

POWER TRANSISTOR DRIVING BASE AMPLIFIER BUILT-IN TYPE OPTOCOUPLER

PS9634
PS9634L

FEATURES

- **HIGH INSTANTANEOUS COMMON MODE REJECTION VOLTAGE**
CMH = -1000 V/μs MIN, CML = 1000 V/μs MIN
- **HIGH POWER SUPPLY VOLTAGE (Vcc)**
Vcc = 18 V
- **HIGH RESPONSE SPEED**
tPHL, tPLH = 5 μs MAX
- **HIGH OUTPUT CURRENT**
Io1 = 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 (TA = -20 °C to +80 °C, unless otherwise specified)

PART NUMBER				PS9634, PS9634L		
SYMBOLS		PARAMETERS	UNITS	MIN	TYP	MAX
Input Characteristic	VF	Forward Voltage, IF = 5 mA, TA = 25 °C	V		1.1	1.4
	IR	Reverse Current, VR = 5 V, TA = 25 °C	μA			5
	Ct	Capacitance Between Terminals V = 0, f = 1.0 MHz, TA = 25 °C	pF		30	
Output Characteristics	Vcc	Supply Voltage	V	5.4		15
	VO1L*	Low Level Output Voltage (O1) Vcc = 6 V, Io1 = 0.4 A, RL2 = 10 Ω, IF = 5 mA	V		0.25	0.4
	VO2H*	High Level Output Voltage (O2) Vcc = 6 V, Io2 = -0.4 A, IF = 5 mA	V	4.5	5.0	
	VO2L	Low Level Output Voltage (O2) Vcc = 6 V, Io2 = 0.5 A, IF = 0	V		0.25	0.4
	IO1L*	Leak Current (O1), Vcc = 13 V, IF = 0	μA			100
	IO2L	Leak Current (O2), Vcc = 13 V, IF = 5 mA	μA			100
	ICCH	High Level Supply Current Vcc = 6 V, IF = 5 mA, TA = 25 °C Vcc = 6 V, IF = 5 mA	mA		8	12
			mA			16
	ICCL	Low Level Supply Current Vcc = 6 V, IF = 0, TA = 25 °C Vcc = 6 V, IF = 0	mA		15	18
			mA			22
Propagation Characteristics	IFLH*	Input ON Current, Low ♦ High Vcc = 6 V, RL1 = 5 Ω, RL2 = 10 Ω, TA = 25 °C Vcc = 6 V, RL1 = 5 Ω, RL2 = 10 Ω	mA	0.3	1.5	3.0
			mA	0.2		5.0
	RI-O	Insulation Resistance, RH = 40% to 60%, TA = 25 °C	Ω	10 ¹¹		
	tPLH*	Propagation Delay Time, Low ♦ High Vcc = 6 V, IF = 5 mA, RL1 = 5 Ω, RL2 = 10 Ω, TA = 25 °C	μs		3	5
	tPHL*	Propagation Delay Time, High ♦ Low Vcc = 6 V, IF = 5 mA, RL1 = 5 Ω, RL2 = 10 Ω, TA = 25 °C	μs		3	5
Propagation Characteristics	CMH*	Instantaneous Common Mode Rejection Voltage (Output "High"), TA = 25°C, VCM = 600 V (peak), IF = 5 mA RL1 = 470 Ω, RL2 = 1 kΩ, ΔVO2H = 0.5 V	V/μs	-1000		
	CML*	Instantaneous Common Mode Rejection Voltage (Output "Low"), TA = 25°C, VCM = 600 V (peak), IF = 0 mA RL1 = 470 Ω, RL2 = 1 kΩ, ΔVO2L = 0.5 V	V/μs	1000		

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

ABSOLUTE MAXIMUM RATINGS¹ ($T_A = 25^\circ\text{C}$)

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	$^\circ\text{C}$	-20 to +80
T_{STG}	Storage Temperature	$^\circ\text{C}$	-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 $T_A = 25^\circ\text{C}$ and $RH = 60\%$.

