CEL

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

PS2911-1

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 mA, V_{CE} = 5 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

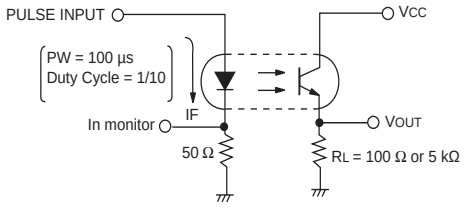
- **DC/DC CONVERTER**
- **MODEM/PC CARD**

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER				PS2911-1		
	SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, I_F = 5 mA	V	0.9	1.1	1.3
	I_R	Reverse Current, V_R = 5 V	μA			5
	C_T	Terminal Capacitance, V = 0, f = 1.0 MHz	pF		15	
Transistor	I_{CEO}	Collector to Emitter Current, I_F = 0 mA, V_{CE} = 40 V	nA			100
Coupled	CTR	Current Transfer Ratio (I_C/I_F)[1], I_F = 1 mA, V_{CE} = 5 V	%	100	200	400
	$V_{CE(sat)}$	Collector Saturation Voltage, I_F = 1 mA, I_C = 0.2 mA	V		0.13	0.3
	R_{I-O}	Isolation Resistance, V_{I-O} = 1.0 k V_{DC}	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 = 100 Ω	μs		5	
	t_F	Fall Time[2], V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω	μs		10	
	t_{on}	On Time[2], V_{CC} = 5 V, IF = 1 mA, R_L = 5 kΩ	μs		40	
	t_S	Storage Time[2], V_{CC} = 5 V, I_F = 1 mA, R_L = 5 kΩ	μs		10	
	t_{off}	Off Time[2], V_{CC} = 5 V, I_F = 1 mA, R_L = 5 kΩ	μs		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

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
Diode			
I_F	Forward Current (DC)	mA	50
$\Delta I_F/°C$	Forward Current Derating	mA/°C	0.5
$I_{F\ (Peak)}$	Peak Forward Current[2]	A	0.5
P_D	Power Dissipation	mW	60
V_R	Reverse Voltage	V	6
Transistor			
V_{CEO}	Collector to Emitter Voltage	V	40
V_{ECO}	Emitter to Collector Voltage	V	5
I_C	Collector Current	mA	40
$\Delta P_C/°C$	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

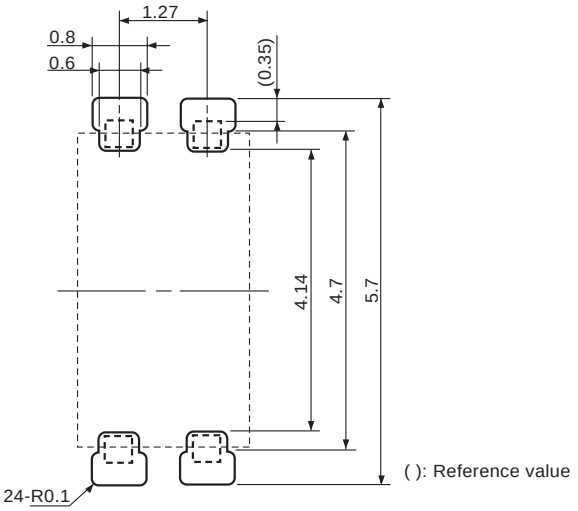
Notes:
1. Operation in excess pf any one of these parameters may result in permanent damage.
2. PW = 100 μs, Duty Cycle = 1%.
3. AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output.

