LITEON®
OPTOELECTRONICS

Photocoupler
Product Data Sheet
LTV-2X7 series

Spec No. :DS70-2009-0016
Effective Date: 09/18/2018
Revision: F

LITE-ON DCC

RELEASE

BNS-OD-FC001/A4

LITE-ON Technology Corp. / Optoelectronics
No.90,Chien 1 Road, Chung Ho, New Taipei City 23585, Taiwan, R.O.C.
Tel: 886-2-2222-6181 Fax: 886-2-2221-1948 / 886-2-2221-0660
http://www.liteon.com/opto

Photocoupler
LTV-2X7 series

1. DESCRIPTION

1.1 Features

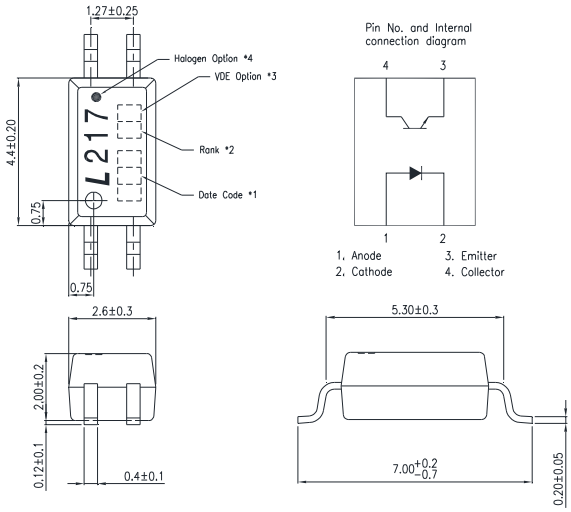
- Current transfer ratio (CTR) : MIN. 50% at I_F = 5mA, V_{CE} = 5V
- High input-output isolation voltage. (Viso=3,750Vrms)
- Employs double transfer mold technology
- Safety approval:
  UL 1577
  VDE DIN EN60747-5-5 (VDE 0884-5)
  CSA CA5A
  DEMKO/FIMKO/SEMKO/NEMKO
  CQC GB4943.1-2011/ GB8898-2011
- 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
- Halogen Free

1.2 Applications

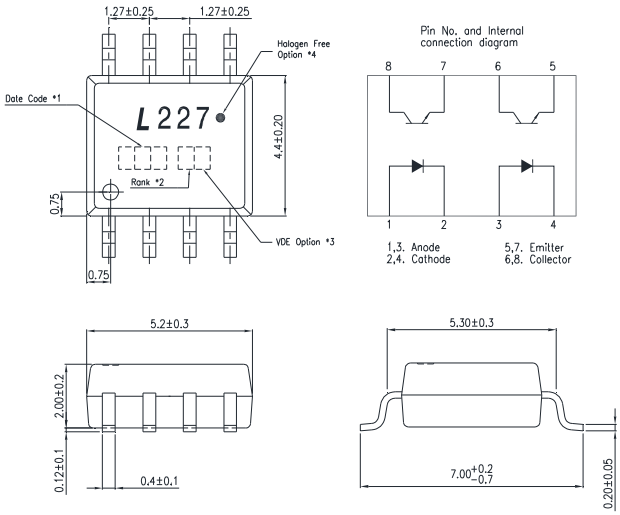
- Hybrid substrates that require high density mounting.
- Programmable controllers
- System appliances, measuring instruments

2. PACKAGE DIMENSIONS

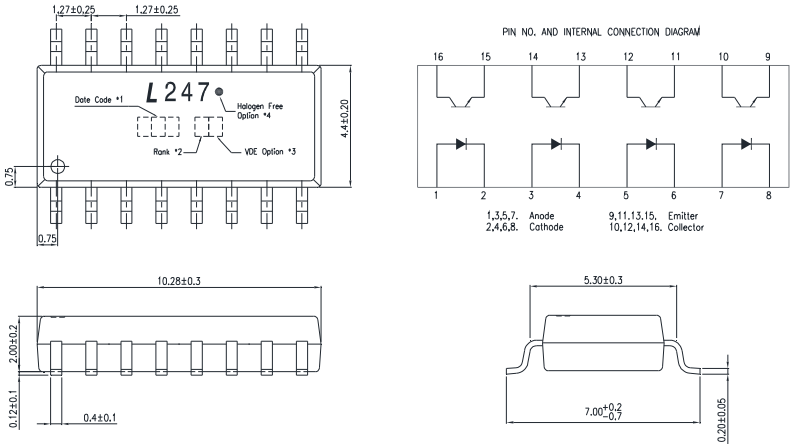
2.1 LTV-217



2.2 LTV-227



2.3 LTV-247



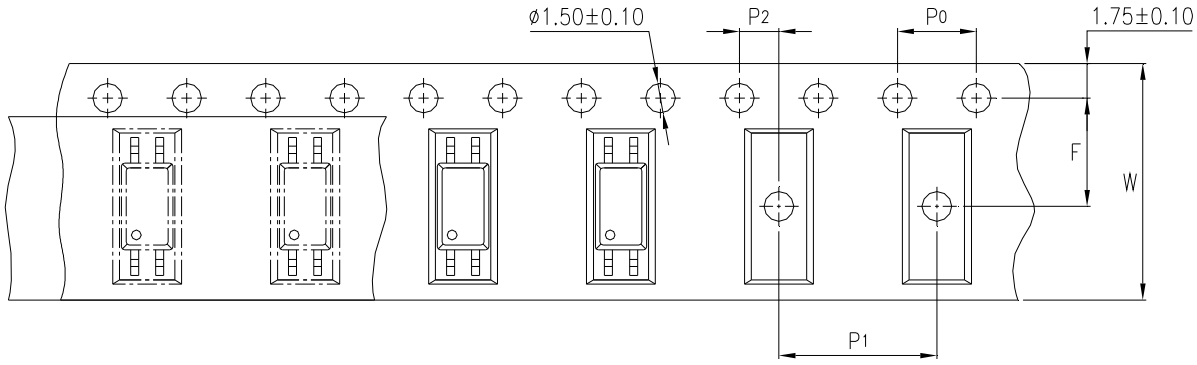
Notes :

