PHOTOCOUPLER
PS2703-1

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

–NEPOC Series–

DESCRIPTION

The PS2703-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon phototransistor.

This 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 Vr.m.s.)
- High collector to emitter voltage (V_{CEO} = 120 V)
- SOP (Small Outline Package) type
- Each isolated channel per package
- High-speed switching (t_r, t_f = 10 μs TYP.)
- Taping product number: PS2703-1-F3, 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)

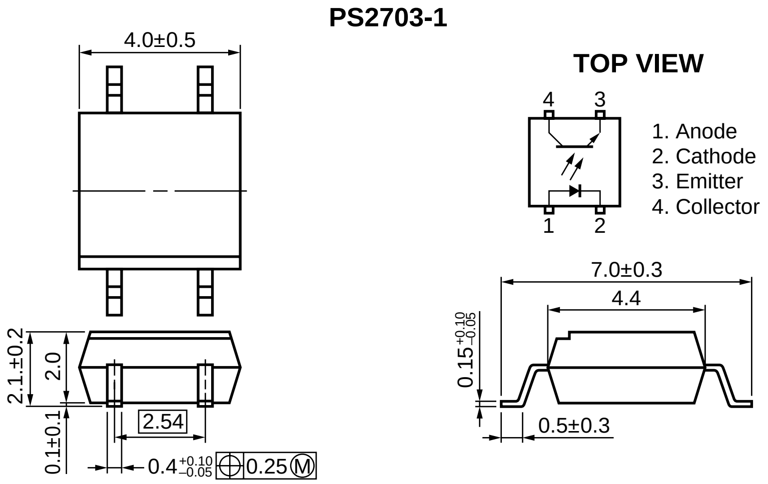
APPLICATIONS

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

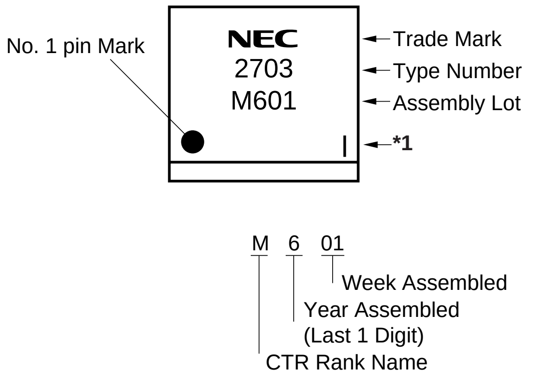
Document No. PN10242EJ02V0DS (2nd edition)
Date Published March 2006 CP(K)

The mark ★ shows major revised points.

PACKAGE DIMENSIONS (in millimeters)



★ MARKING EXAMPLE



***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]
PS2703-1	PS2703-1-A	Pb-Free	Magazine case 100 pcs	Standard products (UL, BSI, CSA approved)	PS2703-1
PS2703-1-F3	PS2703-1-F3-A		Embossed Tape 3 500 pcs/reel		
PS2703-1-F4	PS2703-1-F4-A				
PS2703-1-V	PS2703-1-V-A		Magazine case 100 pcs	DIN EN60747-5-2 (VDE0884 Part2) Approved (Option)	
PS2703-1-V-F3	PS2703-1-V-F3-A		Embossed Tape 3 500 pcs/reel		
PS2703-1-V-F4	PS2703-1-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
	Reverse Voltage	V_R	6	V
	Power Dissipation Derating	$\Delta P_D/°C$	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}	120	V
	Emitter to Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	30	mA
	Power Dissipation Derating	$\Delta P_C/°C$	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.