RECOMMENDED OPERATING CONDITIONS ($T_A = 25^\circ\text{C}$)

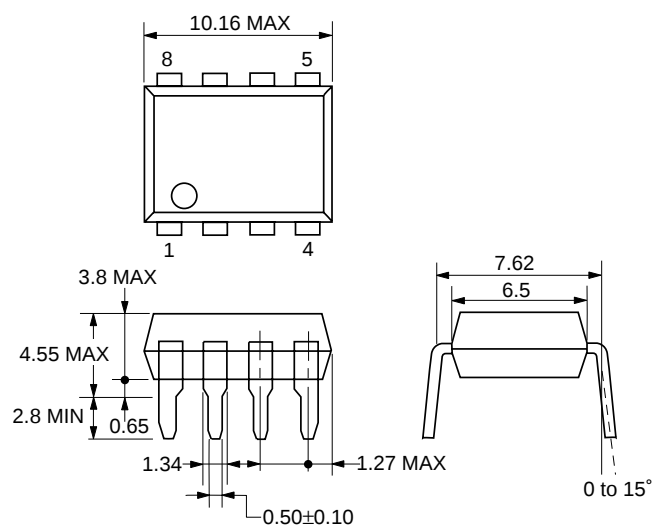
PART NUMBER			PS9634, PS9634L		
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
I_{FLH}	Input ON Current	mA	6	8	10
V_{CC}	Supply Voltage	V	5.4		15
I_{O1}	Output Current (O1)	A	0.1	0.2	0.3
I_{O2}	Output Current (O2)	A	0.1	0.2	0.3
T_{OP}	Operating Temperature	$^\circ\text{C}$	0	25	50

TRUTH TABLE

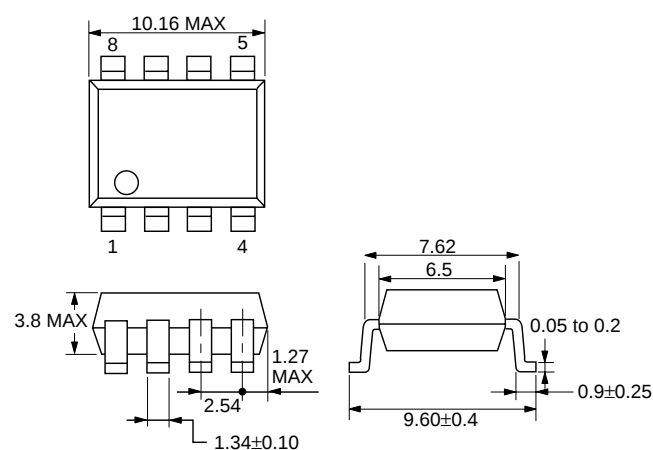
	LED	
	ON	OFF
Tr. 1	ON	OFF
Tr. 2	OFF	ON

OUTLINE DIMENSIONS (Units in mm)

PS9634

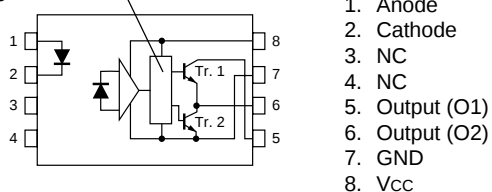


PS9634L

**PIN CONNECTION** (Top View)

PS9634

Signal processing circuit



1. Anode
2. Cathode
3. NC
4. NC
5. Output (O1)
6. Output (O2)
7. GND
8. Vcc

MEASUREMENT CIRCUITS FOR ELECTRICAL CHARACTERISTICS

FIG. 1 (V_{O1L})

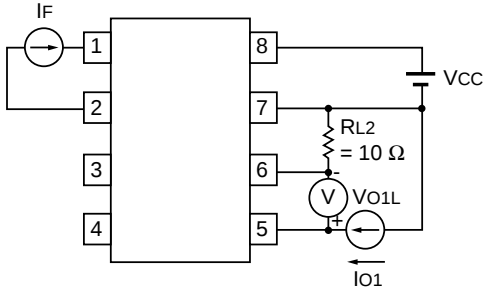


FIG. 2 (V_{O2H})

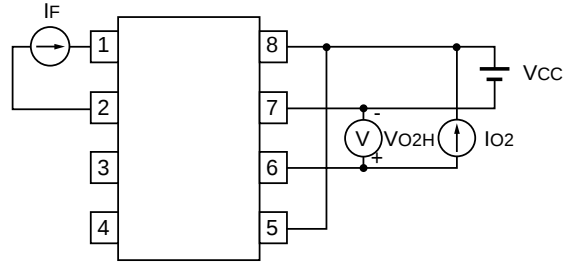


FIG. 3 (I_{O1L})