1. 1-digit year code, Example : 2010 = A
   2-digit work week ranging from ‘01’ to ‘53’
2. Rank shall be or shall not be marked
3. VDE mark only appears on devices or ordered “V” option.
4. “●” indicates Halogen free option.

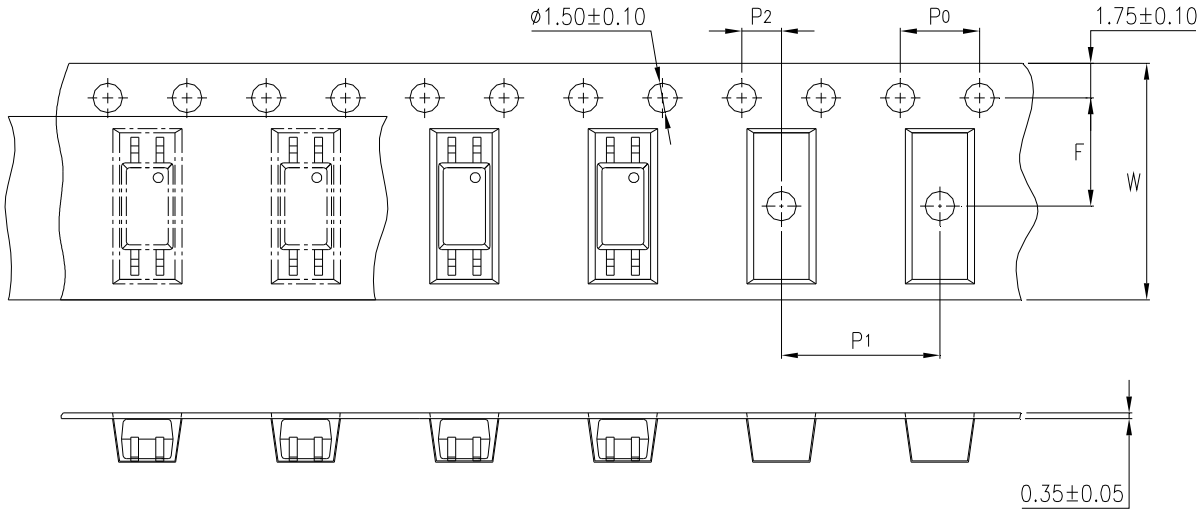
*All dimensions in millimeters.

