

PHOTOCOUPLER

PS2703-1, PS2703-2, PS2703-4

**HIGH ISOLATION VOLTAGE HIGH COLLECTOR TO EMITTER VOLTAGE
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 Out-line Package) for high density applications.

This package has shield effect to cut off ambient light.

FEATURES

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

★ APPLICATIONS

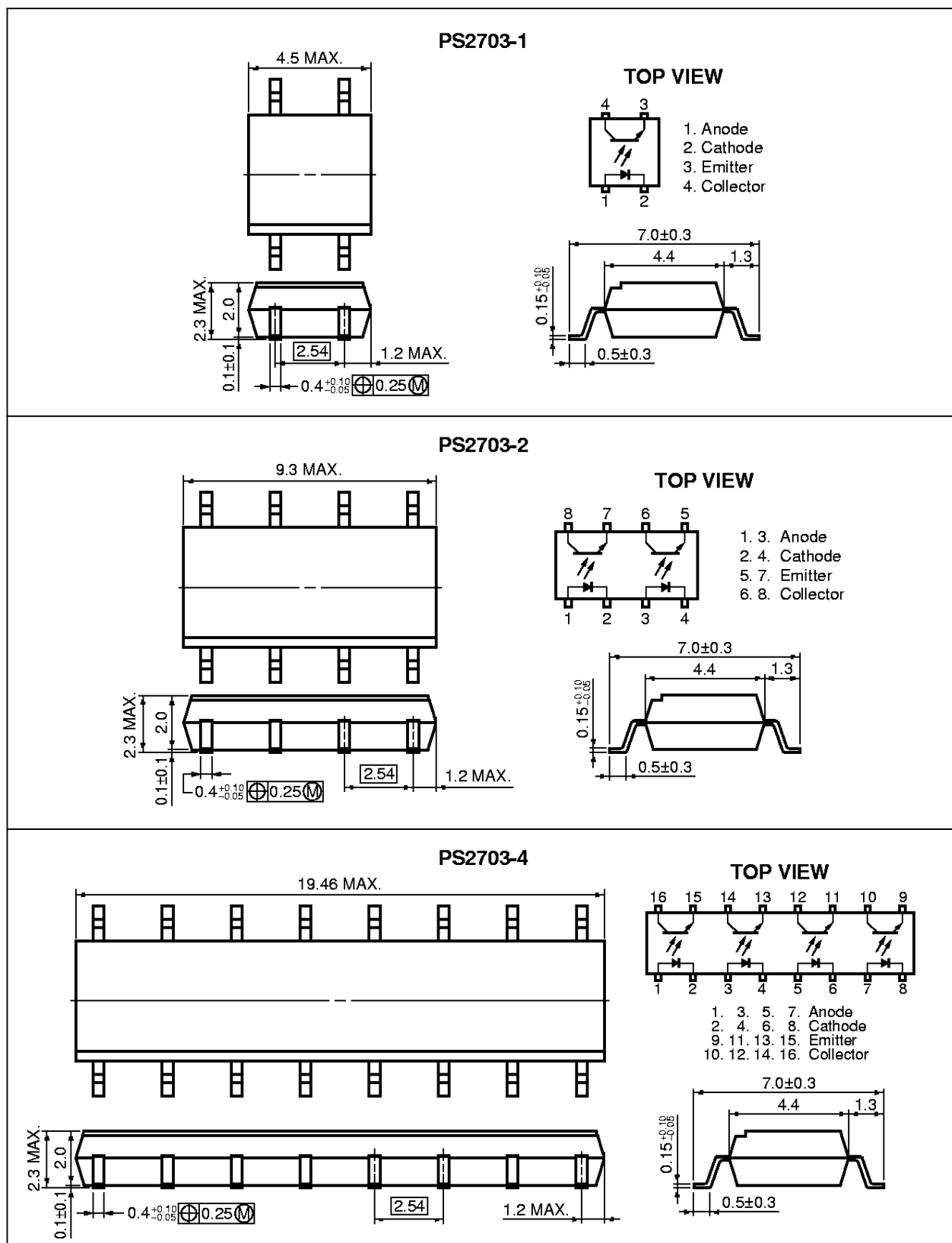
- Hybrid IC
- Measuring instruments
- Power supply
- Programmable logic controllers

