NEC

PHOTOCOUPLER
PS9115

HIGH CMR, 10 Mbps TOTEM POLE OUTPUT TYPE 5-PIN SOP PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS9115 is an optically coupled high-speed, totem pole output isolator containing a GaAlAs LED on the input side and a photodiode and a signal processing circuit on the output side on one chip.

PS9115 is specified high CMR, high CTR and pulse width distortion with operating temperature.

FEATURES

- Wave soldering (260°C, 10 s, One)
- High common mode transient immunity (CM_H, CM_L = ±20 kV/μs TYP.)
- High-speed (10 Mbps)
- Pulse width distortion ($|t_{PHL} - t_{PLH}|$ = 7 ns TYP.)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Totem pole output
- Ordering number of taping product: PS9115-F3, F4: 2 500 pcs/reel

APPLICATIONS

- Measurement equipment
- PDP
- Line Receiver for FA Network

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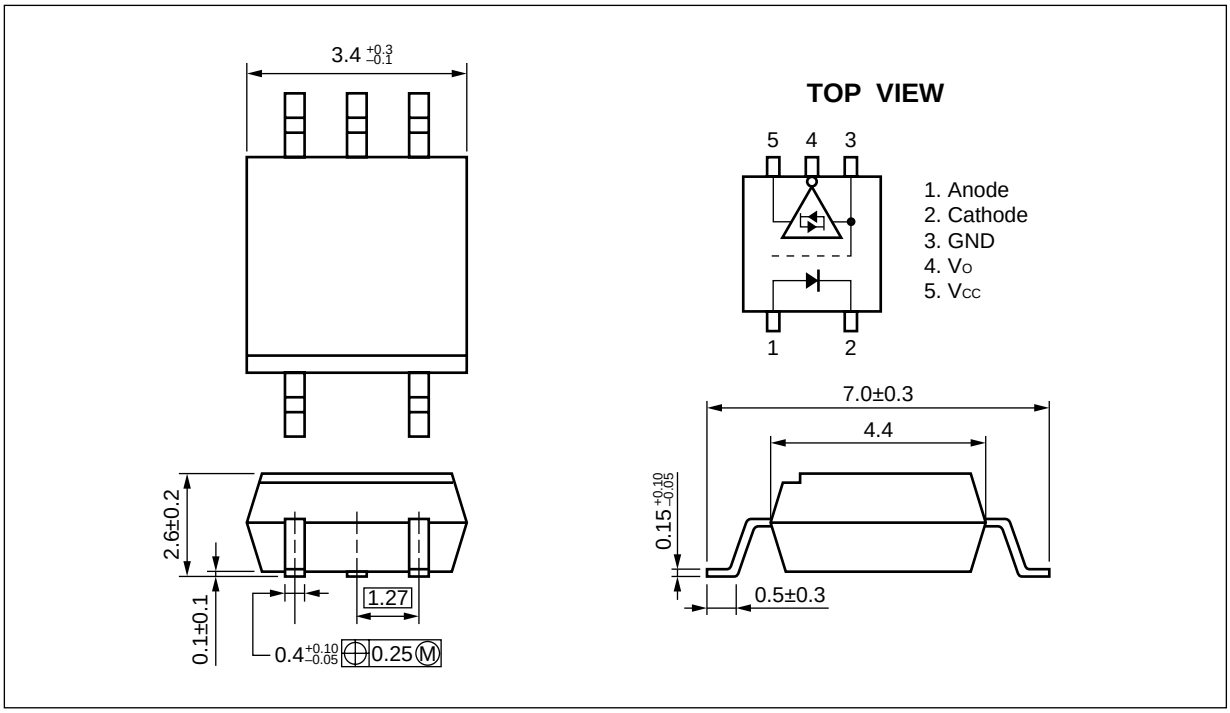
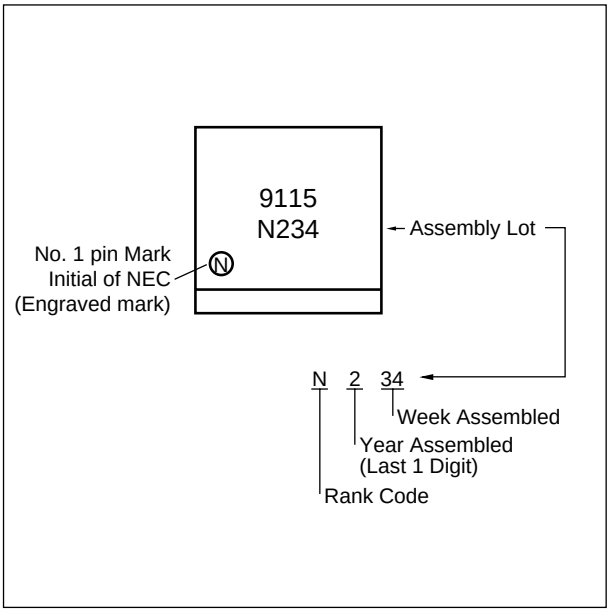
Date Published February 2003 CP(K)
Printed in Japan