3. TAPING DIMENSIONS

3.1 LTV-217

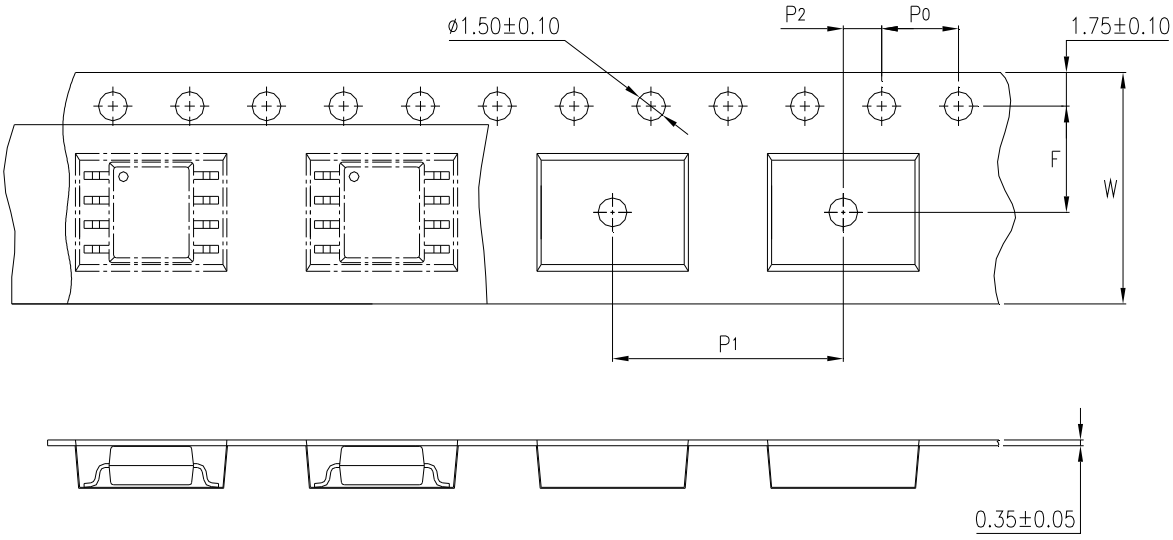


3.2 LTV-217-TP1



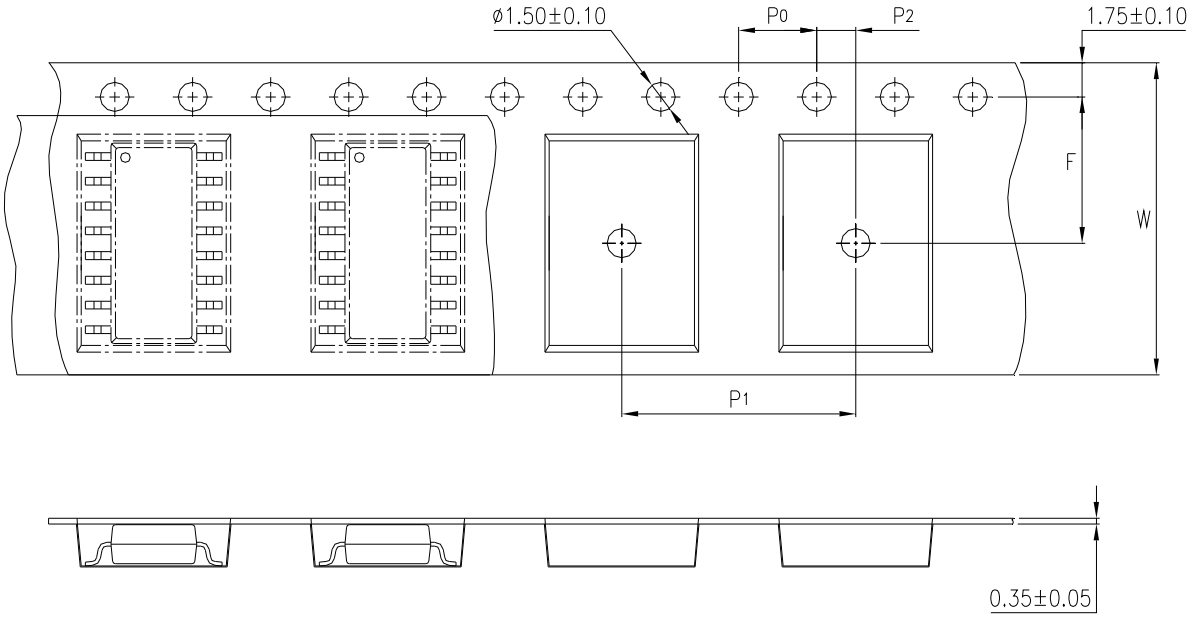
Description	Symbol	Dimension in mm (inch)
Tape wide	W	12±0.3 (0.47)
Pitch of sprocket holes	P_0	4±0.1 (0.15)
Distance of compartment	F	5.5±0.1 (0.217)
	P_2	2±0.1 (0.079)
Distance of compartment to compartment	P_1	8±0.1 (0.315)

3.3 LTV-227



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	12±0.1 (0.472)

3.4 LTV-247



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)

3.5 Quantities per Reel

Package Type	LTV-217	LTV-227	LTV-247
Quantities (pcs)	3000	2000	2000

4. RATING AND CHARACTERISTICS

4.1 Absolute Maximum Ratings at Ta=25℃

	Parameter	Symbol	Rating			Unit
			217	227	247	
Input	Forward Current	I_F	50			mA
	Reverse Voltage	V_R	6			V
	Power Dissipation	P	70			mW
	Pulse Forward Current	I_{FSM}	1			A
	Junction Temperature	T_J	125			°C
Output	Collector - Emitter Voltage	V_{CEO}	80			V
	Emitter - Collector Voltage	V_{ECO}	7			V
	Collector Current	I_C	50			mA
	Collector Power Dissipation	P_C	150		100	mW
	Junction Temperature	T_J	125			°C
	Total Power Dissipation	P_{tot}	200		170	mW
1.	Isolation Voltage	V_{iso}	3750			V_{rms}
	Operating Temperature	T_{opr}	-55 ~ +110			°C
	Storage Temperature	T_{stg}	-55 ~ +150			°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

4.2 ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25℃

Parameter			Symbol	Min.	Typ.	Max.	Unit	Test Condition
Input		Forward Voltage	V_F	—	1.2	1.4	V	I_F=20mA
		Reverse Current	I_R	—	—	10	μA	V_R=4V
		Terminal Capacitance	C_t	—	30	250	pF	V=0, f=1KHz
Output		Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE}=20V, I_F=0
		Collector-Emitter Breakdown Voltage	BV_{CEO}	80	—	—	V	I_C=0.1mA, I_F=0
		Emitter-Collector Breakdown Voltage	BV_{ECO}	7	—	—	V	I_E=10μA, I_F=0
TRANSFER CHARACTERISTICS		Collector Current	I_C	2.5	—	30	mA	I_F=5mA V_{CE}=5V
	1.	Current Transfer Ratio	CTR	50	—	600	%	
		Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	0.4	V	I_F=8mA I_C=2.4mA
		Isolation Resistance	R_{iso}	5×10^{10}	1×10^{11}	—	Ω	DC500V, 40 ~ 60% R.H.
		Floating Capacitance	Cf	—	0.6	1	pF	V=0, f=1MHz
		Response Time (Rise)	tr	—	2	18	μs	V_{CC}=10V, I_C=2mA R_L=100Ω, f=100Hz
		Response Time (Fall)	tf	—	3	18	μs	
		Turn-On Time	T_{ON}	—	3	—	μs	
		Turn-Off Time	T_{OFF}	—	3	—	μs	
		Turn-On Time	t_{ON}	—	2	—	μs	V_{CC}=5V, I_F=16mA R_L=1.9KΩ
		Storage Time	Ts	—	25	—	μs	
		Turn-Off Time	t_{OFF}	—	40	—	μs	

