

## HIGH CTR, AC INPUT RESPONSE TYPE 4 PIN ULTRA SMALL PACKAGE FLAT LEAD OPTOCOUPLER

### PS2915-1

### FEATURES

- **ULTRA SMALL FLAT-LEAD PACKAGE:**  
4.6 (L) x 2.5 (W) x 2.1 (H) mm
- **HIGH CURRENT TRANSFER RATIO:**  
CTR = 200% TYP @  $I_F = \pm 1$  mA,  $V_{CE} = 5$  V
- **HIGH ISOLATION VOLTAGE**  
BV: 2500 V<sub>r.m.s.</sub>
- **TAPE AND REEL AVAILABLE:**  
PS2915-F3, F4: 3500 pcs/reel

### DESCRIPTION

The PS2915-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon phototransistor in one package for high density mounting applications. An ultra small flat lead package has been provided which realizes a reduction in mounting area of about 30% compared with the PS28XX series.

### APPLICATIONS

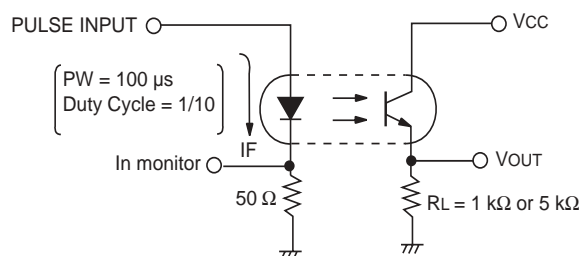
- DC/DC CONVERTER
- MODEM/PC CARD

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

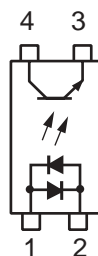
| PART NUMBER |                      |   | PS2915-1 |                  |     |
|-------------|----------------------|---|----------|------------------|-----|
| SYMBOLS     | PARAMETERS           | UNITS   | MIN      | TYP              | MAX |
| Diode       | V <sub>F</sub>       | Forward Voltage, I <sub>F</sub> = ±1 mA   | V        | 0.9              | 1.3 |
|             | C <sub>T</sub>       | Terminal Capacitance, V = 0, f = 1.0 MHz  | pF       |                  | 30  |
| Transistor  | I <sub>CEO</sub>     | Collector to Emitter Dark Current, I <sub>F</sub> = 0 mA, V <sub>CE</sub> = 40 V                                      | nA       |                  | 100 |
| Coupled     | CTR                  | Current Transfer Ratio (I <sub>C</sub> /I <sub>F</sub> ) <sup>1</sup> , I <sub>F</sub> = ±1 mA, V <sub>CE</sub> = 5 V | %        | 100              | 400 |
|             | V <sub>CE(sat)</sub> | Collector Saturation Voltage, I <sub>F</sub> = ±1 mA, I <sub>C</sub> = 0.2 mA   | V        |                  | 0.3 |
|             | R <sub>I-O</sub>     | Isolation Resistance, V <sub>I-O</sub> = 1.0 kV <sub>DC</sub>   | Ω        | 10 <sup>11</sup> |     |
|             | C <sub>I-O</sub>     | Isolation Capacitance, V = 0 V, f = 1.0 MHz   | pF       |                  | 0.4 |
|             | t <sub>r</sub>       | Rise Time <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 1 kΩ                          | μs       |                  | 5   |
|             | t <sub>f</sub>       | Fall Time <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 1 kΩ                          | μs       |                  | 10  |
|             | t <sub>on</sub>      | On Time, V <sub>CC</sub> = 5 V, I <sub>F</sub> = ±1 mA, R <sub>L</sub> = 5 kΩ   | μs       |                  | 40  |
|             | t <sub>off</sub>     | Storage Time <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>F</sub> = ±1 mA, R <sub>L</sub> = 5 kΩ                      | μs       |                  | 10  |
|             | t <sub>off</sub>     | Off Time <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>F</sub> = ±1 mA, R <sub>L</sub> = 5 kΩ                          | μs       | 120              |     |

Notes:

1. CTR RANK:  
N: 100 to 400 (%)
2. Test Circuit for Switching Time



PS2915-1



**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** (TA = 25°C)

| SYMBOLS    | PARAMETERS                        | UNITS   | RATINGS     |
|------------|-----------------------------------|---------|-------------|
| Diode      |                                   |         |             |
| IF         | Forward Current                   | mA      | ±50         |
| ΔIF/°C     | Forward Current Derating          | mW/°C   | 0.5         |
| IF (Peak)  | Peak Forward Current <sup>2</sup> | A       | ±0.5        |
| PD         | Power Dissipation                 | mW      | 60          |
| Transistor |                                   |         |             |
| VCEO       | Collector to Emitter Voltage      | V       | 40          |
| VECO       | Emitter to Collector Voltage      | V       | 5           |
| IC         | Collector Current                 | mA      | 40          |
| ΔPC/°C     | Power Dissipation Derating        | mW/°C   | 1.2         |
| PC         | Power Dissipation                 | mW      | 120         |
| Coupled    |                                   |         |             |
| BV         | Isolation Voltage <sup>3</sup>    | Vr.m.s. | 2500        |
| PT         | Total Power Dissipation           | mW      | 160         |
| TA         | Operating Ambient Temp.           | °C      | -55 to +100 |
| TSTG       | Storage Temperature               | °C      | -55 to +150 |

Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. PW = 100 μs, Duty Cycle = 1%.
3. AC voltage for 1 minute at TA = 25 °C, RH = 60 % between input and output.

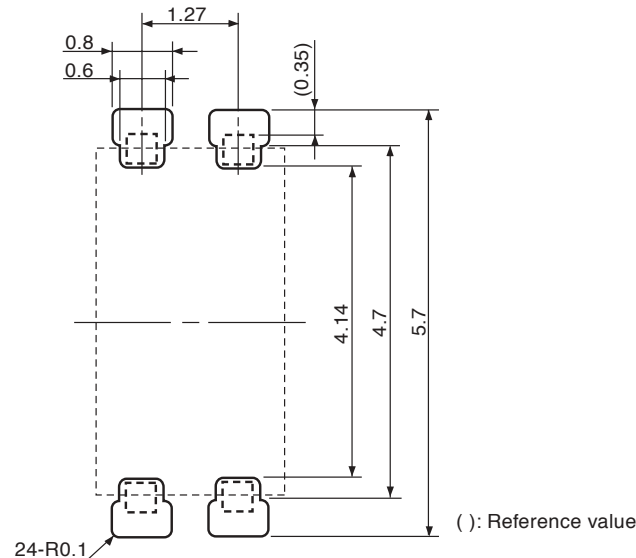
**CAUTIONS REGARDING NOISE:**

Be aware that when voltage is applied suddenly between the optocoupler's input and output or between collector-emitters at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

**ORDERING INFORMATION**

| PART NUMBER | PACKING STYLE               |
|-------------|-----------------------------|
| PS2915-1-F3 | Embossed Tape 3500 pcs/reel |
| PS2915-1-F4 |                             |

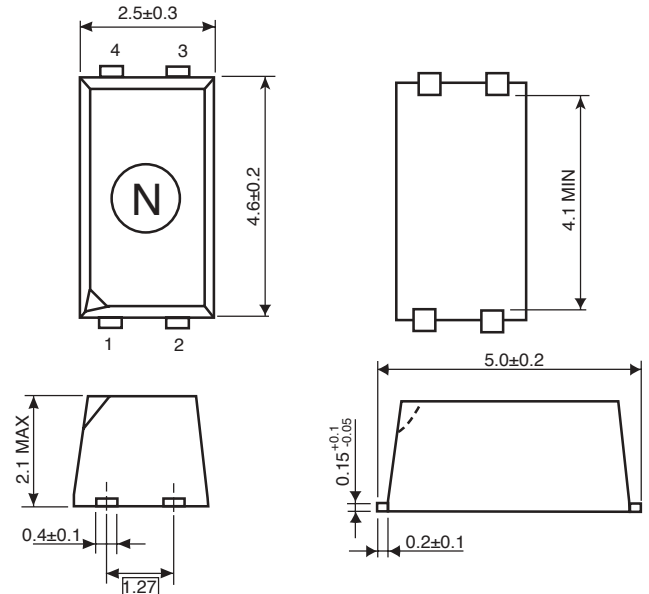
**RECOMMENDED MOUNT PAD DIMENSIONS** (Units in mm)



