

## 阅读申明

- 1.本站收集的数据手册和产品资料都来自互联网，版权归原作者所有。如读者和版权方有任何异议请及时告之，我们将妥善解决。
- 2.本站提供的中文数据手册是英文数据手册的中文翻译，其目的是协助用户阅读，该译文无法自动跟随原稿更新，同时也可能存在翻译上的不当。建议读者以英文原稿为参考以便获得更精准的信息。
- 3.本站提供的产品资料，来自厂商的技术支持或者使用者的心得体会等，其内容可能存在描述上的差异，建议读者做出适当判断。
- 4.如需与我们联系，请发邮件到marketing@iczoom.com，主题请标有“数据手册”字样。

## Read Statement

1. The datasheets and other product information on the site are all from network reference or other public materials, and the copyright belongs to the original author and original published source. If readers and copyright owners have any objections, please contact us and we will deal with it in a timely manner.
2. The Chinese datasheets provided on the website is a Chinese translation of the English datasheets. Its purpose is for reader's learning exchange only and do not involve commercial purposes. The translation cannot be automatically updated with the original manuscript, and there may also be improper translations. Readers are advised to use the English manuscript as a reference for more accurate information.
3. All product information provided on the website refer to solutions from manufacturers' technical support or users the contents may have differences in description, and readers are advised to take the original article as the standard.
4. If you have any questions, please contact us at marketing@iczoom.com and mark the subject with "Datasheets" .

# ANY8009B

## High Frequency, Low Power Oscillator

# AnyCLK

Service depends on time

### Features

- Any frequency between 115 MHz and 137 MHz accurate to 6 decimal places
- 100% pin-to-pin drop-in replacement to quartz-based XO
- Excellent total frequency stability as low as  $\pm 20$  ppm
- Operating temperature from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ . For  $125^{\circ}\text{C}$  and/or  $-55^{\circ}\text{C}$  options, refer to [ANY8919](#) and [ANY8921](#)
- Low power consumption of 4.9 mA typical at 1.8V
- Standby mode for longer battery life
- Fast startup time of 5 ms
- LVC MOS/HCMOS compatible output
- Industry-standard packages: 2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0 mm x mm
- Instant samples with [Time Machine II](#) and [field programmable oscillators](#)
- RoHS and REACH compliant, Pb-free, Halogen-free and Antimony-free
- For AEC-Q100 oscillators, refer to [ANY8924](#) and [ANY8925](#)

### Applications

- Ideal for GPON/GPON, network switches, routers, servers, embedded systems
- Ideal for Ethernet, PCI-E, DDR, etc.



## Electrical Specifications

**Table 1. Electrical Characteristics**

All Min and Max limits are specified over temperature and rated operating voltage with 15 pF output load unless otherwise stated. Typical values are at  $25^{\circ}\text{C}$  and nominal supply voltage.

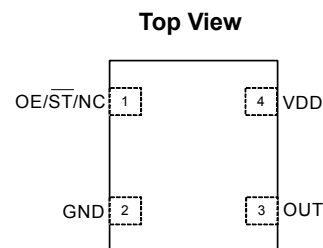
Parameters	Symbol	Min.	Typ.	Max.	Unit	Condition
<b>Frequency Range</b>						
Output Frequency Range	f	115	–	137	MHz	
<b>Frequency Stability and Aging</b>						
Frequency Stability	F_stab	-20	–	+20	ppm	Inclusive of Initial tolerance at $25^{\circ}\text{C}$ , 1st year aging at $25^{\circ}\text{C}$ , and variations over operating temperature, rated power supply voltage and load.
		-25	–	+25	ppm	
		-50	–	+50	ppm	
<b>Operating Temperature Range</b>						
Operating Temperature Range	T_use	-20	–	+70	$^{\circ}\text{C}$	Extended Commercial
		-40	–	+85	$^{\circ}\text{C}$	Industrial
<b>Supply Voltage and Current Consumption</b>						
Supply Voltage	Vdd	1.62	1.8	1.98	V	Contact <a href="#">Anyclk</a> for 1.5V support
		2.25	2.5	2.75	V	
		2.52	2.8	3.08	V	
		2.7	3.0	3.3	V	
		2.97	3.3	3.63	V	
		2.25	–	3.63	V	
Current Consumption	Idd	–	6.2	7.5	mA	No load condition, f = 125 MHz, Vdd = 2.8V, 3.0V, 3.3V or 2.25 to 3.63V
		–	5.5	6.4	mA	No load condition, f = 125 MHz, Vdd = 2.5V
		–	4.9	5.6	mA	No load condition, f = 125 MHz, Vdd = 1.8V
OE Disable Current	I_OD	–	–	4.2	mA	Vdd = 2.5V to 3.3V, OE = GND, Output in high-Z state
		–	–	4.0	mA	Vdd = 1.8V, OE = GND, Output in high-Z state
Standby Current	I_std	–	2.6	4.3	$\mu\text{A}$	$\overline{\text{ST}}$ = GND, Vdd = 2.8V to 3.3V, Output is weakly pulled down
		–	1.4	2.5	$\mu\text{A}$	$\overline{\text{ST}}$ = GND, Vdd = 2.5V, Output is weakly pulled down
		–	0.6	1.3	$\mu\text{A}$	$\overline{\text{ST}}$ = GND, Vdd = 1.8V, Output is weakly pulled down
<b>LVC MOS Output Characteristics</b>						
Duty Cycle	DC	45	–	55	%	All Vdds
Rise/Fall Time	Tr, Tf	–	1	2	ns	Vdd = 2.5V, 2.8V, 3.0V or 3.3V, 20% - 80%
		–	1.3	2.5	ns	Vdd = 1.8V, 20% - 80%
		–	0.8	2	ns	Vdd = 2.25V - 3.63V, 20% - 80%
Output High Voltage	VOH	90%	–	–	Vdd	IOH = -4 mA (Vdd = 3.0V or 3.3V)
Output Low Voltage	VOL	–	–	10%	Vdd	IOL = 4 mA (Vdd = 3.0V or 3.3V)

