

### PROTECTION PRODUCTS

#### Description

RClamp®1561PQ is a low capacitance ESD protection device specifically designed to protect high power RF interfaces. It offers desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

RClamp1561PQ is bidirectional and features a working voltage of 15V, high ESD withstand voltage (+/-10kV contact per IEC 61000-4-2), and low typical capacitance (0.25pF at  $V_R=15V$ ). RClamp1561PQ has been specifically engineered to minimize harmonic distortion in RF circuits, including high and low GSM bands. This makes it ideal for use on RF, FM, GSM and other antenna circuits commonly found in mobile and automotive applications.

RClamp1561PQ is in a 2-pin SLP1006P2 package measuring 1.0 x 0.6 mm with a nominal height of only 0.50mm. Leads are finished with NiPdAu. This device is qualified to AEC-Q100.

#### Features

- High ESD withstand voltage
  - ♦ IEC 61000-4-2 (ESD) 15kV (air), 10kV (contact)
- Low capacitance: 0.25pF Typical
- Qualified to AEC-Q100, Grade 1
- Protects one high-speed line
- Working voltage:  $\pm 15V$
- Low reverse leakage current
- Solid-state silicon-avalanche technology

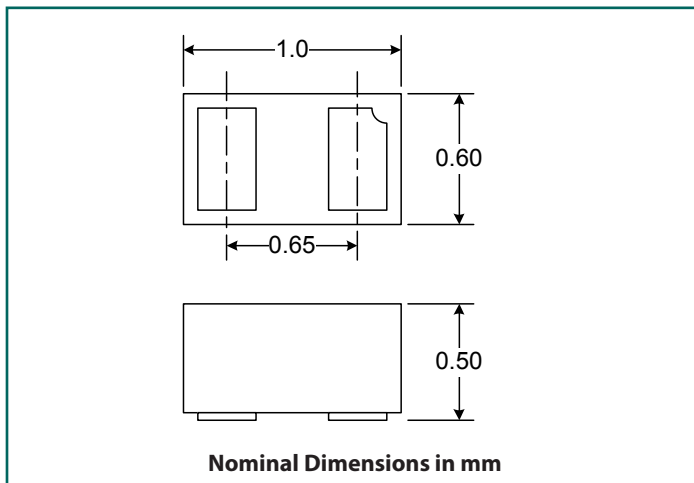
#### Mechanical Characteristics

- SLP1006P2 Package
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Nominal Dimensions: 1.0 x 0.60 x 0.50 mm
- Lead Finish: NiPdAu
- Marking: Marking Code
- Packaging: Tape and Reel

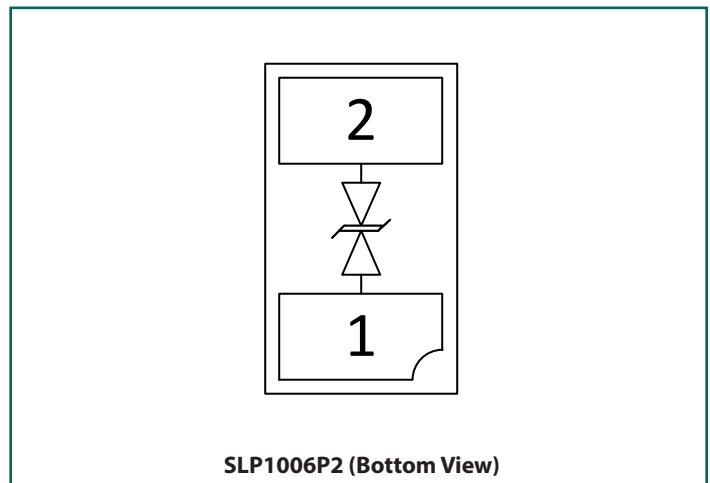
#### Applications

- RF Antenna
- GPS Antenna
- FM Antenna
- Bluetooth Circuits
- Automated Meter Reading
- Industrial Equipment

#### Nominal Dimensions



#### Schematic and Pin Configuration



## Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power ( $t_p = 8/20\mu\text{s}$ )	$P_{PK}$	70	W
Peak Pulse Current ( $t_p = 8/20\mu\text{s}$ )	$I_{PP}$	2	A
ESD per IEC 61000-4-2 (Air) <sup>(1)</sup> ESD per IEC 61000-4-2 (Contact) <sup>(1)</sup>	$V_{ESD}$	$\pm 15$ $\pm 10$	kV
Operating Temperature	$T_J$	-40 to +125	°C
Storage Temperature	$T_{STG}$	-55 to +150	°C

