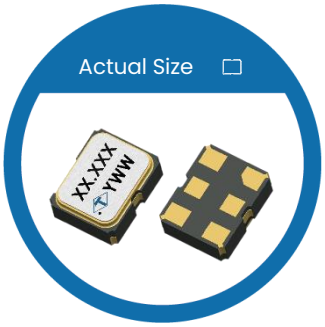
TAITIEN
The Frequency and Timing Control Specialist

OB-U Type Ultra Low Phase Noise

2.5 x 2.0 mm SMD Differential Output Crystal Oscillator



RoHS Compliant

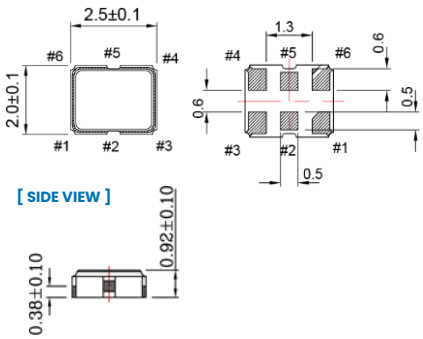
FEATURES

- Industry Standard 2.5 x 2.0 x 0.92mm Hermetically Sealed Ceramic Package
- Ultra Low Jitter Performance: Typical 50fs RMS from 12kHz - 20MHz
- Differential Output Level: LVPECL, LVDS and HCSL
- Operation Supply Voltage: 1.8V, 2.5V and 3.3V
- Pb-free/RoHS Compliant

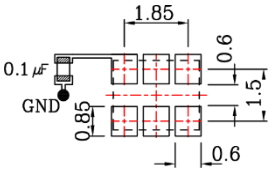
TYPICAL APPLICATION

- 100G/400G/800G Ethernet, Optical modules 100G/400G/800G QSFP
- 100G/200G SerDes, SONET, Fiber Channel, Test Instrumentation

DIMENSION (mm)



SOLDER PAD LAYOUT (mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1μF as close to the part as possible between V_{DD} and GND pads.

PIN FUNCTION

PIN#	FUNCTION
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	Comp. Output
6	V_{DD}

ELECTRICAL SPECIFICATION

Parameter		Symbol	LVPECL						Unit	Conditions / Remarks
			3.3V			2.5V				
			Min.	Typ.	Max.	Min.	Typ.	Max.		
Supply Voltage Variation		V_{DD}	V_{DD} – 10%	V_{DD}	V_{DD} + 10%	V_{DD} – 10%	V_{DD}	V_{DD} + 10%	V	
Frequency Range		F_O	100	-	220	100	-	220	MHz	(*1)
Standard Frequency			100, 125, 156.25						MHz	(*1)
Power Current Consumption		I_{DD}	-	50	66	-	50	63	mA	OE= V_{DD}
Output Voltage	High-Level	V_{OH}	V_{DD}-1.085	V_{DD}-0.95	V_{DD}-0.88	V_{DD}-1.085	V_{DD}-0.95	V_{DD}-0.88	V	
	Low-Level	V_{OL}	V_{DD}-1.81	V_{DD}-1.7	V_{DD}-1.62	V_{DD}-1.81	V_{DD}-1.7	V_{DD}-1.62	V	
Differential Output Swing		V_{SW}	0.8	-	2	0.8	-	2	V	
Output Amplitude (Single-ended output signal)		V_{OPP}	0.4	0.75	0.95	0.4	0.75	0.95	V	
Transition Time 20%-80%, V_{OPP}	Rise Time	Tr	-	0.2	0.4	-	0.2	0.4	nSec	
	Fall Time	Tf	-	0.2	0.4	-	0.2	0.4	nSec	
Duty Cycle		Duty	45	-	55	45	-	55	%	
Start-up Time		Tstart	-	-	5	-	-	5	mSec	Start from t=0 to 90% V_{DD}
OE (Tri-State)	Enable Voltage	V_{IH}	0.7 x V_{DD}	-	-	0.7 x V_{DD}	-	-	V	
	Disable Voltage	V_{IL}	-	-	0.3 x V_{DD}	-	-	0.3 x V_{DD}	V	
Stand by Current		I_{DDD}	-	20	30	-	20	30	μA	OE=GND
Output Loading			50						Ω	Terminated to V_{DD}-2V
Phase Noise	Offset 10kHz		-	-151	-	-	-151	-	dBc/Hz	
	Offset 100kHz		-	-158	-	-	-158	-	dBc/Hz	F_O=156.25MHz
	Offset 1MHz		-	-159	-	-	-159	-	dBc/Hz	
RMS Phase Jitter		Phj	-	55	100	-	55	100	fSec	Integrated 12kHz – 20MHz Offset Frequency F_O=156.25MHz
Aging		Ag	-	-	±3	-	-	±3	ppm	T=25°C, First Year
Junction Temperature		Tj	-40	-	125	-40	-	125	°C	
Storage Temp. Range		Tstg	-55	-	150	-55	-	150	°C	

