

**HIGH SPEED ANALOG OUTPUT TYPE
8-PIN PHOTOCOUPLER**

-NEPOC™ Series-

DESCRIPTION

The PS8601 and PS8601L are 8-pin high speed photocouplers containing a GaAlAs LED on input side and a P-N photodiode and a high speed amplifier transistor on output side on one chip. The PS8601 is in a plastic DIP (Dual In-line Package). The PS8601L is lead bending type (Gull wing) for surface mount.

★ FEATURES

- High supply voltage (V_{CC} = 35 V MAX.)
- High speed response (t_{PHL}, t_{PLH} = 0.8 μs MAX.)
- High isolation voltage (BV = 5 000 V_{r.m.s.})
- TTL, CMOS compatible with a resistor
- For Infrared reflow soldering
- Ordering number of tape product: PS8601L-E3, E4: 1 000 pcs/reel
- Safety standards
 - UL approved: File No. E72422 (S)
 - BSI approved: No. 8004
 - VDE0884 approved (Option) No.91877

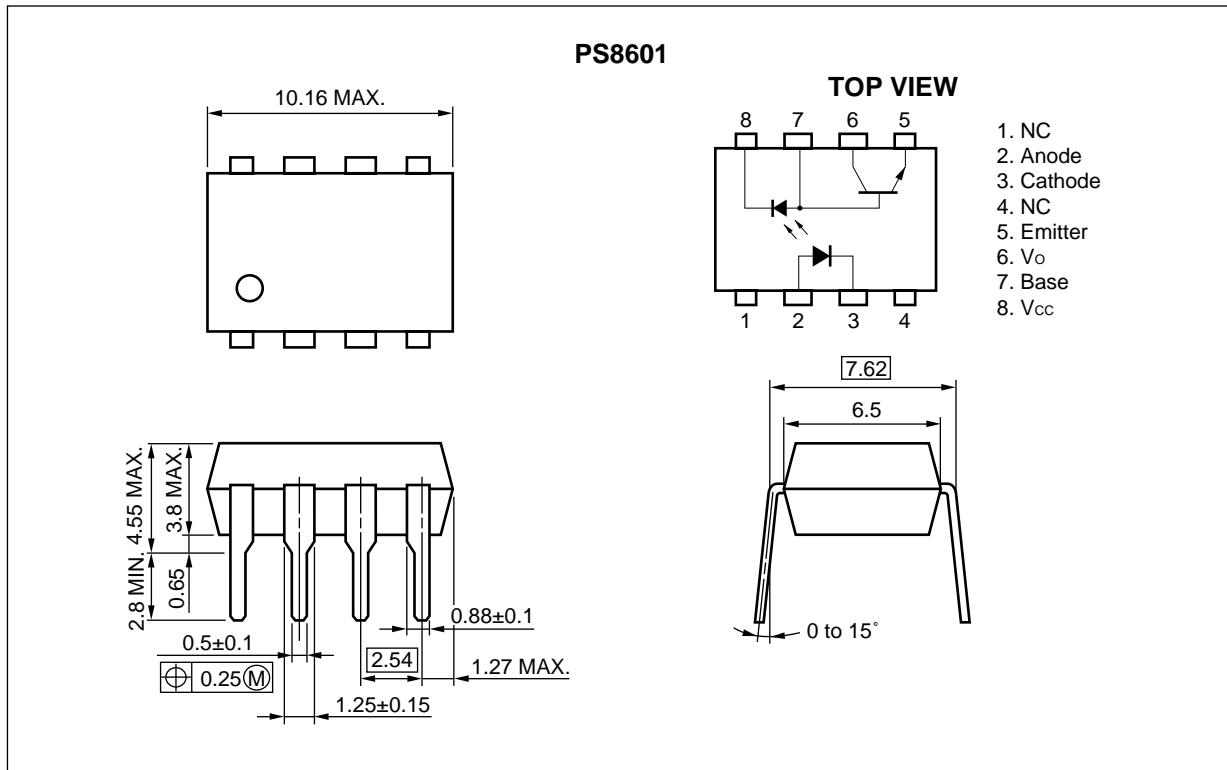
★ APPLICATIONS

- Interface for measurement or control equipment
- Substitutions for relays and pulse transformers

