level Pulse Time | t _{WRHR8} | | 120 | - | ns | |
| Read Data Delay Time | t _{RDD8} | CL=15pF | | 110 | ns | D7 to D0 |
| Read Data Hold Time | t _{RDH8} | | 0 | | ns | |

Note) Each timing is specified based on 20% and 80% of VDD.

(3) Write Operation (Parallel Interface / 68-series MPU)

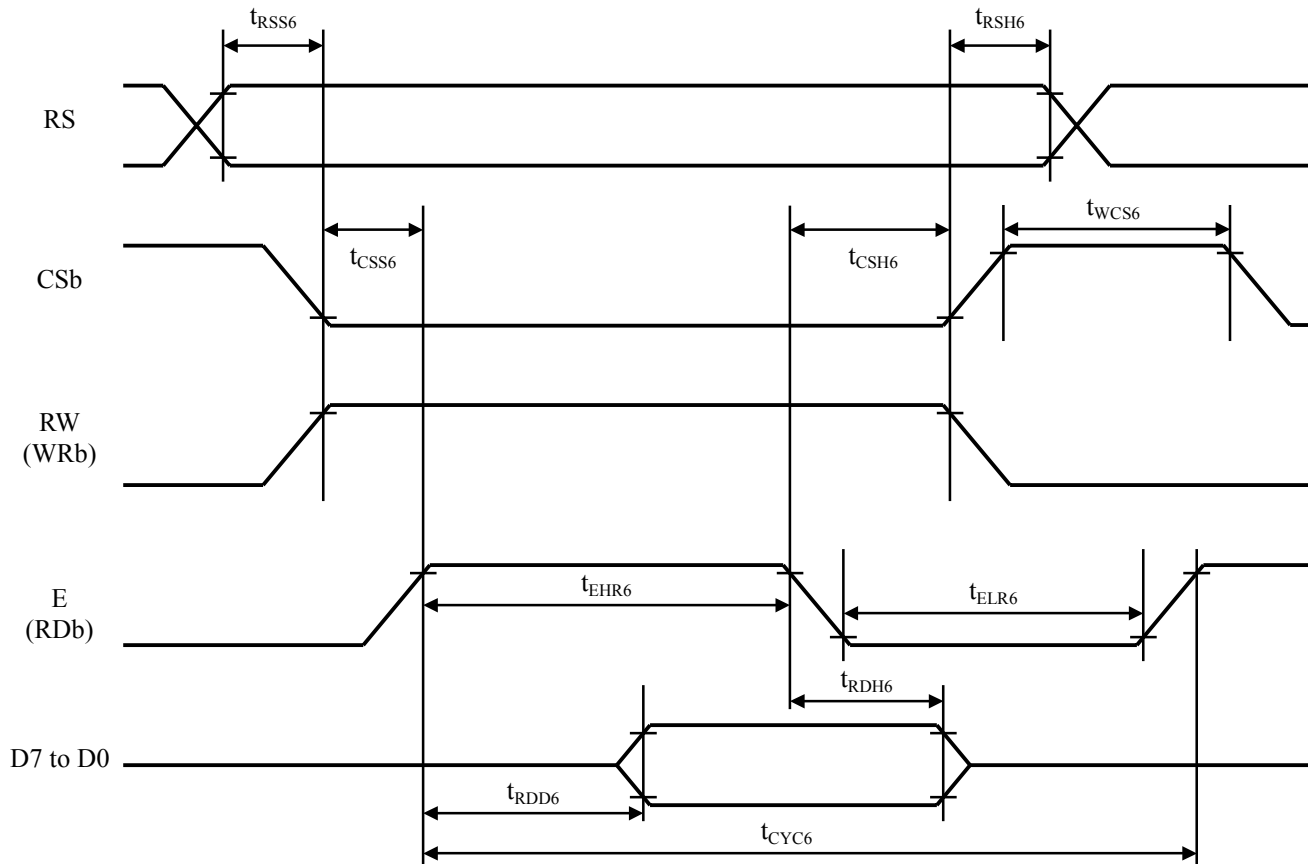


(VDD=2.4 to 3.6V, Ta=-40 to +85°C)

