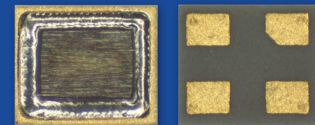


# IoT Optimized Ultra-Miniature Quartz Crystal



ABM13W SERIES



**1.20 x 1.00 x 0.33mm**  
**RoHS/RoHS II Complaint**  
**MSL = N/A: Not Applicable**

## FEATURES

- World's smallest At-Cut MHz Crystal (1.20 x 1.00 x 0.33 mm package)
- Ideally suited for space constraint IoT, Wearables & Wireless applications
- Simultaneously optimized for low plating load & ESR over extended temperature range
- Enhanced performance for start-up time and power savings with Low Energy SoC's
- Low profile ideal for height constraint designs
- Available with  $\pm 10$  ppm set-tolerance

## APPLICATIONS

- Wearables
- Wireless Modules
- Internet of Things (IoT)
- Bluetooth / Bluetooth Low Energy (BLE)
- Machine-to-Machine (M2M) Connectivity
- Ultra-Low Power MCU's, SoC's, Transceivers
- Near Field Communication
- ISM Band Applications

## Electrical Specifications

Parameters	Min.	Typ.	Max.	Units	Note
Frequency Range	32.0000		80.0000	MHz	
Standard Available Frequencies	32.0000, 37.4000, 38.4000, 40.0000, 45.0000, 48.0000, 52.0000, 60.0000, 76.8000, 80.0000			MHz	Contact Abracon for Nonstandard Frequencies
Operation Mode	Fundamental				
Operating Temperature Range	-40		+85	°C	See Options
Storage Temperature	-40		+125	°C	
Frequency Tolerance @ +25°C	-10		+10	ppm	See options
Frequency Stability over the Operating Temperature ( ref. to +25°C)	-15		+15	ppm	See options
Equivalent series resistance (R1) (over -40°C to +125°C)		< 45	100	$\Omega$	32.0000-32.9999MHz
		< 35	80		33.0000-36.9999MHz
		< 25	50		37.0000-80.0000MHz
Shunt capacitance (C0)			1.0	pF	
Load capacitance (CL)		5.0		pF	See options
Drive Level		10	100	$\mu$ W	
Aging (1 year)	-2		+2	ppm	@25°C $\pm$ 3°C
Insulation Resistance	500			M $\Omega$	@100 Vdc $\pm$ 15V

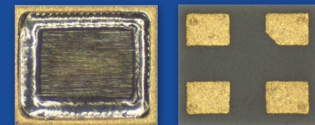


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 Phone: 512-371-6159 | Fax: 512-351-8858  
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REVISED: 08.15.2018

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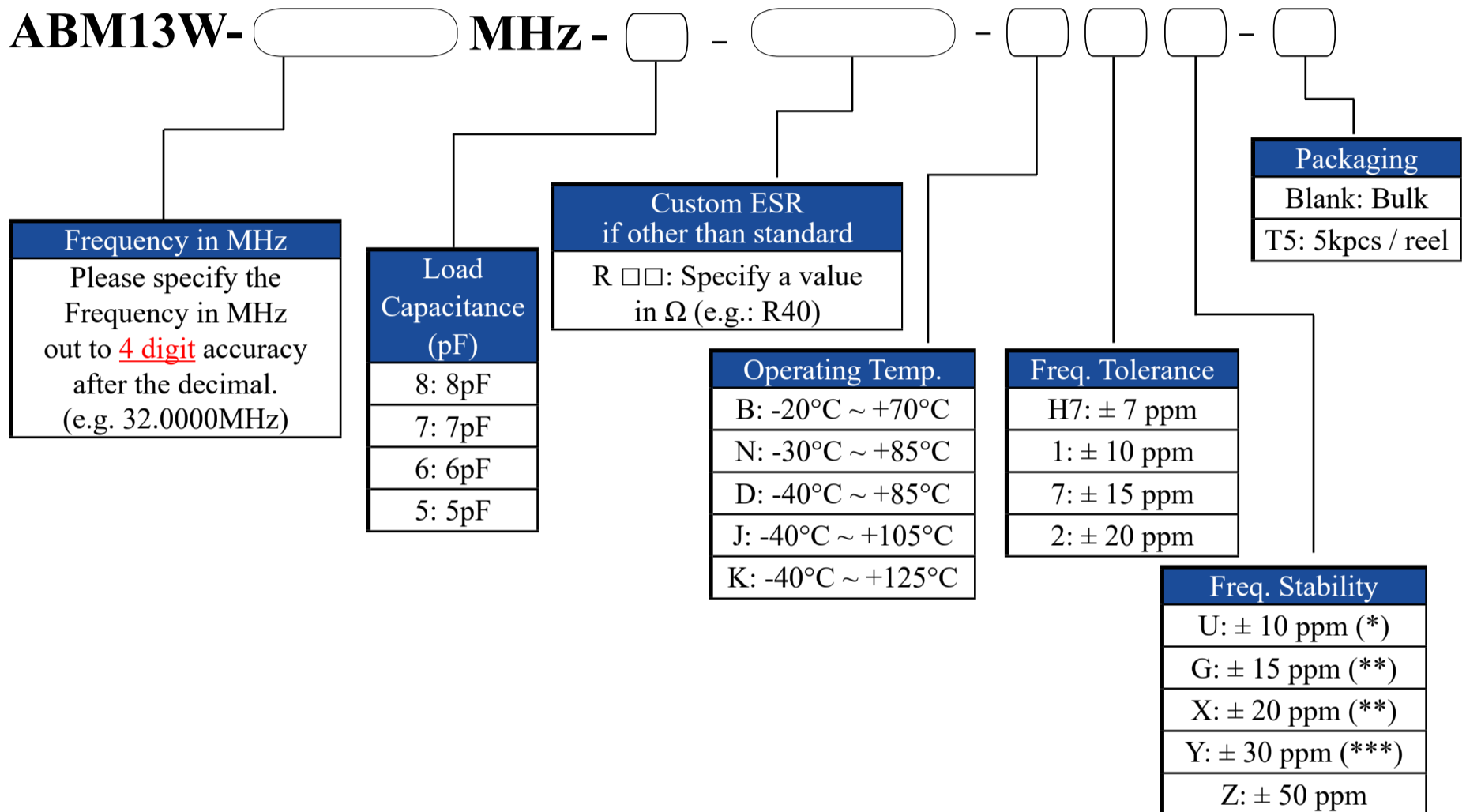