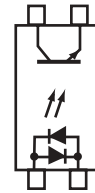
**OPTOCOUPLER CONSTRUCTION**

| PARAMETER          | UNITS (MIN) |
|--------------------|-------------|
| Air Distance       | 4 mm        |
| Creepage Distance  | 4 mm        |
| Isolation Distance | 0.4 mm      |

**OUTLINE DIMENSIONS** (Units in mm)

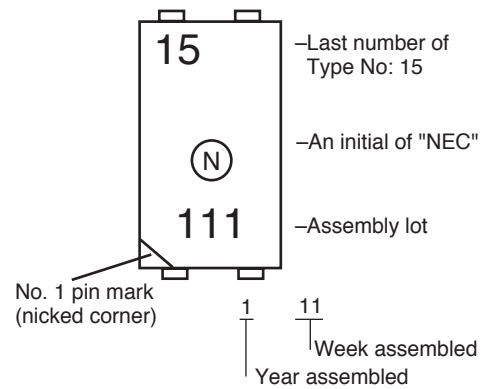


**TOP VIEW**

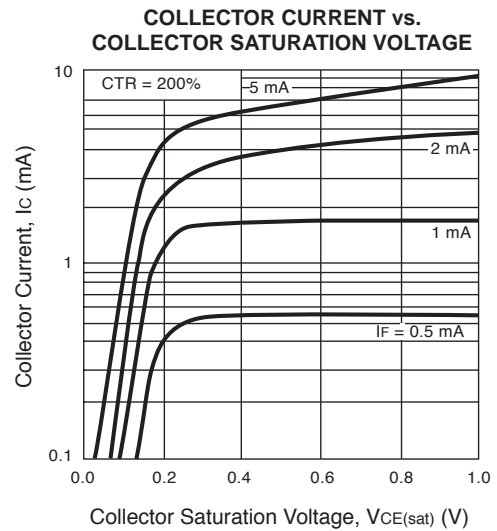
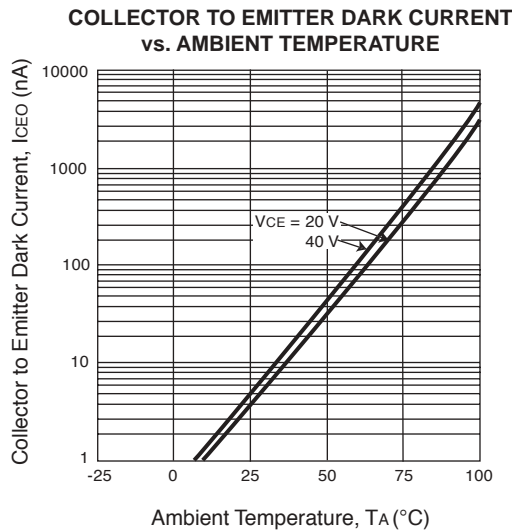
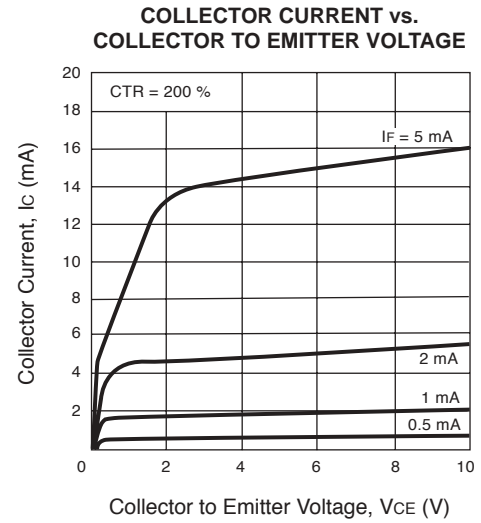
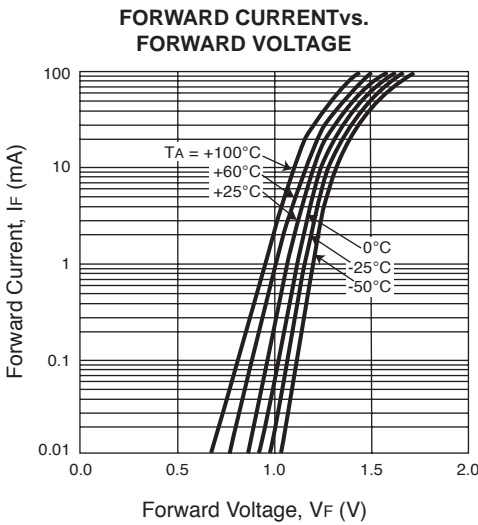
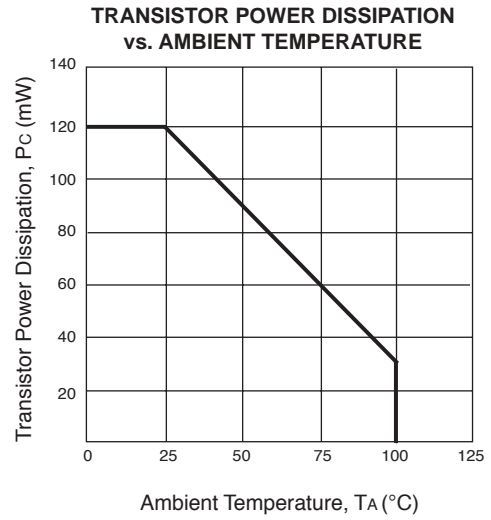
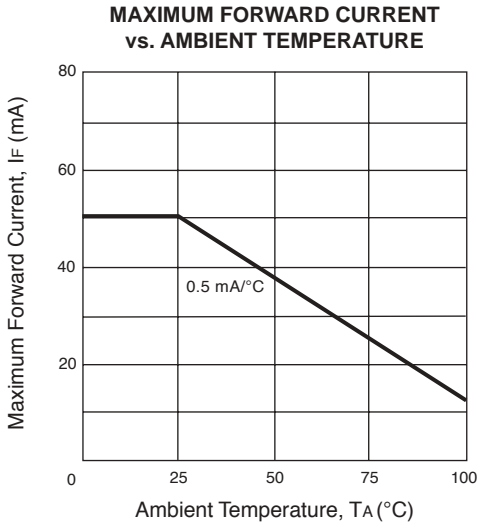


