NEC

PHOTOCOUPLERS

PS8602, PS8602L

HIGH NOISE REDUCTION
HIGH SPEED ANALOG OUTPUT TYPE
8 PIN PHOTOCOUPLER

DESCRIPTION

PS8602 and PS8602L is a 8-pin high speed photocoupler containing a GaAlAs LED on input side and a P-N photodiode and a high speed amplifier transistor on output side on one chip. PS8602 is in a plastic DIP (Dual In-line Package). PS8602L is lead bending type (Gull wing) for surface mount.

FEATURES

- High common mode transient immunity
  (OM_R, OM_L: ±2000 V/μs MIN.)
- 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 $V_{r.m.s.}$ MIN.)
- TTL, CMOS compatible with a resistor
- Taping product number (PS8602L-E3)
- UL recognized [File No. E72422(s)]
- VDE0884 recognized: option

APPLICATIONS

- Interface circuit for various instrumentations, control equipments.
- Computer and peripheral manufactures.

ORDERING INFORMATION

PART NUMBER	PACKAGE	SAFETY STANDARD APPROVAL
PS8602	8 pin DIP	Normal specification products • UL Approved
PS8602L	8 pin DIP, lead bending type	
PS8602L1	8 pin DIP, lead bending type (for long distance)	
PS8602L2		
PS8602-V	8 pin DIP	VDE0884 specification products (option) • VDE Approved
PS8602L-V	8 pin DIP, lead bending type	
PS8602L1-V	8 pin DIP, lead bending type (for long distance)	
PS8602L2-V		

[Handling Precaution]

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

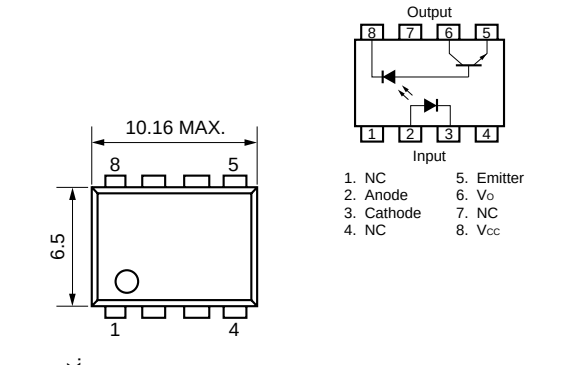
Document No. P11651EJ2V0DS00 (2nd edition)
(Previous No. LC-2388)
Date Published July 1996 P
Printed in Japan

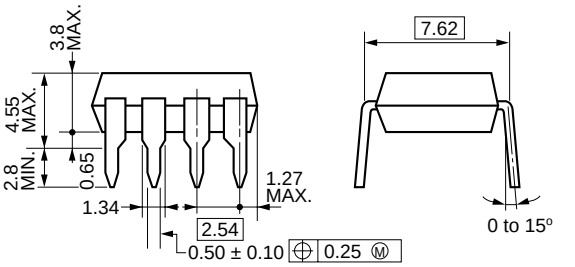
PACKAGE DIMENSIONS (Unit: mm)

DIP (Dual In-line Package)

PS8602

PIN CONNECTIONS (Top View)

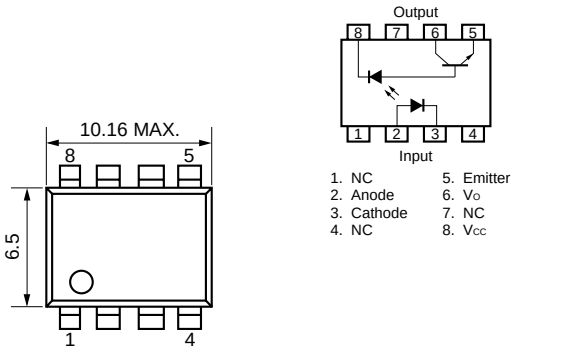


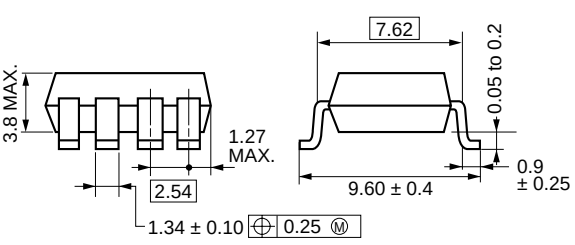


Lead Bending type (Gull-wing)