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## Options and Part Identification [Note 1]



(\*) Only offered @ Operating Temp. Range options: B & N  
 (\*\*) Only offered @ Operating Temp. Range options: B, N, & D  
 (\*\*\*) Only offered @ Operating Temp. Range options: B, N, D, & J  
 Contact ABRACON for tighter Frequency Stability options.

**Note 1:**  
 Contact Abracon for part number requests with carrier frequency callouts up to 5 & 6 digit accuracy after the decimal.

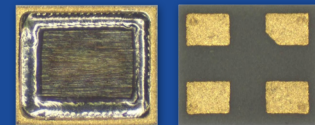


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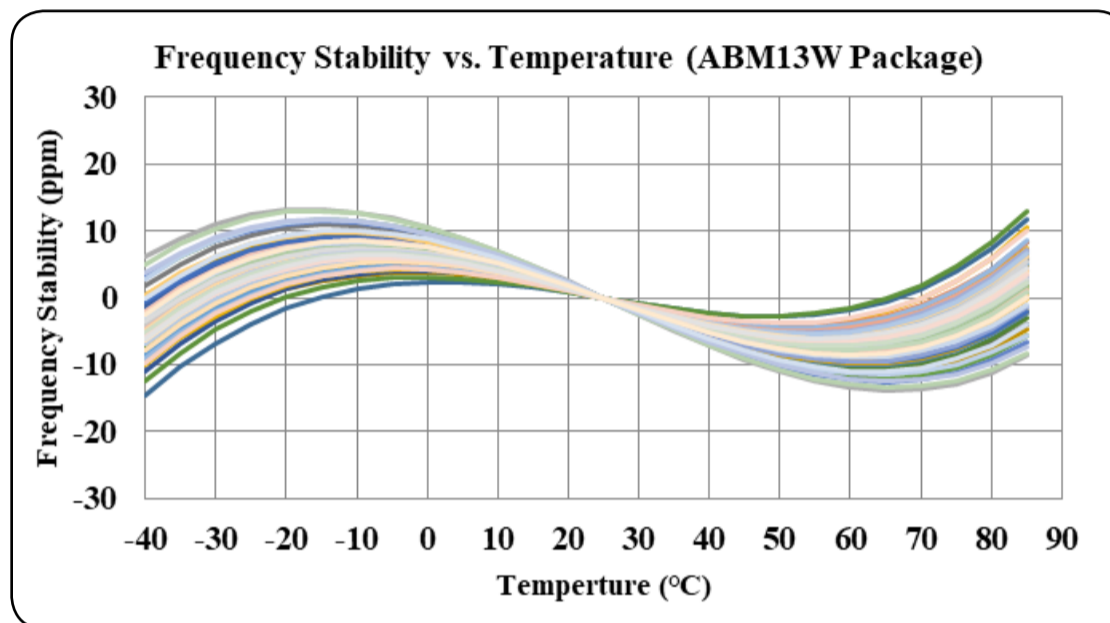


