LITEON OPTOELECTRONICS

Data Sheet

Photocoupler
LTV-2530-EE series

1. DESCRIPTION

The LTV-2530 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. Connection for the bias of the photodiode improves the speed that of a conventional phototransistor coupler by reducing the base-collector capacitances. The internal shield ensures high common mode transient immunity. A guaranteed common mode transient immunity is up to 1KV/μsec.

1.1 Features

- High speed – 1MBd typical
- Available in Dual-in-line, Wide lead spacing, Surface mounting package.
- Storable output.
- Safety approval

  UL/ cUL Recognized 5000 VRMS/1 min

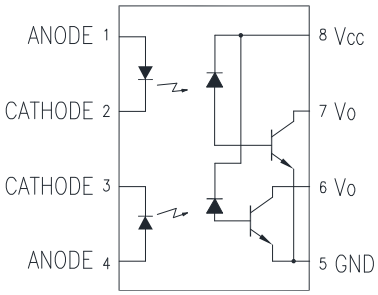
  IEC/EN/DIN EN 60747-5-5 VIORM = 630 Vpeak

1.2 Applications

- Isolation in line receivers
- Digital isolation for A/D, D/A conversion
- Ground loop elimination
- Feedback Element in Switching Mode Power Supplier
- Pulse transformer replacement
- Power transistor isolation in motor drives
- Interface between Microprocessor system, computer and their peripheral

1.3 Functional Diagram

Pin No. and Internal connection diagram



Truth Table (Positive Logic)

LED	OUT
ON	L
OFF	H

A 0.1μF bypass Capacitor must be connected between Pin8 and Pin5

2. TYPE

Part number	Lead Frame		Suffix option			Quantity	Customized suffix
	Type	Clearance distance	Tape & Reel	Pin 1 location	IEC/EN/DIN EN60747-5-5		
LTV-2530	Through hole	Typ. 7 mm			-V*	1000 per reel 50 per tube	EE
LTV-2530M	Wide lead	Typ. 8 mm					
LTV-2530S	Surface mount	Typ. 8 mm	-TA -TA1	lower right of the tape			
LTV-2530S2	Surface mount 2	Min. 8 mm		upper left of the tape			

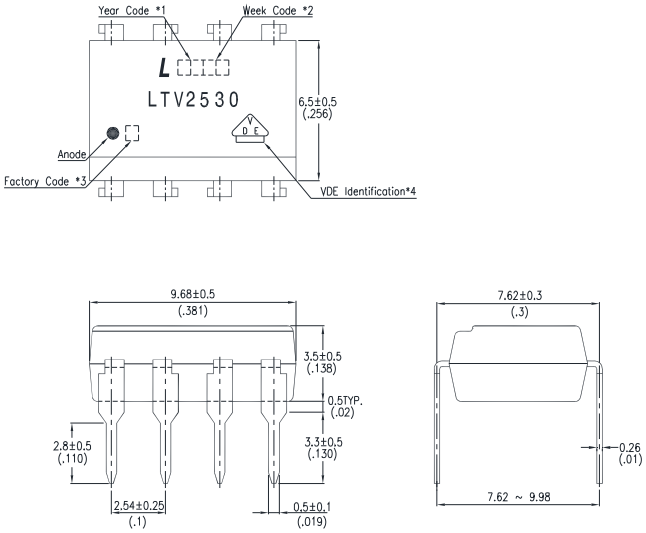
Example 1 : LTV-2530S-TA1-EE

Example 2 : LTV2530STA1-V-EE

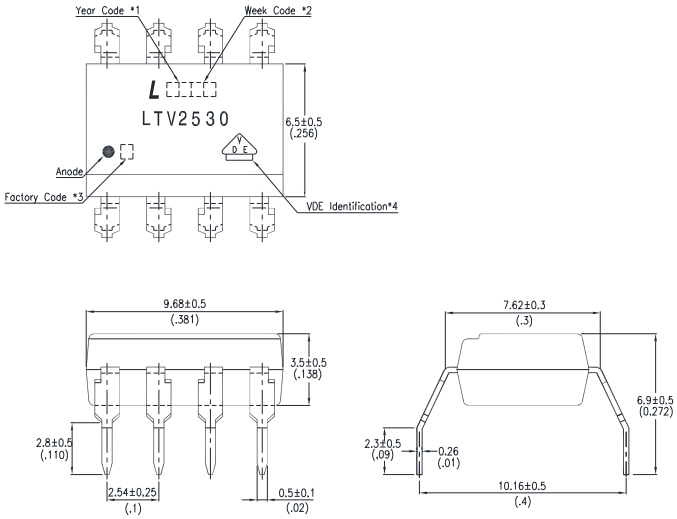
* Naming rule of VDE option : All ”-” before -V be removed.

