DATA SHEET

NEC

PHOTOCOUPLER

PS9634,PS9634L

POWER TRANSISTOR DRIVING BASE AMPLIFIER BUILT-IN TYPE PHOTOCOUPLER

DESCRIPTION

The PS9634 and PS9634L are optical linkage devices mounting a GaAs infrared ray LED on the light emitting side (input side) and a photo diode and a signal processing circuit on the light receiving side (output side) on one chip.

They can directly drive a power transistor of 15 to 20 A class used for such as an inverter control air conditioner or general purpose inverter.

The PS9634L has a surface mount type lead.

FEATURES

- High instantaneous common mode rejection voltage (CM_H = –1 000 V/μs MIN., CM_L = 1 000 V/μs MIN.)
- High supply voltage (V_{CC} = 18 V)
- High-speed response (t_{PHL}, t_{PLH} = 5 μs MAX.)
- High output current (I_{O1} = 0.5 A (DC), I_{O1P} = 1.0 A (pulse))
- Taping product name (PS9634L-E3, E4)

APPLICATIONS

- Inverter control air conditioner
- General purpose inverter

The information in this document is subject to change without notice.

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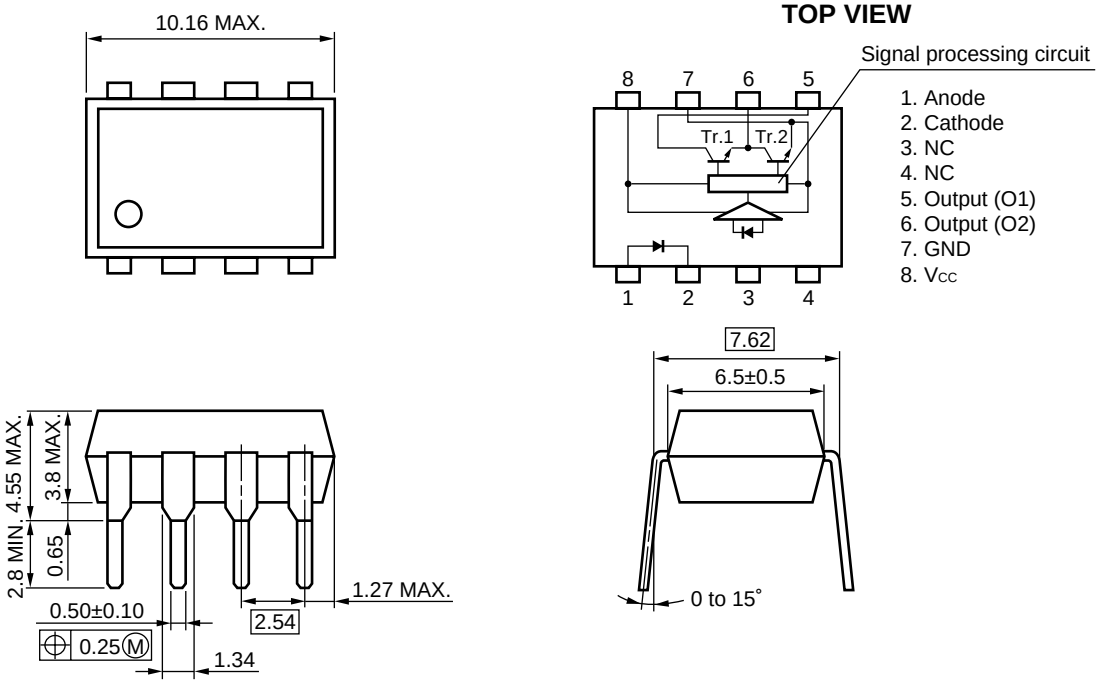
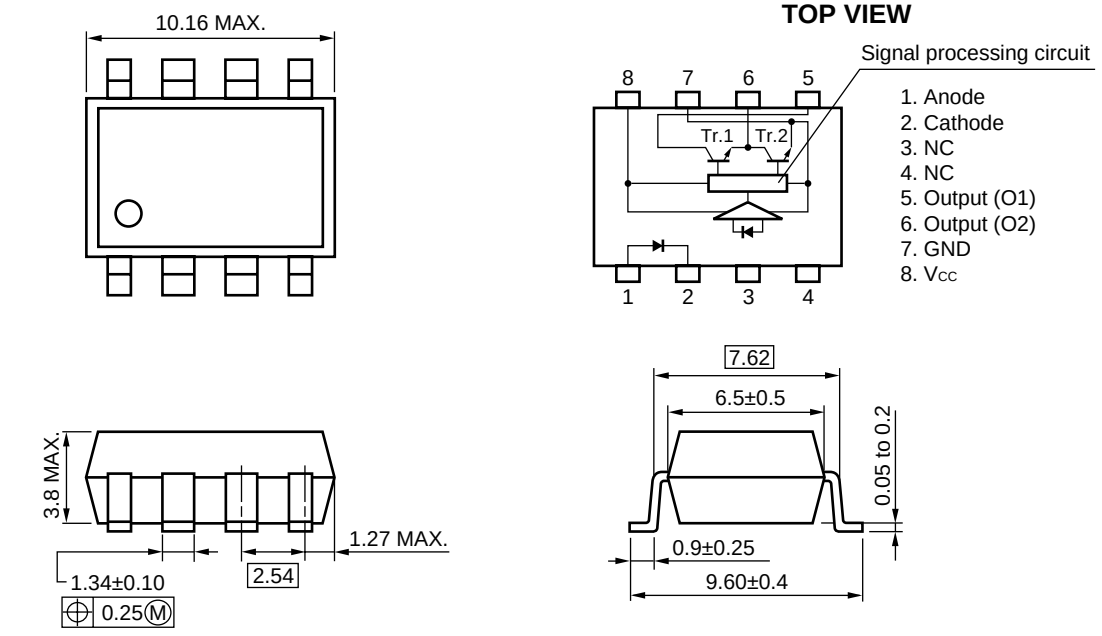
The mark ★ shows major revised points.

