CEL

PHOTOCOUPLER
PS8103

HIGH-SPEED (200 kbps) ANALOG OUTPUT TYPE 5-PIN SOP PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

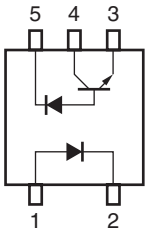
The PS8103 is an optically coupled isolator containing a GaAs LED on the light emitting diode (input side) and a PIN photodiode and a high-speed amplifier transistor on the output side on one chip.

This is a plastic SOP (Small Out-line Package) type for high density applications.

FEATURES

- Wide operating V_{CC} range (V_{CC} = –0.5 to +15 V)
- ★ Small package (5-pin SOP)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- High-speed response (t_{PHL}, t_{PLH} = 5 μs MAX. (@R_L = 4.1 kΩ))
- Ordering number of taping product: PS8103-F3, F4: 2 500 pcs/reel
- ★ Pb-Free product
- ★ Safety standards
  - UL approved: File No. E72422

PIN CONNECTION
(Top View)



1. Anode
2. Cathode
3. GND
4. V_O
5. V_{CC}

APPLICATIONS

- Computer and peripheral manufactures
- General purpose inverter
- Substitutions for relays and pulse transformers
- Power supply

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

Document No. PN10261EJ02V0DS (2nd edition)
Date Published February 2005 CP(K)
Printed in Japan

The mark ★ shows major revised points.

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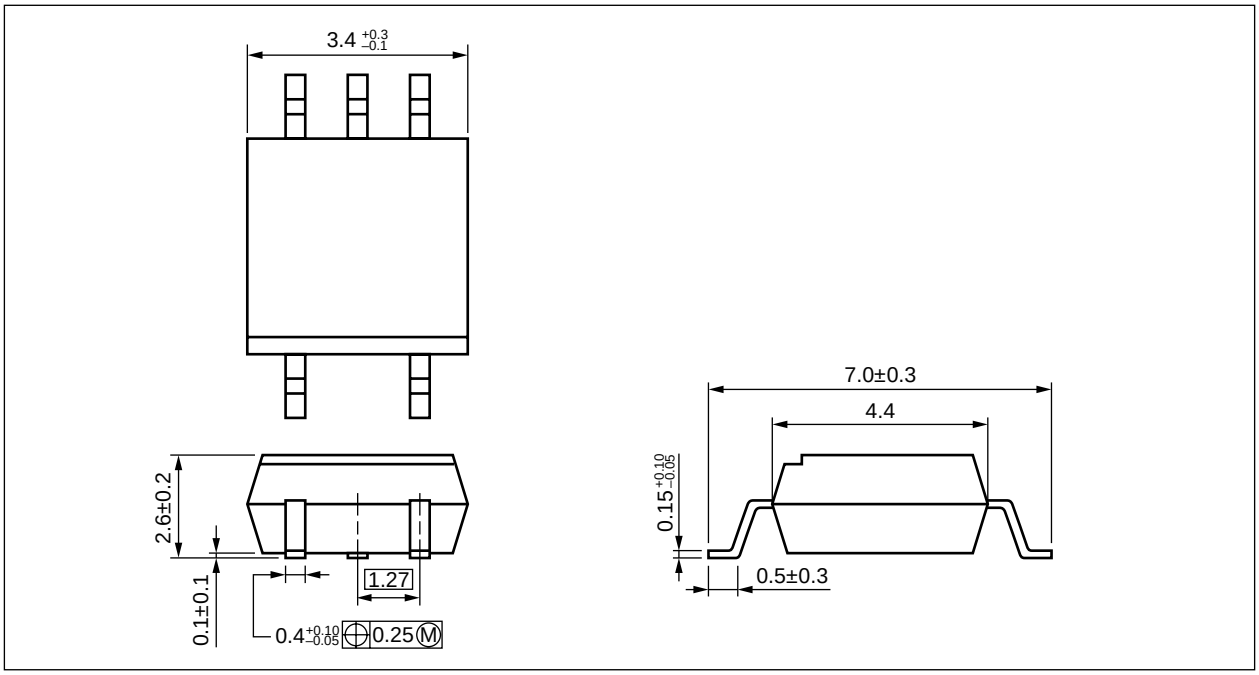
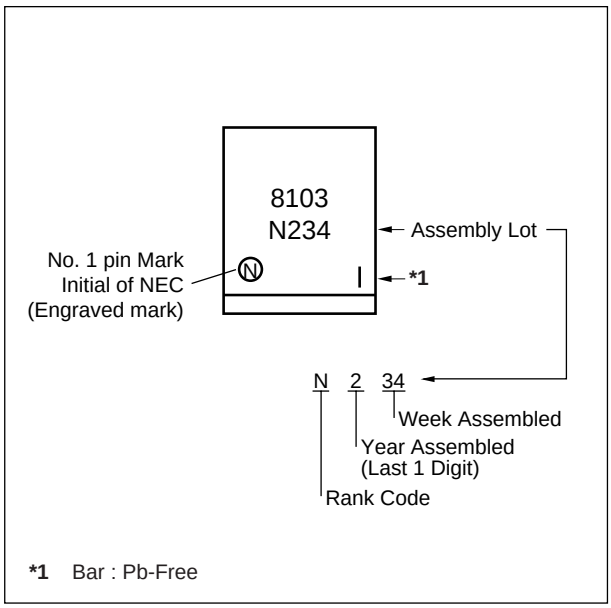
PACKAGE DIMENSIONS (UNIT: mm)



