

**HIGH COLLECTOR TO EMITTER VOLTAGE
HIGH ISOLATION VOLTAGE
MULTI PHOTOCOUPLER SERIES**

–NEPOC Series–

DESCRIPTION

The PS2533-1, -2, -4 and PS2533L-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington connected phototransistor.

The PS2533-1, -2, -4 are in a plastic DIP (Dual In-line Package) and the PS2533L-1, -2, -4 are lead bending type (Gull-wing) for surface mount.

FEATURES

- High collector to emitter voltage ($V_{CEO} = 350\text{ V}$)
- High Isolation voltage ($BV = 5\,000\text{ V r.m.s.}$)
- High current transfer ratio ($CTR = 4\,000\% \text{ TYP.}$)
- High-speed switching ($t_r, t_f = 100\text{ }\mu\text{s TYP.}$)
- Ordering number of tape product: PS2533L-1-E3, E4, F3, F4, PS2533L-2-E3, E4
- Safety standards
 - UL approved: File No. E72422 (S)
 - BSI approved: No. 8221/8222
 - CSA approved: No. CA 101391
 - NEMKO approved: No. P98101708
 - SEMKO approved: No. 9824187/01-02
 - DEMKO approved: No. 307863
 - FIMKO approved: No. F1 11397
 - VDE0884 approved (Option)

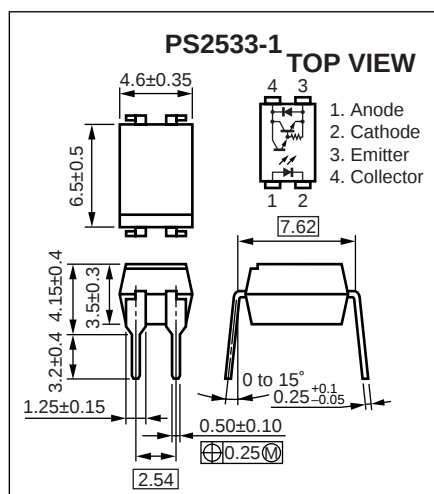
APPLICATIONS

- Telephone, Exchange equipment
- FAX/MODEM

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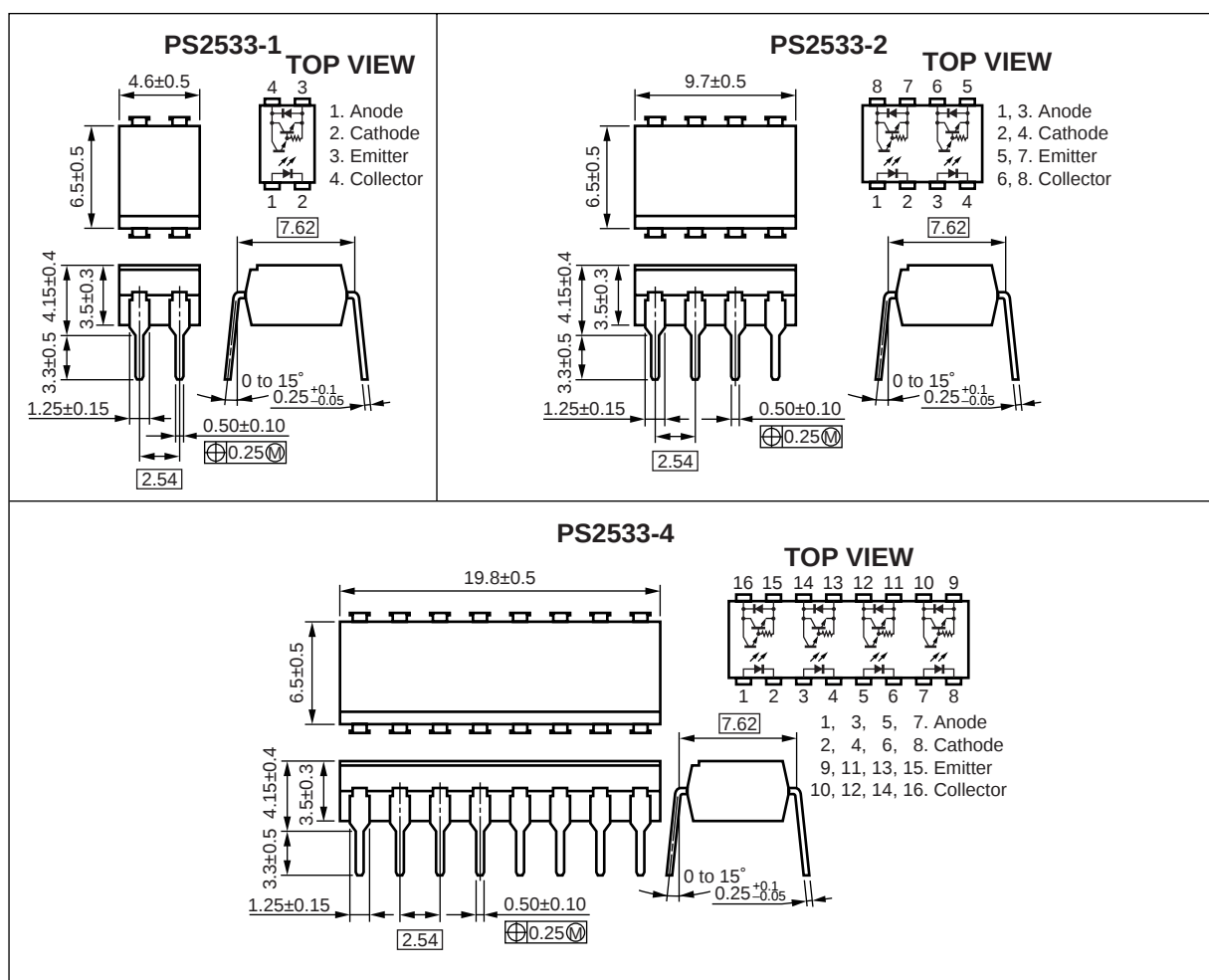
★ PACKAGE DIMENSIONS (Unit : mm)