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) • VDE approved
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 ($T_A = 25\text{ }^{\circ}\text{C}$, 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	6.0		V
	Power Dissipation Derating	$\Delta P_D/^{\circ}\text{C}$	0.8		mW/ $^{\circ}\text{C}$
	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	$\Delta P_C/^{\circ}\text{C}$	1.5	1.2	mW/ $^{\circ}\text{C}$
	Power Dissipation	P_C	150	120	mW/ch
Isolation Voltage ²		BV	3 750		V r.m.s.
Operating Ambient Temperature		T_A	-55 to +100		$^{\circ}\text{C}$
Storage Temperature		T_{stg}	-55 to +150		$^{\circ}\text{C}$

*1 PW = 100 μs , Duty Cycle = 1 %

*2 AC voltage for 1 minute at $T_A = 25\text{ }^{\circ}\text{C}$, RH = 60 % between input and output

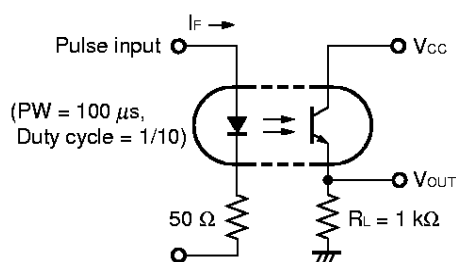
ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	$I_F = 5\text{ mA}$		1.1	1.4	V
	Reverse Current	I_R	$V_R = 5\text{ V}$			5	μA
	Terminal Capacitance	C_i	$V = 0\text{ V}$, $f = 1\text{ MHz}$		30		pF
Transistor	Collector to Emitter Current	I_{CEO}	$I_F = 0\text{ mA}$, $V_{CE} = 120\text{ V}$			100	nA
Coupled	Current Transfer Ratio ^{*1}	CTR	$I_F = 5\text{ mA}$, $V_{CE} = 5\text{ V}$	50	150	400	%
			$I_F = 1\text{ mA}$, $V_{CE} = 5\text{ V}$	10	80		
	Collector Saturation Voltage	$V_{CE(sat)}$	$I_F = 10\text{ mA}$, $I_C = 2\text{ mA}$			0.3	V
	Isolation Resistance	R_{i-o}	$V_{i-o} = 1\text{ kV}_{DC}$	10^{11}			Ω
	Isolation Capacitance	C_{i-o}	$V = 0\text{ V}$, $f = 1\text{ MHz}$		0.4		pF
	Rise Time ^{*2}	t_r	$V_{CC} = 5\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 1\text{ k}\Omega$		10		μs
	Fall Time ^{*2}	t_f					

