PS2706-1

AC INPUT RESPONSE
DARLINGTON TRANSISTOR
SOP MULTI PHOTOCOUPLER SERIES

–NEPOC Series–

DESCRIPTION

The PS2706-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon darlington-connected phototransistor.

This 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

- AC input response
- High current transfer ratio (CTR = 2 000% TYP.)
- High isolation voltage (BV = 3 750 Vr.m.s.)
- Small and thin (SOP) package
- High-speed switching (t_r, t_f = 200 μs TYP.)
- Ordering number of taping product: PS2706-1F3, F4
- ★ Safety standards
  - UL approved: File No. E72422
  - BSI approved: File No. 8219/8220
  - CSA approved: File No. CA 101391
  - DIN EN60747-5-2 (VDE0884 Part2) approved (Option)

APPLICATIONS

- Hybrid IC
- Telephone, Exchange equipment
- FA/OA equipment
- Programmable logic controllers

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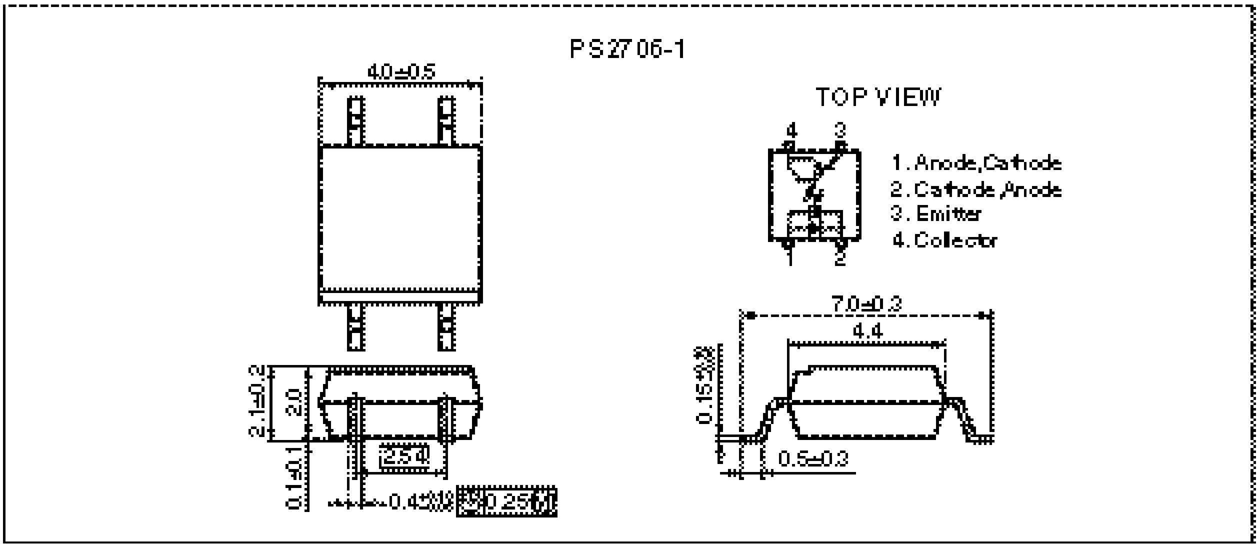
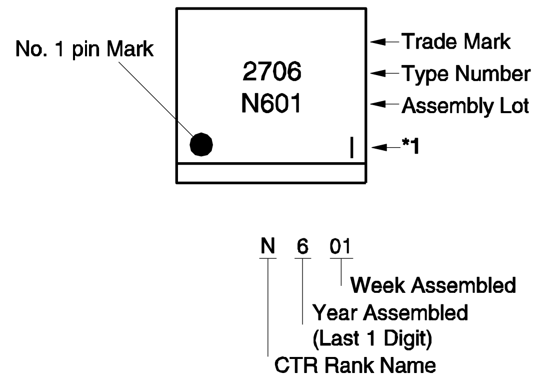
The mark ★ shows major revised points.

