OPTOELECTRONICS

Photocoupler Product Data Sheet

H11Lx-L series

Spec No. :DS70-2016-0020
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Revision: B

LITE-ON DCC

RELEASE

BNS-OD-FC001/A4

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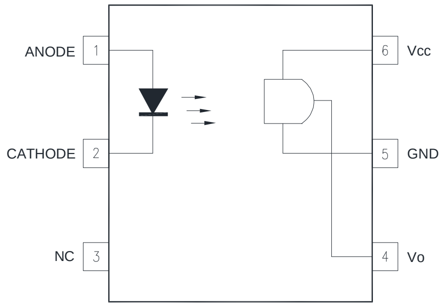
H11Lx-L series 6-Pin Schmitt trigger Output Photocoupler with Ultra Low Power

1. Description

1.1 Features

- Ultra-low I_{DD} current: 1.3 mA/channel maximum
- High data rate, 2MHz typical (NRZ)
- Free from latch up and oscilliation throughout voltage and temperature ranges.
- Microprocessor compatible drive
- Logic compatible output sinks 16mA at 0.4V maximum
- Guaranteed on/off threshold hysteresis
- Wide operating range
- Guaranteed performance over temperature -40ºC ~ +100ºC.
- 10 kV/µs minimum common mode transient immunity (CMTI) at V_{CM} = 1000 V.
- MSL Level 1
- Safety approval:
  UL 1577 recognized with 5000 V_{RMS} for 1 minute
  VDE DIN EN60747-5-5, V_{IORM} = 630 Vpeak

Functional Diagram



1.2 Applications

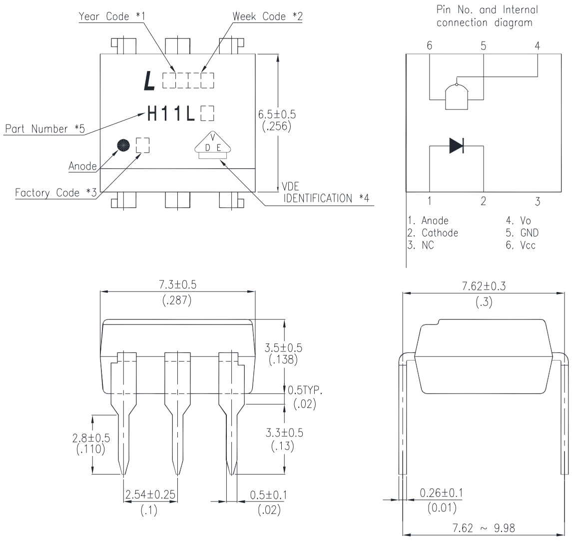
- Logic to logic isolator
- Programmable current level sensor
- Line receiver—eliminate noise and transient problems
- A.C. to TTL conversion—square wave shaping
- Digital programming of power supplies
- Interfaces computers with peripherals