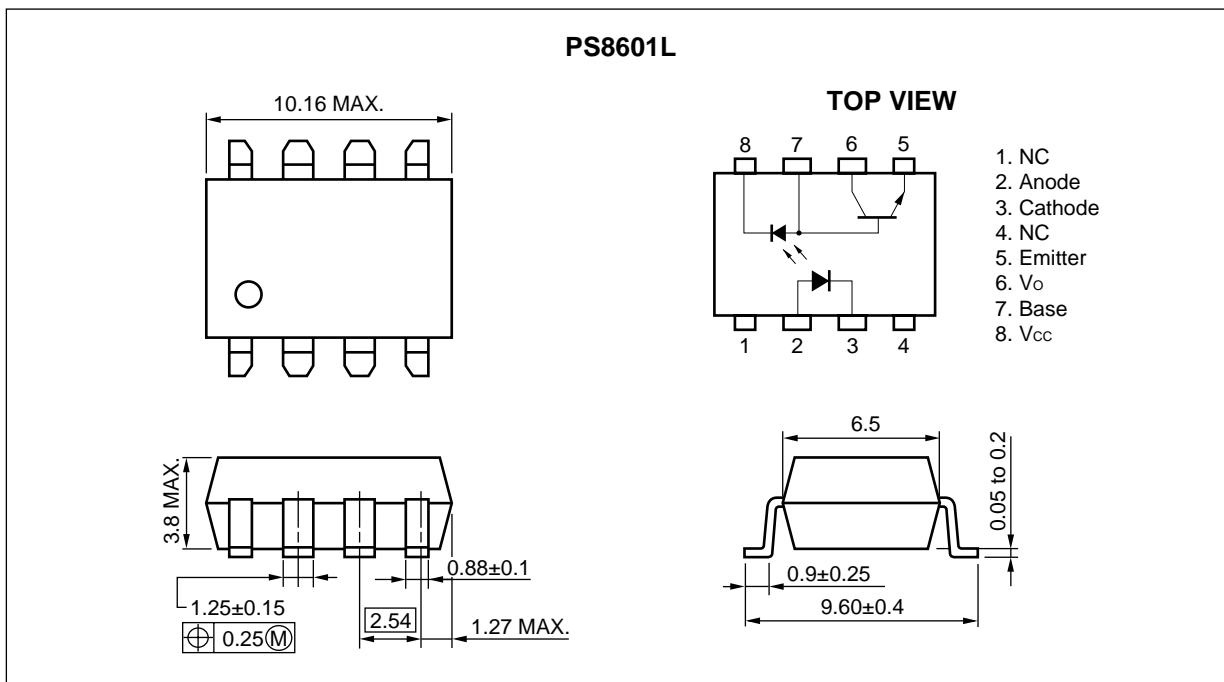
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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

★ PACKAGE DIMENSIONS (UNIT: mm)