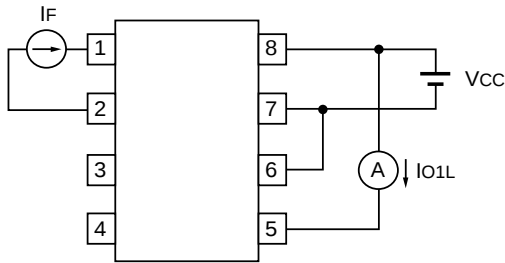


FIG. 4 (I_{O2L})

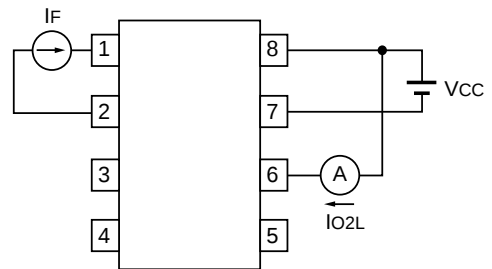


FIG. 5 (I_{FLH})

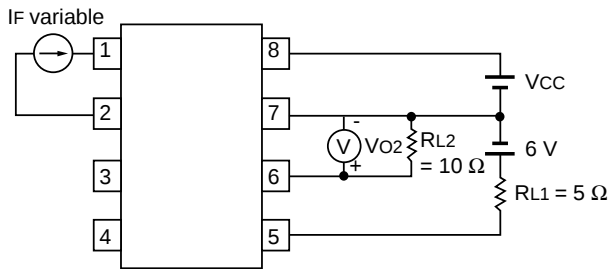


FIG. 6 (t_{PLH} , t_{PHL})

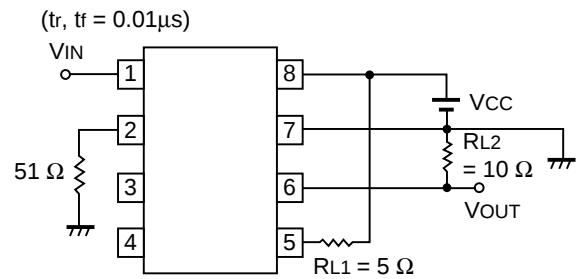
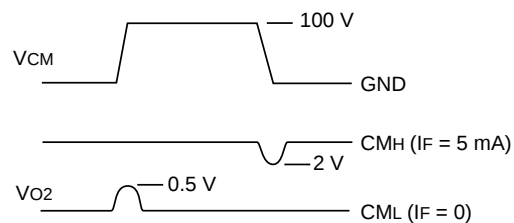
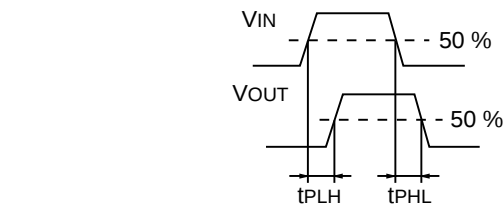
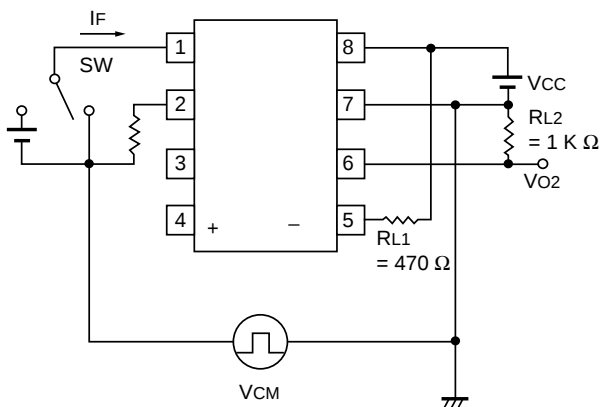
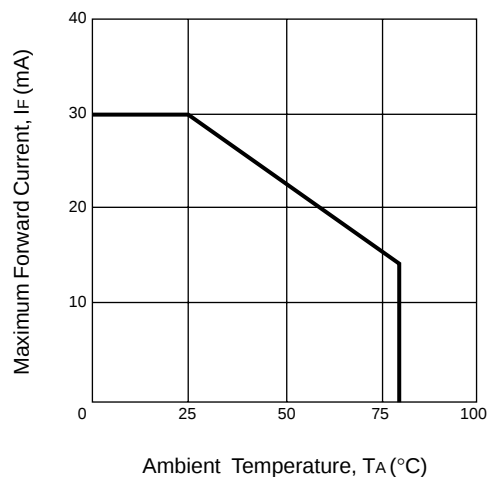