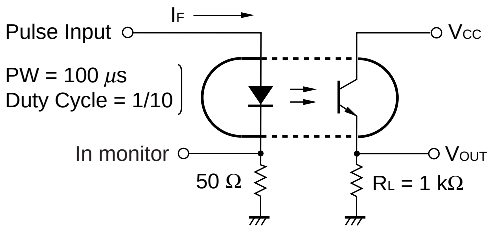
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 5 mA		1.1	1.4	V
	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 Dark 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

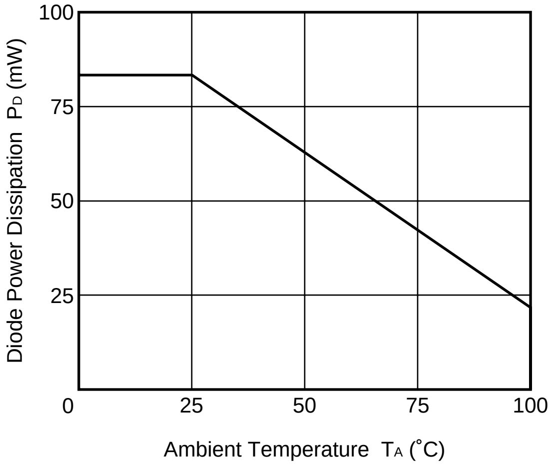
CTR rank	CTR (%)	Conditions
K	200 to 400	I_F = 5 mA, V_{CE} = 5 V
	80 to	I_F = 1 mA, V_{CE} = 5 V
L	100 to 300	I_F = 5 mA, V_{CE} = 5 V
	25 to	I_F = 1 mA, V_{CE} = 5 V
M	50 to 150	I_F = 5 mA, V_{CE} = 5 V
	10 to	I_F = 1 mA, V_{CE} = 5 V

***2** Test circuit for switching time

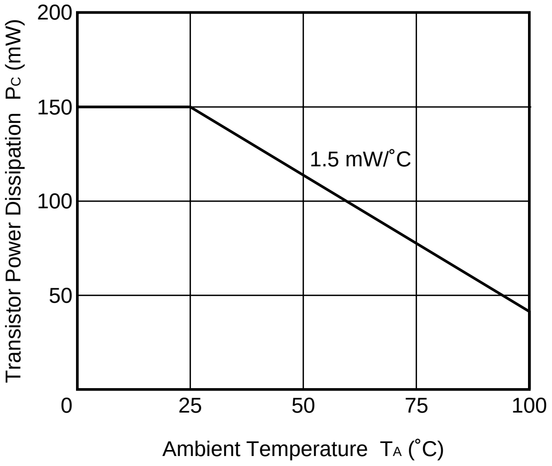


TYPICAL CHARACTERISTICS (TA = 25°C, unless otherwise specified)

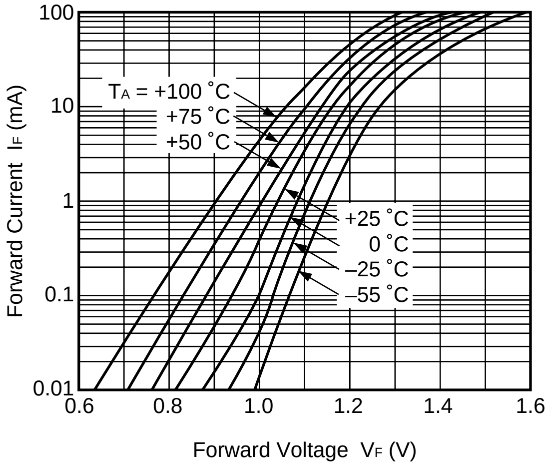
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



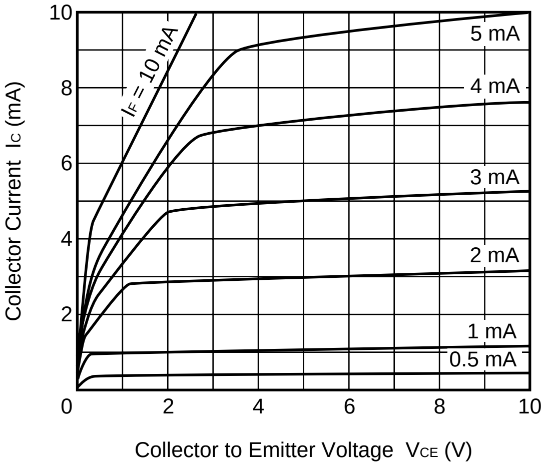
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



