

DATA SHEET

NEC

PHOTOCOUPLER PS2703-1, PS2703-2, PS2703-4

HIGH ISOLATION VOLTAGE HIGH COLLECTOR TO EMITTER VOLTAGE TYPE SOP MULTI PHOTOCOUPLER

–NEPOC™ Series–

DESCRIPTION

The PS2703-1, PS2703-2, PS2703-4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

Each is mounted in a plastic SOP (Small Outline Package) for high density applications.

This package has shield effect to cut off ambient light.

FEATURES

- High isolation voltage ($BV = 3\,750\text{ Vr.m.s.}$)
- High collector to emitter voltage ($V_{CEO} = 120\text{ V}$)
- SOP (Small Outline Package) type
- Each isolated channel per package
- High-speed switching ($t_r, t_f = 10\ \mu\text{s TYP.}$)
- Taping product number (Only-1 type): PS2703-1-E3, E4, F3, F4
- UL approved: File No. E72422 (S)
- VDE0884 approved (Option)

★ APPLICATIONS

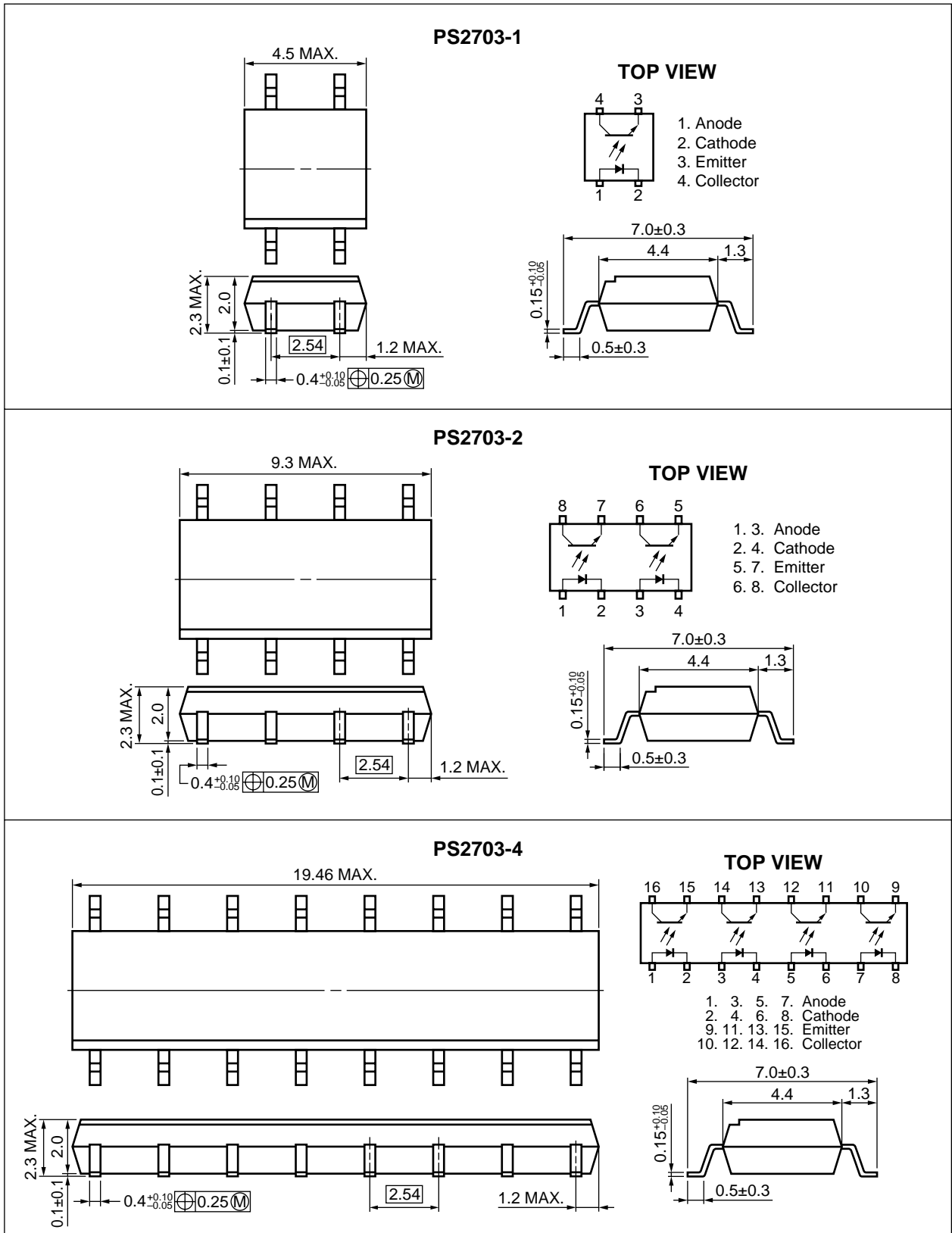
- Hybrid IC
- Telephone/FAX
- FA/OA equipment
- Programmable logic controllers
- Power supply