| PARAMETER | SYMBOL | CONDITION | MIN. | MAX. | UNIT | TERMINAL |
|-----------------------------|------------|-----------|------|------|------|----------|
| RS Hold Time | t_{RSH6} | | 30 | - | ns | RS |
| RS Setup Time | t_{RSS6} | | 30 | - | ns | RS |
| CSb Hold Time | t_{CSH6} | | 30 | - | ns | CSb |
| CSb Setup Time | t_{CSS6} | | 30 | - | ns | CSb |
| CSb "H" Level Pulse Width | t_{WCS6} | | 180 | - | ns | CSb |
| System Cycle Time | t_{CYC6} | | 180 | - | ns | E |
| Enable "L" Level Pulse Time | t_{ELW6} | | 80 | - | ns | E |
| Enable "H" Level Pulse Time | t_{EHW6} | | 80 | - | ns | E |
| Data Setup Time | t_{DS6} | | 70 | - | ns | D7 to D0 |
| Data Hold Time | t_{DH6} | | 40 | - | ns | D7 to D0 |

Note) Each timing is specified based on 20% and 80% of VDD.

(4) Read Operation (Parallel Interface / 68-series MPU)

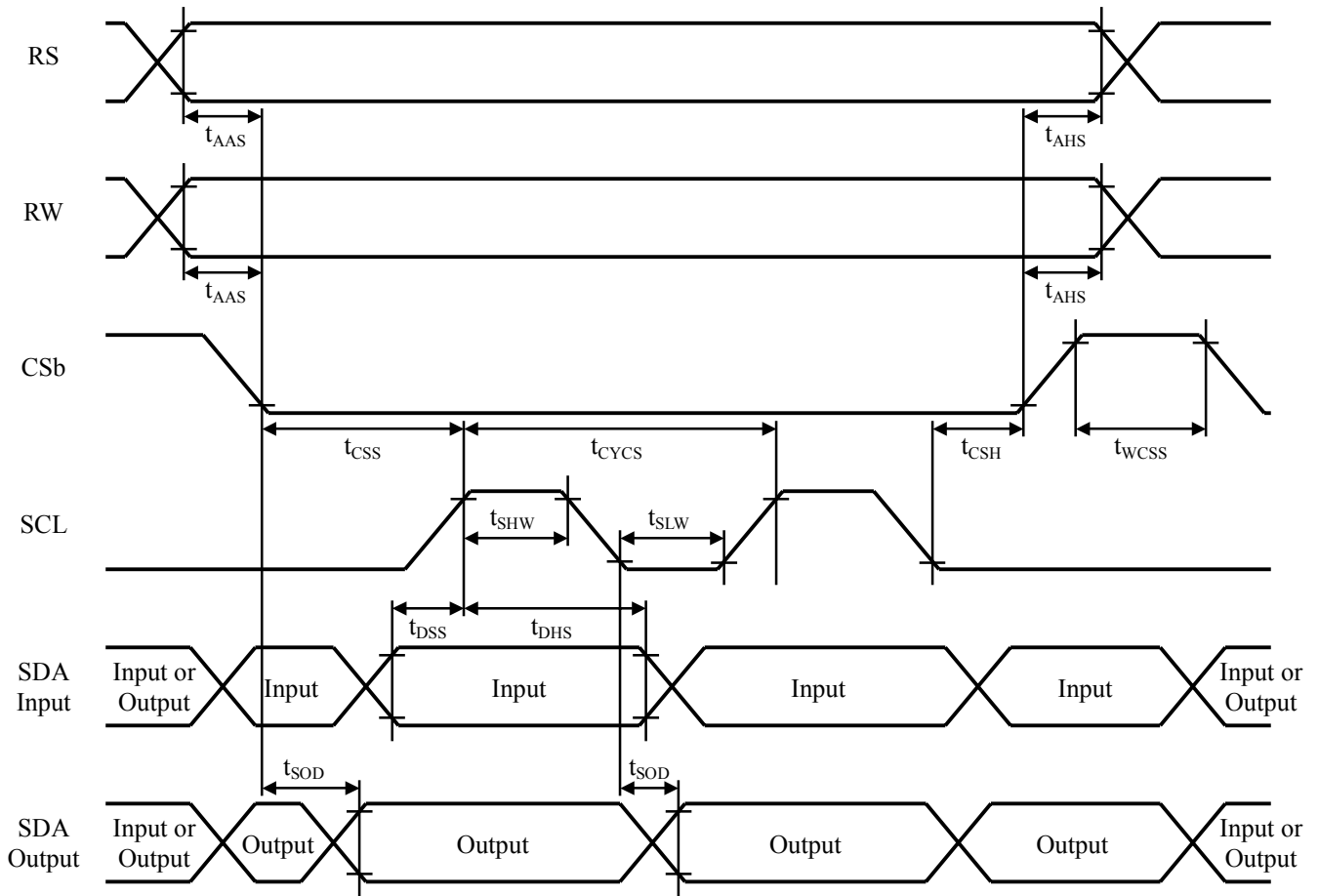


(VDD=2.4 to 3.6V, Ta=-40 to +85°C)

| PARAMETER | SYMBOL | CONDITION | MIN. | MAX. | UNIT | TERMINAL |
|-----------------------------|------------|-----------|------|------|------|----------|
| RS Hold Time | t_{RSH6} | | 40 | - | ns | RS |
| RS Setup Time | t_{RSS6} | | 40 | - | ns | RS |
| CSb Hold Time | t_{CSH6} | | 40 | - | ns | CSb |
| CSb Setup Time | t_{CSS6} | | 40 | - | ns | CSb |
| CSb "H" Level Pulse Width | t_{WCS6} | | 140 | - | ns | CSb |