★ **PACKAGE DIMENSIONS (in millimeters)**

PS9634



PS9634L



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

Parameter		Symbol	Ratings	Unit
Diode	Forward Current (DC)	I_F	30	mA
	Reverse Voltage	V_R	6.0	V
	Peak Forward Current *1	I_{FM}	1	A
Detector	Supply Voltage	V_{CC}	18	V
	Output Current (O1)	I_{O1}	0.5	A
	Peak Output Current (O1)	I_{O1P}	1.0	
	Output Current (O2)	I_{O2}	0.8	
	Peak Output Current (O2)	I_{O2P}	2.0	
	Output Voltage (O1)	V_{O1}	18	V
	Power Dissipation	P_O	500	mW
Isolation Voltage *2		BV	5 000	Vr.m.s.
Total Power Dissipation		P_T	550	mW
Operating Ambient Temperature		T_A	–20 to +80	°C
Storage Temperature		T_{stg}	–55 to +150	°C

***1** PW = 100 μs, Duty Cycle = 1 %

***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
Input On Current	I_{FLH}	6	8	10	mA
Supply Voltage	V_{CC}	5.4		15	V
Output Current (O1)	I_{O1}	0.1	0.2	0.3	A
Output Current (O2)	I_{O2}				
Operating Ambient Temperature	T_A	0	25	50	°C

TRUTH TABLE

	LED	
	ON	OFF
Tr. 1	ON	OFF
Tr. 2	OFF	ON

ELECTRICAL CHARACTERISTICS (T_A = –20 to +80 °C, unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Fig.
Diode	Forward Voltage	V_F	I_F = 5 mA, T_A = 25 °C		1.1	1.4	V	
	Reverse Current	I_R	V_R = 5 V, T_A = 25 °C			5	μA	
	Terminal Capacitance	C_t	V = 0 V, f = 1.0 MHz, T_A = 25 °C		30		pF	
Detector	Supply Voltage	V_{CC}		5.4		15	V	
	Low Level Output Voltage (O1)	V_{O1L}	V_{CC} = 6 V, I_{O1} = 0.4 A, R_{L2} = 10 Ω, I_F = 5 mA		0.25	0.40	V	1
	High Level Output Voltage (O2)	V_{O2H}	V_{CC} = 6 V, I_{O2} = –0.4 A, I_F = 5 mA	4.5	5.0		V	2
	Low Level Output Voltage (O2)	V_{O2L}	V_{CC} = 6 V, I_{O2} = 0.5 A, I_F = 0 mA		0.25	0.40	V	
	Leakage Current (O1)	I_{O1L}	V_{CC} = 13 V, I_F = 0 mA			100	μA	3
	Leakage Current (O2)	I_{O2L}	V_{CC} = 13 V, I_F = 5 mA			100	μA	4
	High Level Supply Current	I_{CCH}	T_A = 25 °C		8	12	mA	
			V_{CC} = 6 V, I_F = 5 mA			16		
	Low Level Supply Current	I_{CCL}	T_A = 25 °C		15	18	mA	
			V_{CC} = 6 V, I_F = 0 mA			22		
Coupled	Input On Current (L → H)	I_{FLH}	T_A = 25 °C	0.3	1.5	3.0	mA	5
			V_{CC} = 6 V, R_{L1} = 5 Ω, R_{L2} = 10 Ω	0.2		5.0		
	Isolation Resistance	R_{I-O}	RH = 40 to 60 %, T_A = 25 °C	10^{11}			Ω	
	Propagation Delay Time (L → H)	t_{PLH}	V_{CC} = 6 V, I_F = 5 mA, T_A = 25 °C R_{L1} = 5 Ω, R_{L2} = 10 Ω		3	5	μs	6
	Propagation Delay Time (H → L)	t_{PHL}						
	Instantaneous Common Mode Rejection Voltage (Output: High)	CM_H	T_A = 25 °C, V_{CM} = 600 V (peak), I_F = 5 mA, R_{L1} = 470 Ω, R_{L2} = 1 kΩ, ΔV02H = 2 V	–1 000			V/μs	7
	Instantaneous Common Mode Rejection Voltage (Output: Low)	CM_L	T_A = 25 °C, V_{CM} = 600 V (peak), I_F = 0 mA, R_{L1} = 470 Ω, R_{L2} = 1 kΩ, ΔV02L = 0.5 V	1 000			V/μs	

