

# SHOULDER

## SPECIFICATION

|              |                |
|--------------|----------------|
| <b>Item:</b> | SAW Resonator  |
| <b>Type:</b> | TO39, F11, F12 |





## SAW Resonator

### Scope

This specification shall cover the characteristics of 1-port SAW resonator.



**T039**



**F11**



**F12**

The 1-port SAW Resonator is designed to be the frequency control element in transmitters and receiver local oscillators, allowing reduced receiver bandwidths, which results in improved sensitivity and immunity to interference.

The SAW Resonators are typically required in applications such as wireless point of sale terminals, computer peripherals and personal and home security.

| Electrical Characteristics                    |                                |                          |
|---|--------------------------------|--------------------------|
| Parameter                                     |                                | Value                    |
| Center Frequency (Fc)                         |                                | See table 1              |
| Frequency Tolerance (at 25°C)                 |                                | See table 1              |
| Operating Temperature Range                   |                                | -20°C to +85°C           |
| Storage Temperature Range                     |                                | -45°C to +85°C           |
| DC Voltage $V_{DC}$                           |                                | 10V                      |
| AC Voltage $V_{PP}$                           |                                | 10V 50Hz/60Hz            |
| RF Power Dissipation                          |                                | 0dBm                     |
| Insertion Loss                                |                                | See table 1              |
| Quality Factor Unload Q                       |                                | 12.800 typical           |
| 50Ω Load Q                                    |                                | 2.000 typical            |
| Temperature Stability                         | Turnover Temperature ( $T_o$ ) | 50°C Maximum             |
|   | Turnover Frequency ( $f_o$ )   | $f_o \pm 1.3$ typical    |
|   | Freq. Temp. Coefficient (FTC)  | 0.032ppM/°C <sup>2</sup> |
| Frequency Aging (at 25°C)                     |                                | $\pm 10$ ppM/year        |
| DC Insulation Resistance between any two pins |                                | 1.0MΩ minimum            |
| RF Equivalent RLC Model                       | Motional Resistance ( $R_M$ )  | 26Ω Maximum              |
|   | Motional Indutance ( $L_M$ )   | 86μH typical             |
|   | Motional Capacitance ( $C_M$ ) | 1.5pF typical            |
| Pin 1 to Pin 2 Static Capacitance ( $C_o$ )   |                                | 2.3pF Maximum            |
| Transducer Static Capacitance ( $C_p$ )       |                                | 1.9pF typical            |

### Remark

#### 1. Static Voltage

Static voltage between signal load & ground may cause deterioration & destruction of the component. Please avoid static voltage.

#### 2. Ultrasonic cleaning

Ultrasonic vibration may cause deterioration & destruction of the component. Please avoid ultrasonic cleaning.

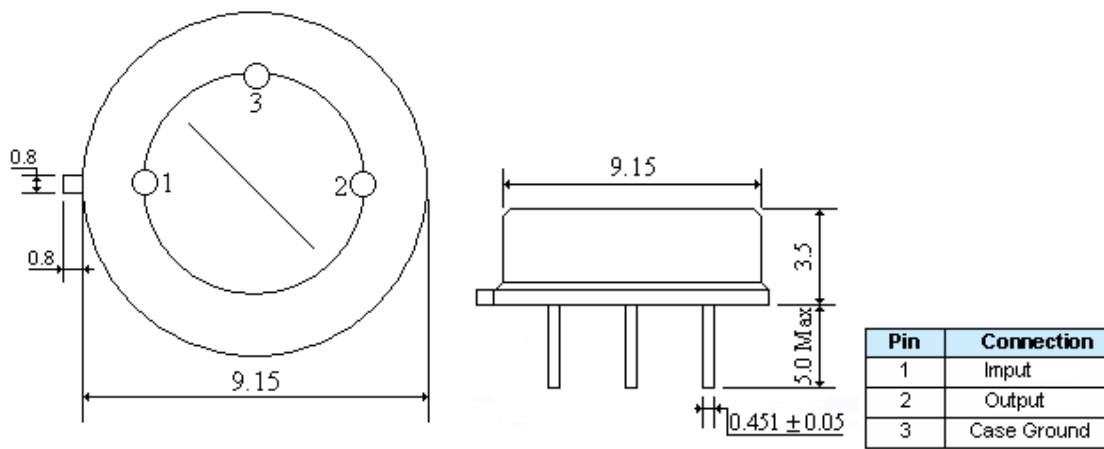
#### 3. Soldering

Only leads of component may be soldered. Please avoid soldering another part of component.

