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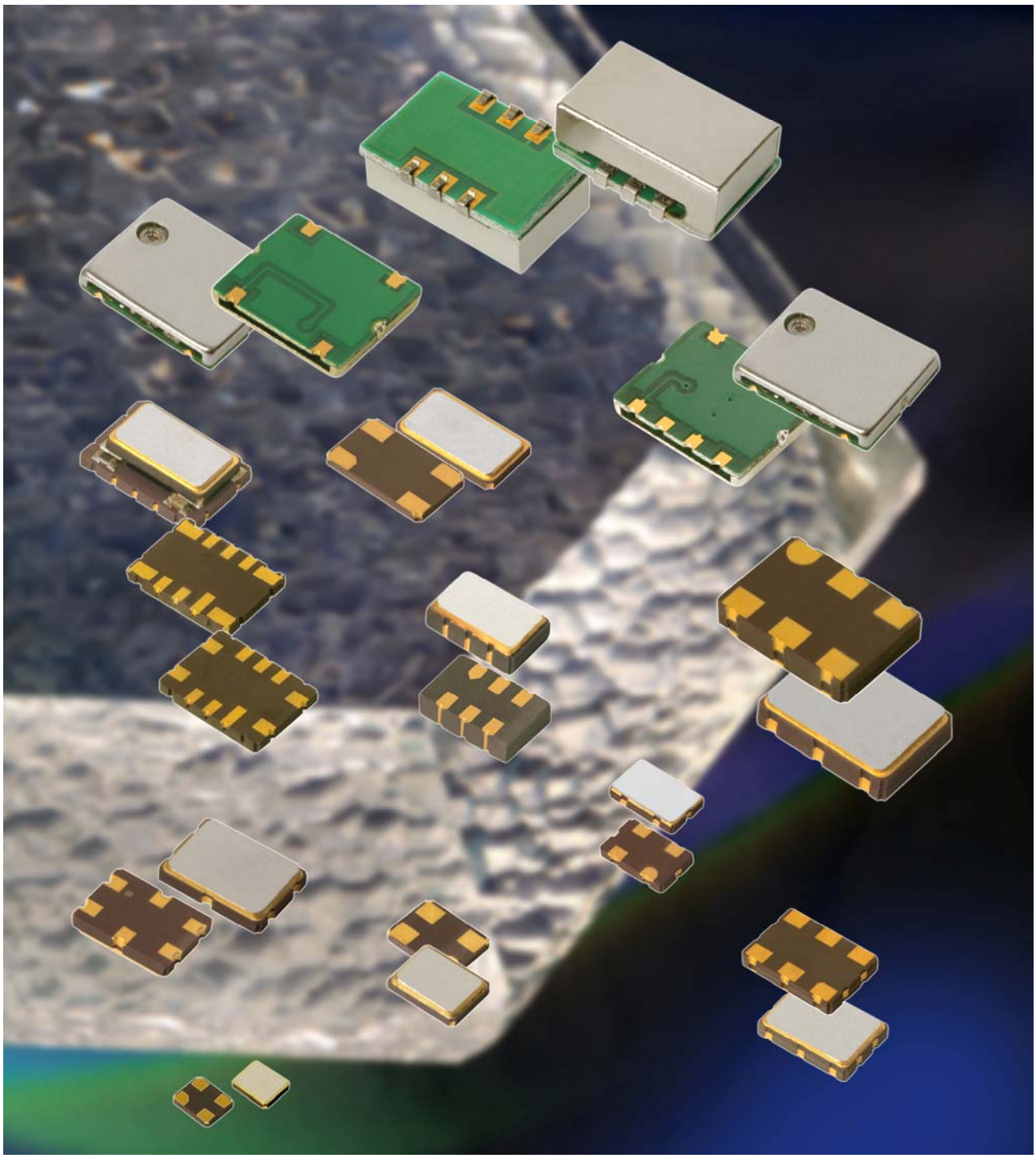
Quartz Crystals