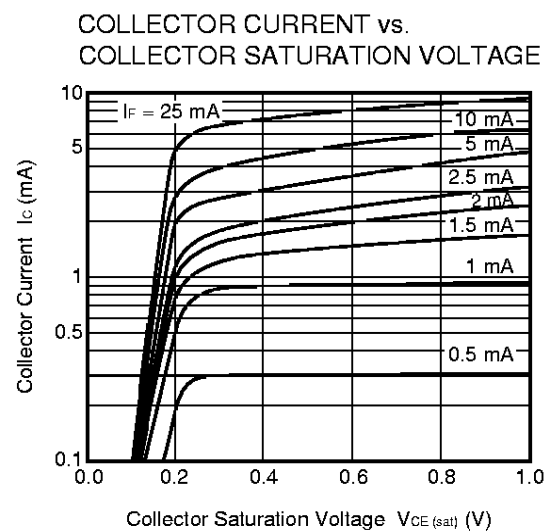
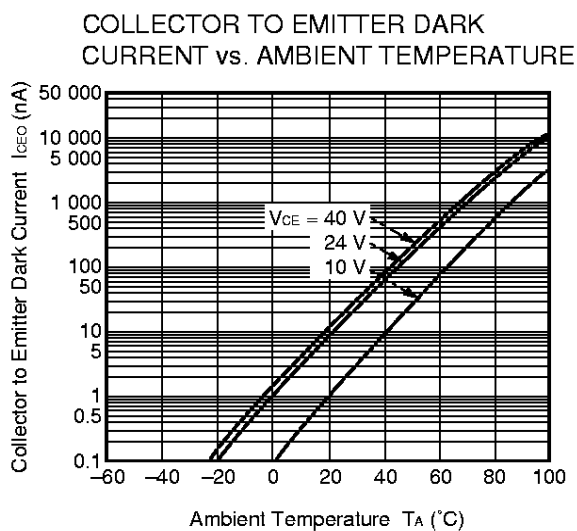
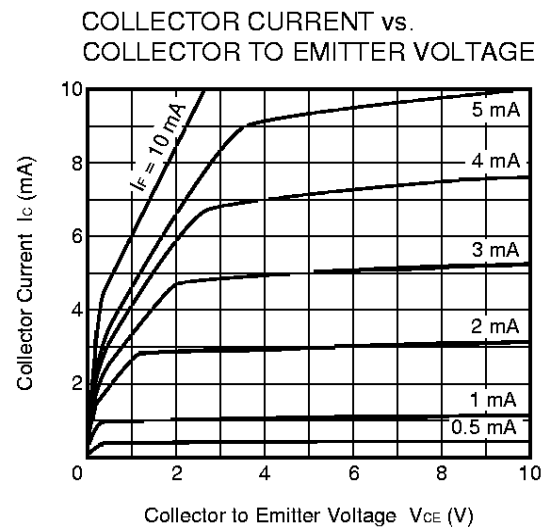
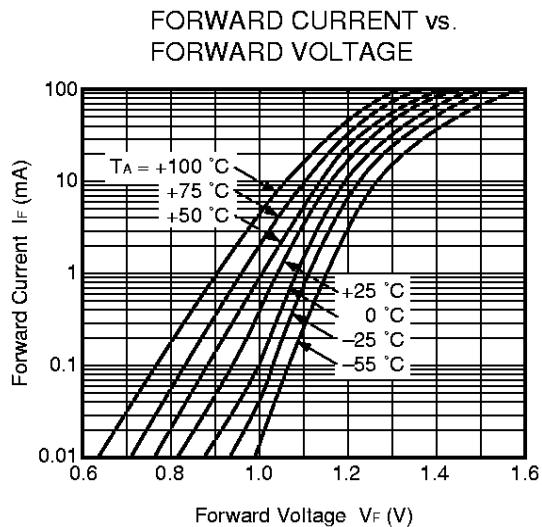
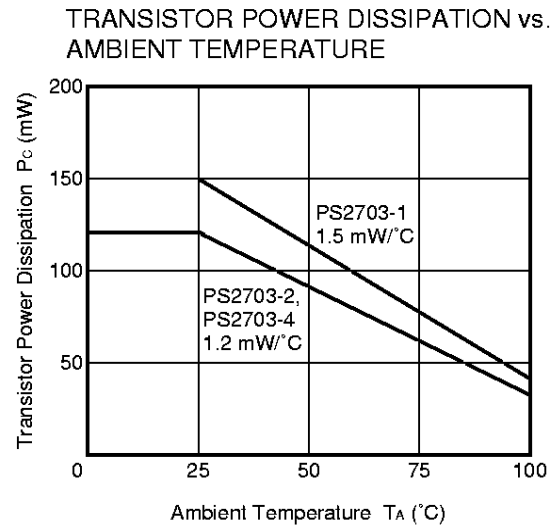
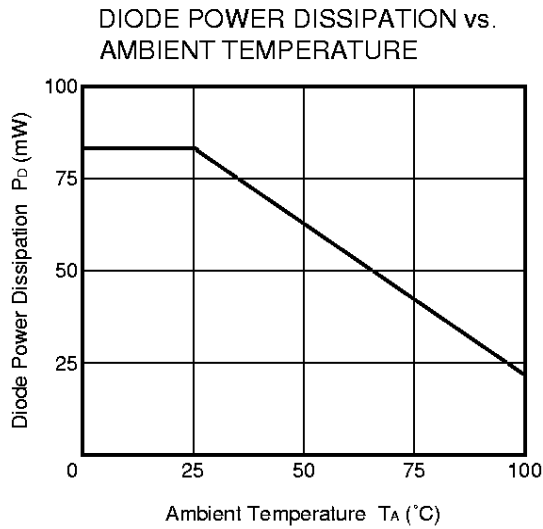
*1 CTR rank (only PS2703-1)