CAUTIONS REGARDING NOISE:
Be aware that when voltage is applied suddenly between the optocoupler's input and outout 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
PS2911-1-F3	Embossed Tape 3500 pcs/reel
PS2911-1-F4	

RECOMMENDED MOUNT PAD DIMENSIONS (Units in mm)

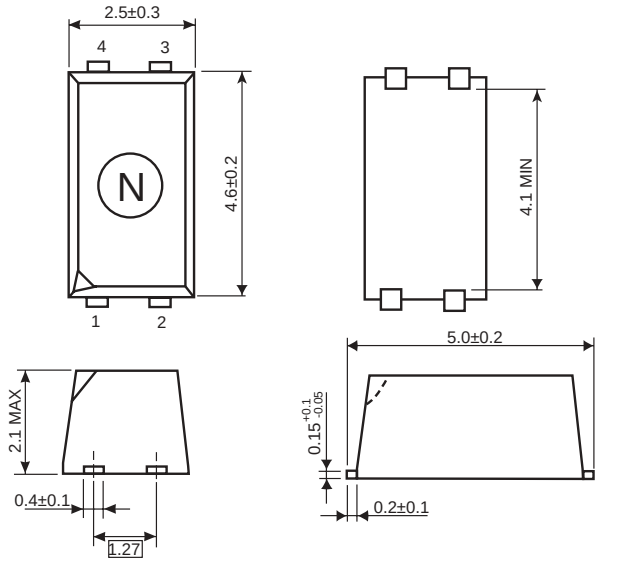


Remark: This drawing is considered to meet air and outer creepage distance 4.0 mm minimum. All dimensions in this figure must be evaluated before use.

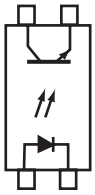
OPTOCOUPLER CONSTRUCTION

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

OUTLINE DIMENSIONS (Units in mm)

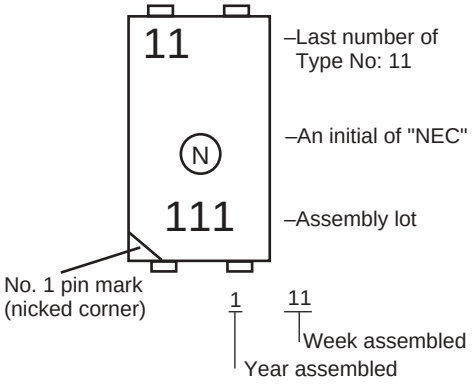


TOP VIEW



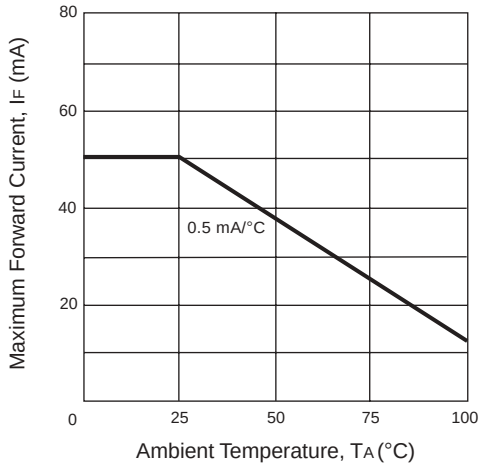
1. Anode
2. Cathode
3. Emitter
4. Collector

MARKING

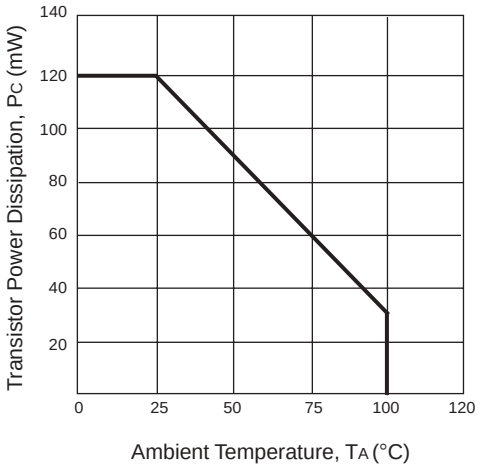


TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

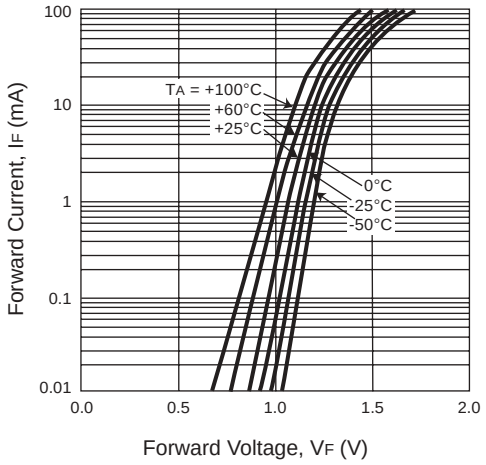
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



