

Photocouplers LTV-816-Cu 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 $V_{CE} = 2\text{V}$, $I_C = 2\text{mA}$, $R_L = 100\Omega$)
- Dual-in-line package : LTV-816-Cu : 1-channel type
- Wide lead spacing package : LTV-816M-Cu : 1-channel type
- Surface mounting package : LTV-816S-Cu : 1-channel type
- Tape and reel packaging :
 - LTV-816S-TA-Cu : 1-channel type
 - LTV-816S-TA1-Cu : 1-channel type
 - LTV-816S-TP-Cu : 1-channel type
- 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)
- BSI RoHS Compliance
 - All materials be used in device are followed EU RoHS directive (No.2002/95/EC, 2011/65/EU, and 2015/863).
- ESD pass HBM 8000V/MM2000V
- MSL class1
- Copper base lead frame
- Halogen Free Option

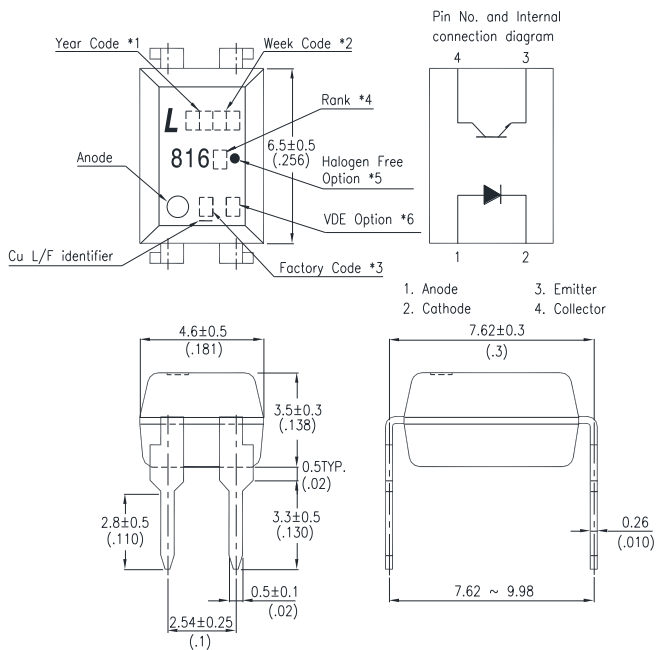
1.2 Applications

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

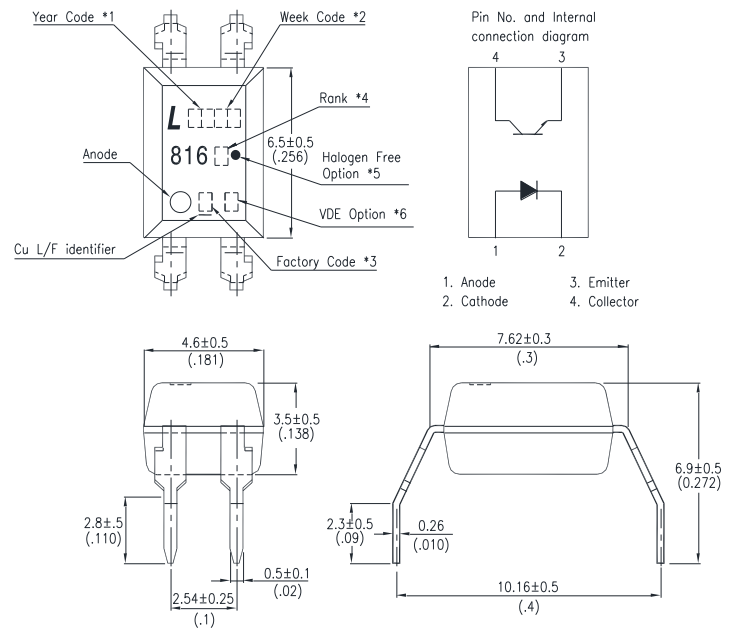
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2. PACKAGE DIMENSIONS