1. Anode, Cathode
2. Cathode, Anode
3. Emitter
4. Collector

**MARKING**

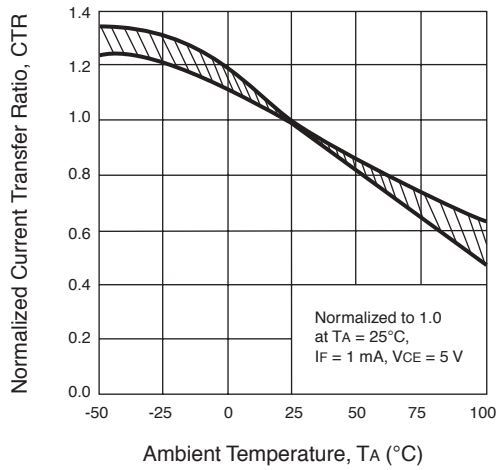


**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

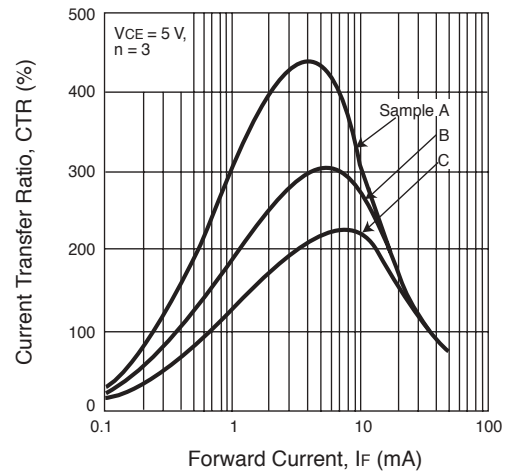


**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

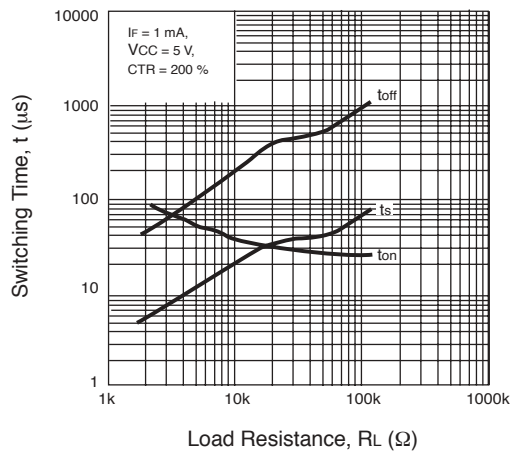
**NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE**



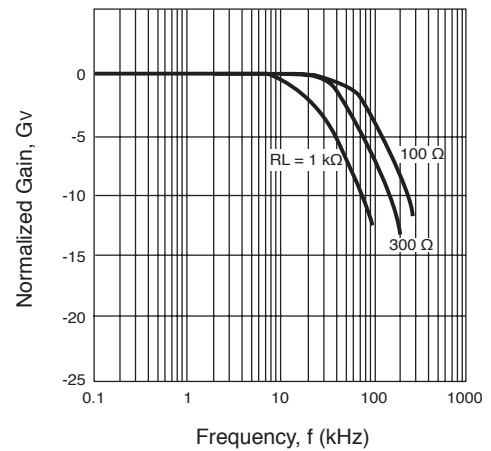
**CURRENT TRANSFER RATIO vs. FORWARD CURRENT**



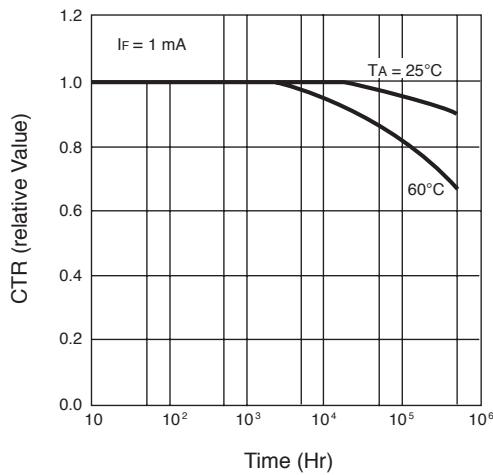
**SWITCHING TIME vs. LOAD RESISTANCE**



**FREQUENCY RESPONSE**



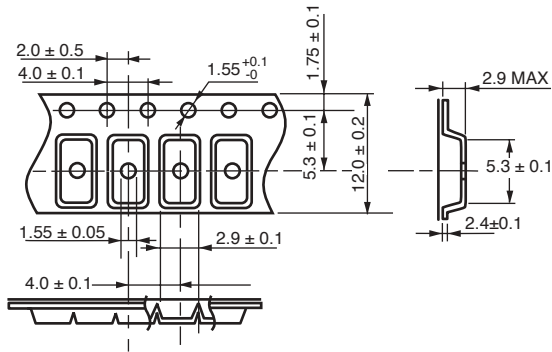
**LONG TERM CTR DEGRADATION**



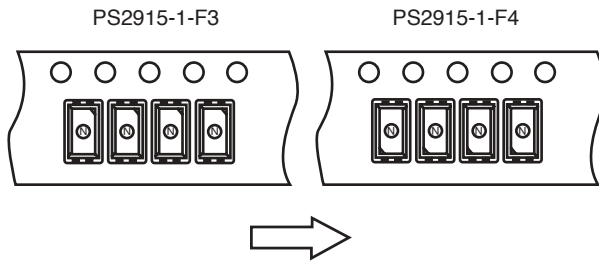
Remark: The graphs indicate nominal characteristics.