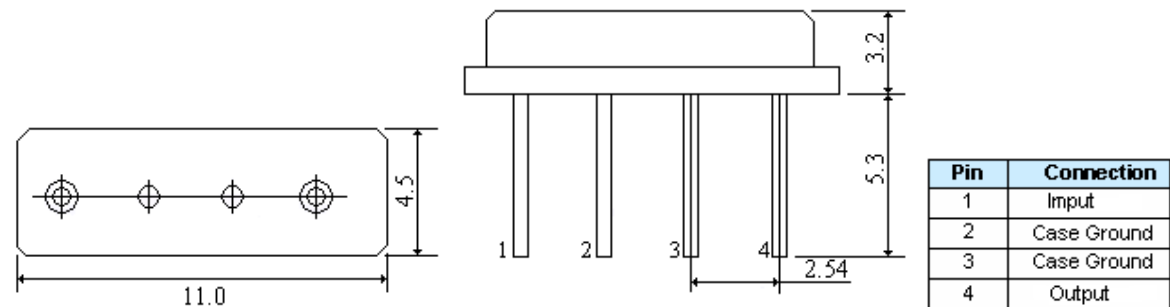


## SAW Resonator

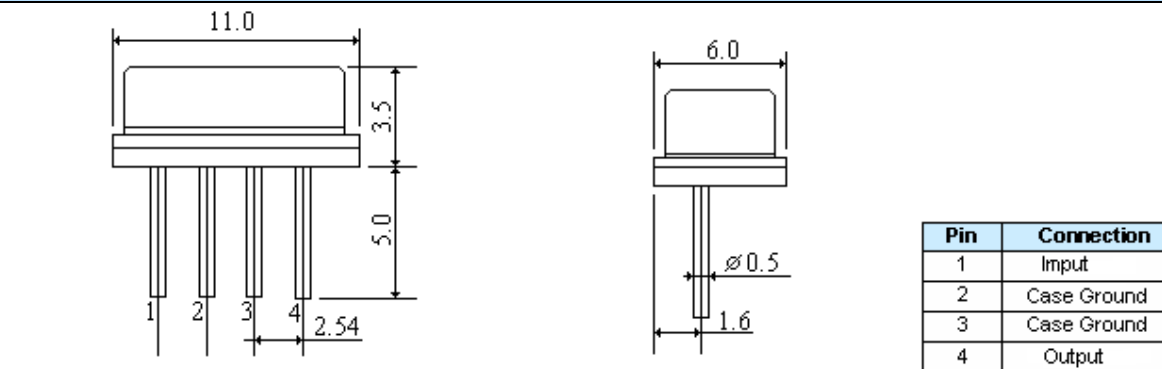
### Mechanical Dimensions (All in mm) TO39



### Mechanical Dimensions (All in mm) F11



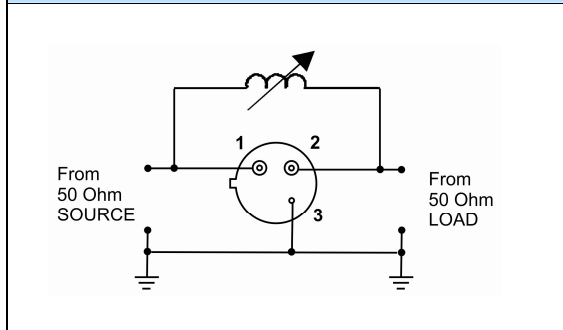
### Mechanical Dimensions (All in mm) F12



