



# Photocoupler

## Product Data Sheet

### LTV-702F

### (M, S, S-TA, S-TA1) series

Spec No.: DS-70-96-0010

Effective Date: 07/20/2016

Revision: F

**LITE-ON DCC**

**RELEASE**

BNS-OD-FC001/A4

## Photocoupler LTV-702F (M, S, S-TA, S-TA1) series

### 1. DESCRIPTION

#### 1.1 Features

- Current transfer ratio (CTR : 40% ~ 320% at  $I_F = 10\text{mA}$ ,  $V_{CE} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ )
- High input-output isolation voltage  $V_{iso} = 5,000\text{Vrms}$
- High collector-emitter voltage (  $V_{CEO} = 70\text{V}$  )
- Response time (  $t_r$  : TYP.  $2\mu\text{s}$  at  $V_{CC} = 5\text{V}$ ,  $I_F = 10\text{mA}$ ,  $R_L = 75\Omega$  )
- Dual-in-line package :  
LTV-702F
- Wide lead spacing package :  
LTV-702FM
- Surface mounting package :  
LTV-702FS
- Tape and reel packaging :  
LTV-702FS-TA, LTV-702FS-TA1
- Safety approval
  - \* UL approved (No. E113898)
  - \* TUV approved (No. R9653630)
  - \* CSA approved (No. CA91533-1)
  - \* FIMKO approved (No. 193422-01)
  - \* NEMKO approved (No. P96103013)
  - \* DEMKO approved (No. 303968)
  - \* SEMKO approved (No. 9646047 / 01-30)
  - \* VDE approved (No. 094722 )
- RoHS Compliance  
All materials be used in device are followed EU RoHS directive (No.2002/95/EC).
- ESD pass HBM 8000V/MM2000V
- MSL class1

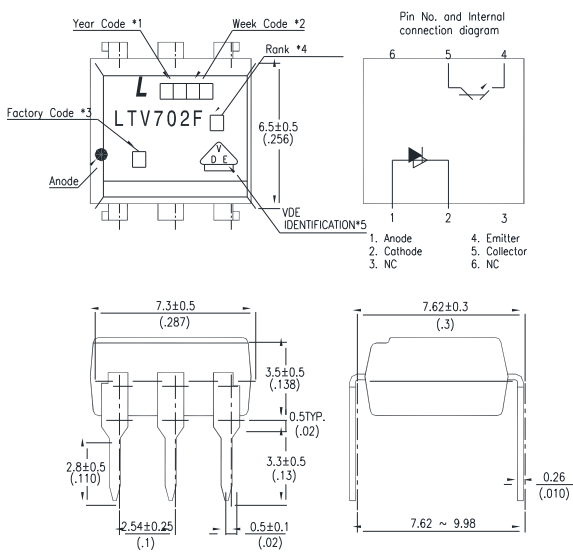
#### 1.2 Applications

- Directly connectable to TTL

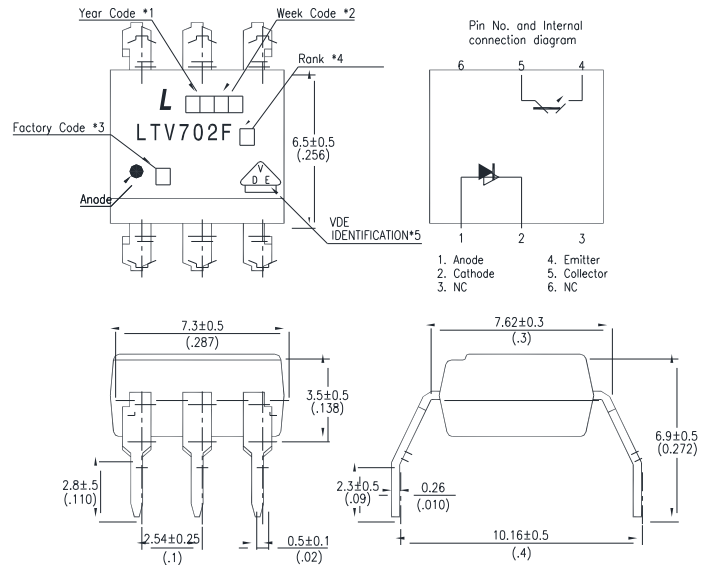
## Photocoupler LTV-702F (M, S, S-TA, S-TA1) series