PACKAGE DIMENSIONS (UNIT: mm)



MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Package	Packing Style	Application Part Number[*1]
PS9115	5-pin SOP	20 pcs (Tape 20 pcs cut)	PS9115
PS9115-F3		Embossed tape 2 500 pcs/reel	
PS9115-F4			

***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[*1]	I_F	30	mA
	Reverse Voltage	V_R	5	V
Detector	Supply Voltage	V_{CC}	7	V
	Output Voltage	V_O	7	V
	High Level Output Current	I_{OH}	–5	mA
	Low Level Output Current	I_{OL}	13	mA
	Power Dissipation[*2]	P_C	130	mW
Isolation Voltage[*3]		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T_A	–40 to +85	°C
Storage Temperature		T_{stg}	–55 to +125	°C

***1** Reduced to 0.3 mA/°C at T_A = 25°C or more.

***2** T_A = –40 to +85°C, Applies to output pin V_O and power supply pin V_{CC}. Reduced to 2.36 mW/°C at T_A = 70°C or more.

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

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
High Level Input Current	I_{FH}	7.5		12.5	mA
Low Level Input Voltage	V_{FL}	0		0.8	V
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
TTL (loads)	N			3	
Operating Ambient Temperature	T_A	0		+85	°C

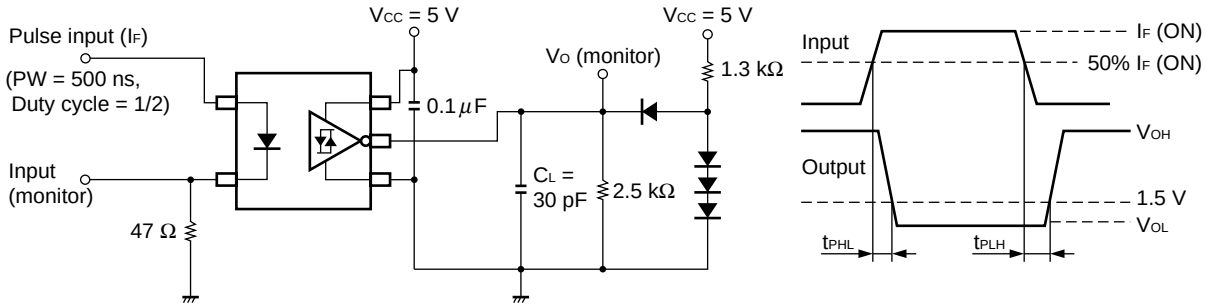
ELECTRICAL CHARACTERISTICS (T_A = 0 to +85°C, unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.[*1]	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 10 mA, T_A = 25°C	1.4	1.65	1.9	V
	Reverse Current	I_R	V_R = 3 V, T_A = 25°C			10	μA
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz, T_A = 25°C		30		pF
Detector	High Level Output Current[*2]	I_{OH}	V_{CC} = V_O = 5.5 V, V_F = 0.8 V		0.003	200	μA
	High Level Output Voltage	V_{OH}	V_{CC} = 4.5 V, V_F = 0.8 V, I_{OH} = –2 mA	2.4	3.0		V
	Low Level Output Voltage	V_{OL}	V_{CC} = 4.5 V, I_F = 7 mA, I_{OL} = 8 mA		0.25	0.6	V
