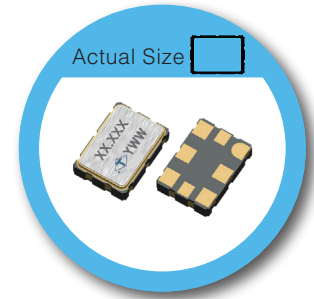


# OD-M Type High Frequency and Ultra Low Noise 7.0 x 5.0mm SMD Crystal Oscillator

## FEATURE

- Low Power Supply Voltage: 3.3, 2.5 and 1.8V Supply Options
- Clock Output: LVPECL, LVDS, CML, HCSL and LVCMOS
- Output Frequency Support from 15MHz to 2.1GHz
- Ultra Low Noise, Phase Jitter < 300 fs  
(Typical: 150 fs at 12kHz to 20MHz Frequency Offsets)
- Tri-state Enable / Disable Mode.
- Temperature Range: -40 to 85°C
- Pb-free/RoHS Compliant

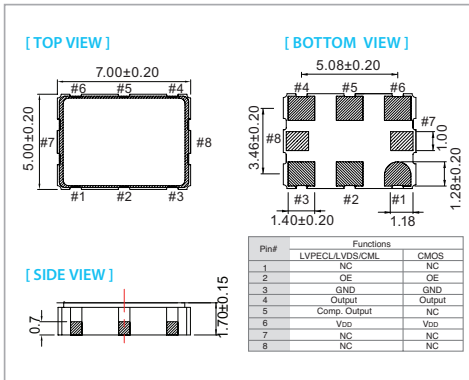


RoHS Compliant

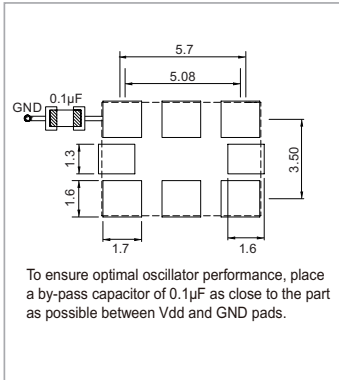
## TYPICAL APPLICATION

- SONET/SDH, Gigabit Ethernet
- Storage Area Networking (SAN)
- SD/HD Video
- FPGA Clock Generation

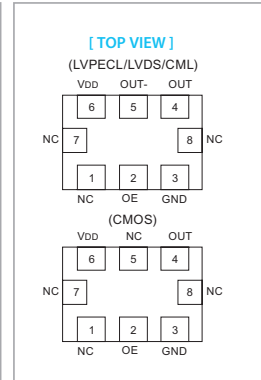
## DIMENSION (mm)



## SOLDER PAD LAYOUT (mm)



## PIN ASSIGNMENTS



## ELECTRICAL SPECIFICATION

Parameter	LVPECL				unit		
	3.3V		2.5V				
	Min.	Max.	Min.	Max.			
<b>Supply Voltage Variation (V<sub>DD</sub>) ±10%</b>	V <sub>DD</sub> -10%	V <sub>DD</sub> +10%	V <sub>DD</sub> -10%	V <sub>DD</sub> +10%	V		
<b>Frequency Range</b>	15	2100	15	2100	MHz		
<b>Standard Frequency</b>	100, 106.25, 125, 156.25, 187.5, 200, 212.5, 266, 300, 312.5, 400						
<b>Supply Current</b>	—	110	—	95	mA		
<b>Output Level</b>	Output High	V <sub>DD</sub> -1.165	V <sub>DD</sub> -0.8	V <sub>DD</sub> -1.165	V <sub>DD</sub> -0.8	V	
	Output Low	V <sub>DD</sub> -2.0	V <sub>DD</sub> -1.55	V <sub>DD</sub> -2.0	V <sub>DD</sub> -1.55		
<b>Transition Time (20%-80%)</b>	Rise Time / Fall Time		—	0.35	—	0.35	nSec
<b>Duty Cycle</b>	45	55	45	55	%		
<b>Startup Time</b>	—	8	—	8	mSec		
<b>Tri-State Mode (Input to Pin 2)</b>	Enable	0.7 x V <sub>DD</sub>	—	0.7 x V <sub>DD</sub>	—	V	
	Disable	—	0.3 x V <sub>DD</sub>	—	0.3 x V <sub>DD</sub>		
<b>Standby Current</b>	—	110	—	95	mA		
<b>Phase Noise</b>	<b>Typ.</b>	<b>Max.</b>	<b>Typ.</b>	<b>Max.</b>			
<b>At V<sub>DD</sub>=3.3V, F<sub>out</sub>=873.515MHz</b>	1kHz offset	-106	—	-106	—	dBc/Hz	
	10kHz offset	-115	—	-115	—		
	100kHz offset	-123	—	-123	—		
	1MHz offset	-133	—	-133	—		
	20MHz offset	-150	—	-150	—		
<b>RMS Phase Jitter (12kHz to 20MHz)</b>	150	300	150	300	fs		
<b>Period Jitter</b>	—	50	—	50	ps		

