

PHOTOCOUPLERS

PS2706-1, PS2706-2, PS2706-4

HIGH ISOLATION VOLTAGE AC INPUT, DARLINGTON TRANSISTOR TYPE SOP MULTI PHOTOCOUPLER

– NEPOC Series –

DESCRIPTION

The PS2706-1, -2 and -4 series are optically coupled isolator containing GaAs light emitting diodes and an NPN silicon darlington-connected 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.

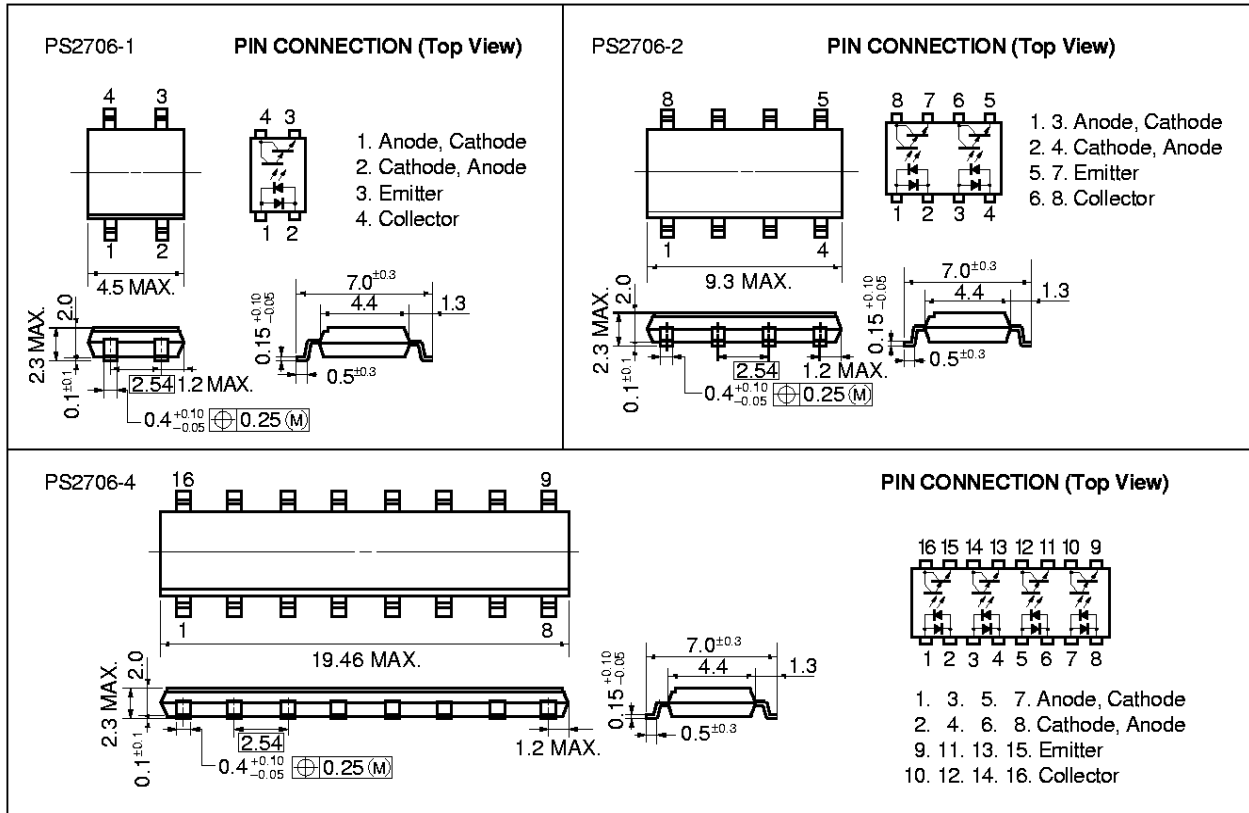
FEATURES

- High isolation voltage
(BV : 3.75 kV_{r.m.s.} MIN.)
- SOP (Small Out-line Package)
- Each isolated channels per package
- AC input response
- 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.)
- Taping product number (only -1 type)
(PS2706-1 -E3, E4)
- UL Approved (File No. E72422(S))
- VDE 0884 Approved (Option)

