

### HIGH SPEED ANALOG OUTPUT TYPE 8 PIN PHOTOCOUPLER

#### DESCRIPTION

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

#### FEATURES

- High supply voltage (V<sub>CC</sub> = 35 V MAX.)
- High speed response (t<sub>PHL</sub>, t<sub>PLH</sub>: 0.8 μs MAX.)
- High isolation voltage (BV: 5 000 V<sub>r.m.s.</sub> MIN.)
- TTL, CMOS compatible with a resistor
- Taping product number (PS8601L-E3)
- UL recognized [File No. E72422(s)]
- VDE0884 recognized: option

#### APPLICATIONS

- Interface circuit for various instrumentations, control equipments.
- Computer and peripheral manufactures.
- Electrical isolation of TV video terminals.

#### ORDERING INFORMATION

PART NUMBER	PACKAGE	SAFETY STANDARD APPROVAL
PS8601	8 pin DIP	Normal specification products • UL Approved
PS8601L	8 pin DIP, lead bending type	
PS8601L1	8 pin DIP, lead bending type (for long distance)	
PS8601L2		
PS8601-V	8 pin DIP	VDE0884 specification products (option) • VDE Approved
PS8601L-V	8 pin DIP, lead bending type	
PS8601L1-V	8 pin DIP, lead bending type (for long distance)	
PS8601L2-V		

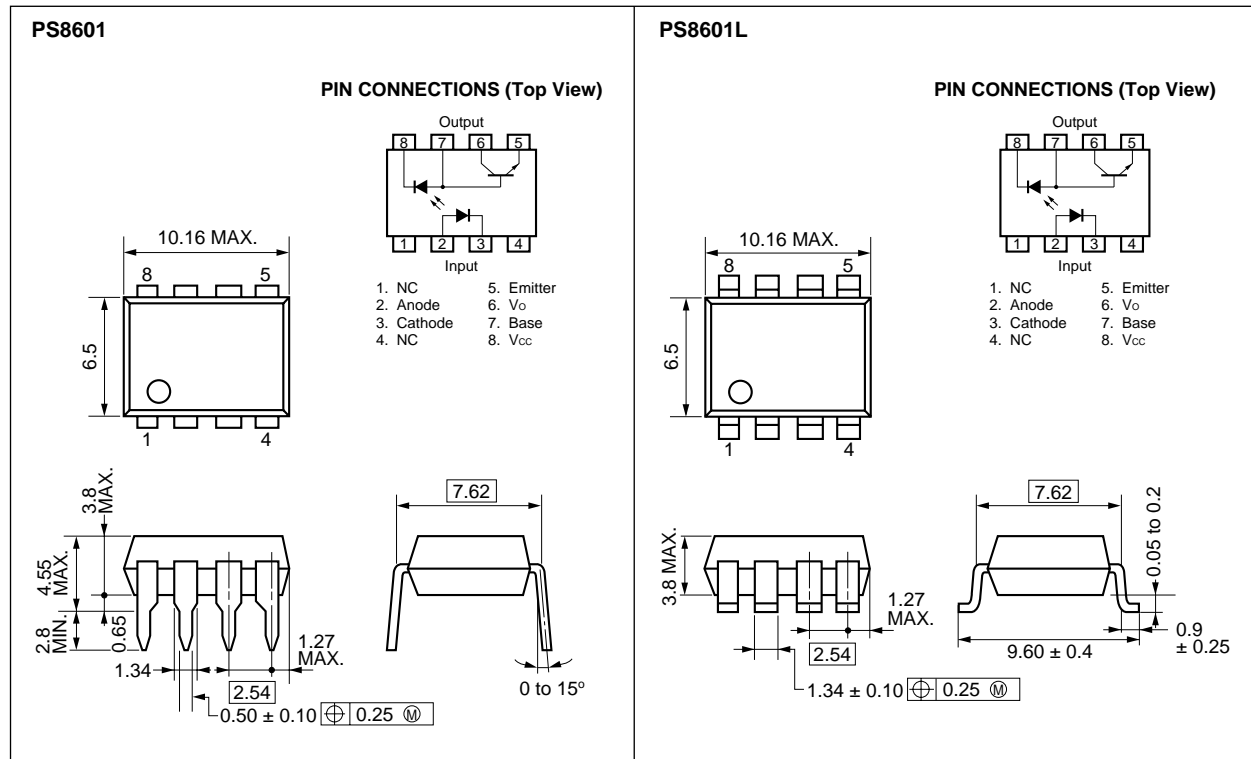
#### [Handling Precaution]