PACKAGE DIMENSIONS (in millimeters)



★ MARKING EXAMPLES



***1** Bar : Pb-Free

Remark "PS" and "-1" are omitted from original type number

★ ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number[*1]
PS2706-1	PS2706-1-A	Pb-Free	Magazine case 100 pcs	Standard products (UL, BSI, CSA approved)	PS2706-1
PS2706-1-F3	PS2706-1-F3-A		Embossed Tape 3 500 pcs/reel		
PS2706-1-F4	PS2706-1-F4-A				
PS2706-1-V	PS2706-1-V-A		Magazine case 100 pcs	DIN EN60747-5-2 (VDE0884 Part2) Approved (Option)	
PS2706-1-V-F3	PS2706-1-V-F3-A		Embossed Tape 3 500 pcs/reel		
PS2706-1-V-F4	PS2706-1-V-F4-A				

***1** For the application of the Safety Standard, following part number should be used.

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

Parameter		Symbol	Ratings	Unit
Diode	Forward Current (DC)	I_F	±50	mA
	Power Dissipation Derating	ΔP_D/°C	0.8	mW/°C
	Power Dissipation	P_D	80	mW
	Peak Forward Current[*1]	I_{FP}	±1	A
Transistor	Collector to Emitter Voltage	V_{CEO}	40	V
	Emitter to Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	200	mA
	Power Dissipation Derating	ΔP_C/°C	1.5	mW/°C
	Power Dissipation	P_C	150	mW
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

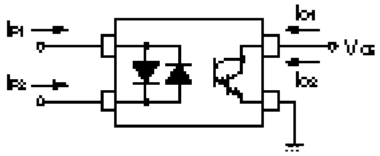
***1** PW = 100 μs, Duty Cycle = 1%

***2** AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output
Pins 1-2 shorted together, 3-4 shorted together.

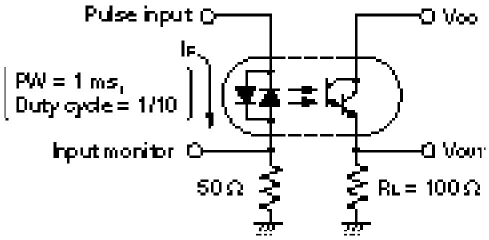
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = ±5 mA		1.1	1.4	V
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz		60		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	I_F = 0 mA, V_{CE} = 40 V			400	nA
Coupled	Current Transfer Ratio (I_C/I_F)	CTR	I_F = ±1 mA, V_{CE} = 2 V	200	2 000		%
	CTR Ratio[*1]	CTR1/ CTR2	I_F = ±1 mA, V_{CE} = 2 V	0.3	1.0	3.0	
	Collector Saturation Voltage	$V_{CE\,(sat)}$	I_F = ±1 mA, I_C = 2 mA			1.0	V
	Isolation Resistance	$R_{I\text{-}O}$	$V_{I\text{-}O}$ = 1 kV_{DC}	10^{11}			Ω
	Isolation Capacitance	$C_{I\text{-}O}$	V = 0 V, f = 1 MHz		0.4		pF
	Rise Time [*2]	t_r	V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω		200		μs
	Fall Time [*2]	t_f			200		

