

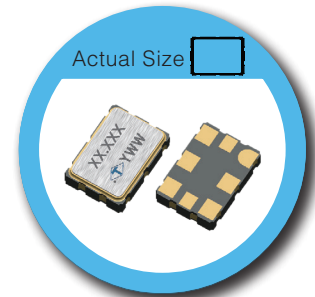
# OD-P Type High Frequency, Ultra Low Noise and Frequency Selectable 7.0 x 5.0mm Quad Frequency SMD Crystal Oscillator

## FEATURE

- Any Frequency Quad Frequency Selectable.
- 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

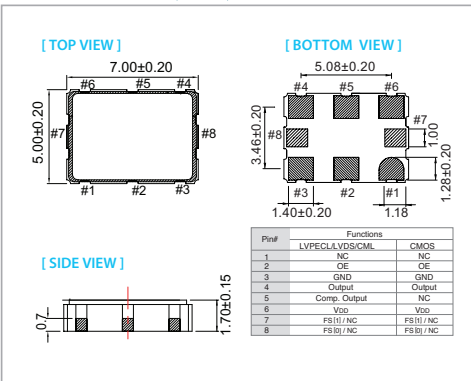
## TYPICAL APPLICATION

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

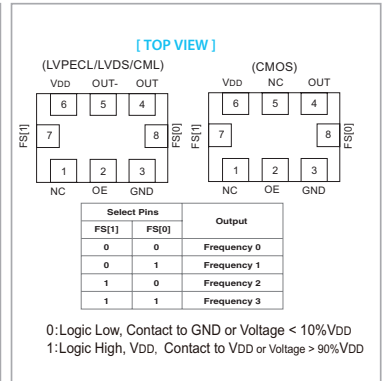
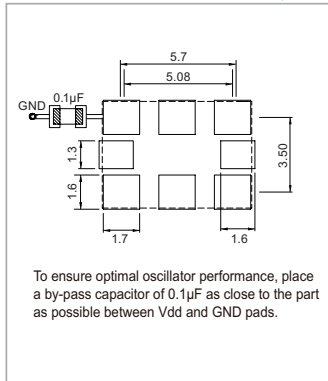


RoHS Compliant

## DIMENSION (mm)



## SOLDER PAD LAYOUT(mm) PIN ASSIGNMENTS



## ELECTRICAL SPECIFICATION

Parameter	LVPECL				unit	
	3.3V		2.5V			
	Min.	Max.	Min.	Max.		
Supply Voltage Variation (VDD) ±10%	VDD-10%	VDD+10%	VDD-10%	VDD+10%	V	
Frequency Range	15	2100	15	2100	MHz	
Standard Frequency	155.52, 156.25, 187.5, 212.5, 250, 312.5, 622.08, 805.664, 873.515MHz					
Supply Current	-	110	-	95	mA	
Output Level	Output High	VDD-1.165	VDD-0.8	VDD-1.165	VDD-0.8	V
	Output Low	VDD-2.0	VDD-1.55	VDD-2.0	VDD-1.55	
Transition Time (20%-80%)	Rise Time / Fall Time	-	0.35	-	0.35	nSec
Duty Cycle		45	55	45	55	%
Startup Time		-	8	-	8	mSec
Tri-State Mode (Input to Pin 2)	Enable	0.7-VDD	-	0.7 x VDD	-	V
	Disable	-	0.3 x VDD	-	0.3 x VDD	
Standby Current		-	110	-	95	mA
Phase Noise		Typ.	Max.	Typ.	Max.	
	At VDD=3.3V, Fout=873.515MHz	1kHz offset	-106	-	-106	-
10kHz offset	-115	-	-115	-		
100kHz offset	-123	-	-123	-		
1MHz offset	-133	-	-133	-		
20MHz offset	-150	-	-150	-		
RMS Phase Jitter (12kHz to 20MHz)		150	300	150	300	fs
Period Jitter		-	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	155.52, 156.25, 187.5, 212.5, 312.5, 622.08, 805.664, 873.515MHz								
Supply Current	-	90	-	80	-	70	mA		
Output Level	Output High	-	1.6	-	1.6	-	1.6	V	
	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>	-	V	
	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	-	dBc/Hz	
	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	155.52, 156.25, 187.5, 212.5, 312.5, 622.08, 805.664, 873.515MHz								
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>	V	
	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>	-	V	
	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	-	dBc/Hz	
	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	V
	Output Low	0	0.15	0	0.15	0	0.15	V
Transition Time (20% - 80%)	Rise Time	-	0.4	-	0.4	-	0.4	nSec
	Fall Time	-	0.4	-	0.4	-	0.4	nSec
Duty Cycle	45	55	-	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>	-	V
	Disable	-	0.3 x V <sub>DD</sub>	-	0.3 x V <sub>DD</sub>	-	0.3 x V <sub>DD</sub>	V
Stand by Current	Disable	-	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	-	dBc/Hz
	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.**

Specifications subject to change without notice.

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	106.25, 125, 133.33, 150, 155.52, 156.25, 187.5, 212.5MHz						
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>	V
	Output Low	–	0.1X V <sub>DD</sub>	–	0.1X V <sub>DD</sub>	–	0.1X 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
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>	V
	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

### 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