## Electrical Characteristics (T=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Stand-Off Voltage	$V_{RWM}$	-40°C to 125°C			15	V
Reverse Breakdown Voltage	$V_{BR}$	$I_t = 1\text{mA}$ -40°C to 125°C	16.5	19	20.5	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 15\text{V}$	T = 25°C	<5	50	nA
			T = 125°C	<5	100	nA
Clamping Voltage	$V_C$	$I_{PP} = 2\text{A}$ , $t_p = 8/20\mu\text{s}$		32	35	V
ESD Clamping Voltage <sup>2</sup>	$V_C$	$I_{PP} = 4\text{A}$ , $t_p = 0.2/100\text{ns}$ (TLP)		29.5		V
ESD Clamping Voltage <sup>2</sup>	$V_C$	$I_{PP} = 16\text{A}$ , $t_p = 0.2/100\text{ns}$ (TLP)		76		V
Dynamic Resistance <sup>2,3</sup>	$R_{DYN}$	$t_p = 0.2/100\text{ns}$ (TLP)		3.8		Ohms
Junction Capacitance	$C_J$	$V_R = 15\text{V}$ , $f = 1\text{MHz}$ T = 25°C		0.25	0.3	pF
Cutoff Frequency	$F_C$	-3dB	>20			GHz

### Notes:

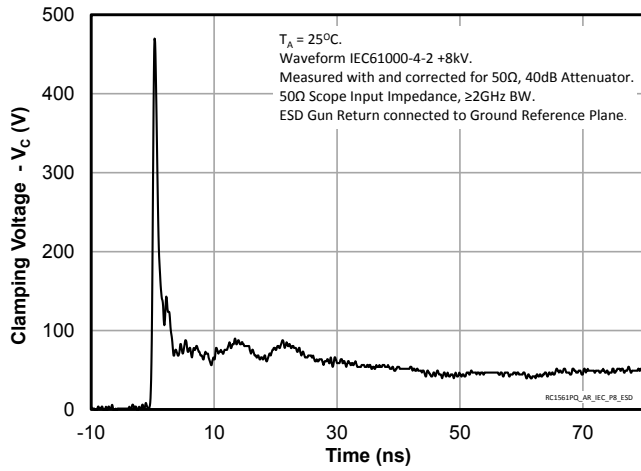
(1): ESD gun return path connected to Ground Reference Plane (GRP)

(2): Transmission Line Pulse Test (TLP) Settings:  $t_p = 100\text{ns}$ ,  $t_r = 0.2\text{ns}$ ,  $I_{TLP}$  and  $V_{TLP}$  averaging window:  $t_1 = 70\text{ns}$  to  $t_2 = 90\text{ns}$

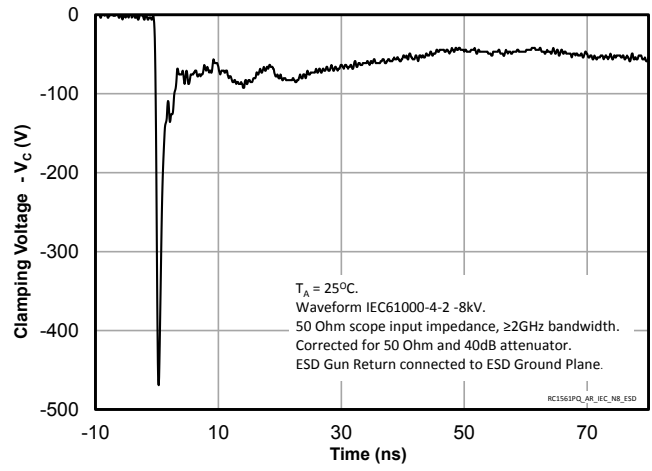
(3): Dynamic resistance calculated from  $I_{TLP} = 4\text{A}$  to  $I_{TLP} = 16\text{A}$

