NEC's HIGH CMR, 10 Mbps OPEN COLLECTOR OUTPUT TYPE 5 PIN SOP OPTOCOUPLER

PS9714

FEATURES

- **HIGH COMMON MODE TRANSIENT IMMUNITY:**
  C_{MH}, C_{ML}: ± 20 kV/μs TYP
- **PULSE WIDTH DISTORTION:**
  $|t_{PHL} - t_{PLH}|$ = 3 ns TYP
- **HIGH SPEED RESPONSE:**
  10 Mbps
- **HIGH ISOLATION VOLTAGE:**
  BV: 2500 $V_{r.m.s.}$
- **OPEN COLLECTOR OUTPUT TYPE**
- **SMALL OUTLINE PACKAGE:**
  5 PIN SOP
- **TAPE AND REEL AVAILABLE:**
  PS9714-F3, F4: 3500 Pcs/Reel
- **SAFETY STANDARDS:**
  UL and VDE0884 approved

DESCRIPTION

NEC's PS9714 is an optically coupled, high speed isolator containing a GaAlAs LED on the light emitting diode (input) side and a photodiode and a signal procesing circuit on the detector (output) side on one chip. The PS9714 is in a plastic SOP (Small Outline Package) for high density applications.

APPLICATIONS

- **MEASUREMENT EQUIPMENT**
- **PDP**
- **FACTORY AUTOMATION NETWORK**

ELECTRICAL CHARACTERISTICS (T_A = -40 to +85°C unless otherwise specified)

PART NUMBER				PS9714		
	SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, I_F = 10 mA, T_A = 25°C	V	1.4	1.65	1.9
	I_R	Reverse Current, V_R = 3 V, T_A = 25°C	μA			10
	Ct	Terminal Capacitance, V = 0 V, f = 1 MHz, T_A = 25°C	pF		30	
Detector	I_{OH}	High Level Output Current, V_{CC} = V_O = 5.5 V, V_F = 0.8 V	μA		0.02	250
	V_{OL}	Low Level Output Voltage, V_{CC} = 5.5 V, I_F = 5 mA, I_O = 13 mA	V		0.15	0.6
	I_{CCH}	High Level Supply Current, V_{CC} = 5.5 V, I_F = 0 mA	mA		3	8
	I_{CCL}	Low Level Supply Current, V_{CC} = 5.5 V, I_F = 10 mA	mA		7.0	11
	I_{FHL}	Threshold Input Current, V_{CC} = 5 V, V_O = 0.8 V, R_L = 350 Ω	%		2.0	5.0
Coupled	R_{I-O}	Isolation Resistance, V_{in-out} = 1kVDC, RH = 40 to 60%, T_A = 25°C	Ω	10^{11}		
	C_{I-O}	Isolation Capacitance, V = 0, f = 1 MHz, T_A = 25°C	pF		0.9	
	t_{PHL}	Propagation Delay Time, High → Low[1], V_{CC} = 5 V, I_F = 7.5 mA, R_L = 350 Ω	ns			100
		T_A = 25°C			54	75
	t_{PLH}	Propagation Delay Time, Low → High[1], V_{CC} = 5 V, I_F = 7.5 mA, R_L = 350 Ω	ns			100
		T_A = 25°C			51	75
	t_r	Rise Time, V_{CC} = 5 V, I_F = 7.5 mA, R_L = 350 Ω	ns		20	
	t_f	Fall Time, V_{CC} = 5 V, I_F = 7.5 mA, R_L = 350 Ω	ns		10	
	PWD	Pulse Width Distortion, V_{CC} = 5 V, I_F = 7.5 mA, R_L = 350 Ω	ns		3	50
	t_{PSK}	Propagation Skew, V_{CC} = 5 V, I_F = 7.5 mA, R_L = 350 Ω	ns			60
	CM_H	Common Mode Transient Immunity at High Level Output[2] V_{CC} = 5 V, V_{CM} = 1 kV, T_A = 25°C, I_F = 0 mA, $V_{O\,(MIN)}$ = 2 V	kV/μs	10	20	
	CM_L	Common Mode Transient Immunity at Low Level Output[2] V_{CC} = 5 V, V_{CM} = 1 kV, T_A = 25°C, I_F = 7.5 mA, $V_{O\,(MAX)}$ = 0.8 V	kV/μs	10	20	

Please see notes on the next page.