3. PACKAGE DIMENSIONS

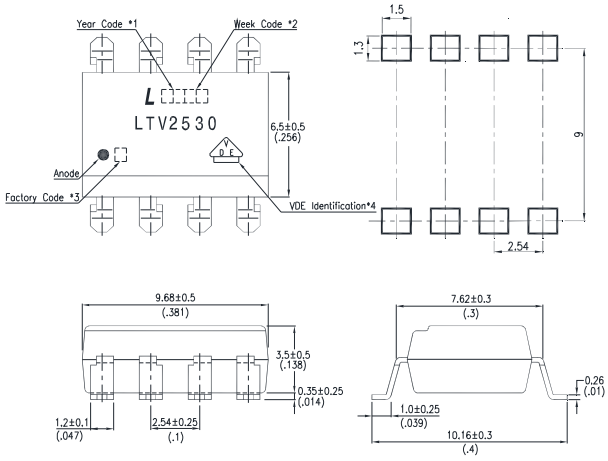
3.1 LTV-2530



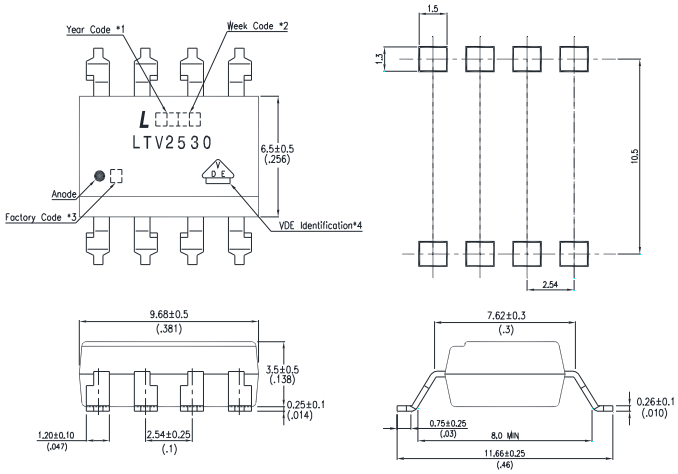
3.2 LTV-2530M



3.3 LTV-2530S



3.4 LTV-2530S2



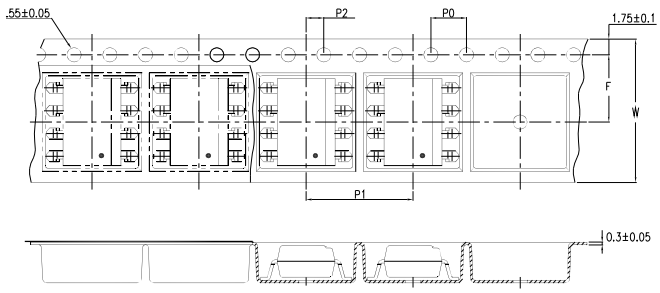
Notes :

1. 2-digit year code, example : 2017 = 17
2. 2-digit work week ranging from ‘01’ to ‘52’
3. Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
4. VDE identification mark (option).

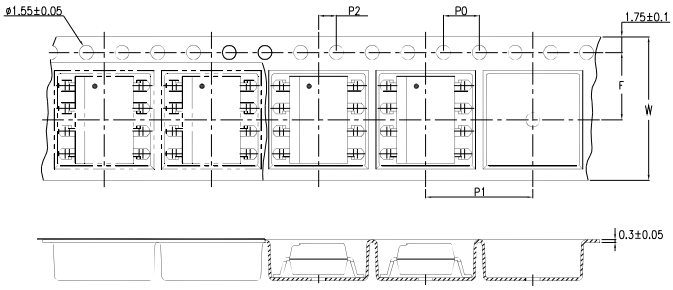
Dimensions in millimeters (inches).