**Table 1. Electrical Characteristics (continued)**

Parameters	Symbol	Min.	Typ.	Max.	Unit	Condition
<b>Input Characteristics</b>						
Input High Voltage	V <sub>IH</sub>	70%	–	–	V <sub>dd</sub>	Pin 1, OE or $\overline{ST}$
Input Low Voltage	V <sub>IL</sub>	–	–	30%	V <sub>dd</sub>	Pin 1, OE or $\overline{ST}$
Input Pull-up Impedance	Z <sub>in</sub>	50	87	150	k $\Omega$	Pin 1, OE logic high or logic low, or $\overline{ST}$ logic high
		2	–	–	M $\Omega$	Pin 1, $\overline{ST}$ logic low
<b>Startup and Resume Timing</b>						
Startup Time	T <sub>start</sub>	–	–	5	ms	Measured from the time V <sub>dd</sub> reaches its rated minimum value
Enable/Disable Time	T <sub>oe</sub>	–	–	122	ns	f = 137 MHz. For other frequencies, T <sub>oe</sub> = 100 ns + 3 ' cycles
Resume Time	T <sub>resume</sub>	–	–	5	ms	Measured from the time ST pin crosses 50% threshold
<b>Jitter</b>						
RMS Period Jitter	T <sub>jitt</sub>	–	1.9	3	ps	f = 125 MHz, V <sub>dd</sub> = 2.5V, 2.8V, 3.0V or 3.3V
		–	1.8	4	ps	f = 125 MHz, V <sub>dd</sub> = 1.8V
Peak-to-peak Period Jitter	T <sub>pk</sub>	–	12	25	ps	f = 125 MHz, V <sub>dd</sub> = 2.5V, 2.8V, 3.0V or 3.3V
		–	14	30	ps	f = 125 MHz, V <sub>dd</sub> = 1.8V
RMS Phase Jitter (random)	T <sub>phj</sub>	–	0.5	0.9	ps	Integration bandwidth = 900 kHz to 7.5 MHz
		–	1.3	2	ps	Integration bandwidth = 12 kHz to 20 MHz

**Table 2. Pin Description**

Pin	Symbol		Functionality
1	OE/ $\overline{ST}$ /NC	Output Enable	H <sup>[1]</sup> : specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H <sup>[1]</sup> : specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to I <sub>std</sub> .
		No Connect	Any voltage between 0 and V <sub>dd</sub> or Open <sup>[1]</sup> : Specified frequency output. Pin 1 has no function.
2	GND	Power	Electrical ground
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage <sup>[2]</sup>



**Figure 1. Pin Assignments**

**Notes:**

- In OE or  $\overline{ST}$  mode, a pull-up resistor of 10 k $\Omega$  or less is recommended if pin 1 is not externally driven. If pin 1 needs to be left floating, use the NC option.
- A capacitor of value 0.1  $\mu$ F or higher between V<sub>dd</sub> and GND is required.

**Table 3. Absolute Maximum Limits**

Attempted operation outside the absolute maximum ratings may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

Parameter	Min.	Max.	Unit
Storage Temperature	-65	150	°C
Vdd	-0.5	4	V
Electrostatic Discharge	–	2000	V
Soldering Temperature (follow standard Pb free soldering guidelines)	–	260	°C
Junction Temperature <sup>[3]</sup>	–	150	°C

Note:

- Exceeding this temperature for extended period of time may damage the device.

**Table 4. Thermal Consideration<sup>[4]</sup>**

Package	$\theta_{JA}$ , 4 Layer Board (°C/W)	$\theta_{JA}$ , 2 Layer Board (°C/W)	$\theta_{JC}$ , Bottom (°C/W)
7050	142	273	30
5032	97	199	24
3225	109	212	27
2520	117	222	26
2016	152	252	36

Note:

- Refer to JESD51 for  $\theta_{JA}$  and  $\theta_{JC}$  definitions, and reference layout used to determine the  $\theta_{JA}$  and  $\theta_{JC}$  values in the above table.

**Table 5. Maximum Operating Junction Temperature<sup>[5]</sup>**

Max Operating Temperature (ambient)	Maximum Operating Junction Temperature
70°C	80°C
85°C	95°C

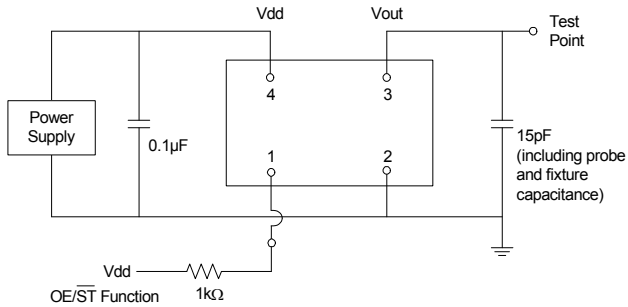
Note:

- Datasheet specifications are not guaranteed if junction temperature exceeds the maximum operating junction temperature.

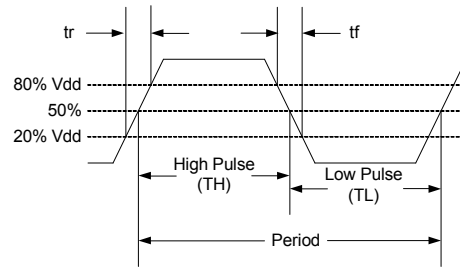
**Table 6. Environmental Compliance**

Parameter	Condition/Test Method
Mechanical Shock	MIL-STD-883F, Method 2002
Mechanical Vibration	MIL-STD-883F, Method 2007
Temperature Cycle	JESD22, Method A104
Solderability	MIL-STD-883F, Method 2003
Moisture Sensitivity Level	MSL1 @ 260°C

### Test Circuit and Waveform<sup>[6]</sup>



**Figure 2. Test Circuit**

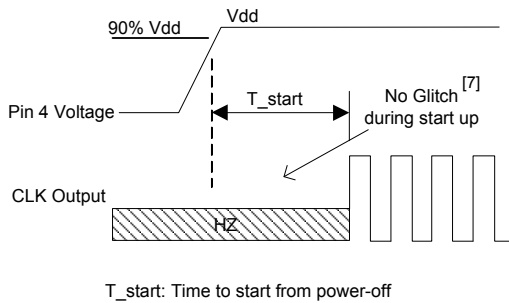


**Figure 3. Waveform**

**Note:**

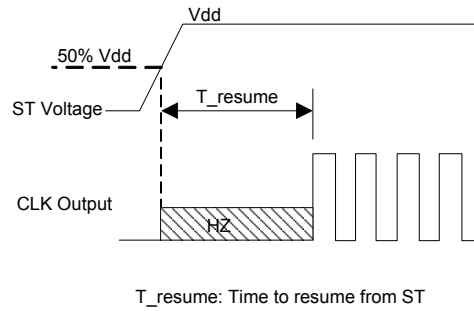
6. Duty Cycle is computed as  $Duty\ Cycle = TH/Period$ .

