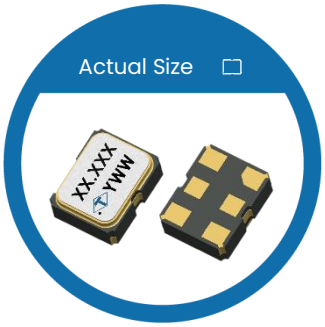
TAITIEN
The Frequency and Timing Control Specialist

OB-U Type 312.5MHz Ultra Low Phase Noise

2.5 x 2.0 mm SMD Differential Output Crystal Oscillator



RoHS Compliant

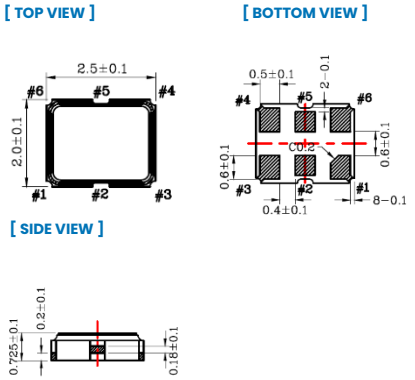
FEATURES

- Industry Standard 2.5 x 2.0 x 0.725mm Hermetically Sealed Ceramic Package
- Ultra Low Jitter Performance: Typical 30fs RMS from 12kHz - 20MHz
- Differential Output Level: LVPECL and LVDS
- Operation Supply Voltage: 1.8V, 2.5V and 3.3V
- Pb-free/RoHS Compliant

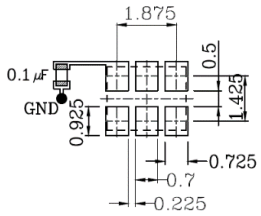
TYPICAL APPLICATION

- Optical modules 800G, 1.6T, 3.2T QSFP, Fiber Channel
- 100G/200G SerDes, SONET, 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

No	Name	Type	Function and Remarks		
1	OE(Tri-State)	Input	Output control pin. Reference as below Table		
			Input Level	Oscillation	Outputs
			"H"	Enable	Enable: Specified Frequency
			"L"	Disable	Disable: Hi-Z
2	N.F.	-	No Function, It can be connected to High or Low or floating.		
3	GND	Power-	GND pin		
4	OUT	Output	Frequency output		
5	$\overline{OUT}$	Output	Frequency output, inversion#4		
6	V_{DD}	Power+	Power Supply, V_{DD} pin		

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} – 5%	V_{DD}	V_{DD} + 5%	V	
Frequency Range		F_O	220	-	400	220	-	400	MHz	(*1)
Standard Frequency			312.5						MHz	(*1)
Power Current Consumption		I_{DD}	-	22	60	-	20	60	mA	OE= V_{DD} Terminated to V_{DD}-2V
Output Voltage	High-Level	V_{OH}	V_{DD}-1.1	-	-	V_{DD}-1.1	-	-	V	
	Low-Level	V_{OL}	-	-	V_{DD}-1.5	-	-	V_{DD}-1.5	V	
Differential Output Swing		V_{SW}	0.8	-	2	0.8	-	2	V	
Output Amplitude (Single-ended output signal)		V_{OPP}	0.55	0.75	0.95	0.55	0.75	0.95	V	
Transition Time 20%~80%, V_{OPP}	Rise Time	Tr	-	0.2	0.35	-	0.2	0.35	nSec	
	Fall Time	Tf	-	0.2	0.35	-	0.2	0.35	nSec	
Duty Cycle		Duty	45	-	55	45	-	55	%	
Start-up Time		Tstart	-	-	2	-	-	2	mSec	Start from t=0 to 90% V_{DD}
OE (Tri-State)	Enable Voltage	V_{IH}	0.8 x V_{DD}	-	-	0.8 x V_{DD}	-	-	V	
	Disable Voltage	V_{IL}	-	-	0.2 x V_{DD}	-	-	0.2 x V_{DD}	V	
Stand by Current		I_{DDD}	-	10	60	-	10	60	μA	OE=GND
Output Loading			50						Ω	Terminated to V_{DD}-2V
Phase Noise	Offset 10kHz		-	-132	-	-	-151	-	dBc/Hz	
	Offset 100kHz		-	-153	-	-	-158	-	dBc/Hz	F_O=312.5MHz
	Offset 1MHz		-	-161	-	-	-159	-	dBc/Hz	
RMS Phase Jitter		Phj	-	28	50	-	30	50	fSec	Integrated 12kHz – 20MHz Offset Frequency F_O=312.5MHz
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 without notice.