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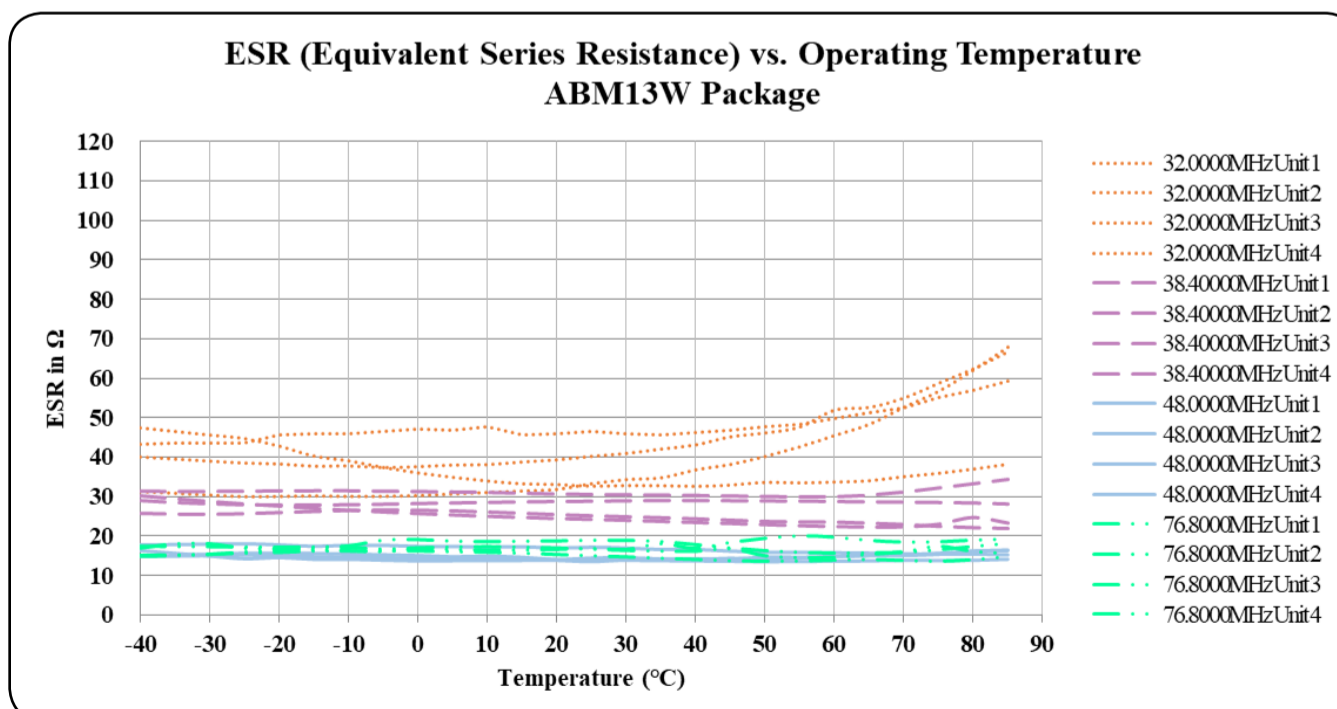


1.20 x 1.00 x 0.33mm  
 RoHS/RoHS II Complaint  
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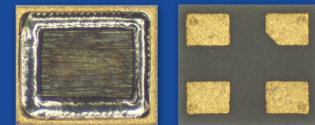
## Typical Frequency vs. Temperature Characteristics (ref. to +25°C):



