

FEATURES

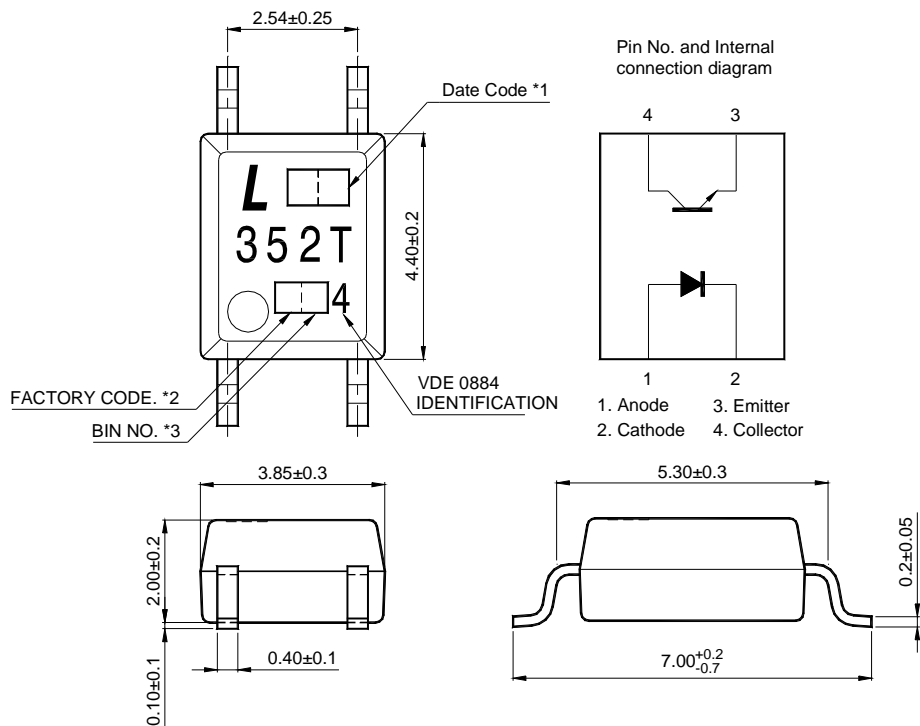
- * This specification shall be applied to photocoupler. Model No. LTV-352T as an option.
- * High current transfer ratio
(CTR : MIN. 1000% at $I_F = 1\text{mA}$, $V_{CE} = 2\text{V}$)
- * High input-output isolation voltage
($V_{iso} = 3,750\text{Vrms}$)
- * High collector-emitter voltage
($V_{CEO} = 300\text{V}$)
- * Mini-flat package :
2.0mm profile : LTV-352T-V
- * UL approved (No. E113898)
- * CUL approved (No. E113898 , 01SC19287)
- * CSA approved (No. 1243207)
- * FIMKO approved (No. FI-16420)
- * NEMKO approved (No. P01100403)
- * DEMKO approved (No. 310475-01)
- * SEMKO approved (No. 0109173 / 01-08)
- * VDE approved (No. 094722)
- * RoHS compliance

APPLICATIONS

- * Hybrid substrates that require high density mounting.
- * Telephone sets
- * Copiers, facsimiles
- * Interfaces with various power supply circuits, power distribution boards.

OUTLINE DIMENSIONS

LTV-352T-V :