### 2. PACKAGE DIMENSIONS

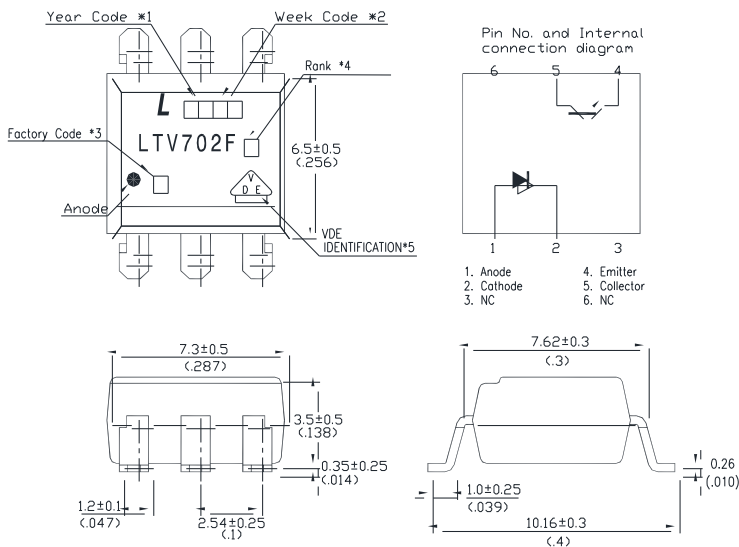
#### 2.1 LTV-702F



#### 2.2 LTV-702FM



#### 2.3 LTV-702FS



#### Notes :

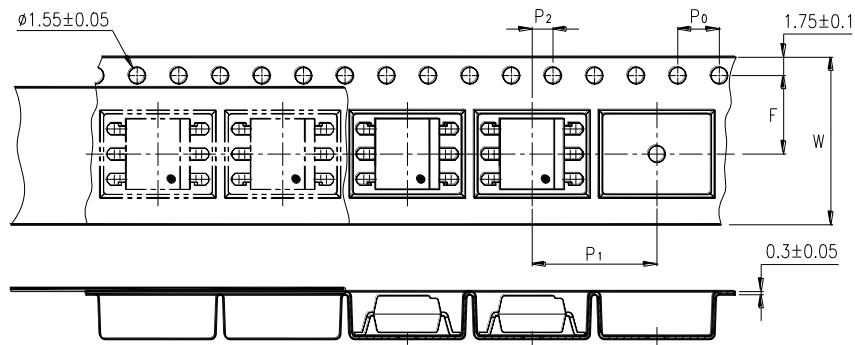
1. Year date code.
2. 2-digit work week.
3. Factory identification mark shall be marked (Y: Thailand, W: China-CZ).
4. Rank shall be or shall not be marked.
5. For VDE option.

Dimensions in millimeters (inches).

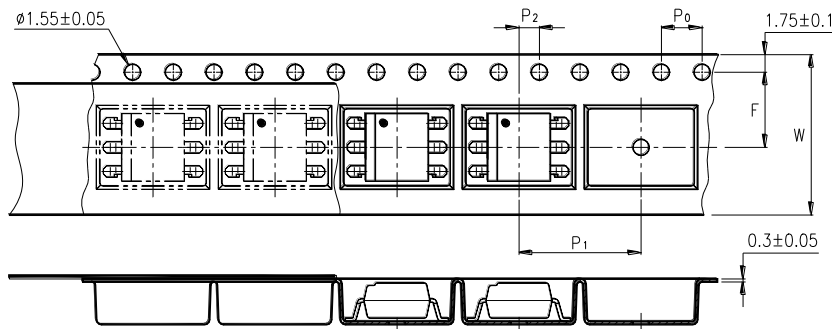
## Photocoupler LTV-702F (M, S, S-TA, S-TA1) series

### 3. TAPING DIMENSIONS

#### 3.1 LTV-702FS-TA



#### 3.2 LTV-702FS-TA1



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

#### 3.3 Quantities Per Reel

Package Type	TA / TA1
Quantities (pcs)	1000

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### 4. RATING AND CHARACTERISTICS

