

## NEC's HIGH CTR 4 PIN ULTRA SMALL PACKAGE FLAT LEAD OPTOCOUPLER

### FEATURES

- **SMALL AND THIN PACKAGE:**  
4.6 (L) x 2.5 (W) x 2.1 (H) mm
- **HIGH CURRENT TRANSFER RATIO:**  
CTR = 200% TYP @  $I_F = 1 \text{ mA}$ ,  $V_{CE} = 5 \text{ V}$
- **HIGH ISOLATION VOLTAGE**  
BV: 2500  $V_{r.m.s.}$
- **TAPE AND REEL AVAILABLE**

### DESCRIPTION

NEC's PS2911-1 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

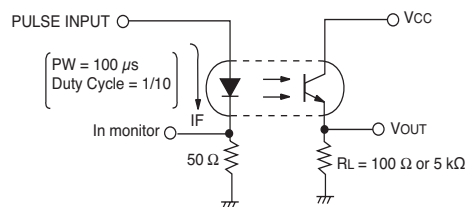
### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

PART NUMBER			PS2911-1			
SYMBOLS		PARAMETERS	UNITS	MIN	TYP	MAX
Diode	$V_F$	Forward Voltage, $I_F = 5 \text{ mA}$	V	0.9	1.1	1.3
	$I_R$	Reverse Current, $V_R = 5 \text{ V}$	$\mu\text{A}$			5
	$C_T$	Terminal Capacitance, $V = 0$ , $f = 1.0 \text{ MHz}$	pF		15	
Transistor	$I_{CEO}$	Collector to Emitter Current, $I_F = 0 \text{ mA}$ , $V_{CE} = 40 \text{ V}$	nA			100
Coupled	CTR	Current Transfer Ratio ( $I_C/I_F$ ) <sup>1</sup> , $I_F = 1 \text{ mA}$ , $V_{CE} = 5 \text{ V}$	%	100	200	400
	$V_{CE(sat)}$	Collector Saturation Voltage, $I_F = 1 \text{ mA}$ , $I_C = 0.2 \text{ mA}$	V		0.13	0.3
	$R_{I-O}$	Isolation Resistance, $V_{I-O} = 1.0 \text{ k V}_{DC}$	$\Omega$	$10^{11}$		
	$C_{I-O}$	Isolation Capacitance, $V = 0 \text{ V}$ , $f = 1.0 \text{ MHz}$	pF		0.4	
	$t_r$	Rise Time <sup>2</sup> , $V_{CC} = 5 \text{ V}$ , $I_C = 2 \text{ mA}$ , $R_L = 100 \Omega$	$\mu\text{s}$		5	
	$t_f$	Fall Time <sup>2</sup> , $V_{CC} = 5 \text{ V}$ , $I_C = 2 \text{ mA}$ , $R_L = 100 \Omega$	$\mu\text{s}$		10	
	$t_{on}$	On Time <sup>2</sup> , $V_{CC} = 5 \text{ V}$ , $I_F = 1 \text{ mA}$ , $R_L = 5 \text{ k}\Omega$	$\mu\text{s}$		40	
	$t_s$	Storage Time <sup>2</sup> , $V_{CC} = 5 \text{ V}$ , $I_F = 1 \text{ mA}$ , $R_L = 5 \text{ k}\Omega$	$\mu\text{s}$		10	
$t_{off}$	Off Time <sup>2</sup> , $V_{CC} = 5 \text{ V}$ , $I_F = 1 \text{ mA}$ , $R_L = 5 \text{ k}\Omega$	$\mu\text{s}$		120		

#### 1. CTR RANK:

- N: 100 to 400 (%)
- K: 200 to 400 (%)
- L: 150 to 300 (%)
- M: 100 to 200 (%)

#### 2. Test Circuit for Switching Time



#### PS2911-1



The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

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

SYMBOLS	PARAMETERS	UNITS	RATINGS
Diode			
IF	Forward Current (DC)	mA	50
ΔIF/°C	Forward Current Derating	mA/°C	0.5
IF (Peak)	Peak Forward Current <sup>2</sup>	A	0.5
PD	Power Dissipation	mW	60
VR	Reverse Voltage	V	6
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.