### Timing Diagrams



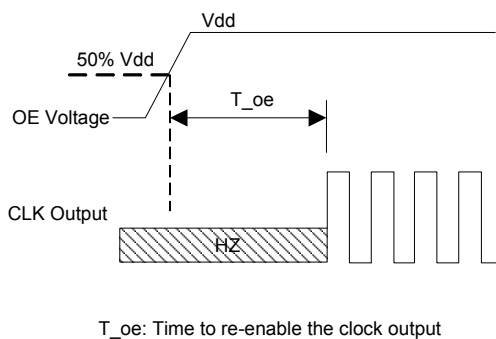
$T_{start}$ : Time to start from power-off

**Figure 4. Startup Timing (OE/ST Mode)**



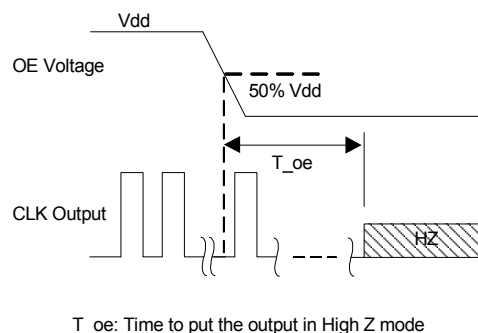
$T_{resume}$ : Time to resume from ST

**Figure 5. Standby Resume Timing (ST Mode Only)**



$T_{oe}$ : Time to re-enable the clock output

**Figure 6. OE Enable Timing (OE Mode Only)**



$T_{oe}$ : Time to put the output in High Z mode

**Figure 7. OE Disable Timing (OE Mode Only)**

**Note:**

7. ANY8009 has “no runt” pulses and “no glitch” output during startup or resume.

### Performance Plots<sup>[8]</sup>

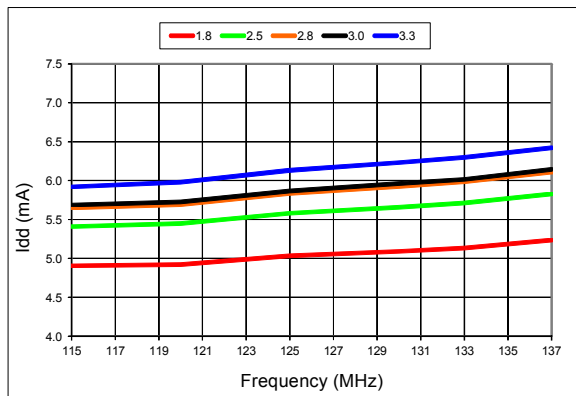


Figure 8. Idd vs Frequency

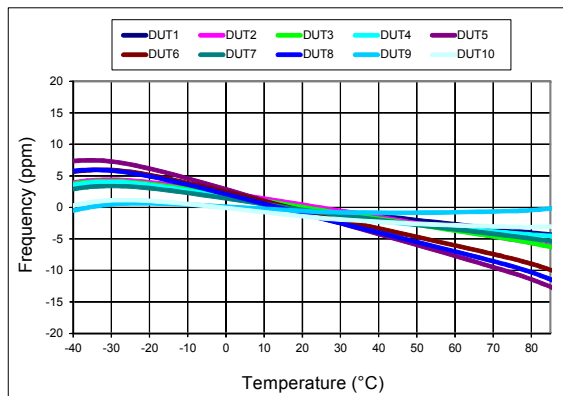


Figure 9. Frequency vs Temperature, 1.8V

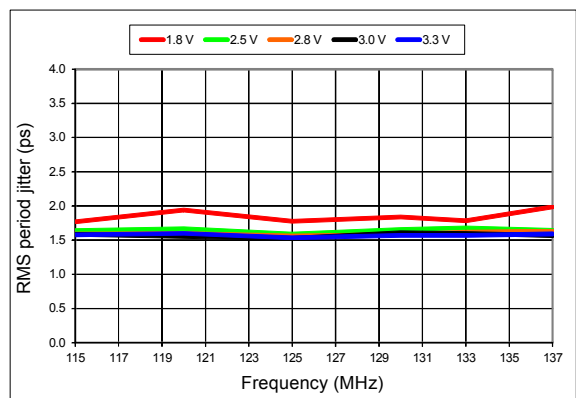


Figure 10. RMS Period Jitter vs Frequency

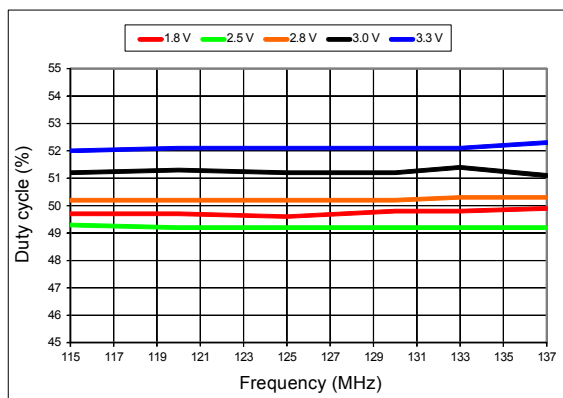


Figure 11. Duty Cycle vs Frequency

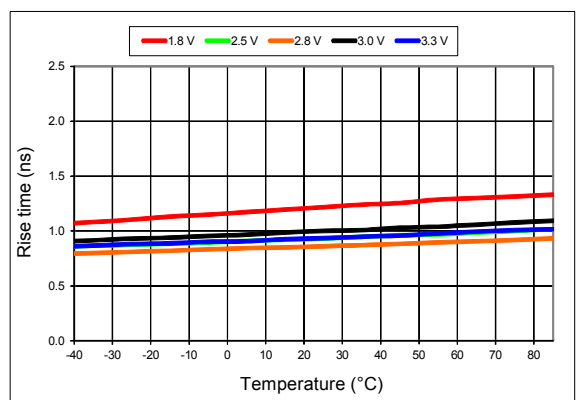


Figure 12. 20%-80% Rise Time vs Temperature

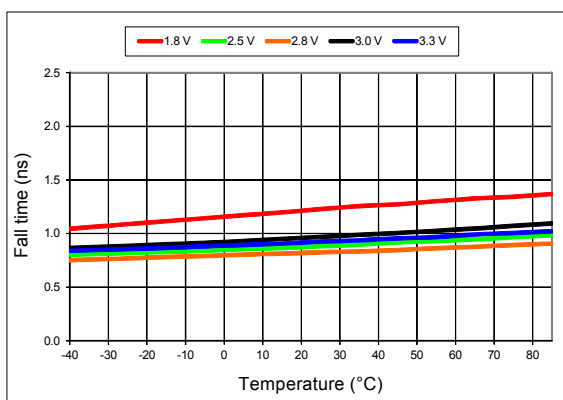
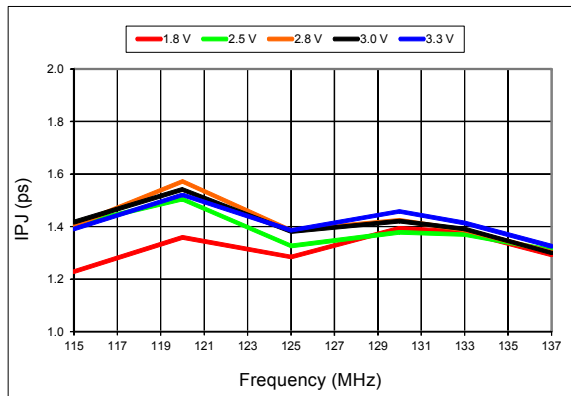
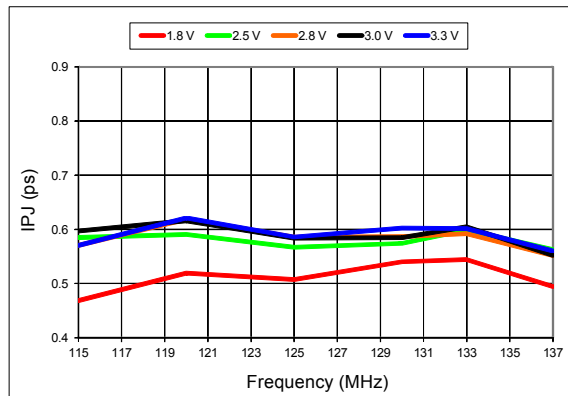


Figure 13. 20%-80% Fall Time vs Temperature

### Performance Plots<sup>[8]</sup>



**Figure 14. RMS Integrated Phase Jitter Random (12 kHz to 20 MHz) vs Frequency<sup>[9]</sup>**



**Figure 15. RMS Integrated Phase Jitter Random (900 kHz to 20 MHz) vs Frequency<sup>[9]</sup>**

**Notes:**

- 8. All plots are measured with 15 pF load at room temperature, unless otherwise stated.
- 9. Phase noise plots are measured with Agilent E5052B signal source analyzer.

### Programmable Drive Strength

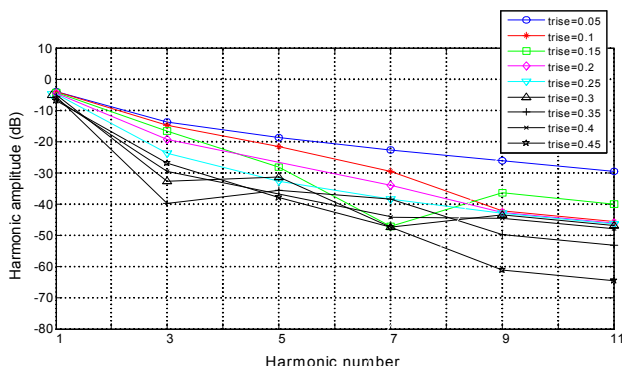
The ANY8009 includes a programmable drive strength feature to provide a simple, flexible tool to optimize the clock rise/fall time for specific applications. Benefits from the programmable drive strength feature are:

- Improves system radiated electromagnetic interference (EMI) by slowing down the clock rise/fall time
- Improves the downstream clock receiver's (RX) jitter by decreasing (speeding up) the clock rise/fall time.
- Ability to drive large capacitive loads while maintaining full swing with sharp edge rates.

For more detailed information about rise/fall time control and drive strength selection, see the Anyclk Applications Note.

