

MO8225

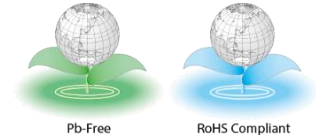
0.3 ps Jitter Oscillator for Networking

Features

- 25 MHz, 25.001200 MHz and 25.000625 MHz for Ethernet applications
- 100% pin-to-pin drop-in replacement to quartz-based oscillators
- Ultra-low phase jitter: 0.3 ps
- Frequency stability as low as ± 10 PPM
- Industrial or extended commercial temperature range
- LVCMOS/LVTTL compatible output
- Standby or output enable modes
- Standard 4-pin packages: 2.7 x 2.4 (compatible with 2.5 x 2.0 footprint), 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0 mm x mm
- Outstanding silicon reliability of 2 FIT or 500 million hour MTBF
- Pb-free, RoHS and REACH compliant
- Ultra-short lead time

Applications

- SATA, SAS, Ethernet, 10Gb Ethernet, XAUI
- Computing, storage, networking, telecom, industrial control



Electrical Characteristics^[1]

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Output Frequency Range	f	25.000000, 25.001200, 25.000625			MHz	
Frequency Stability	F _{stab}	-10	—	+10	PPM	Inclusive of Initial tolerance at +25 °C, and variations over operating temperature, rated power supply voltage and load
		-20	—	+20	PPM	
		-25	—	+25	PPM	
		-50	—	+50	PPM	
Operating Temperature Range	T _{use}	-20	—	+70	°C	Extended Commercial
		-40	—	+85	°C	Industrial
Supply Voltage	V _{dd}	+1.71	+1.8	+1.89	V	Supply voltages between +2.5V and +3.3V can be supported. Contact KDS for additional information.
		+2.25	+2.5	+2.75	V	
		+2.52	+2.8	+3.08	V	
		+2.97	+3.3	+3.63	V	
Current Consumption	I _{dd}	—	+31	+33	mA	No load condition, f = 20 MHz, V _{dd} = +2.5V, +2.8V or +3.3V
		—	+29	+31	mA	No load condition, f = 20 MHz, V _{dd} = +1.8V
OE Disable Current	I _{OD}	—	—	+31	mA	V _{dd} = +2.5V, +2.8V or +3.3V, OE = GND, output is Weakly Pulled Down
		—	—	+30	mA	V _{dd} = +1.8 V. OE = GND, output is Weakly Pulled Down
Standby Current	I _{std}	—	—	+70	μA	V _{dd} = +2.5V, +2.8V or +3.3V, \overline{ST} = GND, output is Weakly Pulled Down
		—	—	+10	μA	V _{dd} = +1.8 V. \overline{ST} = GND, output is Weakly Pulled Down
Duty Cycle	DC	45	—	55	%	
Rise/Fall Time	T _r , T _f	—	1.2	2.0	ns	15 pF load, 10% - 90% V _{dd}
Output Voltage High	VOH	90%	—	—	V _{dd}	IOH = -6.0 mA, IOL = +6.0 mA, (V _{dd} = +3.3V, +2.8V, +2.5V)
Output Voltage Low	VOL	—	—	10%	V _{dd}	IOH = -3.0 mA, IOL = +3.0 mA, (V _{dd} = +1.8V)
Input Voltage High	VIH	70%	—	—	V _{dd}	Pin 1, OE or \overline{ST}
Input Voltage Low	VIL	—	—	30%	V _{dd}	Pin 1, OE or \overline{ST}
Input Pull-up Impedance	Z _{in}	—	100	250	kΩ	Pin 1, OE logic high or logic low, or \overline{ST} logic high
		2.0	—	—	MΩ	Pin 1, \overline{ST} logic low
Startup Time	T _{start}	—	7.0	10	ms	Measured from the time V _{dd} reaches its rated minimum value
OE Enable/Disable Time	T _{oe}	—	—	150	ns	
Resume Time	T _{resume}	—	6.0	10	ms	In standby mode, measured from the time \overline{ST} pin crosses 50% threshold. Refer to Figure 5.
RMS Period Jitter	T _{jitt}	—	1.5	2.0	ps	V _{dd} = +2.5V, +2.8V or +3.3V
		—	2.0	3.0	ps	V _{dd} = +1.8V
RMS Phase Jitter (random)	T _{phj}	—	0.25	0.3	ps	IEEE802.3-2005 10GbE jitter measurement specifications
First year Aging	F _{aging}	-1.5	—	+1.5	PPM	+25 °C
10-year Aging		-5.0	—	+5.0	PPM	+25 °C

Note:

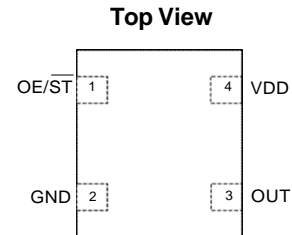
1. All electrical specifications in the above table are specified with 15 pF output load and for all V_{dd}(s) unless otherwise stated.
2. Contact KDS for custom drive strength to drive higher or multiple load, or SoftEdge™ option for EMI reduction.