#### 4.1 Absolute Maximum Ratings at Ta=25°C

	Parameter	Symbol	Rating	Unit
Input	Forward Current	$I_F$	60	mA
	Reverse Voltage	$V_R$	6	V
	Power Dissipation	P	105	mW
	Junction Temperature	$T_J$	125	°C
Output	Collector - Emitter Voltage	$V_{CEO}$	70	V
	Emitter - Collector Voltage	$V_{ECO}$	6	V
	Collector Current	$I_C$	50	mA
	Collector Power Dissipation	$P_C$	160	mW
Total Power Dissipation		$P_{tot}$	200	mW
*1 Isolation Voltage		$V_{iso}$	5000	$V_{rms}$
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

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### 4.2 ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C

PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
INPUT	Forward Voltage	$V_F$	—	1.4	1.7	V	$I_F=60\text{mA}$
	Reverse Current	$I_R$	—	—	10	$\mu\text{A}$	$V_R=6\text{V}$
	Terminal Capacitance	$C_t$	—	30	250	pF	$V=0, f=1\text{KHz}$
OUTPUT	Collector Dark Current	$I_{CEO}$	—	—	50	nA	$V_{CE}=10\text{V}, I_F=0$
	Collector-Emitter Breakdown Voltage	$BV_{CEO}$	70	—	—	V	$I_C=0.1\text{mA}$ $I_F=0$
	Emitter-Collector Breakdown Voltage	$BV_{ECO}$	6	—	—	V	$I_E=10\mu\text{A}$ $I_F=0$
TRANSFER CHARACTERISTICS	Collector Current	$I_C$	4	—	32	mA	$I_F=10\text{mA}, V_{CE}=5\text{V}$
	*Current Transfer Ratio	CTR	40	—	320	%	
	Collector-Emitter Saturation Voltage	$V_{CE}(\text{sat})$	—	0.25	0.4	V	$I_F=10\text{mA}$ $I_C=2.5\text{mA}$
	Isolation Resistance	$R_{ISO}$	$5 \times 10^{10}$	$1 \times 10^{11}$	—	$\Omega$	DC500V 40 ~ 60% R.H.
	Floating Capacitance	$C_F$	—	0.6	1	pF	$V=0, f=1\text{MHz}$
	Cut-Off Frequency	$f_c$	—	150	—	kHz	$V_{CC}=5\text{V}, I_F=10\text{mA}$ $R_L=75\Omega, -3\text{dB}$
	Response Time (Rise)	$t_R$	—	2	7	$\mu\text{s}$	$V_{CC}=5\text{V}, I_F=10\text{mA}$ $R_L=75\Omega$
	Response Time (Fall)	$t_f$	—	2	8	$\mu\text{s}$	

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

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**5. RANK TABLE OF CURRENT TRANSFER RATIO CTR**

CTR Rank	Min	Max	Condition
A	40	80	I <sub>F</sub> =10mA, V <sub>CE</sub> =5V, T <sub>A</sub> =25°C
B	63	125	
C	100	200	
D	160	320	
No mark	40	320	

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## 6. CHARACTERISTICS CURVES

