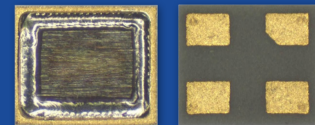




**THE DATASHEET OF**  
**ABM13W-48.0000MHZ-5-DH7G-T5**



# 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) at 5pF plating load*		< 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

(\* ) Plating Load = Load Capacitance (CL)

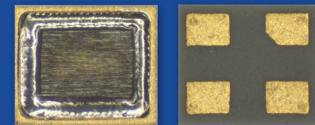


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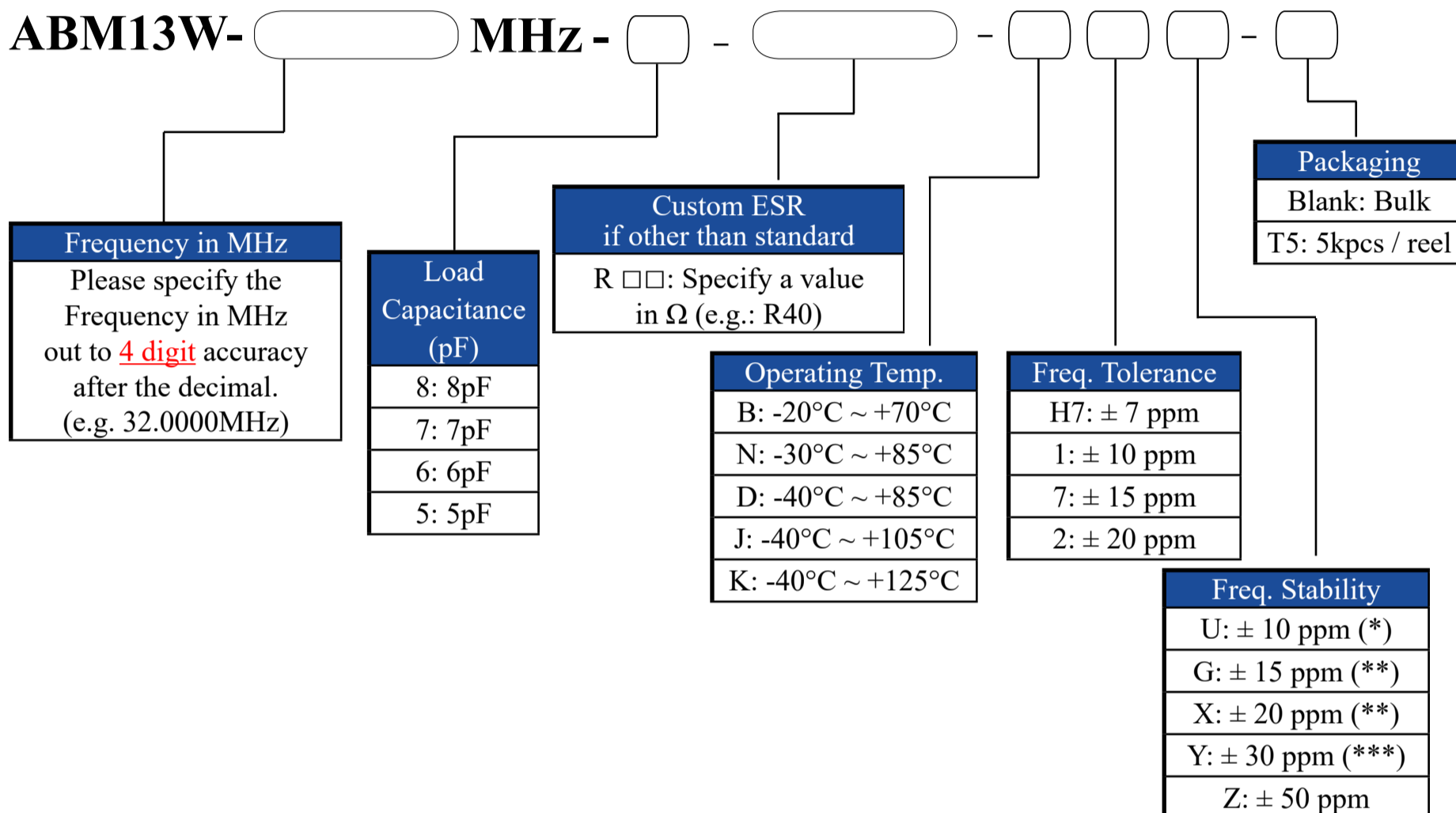


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## Options and Part Identification [Note 1]



(\*) 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.