This product is weak for static electricity by designed with high speed integrated circuit. So, protect against static electricity when handling.

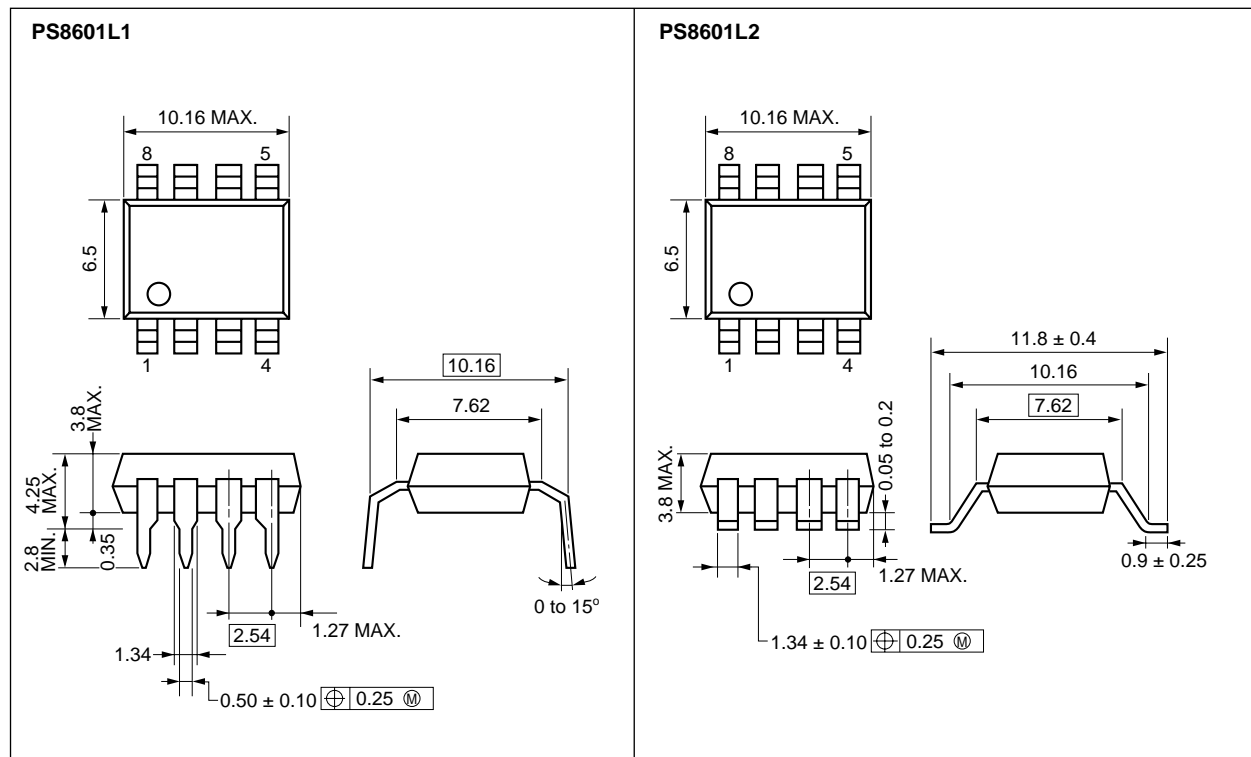
PACKAGE DIMENSIONS (Unit: mm)

DIP (Dual In-line Package)

Lead Bending type (Gull-wing)



Lead Bending type (for long distance)



**ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25 °C)**

Diode

Forward Current	I <sub>F</sub>	25	mA
Reverse Voltage	V <sub>R</sub>	5	V
Power Dissipation	P <sub>D</sub>	45	mW

Detector

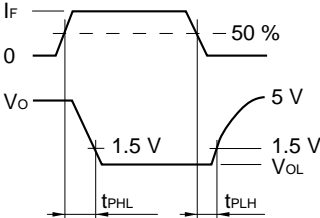
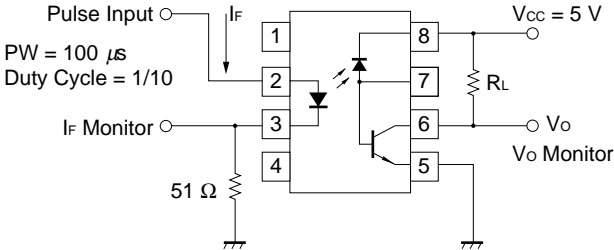
Supply Voltage	V <sub>CC</sub>	35	V
Output Voltage	V <sub>O</sub>	35	V
Output Current	I <sub>O</sub>	8	mA
Power Dissipation	P <sub>C</sub>	100	mW
Isolation Voltage <sup>*1</sup>	BV	5 000	V <sub>r.m.s.</sub>
Operating Temperature	T <sub>A</sub>	-55 to +100	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

\*1 AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60 % between input and output.

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

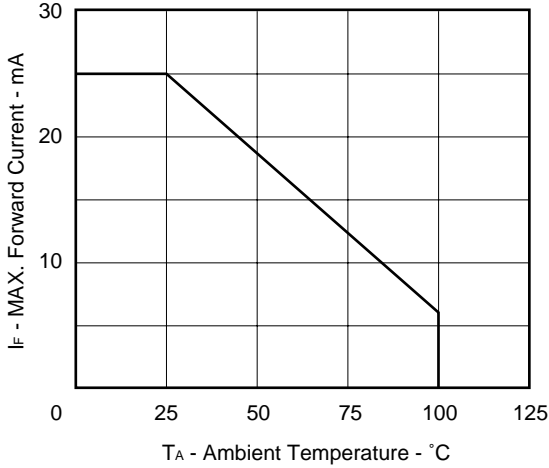
PARAMETER		SYMBOL	MIN.	TYP	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V <sub>F</sub>		1.7	2.2	V	I <sub>F</sub> = 16 mA
	Reverse Current	I <sub>R</sub>			10	μA	V <sub>R</sub> = 5 V
	Forward Voltage Temperature Coefficient	$\frac{\Delta V_F}{\Delta T}$		-1.6		mV/°C	I <sub>F</sub> = 16 mA
	Junction Capacitance	C <sub>i</sub>		60		pF	V = 0, f = 1 MHz
Detector	High Level Output Current	I <sub>OH</sub> 1		3	500	nA	I <sub>F</sub> = 0 mA, V <sub>CC</sub> = V <sub>O</sub> = 5.5 V
	High Level Output Current	I <sub>OH</sub> 2			100	μA	I <sub>F</sub> = 0 mA, V <sub>CC</sub> - V <sub>O</sub> = 35 V
	Low Level Output Voltage	V <sub>OL</sub>		0.1	0.4	V	I <sub>F</sub> = 16 mA, V <sub>CC</sub> = 4.5 V, I <sub>O</sub> = 1.2 mA
	Low Level Supply Current	I <sub>CC</sub> L		50		μA	I <sub>F</sub> = 16 mA, V <sub>O</sub> = Open, V <sub>CC</sub> = 35 V
	High Level Supply Current	I <sub>CC</sub> H		0.01	1	μA	I <sub>F</sub> = 0 mA, V <sub>O</sub> = Open, V <sub>CC</sub> = 35 V
Coupler	Current Transfer Ratio	CTR	15			%	I <sub>F</sub> = 16 mA, V <sub>CC</sub> = 4.5 V, V <sub>O</sub> = 0.4 V
	Isolation Resistance	R <sub>1-2</sub>	10 <sup>11</sup>			Ω	V <sub>in-out</sub> = 1 kV <sub>DC</sub>
	Isolation Capacitance	C <sub>1-2</sub>		0.7		pF	V = 0, f = 1 MHz
	Propagation Delay Time (H → L)	t <sub>PHL</sub>		0.5	0.8	μs	I <sub>F</sub> = 16 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1.9 kΩ
	Propagation Delay Time (L → H)	t <sub>PLH</sub>		0.3	0.8	μs	I <sub>F</sub> = 16 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1.9 kΩ

