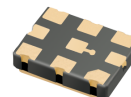


Product Features

- Multiple Output Frequencies (2, 3, or 4) - Selectable
- **QiK Chip™** Technology
- Superior Jitter Performance (less than 0.25 ps RMS, 12 kHz - 20 MHz)
- SAW replacement - better performance
- Frequencies from 50 MHz - 1.4 GHz (LVDS/LVPECL/CML)
- Frequencies from 10 MHz - 150 MHz (HCMOS)



QiK Chip™



Product Description

The multiple frequency oscillator utilizes MtronPTI's QiK Chip™ technology to provide a very low jitter clock for all output frequencies. The M21x is available with up to 4 different frequency outputs from 10MHz through 1.4 GHz. The M21x utilizes the stable fundamental 3rd overtone crystal and the QiK Chip™ IC to provide the wide range of output frequencies. Using this design approach, the M21x provides exceptional performance in frequency stability, jitter, phase noise and long term reliability.

Product Applications

- Global/Regional selection
- Forward Error Correction (FEC) / Selectable Functionality applications
- Telecommunications such as SONET / SDH / DWDM / FEC / SERDES / OC-3 thru OC-192
- 1-2-4-10 Gigabit Fibre Channel
- Wireless base stations / WLAN / Gigabit Ethernet
- xDSL, Network Communications
- Avionic flight controls
- Military communications
- Clock and data recovery
- Low jitter clock generation
- Frequency margining

Product Ordering Information

Ordering Information	
Product Series	M21
Number of Frequencies	2: Two Selectable Frequencies 3: Three Selectable Frequencies 4: Four Selectable Frequencies
Supply Voltage	0: 3.3 V 1: 2.5 V 2: 1.8 V
Operating Temperature	2: -40°C to +85°C 6: -20°C to +70°C
Stability	4: ±50 ppm 3: ±100 ppm 8: ±20 ppm
Enable/Disable Function	B: Enable High (Pad 1) G: Enable High (Pad 2) S: Enable Low (Pad 1) M: Enable Low (Pad 2)
Two Frequency Select Function	1: FS0=Pad 1 2: FS0=Pad 2 *A: FS0=Pad A
Package/Lead Configuration	N: 5 x 7 mm Leadless
Factory Assigned to Accommodate	
Customer Specified Frequencies - Contact Factory	

*For three and four frequency selections, FS0=Pad A

Frequency Select Truth Table		
	FS1	FS0
Frequency 1	High	High
Frequency 2	High	Low
Frequency 3	Low	High
Frequency 4	Low	Low

NOTE: Logic Low = 20% Vcc max.
Logic High = 80% Vcc min.

