NEC

HIGH COLLECTOR TO EMITTER VOLTAGE 4 PIN ULTRA SMALL FLAT LEAD OPTOCOUPLER

PS2932-1
PS2933-1

FEATURES

- **ULTRA SMALL FLAT LEAD PACKAGE:**
  4.6 (L) x 2.5 (W) x 2.1 (H) mm
- **ISOLATION DISTANCE:**
  0.4 mm MIN
- **HIGH COLLECTOR TO EMITTER VOLTAGE:**
  V_{CEO} = 300 V: PS2932-1
  V_{CEO} = 350 V: PS2933-1
- **HIGH ISOLATION VOLTAGE**
  BV = 2500 $V_{r.m.s.}$
- **AVAILABLE ON TAPE AND REEL:**
  PS2932-1-F3, F4: 3500 pcs/reel
  PS2933-1-F3, F4: 3500 pcs/reel

DESCRIPTION

The PS2932-1 and PS2933-1 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor in one package for high density mounting applications. This device is housed in an ultra-small flat-lead package which realizes a reduction in mounting area of about 30% compared to the PS28xx series.

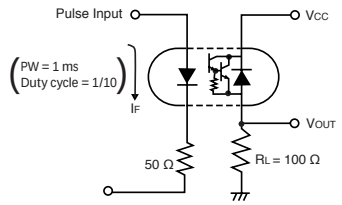
APPLICATIONS

- **HYBRID IC**
- **TELEPHONE, EXCHANGE EQUIPMENT, FAX**

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER					PS2932-1, PS2933-1		
	SYMBOLS	PARAMETERS		UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, I_F = 1 mA		V	0.9	1.1	1.3
	I_R	Reverse Current, V_R = 5 V		μA			5
	C_T	Terminal Capacitance, V = 0 V, f = 1.0 MHz		pF		15	
Transistor	I_{CEO}	Collector to Emitter Current, V_{CE} = 300 V (350 V)[1]		nA			400
Coupled	CTR	Current Transfer Ratio (I_C/I_F), I_F = 1 mA, V_{CE} = 2 V		%	400	2000	4500
	$V_{CE(sat)}$	Collector Saturation Voltage, I_F = 1 mA, I_C = 2 mA		V		0.8	1
	R_{I-O}	Isolation Resistance, V_{I-O} = 1.0 kV_{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 = 10 mA, R_L = 100 Ω	μs		20	
	t_F	Fall Time[2]		μs		5	

Notes
1. I_{CEO} condition : PS2932-1: V_{CE} = 300 V:
   PS2933-1: V_{CE} = 350 V:
2. Test circuit for switching time:



ABSOLUTE MAXIMUM RATINGS[1]

(T_A = 25°C unless otherwise specified)

SYMBOLS	PARAMETERS	UNITS	RATINGS
Diode			
I_F	Forward Current (DC)	mA	50
$\Delta IF/°C$	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 PS2932-1	V	300
	PS2933-1		350
V_{ECO}	Emitter to Collector Voltage	V	0.3
I_C	Collector Current	mA	60
P_C	Power Dissipation	mW	120
$\Delta P_C/°C$	Power Dissipation Derating	mW/°C	1.2
Coupled			
V_{ISO}	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

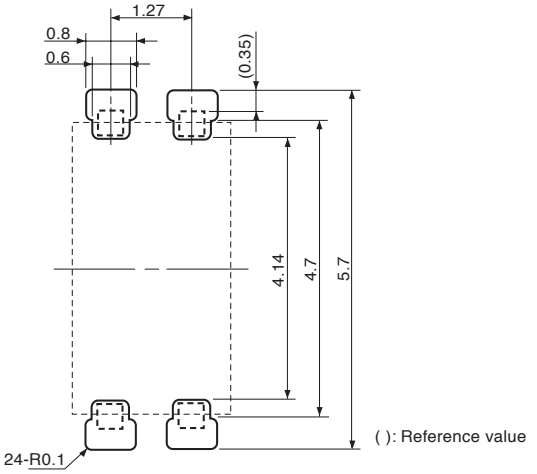
Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. PW = 100 μs, Duty Cycle = 1%.
3. AC voltage for 1 minute at TA = 25°C, RH = 60 % between input and output.

