






A Product Line of  
Diodes Incorporated



## SPECIFICATION FOR APPROVAL

CUSTOMER	_____
NOMINAL FREQUENCY	16.000000 MHz
HOLDER TYPE	TYPE MN 7.0x5.0 SEAM SEALED CRYSTAL CLOCK OSCILLATOR
SPEC. NO. ( P/N )	MN1600001Q
CUSTOMER P/N	_____
ISSUE DATE	September 10, 2018
VERSION	C

APPROVED	PREPARED	QA
		

### Diodes Incorporated

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<https://www.diodes.com>

- \*Pb-free
- \*RoHS Compliant
- \*HF-Halogen Free
- \*REACH Compliant
- \*AEC-Q200 Compliant

**TYPE MN 7.0x5.0 SEAM SEALED CRYSTAL CLOCK OSCILLATOR**

**MN1600001Q**

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**VERSION HISTORY**

Version No.	Version Date	Description	Notes
A	Nov.19,2013	Initial Release	
B	Nov.18,2015	Modified test circuit	
C	Sep.10,2018	Modified test circuit & Updated logo	

# TYPE MN 7.0x5.0 SEAM SEALED CRYSTAL CLOCK OSCILLATOR

## MN1600001Q

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### ELECTRICAL SPECIFICATIONS

SRe Part Number : MN1600001Q

Item	Symbol	Specifications	Units	Notes
Nominal Frequency	Fo	16.000000	MHz	
Frequency Stability	FT	± 25	ppm	**See note
Operating Temperature Range	TR	-40 to +85	°C	
Supply Voltage	V <sub>DD</sub>	+3.3 ± 10%	V	
Logic Type	LT	LVC MOS		
Supply Current, Output Enabled	I <sub>DD/OE</sub>	20	mA	Max.
Supply Current, Output Disabled	I <sub>DD/OD</sub>	10	µA	Max.
Duty Cycle (Symmetry)	DC/SY	45 / 55	%	Measured 50% of Waveform
Rise / Fall Time	T <sub>R</sub> /T <sub>F</sub>	3	ns	Max. Measured at 10 / 90% of Waveform
Output Voltage V <sub>OL</sub>		10% V <sub>DD</sub>	V	Max.
Output Voltage V <sub>OH</sub>		90% V <sub>DD</sub>	V	Min.
Output Load	CL	15	pF	Max.
Down Spread		-1.00	%	
Start Up Time		10	ms	Max.
EMI Reduction		-7	dBc	Min (-12dBc typ)
Storage Temperature Range		-55 to +125	°C	

※ This product doesn't include harmful substance that stipulated by SONY SS-00259 Level 1 and S-AT2-001 Level 1 standard. RoHS Compliant (Pb - Free).

\*\*Stability includes all combinations of Operating Temperature, Load changes, rated Input (Supply) Voltage changes, Initial Calibration Tolerance (25°C), Aging (1 year at 25°C Average Effective Ambient Temperature), Shock and Vibration.

#### Output Enable / Disable Function

Parameter	Min.	Typ.	Max.	Units	Notes
Input Voltage (Pin1), Output Enable	0.7V <sub>DD</sub>			V	Or Open
Input Voltage (Pin1), Output Disable (low power standby)			0.3V <sub>DD</sub>	V	Output is Hi-Z

