NEC

HIGH ISOLATION VOLTAGE DARLINGTON TRANSISTOR TYPE SOP MULTI PHOTOCOUPLER

PS2702-1

FEATURES

- **HIGH ISOLATION VOLTAGE**
  BV:3.75 k V r.m.s. MIN
- **SOP (SMALL OUT-LINE PACKAGE)**
- **ISOLATED CHANNELS PER EACH PACKAGE**
- **HIGH CURRENT TRANSFER RATIO**
  CTR: 200% MIN @ I_F = 1 mA, V_{CE} = 2 V
- **HIGH SPEED SWITCHING**
  t_r, t_f, = 200 µs TYP
- **TAPE AND REEL AVAILABLE**

DESCRIPTION

PS2702-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon Darlington-connected phototransistor. This device is mounted in a plastic SOP (Small Outline Package) for high density applications and has a shield effect to cut off ambient light.

APPLICATIONS

Interface circuit for various instrumentations and control equipment.

- **AC LINE/DIGITAL LOGIC**
- **DIGITAL LOGIC INTERFACE**
- **TWISTED PAIR LINE RECEIVER**
- **TELEPHONE/TELEGRAPH LINE RECEIVER**
- **HIGH FREQUENCY POWER SUPPLY FEEDBACK CONTROL**
- **RELAY CONTACT MONITOR**
- **POWER SUPPLY MONITOR**

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER				PS2702-1		
SYMBOLS		PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, I_F = 5 mA	V		1.1	1.4
	I_R	Reverse Current, V_R = 5 V	µA			5
	Ct	Terminal Capacitance, V= 0, f = 1.0 MHz	pF		30	
Transistor	I_{CEO}	Collector to Emitter Dark Current, V_{CE} = 40 V, I_F = 0	nA			400
Coupled	CTR	Current Transfer Ratio[1], I_F = 1 mA, V_{CE} = 2 V	%	200	2000	
	$V_{CE\ (sat)}$	Collector Saturation Voltage, I_F = 1 mA, I_C = 2 mA	V			1.0
	R_{I-O}	Isolation Resistance, V_{in-out} = 1.0 kV DC	Ω	10^{11}		
	C_{I-O}	Isolation Capacitance, V = 0, f = 1.0 MHz	pF		0.4	
	t_r	Rise Time [2], V_{CC} = 5 V, I_C = 2 mA, RL = 100 Ω	µs		200	
	t_f	Fall Time [2], V_{CC} = 5 V, I_C = 2 mA, RL = 100 Ω	µs		200	

Notes:

1. CTR rank
   K: 2000 to (%)
   L: 700 to 3400 (%)
   M: 200 to 1000 (%)

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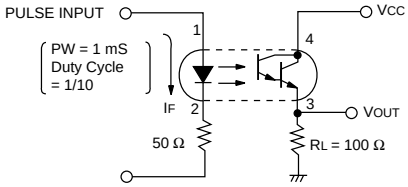
2. Test Circuit for Switching Time



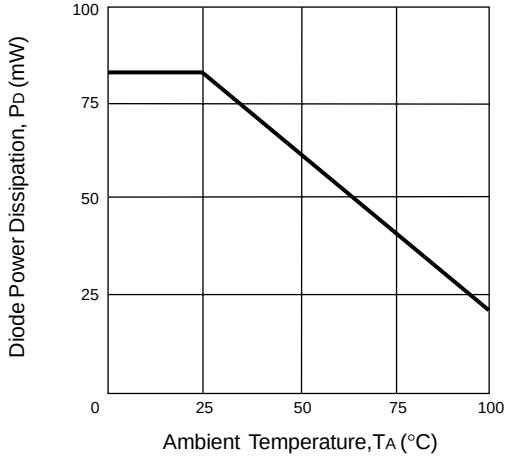
ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
			PS2702 -1
Diode			
I_F	Forward Current (DC)	mA	50
V_R	Reverse VoltageV	6	
P_D	Power Dissipation	mW/Ch	80
ΔP_D/°C	Power Dissipation Derating	mW/°C	0.8
$I_{F\ (PEAK)}$	Peak Forward Current (PW = 100 µs, Duty Cycle 1%)	A	1
Transistor			
V_{CEO}	Collector to Emitter Voltage	V	40
V_{ECO}	Emitter to Collector Voltage	V	6
I_C	Collector Current	mA/Ch	200
P_C	Power Dissipation	mW/Ch	150
ΔP_C/°C	Power Dissipation Derating	mW/°C	1.5
Coupled			
BV	Isolation Voltage [2]	$V_{r.m.s.}$	3750
T_{STG}	Storage Temperature	°C	-55 to +150
T_A	Ambient Temperature	°C	-55 to +100