Note: not all combination of options are available. Other specifications may be available upon request.

Parameter	LVDS						unit
	3.3V		2.5V		1.8V		
	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (V <sub>DD</sub> ) ±5%	-	-	-	-	1.71	1.89	V
Supply Voltage Variation (V <sub>DD</sub> ) ±10%	3.63	2.97	2.25	2.75	-	-	
Frequency Range	15	2100	15	2100	15	2100	MHz
Standard Frequency	100, 106.25, 125, 156.25, 187.5, 200, 212.5, 266, 300, 312.5, 400						
Supply Current	-	90	-	80	-	70	mA
Output Level	Output High	-	1.6	-	1.6	-	1.6
	Output Low	0.9	-	0.9	-	0.9	-
Transition Time (20%-80%)	Rise Time / Fall Time	-	0.35	-	0.35	-	0.35
							nSec
Duty Cycle	45	55	45	55	45	55	%
Startup Time	-	8	-	8	-	8	mSec
Tri-State Mode (Input to Pin 2)	Enable	0.7 x V <sub>DD</sub>	-	0.7 x V <sub>DD</sub>	-	0.7 x V <sub>DD</sub>	-
	Disable	-	0.3 x V <sub>DD</sub>	-	0.3 x V <sub>DD</sub>	-	0.3 x V <sub>DD</sub>
Standby Current	-	90	-	80	-	70	mA
Phase Noise		Typ.	Max.	Typ.	Max.	Typ.	Max.
At V <sub>DD</sub> =3.3V, F <sub>out</sub> =873.515MHz	1kHz offset	-106	-	-106	-	-106	-
	10kHz offset	-115	-	-115	-	-115	-
	100kHz offset	-123	-	-123	-	-123	-
	1MHz offset	-133	-	-133	-	-133	-
	10MHz offset	-150	-	-150	-	-150	-
RMS Phase Jitter (12kHz to 20MHz)	150	300	150	300	150	300	fs
Period Jitter	-	50	-	50	-	50	ps

Parameter	CML						unit
	3.3V		2.5V		1.8V		
	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (V <sub>DD</sub> ) ±5%	-	-	-	-	1.71	1.89	V
Supply Voltage Variation (V <sub>DD</sub> ) ±10%	3.63	2.97	2.25	2.75	-	-	
Frequency Range	15	2100	15	2100	15	2100	MHz
Standard Frequency	100, 106.25, 125, 156.25, 187.5, 200, 212.5, 266, 300, 312.5, 400						
Supply Current	-	90	-	80	-	70	mA
Output Level	Output High	V <sub>DD</sub> -0.085	V <sub>DD</sub>	V <sub>DD</sub> -0.085	V <sub>DD</sub>	V <sub>DD</sub> -0.085	V <sub>DD</sub>
	Output Low	V <sub>DD</sub> -0.6	V <sub>DD</sub> -0.32	V <sub>DD</sub> -0.6	V <sub>DD</sub> -0.32	V <sub>DD</sub> -0.6	V <sub>DD</sub> -0.32
Transition Time (20%-80%)	Rise Time / Fall Time	-	0.35	-	0.35	-	0.35
							nSec
Duty Cycle	45	55	45	55	45	55	%
Startup Time	-	8	-	8	-	8	mSec
Tri-State Mode (Input to Pin 2)	Enable	0.7 x V <sub>DD</sub>	-	0.7 x V <sub>DD</sub>	-	0.7 x V <sub>DD</sub>	-
	Disable	-	0.3 x V <sub>DD</sub>	-	0.3 x V <sub>DD</sub>	-	0.3 x V <sub>DD</sub>
Standby Current	-	90	-	80	-	70	mA
Phase Noise		Typ.	Max.	Typ.	Max.	Typ.	Max.
At V <sub>DD</sub> =3.3V, F <sub>out</sub> =873.515MHz	1kHz offset	-107	-	-107	-	-107	-
	10kHz offset	-117	-	-117	-	-117	-
	100kHz offset	-125	-	-125	-	-125	-
	1MHz offset	-135	-	-135	-	-135	-
	10MHz offset	-150	-	-150	-	-150	-
RMS Phase Jitter (12kHz to 20MHz)	150	300	150	300	150	300	fs
Period Jitter	-	50	-	50	-	50	ps