ORDERING INFORMATION

ORDERING NUMBER	PACKAGE	SAFETY STANDARD APPROVAL
PS2706-1	4 pin SOP	Standard specification products • UL Approved
PS2706-2	8 pin SOP	
PS2706-4	16 pin SOP	
PS2706-1-V	4 pin SOP	VDE0884 specification products (Option) • VDE Approved • UL Approved
PS2706-2-V	8 pin SOP	
PS2706-4-V	16 pin SOP	

PACKAGE DIMENSIONS (Unit: in millimeters)



ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

		(PS2706-1)	(PS2706-2, 2706-4)	
Diode				
Forward Current (DC)	I _F	±50	±50	mA
Power Dissipation Derating	ΔP _D /°C	0.8	0.8	mW/°C
Power Dissipation	P _D	80	80	mW/channel
Peak Forward Current	I _{F(peak)}	±1	±1	A
(PW = 100 μs, Duty Cycle 1 %)				
Transistor				
Collector to Emitter Voltage	V _{CEO}	40	40	V
Emitter to Collector Voltage	V _{ECO}	6	6	V
Collector Current	I _C	200	160	mA/channel
Power Dissipation Derating	ΔP _C /°C	1.5	1.2	mW/°C
Power Dissipation	P _C	150	120	mW/channel
Coupled				
Isolation Voltage *1)	BV	3 750	3 750	V _{r.m.s.}
Storage Temperature	T _{stg}	-55 to +150	-55 to +150	°C
Operating Temperature	T _{opt}	-55 to +100	-55 to +100	°C

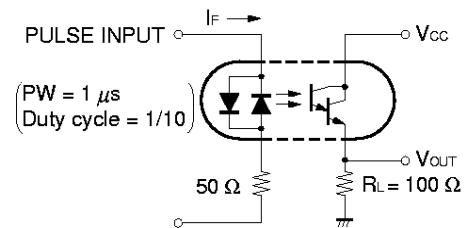
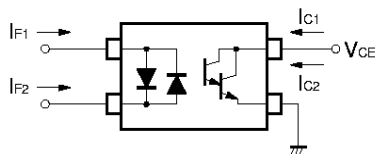
*1) AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output.

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V _F		1.1	1.4	V	I _F = ±5 mA
	Junction Capacitance	C _J		60		pF	V = 0, f = 1.0 MHz
Transistor	Collector to Emitter Dark Current	I _{CEO}			400	nA	V _{CE} = 40 V, I _F = 0
Coupled	Current Transfer Ratio	CTR	200	2 000		%	I _F = ±1 mA, V _{CE} = 2 V
	CTR Ratio *2)	CTR ₁ /CTR ₂	0.3	1.0	3.0		I _F = ±1 mA, V _{CE} = 2 V
	Collector Saturation Voltage	V _{CE(sat)}			1.0	V	I _F = ±1 mA, I _C = 2 mA
	Isolation Resistance	R ₁₋₂	10 ¹¹			Ω	V _{in-out} = 1.0 kV _{DC}
	Isolation Capacitance	C ₁₋₂		0.4		pF	V = 0, f = 1.0 MHz
	Rise Time *3)	t _r		200		μs	V _{CC} = 5 V, I _C = 2 mA, R _L = 100 Ω
Fall Time *3)	t _f		200		μs	V _{CC} = 5 V, I _C = 2 mA, R _L = 100 Ω	

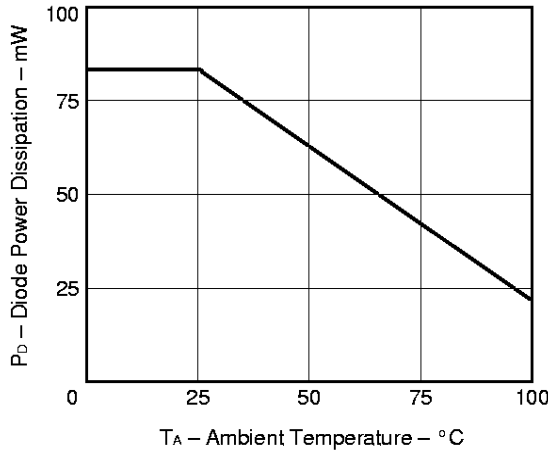
*2) CTR₁ = I_{C1}/I_{F1}, CTR₂ = I_{C2}/I_{F2}