CAUTIONS REGARDING NOISE:
Be aware that when voltage is applied suddenly between the optocoupler's input and 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
PS29132-1-F3	Embossed Tape 3500 pcs/reel
PS2932-1-F4	
PS29133-1-F3	
PS29133-1-F4	

RECOMMENDED MOUNT PAD DIMENSIONS (Units in mm)

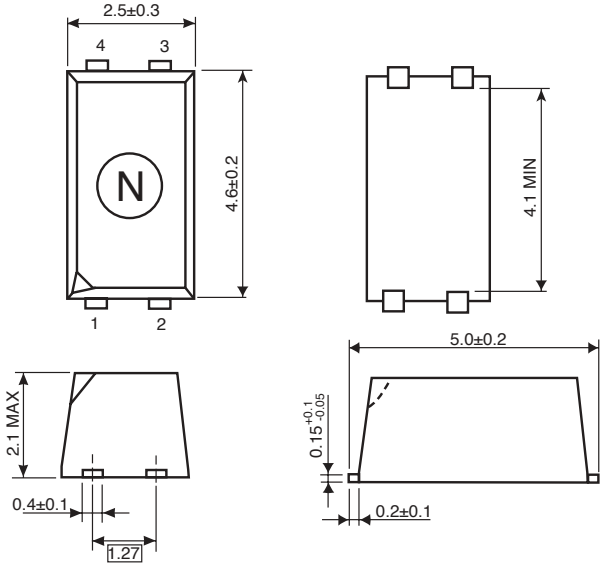


Remark:
This drawing is considered to meet air and outer creepage distance 4.0 mm minimum. All simensions in this figure must be evaluated before use.

OPTOCOUPLER CONSTRUCTION

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

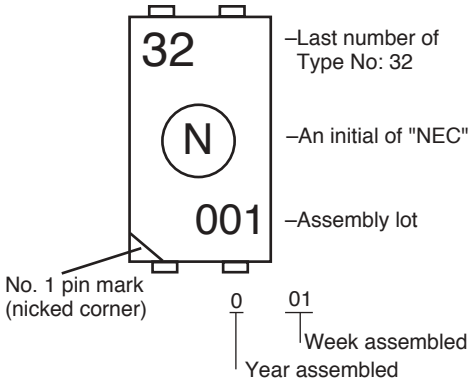
OUTLINE DIMENSIONS (Units in mm)



TOP VIEW

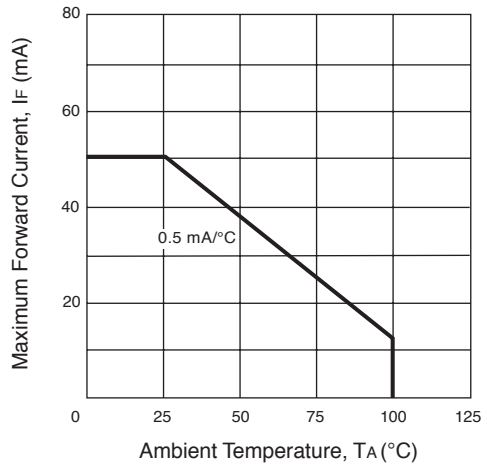
1. Anode
2. Cathode
3. Emitter
4. Collector

