NEC

PHOTOCOUPLER
PS9715

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

–NEPOC Series–

DESCRIPTION

The PS9715 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.

FEATURES

- High common mode transient immunity (CM_H, CM_L = ±20 kV/μs TYP.)
- Small and thin package (5-pin SOP)
- 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 (No pull-up resistor required)
- Ordering number of taping product: PS9715-F3, F4: 3 500 pcs/reel

APPLICATIONS

- Measurement equipment
- PDP
- Line Receiver for FA Network

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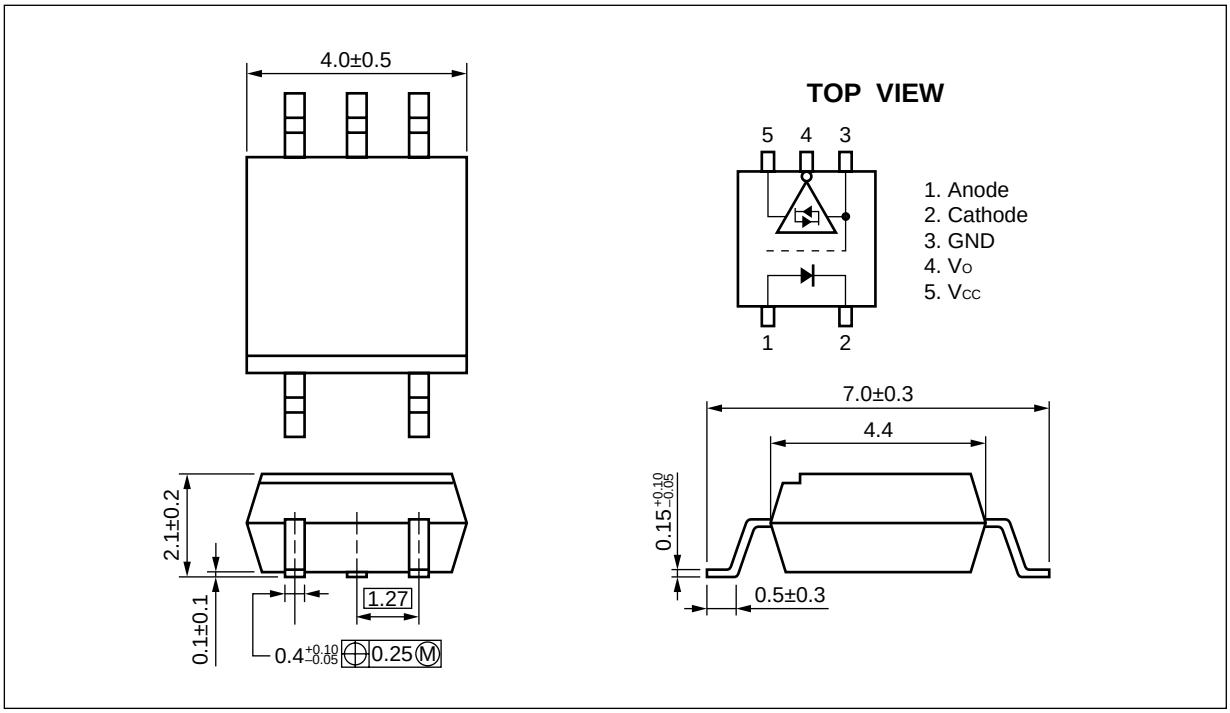
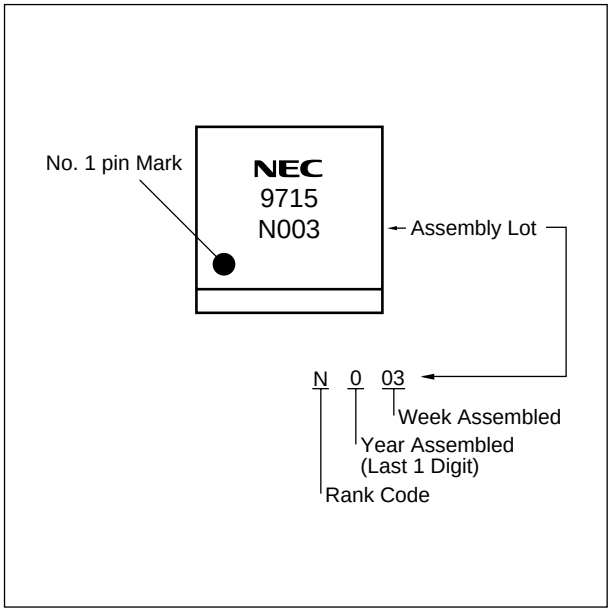
(Previous No. P14869EJ2V0DS00)
Date Published April 2002 CP(K)
Printed in Japan

The mark ★ shows major revised points.