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

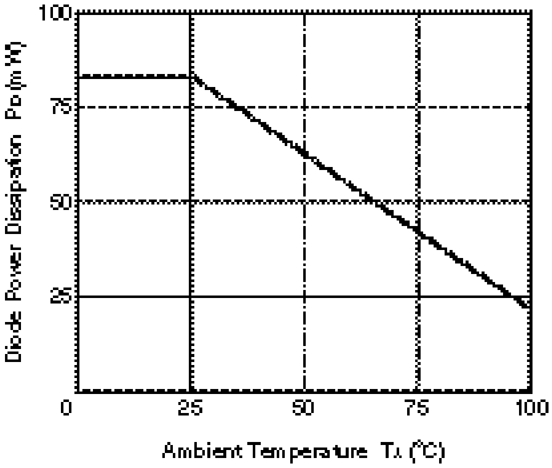


***2** Test circuit for switching time

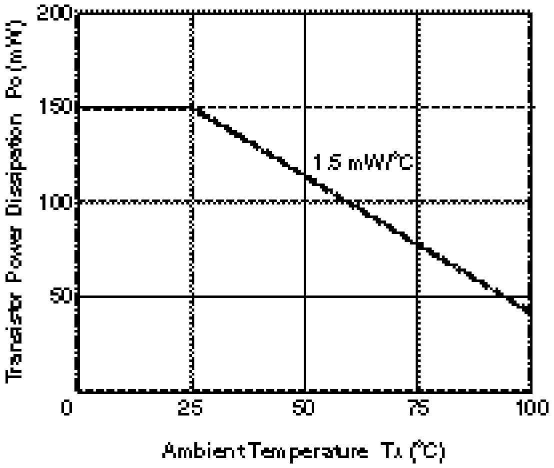


TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

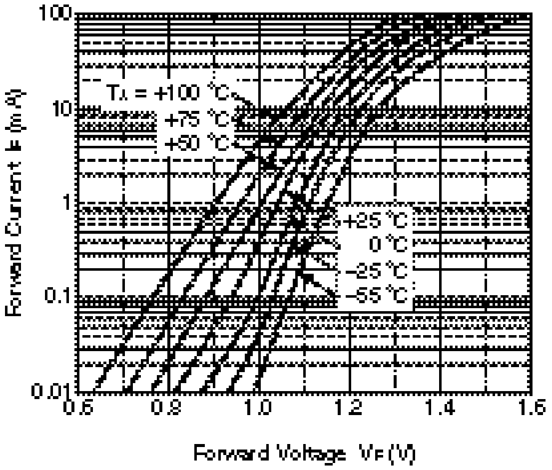
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



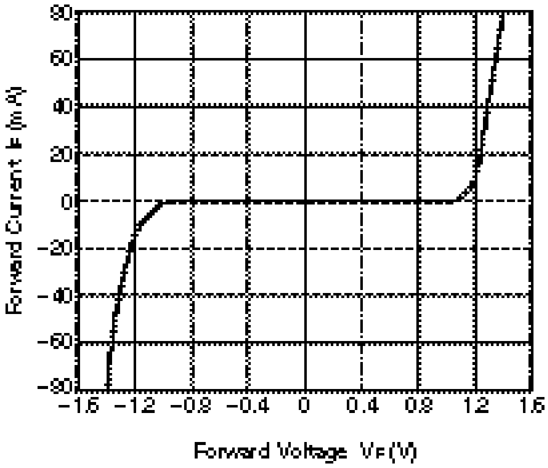
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



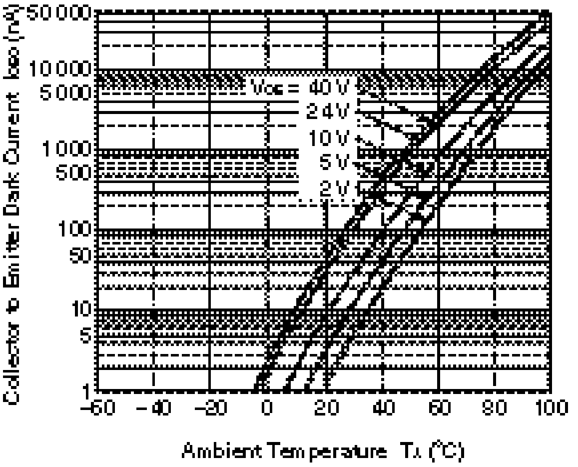
FORWARD CURRENT vs. FORWARD VOLTAGE



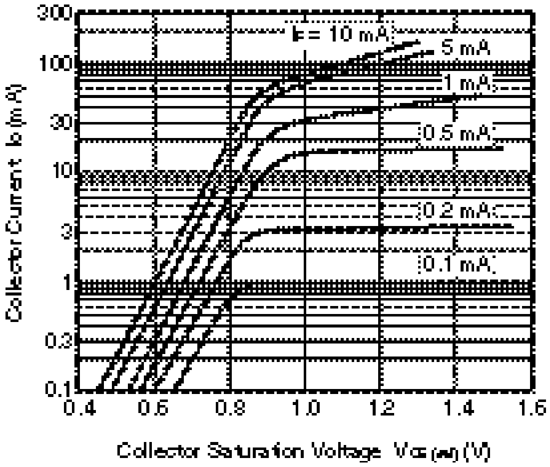
FORWARD CURRENT vs. FORWARD VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

