

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

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 $V_{r.m.s.}$
- **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

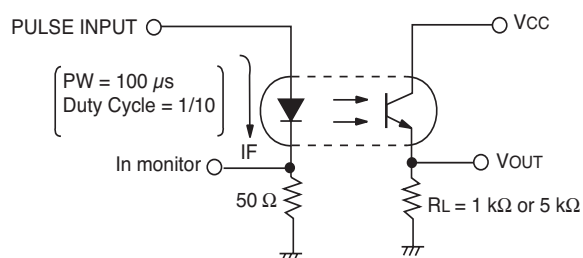
- DC/DC CONVERTER
- MODEM/PC CARD

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

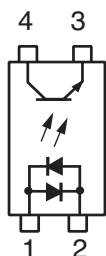
| PART NUMBER | | | PS2915-1 | | | |
|-------------|---------------|--|---------------|-----------|------|-----|
| | SYMBOLS | PARAMETERS | UNITS | MIN | TYP | MAX |
| Diode | V_F | Forward Voltage, $I_F = \pm 1$ mA | V | 0.9 | 1.1 | 1.3 |
| | C_T | Terminal Capacitance, $V = 0$, $f = 1.0$ MHz | pF | | 30 | |
| Transistor | I_{CEO} | Collector to Emitter Dark Current, $I_F = 0$ mA, $V_{CE} = 40$ V | nA | | | 100 |
| Coupled | CTR | Current Transfer Ratio (I_C/I_F) ¹ , $I_F = \pm 1$ mA, $V_{CE} = 5$ V | % | 100 | 200 | 400 |
| | $V_{CE(sat)}$ | Collector Saturation Voltage, $I_F = \pm 1$ mA, $I_C = 0.2$ mA | V | | 0.13 | 0.3 |
| | R_{I-O} | Isolation Resistance, $V_{I-O} = 1.0$ kVDC | Ω | 10^{11} | | |
| | C_{I-O} | Isolation Capacitance, $V = 0$ V, $f = 1.0$ MHz | pF | | 0.4 | |
| | t_r | Rise Time ² , $V_{CC} = 5$ V, $I_C = 2$ mA, $R_L = 1$ k Ω | μs | | 5 | |
| | t_f | Fall Time ² , $V_{CC} = 5$ V, $I_C = 2$ mA, $R_L = 1$ k Ω | μs | | 10 | |
| | t_{on} | On Time, $V_{CC} = 5$ V, $I_F = \pm 1$ mA, $R_L = 5$ k Ω | μs | | 40 | |
| | t_{off} | Storage Time ² , $V_{CC} = 5$ V, $I_F = \pm 1$ mA, $R_L = 5$ k Ω | μs | | 10 | |
| | t_{off} | Off Time ² , $V_{CC} = 5$ V, $I_F = \pm 1$ mA, $R_L = 5$ k Ω | μs | | 120 | |

Notes:

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



PS2915-1



ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

| SYMBOLS | PARAMETERS | UNITS | RATINGS |
|-----------------------|-----------------------------------|---------------------|-------------|
| Diode | | | |
| I _F | Forward Current | mA | ±50 |
| ΔI _F /°C | Forward Current Derating | mW/°C | 0.5 |
| I _F (Peak) | Peak Forward Current ² | A | ±0.5 |
| P _D | Power Dissipation | mW | 60 |
| Transistor | | | |
| V _{CEO} | Collector to Emitter Voltage | V | 40 |
| V _{ECO} | Emitter to Collector Voltage | V | 5 |
| I _C | Collector Current | mA | 40 |
| ΔP _C /°C | Power Dissipation Derating | mW/°C | 1.2 |
| P _C | Power Dissipation | mW | 120 |
| Coupled | | | |
| BV | Isolation Voltage ³ | V _{r.m.s.} | 2500 |
| P _T | Total Power Dissipation | mW | 160 |
| T _A | Operating Ambient Temp. | °C | -55 to +100 |
| T _{STG} | 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 T_A = 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.