4. TAPING DIMENSIONS

4.1 : LTV-2530S-TA

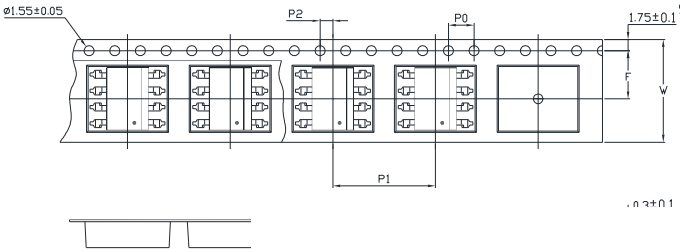


4.2 : LTV-2530S-TA1

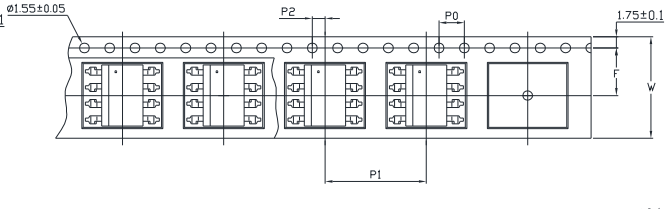


Description	Symbol	Dimension in mm (inch)
Tape wide	W	16±0.3 (0.63)
Pitch of sprocket holes	P_0	4±0.1 (0.15)
Distance of compartment	F	7.5±0.1 (0.295)
	P_2	2±0.1 (0.079)
Distance of compartment to compartment	P_1	12±0.1 (0.472)

4.3 : LTV-2530S2-TA



4.4 : LTV-2530S2-TA1



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Distance of compartment to compartment	P_1	12±0.1 (0.472)

5. RATING AND CHARACTERISTICS

5.1 Absolute Maximum Ratings at Ta=25°C

	Parameter	Symbol	Rating	Unit	Note
Input	Average Forward Input Current	$I_{F(AVG)}$	25	mA	
	Peak Forward Input Current (50% duty cycle, 1 ms pulse width)	$I_{F(PEAK)}$	50	mA	
	Peak Transient Input Current (≤1 μs pulse width, 300 pps)	$I_{F(TRANS)}$	1	A	
	Junction Temperature	T_J	125	°C	
	Reverse Input Voltage	V_R	5	V	
	Input Power Dissipation	P_{IN}	45	mW	
Output	Average Output Current	$I_{O(AVG)}$	8	mA	
	Peak Output Current	$I_{O(PEAK)}$	16	mA	
	Output Voltage (Pins 7-5, 6-5)	V_O	20	V	
	Output Power Dissipation	P_O	35	mW	
others	Supply Voltage (Pin 8-5)	V_{CC}	30	V	
	Operating Temperature	T_{opr}	-55 ~ +100	°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.

1. 260°C for 10 seconds. Refer to Lead Free Reflow Profile.

5.2 ELECTRICAL OPTICAL CHARACTERISTICS (DC) at Ta = 25°C

Parameters	Symbol	Min	Typ	Max	Units	Test Condition	Fig.	Note
Input Forward Voltage	V_F	—	1.5	1.7	V	I_F =16mA, T_A=25°C	5	1,
Input Reverse Voltage	BV_R	5	—	—	V	I_R = 10μA		1,
Current transfer ratio	CTR	7	30	50	%	I_F=16mA , V_{CC}=4.5V; Vo=0.5V, T_A=25°C	3, 4, 6	1, 2
Logic low output voltage output voltage	V_{OL}	—	0.1	0.5	V	I_F=16mA, V_{CC} =4.5V; I_O=1.1mA, T_A =25°C	3	1,
		—	—	0.5		I_F=16mA, V_{CC} =4.5V; I_O=0.8mA, T_A =25°C		
Logic high output current	I_{OH}	—	0.003	0.5	μA	V_O= V_{CC} =5.5V T_A=25°C I_F=0mA	9	1,
		—	—	50	μA	V_O= V_{CC} =15V		1,
Logic low supply current	I_{ccL}	—	200	400	μA	I_F=16mA, V_{CC} =15V V_O=open		
Logic high supply current	I_{ccH}	—	0.05	4	μA	I_F=0mA, T_A=25°C		1,

Over recommended temperature (T_A = 0°C to 70°C) unless otherwise specified.

Note.