DIP Type (New package)

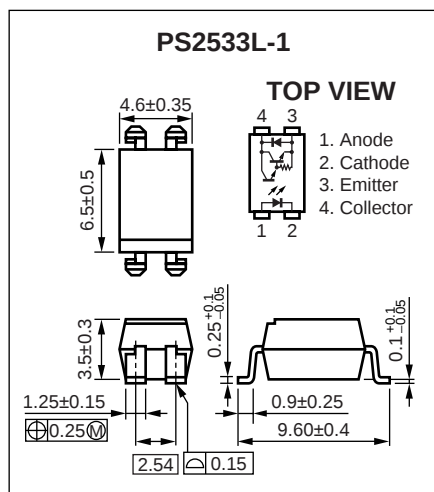


Caution New package 1-ch only

DIP Type

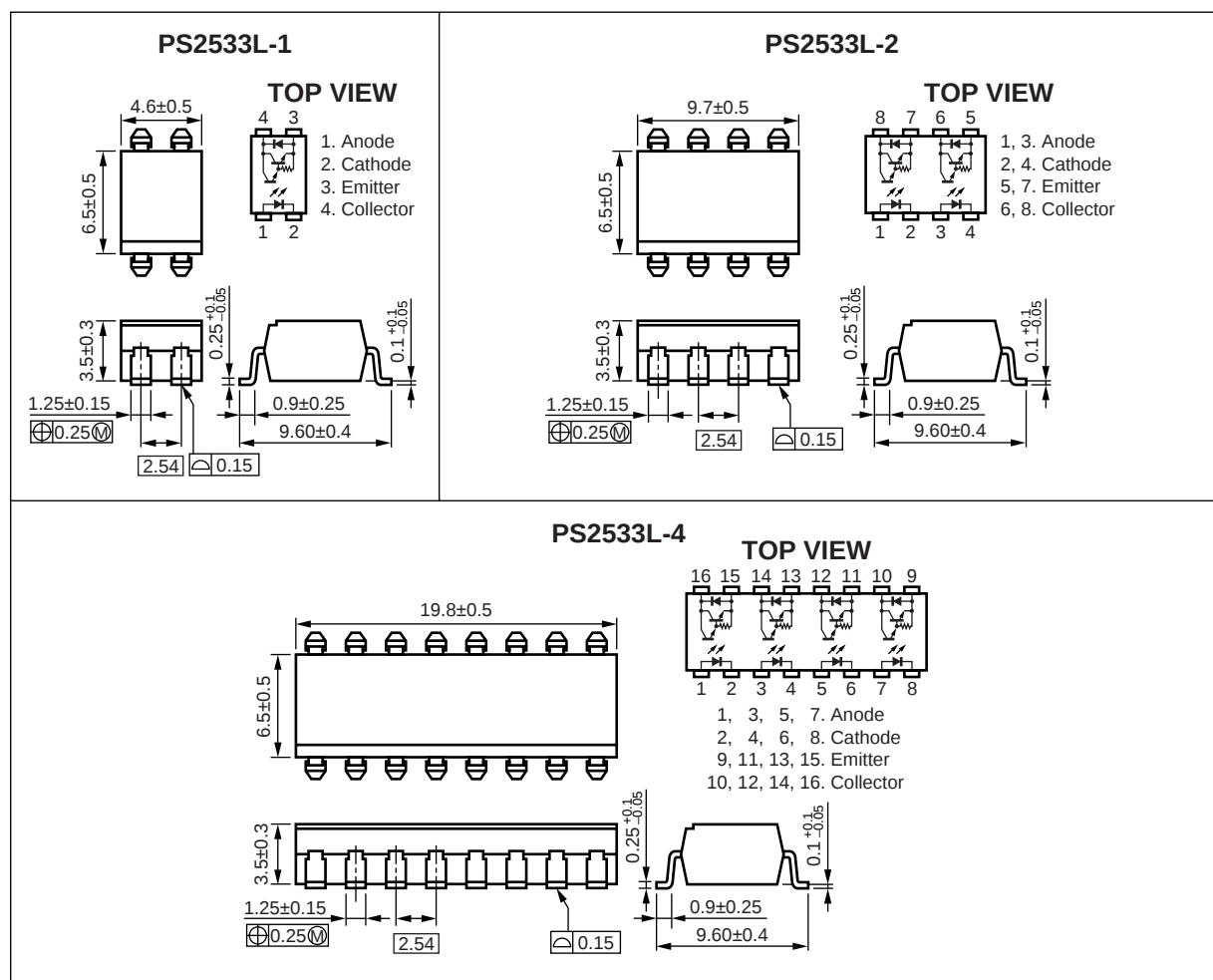


Lead Bending Type (New package)