PS8602L

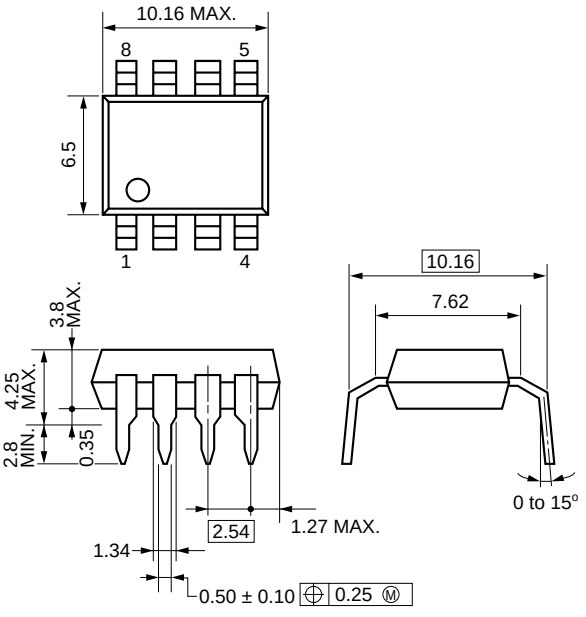
PIN CONNECTIONS (Top View)



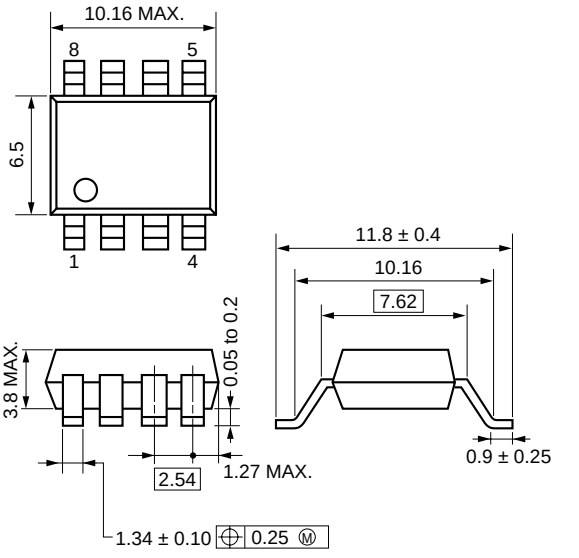


Lead Bending type (for long distance)

PS8602L1



PS8602L2



ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

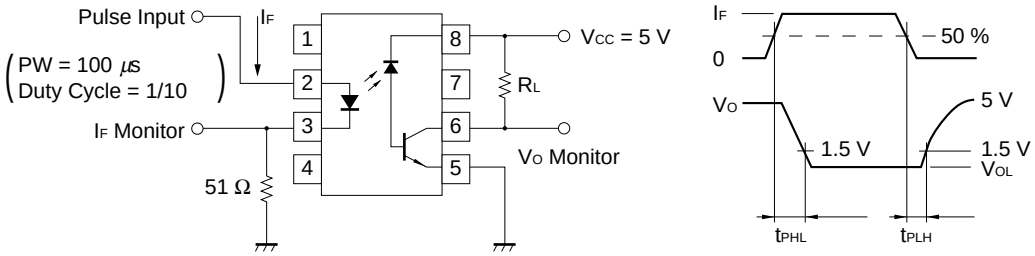
Diode			
Forward Current	I_F	25	mA
Reverse Voltage	V_R	5	V
Power Dissipation	P_D	45	mW
Detector			
Supply Voltage	V_{CC}	35	V
Output Voltage	V_O	35	V
Output Current	I_O	8	mA
Power Dissipation	P_C	100	mW
Isolation Voltage*1	BV	5 000	$V_{r.m.s.}$
Operating Temperature	T_A	–55 to +100	°C
Storage Temperature	T_{stg}	–55 to +150	°C