	High Level Supply Current	I_{CCH}	V_{CC} = 5.5 V, I_F = 0 mA, V_O = open		12	16	mA
	Low Level Supply Current	I_{CCL}	V_{CC} = 5.5 V, I_F = 10 mA, V_O = open		13	16	mA
	High Level Output Short Circuit Current	I_{OSH}	V_{CC} = 5.5 V, V_O = GND, I_F = 0 mA, 10 ms or less		–26		mA
	Low Level Output Short Circuit Current	I_{OSL}	V_{CC} = V_O = 5.5 V, I_F = 8 mA, 10 ms or less		34		mA
Coupled	Threshold Input Current (H → L)	I_{FHL}	T_A = 25°C		2.3	5	mA
			V_{CC} = 5 V, V_O = 0.6 V			6	
	Isolation Resistance	R_{I-O}	V_{I-O} = 1 kV_{DC}, RH = 40 to 60%, T_A = 25°C	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz, T_A = 25°C		0.6		pF
	Propagation Delay Time (H → L)[*3]	t_{PHL}	T_A = 25°C	15	33	65	ns
			V_{CC} = 5 V, I_F = 7.5 mA	10		85	
	Propagation Delay Time (L → H)[*3]	t_{PLH}	T_A = 25°C	15	40	65	ns
			V_{CC} = 5 V, I_F = 7.5 mA	10		85	
	Pulse Width Distortion (PWD)[*3]	$\lvert t_{PHL}-t_{PLH} \rvert$	V_{CC} = 5 V, I_F = 7.5 mA		7	50	ns
	Common Mode Transient Immunity at High Level Output[*4]	CM_H	V_{CC} = 5 V, T_A = 25°C, I_F = 0 mA, $V_{O\,(MIN.)}$ = 2 V, V_{CM} = 1 kV	10	20		kV/μs
	Common Mode Transient Immunity at Low Level Output[*4]	CM_L	V_{CC} = 5 V, T_A = 25°C, I_F = 7.5 mA, $V_{O\,(MAX.)}$ = 0.8 V, V_{CM} = 1 kV	10	20		kV/μs

***1** Typical values at T_A = 25°C

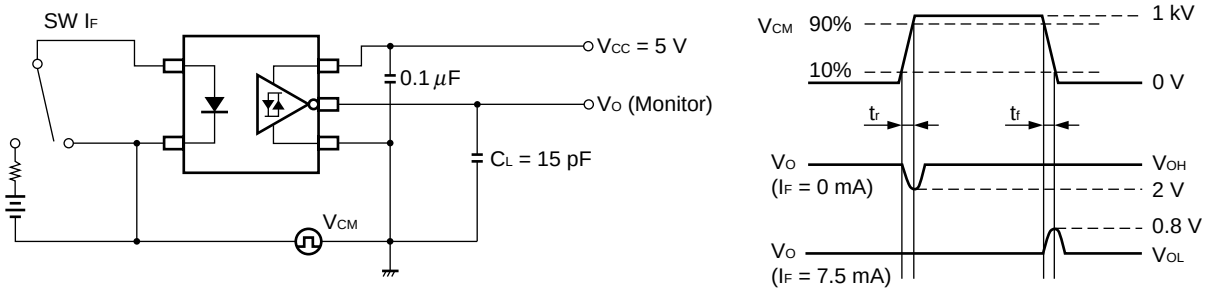
***2** Because a high-level output current (I_{OH}) of 300 μA or more may be output when the temperature is 0°C or less and when V_{CC} is around 3 to 4 V, it is important to confirm the characteristics (operation with the power supply on and off) during design, before using this device.

***3** Test circuit for propagation delay time



C_L includes probe and stray wiring capacitance.

