

3rd. Over Tone Quartz Crystal Oscillator for 135MHz

■GENERAL DESCRIPTION

The NJU6397 series that is a C-MOS IC for quartz crystal oscillator consists of an oscillation amplifier and 3-state output buffer.

This series has three types of A, B and C. The frequency range of the A type is from 75 to 90MHz, and the B type is from 90 to 110MHz, and the C type is from 110 to 135MHz.

The oscillation amplifier realizes very low oscillation stop current with NAND circuit.

The 3-state output buffer is C-MOS compatible.

■PACKAGE OUTLINE

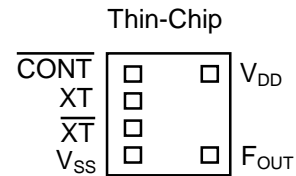


NJU6397XC-D

■FEATURES

- Operating Voltage 2.3 to 3.6V
- Maximum Oscillation Frequency (See Line-up Table)
- High Fan-out $I_{OH}/I_{OL} = 6mA @ V_{DD}=2.5V$
 $I_{OH}/I_{OL} = 8mA @ V_{DD}=3.3V$
- 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

■PAD LOCATION



■LINE-UP TABLE

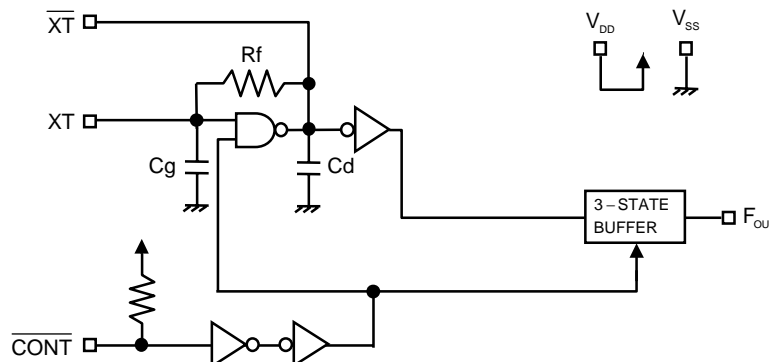
| Type No. | Recommended Oscillation Frequency | Output Frequency | C_g/C_d |
|----------|-----------------------------------|------------------|-----------|
| NJU6397 | A | 75 to 90MHz | 11/12pF |
| | B | 90 to 110MHz | 9/10pF |
| | C | 110 to 135MHz | 8/9pF |

■COORDINATES

| No | Pad Name | X | Y |
|----|-----------|------|------|
| 1 | CONT | -178 | 231 |
| 2 | XT | -178 | 77 |
| 3 | 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 | |
| $\overline{\text{XT}}$ | | |
| V_{SS} | $V_{\text{SS}}=0\text{V}$ | |
| F_{OUT} | Frequency Output | |
| V_{DD} | $V_{\text{DD}}=2.5\text{V}/3.3\text{V}$ | |

■ABSOLUTE MAXIMUM RATINGS

($T_a=25^\circ\text{C}$)

| 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 | T_{opr} | -40 to +85 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -55 to +125 | $^\circ\text{C}$ |

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} | | 2.3 | | 3.6 | V |

(V_{DD}=2.5V, Ta=25°C)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|--------------------------------|--|-----|-------|------|------|
| Operating Current | I _{DD1} | A type, fosc=90MHz, C _L =15pF | | 10 | 20 | mA |
| | | B type, fosc=110MHz, C _L =15pF | | 10 | 20 | |
| | | C type, fosc=135MHz, C _L =15pF | | 15 | 30 | |
| Oscillation Stopping Current | I _{DD2} | CONT=V _{SS} , No load | | 2 | 5 | uA |
| Stand-by Current | I _{st} | CONT=XT=V _{SS} , No load Note3) | | | 1 | uA |
| Input Voltage | V _{IH} | | 2.0 | | 3.5 | V |
| | V _{IL} | | 0 | | 0.5 | V |
| Output Current | I _{OH} | V _{OH} =2.2V | 6 | | | mA |
| | I _{OL} | V _{OL} =0.3V | 6 | | | mA |
| Input Current | I _{IN} | CONT=0.8V _{DD} | | 7.5 | 12.0 | uA |
| | | CONT=0.2V _{DD} | | 1.2 | 2.0 | uA |
| 3-state Off Leakage Current | I _{oz} | CONT=V _{SS} , F _{OUT} = V _{DD} or V _{SS} | | | ±0.1 | uA |
| Feedback Resistance | R _f | A type | | 3.8 | | kΩ |
| | | B type | | 3.8 | | |
| | | C type | | 2.9 | | |
| Internal Capacitor | C _g /C _d | A type, fosc=90MHz | | 11/12 | | pF |
| | | B type, fosc=110MHz | | 9/10 | | |
| | | C type, fosc=135MHz | | 8/9 | | |
| Maximum Oscillation Frequency | F _{MAX} | A type | 90 | | | MHz |
| | | B type | 110 | | | |
| | | C type | 135 | | | |
| 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% | | 3 | 4 | ns |
| Output Signal Fall Time | t _f | C _L =15pF, 90% to 10% | | 3 | 4 | ns |
| Output Disable time | T _{PLZ} | C _L =15pF, R _{UP} =10kΩ | | | 200 | ns |
| Output Enable Time | T _{PZL} | C _L =15pF, R _{UP} =10kΩ | | | 200 | ns |

Note3) Excluding input current on CONT Terminal.

