

## HIGH ISOLATION VOLTAGE AC INPUT RESPONSE TYPE SOP MULTI PHOTOCOUPLER

### PS2705-1

### FEATURES

- **HIGH ISOLATION VOLTAGE**  
BV: 3.75 k V<sub>r.m.s.</sub> MIN
- **SOP (SMALL OUT-LINE PACKAGE)**
- **ISOLATED CHANNELS PER EACH PACKAGE**
- **AC INPUT RESPONSE**
- **HIGH SPEED SWITCHING**  
tr = 3 μs, tf = 5 μs TYP
- **LOW COLLECTOR TO EMITTER DARK CURRENT**  
ICEO: 5 nA TYP @ TA = 25 °C, VCE = 40 V
- **HIGH CURRENT TRANSFER RATIO**  
CTR = 100% TYP
- **TAPE AND REEL AVAILABLE**

### DESCRIPTION

PS2705-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon phototransistor. The device is mounted in a plastic SOP (Small Out-line 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**
- **SEQUENCE CONTROLLERS**
- **SYSTEMS APPLICATIONS, MEASURING INSTRUMENTS**

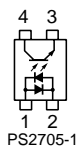
### ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER			PS2705-1			
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX	
Diode	V <sub>F</sub>	Forward Voltage, I <sub>F</sub> = ± 5 mA	V	1.1	1.4	
	C <sub>t</sub>	Terminal Capacitance, V = 0, f = 1.0 MHz	pF	60		
Transistor	ICEO	Collector to Emitter Dark Current, V <sub>CE</sub> = 40 V, I <sub>F</sub> = 0	nA		100	
Coupled	CTR	Current Transfer Ratio <sup>1</sup> , I <sub>F</sub> = ± 5 mA, V <sub>CE</sub> = 5 V	%	50	100	300
	CTR <sub>1</sub> /CTR <sub>2</sub>	CTR Ratio <sup>3</sup> , I <sub>F</sub> = ± 5 mA, V <sub>CE</sub> = 5 V		0.3	1.0	3.0
	V <sub>CE (sat)</sub>	Collector Saturation Voltage, I <sub>F</sub> = ± 10 mA, I <sub>C</sub> = 2 mA	V			0.3
	R <sub>I-O</sub>	Isolation Resistance, V <sub>in-out</sub> = 1.0 k VDC	Ω	10 <sup>11</sup>		
	C <sub>I-O</sub>	Isolation Capacitance, V = 0, f = 1.0 MHz	pF		0.4	
	tr	Rise Time <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω	μs		3	
	tf	Fall Time <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω	μs		5	

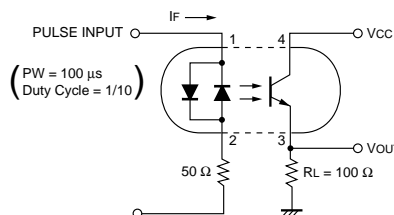
**Notes:**

1. CTR Rank

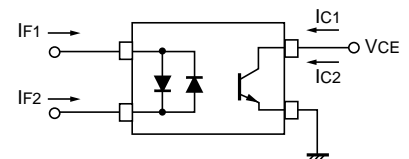
- M: 50 - 150%
- L: 100 - 300%
- N: 50 - 300%