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

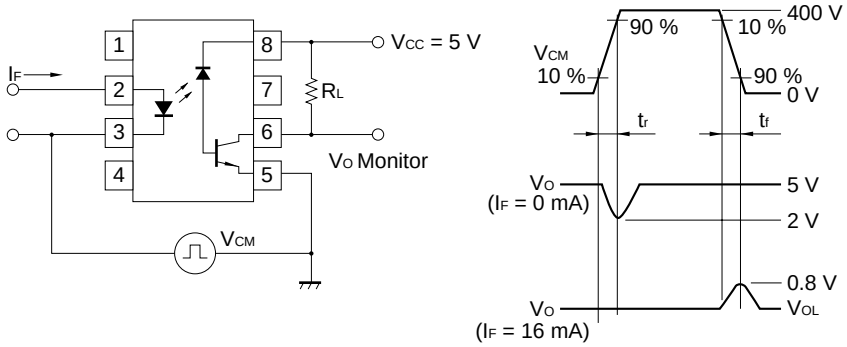
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V_F		1.7	2.2	V	I_F = 16 mA
	Reverse Current	I_R			10	μA	V_R = 5 V
	Forward Voltage Temperature Coefficient	$\frac{\Delta V_F}{\Delta T}$		–1.6		mV/°C	I_F = 16 mA
	Junction Capacitance	C_t		60		pF	V = 0, f = 1 MHz
Detector	High Level Output Current	I_{OH} 1		3	500	nA	I_F = 0 mA, V_{CC} = V_O = 5.5 V
	High Level Output Current	I_{OH} 2			100	μA	I_F = 0 mA, V_{CC} = V_O = 35 V
	Low Level Output Voltage	V_{OL}		0.1	0.4	V	I_F = 16 mA, V_{CC} = 4.5 V, I_O = 1.2 mA
	Low Level Supply Current	I_{CCL}		50		μA	I_F = 16 mA, V_O = Open, V_{CC} = 35 V
	High Level Supply Current	I_{CCH}		0.01	1	μA	I_F = 0 mA, V_O = Open, V_{CC} = 35 V
Coupler	Current Transfer Ratio	CTR	15			%	I_F = 16 mA, V_{CC} = 4.5 V, V_O = 0.4 V
	Isolation Resistance	R_{1-2}	10^{11}			Ω	V_{in-out} = 1 kV_{DC}
	Isolation Capacitance	C_{1-2}		0.7		pF	V = 0, f = 1 MHz
	Propagation Delay Time (H → L) *2	t_{PHL}		0.5	0.8	μs	I_F = 16 mA, V_{CC} = 5 V, R_L = 1.9 kΩ
	Propagation Delay Time (L → H) *2	t_{PLH}		0.3	0.8	μs	I_F = 16 mA, V_{CC} = 5 V, R_L = 1.9 kΩ
	Common mode transient immunity at high level output *3	CM_H	2 000			V/μs	I_F = 0 mA, V_{CM} = 400 V, R_L = 4.1 kΩ
	Common mode transient immunity at low level output *3	CM_L	–2 000			V/μs	I_F = 16 mA, V_{CM} = 400 V, R_L = 4.1 kΩ

***2** Test Circuit for Propagation Delay Time.

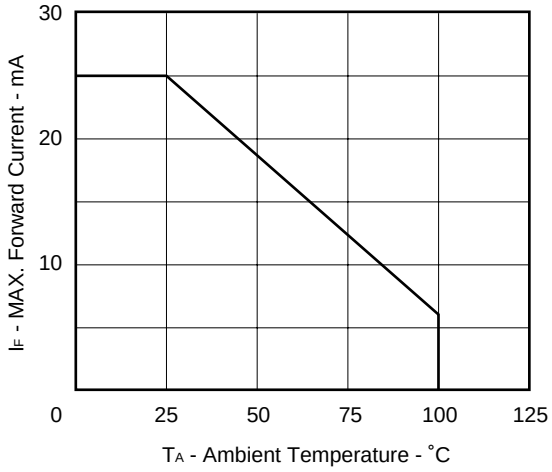


***3** Test Circuit for Common mode transient immunity

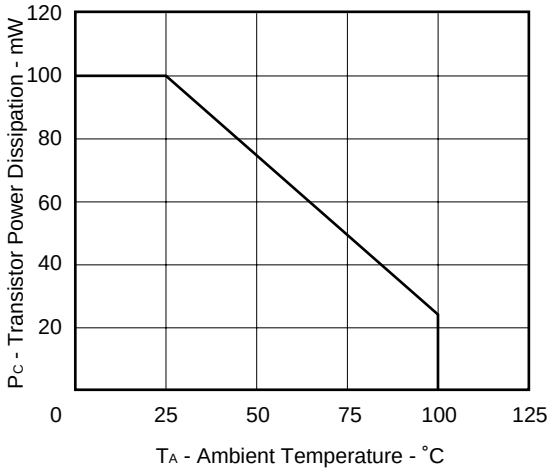


TYPICAL CHARACTERISTICS (T_A = 25 °C)