M21x Series Multiple Frequency Clock Oscillator

5x7 mm, 3.3/2.5/1.8 Volt, LVPECL/LVDS/CML/HCMOS Output

Performance Characteristics

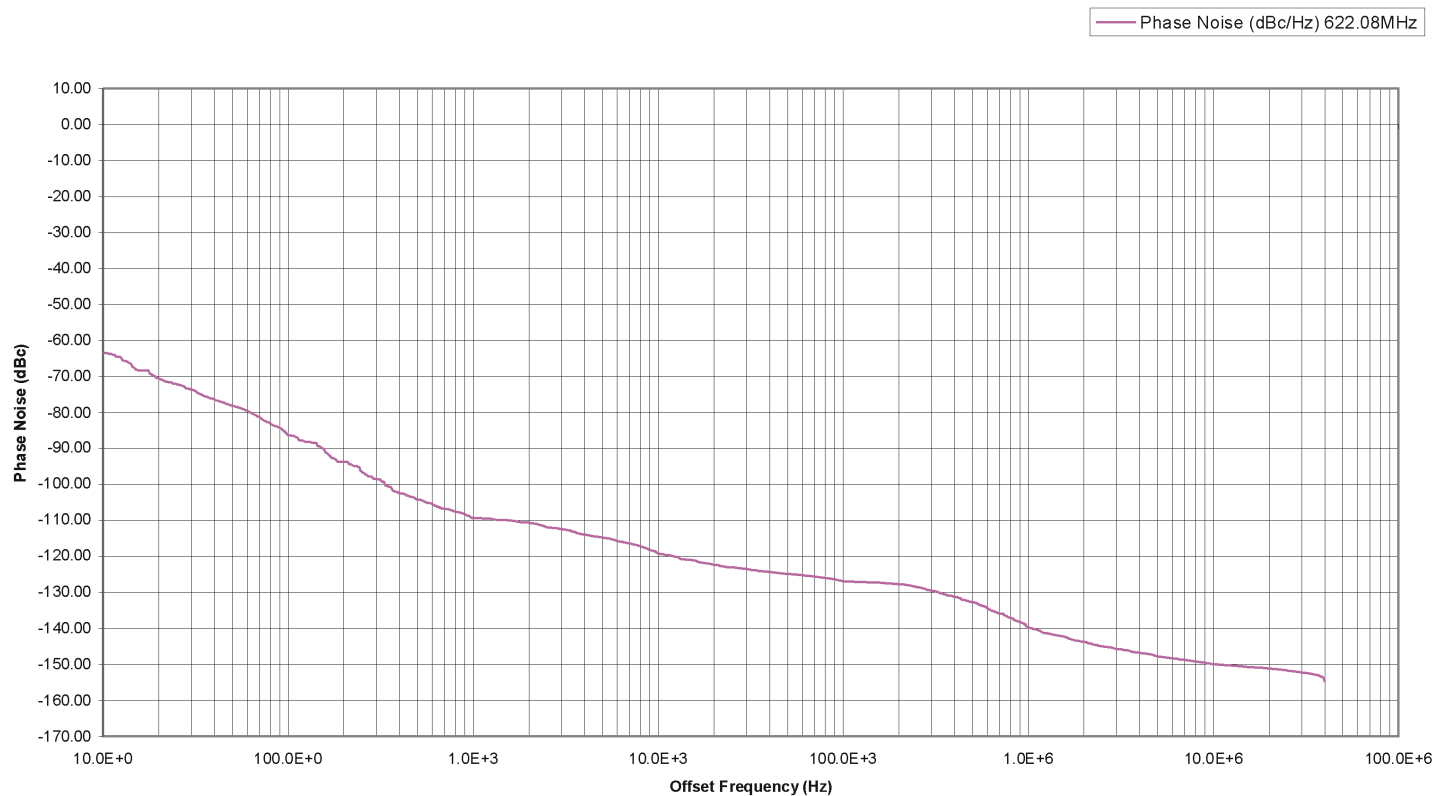
	Electrical Specifications					
	PARAMETER	Symbol	Min.	Typ.	Max.	Units
	Frequency Range	F	50 10		1400 150	MHz
	Operating Temperature	T _A	-20 to +70 -40 to +85			°C
	Storage Temperature	T _S	-55		+125	°C
	Frequency Stability	ΔF/F	See Ordering Information			ppm
	Aging					
	1st Year		-3		+3	ppm
	Thereafter (per year)		-1		+1	ppm
	Supply Voltage	V _{cc}	1.71 2.375 3.135	1.8 2.5 3.3	1.89 2.625 3.465	V V V
	Input Current	I _{cc}			125 105	mA mA
	Load		50 Ohms to (V _{cc} - 2) V _{dc} 100 Ohm differential load			
				15		pF
	Symmetry (Duty Cycle)		45		55	%
	Output Skew			20 15 20		ps ps ps
	Differential Voltage	V _{od}	250	350	450	mV
		V _{od}	0.7	0.95	1.20	V _{pp}
	Common Mode Output Voltage	V _{cm}		1.2		V
	Logic "1" Level	V _{oh}	V _{cc} - 1.02			V
			90% V _{dd}			
	Logic "0" Level	V _{ol}			V _{cc} - 1.63	V
					10% V _{dd}	
	Rise/Fall Time	T _r /T _f		0.23	0.35	ns
					6.0	ns
	Enable Function Option B		80% V _{cc} min. or N/C: Output active 0.5V max: Output disables to high-Z			Customer Specified
	Enable Function Option S		0.5V max or N/C: Output active 80% V _{cc} min: Output disables to high-Z			Customer Specified
	Tristate Function		Input Logic "1" or floating: output active Input Logic "0": output disables to high-Z			Customer Specified
	Frequency Selection		See Truth Table			
	Settling Time				10	ms
	Start up Time				10	ms
	Phase Jitter					
	@ 622.08 MHz	φ _J		0.25		ps RMS
	@ 125 MHz				0.50	ps RMS
						LVPECL/LVDS/CML Integrated 12 kHz – 20 MHz
						HCMOS (12 kHz – 20 MHz)
Environmental	Mechanical Shock	Per MIL-STD-202, Method 213, Condition C (100 g's, 6 mS duration, ½ sinewave)				
	Vibration	Per MIL-STD-202, Method 201 & 204 (10 g's from 10-2000 Hz)				
	Hermeticity	Per MIL-STD-202, Method 112, (1x10 ⁻⁸ atm. cc/s of Helium)				
	Thermal Cycle	Per MIL-STD-883, Method 1010, Condition B (-55°C to +125°C, 15 min. dwell, 10 cycles)				
	Solderability	Per EIAJ-STD-002				
	Max. Soldering Cond.	See solder profile, Figure 1				