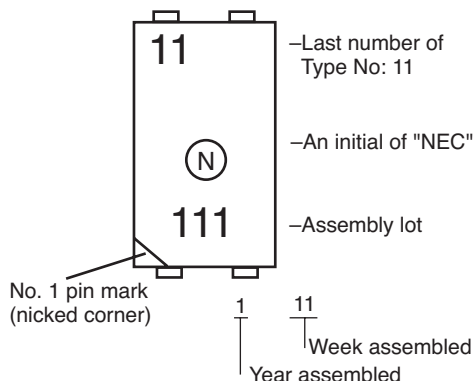
**ORDERING INFORMATION (Solder Contains Lead)**

PART NUMBER	PACKING STYLE
PS2911-1-F3	Embossed Tape 3500 pcs/reel
PS2911-1-F4	

**ORDERING INFORMATION (Pb-Free)**

PART NUMBER	PACKING STYLE
PS2911-1-F3-A	Embossed Tape 3500 pcs/reel
PS2911-1-F4-A	

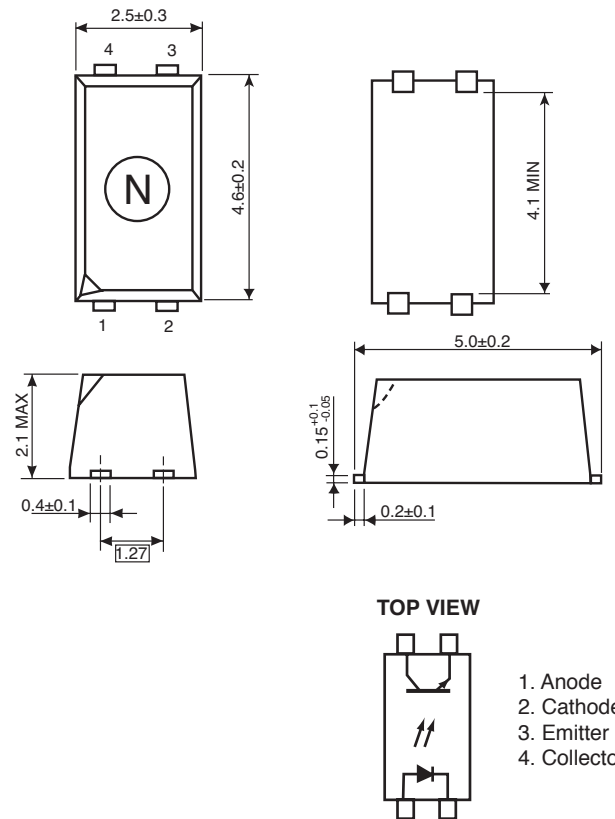
**MARKING**



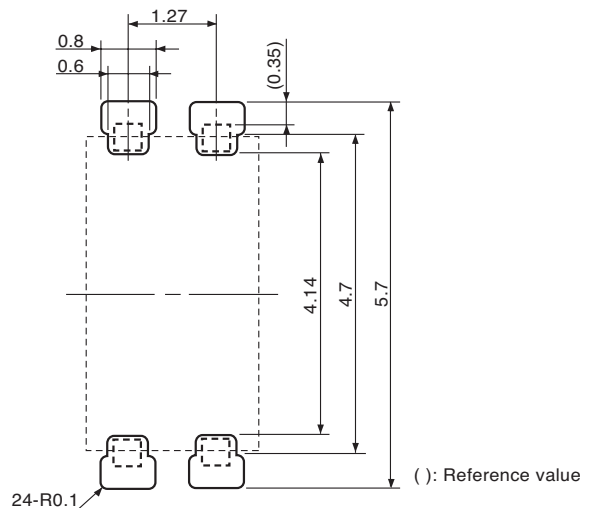
**OPTOCOUPLER CONSTRUCTION**

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

**OUTLINE DIMENSIONS** (Units in mm)



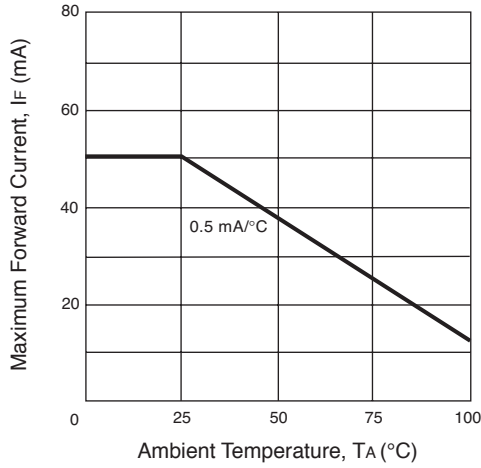
**RECOMMENDED MOUNT PAD DIMENSIONS** (Units in mm)