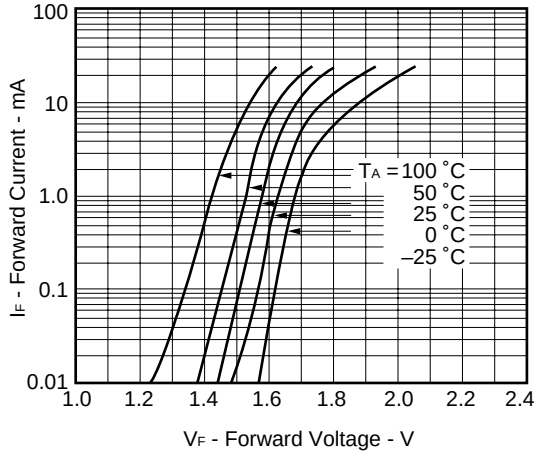
MAX. FORWARD CURRENT vs. AMBIENT TEMPERATURE



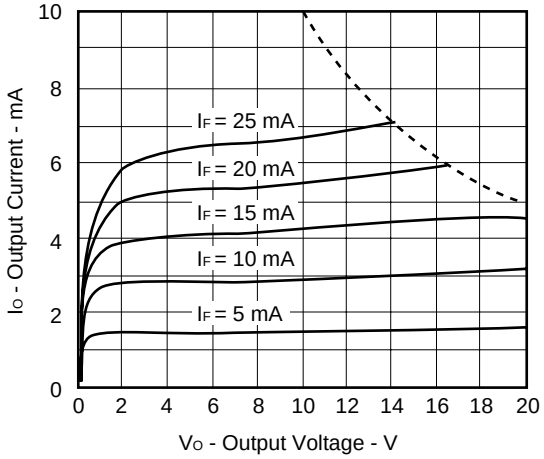
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



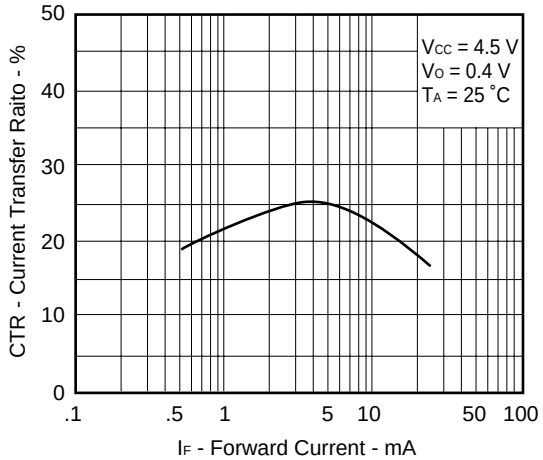
FORWARD CURRENT vs. FORWARD VOLTAGE



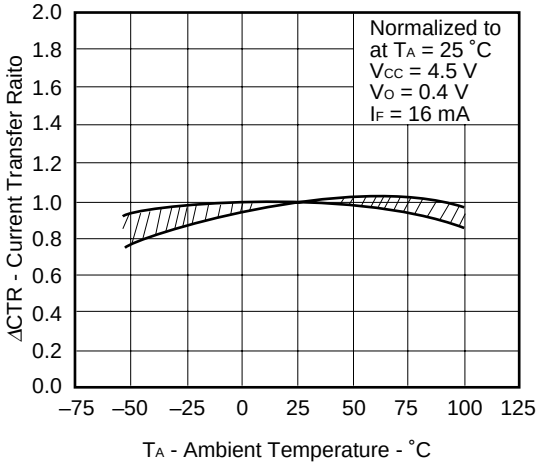
OUTPUT CURRENT vs. OUTPUT VOLTAGE



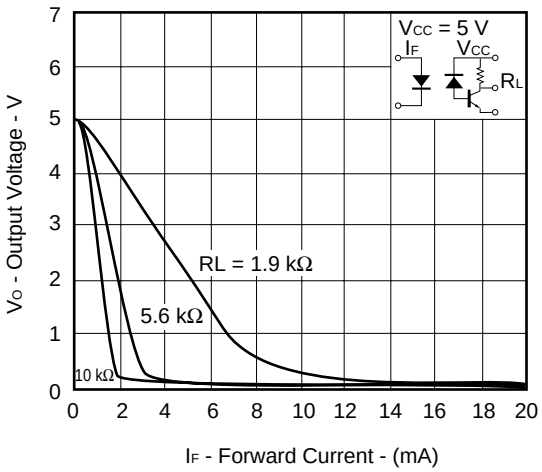
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



