NEC

POWER TRANSISTOR DRIVING BASE AMPLIFIER BUILT-IN TYPE OPTOCOUPLER

PS9634
PS9634L

FEATURES

- **HIGH INSTANTANEOUS COMMON MODE REJECTION VOLTAGE**
  CM_H = -1000 V/μs MIN, CM_L = 1000 V/μs MIN
- **HIGH POWER SUPPLY VOLTAGE (V_{CC})**
  V_{CC} = 18 V
- **HIGH RESPONSE SPEED**
  t_{PHL}, t_{PLH} = 5 μs MAX
- **HIGH OUTPUT CURRENT**
  I_{O1} = 0.5 A (DC), 1.0 A (pulse) MAX
- **CAN BE SOLDERED BY INFRARED REFLOW SOLDERING**

DESCRIPTION

The PS9634 is an optical linkage device mounting a GaAs infrared LED on the light emitting side (input side), and a photodiode and a signal processing circuit on the light receiving side (output side) on one chip. The device can directly drive a power transistor of 15 A to 20 A class and may be used for an inverter control air conditioner or general purpose inverter. The PS9634L has formed leads for surface mounting.

ESD SENSITIVE

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

PART NUMBER				PS9634, PS9634L		
SYMBOLS		PARAMETERS	UNITS	MIN	TYP	MAX
Input Characteristic	V_F	Forward Voltage, I_F = 5 mA, T_A = 25 °C	V		1.1	1.4
	I_R	Reverse Current, V_R = 5 V, T_A = 25 °C	μA			5
	C_t	Capacitance Between Terminals V = 0, f = 1.0 MHz, T_A = 25 °C	pF		30	
Output Characteristics	V_{CC}	Supply Voltage	V	5.4		15
	V_{O1L}*	Low Level Output Voltage (O1) V_{CC} = 6 V, I_{O1} = 0.4 A, R_{L2} = 10 Ω, I_F = 5 mA	V		0.25	0.4
	V_{O2H}*	High Level Output Voltage (O2) V_{CC} = 6 V, I_{O2} = -0.4 A, I_F = 5 mA	V	4.5	5.0	
	V_{O2L}	Low Level Output Voltage (O2) V_{CC} = 6 V, I_{O2} = 0.5 A, I_F = 0	V		0.25	0.4
	I_{O1L}*	Leak Current (O1), V_{CC} = 13 V, I_F = 0	μA			100
	I_{O2L}	Leak Current (O2), V_{CC} = 13 V, I_F = 5 mA	μA			100
	I_{CCH}	High Level Supply Current V_{CC} = 6 V, I_F = 5 mA, T_A = 25 °C	mA		8	12
		V_{CC} = 6 V, I_F = 5 mA	mA			16
	I_{CCL}	Low Level Supply Current V_{CC} = 6 V, I_F = 0, T_A = 25 °C	mA		15	18
		V_{CC} = 6 V, I_F = 0	mA			22
	I_{FLH}*	Input ON Current, Low ♦ High V_{CC} = 6 V, R_{L1} = 5 Ω, R_{L2} = 10 Ω, T_A = 25 °C	mA	0.3	1.5	3.0
		V_{CC} = 6 V, R_{L1} = 5 Ω, R_{L2} = 10 Ω	mA	0.2		5.0
Propagation Characteristics	R_{I-O}	Insulation Resistance, RH = 40% to 60%, T_A = 25 °C	Ω	10^{11}		
	t_{PLH}*	Propagation Delay Time, Low ♦ High V_{CC} = 6 V, I_F = 5 mA, R_{L1} = 5 Ω, R_{L2} = 10 Ω, T_A = 25 °C	μs		3	5
	t_{PHL}*	Propagation Delay Time, High ♦ Low V_{CC} = 6 V, I_F = 5 mA, R_{L1} = 5 Ω, R_{L2} = 10 Ω, T_A = 25 °C	μs		3	5
	CM_H*	Instantaneous Common Mode Rejection Voltage (Output "High"), T_A = 25°C, V_{CM} = 600 V (peak), I_F = 5 mA R_{L1} = 470 Ω, R_{L2} = 1 kΩ, ΔV_{O2H} = 0.5 V	V/μs	-1000		
	CM_L*	Instantaneous Common Mode Rejection Voltage (Output "Low"), T_A = 25°C, V_{CM} = 600 V (peak), I_F = 0 mA R_{L1} = 470 Ω, R_{L2} = 1 kΩ, ΔV_{O2L} = 0.5 V	V/μs	1000		

*Note: See Figures 1-7 for test schematic.