*1: Standard frequencies are frequencies in which the crystal has been designed and does not imply a stock position.

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change with notice.

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Parameter		Symbol	LVDS									Unit	Conditions / Remarks
			3.3V			2.5V			1.8V				
			Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
Supply Voltage Variation		V_{DD}	V_{DD} – 10%	V_{DD}	V_{DD} + 10%	V_{DD} – 10%	V_{DD}	V_{DD} + 10%	V_{DD} – 5%	V_{DD}	V_{DD} + 5%	V	
Frequency Range		F_O	100	-	175	100	-	175	100	-	175	MHz	(*1)
Standard Frequency			100, 125, 156.25									MHz	(*1)
Power Current Consumption		I_{DD}	-	15	35	-	15	35	-	15	30	mA	OE= V_{DD}
Output Voltage (Single-ended)	High-Level	V_{OH}	-	1.43	1.6	-	1.43	1.6	-	1.43	1.6	V	
	Low-Level	V_{OL}	0.9	1.1	-	0.9	1.1	-	0.9	1.1	-	V	
Differential Output Voltage (Out_H-Out_L)		V_{OD}	247	330	454	247	330	454	247	330	454	mV	V_{DD}=OUT(High)-OUTN(Low)
Differential Output Voltage Error		ΔV_{OD}	-	-	50	-	-	50	-	-	50	mV	$\Delta V_{OD}=\|V_{OD1}-V_{OD2}\|$
Differential Output Amplitude		V_{SW}	0.494	-	0.9	0.494	-	0.9	0.494	-	0.9	V	
Offset Voltage		V_{OS}	1.125	1.25	1.375	1.125	1.25	1.375	1.125	1.25	1.375	V	Offset Voltage, V_{OS1}, V_{OS2}
Offset Voltage Error		ΔV_{OS}	-	-	50	-	-	50	-	-	50	mV	$\Delta V_{OS}=\|V_{OS1}-V_{OS2}\|$
Transition Time 20%~80%, V_{OD}	Rise Time	Tr	-	0.2	0.3	-	0.2	0.3	-	0.2	0.4	nSec	
	Fall Time	Tf	-	0.2	0.3	-	0.2	0.3	-	0.2	0.4	nSec	
Duty Cycle		Duty	45	-	55	45	-	55	45	-	55	%	
Start-up Time		Tstart	-	-	5	-	-	5	-	-	5	mSec	Start from t=0 to 90% V_{DD}
Tri-State	Enable Voltage	V_{IH}	0.7 x V_{DD}	-	-	0.7 x V_{DD}	-	-	0.7 x V_{DD}	-		V	
	Disable Voltage	V_{IL}	-	-	0.3 x V_{DD}	-	-	0.3 x V_{DD}	-	-	0.3 x V_{DD}	V	
Stand by Current		I_{DDD}	-	20	30	-	20	30	-	20	30	µA	OE=GND
Output Loading			100									Ω	Connect between OUT and OUTn
Phase Noise	Offset 10kHz		-	-147	-	-	-147	-	-	-146	-	dBc/Hz	
	Offset 100kHz		-	-156	-	-	-156	-	-	-155	-	dBc/Hz	F_O=156.25MHz
	Offset 1MHz		-	-158	-	-	-158	-	-	-158	-	dBc/Hz	
RMS Phase Jitter		Phj	-	55	100	-	55	100	-	55	100	fSec	Integrated 12kHz – 20MHz Offset Frequency F_O=156.25MHz
Aging		Ag	-	-	±3	-	-	±3	-	-	±3	ppm	T=25°C, First Year
Junction Temperature		Tj	-40	-	125	-40	-	125	-40	-	125	°C	
Storage Temp. Range		Tstg	-55	-	150	-55	-	150	-55	-	150	°C	