CTR rank	CTR (%)	Conditions
K	200 to 400	$I_F = 5\text{ mA}$, $V_{CE} = 5\text{ V}$
	80 to	$I_F = 1\text{ mA}$, $V_{CE} = 5\text{ V}$
L	100 to 300	$I_F = 5\text{ mA}$, $V_{CE} = 5\text{ V}$
	25 to	$I_F = 1\text{ mA}$, $V_{CE} = 5\text{ V}$
M	50 to 150	$I_F = 5\text{ mA}$, $V_{CE} = 5\text{ V}$
	10 to	$I_F = 1\text{ mA}$, $V_{CE} = 5\text{ V}$

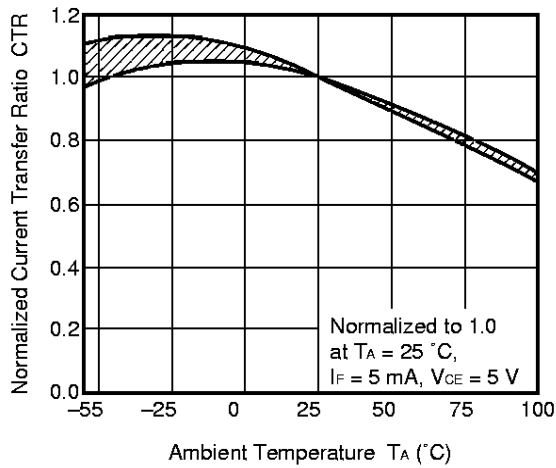
*2 Test circuit for switching time



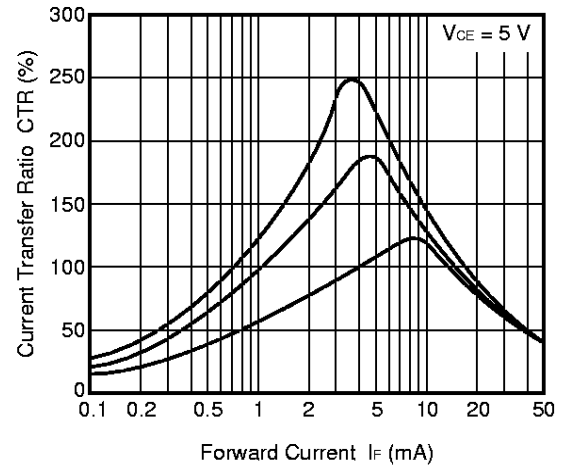
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)



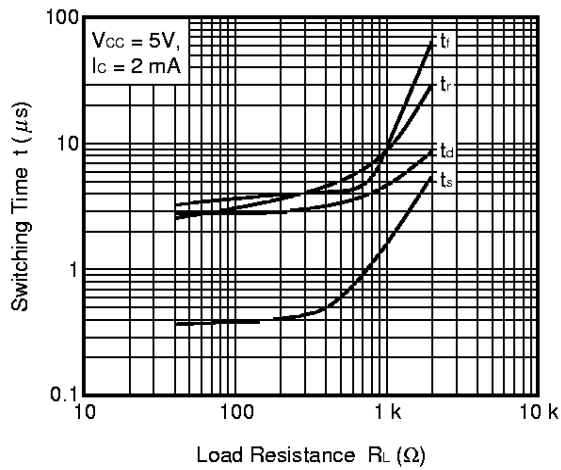
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



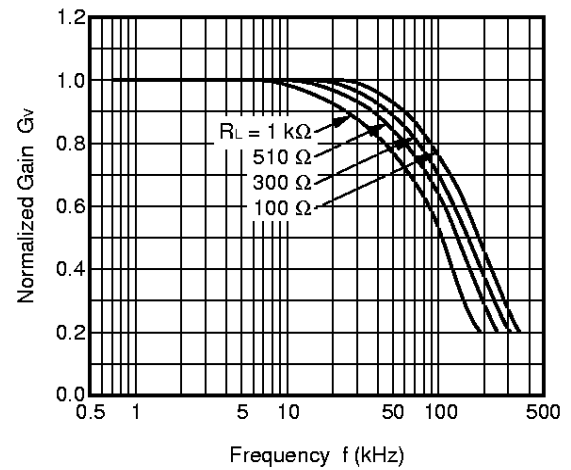
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



