

**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

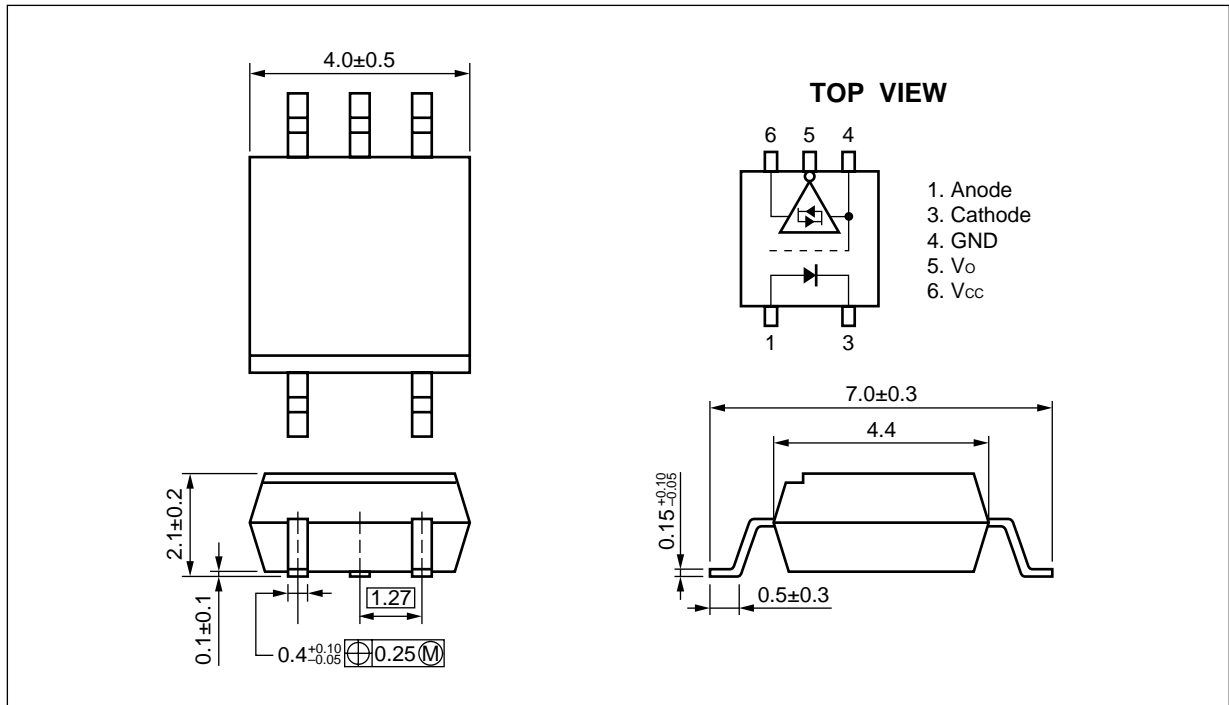
- High common mode transient immunity ($CM_H, CM_L = \pm 20 \text{ kV}/\mu\text{s}$ TYP.)
- Small package (5-pin SOP)
- High-speed (10 Mbps)
- Pulse width distortion ($|t_{PHL} - t_{PLH}| = 7 \text{ ns}$ TYP.)
- High isolation voltage ($BV = 2\,500 \text{ Vr.m.s.}$)
- Totem pole output (No pull-up resistor required)
- Ordering number of taping product: PS9715-F3, F4: 3 500 pcs/reel

APPLICATIONS

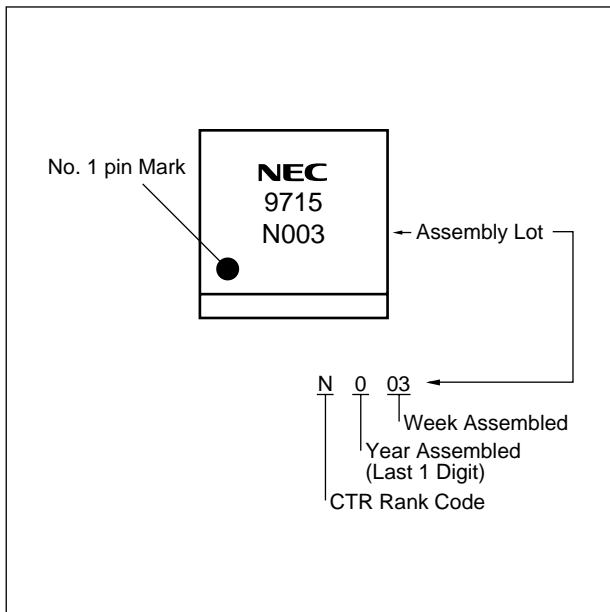
- Measurement equipment
- PDP
- ★ • Line Receiver for FA Network