★ MARKING



★ ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS8103	PS8103-A	Pb-Free*2	Magazine case 100 pcs	Standard products	PS8103
PS8103-F3	PS8103-F3-A		Embossed Tape 2 500 pcs/reel	(UL approved)	
PS8103-F4	PS8103-F4-A				

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

***2** With regards to terminal solder (the solder contains lead) plated products (conventionally plated), contact your nearby sales office.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	5	V
	Power Dissipation*1	P_D	50	mW
Detector	Supply Voltage	V_{CC}	−0.5 to +15	V
	Output Voltage	V_O	−0.5 to +15	V
	Output Current	I_O	8	mA
	Power Dissipation*2	P_C	80	mW
Isolation Voltage*3		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T_A	−40 to +100	°C
Storage Temperature		T_{stg}	−55 to +125	°C

***1** Reduced to 0.5 mW/°C at T_A = 25°C or more.

***2** Applies to output pin V_O. Reduced to 0.8 mW/°C at T_A = 25°C or more.

***3** 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)

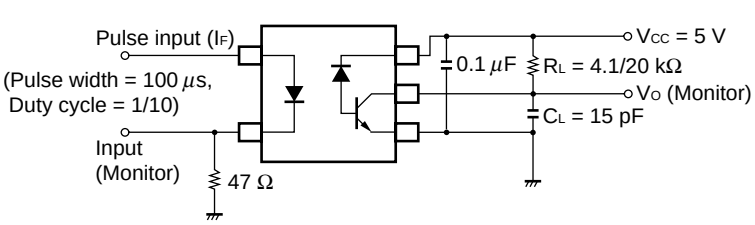
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 16 mA		1.2	1.5	V
	Reverse Current	I_R	V_R = 3 V			10	μA
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz		30		pF
Detector	High Level Output Current	I_{OH} (1)	I_F = 0 mA, V_{CC} = V_O = 5.5 V		7	500	nA
	High Level Output Current	I_{OH} (2)	I_F = 0 mA, V_{CC} = V_O = 15 V			100	μA
	Low Level Output Voltage	V_{OL}	I_F = 16 mA, V_{CC} = 4.5 V, I_{OL} = 1.1 mA		0.1	0.4	V
	High Level Supply Current	I_{CCH}	I_F = 0 mA, V_O = open, V_{CC} = 15 V		0.01	1	μA
	Low Level Supply Current	I_{CCL}	I_F = 16 mA, V_O = open, V_{CC} = 15 V		150	800	
Coupled	Current Transfer Ratio (I_C/I_F) *1	CTR	I_F = 16 mA, V_{CC} = 4.5 V, V_O = 0.4 V	10	23	30	%
	Isolation Resistance	R_{I-O}	V_{I-O} = 1 kV_{DC}, RH = 40 to 60%	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz		0.4		pF
	Propagation Delay Time (H → L) *2	t_{PHL}	I_F = 16 mA, V_{CC} = 5 V, R_L = 4.1 kΩ, C_L = 15 pF		1	5	μs
	Propagation Delay Time (L → H) *2	t_{PLH}			2	5	
	Propagation Delay Time (H → L) *2	t_{PHL}	I_F = 16 mA, V_{CC} = 5 V, R_L = 20 kΩ, C_L = 15 pF		1	15	
	Propagation Delay Time (L → H) *2	t_{PLH}			7	15	

