

3rd. Over Tone Quartz Crystal Oscillator for 166MHz

■GENERAL DESCRIPTION

The NJU6396 is a C-MOS IC for XO's, and can oscillate up to 166MHz maximum at very low operating voltage. High Fan-out is gained from low operating voltage with 3-state output buffer and the oscillation amplifier that is realized very low stand-by current using NAND circuit. Furthermore, not using PLL, the electrical character shows a very low jitter. The NJU6396 is suitable for mobile, optical communications (included WDM system) and not to mention previous applications; Computer & Peripherals, telecommunications, LAN/WAN, Wireless and so on.

■FEATURES

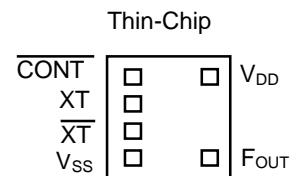
- Operating Voltage 2.7 to 3.6V
- Maximum Oscillation Frequency 166MHz
- High Fan-out $I_{OH}/I_{OL} = 8mA$ $V_{DD} = 3.3V$
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Oscillation Capacitors C_g and C_d on-chip
- Package Outline Thin-Chip
- C-MOS Technology

■PACKAGE OUTLINE



NJU6396C-D

■PAD LOCATION

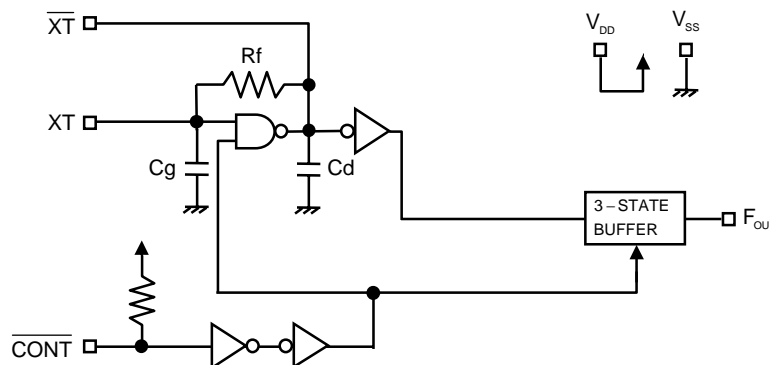


■COORDINATES

| No | Pad Name | X | Y |
|----|--------------------------|------|------|
| 1 | $\overline{\text{CONT}}$ | -178 | 231 |
| 2 | XT | -178 | 77 |
| 3 | $\overline{\text{XT}}$ | -178 | -77 |
| 4 | V_{SS} | -178 | -231 |
| 5 | F_{OUT} | 206 | -231 |
| 8 | V_{DD} | 206 | 231 |

Starting Point: Chip Center Unit[um]
 Chip Size: 0.7x0.75mm
 Thin-Chip Thickness: 200±20um
 Pad Size: 90x90um

■BLOCK DIAGRAM



■TERMINAL DESCRIPTION

| SYMBOL | FUNCTION | |
|--------------------------|---|--|
| $\overline{\text{CONT}}$ | Oscillation and 3-state Output Buffer Control | |
| | $\overline{\text{CONT}}$ | F_{OUT} |
| | H or OPEN | Output frequency f_0 |
| | L | Oscillation Stop and High impedance Output |
| $\overline{\text{XT}}$ | Quartz Crystal Connecting Terminals | |
| V_{SS} | $V_{\text{SS}}=0\text{V}$ | |
| F_{OUT} | Frequency Output | |
| V_{DD} | $V_{\text{DD}}=3.3\text{V}$ | |

■ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER | SYMBOL | RATING | UNIT |
|-----------------------------|-----------------|--|------|
| Supply Voltage | V_{DD} | -0.5 to +7.0 | V |
| Input Voltage | V_{IN} | $V_{\text{SS}}-0.5$ to $V_{\text{DD}}+0.5$ | V |
| Output Voltage | V_{O} | -0.5 to $V_{\text{DD}}+0.5$ | V |
| Input Current | I_{IN} | ± 10 | mA |
| Output Current | I_{O} | ± 25 | mA |
| Operating Temperature Range | Topr | -40 to +85 | °C |
| Storage Temperature Range | Tstg | -55 to +125 | °C |

 Note1) If the supply voltage(V_{DD}) is less than 7.0V, the input voltage do not over the V_{DD} level.

 Note2) Decoupling capacitor should be connected between V_{DD} and V_{SS} due to the stabilized operation for the circuit.