\*2 Test Circuit for Propagation Delay Time.

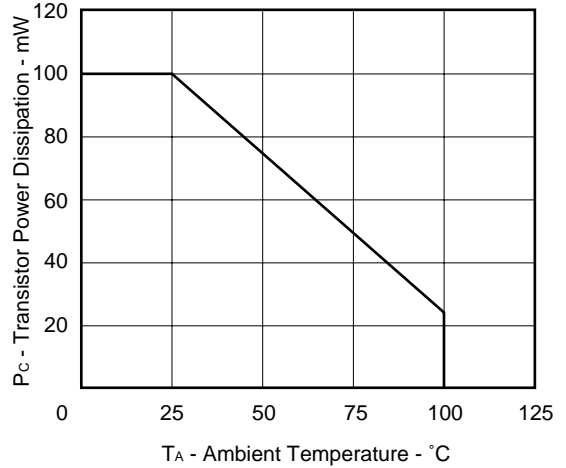


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

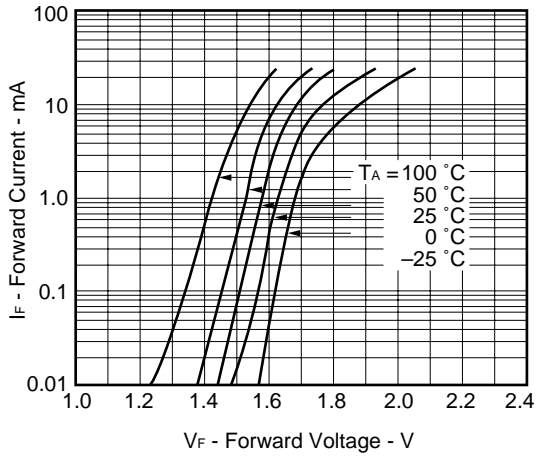
MAX. FORWARD CURRENT vs. AMBIENT TEMPERATURE



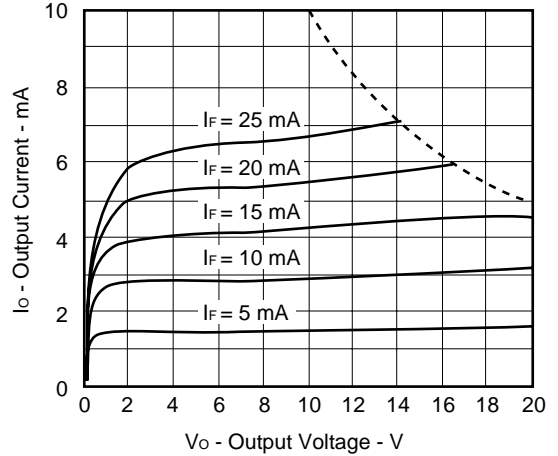
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