★ **PACKAGE DIMENSIONS (UNIT: mm)**



MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Package	Packing Style	Application Part Number*1
PS9715	5-pin SOP	Magazine case 100 pcs	PS9715
PS9715-F3		Embossed tape 3 500 pcs/reel	
PS9715-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	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*1	P_C	130	mW
Isolation Voltage*2		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T_A	–40 to +85	°C
Storage Temperature		T_{stg}	–55 to +125	°C

***1** T_A = –40 to +85°C, Applies to output pin V_O and power supply pin V_{CC}.

***2** 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

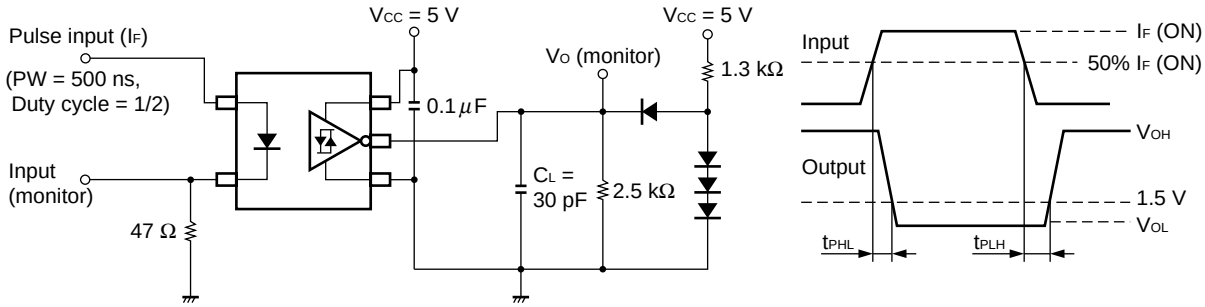
ELECTRICAL CHARACTERISTICS (T_A = 0 to +85°C, unless otherwise specified)

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		12	17	mA
	Low Level Supply Current	I_{CCL}	V_{CC} = 5.5 V, I_F = 10 mA		13	18	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}	V_{CC} = 5 V, T_A = 25°C		2.3	5	mA
						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		0.4		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

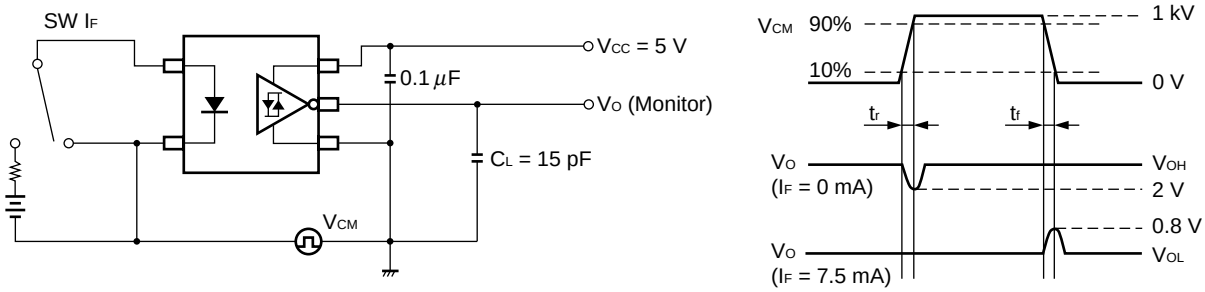
***2** Because a high-level output current (I_{OH}) of 300 μA or more may be output when the temperature is 0°C or less and when V_{CC} is around 3 to 4 V, it is important to confirm the characteristics (operation with the power supply on and off) during design, before using this device.

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



C_L includes probe and stray wiring capacitance.