Note 1: Contact factory for standard frequency availability over 945 MHz.

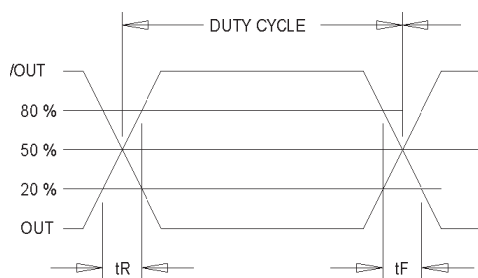
Note 2: Stability is inclusive of initial tolerance, deviation over temperature, shock, vibration, supply voltage, and aging for one year at 50°C mean ambient temperature.

Note 3: See Load Circuit Diagram in this datasheet. Consult factory with nonstandard output load requirements.

Phase Noise Plot



Output Waveform

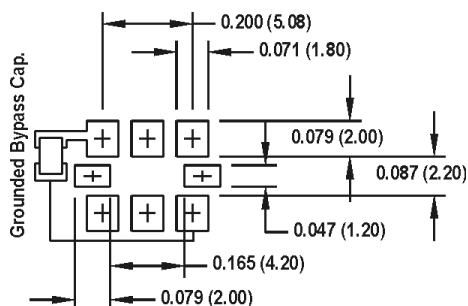
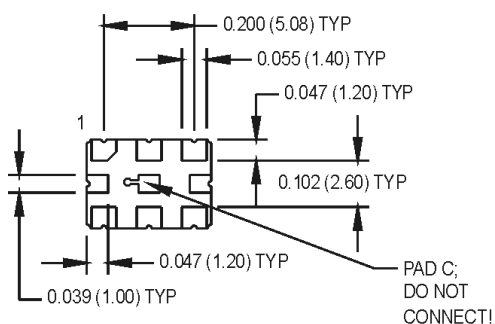
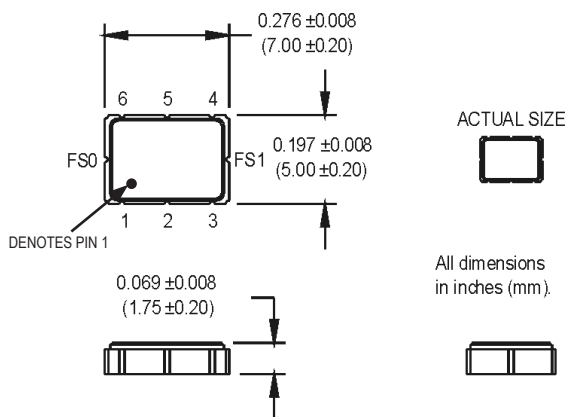


Output Waveform: LVDS/CML/LVPECL

M21x Series Multiple Frequency Clock Oscillator

5x7 mm, 3.3/2.5/1.8 Volt, LVPECL/LVDS/CML/HCMOS Output

Product Dimension & Pinout Information



PAD 1 ENABLE

Pad1: Enable/Disable or Tristate

Pad2: N/C or FS0

Pad3: Ground

Pad4: Output Q (LVPECL, LVDS, CML, HCMOS)

Pad5: Output $\bar{Q}$ (LVPECL, LVDS, CML) N/C for HCMOS

Pad6: Vcc

PadA: FS0 or N/C

PadB: FS1

PadC: Do not connect!