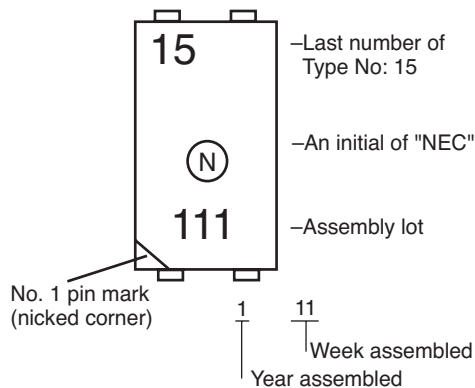
ORDERING INFORMATION (Solder Contains Lead)

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

ORDERING INFORMATION (Pb-Free)

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

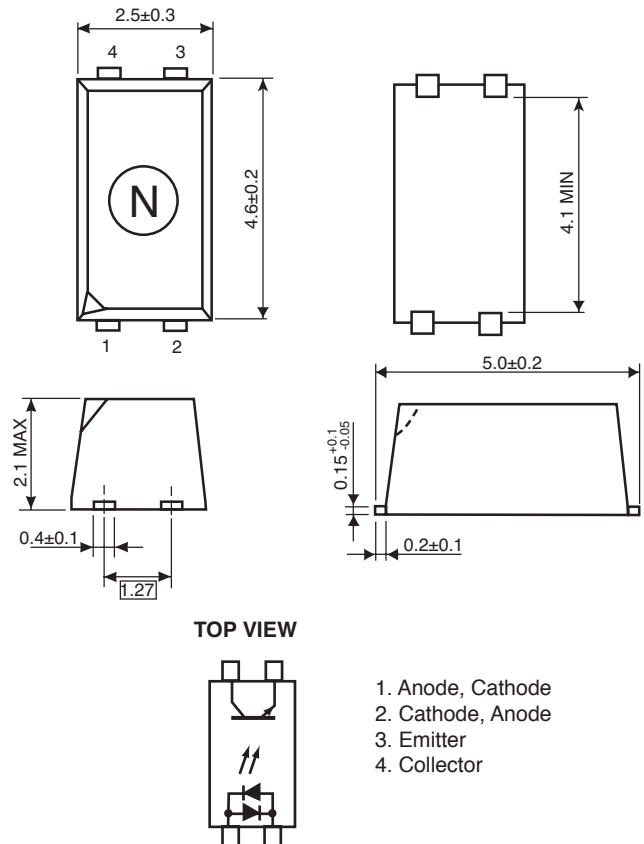
MARKING



OPTOCOUPLER CONSTRUCTION

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

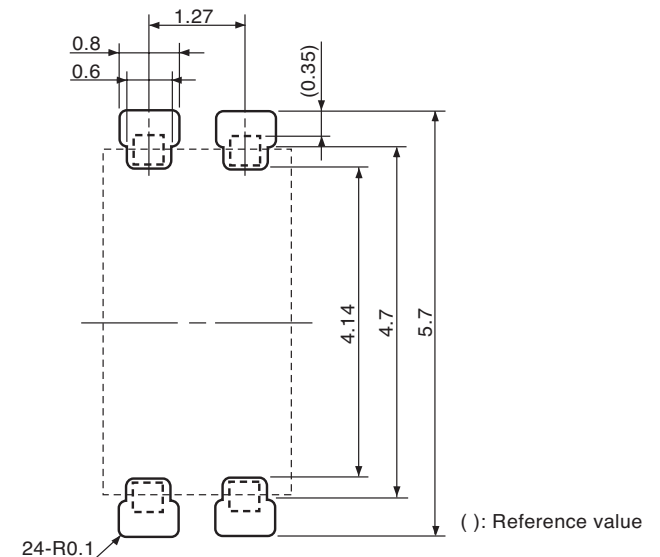
OUTLINE DIMENSIONS (Units in mm)



