

Photocoupler LTV-816-RO series

1. DESCRIPTION

1.1 Features

- Current transfer ratio (CTR : MIN. 50% at $I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$, $T_a = 25^\circ\text{C}$)
- High input-output isolation voltage ($V_{iso} = 5,000\text{Vrms}$)
- Response time (t_r : TYP. $4\mu\text{s}$ at $V_{CC} = 5\text{V}$, $I_C = 2\text{mA}$, $R_L = 100\Omega$)
- Dual-in-line package :
 - LTV-816 : 1-channel type
- Wide lead spacing package :
 - LTV-816M : 1-channel type
- Surface mounting package :
 - LTV-816S : 1-channel type
 - LTV-816S1 : 1-channel type
 - LTV-816S2 : 1-channel type
- Tape and reel packaging :
 - LTV-816S-TA : 1-channel type
 - LTV-816S1-TA : 1-channel type
 - LTV-816S-TA1 : 1-channel type
 - LTV-816S1-TA1 : 1-channel type
 - LTV-816S-TP : 1-channel type
 - LTV-816S1-TP : 1-channel type
 - LTV-816S2-TP : 1-channel type
- ESD pass HBM 8000V / MM2000V / CDM2000V
- Safety approval
 - UL 1577
 - VDE DIN EN60747-5-5 (VDE 0884-5)
 - CSA CA5A
 - CQC GB4943.1-2011/ GB8898-2011 (meet Altitude up to 5000m)
 - Nordic Safety (FIMKO/NEMKO/SEMKO/DEMKO)
- Halogen Free option
- RoHS Compliance
 - All materials be used in device are followed EU RoHS directive (No.2002/95/EC, 2011/65/EU, and 2015/863).
- MSL class1

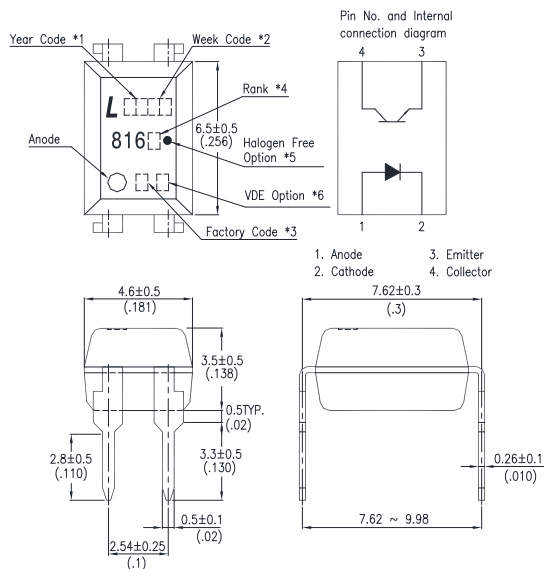
1.2 Applications

- Hybrid substrates that require high density mounting.
- Programmable controllers

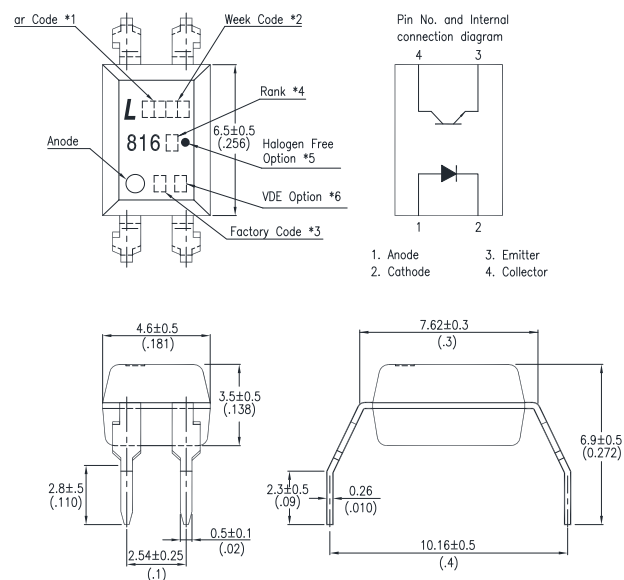
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2. PACKAGE DIMENSIONS