# Typical Characteristics

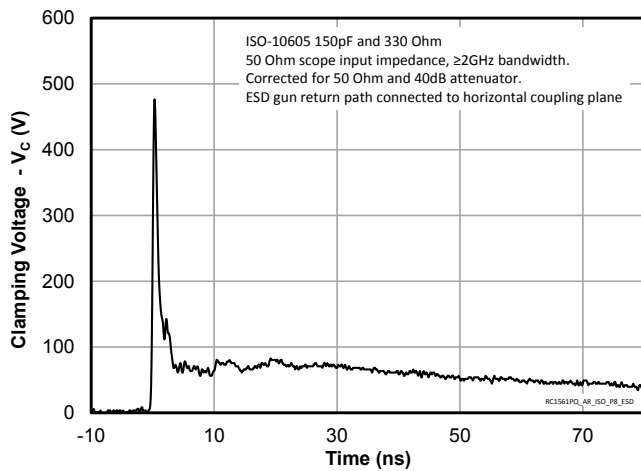
**ESD Clamping (+8kV Contact per IEC 61000-4-2)**



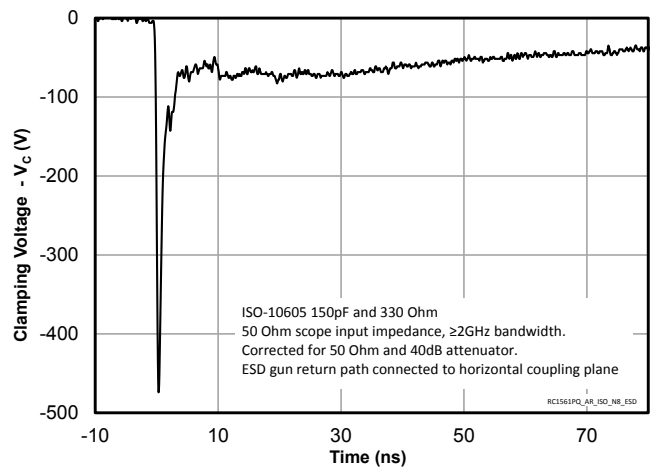
**ESD Clamping (-8kV Contact per IEC 61000-4-2)**



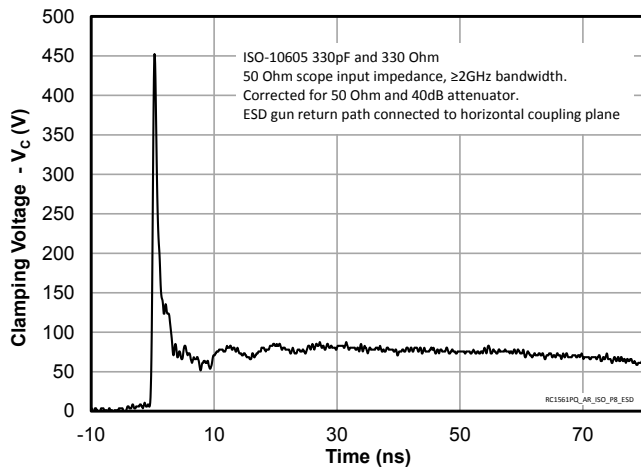
**ESD Clamping (+8kV Contact per ISO-10605 150pF, 330 $\Omega$ )**



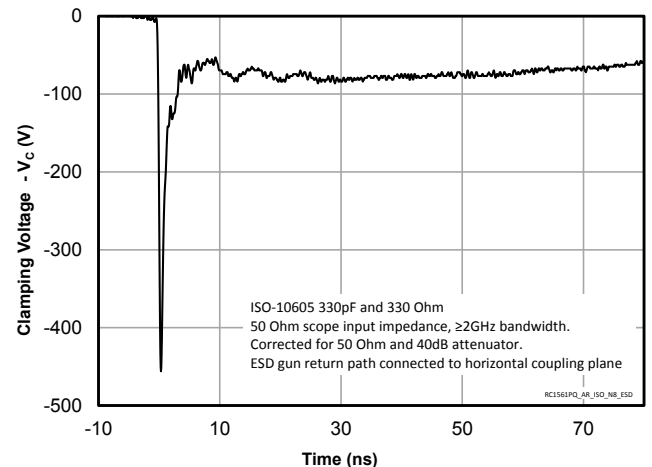
**ESD Clamping (-8kV Contact per ISO-10605 150pF, 330 $\Omega$ )**