2.1 LTV-816-Cu series



2.2 LTV-816M-Cu series

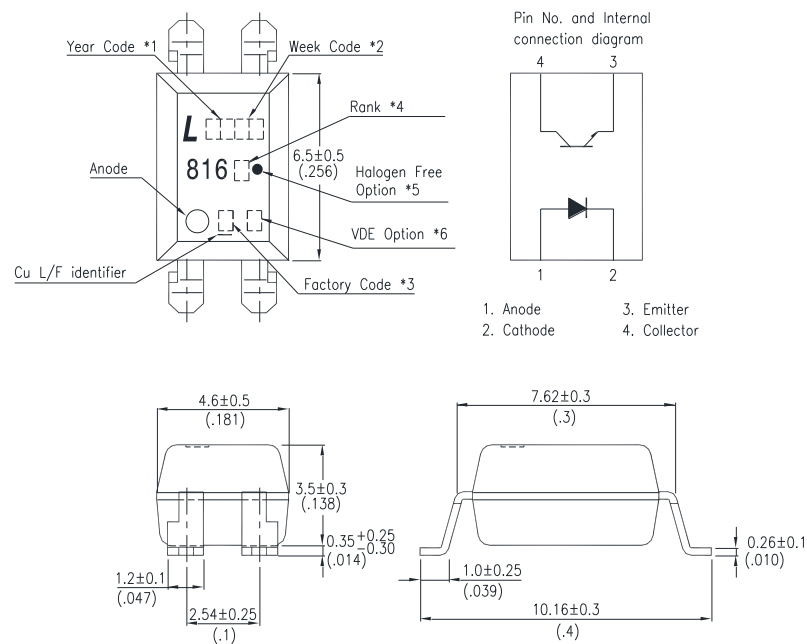


Notes :

1. Year date code.
2. 2-digit work week.
3. Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
4. Rank shall be marked or not be marked.
5. Halogen Free option
6. "V" for VDE option.

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2.3 LTV-816S-Cu series:



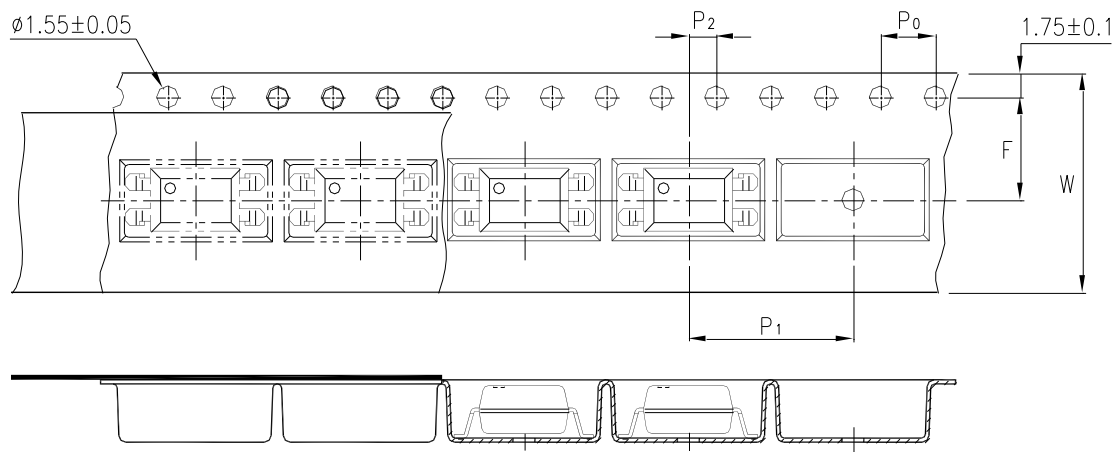
Notes :

1. Year date code.
2. 2-digit work week.
3. Factory identification mark shall be marked (W: China-CZ, Y: Thailand)
4. Rank shall be or not be marked.
5. Halogen Free option
6. "V" for VDE option.