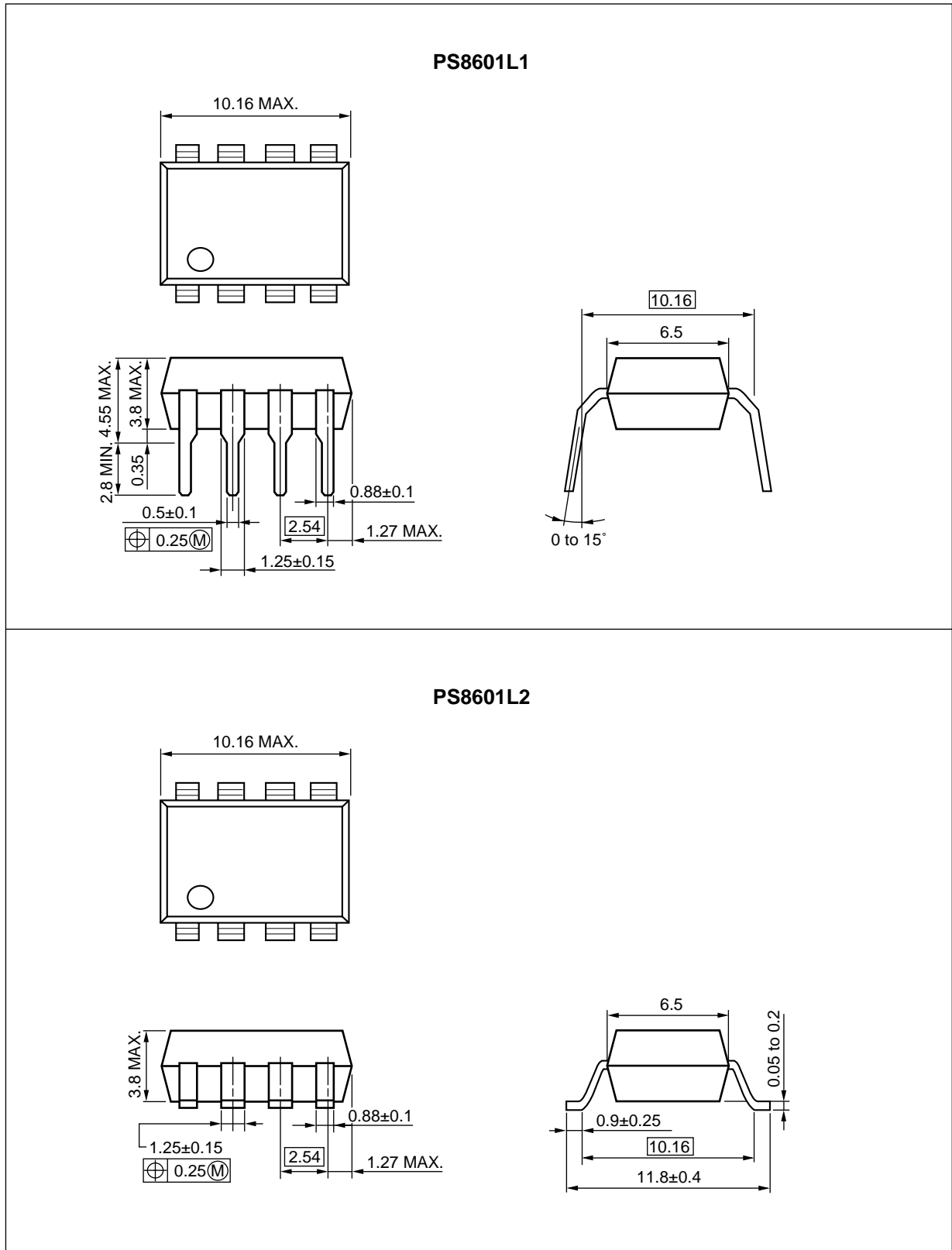
DIP Type



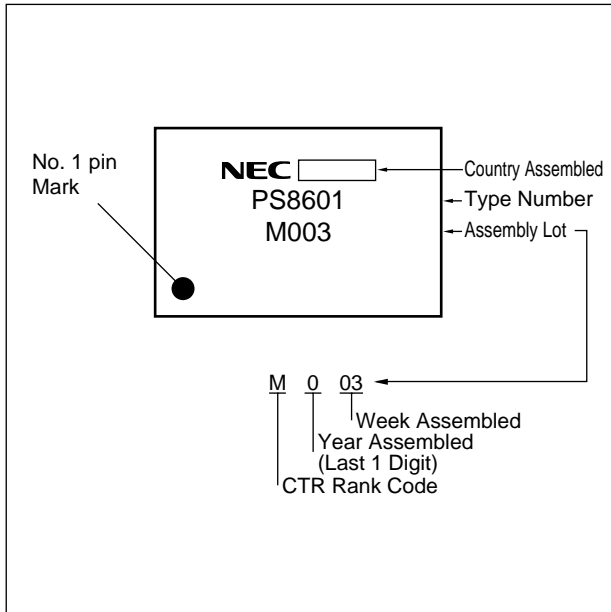
Lead Bending Type



Lead Bending Type For Long Creepage Distance



★ MARKING EXAMPLE



★ ORDERING INFORMATION

Part Number	Package	Packing Style	Application Part Number ^{*1}	
PS8601	8-pin DIP	Magazine case 50 pcs	PS8601	
PS8601L			PS8601L	
PS8601L1				
PS8601L2				
PS8601L-E3		Embossed Tape 1 000 pcs/reel		PS8601
PS8601L-E4				
PS8601-V		Magazine case 50 pcs	PS8601L	
PS8601L-V				
PS8601L1-V				
PS8601L2-V				
PS8601L-V-E3		Embossed Tape 1 000 pcs/reel		
PS8601L-V-E4				

*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	I _F	25	mA
	Reverse Voltage	V _R	5	V
	Power Dissipation	P _D	45	mW
Detector	Supply Voltage	V _{CC}	35	V
	Output Voltage	V _O	35	V
	Output Current	I _O	8	mA
	Power Dissipation	P _C	100	mW
Isolation Voltage ^{*1}		BV	5 000	Vr.m.s.
Operating Ambient Temperature		T _A	-55 to +100	°C
Storage Temperature		T _{stg}	-55 to +100	°C

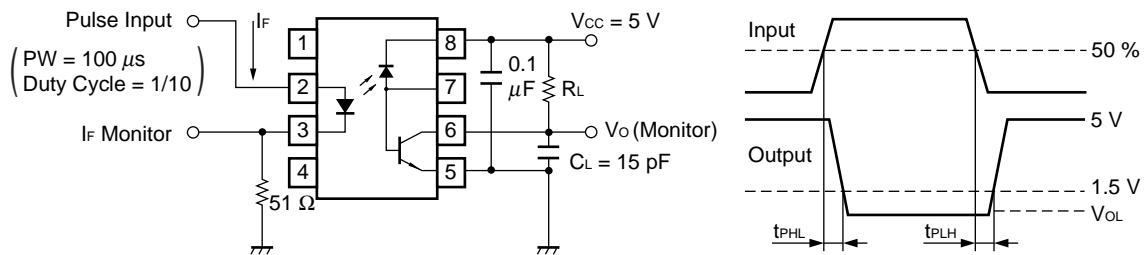
*1 AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output.

