

Photocoupler LTV-2301 series

1. DESCRIPTION

1.1 Features

- Current transfer ratio (CTR : min 50% at $I_F = 1\text{mA}$, $V_{CE} = 5\text{V}$, $T_A = 25^\circ\text{C}$)
- High input-output isolation voltage ($V_{iso} = 3,750\text{Vrms}$)
- Response time
 T_{ON} : TYP. $15\mu\text{s}$, T_{OFF} : TYP. $20\mu\text{s}$ at $I_F = 1\text{mA}$, $V_{CC} = 5\text{V}$, $R_L = 10\text{k}\Omega$, $T_A = 25^\circ\text{C}$
 T_{PHL} : Max. $30\mu\text{s}$, T_{PLH} : Max. $30\mu\text{s}$ at $I_F = 1\text{mA}$, $V_{CC} = 5\text{V}$, $R_L = 10\text{k}\Omega$, $T_A = 25^\circ\text{C}$
- MSL class1
- Operating temperature: -55 to 125°C
- LTV-2301 correspond to the transmission rate of 40 kbps
- Safety approval
UL 1577
VDE DIN EN60747-5-5 (VDE 0884-5)

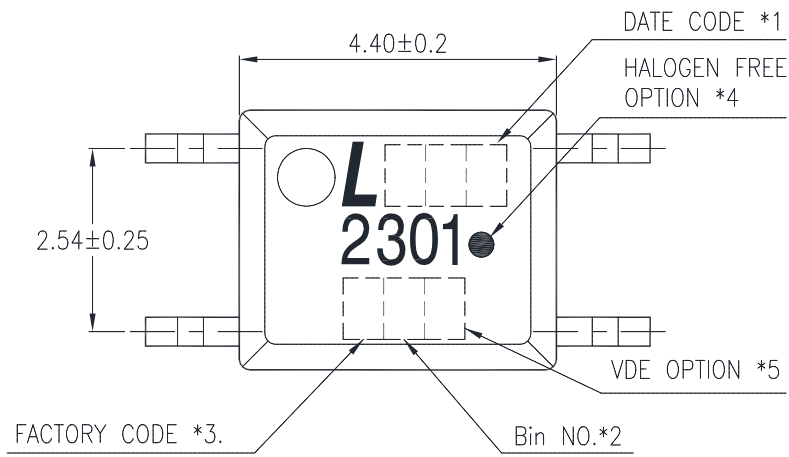
1.2 Applications

- Measurement equipment
- Programmable controller
- Telephone/Telegraph Receiver
- Power supply

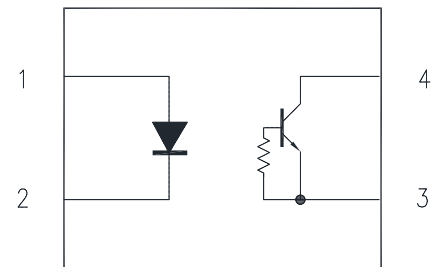
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2. PACKAGE DIMENSIONS

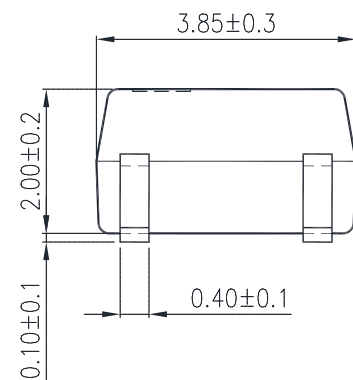
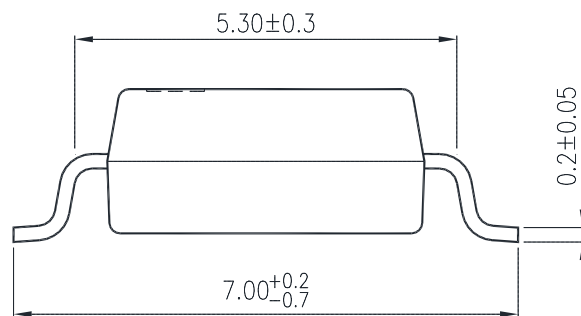
2.1 LTV-2301 series



Pin No. and Internal connection diagram



1. Anode 3. Emitter
2. Cathode 4. Collector



Notes :