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
Input			
V_R	Reverse Voltage	V	6
I_F/I_{FM}	Forward Current[2]	mA/A	30/1
Output			
V_{CC}	Power Voltage	V	18
I_{O1}	Output Current (O1)	A	0.5
I_{O1P}	Peak Output Current (O1)	A	1.0
I_{O2}	Output Current (O2)	A	0.8
I_{O2P}	Peak Output Current (O2)	A	2.0
V_{O1}	Output Voltage (O1)	V	18
P_O	Power Dissipation	mW	500
P_T	Total Power Dissipation	mW	550
BV	Insulation Withstand Voltage[3]	$V_{r.m.s.}$	5000
T_{OP}	Operating Temperature	°C	-20 to +80
T_{STG}	Storage Temperature	°C	-55 to +150

Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. Peak forward current I_{FM}: Pulse width = 100 μs; Duty Ratio = 1%.
3. When all input pins are connected to all output pins at T_A = 25 °C and RH = 60 %.

RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

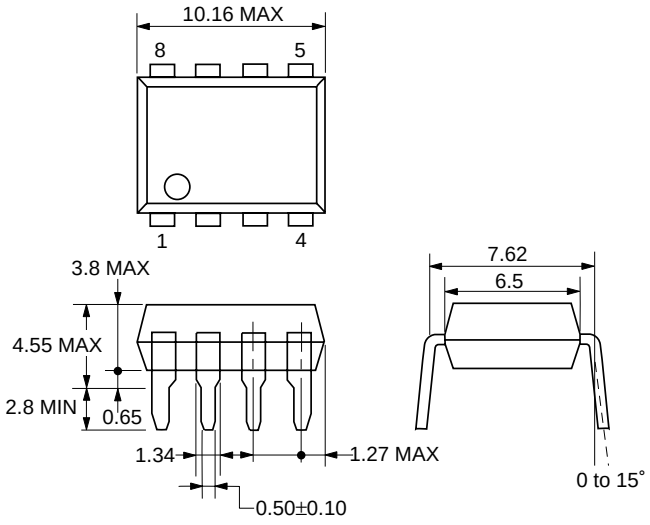
PART NUMBER			PS9634,PS9634L		
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
I_{FLH}	Input ON Current	mA	6	8	10
V_{CC}	Supply Voltage	V	5.4		15
I_{O1}	Output Current (O1)	A	0.1	0.2	0.3
I_{O2}	Output Current (O2)	A	0.1	0.2	0.3
T_{OP}	Operating Temperature	°C	0	25	50

TRUTH TABLE

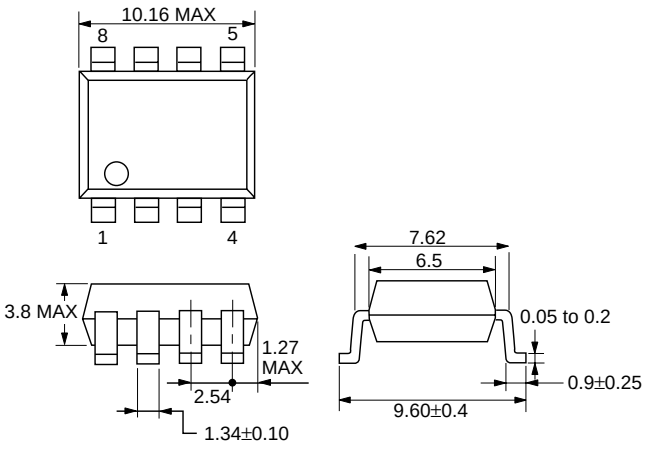
	LED	
	ON	OFF
Tr. 1	ON	OFF
Tr. 2	OFF	ON

OUTLINE DIMENSIONS (Units in mm)

PS9634

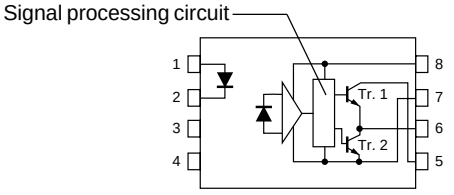


PS9634L



PIN CONNECTION (Top View)

