LITEON®
OPTOELECTRONICS

Photocoupler

Product Data Sheet

LTV-071L

Spec No.: DS70-2016-0026

Effective Date: 06/04/2016

Revision: -

LITE-ON DCC

RELEASE

BNS-OD-FC001/A4

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PHOTOCOUPLER
LTV-071L

1. DESCRIPTION

The LTV-071L consists of a high efficient AlGaAs Light Emitting Diode and a high speed optical detector. This design provides excellent AC and DC isolation between the input and output sides of the Optocoupler. The output of the optical detector features a totem pole output. The internal shield ensures high common mode transient immunity. A guaranteed common mode transient immunity is up to 10KV/μs. The Optocoupler operational parameters are guaranteed over the temperature range from -40°C to +105°C.

1.1 Features

- Dual channel High speed 15MBd
- 3.3V and 5.5V CMOS Compatible
- Available in SO8.
- Safety approval

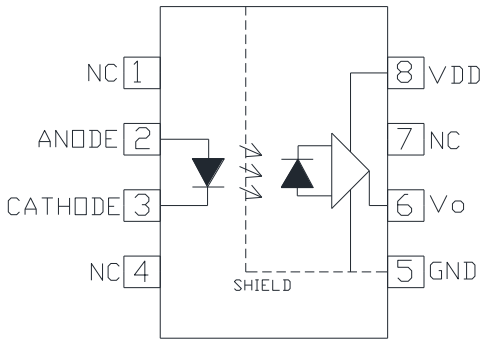
  UL 1577

  VDE DIN/EN 60747-5-5
- RoHS Compliance

1.2 Applications

- High Voltage Isolation
- Isolation in line receivers
- Ground loop elimination
- Feedback Element in Switching Mode Power Supplier
- Data transmission
- CANBus, RS485, USB
- Interface between Microprocessor system, computer and their peripheral