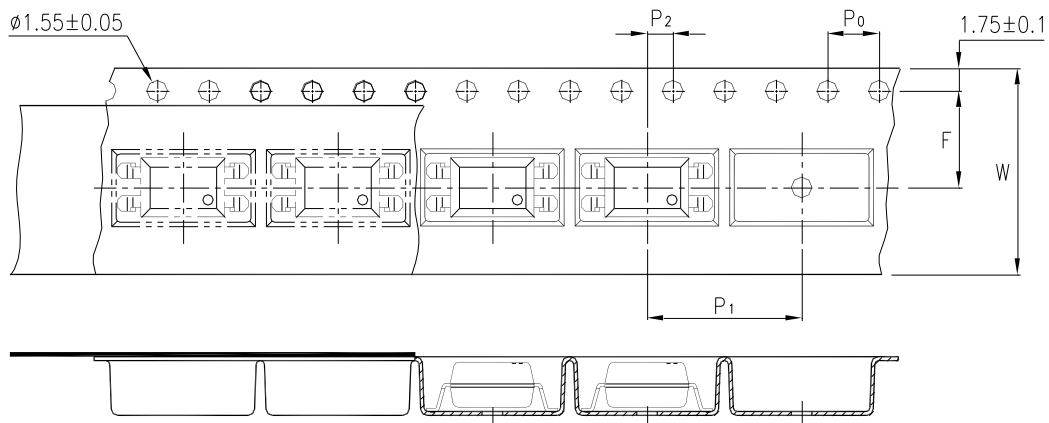
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3. TAPING DIMENSIONS

3.1 P/N : LTV-816S-TA1-Cu:



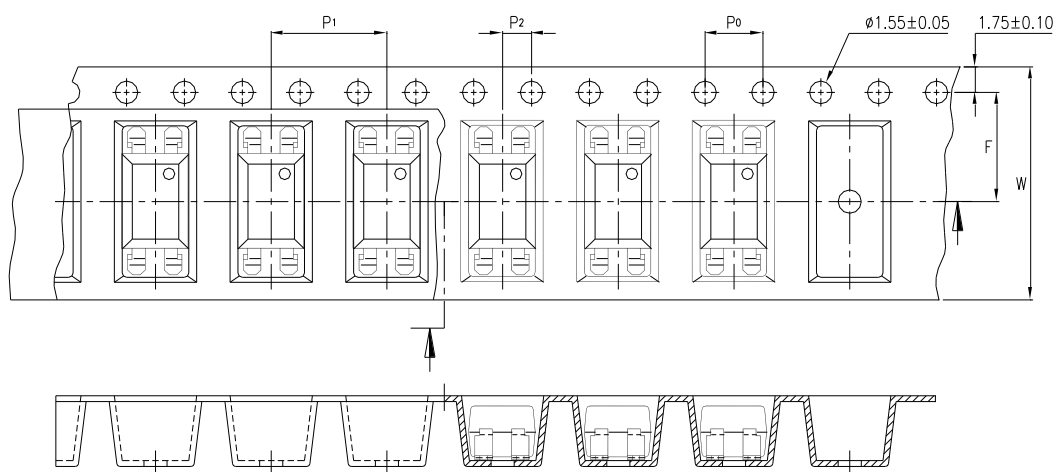
3.2 P/N : LTV-816S-TA-Cu:



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)

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3.3 P/N : LTV-816S-TP-Cu:



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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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	RthJ-A	325	°C/W
	Thermal Resistance Junction-Case	RthJ-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	$V_{CE}=5\text{V}$, $I_C=2\text{mA}$ $R_L=100\Omega$, -3dB
	Response Time (Rise)	t_r	—	4	18	μs	$V_{CE}=2\text{V}$, $I_C=2\text{mA}$ $R_L=100\Omega$,
	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
L	50	100	$I_F=5mA$, $V_{CE}=5V$, $T_a=25^{\circ}C$
A	80	160	
B	130	260	
C	200	400	
D3	300	450	
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