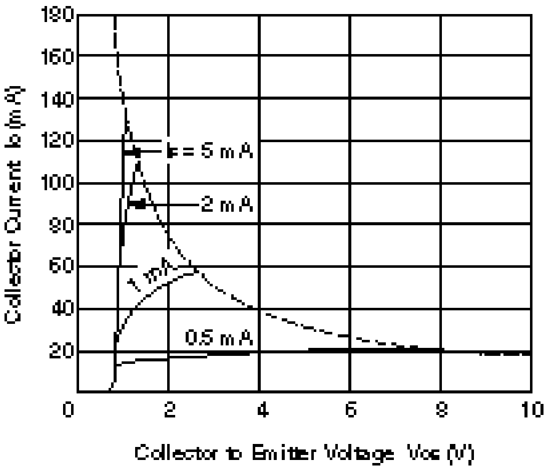


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

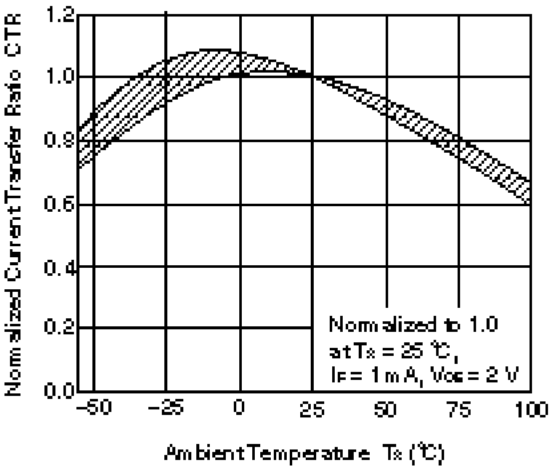


Remark The graphs indicate nominal characteristics.

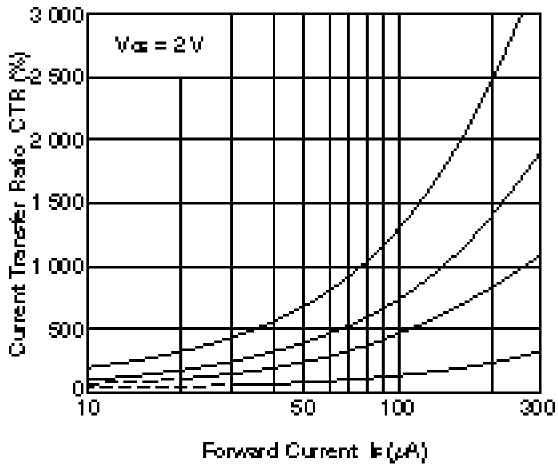
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



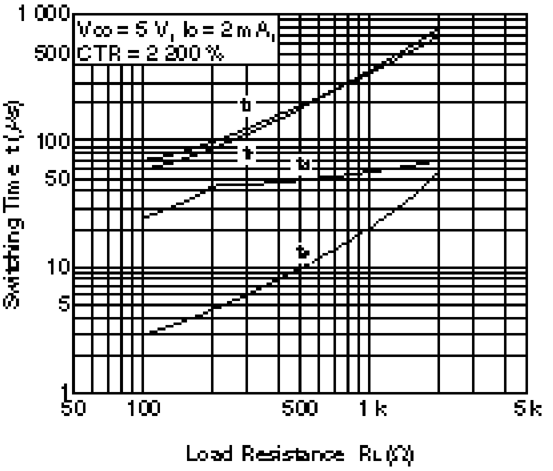
NORMALIZED CURRENT TRANSFER
RATIO vs. AMBIENT TEMPERATURE