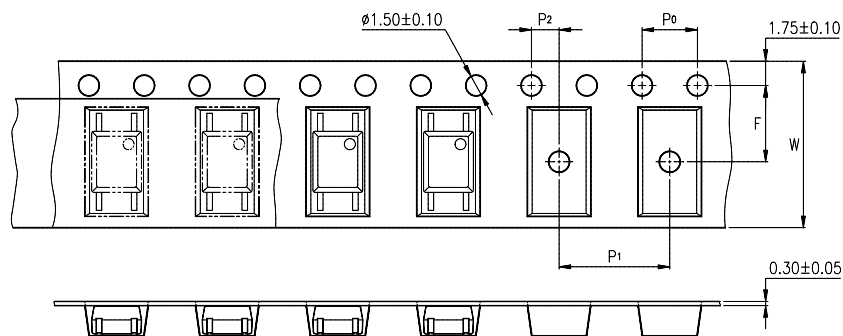
1. 1-digit Year date code, 2-digit work week.
2. Rank shall be or shall not be marked.
3. Factory identification mark shall be marked (W: China -CZ, X: China -TJ)
4. "●" indicates halogen free option.
5. "V" for VDE option.

* Dimensions are in Millimeters.

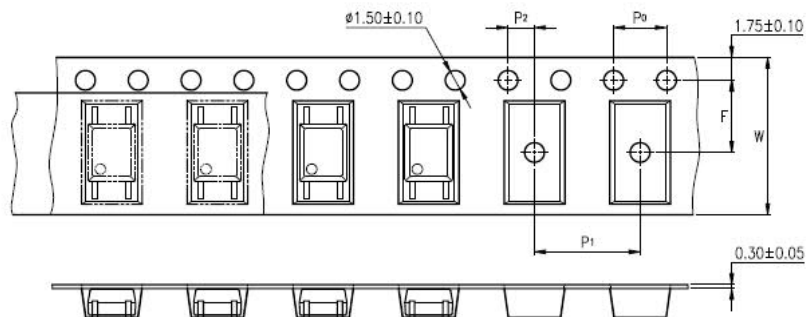
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3. TAPING DIMENSIONS

3.1 LTV-2301 (no suffix)



3.2 LTV-2301-TP



Description	Symbol	Dimension in mm (inch)
Tape wide	W	12±0.3 (0.47)
Pitch of sprocket holes	P_0	4±0.1 (0.15)
Distance of compartment	F	5.5±0.1 (0.217)
	P_2	2±0.1 (0.079)
Distance of compartment to compartment	P_1	8±0.1 (0.315)

3.3 Quantities Per Reel

Package Type	LTV-2301 series
Quantities (pcs)	3000

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4. RATING AND CHARACTERISTICS

4.1 Absolute Maximum Ratings at $T_A=25^{\circ}\text{C}$

	Parameter	Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_J	125	$^{\circ}\text{C}$
Output	Collector - Emitter Voltage	V_{CEO}	70	V
	Emitter - Collector Voltage	V_{ECO}	2	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
	Junction Temperature	T_J	125	$^{\circ}\text{C}$
1.	Isolation Voltage	V_{iso}	3750	V_{rms}
	Operating Temperature	T_{opr}	-55 ~ +125	$^{\circ}\text{C}$
	Storage Temperature	T_{stg}	-55 ~ +125	$^{\circ}\text{C}$
2.	Soldering Temperature	T_{sol}	260	$^{\circ}\text{C}$

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. For 10 Seconds

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4.2 ELECTRICAL OPTICAL CHARACTERISTICS at $T_A=25^\circ\text{C}$