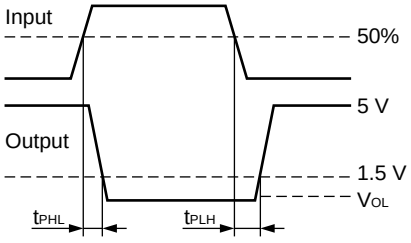
***1** CTR rank

L : 15 to 30 (%)

N : 10 to 30 (%)

***2** Test circuit for propagation delay time





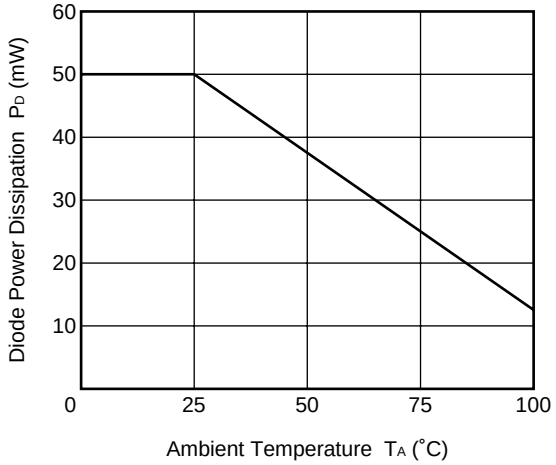
C_L includes probe and stray wiring capacitance.

USAGE CAUTIONS

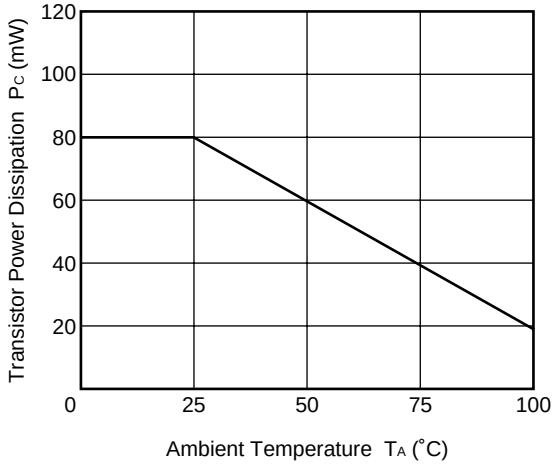
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor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

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

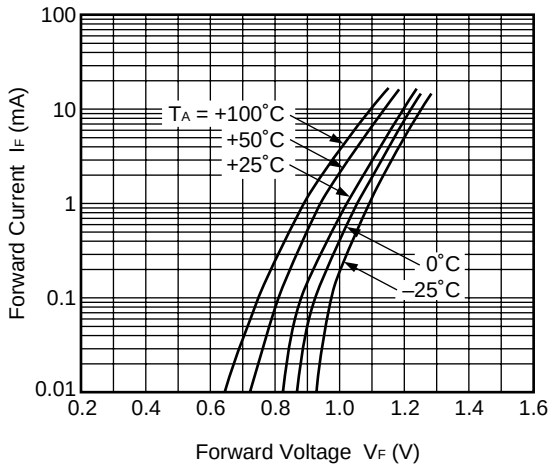
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



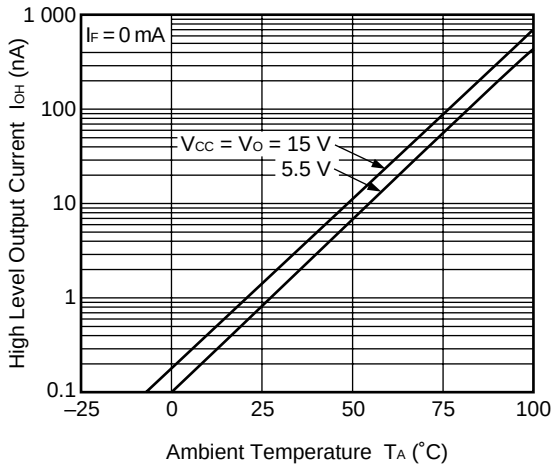
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