## Typical ESR (Equivalent Series Resistance) vs. Temperature Characteristics:



# IoT Optimized Ultra-Miniature Quartz Crystal

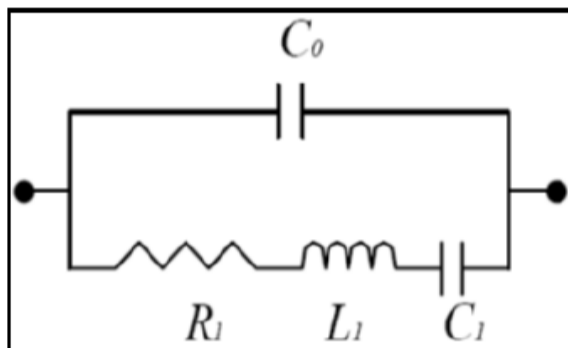


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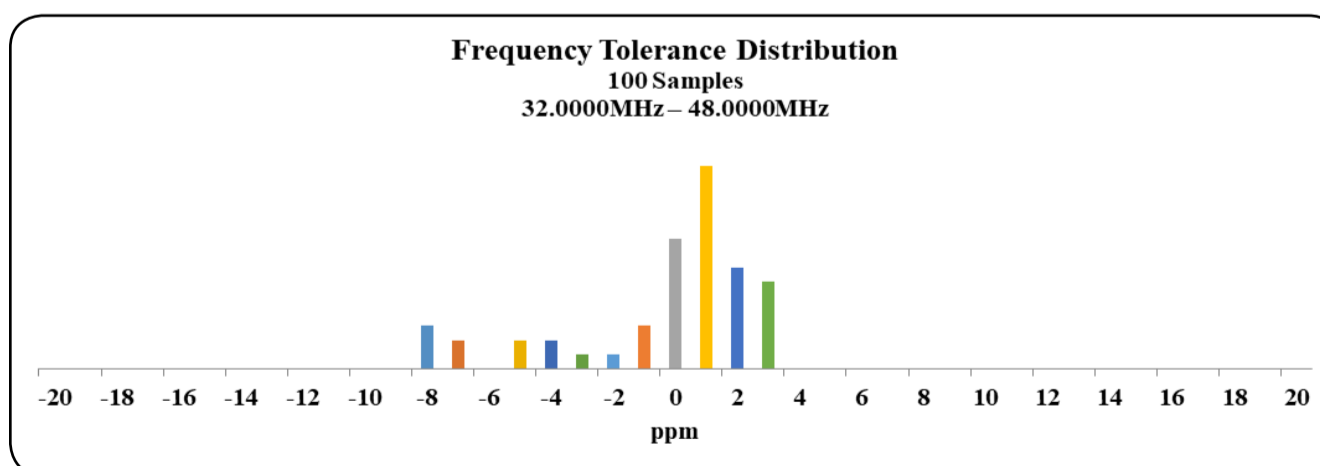
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 RoHS/RoHS II Complaint  
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**SPICE Models (based on typical values at 25°C ± 3°C):**

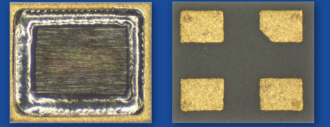


<b>Frequency: 32.0000MHz</b>				<b>Frequency: 38.4000MHz</b>			
<b>Plating Load: 8pF</b>				<b>Plating Load: 6pF</b>			
C0	=	0.46	pF	C0	=	0.48	pF
R1	=	41.19	Ω	R1	=	22.48	Ω
L1	=	16.91	mH	L1	=	10.99	mH
C1	=	1.46	fF	C1	=	1.57	fF
<b>Frequency: 48.0000MHz</b>				<b>Frequency: 76.8000MHz</b>			
<b>Plating Load: 6pF</b>				<b>Plating Load: 6pF</b>			
C0	=	0.86	pF	C0	=	0.77	pF
R1	=	19.50	Ω	R1	=	16.97	Ω
L1	=	5.73	mH	L1	=	1.58	mH
C1	=	1.92	fF	C1	=	2.74	fF