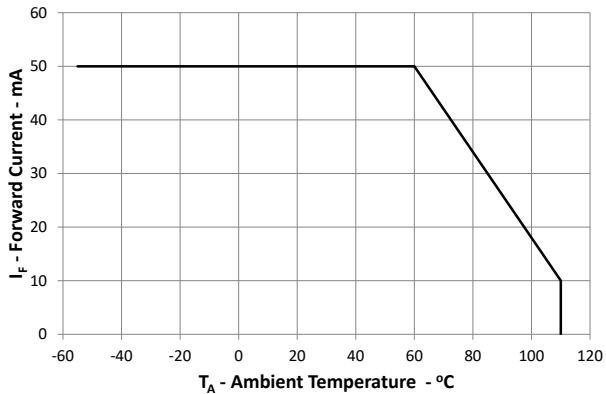


Fig.2 Collector Power Dissipation vs. Ambient Temperature

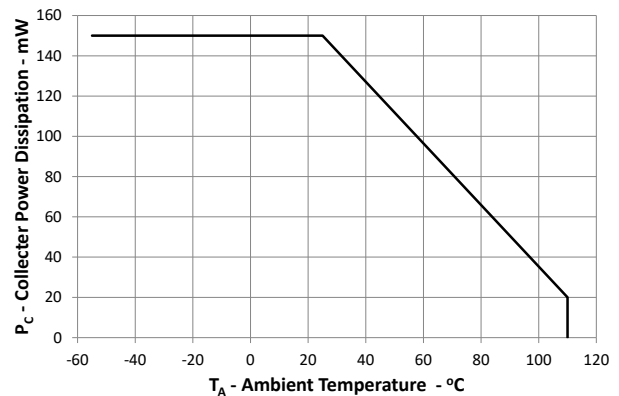


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

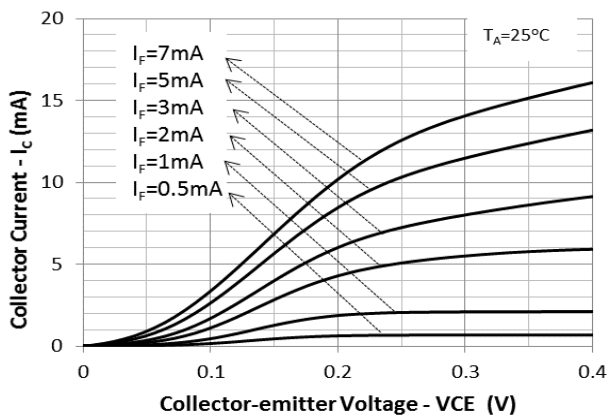


Fig.4 Forward Current vs. Forward Voltage

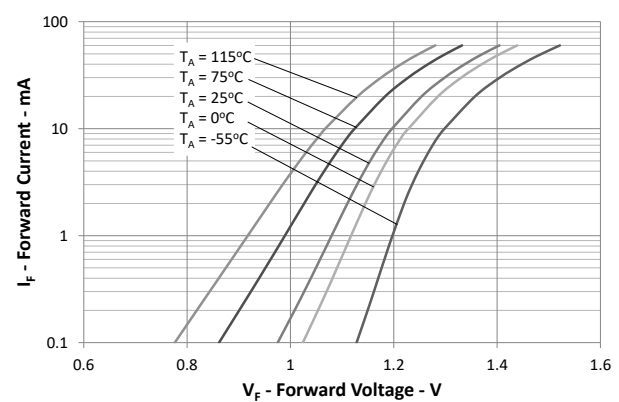


Fig.5 Current Transfer Ratio vs. Forward Current

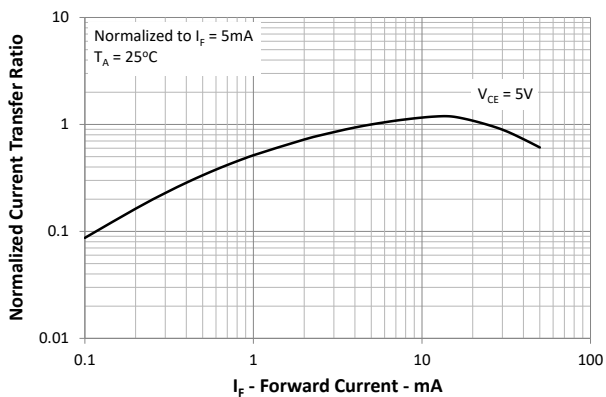
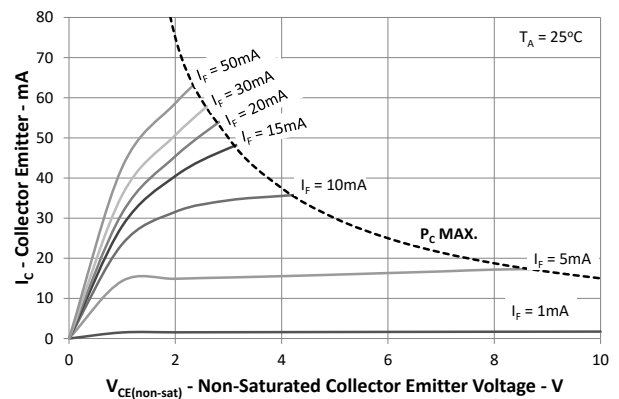


Fig.6 Collector Current vs. Collector-emitter Voltage



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Fig.7 Relative Current Transfer Ratio
vs. Ambient Temperature

