

OB-U Type 312.5MHz Ultra Low Phase Noise

2.5 x 2.0 mm SMD Differential Output Crystal Oscillator

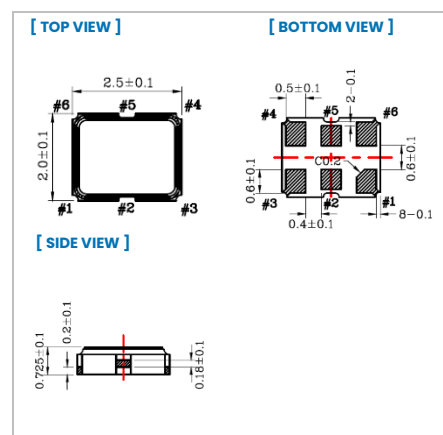
FEATURES

- 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

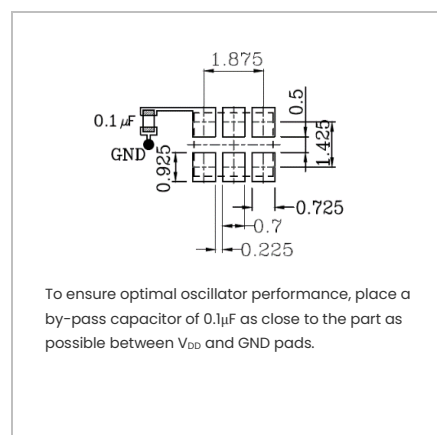
TYPICAL APPLICATION

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

DIMENSION (mm)



SOLDER PAD LAYOUT (mm)



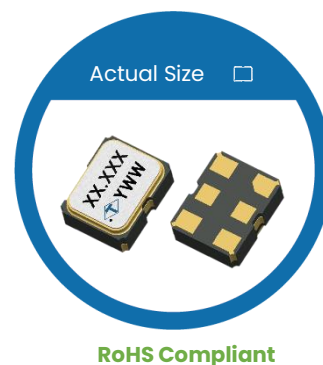
ELECTRICAL SPECIFICATION

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 _{DD0}	–	10	60	–	10	60	μA	OE=GND
Output Loading			50						Ω	Terminated to V _{DD} -2V
Phase Noise	Offset 10kHz		–	-132	–	–	-151	–	dBc/Hz	F _O =312.5MHz
	Offset 100kHz		–	-153	–	–	-158	–	dBc/Hz	
	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		Tsta	–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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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	OUT	Output	Frequency output, inversion#4		
6	V _{DD}	Power+	Power Supply, V _{DD} pin		

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	(*)
Standard Frequency			312.5									MHz	(*)
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	ΔV _{OD} = V _{OD1} -V _{OD2}
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	ΔV _{OS} = V _{OS1} -V _{OS2}
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 _H	0.8 x V _{DD}	-	-	0.8 x V _{DD}	-	-	0.8 x V _{DD}	-	-	V	
	Disable Voltage	V _L	-	-	0.2 x V _{DD}	-	-	0.2 x V _{DD}	-	-	0.2 x V _{DD}	V	
Stand by Current		I _{DD}	-	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
-40 ~ +125		Δ	O	O

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

Phase Noise Data: Typical 27fs @offset 12k-20M, LVPECL output, 3.3V, 312.5MHz