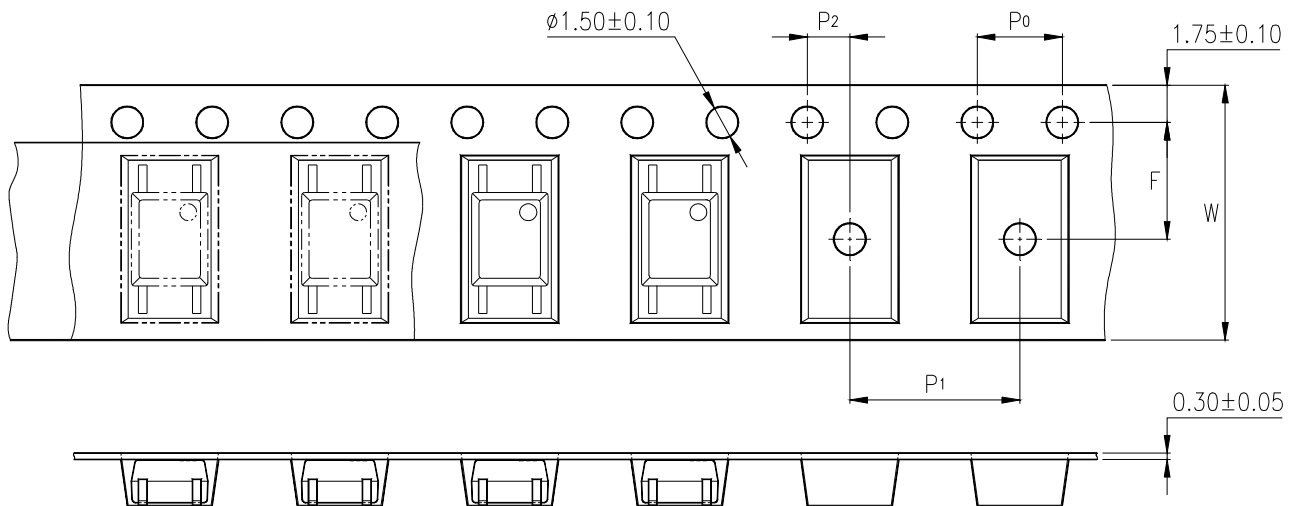


*1. 2-digit date code.

*2. Factory identification mark shall be marked (Z : Taiwan, Y : Thailand, X : China).

*3. Rank shall be or shall not be marked.

TAPING DIMENSIONS



Description	Symbol	Dimensions in mm (inches)
Tape wide	W	12 ± 0.3 (.47)
Pitch of sprocket holes	P_0	4 ± 0.1 (.15)
Distance of compartment	F	5.5 ± 0.1 (.217)
Distance of compartment to compartment	P_2	2 ± 0.1 (.079)
Distance of compartment to compartment	P_1	8 ± 0.1 (.315)

ABSOLUTE MAXIMUM RATING

(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
OUTPUT	Collector - Emitter Voltage	V _{CEO}	300	V
	Emitter - Collector Voltage	V _{ECO}	0.1	V
	Collector Current	I _C	150	mA
	Collector Power Dissipation	P _C	150	mW
Total Power Dissipation		P _{tot}	170	mW
*1	Isolation Voltage	V _{iso}	3,750	V _{rms}
Operating Temperature		T _{opr}	-55 ~ +100	°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

ELECTRICAL - OPTICAL CHARACTERISTICS

(Ta = 25°C)

PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
INPUT	Forward Voltage	V _F	—	1.2	1.4	V	I _F =10mA
	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}	—	—	200	nA	V _{CE} =200V, I _F =0
	Collector-Emitter Breakdown Voltage	BV _{CEO}	300	—	—	V	I _C =0.1mA I _F =0
	Emitter-Collector Breakdown Voltage	BV _{ECO}	0.1	—	—	V	I _E =10μA I _F =0
TRANSFER CHARACTERISTICS	Collector Current	I _C	10	—	—	mA	I _F =1mA V _{CE} =2V
	*1 Current Transfer Ratio	CTR	1,000	—	—	%	
	Collector-Emitter Saturation Voltage	V _{CE(sat)}	—	—	1.2	V	I _F =20mA I _C =100mA
	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=1MHz
	Cut-Off Frequency	f _c	1	7	—	kHz	V _{CE} =2V, I _C =20mA R _L =100Ω, -3dB
	Response Time (Rise)	t _r	—	100	300	μs	V _{CC} =2V, I _C =20mA R _L =100Ω
	Response Time (Fall)	t _f	—	20	100	μs	