***4** Test circuit for common mode transient immunity



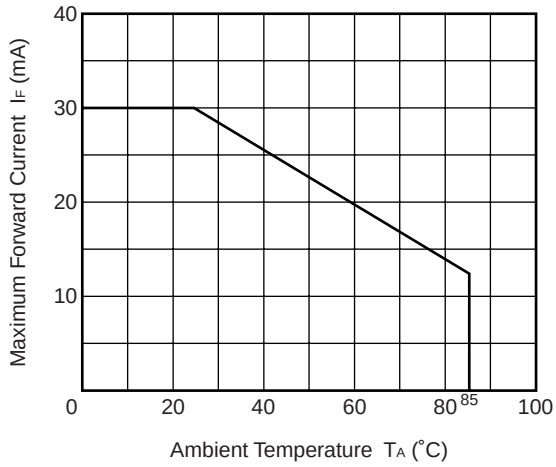
C_L includes probe and stray wiring capacitance.

USAGE CAUTIONS

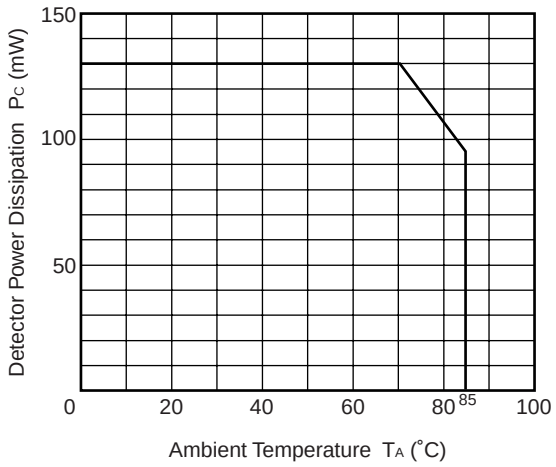
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor 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)

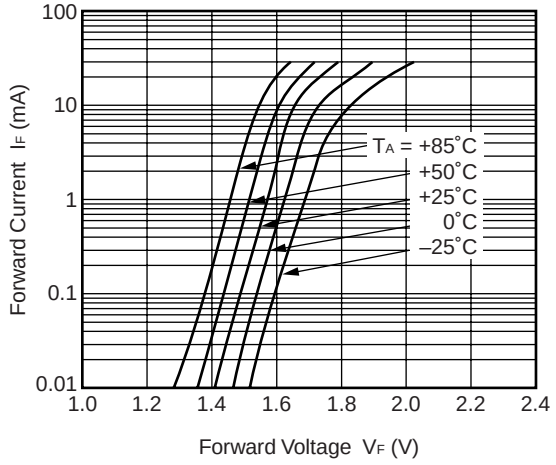
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



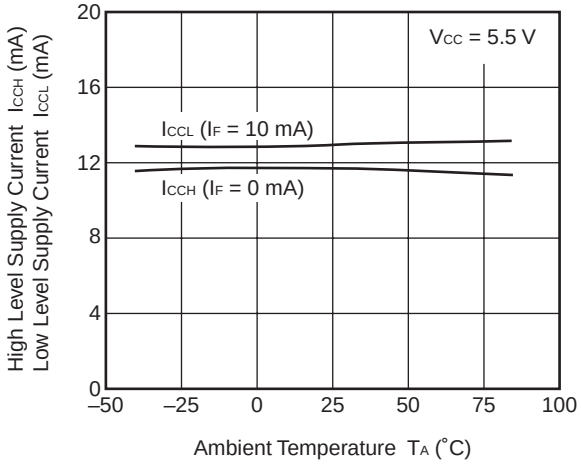
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