Parameter	HCSSL						Unit
	3.3V		2.5V		1.8V		
	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (V <sub>DD</sub> )±10%	3.63	2.97	2.25	2.75	1.71	1.89	V
Frequency Range	15	700	15	700	15	700	MHz
Supply Current	-	115	-	100	-	94	mA
Output Level	Output High	0.66	1.15	0.66	1.15	0.66	1.15
	Output Low	0	0.15	0	0.15	0	0.15
Transition Time (20% - 80%)	Rise Time	-	0.4	-	0.4	-	0.4
	Fall Time	-	0.4	-	0.4	-	0.4
Duty Cycle	45	55	45	55	45	55	%
Startup Time	-	8	-	8	-	8	mSec
Tri-State mode (Input to Pin 2)	Enable	0.7 x V <sub>DD</sub>	-	0.7x V <sub>DD</sub>	-	0.7xV <sub>DD</sub>	-
	Disable	-	0.3 x V <sub>DD</sub>	-	0.3 x V <sub>DD</sub>	-	0.3 x V <sub>DD</sub>
Stand by Current	-	115	-	100	-	94	mA
Output Load	50 ohms to GND						
Phase Noise		Typ.	Max.	Typ.	Max.	Typ.	Max.
At V <sub>DD</sub> =3.3V, f <sub>out</sub> =873.515MHz	1kHz offset	-87	-	-87	-	-87	-
	10kHz offset	-110	-	-110	-	-110	-
	100kHz offset	-127	-	-127	-	-127	-
	1MHz offset	-138	-	-138	-	-138	-
	10MHz offset	-153	-	-153	-	-153	-
RMS Phase Jitter (12KHz to 20MHz)	150	300	150	300	150	300	fs
Period Jitter	-	50	-	50	-	50	ps

Note: not all combination of options are available. Other specifications may be available upon request.

Parameter	CMOS						unit
	3.3V		2.5V		1.8V		
	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (V <sub>DD</sub> ) ±5%	–	–	–	–	1.71	1.89	V
Supply Voltage Variation (V <sub>DD</sub> ) ±10%	3.63	2.97	2.25	2.75	–	–	
Frequency Range	15	250	15	250	15	250	MHz
Standard Frequency	100, 106.25, 125, 156.25, 187.5, 200, 212.5, 266, 300, 312.5, 400						
Supply Current	–	90	–	80	–	70	mA
Output Level	Output High	0.9 x V <sub>DD</sub>	–	0.9 x V <sub>DD</sub>	–	0.9 x V <sub>DD</sub>	–
	Output Low	–	0.1 x V <sub>DD</sub>	–	0.1 x V <sub>DD</sub>	–	0.1 x V <sub>DD</sub>
Transition Time (20%-80%)	Rise Time / Fall Time	–	1.2	–	1.5	–	2
Duty Cycle	F <sub>out</sub> <100MHZ	45	55	45	55	45	55
	F <sub>out</sub> >100MHZ	40	60	40	60	40	60
Startup Time	–	8	–	8	–	8	mSec
Tri-State Mode (Input to Pin 2)	Enable	0.7 x V <sub>DD</sub>	–	0.7 x V <sub>DD</sub>	–	0.7 x V <sub>DD</sub>	–
	Disable	–	0.3 x V <sub>DD</sub>	–	0.3 x V <sub>DD</sub>	–	0.3 x V <sub>DD</sub>
Period Jitter	–	100	–	100	–	100	mA

### FREQ. STABILITY vs. TEMP. RANGE

Temp. (°C)	ppm			
	±20	±25	±30	±50
-20~+70	△	○	○	○
-40~+85	X	△	○	○

\* ○: Available △:Conditional X: Not available

\* Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1<sup>st</sup> year), shock, and vibration