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



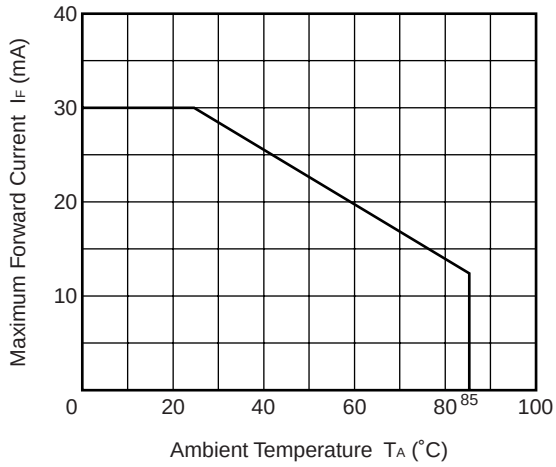
C_L includes probe and stray wiring capacitance.

USAGE CAUTIONS

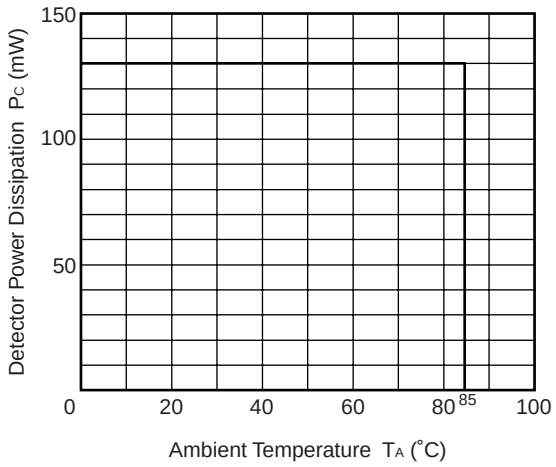
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of more than 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler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

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

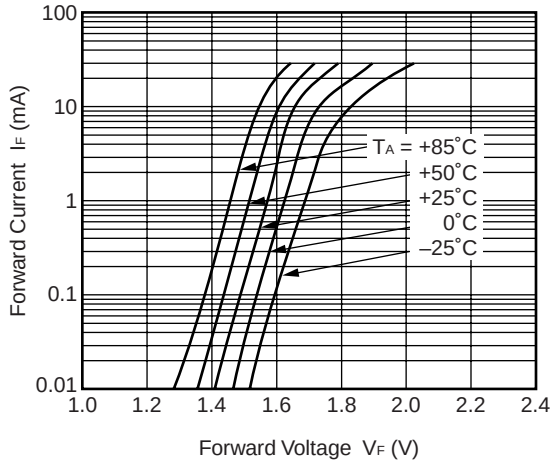
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



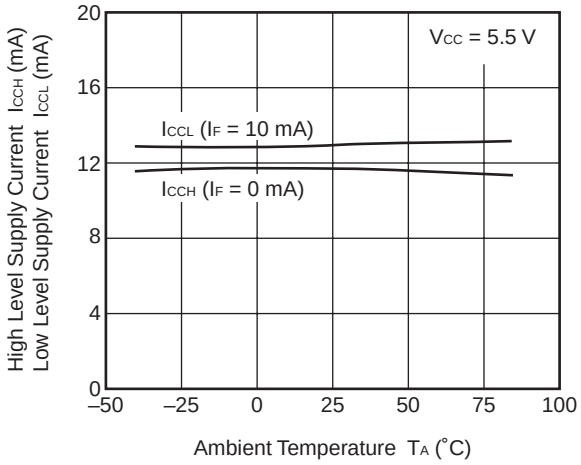
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