2.1 LTV-816 series



2.2 LTV-816M series



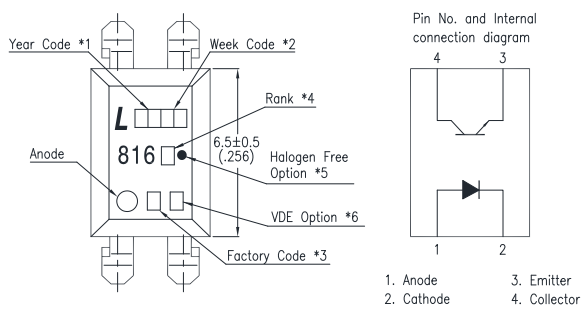
Notes :

1. 2-digit year code, example : 2016 = 16
2. 2-digit work week ranging from '01' to '53'
3. Factory identification mark shall be marked (W:
China-CZ, Y: Thailand)
4. Rank shall be or shall not be marked.
5. "●" for halogen free option.
6. "V" for VDE option.

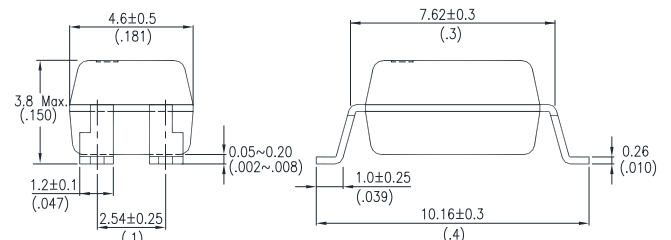
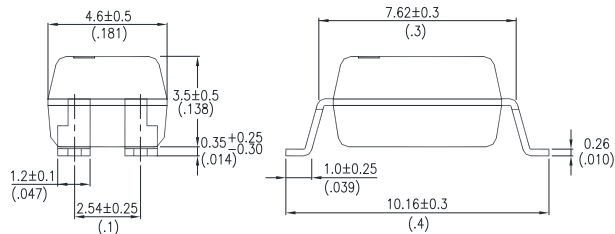
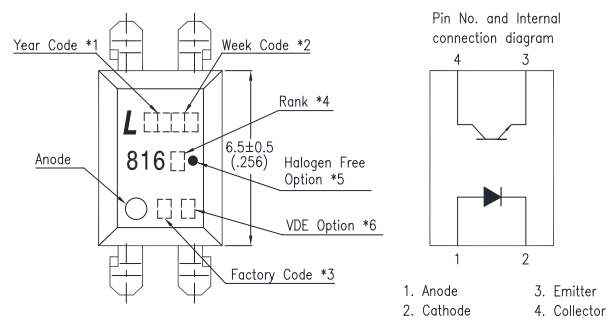
* Dimensions are in Millimeters and (Inches).

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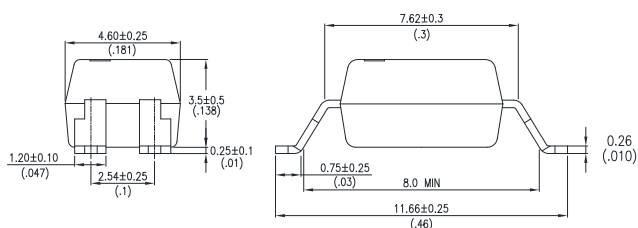
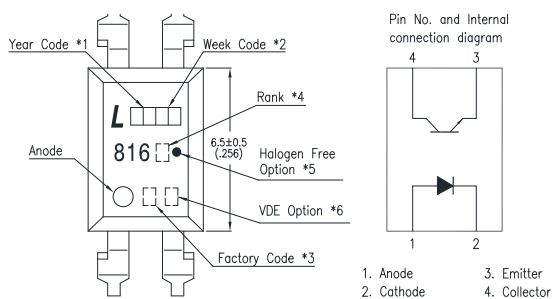
2.3 LTV-816S series



2.4 LTV-816S1 series



2.5 LTV-816S2 series



Notes :

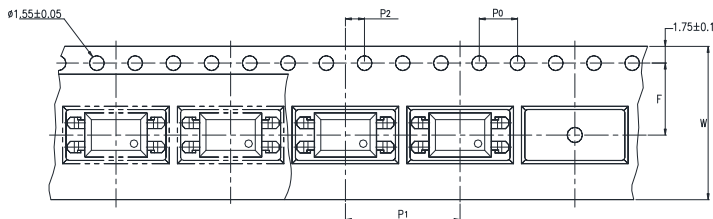
- 2-digit year code, example : 2016 = 16
- 2-digit work week ranging from '01' to '53'
- Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
- Rank shall be or shall not be marked.
- "●" for halogen free option.
- "V" for VDE option.