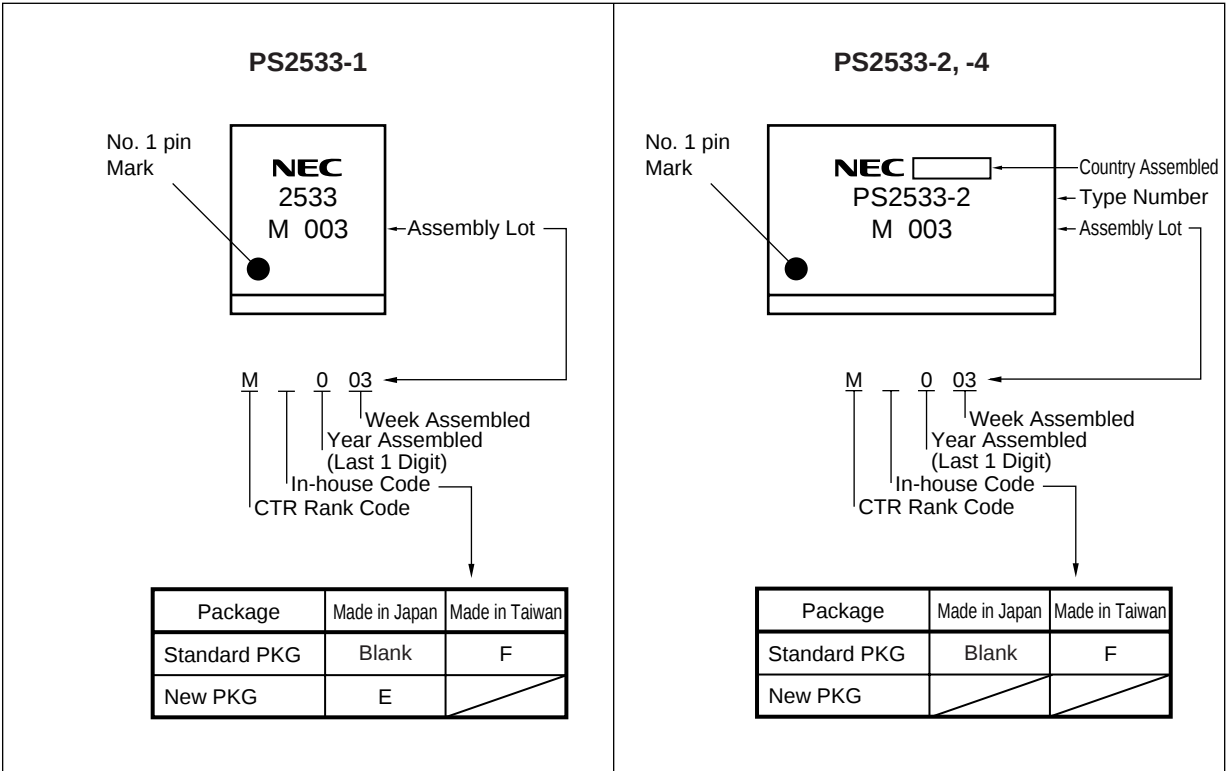


Caution New package 1-ch only

Lead Bending Type



MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Package	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS2533-1	4-pin DIP	Magazine case 100 pcs	Standard products (UL, CSA, BSI, NEMKO, SEMKO, DEMKO, FIMKO approved)	PS2533-1
PS2533L-1				
PS2533L-1-E3		Embossed Tape 1 000 pcs/reel		
PS2533L-1-E4				
PS2533L-1-F3		Embossed Tape 2 000 pcs/reel		
PS2533L-1-F4				
PS2533-2	8-pin DIP	Magazine case 45 pcs		PS2533-2
PS2533L-2				
PS2533L-2-E3		Embossed Tape 1 000 pcs/reel		
PS2533L-2-E4				
PS2533-4	16-pin DIP	Magazine case 20 pcs		PS2533-4
PS2533L-4				
PS2533-1-V	4-pin DIP	Magazine case 100 pcs	VDE0884 approved products (Option)	PS2533-1
PS2533L-1-V				
PS2533L-1-V-E3		Embossed Tape 1 000 pcs/reel		
PS2533L-1-V-E4				
PS2533L-1-V-F3		Embossed Tape 2 000 pcs/reel		
PS2533L-1-V-F4				
PS2533L-2-V	8-pin DIP	Magazine case 45 pcs		PS2533-2
PS2533L-2-V				
PS2533L-2-V-E3		Embossed Tape 1 000 pcs/reel		
PS2533L-2-V-E4				
PS2533-4-V	16-pin DIP	Magazine case 20 pcs		PS2533-4
PS2533L-4-V				

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

ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

Parameter		Symbol	Ratings		Unit
			PS2533-1, PS2533L-1	PS2533-2, -4, PS2533L-2, -4	
Diode	Forward Current (DC)	I_F	80		mA
	Reverse Voltage	V_R	6		V
	Power Dissipation Derating	$\Delta P_D/^{\circ}\text{C}$	1.5	1.2	mW/ $^{\circ}\text{C}$
	Power Dissipation	P_D	150	120	mW/ch
	Peak Forward Current ^{*1}	I_{FP}	1		A
Transistor	Collector to Emitter Voltage	V_{CEO}	350		V
	Emitter to Collector Voltage	V_{ECO}	0.6		V
	Collector Current	I_C	150		mA/ch
	Power Dissipation Derating	$\Delta P_C/^{\circ}\text{C}$	3.0	2.4	mW/ $^{\circ}\text{C}$
	Power Dissipation	P_C	300	240	mW/ch
Isolation Voltage ^{*2}		BV	5 000		Vr.m.s.
Operating Ambient Temperature		T_A	-55 to +100		$^{\circ}\text{C}$
Storage Temperature		T_{stg}	-55 to +150		$^{\circ}\text{C}$