1.3 Functional Diagram

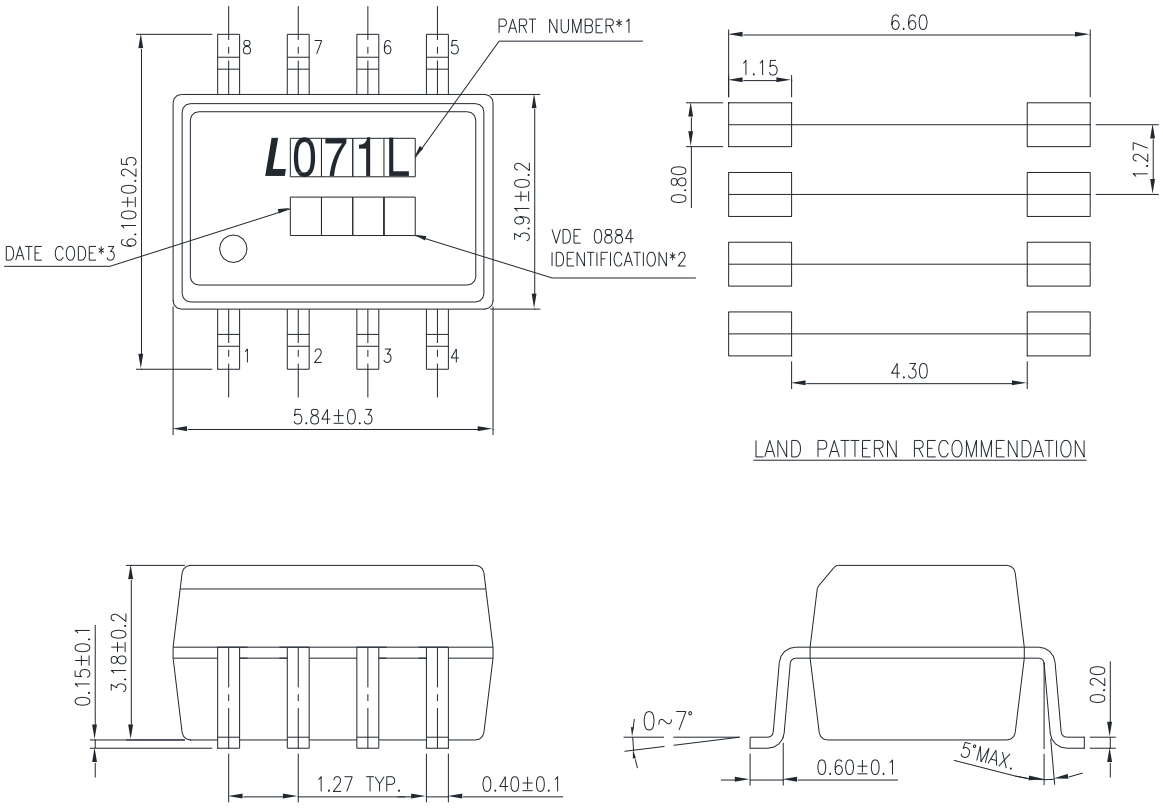


Truth Table (Positive Logic)

LED	OUT
ON	L
OFF	H

A 0.1μF bypass Capacitor must

2. PACKAGE DIMENSIONS



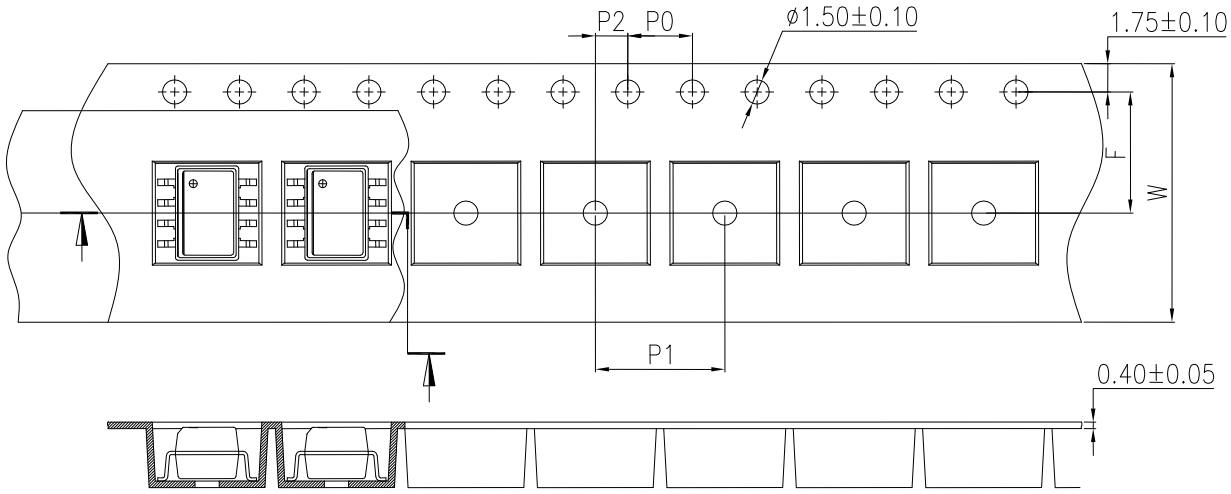
Part No : LTV-071L

Notes :

1. Part numbers
2. “V” to represent VDE0884
3. The first digit is year code, second and third digit is week code

Dimensions are in Millimeters

3. TAPING DIMENSIONS



Description	Symbol	Dimension in mm (inch)
Tape wide	W	16±0.3 (0.63)
Pitch of sprocket holes	P_0	4±0.1 (0.15)
Distance of compartment	F	7.5±0.1 (0.295)
	P_2	2±0.1 (0.079)
Distance of compartment to compartment	P_1	8±0.1 (0.47)

Quantities Per Reel

Package Type	LTV-071L
Quantities (pcs)	3000

4. RATING AND CHARACTERISTICS

4.1 Absolute Maximum Ratings at Ta=25°C *1

	Parameter	Symbol	Rating	Unit
Input	Average Forward Input Current *2	I_F	20	mA/ch
	Reverse Input Voltage	V_R	5	V
Output	Output Collector Current	I_O	10	mA
	Output Collector Voltage	V_O	7	V
	Output Collector Power Dissipation	P_o	60	mW
	Isolation Voltage	V_{iso}	3750	V_{rms}
	Supply Voltage	V_{CC}	7	V
	Operating Temperature	T_{opr}	-40 ~ +105	°C
	Storage Temperature	T_{stg}	-55 ~ +125	°C
	Lead Solder Temperature	T_{sol}	260	°C

1. Ambient temperature = 25°C, unless otherwise specified. Stresses exceeding the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

2. 260°C for 10 seconds. Refer to Lead Free Reflow Profile.