* Dimensions are in Millimeters and (Inches).

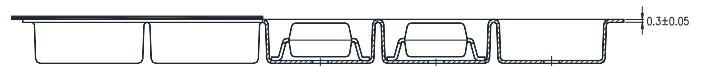
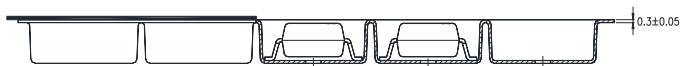
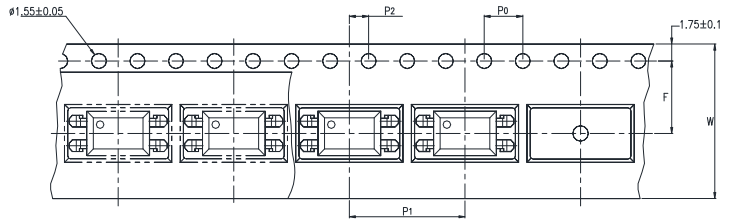
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3. TAPING DIMENSIONS

3.1 LTV-816S-TA/ LTV-816S1-TA series



3.2 LTV-816S-TA1/ LTV-816S1-TA1 series



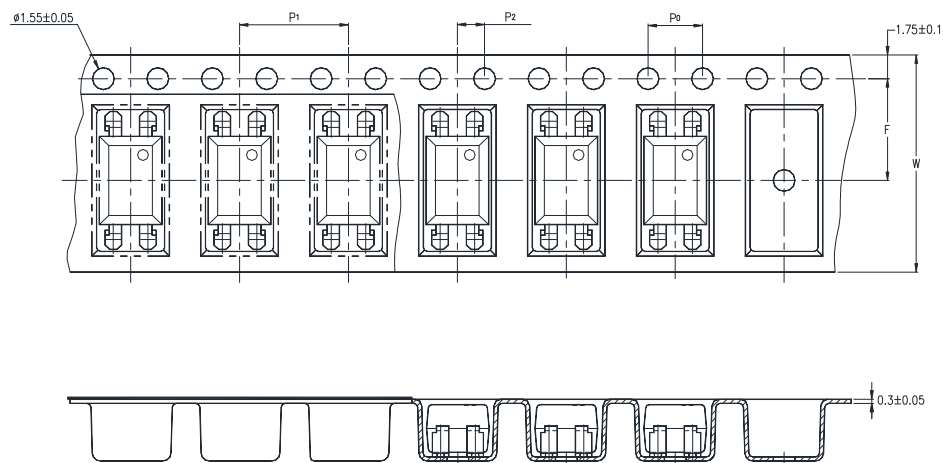
Description	Symbol	Dimension in mm (inch)
Tape wide	W	16±0.3 (0.63)
Pitch of sprocket holes	P ₀	4±0.1 (0.15)
Distance of compartment	F	7.5±0.1 (0.295)
	P ₂	2±0.1 (0.079)
Distance of compartment to compartment	P ₁	12±0.1 (0.472)

3.3 Quantities Per Reel

Package Type	TA/TA1
Quantities (pcs)	1000

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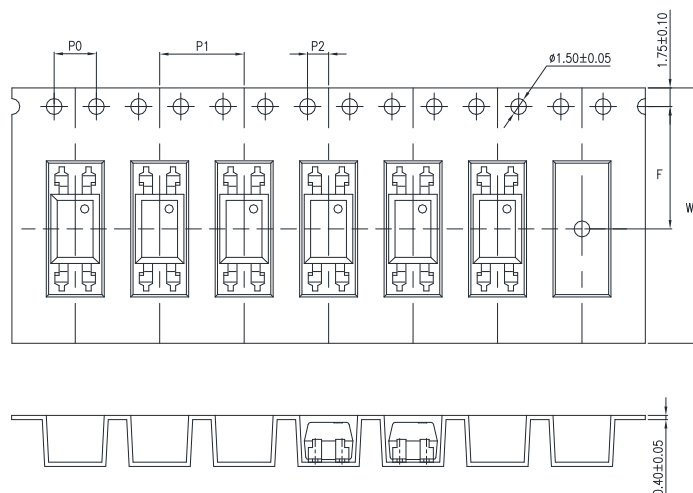
3.4 LTV-816S-TP/ LTV-816S1-TP series



