June 22, 2023

Attn: FCC Office of Engineering and Technology / UL Verification Services TCB

Ref: Class 2 Permissive Change for FCC ID: **2AC8R-NFC2**
Original approval date: May 13, 2019
Additional C2PC dates: none
Applicant: Elkay Manufacturing Company

To Whom It May Concern

This is to request for a Class II Permissive Change to address the following proposed changes to Elkay's **Filter NFC Board**:

1. A new alternate Microprocessor Crystal at Y3 from the same manufacturer as the original with identical electrical and radio characteristics but with a larger SMD pad footprint. That is, the new alternate is not pin-to-pin compatible.
2. Enlarge the PCB trace-pads at Y3 to accommodate both the original and new alternate Microprocessor Crystal.

The reason for these changes is that the original Microprocessor Crystal has increasingly long lead-times to procure and has become more difficult to obtain in the required production volumes.

To clarify, this request addresses all nine conditions of FCC's guidance for permissive change, Notification# 202109-001, titled *Class II Permissive Change for PCB and Part Modification and PAG C2PCPXPAG C2PCPX*, see our finding on page two.

Additionally, to help compare the original and alternate Microprocessor Crystals, see attached technical datasheets on pages 3-5 and pages 6-9, respectively. And for details of the enlarged PCB trace-pads at Y3, see the Schematic document. And for images of the changed Elkay Filter NFC Board, see Internal Photos document.

The following tests were performed to validate the fundamental frequency, primary modulator circuit, maximum power, or field strength ratings have remained unchanged:

- Radiated, conducted emissions: FCC Part 15 Subpart C.
- Frequency stability

If any questions regarding this application, please feel free to contact me.

Sincerely yours,

René G. Laude
Senior Compliance Engineer
Elkay Manufacturing Company

Conditions per FCC's PAG C2PCPX Notification# 202109-001	**Findings**
1) The requirements of § 2.1043 are fulfilled, i.e., the device's block functions for the fundamental frequency, primary modulator circuit, maximum power, or field strength ratings shall remain unchanged.	Compliant
2) Transmitter PCB layout and parts changes are only permitted if there is no change in identifying a device's form, functional specification, as initially granted or previously approved under a Class II permissive change.	Compliant
3) PCB changes are limited to non-substantive modifications layout changes to the same size physical circuit board previously granted.	Compliant
4) C2PCPX is not permitted to add, remove, augment, or change capabilities, such as transmitters, increased bandwidth, additional rule parts, bands, etc..	Compliant
5) In the PAG submission for item C2PCPX, the applicant shall provide complete information on testing demonstrating that the proposed changes for fundamental emissions are unchanged within the normal, acceptable tolerances and out-of-band; emissions do not exceed the appropriate limits. The PAG submission shall include all applicable test reports and internal photos.	Compliant
6) The modified device shall not be marketed under the existing grant of certification before confirmation that the C2PCPX PAG is approved and granted.	Compliant
7) Software Defined Radio (SDR) grants that use the C2PCPX procedure are not permitted to make subsequent Class III permissive changes.	N/A
8) The C2PCPX PAG procedure has no impact on the provisions of V) of this publication for non-SDR software-only changes; thus, adding an equipment class when related to rule changes is still permitted.	N/A
9) Class I permissive changes are not permitted[3] under this C2PCPX procedure.	Compliant

CERAMIC SMD MICRO MINIATURE MICROPROCESSOR CRYSTAL

6.0 x 3.5 x 1.4mm

ABM7

Pb in Glass
(exempt per RoHS 2002/95/EC Annex (5))

RoHS/RoHS II Compliant

Moisture Sensitivity Level (MSL) – This product is Hermetically Sealed and not Moisture Sensitive - MSL = N/A: Not Applicable

FEATURES:

- Low in height (1.4 mm max.)
- Ceramic package assures high reliability
- Small size SMD, suitable for high density applications
- Superior heat-resistant glass sealing
- Wide operating temperature available

APPLICATIONS:

- Computers, Modems, Communication equipment
- Thin equipment
- Industrial wide temperature applications

STANDARD SPECIFICATIONS:

Parameters	Minimum	Typical	Maximum	Units	Notes
Frequency Range	8.000		48.000	MHz	Fundamental AT-cut
Operating Temperature	-10		+60	ºC	See options
Storage Temperature	-55		+125	ºC	
Frequency Tolerance @ +25°C	-50		+50	ppm	See options
Frequency Stability over the Operating Temperature (ref. to +25°C)	-50		+50	ppm	See options
Equivalent series resistance	See table 1 below			Ω	
Shunt capacitance (C0)			7	pF	
Load capacitance (CL)		18		pF	See options
Drive Level		10	100	µW	
Aging@25°C±3°C			±5	ppm	First year
Insulation Resistance	500			MΩ	@ 100Vdc

Table 1

Frequency (MHz)	ESR(Ω) max.
8.000 – 9.999	100
10.000 – 11.999	80
12.000 – 15.999	60
16.000 – 48.000	50

ABRACON

5101 Hidden Creek Ln Spicewood TX 78669
Phone: 512-371-6159 | Fax: 512-351-8858
For terms and conditions of sales, please visit:
www.abracon.com

REVISED: 09-03-19

ABRACON IS
ISO9001-2015
CERTIFIED

CERAMIC SMD MICRO MINIATURE MICROPROCESSOR CRYSTAL

ABM7

Pb in Glass
(exempt per RoHS 2002/95/EC Annex (5))

RoHS/RoHS II Compliant

6.0 x 3.5 x 1.4mm

OPTIONS AND PART IDENTIFICATION: (left blank if standard)

ABM7- [ ] MHz - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

Frequency in MHz
e.g. 14.31818MHz
26.000MHz

Load Capacitance (pF)
Please specify CL in pF or S for series (8 to 33pF)
Please contact ABRACON for other values

Custom ESR if other than standard
R□
□: Specify a value in Ω
(e.g.: R40)

Operating Temp.
E: 0°C ~ +70°C
B: -20°C ~ +70°C
C: -30°C ~ +70°C
N: -30°C ~ +85°C
D: -40°C ~ +85°C
J (***): -40°C ~ +105°C

(***) ±100 ppm only
Please check with Abracon for availability for non-standard frequencies with these operating temperature options.

Freq. Tolerance
1: ± 10 ppm
7: ± 15 ppm
2: ± 20 ppm
3: ± 25 ppm
4: ± 30 ppm

Freq. Stability
U: ± 10 ppm (*)
G: ± 15 ppm (**)
X: ± 20 ppm
W: ± 25 ppm
Y: ± 30 ppm
H: ± 35 ppm
Q: ± 100 ppm

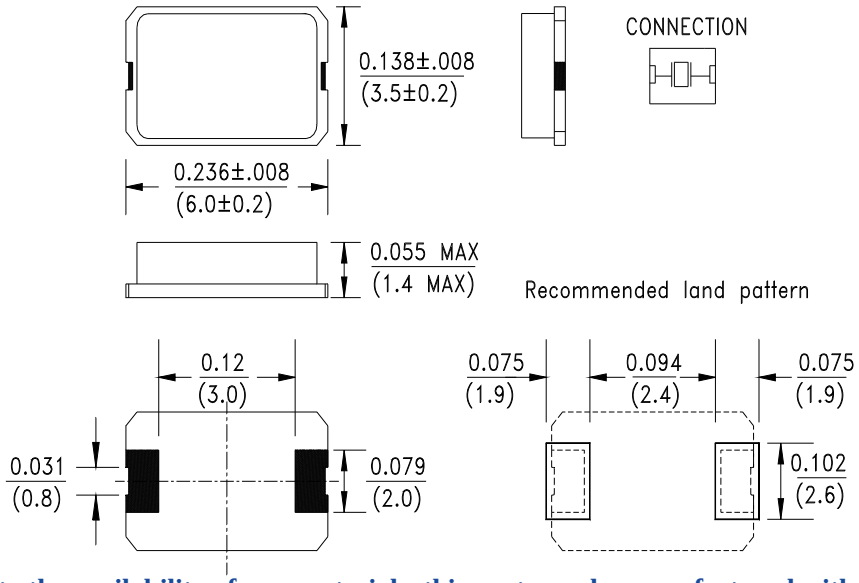
(*) -10°C to 60°C only.
(**) Contact ABRACON for availability for -40°C to +85°C

Packaging

Blank: Bulk
T: 1kpcs/reel
T2: 250pcs/reel

OUTLINE DIMENSION:

Dimensions: inches (mm)



Note: Due to the availability of raw materials, this part may be manufactured with the chamfer on pin 1. Be advised that this does not affect the electrical characteristics of the crystal in any way.