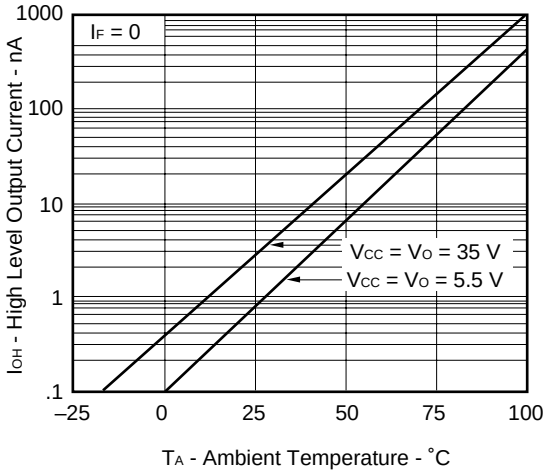
NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE



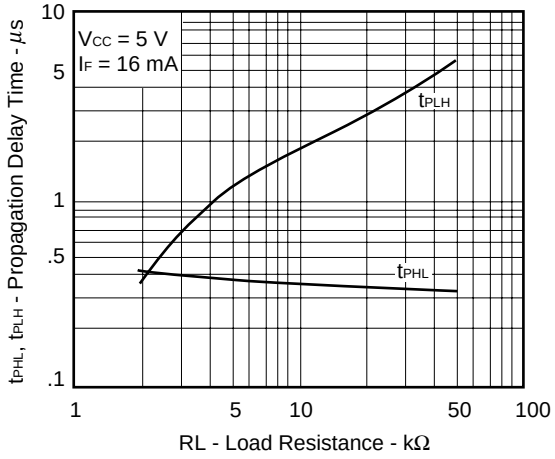
OUTPUT VOLTAGE vs.
FORWARD CURRENT



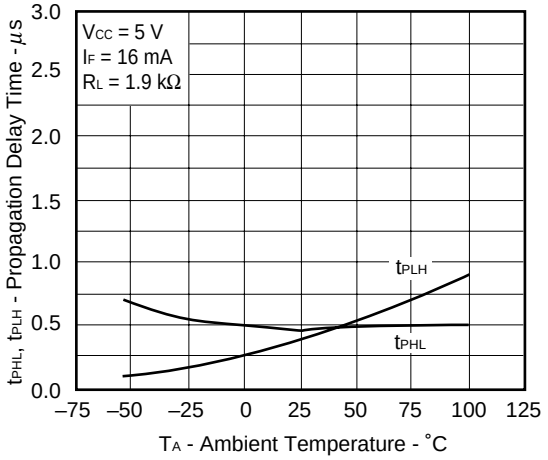
HIGH LEVEL OUTPUT CURRENT
vs. AMBIENT TEMPERATURE



PROPAGATION DELAY TIME
vs. LOAD RESISTANCE



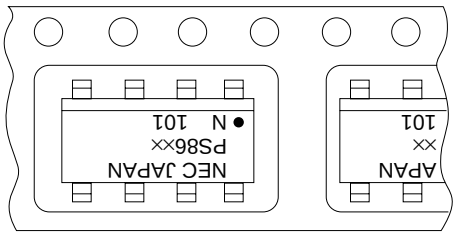
PROPAGATION DELAY TIME
vs. AMBIENT TEMPERATURE