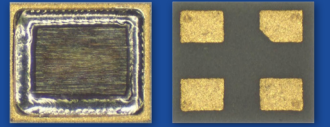


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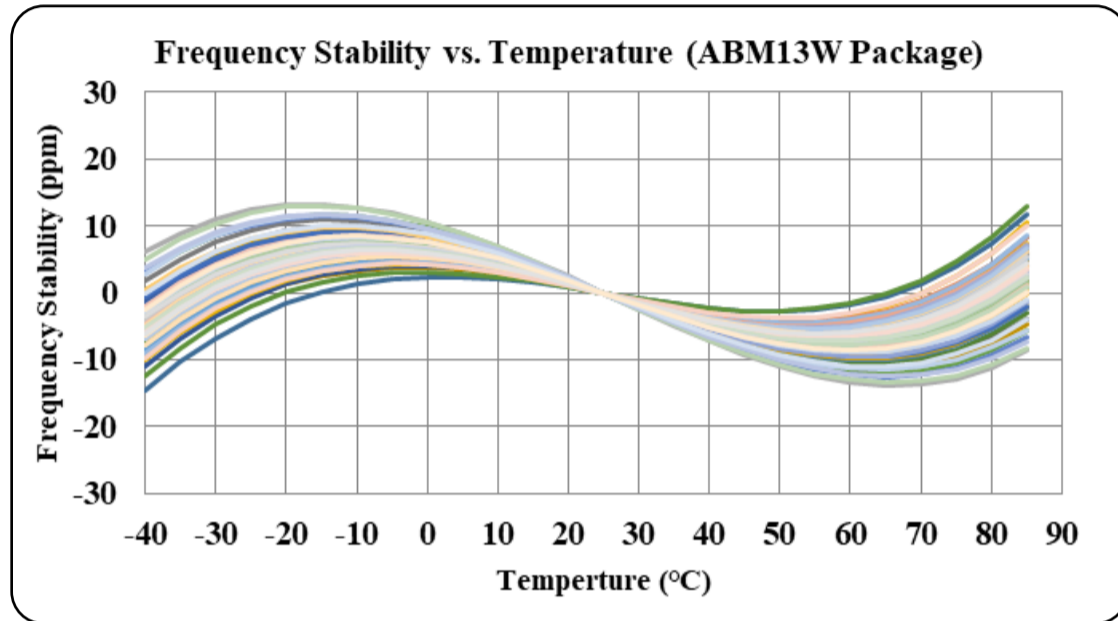