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

5. RANK TABLE OF CURRENT TRANSFER RATIO CTR

MODEL NO.	CTR Rank	Min	Max	Condition
LTV-217	A	80	160	I_F=5mA, V_{CE}=5V, Ta=25°C
	A1	100	160	
	B	130	260	
	C	200	400	
	D	300	600	
	A or B or C or D or No mark	50	600	
LTV-227	B	130	260	
	C	200	400	
	B or C or No mark	50	600	
LTV-247	No mark	100	600	

6. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

Figure 1. Collector Power Dissipation vs. Ambient Temperature

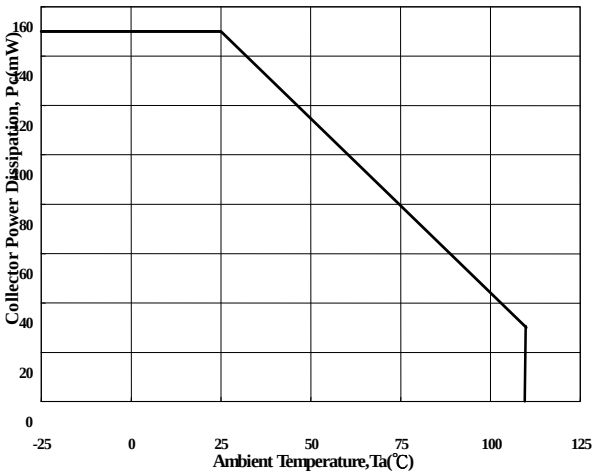


Figure 2. Forward Current vs. Ambient Temperature

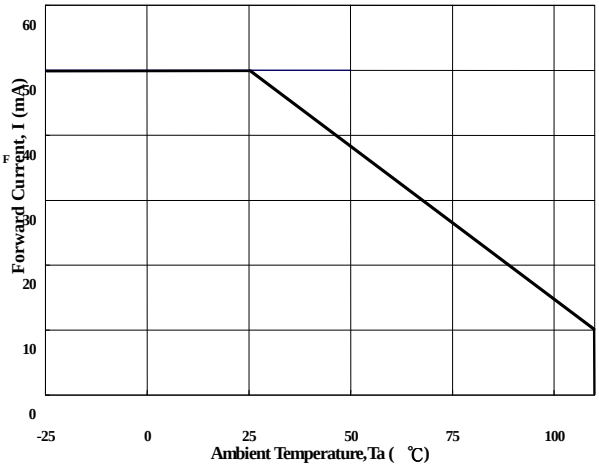


Figure 3. Forward Current vs. Forward Voltage