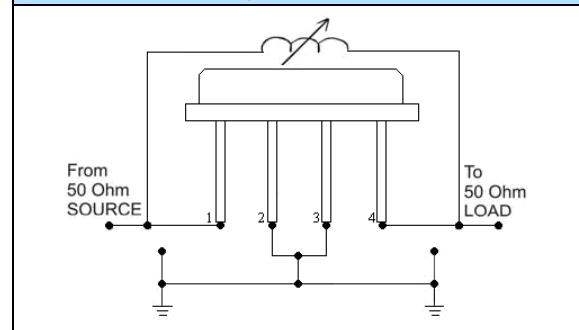


## SAW Resonator

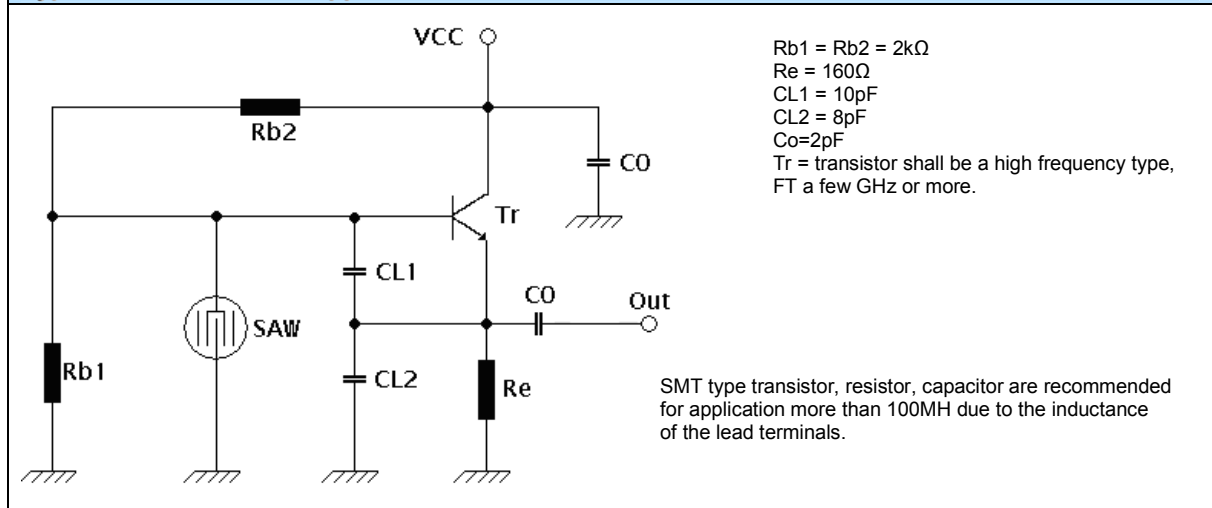
### Electrical Test TO39



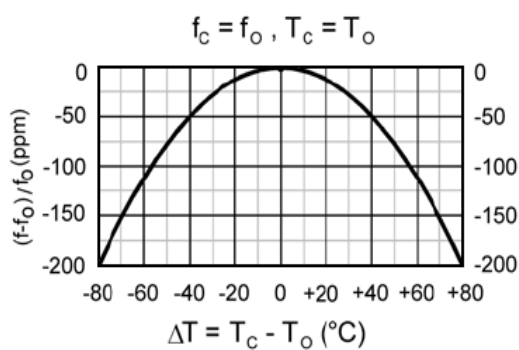
### Electrical Test F11, F12



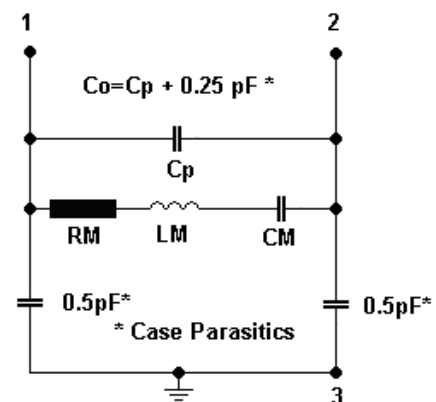
### Typical Local Oscillator Application



### Temperature Characteristics



### Equivalent LC Model

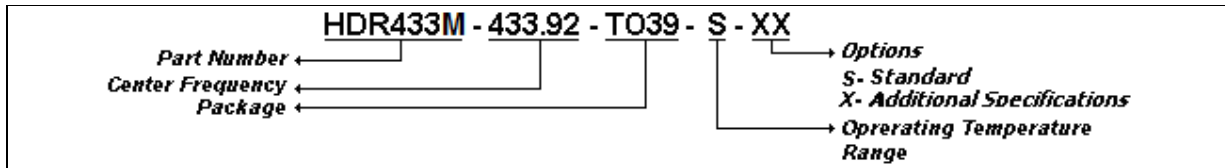




## SAW Resonator

| Environmental Specification  |  |
|--|--|
| 1. Moisture  |  |
| Keep the device at 40°C and 95% rh for 96 hours. Then release the device into the room conditions for 1 to 2 hours prior to the measurement. It shall meet all the initial electrical characteristics.   |  |
| 2. Temperature cycling   |  |
| Subject the device to a low temperature of 55°C for 30 minutes. Following by a high temperature of +85°C for 30 minutes. Then release the device into the room conditions for 1 to 2 hours prior to the measurement. It shall meet all the initial electrical characteristics. |  |
| 3. Resistance to solder heat   |  |
| Dip the device terminals no closer than 1.5mm into the solder bath at 260±10°C for 10±1 sec. Then release the device into the room conditions for 1 to 2 hours. It shall meet all the initial electrical characteristics.  |  |
| 4. Mechanical shock  |  |
| Drop the device randomly onto the concrete floor from the height of 20cm 3 times. The device shall meet all the initial electrical characteristics.  |  |
| 5. Vibration   |  |
| Subject the device to the vibration for 1 hour each in x, y and z axes with the amplitude of 1.5 mm at 10 to 55 Hz. The device shall meet all the initial electrical characteristics.  |  |
| 6. Lead fatigue  |  |
| Pulling test   | Weight along with the direction of lead without an shock 3 kg. The device shall meet all the initial electrical characteristics.   |
| Bending test   | Lead shall be subject to withstand against 90°C bending in the direction of thickness. This operation shall be done toward both directions. The device shall show no evidence of damage and shall meet all the initial electrical characteristics. |