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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	3	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

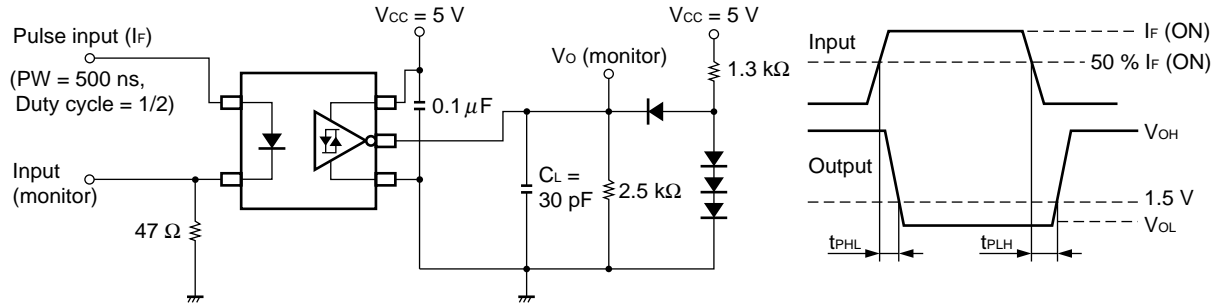
★ ELECTRICAL CHARACTERISTICS (T_A = 0 to +85 °C, unless otherwise specified)

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		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}	V _{CC} = 5 V, I _F = 7.5 mA	T _A = 25 °C	15	33	65	ns
					10		85	
	Propagation Delay Time (L → H) ³	t _{PLH}	V _{CC} = 5 V, I _F = 7.5 mA	T _A = 25 °C	15	40	65	ns
					10		85	
Pulse Width Distortion (PWD) ³	t _{PHL} - t _{PLH}	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 $T_A = 25\text{ }^\circ\text{C}$

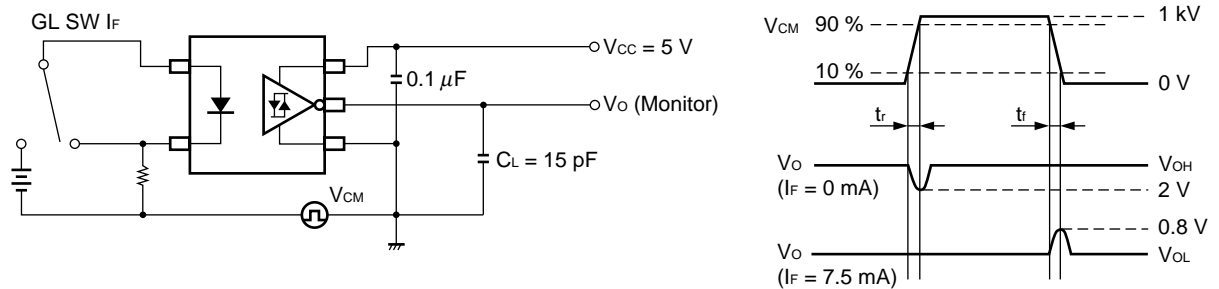
- ★ *2 Because a high-level output current (I_{OH}) of $300\text{ }\mu\text{A}$ or more may be output when the temperature is $0\text{ }^\circ\text{C}$ or less and when V_{CC} is around 3 to 4 V, it is important to confirm the characteristics (operation with the power supply on and off) during design, 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