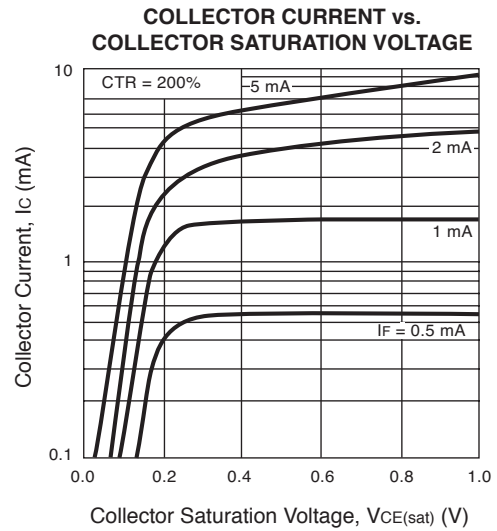
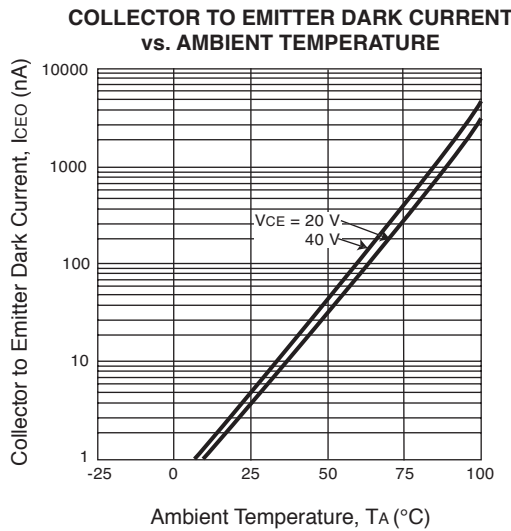
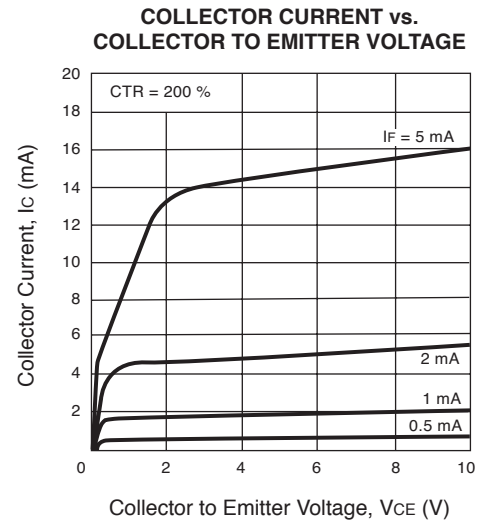
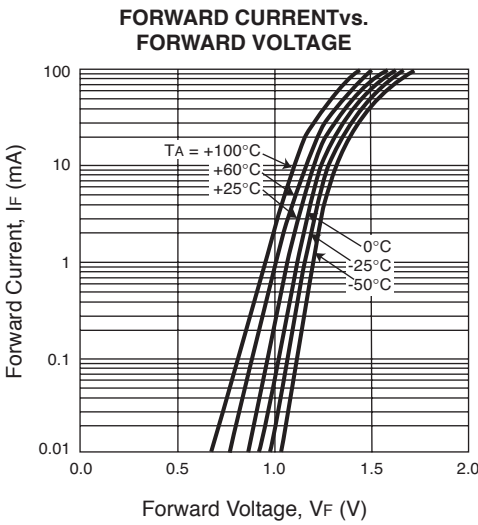
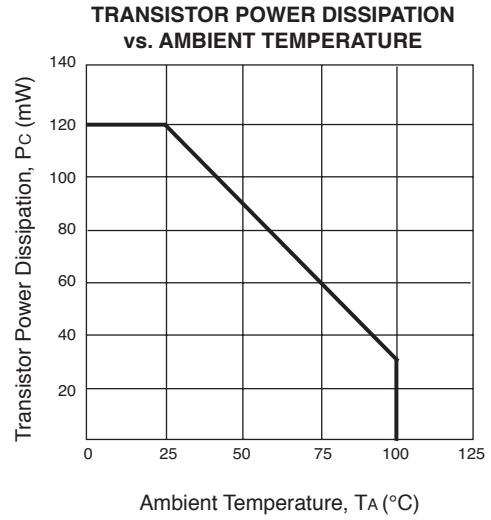
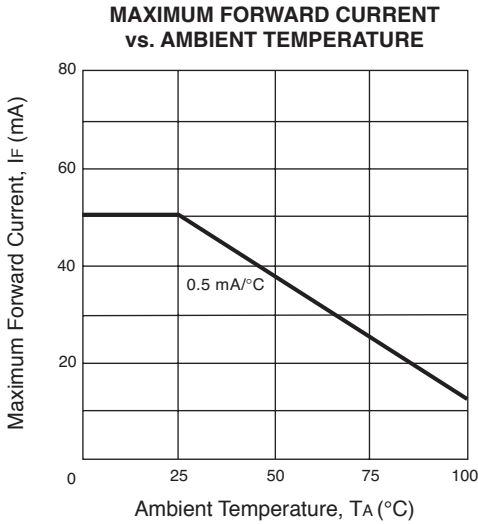
TOP VIEW