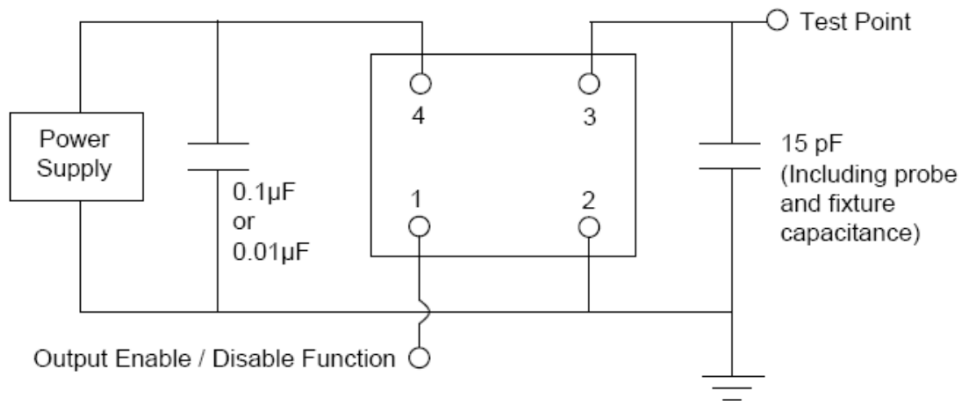


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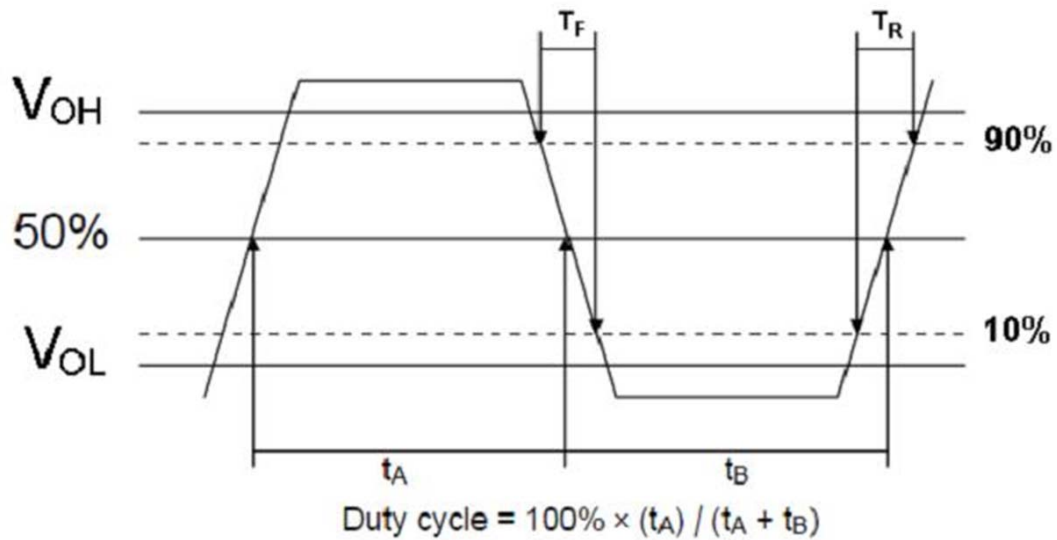
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### TEST CIRCUIT



### OUTPUT WAVEFORM



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## AEC-Q200 RELIABILITY TEST SPECIFICATIONS:

### 1. Initial

- 1.1 Physical Dimensions: JESD22, Method JB1-100
- 1.2 External Visual: MIL-STD-883, Method 2009
- 1.3 Freq. Vs. Temperature: Per Specification/Datasheet

### 2. Mechanical

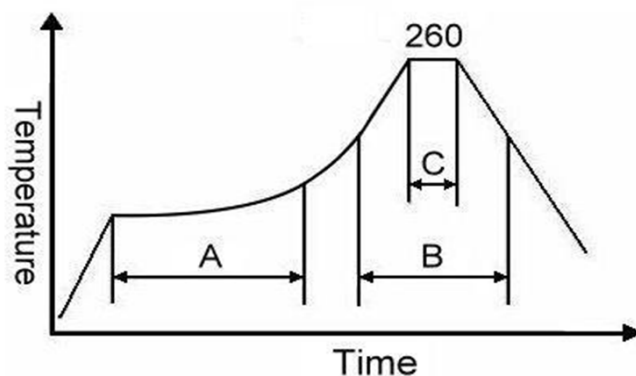
- 2.1 Mechanical Shock: MIL-STD-202 Method 213
- 2.2 Vibration: MIL-STD-202 Method 204
- 2.3 Solderability: J-STD-002
- 2.4 Board Flex: AEC Q200-005
- 2.5 Terminal Strength (SMD): AEC Q200-006

### 3.Environmental

- 3.1 Temp Cycle: JESD22, Method JA-104
- 3.2 Resistance to Solder Heat: MIL-STD-202 Method 210
- 3.3 High Temperature Operating Life: MIL-STD-202, Method 108
- 3.4 High Temp Exposure: MIL-STD-202, Method 108
- 3.5 High Temp & High humidity: MIL-STD-202, Method 103
- 3.6 Thermal Shock: MIL-STD-202, Method 107