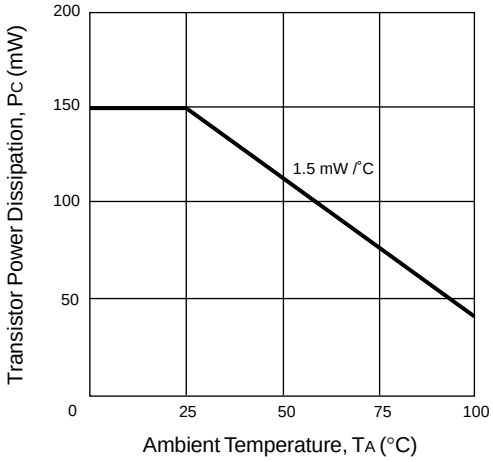
Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and ouput.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

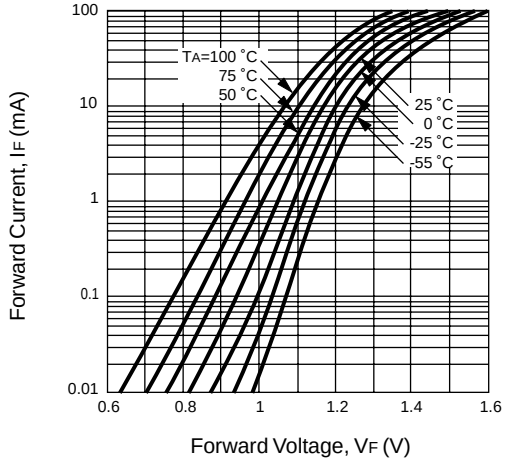
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



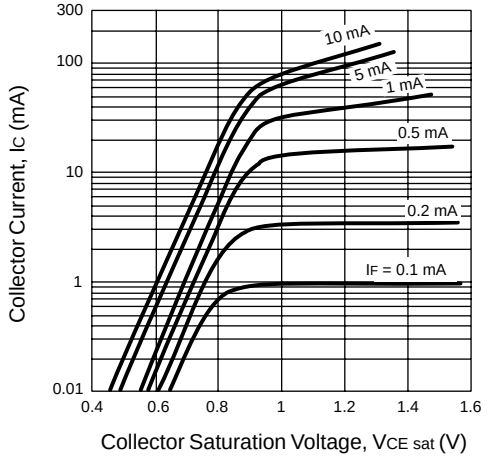
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



FORWARD CURRENT vs. FORWARD VOLTAGE

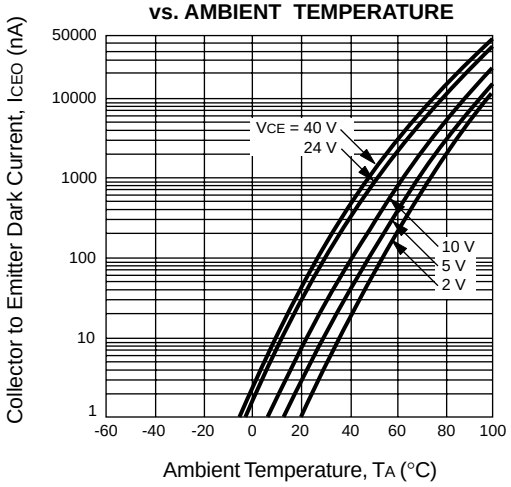


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

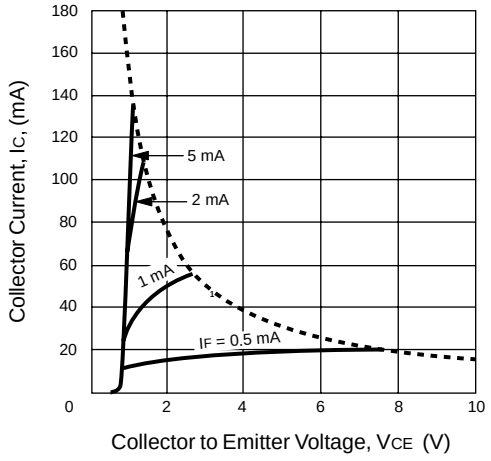


TYPICAL PERFORMANCE CURVES (T_A = 25°C)

