MEMS Oscillator
JSO LC series · 2.8 V

- low power oscillator with HCMOS/LVCMOS output
- compatible to industry standard packages 2016 – 7050
- extended shock & vibration resistance & temperature range
- configured to customer’s specification
- very fast delivery service

Jauch MEMS – Uses SiTime’s MEMS First™ technology
Jauch Quartz GmbH • e-mail: info@jauch.com • full data can be found under: www.jauch.com
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Packaging: lot code only

Pin connection:
- # 1: e/d
- # 2: GND
- # 3: output
- # 4: V_{DC}

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07/09/2018

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Packaging Note / Marking

QTY < 250 pcs. → cut tape
QTY 250/500/1K/3K pcs. → tape and reel
Marking: lot code only

## GENERAL DATA

**TYPE**

<table>
<thead>
<tr>
<th>JSOxxCxLC 2.8 V</th>
</tr>
</thead>
</table>

**frequency range**

- 1.0 ~ 110.0 MHz
- 115.0 ~ 137.0 MHz

**frequency stability over all**

±20 ppm ~ ±50 ppm (see table 1)

**current consumption**

see table 2

**supply voltage V_{DC}**

2.8 V ± 10%

**temperature operating**

- T0 = -20°C ~ +70°C
- T1 = -40°C ~ +85°C
- T2 = -40°C ~ +105°C
- T3 = -40°C ~ +125°C
- T8 = -55°C ~ +125°C

**output logic**

HCMOS/LVCMOS

**rise & fall time**

2.9 ns max. at 15 pF / 5.7 ns max. at 30 pF (see table 4)

**load max.**

- 30 pF max. recommended (≤88.0 MHz)
- 15 pF max. recommended (>88.0 MHz)

**other load capacitances possible, see supplementary document**

**current max.**

3 mA

**low level max.**

0.1 x V_{DC}

**high level min.**

0.9 x V_{DC}

**standby function (e/d)**

stop (S), tristate-only (T) or none (N), see table 3

**output enable time max.**

5 ms (S) / 150 ns (T)

**output disable time max.**

150 ns

**start-up time max.**

5 ms

**standby current max.**

4 µA (for stop (S), see table 3)

**phase jitter 12 kHz ~ 20 MHz**

< 3.0 ps RMS

**symmetry at 0.5 x V_{DC}**

45% ~ 55% (standard)

**TABLE 1: FREQUENCY STABILITY CODE**

<table>
<thead>
<tr>
<th>stability code / temp. code*</th>
<th>B</th>
<th>G</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20°C ~ +70°C T0</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>-40°C ~ +85°C T1</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>-40°C ~ +105°C T2</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>-40°C ~ +125°C T3</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>-55°C ~ +125°C T8</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

* available

* includes stability at 25°C, operating temp. range, supply voltage change, shock and vibration, aging 1st year.

**TABLE 2: CURRENT CONSUMPTION TYP. (FOR MAX. ADD 30%)**

<table>
<thead>
<tr>
<th>current at load</th>
<th>5 pF</th>
<th>15 pF</th>
<th>30 pF</th>
<th>60 pF</th>
<th>unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>output disabled</td>
<td>3.8</td>
<td>3.8</td>
<td>3.8</td>
<td>3.8</td>
<td>mA</td>
</tr>
<tr>
<td>1.0 ~ 19.9 MHz</td>
<td>4.1</td>
<td>4.3</td>
<td>5.2</td>
<td>6.9</td>
<td>mA</td>
</tr>
<tr>
<td>20.0 ~ 29.9 MHz</td>
<td>4.4</td>
<td>5.2</td>
<td>6.7</td>
<td>9.8</td>
<td>mA</td>
</tr>
<tr>
<td>30.0 ~ 49.9 MHz</td>
<td>4.8</td>
<td>6.2</td>
<td>8.3</td>
<td>12.7</td>
<td>mA</td>
</tr>
<tr>
<td>50.0 ~ 79.9 MHz</td>
<td>6.1</td>
<td>8.1</td>
<td>11.7</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>80.0 ~ 110.0 MHz</td>
<td>7.0</td>
<td>10.0</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>115.0 ~ 137.0 MHz</td>
<td>(9.0)</td>
<td>(14.0)</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
</tbody>
</table>

Note: current at default edge control setting “D”, also refer to table 4.