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XO-0241
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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	220	-	400	220	-	400	220	-	400	MHz	(*1)
Standard Frequency							312.5					MHz	(*1)
Power Current Consumption		I_{DD}	-	25	34	-	25	34	-	20	28	mA	OE= V_{DD}, Output Standard
		I_{DD}	-	26	35	-	26	35	-	21	29	mA	OE= V_{DD}, Output Option1
		I_{DD}	-	28	38	-	28	38	-	23	31	mA	OE= V_{DD}, Output Option2
Output Voltage (Single-ended)	High-Level	V_{OH}	-	1.42	1.6	-	1.42	1.6	-	1.42	1.6	V	
	Low-Level	V_{OL}	0.9	1.07	-	0.9	1.07	-	0.9	1.07	-	V	
Differential output voltage OUT(High) - OUTN(Low)		V_{OD}	0.25	0.35	0.45	0.25	0.35	0.45	0.25	0.35	0.45	V	Output: Standard
			0.3	0.45	0.6	0.3	0.45	0.6	0.3	0.45	0.6	V	Output: Option1
			0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8	V	Output: Option2
Differential Output Voltage Error		ΔV_{OD}	-	-	50	-	-	50	-	-	50	mV	$\Delta V_{OD}=\lvert V_{OD1}-V_{OD2}\rvert$
Differential Output Amplitude		V_{SW}	0.49	-	0.9	0.49	-	0.9	0.49	-	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	$\Delta V_{OS}=\lvert V_{OS1}-V_{OS2}\rvert$
Transition Time 20%~80%, V_{OD}	Rise Time	Tr	-	0.2	0.35	-	0.2	0.35	-	0.2	0.35	nSec	
	Fall Time	Tf	-	0.2	0.35	-	0.2	0.35	-	0.2	0.35	nSec	
Duty Cycle		Duty	45	-	55	45	-	55	45	-	55	%	
Start-up Time		Tstart	-	-	2	-	-	2	-	-	2	mSec	Start from t=0 to 90% V_{DD}
Tri-State	Enable Voltage	V_{IH}	0.8 x V_{DD}	-	-	0.8 x V_{DD}	-	-	0.8 x V_{DD}	-		V	
	Disable Voltage	V_{IL}	-	-	0.2 x V_{DD}	-	-	0.2 x V_{DD}	-	-	0.2 x V_{DD}	V	
Stand by Current		I_{DDD}	-	10	60	-	10	60	-	10	60	µA	OE=GND
Output Loading							100					Ω	Connect between OUT and OUTn
Phase Noise	Offset 10kHz		-	-135	-	-	-135	-	-	-135	-	dBc/Hz	
	Offset 100kHz		-	-157	-	-	-157	-	-	-157	-	dBc/Hz	F_O=312.5MHz
	Offset 1MHz		-	-163	-	-	-163	-	-	-163	-	dBc/Hz	
RMS Phase Jitter		Phj	-	25	50	-	25	50	-	30	50	fSec	Integrated 12kHz – 20MHz Offset Frequency F_O=312.5MHz
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.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±20	±25	±50
-40 ~ +85	O	O	O
-40 ~ +105	O	O	O

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

Note: not all combination of options are available. Other specifications may be available upon request.
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Phase Noise Data: Typical 27fs @offset 12k-20M, LVPECL output, 3.3V, 312.5MHz