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP. ^{*1}	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 16 mA		1.7	2.2	V
	Reverse Current	I _R	V _R = 5 V			10	μA
	Forward Voltage Temperature Coefficient	ΔV _F /ΔT	I _F = 16 mA		-1.6		mV/°C
	Terminal Capacitance	C _t	V = 0 V, f = 1 MHz		60		pF
Detector	High Level Output Current	I _{OH} (1)	I _F = 0 mA, V _{CC} = V _O = 5.5 V		3	500	nA
	High Level Output Current	I _{OH} (2)	I _F = 0 mA, V _{CC} = V _O = 35 V			100	μA
	Low Level Output Voltage	V _{OL}	I _F = 16 mA, V _{CC} = 4.5 V, I _O = 1.2 mA		0.1	0.4	V
	Low Level Supply Current	I _{CCL}	I _F = 16 mA, V _O = Open, V _{CC} = 35 V		50		μA
	High Level Supply Current	I _{CCH}	I _F = 0 mA, V _O = Open, V _{CC} = 35 V		0.01	1	μA
	DC Current Gain	h _{FE}	V _O = 5 V, I _O = 3 mA		100		
Coupled	Current Transfer Ratio	CTR	I _F = 16 mA, V _{CC} = 4.5 V, V _O = 0.4 V	15			%
	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		0.7		pF
	Propagation Delay Time (H → L) ^{*2}	t _{PHL}	I _F = 16 mA, V _{CC} = 5 V, R _L = 1.9 kΩ		0.5	0.8	μs
	Propagation Delay Time (L → H) ^{*2}	t _{PLH}	I _F = 16 mA, V _{CC} = 5 V, R _L = 1.9 kΩ		0.3	0.8	μs