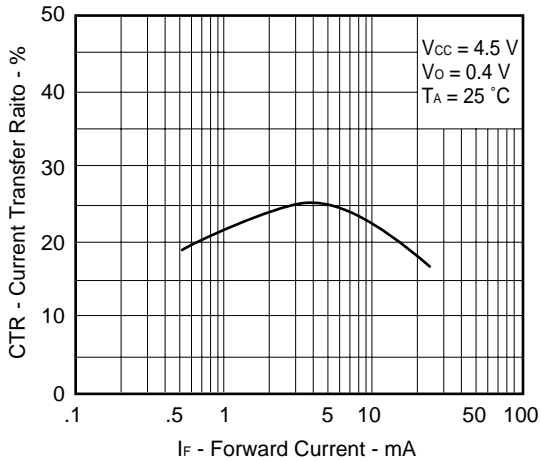
FORWARD CURRENT vs. FORWARD VOLTAGE



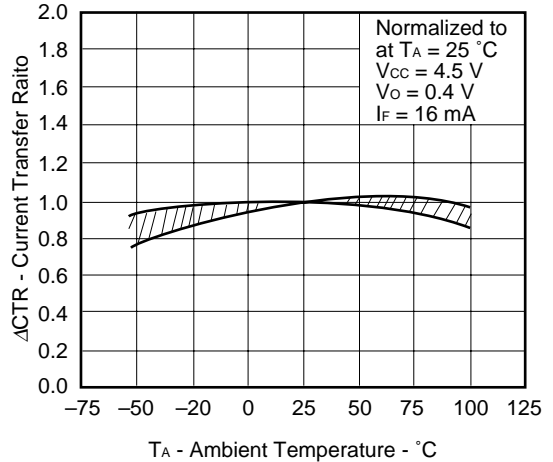
OUTPUT CURRENT vs. OUTPUT VOLTAGE



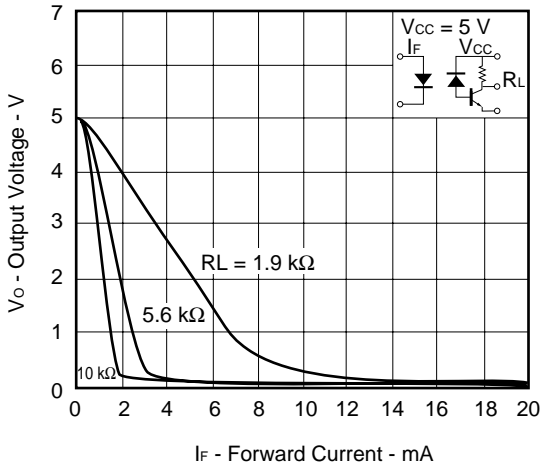
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



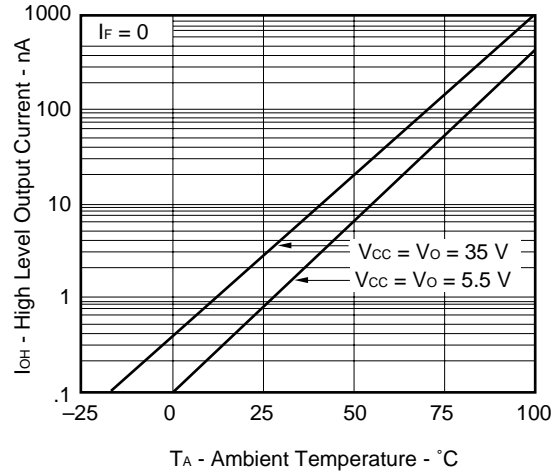
NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE



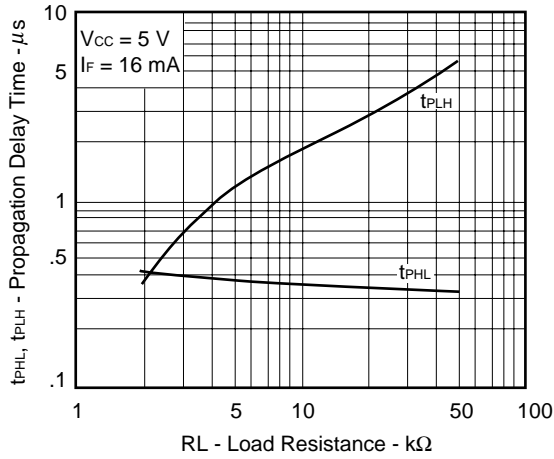
OUTPUT VOLTAGE vs. FORWARD CURRENT



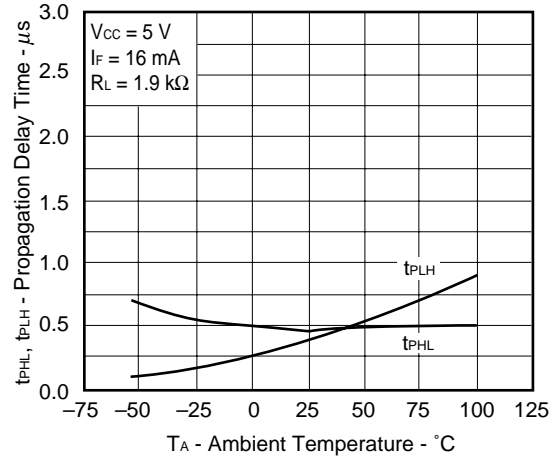
HIGH LEVEL OUTPUT CURRENT vs. AMBIENT TEMPERATURE



PROPAGATION DELAY TIME vs. LOAD RESISTANCE

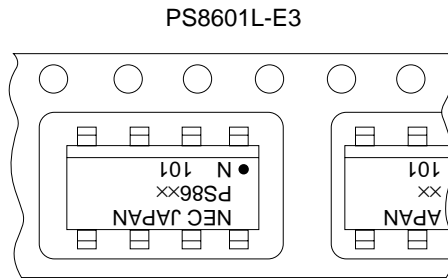


PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE

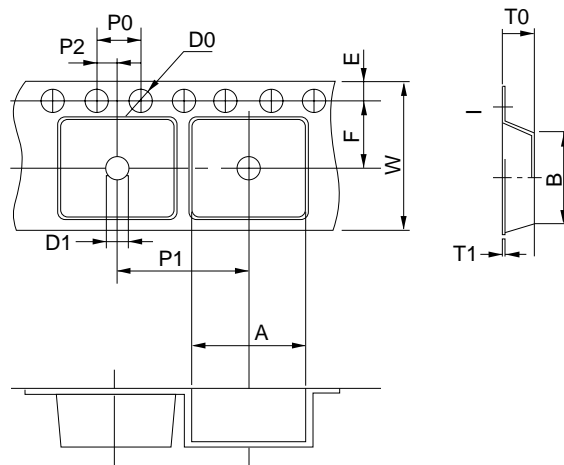


TAPING

1. TAPING DIRECTION



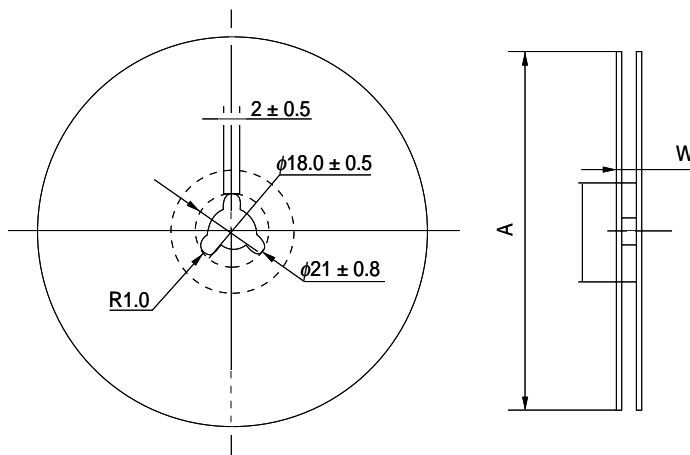
2. OUTLINE AND DIMENSIONS (TAPE)



Unit: mm

SYMBOL	RATINGS
A	10.7 ± 0.1
B	10.3 ± 0.1
D0	1.55 ± 0.1
D1	1.55 ± 0.1
E	1.75 ± 0.1
F	7.5 ± 0.1
P0	4.0 ± 0.1
P1	12.0 ± 0.1
P2	2.0 ± 0.1
T0	4.3 ± 0.2
T1	0.3
W	16 ± 0.3