# TAPING SPECIFICATIONS (Units in mm)

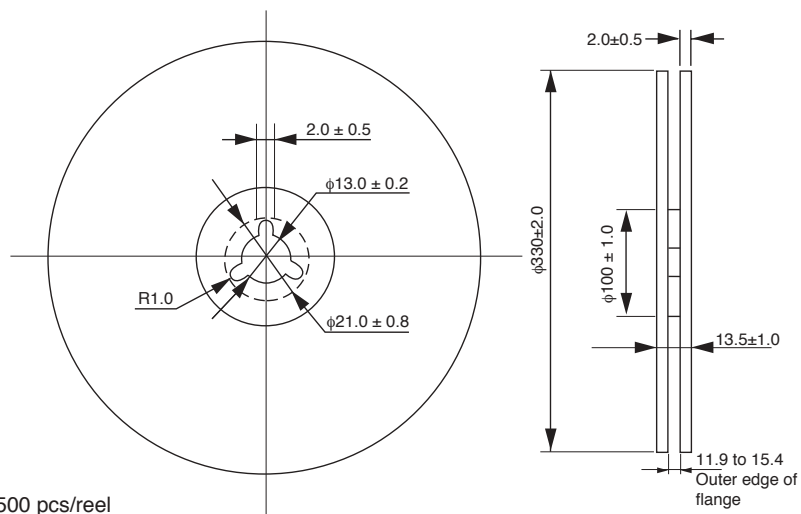
## Tape Outline and Dimensions



## Tape Direction



## Reel Outline and Dimensions



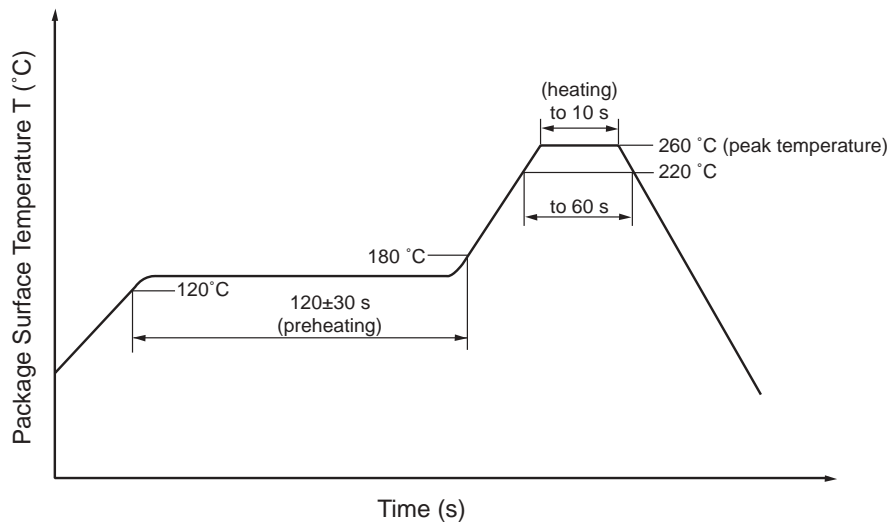
Packing: 3500 pcs/reel

**RECOMMENDED SOLDERING CONDITIONS**

**(1) Infrared reflow soldering**

- Peak reflow temperature 260 °C or below (package surface temperature)
- Time of peak reflow temperature 10 seconds or less
- Time of temperature higher than 220 °C 60 seconds or less
- Time to preheat temperature from 120 to 180°C 120±30 s
- Number of reflows Three
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended).

Recommended Temperature Profile of Infrared Reflow



**(2) Wave soldering**

- Temperature 260 °C or below (molten solder temperature)
- Time 10 seconds or less
- Preheating conditions 120°C or below (package surface temperature)
- Number of times One (Allowed to be dipped in solder including plastic mold portion.)
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended).

**(3) Cautions**

- Fluxes Avoid removing the residual flux with chlorine-based cleaning solvent after a reflow process.

**USAGE CAUTIONS**

1. Protect against static electricity when handling.
2. Avoid storage at a high temperature and high humidity.

Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

EXCLUSIVE NORTH AMERICAN AGENT FOR NEC RF, MICROWAVE & OPTOELECTRONIC SEMICONDUCTORS