

MOS DIGITAL INTEGRATED CIRCUIT

μ PD2813C

CLOCK AND RADIO FREQUENCY COUNTER/DISPLAY CIRCUIT

CMOS LSI

The μ PD2813C is a CMOS LSI very suitable for U.S. band automotive radios and stereos.

The μ PD2813C is packaged in a 42 pin plastic dual in-line package (DIP).

CLOCK FEATURES

1. Standard Clock
 - 12 hour clock (With AM/PM display)
 - Hour and minute display
 - Easy time set controls
2. Elapsed Time Counter
 - Measures elapsed time (Max. 19 hours 59 minutes)
 - Easy reset/start control
3. Calendar Function
 - Month and day display
 - Automatic calendar correction (for 4 years)
 - Easy calendar set controls

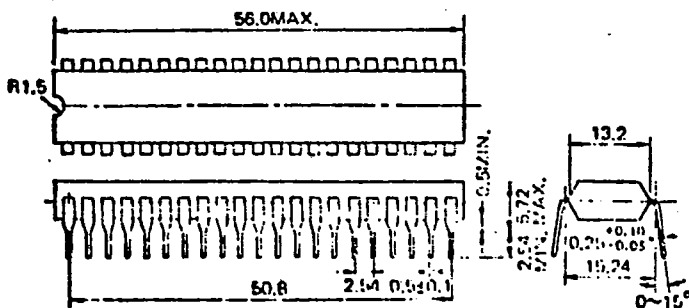
RADIO FEATURES

- Measures standard AM and FM frequencies
- Display frequencies on 3½ digit display
- External programmable IF offset (AM only)

GENERAL FEATURES

- Low power due to CMOS $I_{DD} = 8.0\text{mA (MAX.)}$
- Single power supply $V_{DD} = 5.0 \pm 0.5$ volts
- Display blanking

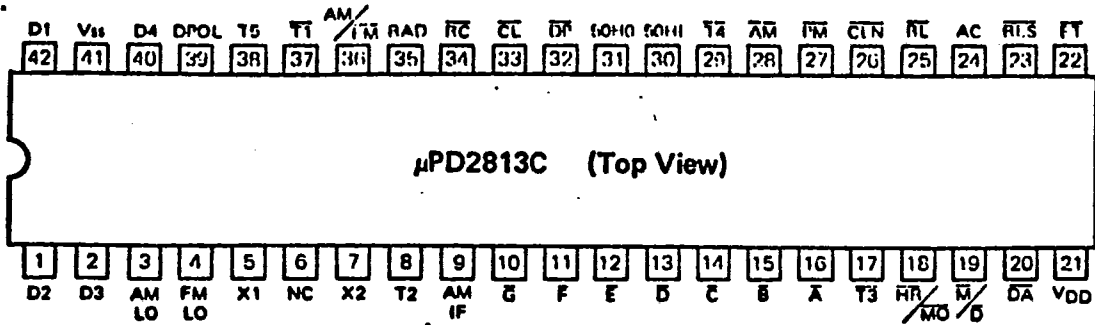
PACKAGE DIMENSIONS (Unit: mm)



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μPD2813C

PIN CONNECTION



| PIN NO. | SYMBOL | DESCRIPTION | PIN NO. | SYMBOL | DESCRIPTION |
|---------|--------------------|-------------------------------|---------|---------------------|--------------------------------|
| 1 | D2 | Digit pulse "D2" output | 22 | \overline{ET} | Elapsed time call input |
| 2 | D3 | Digit pulse "D3" output | 23 | \overline{RES} | Elapsed time reset/start input |
| 3 | AM LO | AM local frequency input | 24 | AC | Clock counter all clear input |
| 4 | FM LO | FM frequency input (1/40) | 25 | \overline{BL} | Display blanking input |
| 5 | X1 | 10.24 MHz oscillator input | 26 | \overline{CLN} | Segment signal "COLON" output |
| 6 | NC | No connection | 27 | \overline{PM} | Segment signal "PM" output |
| 7 | X2 | 10.24 MHz oscillator output | 28 | \overline{AM} | Segment signal "AM" output |
| 8 | T2 | Test terminal 2 (Normal open) | 29 | $\overline{T4}$ | Test terminal 4 (Normal VDD) |
| 9 | AM IF | AM IF offset | 30 | 50HI | 50Hz clock pulse input |
| 10 | \overline{G} | Segment signal "G" output | 31 | 50HO | 50Hz clock pulse output |
| 11 | \overline{F} | Segment signal "F" output | 32 | \overline{DP} | Segment signal "DP" output |
| 12 | \overline{E} | Segment signal "E" output | 33 | \overline{CL} | Timing circuit clearing input |
| 13 | \overline{D} | Segment signal "D" output | 34 | \overline{RC} | Radio frequency call input |
| 14 | \overline{C} | Segment signal "C" output | 35 | RAD | Radio power indicating input |
| 15 | \overline{B} | Segment signal "B" output | 36 | AM/ \overline{FM} | AM/FM switching input |
| 16 | \overline{A} | Segment signal "A" output | 37 | $\overline{T1}$ | Test terminal 1 (Normal VDD) |
| 17 | $\overline{T3}$ | Test terminal 3 (Normal VDD) | 38 | T5 | Test terminal 5 (Normal open) |
| 18 | $\overline{HR/MO}$ | Hour or month set control | 39 | DPOL | Digit polarity selection input |
| 19 | $\overline{M/D}$ | Minute or day set control | 40 | D4 | Digit pulse "D4" output |
| 20 | \overline{DA} | Calendar call input | 41 | Vss | System ground (0V) |
| 21 | VDD | Power supply (+5 ± 0.5V) | 42 | D1 | Digit pulse "D1" output |