| System Cycle Time | t_{CYC6} | | 250 | - | ns | E |
| Enable "L" Level Pulse Time | t_{ELR6} | | 120 | - | ns | E |
| Enable "H" Level Pulse Time | t_{EHR6} | | 120 | - | ns | E |
| Read Data Delay Time | t_{RDD6} | CL=15pF | 0 | 110 | ns | D7 to D0 |
| Read Data Hold Time | t_{RDH6} | | 0 | - | ns | D7 to D0 |

Note) Each timing is specified based on 20% and 80% of VDD.

(5) Serial Interface

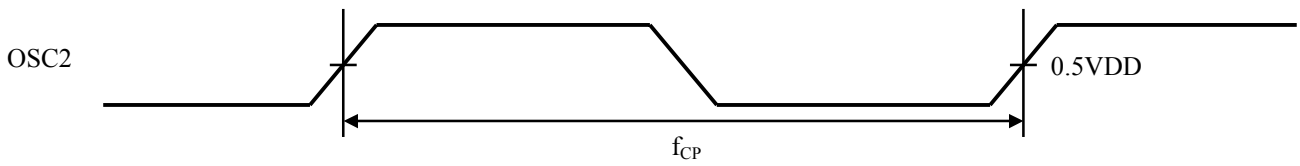


(VDD=2.4 to 3.6V, Ta=-40 to +85°C)

| PARAMETER | SYMBOL | CONDITION | MIN. | MAX. | UNIT | TERMINAL |
|---------------------------|------------|-----------|------|------|------|----------|
| Serial Clock Cycle | t_{CYCS} | | 160 | | ns | |
| SCL "H" Level Pulse Width | t_{SHW} | | 75 | - | ns | SCL |
| SCL "L" Level Pulse Width | t_{SLW} | | 75 | | ns | |
| Address Setup Time | t_{ASS} | | 35 | | ns | RS / RW |
| Address Hold Time | t_{AHS} | | 35 | | ns | RS / RW |
| Data Setup Time | t_{DSS} | | 35 | | ns | SDA |
| Data Hold Time | t_{DHS} | | 35 | | ns | SDA |
| Serial Data Delay Time | t_{SOD} | | - | 40 | ns | SDA |
| CSb - SCL Time | t_{CSS} | | 35 | | ns | |
| CSb Hold Time | t_{CSH} | | 35 | | ns | CSb |
| CSb "H" Level Pulse Width | t_{WCSS} | | 75 | | ns | |

Note) Each timing is specified based on 20% and 80% of VDD.