MARKING

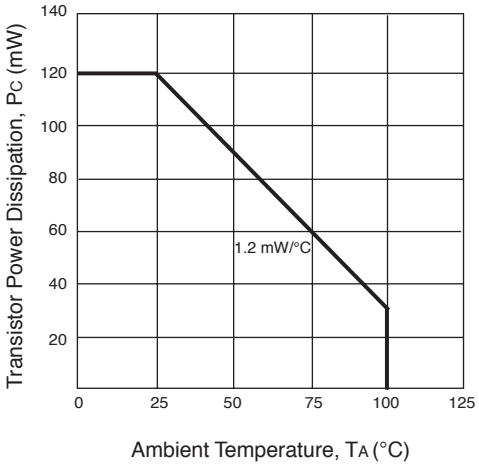


TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

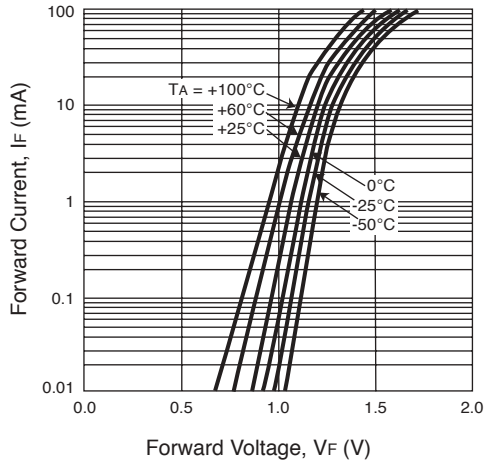
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



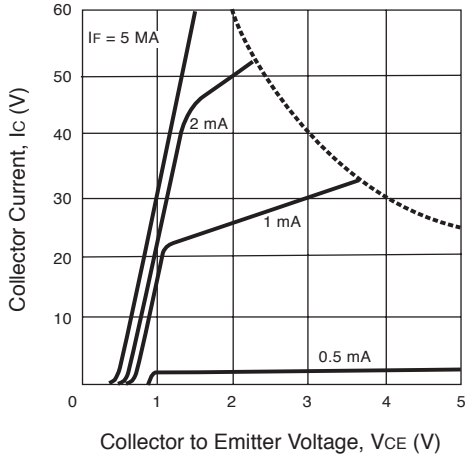
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



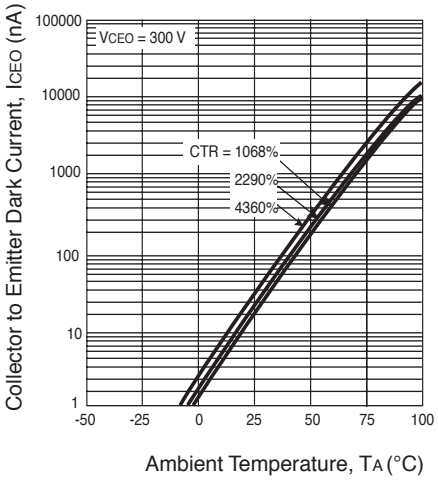
FORWARD CURRENTvs. FORWARD VOLTAGE



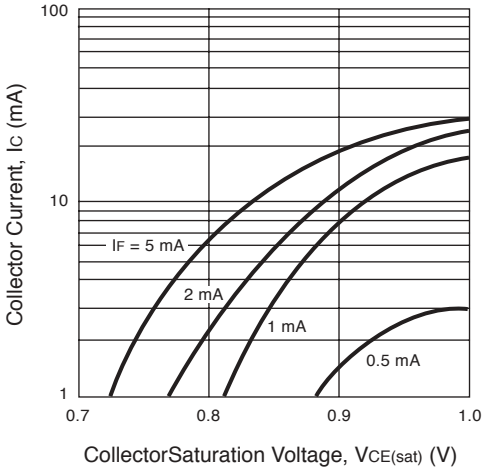
COLLECTOR CURRENTvs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