FIG. 7 (CM_H , CM_L)

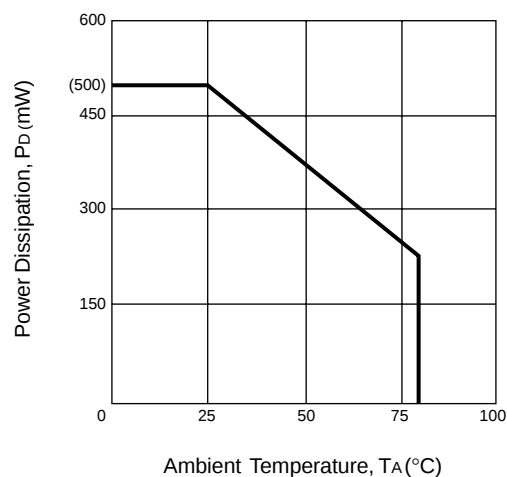


TYPICAL PERFORMANCE CURVES ($T_A = 25^\circ\text{C}$)

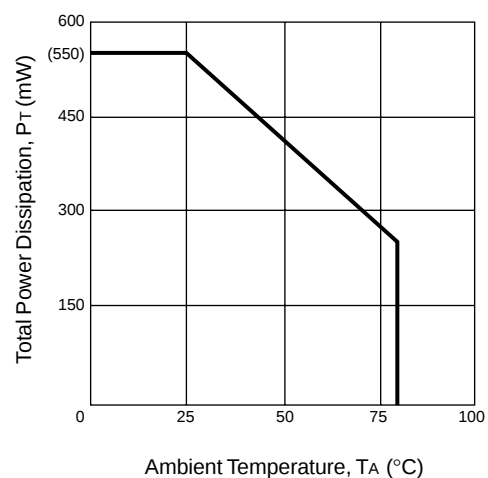
MAXIMUM FORWARD CURRENT vs.
AMBIENT TEMPERATURE



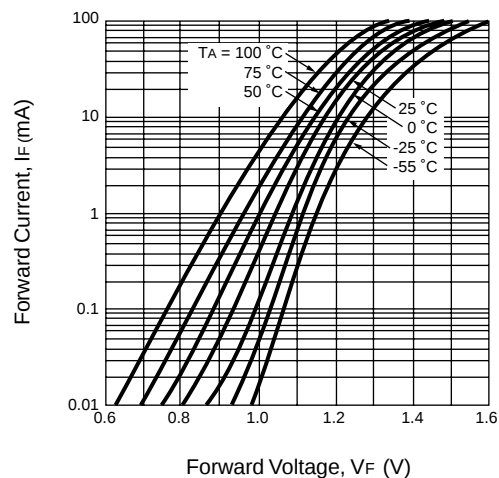
POWER DISSIPATION
vs. AMBIENT TEMPERATURE



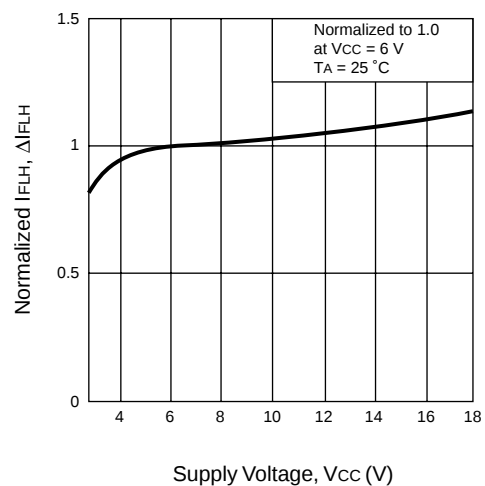
TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