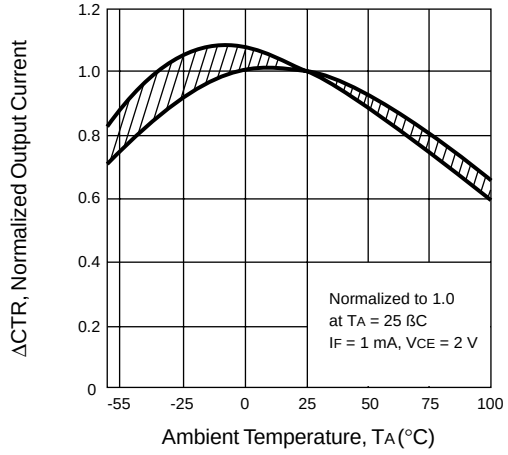
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



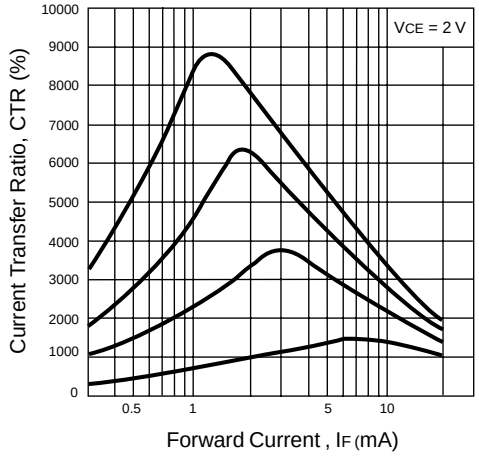
COLLECTOR CURRENT vs. COLLECTOR to EMITTER VOLTAGE



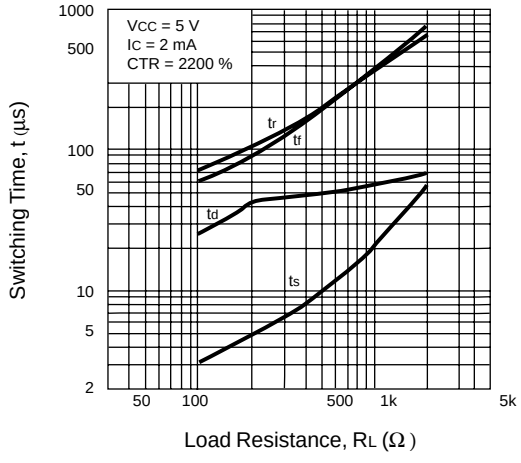
NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE



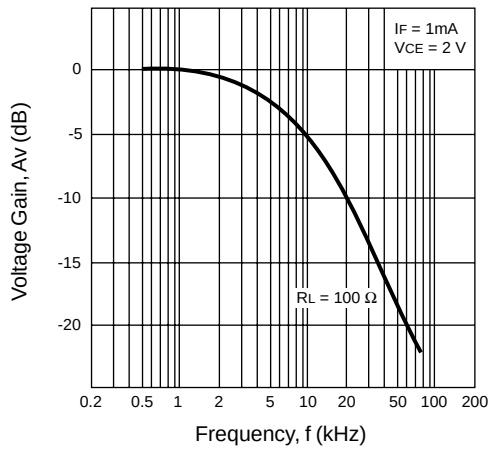
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



