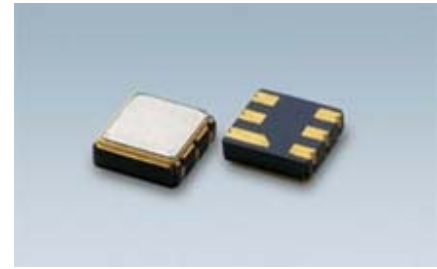
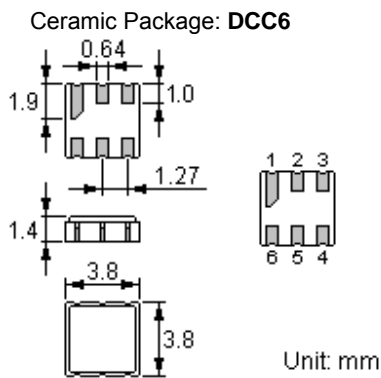


**Features**

- 1-port Resonator
- Provides reliable, fundamental mode, quartz frequency stabilization i.e. in transmitters or local oscillators
- **Surface Mounted Technology (SMT)**
- Lead-free production and RoHS compliance



**Package Dimensions**



**Pin Configuration**

2	Terminal
5	Terminal
1, 3, 4, 6	Ground

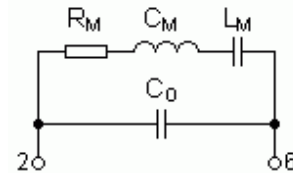
**Marking**

**NDR4002\***

Laser Marking

Top View, Laser Marking  
 "ND": Manufacturer's mark  
 "R": SAW resonator  
 "4002": Part number

**Equivalent LC Model**



Code	1	2	3	4	5	6	7	8	9	10	11	12
2009	A	B	C	D	E	F	G	H	J	K	L	M
2010	N	P	Q	R	S	T	U	V	W	X	Y	Z
2011	a	b	c	d	e	f	g	h	i	j	k	m
2012	n	p	q	r	s	t	u	v	w	x	y	z

**Maximum Ratings**

Rating	Value	Unit
CW RF power dissipation	$P$	0 dBm
DC voltage between any terminals	$V_{DC}$	±30 V
Operating temperature range	$T_A$	-40 ~ +85 °C
Storage temperature range	$T_{stg}$	-40 ~ +85 °C

Electrical Characteristics

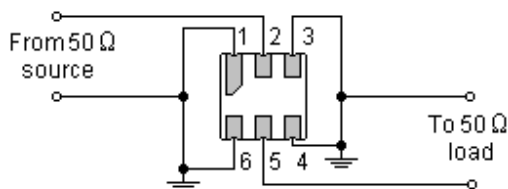
Characteristic		Sym	Minimum	Typical	Maximum	Unit
Center Frequency (+25°C)	Absolute Frequency	$f_c$	433.845		433.995	MHz
	Tolerance from 433.920 MHz	$\Delta f_c$		$\pm 75$		kHz
Insertion Loss		$I_L$		1.5	2.2	dB
Quality Factor	Unloaded Q	$Q_U$		8,800		
	50 $\Omega$ Loaded Q	$Q_L$		1,400		
Temperature Stability	Turnover Temperature	$T_0$	25		45	°C
	Turnover Frequency	$f_0$		$f_c$		kHz
	Frequency Temperature Coefficient	FTC		0.032		ppm/°C <sup>2</sup>
Frequency Aging	Absolute Value during the First Year	$ fA $		$\leq 10$		ppm/yr
DC Insulation Resistance Between Any Two Terminals				1.0		M $\Omega$
RF Equivalent RLC Model	Motional Resistance	$R_M$		19	29	$\Omega$
	Motional Inductance	$L_M$		61.1372		$\mu$ H
	Motional Capacitance	$C_M$		2.2027		fF
	Shunt Static Capacitance	$C_0$	1.9	2.2	2.5	pF