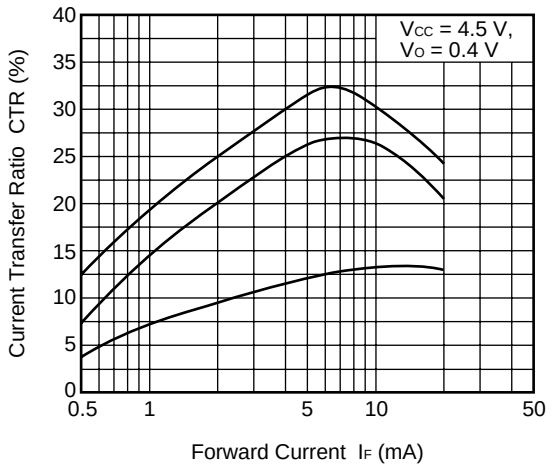
FORWARD CURRENT vs. FORWARD VOLTAGE



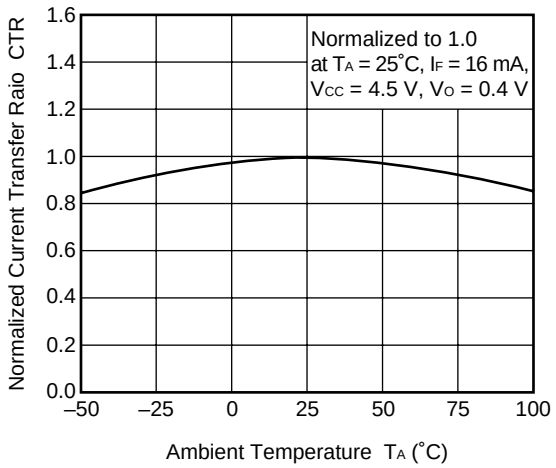
HIGH LEVEL OUTPUT CURRENT vs. AMBIENT TEMPERATURE



CURRENT TRANSFER RATIO vs. FORWARD CURRENT

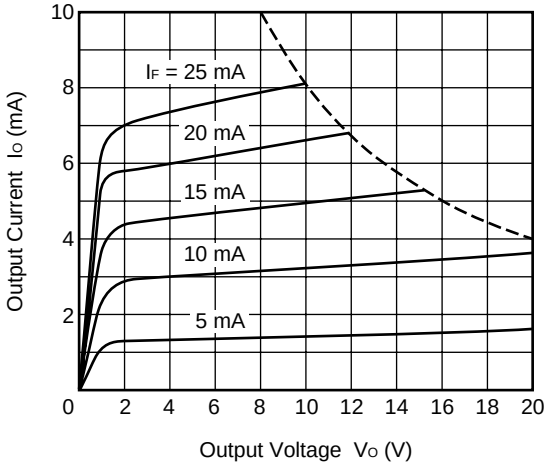


NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE

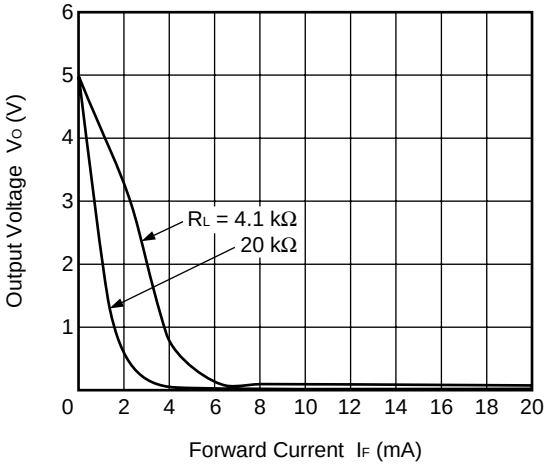


Remark The graphs indicate nominal characteristics.