Parameter		Symbol	Min.	Typ.	Max.	Unit	Test Condition
Input	Forward Voltage	V_F	—	—	1.6	V	$I_F=10\text{mA}$
	Reverse Current	I_R	—	—	10	μA	$V_R=5\text{V}$
	Terminal Capacitance	C_t	—	50	—	pF	$V=0, f=1.0\text{ MHz}$
Output	Collector Dark Current	I_{CEO}	—	—	80	nA	$V_{CE}=40\text{V}, I_F=0$
	Collector-Emitter Breakdown Voltage	BV_{CEO}	70	—	—	V	$I_C=0.1\text{mA}, I_F=0$
	Emitter-Collector Breakdown Voltage	BV_{ECO}	2	—	—	V	$I_E=0.1\text{mA}, I_F=0$
TRANSFER CHARACTERISTICS	Collector Current	I_C	0.5	—	—	mA	$I_F=1\text{mA}$
	Current Transfer Ratio	CTR	50	—	—	%	$V_{CE}=5\text{V}$
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	0.3	V	$I_F=8\text{mA}$ $I_C=2.4\text{mA}$
	Isolation Resistance	R_{iso}	5×10^{10}	—	—	Ω	DC500V, 40 ~ 60% R.H.
	Floating Capacitance	C_f	—	—	1	pF	$V=0, f=1\text{MHz}$
	Response Time (ON)	T_{ON}	—	15	—	μs	$V_{CC}=5\text{V},$ $I_F=1\text{mA}$ $R_L=10\text{k}\Omega$
	Response Time (OFF)	T_{OFF}	—	20	—	μs	
	Propagation delay time (H/L)	T_{pHL}	—	15	30	μs	
	Propagation delay time (L/H)	T_{pLH}	—	8	30	μs	

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5. RANK TABLE OF CURRENT TRANSFER RATIO (CTR)

Rank	Min	Max	Condition
None	50	—	$I_F=1\text{mA}$, $V_{CE}=5\text{V}$, $T_A=25^\circ\text{C}$
GB	100	600	

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

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6. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