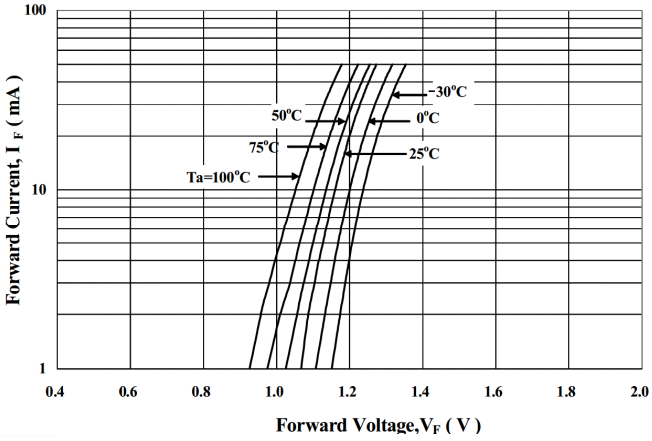


Figure 4. Forward Voltage Temperature Coefficient vs. Forward Current

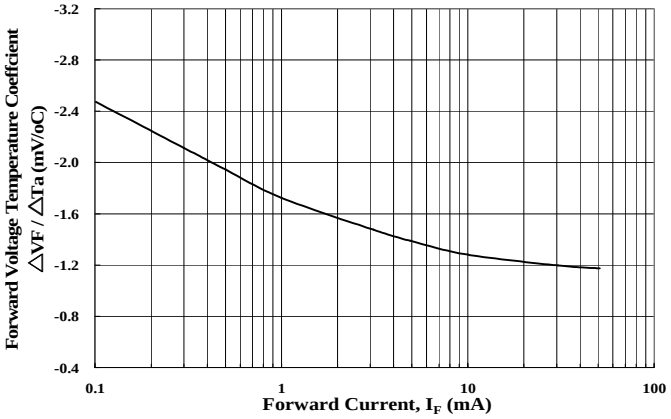


Figure 5. Pulse Forward Current vs. Duty Cycle Ratio

Figure 6. Pulse Forward Current vs. Pulse Forward

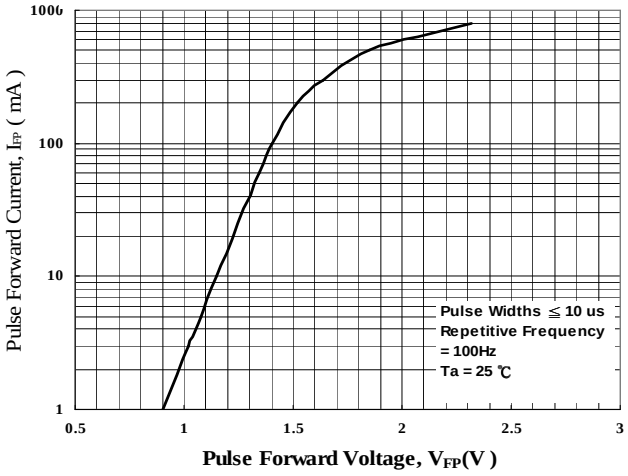


Figure 7. Collector-Emitter Saturation Voltage vs. Forward Current

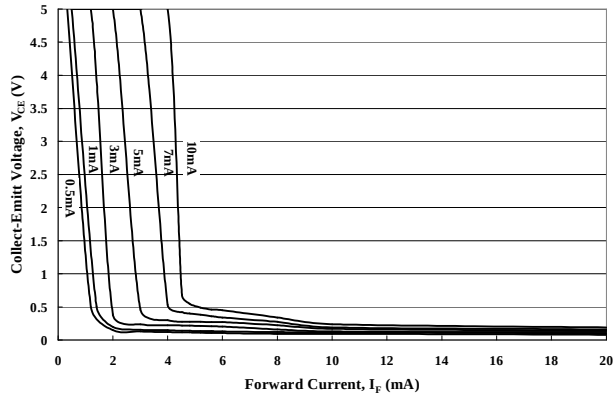


Figure 8. Collector Current vs. Collector-Emitter

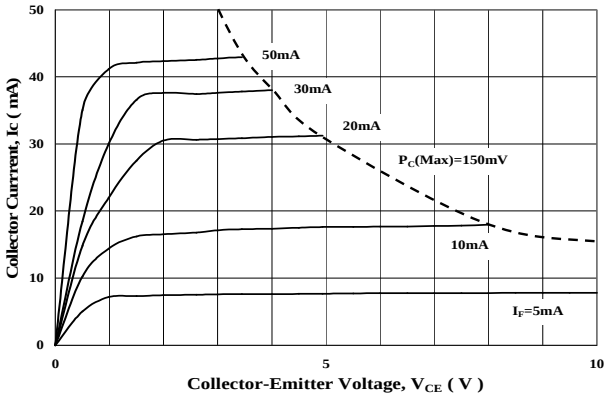


Figure 9. Collector Current vs. Small Collector-Emitter Voltage

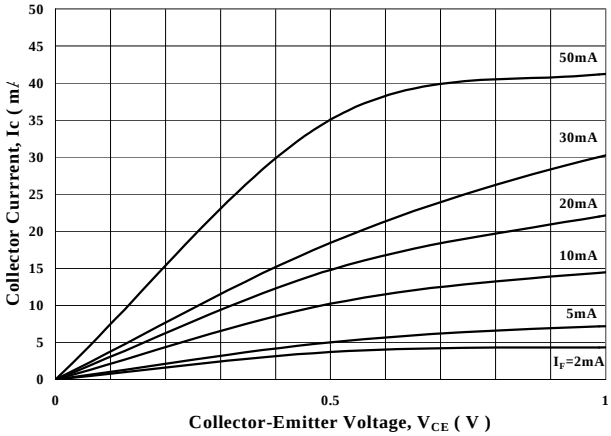