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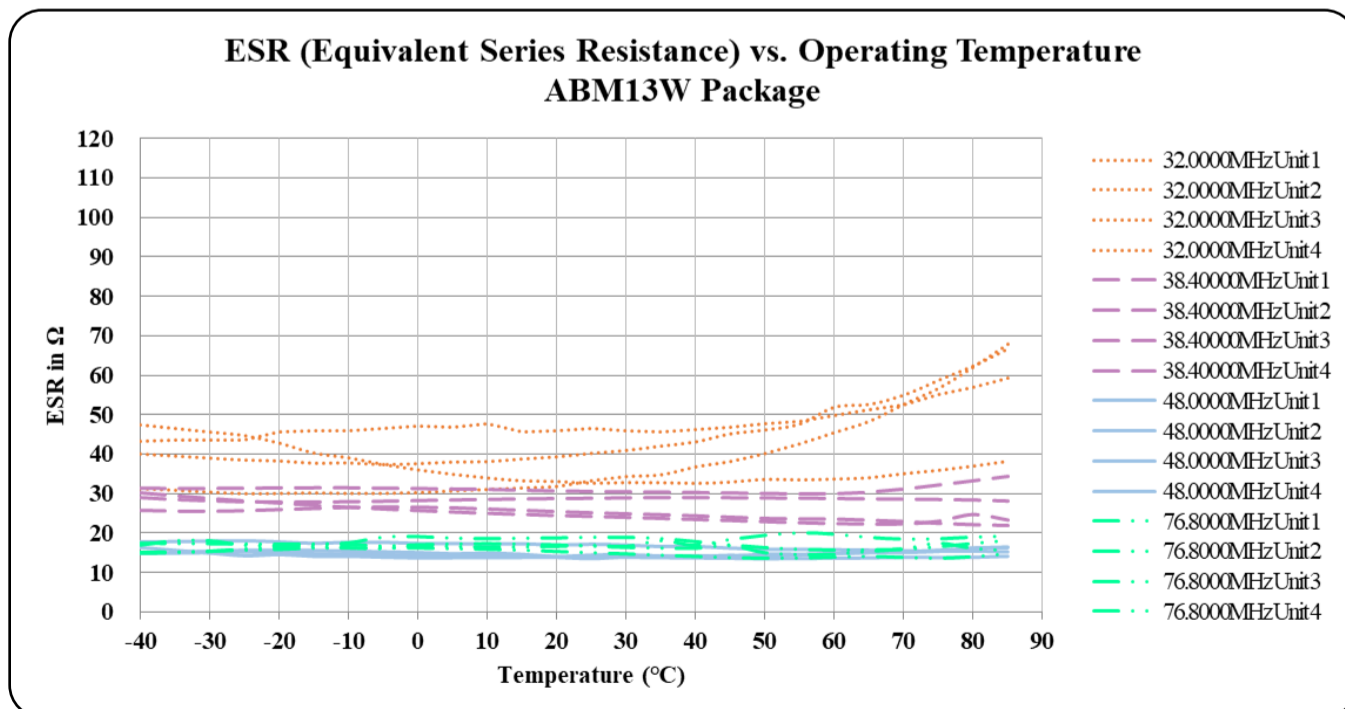


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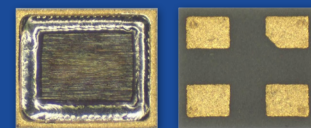
## Typical Frequency vs. Temperature Characteristics (ref. to +25°C):



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



# IoT Optimized Ultra-Miniature Quartz Crystal

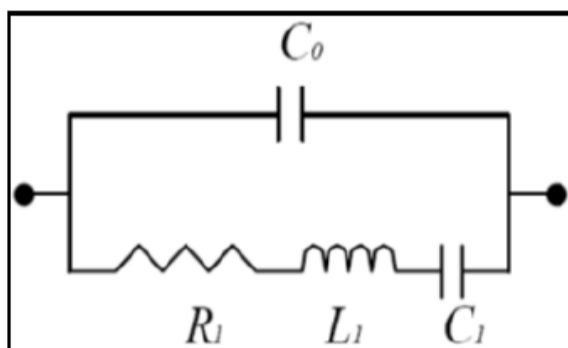


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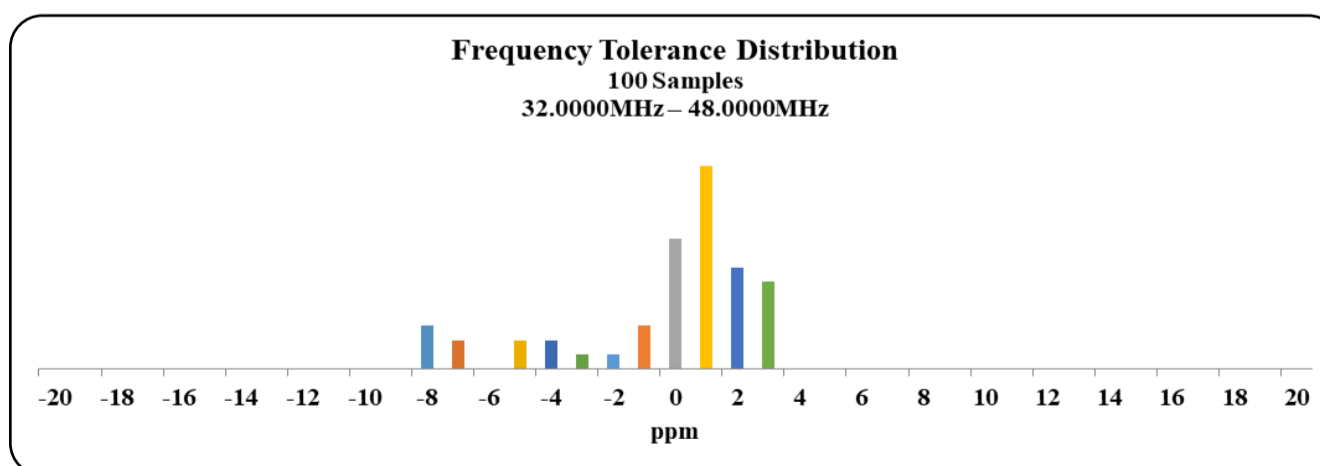
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**SPICE Models (based on typical values at 25°C ± 3°C):**