PS9634



1. Anode
2. Cathode
3. NC
4. NC
5. Output (O1)
6. Output (O2)
7. GND
8. V_{CC}

MEASUREMENT CIRCUITS FOR ELECTRICAL CHARACTERISTICS

FIG. 1 (V_{O1L})

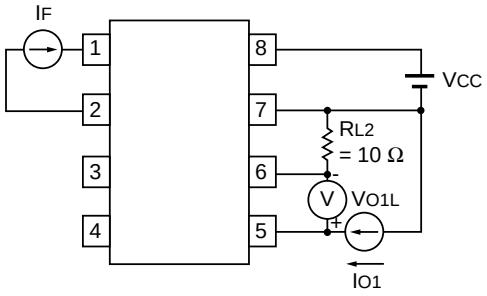


FIG. 2 (V_{O2H})

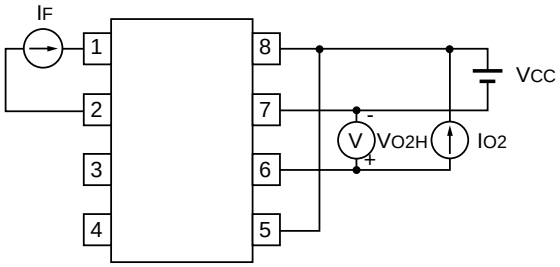


FIG. 3 (I_{O1L})

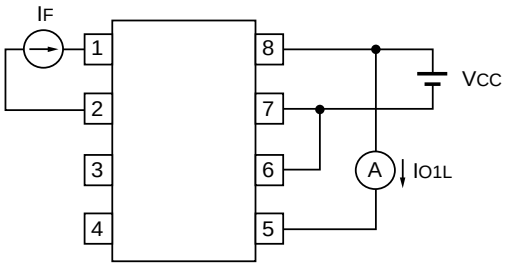


FIG. 4 (I_{O2L})

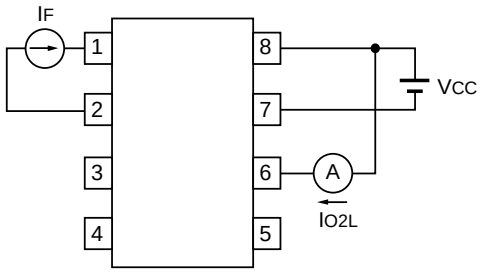


FIG. 5 (I_{FLH})

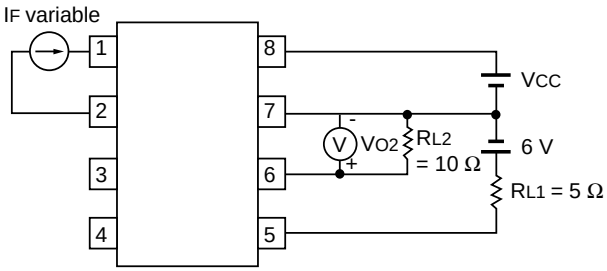


FIG. 6 (t_{PLH}, t_{PHL})