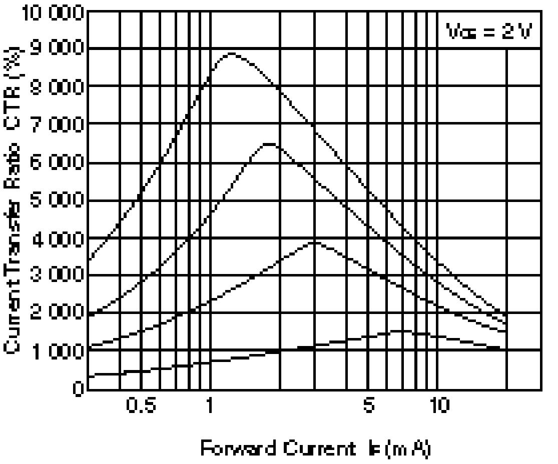
CURRENT TRANSFER RATIO vs.
FORWARD CURRENT



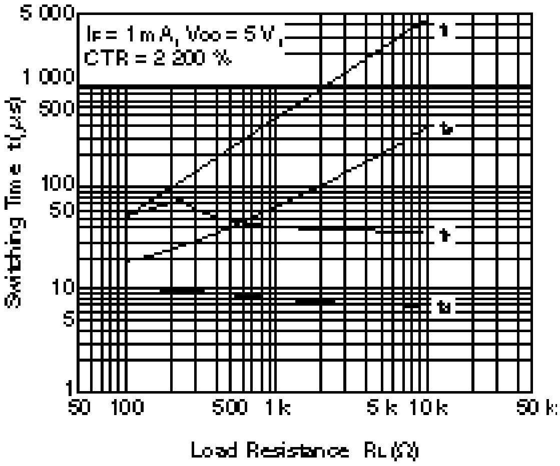
SWITCHING TIME vs.
LOAD RESISTANCE



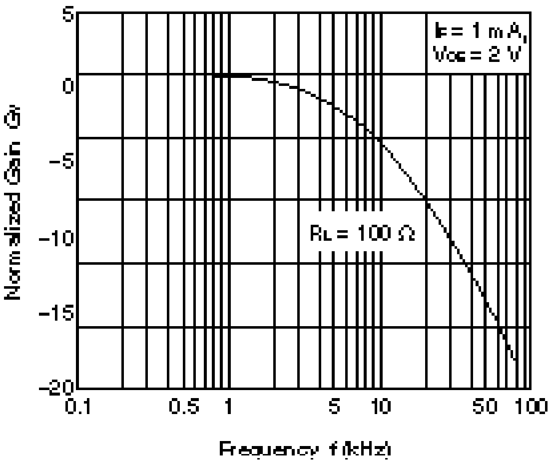
CURRENT TRANSFER RATIO vs.
FORWARD CURRENT



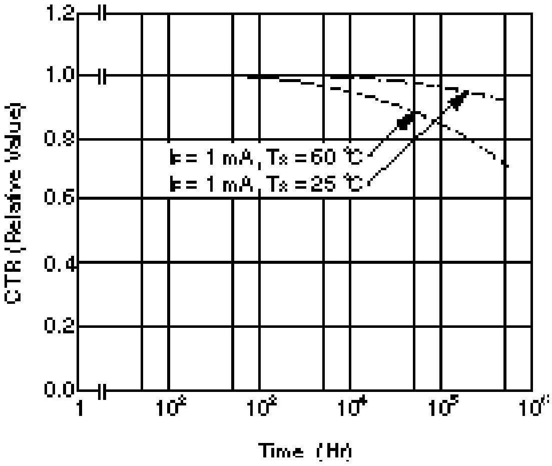
SWITCHING TIME vs.
LOAD RESISTANCE



Remark The graphs indicate nominal characteristics.