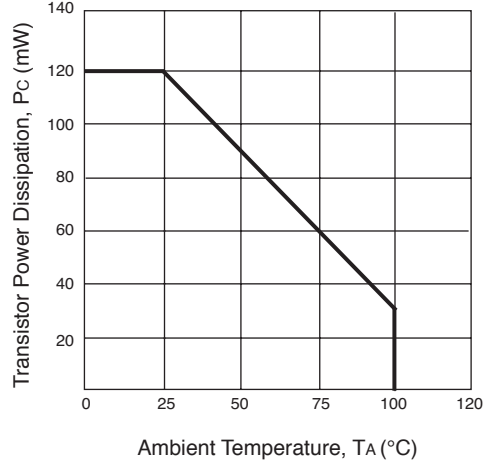
**Remark:** This drawing is considered to meet air and outer creepage distance 4.0 mm minimum. All dimensions in this figure must be evaluated before use.

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

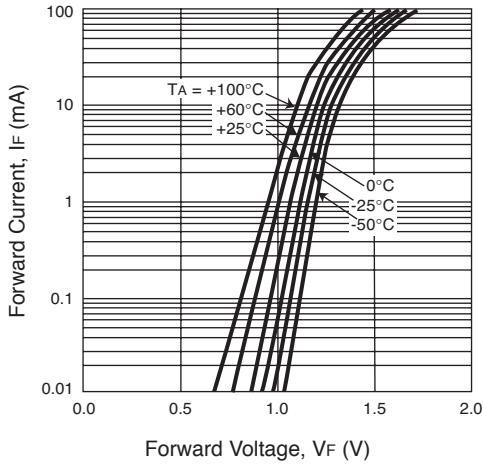
**MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE**



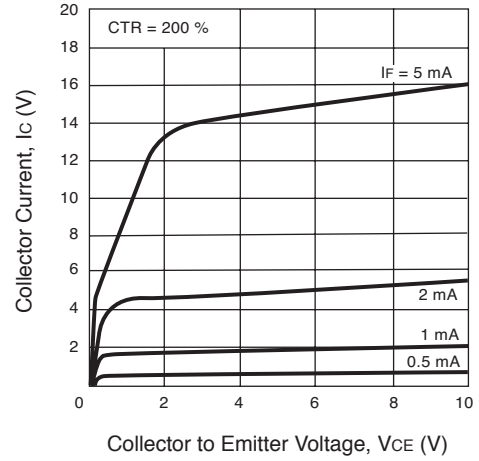
**TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE**



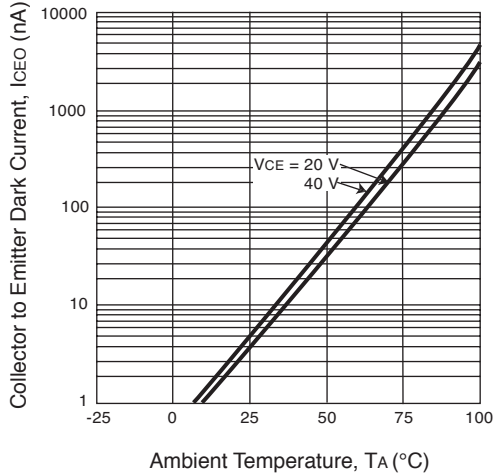
**FORWARD CURRENT vs. FORWARD VOLTAGE**



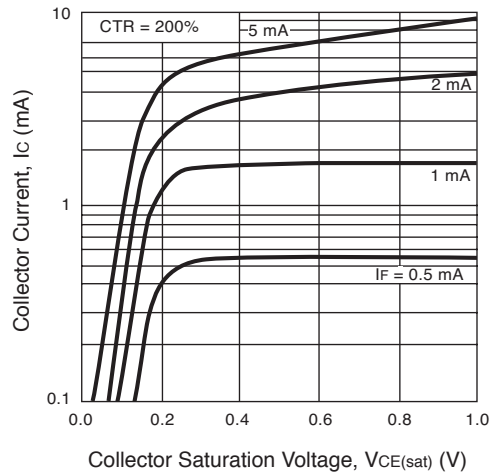
**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**