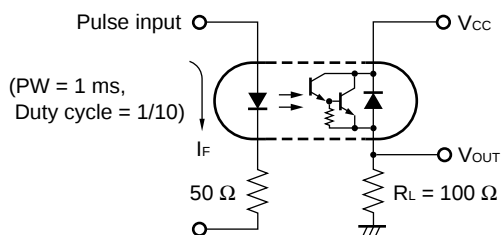
***1** PW = 100 μs , Duty Cycle = 1 %

***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 °C)

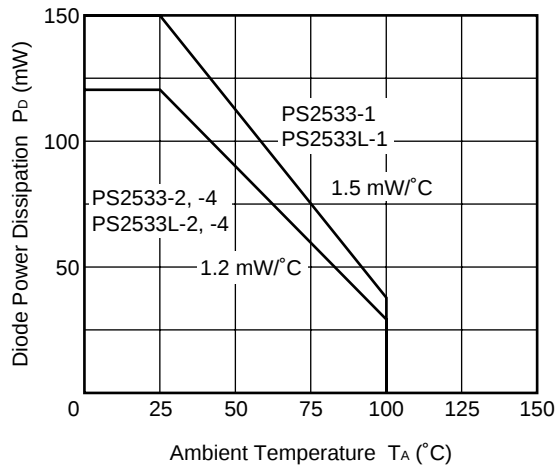
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 10 mA		1.15	1.40	V
	Reverse Current	I _R	V _R = 5 V			5	μA
	Terminal Capacitance	C _t	V = 0 V, f = 1.0 MHz		30		pF
Transistor	Collector to Emitter Dark Current	I _{CEO}	V _{CE} = 350 V, I _F = 0 mA			400	nA
Coupled	Current Transfer Ratio (I _C /I _F)	CTR	I _F = 1 mA, V _{CE} = 2 V	1 500	4 000	6 500	%
	Collector Saturation Voltage	V _{CE(sat)}	I _F = 1 mA, I _C = 2 mA			1.0	V
	Isolation Resistance	R _{I-O}	V _{I-O} = 1.0 kV _{DC}	10 ¹¹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1.0 MHz		0.6		pF
	Rise Time ^{*1}	t _r	V _{CC} = 5 V, I _C = 10 mA, R _L = 100 Ω		100		μs
	Fall Time ^{*1}	t _f			100		

*1 Test circuit for switching time

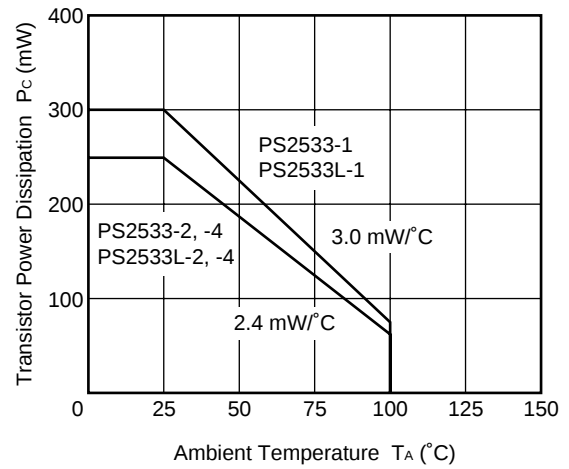


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

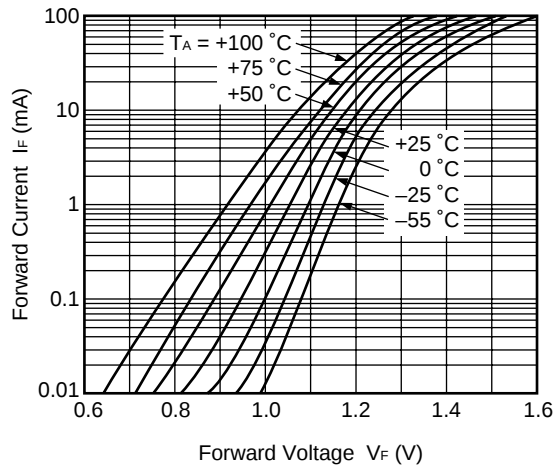
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



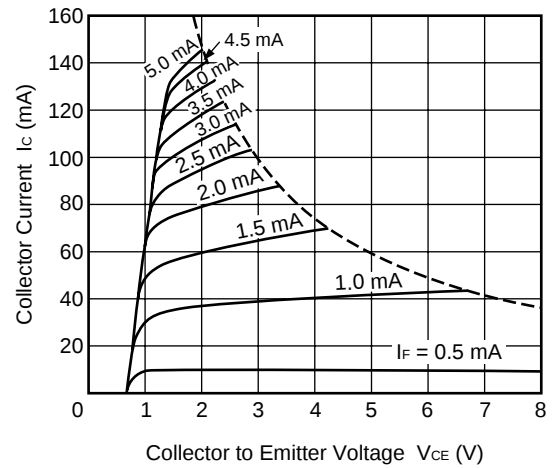
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