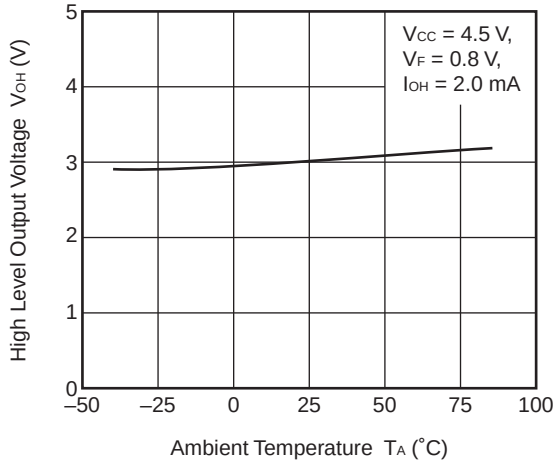
FORWARD CURRENT vs. FORWARD VOLTAGE



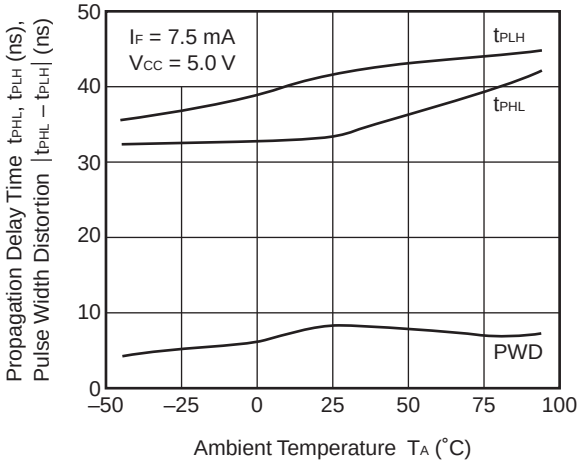
SUPPLY CURRENT vs. AMBIENT TEMPERATURE



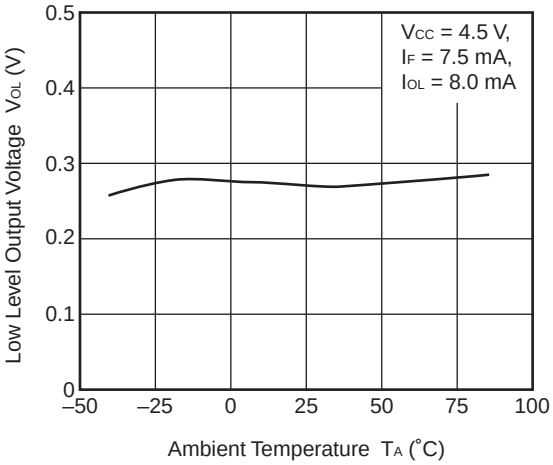
HIGH LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



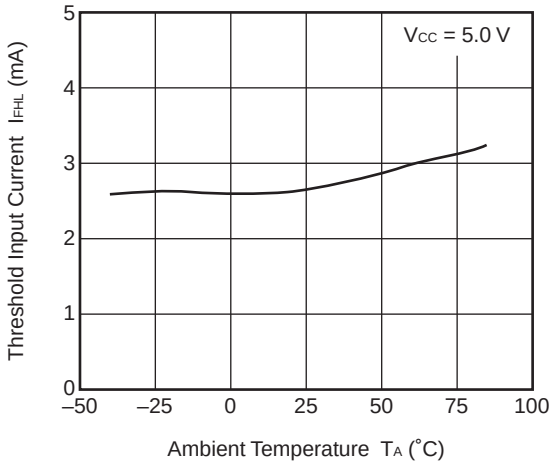
PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. AMBIENT TEMPERATURE



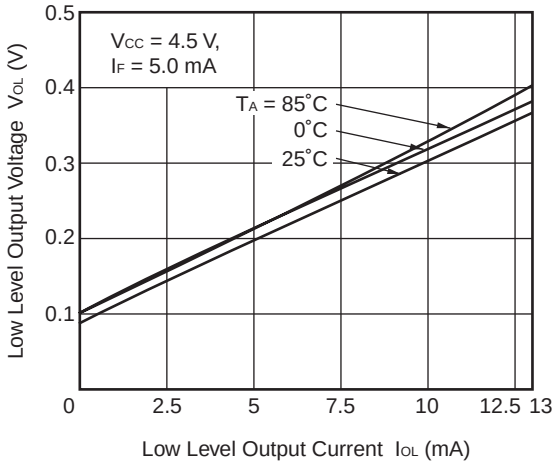
LOW LEVEL OUTPUT VOLTAGE vs.
AMBIENT TEMPERATURE