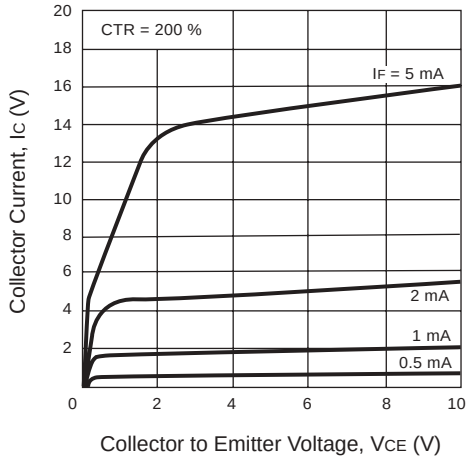
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



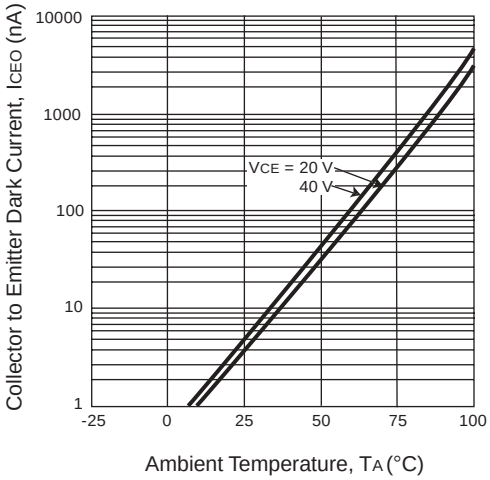
FORWARD CURRENTvs. FORWARD VOLTAGE



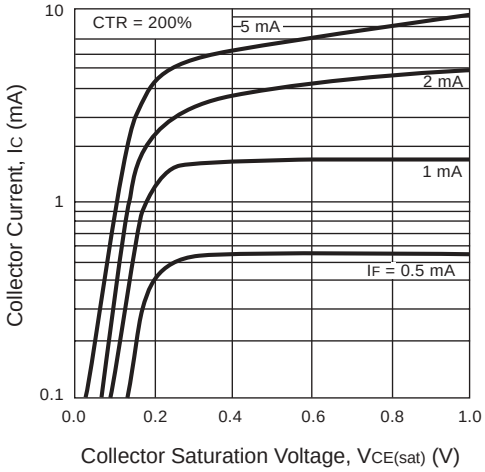
COLLECTOR CURRENTvs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