Truth Table

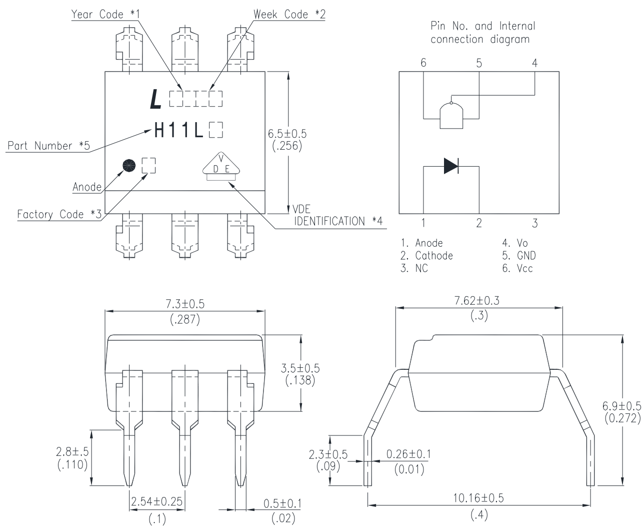
Input	Output
H	L
L	H

2. PACKAGE DIMENSIONS

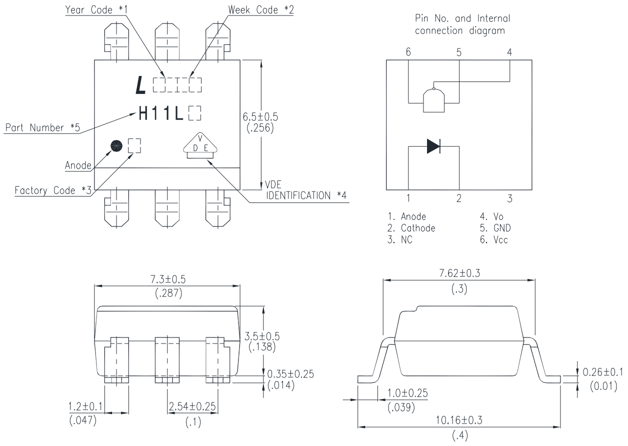
2.1 H11Lx-L



2.2 H11LxM-L



2.3 H11LxS-L



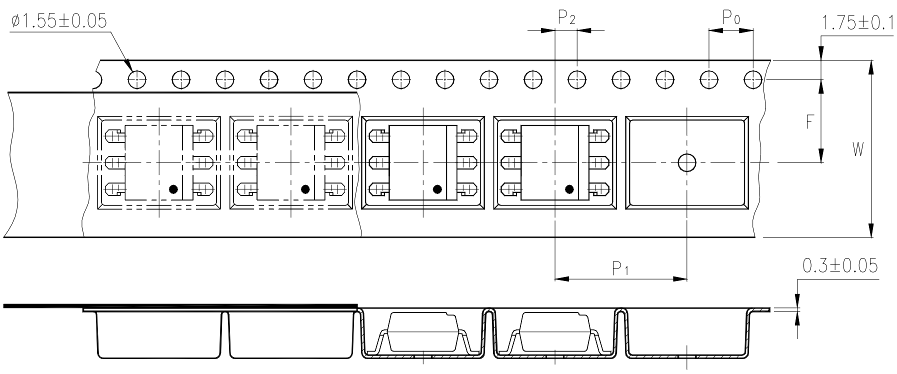
Notes :

1. Year date code.
2. 2-digit work week.
3. Factory identification mark (W: China-CZ, Y: Thailand)
4. VDE option.
5. Part number: H11L1 / H11L2 / H11L3

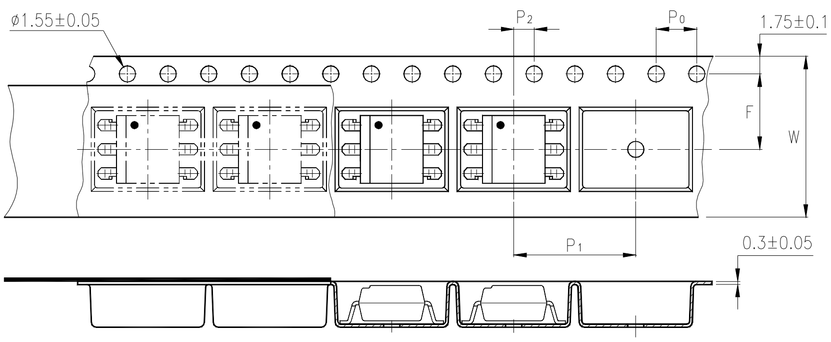
* Dimensions are in Millimeters and (Inches).

3. TAPING DIMENSIONS

3.1 H11LxS-TA-L



3.2 H11LxS-TA1-L



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	12±0.1 (0.472)

3.3 Quantities Per Reel

Package Type	TA / TA1
Quantities (pcs)	1000

4. RATING AND CHARACTERISTICS

4.1 Absolute Maximum Ratings at Ta=25℃

	Parameter	Symbol	Rating	Unit
Input	Forward Current	I_F	20	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	120	mW
Output	V_{45} Allowed Range	V_O	0 ~ 16	V
	V_{65} Allowed Range	V_{CC}	3 ~ 16	V
	I_4 Output Current	I_O	50	mA
	Power Dissipation	P	150	mW
	Total Power Dissipation	P_{tot}	250	mW
1.	Isolation Voltage	V_{iso}	5000	V_{rms}
	Operating Temperature	T_{opr}	-40 ~ +100	^oC
	Storage Temperature	T_{stg}	-55 ~ +150	^oC
2.	Soldering Temperature	T_{sol}	260	^oC

1. AC For 1 Minute, R.H. = 40 ~ 60%

   Isolation voltage shall be measured using the following method.