ABSOLUTE MAXIMUM RATINGS[1]

(T_A = 25°C unless otherwise specified)

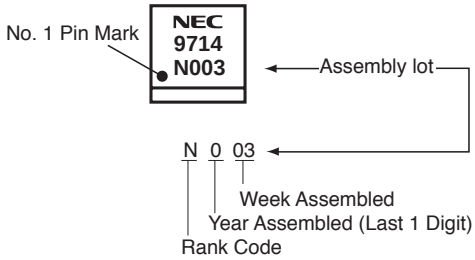
SYMBOLS	PARAMETERS	UNITS	RATINGS
Diode			
I_F	Forward Current	mA	30
V_R	Reverse Voltage	V	3
Detector			
V_{CC}	Supply Voltage	V	7
V_O	Output Voltage	V	7
I_O	Output Current	mA	25
P_C	Power Dissipation[2]	mW	40
BV	Isolation Voltage[3]	$V_{r.m.s.}$	2500
T_A	Operating Ambient Temp.	°C	-40 to +85
T_{STG}	Storage Temperature	°C	-55 to +125

Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. 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

SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V_{FL}	Low Level Input Voltage	V	0		0.8
I_{FH}	High Level Input Current	mA	6.3		12.5
V_{CC}	Supply Voltage	V	4.5	5	5.5
N	TTL (loads) (R_L = 1kΩ)				5
R_L	Pull-up Resistance	Ω	330		4k

MARKING

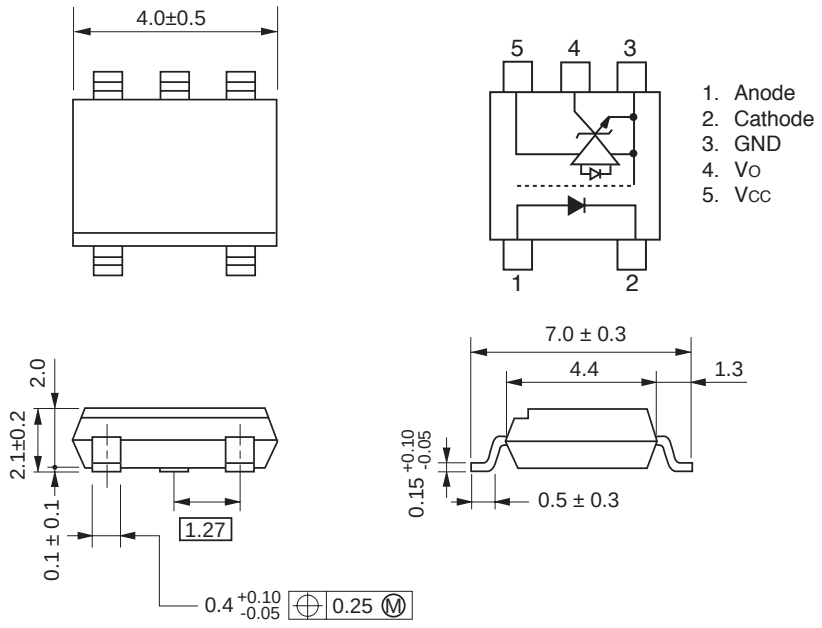


ORDERING INFORMATION

Part Number	Packing Style	Safety Standards Approval
PS9714	Magazine Case 100 pcs	UL
PS9714-F3	Embossed Tape 3500 pcs/reel	Approved
PS9714-F4		
PS9714-V	Magazine Case 100 pcs	VDE0884
PS9714-V-F3	Embossed Tape 3500 pcs/reel	Approved
PS9714-V-F4		

PACKAGE OUTLINE (Units in mm)

PIN CONNECTION (Top View)



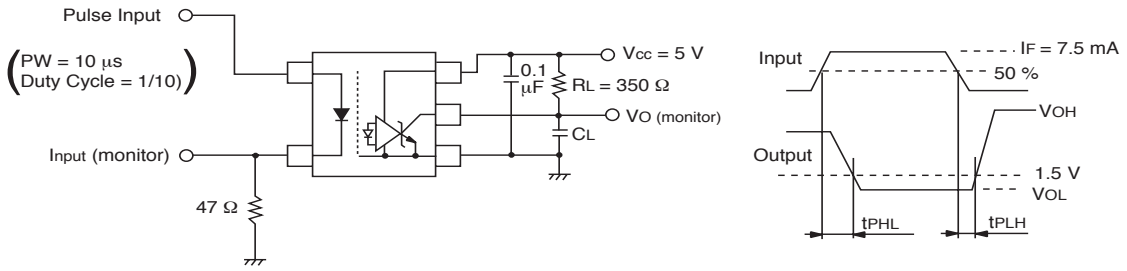
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Notes:

1. Typical values at T_A = 25°C.

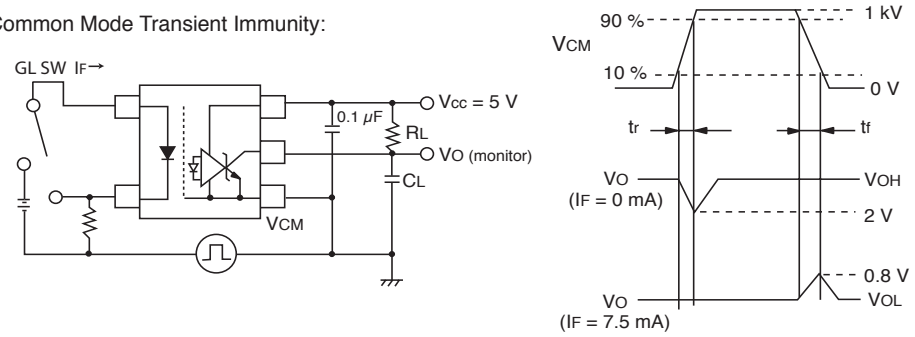
2. Because V_{OL} of 2 V or more may be output when LED current input and when output supply of V_{CC} = 2.6 V or less, it is important to confirm the characteristics (operation with the power supply on and off) during design, before using this device.

3. Test Circuit for Propagation Delay Time:



*CL is approximately 15 pF which includes probe and stray wiring capacitance.

4. Test Circuit for Common Mode Transient Immunity:

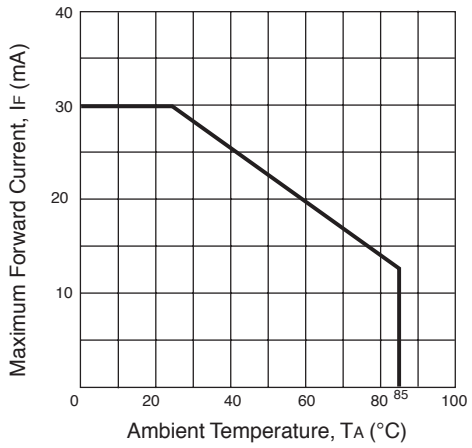


USAGE CAUTIONS

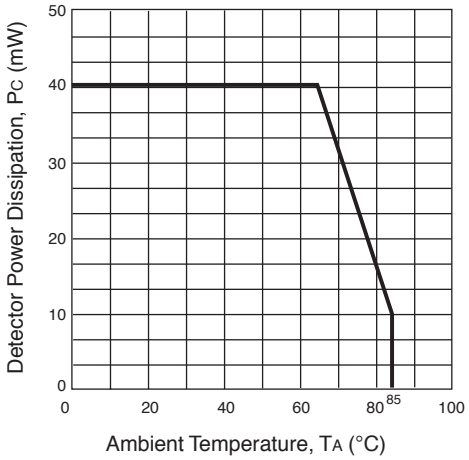
1. Protect against static electricity when handling this product.
2. Bypass capacitor greater than 0.1 μF is used between V_{CC} and GND near device (lead distance: 10 mm MAX).