**Typical Frequency Tolerance Distribution (at 25°C ± 3°C):**



# IoT Optimized Ultra-Miniature Quartz Crystal

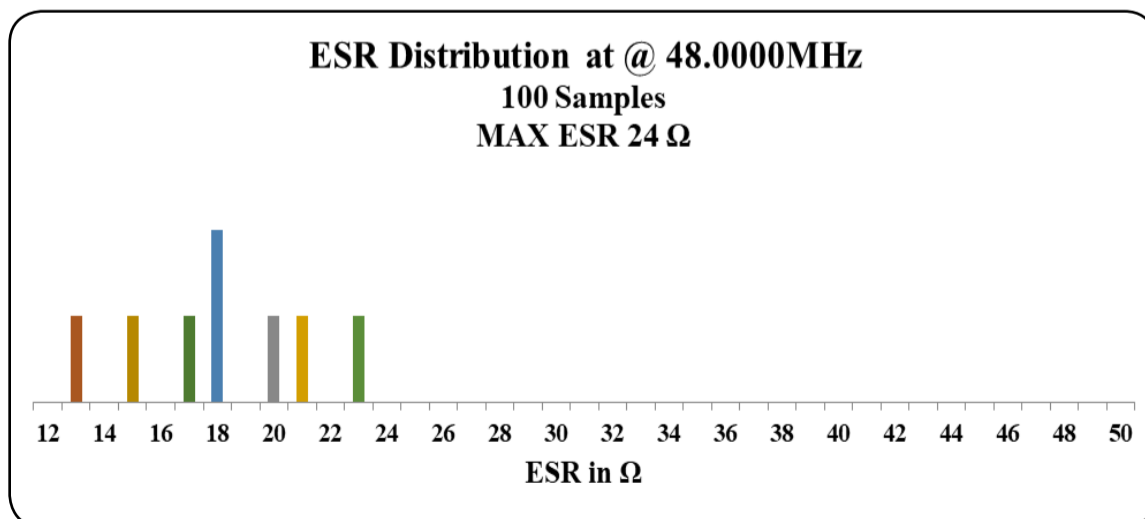
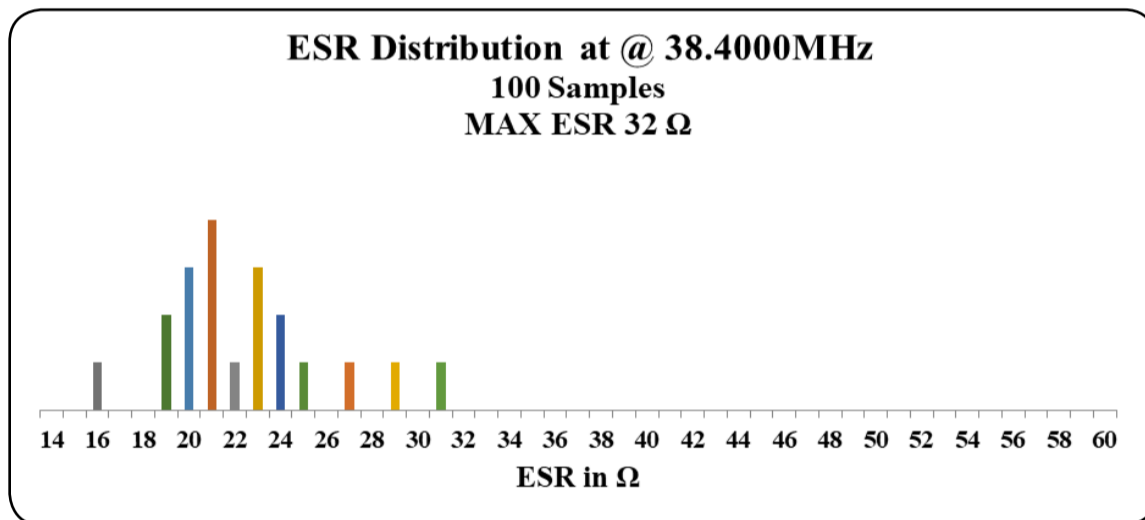
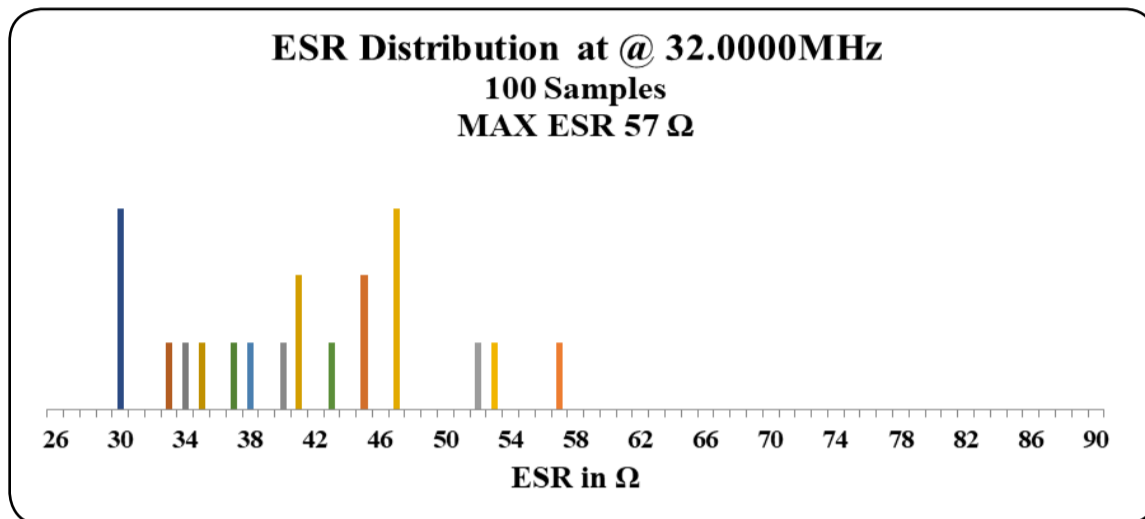