4.2 Recommended Operation Condition

Parameter	Symbol	Min.	Max.	Units
Ambient Operation Temperature	T_A	-40	+105	°C
Supply Voltage	V_{cc}	4.5	5.5	V
		3.0	3.6	V
Input Current (ON)	I_F	7	14	mA

4.3 ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Input						
Input Forward Voltage	V_F	1.3	1.55	1.80	V	I_F= 14mA
Input Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	—	-1.143	—	mV/°C	I_F= 14mA
Input Reverse Voltage	BV_R	5.0	—	—	V	I_R = 10μA
Input Threshold Current	I_{TH}	—	4	6.5	mA	V_O < 0.8V
Input Capacitance	C_{IN}	—	34	—	pF	f = 1MHz, V_F = 0V
Detector						
High Level Supply Current	I_{CCH}	—	3	8	mA	I_F = 0mA
Low Level Supply Current	I_{CCL}	—	3	8	mA	I_F = 14mA
High Level Output Current	V_{OH}	V_{cc}-1	V_{cc}-0.3	-	V	V_{CC} = 3.3V, I_O = -4mA, I_F = 0mA
		V_{cc}-1	V_{cc}-0.2			V_{CC} = 5V, I_O = -4mA, I_F = 0mA
Low Level Output Voltage	V_{OL}	—	0.22	0.80	V	V_{CC} = 3.3V, I_O = 4mA I_F = 14mA
		—	0.16	0.80		V_{CC} = 5V, I_O = 4mA, I_F = 14mA,

Specified over recommended temperature (T_A = -40°C to +105°C) unless otherwise specified.

Typical values applies to V_{CC} = 5V, T_A = 25°C. See note 1.

5. SWITCHING SPECIFICATION

T_A=0~70°C, Vcc=5V, unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Propagation Delay Time to Low Output Level *4	t_{PHL}	—	31	60	ns	I_F=14mA, C_L = 15pF, V_{CC}=3.3V
		—	30	60		I_F=14mA, C_L = 15pF, V_{CC}=5V
Propagation Delay Time to High Output Level *3	t_{PLH}	—	40	60		I_F=14mA, C_L = 15pF, V_{CC}=3.3V
		—	40	60		I_F=14mA, C_L = 15pF, V_{CC}=5V
Pulse Width Distortion	$\lvert t_{PLH} - t_{PHL} \rvert$	—	9	30		I_F=14mA, C_L = 15pF, V_{CC}=3.3V
		—	10	30		I_F=14mA, C_L = 15pF, V_{CC}=5V
Propagation Delay Skew	t_{PSK}			40		C_L = 15pF, V_{CC}=5V
Output Rise Time (10 to 90%)	t_r	—	8	—		I_F=14mA, C_L = 15pF, V_{CC}=5V
Output Fall Time (90 to 10%)	t_f	—	6	—		
Pulse width	t_{PW}	66.7	—	—		—
Common Mode Transient Immunity at High Output Level*5	$\lvert CM_H \rvert$	10	—	—	kV/μs	$\lvert V_{CM} \rvert$ = 1KV, V_{CC} = 5V, I_F =0mA, V_O >3V, T_A = 25°C
Common Mode Transient Immunity at Low Output Level*6	$\lvert CM_L \rvert$	10	—	—	kV/μs	$\lvert V_{CM} \rvert$ = 1KV, V_{CC} = 5V, I_F =14mA, V_O <0.8V, T_A = 25°C

Specified over recommended temperature (TA = -40°C to +105°C) unless otherwise specified. Typical values applies to TA = 25°C

6. ISOLATION CHARACTERISTIC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Input-Output Insulation Leakage Current *7	I_{I-O}	—	—	1.0	μA	45% RH, t = 5s, V_{I-O} = 3kV DC, T_A =25°C
Withstand Insulation Test Voltage *7	V_{ISO}	3750	—	—	V_{RMS}	RH ≤ 50%, t = 1min, T_A = 25°C
Input-Output Resistance *7	R_{I-O}	—	10^{12}	—	Ω	V_{I-O} = 1kV DC
Input-Output Capacitance *7	C_{I-O}	—	0.6	—	pF	f = 1MHz, T_A = 25°C