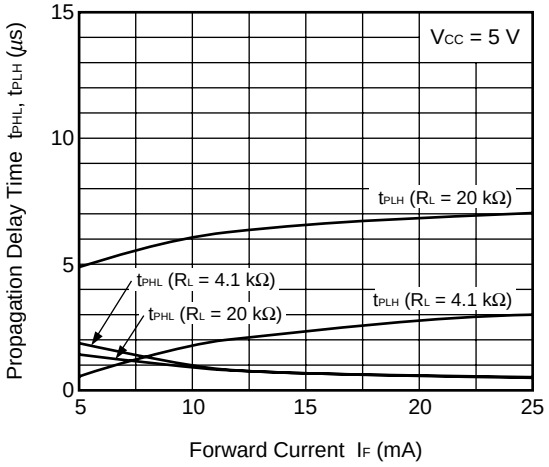
OUTPUT CURRENT vs.
OUTPUT VOLTAGE



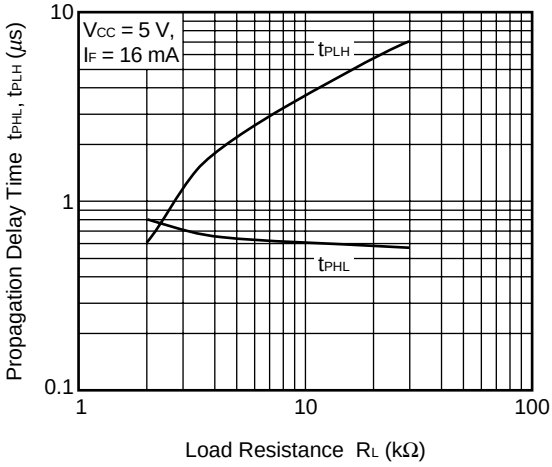
OUTPUT VOLTAGE vs.
FORWARD CURRENT



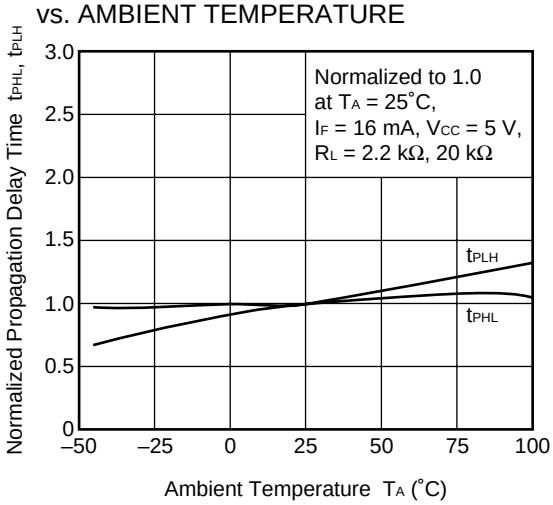
PROPAGATION DELAY TIME vs.
FORWARD CURRENT



PROPAGATION DELAY TIME vs.
LOAD RESISTANCE



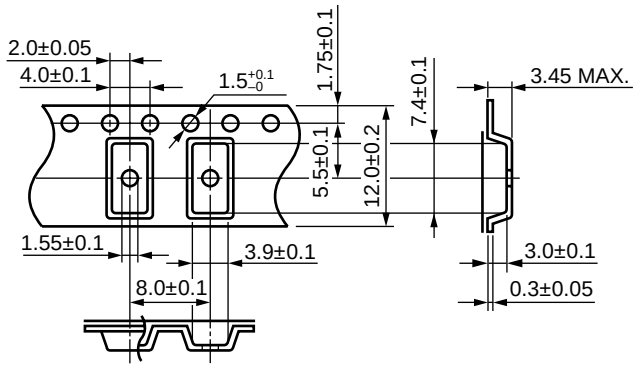
NORMALIZED PROPAGATION DELAY TIME
vs. AMBIENT TEMPERATURE