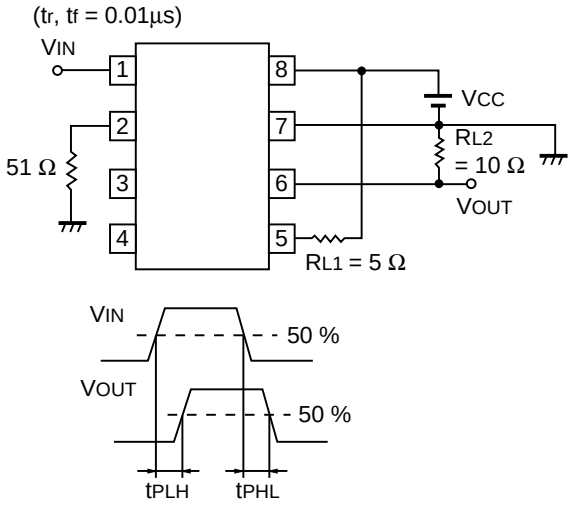
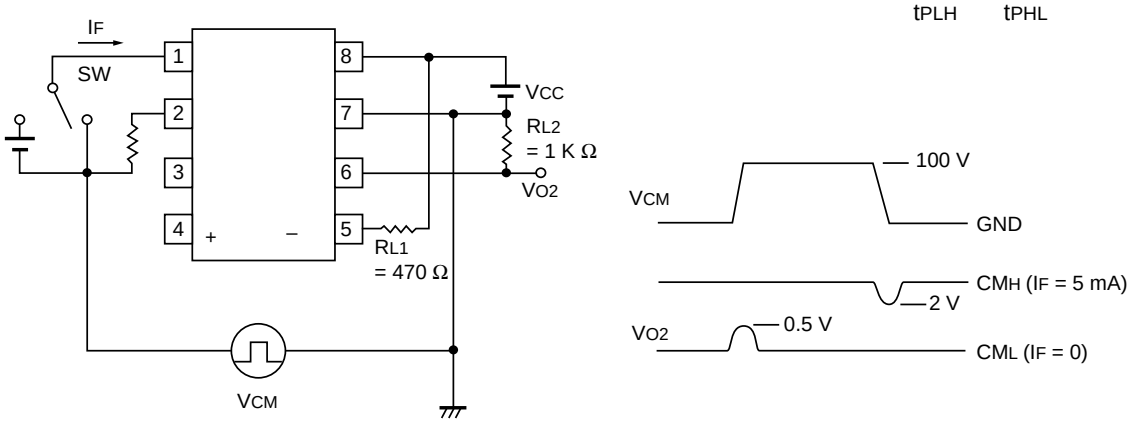
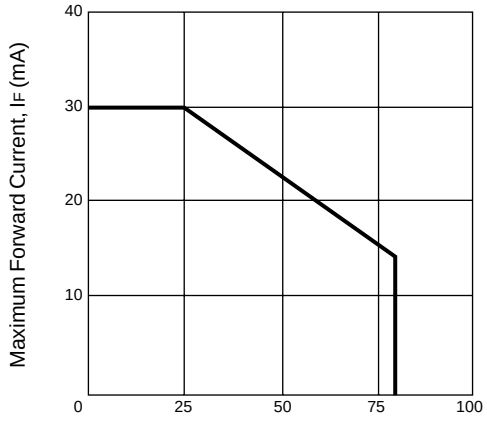


FIG. 7 (CM_H, CM_L)

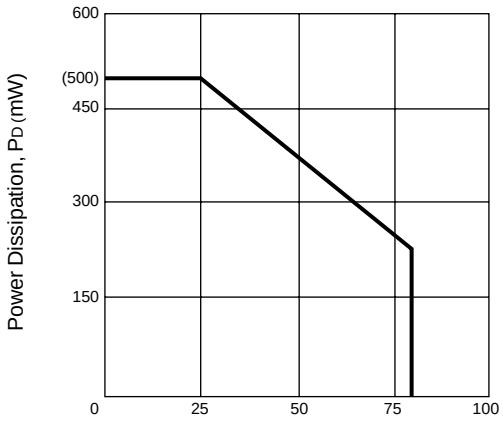


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

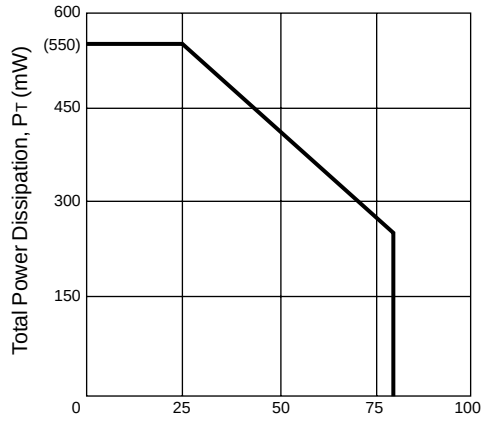
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



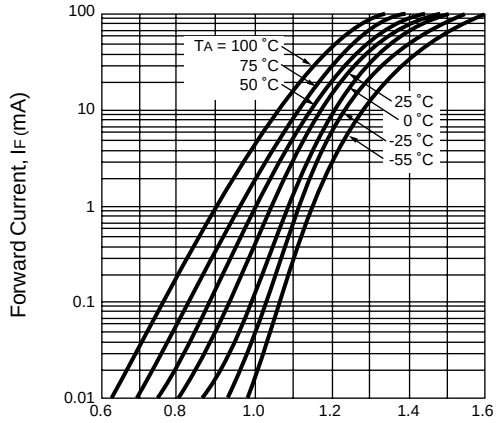
POWER DISSIPATION vs. AMBIENT TEMPERATURE