*3) Test Circuit for Switching Time

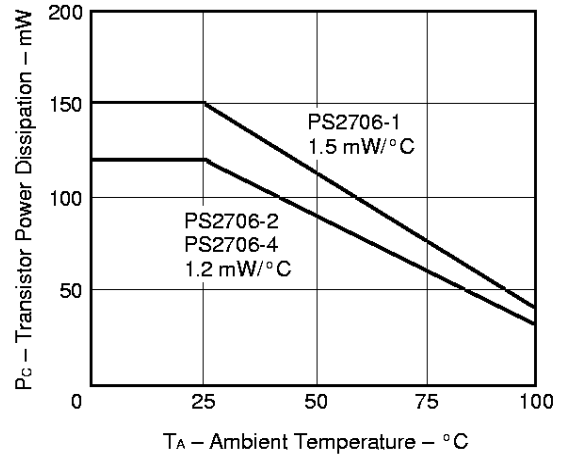


TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$)

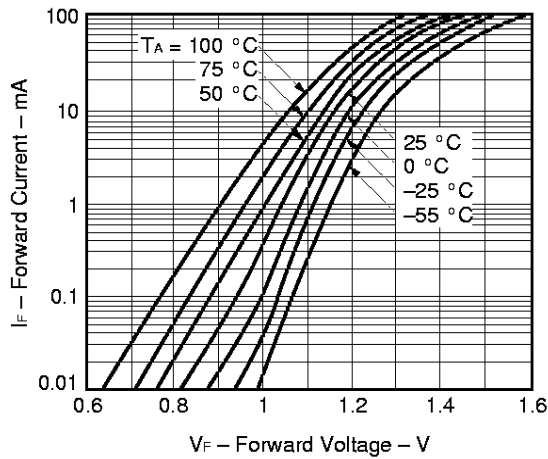
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



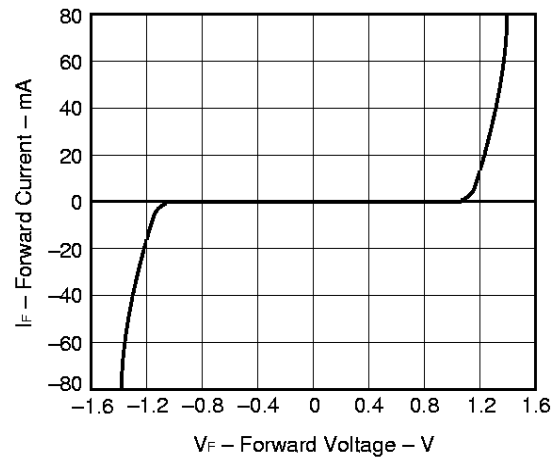
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