## SUGGESTED IR REFLOW PROFILE

\*As per IPC-JEDEC J-STD-020D



Note:

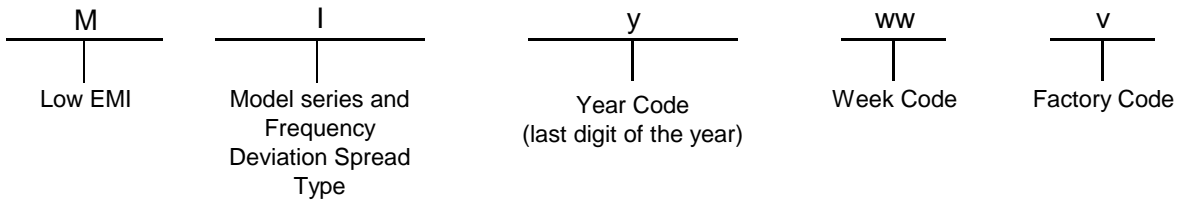
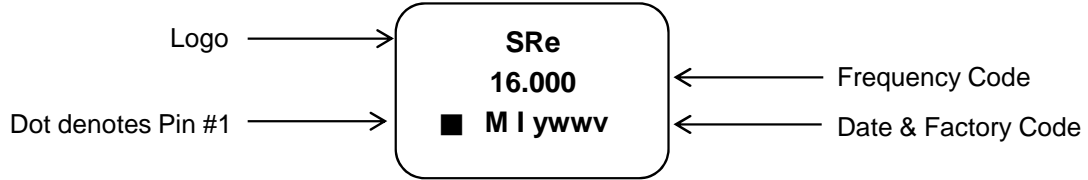
	Stage	Temperature	Time
A	Preheat	150~200°C	60~120 Sec
B	Primary Heat	217°C	60~150 Sec
C	Peak	260°C	10 Sec

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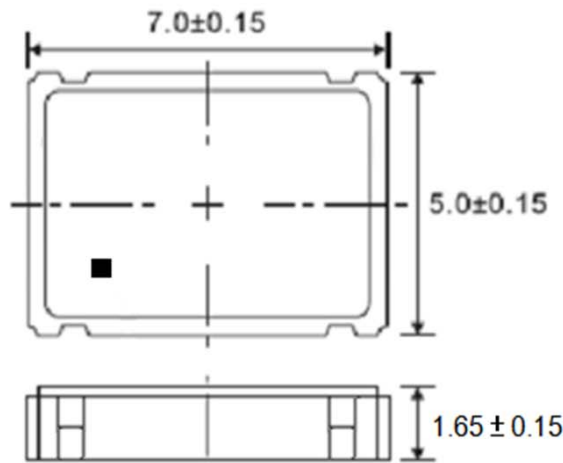
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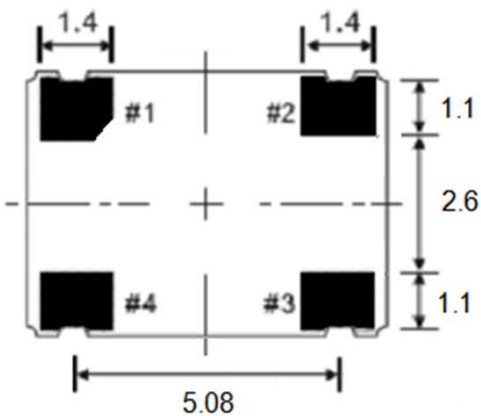
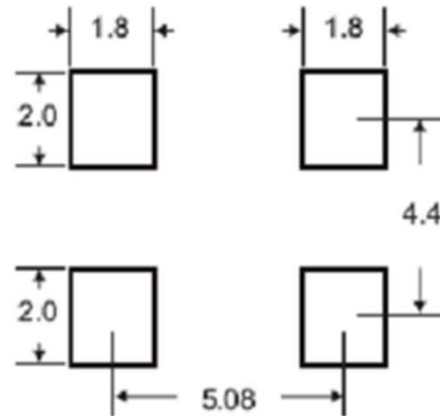
## MARKING



## MECHANICAL DRAWINGS ( Scale:None. Dimensions are in mm.)



### Recommended Land Pattern\*



(Bottom View)

\*Extended high frequency power decoupling is recommended (see test circuit for minimum recommendation). To ensure optimal performance, do not route traces beneath the package.