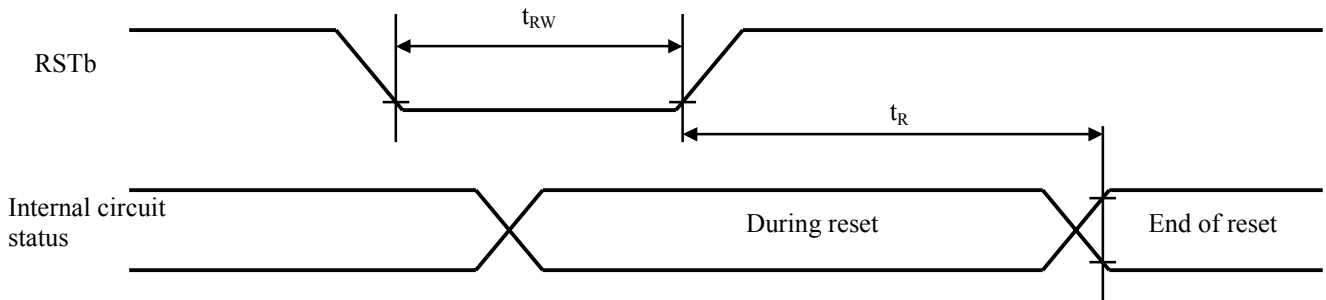
External Clock Input Timing



(VDD=2.4 to 3.6V, VSS=0V, Ta=-40 to +85°C)

| PARAMETER | SYMBOL | MIN. | MAX. | CONDITION | UNIT |
|------------------------------------|----------|------|------|-----------|------|
| External Clock Operating Frequency | f_{CP} | - | 1.18 | OSC2 | MHz |
| External Clock Duty | duty | 35 | 65 | | % |

Reset Input Timing

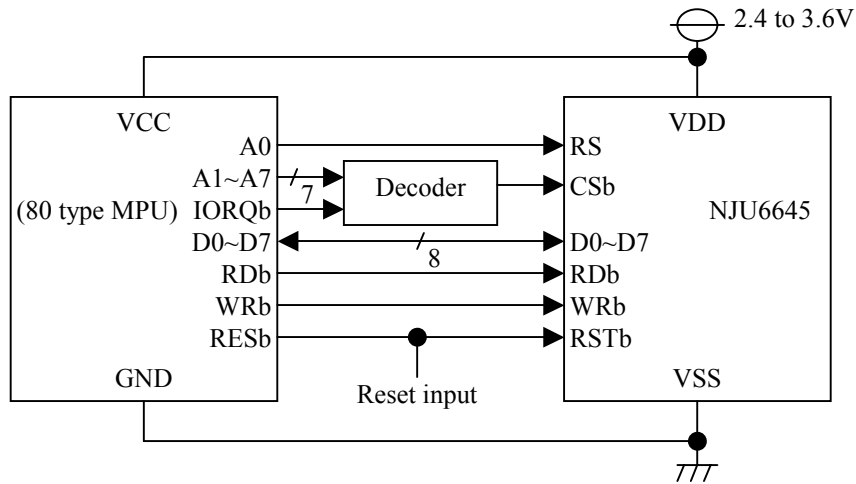


(VDD=2.4 to 3.6V, VSS=0V, Ta=-40 to +85°C)

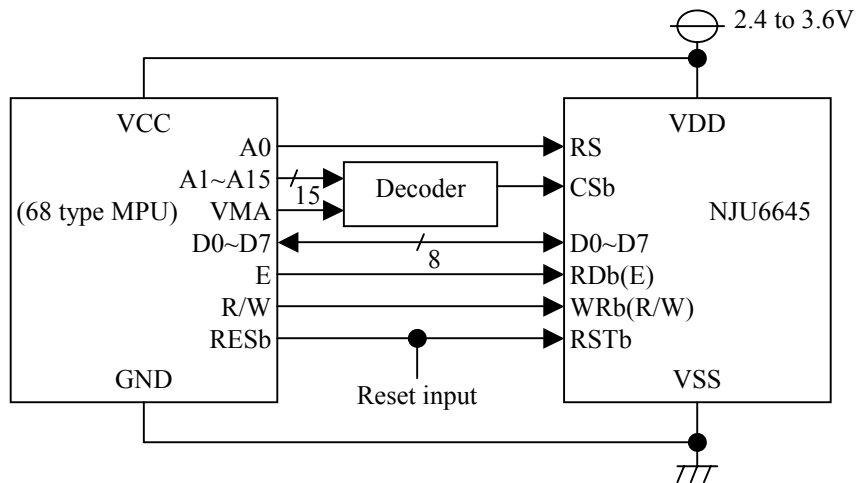
| PARAMETER | SYMBOL | MIN. | MAX. | CONDITION | UNIT |
|----------------------------|----------|------|------|-----------|---------|
| Reset Time | t_R | - | 0.5 | | μ s |
| RSTb "L" Level Pulse Width | t_{RW} | 1.5 | - | | ms |

