



**THE DATASHEET OF  
ABS05W-32.768KHZ-J-2-T**



# 32.768KHZ IoT OPTIMIZED SMD CRYSTAL



ABS05W

1.6 x 1.0 x 0.5 mm



RoHS/RoHS II Compliant

MSL = N/A: NOT APPLICABLE

## FEATURES

- Exceptionally low plating load of 4.0pF, ideal for wearables, wireless, and IoT applications
- Simultaneously optimized for ESR over extended operating temperature range
- Miniature 1.6 x 1.0 x 0.5 mm SMD package, ideally suited for space constrained designs
- Available with  $\pm 20$  ppm set tolerance
- Seam sealed package for long term reliability

## APPLICATIONS

- Wearables
- Wireless Modules
- Internet of Things (IoT)
- Bluetooth/Bluetooth Low Energy (BLE)
- Machine-to-Machine (M2M) Connectivity
- Ultra Low Power MCU
- Near Field Communication (NFC)
- ISM Band Applications
- Ultra low power, energy saving MCU

## STANDARD SPECIFICATIONS

PARAMETERS	MINIMUM	TYPICAL	MAXIMUM	UNITS	NOTES
Frequency	32.768			kHz	
Operation Mode	Flexural Mode (Tuning Fork)				
Operating Temperature	-40		+125	°C	See options
Storage Temperature	-55		+125	°C	
Frequency Tolerance @ +25°C	-20		+20	ppm	Refer to Note #1
Shift through standard RoHS Reflow, (2) reflow cycles maximum	-2.00		+2.00	ppm	260°C peak maximum reflow temperature, relative to stand-alone set-tolerance frequency
Temperature Coefficient:	-0.04	-0.03	-0.02	ppm/T <sup>2</sup>	
Turn-over temperature:	+20	+25	+30	°C	
Frequency Stability Over Operating Temperature, relative to in-circuit measured frequency post reflow	-200		1	ppm	Over -40°C to +85°C
	-300		1	ppm	Over -40°C to +105°C
	-450		1	ppm	Over -40°C to +125°C
Load capacitance (CL)	4			pF	Refer to Note #2
Equivalent Series Resistance (ESR)		< 50	60	k $\Omega$	@ +25 $\pm$ 3°C
		< 55	70	k $\Omega$	Over -40°C to +85°C
		< 60	75	k $\Omega$	Over -40°C to +105°C
		< 65	85	k $\Omega$	Over -40°C to +125°C
Shunt capacitance (C0)		1.45	2.0	pF	Combined Electrode & Package Capacitance
Motional Capacitance (C1)		7.91		fF	C1 also referred as Cm
Motional Inductance (L1)		2,987,787		mH	L1 also referred as Lm
Drive Level		0.1	0.5	$\mu$ W	
Crystal sensitivity to closed-loop oscillator loading (Ts)	115	122	140	ppm/pF	Refer to Note #3
Q value	8,000	14,000			Quality Factor
Aging @ +25°C $\pm$ 3°C [First Year]	-3		+3	ppm	Relative to post reflow measured frequency
Aging @ +25°C $\pm$ 3°C [Over 10-years]	-15		+15	ppm	Relative to post reflow measured frequency
Insulation Resistance	500			M $\Omega$	@ 100Vdc $\pm$ 15V

Note #1: With an effective loop capacitance of 4.0pF, the oscillator circuit will be within set-tolerance specification; less any frequency shift due to the reflow process.

Note #2: The oscillator loop needs to present an effective loop capacitance of 4.0 pF to track the stand-alone crystal frequency. This loop capacitance is essential to ensure highest possible Closed-Loop Safety Factor for the entire population of crystals.

