

# PHOTOCOUPLER PS9714

## HIGH CMR, 10 Mbps OPEN COLLECTOR OUTPUT TYPE 5-PIN SOP PHOTOCOUPLER -NEPOC Series-

#### DESCRIPTION

The PS9714 is an optically coupled high-speed, 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<sub>H</sub>, CM<sub>L</sub> =  $\pm 20 \text{ kV}/\mu \text{s TYP.}$ )
- Pulse width distortion ( $|t_{PHL} t_{PLH}| = 3 \text{ ns TYP.}$ )
- Small package (5-pin SOP)
- High-speed (10 Mbps)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Open collector output
- Ordering number of taping product: PS9714-F3, F4: 3 500 pcs/reel
- Safety standards
  - UL approved: File No. E72422 (S)
  - VDE0884 approved (Option)

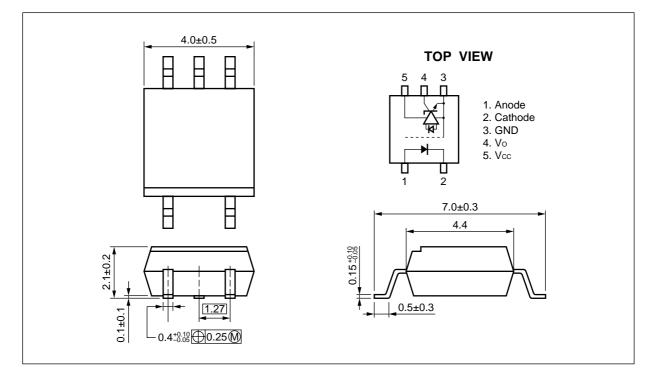
#### **APPLICATIONS**

- Measurement equipment
- PDP
- FA Network

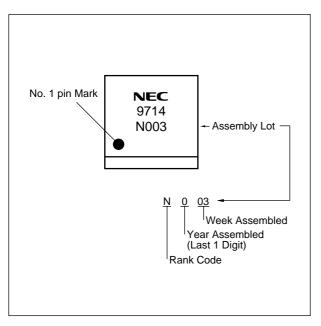
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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

## PACKAGE DIMENSIONS (UNIT: mm)



#### MARKING



#### ORDERING INFORMATION

Part Number	Package	Packing Style	Safety Standards Approval	Application Part Number <sup>*1</sup>
PS9714	5-pin SOP	Magazine case 100 pcs	UL approved	PS9714
PS9714-F3		Embossed Tape 3 500 pcs/reel		
PS9714-F4				
PS9714-V		Magazine case 100 pcs	VDE0884 approved	
PS9714-V-F3		Embossed Tape 3 500 pcs/reel		
PS9714-V-F4				

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

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

Parameter		Symbol	Ratings	Unit
Diode	Forward Current	lf	30	mA
	Reverse Voltage	Vr	3	V
Detector	Detector Supply Voltage		7	V
	Output Voltage	Vo	7	V
	Output Current	lo	25	mA
	Power Dissipation *1	Pc	40	mW
Isolation Voltage <sup>*2</sup>		BV	2 500	Vr.m.s.
Operating Ambient Temperature		TA	-40 to +85	°C
Storage Temperature		Tstg	-55 to +125	°C

\*1 Applies to output pin Vo. Reduced to 1.5 mW/°C at  $T_A = 65^{\circ}C$  or more.

\*2 AC voltage for 1 minute at  $T_A = 25^{\circ}C$ , RH = 60% between input and output.