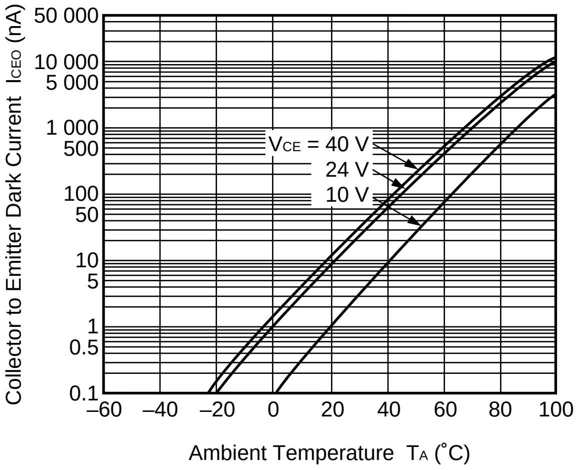
FORWARD CURRENT vs. FORWARD VOLTAGE



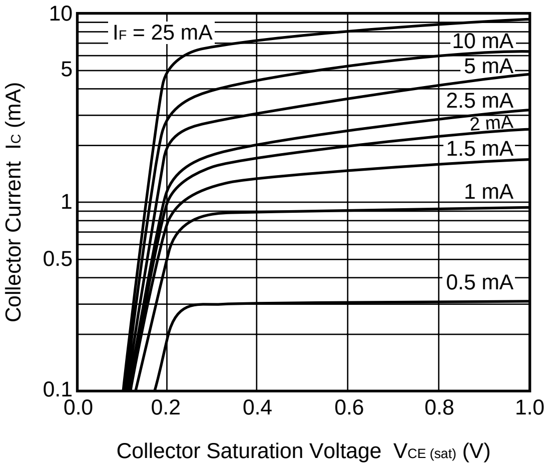
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

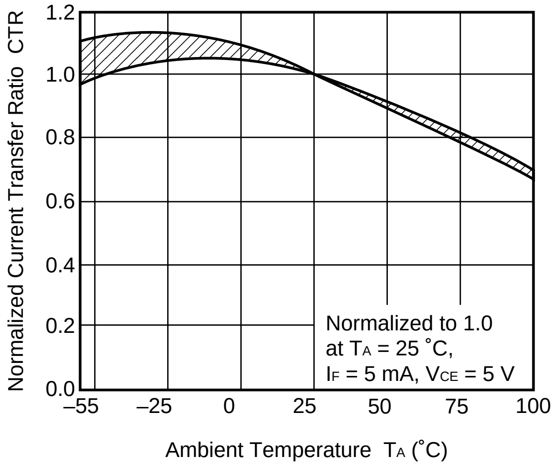


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

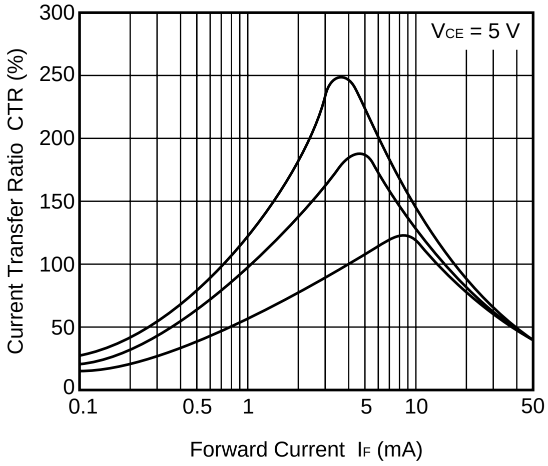


Remark The graphs indicate nominal characteristics.