CERAMIC SMD MICRO MINIATURE MICROPROCESSOR CRYSTAL

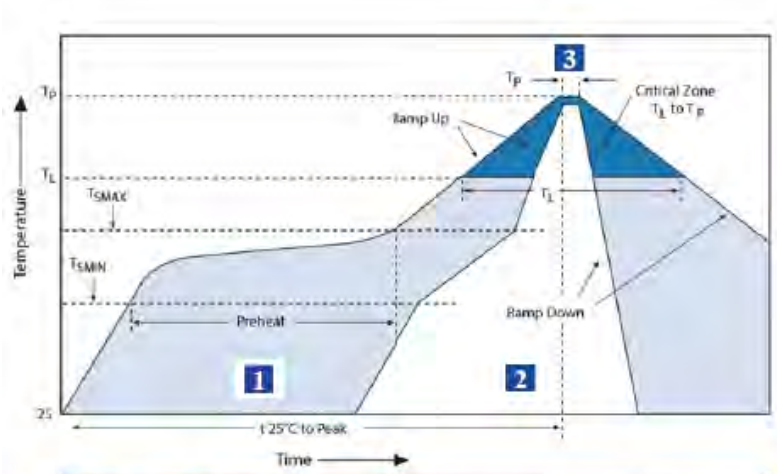
ABM7

Pb in Glass
(exempt per RoHS 2002/95/EC Annex (5))

RoHS/RoHS II Compliant

6.0 x 3.5 x 1.4mm

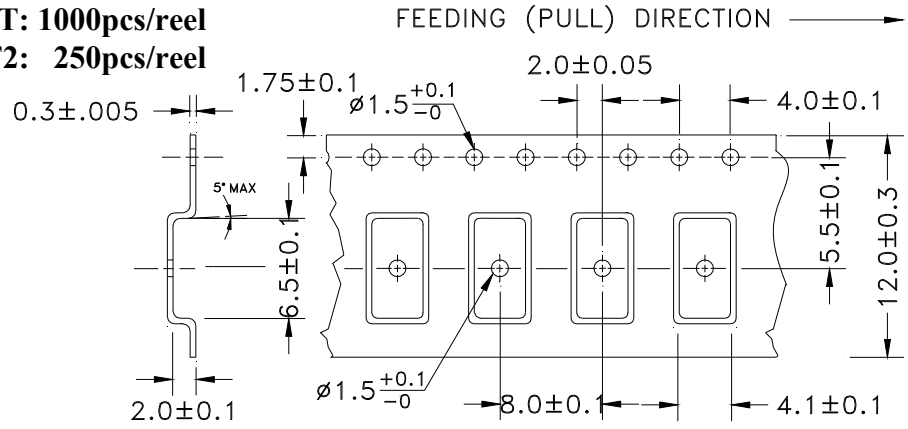
REFLOW PROFILE:

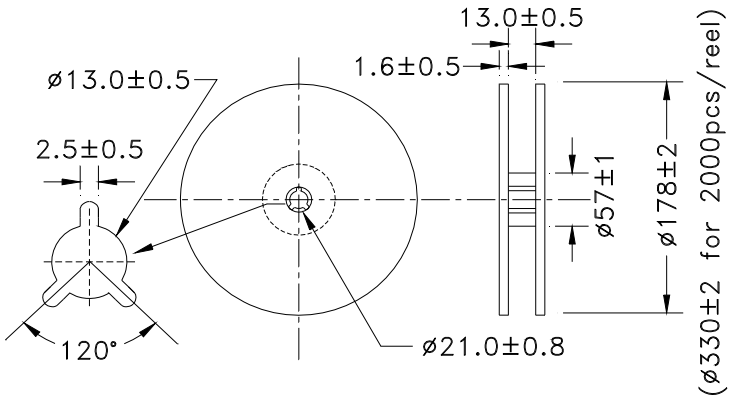


Zone	Description	Temperature	Times
1	Preheat	T_{SMIN} ~ T_{SMAX} 150°C ~ 180°C	60 ~ 120 sec.
2	Reflow	T_L 230°C	30 ~ 40 sec.
3	Peak heat	T_P 260°C + 5°C	10 sec. MAX

TAPE & REEL:

Packaging: **T: 1000pcs/reel**
T2: 250pcs/reel





Dimensions: mm

ATTENTION: Abracon Corporation's products are COTS – Commercial-Off-The-Shelf products; suitable for Commercial, Industrial and, where designated, Automotive Applications. Abracon's products are not specifically designed for Military, Aviation, Aerospace, Life-dependant Medical applications or any application requiring high reliability where component failure could result in loss of life and/or property. For applications requiring high reliability and/or presenting an extreme operating environment, written consent and authorization from Abracon Corporation is required. Please contact Abracon Corporation for more information.