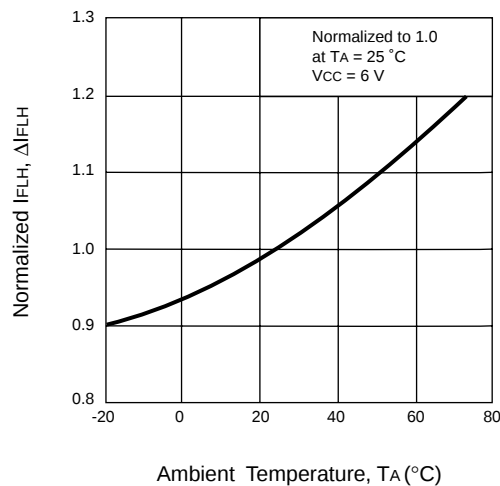
FORWARD CURRENT vs.
FORWARD VOLTAGE



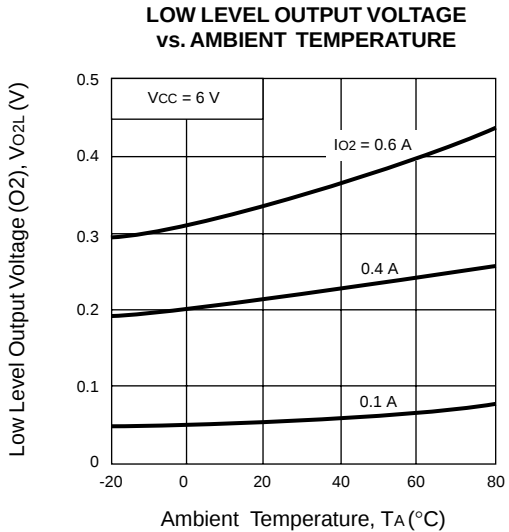
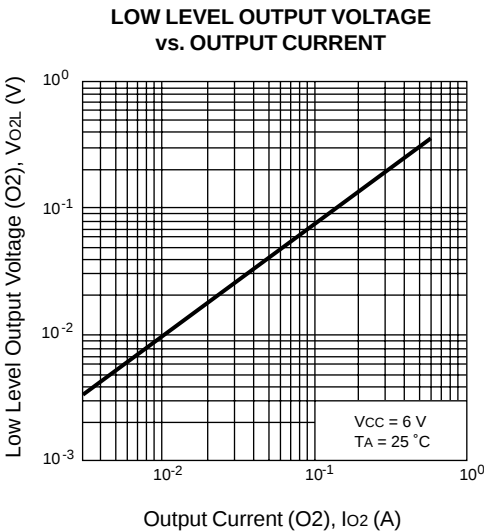
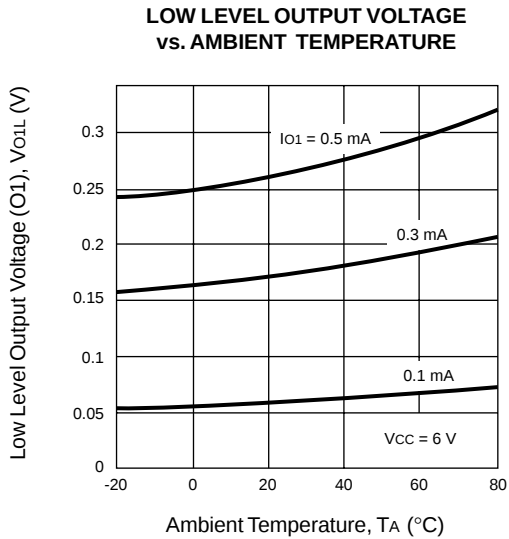
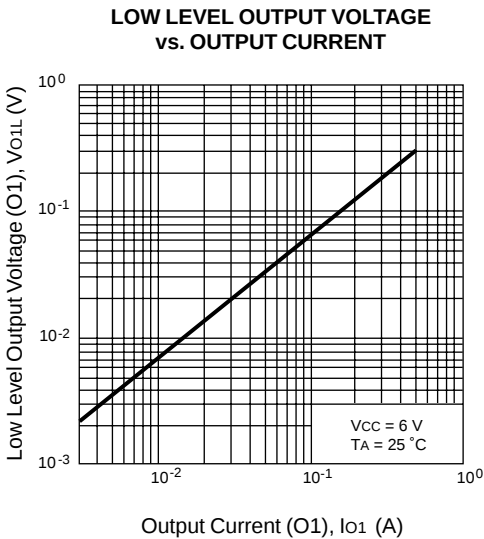
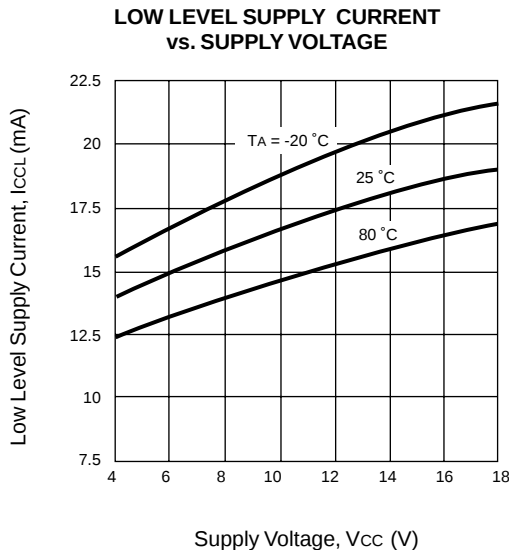
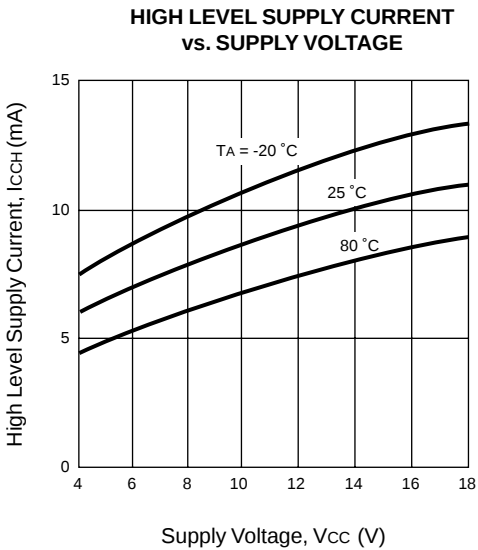
NORMALIZED I_{FLH} vs.
SUPPLY VOLTAGE