Figure 10. Normalized CTR vs. Forward Current

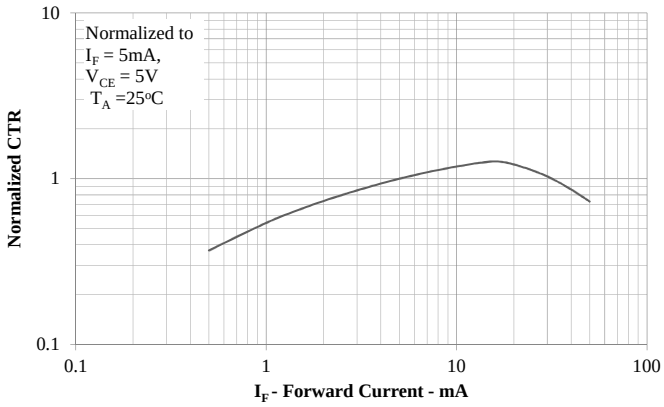


Figure 11. Collector Dark Current vs. Ambient Temperature

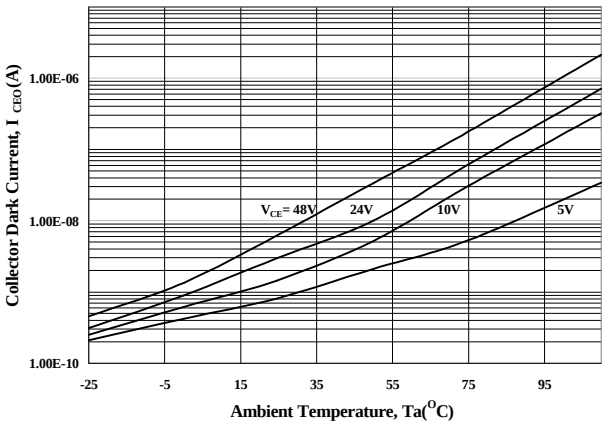


Figure 12. Current Transfer Ratio vs. Forward Current

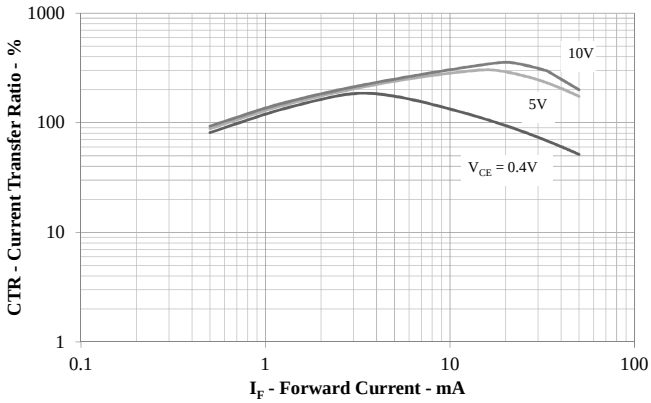


Figure 13. Normalized CTR vs. Ambient Temperature

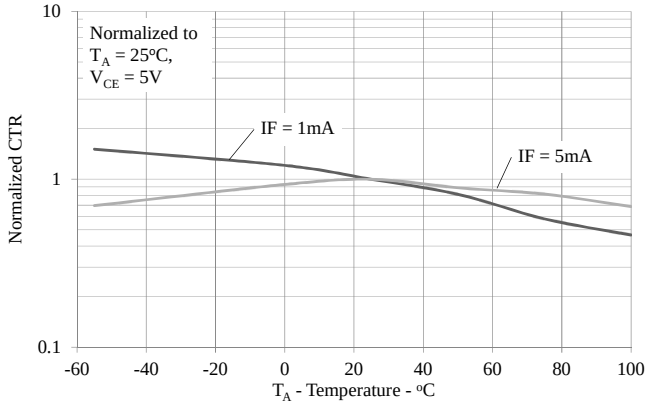


Figure 14. Collector-Emitter Saturation Voltage vs. Ambient Temperature

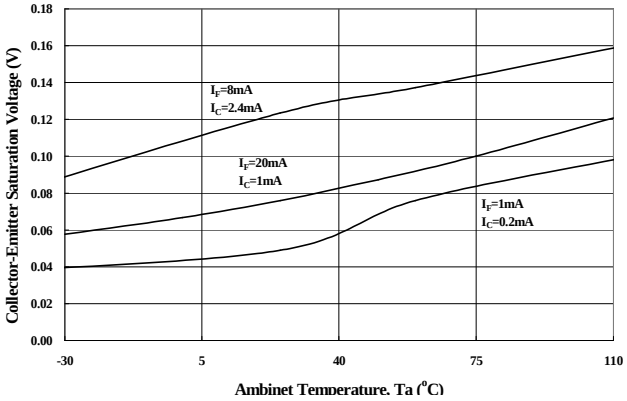


Figure 15. Collector Current vs. Ambient Temperature

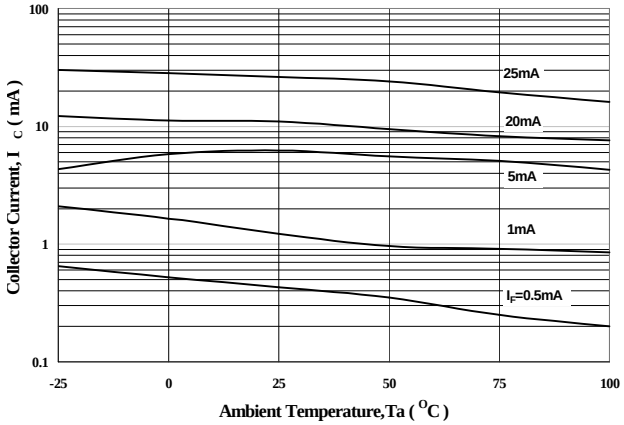


Figure 16. Switching Time vs. Load Resistance