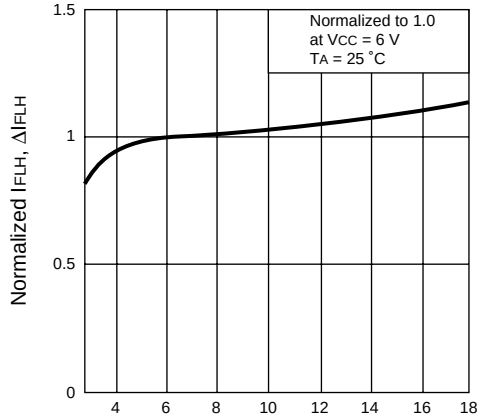
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



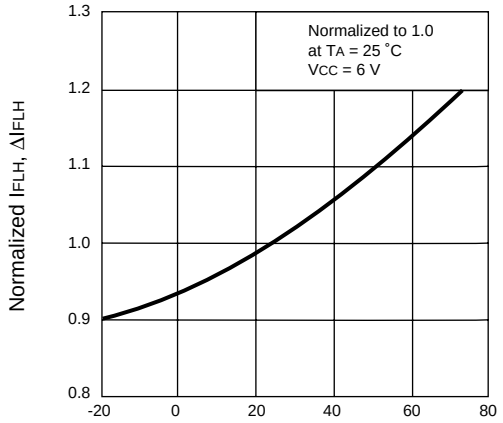
FORWARD CURRENT vs. FORWARD VOLTAGE



NORMALIZED I_{FLH} vs. SUPPLY VOLTAGE

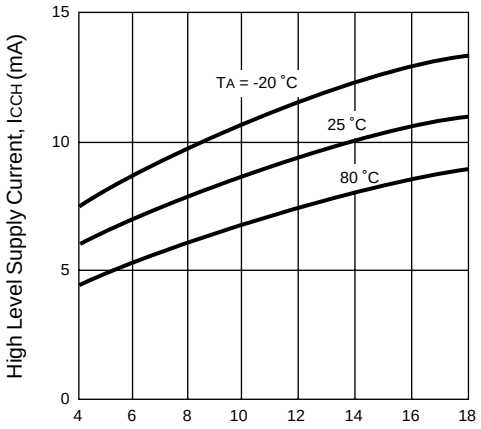


NORMALIZED I_{FLH} vs. AMBIENT TEMPERATURE

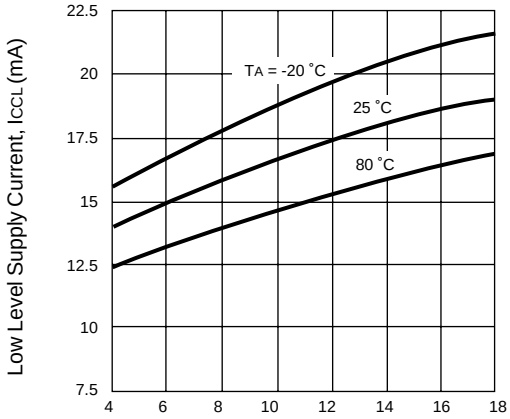


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

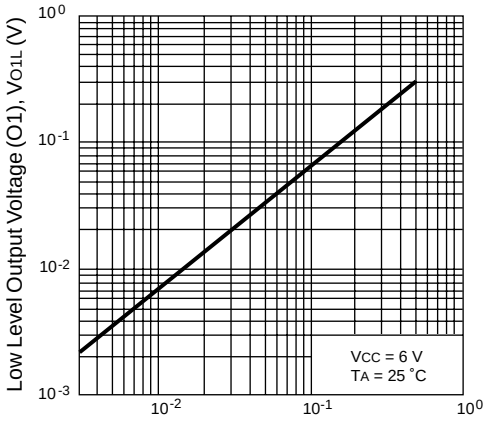
HIGH LEVEL SUPPLY CURRENT vs. SUPPLY VOLTAGE