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

RECOMMENDED MOUNT PAD DIMENSIONS (Units in mm)

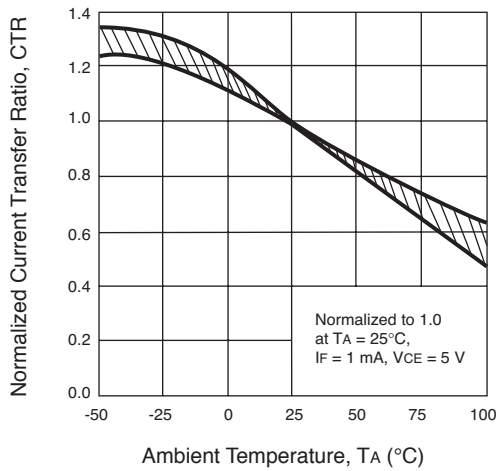


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

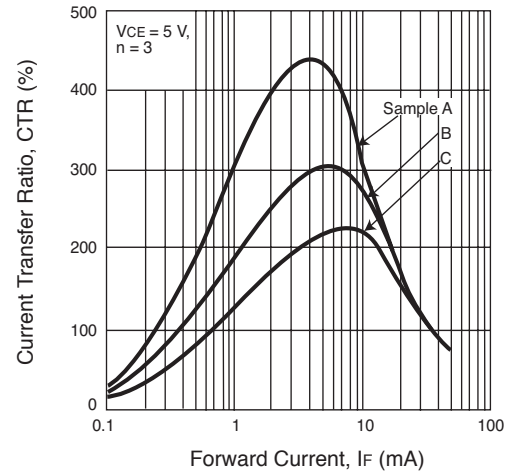


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

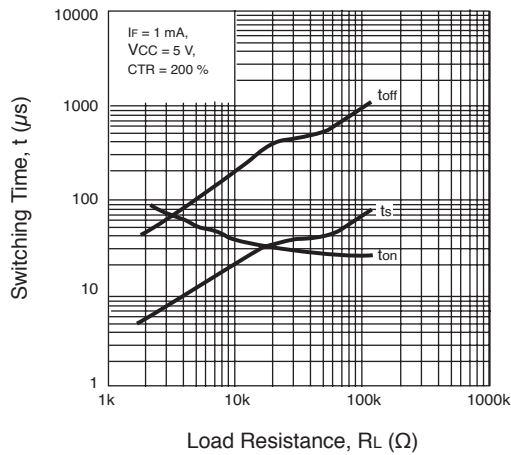
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



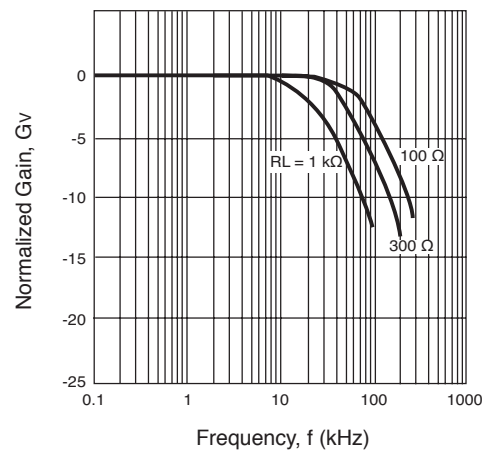
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



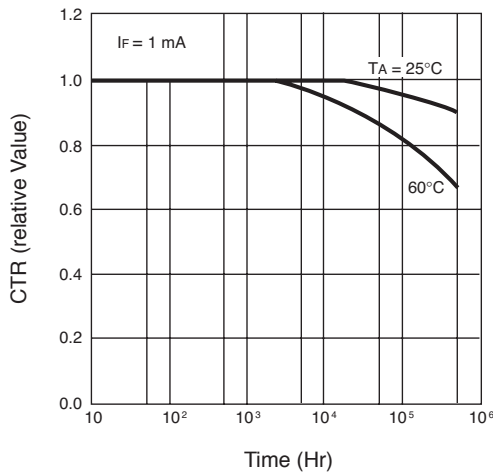
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