★ *1 Typical values at T_A = 25 °C

*2 Test circuit for propagation delay time

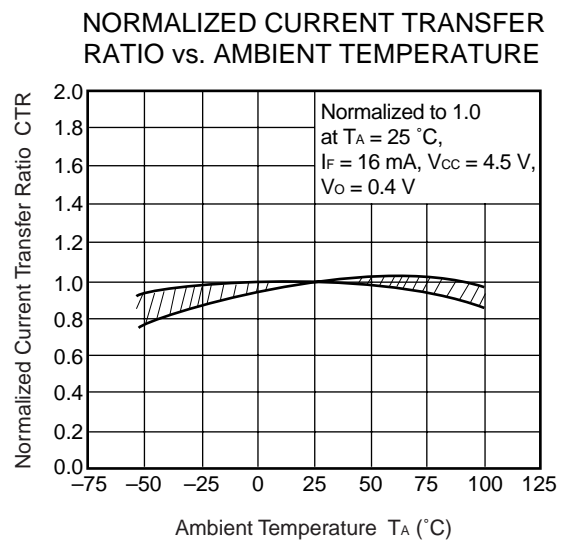
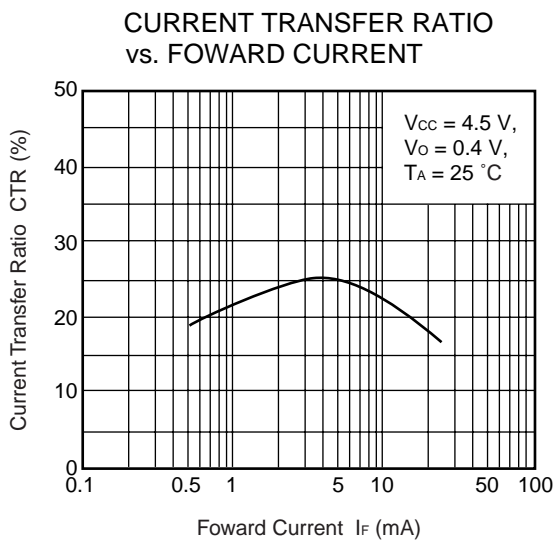
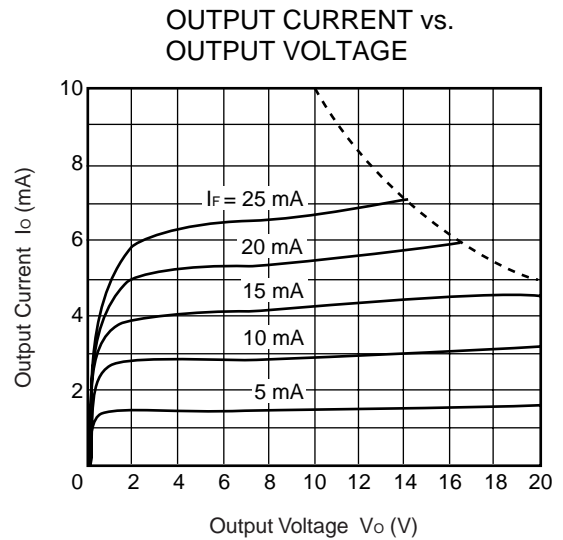
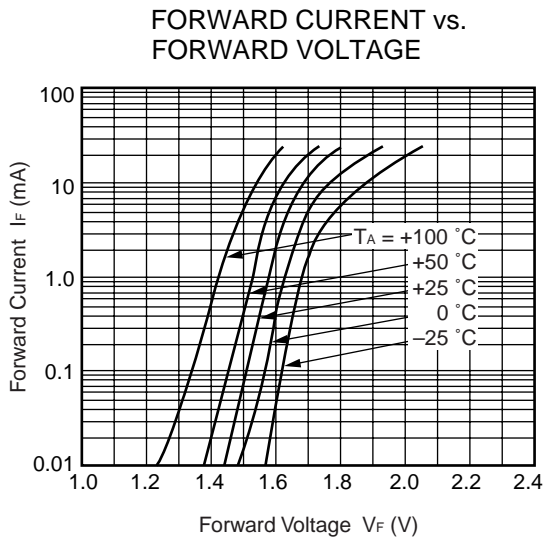
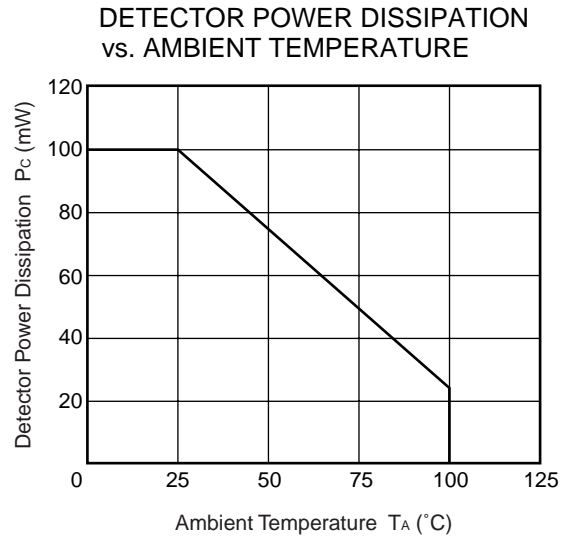
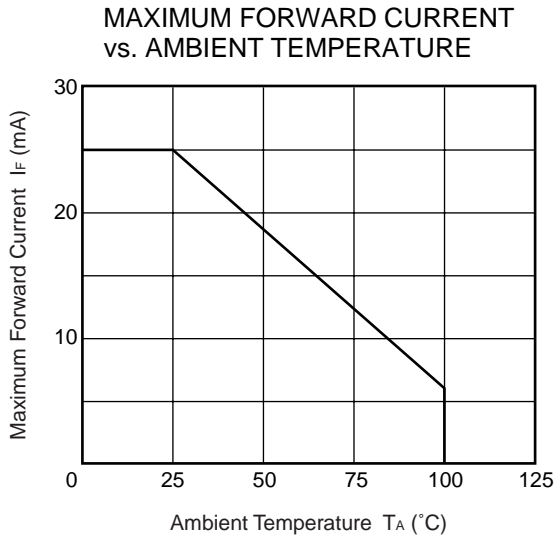


C_L includes probe and stray wiring capacitance

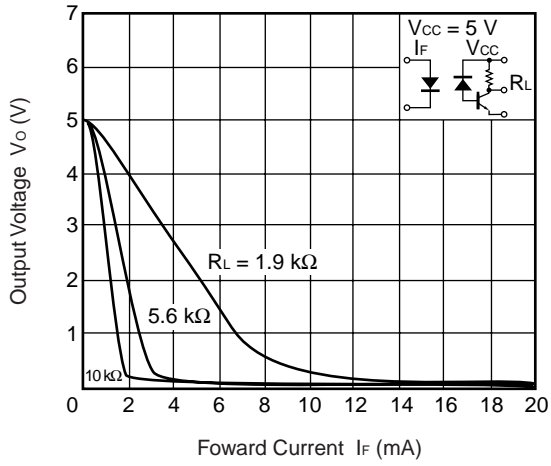
★ **USAGE CAUTIONS**

1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of more than 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.