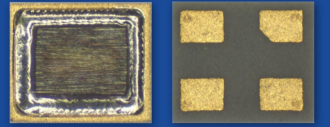


<b>Frequency: 32.0000MHz</b>				<b>Frequency: 38.4000MHz</b>			
<b>Plating Load: 8pF</b>				<b>Plating Load: 6pF</b>			
C0	=	0.46	pF	C0	=	0.48	pF
R1	=	41.19	Ω	R1	=	22.48	Ω
L1	=	16.91	mH	L1	=	10.99	mH
C1	=	1.46	fF	C1	=	1.57	fF
<b>Frequency: 48.0000MHz</b>				<b>Frequency: 76.8000MHz</b>			
<b>Plating 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):**



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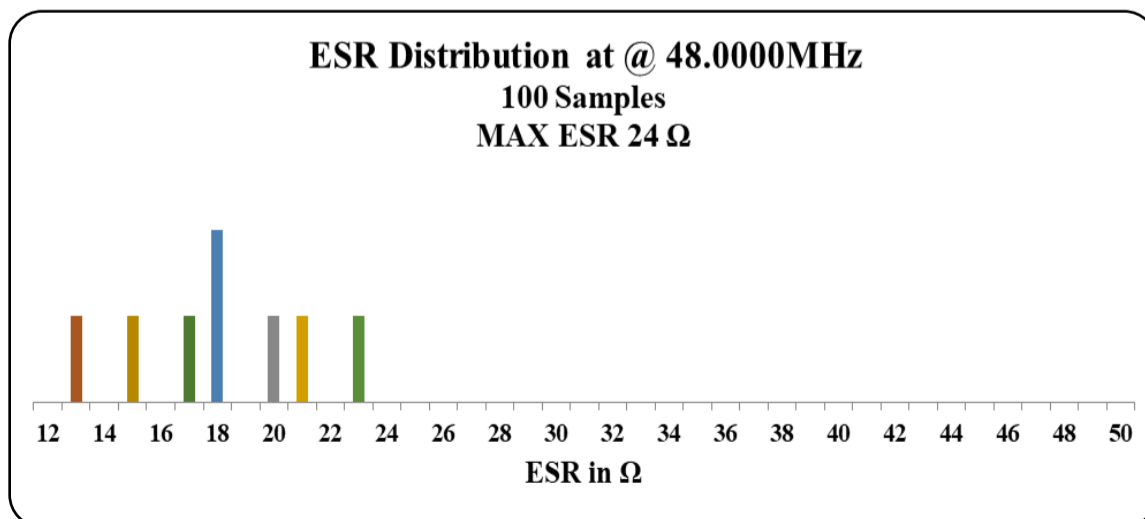
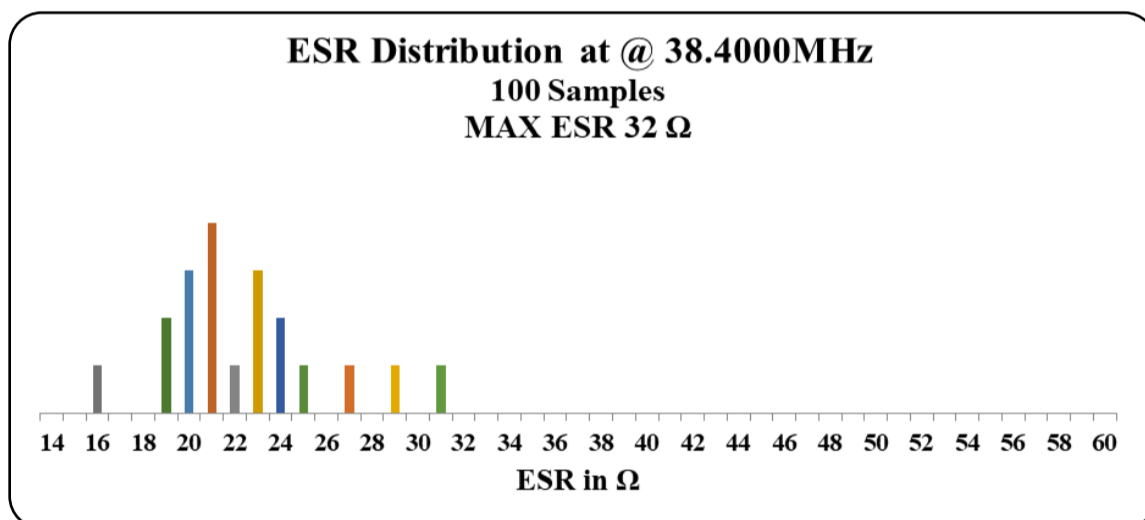
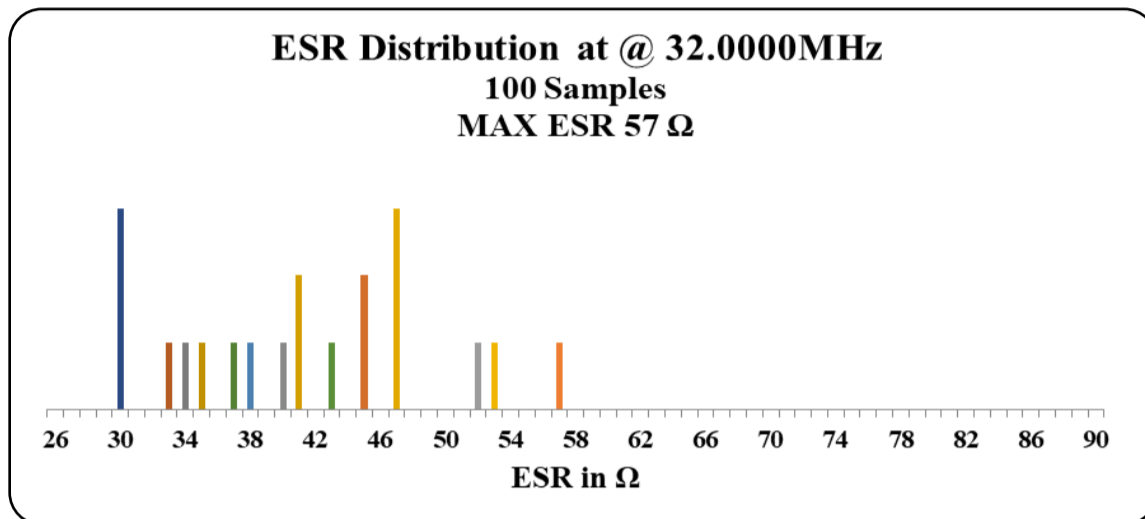


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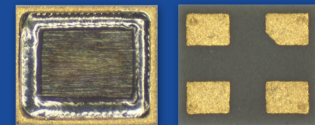


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## Typical ESR Distribution (at 25°C ± 3°C):



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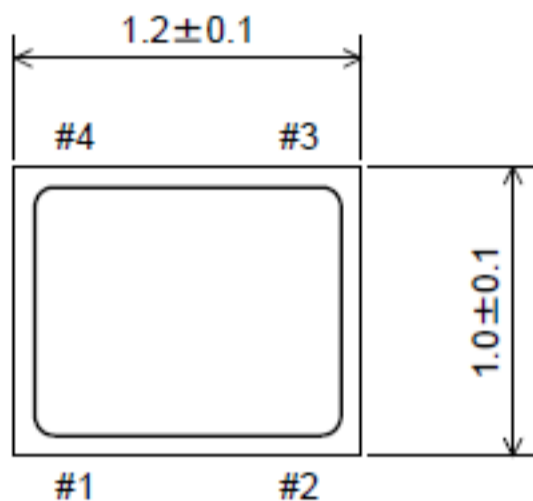