**ESD Clamping (+8kV Contact per ISO-10605 330pF, 330 $\Omega$ )**

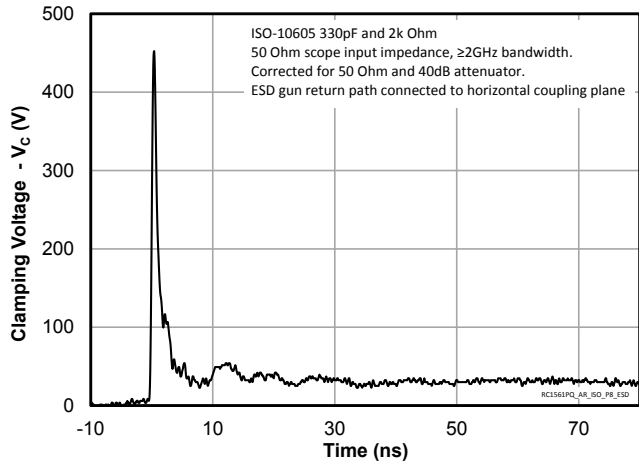


**ESD Clamping (-8kV Contact per ISO-10605 330pF, 330 $\Omega$ )**

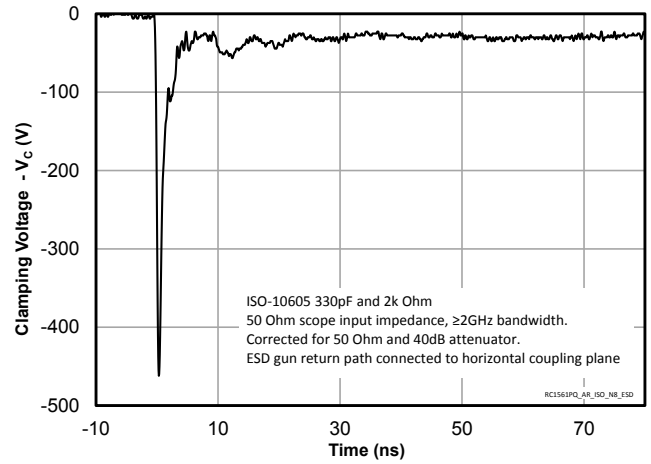


# Typical Characteristics (Continued)

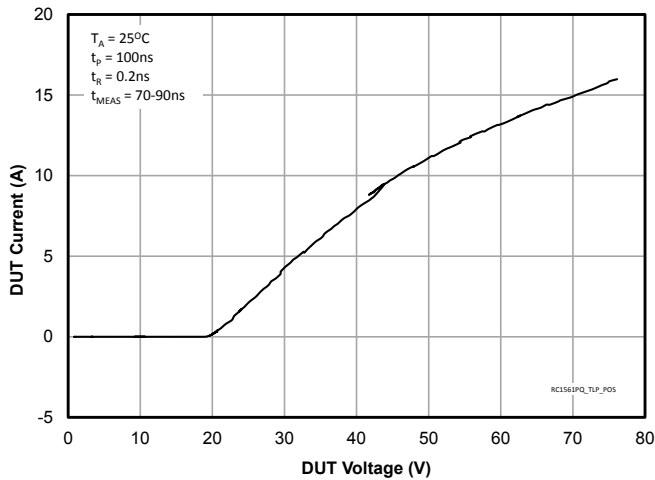
**ESD Clamping (+8kV Contact per ISO-10605 330pF, 2kΩ)**



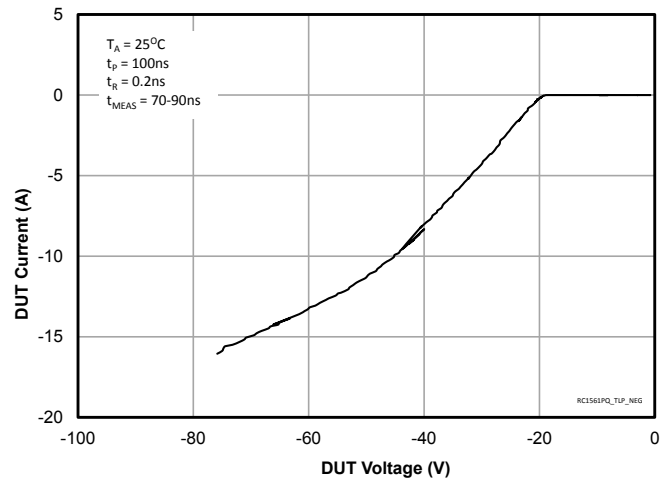
**ESD Clamping (-8kV Contact per ISO-10605 330pF, 2kΩ)**