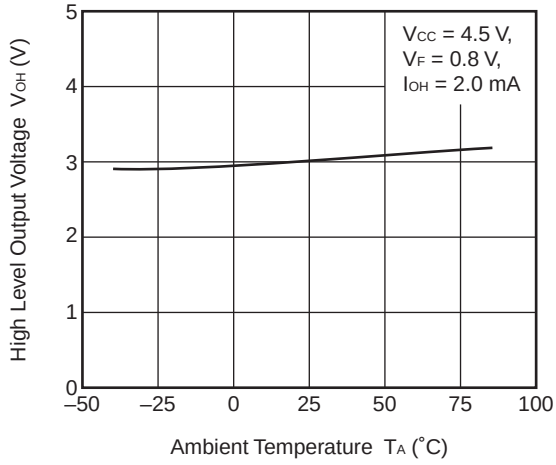
FORWARD CURRENT vs. FORWARD VOLTAGE



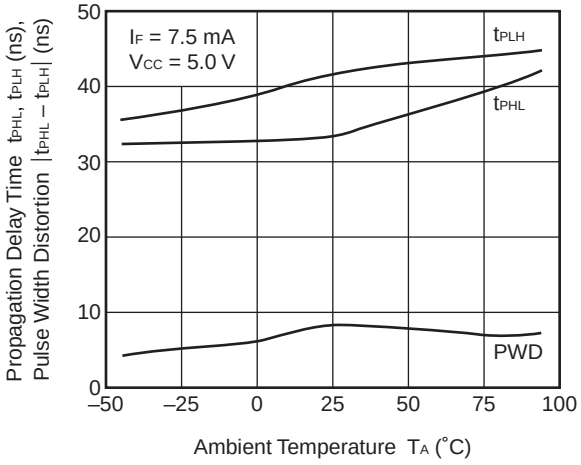
SUPPLY CURRENT vs. AMBIENT TEMPERATURE



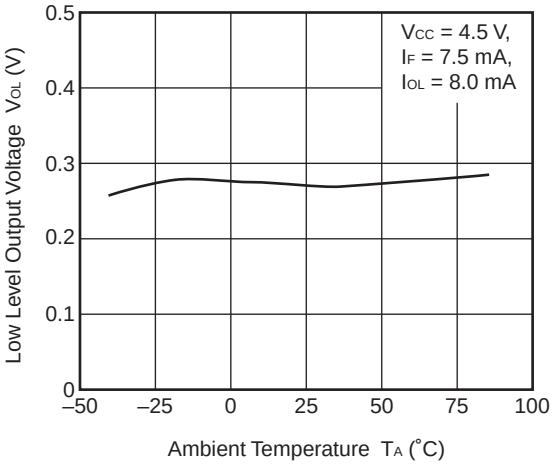
HIGH LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



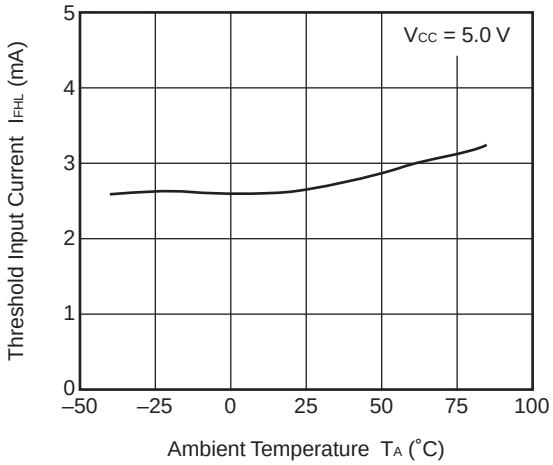
PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. AMBIENT TEMPERATURE



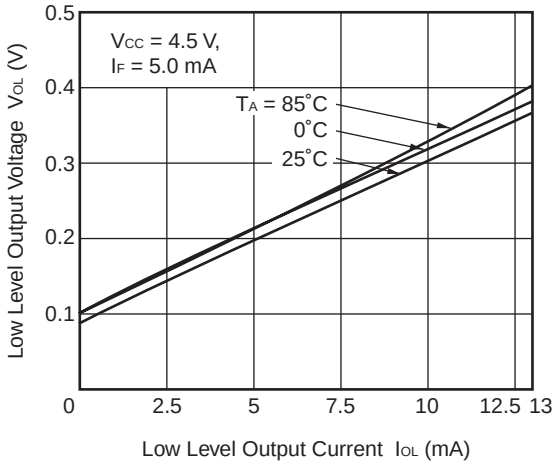
LOW LEVEL OUTPUT VOLTAGE vs.
AMBIENT TEMPERATURE



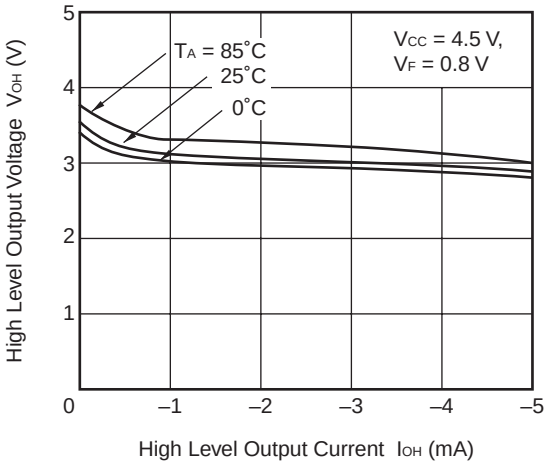
THRESHOLD INPUT CURRENT vs.
AMBIENT TEMPERATURE