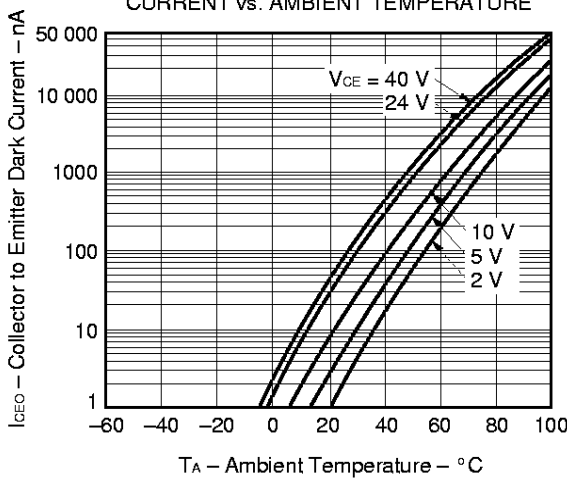
FORWARD CURRENT vs. FORWARD VOLTAGE



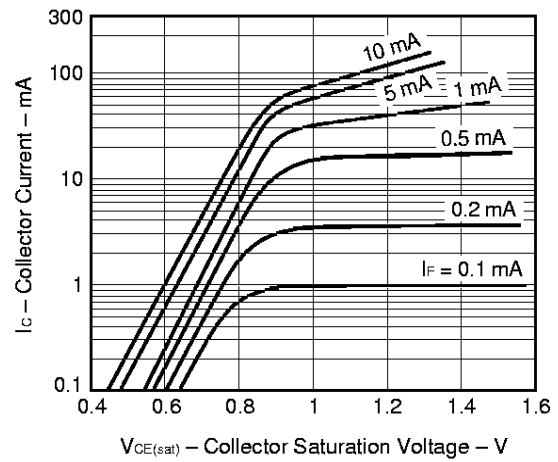
FORWARD CURRENT vs. FORWARD VOLTAGE



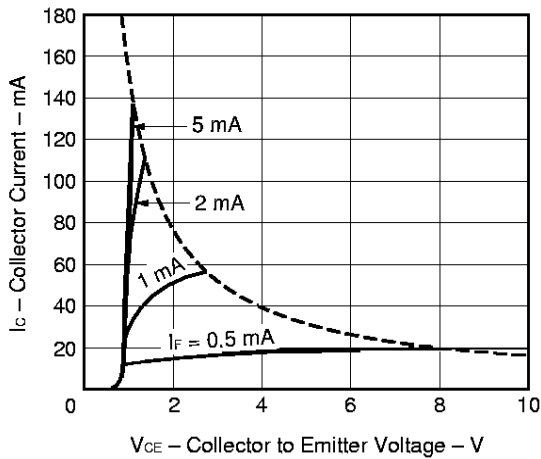
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



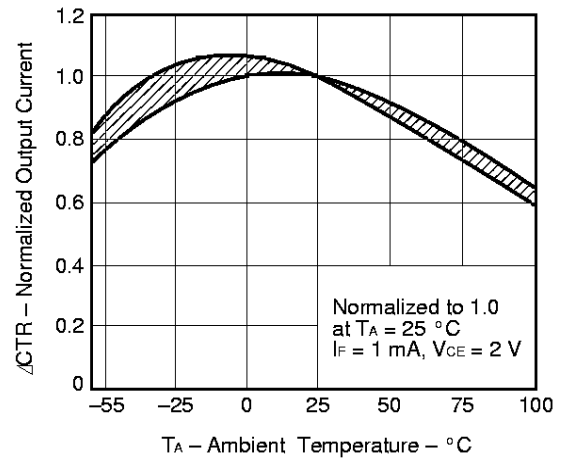
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



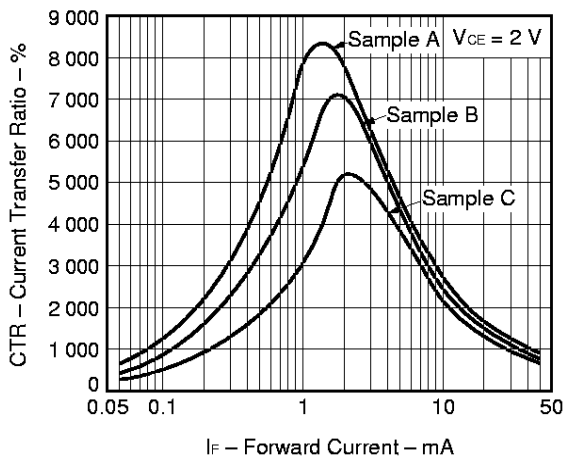
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