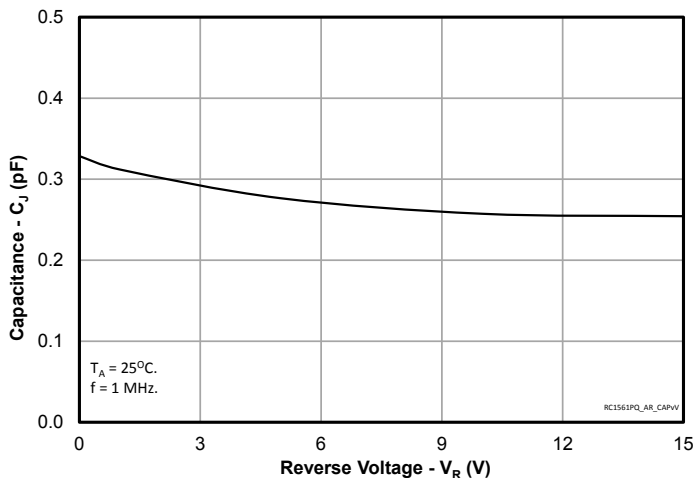
**TLP Characteristic (Positive Pulse)**



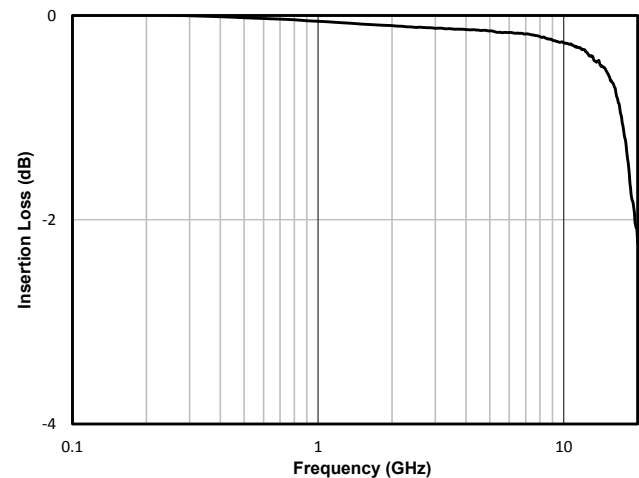
**TLP Characteristic (Negative Pulse)**



**Capacitance vs. Reverse Voltage**

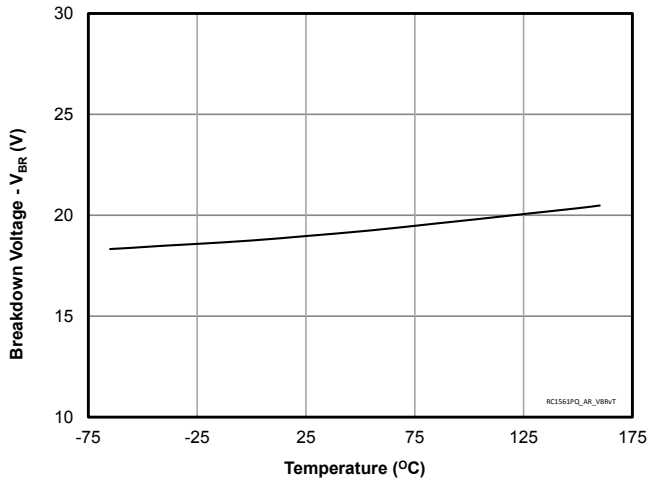


**Insertion Loss (S21)**

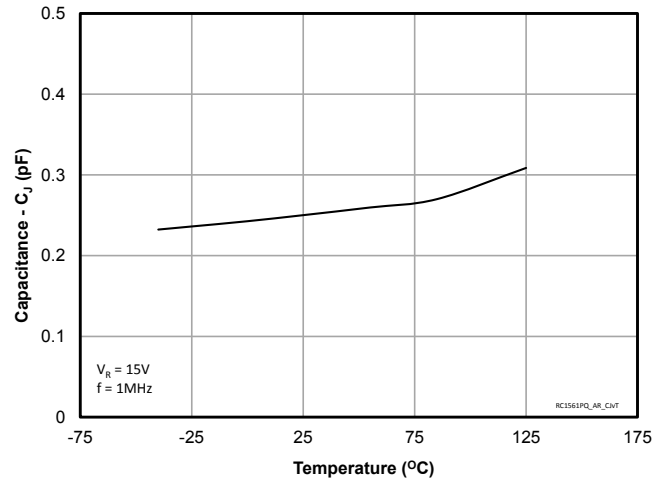


# Typical Characteristics (Continued)

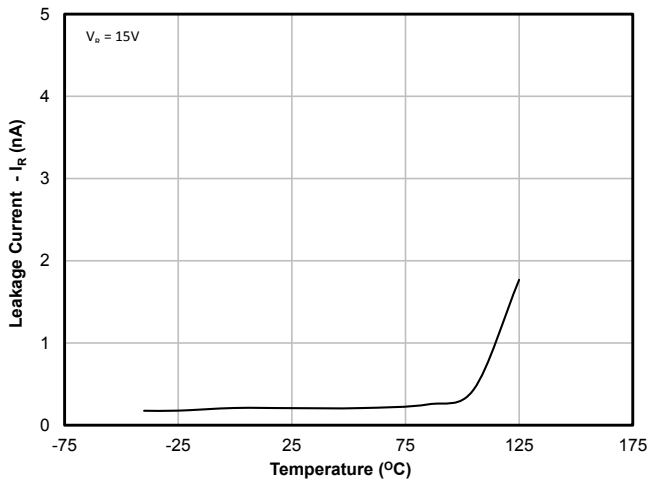