ORDERING INFORMATION

Part Number	Package	Safety Standard Approval
PS2703-1	4-pin SOP	Standard specification products • UL approved
PS2703-2	8-pin SOP	
PS2703-4	16-pin SOP	
PS2703-1-V	4-pin SOP	VDE0884 specification products (Option)
PS2703-2-V	8-pin SOP	
PS2703-4-V	16-pin SOP	

The information in this document is subject to change without notice.

PACKAGE DIMENSIONS (in millimeters)



ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise specified)

Parameter		Symbol	Ratings		Unit
			PS2703-1	PS2703-2, PS2703-4	
Diode	Forward Current (DC)	I _F	50		mA
	Reverse Voltage	V _R	6		V
	Power Dissipation Derating	ΔP _D /°C	0.8		mW/°C
	Power Dissipation	P _D	80		mW/ch
	Peak Forward Current ^{*1}	I _{FP}	1		A
Transistor	Collector to Emitter Voltage	V _{CEO}	120		V
	Emitter to Collector Voltage	V _{ECO}	6		V
	Collector Current	I _C	30		mA/ch
	Power Dissipation Derating	ΔP _C /°C	1.5	1.2	mW/°C
	Power Dissipation	P _C	150	120	mW/ch
Isolation Voltage ^{*2}		BV	3 750		Vr.m.s.
Operating Ambient Temperature		T _A	-55 to +100		°C
Storage Temperature		T _{stg}	-55 to +150		°C

*1 PW = 100 μs, Duty Cycle = 1 %

*2 AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output

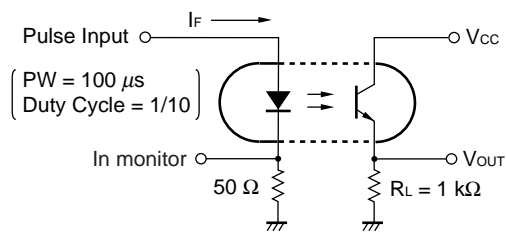
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 5 mA		1.1	1.4	V
	Reverse Current	I _R	V _R = 5 V			5	μA
	Terminal Capacitance	C _t	V = 0 V, f = 1 MHz		30		pF
Transistor	Collector to Emitter Current	I _{CEO}	I _F = 0 mA, V _{CE} = 120 V			100	nA
Coupled	Current Transfer Ratio (I _c /I _F) ^{*1}	CTR	I _F = 5 mA, V _{CE} = 5 V	50	150	400	%
			I _F = 1 mA, V _{CE} = 5 V	10	80		
	Collector Saturation Voltage	V _{CE(sat)}	I _F = 10 mA, I _c = 2 mA			0.3	V
	Isolation Resistance	R _{I-O}	V _{I-O} = 1 kV _{DC}	10 ¹¹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz		0.4		pF
	Rise Time ^{*2}	t _r	V _{CC} = 5 V, I _c = 2 mA, R _L = 1 kΩ		10		μs
	Fall Time ^{*2}	t _f			10		

*1 CTR rank (only PS2703-1)

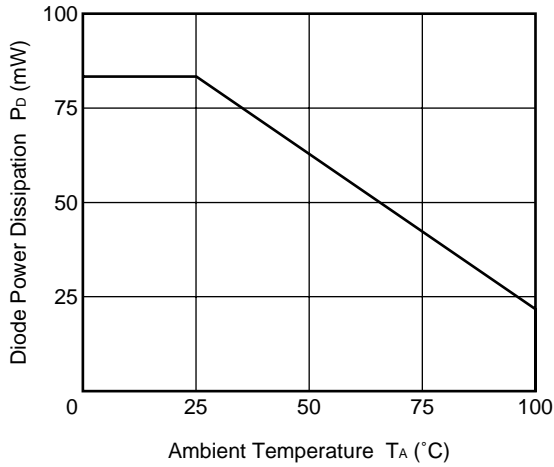
CTR rank	CTR (%)	Conditions
K	200 to 400	I _F = 5 mA, V _{CE} = 5 V
	80 to	I _F = 1 mA, V _{CE} = 5 V
L	100 to 300	I _F = 5 mA, V _{CE} = 5 V
	25 to	I _F = 1 mA, V _{CE} = 5 V
M	50 to 150	I _F = 5 mA, V _{CE} = 5 V
	10 to	I _F = 1 mA, V _{CE} = 5 V