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

ISOLATION SPECIFICATION ACCORDING TO VDE 0884

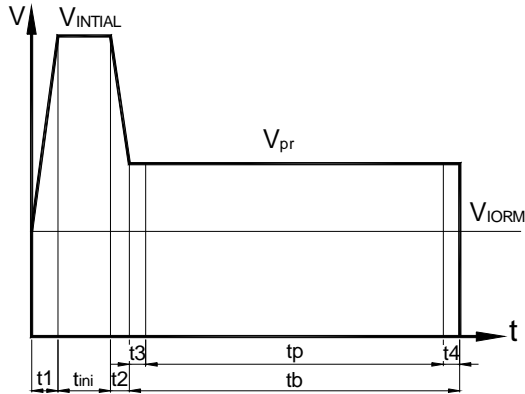
Parameter	Symbol	Conditions	Rating	Unit	Remark	
Class of environmental test	-	DIN IEC68	30/100/21	-		
Pollution	-	DIN VDE0110	2	-		
Maximum Operating Isolation Voltage	V_{IORM}	-	565	V_{PEAK}	Refer to the Diagram 1, 2	
Partial Discharge Test Voltage (Between Input and Output)	Diagram 1	V_{pr}	$t_p=60s, q_c<5pC$	848		V_{PEAK}
	Diagram 2		$t_p=1s, q_c<5pC$	1059		V_{PEAK}
Maximum Over-voltage	$V_{INITIAL}$	$t_{INI} = 10s$	6000	V_{PEAK}		
Safety Maximum Ratings					Refer to the Figure 1, 3	
1) Case Temperature	T_{si}	$I_F = 0, P_c = 0$	150	$^{\circ}C$		
2) Input Current	I_{si}	$P_c=0$	200	mA		
3) Electric Power (Output or Total Power Issipation)	P_{si}	-	300	mW		
Isolation Resistance (Test Voltage Between Input and Output : DC500V)	R_{ISO}	$T_a=T_{si}$	MIN. 10^9	Ω		
		$T_a=T_{opr}(MAX.)$	MIN. 10^{11}			
		$T_a=25^{\circ}C$	MIN. 10^{12}			

Precautions in performing isolation test

- * Partial discharge test methods shall be the ones according to the specifications of VDE 0884:1992-06
- * Please don't carry out isolation test (V_{iso}) over $V_{INITIAL}$,This product deteriorates isolation characteristics by partial discharge due to applying high voltage (ex. $V_{INITIAL}$). And there is possibility that this product occurs partial discharge in operating isolation voltage (V_{IORM})

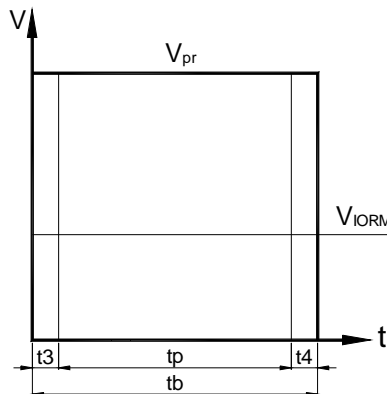
PARTIAL DISCHARGE TEST METHOD

Method (A) for type testing and random testing.



t_1, t_2 = 1 to 10s
 t_3, t_4 = 1s
 t_p (Partial Discharge Measuring Time) = 60s
 t_b = 62s
 t_{ini} = 10s

Method (B) for routine testing.



t_3, t_4 = 0.1s
 t_p (Partial Discharge Measuring Time) = 1s
 t_b = 1.2s

The partial discharge level shall not exceed 5 pC during the partial discharge measuring time interval t_p under the test conditions shown above.