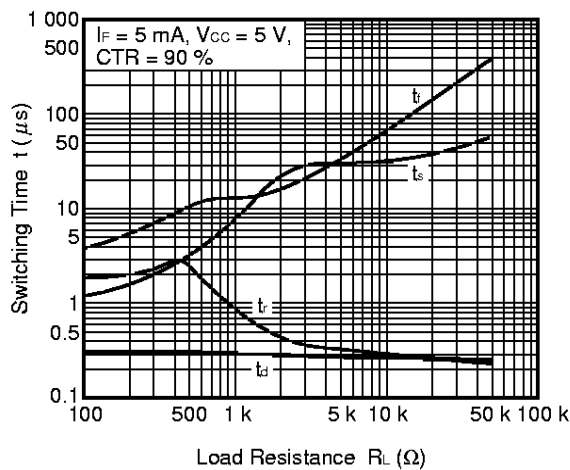
SWITCHING TIME vs. LOAD RESISTANCE



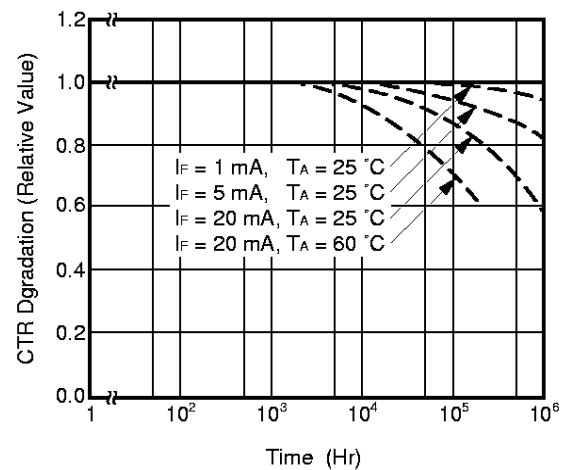
FREQUENCY RESPONSE



SWITCHING TIME vs. LOAD RESISTANCE

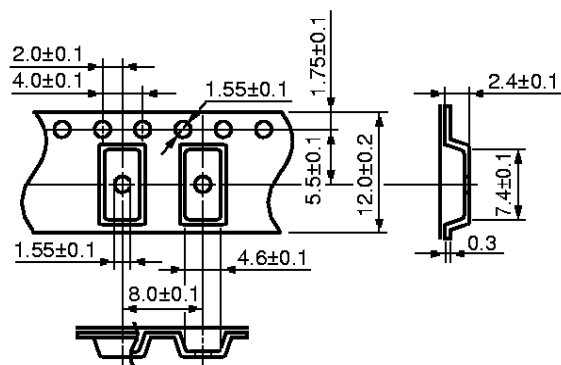


LONG TIME CTR DEGRADATION

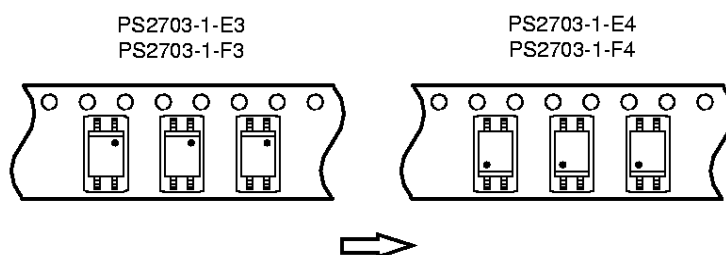


★ TAPING SPECIFICATIONS (in millimeters)