APPLICATION CIRCUIT

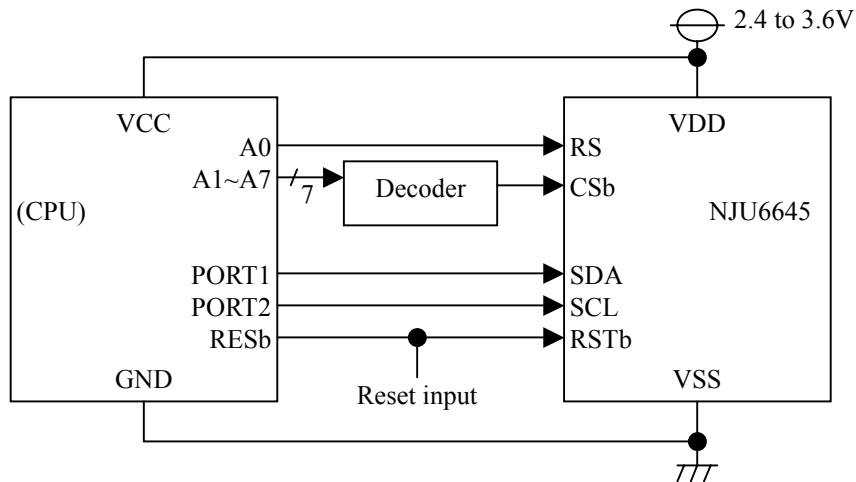
- (1) Microprocessor Interface Example
 - (i) 80 type MPU