   (1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.

   (2) The isolation voltage tester with zero-cross circuit shall be used.

   (3) The waveform of applied voltage shall be a sine wave.

2. For 10 Seconds

4.2 ELECTRICAL OPTICAL CHARACTERISTICS

All Typical values at T_A = 25℃ and V_{CC} = 3 to 16 V, unless otherwise specified

	Parameter		Symbol	Min.	Typ.	Max.	Unit	Test Condition	Figure	Note
Input	Input Forward Voltage		V_F	1.2	1.4	1.6	V	I_F = 10mA	6	
				0.75				I_F = 0.3mA		
	Reverse Current		I_R			10	μA	V_R = 5V		
	Input Capacitance		C_{IN}			100	pF	f = 1 MHz, V_F = 0 V		
Output	Operating Voltage Range		V_{CC}	3		15	V		5	
	Supply Current		$I_{CC(off)}$		0.7	1.3	mA	I_F = 0 , V_{CC} = 5V		
	Output Current, High		I_{OH}			100	μA	I_F = 0 , V_{CC} = V_O = 15V		
	Supply Current		$I_{CC(on)}$		0.7	1.3	mA	I_F = 10mA , V_{CC} = 5V	5	
	Output Voltage, low		V_{OL}		0.2	0.4	V	R_L = 270Ω,V_{CC}=5V, I_F=I_{FON}(max.)	4	
	Turn-On Threshold Current	H11L1	$I_{F(ON)}$		1.0	1.6	mA	R_L = 270Ω,V_{CC}=5V	1, 2, 3	1
		H11L2				10				
		H11L3				5				
	Turn-Off Threshold Current		$I_{F(OFF)}$	0.3			mA	R_L = 270Ω,V_{CC}=5V		
	Hysteresis Ratio		$I_{F(OFF)}$ / $I_{F(ON)}$	0.5		0.9		R_L = 270Ω,V_{CC}=5V		

Note 1: Maximum $I_{F(ON)}$ is the maximum current required to trigger the output, For example, a 1.6mA maximum trigger current would require the LED to be driven at a current greater than 1.6mA to guarantee the device turns on. A 10% gurad band is recommended to account for degradation of LED over its lifetime.

4.3 SWITCHING SPECIFICATION

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition	Figure	Note
Propagation Delay Time to Low Output Level	T_{PHL}	—	180	500	ns	R_L = 270Ω,V_{CC}=5V, I_F=I_{FON}(max.), T_A=25°C	—	—
Fall Time	t_f	—	3	—	ns		—	—
Propagation Delay Time to High Output Level	T_{PLH}	—	120	500	ns		—	—
Rise Time	t_r	—	0.1	—	ns		—	—
Data Rate	—	—	2	—	MHz	—	—	—
Logic High Common Mode Transient Immunity	$\|CM_H\|$	10	—	—	kV/μs	V_{CC} = 5V, V_{CM} = 1000V, R_L = 270Ω I_F = 0mA, T_A = 25°C	8	2
Logic Low Common Mode Transient Immunity	$\|CM_L\|$	10	—	—	kV/μs	V_{CC} = 5V, V_{CM} = 1000V R_L = 270Ω, I_F=I_{FON}(max.), T_A = 25°C	8	3

Note 2: Common mode transient immunity in a Logic High level is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM}, to assure that the output will remain in a Logic High state (i.e., V_O > 3.0 V).

Note 3: Common mode transient immunity in a Logic Low level is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM}, to assure that the output will remain in a Logic Low state (i.e., V_O < 1.0 V).

