**GENERAL DESCRIPTION**

The NJU6395 series is up to 125MHz low-voltage C-MOS quartz crystal oscillator, the NJU6395A is up to 110MHz and the NJU6395B is up to 125MHz.

The NJU6395 series consists of an oscillation amplifier, internal capacitors (Cg, Cd), feedback resistance (Rf), and 3-state output buffer.

The output is 8mA at 3V and 12mA at 5V operation, which can drive C-MOS load.

**FEATURES**

- Low Operating Voltage
- Maximum Oscillation Frequency A: 110MHz  
B: 125MHz
- High Fan-out
  - \( I_{\text{OH}} / I_{\text{OL}} = 8\text{mA} \) @3V  
  - \( I_{\text{OH}} / I_{\text{OL}} = 12\text{mA} \) @5V
- 3-State Output Buffer
- Oscillation Stop and Output Buffer Stand-by Function
- Oscillation Capacitors Cg and Cd on-chip
- Package Outline Chip/Thin-Chip/EMP-8
- C-MOS Technology

**LINE-UP TABLE**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Operating Voltage Range[V]</th>
<th>Recommended Oscillation Frequency[MHz]</th>
<th>Package</th>
<th>Cg/Cd [pF]</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJU6395</td>
<td>A 2.7 to 5.5</td>
<td>80 to 110</td>
<td>C/CT/E</td>
<td>8.5/9.5</td>
</tr>
<tr>
<td></td>
<td>B 2.4 to 3.6</td>
<td>105 to 125</td>
<td>C/CT/E</td>
<td>8.0/9.0</td>
</tr>
</tbody>
</table>

**COORDINATES**

Starting Point : Chip Center  
Unit[um]  
Chip Size:1.24x0.8mm  
Thin-Chip Thickness:260±20um  
Pad Size:100x100um  
Note1) No.6 and No.7 are no pad.

**PAD LOCATION**

<table>
<thead>
<tr>
<th>No</th>
<th>Pad Name</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CONT</td>
<td>-428</td>
<td>258</td>
</tr>
<tr>
<td>2</td>
<td>XT</td>
<td>-428</td>
<td>-86</td>
</tr>
<tr>
<td>3</td>
<td>XT</td>
<td>-428</td>
<td>-86</td>
</tr>
<tr>
<td>4</td>
<td>VSS</td>
<td>-428</td>
<td>-258</td>
</tr>
<tr>
<td>5</td>
<td>FOUT</td>
<td>478</td>
<td>-258</td>
</tr>
<tr>
<td>8</td>
<td>VDD</td>
<td>478</td>
<td>258</td>
</tr>
</tbody>
</table>

**BLOCK DIAGRAM**

![Diagram](image-url)
NJU6395 Series

■ TERMINAL DESCRIPTION

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONT</td>
<td>Oscillation and 3-state Output Buffer Control</td>
</tr>
<tr>
<td>FOUT</td>
<td>Output frequency f0</td>
</tr>
<tr>
<td>L</td>
<td>Oscillation Stop and High impedance Output</td>
</tr>
<tr>
<td>XT</td>
<td>Quartz Crystal Connecting Terminals</td>
</tr>
<tr>
<td>VSS</td>
<td>VSS=0V</td>
</tr>
<tr>
<td>VDD</td>
<td>VDD=3V/5V</td>
</tr>
</tbody>
</table>

■ ABSOLUTE MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>RATING</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>VDD</td>
<td>-0.5 to +7.0</td>
<td>V</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>VIN</td>
<td>VSS-0.5 to VDD+0.5</td>
<td>V</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>VOUT</td>
<td>-0.5 to VDD+0.5</td>
<td>V</td>
</tr>
<tr>
<td>Input Current</td>
<td>IIN</td>
<td>±10 mA</td>
<td>mA</td>
</tr>
<tr>
<td>Output Current</td>
<td>IOUT</td>
<td>±25 mA</td>
<td>mA</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>PD</td>
<td>450(EMP-8)</td>
<td>mW</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>Topr</td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>Tstg</td>
<td>-55 to +125</td>
<td>°C</td>
</tr>
</tbody>
</table>

Note2) If the supply voltage (VDD) is less than 7.0V, the input voltage must not over the VDD level though 7.0V is limit specified.

Note3) Decoupling capacitor should be connected between VDD and VSS due to the stabilized operation for the circuit.

Note4) The power dissipation is EMP-8 package without board.
## ELECTRICAL CHARACTERISTICS

### Operating Voltage

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Voltage</td>
<td>$V_{DD}$</td>
<td>A version</td>
<td>2.7</td>
<td>5.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B version</td>
<td>2.4</td>
<td>3.6</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