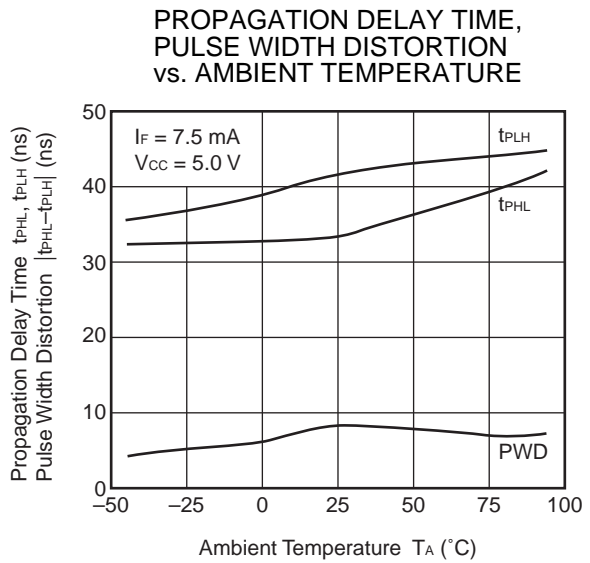
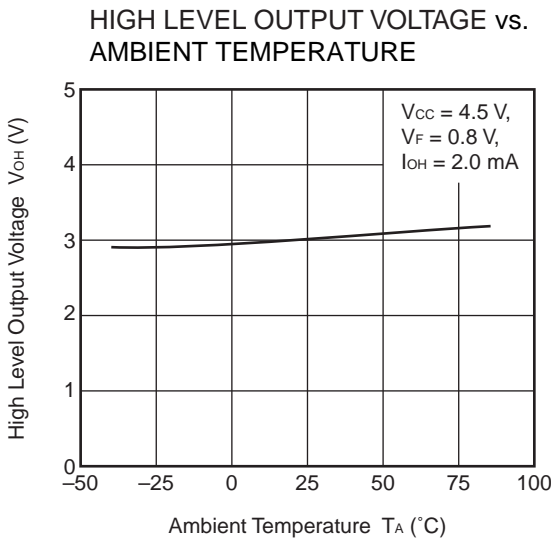
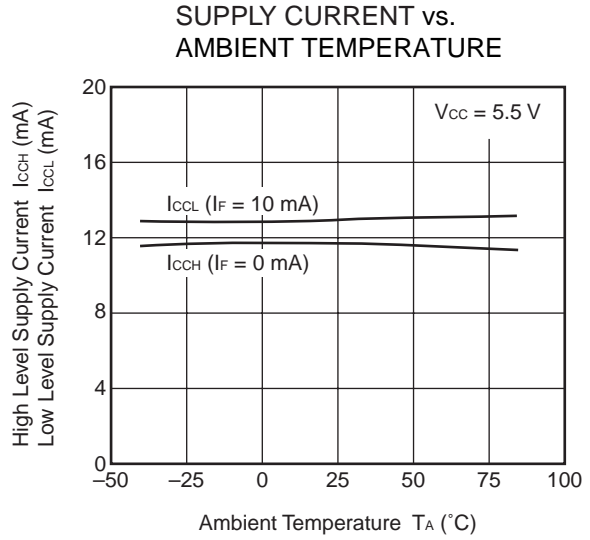
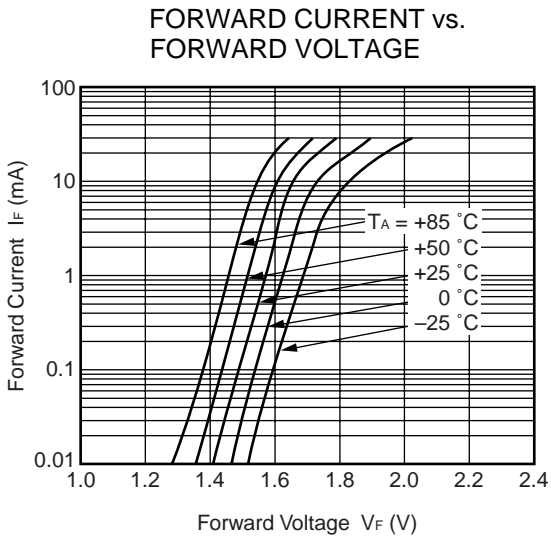
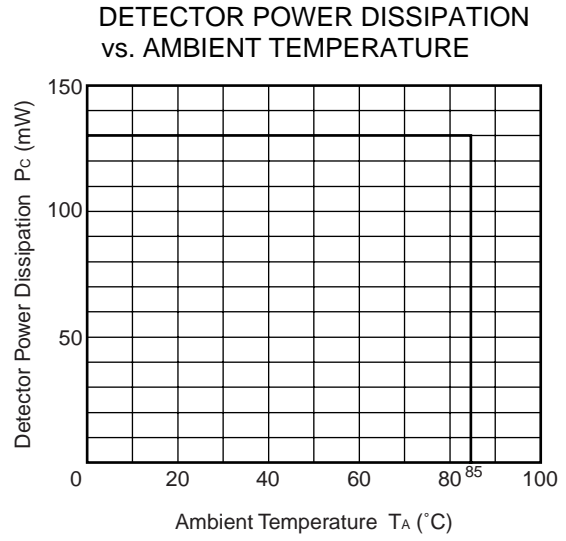
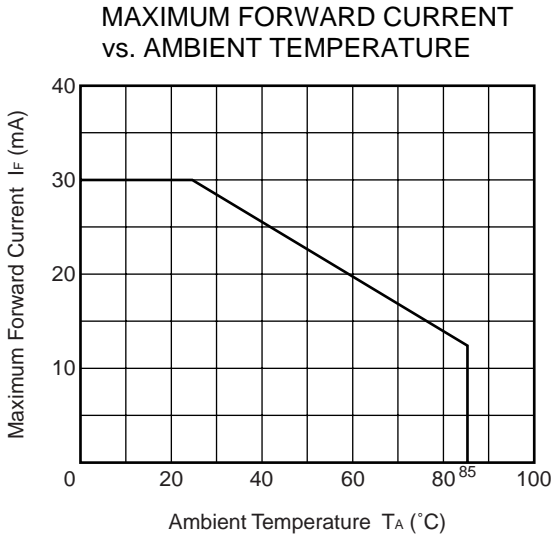