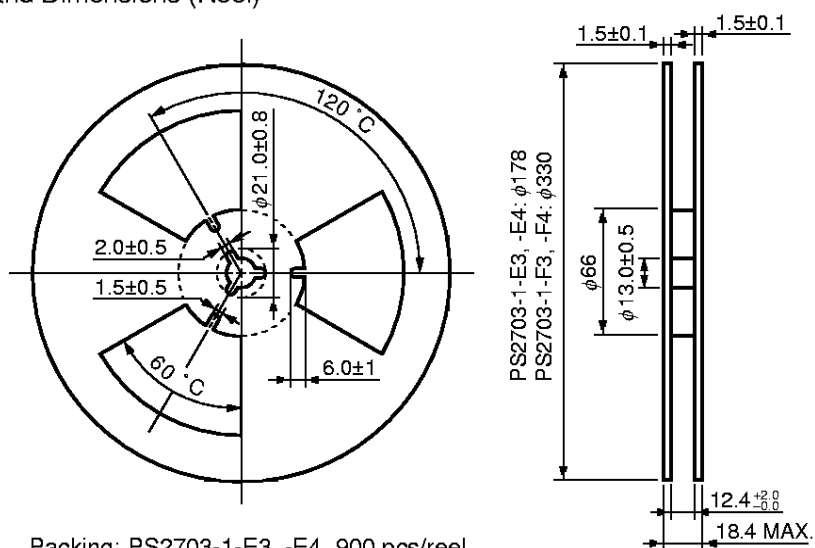
Outline and Dimensions (Tape)



Taping Direction



Outline and Dimensions (Reel)



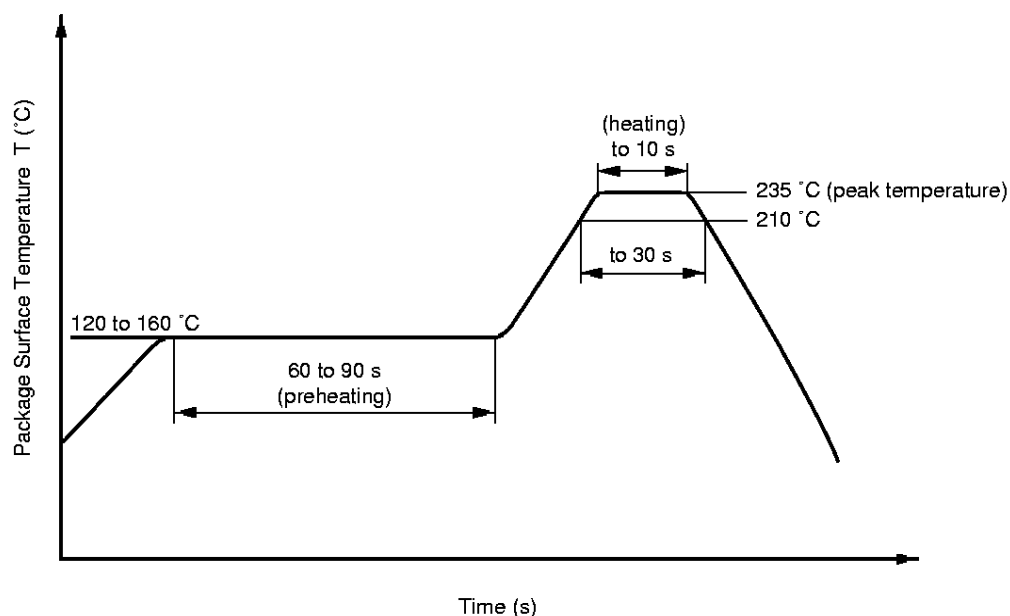
Packing: PS2703-1-E3, -E4 900 pcs/reel
PS2703-1-F3, -F4 3 500 pcs/reel

RECOMMENDED SOLDERING CONDITIONS

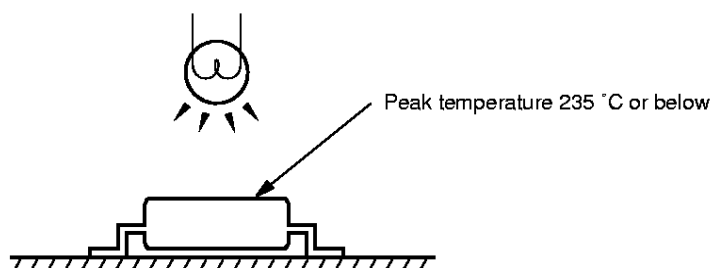
(1) Infrared reflow soldering

- 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



Caution Please avoid to removed the residual flux by water after the first reflow processes.



(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)		IIIa	
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 Current (input current I_F , $P_{si} = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500$ V dc at $T_A = 175$ °C (T_{si})	T_{si} I_{si} P_{si} Ris MIN.	150 200 300 10^9	°C mA mW 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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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

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

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.