1. Each channel

2. $$CTR = \frac{I_C}{I_F} \times 100\%$$

6. SWITCHING SPECIFICATION (AC)

Parameter	Symbol	Min	Typ	Max	Units	Test Condition	Fig.	Note
Propagation Delay Time to Low Output Level	t_{PHL}	—	0.2	1.5	μs	T_A=25°C R_L=4.1KΩ	1,7,8	1, 2
		—	0.2	0.8		T_A=25°C R_L=1.9KΩ		
Propagation Delay Time to High Output Level	t_{PLH}	—	0.9	1.5	μs	T_A=25°C R_L=4.1KΩ	1,7,8	1, 2
		—	0.6	0.8		T_A=25°C R_L=1.9KΩ		
Logic High Common Mode Transient Immunity	$\|CM_H\|$	1000	10000	—	V/μs	I_F=0mA;V_{CM}=10V; R_L=1.9KΩ; T_A=25C	2	1, 2, 3
Logic Low Common Mode Transient Immunity	$\|CM_L\|$	1000	10000	—	V/μs	I_F=0mA;V_{CM}=10V; R_L=1.9KΩ; T_A=25C	2	1, 2, 3
Bandwidth	BW	—	3	—	MHz	R_L=100KΩ		

Over recommended temperature (T_A = 0°C to 70°C), V_{CC} = 5 V, I_F = 16 mA unless otherwise specified.

Note

1. The 1.9KΩ load represents 1TTL unit load of 1.6mA and the 5.6KΩ pull-up resistor.
2. The 4.1KΩ load represents 1LSTTL unit load of 0.36mA and the 6.1KΩ pull-up resistor.
3. Common mode transient immunity in a Logic High level is the maximum tolerable (positive) dV_{CM}/dt on the leading edge of the common mode pulse signal, V_{CM}, to assure that the output will remain in a Logic High state (i.e., VO > 2.0 V). Common mode transient immunity in a Logic Low level is the maximum tolerable (negative) dV_{CM}/dt on the trailing edge of the common mode pulse signal, V_{CM}, to assure that the output will remain in a Logic Low state (i.e., VO < 0.8 V).

7. ISOLATION CHARACTERISTIC

Parameter	Symb	Min.	Typ.	Max.	Unit	Test Condition	Note
Withstand Insulation Test Voltage	V_{ISO}	5000	—	—	V_{RMS}	RH ≤ 50%, t = 1min, T_A = 25°C	1
Input-Output Resistance	R_{I-O}	—	10^{12}	—	Ω	V_{I-O} = 500V DC	2
Input-Output Capacitance	C_{I-O}	—	0.6	—	pF	f=1MHz, T_A = 25°C	3

*All Typical at T_A=25°C

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. Device considered a two-terminal device: Pins 1, 2, 3, and 4 shorted together and Pins 5, 6, 7, and 8 shorted together.

3. Measured between the LED anode and cathode shorted together and pins 5 through 8 shorted together

8. CHARACTERISTIC CURVES

Figure 1: DC and Pulsed Transfer Characteristics.

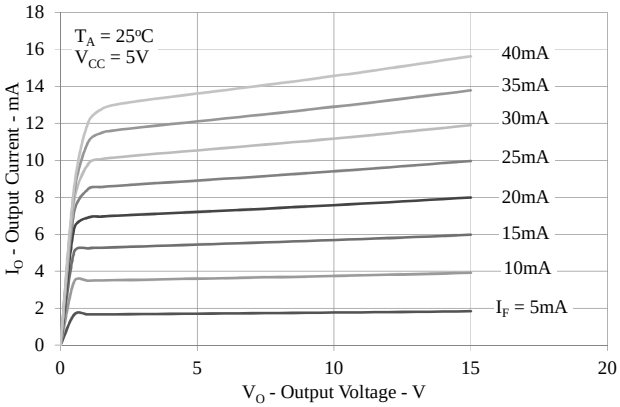


Figure 2: Current Transfer Ratio vs. Input Current.

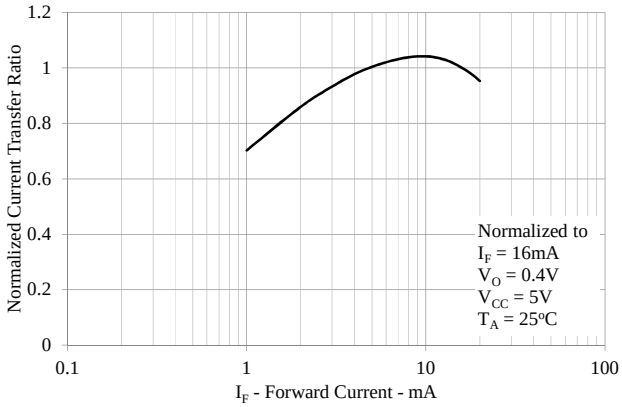


Figure 3: Input Current vs. Forward Voltage.

