

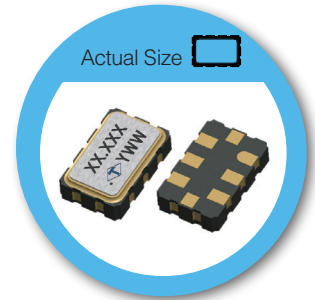
VJ-M Type High Frequency and Ultra Low Noise 5.0 x 3.2 mm SMD Voltage Control Crystal Oscillator

FEATURE

- Low Power Supply Voltage: 3.3, 2.5, and 1.8V supply options
- Clock Output: LVPECL, LVDS, CML, HCSSL 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

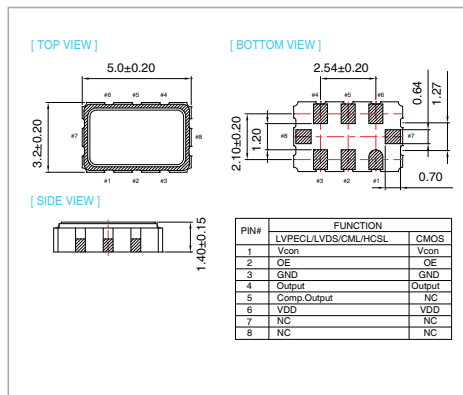
TYPICAL APPLICATION

- Set-top Box, HDTV
- xDSL/ VoIP, Cable modem
- Jitter Attenuator, ADC

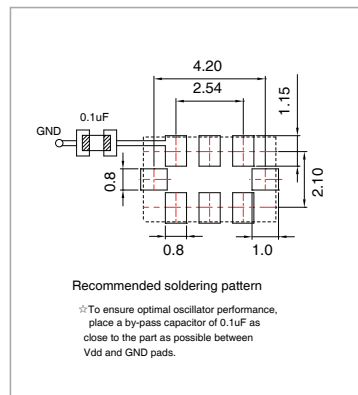


RoHS Compliant

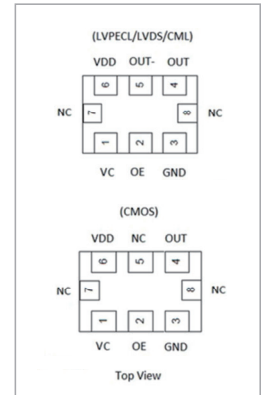
DIMENSION (mm)



SOLDER PAD LAYOUT(mm)