FREQUENCY RESPONSE

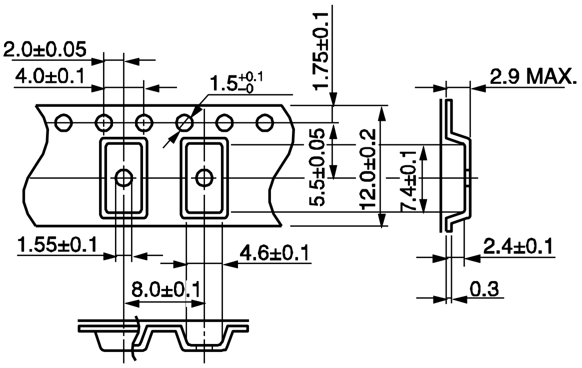


LONG TERM CTR DEGRADATION

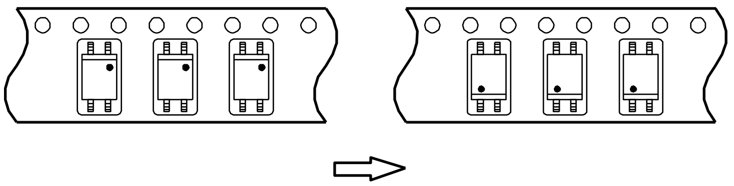
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)

Outline and Dimensions (Tape)

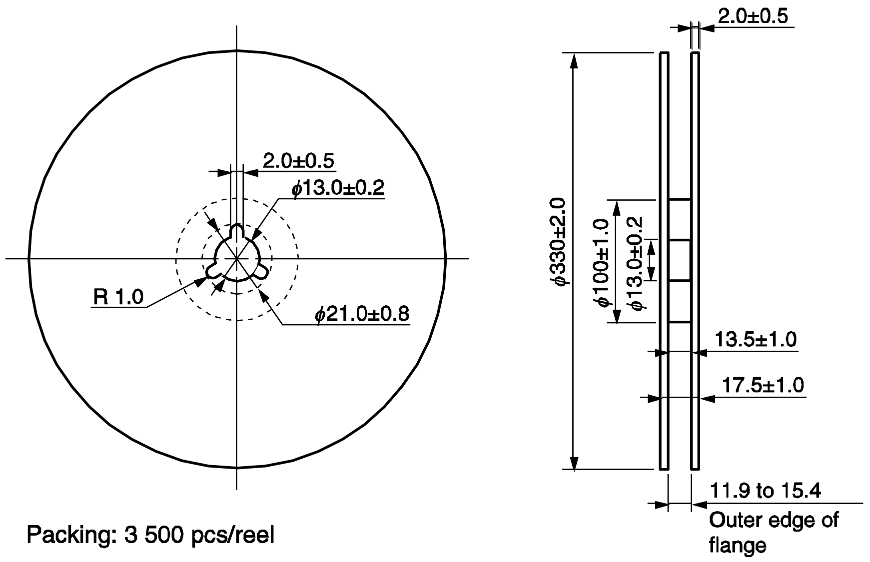


Tape Direciton


PS2706-1-F3

PS2706-1-F4

Outline and Dimensions (Reel)



Packing: 3 500 pcs/reel

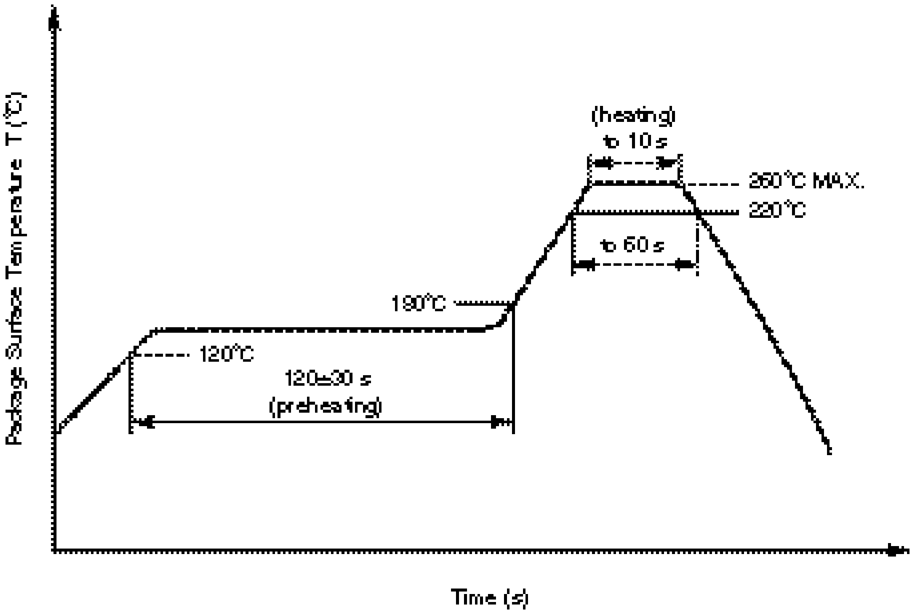
NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