Specified over recommended temperature (T_A = -40°C to +105°C) unless otherwise specified. Typical values applies to T_A = 25°C

Notes

1. A 0.1μF or bigger bypass capacitor for V_{CC} is needed as shown in Fig.1
2. Peaking driving circuit may be used to speed up the LED. The peak drive current of LED may go up to 50mA and maximum pulse width 50ns, as long as average current doesn't exceed 20mA.
3. t_{PLH} (propagation delay) is measured from the 6.5 mA point on the falling edge of the input pulse to the 1.5 V point on the rising edge of the output pulse.
4. t_{PHL} (propagation delay) is measured from the 6.5 mA point on the rising edge of the input pulse to the 1.5 V point on the falling edge of the output pulse.
5. $|CM_H|$ is the maximum tolerable rate of rise of the common mode voltage to assure that the output will remain in a high logic state (i.e., VO > 3.0 V).
6. $|CM_L|$ is the maximum tolerable rate of fall of the common mode voltage to assure that the output will remain in a low logic state (i.e., VO < 0.8 V).
7. Device is considered a two-terminal device: pins 1, 2, 3, and 4 shorted together, and pins 5, 6, 7, and 8 shorted together.

7. SWITCHING TIME TEST CIRCUIT

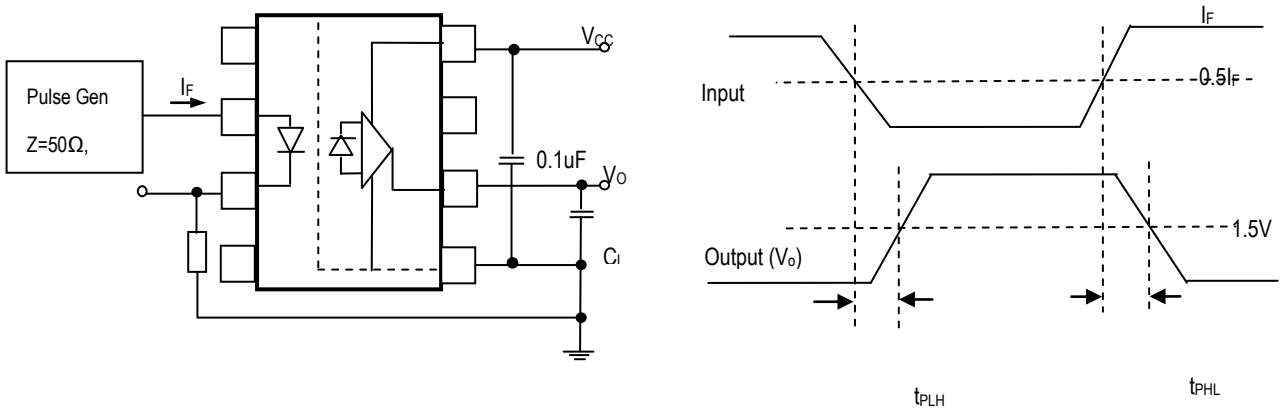


Figure 1: One Channel Test Circuit for t_{PHL} and t_{PLH}

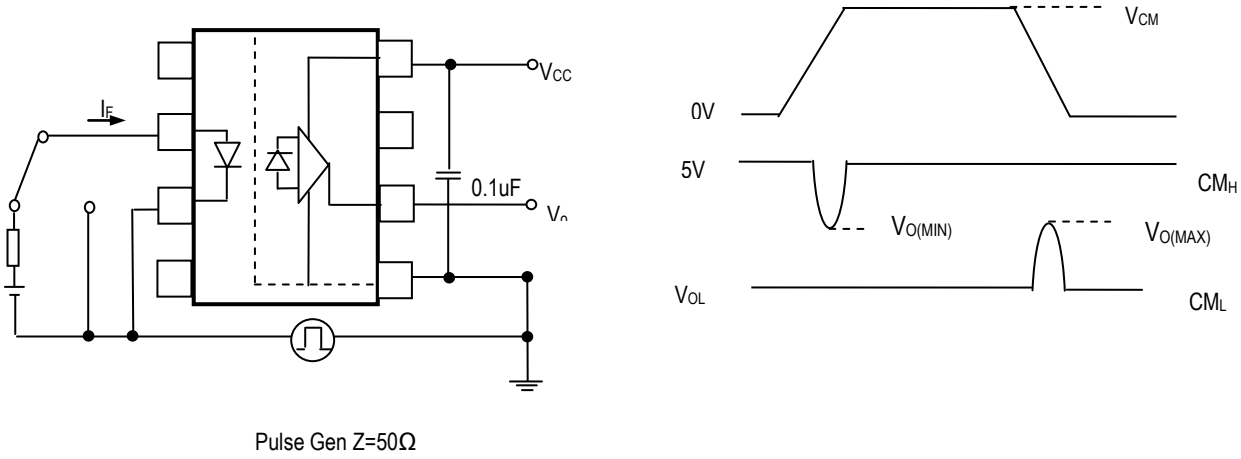