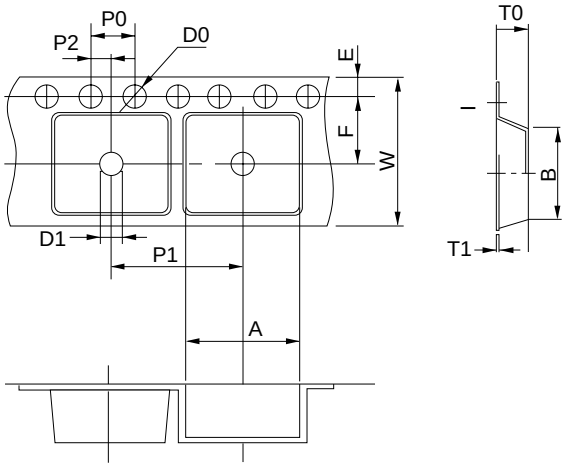
TAPING

1. TAPING DIRECTION

PS8602L-E3



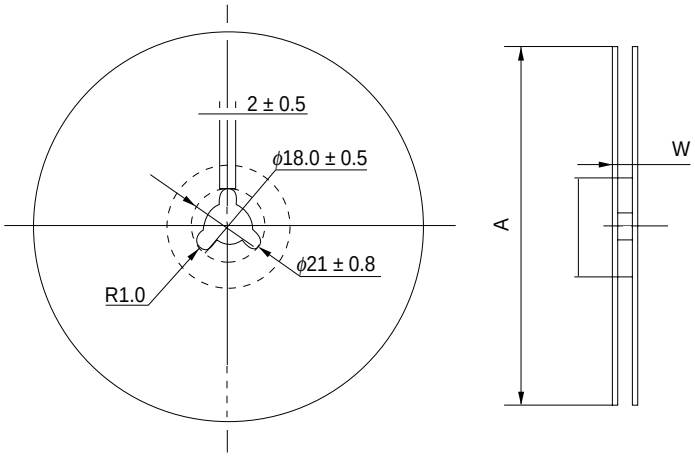
2. OUTLINE AND DIMENSIONS (TAPE)



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

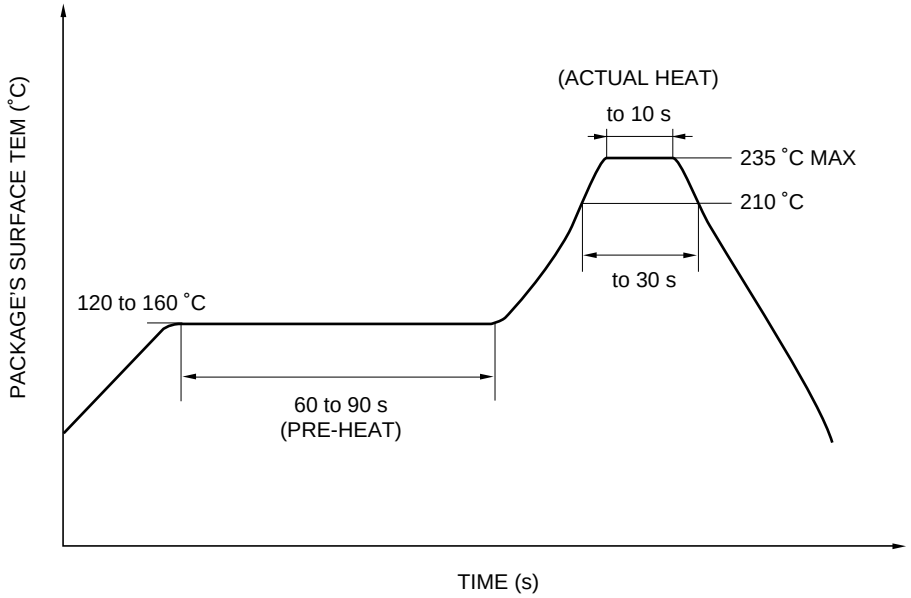
SYMBOL	RATINGS
A	330
N	80 ± 5.0
W	$16.4^{+2.0}_{-0}$

4. PACKING; 1000 pieces/reel

SOLDERING PRECAUTION

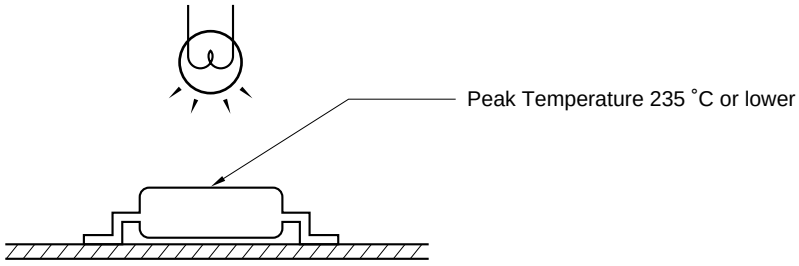
(1) Infrared reflow soldering
- Peak temperature : 235 °C or lower (plastic surface)
- Time : 30 s or less
  (Time during plastic surface temperature overs 210 °C)
- No. of reflow times : Three
- Flux : Rosin-base flux

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 ≤ 300 V_{eff} for rated line voltages ≤ 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 × 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 × U_{IORM}, Pd < 5 pC	U_{pr}	1 424	V_{peak}
Highest permissible overvoltage	U_{TR}	8 000	V_{peak}
Degree of pollution (DIN VDE0109)		2	
Clearance distance		> 7.0	mm
Creepage distance		> 7.0	mm
Comparative tracking index (DIN IEC 112/VDE0303 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 IF, Psi = 0) Power (output or total power dissipation) Isolation resistance U_{IO} = 500 V dc at 175 Cel (Tsi)	 Tsi Isi Psi 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.

M4 96.5