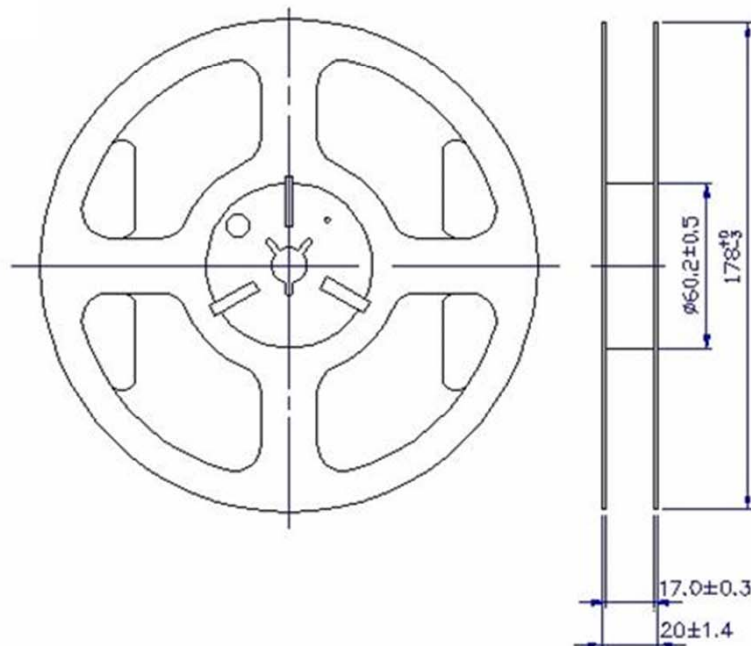
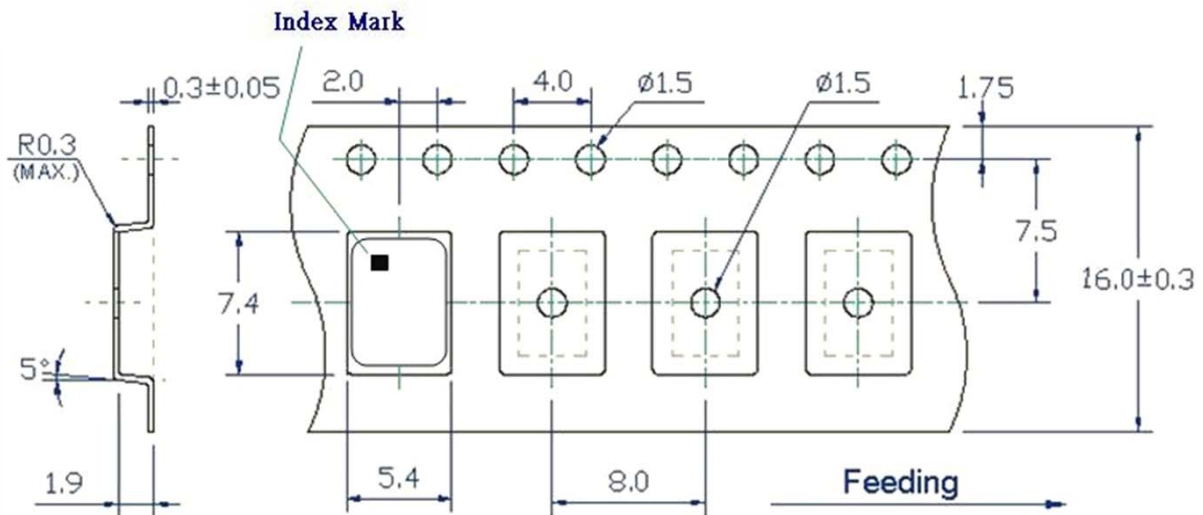
Pin	Function
1	OE
2	Ground
3	Clock Output
4	V <sub>DD</sub>

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### TAPE & REEL



1. 230mm minimum leader which consist of carrier and/or tape followed by a minimum of 160mm of empty carrier tape sealed with cover tape.
2. 160mm minimum trailer of empty carrier tape sealed with cover tape.

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### PACKING