Figure 2: One Channel Test Circuit for Common Mode Transient Immunity

8. TYPICAL PERFORMANCE CURVES

Figure 3: Input Current vs Forward Voltage

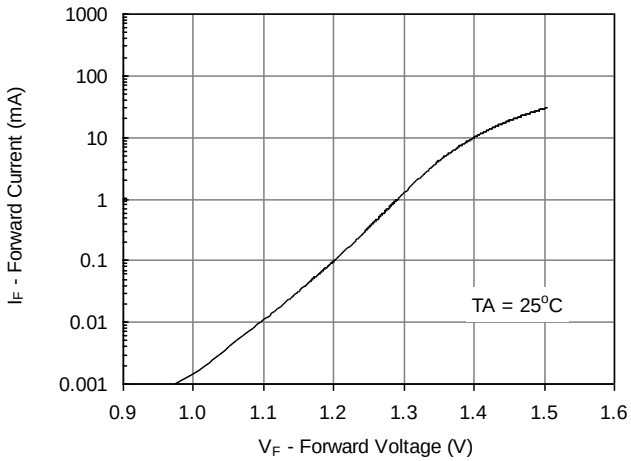


Figure 4: Forward Voltage vs Temperature

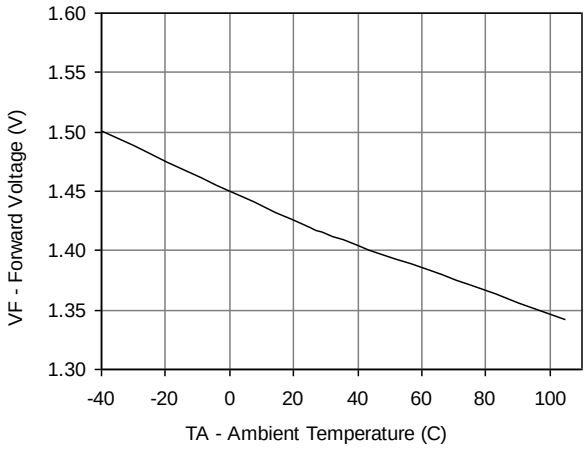


Figure 5: Supply Current High vs Temperature

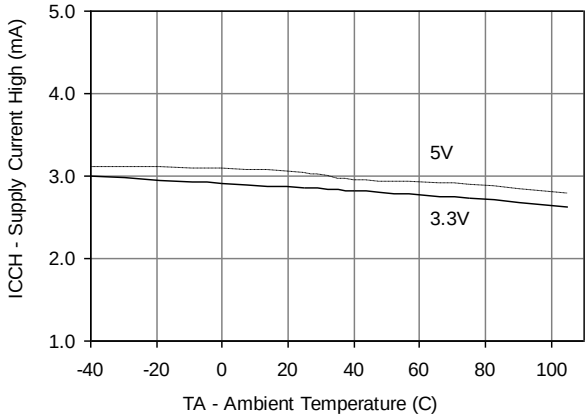


Figure 6: Supply Current Low vs Supply Voltage

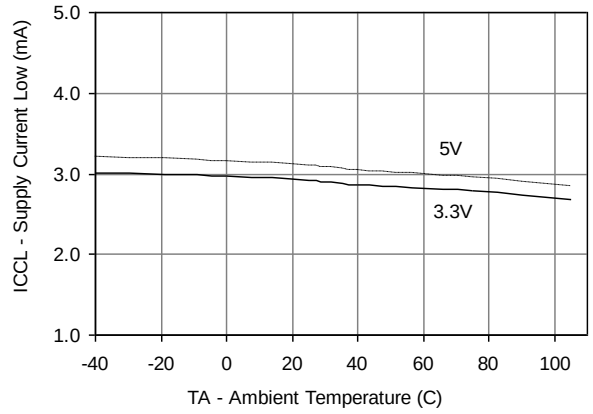


Figure 7: Switching Speed vs Input Current at 5V

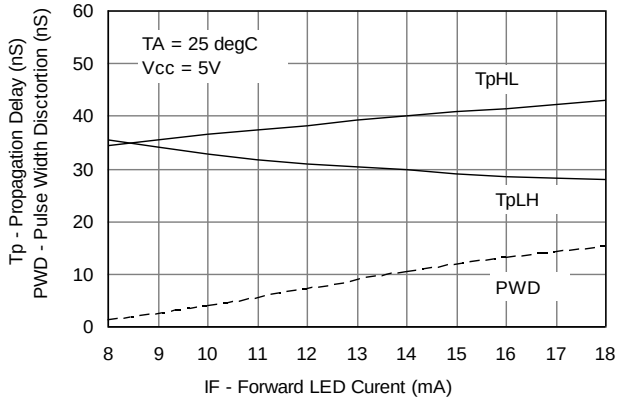


Figure 8: Switching Speed vs Input Current at .3V

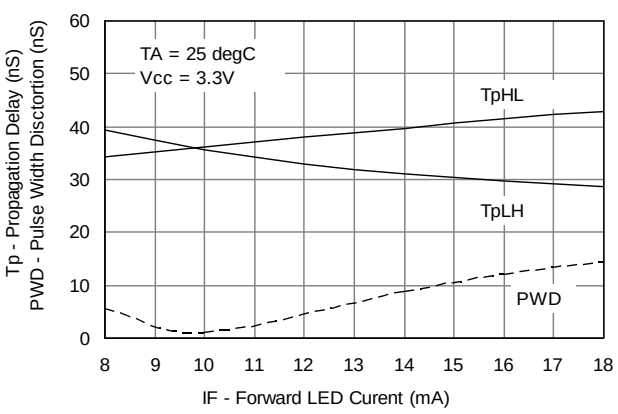
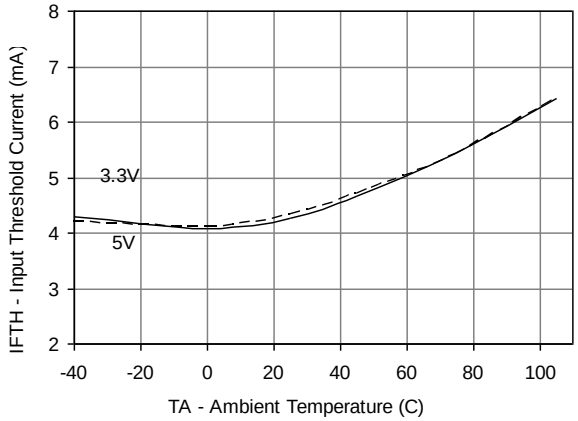