PAD 2 ENABLE

Pad1: N/C or FS0

Pad2: Enable/Disable or Tristate

Pad3: Ground

Pad4: Output Q (LVPECL, LVDS, CML, HCMOS)

Pad5: Output $\bar{Q}$ (LVPECL, LVDS, CML) N/C for HCMOS

Pad6: Vcc

PadA: FS0 or N/C

PadB: FS1

PadC: Do not connect!

M21x Series Multiple Frequency Clock Oscillator

5x7 mm, 3.3/2.5/1.8 Volt, LVPECL/LVDS/CML/HCMOS Output

Handling Information

Although protection circuitry has been designed into the M21x oscillator, proper precautions should be taken to avoid exposure to electrostatic discharge (ESD) during handling and mounting. MtronPTI utilizes a human-body model (HBM) and a charged-device model (CDM) for ESD-susceptibility testing and protection design evaluation. ESD voltage thresholds are dependent on the circuit parameters used to define the mode. Although no industry-wide standard has been adopted for the CDM, a standard HBM (resistance = 1500 Ω , capacitance = 100 pF) is widely used and therefore can be used for comparison purposes. The HBM ESD threshold presented here was obtained using these circuit parameters.

Model	ESD Threshold, Minimum	Unit
Human Body	1500*	V
Charged Device	1500*	V

* MIL-STD-883D, Method 3015, Class 1

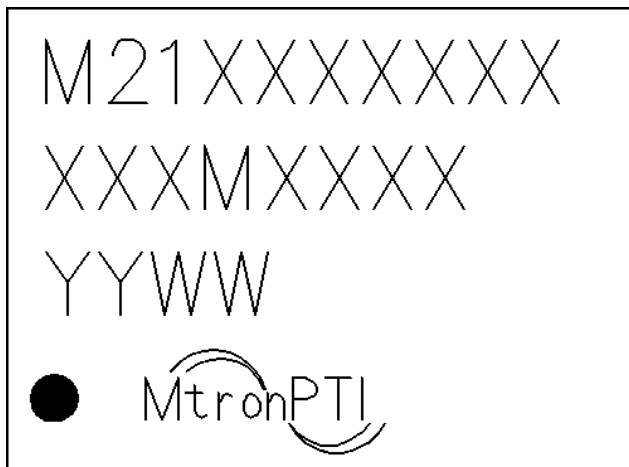


Quality Parameters

Environmental Specifications/Qualification Testing Performed on the M21x Clock Oscillator		
Test	Test Method	Test Condition
Electrical Characteristics	Internal Specification	Per Specification
Frequency vs. Temperature	Internal Specification	Per Specification
Mechanical Shock	MIL-STD-202, Method 213, C	100 g's
Vibration	MIL-STD-202, Method 201-204	10 g's from 10-2000 Hz
Thermal Cycle	MIL-STD-883, Method 1010, B	-55 Deg. C to +125 Deg. C, 15 minute Dwell, 10 cycles
Aging	Internal Specification	168 Hours at 105 Degrees C
Gross Leak	MIL-STD-202, Method 112	30 Second Immersion
Fine Leak	MIL-STD-202, Method 112	Must meet 1×10^{-8}
Solderability	MIL-STD-883, Method 2003	8 Hour Steam Age – Must Exhibit 95% coverage
Resistance to Solvents	MIL-STD-883, Method 2015	Three 1 minute soaks
Terminal Pull	MIL-STD-883, Method 2004, A	2 Pounds
Lead Bend	MIL-STD-883, Method 2004, B1	1 Bending Cycle
Physical Dimensions	MIL-STD-883, Method 2016	Per Specification
Internal Visual	Internal Specification	Per Internal Specification

Part Marking Guide

Line 1: Model Number
Line 2: Frequency
Line 3: Date Code
Line 4: Pin 1 Indicator / MtronPTI