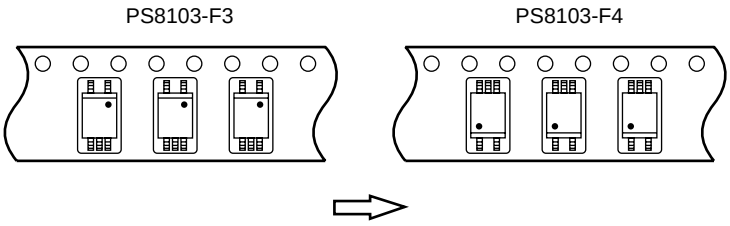
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

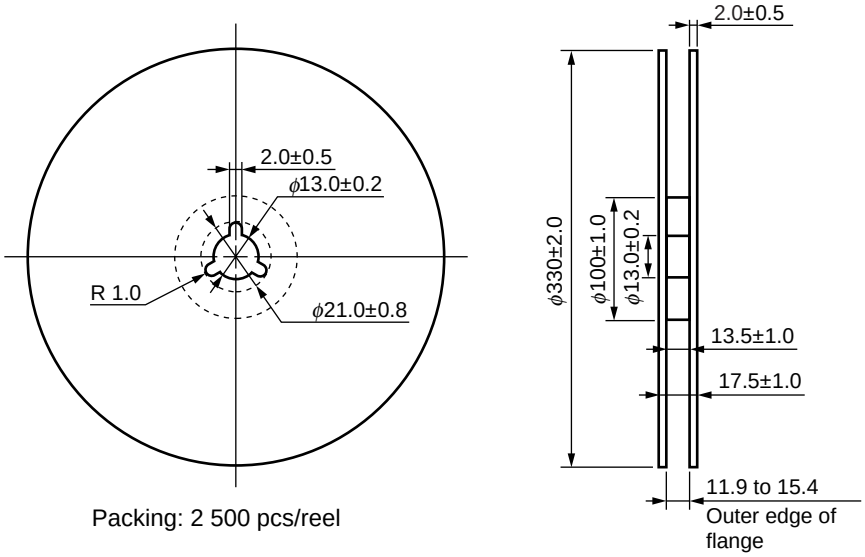
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

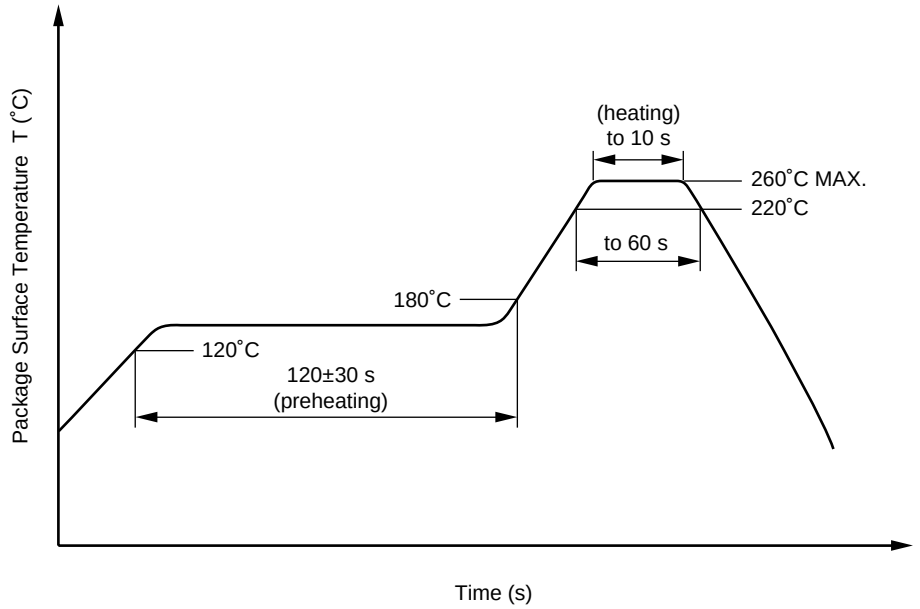
NOTES ON HANDLING

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.

★ USAGE CAUTIONS

1. Protect against static electricity when handling.

2. Avoid storage at a high temperature and high humidity.

CEL California Eastern Laboratories

4590 Patrick Henry Drive
Santa Clara, CA 95054-1817
Telephone: (408) 919-2500
Facsimile: (408) 988-0279

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
Lead (Pb)	< 1000 PPM	-A	-AZ
		Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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