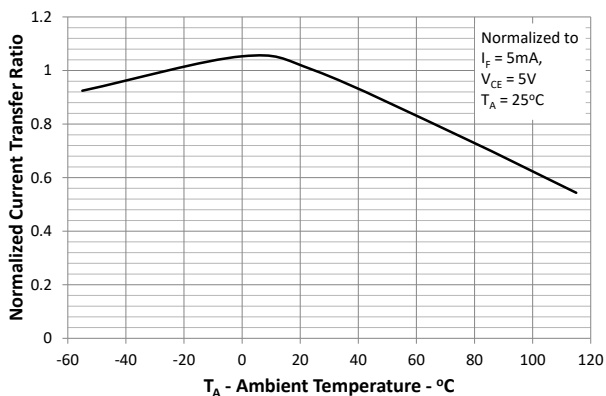


Fig.8 Collector-emitter Saturation Voltage
vs. Ambient Temperature

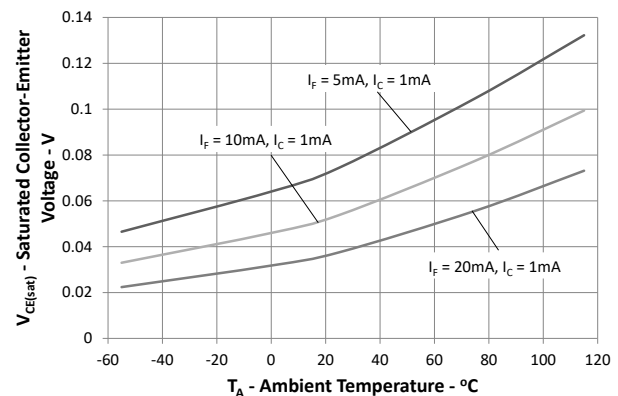


Fig.9 Collector Dark Current vs.
Ambient Temperature

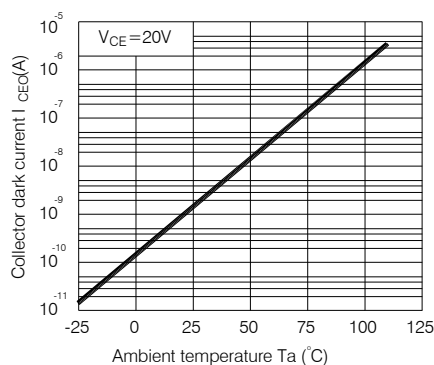


Fig.10 Response Time vs. Load
Resistance

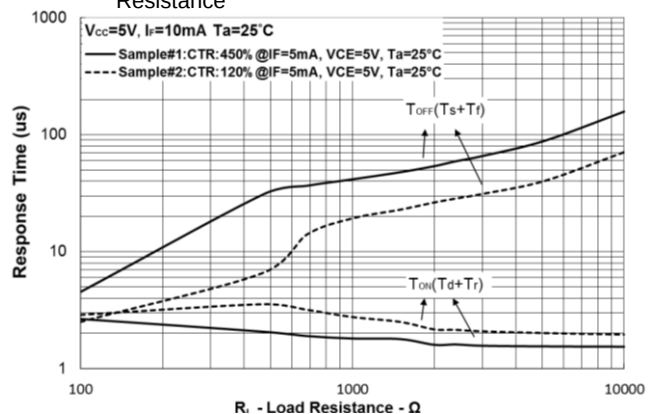