■ELECTRICAL CHARACTERISTICS

(Ta=25°C)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------|-----------------|------------|-----|-----|-----|------|
| Operating Voltage | V _{DD} | | 2.7 | | 3.6 | V |

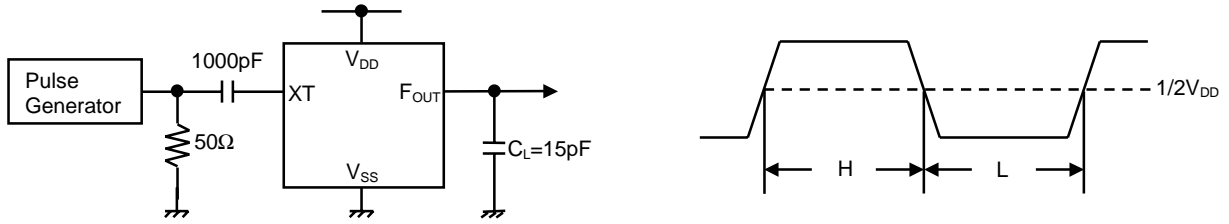
 (V_{DD}=3.3V, Ta=25°C)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|------------------|---|------|------|------|------|
| Operating Current | I _{DD1} | fosc=166MHz, C _L =15pF | | 27 | 40 | mA |
| Oscillation Stopping Current | I _{DD2} | $\overline{\text{CONT}} = V_{SS}$, No load | | | 10 | uA |
| Stand-by Current | I _{st} | $\overline{\text{CONT}} = \text{XT} = V_{SS}$, No load Note3) | | | 1 | uA |
| Input Voltage | V _{IH} | | 2.31 | | 3.3 | V |
| | V _{IL} | | 0 | | 0.99 | V |
| Output Current | I _{OH} | V _{OH} =2.97V | 8 | | | mA |
| | I _{OL} | V _{OL} =0.33V | 8 | | | mA |
| Input Current | I _{IN} | $\overline{\text{CONT}} = 0.8V_{DD}$ | | 10.0 | 15.0 | uA |
| | | $\overline{\text{CONT}} = 0.2V_{DD}$ | | 1.8 | 3.0 | uA |
| 3-state Off Leakage Current | I _{OZ} | $\overline{\text{CONT}} = V_{SS}$, F _{OUT} = V _{DD} or V _{SS} | | | ±0.1 | uA |
| Internal Capacitor | Cg/Cd | fosc=166MHz | | 9/10 | | pF |
| Maximum Oscillation Frequency | F _{MAX} | | 166 | | | MHz |
| Output Signal Symmetry | SYM | C _L =15pF, @V _{DD} /2 | 45 | 50 | 55 | % |
| Output Signal Rise Time | t _r | C _L =15pF, 10% to 90% | | 2 | 3 | ns |
| Output Signal Fall Time | t _f | C _L =15pF, 90% to 10% | | 2 | 3 | ns |
| Output Disable time | T _{PLZ} | C _L =15pF, R _{UP} =10kΩ | | | 150 | ns |
| Output Enable Time | T _{PZL} | C _L =15pF, R _{UP} =10kΩ | | | 150 | ns |

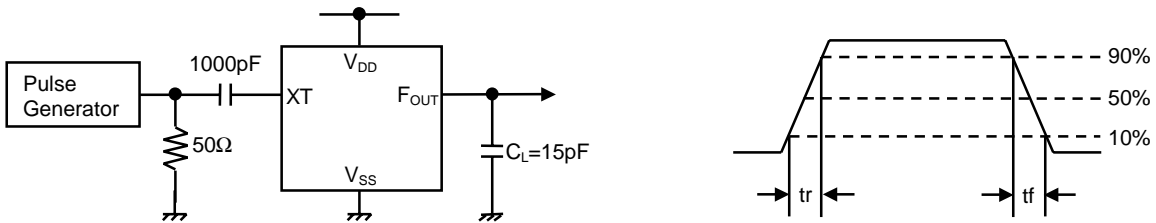
 Note3) Excluding input current on $\overline{\text{CONT}}$ Terminal.

MEASUREMENT CIRCUITS

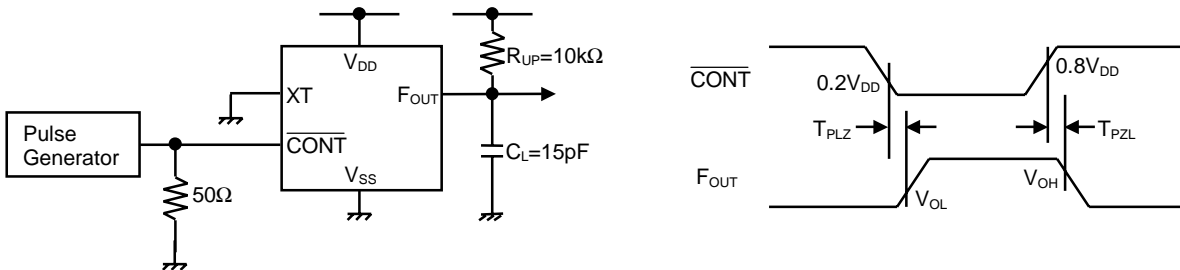
(1) Output Signal Symmetry ($C_L=15\text{pF}$)



(2) Output Signal Rise/Fall Time ($C_L=15\text{pF}$)



(3) Output Disable/Enable Time ($C_L=15\text{pF}, R_{UP}=10\text{k}\Omega$)



[CAUTION]
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