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Parameter		Symbol	HCSL									Unit	Conditions / Remarks
			3.3V			2.5V			1.8V				
			Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
Supply Voltage Variation		V_{DD}	V_{DD} – 10%	V_{DD}	V_{DD} + 10%	V_{DD} – 5%	V_{DD}	V_{DD} + 5%	V_{DD} – 5%	V_{DD}	V_{DD} + 5%	V	
Frequency Range		F_O	100	-	170	100	-	170	100	-	170	MHz	(*1)
Standard Frequency			100, 125, 156.25									MHz	(*1)
Power Current Consumption		I_{DD}	-	34	46	-	34	46	-	34	46	mA	OE= V_{DD}
Output Voltage (Single-ended)	High-Level	V_{OH}	0.55	-	0.9	0.55	-	0.9	0.5	-	1.0	V	
	Low-Level	V_{OL}	-0.15	-	0.15	-0.15	-	0.15	-0.15	-	0.15	V	
Output Swing(Single-ended output signal)		V_{OPP}	0.55	-	-	0.55	-	-	0.5	-	-	V	
Transition Time 20%~80%, V_{OD}	Rise Time	Tr	-	0.3	0.6	-	0.3	0.6	-	0.3	0.6	nSec	
	Fall Time	Tf	-	0.3	0.6	-	0.3	0.6	-	0.3	0.6	nSec	
Duty Cycle		Duty	45	-	55	45	-	55	45	-	55	%	
Start-up Time		Tstart	-	-	5	-	-	5	-	-	5	mSec	Start from t=0 to 90% V_{DD}
Tri-State	Enable Voltage	V_{IH}	0.7 x V_{DD}	-	-	0.7 x V_{DD}	-	-	0.7 x V_{DD}	-	-	V	
	Disable Voltage	V_{IL}	-	-	0.3 x V_{DD}	-	-	0.3 x V_{DD}	-	-	0.3 x V_{DD}	V	
Stand by Current		I_{DDD}	-	-	30	-	-	30	-	-	30	µA	OE=GND
Output Loading			50 (to GND)									Ω	Terminated to GND
Phase Noise	Offset 10kHz		-	-152	-	-	-152	-	-	-152	-	dBc/Hz	
	Offset 100kHz		-	-157	-	-	-157	-	-	-157	-	dBc/Hz	F_O=156.25MHz
	Offset 1MHz		-	-160	-	-	-160	-	-	-160	-	dBc/Hz	
RMS Phase Jitter		Phj	-	55	100	-	55	100	-	55	100	fSec	Integrated 12kHz – 20MHz Offset Frequency F_O=156.25MHz
Aging		Ag	-	-	±3	-	-	±3	-	-	±3	ppm	T=25°C, First Year
Junction Temperature		Tj	-40	-	125	-40	-	125	-40	-	125	°C	
Storage Temp. Range		Tstg	-55	-	150	-55	-	150	-55	-	150	°C	

*1: Standard frequencies are frequencies in which the crystal has been designed and does not imply a stock position.

Note: not all combination of options are available. Other specifications may be available upon request.
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FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±20	±25	±50	±100
-20 ~ +70	O	O	O	O
-40 ~ +85	△	O	O	O
-40 ~ +105	X	X	O	O
-40 ~ +125	X	X	△	O

O : Available △ : Conditional X : Not Available
Inclusive of calibration @ 25°C ,operating temperature rrange,input Voltage variation,load variation,aging (1st year),shock,and vibration

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