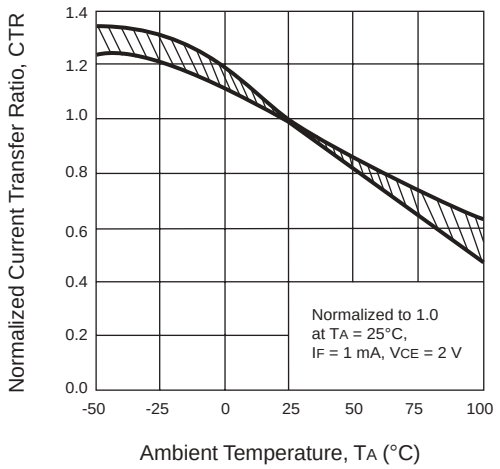


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

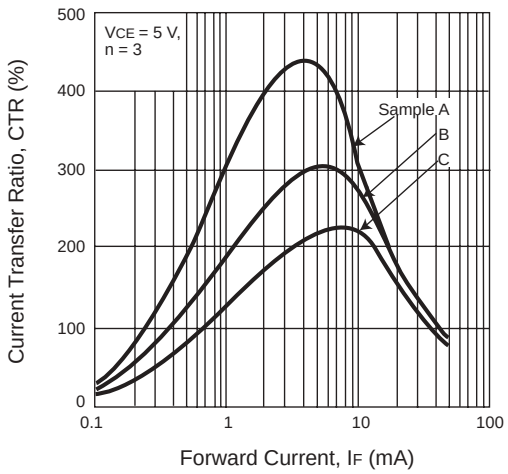


TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

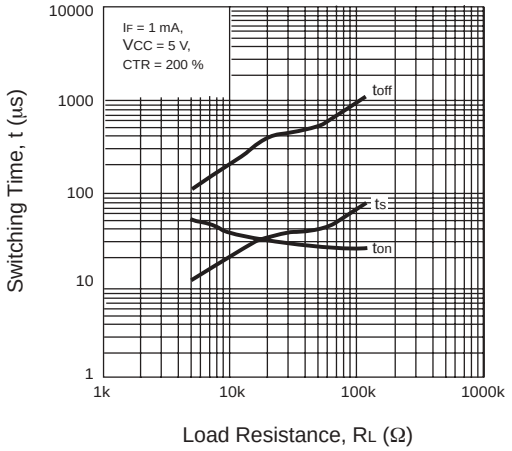
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



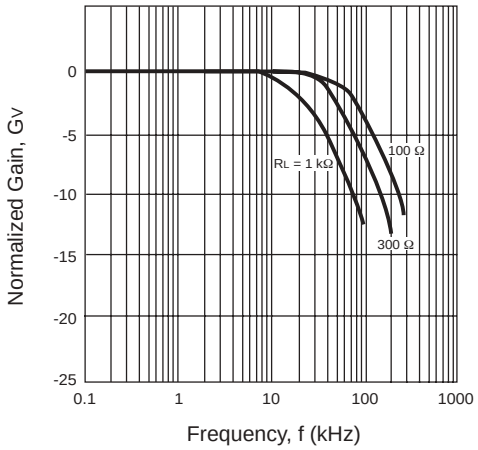
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



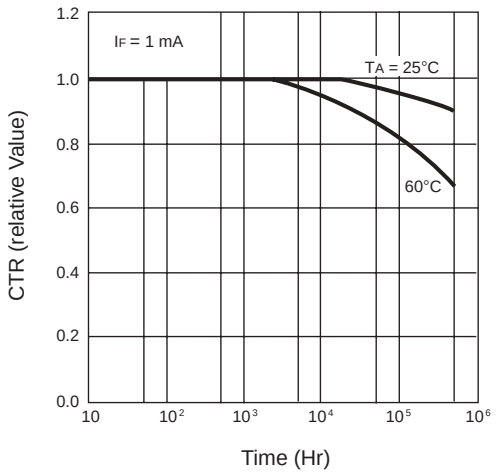
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE

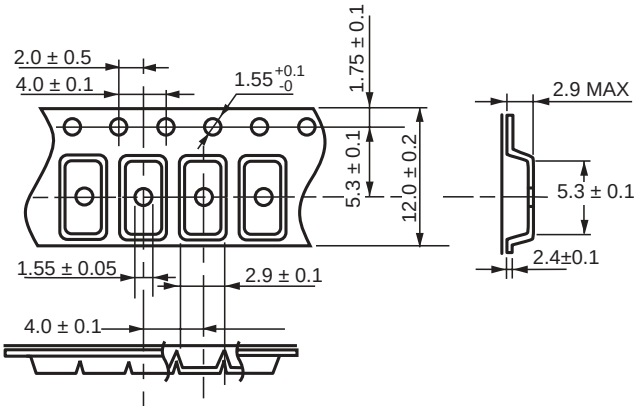


LONG TERM CTR DEGRADATION

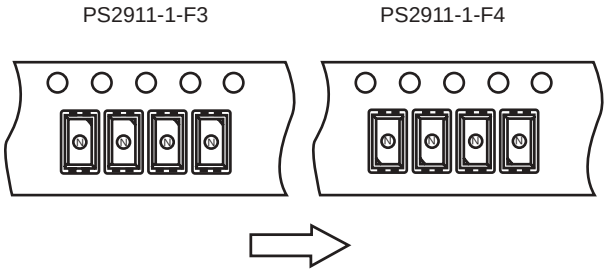


TAPING SPECIFICATIONS (Units in mm)