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

MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE

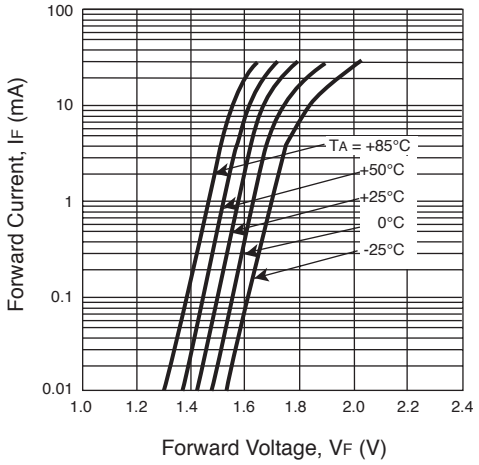


DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE

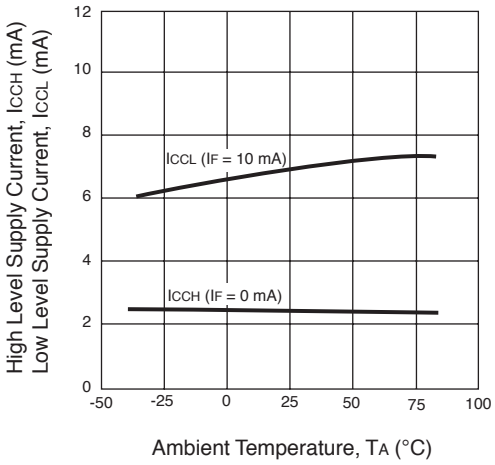


TYPICAL PERFORMANCE CURVES (T_A = 25°C, unless otherwise specified)

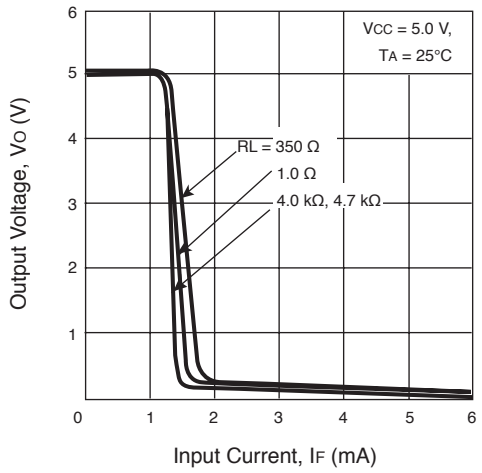
FORWARD CURRENT vs. FORWARD VOLTAGE



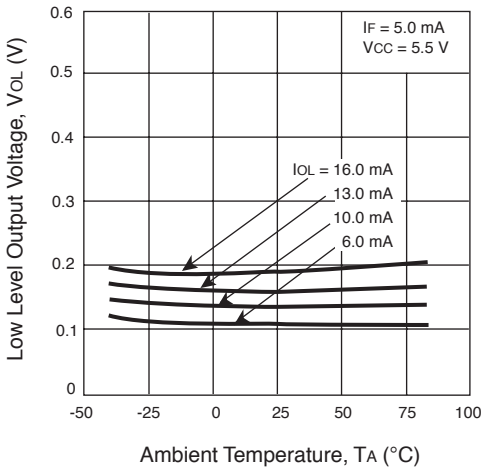
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



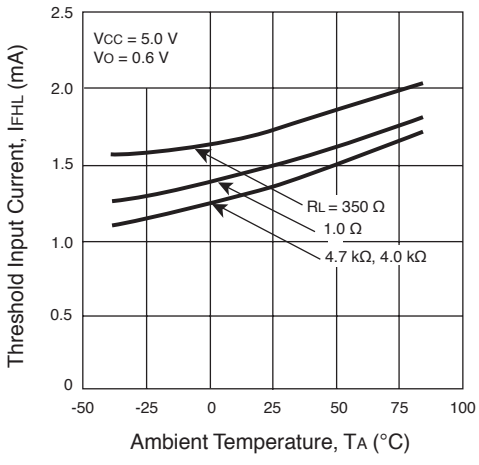
OUTPUT VOLTAGE vs. INPUT CURRENT



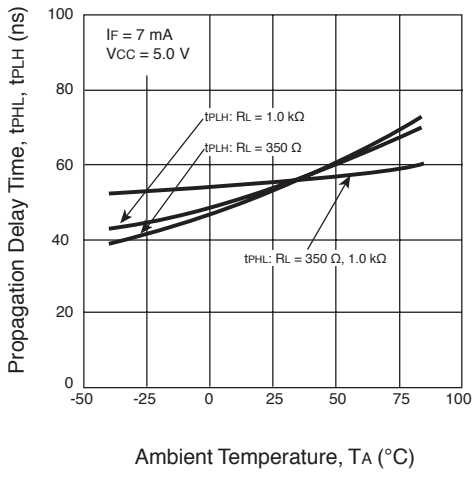
LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