MORE THAN FREQUENCY



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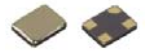
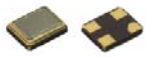
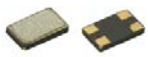
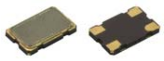
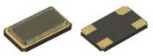
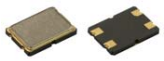
Ceramic and metal packaged SMD Quartz Crystal

Type	Size	Frequency Range	Mode of oscillation	Package Type
	[mm]	[MHz]		
SMX-315	L = 3.2 W = 1.5 H = 0.9	32.768 kHz	tuning fork	
SMX-7S	L = 2.0 W = 1.6 H = 0.4	16 ~ 50 MHz	fundamental	
SMX-6S	L = 2.5 W = 2.0 H = 0.6	12 ~ 40 MHz	fundamental	
SMX-5S	L = 3.2 W = 2.5 H = 0.6	13 ~ 50 MHz	fundamental	
SMX-4S	L = 4.0 W = 2.5 H = 0.7	13 ~ 50 MHz	fundamental	
SMX-3S	L = 5.0 W = 3.2 H = 0.7	10 ~ 67 MHz 50 ~ 240 MHz	fundamental 3rd & 5th OT	
SMX-2S	L = 6.0 W = 3.5 H = 1.0	9.6 ~ 67 MHz 50 ~ 240 MHz	fundamental 3rd & 5th OT	
SMX-1S	L = 7.0 W = 5.0 H = 1.3	8 ~ 200 MHz 40 ~ 250 MHz	fundamental 3rd & 5th OT	
SMX-3C	L = 5.0 W = 3.2 H = 0.8	12 ~ 67 MHz	fundamental	
SMX-2C	L = 6.0 W = 3.5 H = 1.0	10 ~ 67 MHz	fundamental	
SMX-1C-A **SMX-1C-B** **SMX-1C-C**	L = 7.0 W = 5.0 H = 1.2	6 ~ 50 MHz 30 ~ 84 MHz	fundamental 3rd OT	
SMX-1CL	L = 11.8 W = 5.5 H = 1.8	3.2 ~ 50 MHz 30 ~ 70 MHz	fundamental 3rd OT	
SMX-3F3 new	height = 2.0 ~ 4.5	3.5 ~ 40 MHz 32 ~ 70 MHz	fundamental 3rd OT	
SMX-3F	height = 2.0 ~ 4.5	3.5 ~ 40 MHz 32 ~ 70 MHz	fundamental 3rd OT	
SMX-4F	height = 2.5 ~ 5.0	3.5 ~ 70 MHz 32 ~ 70 MHz	fundamental **3rd OT**	
SMX-5F	height = 3.0 ~ 5.0	3.5 ~ 70 MHz 32 ~ 70 MHz	fundamental **3rd OT**	

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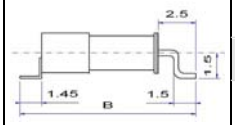
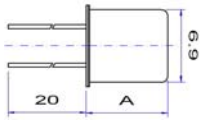
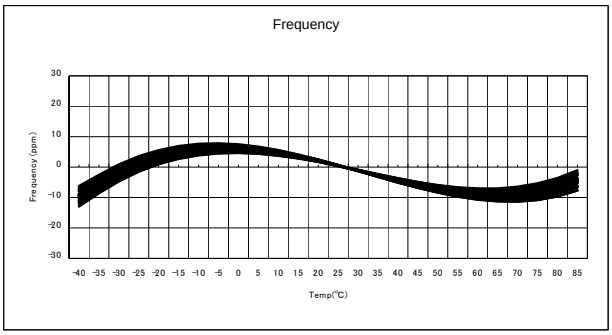
Metal packaged SMD & Through Hole Quartz Crystal