• Peak reflow temperature	260°C or below (package surface temperature)
• Time of peak reflow temperature	10 seconds or less
• Time of temperature higher than 220°C	60 seconds or less
• Time to preheat temperature from 120 to 180°C	120±30 s
• 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) Wave soldering

• Temperature	260°C or below (molten solder temperature)
• Time	10 seconds or less
• Preheating conditions	120°C or below (package surface temperature)
• Number of times	One (Allowed to be dipped in solder including plastic mold portion.)
• Flux	Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

★ **(3) Soldering by soldering iron**

• Peak temperature (lead part temperature)	350°C or below
• Time (each pins)	3 seconds or less
• Flux	Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead.

(b) Please be sure that the temperature of the package would not be heated over 100°C.

(4) Cautions

- Fluxes

  Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

2. Cautions regarding noise

Be aware that when voltage is applied suddenly between the photocoupler’s input and output or between collector-emitters at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

★ 3. Measurement conditions of current transfer ratios (CTR), which differ according to photocoupler

Check the setting values before use, since the forward current conditions at CTR measurement differ according to product.

When using products other than at the specified forward current, the characteristics curves may differ from the standard curves due to CTR value variations or the like. Therefore, check the characteristics under the actual operating conditions and thoroughly take variations or the like into consideration before use.

USAGE CAUTIONS

1. Protect against static electricity when handling.
2. Avoid storage at a high temperature and high humidity.

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

Parameter	Symbol	Speck	Unit
Application classification (DIN VDE 0109)			
for rated line voltages ≤ 300 Vr.m.s.		IV	
for rated line voltages ≤ 600 Vr.m.s.		III	
Climatic test class (DIN IEC 68 Teil 1/09.80)		55/100/21	
Dielectric strength			
maximum operating isolation voltage	U_{IORM}	710	V_{peak}
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_{pr}	850	V_{peak}
Test voltage (partial discharge test, procedure b for all devices 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	Ris MIN.	10^{12}	Ω
V_{IO} = 500 V dc at T_A MAX. at least 100 °C	Ris MIN.	10^{11}	Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)			
Package temperature	Tsi	150	°C
Current (input current I_F, Psi = 0)	Isi	200	mA
Power (output or total power dissipation)	Psi	300	mW
Isolation resistance			
V_{IO} = 500 V dc at T_A = 175 °C (Tsi)	Ris MIN.	10^9	Ω

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M8E 00. 4-0110

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▶For further information, please contact

NEC Compound Semiconductor Devices, Ltd. **http://www.ncsd.necel.com/**
E-mail: salesinfo@ml.ncsd.necel.com (sales and general)
techinfo@ml.ncsd.necel.com (technical)
Sales Division TEL: +81-44-435-1573 FAX: +81-44-435-1579

NEC Compound Semiconductor Devices Hong Kong Limited
E-mail: ncsd-hk@elhk.nec.com.hk (sales, technical and general)

Hong Kong Head Office	TEL: +852-3107-7303	FAX: +852-3107-7309
Taipei Branch Office	TEL: +886-2-8712-0478	FAX: +886-2-2545-3859
Korea Branch Office	TEL: +82-2-558-2120	FAX: +82-2-558-5209

NEC Electronics (Europe) GmbH **http://www.ee.nec.de/**
TEL: +49-211-6503-0 FAX: +49-211-6503-1327

California Eastern Laboratories, Inc. **http://www.cel.com/**
TEL: +1-408-988-3500 FAX: +1-408-988-0279

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ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный
+7 495 668 12 70
info@moschip.ru

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9