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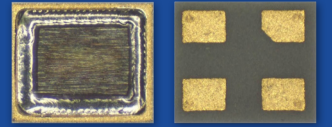


1.20 x 1.00 x 0.33mm  
RoHS/RoHS II Complaint  
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## Typical ESR Distribution (at 25°C ± 3°C):



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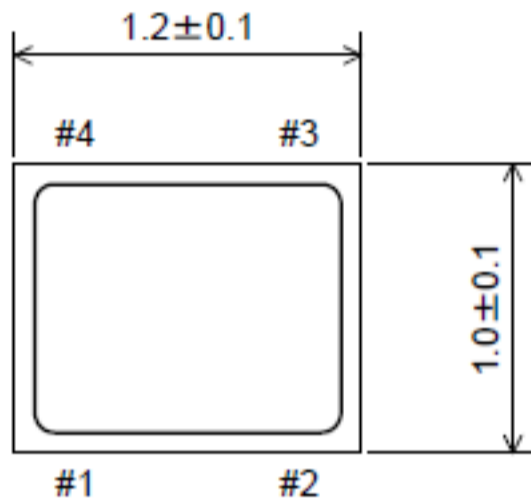


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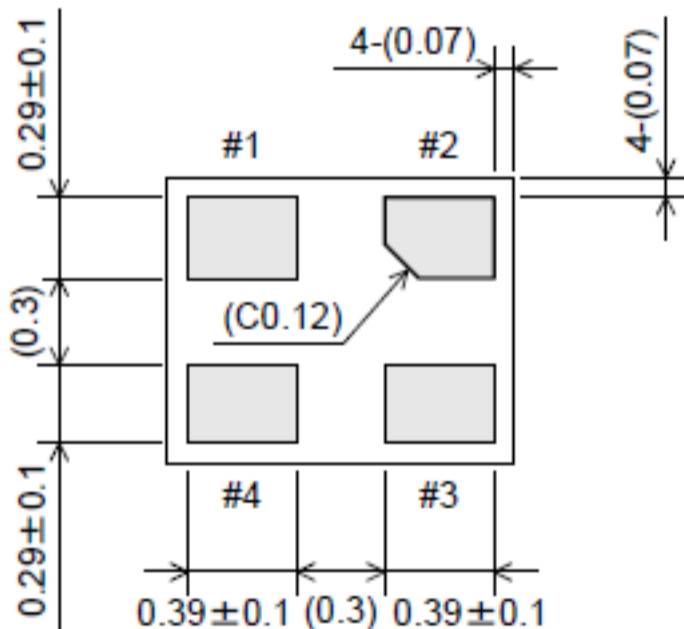
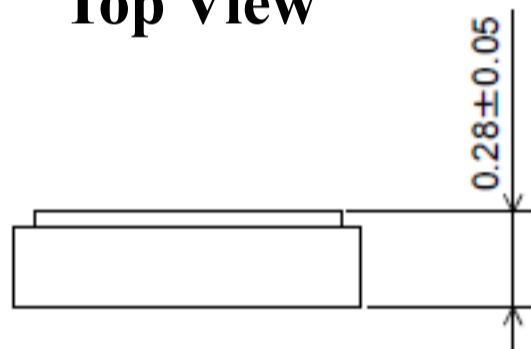
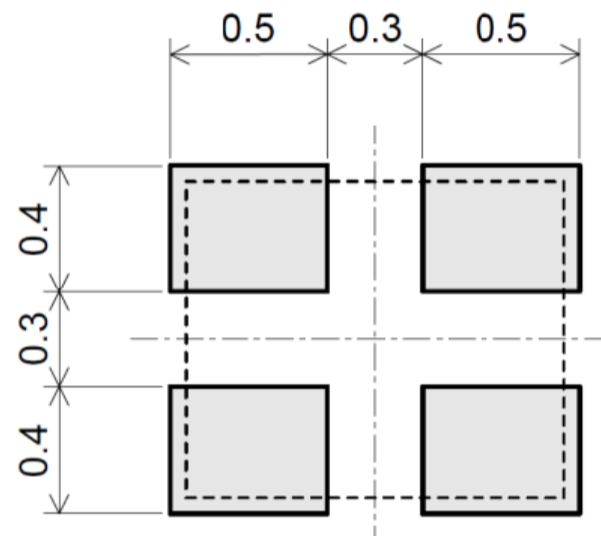
1.20 x 1.00 x 0.33mm  
 RoHS/RoHS II Compliant  
 MSL = N/A: Not Applicable