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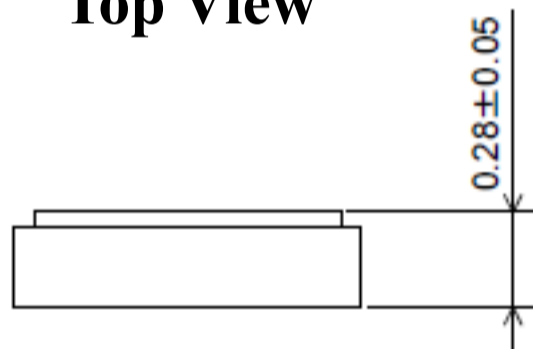


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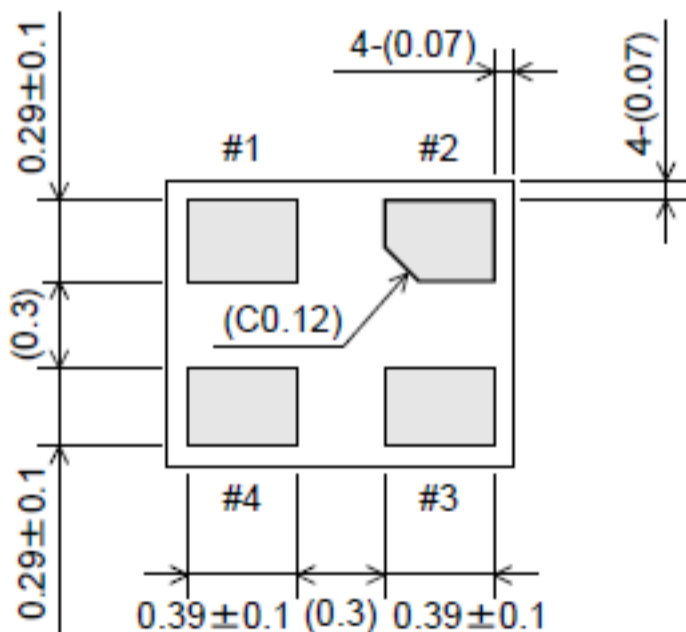
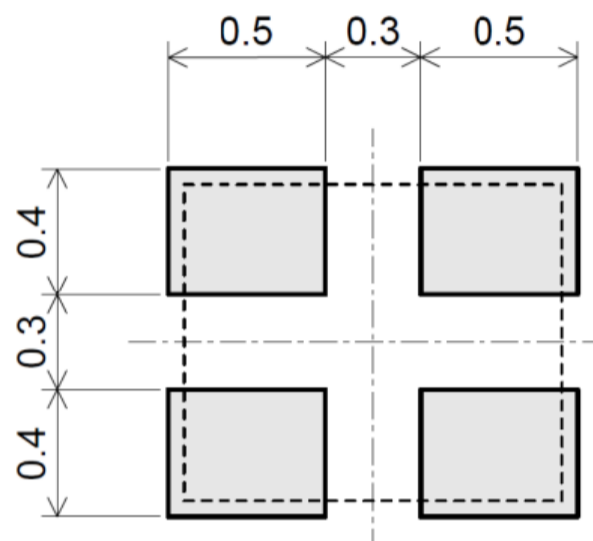
## Mechanical Dimensions



Top View

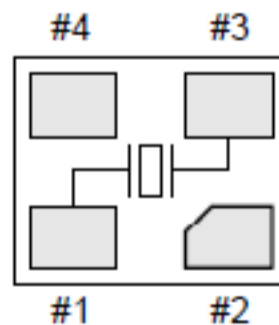


## Recommended Land Pattern



Bottom View

## Internal connection



Pin #2: GND (Electrically connected to metallic package lid)  
 Pin #4: NC (No internal connection, leave floating or connect to GND)