THRESHOLD INPUT CURRENT vs. AMBIENT TEMPERATURE

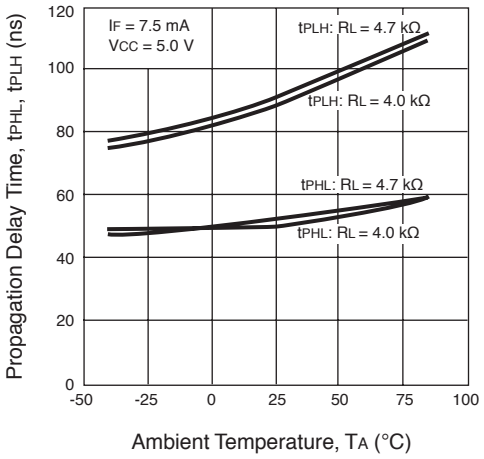


PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE

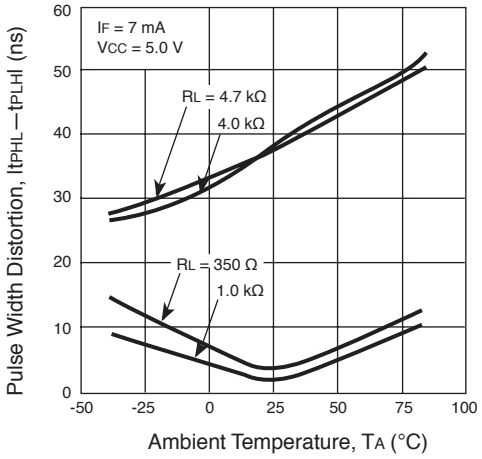


TYPICAL PERFORMANCE CURVES (T_A = 25°C, unless otherwise specified)

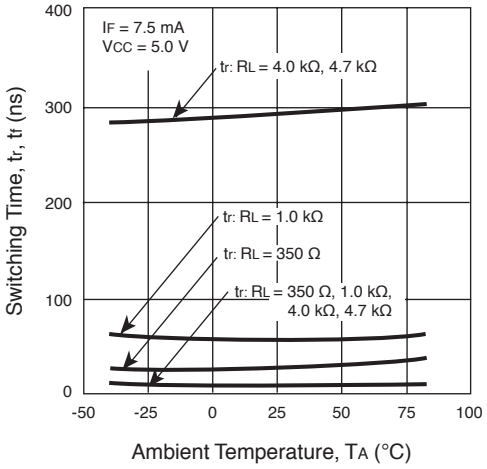
PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE



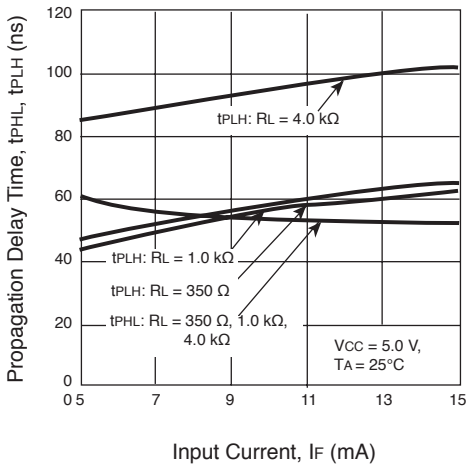
PULSE WIDTH DISTORTION vs. AMBIENT TEMPERATURE