RoHS Compliant

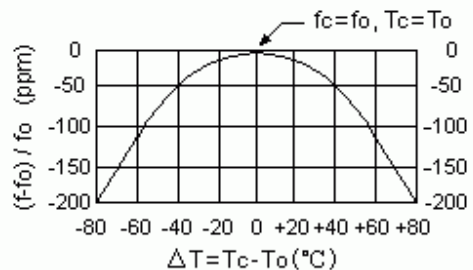
Electrostatic Sensitive Device

1. Unless noted otherwise, case temperature  $T_C = +25^\circ\text{C} \pm 2^\circ\text{C}$ .
2. The center frequency,  $f_c$ , is measured at the minimum insertion loss point with the resonator in the 50 $\Omega$  test system.
3. Frequency aging is the change in  $f_c$  with time and is specified at +65°C or less. Aging may exceed the specification for prolonged temperatures above +65°C. Typically, aging is greatest the first year after manufacture, decreasing in subsequent years.
4. Turnover temperature,  $T_0$ , is the temperature of maximum (or turnover) frequency,  $f_0$ . The nominal frequency at any case temperature,  $T_C$ , may be calculated from:  $f = f_0 [1 - \text{FTC} (T_0 - T_C)^2]$ .
5. This equivalent RLC model approximates resonator performance near the resonant frequency and is provided for reference only. The capacitance  $C_0$  is the static capacitance between the two terminals measured at low frequency (10MHz) with a capacitance meter. The measurement includes case parasitic capacitance.