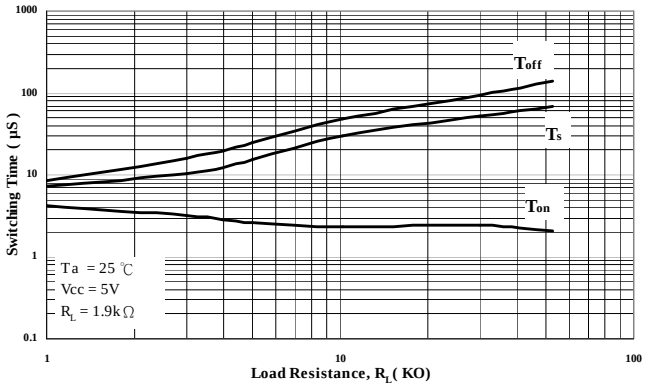


Figure 17. Switching Time vs. Ambient Temperature

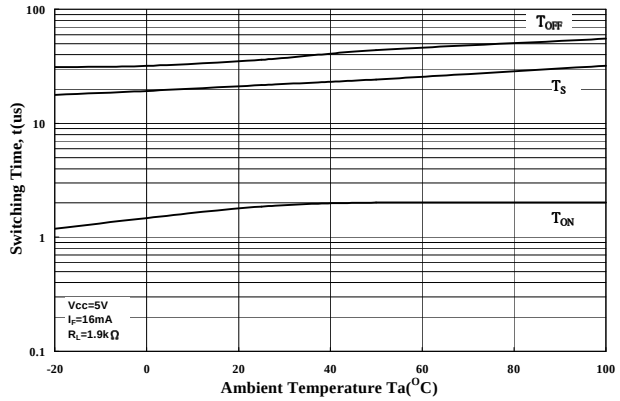
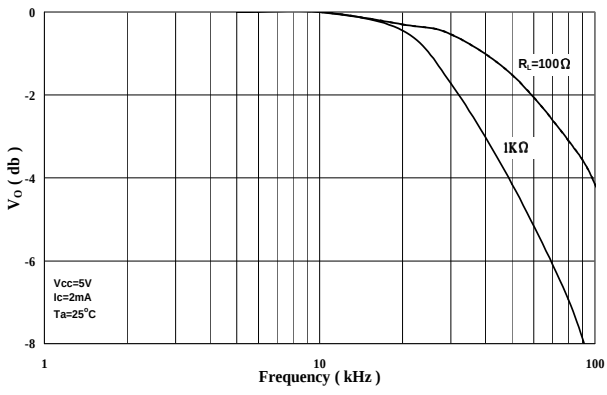
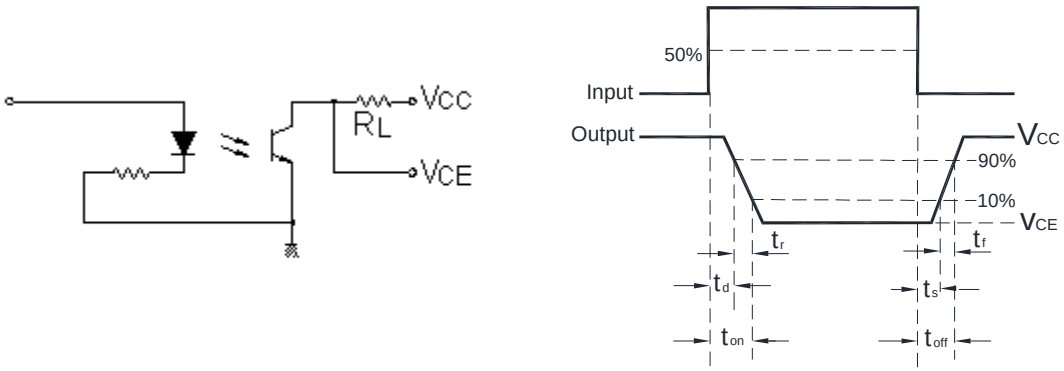


Figure 18. Frequency Response



7. SWITCHING TIME TEST CIRCUIT

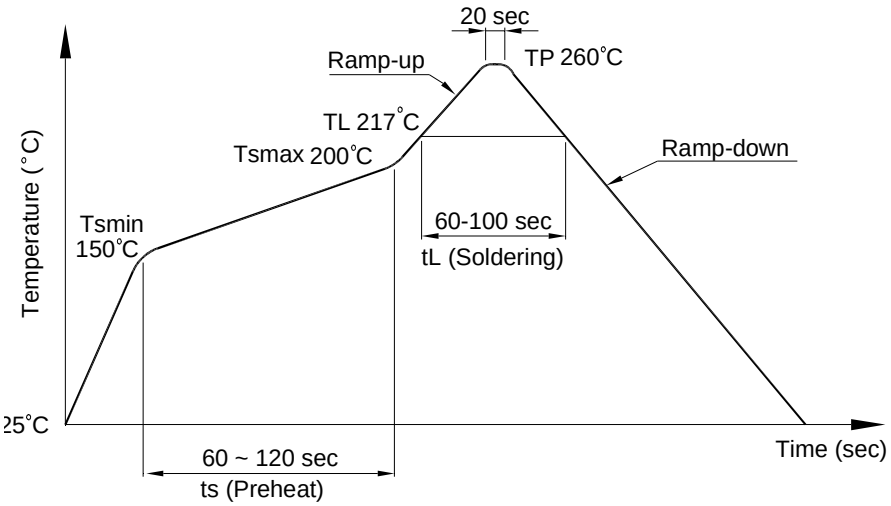


8. TEMPERATURE PROFILE OF SOLDERING

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 ~100 sec
Peak Temperature (T_P)	260˚C
Ramp-up rate	3˚C / sec max.
Ramp-down rate	3~6˚C / sec



8.2 Wave soldering (JEDEC22A111 compliant)

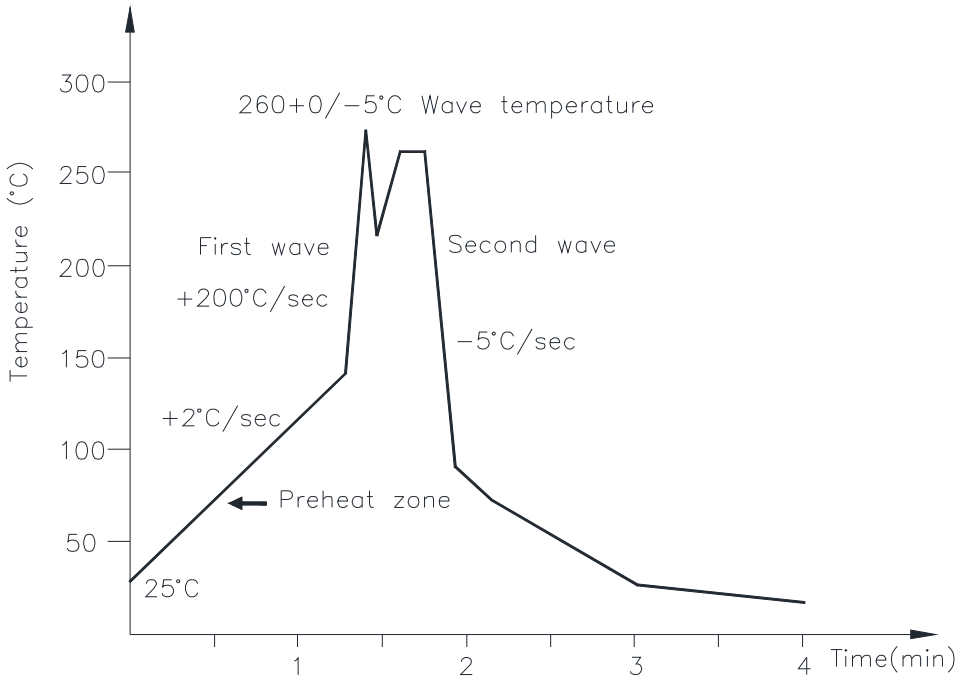
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5˚C