### EMI Reduction by Slowing Rise/Fall Time

Figure 16 shows the harmonic power reduction as the rise/fall times are increased (slowed down). The rise/fall times are expressed as a ratio of the clock period. For the ratio of 0.05, the signal is very close to a square wave. For the ratio of 0.45, the rise/fall times are very close to near-triangular waveform. These results, for example, show that the 11th clock harmonic can be reduced by 35 dB if the rise/fall edge is increased from 5% of the period to 45% of the period.



**Figure 16. Harmonic EMI reduction as a Function of Slower Rise/Fall Time**

### Jitter Reduction with Faster Rise/Fall Time

Power supply noise can be a source of jitter for the downstream chipset. One way to reduce this jitter is to speed up the rise/fall time of the input clock. Some chipsets may also require faster rise/fall time in order to reduce their sensitivity to this type of jitter. Refer to the [Rise/Fall Time Tables \(Table 7 to Table 11\)](#) to determine the proper drive strength.

### High Output Load Capability

The rise/fall time of the input clock varies as a function of the actual capacitive load the clock drives. At any given drive strength, the rise/fall time becomes slower as the output load increases. As an example, for a 3.3V ANY8009 device with default drive strength setting, the typical rise/fall time is 0.46 ns for 5 pF output load. The typical rise/fall time slows down to 1 ns when the output load increases to 15 pF. One can choose to speed up the rise/fall time to 0.72 ns by then increasing the driven strength setting on the ANY8009 to "F."

The ANY8009 can support up to 30 pF or higher in maximum capacitive loads with up to 3 additional drive strength settings. Refer to the [Rise/Fall Time Tables \(Table 7 to 11\)](#) to determine the proper drive strength for the desired combination of output load vs. rise/fall time

### ANY8009 Drive Strength Selection

Tables 7 through 11 define the rise/fall time for a given capacitive load and supply voltage.

1. Select the table that matches the ANY8009 nominal supply voltage (1.8V, 2.5V, 2.8V, 3.0V, 3.3V).
2. Select the capacitive load column that matches the application requirement (5 pF to 30 pF)
3. Under the capacitive load column, select the desired rise/fall times.
4. The left-most column represents the part number code for the corresponding drive strength.
5. Add the drive strength code to the part number for ordering purposes.

### Calculating Maximum Frequency

Based on the rise and fall time data given in Tables 7 through 11, the maximum frequency the oscillator can operate with guaranteed full swing of the output voltage over temperature as follows:

$$\text{Max Frequency} = \frac{1}{5 \times \text{Trf}_{20/80}}$$

where  $\text{Trf}_{20/80}$  is the typical value for 20%-80% rise/fall time.