NORMALIZED I_{FLH} vs.
AMBIENT TEMPERATURE

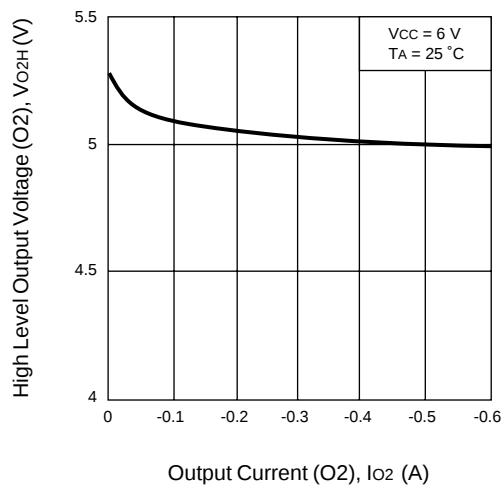


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

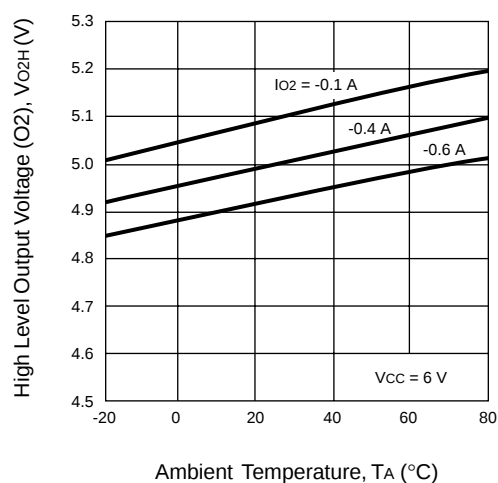


TYPICAL PERFORMANCE CURVES ($T_A = 25^\circ\text{C}$)