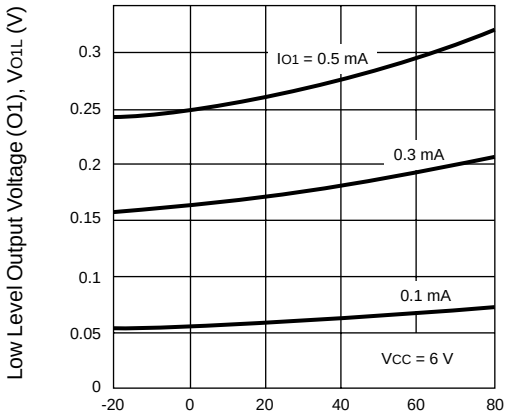
LOW LEVEL SUPPLY CURRENT vs. SUPPLY VOLTAGE



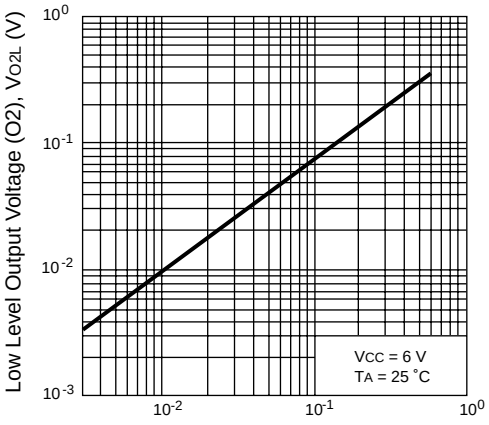
LOW LEVEL OUTPUT VOLTAGE vs. OUTPUT CURRENT



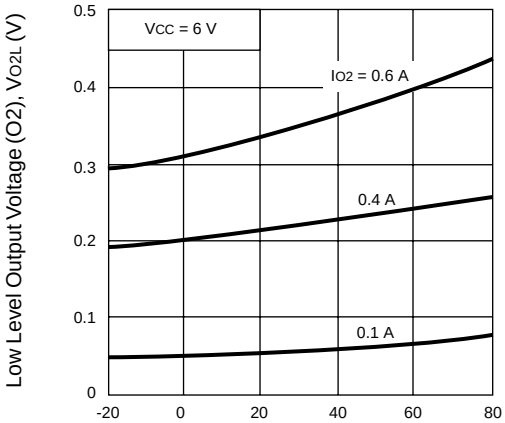
LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



LOW LEVEL OUTPUT VOLTAGE vs. OUTPUT CURRENT

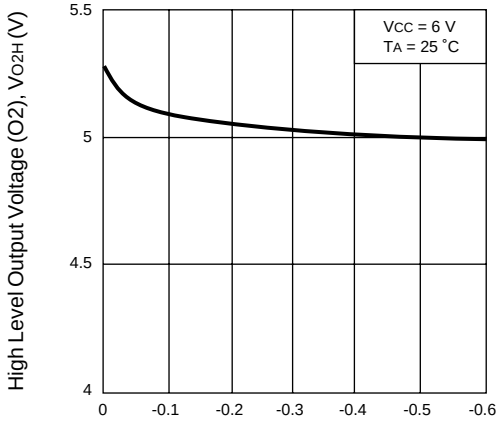


LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

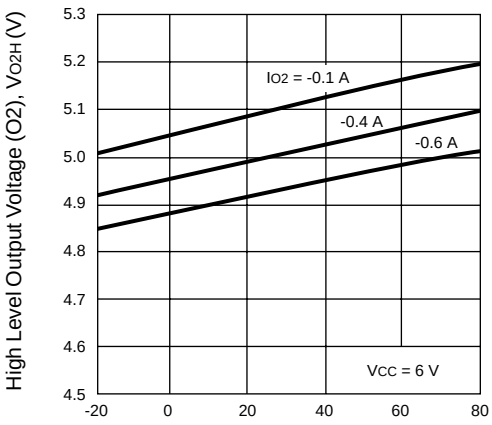


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

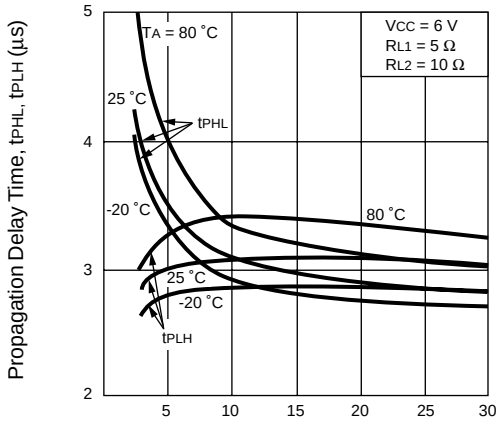
HIGH LEVEL OUTPUT VOLTAGE vs. OUTPUT CURRENT