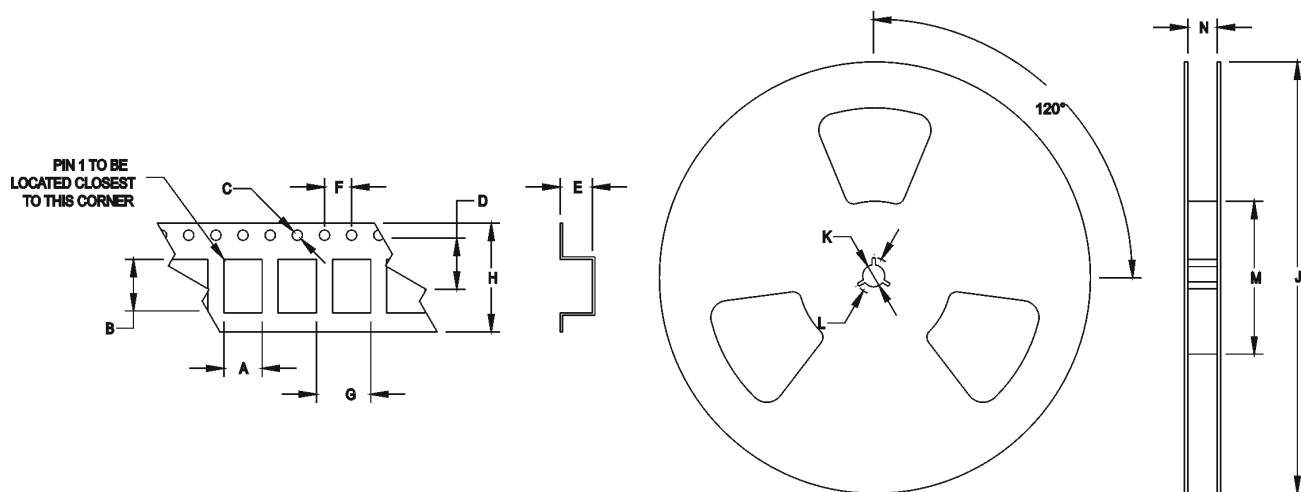


M21x Series Multiple Frequency Clock Oscillator

5x7 mm, 3.3/2.5/1.8 Volt, LVPECL/LVDS/CML/HCMOS Output

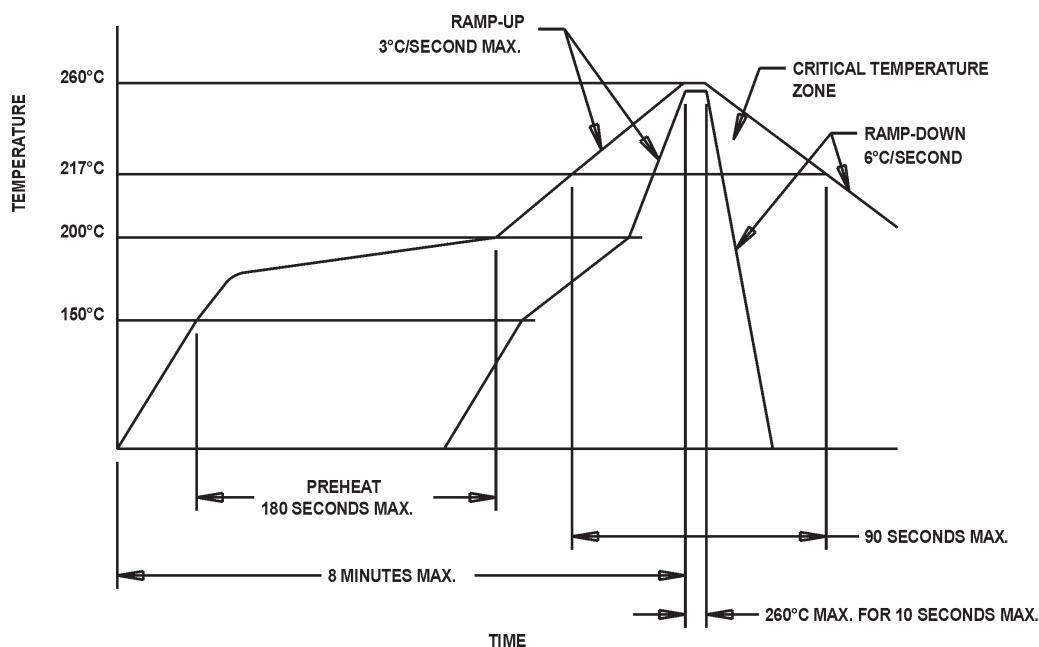
Tape & Reel Specifications

(all measurements are in mm)	A	B	C	D	E	F	G	H	I	J	K	L
M21x	6.51	9.29	1.5	7.5	2.8	4	8/12	16	180-330	13	21	60-100