★ *2 Test circuit for switching time

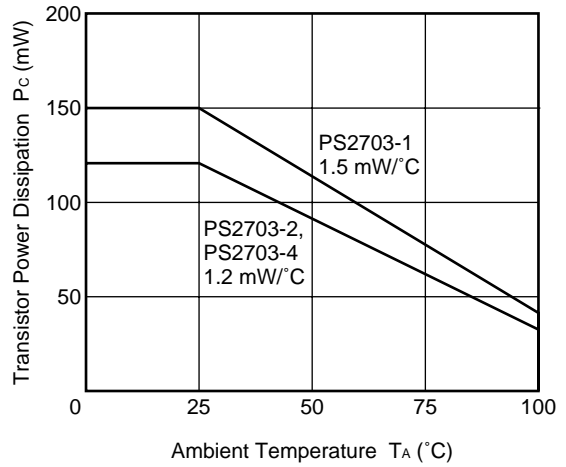


★ TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

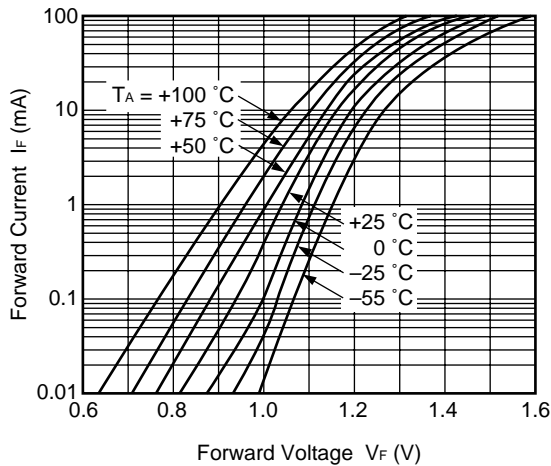
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



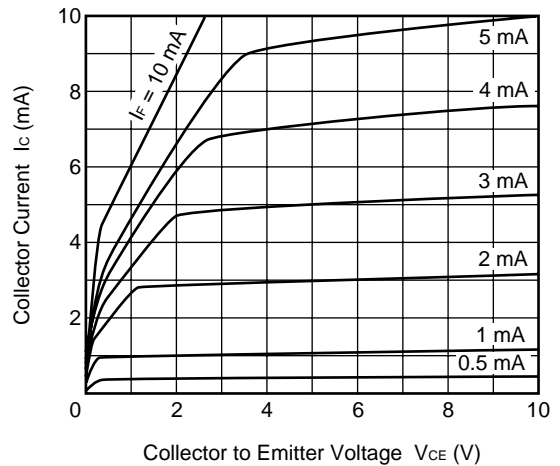
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



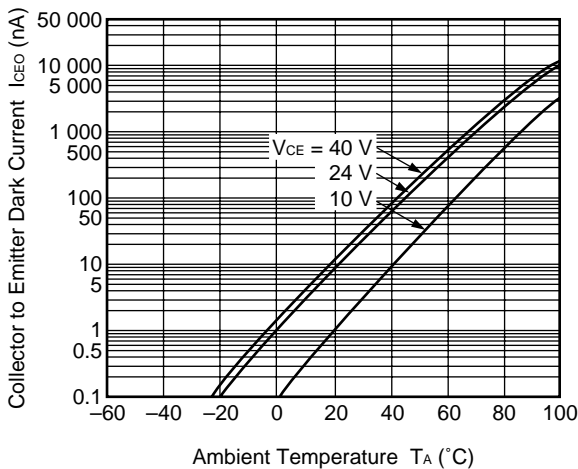
FORWARD CURRENT vs. FORWARD VOLTAGE



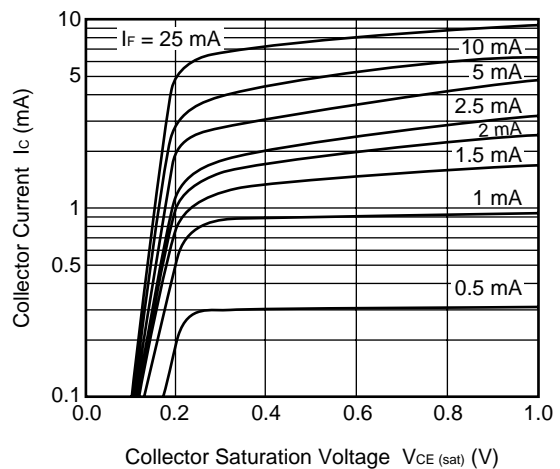
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