Note #3:  $T_s = - (C1) / [ 2*(C0 + CL)^2 ]$  ..... Where CL = 4pF

# 32.768KHZ IoT OPTIMIZED SMD CRYSTAL



ABS05W

1.6 x 1.0 x 0.5 mm



RoHS/RoHS II Compliant

MSL = N/A: NOT APPLICABLE

## OPTIONS AND PART IDENTIFICATION

ABS05W - 32.768kHz - ○ - ○ - ○

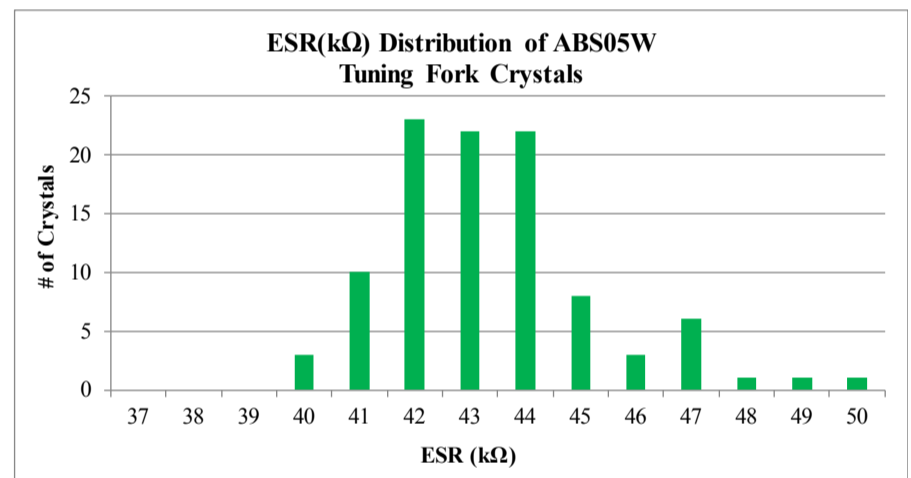
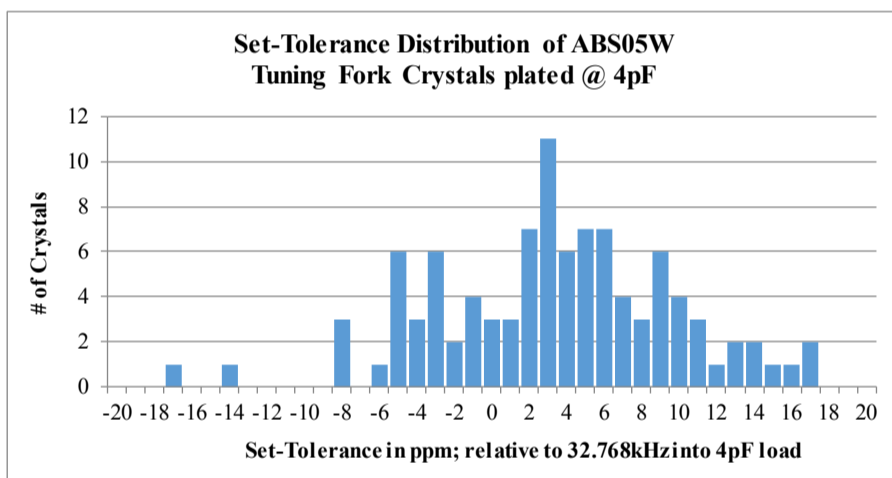
OPERATING TEMP RANGE
D: -40°C ~ +85°C
J: -40°C ~ +105°C
K: -40°C ~ +125°C

Freq. Tolerance
2: ±20ppm

PACKAGING
Blank: Bulk
T: Tape & Reel (5,000pcs/reel)

## TYPICAL FREQUENCY TOLERANCE DISTRIBUTION (AT 25°C ± 3°C)

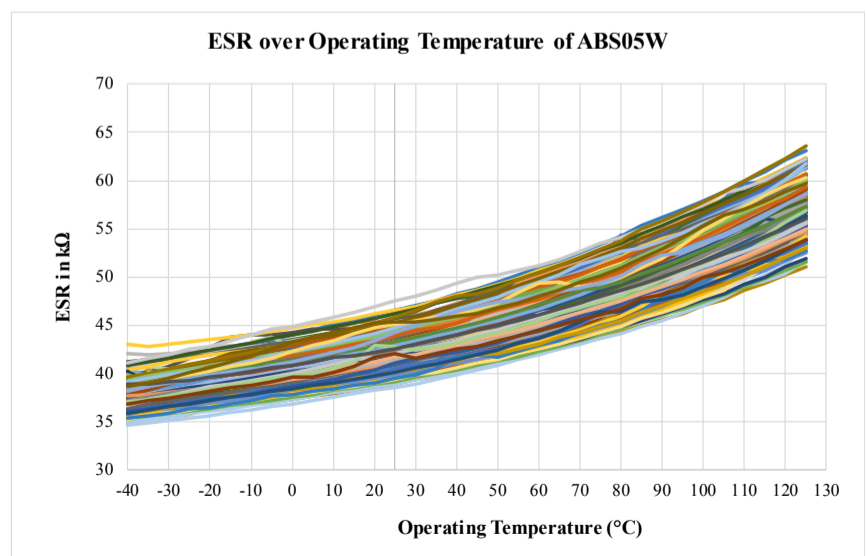
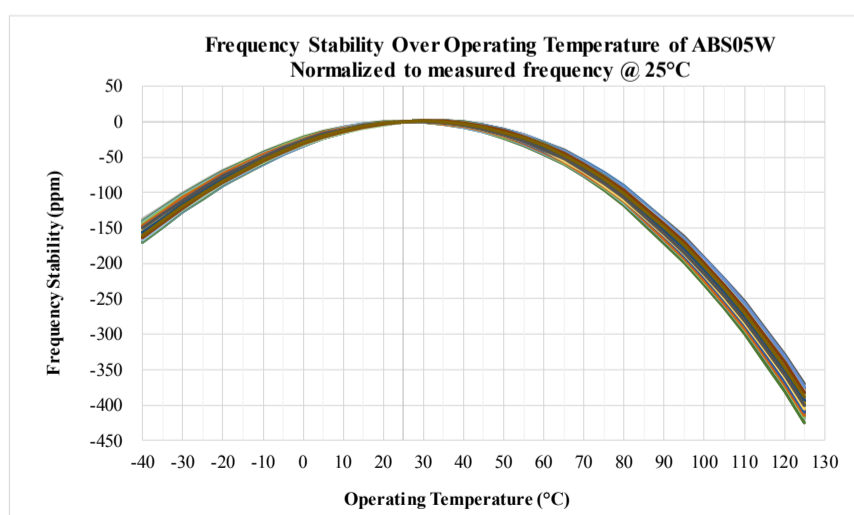
## TYPICAL ESR DISTRIBUTION (AT 25°C ± 3°C)