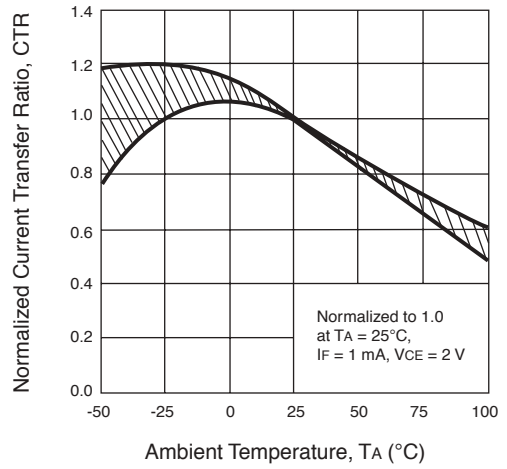


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

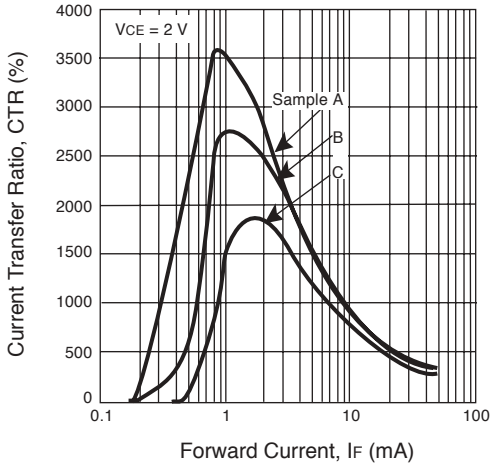


TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

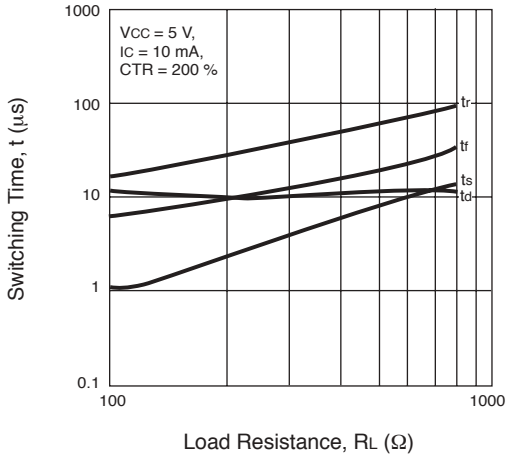
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



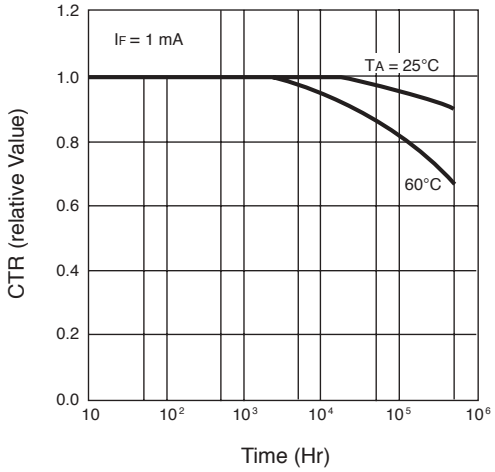
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



SWITCHING TIME vs. LOAD RESISTANCE



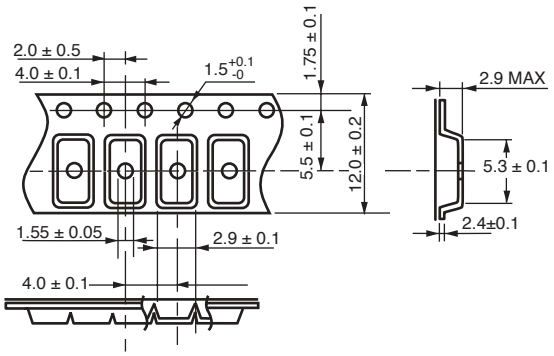
LONG TERM CTR DEGRADATION



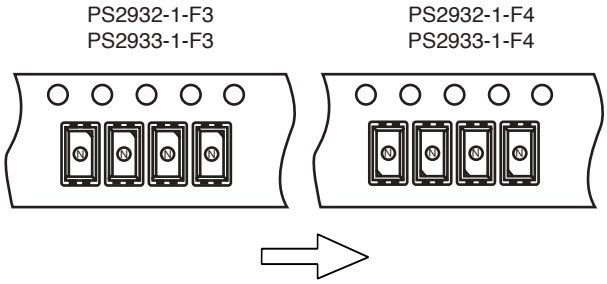
REMARK: The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (Units in mm)