Dimensions: mm

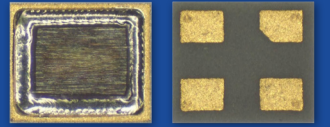


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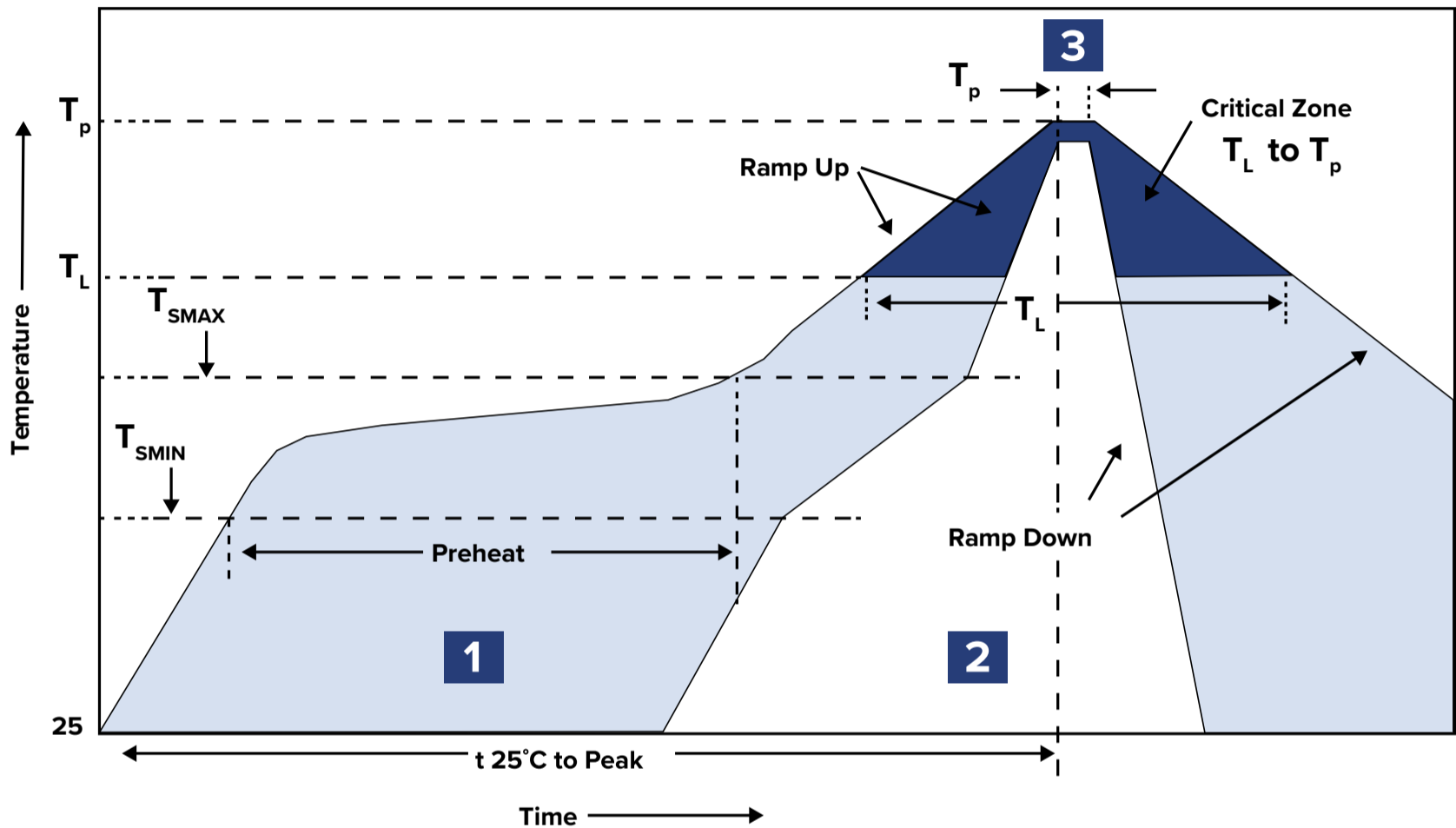


