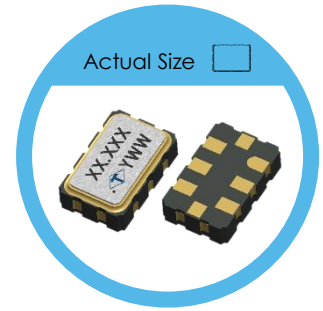


# VJ-M Type High Frequency & Ultra Low Noise 5.0 x 3.2 mm Differential Output Voltage Controlled Crystal Oscillator



**RoHS Compliant**

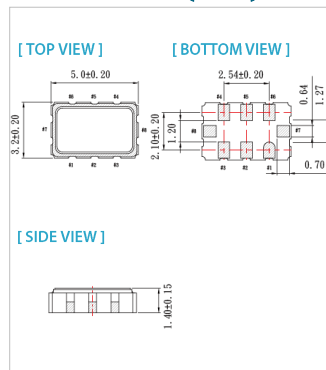
## FEATURES

- Pb-free/RoHS Compliant
- Tri-state Enable / Disable Mode
- Temperature Range: -40 to 85 °C
- Clock Output: LVPECL, LVDS, CML and HCSL
- Output Frequency Support from 15MHz to 2.1GHz
- Low Power Supply Voltage: 3.3, 2.5 and 1.8V Supply Options
- Ultra Low Phase, RMS jitter <300fs(Typical: 250fs at 12kHz to 20MHz Frequency Offsets)

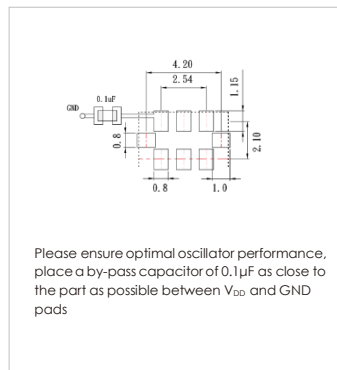
## TYPICAL APPLICATION

- Set-Top Box, HDTV
- xDSL/VoIP, Cable Modem
- Jitter Attenuator, ADC

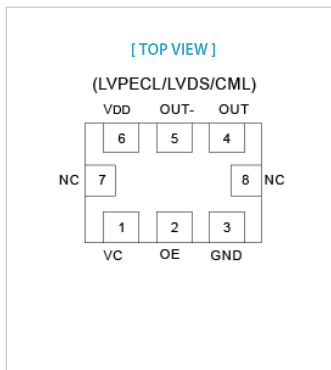
## DIMENSION (mm)



## SOLDER PAD LAYOUT (mm)



## PIN ASSIGNMENTS



## PIN FUNCTION

PIN#	FUNCTION
1	V <sub>con</sub>
2	OE
3	GND
4	Output
5	Comp. Output
6	V <sub>DD</sub>
7	NC
8	NC

## ELECTRICAL SPECIFICATION

Parameter	LVPECL				Unit	Test Condition	
	3.3V		2.5V				
	Min.	Max.	Min.	Max.			
Supply Voltage Variation (V <sub>DD</sub> ) ±10%	2.97	3.63	2.25	2.75	V		
Frequency Range	15	2100	15	2100	MHz		
Supply Current		120		95	mA		
Output Level	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	V	
Transition Time (20% - 80%)	Rise Time		0.35		0.35	nSec	
	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 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>	V	
Stand by Current		120		95	mA		
Output Load	50Ω into V <sub>DD</sub> - 2V						
Phase Noise		Typ.	Max.	Typ.	Max.		
	At V <sub>DD</sub> =3.3V, f <sub>out</sub> =873.515MHz	1kHz offset	-87		-87		dBc/Hz
	10kHz offset	-110		-110		dBc/Hz	
	100kHz offset	-127		-127		dBc/Hz	
	1MHz offset	-138		-138		dBc/Hz	
	20MHz offset	-153		-153		dBc/Hz	
RMS Phase Jitter (Integrated 12 kHz-20 MHz)	250	300	250	300	fs		
Period Jitter		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	LVDS						Unit	Test Condition	
	3.3V		2.5V		1.8V				
	Min.	Max.	Min.	Max.	Min.	Max.			
Supply Voltage Variation (V <sub>DD</sub> )	2.97	3.63	2.25	2.75	1.71	1.89	V		
Frequency Range	15	2100	15	2100	15	2100	MHz		
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		V	
Transition Time (20% – 80%)	Rise Time		0.35		0.35		0.35	nSec	
	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>	V	
Stand by Current			90		80		70	mA	
Output Load	100Ω (Between OUT & OUTN)								
Phase Noise		Typ.	Max.	Typ.	Max.	Typ.	Max.		
At V <sub>DD</sub> =3.3V, f <sub>out</sub> =805.664MHz	1kHz offset		-87		-87		-87	dBc/Hz	
	10kHz offset		-110		-110		-110	dBc/Hz	
	100kHz offset		-127		-127		-127	dBc/Hz	
	1MHz offset		-138		-138		-138	dBc/Hz	
	20MHz offset		-153		-153		-153	dBc/Hz	
RMS Phase Jitter (Integrated 12 kHz~20 MHz)		250	300	250	300	250	300	fs	
Period Jitter			50		50		50	ps	