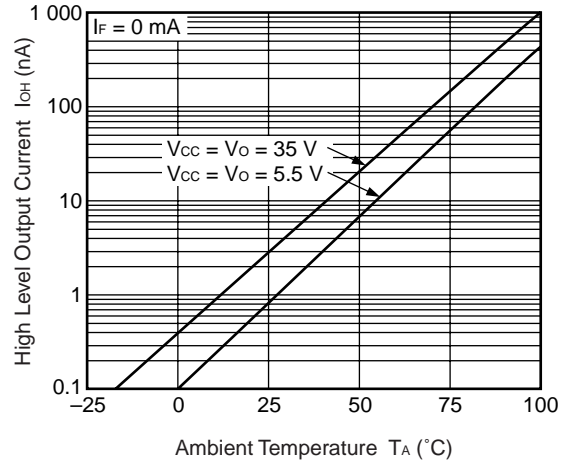
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified)



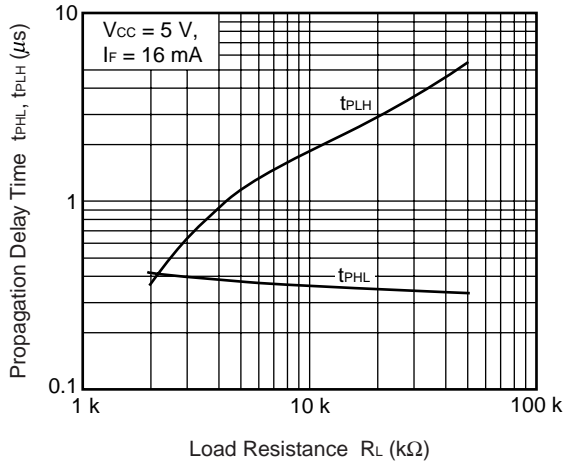
OUTPUT VOLTAGE vs. FOWARD CURRENT



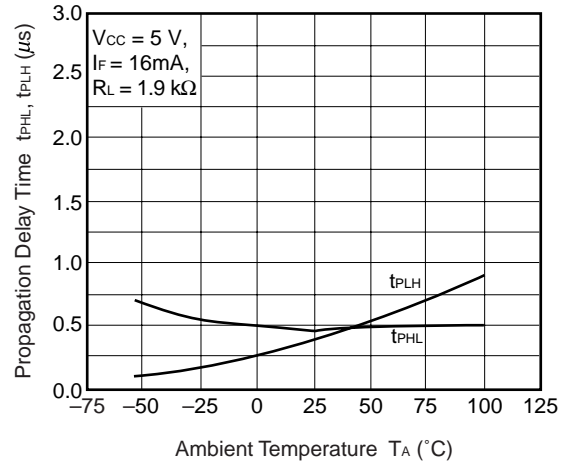
HIGH LEVEL OUTPUT CURRENT vs. AMBIENT TEMPERATURE



PROPAGATION DELAY TIME, vs. LOAD RESISTANCE



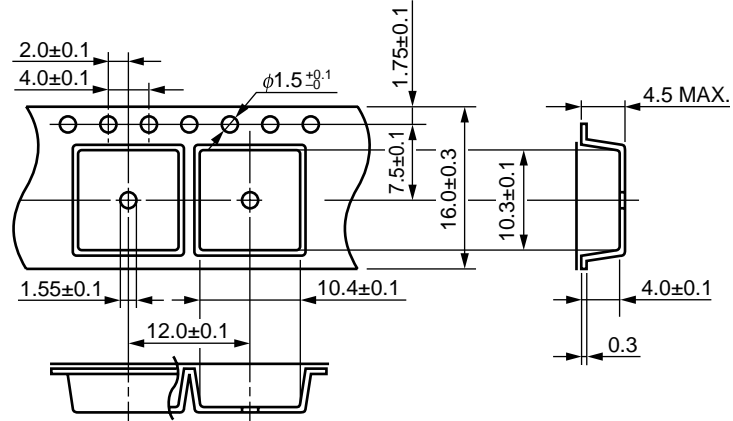
PROPAGATION DELAY TIME, vs. AMBIENT TEMPERATURE



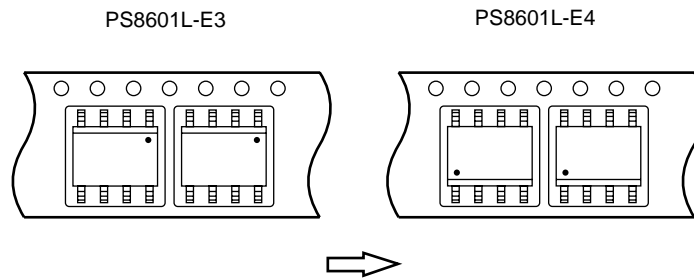
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (UNIT: mm)