**Breakdown Voltage vs. Temperature**



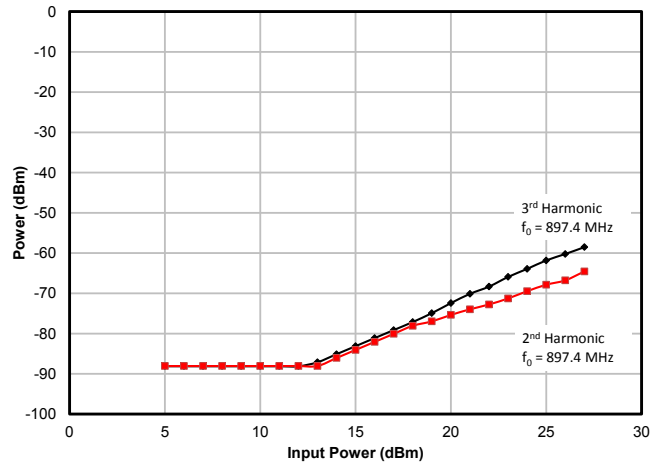
**Capacitance vs. Temperature**



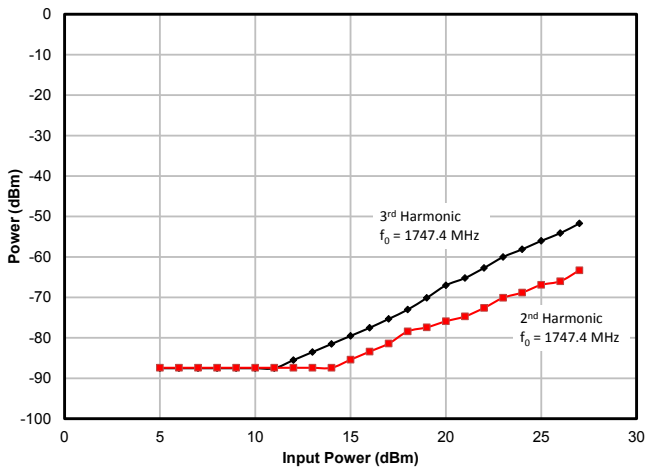
**Leakage Current vs. Temperature**



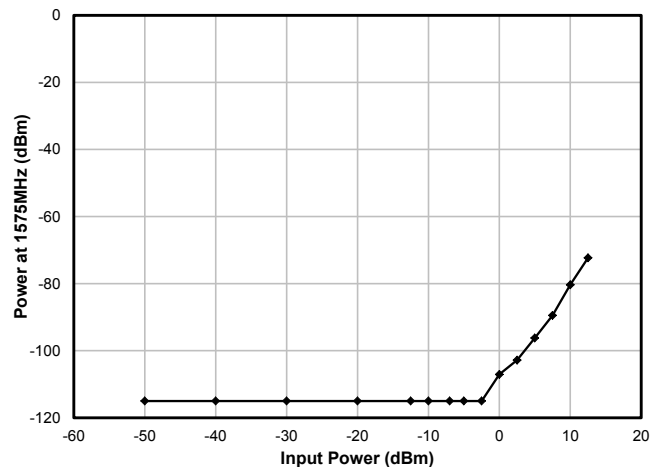
**Harmonic Generation - GSM Low Band**



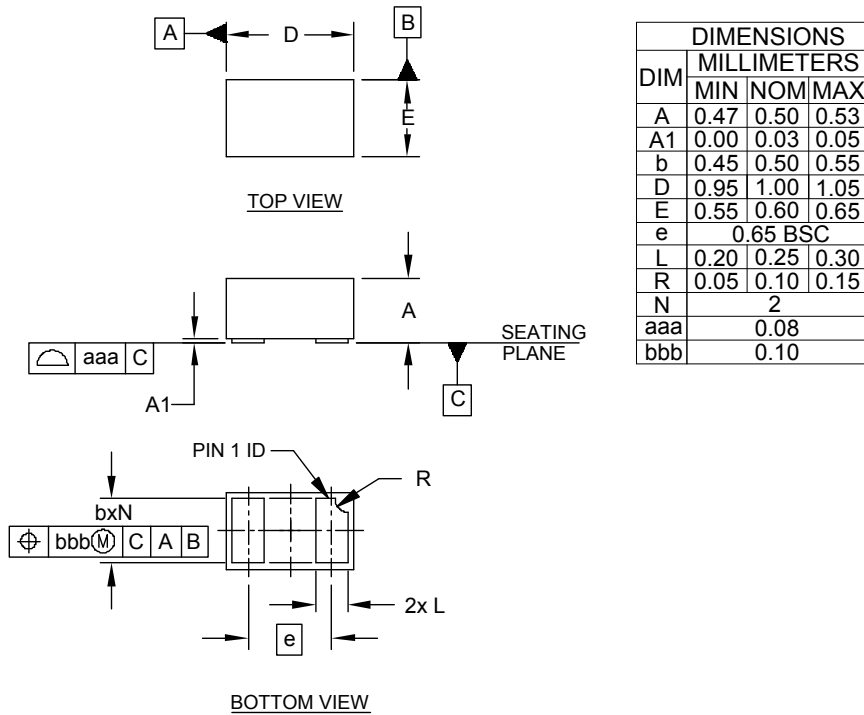