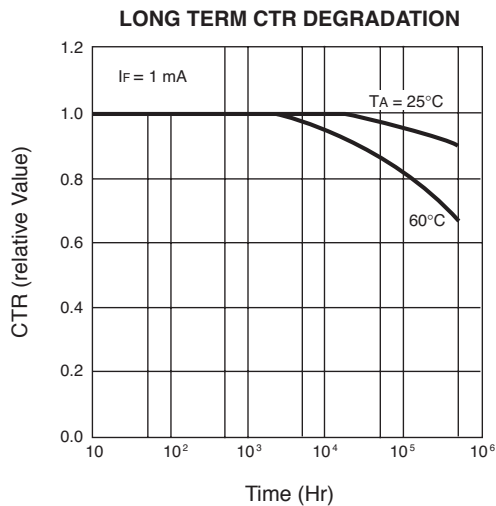
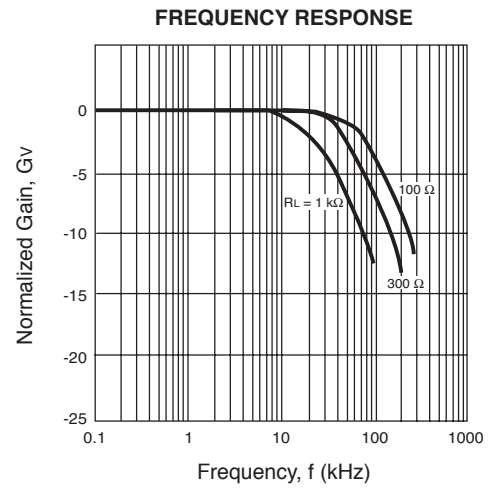
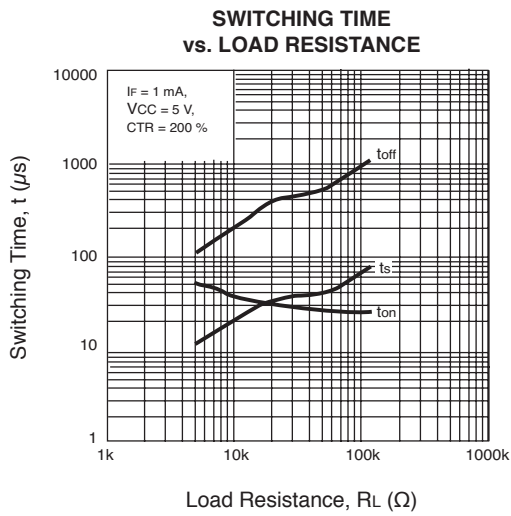
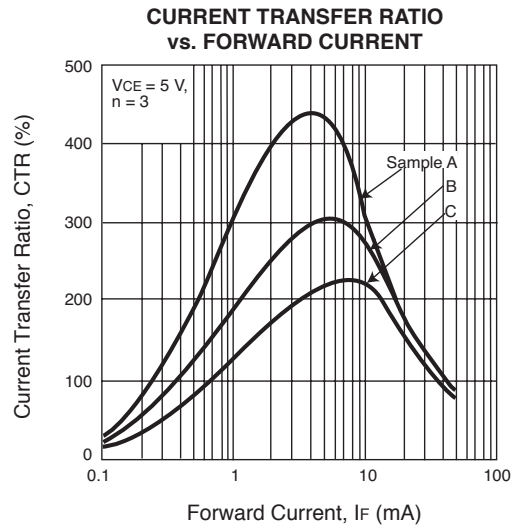
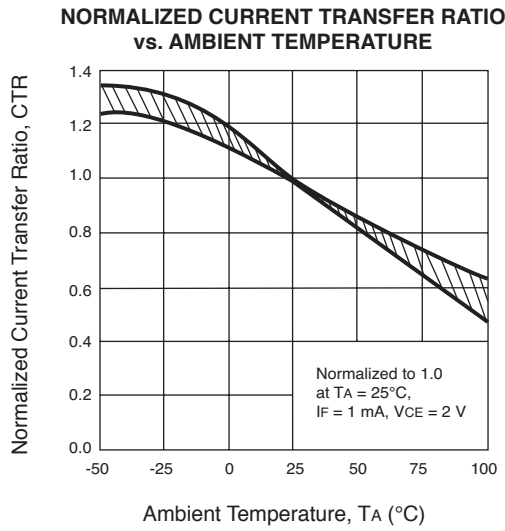
**COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE**



**COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE**

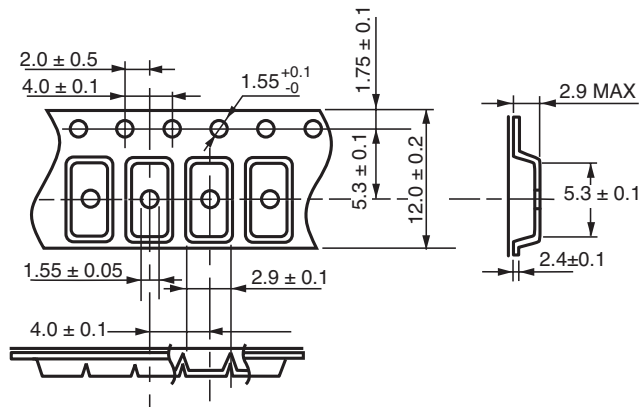


**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

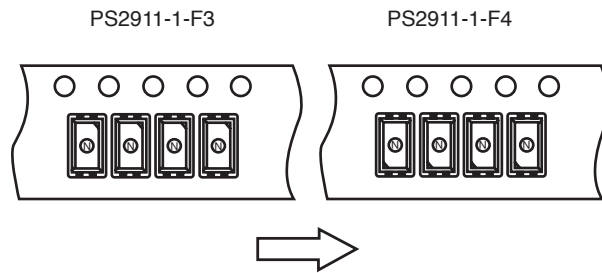


**TAPING SPECIFICATIONS** (Units in mm)

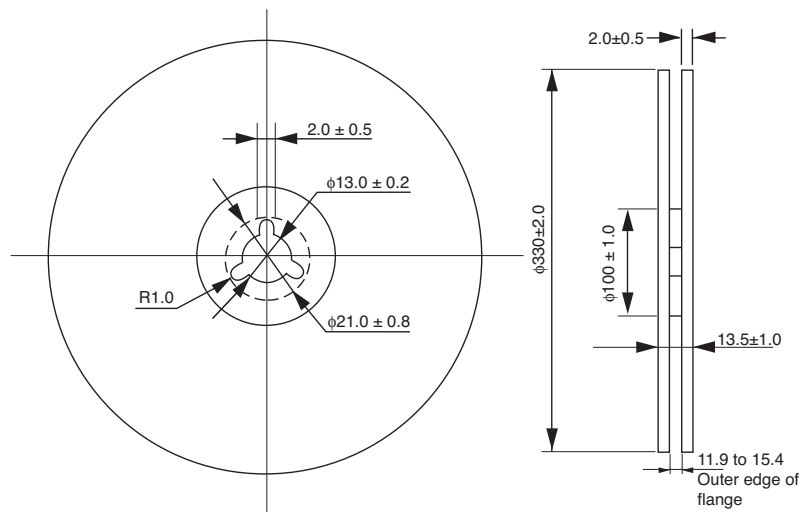
Tape Outline and Dimensions



Tape Direction



Reel Outline and Dimensions

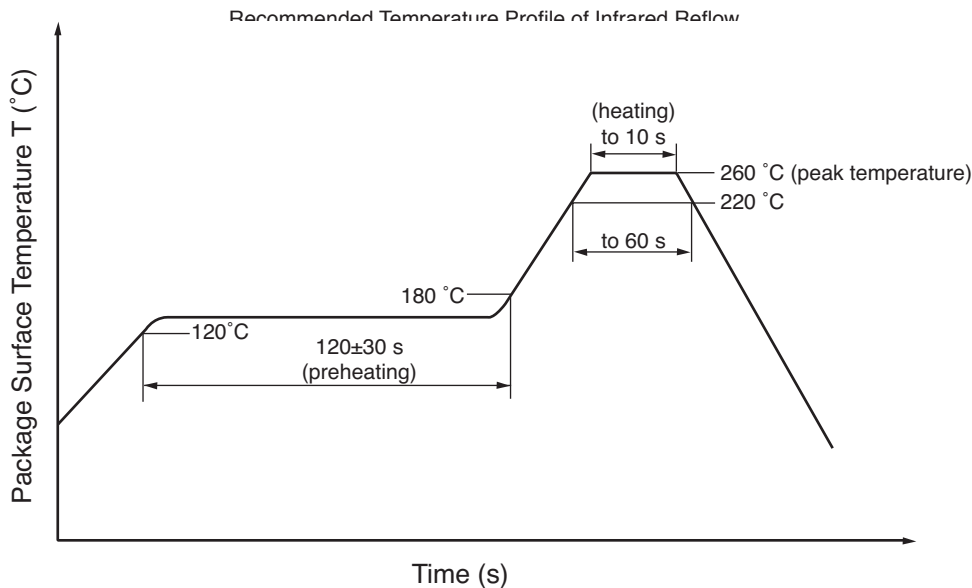


Packing: 3500 pcs/reel

**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).



**(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.

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 4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 919-2500 • FAX (408) 988-0279 • [www.cel.com](http://www.cel.com)

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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

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