MEASUREMENT CIRCUITS FOR ELECTRICAL CHARACTERISTICS

Fig. 1 V_{O1L}

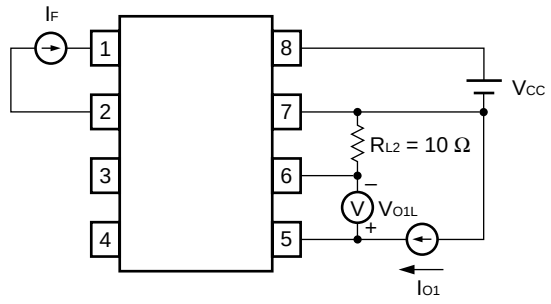


Fig. 2 V_{O2H}

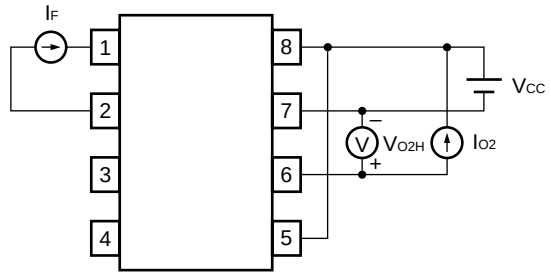


Fig. 3 I_{O1L}

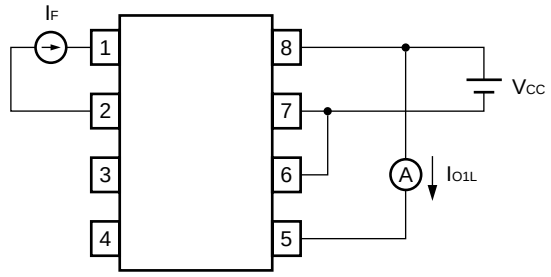


Fig. 4 I_{O2L}

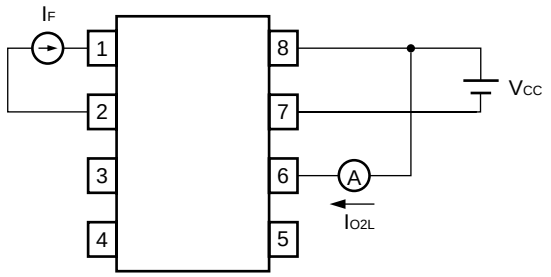


Fig. 5 I_{FLH}

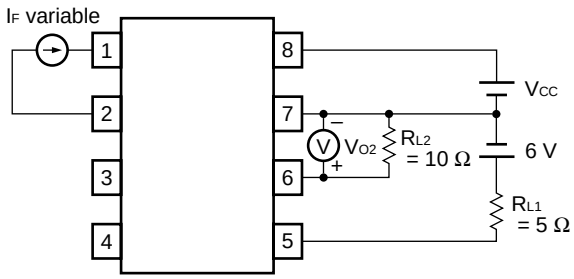


Fig. 6 t_{PLH}, t_{PHL}

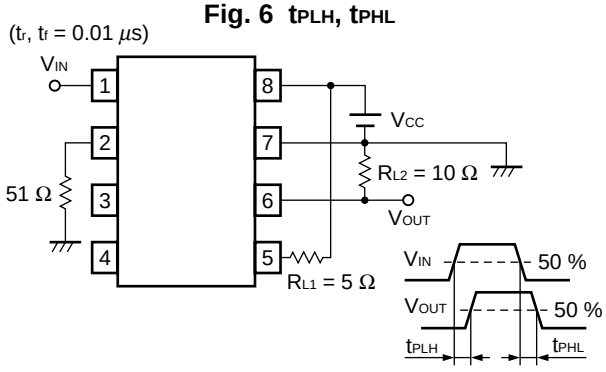
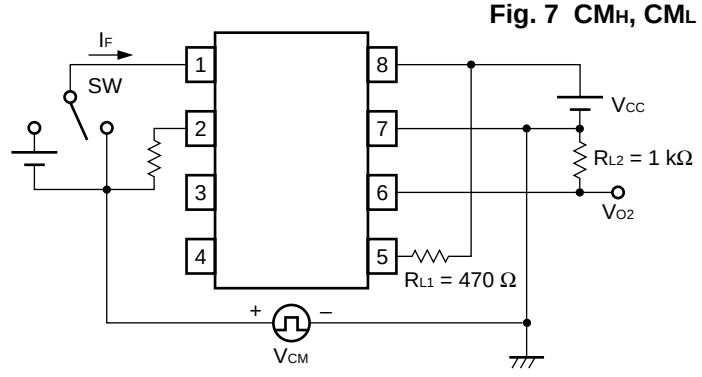
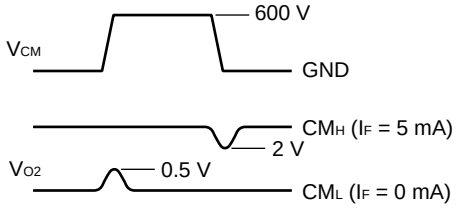