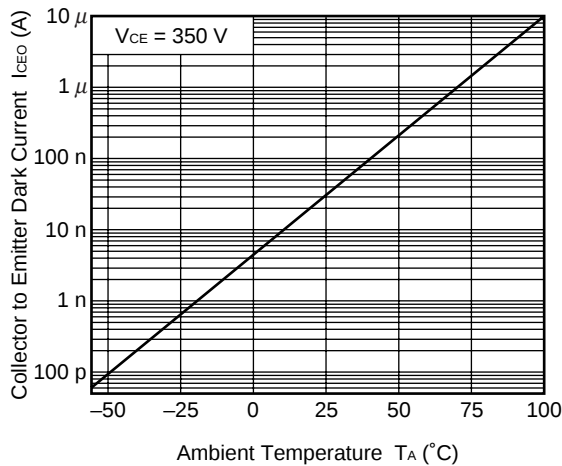
FORWARD CURRENT vs. FORWARD VOLTAGE



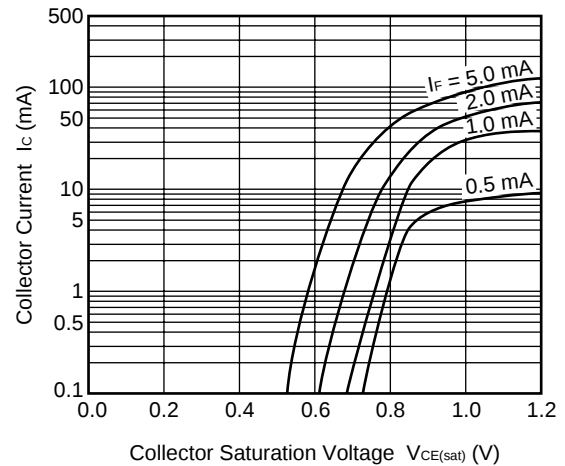
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



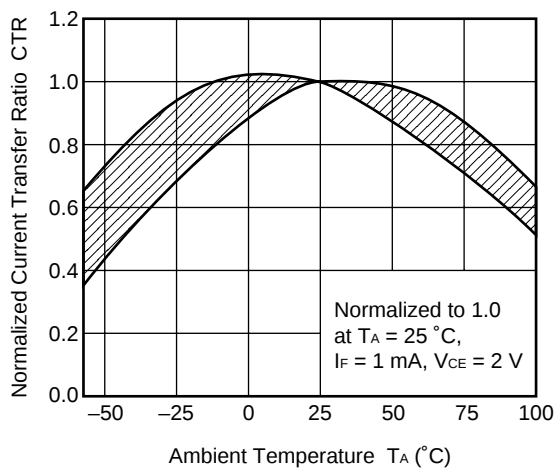
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



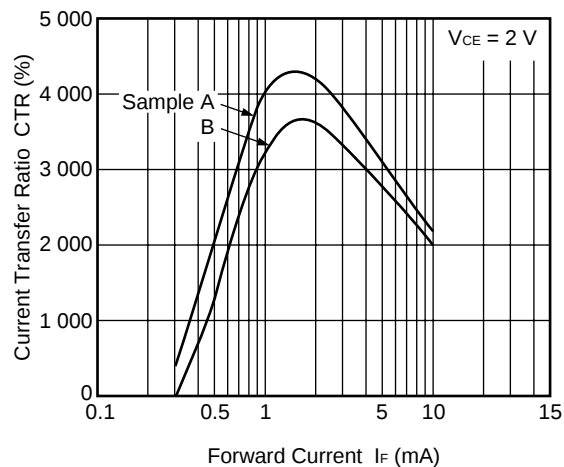
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



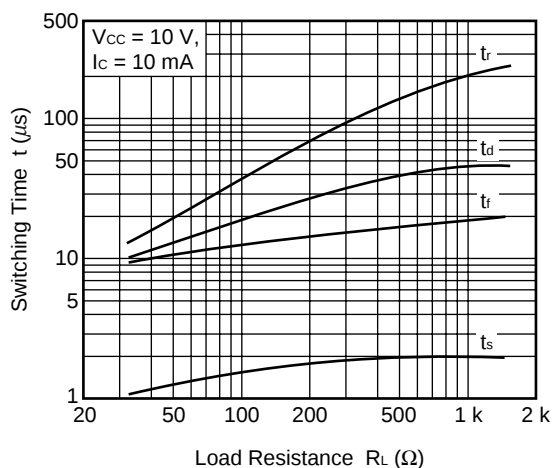
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



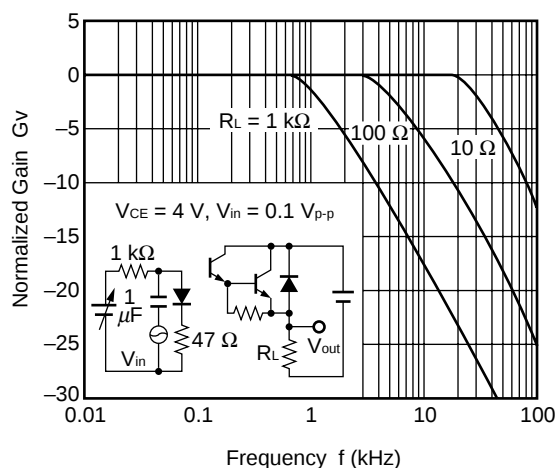
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



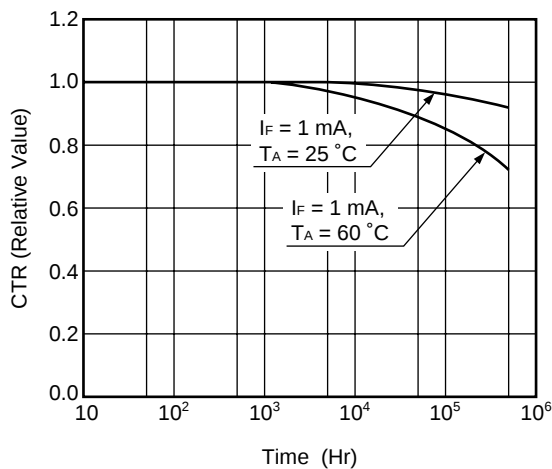
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