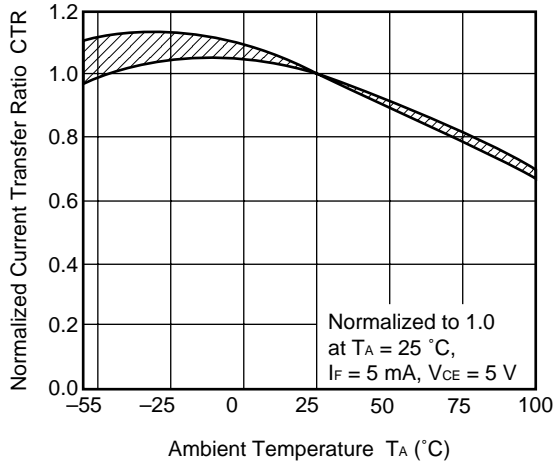
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



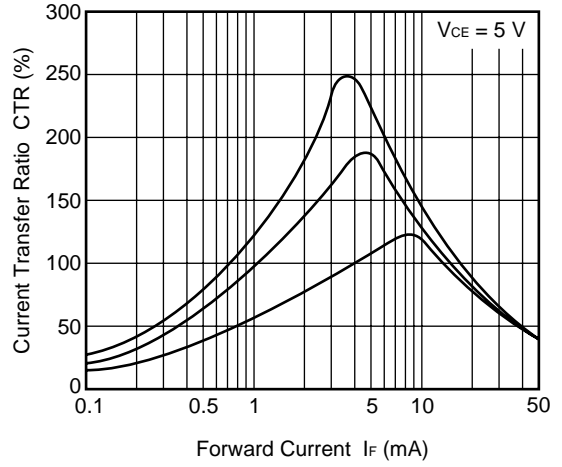
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



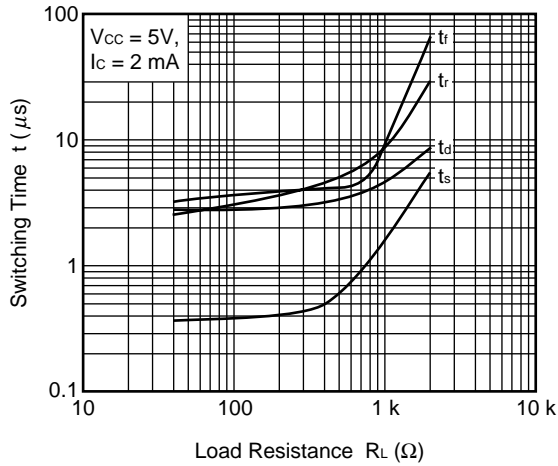
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



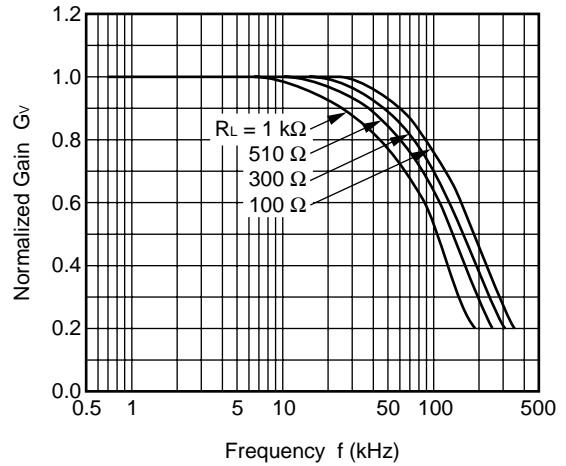
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