Figure 9: Input Threshold Current vs Temperature

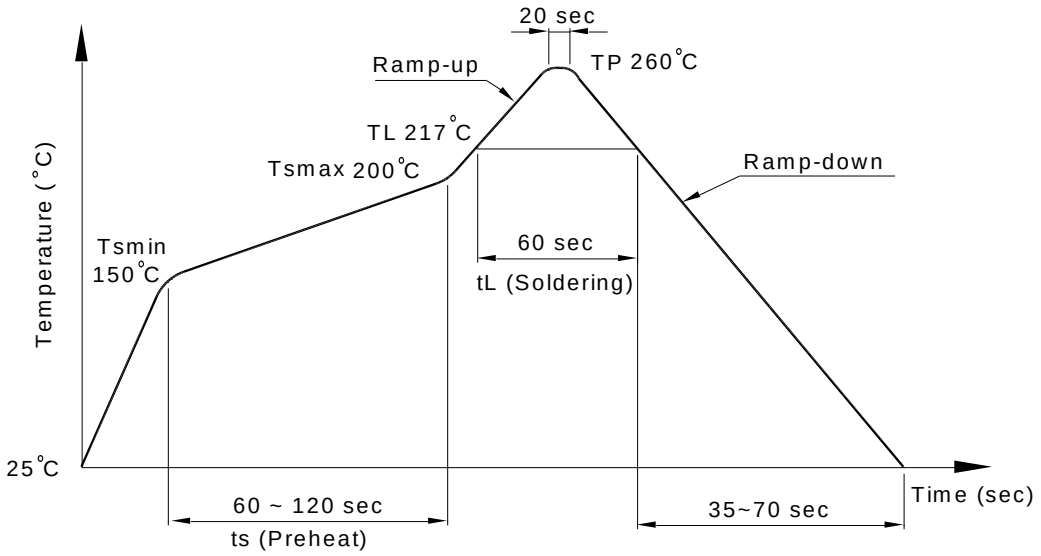


9. TEMPERATURE PROFILE OF SOLDERING

9.1 IR Reflow soldering (JEDEC-STD-020 compliant)

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

Profile item	Conditions
Preheat	
- Temperature Min (T_{Smin})	150˚C
- Temperature Max (T_{Smax})	200˚C
- Time (min to max) (ts)	90±30 sec
Soldering zone	
- Temperature (T_L)	217˚C
- Time (t_L)	60 sec
Peak Temperature (T_P)	260˚C
Ramp-up rate	3˚C / sec max.
Ramp-down rate	3~6˚C / sec



9.2 Wave soldering (JEDEC22A111 compliant)

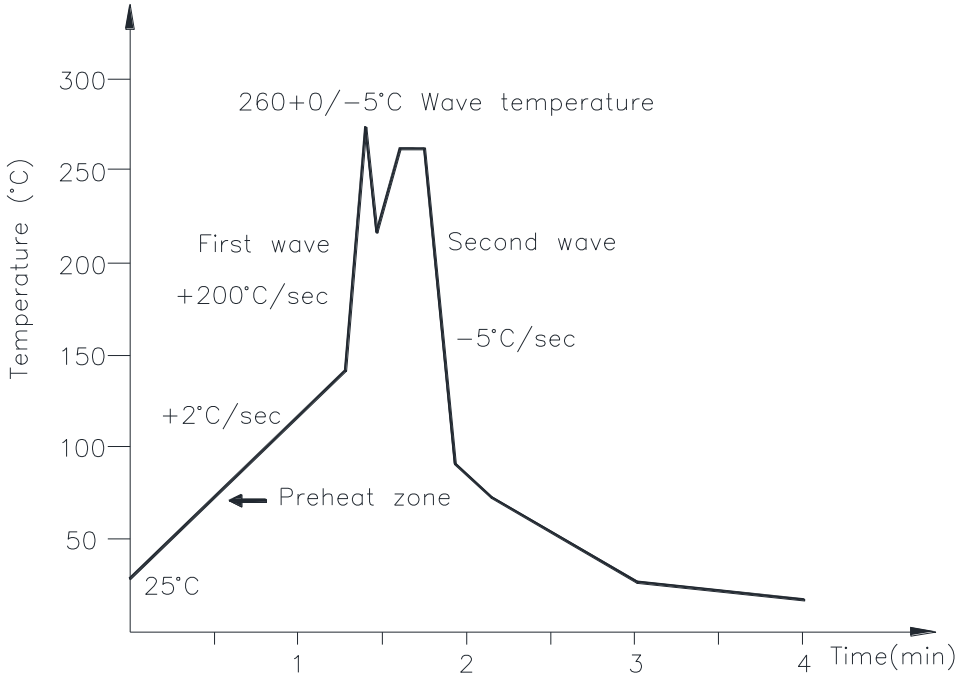
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5˚C

Time: 10 sec.

Preheat temperature:25 to 140˚C

Preheat time: 30 to 80 sec.



9.3 Hand soldering by soldering iron

Allow single lead soldering in every single process. One time soldering is recommended.

Temperature: 380+0/-5˚C

Time: 3 sec max.

10. Notes:

Specifications of the products displayed herein are subject to change without notice.

The products shown in this publication are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical instrumentation and application. For equipment/devices where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc, please contact our sales representatives.