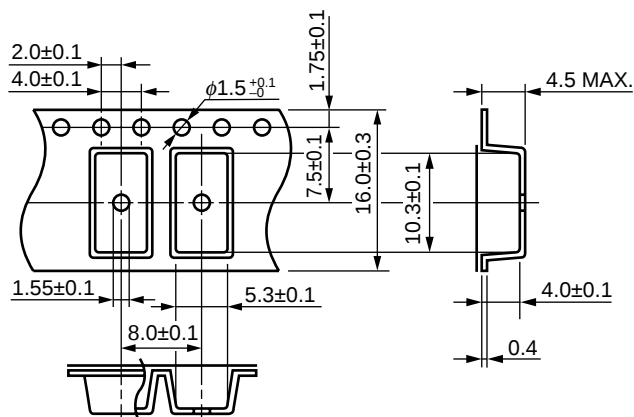
LONG TERM CTR DEGRADATION



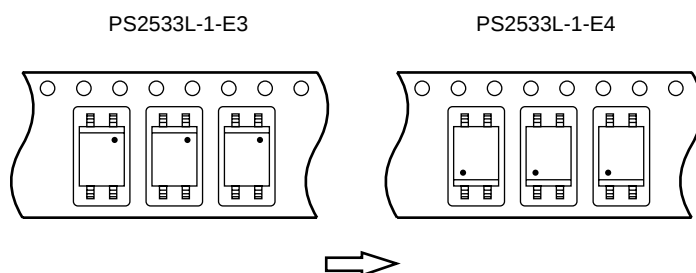
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (Unit : mm)

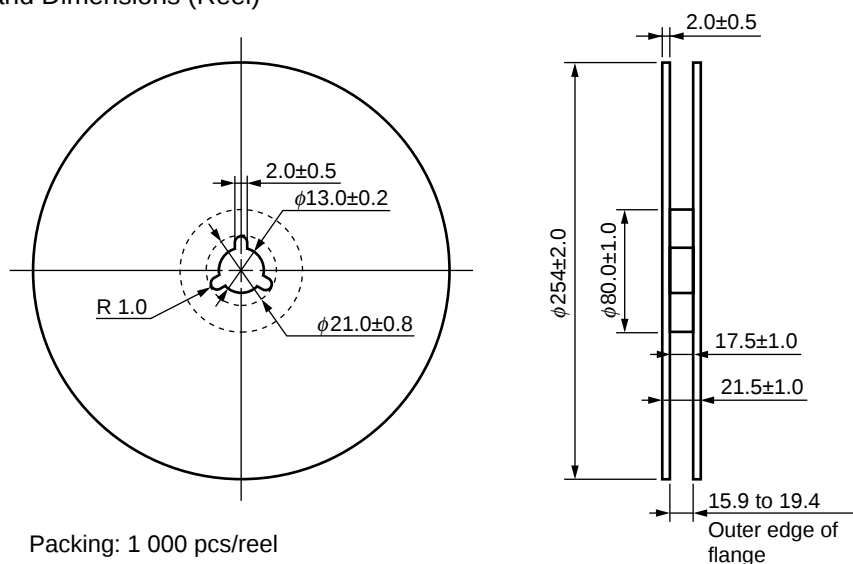
Outline and Dimensions (Tape)



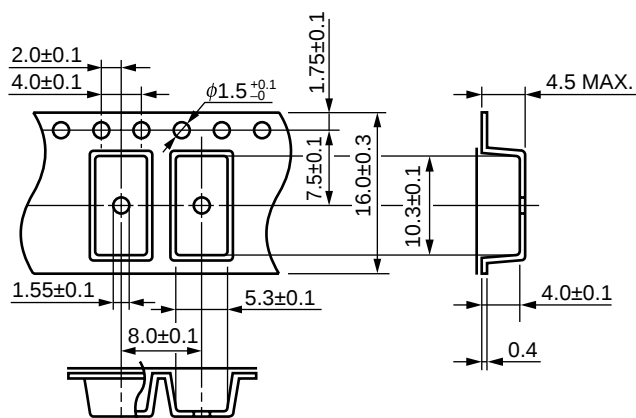
Tape Direction



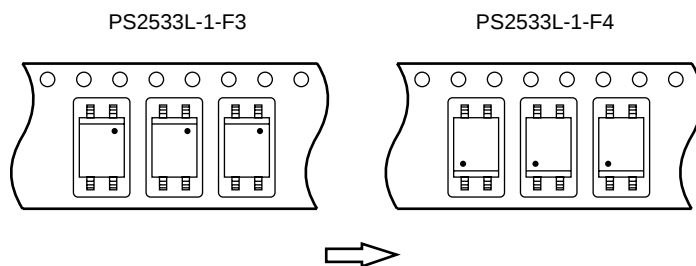
Outline and Dimensions (Reel)