SWITCHING TIME vs. LOAD RESISTANCE

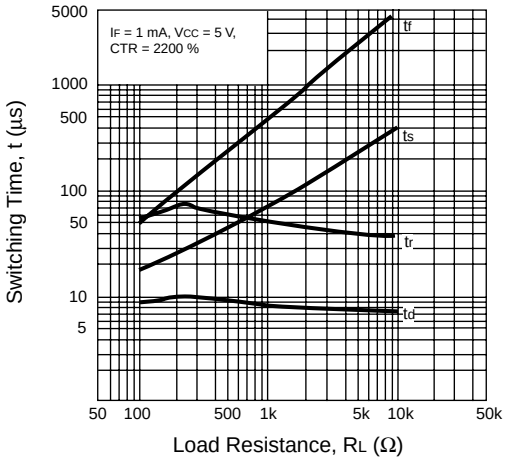


FREQUENCY RESPONSE

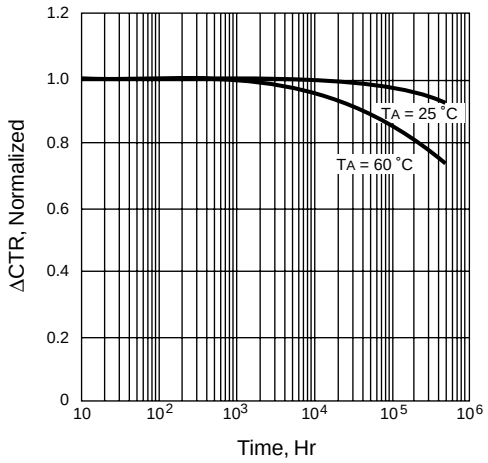


TYPICAL PERFORMANCE CURVES (TA = 25 °C)

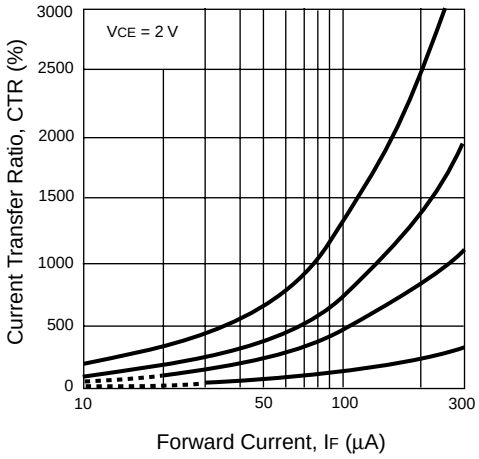
SWITCHING TIME vs. LOAD RESISTANCE



CTR DEGRADATION



CURRENT TRANSFER RATIO vs. FORWARD CURRENT



OUTLINE DIMENSIONS (Units in mm)

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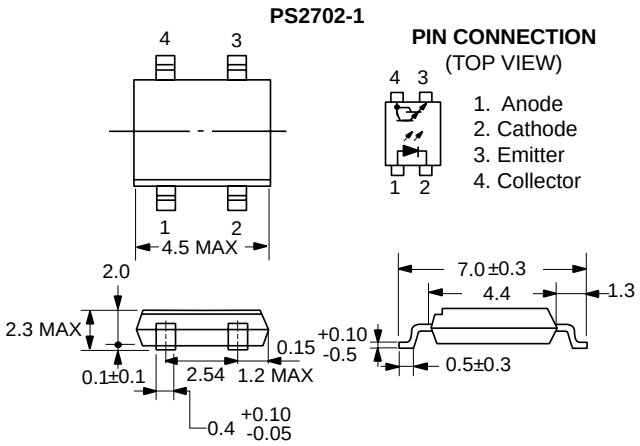
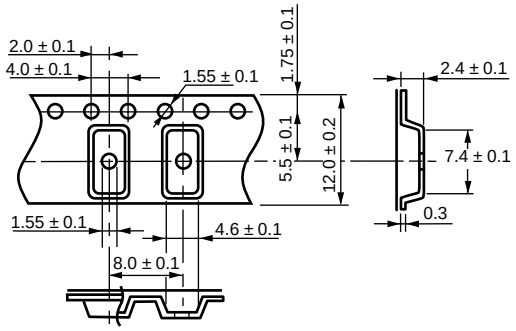


PIN CONNECTION
(TOP VIEW)

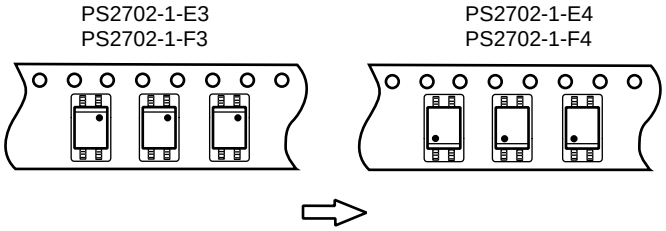
1. Anode
2. Cathode
3. Emitter
4. Collector