## Mechanical Dimensions



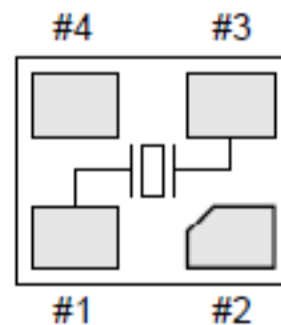
**Top View**

## Recommended Land Pattern



**Bottom View**

## Internal connection



**Pin #2: GND**  
**Pin #4: NC**

Dimensions: mm

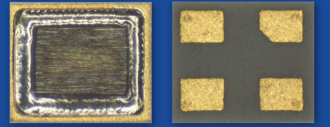


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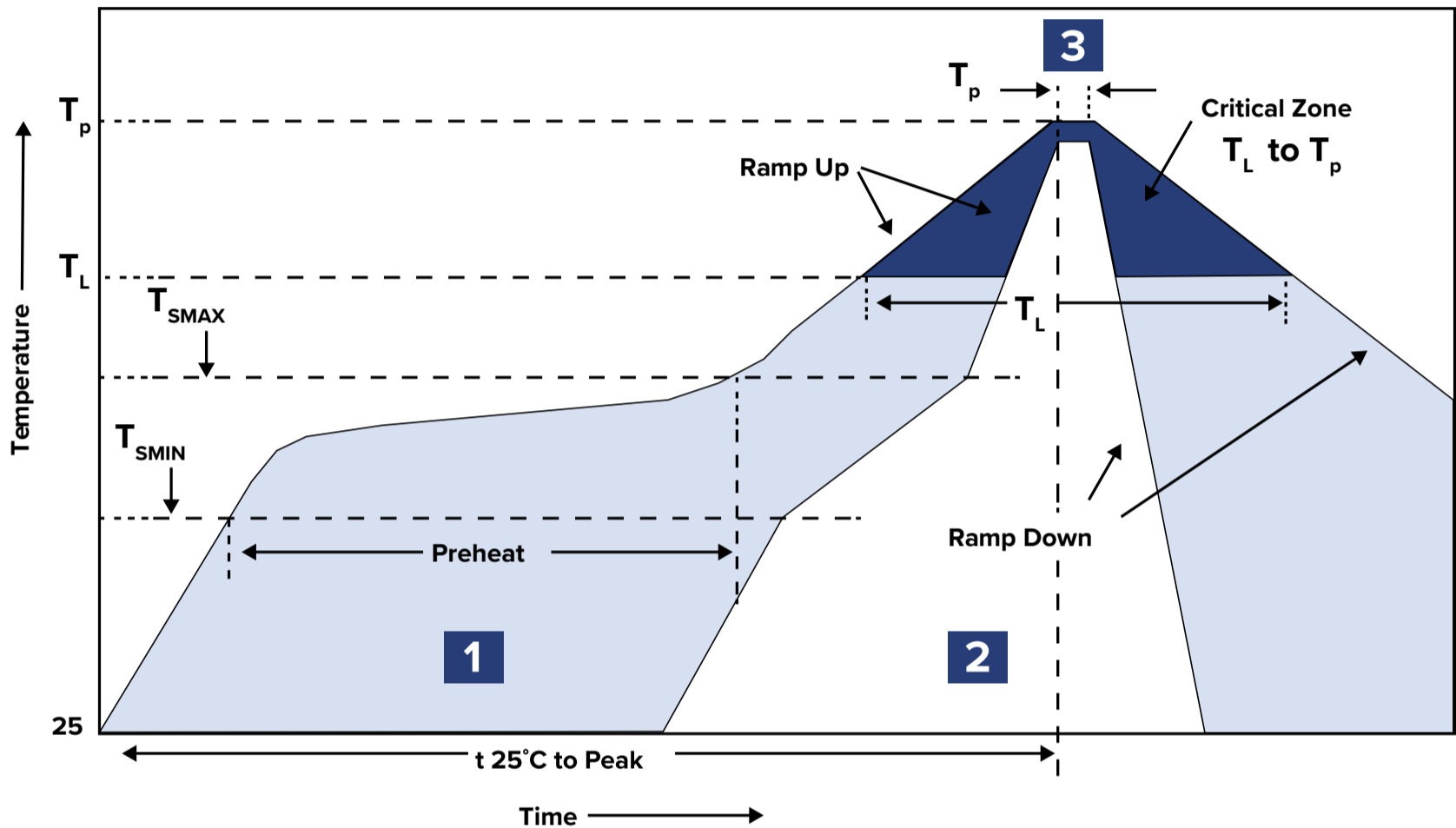


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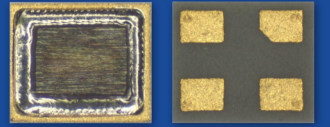
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## Reflow Profile



Zone	Description	Temperature	Time
1	Preheat / Soak	$T_{SMIN} \sim T_{SMAX}$ $160 \pm 10^{\circ}\text{C}$	80 ~ 100 sec.
2	Reflow	$T_L$ $220^{\circ}\text{C}$	50 ~ 70 sec.
3	Peak heat	$T_p$ $260 \pm 5^{\circ}\text{C}$	5 sec. MAX.