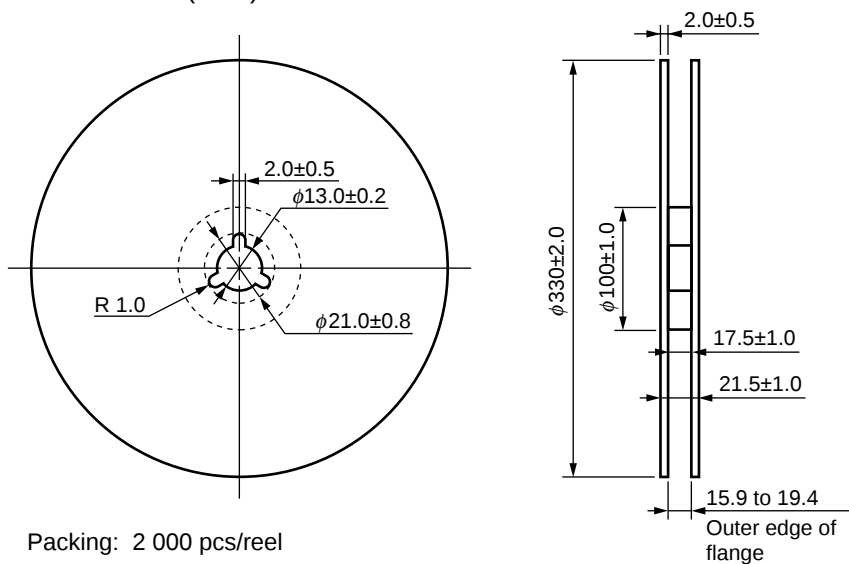
Outline and Dimensions (Tape)



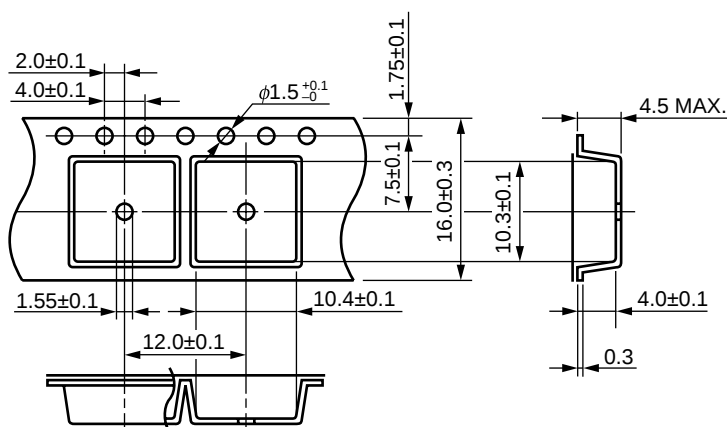
Tape Direction



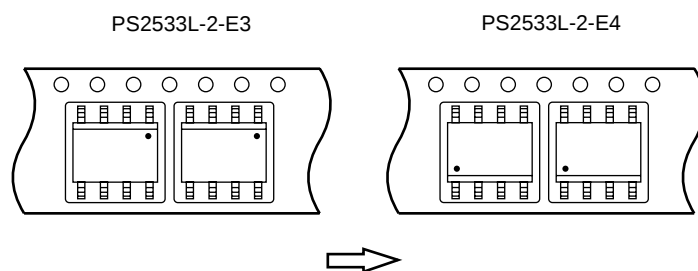
Outline and Dimensions (Reel)



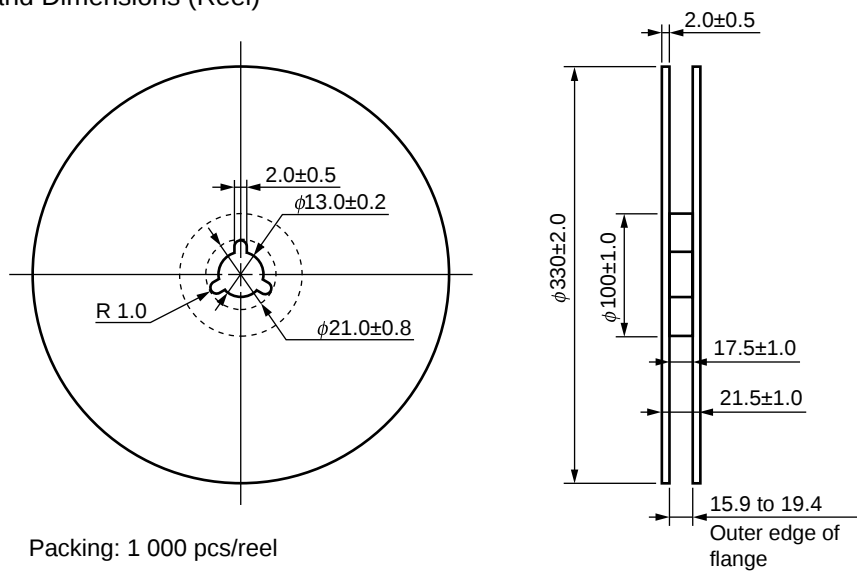
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