TAPING SPECIFICATIONS (Units in mm)

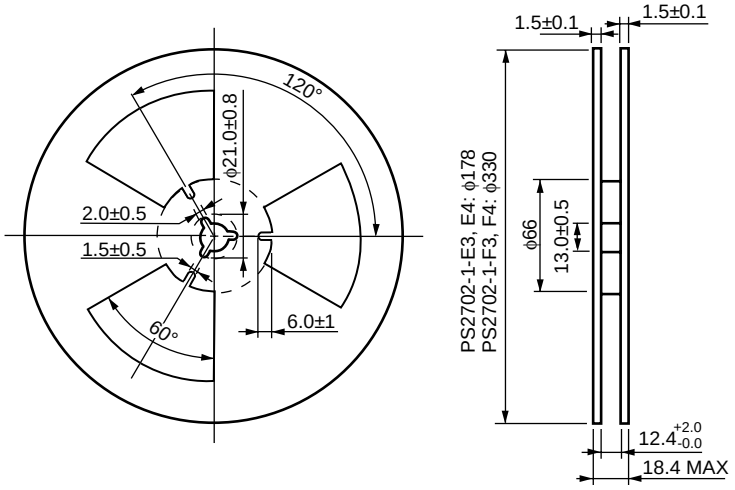
OUTLINE AND DIMENSIONS (TAPE)



TAPING DIRECTION



OUTLINE AND DIMENSIONS (REEL)



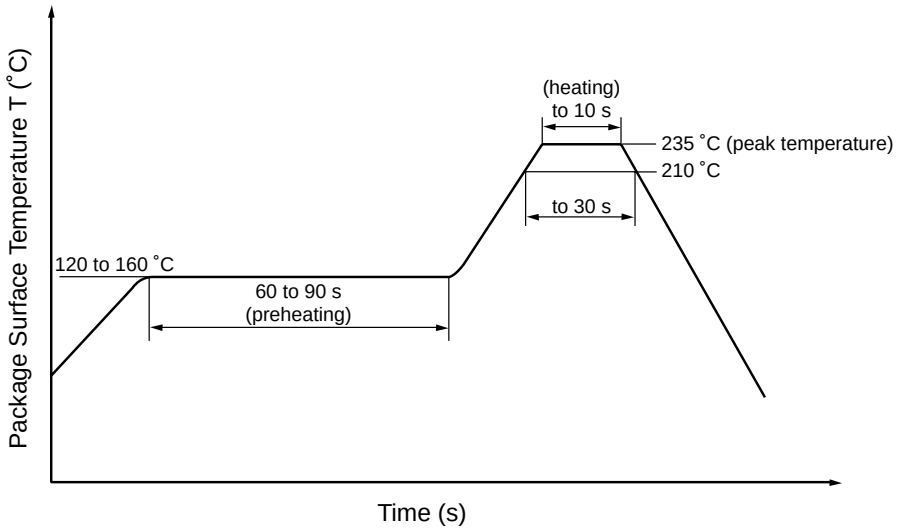
Packing: PS2702-1-E3, E4 900 pcs/reel
PS2702-1-F3, F4 3500 pcs/reel

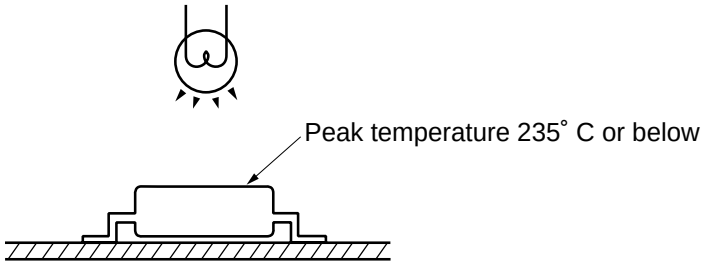
RECOMMENDED SOLDERING CONDITIONS

(1) Infrared reflow soldering

- **Peak reflow temperature** 235 ˚C (package surface temperature)
- **Time of temperature higher than 210 ˚C** 30 seconds or less
- **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) Dip soldering

- **Temperature** 260 ˚C or below (molten solder temperature)
- **Time** 10 seconds or less
- **Number of times** One
- **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 freon-based and chlorine-based cleaning solvent.