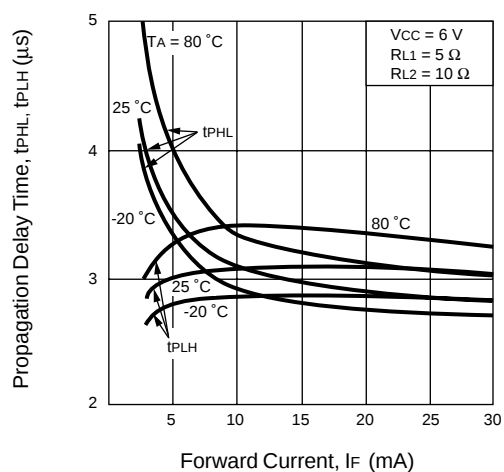
HIGH LEVEL OUTPUT VOLTAGE vs. OUTPUT CURRENT



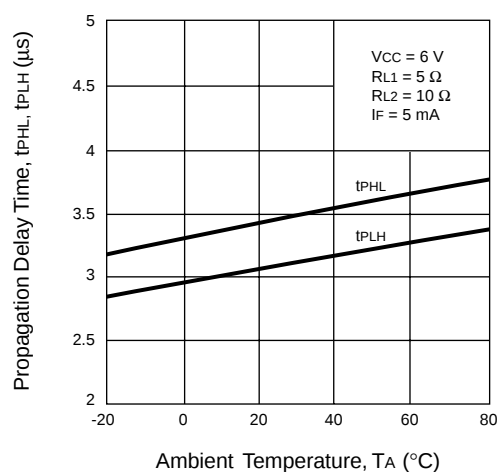
HIGH LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



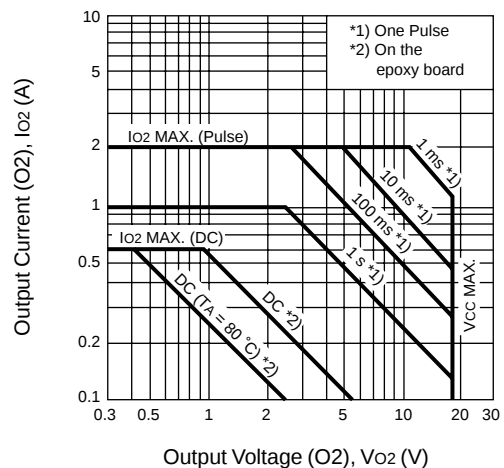
PROPAGATION DELAY TIME vs. FORWARD CURRENT



PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE

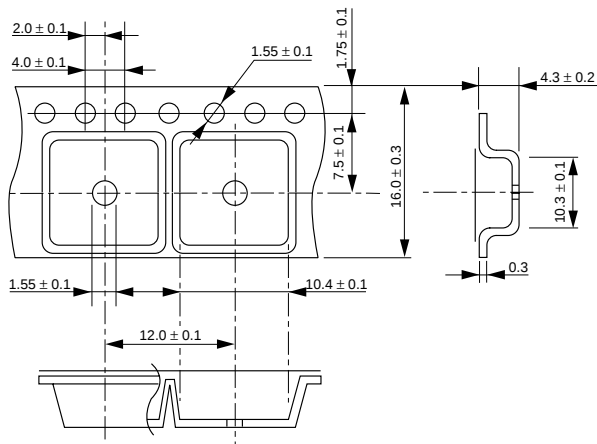


SAFE OPERATING AREA (T_{r1})

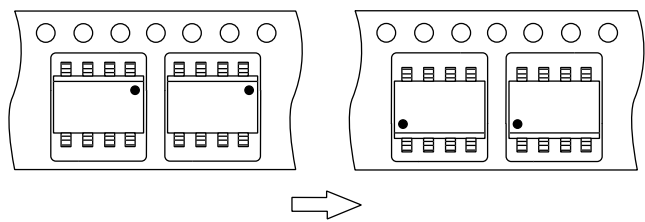


TAPING SPECIFICATIONS (Units in mm)