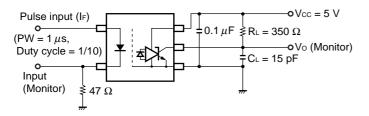
## **RECOMMENDED OPERATING CONDITIONS**

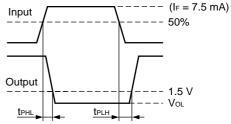
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Low Level Input Voltage	Vfl	0		0.8	V
High Level Input Current	Ifh	6.3		12.5	mA
Supply Voltage	Vcc	4.5	5.0	5.5	V
TTL (R∟ = 1 kΩ, loads)	N			5	
Pull-up resistor	R∟	330		4 k	Ω

# ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = -40 to +85°C, unless otherwise specified)

Parameter		Symbol	Cond	MIN.	TYP. <sup>*1</sup>	MAX.	Unit	
Diode Forward Voltage		VF	IF = 10 mA, TA = 25°C		1.4	1.65	1.9	V
	Reverse Current	<b>I</b> R	Vr = 3 V, Ta = 25°C			10	μA	
	Terminal Capacitance	Ct	V = 0 V, f = 1 MHz,		30		pF	
Detector	High Level Output Current	Юн	Vcc = Vo = 5.5 V, V		0.02	250	μA	
	Low Level Output Voltage <sup>*2</sup>	Vol	Vcc = 5.5 V, IF = 5		0.15	0.6	V	
	High Level Supply Current	Іссн	Vcc = 5.5 V, IF = 0		3	8	mA	
	Low Level Supply Current	ICCL	Vcc = 5.5 V, IF = 10		7.0	11	mA	
Coupled	Threshold Input Current $(H \rightarrow L)$	Ifhl	$V_{CC} = 5 \text{ V}, \text{ Vo} = 0.8 \text{ V}, \text{ RL} = 350 \Omega$			2	5	mA
	Isolation Resistance	RI-0	V⊦o = 1 kVpc, RH = 40 to 60%, T <sub>A</sub> = 25°C		10 <sup>11</sup>			Ω
	Isolation Capacitance	CI-O	V = 0 V, f = 1 MHz, T <sub>A</sub> = 25°C			0.9		pF
	Propagation Delay Time	<b>t</b> PHL		$T_A = 25^{\circ}C$		54	75	ns
	$(H \rightarrow L)^{^{\star 3}}$		Vcc = 5 V, RL = 350 Ω, IF = 7.5 mA				100	
	Propagation Delay Time	<b>t</b> PLH		$T_A = 25^{\circ}C$		51	75	ns
	$(L \rightarrow H)^{*3}$		Vcc = 5 V, RL = 350 Ω, IF = 7.5 mA				100	
	Rise Time	tr	Vcc = 5 V, RL = 350 Ω, IF = 7.5 mA			20		
	Fall Time	tr	$V_{CC} = 5 \text{ V}, \text{ R}_{L} = 350 \Omega, \text{ I}_{F} = 7.5 \text{ mA}$			10		
	Pulse Width Distortion (PWD) <sup>*3</sup>	tphl-tplh	$V_{CC}$ = 5 V, R <sub>L</sub> = 350 $\Omega$ , I <sub>F</sub> = 7.5 mA			3	50	ns
	Propagation Delay Skew	<b>t</b> PSK	Vcc = 5 V, R∟ = 350 Ω, I⊧ = 7.5 mA				60	
	Common Mode Transient Immunity at High Level Output <sup>*4</sup>	СМн	$R_L = 350 \Omega$ , $T_A = 25°C$ , $I_F = 0 mA$ , Vo (MIN.) = 2 V, VCM = 1 kV		10	20		kV/μs
	Common Mode Transient Immunity at Low Level Output <sup>*4</sup>	CM∟			10	20		kV/μs

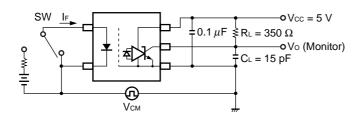
- \*1 Typical values at  $T_A = 25^{\circ}C$
- \*2 Because VoL of 2 V or more may be output when LED current input and when output supply of Vcc = 2.6 V or less, it is important to confirm the characteristics (operation with the power supply on and off) during design, before using this device.
- \*3 Test circuit for propagation delay time

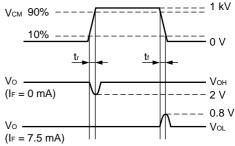




Remark CL includes probe and stray wiring capacitance.