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Pin Configuration

Pin	Symbol	Functionality	
1	OE/ ST	Output Enable	H or Open ^[3] : specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H or Open ^[3] : specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to I _{std} .
2	GND	Power	Electrical ground
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage



Notes:

3. A pull-up resistor of <10 kΩ between OE/ ST pin and Vdd is recommended in high noise environment.

Absolute Maximum

Attempted operation outside the absolute maximum ratings of the part 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	+4.0	V
Electrostatic Discharge	–	+2000	V
Soldering Temperature (follow standard Pb free soldering guidelines)	–	+260	°C

Thermal Consideration

Package	θJA, 4 Layer Board (°C/W)	θJA, 2 Layer Board (°C/W)	θJC, Bottom (°C/W)
7050	191	263	30
5032	97	199	24
3225	109	212	27
2520	117	222	26

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

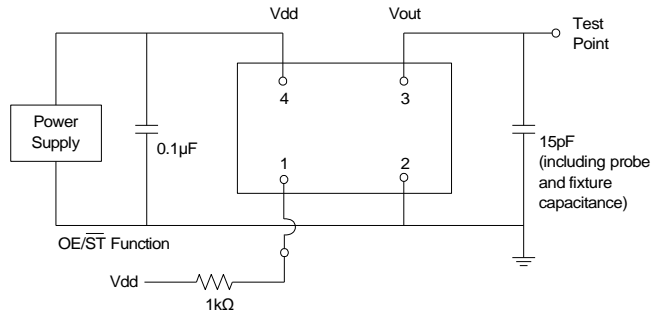


Figure 1. Test Circuit

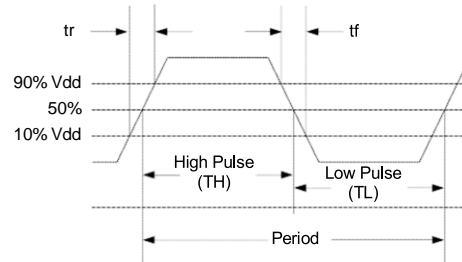


Figure 2. Waveform

Notes:

4. Duty Cycle is computed as $\text{Duty Cycle} = \text{TH} / \text{Period}$.
5. MO8225 supports the configurable duty cycle feature. For custom duty cycle at any given frequency, contact KDS.

Timing Diagram

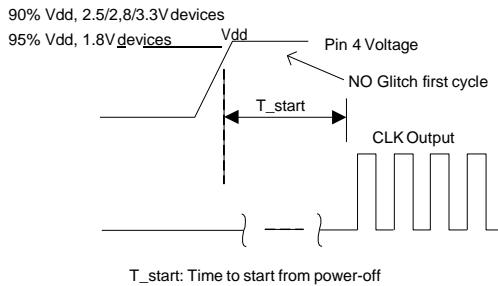


Figure 3. Startup Timing (OE/ST Mode)

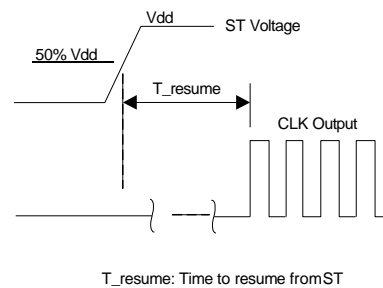


Figure 4. Standby Resume Timing (ST Mode Only)

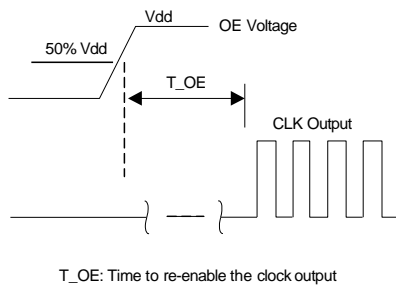


Figure 5. OE Enable Timing (OE Mode Only)

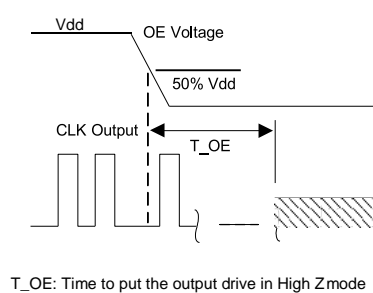
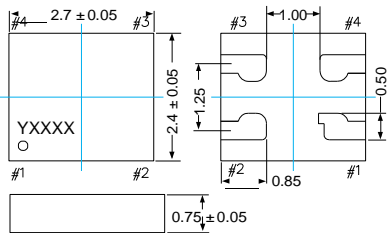
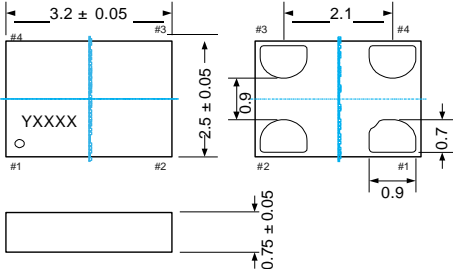
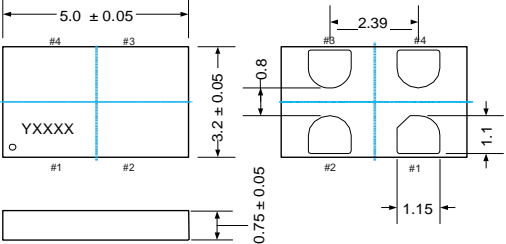
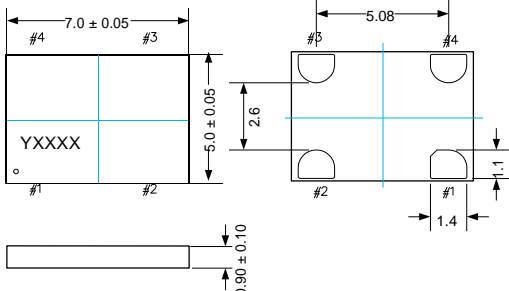