Test Circuit

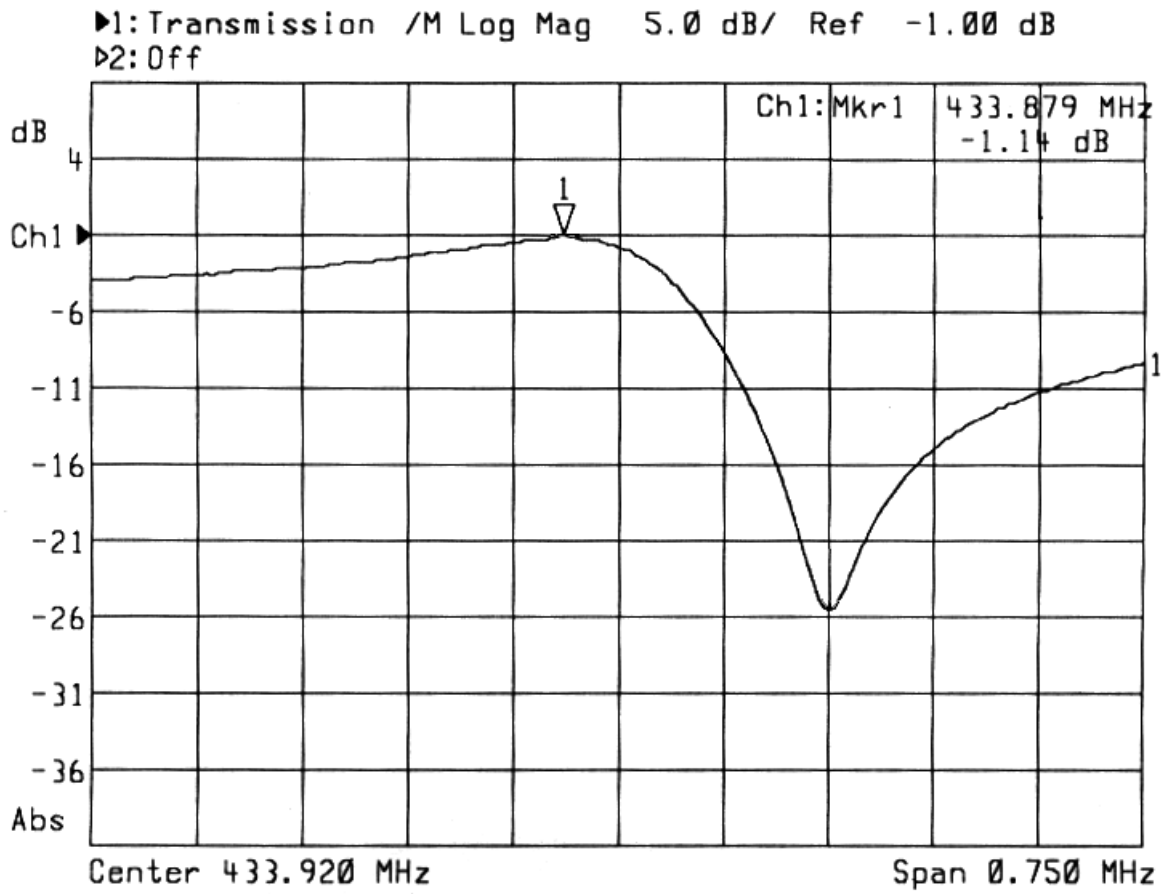


Temperature Characteristics



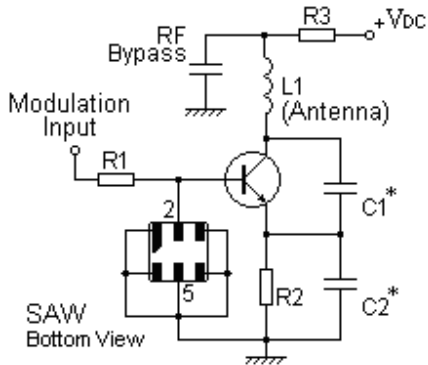
The curve shown above accounts for resonator contribution only.

Typical Frequency Response

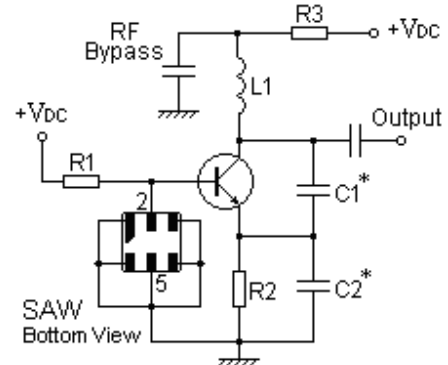


Typical Application Circuits

1) Low-Power Transmitter Application



2) Local Oscillator Application



**Stability Characteristics**

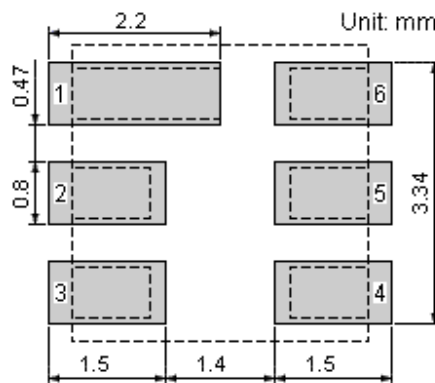
	Test item	Condition of test
1	Mechanical shock	(a) Drops: 3 times on concrete floor (b) Height: 1.0 m
2	Vibration resistance	(a) Frequency of vibration: 10~55Hz (c) Directions: X,Y and Z (b) Amplitude: 1.5 mm (d) Duration: 2 hours
3	Moisture resistance	(a) Condition: 40°C, 90~95% R.H. (c) Wait 4 hours before measurement (b) Duration: 96 hours
4	Climatic sequence	(a) +70°C for 16 hours (c) -25°C for 2 hours (e) Wait 4 hours before measurement (b) +55°C for 24 hours, 90~95% R.H. (d) +40°C for 24 hours, 90~95% R.H.
5	High temperature exposure	(a) Temperature: 70°C (c) Wait 4 hours before measurement (b) Duration: 250 hours
6	Thermal impact	(a) +70°C for 30 minutes ⇒ -25°C for 30 minutes repeated 3 times (b) Wait 4 hours before measurement

