

# 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)<br>(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                          |

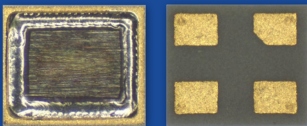


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REVISED: 02.17.2020

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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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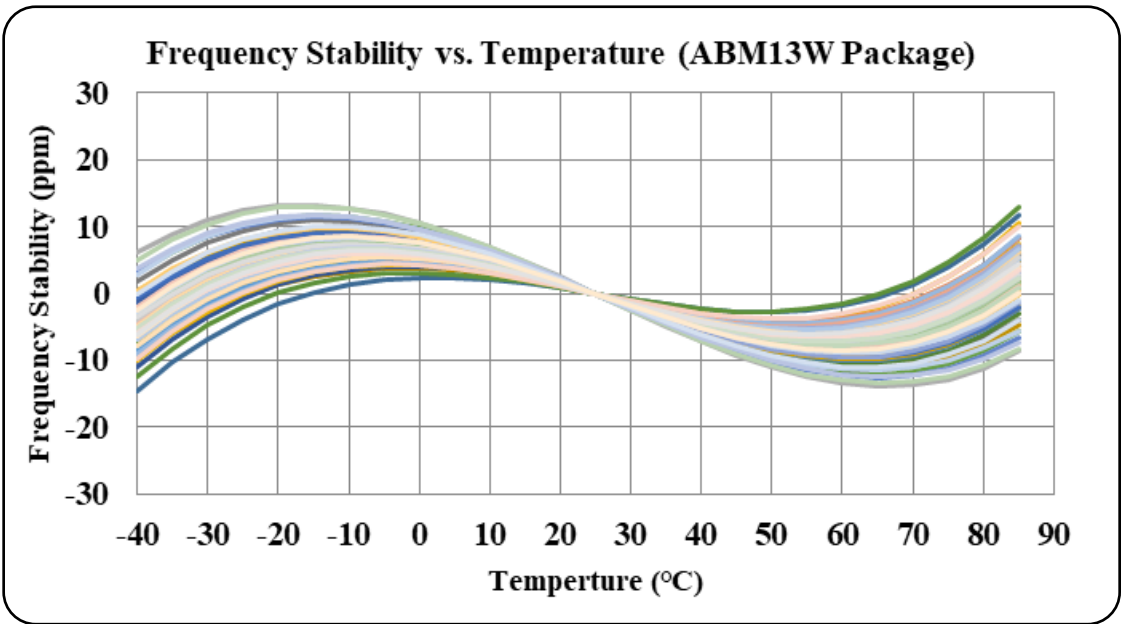


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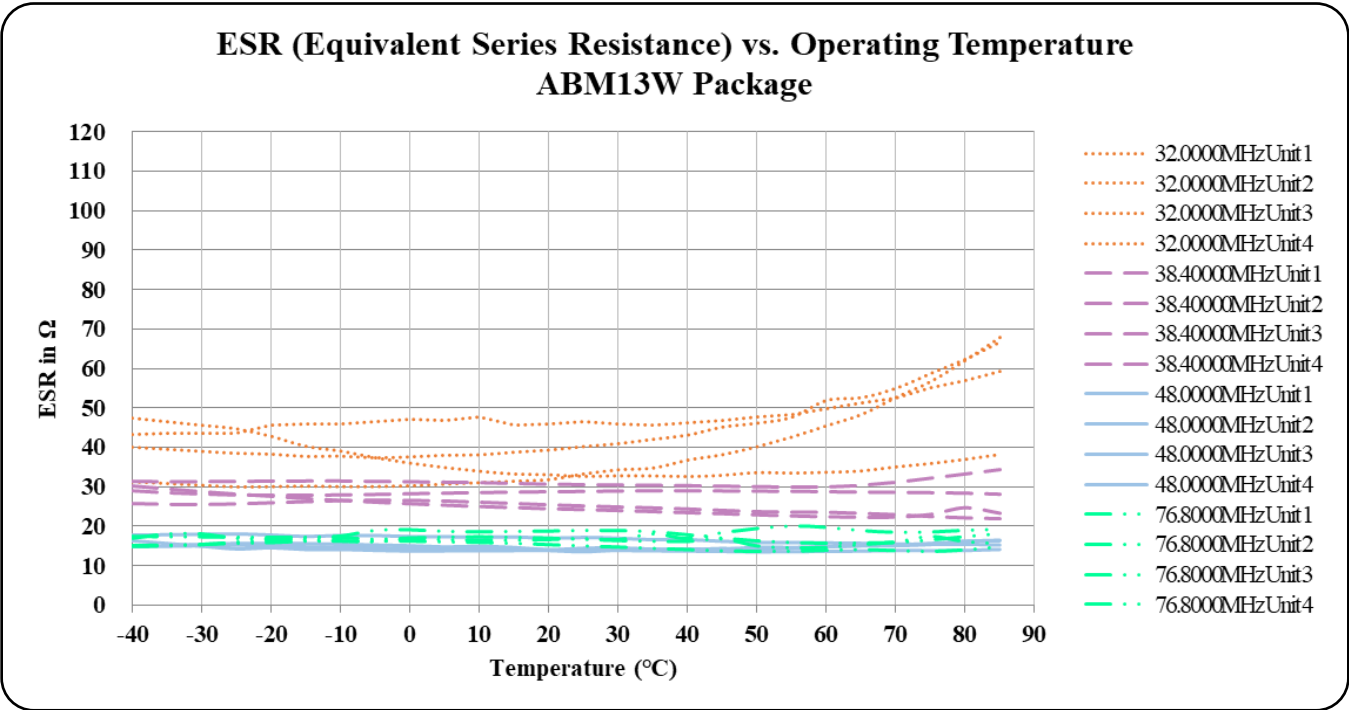