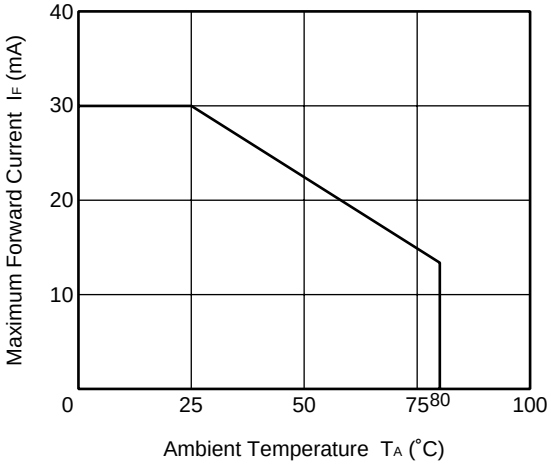
Fig. 7 CM_H, CM_L



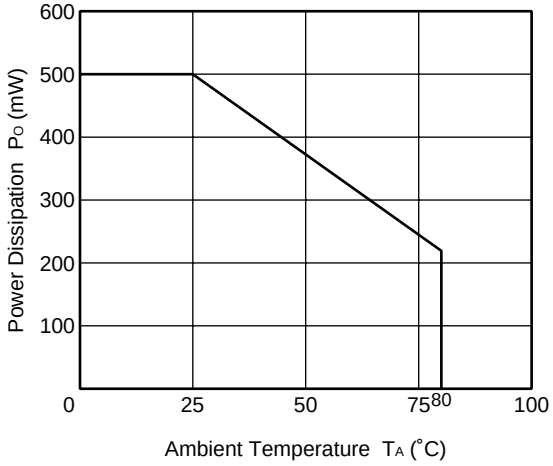


TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

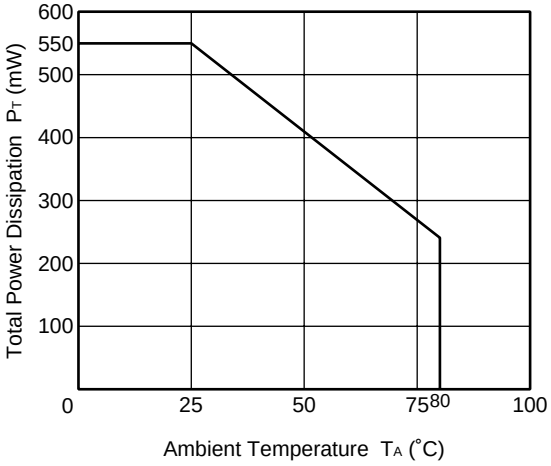
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



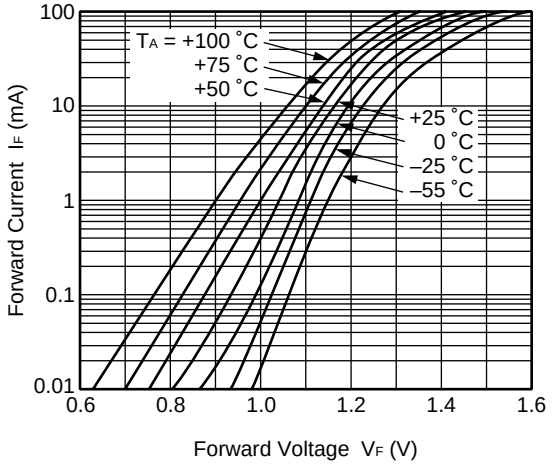
POWER DISSIPATION vs. AMBIENT TEMPERATURE



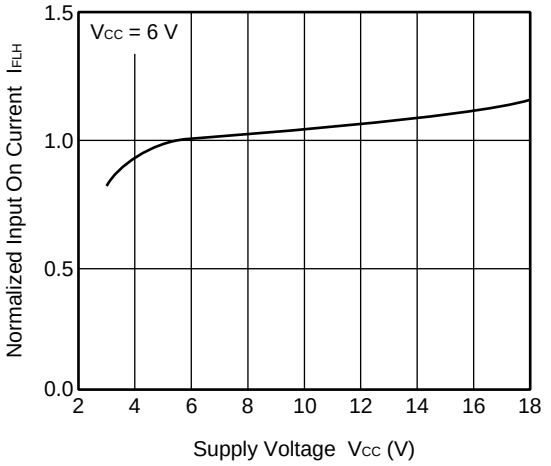
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