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PIN EXPLANATIONS

98D 17421 D T-77-05-05

| PIN NO. | NAME | DESCRIPTION |
|----------------------|--|--|
| 1, 2, 40, 42, 39 | Digit Digit Polarity | These outputs are used as digit drivers for the display. These pins go to high/low level to select the appropriate digit with DPOL Terminal put to low/high level. DPOL is provided with internal pull up resistor. |
| 3 4 | AM Local FM Local | This input is the AM band local oscillator input. This input is the FM band local oscillator input. The frequency is divided by 40 using a prescaler (μ PB551C). |
| 5, 7 | Crystal Osc. | These pins are for connection to a 10.24MHz crystal. |
| 8, 17, 29, 37, 38 | Test | These pins are for testing. 8, 38 pin Normally use at open. 17, 29, 37 pin Normally connect to VDD. |
| 10-16, 26-28, 32 | Segments & COLON, PM, AM, DP | These outputs are used as segment drivers for the display. Active Low (An output is low for a segment to be on.) |
| 18 19 | Set Hours/Months Set Minutes /Days | A ground on these pins causes the hours or months and minutes or days to update at 1 per second rate. There is a one second delay before updating. These inputs are provided with internal pull up resistors. |
| 20 22 23 34 | Call Date Call Elapsed Time Reset/Start Elapsed Time Call Radio Freq. | A ground on this pin switches the display from standard time to date and remains there for 4 seconds. A ground on this pin switches the display from standard time to elapsed time and remains there for 4 seconds. A ground on this pin resets the elapsed time counter. The elapsed time counter starts automatically. A ground on this pin switches the display from standard time to radio frequency and remains there for 4 seconds. These inputs are provided with internal pull up resistors. |
| 35 36 9 | Radio Vcc AM/FM AM IF Offset | The display automatically switches time to frequency when radio is turned on and remains there for 4 seconds, and frequency to time as soon as radio is turned off. A high on this pin sets the logic to expect a AM frequency in. A low sets the internal logic to FM. This input is provided with internal pull up resistor. A high on this pin sets AM IF to 455kHz. A low sets to 262kHz. (Pull up resistor is installed.) |
| 24 33 | All Clear Clear | A high level resets the time counter. Normally pull down to ground with a resistor. A high level resets the timing circuit. Normally connect to VDD. |
| 25 | Display blanking | A low level inhibits the display and key inputs ($\overline{HR/MO}$, $\overline{M/D}$, \overline{DA} , \overline{ET} , \overline{RES}). This input is provided with internal pull up resistor. |

MFD20135

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ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| | | | |
|-----------------------|------|--------------|----|
| Supply Voltage | VDD | -0.3 to +6.0 | V |
| Input Voltage | VI | -0.3 to VDD | V |
| Output Voltage | VO | -0.3 to VDD | V |
| Operating Temperature | Topt | -30 to +75 | °C |
| Storage Temperature | Tstg | -55 to +125 | °C |

ELECTRICAL CHARACTERISTICS (Ta=-30 to +75°C)

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS |
|----------------------------|--------|---------|------|---------|------|---|
| Power Supply Voltage | VDD | 4.5 | 5.0 | 5.5 | V | |
| High Level Input Voltage | VIH | 0.75VDD | | VDD | V | All inputs except |
| Low Level Input Voltage | VIL | 0 | | 0.25VDD | V | 3pin, $\overline{T1}$, $\overline{T3}$ and $\overline{T4}$ |
| High Level Output Voltage | VOH1 | 0.75VDD | | | V | IOH=-1.3mA, *1 |
| Low Level Output Voltage | VOL1 | | | 0.25VDD | V | IOL= 1.3mA, *1 |
| High Level Output Voltage | VOH2 | 0.75VDD | | | V | IOH=-0.5mA, *2 |
| Low Level Output Voltage | VOL2 | | | 0.25VDD | V | IOL= 0.5mA, *2 |
| Maximum Frequency Response | fdmax | 11.0 | | | MHz | X1-X2, divider |
| | fpmax1 | 3.1 | | | MHz | FM input divider |
| | fpmax2 | 2.1 | | | MHz | AM input divider |
| AM Local Input Voltage | Vam | 1.0 | | | Vp-p | C coupled input |
| Power Supply Current | IDD | | | 8.0 | mA | X1-X2, divider |

*1 : 1, 2, 40, 42 pin (digit output)

*2 : 10 to 16, 26 to 28, 32 pin (segment, AM, PM, colon and decimal point output).

μPD2813C

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BLOCK DIAGRAM OF A FM/AM AUTOMOTIVE STEREO USING μPD2813C