Fig.1 Forward Current vs. Ambient Temperature

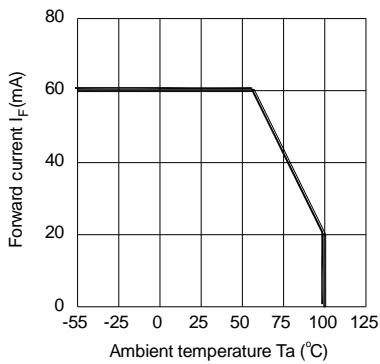


Fig.2 Collector Power Dissipation vs. Ambient Temperature

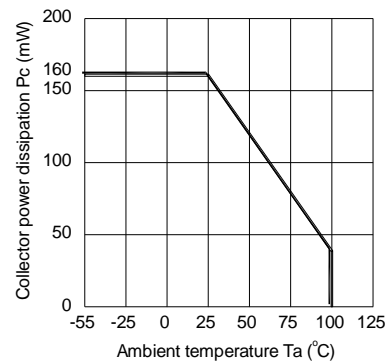


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

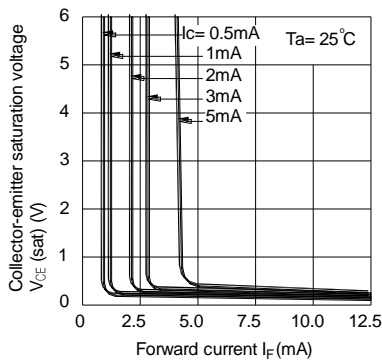


Fig.4 Forward Current vs. Forward Voltage

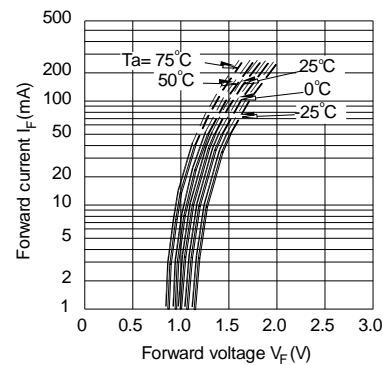


Fig.5 Current Transfer Ratio vs. Forward Current

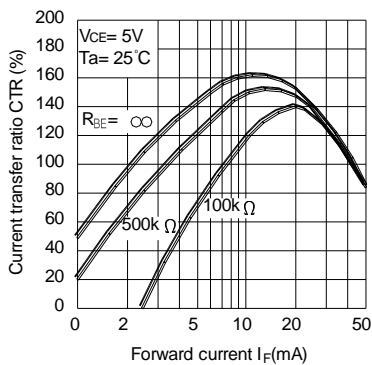
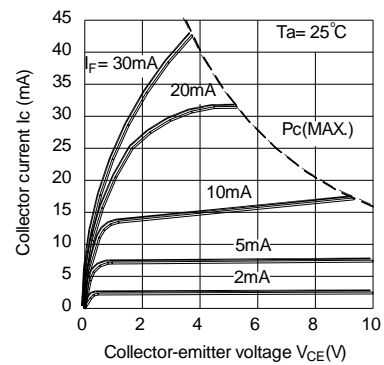


Fig.6 Collector Current vs. Collector-emitter Voltage





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Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

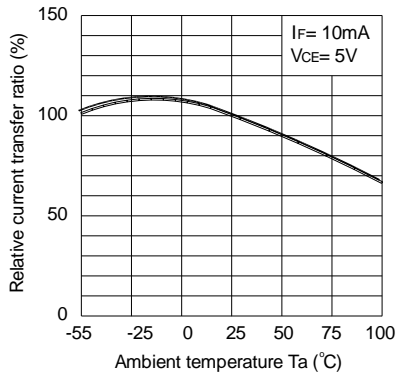


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

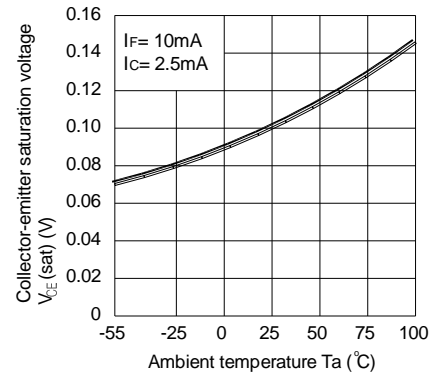


Fig.9 Collector Dark Current vs. Ambient Temperature

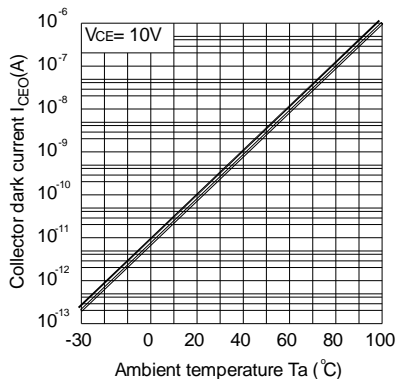


Fig.10 Response Time vs. Load Resistance

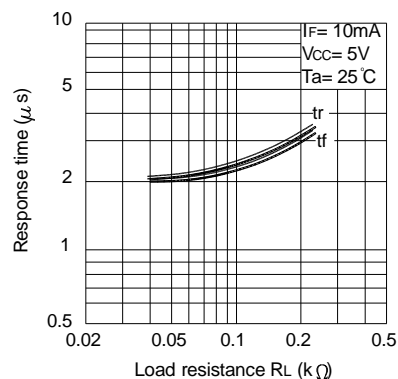
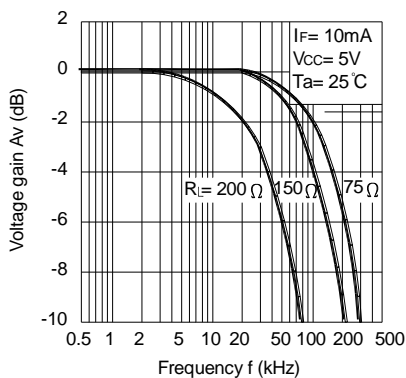
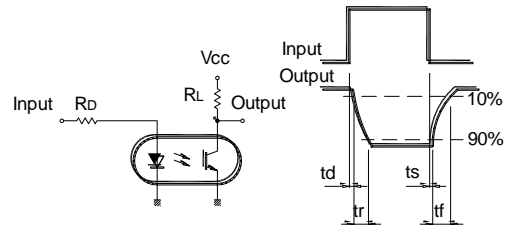