**TABLE 3: CONFIGURABLE STANDBY FUNCTION OPTIONS (E/D)**

<table>
<thead>
<tr>
<th>pin #1 (e/d control)</th>
<th>option</th>
<th>functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>low “0” (V_{IL} ≤ 0.2 V_{DC})</td>
<td>S = Stop</td>
<td>output weakly pulled down, oscillator in sleep mode</td>
</tr>
<tr>
<td>T = TriState</td>
<td>output high impedance, oscillator operates</td>
<td></td>
</tr>
<tr>
<td>N = None</td>
<td>oscillator output active</td>
<td></td>
</tr>
<tr>
<td>high “1” (V_{IH} ≥ 0.8 V_{DC})</td>
<td>all</td>
<td>oscillator output active</td>
</tr>
<tr>
<td>open*</td>
<td>all</td>
<td>oscillator output active</td>
</tr>
</tbody>
</table>

* a pull up resistor is recommended in EMI stressed circuit environments.

Note: some frequencies can’t be configured, see table 5.

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**TABLE 4: MAX. RISE & FALL TIME VS. LOAD CAPACITANCE**

<table>
<thead>
<tr>
<th>C_L (pF)</th>
<th>5 pF</th>
<th>15 pF</th>
<th>30 pF</th>
<th>5 pF</th>
<th>15 pF</th>
<th>30 pF</th>
</tr>
</thead>
<tbody>
<tr>
<td>edge control at 10% ~ 90% of V DC (ns)</td>
<td>1.2</td>
<td>2.2</td>
<td>4.6</td>
<td>0.8</td>
<td>1.6</td>
<td>3.0</td>
</tr>
<tr>
<td>at 20% ~ 80% of V DC (ns)</td>
<td>1.3</td>
<td>2.4</td>
<td>5.2</td>
<td>0.9</td>
<td>1.8</td>
<td>3.5</td>
</tr>
</tbody>
</table>

D=2*  
1  
3  
4  
5  
6  
7  

<table>
<thead>
<tr>
<th>C_L (pF)</th>
<th>15 pF</th>
<th>30 pF</th>
<th>5 pF</th>
<th>15 pF</th>
<th>30 pF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>2.9</td>
<td>5.7</td>
<td>1.0</td>
<td>2.0</td>
<td>3.8</td>
</tr>
<tr>
<td>1.6</td>
<td>3.6</td>
<td>6.4</td>
<td>1.1</td>
<td>2.4</td>
<td>4.4</td>
</tr>
<tr>
<td>3.0</td>
<td>6.2</td>
<td>10.4</td>
<td>2.0</td>
<td>4.2</td>
<td>7.4</td>
</tr>
<tr>
<td>4.0</td>
<td>7.6</td>
<td>13.6</td>
<td>2.8</td>
<td>5.4</td>
<td>9.4</td>
</tr>
<tr>
<td>5.8</td>
<td>11.6</td>
<td>21.0</td>
<td>4.0</td>
<td>8.0</td>
<td>14.2</td>
</tr>
<tr>
<td>12.0</td>
<td>23.0</td>
<td>42.0</td>
<td>8.2</td>
<td>15.2</td>
<td>28.0</td>
</tr>
</tbody>
</table>

* default edge control setting "D" at V_DC = 2.8 V, please also refer to the supplementary information on our homepage for typical values and more details.