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 (0.315)

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3.5 LTV-816S2-TP series



Description	Symbol	Dimension in mm (inch)
Tape wide	W	24±0.3 (0.945)
Pitch of sprocket holes	P ₀	4±0.1 (0.15)
Distance of compartment	F	11.5±0.1 (0.453)
	P ₂	2±0.1 (0.079)
Distance of compartment to compartment	P ₁	8±0.1 (0.315)

3.6 Quantities Per Reel

Package Type	TP
Quantities (pcs)	2000

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4. RATING AND CHARACTERISTICS

4.1 Absolute Maximum Ratings at Ta=25°C

	Parameter	Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
	Peak Forward Current (100μs pulse, 100Hz frequency)	IFP	1	A
	Thermal Resistance Junction-Ambient	Rth _{J-A}	325	°C/W
	Thermal Resistance Junction-Case	Rth _{J-C}	200	°C/W
Output	Collector - Emitter Voltage	V_{CEO}	80	V
	Emitter - Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
	Total Power Dissipation	P_{tot}	200	mW
1.	Isolation Voltage	V_{iso}	5000	V _{rms}
	Operating Temperature	T_{opr}	-55 ~ +110	°C
	Storage Temperature	T_{stg}	-55 ~ +125	°C
2.	Soldering Temperature	T_{sol}	260	°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 Ta=25°C

Parameter		Symbol	Min.	Typ.	Max.	Unit	Test Condition
Input	Forward Voltage	V_F	—	1.2	1.4	V	$I_F=20\text{mA}$
	Reverse Current	I_R	—	—	10	μA	$V_R=4\text{V}$
	Terminal Capacitance	C_t	—	30	250	pF	$V=0, f=1\text{KHz}$
Output	Collector Dark Current	I_{CEO}	—	—	100	nA	$V_{CE}=20\text{V}, I_F=0$
	Collector-Emitter Breakdown Voltage	BV_{CEO}	80	—	—	V	$I_C=0.1\text{mA}, I_F=0$
	Emitter-Collector Breakdown Voltage	BV_{ECO}	6	—	—	V	$I_E=10\mu\text{A}, I_F=0$
TRANSFER CHARACTERISTICS	Collector Current	I_C	2.5	—	30	mA	$I_F=5\text{mA}$
	1. Current Transfer Ratio	CTR	50	—	600	%	$V_{CE}=5\text{V}$
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.1	0.2	V	$I_F=20\text{mA}$ $I_C=1\text{mA}$
	Isolation Resistance	R_{iso}	5×10^{10}	1×10^{11}	—	Ω	DC500V, 40 ~ 60% R.H.
	Floating Capacitance	C_f	—	0.6	1	pF	$V=0, f=1\text{MHz}$
	Cut-off Frequency	f_c	—	80	—	kHz	$V_{CE}=5\text{V}, I_C=2\text{mA}$ $R_L=100\Omega, -3\text{dB}$
	Response Time (Rise)	t_r	—	4	18	μs	$V_{CC}=5\text{V},$ $I_C=2\text{mA}$ $R_L=100\Omega,$
	Response Time (Fall)	t_f	—	3	18	μs	

$$1. \text{ CTR} = \frac{I_C}{I_F} \times 100\%$$

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5. RANK TABLE OF CURRENT TRANSFER RATIO CTR

CTR Rank	Min	Max	Condition
A	80	160	$I_F=5mA$, $V_{CE}=5V$, $T_a=25^{\circ}C$
B	130	260	
C	200	400	
D	300	600	
No bin (L or A or B or C or D or no mark)	50	600	