2. Test Circuit for Switching Time



3. CTR<sub>1</sub> = I<sub>C1</sub>/I<sub>F1</sub>, CTR<sub>2</sub> = I<sub>C2</sub>/I<sub>F2</sub>



**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** (T<sub>A</sub> = 25°C)

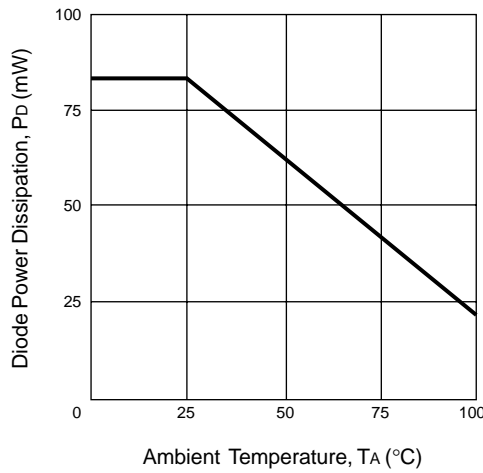
SYMBOLS	PARAMETERS	UNITS	RATINGS
			PS2705-1
Diode			
I <sub>F</sub>	Forward Current (DC)	mA	±50
P <sub>D</sub>	Power Dissipation	mW/Ch	80
ΔP <sub>D</sub> /°C	Power Dissipation Derating	mW/°C	0.8
I <sub>F</sub> (PEAK)	Peak Forward Current (PW = 100 μs, Duty Cycle 1%)	A	±1
Transistor			
V <sub>CEO</sub>	Collector to Emitter Voltage (I <sub>c</sub> = 1mA, I <sub>B</sub> = 0)	V	40
V <sub>ECO</sub>	Emitter to Collector Voltage (I <sub>E</sub> = 100μA, I <sub>B</sub> = 0)	V	6
I <sub>c</sub>	Collector Current	mA/Ch	80
P <sub>c</sub>	Power Dissipation	mW/Ch	150
ΔP <sub>c</sub> /°C	Power Dissipation Derating	mW/°C	1.5
Coupled			
BV	Isolation Voltage <sup>2</sup>	V <sub>r.m.s.</sub>	3750
T <sub>STG</sub>	Storage Temperature	°C	-55 to +150
T <sub>A</sub>	Ambient Temperature	°C	-55 to +100

Notes:

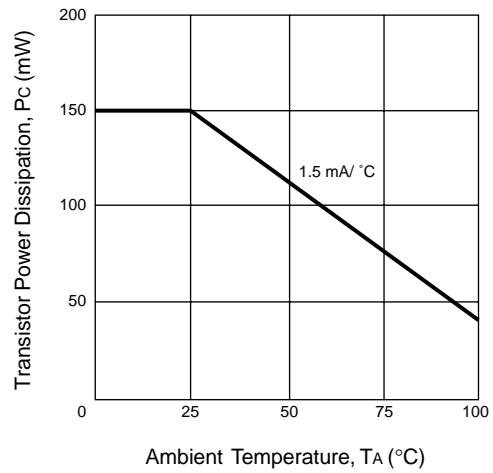
1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60 % between input and output.

**TYPICAL PERFORMANCE CURVES** (T<sub>A</sub> = 25°C)

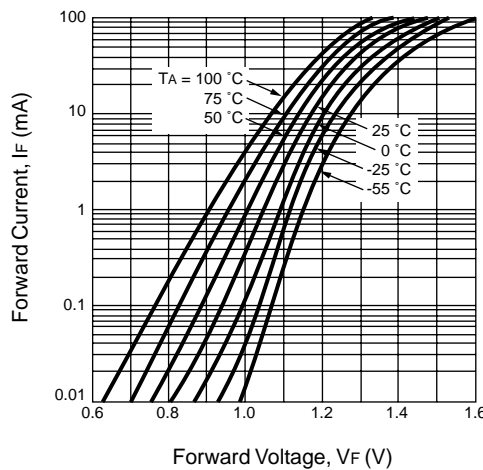
**DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE**



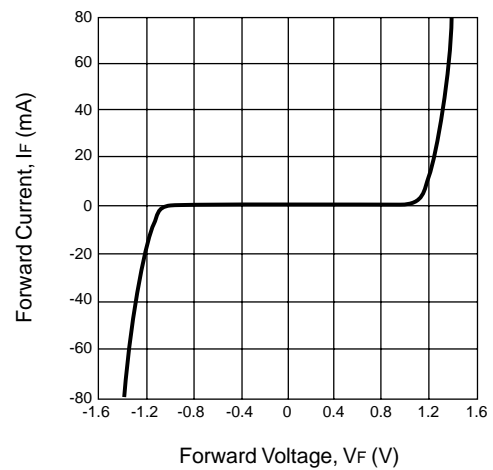
**TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE**