PIN ASSIGNMENTS



ELECTRICAL SPECIFICATION

Parameter	LVPECL				Unit	
	3.3V		2.5V			
	Min.	Max.	Min.	Max.		
Supply Voltage Variation (V _{DD})±10%	3.63	2.97	2.25	2.75	V	
Frequency Range	15	2100	15	2100	MHz	
Supply Current	-	120	-	95	mA	
Output Level	Output High	V _{DD} - 1.165	V _{DD} - 0.8	V _{DD} - 1.165	V _{DD} - 0.8	V
	Output Low	V _{DD} - 2.0	V _{DD} - 1.55	V _{DD} - 2.0	V _{DD} - 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 _{DD}	-	0.7 x V _{DD}	-	V
	Disable	-	0.3 x V _{DD}	-	0.3 x V _{DD}	
Stand by Current	-	120	-	95	mA	
Output Load	50 ohms info V _{DD} -2V					
Phase Noise	Typ.	Max.	Typ.	Max.		
At V _{DD} =3.3V, f _{out} =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
	10MHz offset	-153	-	-153	-	dBc/Hz
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 _{DD})	3.63	2.97	2.25	2.75	1.71	1.89	V	
Frequency Range	15	2100	15	2100	15	2100	MHz	
Supply Current	-	90	-	80	-	75	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	0.7x V _{DD}	-	0.7x V _{DD}	-	0.7 x V _{DD}	-	V
	Disable	-	0.3x V _{DD}	-	0.3x V _{DD}	-	0.3 x V _{DD}	V
Stand by Current	-	90	-	80	-	75	mA	
Output Load	100 ohms between OUT and OUTN							
Phase Noise	Typ.	Max.	Typ.	Max.	Typ.	Max.		
	At V _{DD} =3.3V, F _{out} =805.664MHz	1kHz offset	-87	-	-87	-	-87	-
	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 (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 _{DD})	3.63	2.97	3.63	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 _{DD} - 0.085	V _{DD}	V _{DD} - 0.085	V _{DD}	V _{DD} - 0.085	V _{DD}	V
	Output Low	V _{DD} - 0.6	V _{DD} - 3.2	V _{DD} - 0.6	V _{DD} - 3.2	V _{DD} - 0.6	V _{DD} - 3.2	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	0.7x V _{DD}	-	0.7x V _{DD}	-	0.7 x V _{DD}	-	V
	Disable	-	0.3x V _{DD}	-	0.3x V _{DD}	-	0.3 x V _{DD}	V
Stand by Current	-	90	-	80	-	70	mA	
Output Load	50 ohms to V _{DD}							
Phase Noise	Typ.	Max.	Typ.	Max.	Typ.	Max.		
	At V _{DD} =3.3V, F _{out} =664MHz	1kHz offset	-87	-	-87	-	-87	-
	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 (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 _{DD})±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	45	55	45	55	%	
Startup Time	-	8	-	8	-	8	mSec	
Tri-State mode (Input to Pin 2)	Enable	0.7 x V _{DD}	-	0.7x V _{DD}	-	0.7xV _{DD}	-	V
	Disable	-	0.3 x V _{DD}	-	0.3 x V _{DD}	-	0.3 x V _{DD}	V
Stand by Current	-	115	-	100	-	94	mA	
Output Load	50 ohms to GND							
Phase Noise	Typ.	Max.	Typ.	Max.	Typ.	Max.		
	At V _{DD} =3.3V, f _{out} =873.515MHz	1kHz offset	-87	-	-87	-	-87	-
	10kHz offset	-110	-	-110	-	-110	-	dBc/Hz
	100kHz offset	-127	-	-127	-	-127	-	dBc/Hz
	1MHz offset	-138	-	-138	-	-138	-	dBc/Hz
	10MHz offset	-153	-	-153	-	-153	-	dBc/Hz
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 _{DD})	3.63	2.97	2.25	2.75	1.71	1.89	V	
Frequency Range	15	250	15	250	15	250	MHz	
Supply Current	-	90	-	80	-	70	mA	
Output Level	Output High	0.9xV _{DD}	-	0.9xV _{DD}	-	0.9xV _{DD}	V	
	Output Low	-	0.1xV _{DD}	-	0.1xV _{DD}	-	0.1xV _{DD}	
Transition Time (20% - 80%)	Rise Time	-	1.2	-	1.5	-	2	nSes
	Fall Time	-	1.2	-	1.5	-	2	nSes
Duty cycle	F _{out} < 100MHz	45	55	45	55	45	55	%
	F _{out} > 100MHz	40	60	40	60	40	60	%
Startup Time	-	8	-	8	-	8	mSes	
Tri-State mode (Input to Pin 2)	Enable	0.7x V _{DD}	-	0.7x V _{DD}	-	0.7x V _{DD}	-	V
	Disable	-	0.3xV _{DD}	-	0.3xV _{DD}	-	0.3xV _{DD}	V
Stand by Current	-	90	-	80	-	70	mA	
Output Load	15pF							
Period Jitter	-	100	-	100	-	100	ps	

CONTROL VOLTAGE FUNCTION

Parameter	Control Voltage Function on Pin 1						Unit
	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

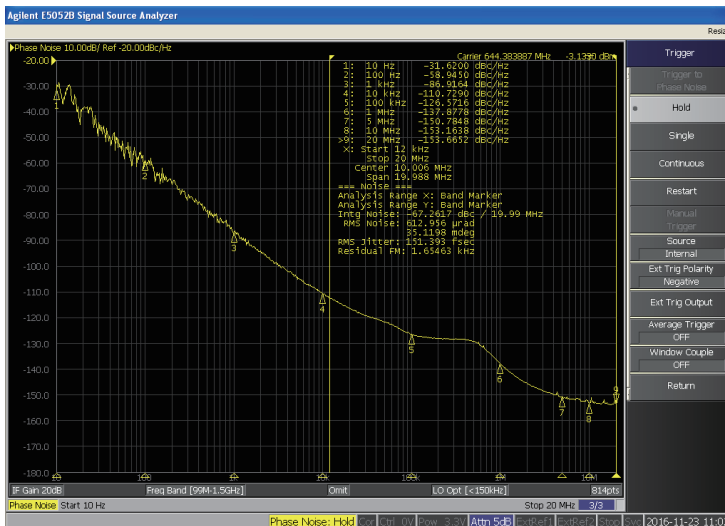
FREQ. STABILITY vs. TEMP. RANGE

Temp. (°C)	ppm	±20	±25	±30	±50
-10 ~ +60		○	○	○	○
-20 ~ +70		△	○	○	○
-40 ~ +85		×	○	○	○

* 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

PHASE NOISE DATA



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