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6. CHARACTERISTICS CURVES

Fig.1 Forward Current
vs. Ambient Temperature

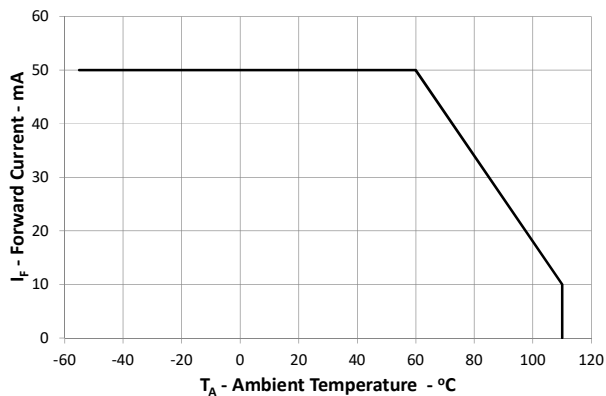


Fig.2 Collector Power Dissipation
vs. Ambient Temperature

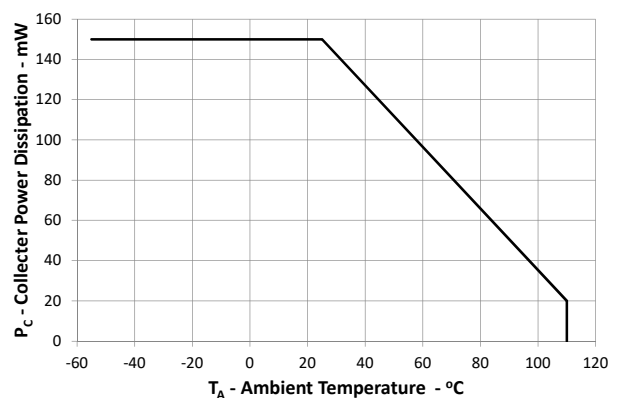


Fig.3 Collector-emitter Saturation
Voltage vs. Forward Current

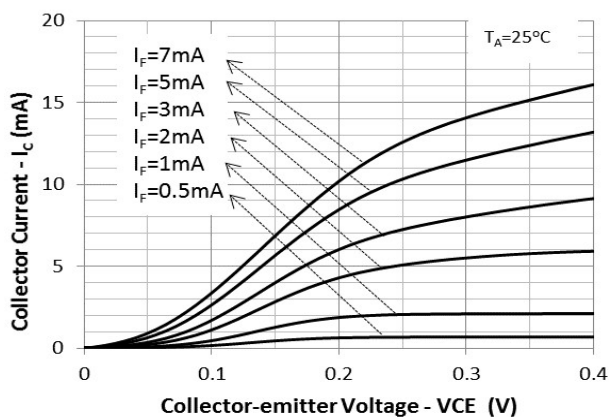


Fig.4 Forward Current vs. Forward
Voltage

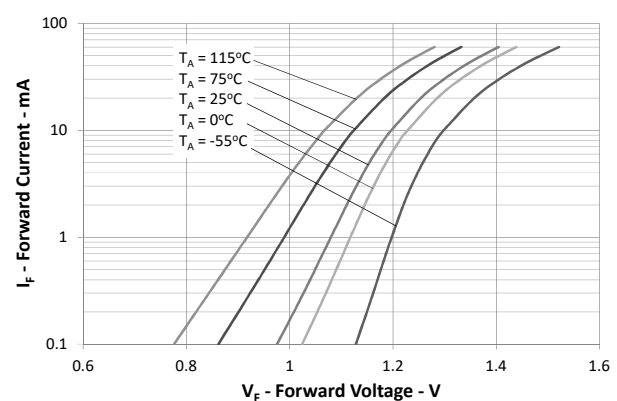


Fig.5 Current Transfer Ratio vs.
Forward Current

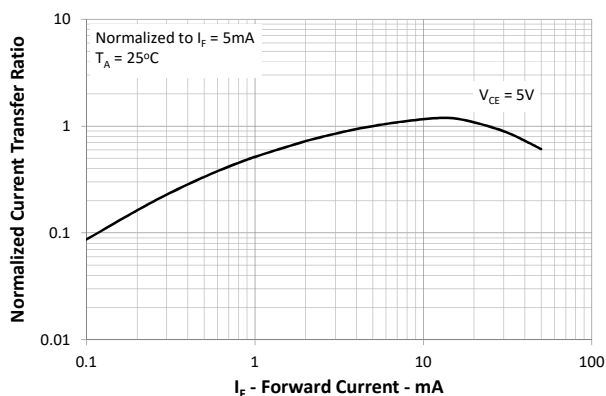
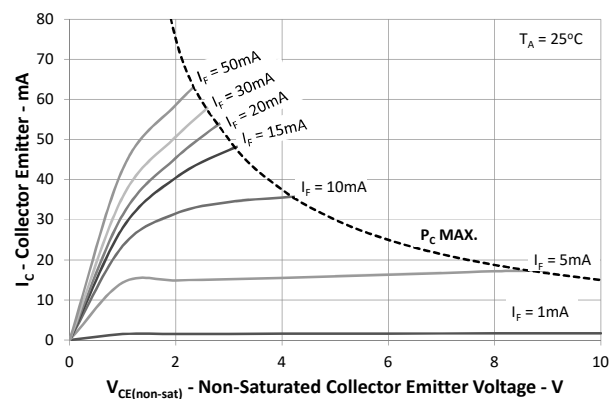