### Example 1

Calculate  $f_{\text{MAX}}$  for the following condition:

- Vdd = 3.3V ([Table 11](#))
- Capacitive Load: 30 pF
- Desired Tr/f time = 1.46 ns (rise/fall time part number code = U)

Part number for the above example:

ANY8009BIU12-33E-136.986300



Drive strength code is inserted here. Default setting is "-"



### Rise/Fall Time (20% to 80%) vs C<sub>LOAD</sub> Tables

Table 7. V<sub>DD</sub> = 1.8V Rise/Fall Times for Specific C<sub>LOAD</sub>

Rise/Fall Time Typ (ns)			
Drive Strength \ C <sub>LOAD</sub>	5 pF	15 pF	30 pF
T	0.93	n/a	n/a
E	0.78	n/a	n/a
U	0.70	1.48	n/a
F or "-": default	0.65	1.30	n/a

Table 8. V<sub>DD</sub> = 2.5V Rise/Fall Times for Specific C<sub>LOAD</sub>

Rise/Fall Time Typ (ns)			
Drive Strength \ C <sub>LOAD</sub>	5 pF	15 pF	30 pF
R	1.45	n/a	n/a
B	1.09	n/a	n/a
T	0.62	1.28	n/a
E	0.54	1.00	n/a
U or "-": default	0.43	0.96	n/a
F	0.34	0.88	n/a

Table 9. V<sub>DD</sub> = 2.8V Rise/Fall Times for Specific C<sub>LOAD</sub>

Rise/Fall Time Typ (ns)			
Drive Strength \ C <sub>LOAD</sub>	5 pF	15 pF	30 pF
R	1.29	n/a	n/a
B	0.97	n/a	n/a
T	0.55	1.12	n/a
E	0.44	1.00	n/a
U or "-": default	0.34	0.88	n/a
F	0.29	0.81	1.48

Table 10. V<sub>DD</sub> = 3.0V Rise/Fall Times for Specific C<sub>LOAD</sub>

Rise/Fall Time Typ (ns)			
Drive Strength \ C <sub>LOAD</sub>	5 pF	15 pF	30 pF
R	1.22	n/a	n/a
B	0.89	n/a	n/a
T or "-": default	0.51	1.00	n/a
E	0.38	0.92	n/a
U	0.30	0.83	n/a
F	0.27	0.76	1.39

Table 11. V<sub>DD</sub> = 3.3V Rise/Fall Times for Specific C<sub>LOAD</sub>

Rise/Fall Time Typ (ns)			
Drive Strength \ C <sub>LOAD</sub>	5 pF	15 pF	30 pF
R	1.16	n/a	n/a
B	0.81	n/a	n/a
T or "-": default	0.46	1.00	n/a
E	0.33	0.87	n/a
U	0.28	0.79	1.46
F	0.25	0.72	1.31

**Note:**

10. "n/a" in Table 7 to Table 11 indicates that the resulting rise/fall time from the respective combination of the drive strength and output load does not provide rail-to-rail swing and is not available.

# High Frequency, Low Power Oscillator

## Pin 1 Configuration Options (OE, $\overline{ST}$ , or NC)

Pin 1 of the ANY8009 can be factory-programmed to support three modes: Output enable (OE), standby ( $\overline{ST}$ ) or No Connect (NC). These modes can also be programmed with the Time Machine using field programmable devices.

### Output Enable (OE) Mode

In the OE mode, applying logic Low to the OE pin only disables the output driver and puts it in Hi-Z mode. The core of the device continues to operate normally. Power consumption is reduced due to the inactivity of the output. When the OE pin is pulled High, the output is typically enabled in  $<1\mu\text{s}$ .

### Standby ( $\overline{ST}$ ) Mode

In the  $\overline{ST}$  mode, a device enters into the standby mode when Pin 1 pulled Low. All internal circuits of the device are turned off. The current is reduced to a standby current, typically in the range of a few  $\mu\text{A}$ . When  $\overline{ST}$  is pulled High, the device goes through the “resume” process, which can take up to 5 ms.

### No Connect (NC) Mode

In the NC mode, the device always operates in its normal mode and output the specified frequency regardless of the logic level on pin 1.

Table 12 below summarizes the key relevant parameters in the operation of the device in OE,  $\overline{ST}$ , or NC mode.

**Table 12. OE vs.  $\overline{ST}$  vs. NC**

	OE	$\overline{ST}$	NC
Active current 125 MHz (max, 1.8V)	5.6 mA	5.6 mA	5.6 mA
OE disable current (max, 1.8V)	4.0 mA	N/A	N/A
Standby current (typical 1.8V)	N/A	0.6 $\mu\text{A}$	N/A
OE enable time at 125 MHz (max)	124 ns	N/A	N/A
Resume time from standby (max, all frequency)	N/A	5 ms	N/A
Output driver in OE disable/standby mode	High Z	weak pull-down	N/A

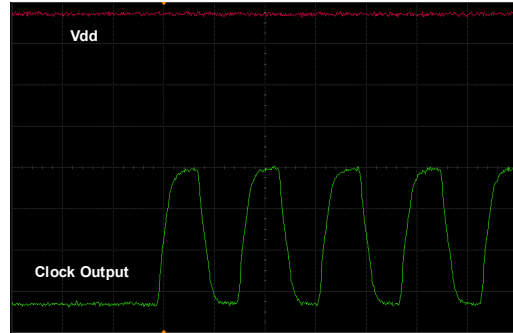
### Output on Startup and Resume

The ANY8009 comes with gated output. Its clock output is accurate to the rated frequency stability within the first pulse from initial device startup or resume from the standby mode.

In addition, the ANY8009 has NO RUNT, NO GLITCH output during startup or resume as shown in the waveform captures in Figure 17 and Figure 18.