C_L includes probe and stray wiring capacitance.

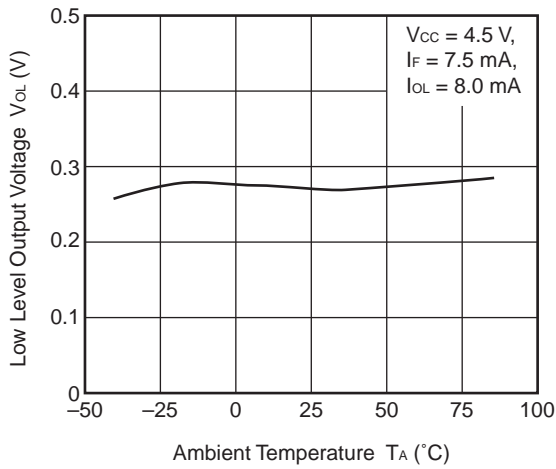
USAGE CAUTIONS

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 $0.1\text{ }\mu\text{F}$ 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.

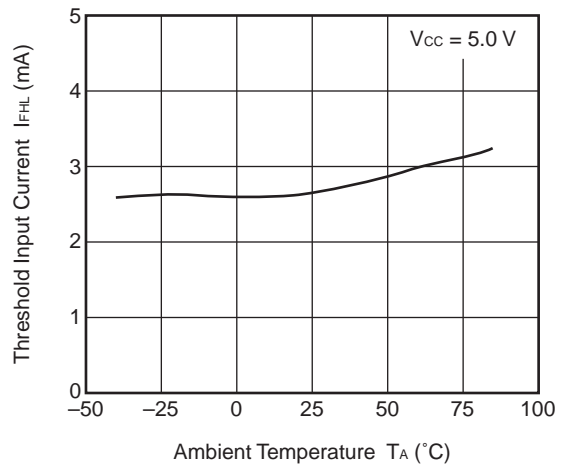
★ TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)



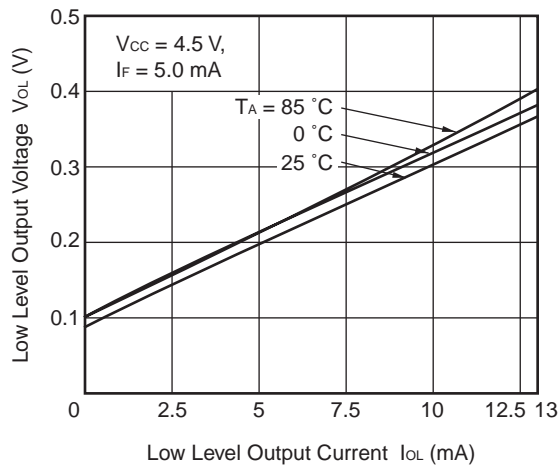
LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