Figure 6. OE Disable Timing (OE Mode Only)

Notes:

6. MO8225 supports “no runt” pulses and “no glitch” output during startup or resume.
7. MO8225 supports gated output which is accurate within rated frequency stability from the first cycle.

Dimensions and Patterns

Package Size – Dimensions (Unit: mm) ^[9]	Recommended Land Pattern (Unit: mm) ^[10]
<p>2.7 x 2.4 x 0.75 mm (100% compatible with 2.5 x 2.0 mm footprint)</p> 	
<p>3.2 x 2.5 x 0.75 mm</p> 	
<p>5.0 x 3.2 x 0.75 mm</p> 	
<p>7.0 x 5.0 x 0.90 mm</p> 	

Notes:

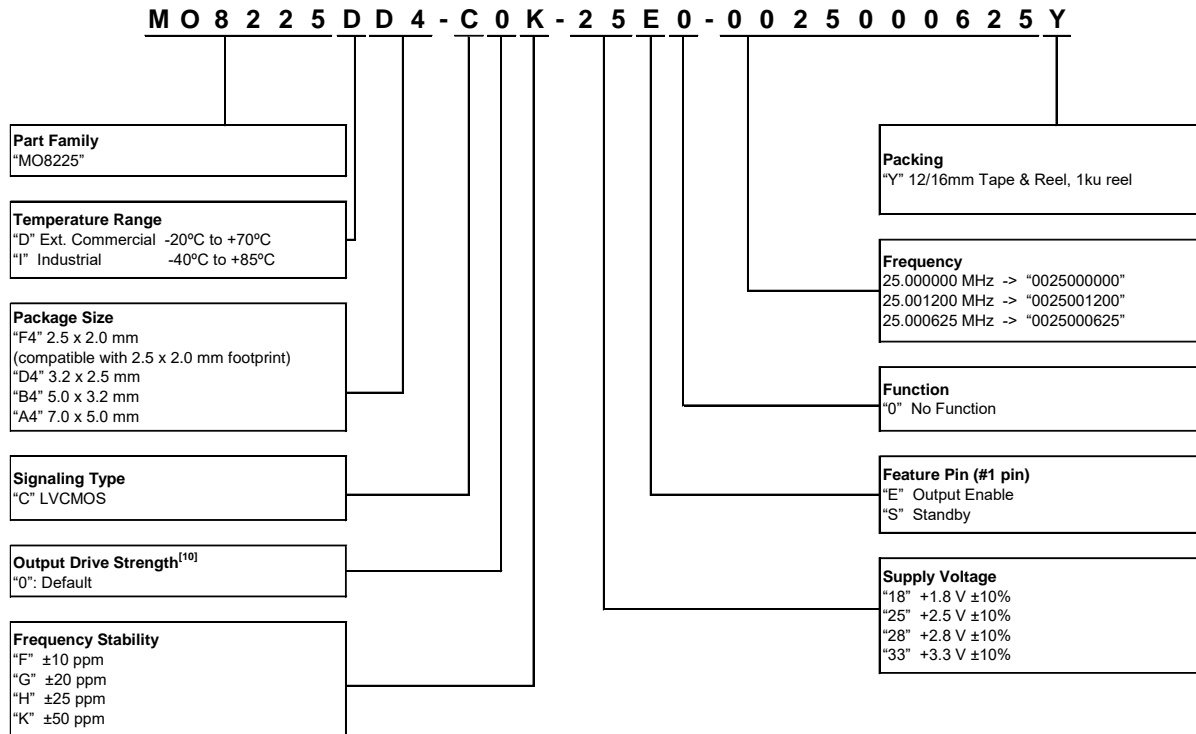
- Top marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of "Y" will depend on the assembly location of the device.
- A capacitor of value 0.1 μ F between Vdd and GND is recommended.

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Ordering Information



Notes:

10. Contact KDS for custom drive strength to drive higher or multiple load, or SoftEdge™ option for EMI reduction.