**Figure 17. Startup Waveform vs. Vdd**



**Figure 18. Startup Waveform vs. Vdd (Zoomed-in View of Figure 17)**

### Instant Samples with Time Machine and Field Programmable Oscillators

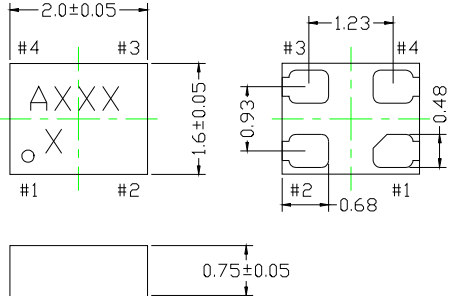
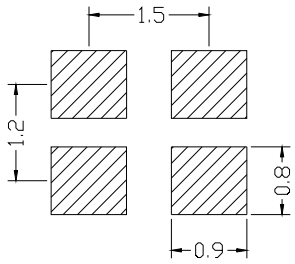
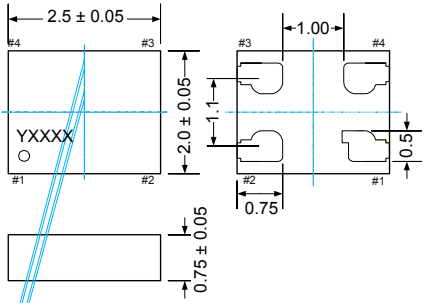
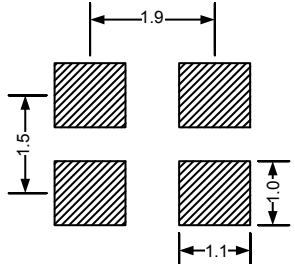
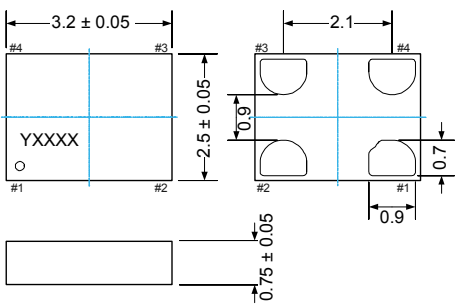
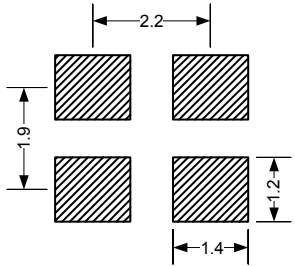
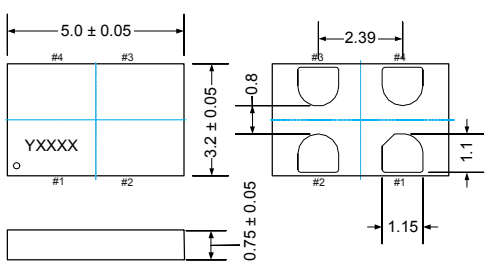
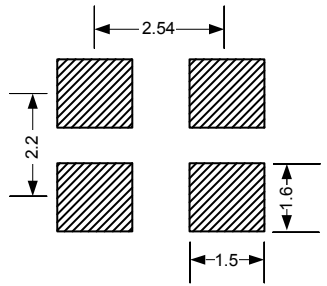
Anyclk supports a field programmable version of the [ANY8009 high frequency, high temperature oscillator](#) for fast prototyping and real time customization of features. The [field programmable devices](#) (FP devices) are available for all five standard ANY8009 package sizes and can be configured to one’s exact specification using the [Time Machine II](#), an USB powered MEMS oscillator programmer.

Customizable Features of the ANY8009 FP Devices Include

- Frequencies between 115 MHz – 137 MHz
- Three frequency stability options,  $\pm 20$  ppm,  $\pm 25$  ppm,  $\pm 50$  ppm
- Two operating temperatures,  $-20$  to  $70^\circ\text{C}$  or  $-40$  to  $85^\circ\text{C}$
- Six supply voltage options, 1.8V, 2.5V, 2.8V, 3.0V, 3.3V and 2.25 to 3.63V continuous
- Output drive strength
- OE,  $\overline{ST}$ , or NC mode

ANY8009 is factory-programmed per customer ordering codes for volume delivery.

### Dimensions and Patterns

Package Size – Dimensions (Unit: mm) <sup>[11]</sup>	Recommended Land Pattern (Unit: mm) <sup>[12]</sup>
<p><b>2.0 x 1.6 x 0.75 mm</b></p> 	
<p><b>2.5 x 2.0 x 0.75 mm</b></p> 	
<p><b>3.2 x 2.5 x 0.75 mm</b></p> 	
<p><b>5.0 x 3.2 x 0.75 mm</b></p> 	

### Dimensions and Patterns

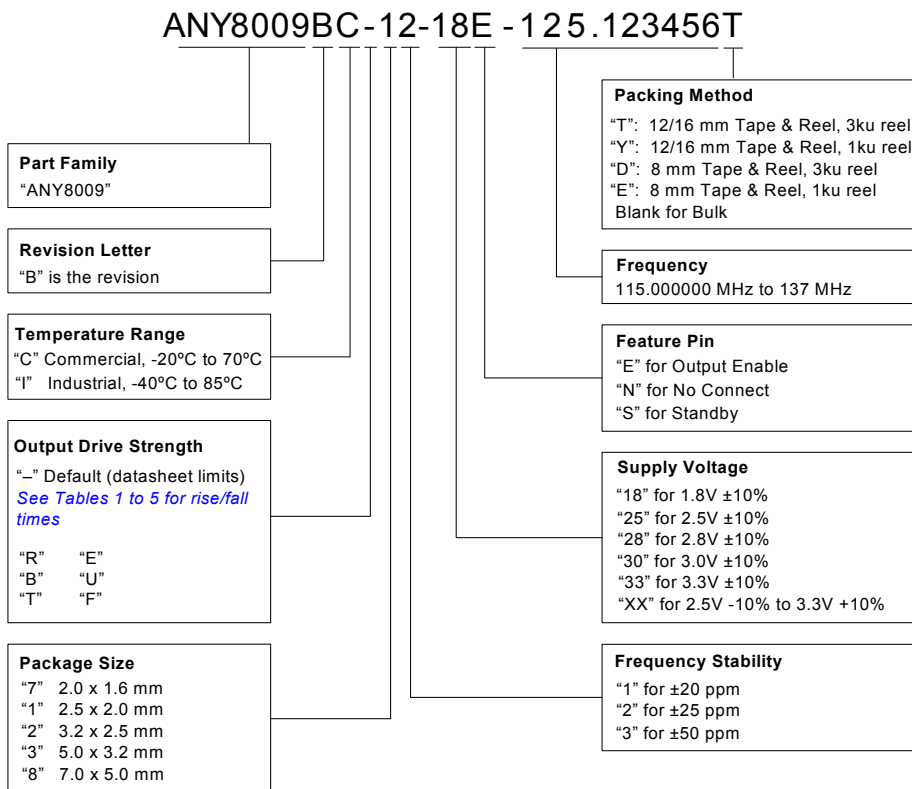
Package Size – Dimensions (Unit: mm) <sup>[11]</sup>	Recommended Land Pattern (Unit: mm) <sup>[12]</sup>
<p><b>7.0 x 5.0 x 0.90 mm</b></p>	

#### Notes:

11. Top marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of “Y” will depend on the assembly location of the device.
12. A capacitor of value 0.1  $\mu$ F or higher between Vdd and GND is required.

### Ordering Information

The Part No. Guide is for reference only. To customize and build an exact part number, use the Anyclk [Part Number Generator](#).