Parameter	HCSL						Unit	Test Condition	
	3.3V		2.5V		1.8V				
	Min.	Max.	Min.	Max.	Min.	Max.			
Supply Voltage Variation (V <sub>DD</sub> ) ±10%	2.97	3.63	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	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>	V	
Stand by Current			115		100		94	mA	
Output Load	50Ω 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	dBc/Hz	
	100kHz offset		-127		-127		-127	dBc/Hz	
	1MHz offset		-138		-138		-138	dBc/Hz	
	20MHz offset		-153		-153		-153	dBc/Hz	
RMS Phase Jitter (Integrated 12 kHz~20 MHz)		250	300	250	300	250	300	fs	
Period Jitter			50		50		50	ps	

Parameter	CML						Unit	Test Condition	
	3.3V		2.5V		1.8V				
	Min.	Max.	Min.	Max.	Min.	Max.			
Supply Voltage Variation (V <sub>DD</sub> )	2.97	3.63	2.25	2.75	1.71	1.89	V		
Frequency Range	15	2100	15	2100	15	2100	MHz		
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	V	
Transition Time (20% – 80%)	Rise Time		0.35		0.35		0.35	nSec	
	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>	V	
Stand by Current			90		80		70	mA	
Output Load	50Ω to V <sub>DD</sub>								
Phase Noise		Typ.	Max.	Typ.	Max.	Typ.	Max.		
At V <sub>DD</sub> =3.3V, f <sub>out</sub> =664MHz	1kHz offset		-87		-87		-87	dBc/Hz	
	10kHz offset		-110		-110		-110	dBc/Hz	
	100kHz offset		-127		-127		-127	dBc/Hz	
	1MHz offset		-138		-138		-138	dBc/Hz	
	20MHz offset		-153		-153		-153	dBc/Hz	
RMS Phase Jitter (Integrated 12 kHz~20 MHz)		250	300	250	300	250	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.

## CONTROL VOLTAGE FUNCTION

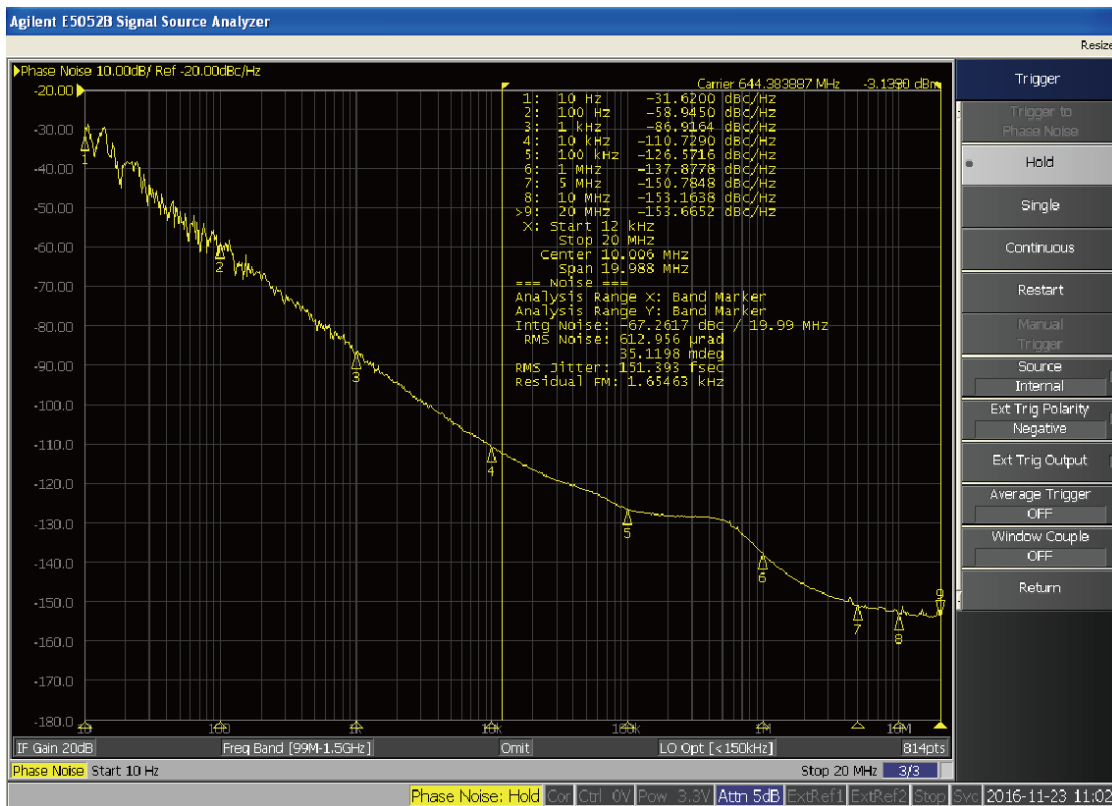
Parameter	Control Voltage Function on Pin 1						Unit	Test Condition
	3.3V		2.5V		1.8V			
	Min.	Max.	Min.	Max.	Min.	Max.		
Control Voltage Center	1.65		1.25		0.9		V	
Control Voltage Range	0.3	3	0.25	2.25	0.18	1.62	V	
Frequency Pulling Range	±50	±250	±50	±250	±50	±250	ppm	
Linearity	±10		±10		±10		%	
Modulation Bandwidth	5	20	5	20	5	20	KHz	
VC Input Impedance	5		5		5		MΩ	

## FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C)	ppm	±20	±25	±30	±50
-10 ~ +60	○	○	○	○	○
-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



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

Specifications subject to change without notice.