\*4 Test circuit for common mode transient immunity



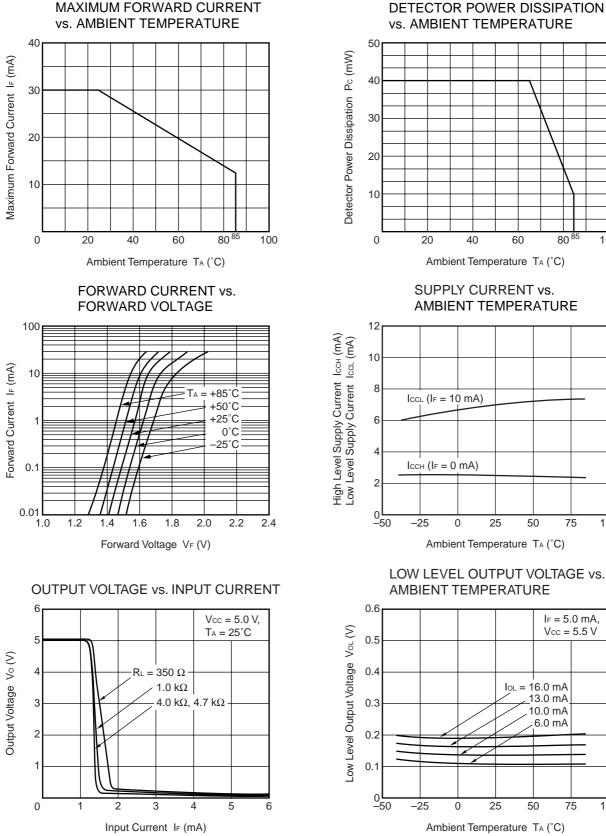


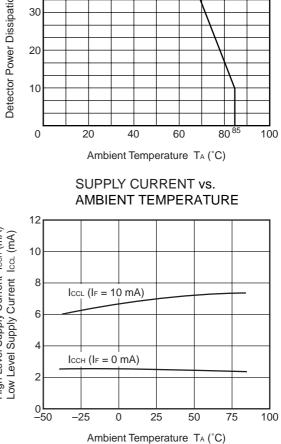
Remark CL includes probe and stray wiring capacitance.

#### **USAGE CAUTIONS**

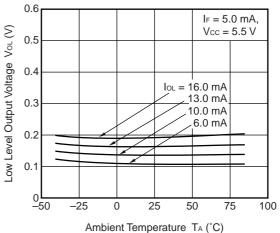
- 1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
- 2. By-pass capacitor of more than 0.1  $\mu$ F is used between Vcc and GND near device. Also, ensure that the distance between the leads of the photocoupler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

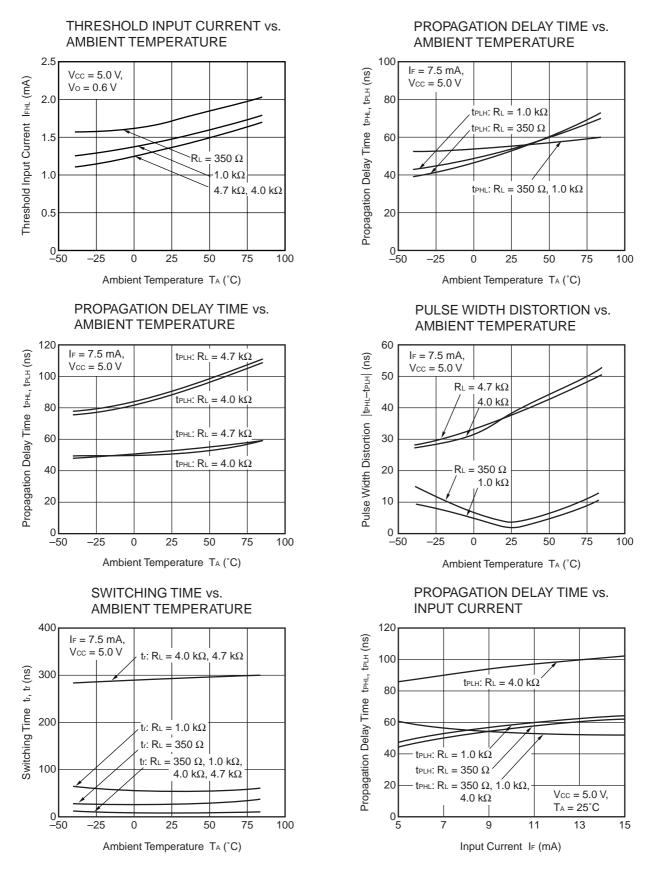
#### TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, unless otherwise specified)