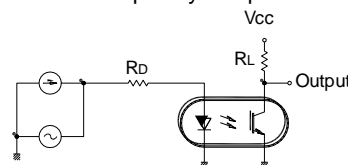
Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response



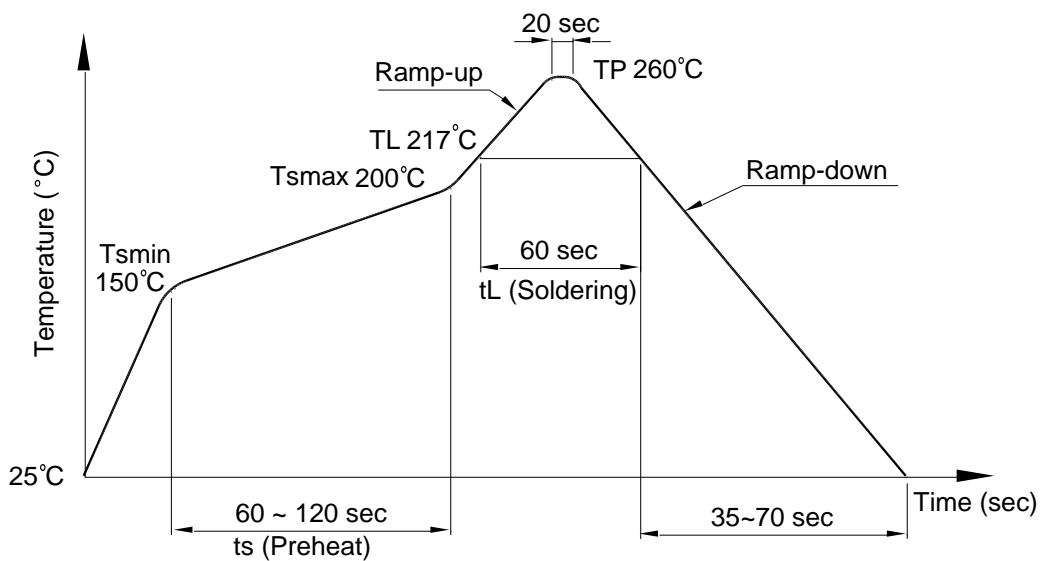
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## 7. TEMPERATURE PROFILE OF SOLDERING

### 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) (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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## 7.2 Wave soldering (JEDEC22A111 compliant)

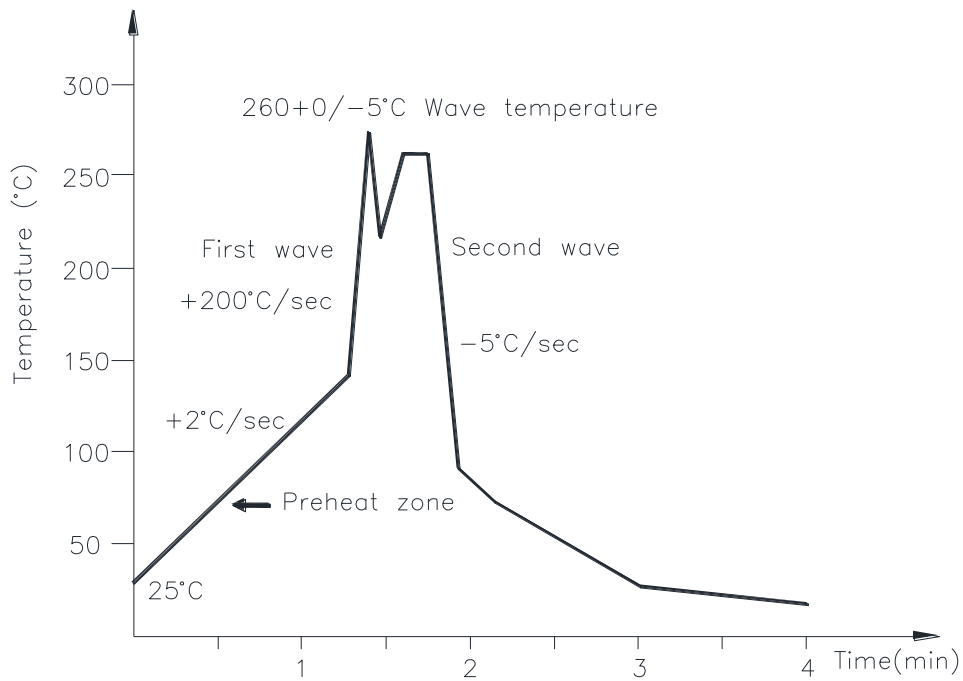
One time soldering is recommended within the condition of temperature.