3. OUTLINE AND DIMENSIONS (REEL)



Unit: mm

SYMBOL	RATINGS
A	330
N	80 ± 5.0
W	16.4 <sup>+2.0</sup> <sub>-0</sub>

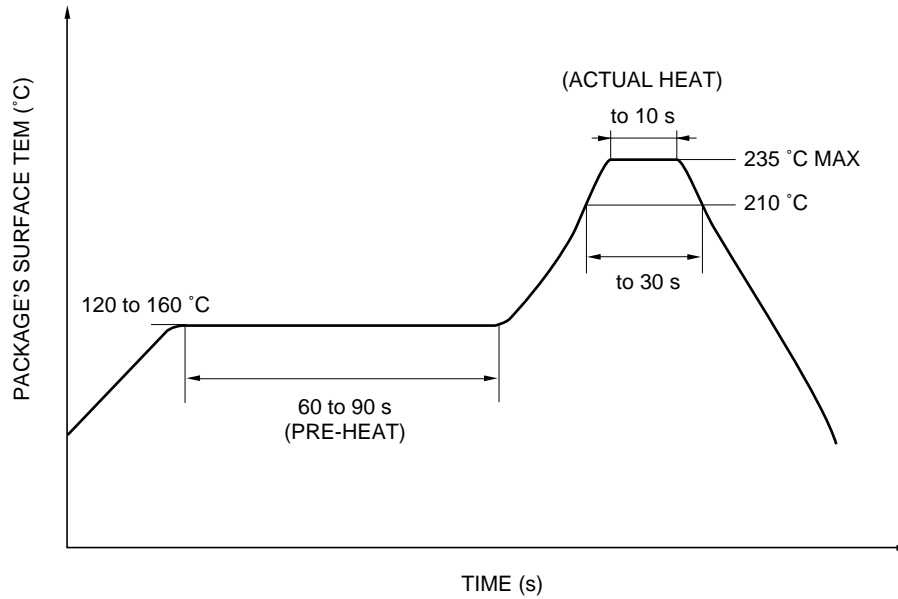
4. PACKING; 1000 pieces/reel

**SOLDERING PRECAUTION**

(1) Infrared reflow soldering

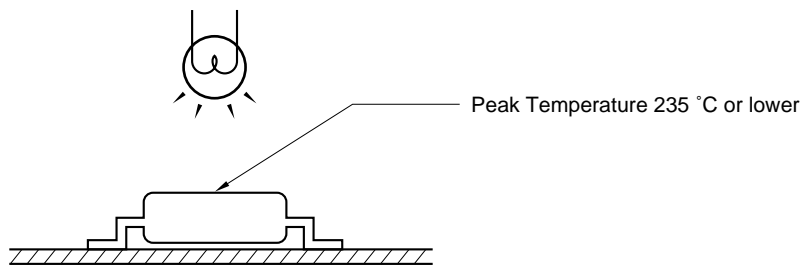
- Peak temperature : 235 °C or lower (plastic surface)
- Time : 30 s or less  
(Time during plastic surface temperature overs 210 °C)
- No. of reflow times : Three
- Flux : Rosin-base flux

**INFRARED RAY REFLOW TEMPERATURE PROFILE**



**<NOTES>**

- (1) Please avoid 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



**SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)**

PARAMETER	SYMBOL	SPECK	UNIT
Application classification (DIN VDE0109) for rated line voltages $\leq 300 V_{eff}$ for rated line voltages $\leq 600 V_{eff}$		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) $U_{pr} = 1.2 \times U_{IORM}, Pd < 5 pC$	$U_{IORM}$ $U_{pr}$	890 1 068	$V_{peak}$ $V_{peak}$
Test voltage (partial discharge test procedure b for random test) $U_{pr} = 1.6 \times U_{IORM}, Pd < 5 pC$	$U_{pr}$	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 VDE0109)		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	Ris min Ris 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 ( $T_{si}$ )	$T_{si}$ $I_{si}$ $P_{si}$ Ris min	175 400 700 $10^9$	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 (Gallium 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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**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.

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Anti-radioactive design is not implemented in this product.