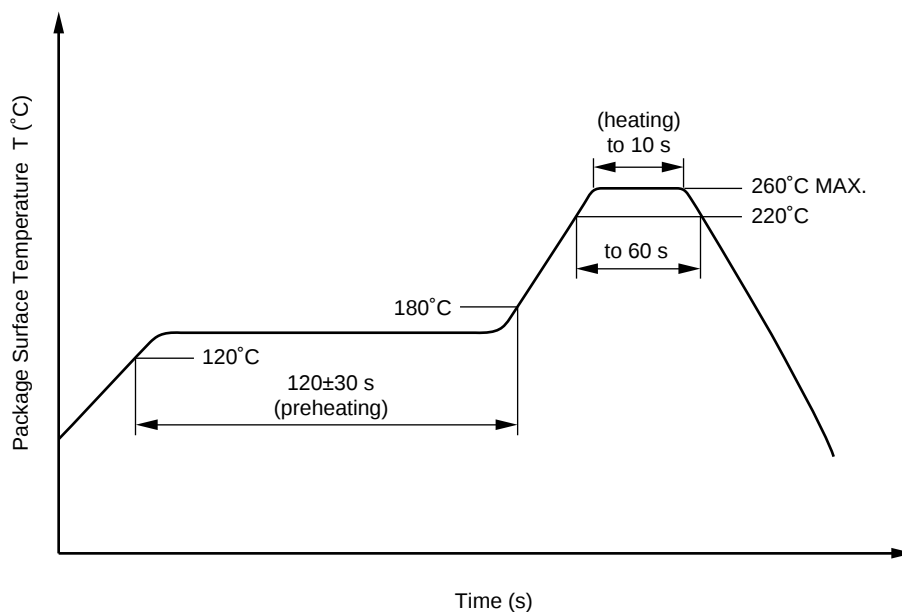
★ NOTES ON HANDLING

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) 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 side may enter the on state, even if the voltage is within the absolute maximum ratings.

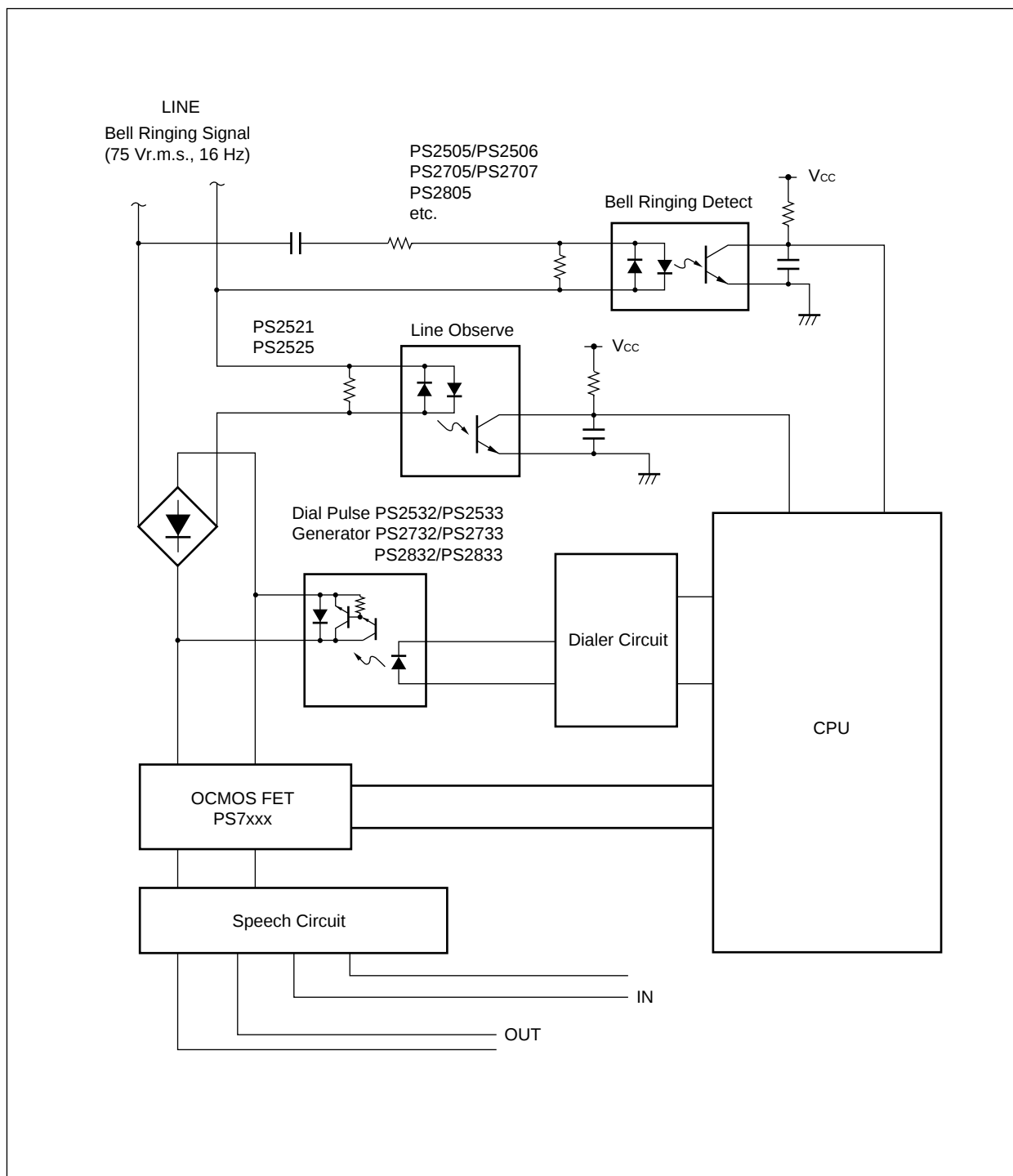
★ USAGE CAUTIONS

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. 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}	890 1 068	V_{peak} 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}	1 424	V_{peak}
Highest permissible overvoltage	U_{TR}	6 000	V_{peak}
Degree of pollution (DIN VDE 0109)		2	
Clearance distance		> 7.0	mm
Creepage distance		> 7.0	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	R_{is} MIN. R_{is} 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} R_{is} MIN.	175 400 700 10^9	°C mA mW Ω

APPLICATION FOR TELEPHONE (EXAMPLE)



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M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT

Caution	GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.
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► For further information, please contact

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