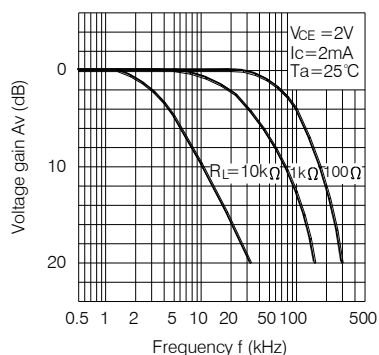
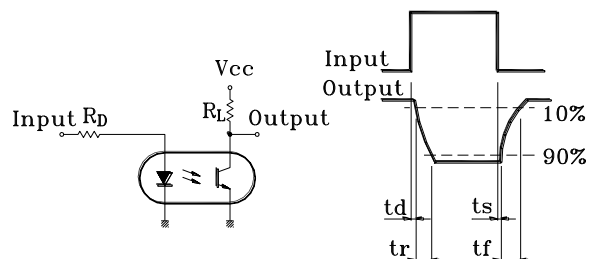


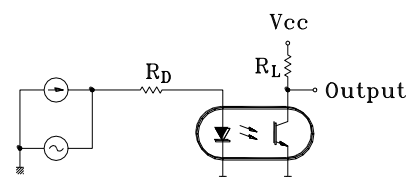
Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



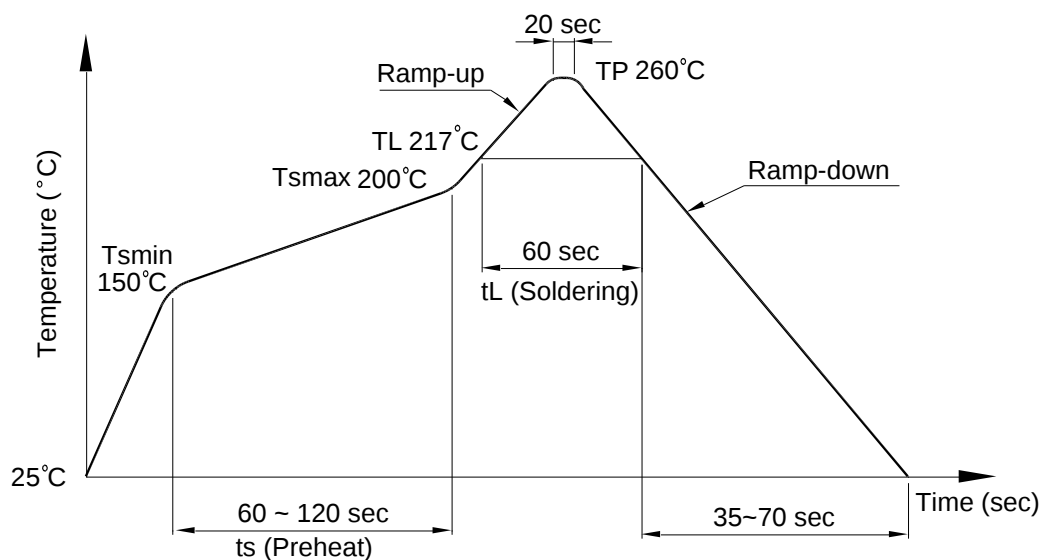
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7. TEMPERATURE PROFILE OF SOLDERING