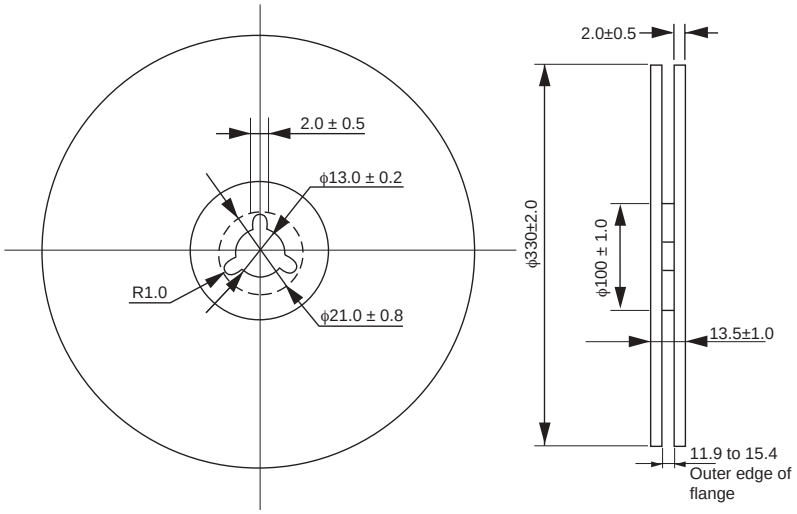
Tape Outline and Dimensions



Tape Direction



Reel Outline and Dimensions



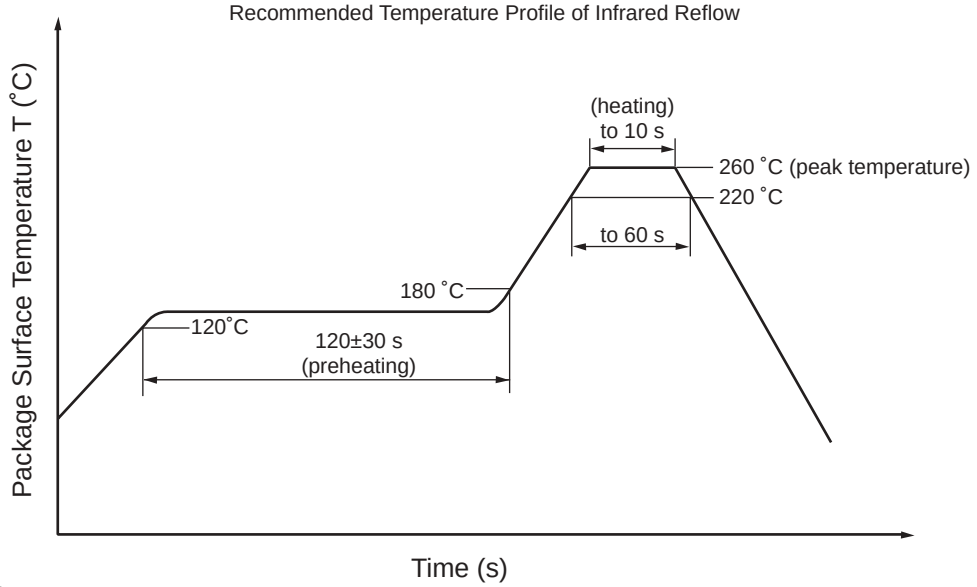
Packing: 3500 pcs/reel

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 ad high humidity.