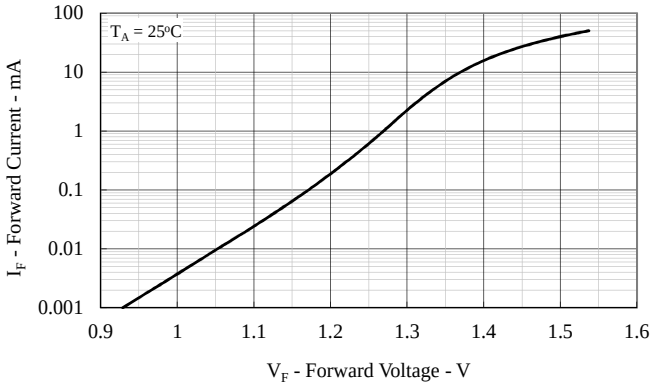


Figure 4: Current Transfer Ratio vs. Temperature.

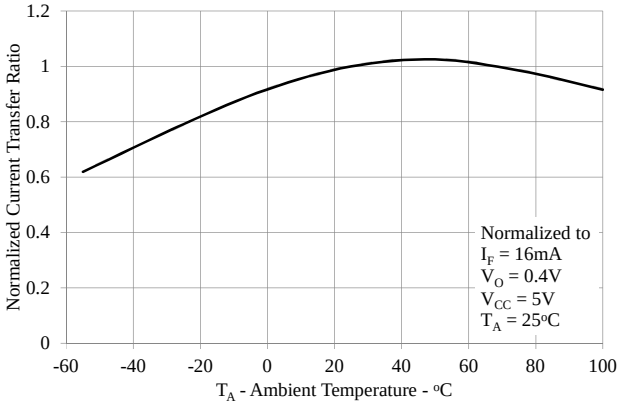


Figure 5: Propagation Delay vs. Load Resistance.

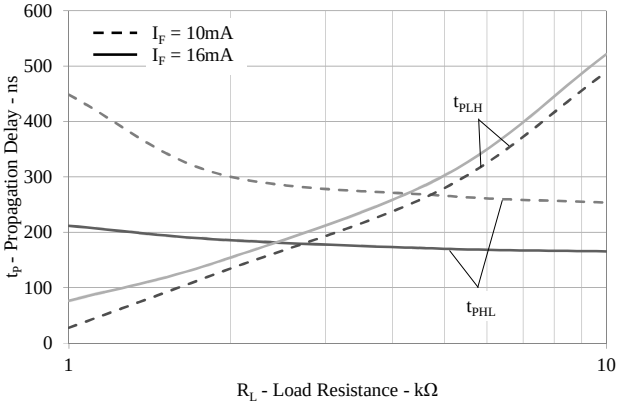


Figure 6: Propagation Delay Time vs.Temperature.

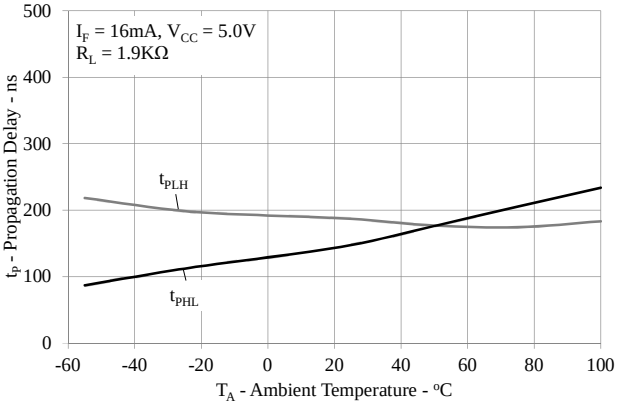


Figure 7: Logic High Output Current vs. Temperature.