Fig.6 Collector Current vs.
Collector-emitter Voltage



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Fig.7 Relative Current Transfer Ratio
vs. Ambient Temperature

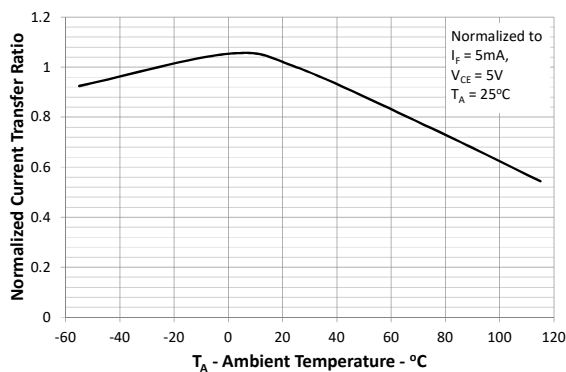


Fig.8 Collector-emitter Saturation Voltage
vs. Ambient Temperature

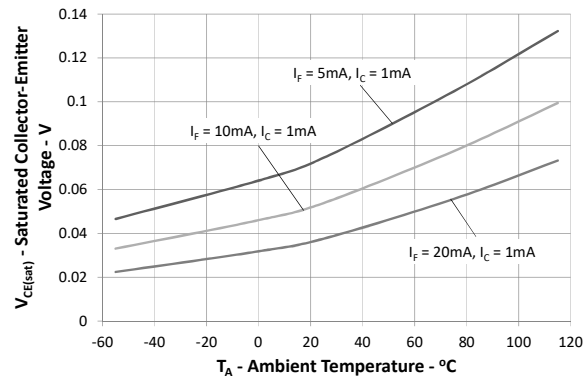


Fig.9 Collector Dark Current vs.
Ambient Temperature

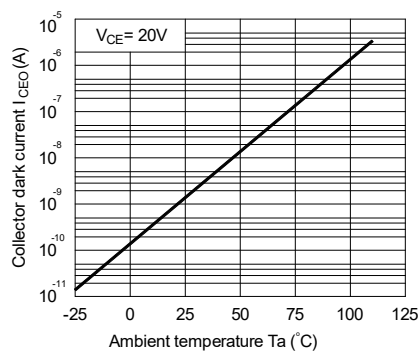


Fig.10 Response Time vs. Load
Resistance

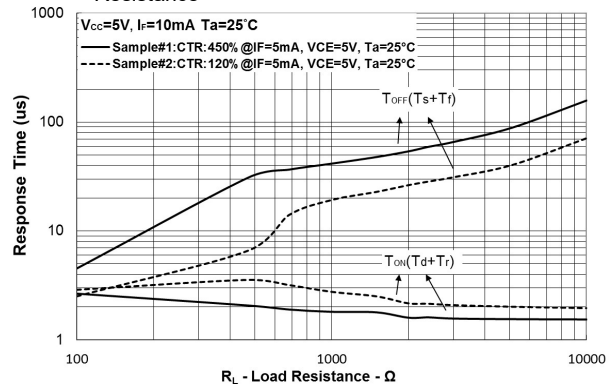
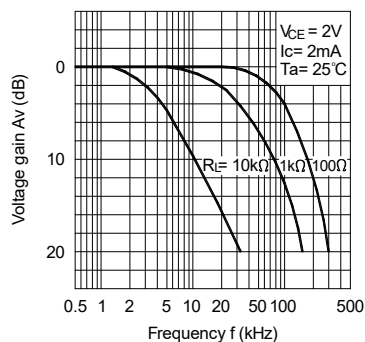
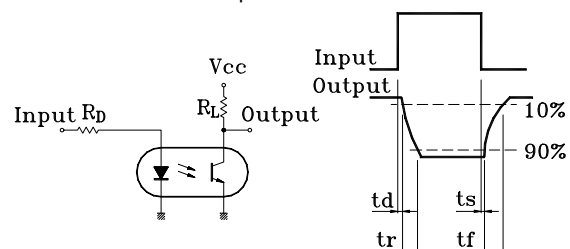