5. TYPICAL PERFORMANCE CURVES

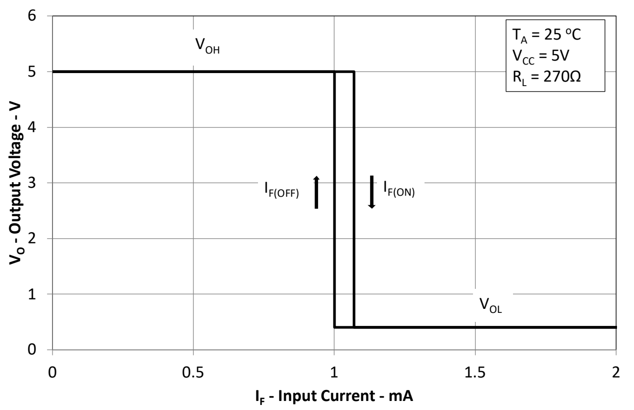


Figure 1. Transfer Chracteristic

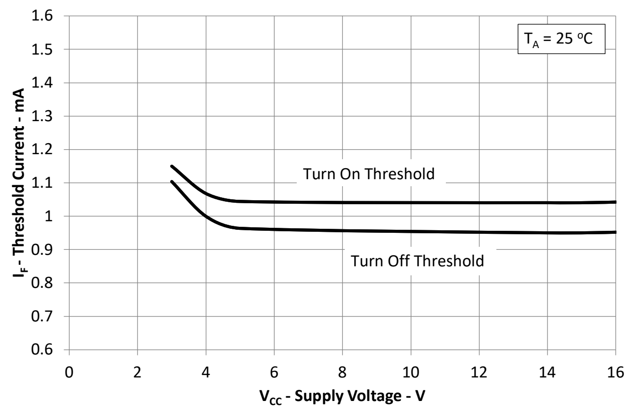


Figure 2. Threshold Current vs. Supply Voltage

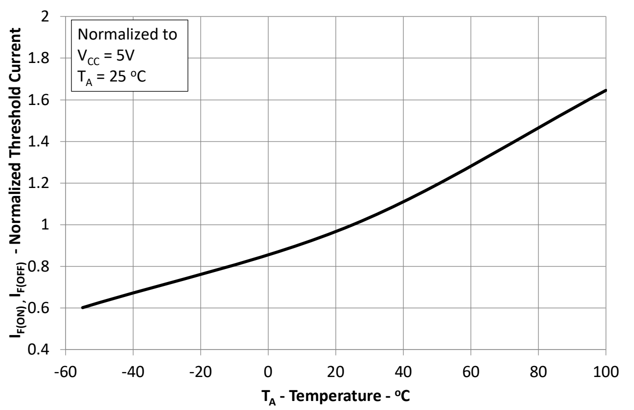


Figure 3. Threshold Current vs. Supply Temperature

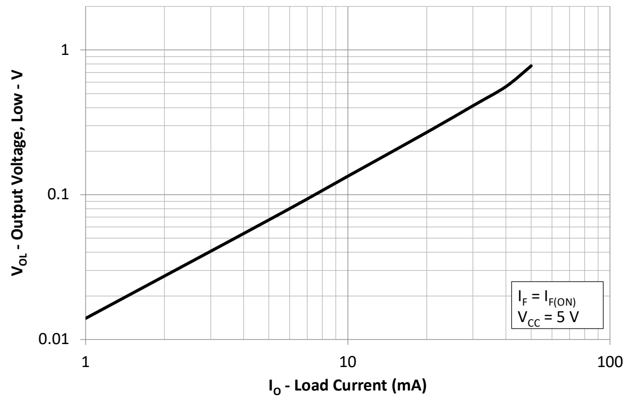