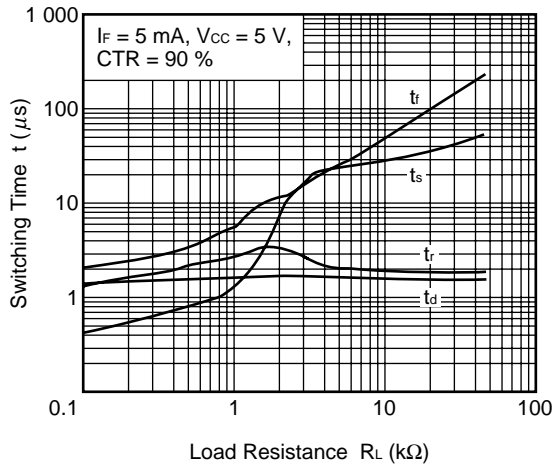
SWITCHING TIME vs. LOAD RESISTANCE



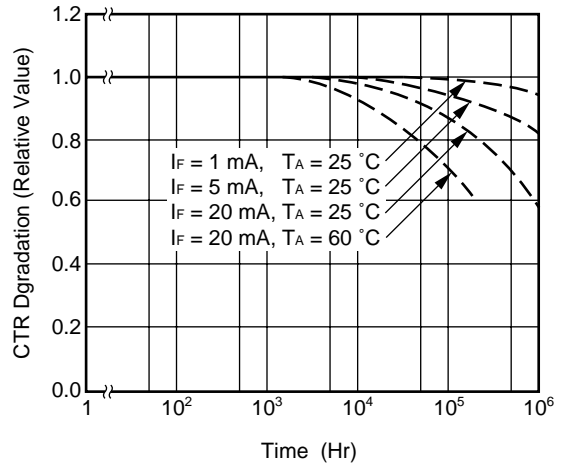
FREQUENCY RESPONSE



SWITCHING TIME vs. LOAD RESISTANCE



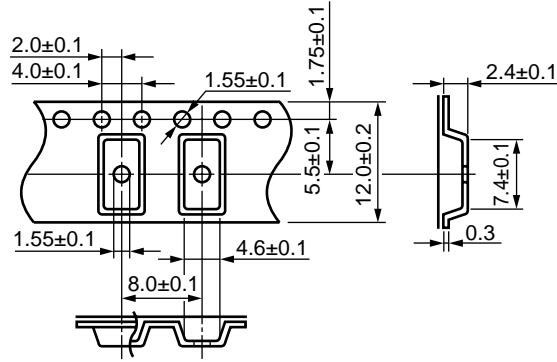
LONG TIME CTR DEGRADATION



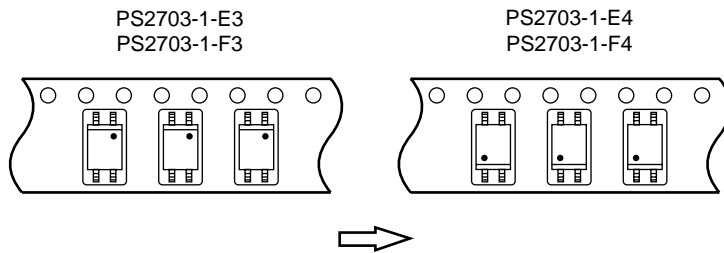
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)

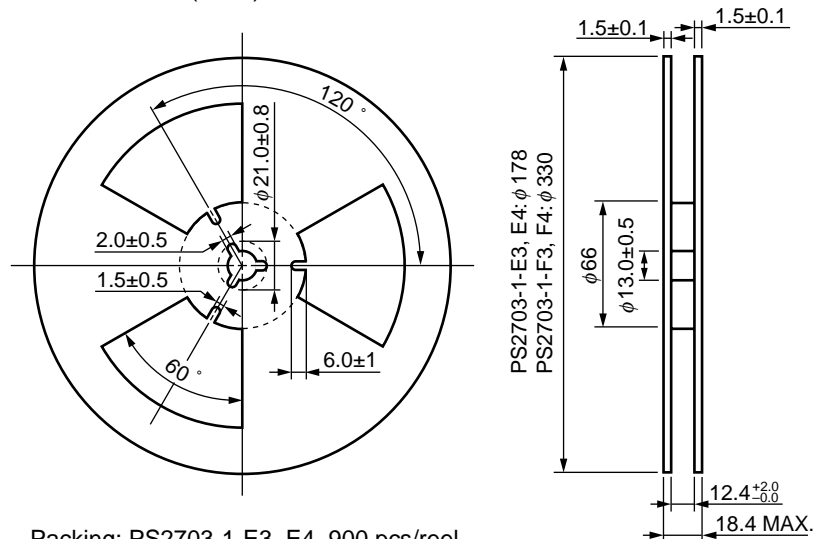
Outline and Dimensions (Tape)



Taping Direction



Outline and Dimensions (Reel)