SMD MICROPROCESSOR CRYSTAL

7.0 x 4.1 x 2.0mm

ABLS7M2

RoHS / RoHS II Compliant

Moisture Sensitivity Level (MSL) – This product is Hermetically Sealed and not Moisture Sensitive - MSL = N/A: Not Applicable

FEATURES:

- **Reduced footprint from ABLS (standard HC/49US package) by 50%**
- Low profile: 2.0mm max. height
- Suitable for RoHS compliant reflow
- Tight stability & extended temperature options
- High reliability & Cost effective
- Resistance welded metal package

APPLICATIONS:

- Wireless Applications
- Home electronics
- Computers, modems, and communications
- Microprocessors

STANDARD SPECIFICATIONS:

Parameters	Minimum	Typical	Maximum	Units	Notes
Frequency Range*	12.0		40.0	MHz	
Standard Frequencies	12.0, 12.288, 13.5, 13.56, 14.31818, 14.7456, 16.0, 18.432, 20.0, 20.5, 24.0, 24.576, 25.0, 26.0, 27.0			MHz	
Operation Mode	Fundamental (AT-cut)				
Operating Temperature	0		+70	ºC	See options
Storage Temperature	-40		+125	ºC	
Frequency Tolerance @+25ºC	-50		+50	ppm	See options
Frequency Stability over the Operating Temperature (ref. to +25ºC)	-50		+50	ppm	See options
Equivalent series resistance (R1) @+25ºC			60	Ω	12.000 ~ 16.000MHz
			40		16.001 ~ 30.000MHz
			25		30.001 ~ 40.000MHz
Shunt capacitance (C0)			5	pF	
Load capacitance (CL)	18			pF	Standard (See options if other than STD)
Drive Level		50	100	µW	
Aging	-5		+5	ppm	@25ºC±3ºC First year
Insulation Resistance	500			MΩ	@ 100Vdc ± 15V
Drive level dependency (DLD)	10nw ~ 100uw, 12 points Change in ESR (Maximum - Minimum) over DLD range < 30% ESR max.				

*** Please contact Abracon for other frequencies.**

Revised:07.29.2021
Headquarters: 5101 Hidden Creek Ln Spicewood TX 78669
Phone: 512-371-6159 | Fax: 512-351-8858

SMD MICROPROCESSOR CRYSTAL

ABLS7M2

RoHS / RoHS II Compliant

7.0 x 4.1 x 2.0mm

PART IDENTIFICATIONS: (left blank if standard)

ABLS7M2 - [ ] MHz - [ ] - [ ] - [ ][ ][ ] - [ ]

Frequency in MHz
Please specify the frequency in MHz. e.g.
12.000MHz
14.31818MHz

Load Capacitance (pF)
Please specify CL (Minimum 8pF) in pF or S for series

Custom ESR if other than standard
R□
□: Specify a value in Ω (e.g.: R40)

Operating Temp.

Blank: 0°C ~ +70°C
A: -10°C ~ +60°C
B: -20°C ~ +70°C
C: -30°C ~ +70°C
N: -30°C ~ +85°C
D: -40°C ~ +85°C
J: -40°C ~ +105°C
K: -40°C ~ +125°C

Freq. Tolerance

Blank: ± 50 ppm
1: ± 10 ppm
7: ± 15 ppm
2: ± 20 ppm
3: ± 25 ppm
4: ± 30 ppm

Freq. Stability (See Table 1 for details)

Blank: ± 50 ppm
U: ± 10 ppm
G: ± 15 ppm
X: ± 20 ppm
W: ± 25 ppm
Y: ± 30 ppm
H: ± 35 ppm
Q: ± 100 ppm

Packaging

Blank: Bulk
T: Tape & Reel

Table 1 Available Combinations of Operating Temp. and Freq. Stability

Operating Temp.	Freq. Stability							
	U:±10ppm	G:±15ppm	X:±20ppm	W:±25ppm	Y:±30ppm	H:±35ppm	Std.:±50ppm	Q:±100ppm
A: -10°C ~ +60°C	√	√	√	√	√	√	√	√
Std.: 0°C ~ +70°C	√	√	√	√	√	√	√	√
B: -20°C ~ +70°C		√	√	√	√	√	√	√
C: -30°C ~ +70°C			√	√	√	√	√	√
N: -30°C ~ +85°C					√	√	√	√
D: -40°C ~ +85°C					√	√	√	√
J: -40°C ~ +105°C							√	√
K: -40°C ~ +125°C								√

Note: Please contact Abracon for other frequency stability and operating temperature range options.