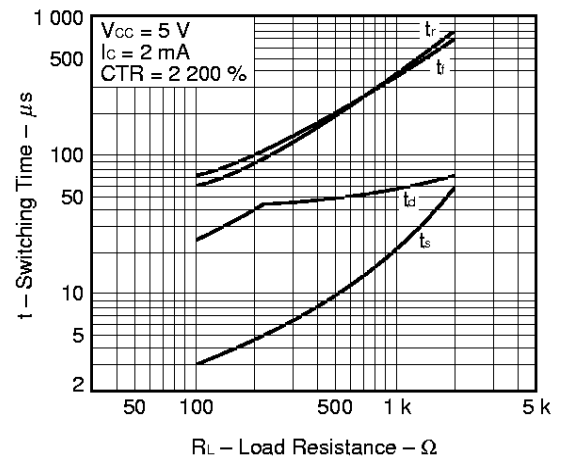
NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE



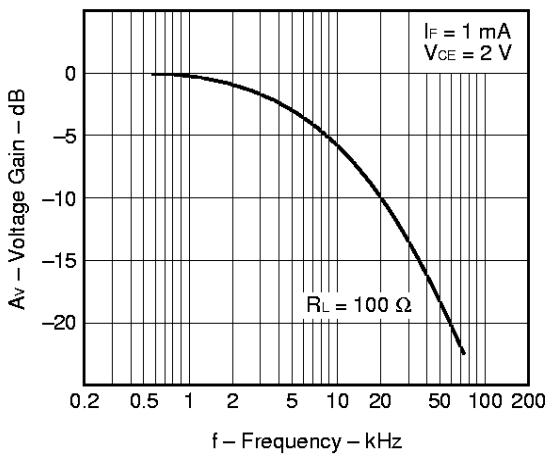
CURRENT TRANSFER RATIO (CTR) vs. FORWARD CURRENT