Figure 4. Output Voltage, Low vs. Load Current

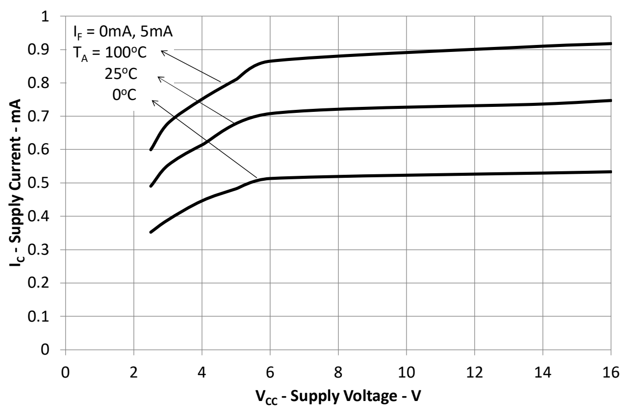


Figure 5. Supply Current vs. Supply Voltage

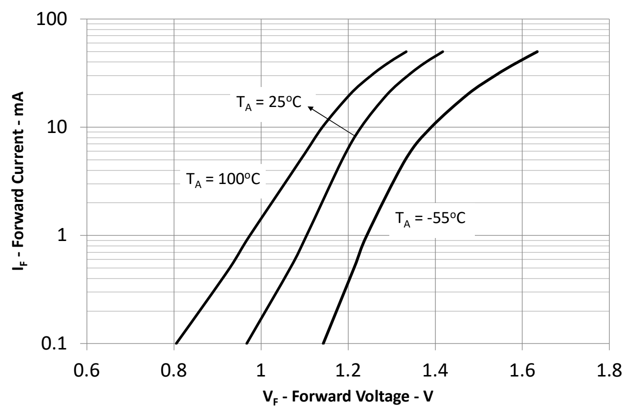


Figure 6. Forward Current vs. LED Forward Voltage

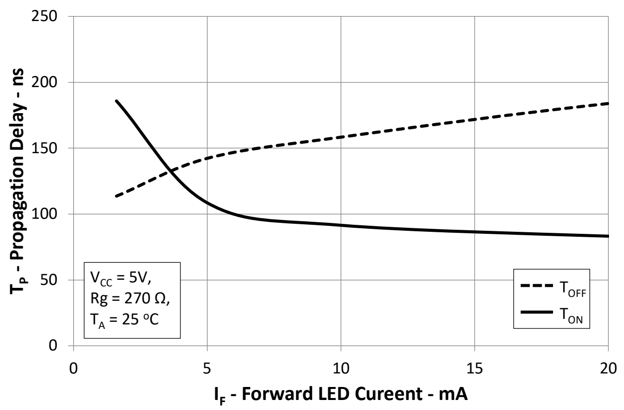


Figure 7. Propagation delay vs. Forward Current