Headquarters: 5101 Hidden Creek Ln Spicewood TX 78669
Phone: 512-371-6159 | Fax: 512-351-8858

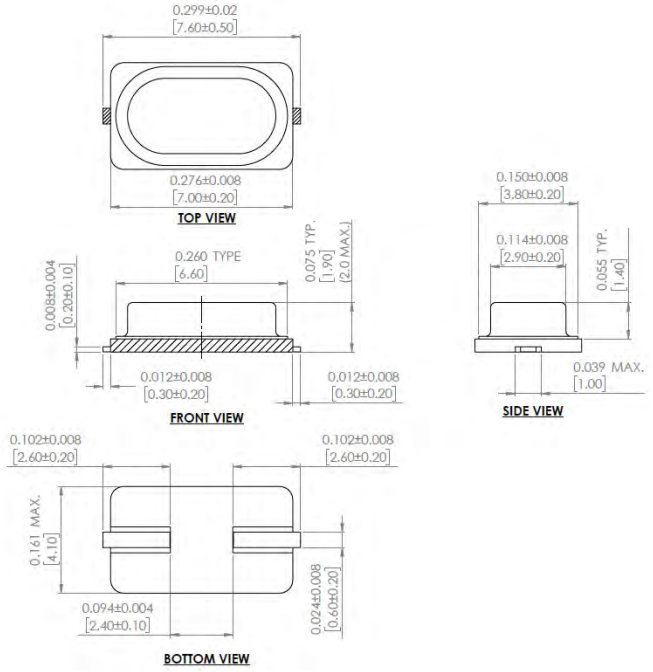
SMD MICROPROCESSOR CRYSTAL

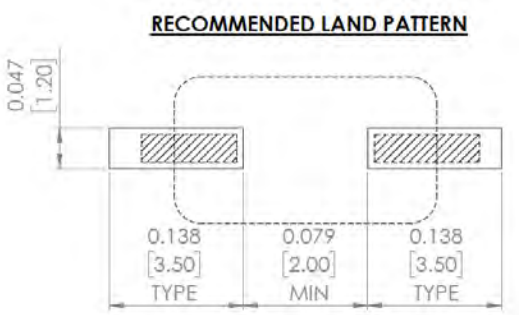
ABLS7M2

RoHS / RoHS II Compliant

7.0 x 4.1 x 2.0mm

OUTLINE DIMENSION:

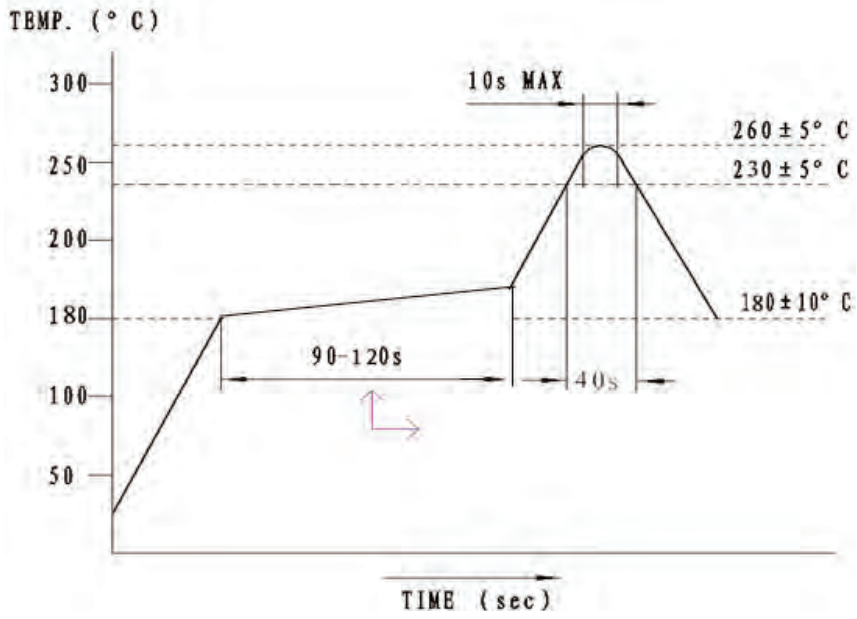




Actual Size Comparison	
ABLS	ABLS7M2
11.4 x 4.7 x 4.2 mm	7.0 x 4.1 x 2.0 mm

Dimension: inches [mm]