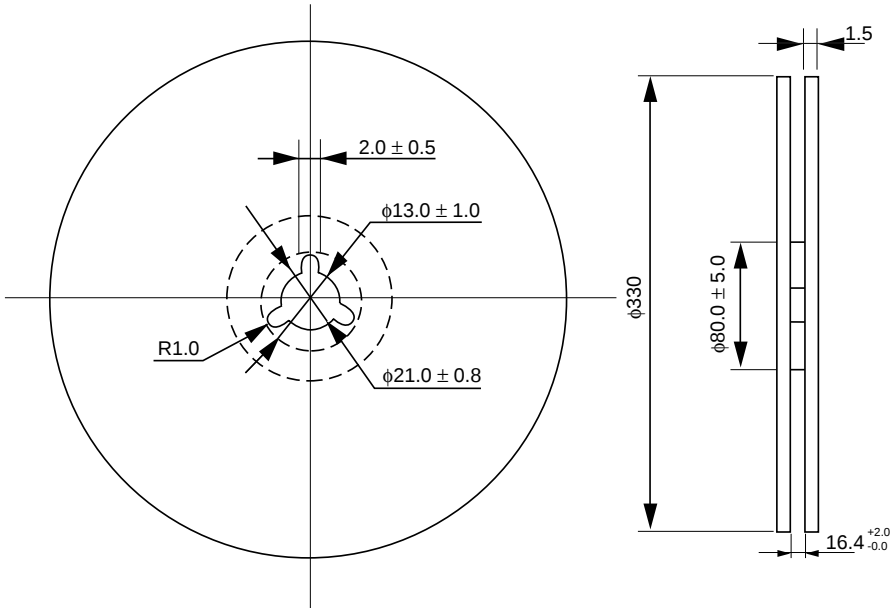
Tape Outline and Dimensions



Tape Direction



Reel Outline and Dimensions

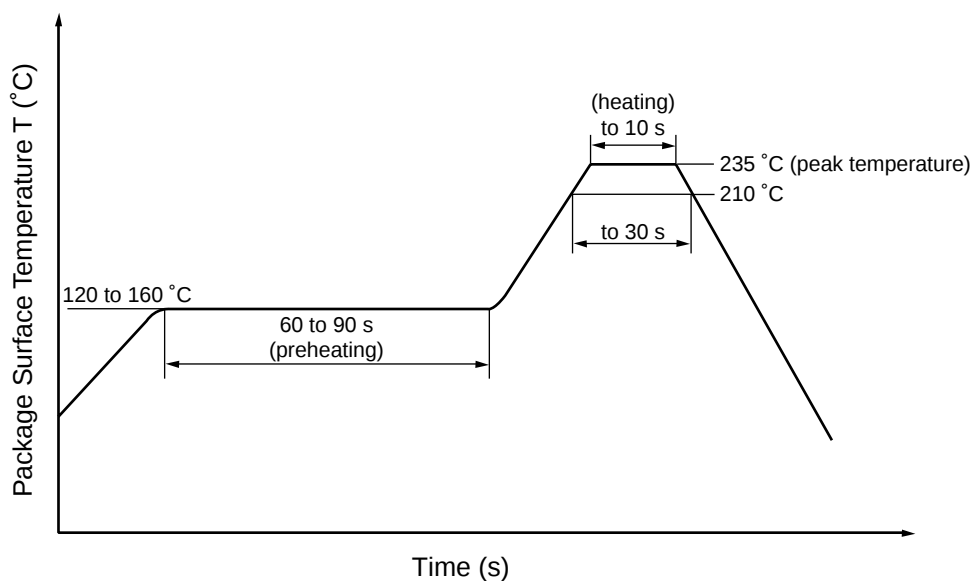


RECOMMENDED SOLDERING CONDITIONS

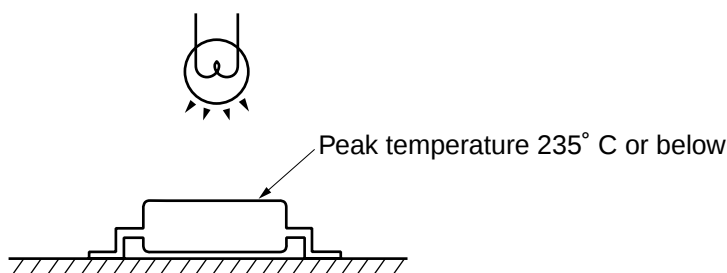
(1) Infrared reflow soldering

- 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.)

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