**FORWARD CURRENT vs. FORWARD VOLTAGE**

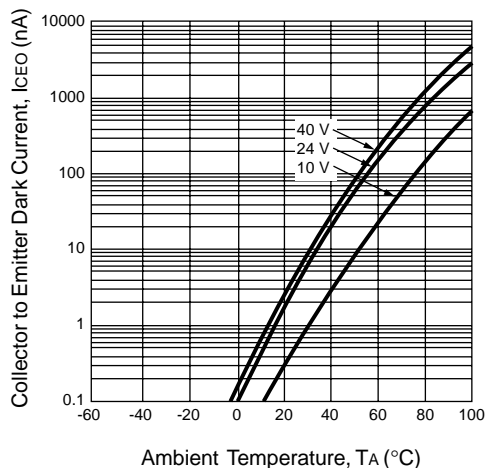


**FORWARD CURRENT vs. FORWARD VOLTAGE**

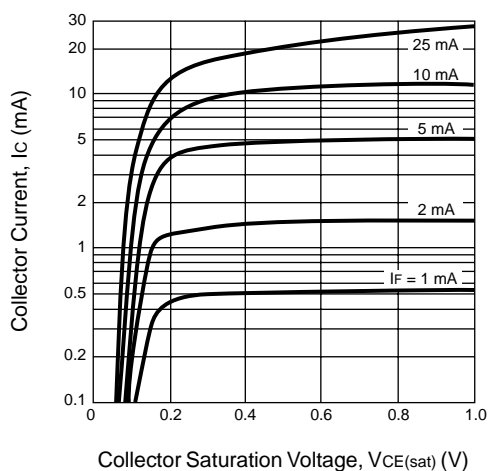


**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$ )

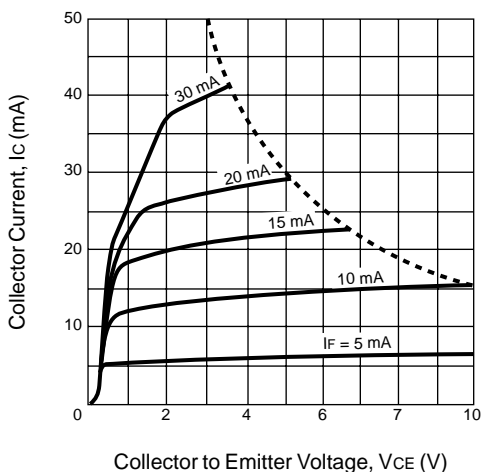
**COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE**



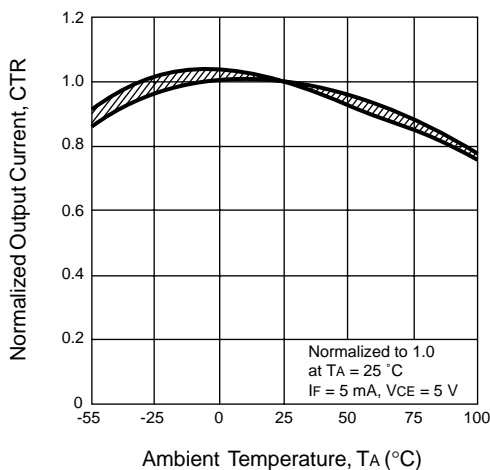
**COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE**



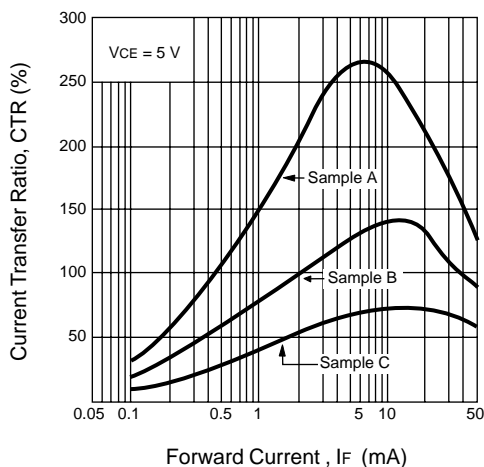
**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**



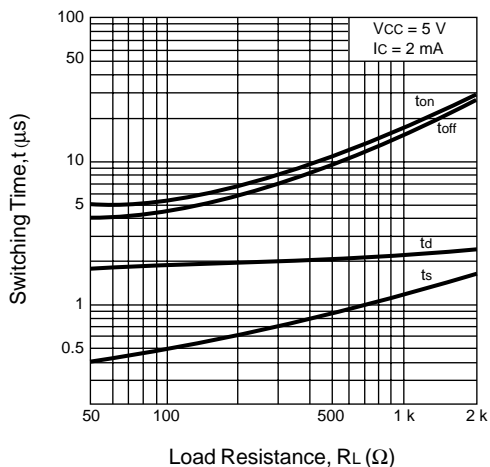
**NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE**