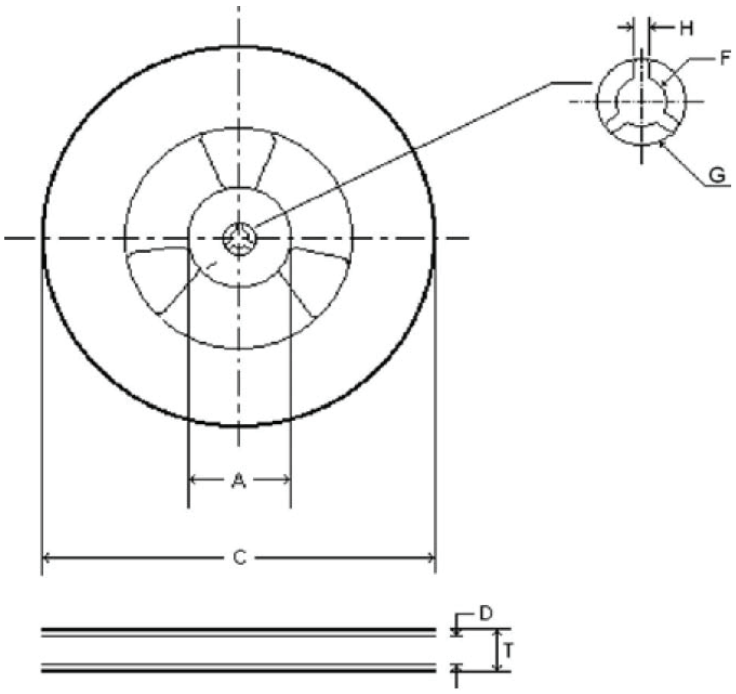
REFLOW PROFILE:



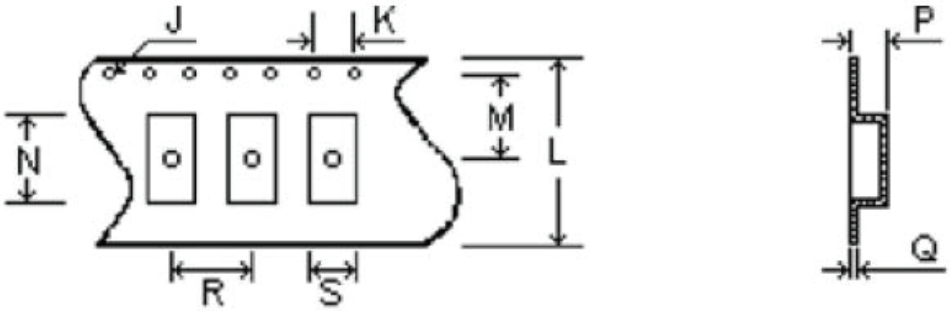
Headquarters: 5101 Hidden Creek Ln Spicewood TX 78669
Phone: 512-371-6159 | Fax: 512-351-8858

TAPE & REEL:

T = tape and reel (3000pcs/reel)



No.	Dimensions (mm)
A	100 ± 1.0
C	330 ± 2.0
D	16.4 ± 1.0
T	20.4 ± 0.5
F	13.0 ± 0.2
G	20.2 min.
H	1.5 min.



No.	Dimensions (mm)
J	Ø1.5
K	4.0 ± 0.1
L	16.0 ± 0.3
M	7.5 ± 0.1
N	9.4 ± 0.1
P	2.5 ± 0.1
Q	0.3 ± 0.05
R	8.0 ± 0.1
S	4.4 ± 0.1

Dimensions: mm

Revised:07.29.2021
Headquarters: 5101 Hidden Creek Ln Spicewood TX 78669
Phone: 512-371-6159 | Fax: 512-351-8858