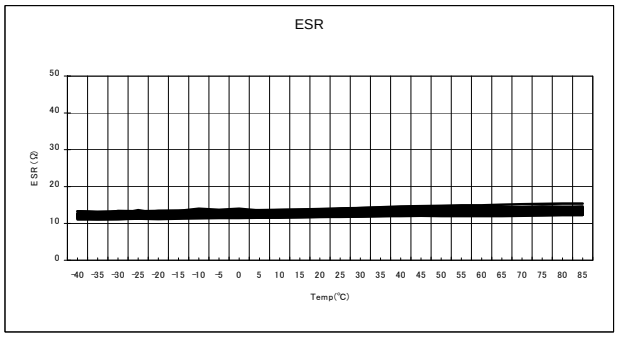
Type	Size		Frequency Range	Mode of oscillation	Package Type
	[mm]		[MHz]		
UM-1 MJ **UM-5 MJ** **UM-4 MJ**	B = 12.0 B =10.0 B = 8.5		8 ~ 200 MHz 30 ~ 180 MHz 50 ~ 250 MHz	fundamental 3rd OT 5th OT	
UM-1 **UM-5** **UM-4**	A = 8.0 A = 6.0 A = 4.5		8 ~ 200 MHz 30 ~ 180 MHz 50 ~ 250 MHz	fundamental 3 rd OT 5th OT	
HC-49S	height = 2.0 ~ 4.5		3.5 ~ 40 MHz 32 ~ 70 MHz	fundamental 3rd OT	
HC-49U	through hole and SMD-type		150 kHz ~ 50 MHz 5 ~ 130 MHz 20 ~ 225 MHz	fundamental 3rd OT 5th OT	

Parameters

frequency stability vs. temperature	±5 ppm, ±10 ppm, ±25 ppm, ±50 ppm & ±100 ppm	
frequency tolerance @ +25 °C	±5 ppm, ±10 ppm, ±25 ppm, ±50 ppm	
load capacitance C_L	series resonance or 8 ~ 32 pF	
operating temperature range	-20 ~ +70 °C -40 ~ +85 °C -55 ~ +125 °C	commercial application industrial application automotive application
Packaging units	tape & reel tape only	500, 1k or 2k pieces < 500 pieces

DIP free frequency & ESR vs. temperature





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ISO 9001 BUREAU VERITAS Certification

Reliability Test Conditions

Environmental	Test Conditions	Reference STD.
fine leak	mass spectrometer leak rate less than 2×10^{-8} atm • cm^3/s of Helium	MIL-STD-883D 1014.9 (condition A)
gross leak	all units leak test in de-ionized water, vacuum degree: 70 mmHg (700 Torr)	MIL-STD-883D 1014.9 (condition A)
thermal shock	-55 °C ~ +125 °C, each temperature dwell 10 min, 200 cycles	MIL-STD-883D 1010.7 (condition B)
IR reflow test	preheat room ~ 200 °C / 180 s, peak temperature: 260 ±5 °C, twice	MIL-STD-202. 210 (condition B)
high temp storage	85 °C, 500 h	MIL-STD-883D 1005.7 (condition A)
high temperature & humidity storage	85 °C, 85 % relative humidity, 500 h	JIS-C 7022 B-5 (condition C)
low temp storage test	-40 °C ±3 °C, 500 h	JIS-C 5021

Mechanical	Test Conditions	Reference STD.
mechanical shock	1500 g, half-sine, 0.5 ms; 3 times in each direction (x, y, z axis)	MIL-STD-883D 2002.3 (condition B)
vibration	10 ~ 2000 Hz, 20 g, 1.52 mm as max. amplitude; 4 h in each direction (x, y, z axis)	MIL-STD-883D 2007.2 (condition A)

Required specification for quotation request	Units	Example
Type		**SMX-3S**
nominal frequency	**MHz**	**44.000 MHz**
fundamental or overtone order		**fundamental**
frequency stability vs. temperature range	**ppm**	**±25 ppm**
operating temperature range	**°C**	**-40 to +85 °C**
frequency tolerance @ +25 °C	**ppm**	**±20 ppm**
aging per year	**ppm**	**±2 ppm**
load capacitance	**pF**	**12 pF**
equivalent series resistance (ESR)	**Ω**	**15 Ω**
drive level	**µW**	**100 µW**
application		**W-LAN**

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