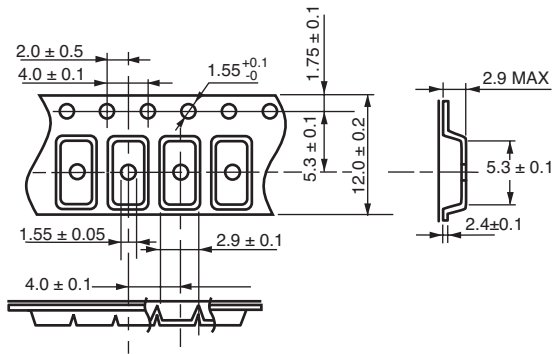
LONG TERM CTR DEGRADATION



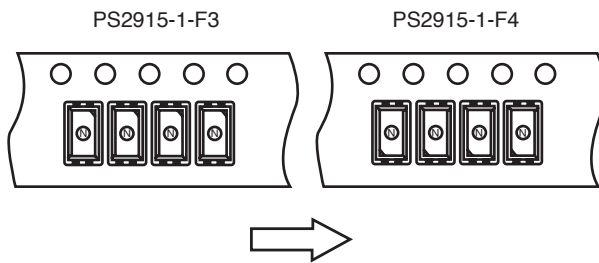
Remark: The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (Units in mm)

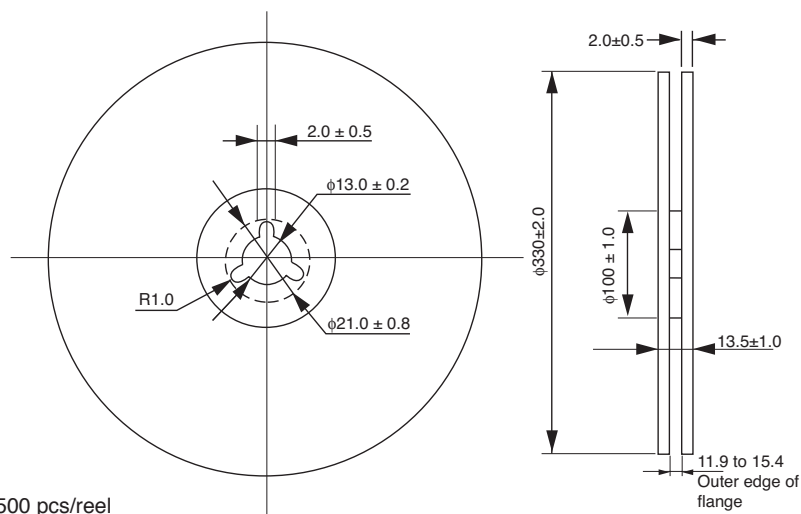
Tape Outline and Dimensions



Tape Direction



Reel Outline and Dimensions



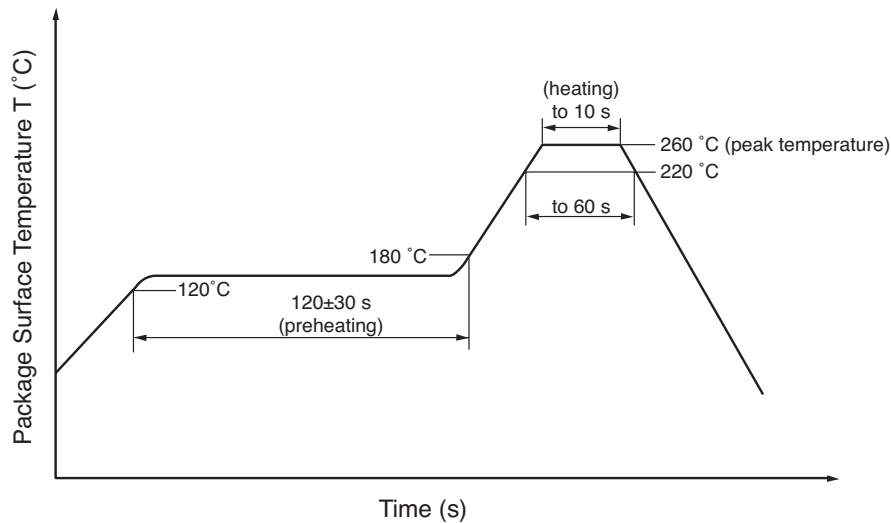
Packing: 3500 pcs/reel

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.

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 | |

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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