**CURRENT TRANSFER RATIO vs. FORWARD CURRENT**

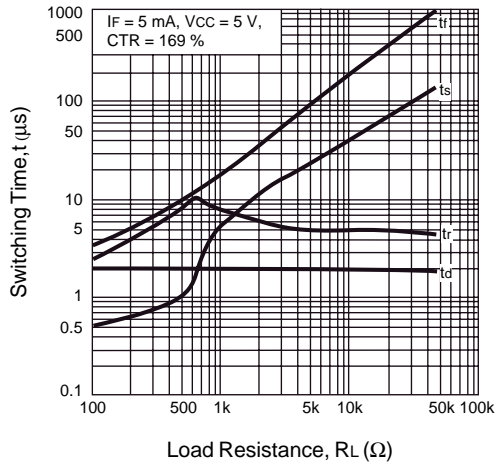


**SWITCHING TIME vs. LOAD RESISTANCE**

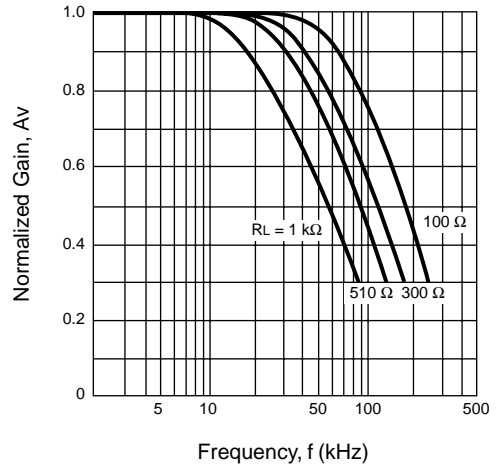


**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$ )

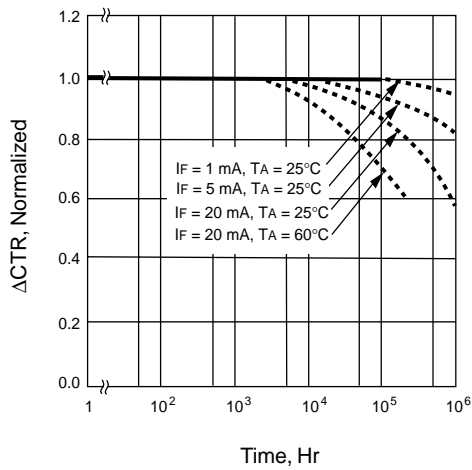
**SWITCHING TIME vs. LOAD RESISTANCE**



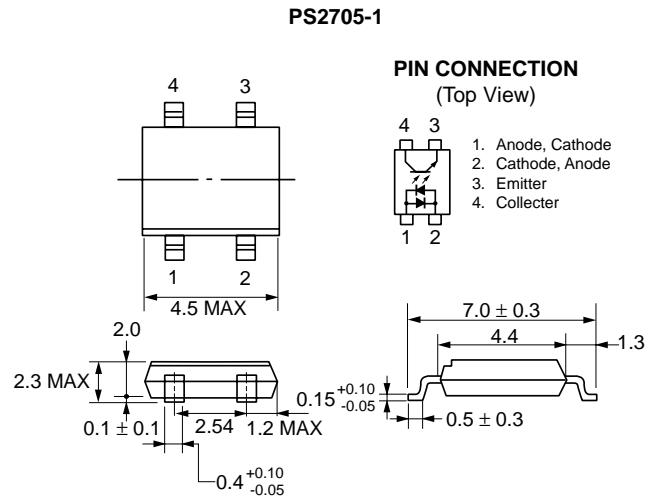
**FREQUENCY RESPONSE**



**CTR DEGRADATION**

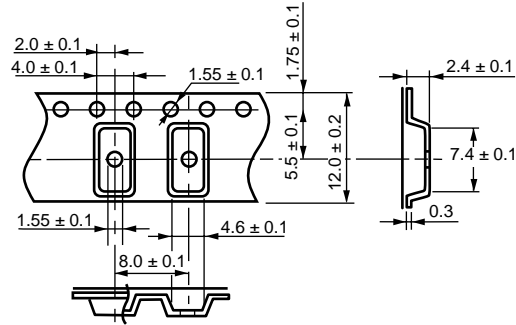


**OUTLINE DIMENSIONS** (Units in mm)

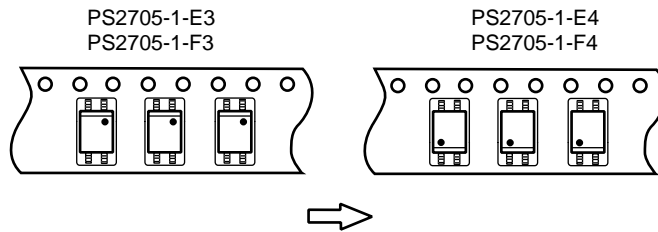


**TAPING SPECIFICATIONS** (Units in mm)

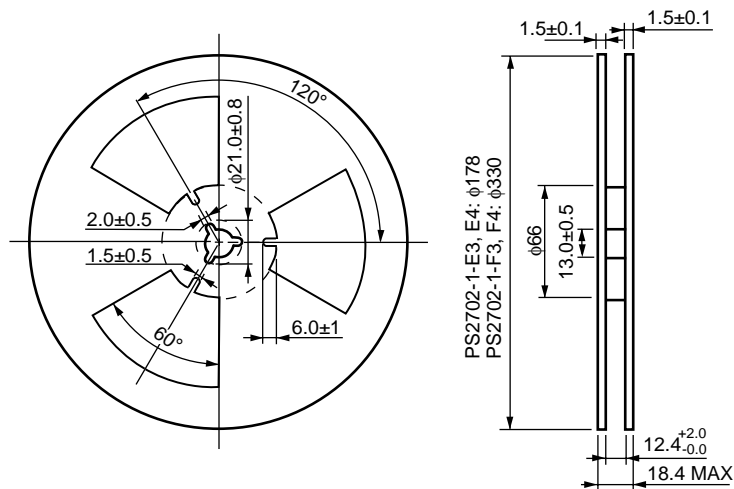