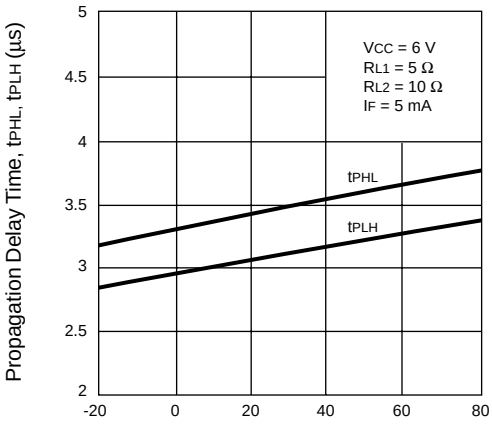
HIGH LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



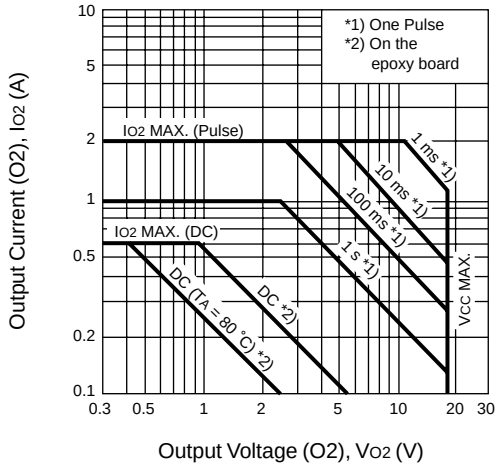
PROPAGATION DELAY TIME vs. FORWARD CURRENT



PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE

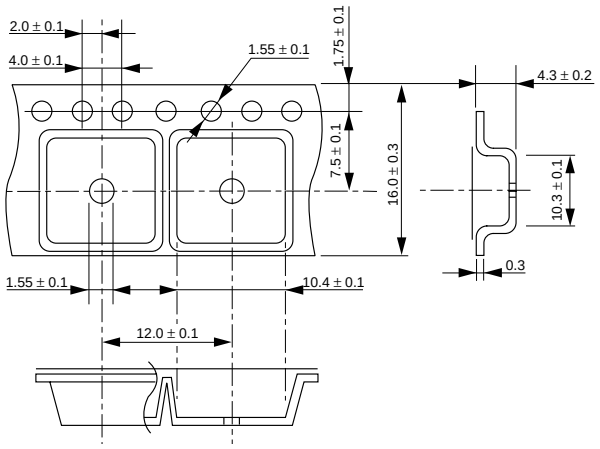


SAFE OPERATING AREA (T_{r1})

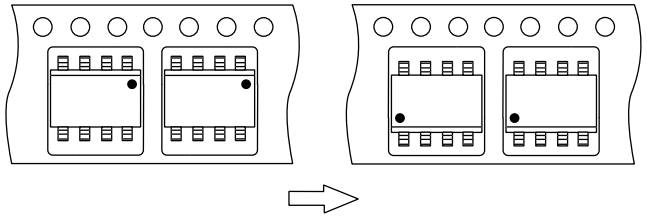


TAPING SPECIFICATIONS (Units in mm)