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)

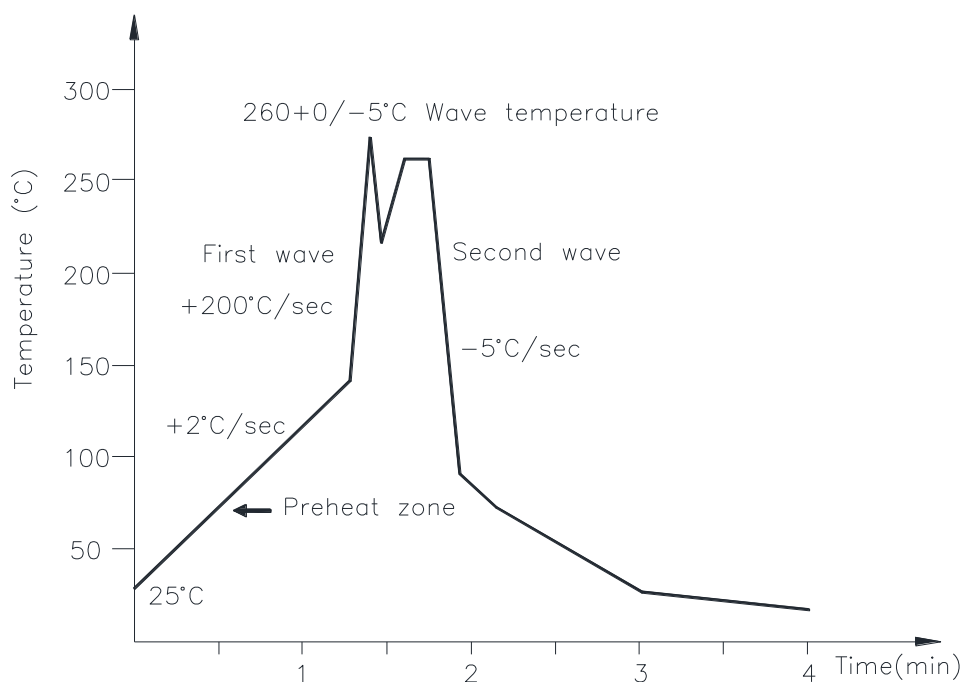
One time soldering is recommended within the condition of temperature.

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.

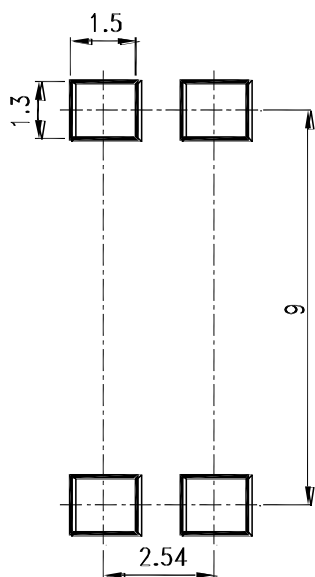
Temperature: $380 \pm 0/-5^{\circ}\text{C}$

Time: 3 sec max.

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8. RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit: mm



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9. NAMING RULE

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

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 P4-P5

(3) CTR RANK

Please refer to the CTR table on Page P8

(4) Halogen free option

(5) Copper base lead frame

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

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

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 P4-P5

(3) CTR RANK

Please refer to the CTR table on Page P8

(4) VDE order option

(5) Halogen free option

(6) Copper base lead frame

Example : LTV816STA1A-V-G-Cu

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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.
- ot recommended.