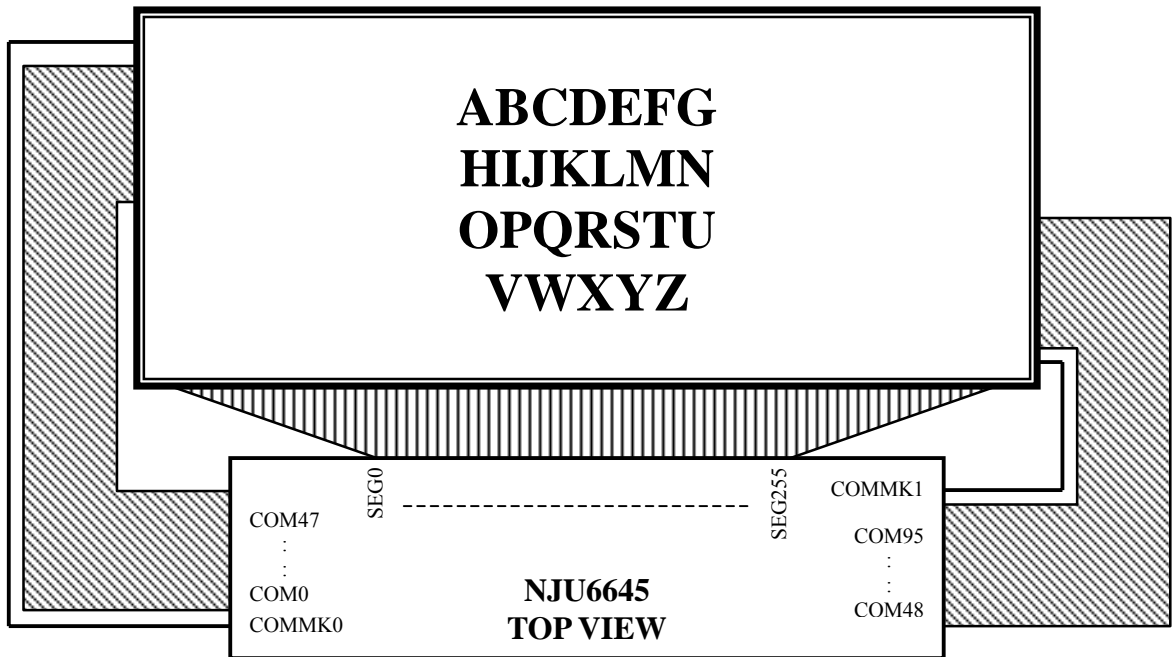
- (ii) 68 type MPU



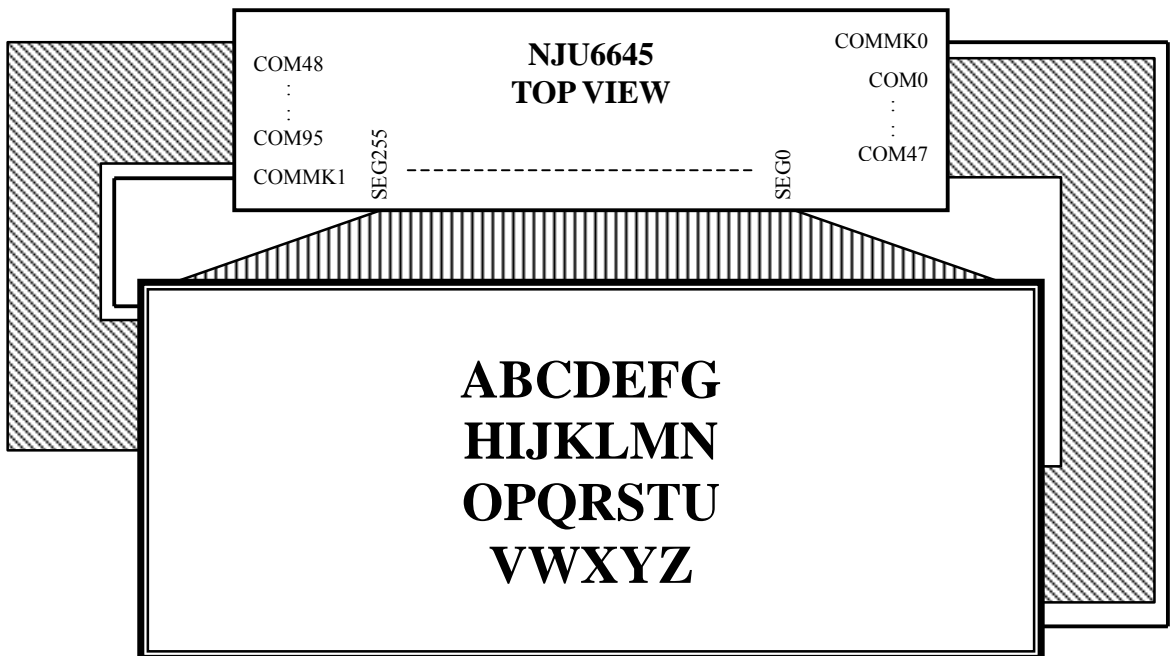
- (iii) Serial Interface



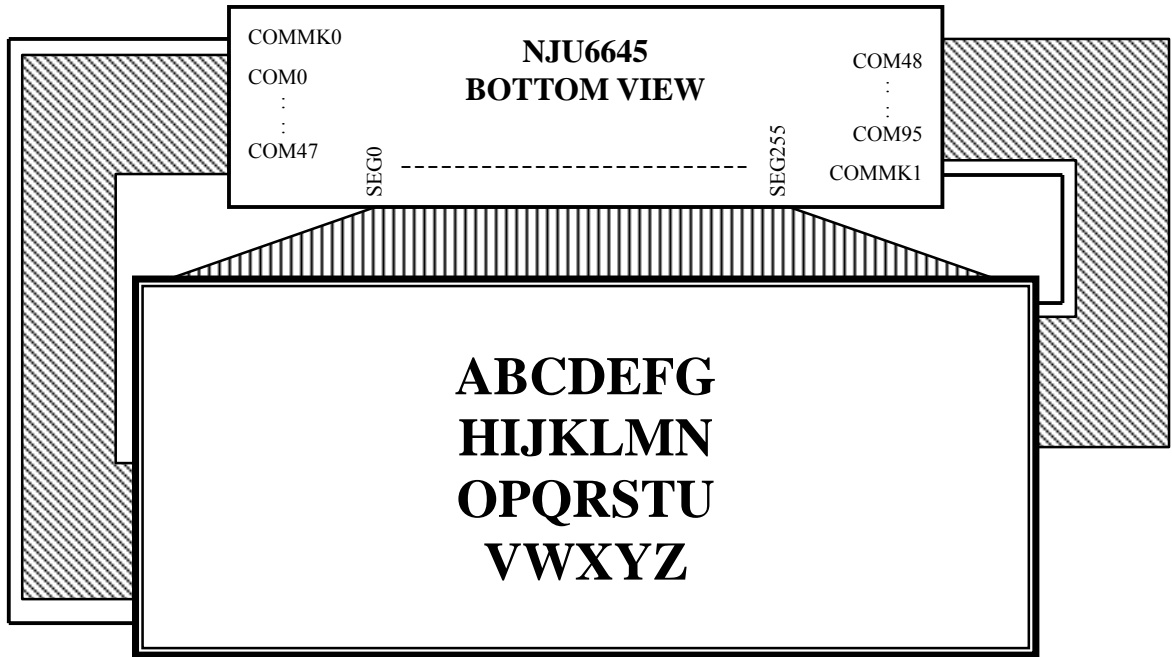