# IoT Optimized Ultra-Miniature Quartz Crystal



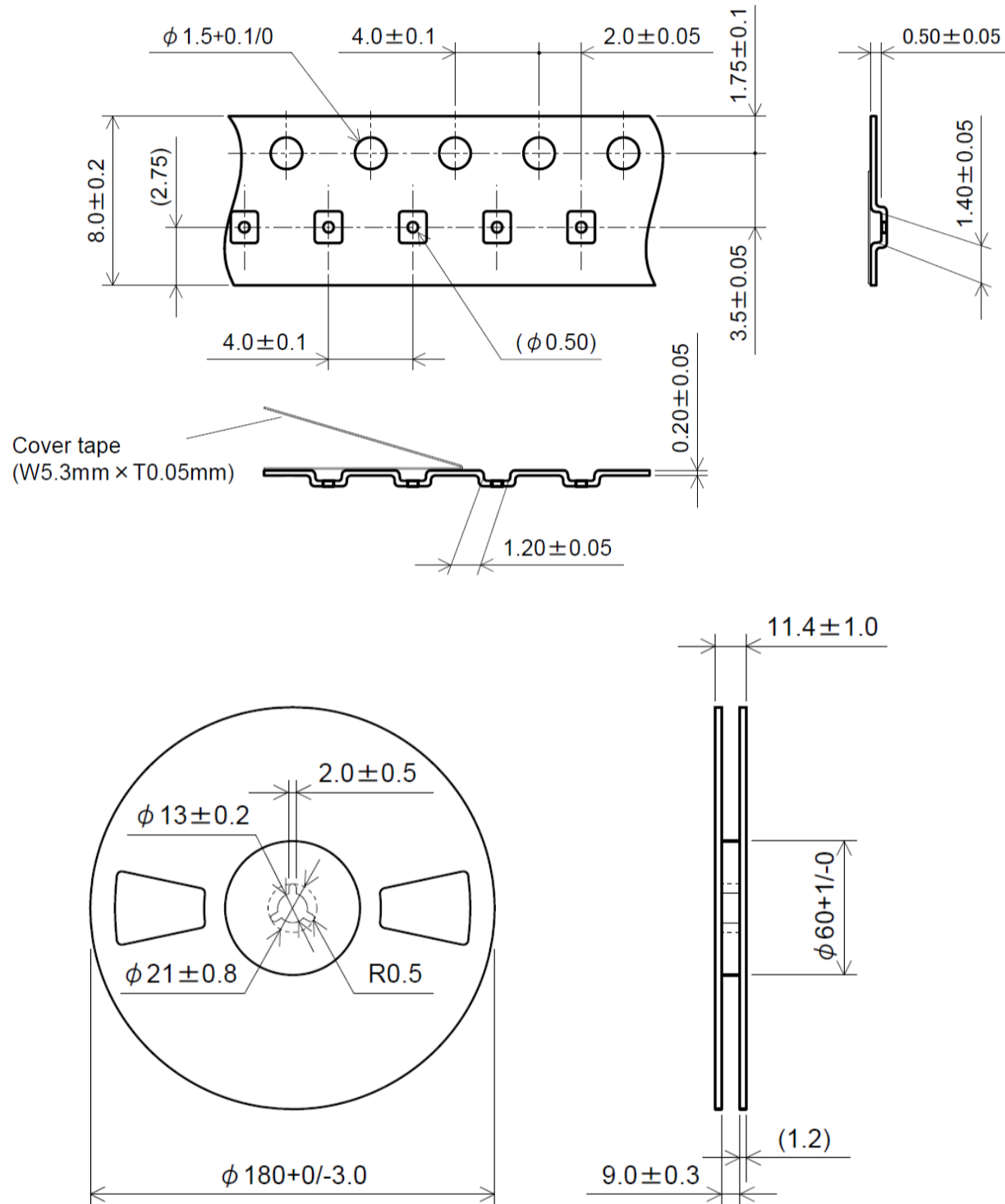
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## Packaging:

T5: Tape and reel (5,000pcs/reel)



## Dimensions: mm

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