### Operating Current

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Current</td>
<td>$I_{DD1}$</td>
<td>A: $f_{osc}=100$MHz, $C_i=15pF$</td>
<td>25</td>
<td>33</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B: $f_{osc}=125$MHz, $C_i=15pF$</td>
<td>20</td>
<td>33</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Oscillation Stopping Current</td>
<td>$I_{DD2}$</td>
<td>$\text{CONT}=V_{SS}$, No load</td>
<td>10</td>
<td></td>
<td>uA</td>
<td></td>
</tr>
<tr>
<td>Stand-by Current</td>
<td>$I_{st}$</td>
<td>$\text{CONT}=XT=V_{SS}$, No load</td>
<td>1</td>
<td></td>
<td>uA</td>
<td></td>
</tr>
<tr>
<td>Input Voltage</td>
<td>$V_{IH}$</td>
<td></td>
<td>2.4</td>
<td>3.0</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$V_{IL}$</td>
<td></td>
<td>0</td>
<td>0.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Output Current</td>
<td>$I_{OH}$</td>
<td>$V_OH=2.7V$</td>
<td>8</td>
<td></td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$I_{OL}$</td>
<td>$V_{OL}=0.3V$</td>
<td>8</td>
<td></td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Input Current</td>
<td>$I_{IN}$</td>
<td>$\text{CONT}=0.8V_{DD}$</td>
<td>15</td>
<td>30</td>
<td>60</td>
<td>uA</td>
</tr>
<tr>
<td>3-state Off Leakage Current</td>
<td>$I_{OZ}$</td>
<td>$\text{CONT}=V_{SS}$, $F_{OUT}=V_{DD}$ or $V_{SS}$</td>
<td>±0.1</td>
<td></td>
<td>uA</td>
<td></td>
</tr>
<tr>
<td>Internal Capacitor</td>
<td>$Cg/Cd$</td>
<td>A: $f_{osc}=100$MHz</td>
<td>8.5</td>
<td>9.5</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B: $f_{osc}=125$MHz</td>
<td>8.0</td>
<td>9.0</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>Maximum Oscillation Frequency</td>
<td>$F_{MAX}$</td>
<td>A version</td>
<td>110</td>
<td></td>
<td>MHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B version</td>
<td>125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Signal Symmetry</td>
<td>$SYM$</td>
<td>$C_L=15pF$, $V_{DD}$</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>%</td>
</tr>
<tr>
<td>Output Signal Rise Time</td>
<td>$tr$</td>
<td>$C_L=15pF$, 10% to 90%</td>
<td>2</td>
<td>4</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Output Signal Fall Time</td>
<td>$tf$</td>
<td>$C_L=15pF$, 90% to 10%</td>
<td>2</td>
<td>4</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Output Disable time</td>
<td>$T_{PLZ}$</td>
<td>$C_L=15pF$, $R_{UP}=10k\Omega$</td>
<td>100</td>
<td></td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Output Enable Time</td>
<td>$T_{PLZ}$</td>
<td>$C_L=15pF$, $R_{UP}=10k\Omega$</td>
<td>100</td>
<td></td>
<td>ns</td>
<td></td>
</tr>
</tbody>
</table>

Note5) Excluding input current on $\text{CONT}$ Terminal.
### NJU6395 Series

**(V_{DD}=5.0V, T_a=25^\circ C, Only A version)**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Current</td>
<td>(I_{DD1})</td>
<td>fosc=100MHz, (C_L=15)pF</td>
<td>50</td>
<td>65</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Oscillation Stopping Current</td>
<td>(I_{DD2})</td>
<td>(\text{CONT}=\text{V}_{SS}, \text{No load})</td>
<td>10</td>
<td>uA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stand-by Current</td>
<td>(I_{st})</td>
<td>(\text{CONT}=\text{XT}=\text{V}_{SS}, \text{No load})</td>
<td>1</td>
<td>uA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Voltage</td>
<td>(V_{IH})</td>
<td></td>
<td>4.0</td>
<td>5.0</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(V_{IL})</td>
<td></td>
<td>0</td>
<td>1.0</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Output Current</td>
<td>(I_{OH})</td>
<td>(V_{OH}=4.5V)</td>
<td>12</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(I_{OL})</td>
<td>(V_{OL}=0.5V)</td>
<td>12</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Current</td>
<td>(I_{IN})</td>
<td>(\text{CONT}=0.8V_{DD})</td>
<td>30</td>
<td>60</td>
<td>120</td>
<td>uA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\text{CONT}=0.2V_{DD})</td>
<td>10</td>
<td>20</td>
<td>40</td>
<td>uA</td>
</tr>
<tr>
<td>3-state Off Leakage Current</td>
<td>(I_{OZ})</td>
<td>(\text{CONT}=\text{V}<em>{SS}, F</em>{\text{OUT}}=V_{DD}) or (\text{V}_{SS})</td>
<td>±0.1</td>
<td>uA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Capacitor</td>
<td>(C_g/C_d)</td>
<td>fosc=100MHz</td>
<td>8.5/9.5</td>
<td>pF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Oscillation Frequency</td>
<td>(F_{\text{MAX}})</td>
<td></td>
<td>110</td>
<td>MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Signal Symmetry</td>
<td>SYM</td>
<td>(C_L=15)pF, (V_{DD}/2)</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>%</td>
</tr>
<tr>
<td>Output Signal Rise Time</td>
<td>tr</td>
<td>(C_L=15)pF, 10% to 90%</td>
<td>2</td>
<td>4</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Output Signal Fall Time</td>
<td>tf</td>
<td>(C_L=15)pF, 90% to 10%</td>
<td>2</td>
<td>4</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Output Disable Time</td>
<td>(T_{PLZ})</td>
<td>(C_L=15)pF, (R_{\text{UP}}=10k\Omega)</td>
<td>100</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Enable Time</td>
<td>(T_{PZL})</td>
<td>(C_L=15)pF, (R_{\text{UP}}=10k\Omega)</td>
<td>100</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note5)** Excluding input current on \(\text{CONT}\) Terminal.
**MEASURMENT CIRCUITS**

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

![Circuit Diagram]

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

![Circuit Diagram]

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

![Circuit Diagram]

[CAUTION]

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