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

Time: 10 sec.

Preheat temperature: 25 to  $140^{\circ}\text{C}$

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.

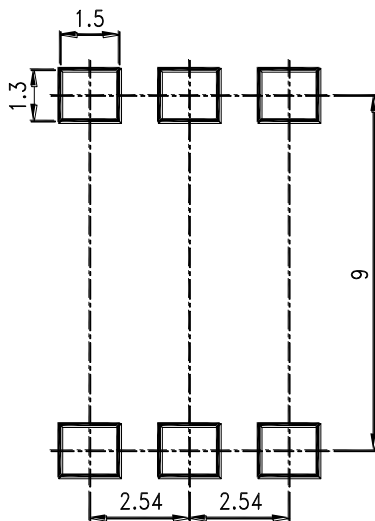
Temperature:  $380 \pm 0 / -5^{\circ}\text{C}$

Time: 3 sec max.

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**8. RECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)**

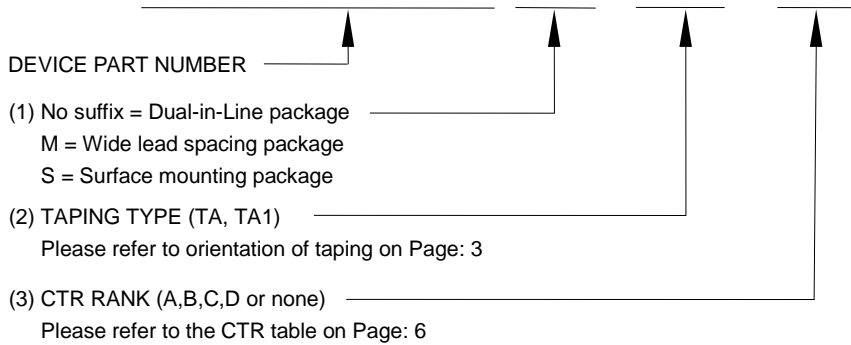
Unit: mm



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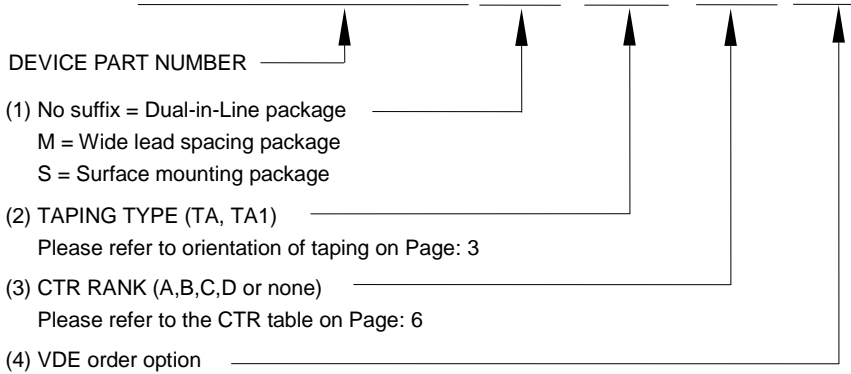
**9. NAMING RULE**

**LTV-702F(1)-(2)-(3)**



Example : LTV-702FS-TA1-A

**LTV702F(1)(2)(3)-V**



Example : LTV702FSTA1A-V

## Photocoupler LTV-702F (M, S, S-TA, S-TA1) series

### 10. NOTES

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- 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 advance.
- 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.