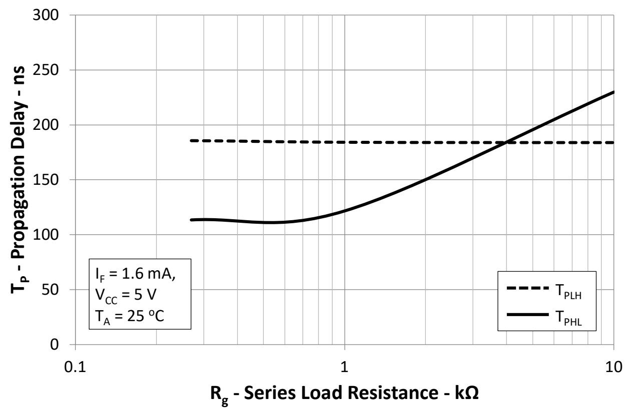


Figure 8. Propagation delay vs. Load resistance

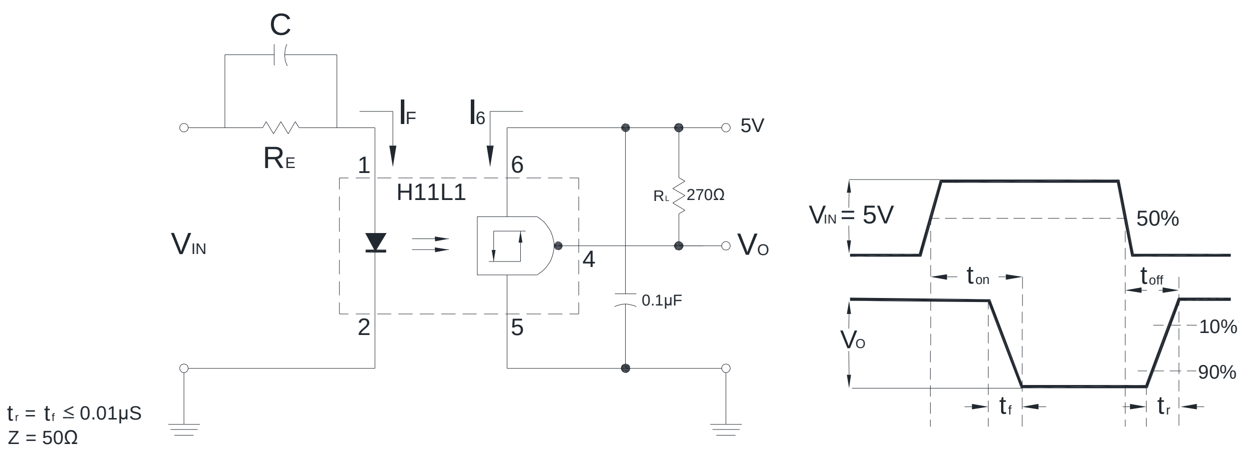


Figure 9. Switching Test Circuit and Waveform

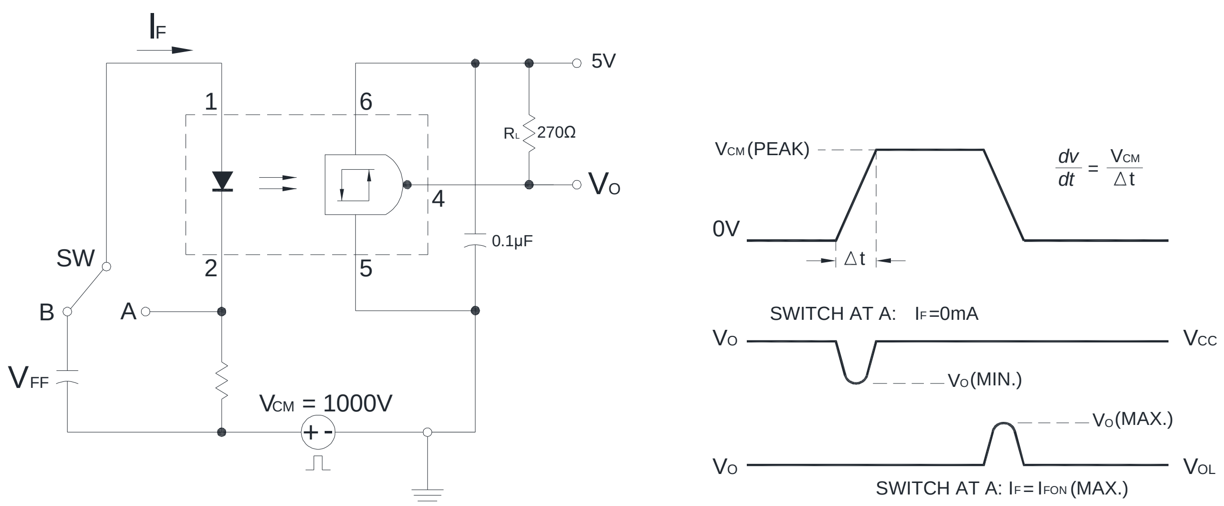


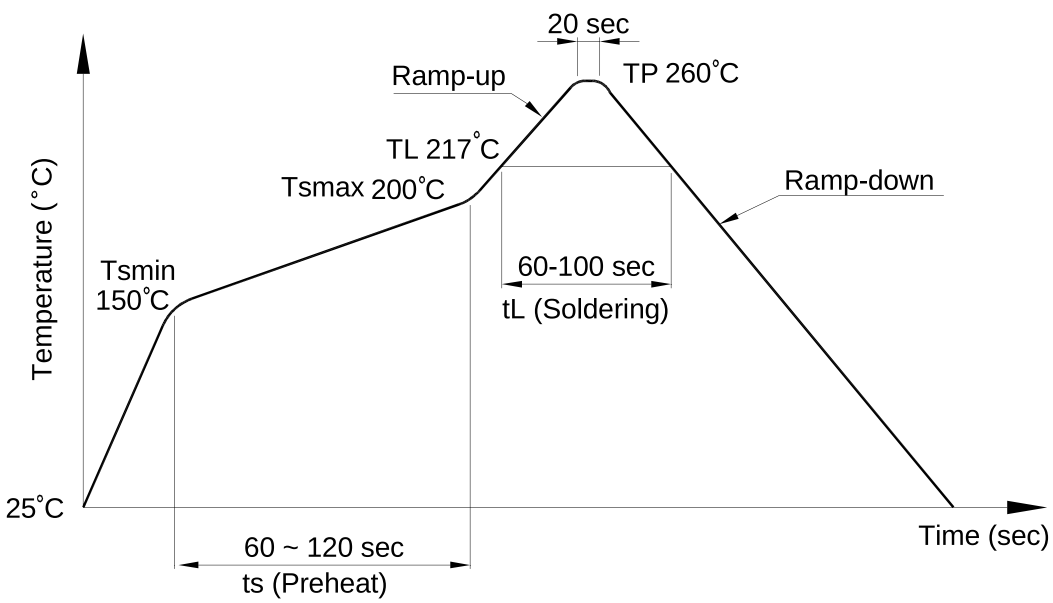
Figure 10 : CMR Test Circuit and Waveforms