### Through Hole SAW Resonator Part Numbering System (Example)



| HDR433M     | 433.92                    | TO39                          | S                           | S   |
|-------------|---------------------------|-------------------------------|-----------------------------|---|
| ↕           | ↕                         | ↕                             | ↕                           | ↕   |
| Part Number | Center Frequency in (MHz) | Package                       | Operating Temperature Range | Option (can be blank)                       |
| See Table 1 | See Table 1               | F11, F12, TO39<br>See Table 1 | S= Standard                 | S= Standard<br>X= Additional Specifications |

- \* **Operating Temperature Range: -20 to 80°C (Standard)**
- \* **Specific Operating Temperature Range under request.**



## SAW Resonator

Table 1:

| Part Number | Center Frequency (MHz) | Frequency Tolerance (KHz) | Insertion Loss (dB) | Package   |
|-------------|------------------------|---------------------------|---------------------|-----------|
| HDR115M     | 115.0                  | + 100                     | 2.5                 | F12       |
| HDR119M     | 119.2                  | + 100                     | 2.5                 | F12       |
| HDR224M     | 224.500                | + 100                     | 2.5                 | TO39, F11 |
| HDR260M     | 260.000                | + 100                     | 2.5                 | TO39, F11 |
| HDR293M     | 293.975                | + 100                     | 2.5                 | TO39, F11 |
| HDR297M     | 297.800                | + 100                     | 2.5                 | TO39, F11 |
| HDR303K     | 303.875                | + 100                     | 2.5                 | TO39, F11 |
| HDR303M     | 303.825                | + 100                     | 2.5                 | TO39, F11 |
| HDR304M     | 304.300                | + 100                     | 2.5                 | TO39, F11 |
| HDR305M     | 305.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR307M     | 307.500                | + 75                      | 2.5                 | TO39, F11 |
| HDR308M     | 308.500                | + 75                      | 2.5                 | TO39, F11 |
| HDR310M     | 310.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR314M     | 314.500                | + 75                      | 2.5                 | TO39, F11 |
| HDR315M     | 315.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR316.8M   | 316.800                | + 75                      | 2.5                 | TO39, F11 |
| HDR318M     | 318.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR320M     | 320.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR325M     | 325.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR330M     | 330.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR335.1M   | 335.100                | + 75                      | 2.5                 | TO39, F11 |
| HDR340M     | 340.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR345M     | 345.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR360M     | 360.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR372.5M   | 372.500                | + 75                      | 2.5                 | TO39, F11 |
| HDR382M     | 382.840                | + 75                      | 2.5                 | TO39, F11 |
| HDR383M     | 383.160                | + 75                      | 2.5                 | TO39, F11 |
| HDR390M     | 390.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR395M     | 395.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR403K     | 403.550                | + 75                      | 2.5                 | TO39, F11 |
| HDR407M     | 407.300                | + 75                      | 2.5                 | TO39, F11 |
| HDR418M     | 418.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR422M     | 422.000                | + 75                      | 2.5                 | TO39, F11 |
| HDR423M     | 423.220                | + 75                      | 2.5                 | TO39, F11 |
| HDR426M     | 426.062                | + 75                      | 2.5                 | TO39, F11 |
| HDR433.42M  | 433.420                | + 75                      | 2.5                 | TO39, F11 |
| HDR433M     | 433.920                | + 75                      | 2.5                 | TO39, F11 |
| HDR435M     | 435.700                | + 75                      | 2.5                 | TO39, F11 |
| HDR447M     | 447.625                | + 100                     | 2.5                 | TO39, F11 |
| HDR456M     | 456.800                | + 100                     | 2.5                 | TO39, F11 |
| HDR457M     | 457.500                | + 100                     | 2.5                 | TO39, F11 |
| HDR462M     | 462.500                | + 150                     | 2.5                 | TO39, F11 |
| HDR479M     | 479.500                | + 150                     | 2.5                 | TO39, F11 |
| HDR857.65M  | 857.650                | + 250                     | 2.5                 | TO39, F11 |
| HDR868M     | 868.000                | + 250                     | 2.5                 | TO39, F11 |
| HDR868.35M  | 868.350                | + 250                     | 2.5                 | TO39, F11 |
| HDR868.95M  | 868.950                | + 250                     | 2.5                 | TO39, F11 |
| HDR915M     | 915.000                | + 250                     | 2.5                 | TO39, F11 |