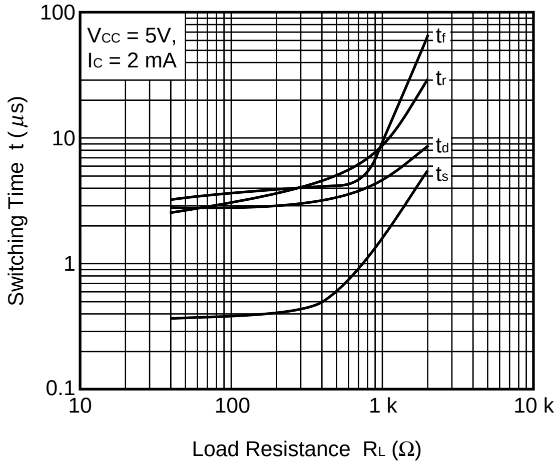
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



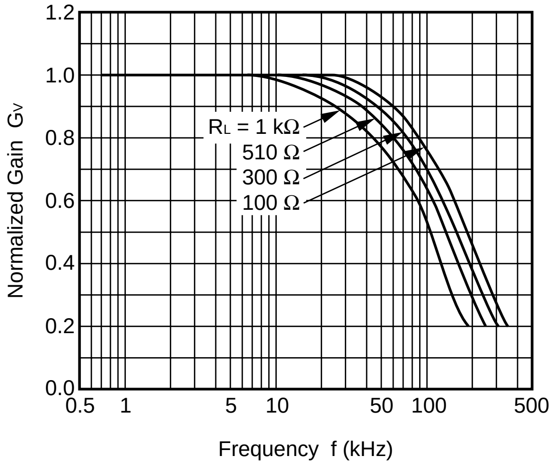
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



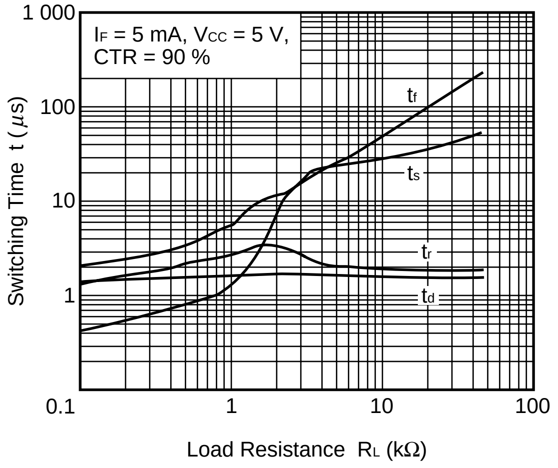
SWITCHING TIME vs. LOAD RESISTANCE



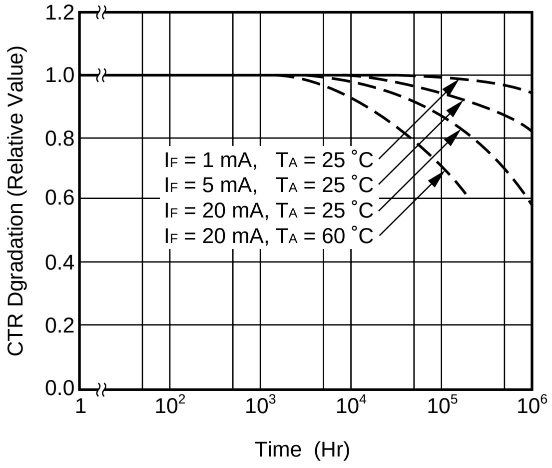
FREQUENCY RESPONSE



SWITCHING TIME vs. LOAD RESISTANCE



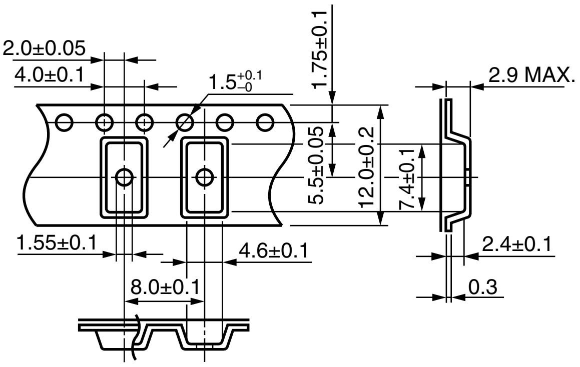
LONG TIME CTR DEGRADATION



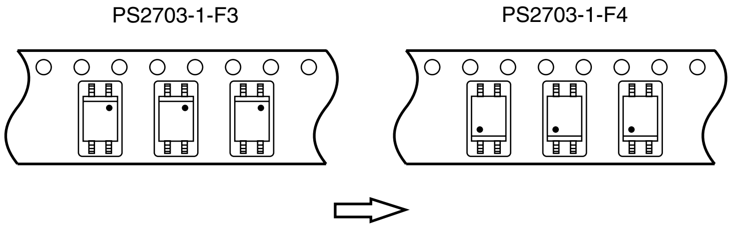
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)