**Requirements:** The SAW resonator shall remain within the electrical specifications after tests.

**Remarks**

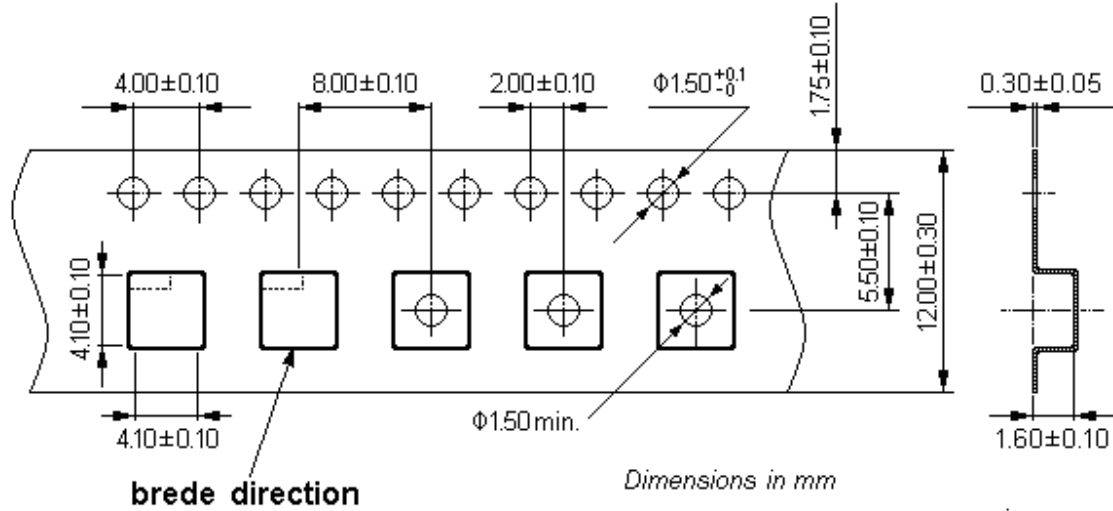
- SAW devices should not be used in any type of fluid such as water, oil, organic solvent, etc.
- Be certain not to apply voltage exceeding the rated voltage of components.
- Do not operate outside the recommended operating temperature range of components.
- Sudden change of temperature shall be avoided, deterioration of the characteristics can occur.
- Be careful of soldering temperature and duration of components when soldering.
- Do not place soldering iron on the body of components.
- Be careful not to subject the terminals or leads of components to excessive force.
- SAW devices are electrostatic sensitive. Please avoid static voltage during operation and storage.
- Ultrasonic cleaning shall be avoided. Ultrasonic vibration may cause destruction of components.