The data above reflects typical distribution, lot-to-lot variation applies

## TYPICAL FREQUENCY Vs. TEMPERATURE CHARACTERISTICS

## TYPICAL ESR (EQUIVALENT SERIES RESISTANCE) VS. TEMPERATURE CHARACTERISTICS



# 32.768KHZ IoT OPTIMIZED SMD CRYSTAL



ABS05W

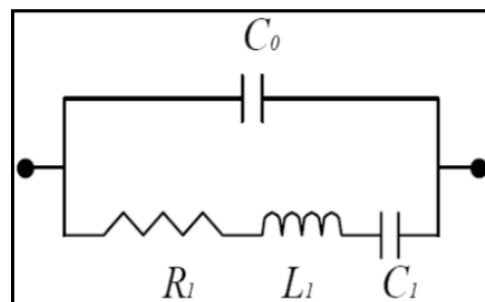
1.6 x 1.0 x 0.5 mm

RoHS/RoHS II Compliant

MSL = N/A: NOT APPLICABLE

SPICE MODEL (BASED ON TYPICAL VALUES AT 25°C ± 3°C):

## Quartz Crystal Equivalent Circuit



Frequency: 32.78kHz

Plating Load (CL) = 4pF

C0 = 1.45 pF

R1 = 43,394 Ω

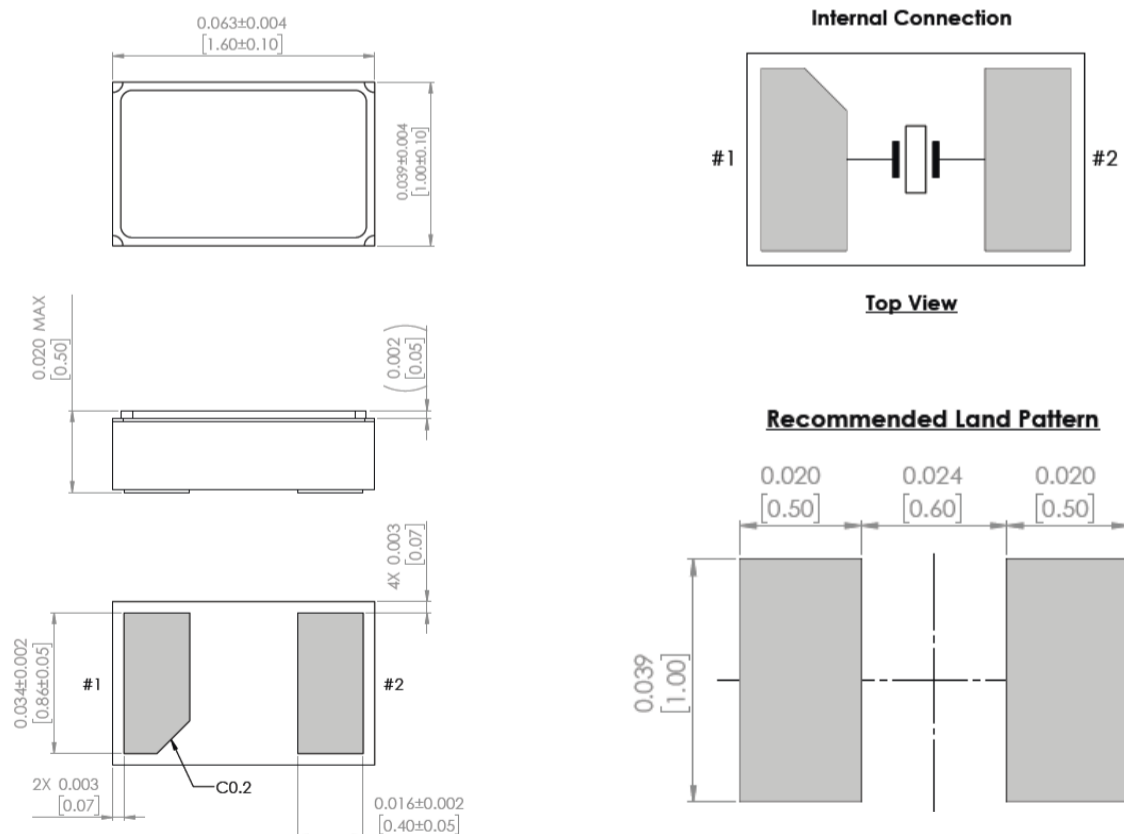
L1 = 2,987,787mH

C1 = 7.91 fF

## MECHANICAL DIMENSIONS

Dimensions: mm

Typical Weight: 2.7 mg





## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- [View ABS05W-32.768KHZ-J-2-T on WIN SOURCE](#)
- [Abracon LLC Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management