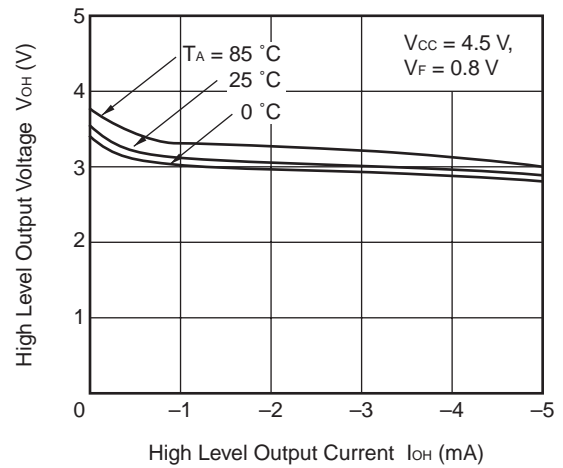
THRESHOLD INPUT CURRENT vs. AMBIENT TEMPERATURE



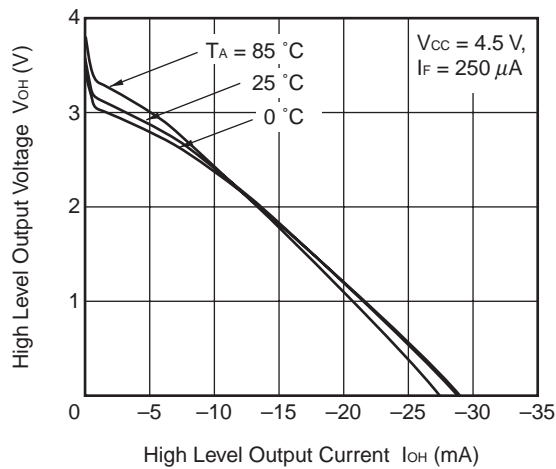
LOW LEVEL OUTPUT VOLTAGE vs. LOW LEVEL OUTPUT CURRENT



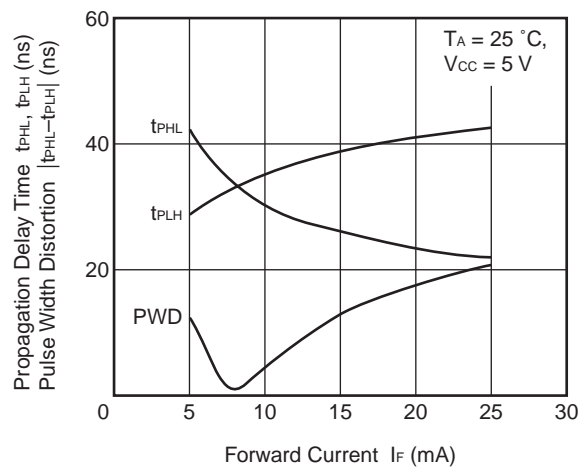
HIGH LEVEL OUTPUT VOLTAGE vs. HIGH LEVEL OUTPUT CURRENT



HIGH LEVEL OUTPUT VOLTAGE vs. HIGH LEVEL OUTPUT CURRENT



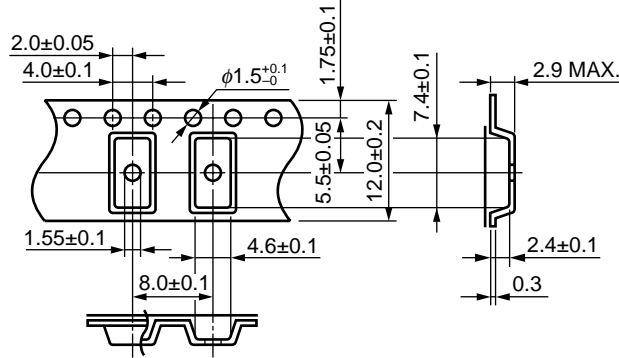
PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. FORWARD CURRENT