CHARACTERISTICS CURVES

Fig.1 Forward Current vs. Ambient Temperature

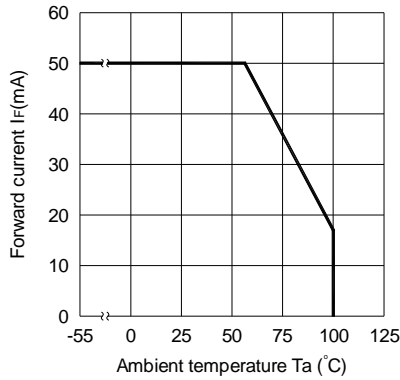


Fig.2 Collector Power Dissipation vs. Ambient Temperature

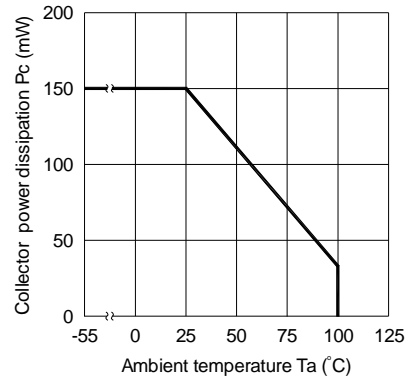


Fig.3 Collector-emitter saturation Voltage vs. Forward current

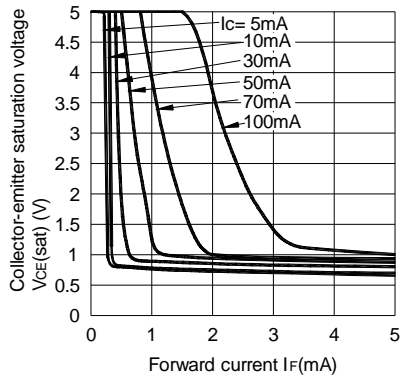


Fig.4 Forward Current vs. Forward Voltage

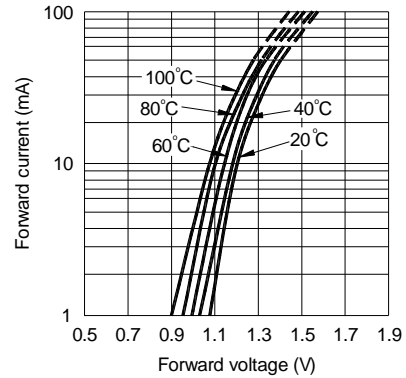


Fig.5 Current Transfer Ratio vs. Forward Current

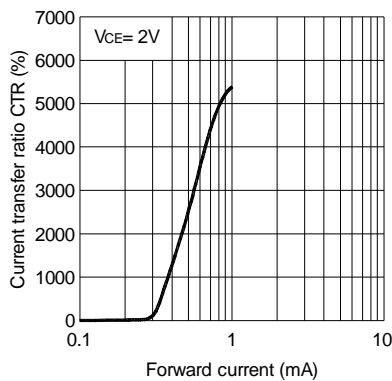
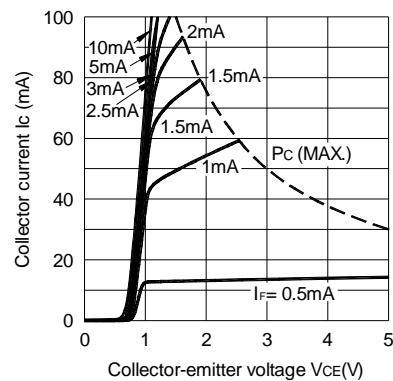