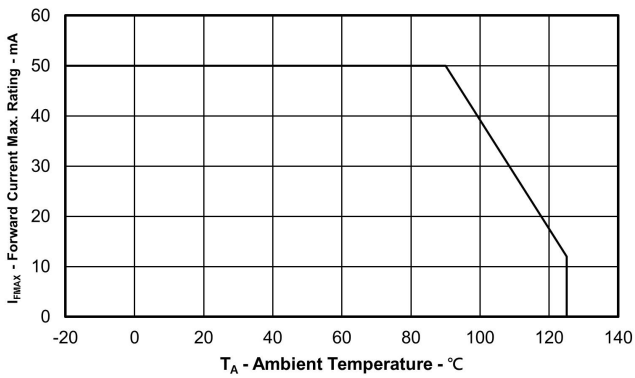


Figure 1. I_F Maximum rating vs. T_A

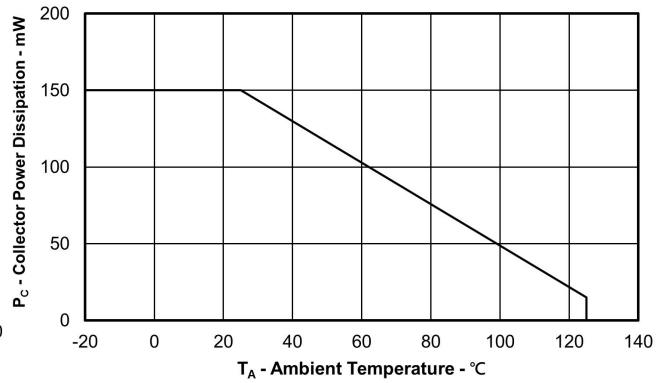


Figure 2. P_C Maximum rating vs. T_A

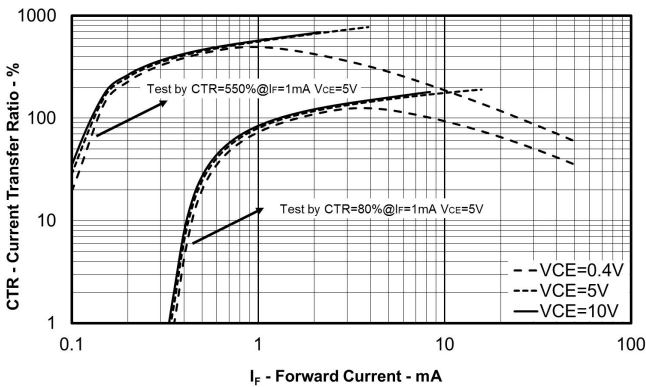


Figure 3. CTR vs. I_F

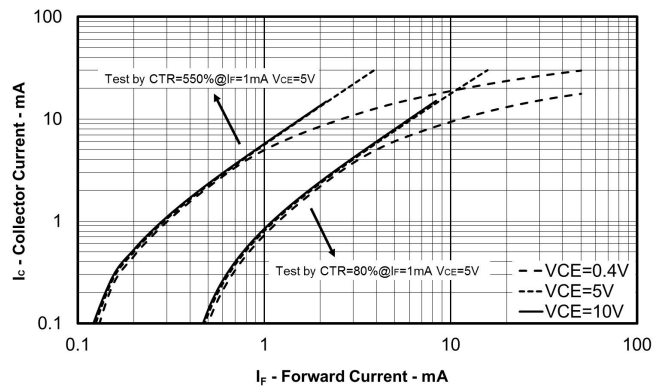


Figure 4. I_C vs. I_F

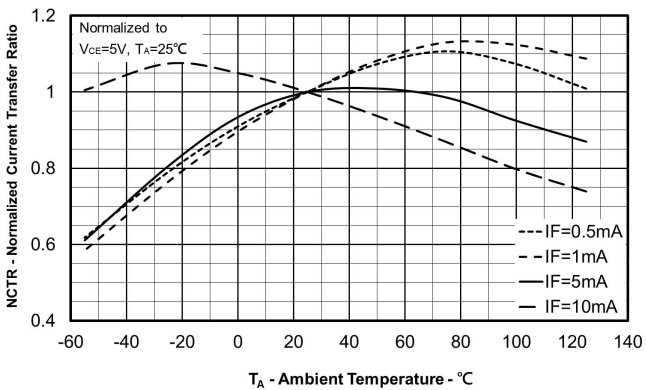


Figure 5. Non-saturated Normalized CTR vs. T_A

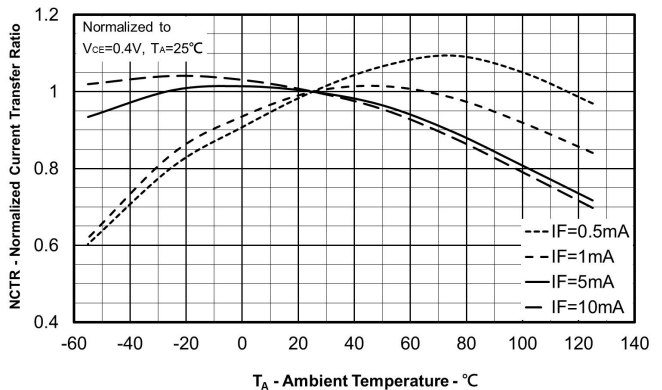


Figure 6 Saturated Normalized CTR vs. T_A

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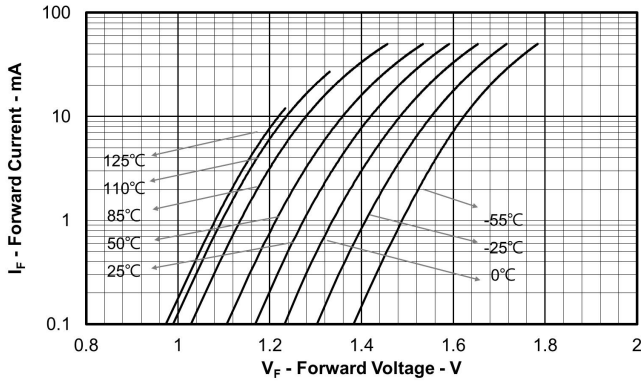