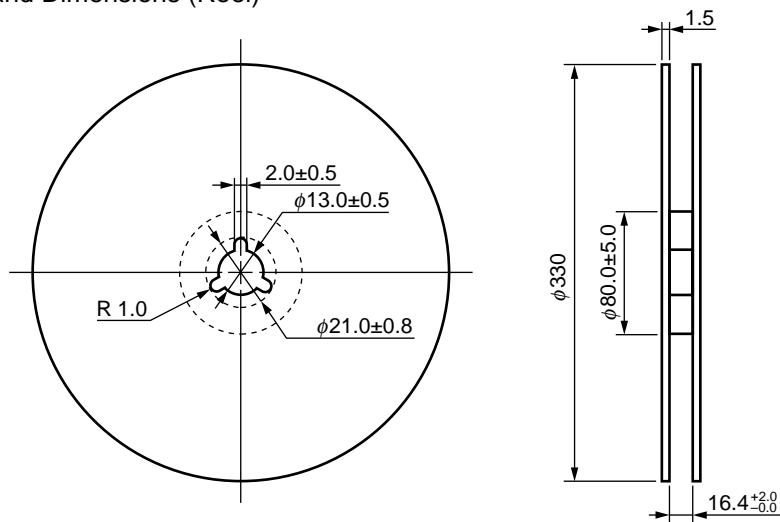
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 1 000 pcs/reel

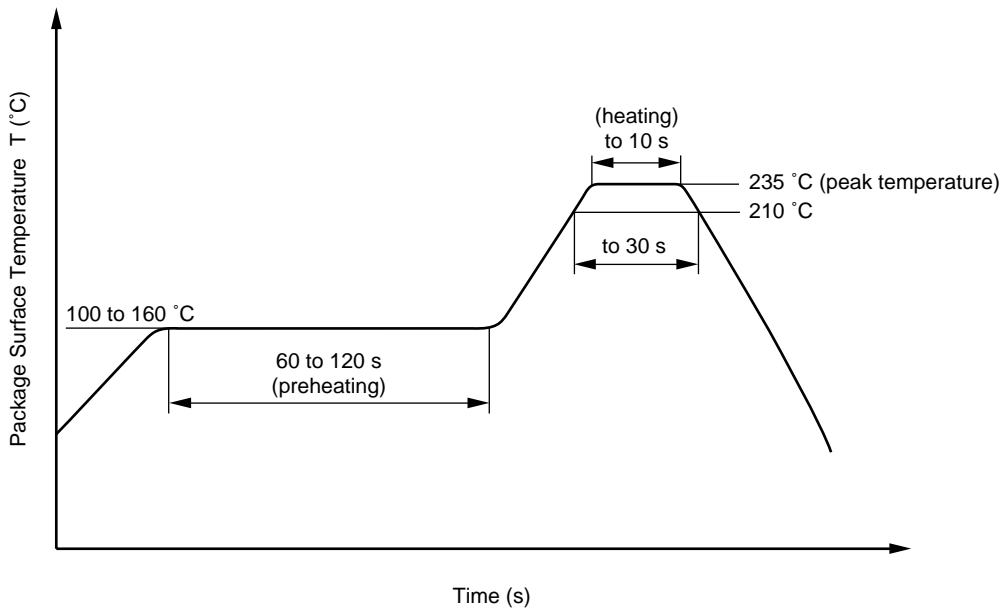
★ NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

- Peak reflow temperature 235 °C or below (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



(2) Wave soldering

- Temperature 260 °C or below (molten solder temperature)
- Time 10 seconds or less
- Preheating conditions 100 °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 at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

★ SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

Parameter	Symbol	Speck	Unit
Application classification (DIN VDE 0109) for rated line voltages $\leq 300 V_{r.m.s.}$ for rated line voltages $\leq 600 V_{r.m.s.}$		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 random test) $U_{pr} = 1.6 \times U_{IORM}, P_d < 5 pC$	U_{pr}	1 424	V_{peak}
Highest permissible overvoltage	U_{TR}	8 000	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 $T_A = 25 ^\circ C$ $V_{IO} = 500 V$ dc at T_A MAX. at least $100 ^\circ C$	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 $T_A = 175 ^\circ C$ (T_{si})	T_{si} I_{si} P_{si} Ris MIN.	175 400 700 10^9	°C mA mW Ω

DIAGRAM 1 According to VDE0884 test voltage waveform: Procedure a, destructive test (for type or random test)