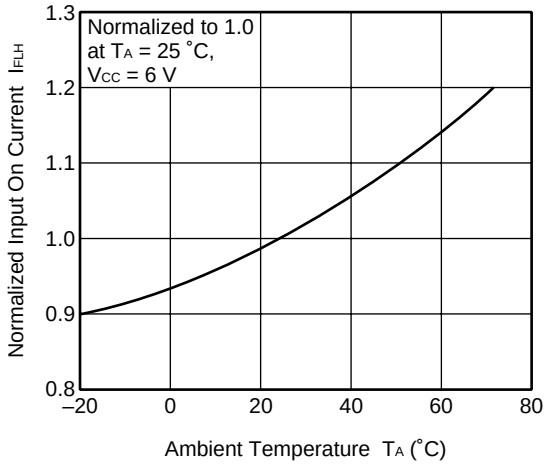
FORWARD CURRENT vs. FORWARD VOLTAGE



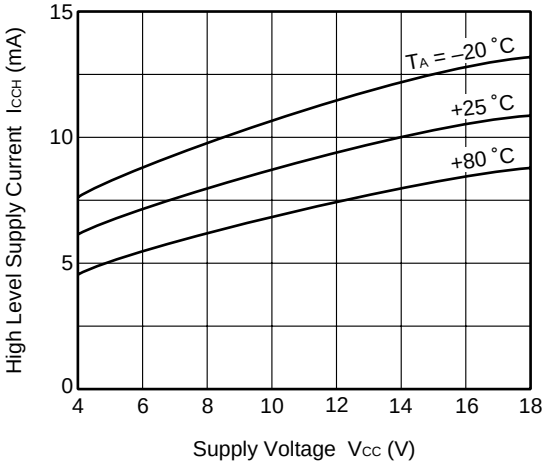
NORMALIZED INPUT ON CURRENT vs. SUPPLY VOLTAGE



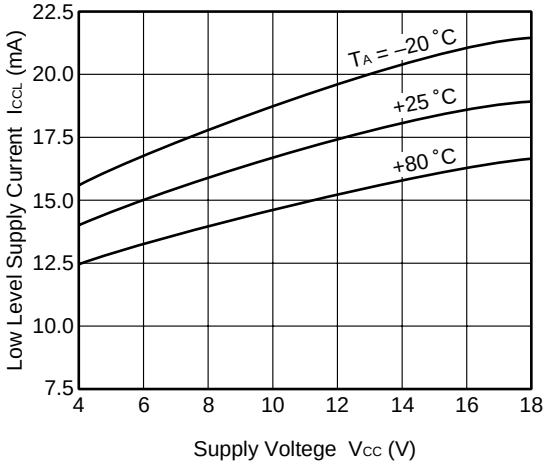
NORMALIZED INPUT ON CURRENT vs. AMBIENT TEMPERATURE



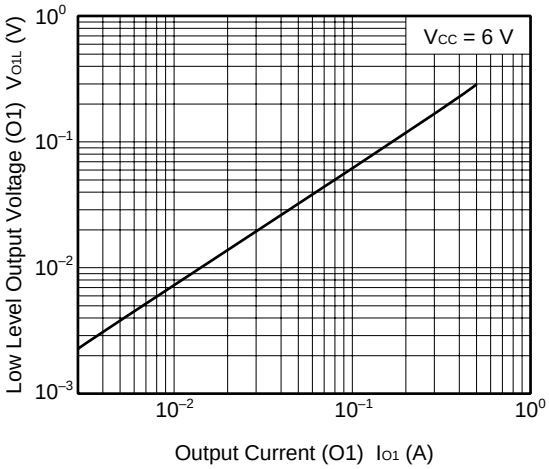
HIGH LEVEL SUPPLY CURRENT vs. SUPPLY VOLTAGE



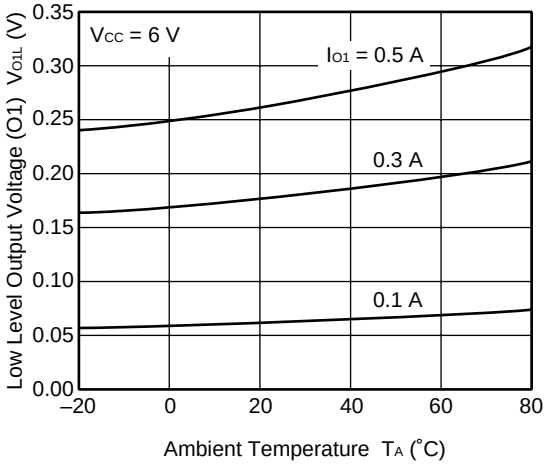
LOW LEVEL SUPPLY CURRENT vs. SUPPLY VOLTAGE



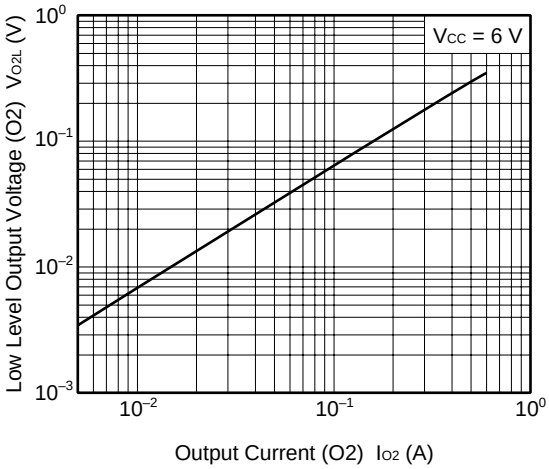
LOW LEVEL OUTPUT VOLTAGE (O1) vs. OUTPUT CURRENT (O1)