SWITCHING TIME vs. AMBIENT TEMPERATURE

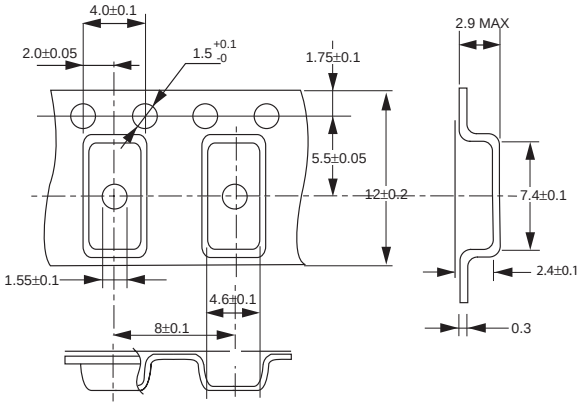


PROPAGATION DELAY TIME vs. INPUT CURRENT



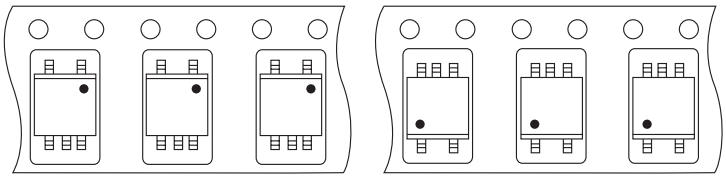
TAPING SPECIFICATIONS

Tape Outline and Dimensions

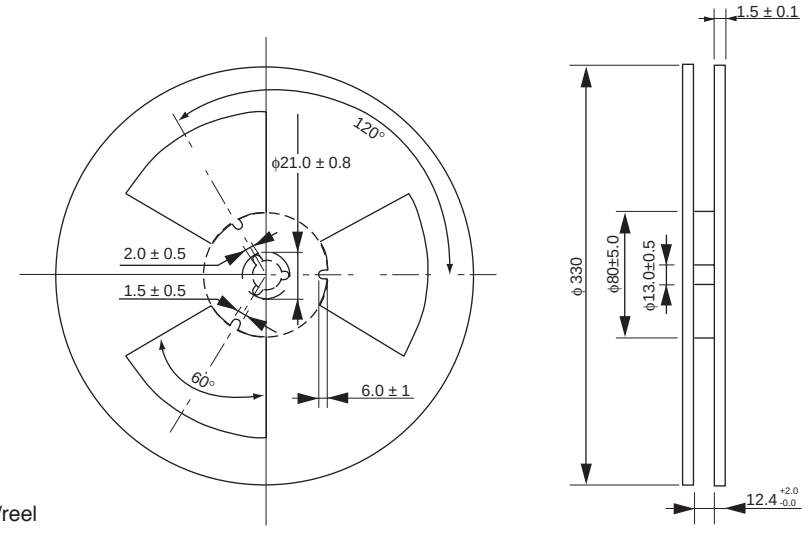


Tape Direction

PS9714-F3 PS9714-F4



Reel Outline and Dimensions

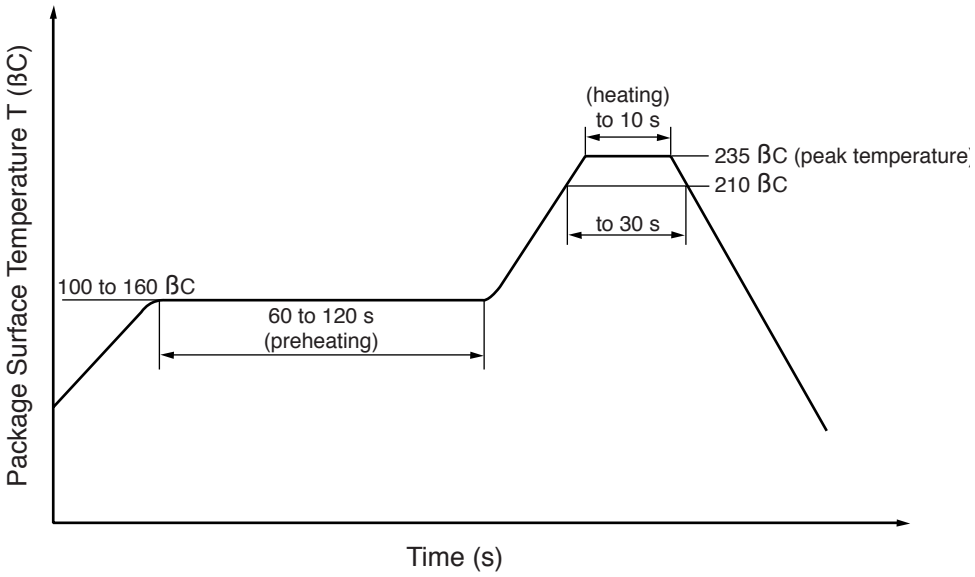


Packing: 3500 pcs/reel

RECOMMENDED SOLDERING CONDITIONS

(1) Infrared reflow soldering

• Peak reflow temperature	235 ˚C or below (package surface temperature)
• Time of temperature higher than 210 ºC	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.)



(2) Cautions

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

Life Support Applications
These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.