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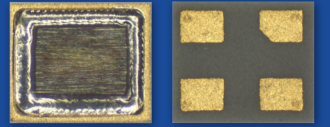
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## Reflow Profile



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

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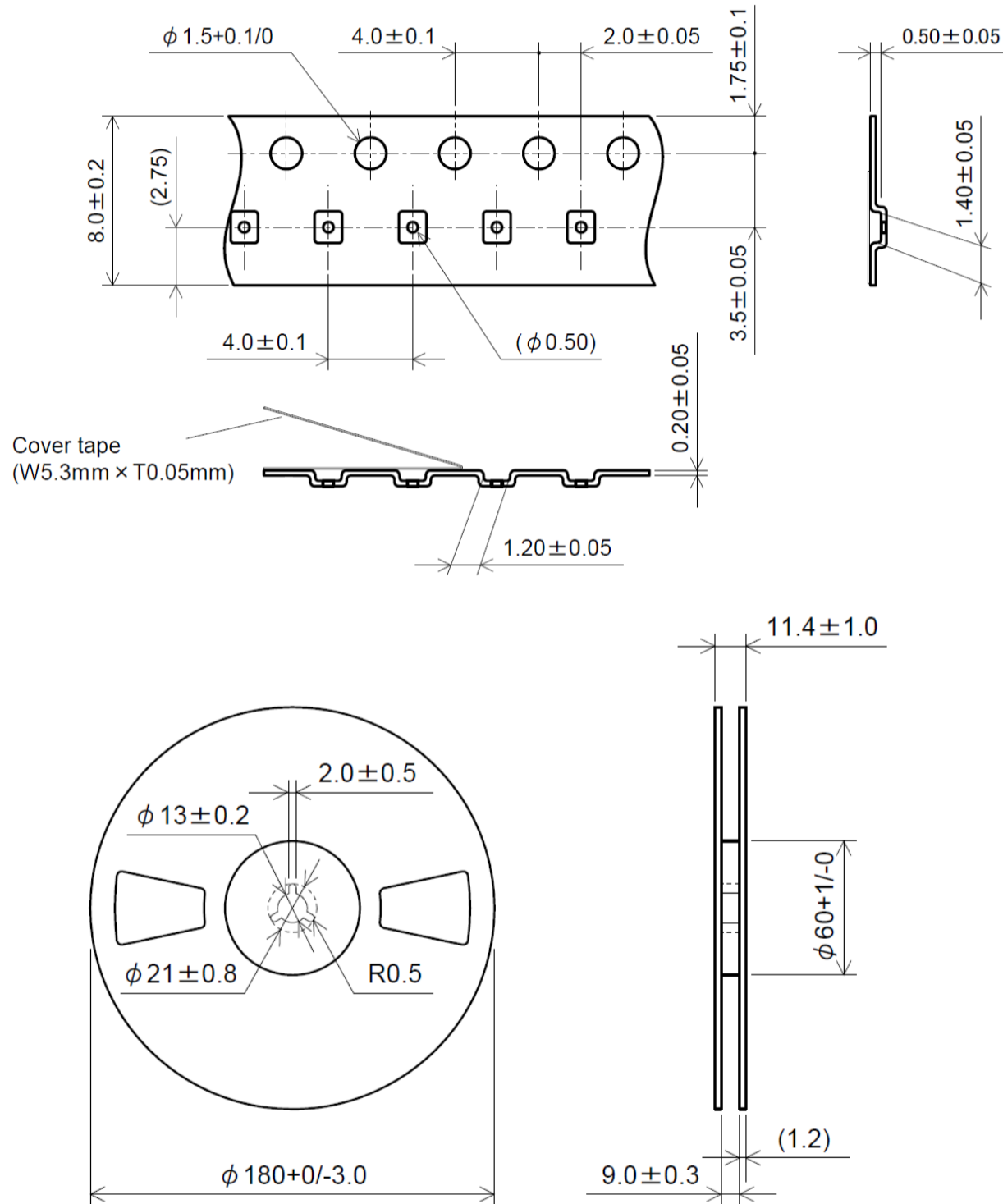
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## Packaging:

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



## Dimensions: mm

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