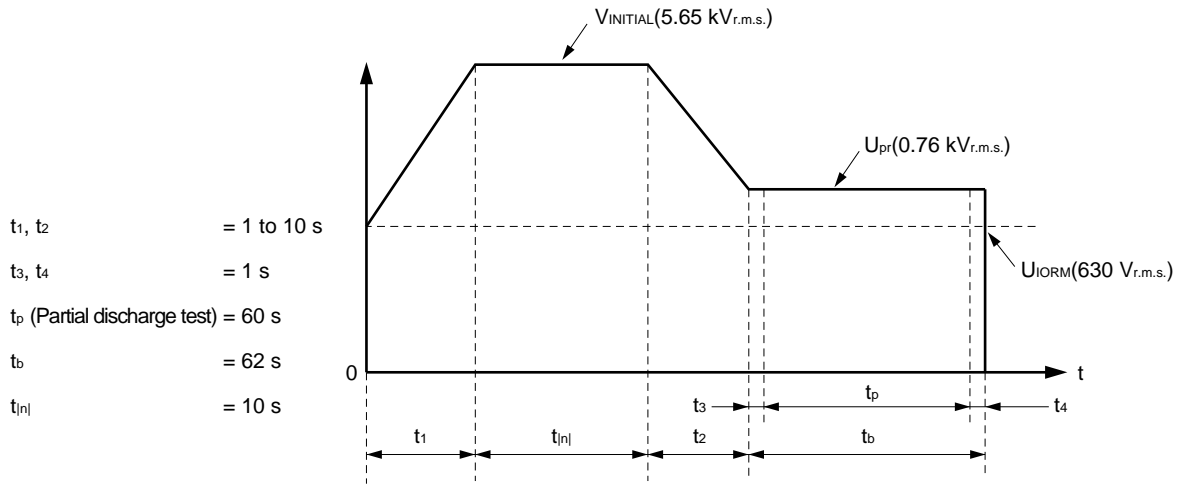


DIAGRAM 2 According to VDE0884 test voltage waveform: Procedure b, nondestructive test (for random test)

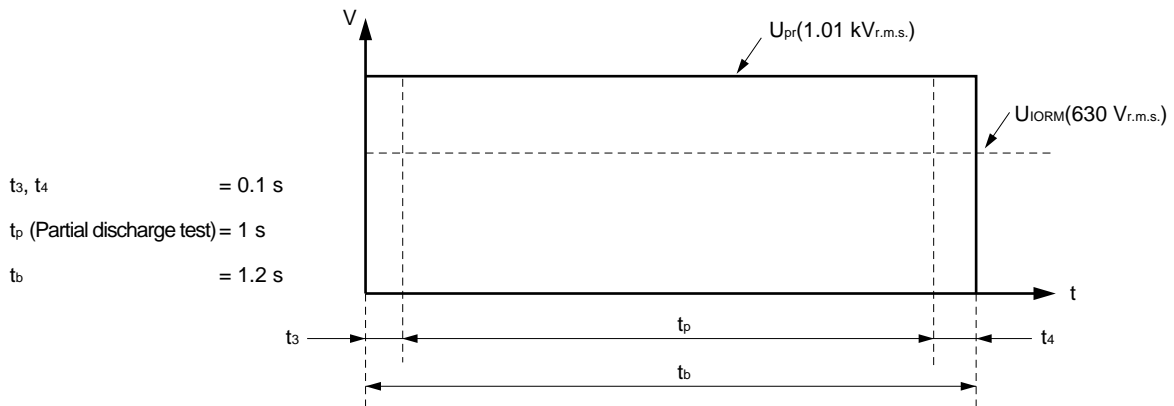
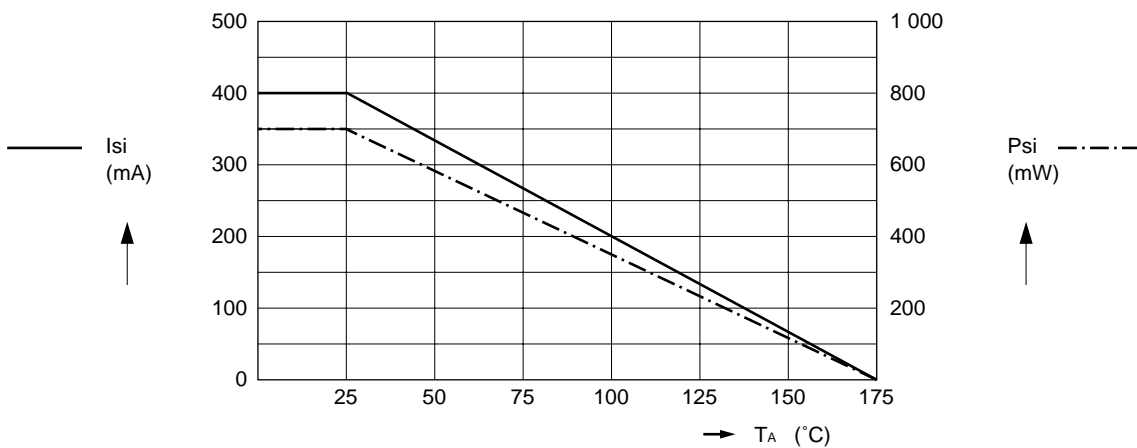


DIAGRAM 3 Safety maximum ratings – Ambient temperature (photocoupler malfunction)



[MEMO]

[MEMO]

[MEMO]

SAFETY INFORMATION ON THIS PRODUCT

<p>Caution</p>	<p>GaAs Products</p>	<p>The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> • 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. <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p>
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