- (2) Connection with Panel Display
 (i) SEL1="0", SEL2="0"



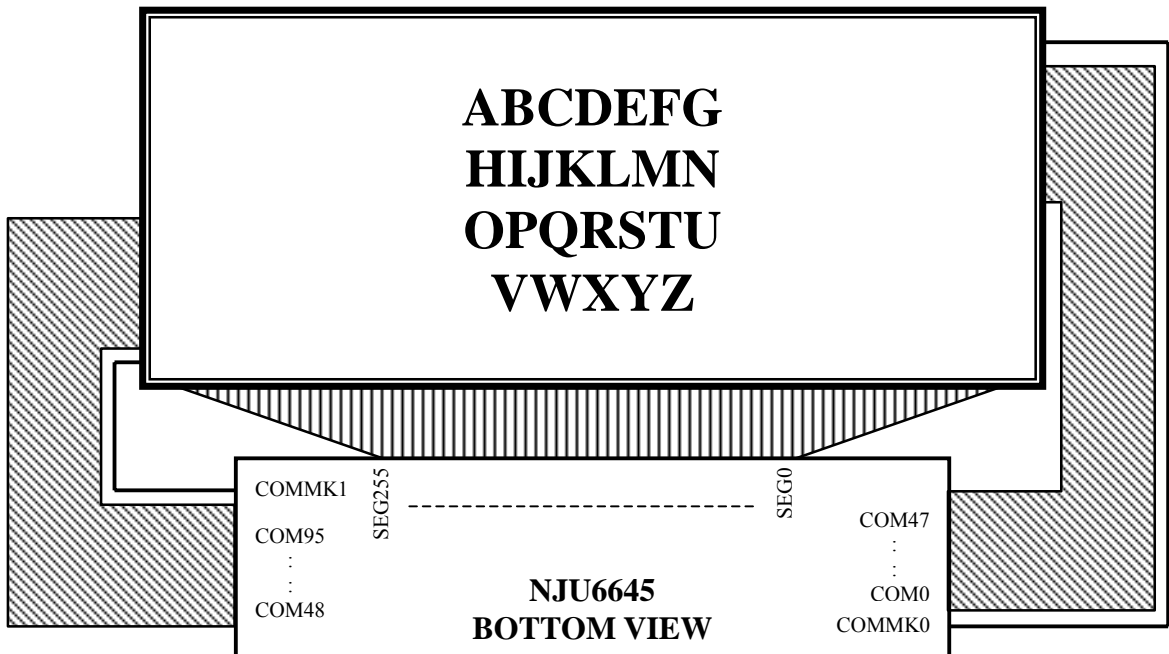
- (ii) SEL1="1", SEL2="1"