**Recommended Land Pattern**

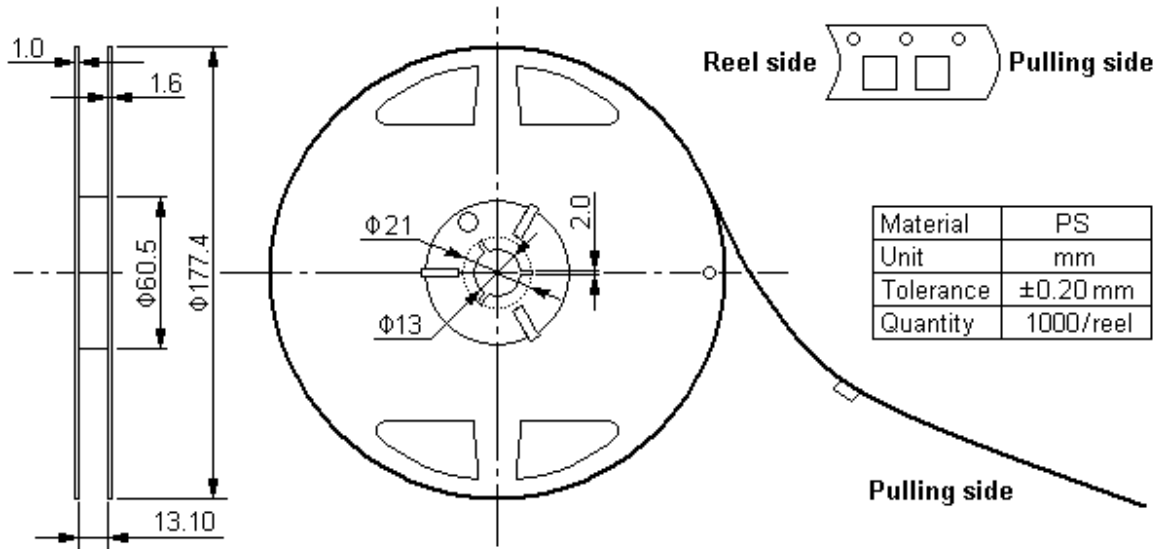


**Packing Information**

Carrier Tape



Reel Dimensions



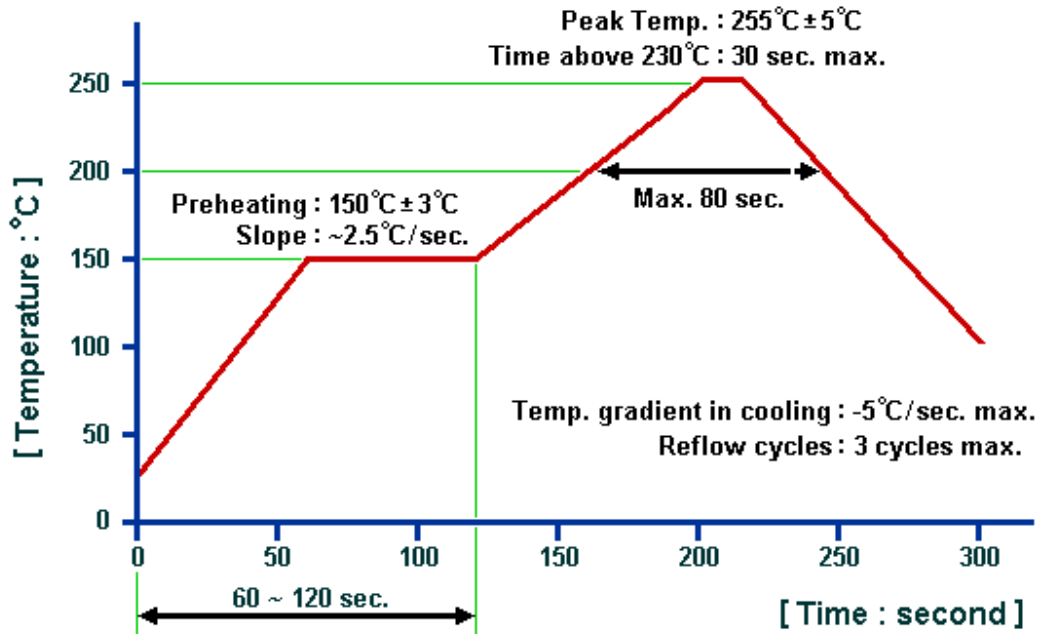
Outer Packing

Type	Quantity	Dimension	Description	Weight
Carton Box I	5000	190×190×95	anti-static plastic bag & carton box 1 reel / bag	0.85
Carton Box II	10000	190×190×190	5 bags / box (5000 pcs) 10 bags / box (10000 pcs)	1.80

Unit: mm

Unit: kg

**Recommended Soldering Profile**



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1. The specifications of this device are subject to change or obsolescence without notice.
2. Typically, equipment utilizing this device requires emissions testing and government approval, which is the responsibility of the equipment manufacturer.
3. Our liability is only assumed for the Surface Acoustic Wave (SAW) component(s) per se, not for applications, processes and circuits implemented within components or assemblies.
4. For questions on technology, prices and delivery, please contact our sales offices or e-mail [winnsky@winnsky.com](mailto:winnsky@winnsky.com)