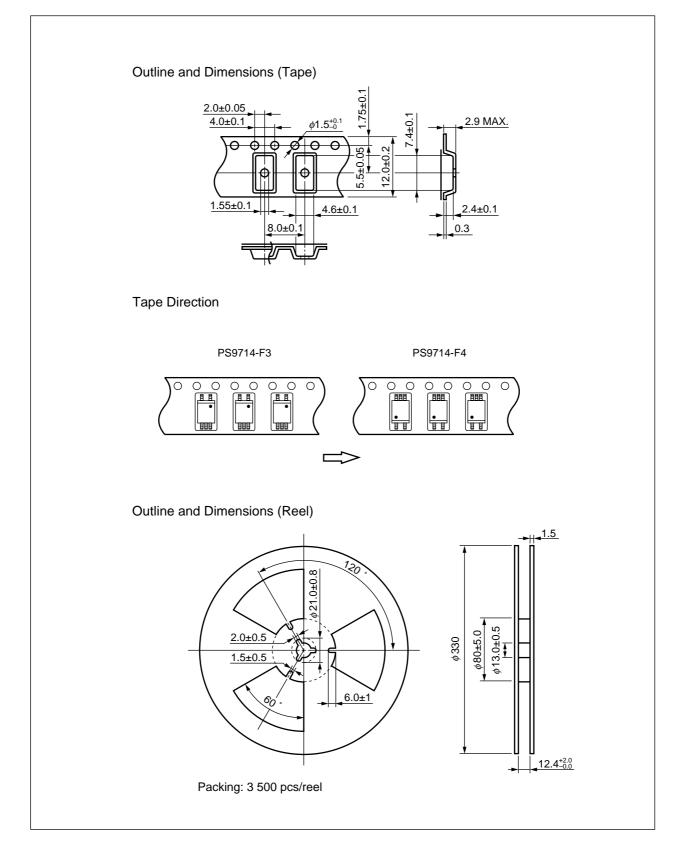
LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE





Remark The graphs indicate nominal characteristics.

#### TAPING SPECIFICATIONS (UNIT: mm)



#### **RECOMMENDED SOLDERING CONDITIONS**

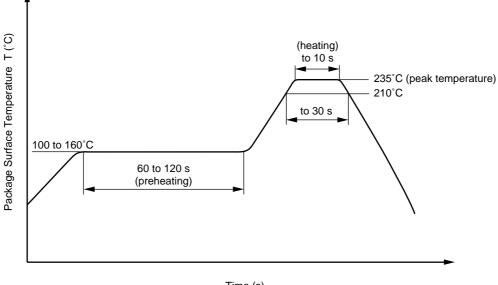
## (1) Infrared reflow soldering

- Peak reflow temperature 235°C or below (package surface temperature)
- Time of temperature higher than 210°C
- Number of reflows
- Flux

Three 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

30 seconds or less





#### (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.			
<ul> <li>Do not cut or cleave off any part of the product.</li> </ul>				
<ul> <li>Do not crush or chemically dissolve the product.</li> </ul>				
	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

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#### ► Technical issue

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