**TABLE 5: NON-CONFIGURABLE FREQUENCIES**

<table>
<thead>
<tr>
<th>Operating temperature option</th>
<th>T2 = (-40°C ~ +105°C)</th>
<th>T3 = (-40°C ~ +125°C)</th>
<th>T8 = (-55°C ~ +125°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>from (MHz)</td>
<td>to (MHz)</td>
<td>from (MHz)</td>
<td>to (MHz)</td>
</tr>
<tr>
<td>61.223</td>
<td>61.674</td>
<td>61.223</td>
<td>61.974</td>
</tr>
<tr>
<td>69.796</td>
<td>70.485</td>
<td>69.340</td>
<td>70.827</td>
</tr>
<tr>
<td>79.063</td>
<td>79.162</td>
<td>78.715</td>
<td>79.561</td>
</tr>
<tr>
<td>81.428</td>
<td>82.232</td>
<td>80.160</td>
<td>80.174</td>
</tr>
<tr>
<td>91.834</td>
<td>92.155</td>
<td>80.780</td>
<td>82.632</td>
</tr>
<tr>
<td>94.249</td>
<td>94.430</td>
<td>91.834</td>
<td>95.474</td>
</tr>
<tr>
<td>94.875</td>
<td>94.994</td>
<td>96.192</td>
<td>96.209</td>
</tr>
<tr>
<td>97.714</td>
<td>98.679</td>
<td>96.936</td>
<td>99.158</td>
</tr>
<tr>
<td>110.0</td>
<td>115.194</td>
<td>110.0</td>
<td>119.342</td>
</tr>
<tr>
<td>117.811</td>
<td>118.038</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>118.594</td>
<td>118.743</td>
<td>120.239</td>
<td>120.262</td>
</tr>
<tr>
<td>122.142</td>
<td>122.705</td>
<td>121.170</td>
<td>121.243</td>
</tr>
<tr>
<td>123.022</td>
<td>123.348</td>
<td>121.601</td>
<td>123.948</td>
</tr>
</tbody>
</table>

**EXAMPLE**

O 26.123456 – JSO 75 C1 L C – B – 2.8 – TO – S – D

- D = default
- O = Oscillator
- 0 ~ 7, see table 4
- S = Stop
- T = TriState
- N = None
- JSO = Jauch Silicon Oscillator
- package: 75 = 7050 22 = 2520 53 = 5032 21 = 2016 32 = 3225
- frequency range: C1 = 1.0 ~ 110.0 MHz, C2 = 115.0 ~ 137.0 MHz
- function/feature: L = lowpower
- output I/F: C = (H)CMOS
- edge control: D
- standby function options: S
- temperature range: T0 = -20°C ~ 70°C, T1 = -40°C ~ 85°C, T2 = -40°C ~ 105°C, T3 = -40°C ~ 125°C, T8 = -55°C ~ 125°C
- supply voltage: 3.3 ~ 3.3 V, 2.5 V, 1.8 V, 2.8 V ~ 3.3 V
- frequency stability overall: B = ± 50 ppm, G = ± 30 ppm, C = ± 25 ppm, D = ± 20 ppm
MEMS Oscillator · JSO LC series · 2.8 V

**DIMENSIONS**

2.0 x 1.6 x 0.75
JSO21 LC

![Diagram of JSO21 LC dimensions](image)

2.5 x 2.0 x 0.75
JSO22 LC

![Diagram of JSO22 LC dimensions](image)

3.2 x 2.5 x 0.75
JSO32 LC

![Diagram of JSO32 LC dimensions](image)

5.0 x 3.2 x 0.75
JSO53 LC

![Diagram of JSO53 LC dimensions](image)

7.0 x 5.0 x 0.90
JSO75 LC

![Diagram of JSO75 LC dimensions](image)

**Pin connection**
- #1: e/d
- #2: GND
- #3: output
- #4: V<sub>in</sub>

**Note:** A capacitor of 0.1 μF between V<sub>in</sub> and GND is recommended.

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MEMS Oscillator · JSo LC series · 2.8 V

TAPING SPECIFICATION

2.0 x 1.6 x 0.75
JSo21 LC

2.5 x 2.0 x 0.75
JSo22 LC

3.2 x 2.5 x 0.75
JSo32 LC

5.0 x 3.2 x 0.75
JSo53 LC

7.0 x 5.0 x 0.90
JSo75 LC

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