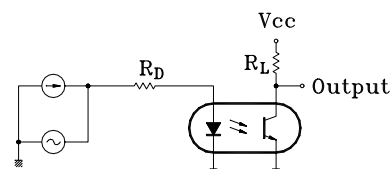
Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



Note : Test condition of the characteristic curve is to indicate how it is measured and only for reference. It's not the reference of circuit design Specifications or requirement.

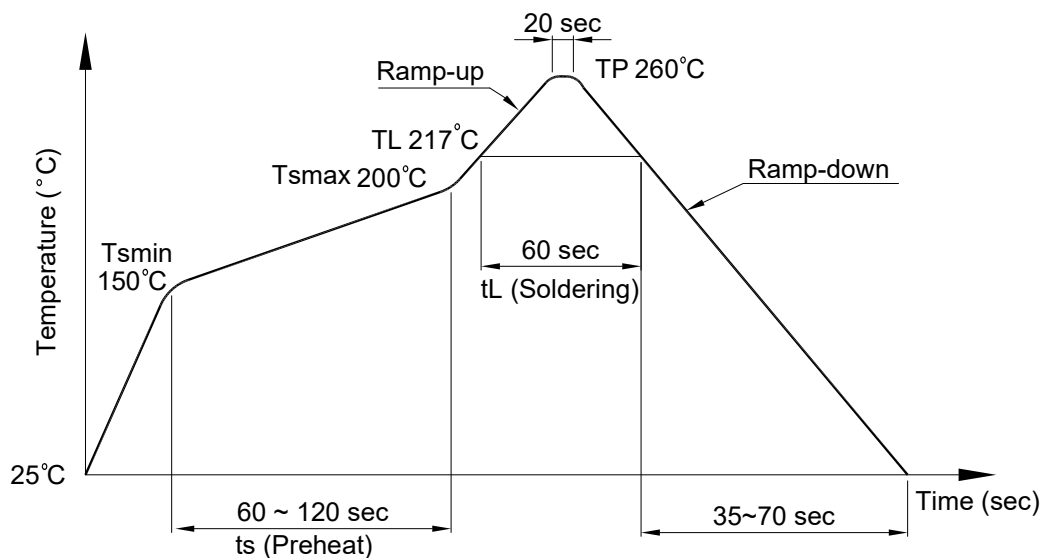
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7. TEMPERATURE PROFILE OF SOLDERING

7.1 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) (t_s)	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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7.2 Wave soldering (JEDEC22A111 compliant)

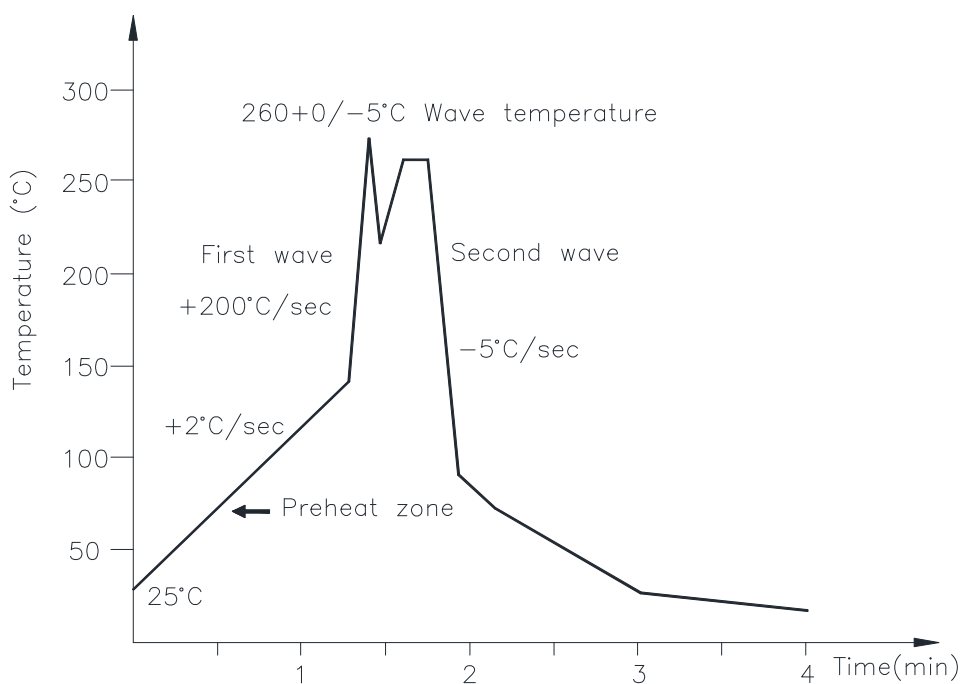
One time soldering is recommended within the condition of temperature.