Fig.6 Collector Current vs. Collector-emitter Voltage



CHARACTERISTICS CURVES

Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

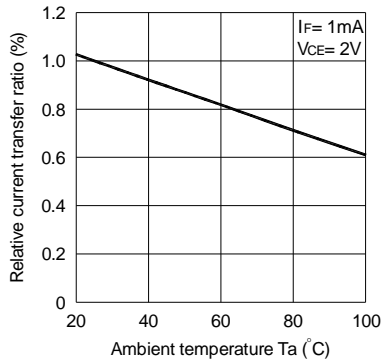


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

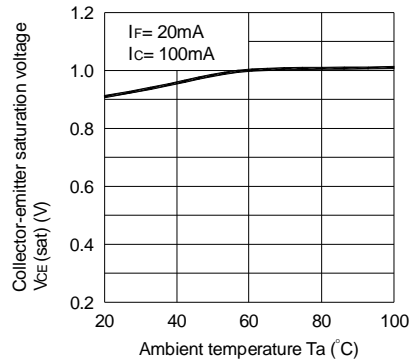


Fig.9 Collector Dark Current vs. Temperature

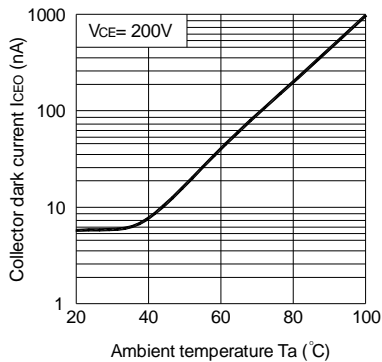


Fig.10 Response Time vs. Load Resistance

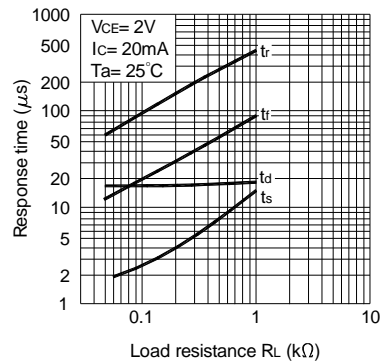
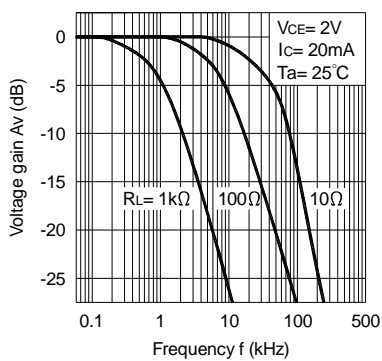
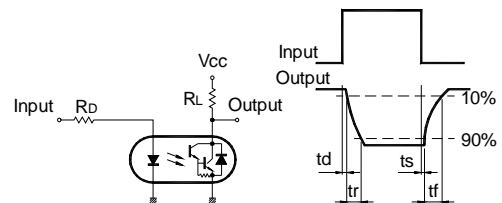


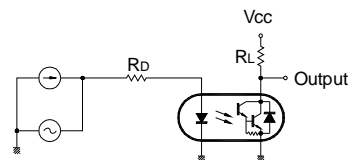
Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



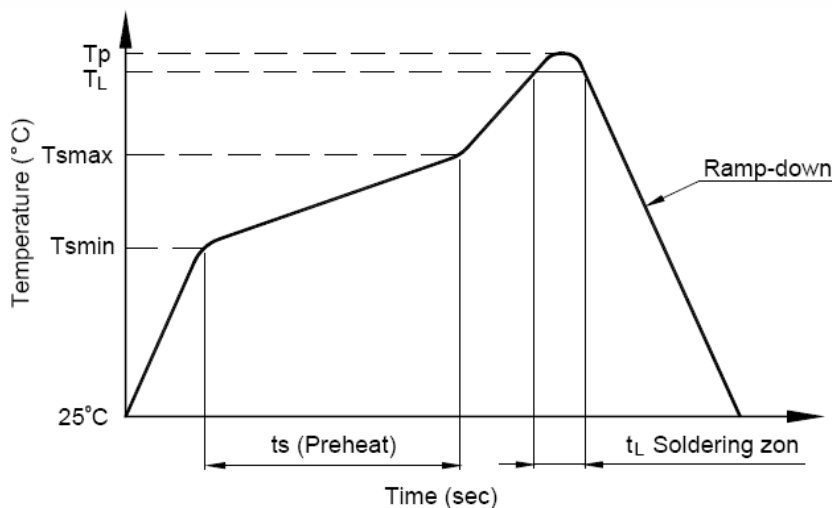
Temperature Profile of Soldering Reflow

(1) One time soldering reflow is recommended within the condition of temperature and time profile shown below.

1. Wave solder
- 260 °C / 10 sec

2. IR reflow

Profile item	Condition
Preheat	
- Temperature Min (T_{smin})	150 °C
- Temperature Max (T_{smax})	180 °C
- Time (min to max) (t_s)	90 ± 30 sec
Soldering zone	
- Temperature (T_L)	250 °C
- Time (t_L)	10 ~15 sec
Peak temperature (T_p)	260 °C
Ramp-down rate	3 ~ 6 °C / sec



Temperature Profile of Soldering Reflow

(2) When using another soldering method such as infrared ray lamp, the temperature may rise partially in the mold of the device.

Keep the temperature on the package of the device within the condition of above (1)

RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit : mm