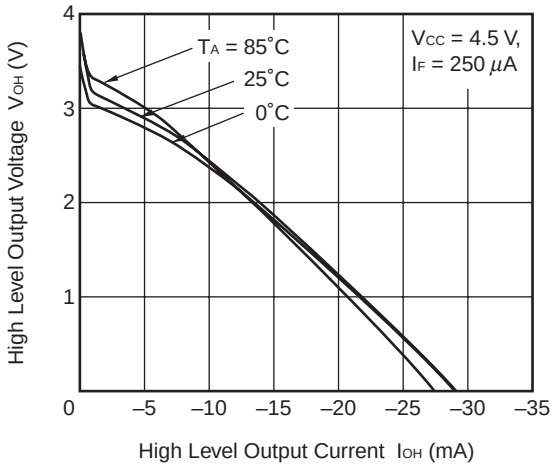
LOW LEVEL OUTPUT VOLTAGE vs.
LOW LEVEL OUTPUT CURRENT



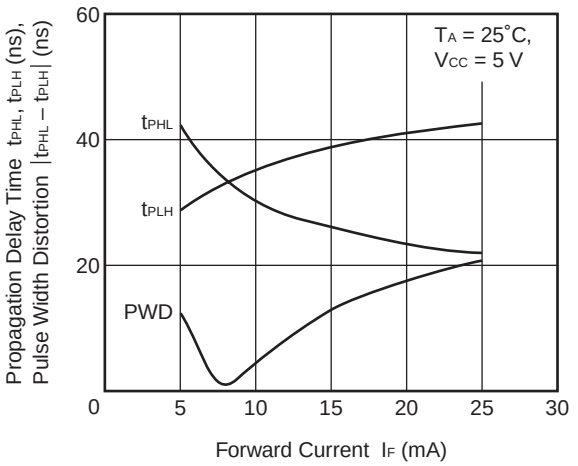
HIGH LEVEL OUTPUT VOLTAGE vs.
HIGH LEVEL OUTPUT CURRENT



HIGH LEVEL OUTPUT VOLTAGE vs.
HIGH LEVEL OUTPUT CURRENT



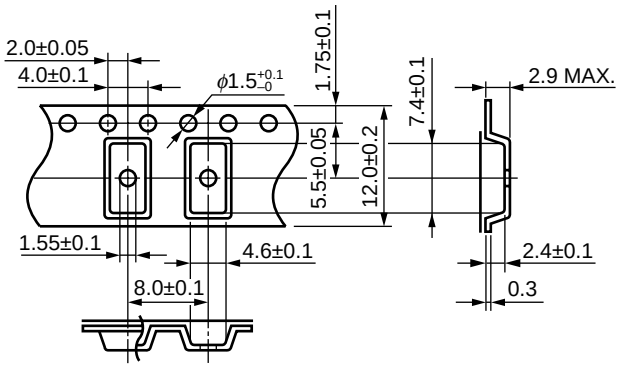
PROPAGATION DELAY TIME,
PULSE WIDTH DISTORTION
vs. FORWARD CURRENT



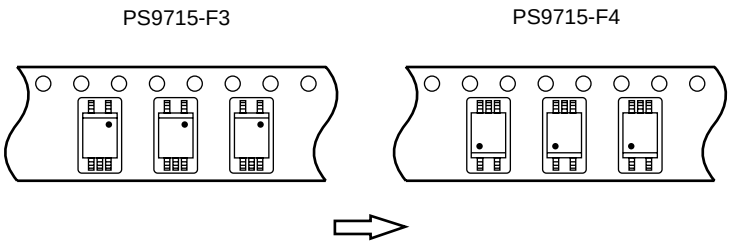
Remark The graphs indicate nominal characteristics.