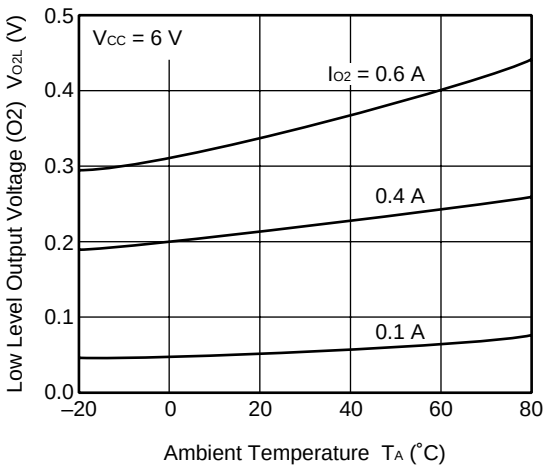
LOW LEVEL OUTPUT VOLTAGE (O1) vs. AMBIENT TEMPERATURE



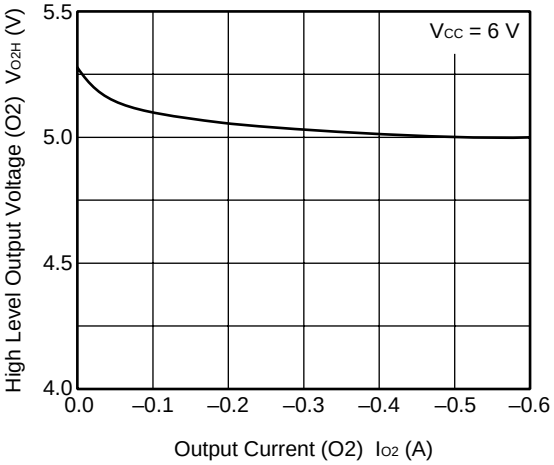
LOW LEVEL OUTPUT VOLTAGE (O2) vs. OUTPUT CURRENT (O2)



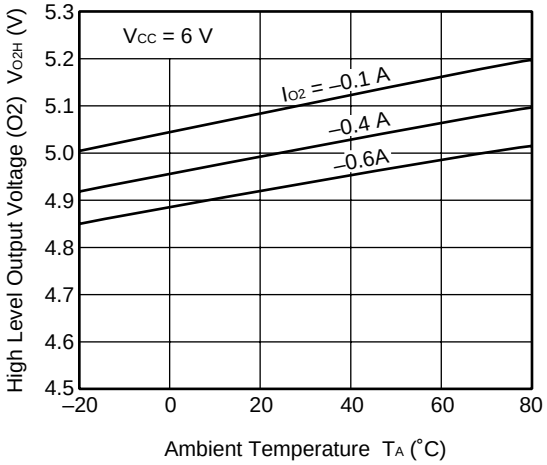
LOW LEVEL OUTPUT VOLTAGE (O2) vs. AMBIENT TEMPERATURE



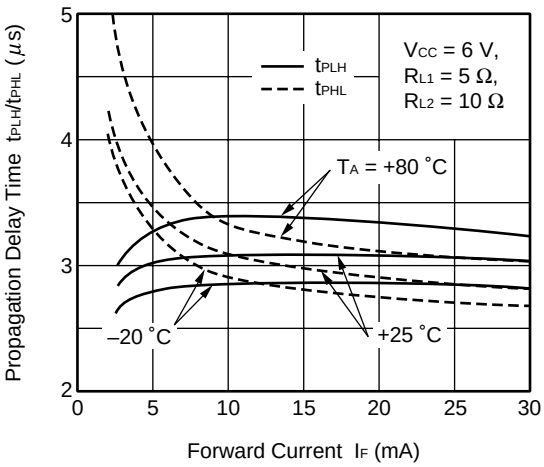
HIGH LEVEL OUTPUT VOLTAGE (O2) vs. OUTPUT CURRENT (O2)



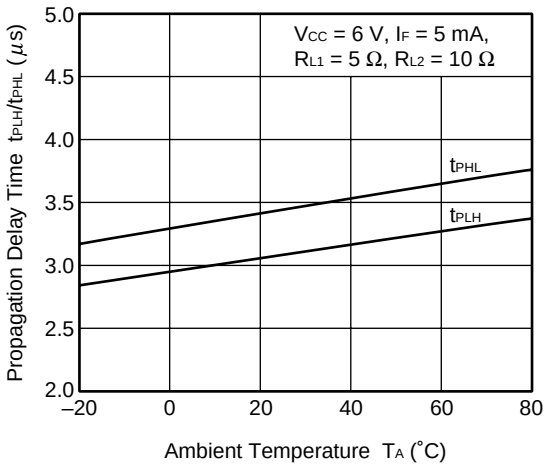
HIGH LEVEL OUTPUT VOLTAGE (O2) vs. AMBIENT TEMPERATURE



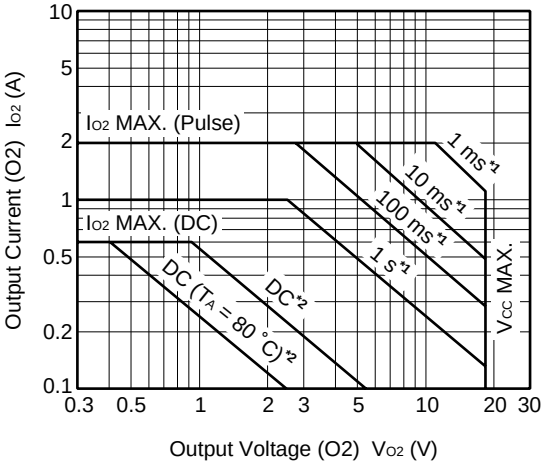
PROPAGATION DELAY TIME vs. FORWARD CURRENT



PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE



SAFE OPERATING AREA (Tr.1)

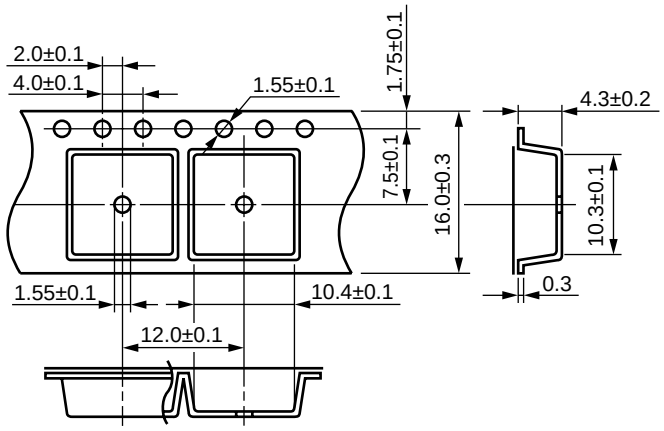


***1** One pulse
***2** On the epoxy board

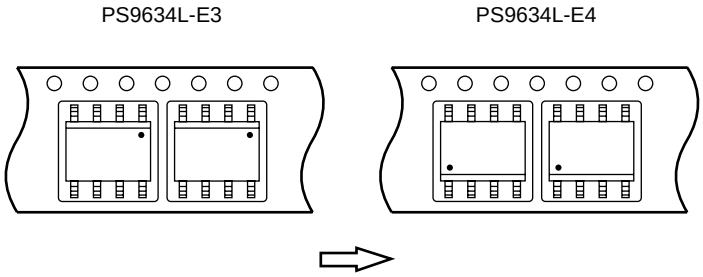
Remark The measurement of TYPICAL CHARACTERISTICS are only for reference, not guaranteed.

★ **TAPING SPECIFICATIONS (in millimeters)**

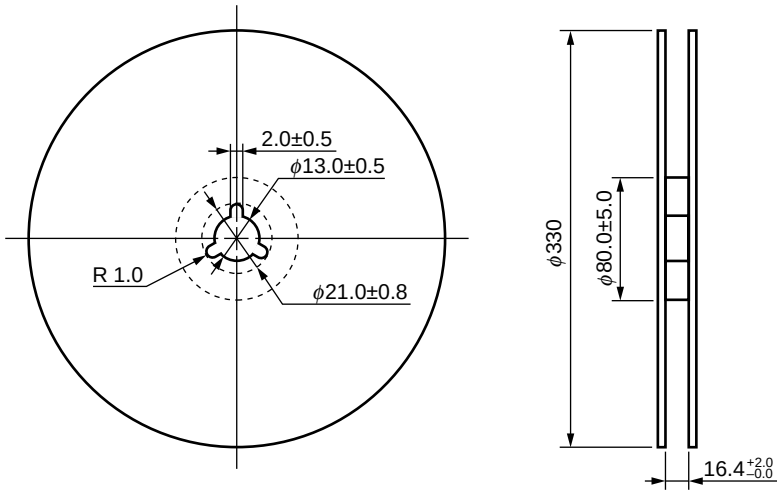
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