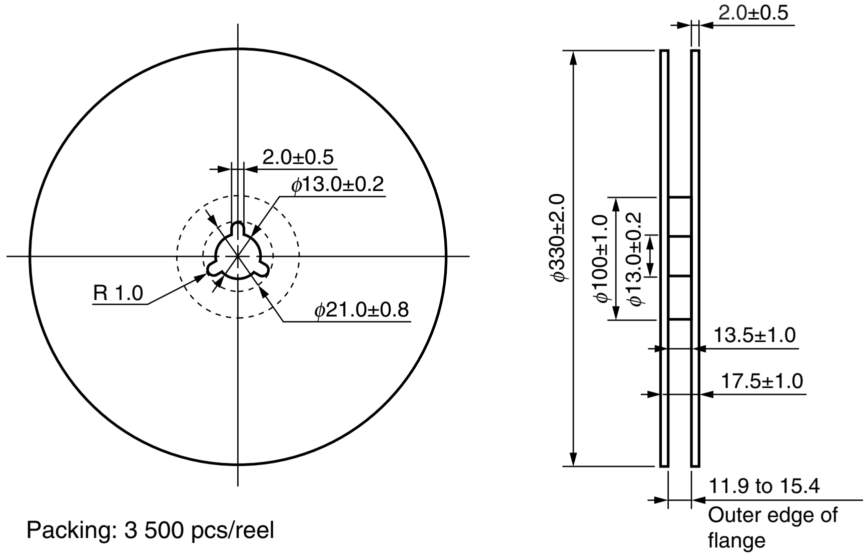
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 3 500 pcs/reel

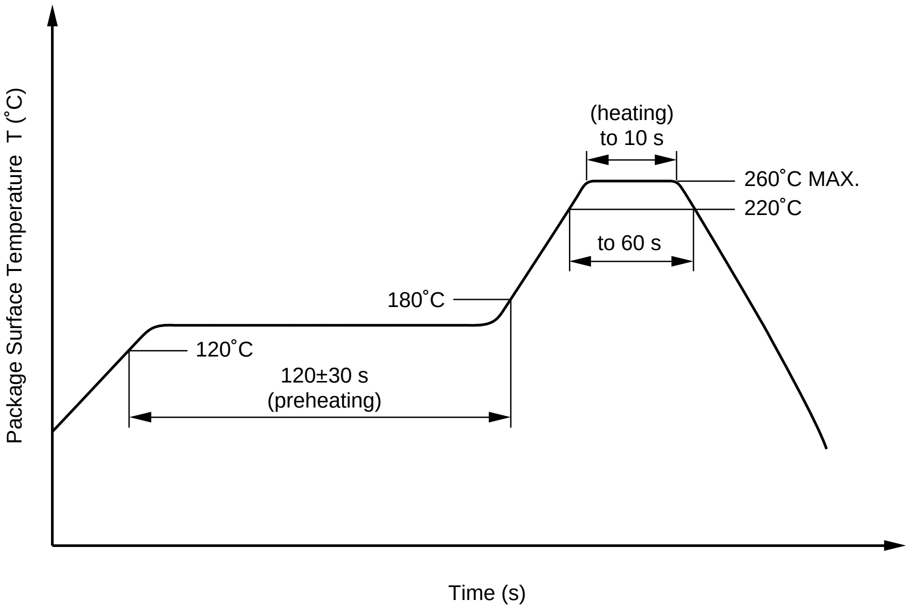
NOTES ON HANDLING

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.			
Test voltage (partial discharge test procedure a for type test and random test)	U_{IORM}	710	V_{peak}
$U_{pr} = 1.2 \times U_{IORM}$, $P_d < 5$ 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

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0504

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