Figure 7. I_F vs. V_F

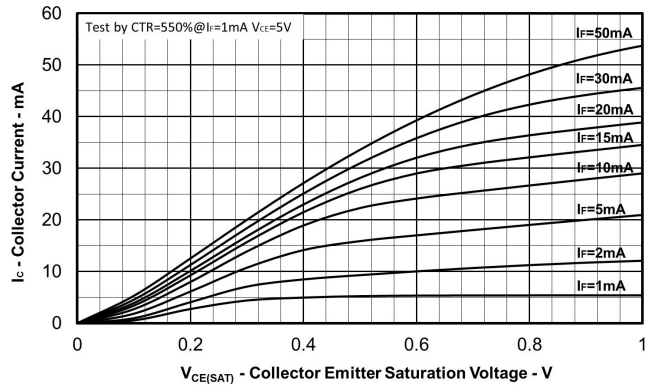


Figure 8. I_C vs. V_{CE}

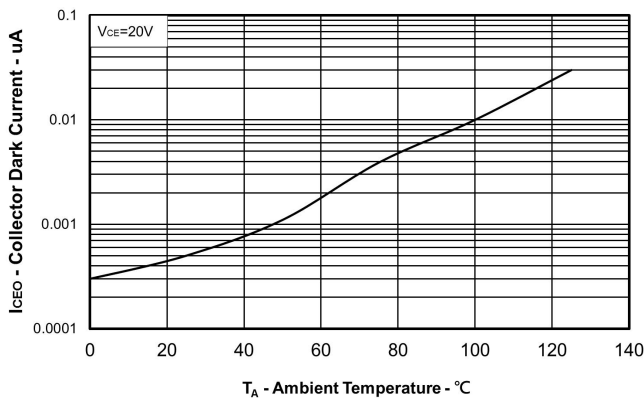


Figure 9. I_{CEO} vs. T_A

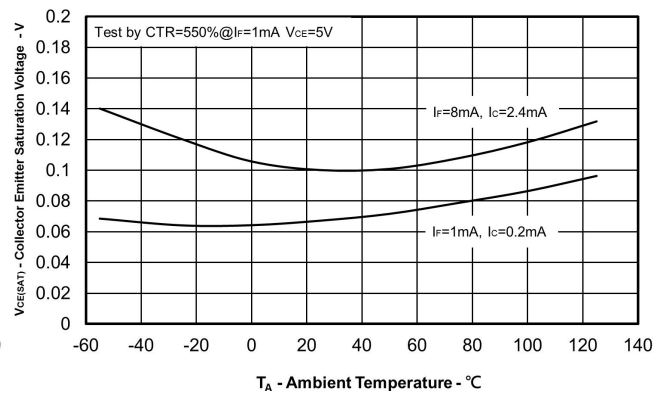


Figure 10. $V_{CE(SAT)}$ vs. T_A

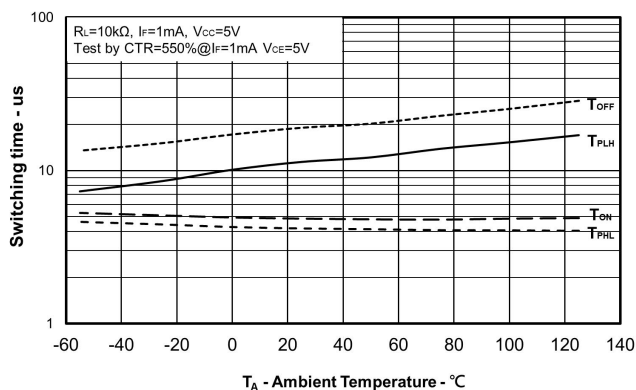


Figure 11. Response Time vs. T_A

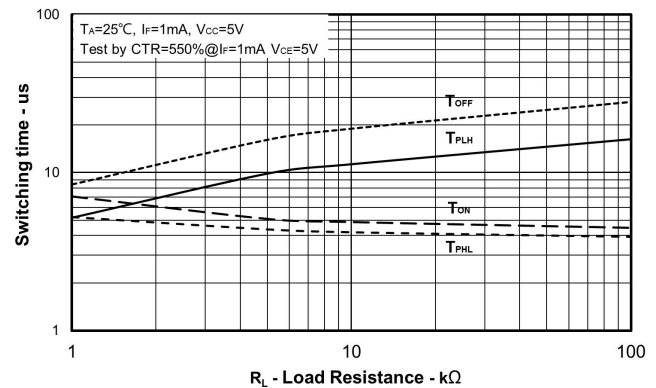


Figure 12. Response time vs. Load Resistance

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7. TEST CIRCUIT