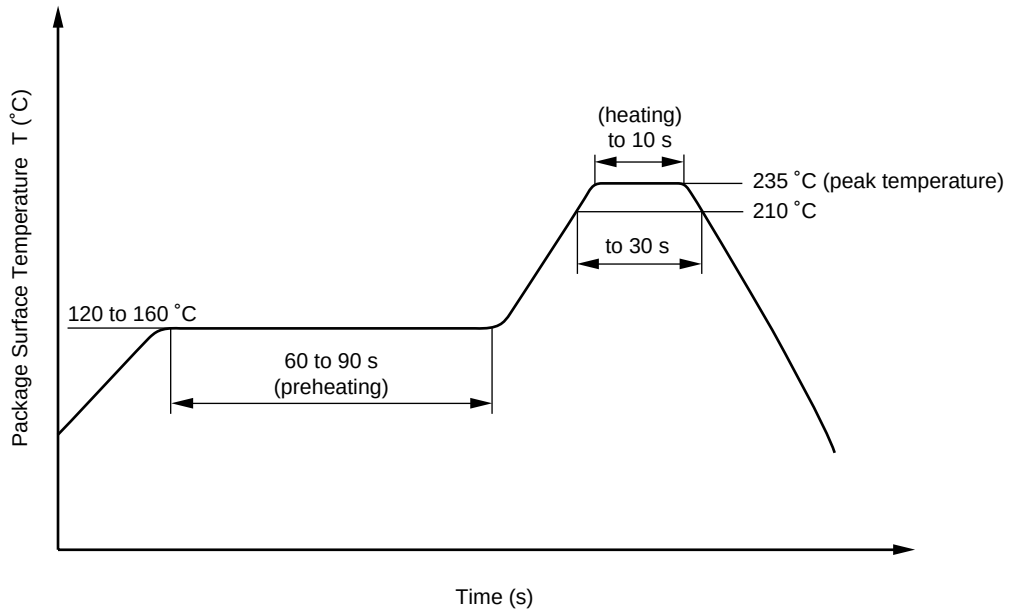
Packing: 1 000 pcs/reel

RECOMMENDED SOLDERING CONDITIONS

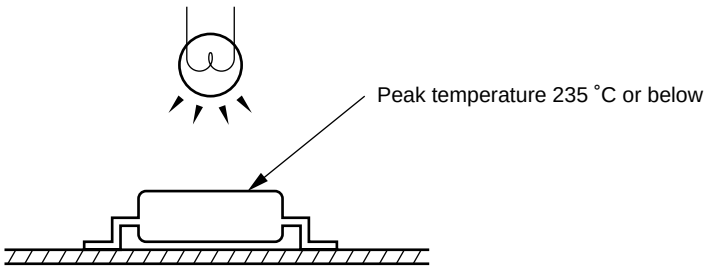
(1) Infrared reflow soldering

- Peak reflow temperature 235 °C (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



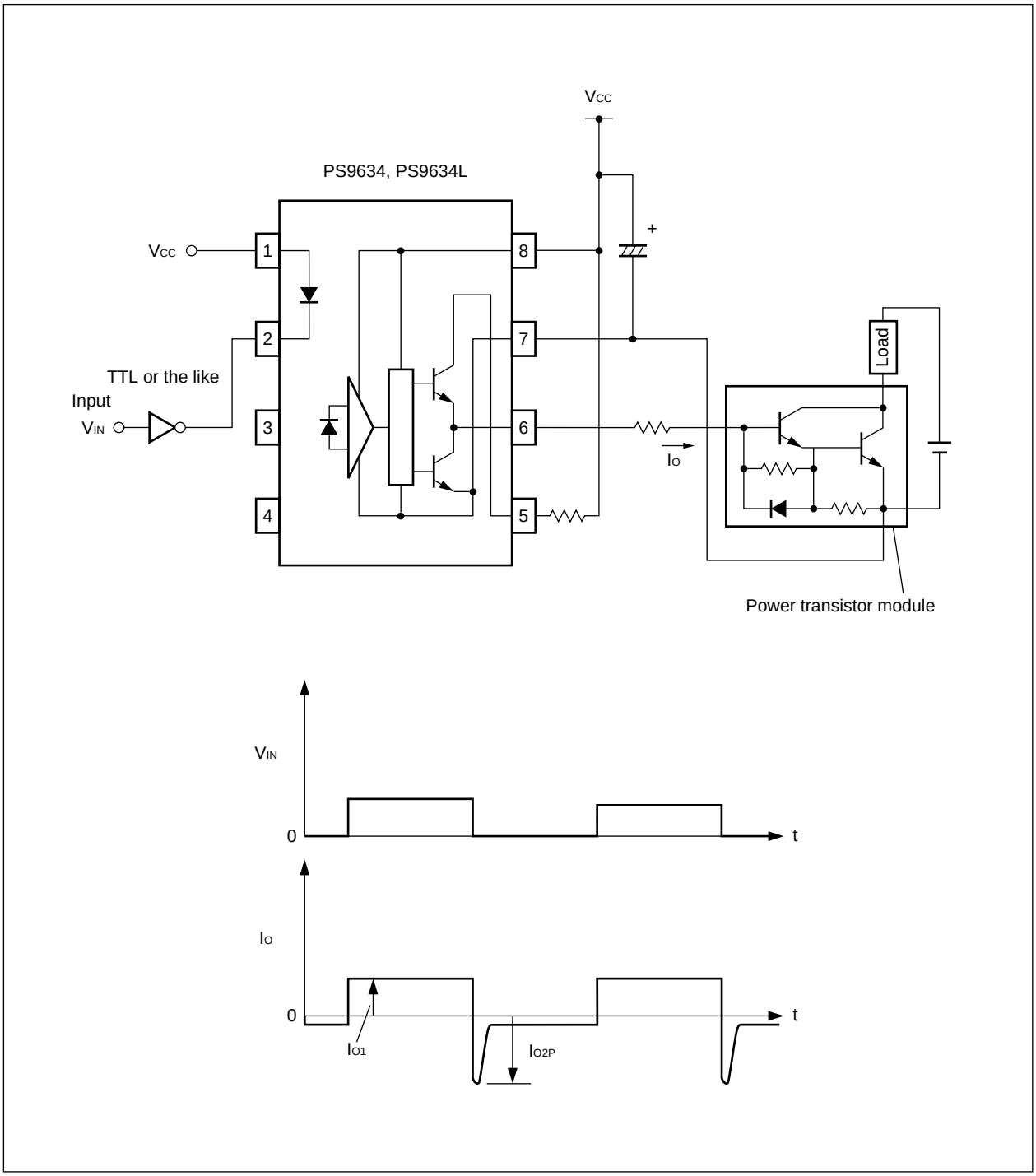
Caution Please avoid to removed the residual flux by water after the first reflow processes.



(2) Dip soldering

- Temperature 260 °C or below (molten solder temperature)
- Time 10 seconds or less
- 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.)

APPLICATION EXAMPLE OF PHOTOCOUPLER (TO POWER TRANSISTOR MODULE)



CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.

M4 96.5