**Table 13. Ordering Codes for Supported Tape & Reel Packing Method**

Device Size (mm x mm)	16 mm T&R (3ku)	16 mm T&R (1ku)	12 mm T&R (3ku)	12 mm T&R (1ku)	8 mm T&R (3ku)	8 mm T&R (1ku)
2.0 x 1.6	-	-	-	-	D	E
2.5 x 2.0	-	-	-	-	D	E
3.2 x 2.5	-	-	-	-	D	E
5.0 x 3.2	-	-	T	Y	-	-
7.0 x 5.0	T	Y	-	-	-	-

**Table 14. Additional Information**

Document	Description	Download Link
<b>Time Machine II</b>	MEMS oscillator programmer	<a href="mailto:info@anyclk.com">Mail to info@anyclk.com</a>
<b>Field Programmable Oscillators</b>	Devices that can be programmable in the field by Time Machine II	<a href="mailto:info@anyclk.com">Mail to info@anyclk.com</a>
<b>Manufacturing Notes</b>	Tape & Reel dimension, reflow profile and other manufacturing related info	<a href="mailto:info@anyclk.com">Mail to info@anyclk.com</a>
<b>Qualification Reports</b>	RoHS report, reliability reports, composition reports	<a href="mailto:info@anyclk.com">Mail to info@anyclk.com</a>
<b>Performance Reports</b>	Additional performance data such as phase noise, current consumption and jitter for selected frequencies	<a href="mailto:info@anyclk.com">Mail to info@anyclk.com</a>
<b>Termination Techniques</b>	Termination design recommendations	<a href="mailto:info@anyclk.com">Mail to info@anyclk.com</a>
<b>Layout Techniques</b>	Layout recommendations	<a href="mailto:info@anyclk.com">Mail to info@anyclk.com</a>

## Revision History

**Table 15. Datasheet Version and Change Log**

Version	Release Date	Change Summary
1.0	6/10/14	<ul style="list-style-type: none"> <li>Final production release</li> </ul>
1.01	5/07/15	<ul style="list-style-type: none"> <li>Revised the Electrical Characteristics, Timing Diagrams and Performance Plots</li> <li>Revised 2016 package diagram</li> </ul>
1.02	6/18/15	<ul style="list-style-type: none"> <li>Added 16 mm T&amp;R information to Table 13</li> <li>Revised 12 mm T&amp;R information to Table 13</li> </ul>

## Supplemental Information

The Supplemental Information section is not part of the datasheet and is for informational purposes only.

## Silicon MEMS Outperforms Quartz



## Best Reliability

Silicon is inherently more reliable than quartz. Unlike quartz suppliers, Anyclk has in-house MEMS and analog CMOS expertise, which allows Anyclk to develop the most reliable products. Figure 1 shows a comparison with quartz technology.

### Why is Anyclk Best in Class:

- Anyclk's MEMS resonators are vacuum sealed using an advanced EpiSeal™ process, which eliminates foreign particles and improves long term aging and reliability
- World-class MEMS and CMOS design expertise

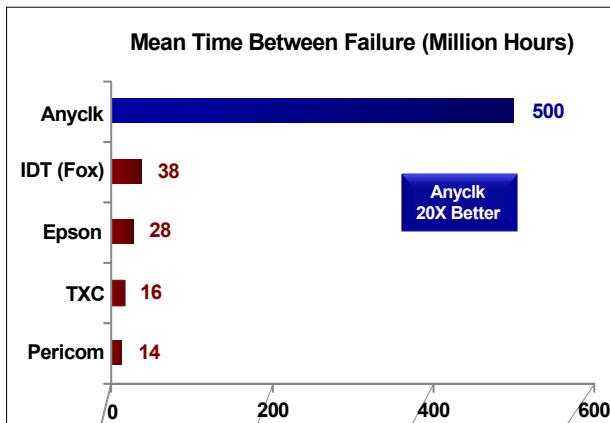


Figure 1. Reliability Comparison<sup>[1]</sup>

## Best Aging

Unlike quartz, MEMS oscillators have excellent long term aging performance which is why every new Anyclk product specifies 10-year aging. A comparison is shown in Figure 2.

### Why is Anyclk Best in Class:

- Anyclk's MEMS resonators are vacuum sealed using an advanced EpiSeal process, which eliminates foreign particles and improves long term aging and reliability
- Inherently better immunity of electrostatically driven MEMS resonator

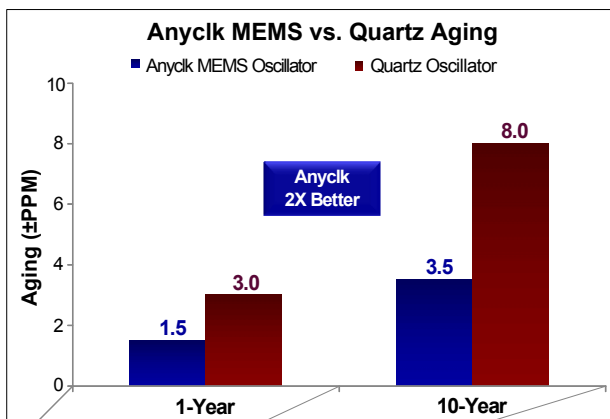


Figure 2. Aging Comparison<sup>[2]</sup>

## Best Electro Magnetic Susceptibility (EMS)

Anyclk's oscillators in plastic packages are up to 54 times more immune to external electromagnetic fields than quartz oscillators as shown in Figure 3.

### Why is Anyclk Best in Class:

- Internal differential architecture for best common mode noise rejection
- Electrostatically driven MEMS resonator is more immune to EMS

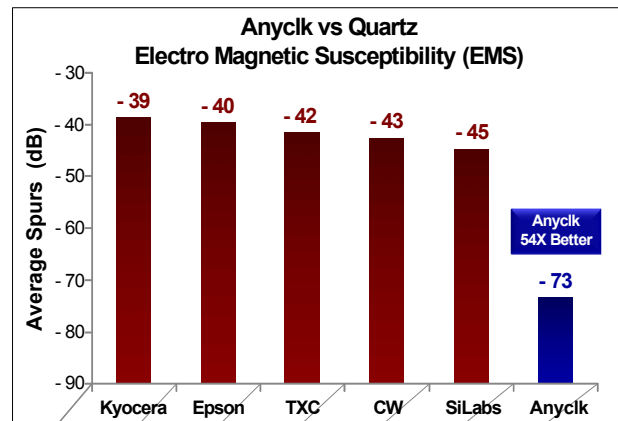


Figure 3. Electro Magnetic Susceptibility (EMS)<sup>[3]</sup>

## Best Power Supply Noise Rejection

Anyclk's MEMS oscillators are more resilient against noise on the power supply. A comparison is shown in Figure 4.