Standard Tape and Reel: 1000 parts per reel

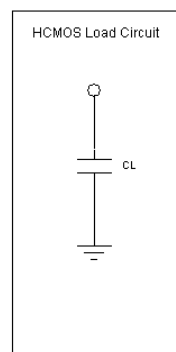
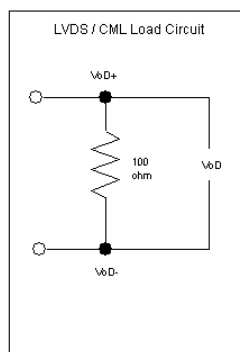
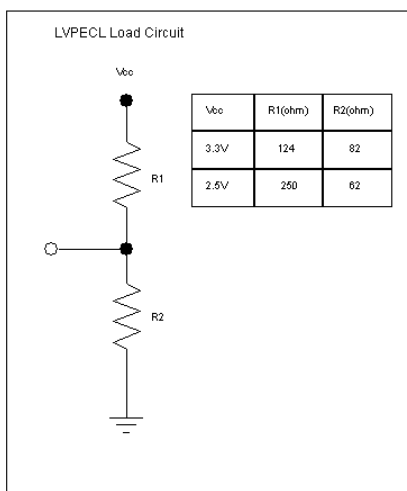
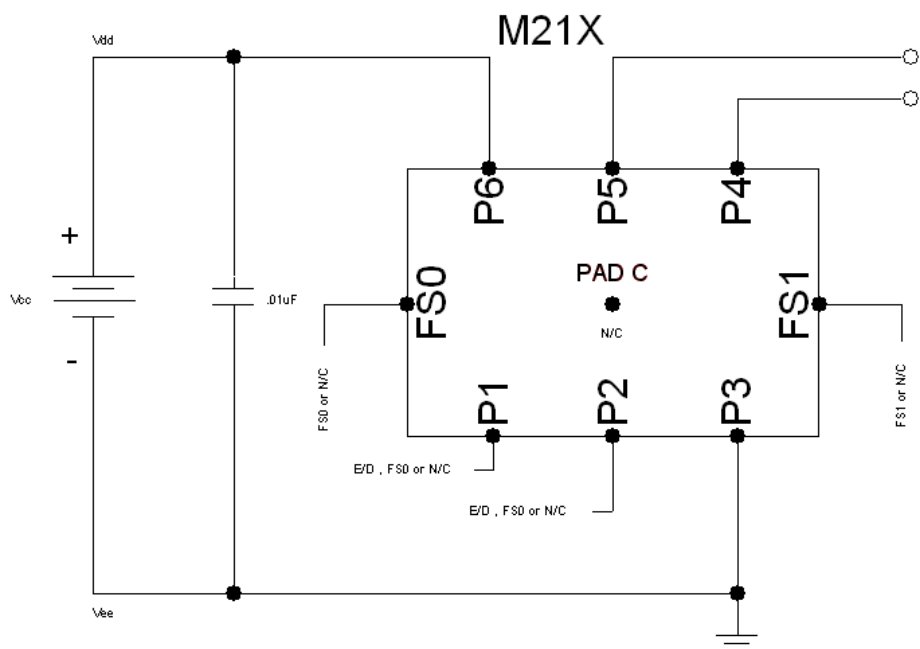
Maximum Soldering Conditions



Solder Conditions

Note: Exceeding these limits may damage the device.

Typical Test Circuit & Load Circuit Diagrams



Product Revision Table

Date	Revision	PCN Number	Details of Revision
7/20/07	A	10118	IC Revision to improve phase noise and electrical performance

For custom products or additional specifications contact our sales team at
800.762.8800 (toll free) or 605.665.9321

For more information on this product visit the MtronPTI website at
www.mtronpti.com