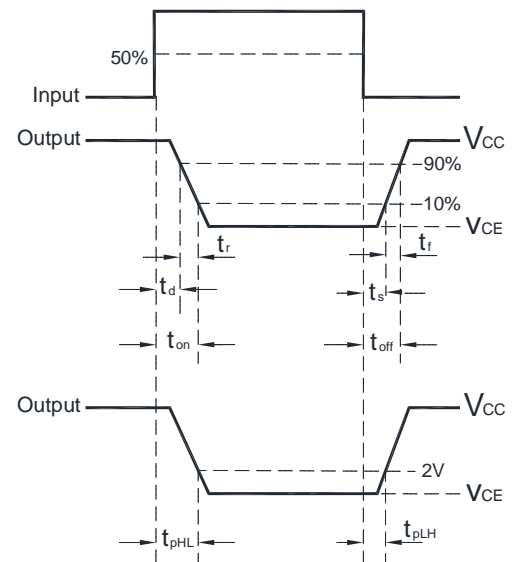
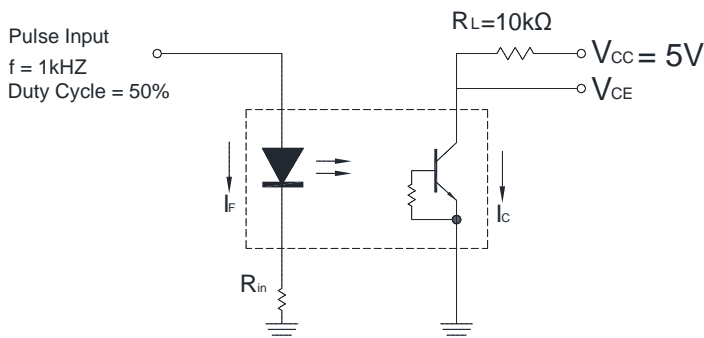


Figure 1: Switching time

8. TEMPERATURE PROFILE OF SOLDERING

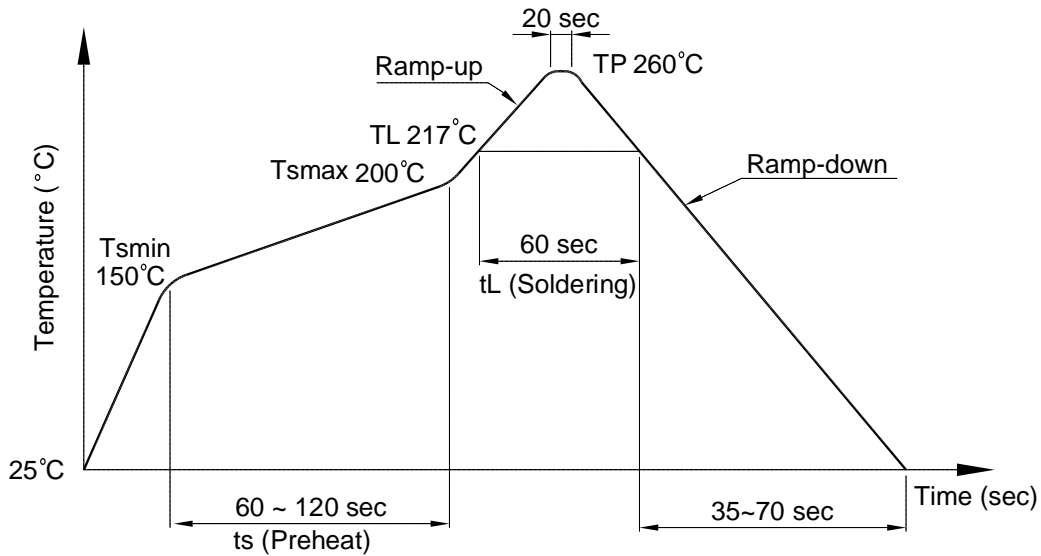
8.1 IR Reflow soldering (JEDEC-STD-020C compliant)

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 sec
Peak Temperature (T_P)	260°C
Ramp-up rate	3°C / sec max.
Ramp-down rate	3-6°C / sec



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8.2 Wave soldering (JEDEC22A111 compliant)