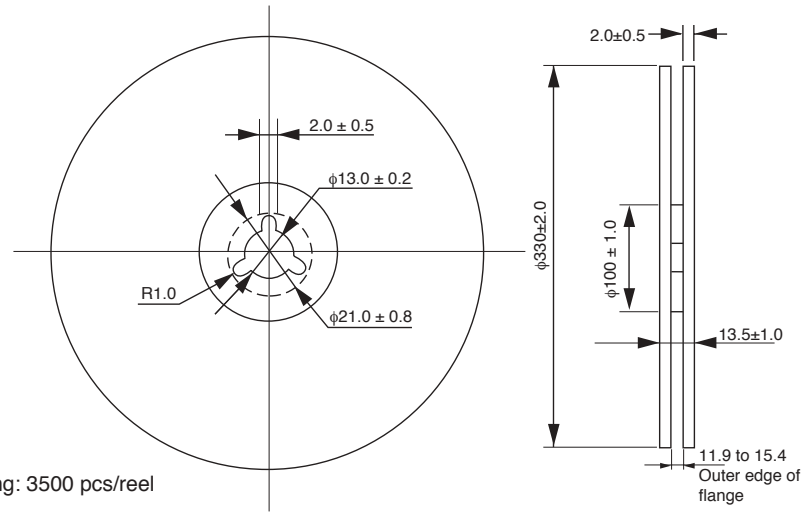
Tape Outline and Dimensions



Tape Direction



Reel Outline and Dimensions



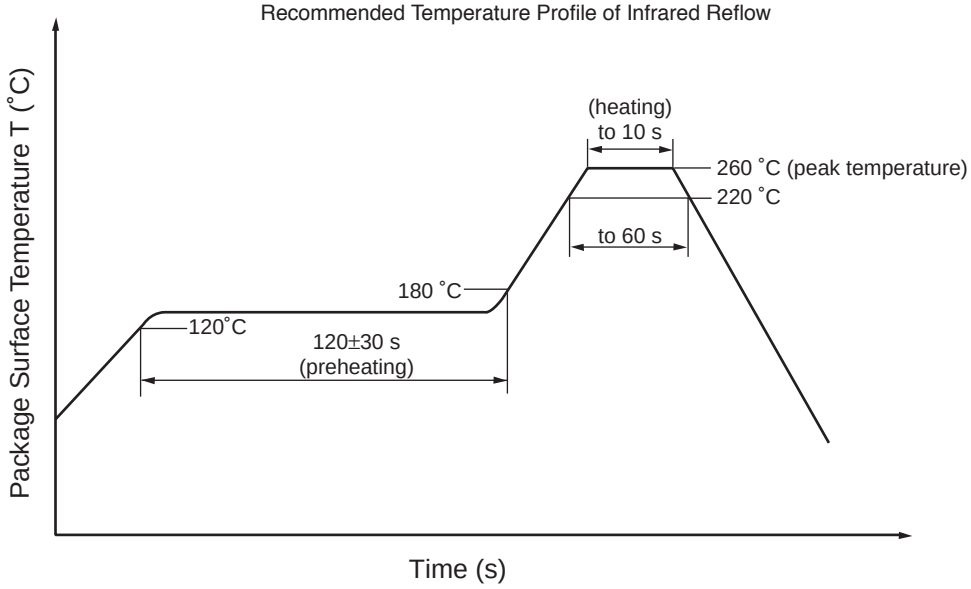
Packing: 3500 pcs/reel

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 ad high humidity.