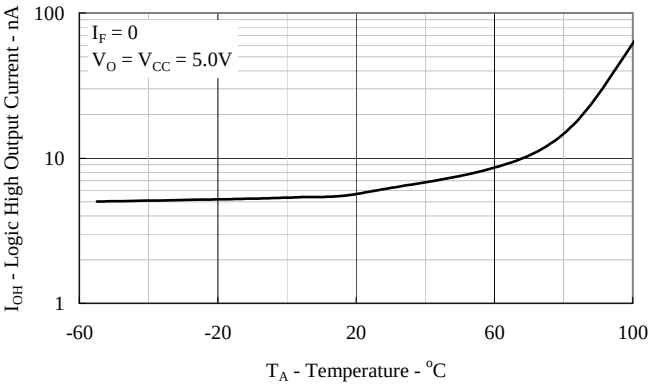


Figure 8: Frequency Response.

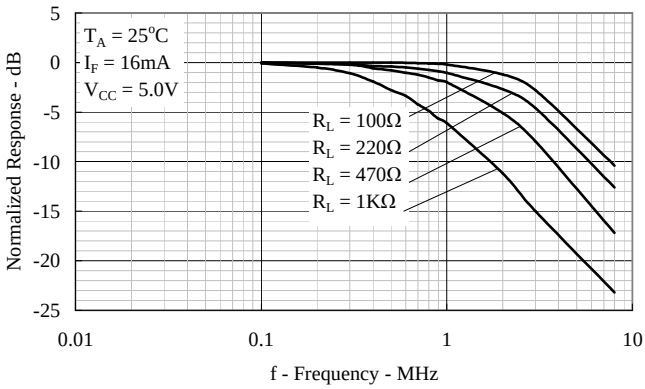


Figure 9: Test Circuit for t_{PHL} and t_{PLH}

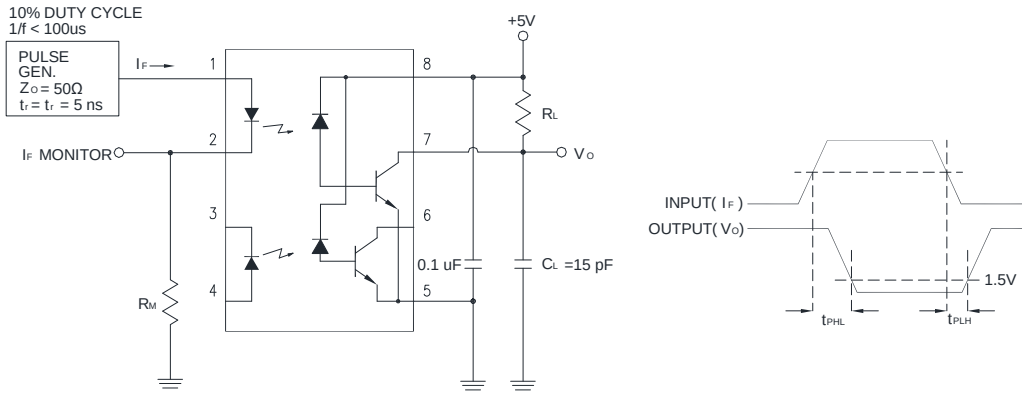
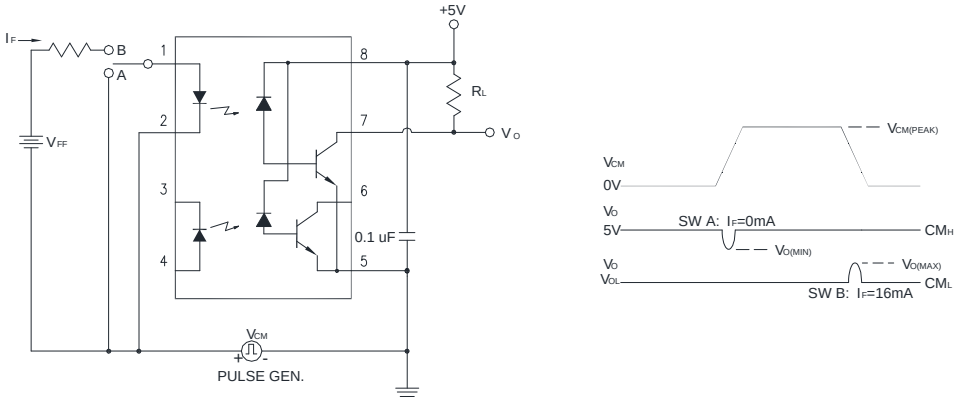