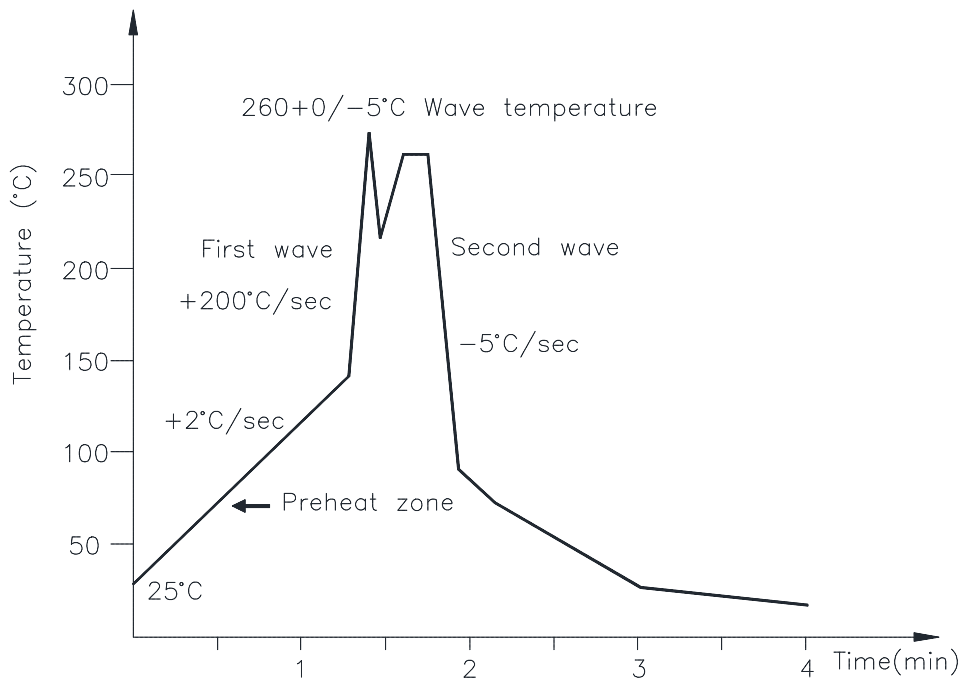
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5°C

Time: 10 sec.

Preheat temperature: 25 to 140°C

Preheat time: 30 to 80 sec.



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8.3 Hand soldering by soldering iron

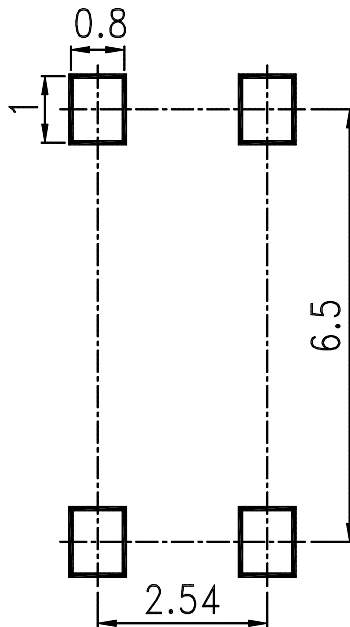
Allow single lead soldering in every single process. One time soldering is recommended.

Temperature: 380+0/-5°C

Time: 3 sec max.

9. RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

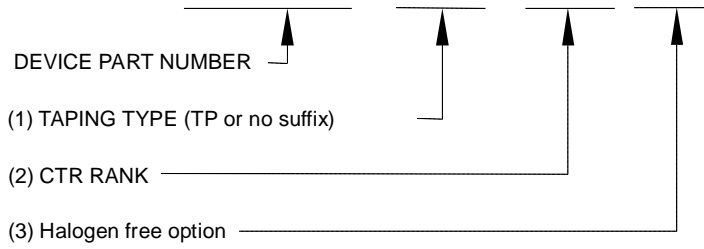
Unit: mm



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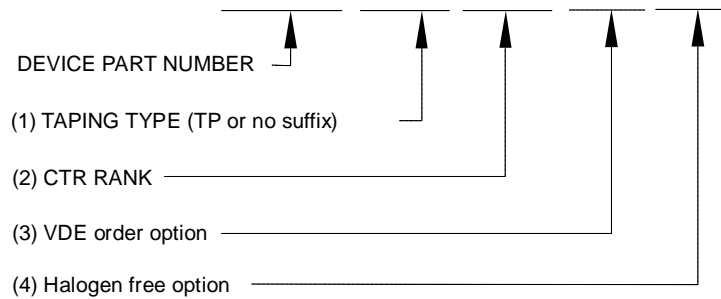
10. NAMING RULE

LTV-2301 -(1)-(2)-G



Example : LTV-2301-TP-GB-G

LTV2301(1)(2)-V-G



Example : LTV2301TPGB-V-G

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11. 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.