Time: 10 sec.

Preheat temperature:25 to 140˚C

Preheat time: 30 to 80 sec.



8.3 Hand soldering by soldering iron

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

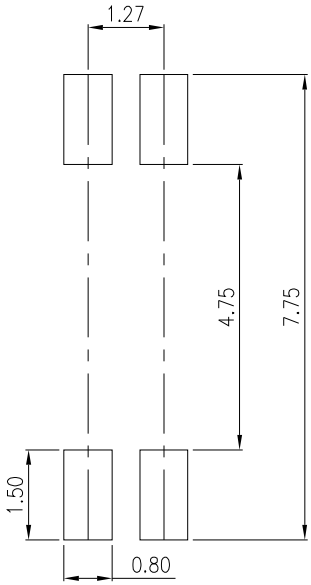
Temperature: 380+0/-5°C

Time: 3 sec max.

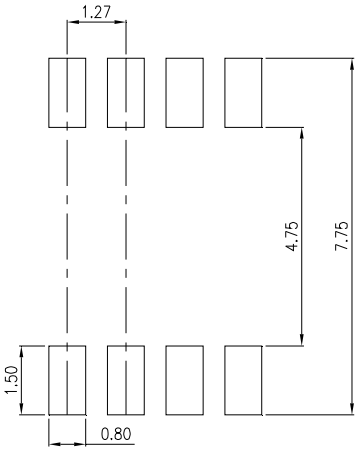
9. RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit: mm

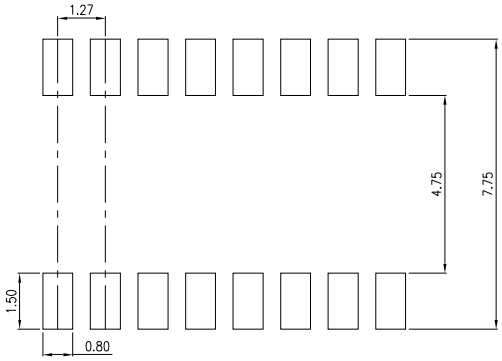
9.1 LTV-217



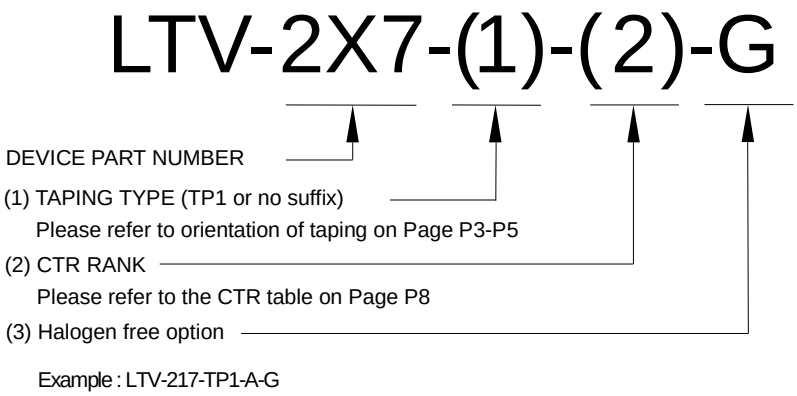
9.2 LTV-227



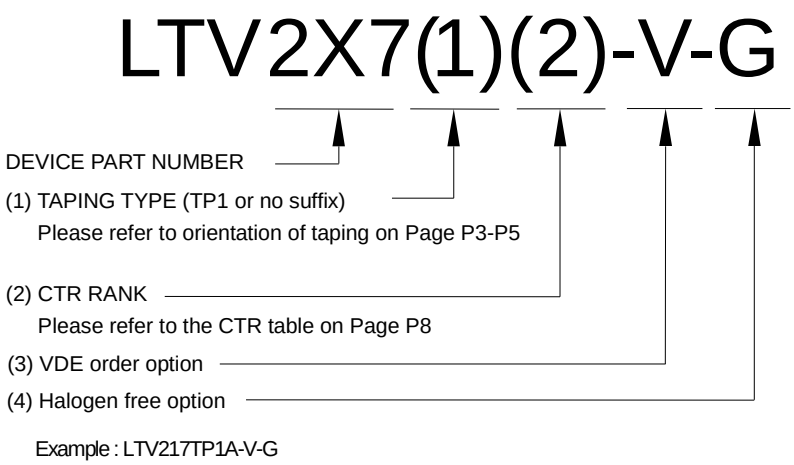
9.3 LTV-247



10. NAMING RULE



Example : LTV-217-TP1-A-G



Example : LTV217TP1A-V-G

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.