Figure 10: Single Channel Test Circuit for Common Mode Transient Immunity

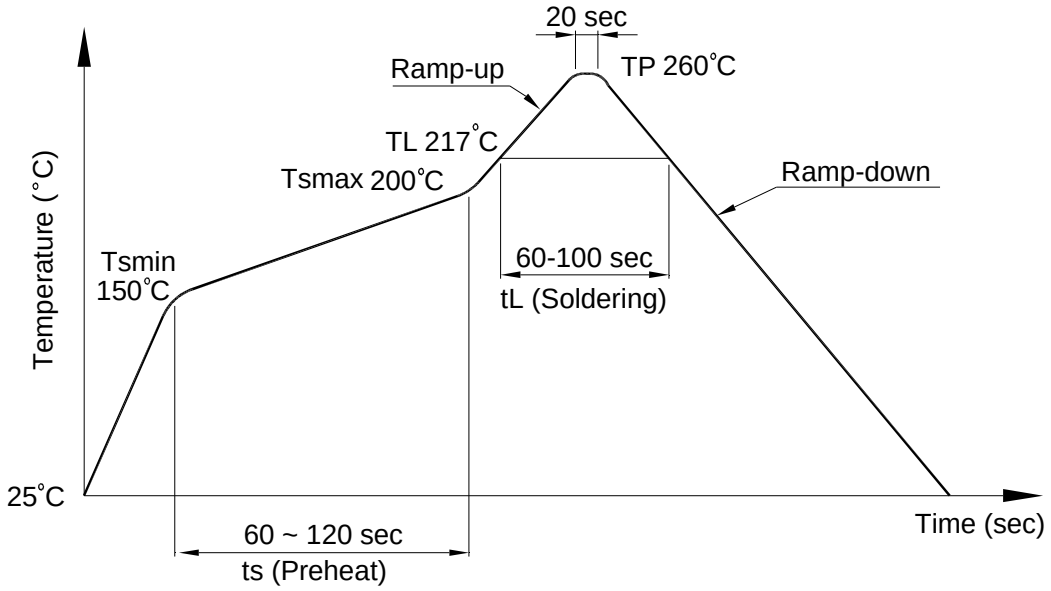


9. TEMPERATURE PROFILE OF SOLDERING

9.1 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



9.2 Wave soldering (JEDEC22A111 compliant)

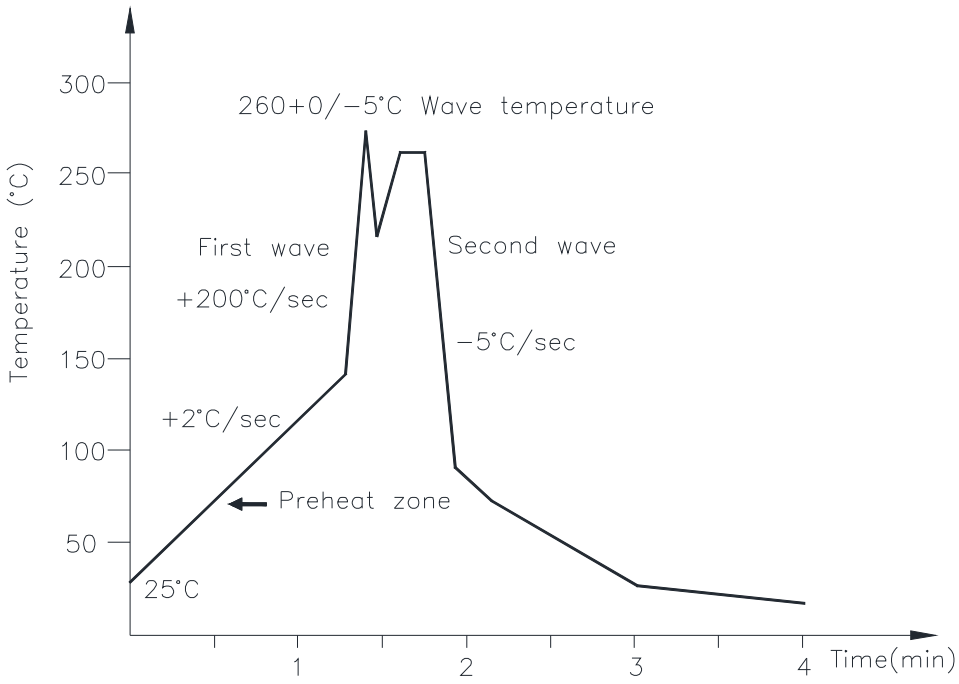
One time soldering is recommended within the condition of temperature.

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

- 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.