★ **TAPING SPECIFICATIONS (UNIT: mm)**

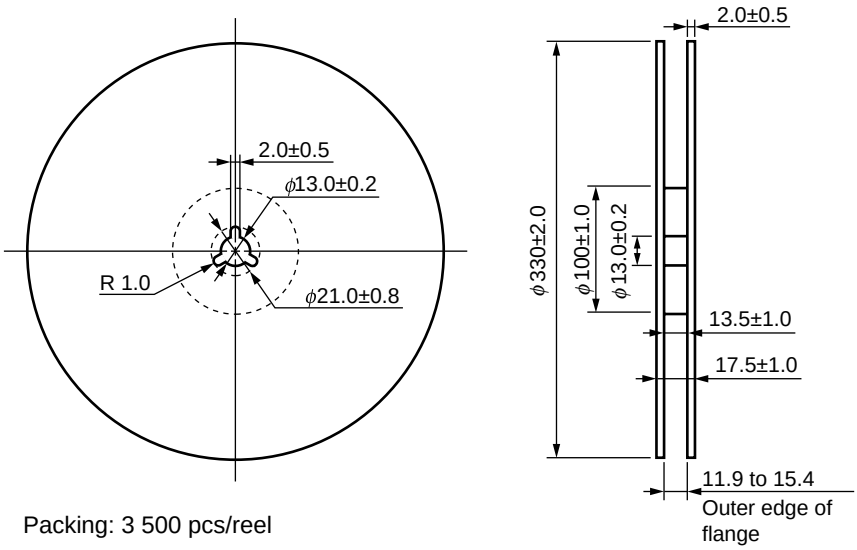
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



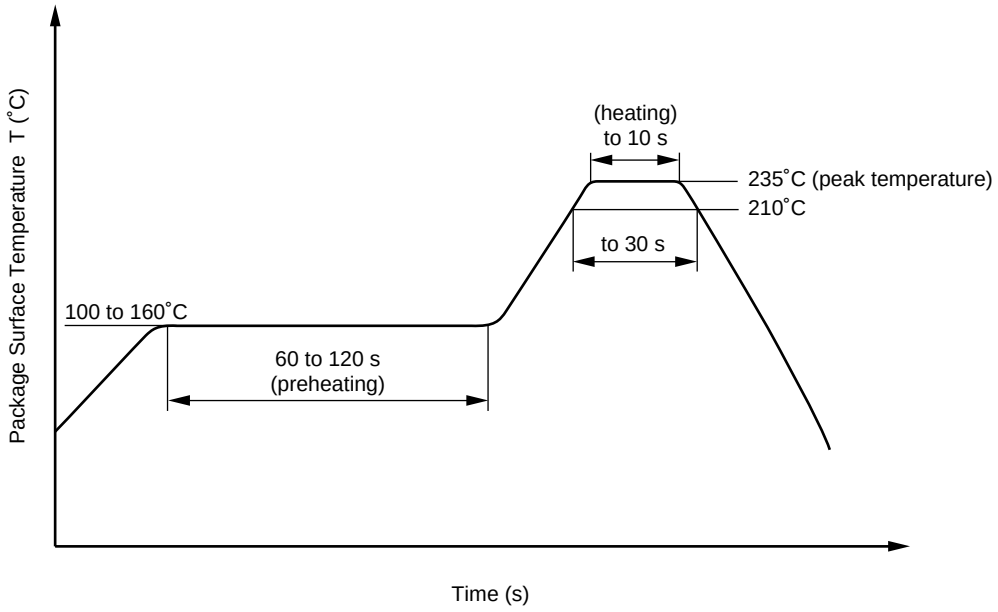
Packing: 3 500 pcs/reel

★ 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) Cautions

• Fluxes

Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

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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.

▶**Business issue**

NEC Compound Semiconductor Devices, Ltd.
5th Sales Group, Sales Division TEL: +81-3-3798-6372 FAX: +81-3-3798-6783 E-mail: salesinfo@csd-nec.com

NEC Compound Semiconductor Devices Hong Kong Limited
Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309
Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859
Korea Branch Office TEL: +82-2-528-0301 FAX: +82-2-528-0302

NEC Electron Devices European Operations http://www.nec.de/
TEL: +49-211-6503-101 FAX: +49-211-6503-487

California Eastern Laboratories, Inc. http://www.cel.com/
TEL: +1-408-988-3500 FAX: +1-408-988-0279

▶**Technical issue**

NEC Compound Semiconductor Devices, Ltd. http://www.csd-nec.com/
Sales Engineering Group, Sales Division
E-mail: techinfo@csd-nec.com FAX: +81-44-435-1918