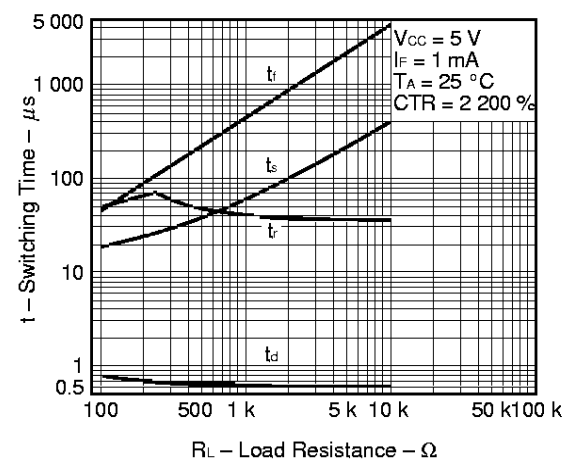
SWITCHING TIME vs. LOAD RESISTANCE

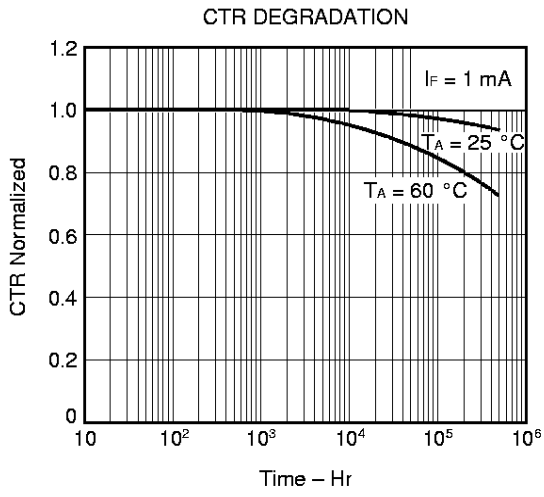


FREQUENCY RESPONSE



SWITCHING TIME vs. LOAD RESISTANCE



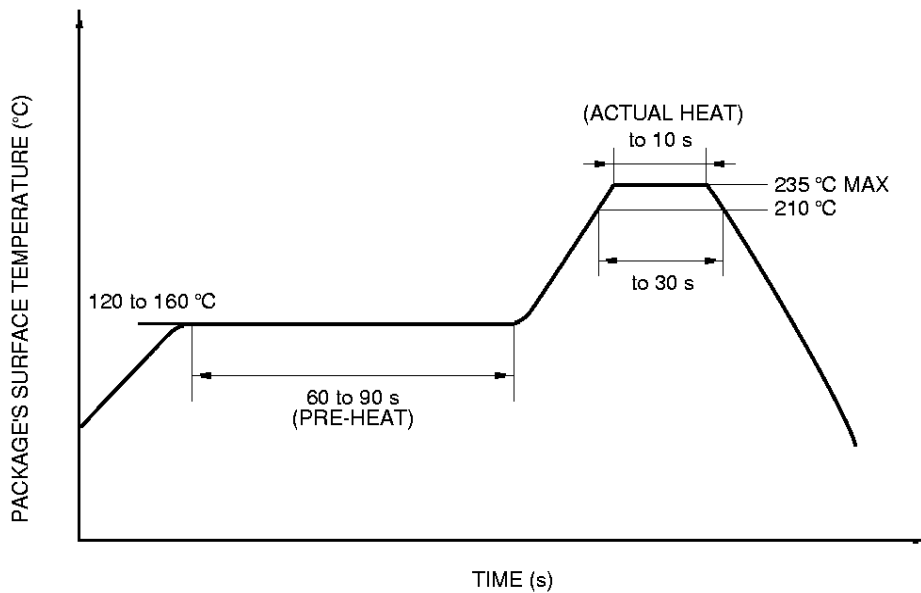


* The measurement of TYPICAL CHARACTERISTICS are only for reference, not guaranteed.

SOLDERING PRECAUTION

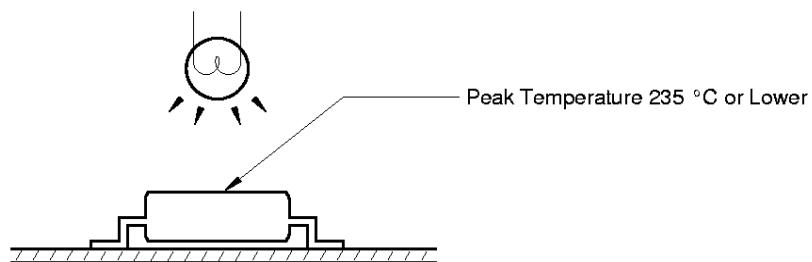
- (1) Infrared reflow soldering
 - Peak reflow temperature : 235 °C or below (Plastic surface temperature)
 - Reflow time : 30 seconds or less (Time period during which the plastic surface temperature is 210 °C)
 - Number of reflow processes: Three
 - Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

INFRARED RAY REFLOW TEMPERATURE PROFILE



<NOTES>

- (1) Please avoid to be removed the residual flux by water after the first reflow processes.



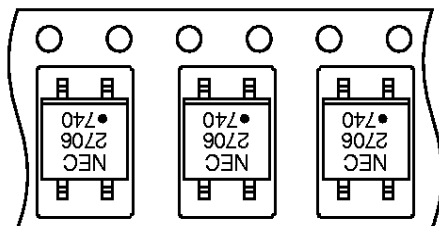
- (2) Dip soldering
 - Peak temperature : 260 °C or lower
 - Time : 10 s or less
 - Flux : Rosin-base flux

• **TAPING (Only PS2706-1)**

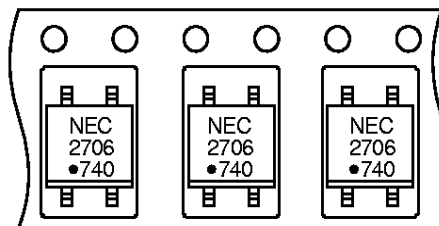
These conform to EIAJ "Electronic Parts Taping Size" (RC-1009B: Chip type).

There are two types of taping according to the direction in which SOP photo couplers are stuck to the tape.