**OUTLINE AND DIMENSIONS (TAPE)**



**TAPING DIRECTION**



**OUTLINE AND DIMENSIONS (REEL)**

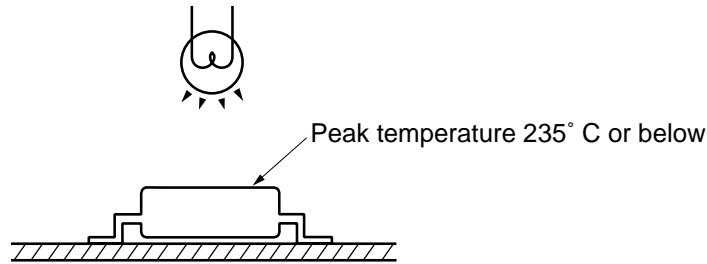
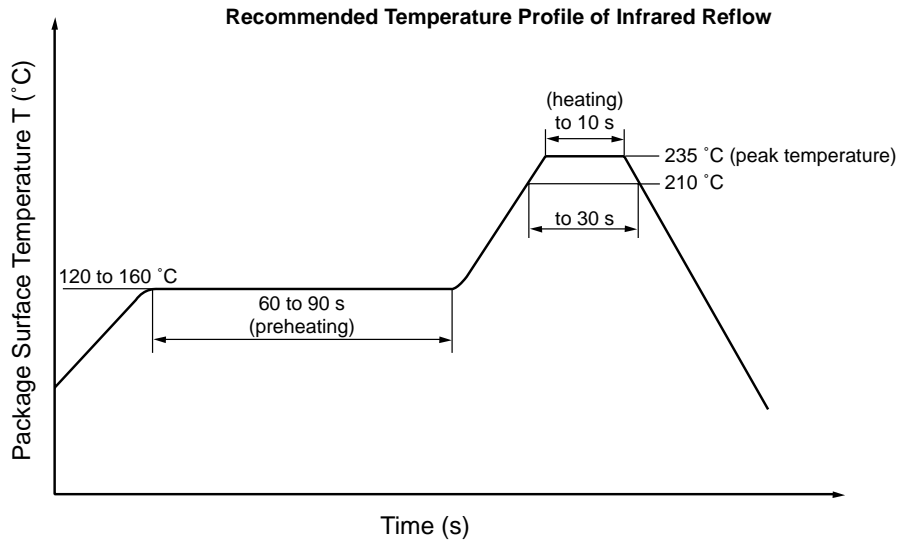


Packing: PS2705-1-E3, E4 900 pcs/reel  
 PS2705-1-F3, F4 3500 pcs/reel

## 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).



### (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).

## CAUTION

This device contains GaAs (Gallium Arsenide) material which is a harmful substance if ingested.  
Please do not under any circumstances break the hermetic seal.