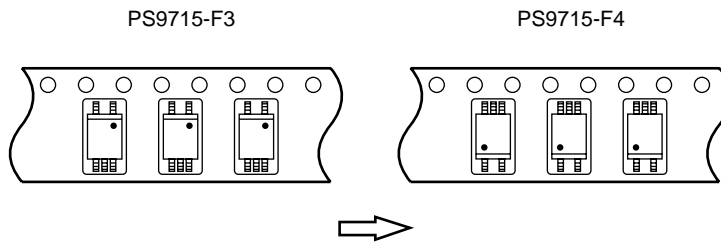
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (UNIT: mm)

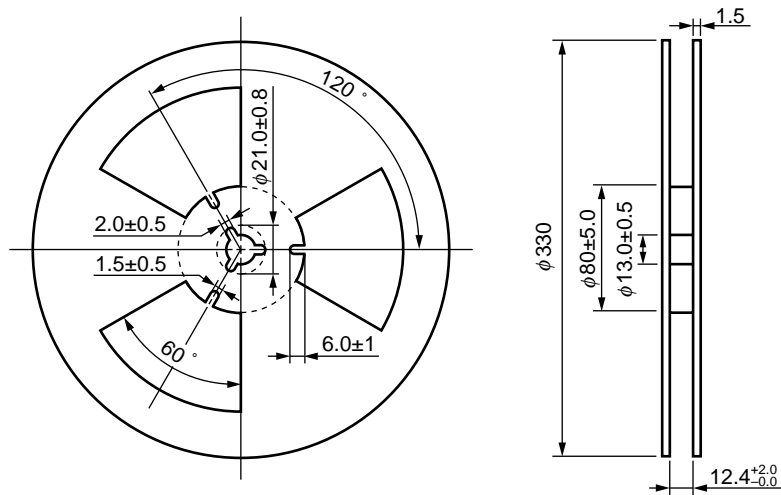
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



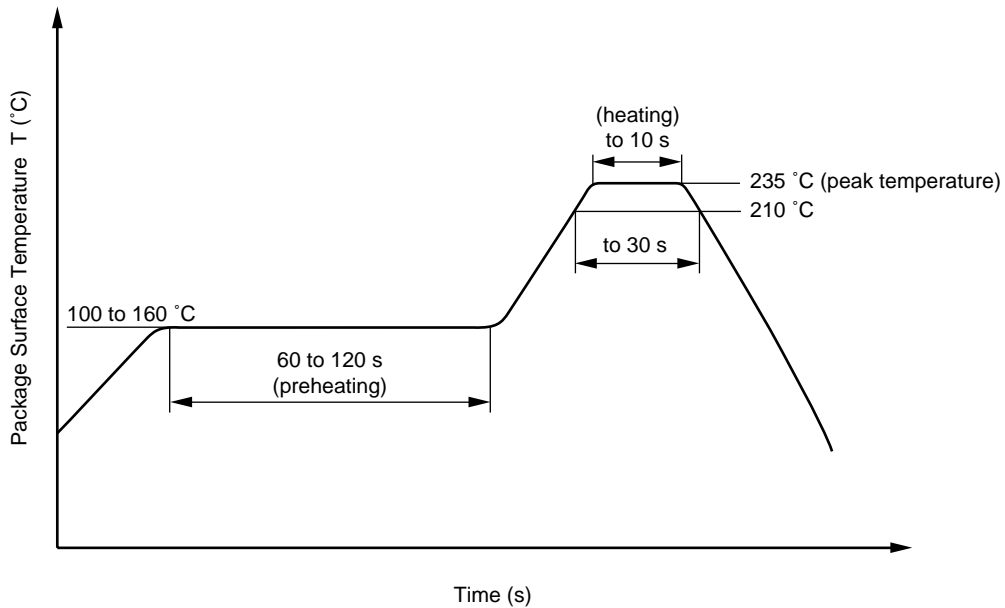
Packing: 3 500 pcs/reel

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) Wave soldering**

- Temperature 260 °C or below (molten solder temperature)
- Time 10 seconds or less
- Preheating conditions 100 °C or below (package surface temperature)
- Number of times One
- 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.

[MEMO]

[MEMO]

SAFETY INFORMATION ON THIS PRODUCT

<p>Caution</p>	<p>GaAs Products</p>	<p>The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> • 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. <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p>
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M8E 00.4