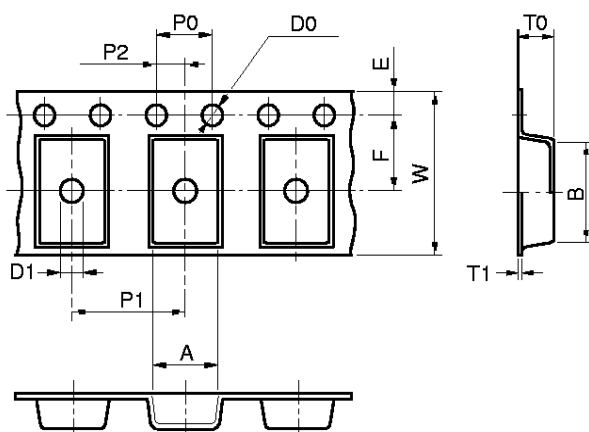
PS2706-1-E3



PS2706-1-E4



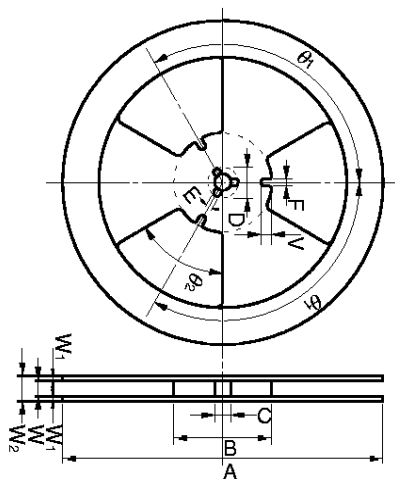
OUTLINE AND DIMENSIONS (:TAPE)



SYMBOL	RATINGS
A	4.6 ± 0.1
B	7.4 ± 0.1
D0	1.55 ± 0.1
D1	1.55 ± 0.1
E	1.75 ± 0.1
F	5.5 ± 0.1
P1	8 ± 0.1
P0	4 ± 0.1
P2	2 ± 0.1
T0	2.4 ± 0.1
T1	0.3
W	12 ± 0.2

Unit (mm)

OUTLINE AND DIMENSIONS (:REEL)



SYMBOL	RATINGS	
	E3, E4	F3, F4
A	178	330
B	66	
C	13 ± 0.5	
D	21 ± 0.8	
E	2.0 ± 0.5	
F	1.5 ± 0.5	
V	6 ± 1	
W	12.4 ^{+2.0} ₋₀	
W1	1.5 ± 0.1	
W2	18.4 MAX.	
θ1	120°	
θ2	60°	

Unit (mm)

PACKING: 900 pieces/reel E3, E4
 3 500 pieces/reel F3, F4

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

PARAMETER	SYMBOL	SPECK	UNIT
Application classification (DIN VDE 0109) for rated line voltages $\leq 300 V_{eff}$ for rated line voltages $\leq 600 V_{eff}$		IV III	
Climatic test class (DIN 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) $U_{pr} = 1.2 \times U_{IORM}, Pd < 5 pC$	U_{IORM} U_{pr}	710 850	V_{peak} V_{peak}
Test voltage (partial discharge, test procedure b for random test) $U_{pr} = 1.6 \times U_{IORM}, Pd < 5 pC$	U_{pr}	1140	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	Cel
Operating temperature range	T_{amb}	-55 to +100	Cel
Isolation resistance, minimum value $U_{IO} = 500 V$ dc at 25 Cel $U_{IO} = 500 V$ dc at $T_{amp\ maximum}$ at least 100 Cel	$R_{is\ min}$ $R_{is\ min}$	10^{12} 10^{11}	ohm ohm
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current $I_F, Psi = 0$) Power (output or total power dissipation) Isolation resistance $U_{IO} = 500 V$ dc at 175 Cel (T_{si})	T_{si} I_{si} P_{si} $R_{is\ min}$	150 200 300 10^9	Cel mA mW ohm

Caution

**The Great Care must be taken in dealing with the devices in this guide.
The reason is that the material of the devices is GaAs (Galium Arsenide), which is
designated as harmful substance according to the law concerned.
Keep the law concerned and so on, especially in case of removal.**

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"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

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 in "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 NEC Sales Representative in advance.

Anti-radioactive design is not implemented in this product.