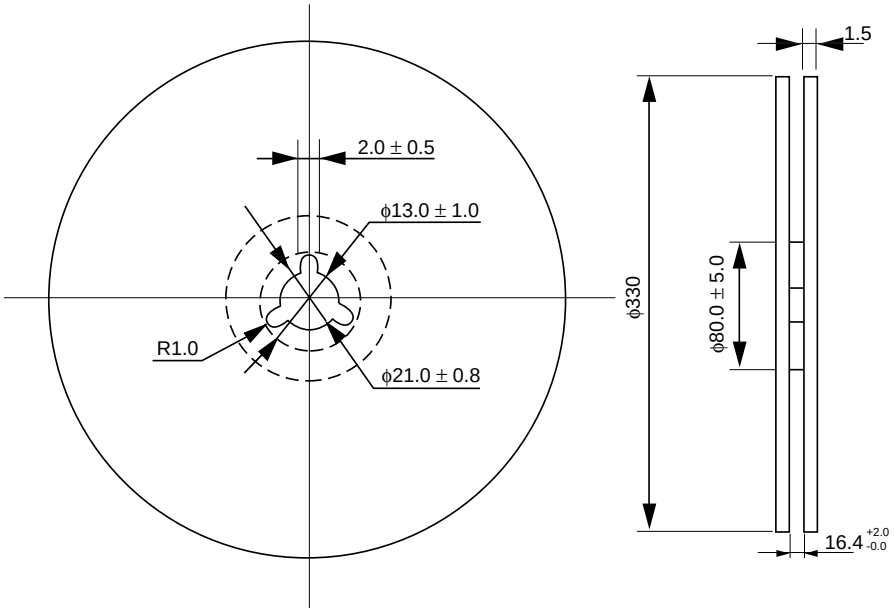
Tape Outline and Dimensions



Tape Direction



Reel Outline and Dimensions

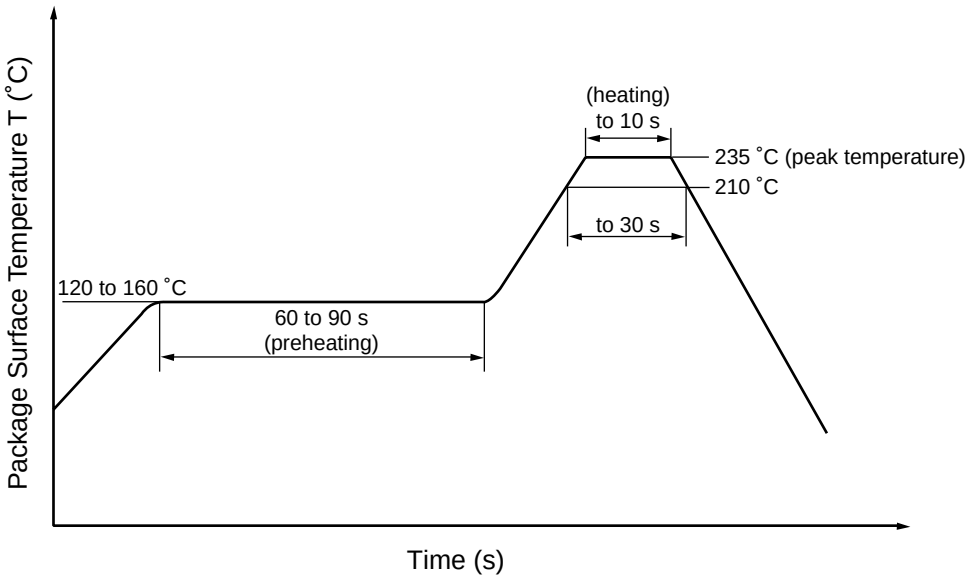


RECOMMENDED SOLDERING CONDITIONS

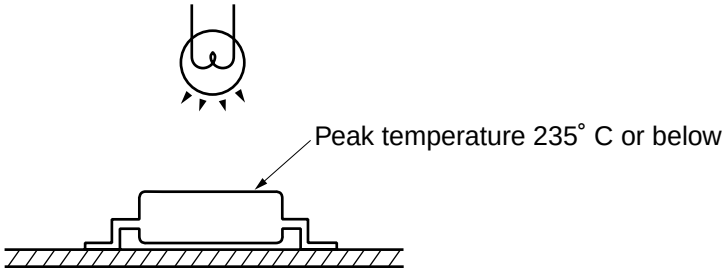
(1) Infrared reflow soldering

• Peak reflow temperature	235 °C or below (plastic surface)
• Time of temperature higher than 210 °C	30 seconds or less
• Number of reflows	Three
• Flux	Rosin flux containing a small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

Recommended Temperature Profile of Infrared Reflow



CAUTION: Avoid removing the residual flux with water after the first reflow process.



(2) Dip soldering

• Temperature	260 °C or below (molten solder temperature)
• Time	10 seconds or less
• Number of times	One
• Flux	Rosin flux containing a small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)