Temperature: $260 \pm 0/-5^{\circ}\text{C}$

Time: 10 sec.

Preheat temperature: 25 to 140°C

Preheat time: 30 to 80 sec.



7.3 Hand soldering by soldering iron

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

Temperature: $380 \pm 0/-5^{\circ}\text{C}$

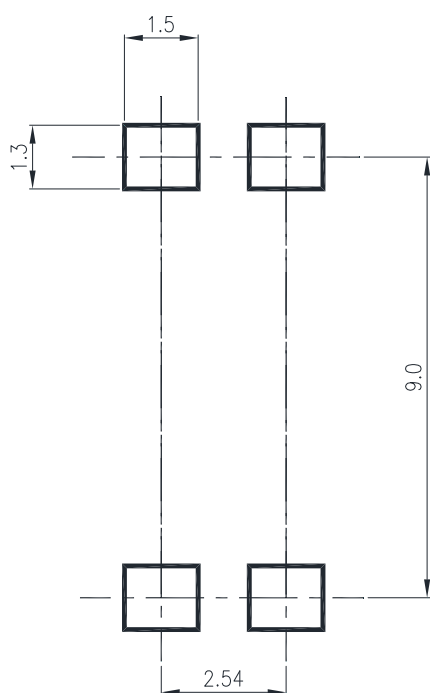
Time: 3 sec max.

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8. RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

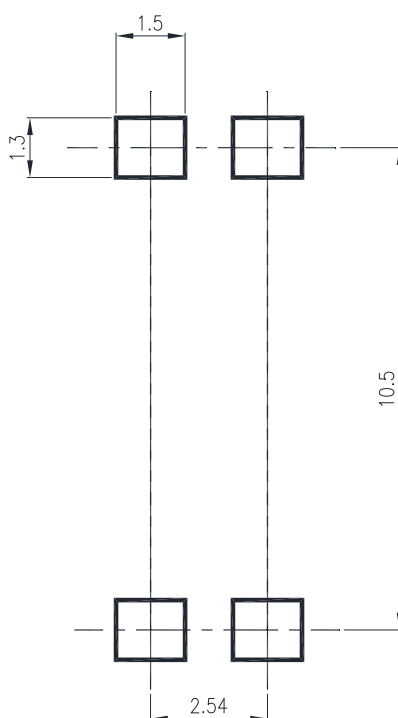
8.1 LTV-816S / LTV-816S1 series

Unit: mm



8.2 LTV-816S2 series

Unit: mm



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9. NAMING RULE

LTV-816(1)-(2)-(3)-G-RO

DEVICE PART NUMBER

(1) No suffix = Dual-in-Line package

M = Wide lead spacing package

S = Surface mounting package

(2) TAPING TYPE(TA,TA1,TP or none)

LTV-816S have tape and reel solution

Please refer to orientation of taping on Page 4-6

(3) CTR RANK

Please refer to the CTR table on Page 9

(4) Halogen free option

(5) Customer code

Example : LTV-816S-TA1-A-G

LTV816(1)(2)(3)-V-G-RO

DEVICE PART NUMBER

(1) No suffix = Dual-in-Line package

M = Wide lead spacing package

S = Surface mounting package

(2) TAPING TYPE(TA,TA1,TP or none)

LTV-816S have tape and reel solution

Please refer to orientation of taping on Page 4-6

(3) CTR RANK

Please refer to the CTR table on Page 9

(4) VDE order option

(5) Halogen free option

(6) Customer code

Example : LTV816STA1A-V-G

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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.