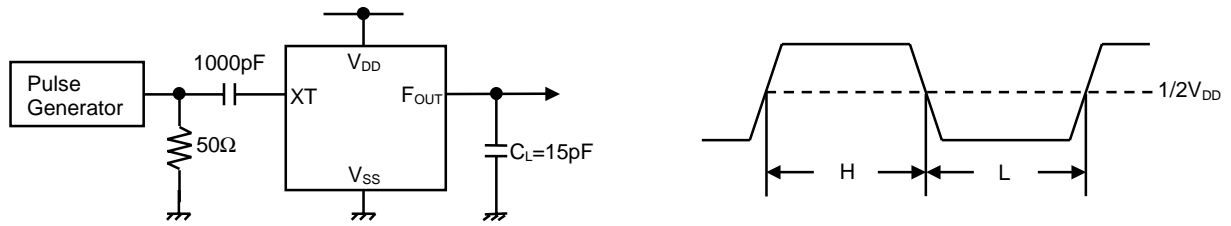
($V_{DD}=3.3V, T_a=25^{\circ}C$)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------|---|-----|-------|-----------|------------|
| Operating Current | I_{DD1} | A type, fosc=90MHz, $C_L=15pF$ | | 13 | 25 | mA |
| | | B type, fosc=110MHz, $C_L=15pF$ | | 13 | 25 | |
| | | C type, fosc=135MHz, $C_L=15pF$ | | 18 | 35 | |
| Oscillation Stopping Current | I_{DD2} | $\overline{CONT}=V_{SS}$, No load | | | 10 | μA |
| Stand-by Current | I_{st} | $\overline{CONT}=\overline{XT}=V_{SS}$, No load Note3) | | | 1 | μA |
| Input Voltage | V_{IH} | | 2.3 | | 3.3 | V |
| | V_{IL} | | 0 | | 1.0 | V |
| Output Current | I_{OH} | $V_{OH}=2.97V$ | 8 | | | mA |
| | I_{OL} | $V_{OL}=0.33V$ | 8 | | | mA |
| Input Current | I_{IN} | $\overline{CONT}=0.8V_{DD}$ | | 10.0 | 15.0 | μA |
| | | $\overline{CONT}=0.2V_{DD}$ | | 1.8 | 3.0 | μA |
| 3-state Off Leakage Current | I_{OZ} | $\overline{CONT}=V_{SS}$, $F_{OUT}=V_{DD}$ or V_{SS} | | | ± 0.1 | μA |
| Feedback Resistance | R_f | A type | | 3.8 | | k Ω |
| | | B type | | 3.8 | | |
| | | C type | | 2.9 | | |
| Internal Capacitor | C_g/C_d | A type, fosc=90MHz | | 11/12 | | pF |
| | | B type, fosc=110MHz | | 9/10 | | |
| | | C type, fosc=135MHz | | 8/9 | | |
| Maximum Oscillation Frequency | F_{MAX} | A type | 90 | | | MHz |
| | | B type | 110 | | | |
| | | C type | 135 | | | |
| Output Signal Symmetry | SYM | $C_L=15pF$, @ $V_{DD}/2$ | 45 | 50 | 55 | % |
| Output Signal Rise Time | tr | $C_L=15pF$, 10% to 90% | | 2 | 3 | ns |
| Output Signal Fall Time | tf | $C_L=15pF$, 90% to 10% | | 2 | 3 | ns |
| Output Disable time | T_{PLZ} | $C_L=15pF$, $R_{UP}=10k\Omega$ | | | 150 | ns |
| Output Enable Time | T_{PZL} | $C_L=15pF$, $R_{UP}=10k\Omega$ | | | 150 | ns |

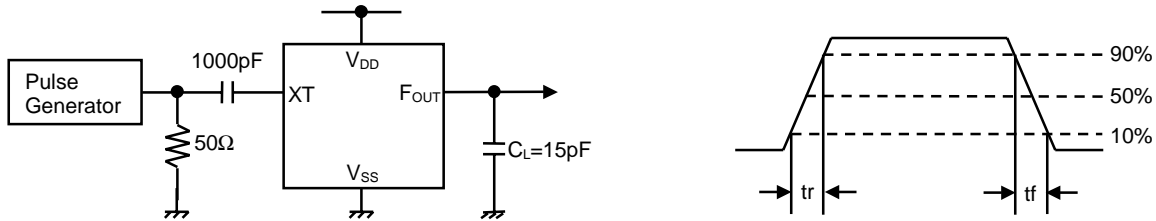
Note3) Excluding input current on CONT Terminal.

MEASUREMENT CIRCUITS

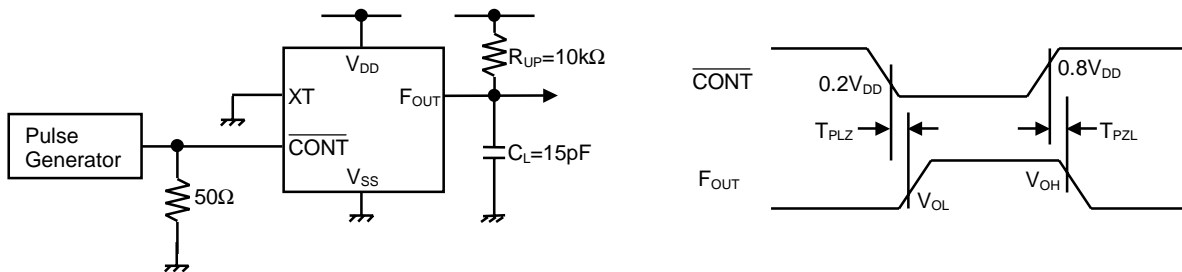
(1) Output Signal Symmetry ($C_L=15\text{pF}$)



(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]
 The specifications on this data book are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this data book are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.