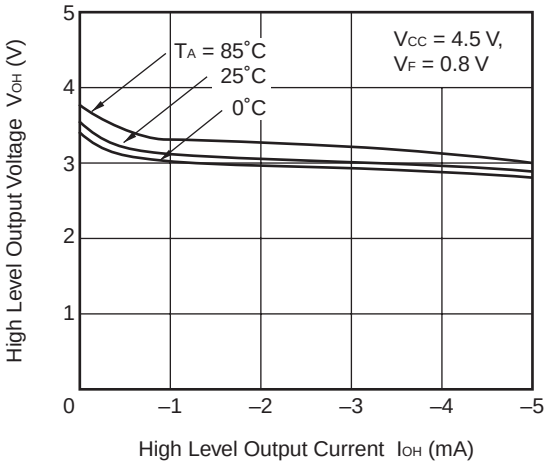
THRESHOLD INPUT CURRENT vs.
AMBIENT TEMPERATURE



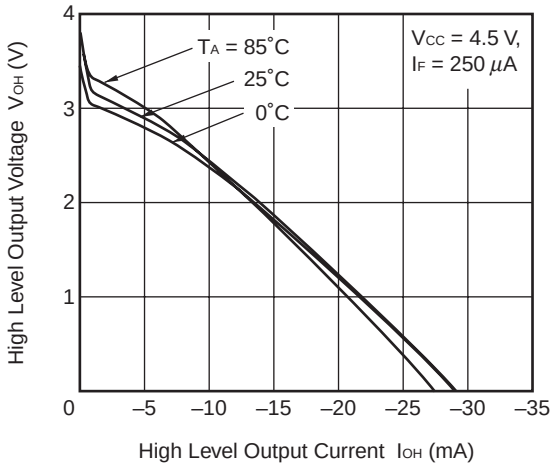
LOW LEVEL OUTPUT VOLTAGE vs.
LOW LEVEL OUTPUT CURRENT



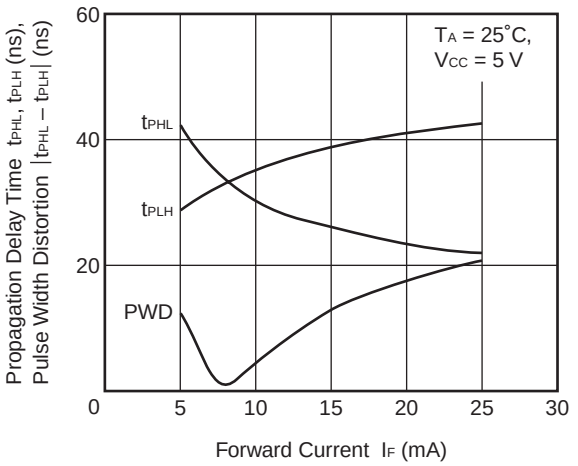
HIGH LEVEL OUTPUT VOLTAGE vs.
HIGH LEVEL OUTPUT CURRENT



HIGH LEVEL OUTPUT VOLTAGE vs.
HIGH LEVEL OUTPUT CURRENT



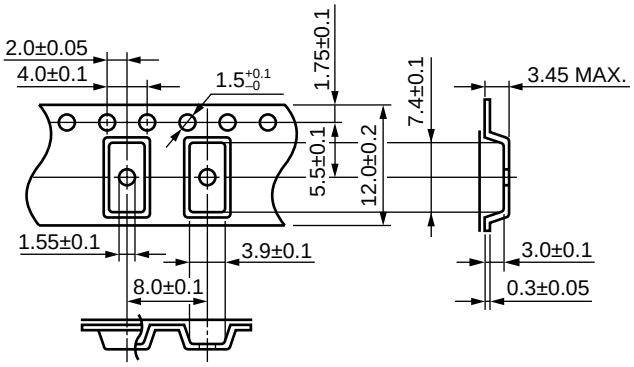
PROPAGATION DELAY TIME,
PULSE WIDTH DISTORTION
vs. FORWARD CURRENT