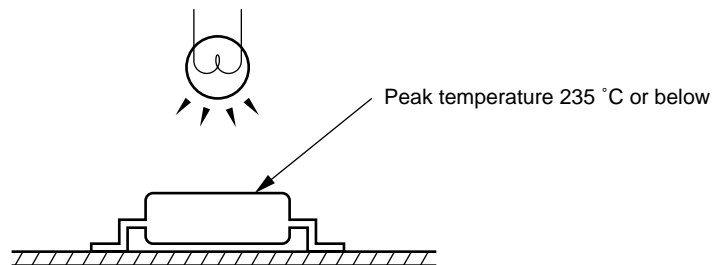
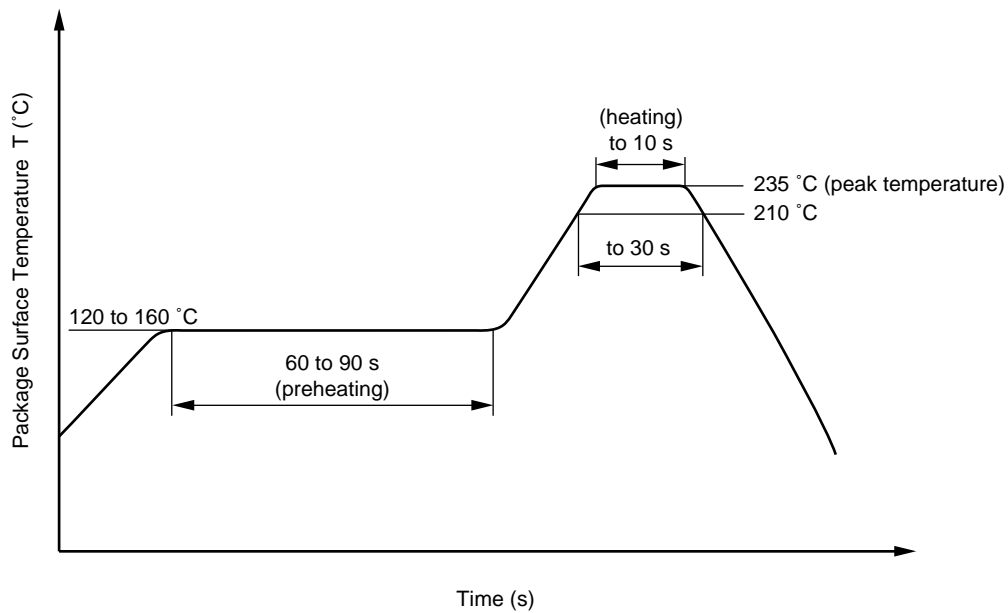
Packing: PS2703-1-E3, E4 900 pcs/reel
 PS2703-1-F3, F4 3 500 pcs/reel

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.)

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

Parameter	Symbol	Speck	Unit
Application classification (DIN VDE 0109) for rated line voltages ≤ 300 Vr.m.s. for rated line voltages ≤ 600 Vr.m.s.		IV III	
Climatic test class (DIN IEC 68 Teil 1/09.80)		55/100/21	
Dielectric strength maximum operating isolation voltage. Test voltage (partial discharge test procedure a for type test and random test) $U_{pr} = 1.2 \times U_{IORM}, P_d < 5$ pC	U_{IORM} U_{pr}	710 850	V_{peak} V_{peak}
Test voltage (partial discharge test procedure b for random test) $U_{pr} = 1.6 \times U_{IORM}, P_d < 5$ pC	U_{pr}	1 140	V_{peak}
Highest permissible overvoltage	U_{TR}	6 000	V_{peak}
Degree of pollution (DIN VDE 0109)		2	
Clearance distance		> 5	mm
Creepage distance		> 5	mm
Comparative tracking index (DIN IEC 112/VDE 0303 part 1)	CTI	175	
Material group (DIN VDE 0109)		III a	
Storage temperature range	T_{stg}	-55 to +150	°C
Operating temperature range	T_A	-55 to +100	°C
Isolation resistance, minimum value $V_{IO} = 500$ V dc at $T_A = 25$ °C $V_{IO} = 500$ V dc at T_A MAX. at least 100 °C	Ris MIN. Ris MIN.	10^{12} 10^{11}	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)			
Package temperature	T_{si}	150	°C
Current (input current $I_F, P_{si} = 0$)	I_{si}	200	mA
Power (output or total power dissipation)	P_{si}	300	mW
Isolation resistance $V_{IO} = 500$ V dc at $T_A = 175$ °C (T_{si})	Ris MIN.	10^9	Ω

[MEMO]

[MEMO]

CAUTION

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

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Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.