### Why is Anyclk Best in Class:

- On-chip regulators and internal differential architecture for common mode noise rejection
- Best analog CMOS design expertise

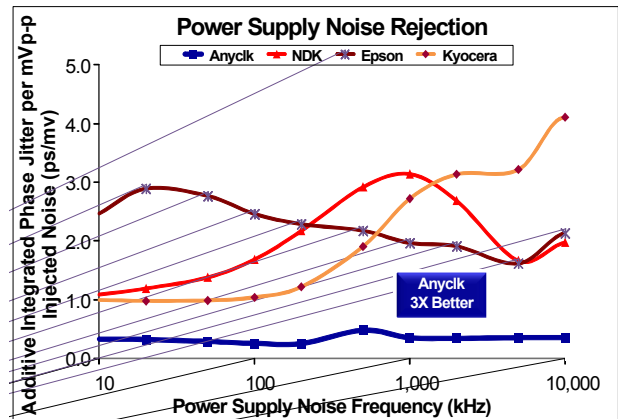


Figure 4. Power Supply Noise Rejection<sup>[4]</sup>

## Best Vibration Robustness

High-vibration environments are all around us. All electronics, from handheld devices to enterprise servers and storage systems are subject to vibration. Figure 5 shows a comparison of vibration robustness.

### Why is Anyclk Best in Class:

- The moving mass of Anyclk’s MEMS resonators is up to 3000 times smaller than quartz
- Center-anchored MEMS resonator is the most robust design

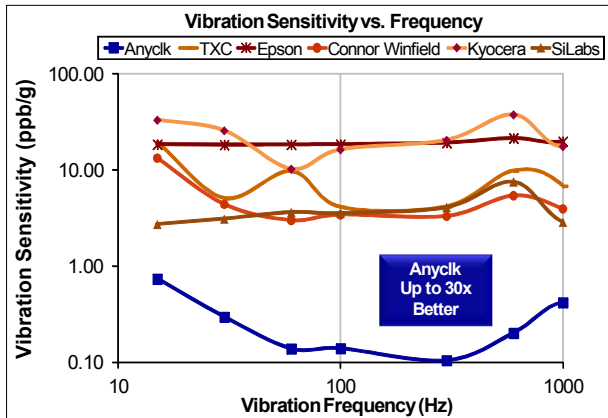


Figure 5. Vibration Robustness<sup>[5]</sup>

## Best Shock Robustness

Anyclk’s oscillators can withstand at least 50,000 g shock. They all maintain their electrical performance in operation during shock events. A comparison with quartz devices is shown in Figure 6.

### Why is Anyclk Best in Class:

- The moving mass of Anyclk’s MEMS resonators is up to 3000 times smaller than quartz
- Center-anchored MEMS resonator is the most robust design

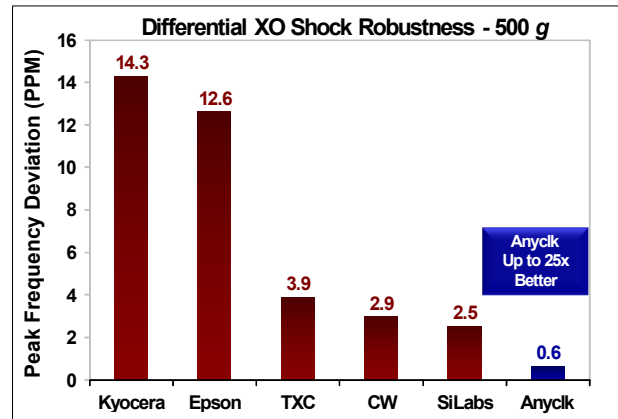


Figure 6. Shock Robustness<sup>[6]</sup>

### Notes:

1. Data Source: Reliability documents of named companies.
2. Data source: Anyclk and quartz oscillator devices datasheets.
3. Test conditions for Electro Magnetic Susceptibility (EMS):
  - According to IEC EN61000-4.3 (Electromagnetic compatibility standard)
  - Field strength: 3V/m
  - Radiated signal modulation: AM 1 kHz at 80% depth
  - Carrier frequency scan: 80 MHz – 1 GHz in 1% steps
  - Antenna polarization: Vertical
  - DUT position: Center aligned to antenna

**Devices used in this test:**

Anyclk, ANY9120AC-1D2-33E156.250000 - MEMS based - 156.25 MHz  
 Epson, EG-2102CA 156.2500M-PHPAL3 - SAW based - 156.25 MHz  
 TXC, BB-156.250MBE-T - 3rd Overtone quartz based - 156.25 MHz  
 Kyocera, KC7050T156.250P30E00 - SAW based - 156.25 MHz  
 Connor Winfield (CW), P123-156.25M - 3rd overtone quartz based - 156.25 MHz  
 SiLabs, Si590AB-BDG - 3rd overtone quartz based - 156.25 MHz
4. 50 mV pk-pk Sinusoidal voltage.
 

**Devices used in this test:**

Anyclk, ANY8208AI-33-33E-25.000000, MEMS based - 25 MHz  
 NDK, NZ2523SB-25.6M - quartz based - 25.6 MHz  
 Kyocera, KC2016B25MOC1GE00 - quartz based - 25 MHz  
 Epson, SG-310SCF-25M0-MB3 - quartz based - 25 MHz
5. **Devices used in this test:** same as EMS test stated in Note 3.
6. Test conditions for shock test:
  - MIL-STD-883F Method 2002
  - Condition A: half sine wave shock pulse, 500-g, 1ms
  - Continuous frequency measurement in 100 μs gate time for 10 seconds

**Devices used in this test:** same as EMS test stated in Note 3
7. Additional data, including setup and detailed results, is available upon request to qualified customers. Please contact [info@anyclk.com](mailto:info@anyclk.com)

# Document Feedback Form

Anyclk values your input in improving our documentation. Click [here](#) for our online feedback form or fill out and email the form below to [info@anyclk.com](mailto:info@anyclk.com).

1. Does the Electrical Characteristics table provide complete information?                      Yes                      No

If No, what parameters are missing?

---

2. Is the organization of this document easy to follow?                      Yes                      No

If "No," please suggest improvements that we can make:

---

3. Is there any application specific information that you would like to see in this document? (Check all that apply)

EMI                      Termination recommendations                      Shock and vibration performance                      Other

If "Other," please specify:

---

4. Are there any errors in this document?                      Yes                      No

If "Yes", please specify (what and where):

---

5. Do you have additional recommendations for this document?

---

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City / State or Province / Postal Code / Country \_\_\_\_\_

Telephone \_\_\_\_\_

Application \_\_\_\_\_

Would you like a reply?                      Yes                      No

Thank you for your feedback. Please click the email icon in your Adobe Reader tool bar and send to [info@anyclk.com](mailto:info@anyclk.com). Or you may use our [online feedback form](#).