6. TEMPERATURE PROFILE OF SOLDERING

6.1 IR Reflow soldering (JEDEC-STD-020C 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 ~ 100 sec
Peak Temperature (T_P)	260˚C
Ramp-up rate	3˚C / sec max.
Ramp-down rate	3~6˚C / sec



6.2 Wave soldering (JEDEC22A111 compliant)

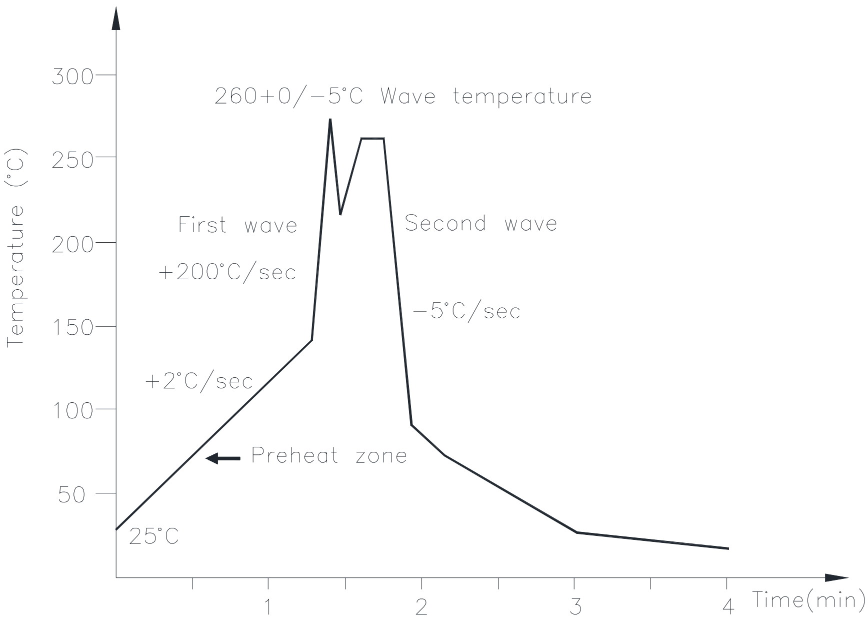
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5˚C

Time: 10 sec.

Preheat temperature:25 to 140˚C

Preheat time: 30 to 80 sec.



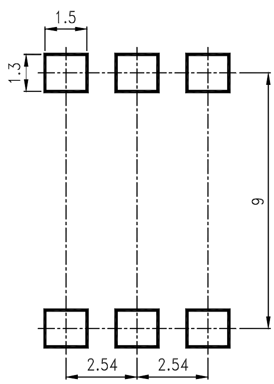
6.3 Hand soldering by soldering iron

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

Temperature: 380+0/-5˚C

Time: 3 sec max.

7. RRECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)



8. NAMING RULE

Part Number Options
H11Lx-L
H11LxM-L
H11LxS-TA-L
H11LxS-TA1-L
H11Lx-V-L
H11LxM-V-L
H11LxSTA-V-L
H11LxSTA1-V-L

Definition of Suffix	Remark
"H11Lx-L"	LiteOn model name Part number: H11L1 / H11L2 / H11L3
"No Suffix"	Dual-in-Line package clearance distance 7 mm typical
"M"	Wide lead spacing package clearance distance 8 mm typical
"S"	Surface mounting package clearance distance 8 mm typical
"TA"	Pin 1 location at lower right of the tape
"TA1"	Pin 1 location at upper left of the tape
"V"	VDE approved option

9. Notes

- LiteOn is continually improving the quality, reliability, function or design and LiteOn reserves the right to make changes without further notices.
- 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 application and instrumentation.
- 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.
- When requiring a device for any "specific" application, please contact our sales in advice.
- If there are any questions about the contents of this publication, please contact us at your convenience.
- The contents described herein are subject to change without prior notice.
- Immerge unit's body in solder paste is not recommended.