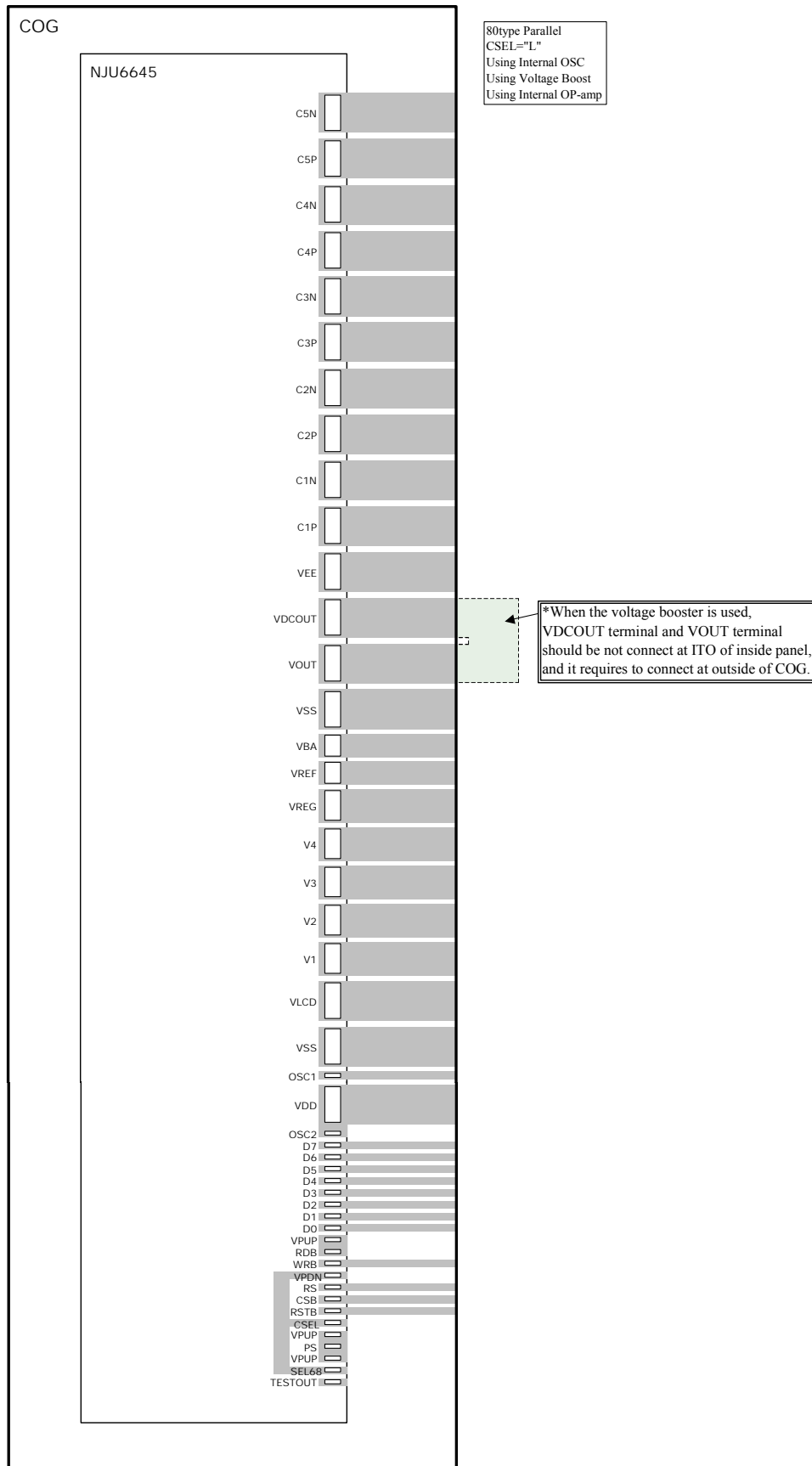
(iii) SEL1="1", SEL2="0"



(iv) SEL1="0", SEL2="1"



■ COG WIRING EXAMPLE



[CAUTION]

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