**Harmonic Generation - GSM High Band**



**Intermodulation Distortion (Input: 760MHz + 815 MHz)**



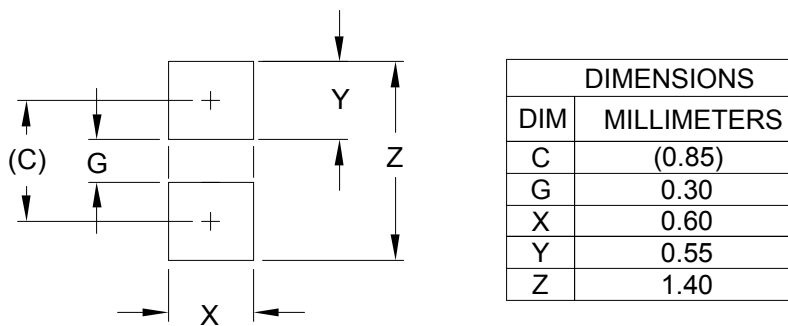
## Outline Drawing - SLP1006P2



### NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).

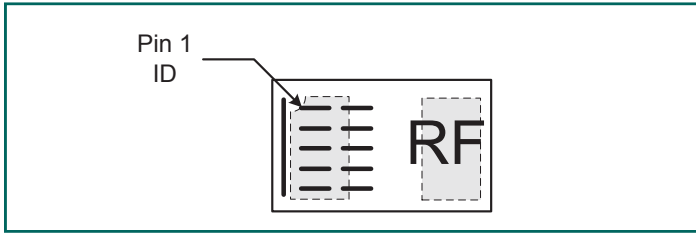
## Land Pattern - SLP1006P2



### NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

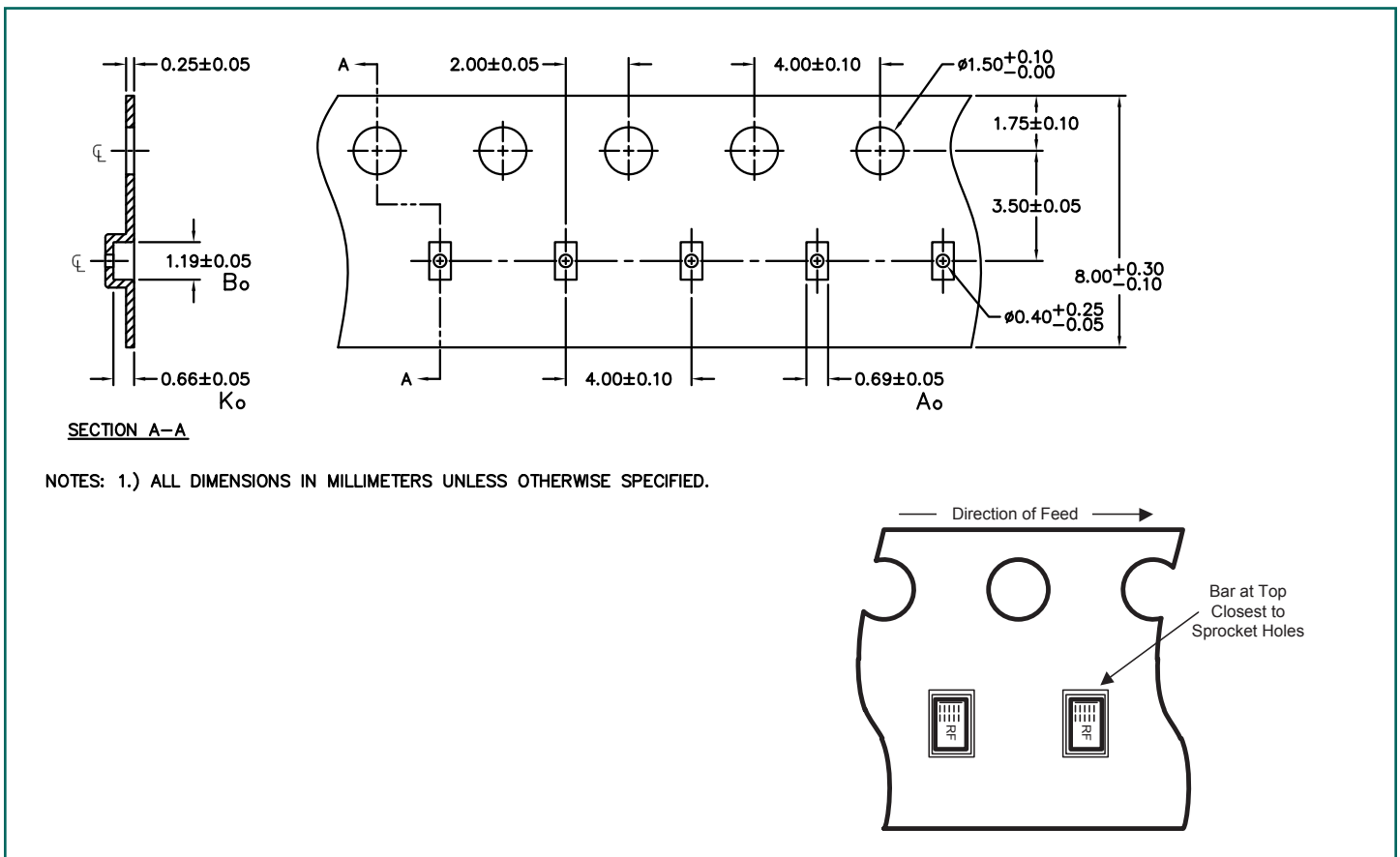
## Marking Code



Notes:

- 1) Device is electrically symmetrical
- 2) Dashes indicate line matrix date code
- 3) Bar indicates Pin 1 location

## Tape and Reel Specification



## Ordering Information

Part Number	Qty per Reel	Reel Size
RClamp1561PQTCT	3,000	7 Inch
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