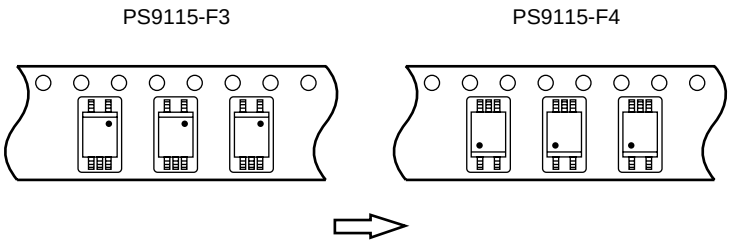
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

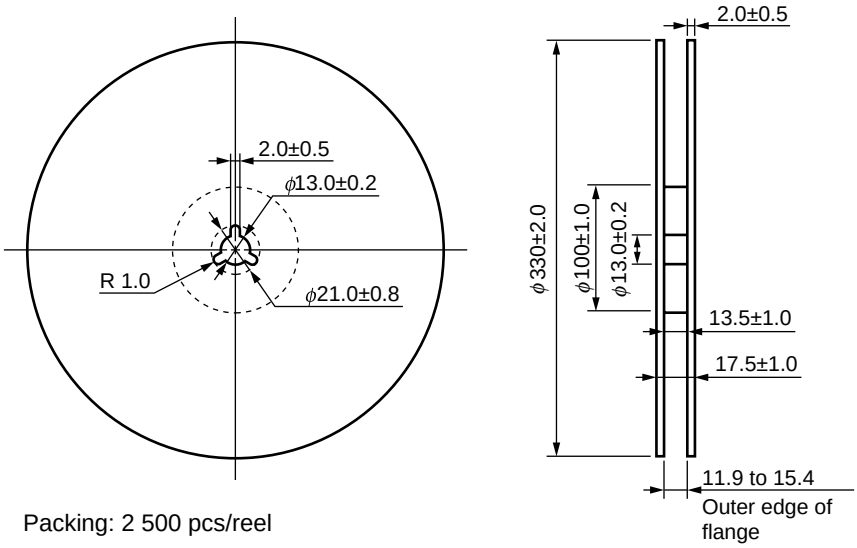
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

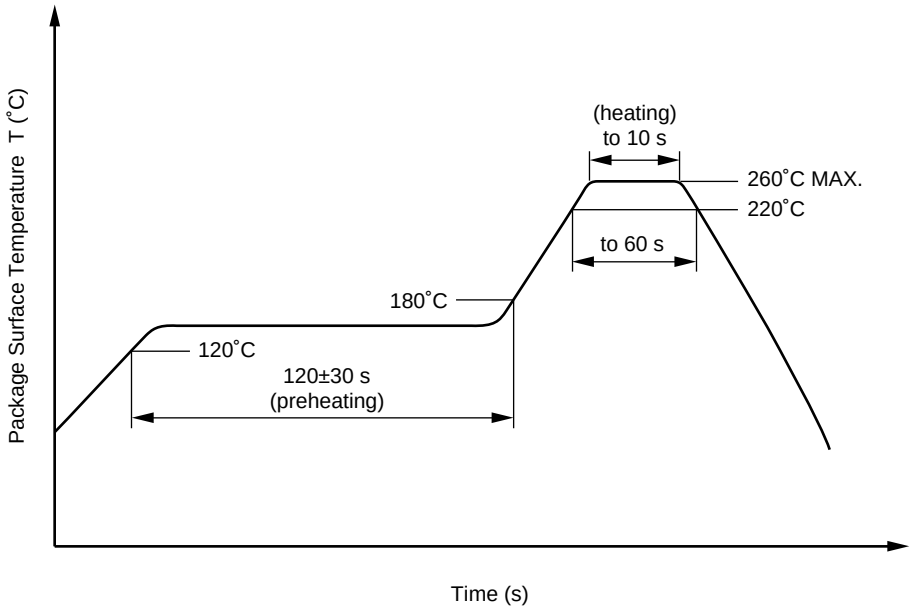
NOTES ON HANDLING

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) 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.

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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.

▶**For further information, please contact**

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