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## Typical Frequency vs. Temperature Characteristics (ref. to +25°C):



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



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



| Frequency: 32.0000MHz |   |       |    | Frequency: 38.4000MHz |   |       |    |
|-----------------------|---|-------|----|-----------------------|---|-------|----|
| Plating Load: 8pF     |   |       |    | Plating Load: 6pF     |   |       |    |
| 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 |

| Frequency: 48.0000MHz |   |       |    | Frequency: 76.8000MHz |   |       |    |
|-----------------------|---|-------|----|-----------------------|---|-------|----|
| Plating Load: 6pF     |   |       |    | Plating Load: 6pF     |   |       |    |
| 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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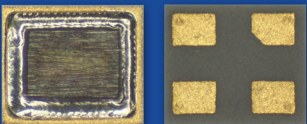


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## Typical ESR Distribution (at 25°C ± 3°C):



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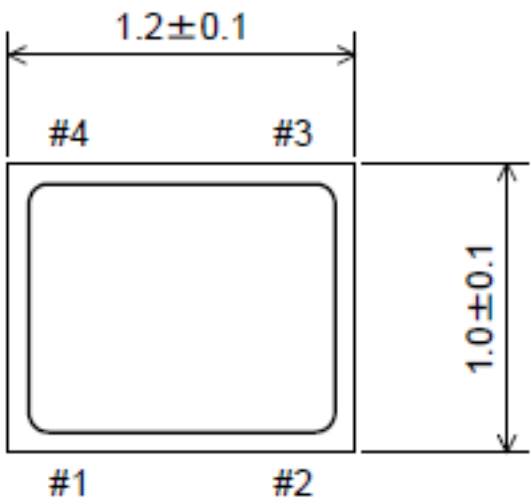


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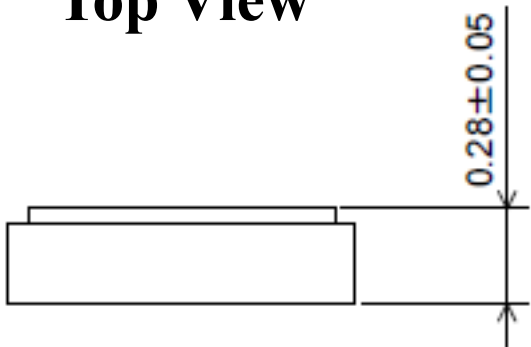


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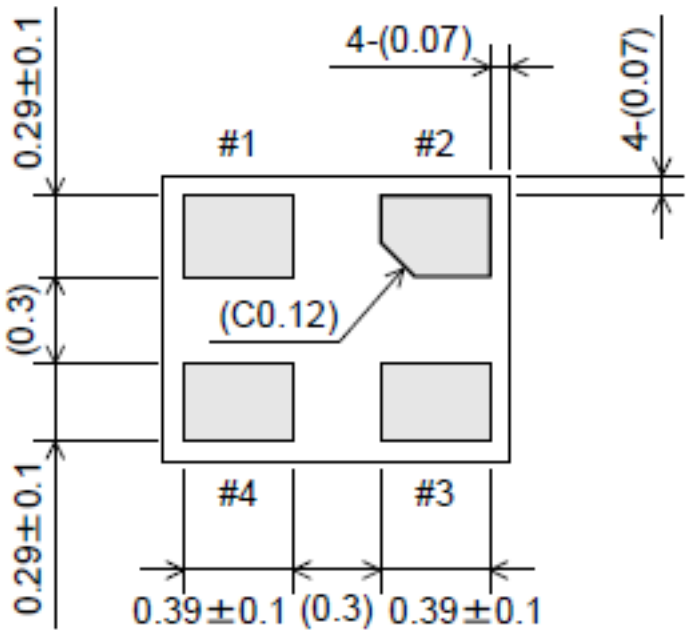
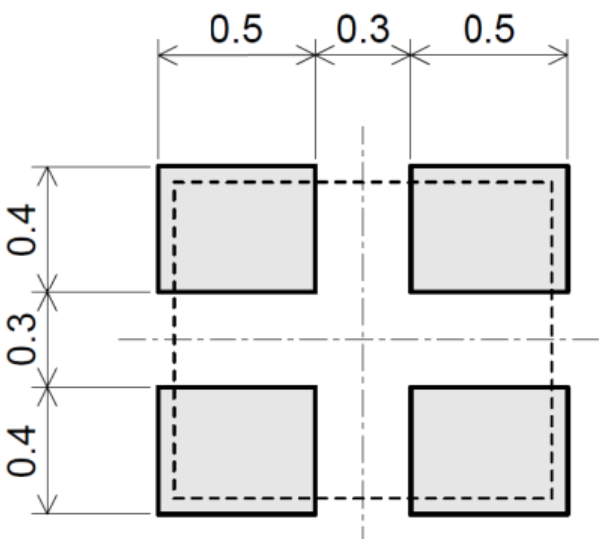
## Mechanical Dimensions



Top View

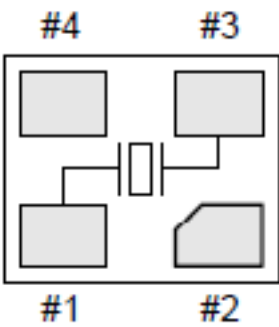


## Recommended Land Pattern



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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## Reflow Profile



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

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## Packaging:

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



## Dimensions: mm

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#### Как с нами связаться

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**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

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