ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-M302X(L)/M305X(L)/M307X(L)

Customer: _____

Date: _____

SHENZHEN ORIENT COMPONENTS CO ., LTD

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1. Features

(1) High isolation voltage between input and output (Viso:3750 V rms)
(2) 4pin non zero-cross optoisolators triac driver output
(3) High repetitive peak off-state voltage VDRM :
M302X: Min. 400V, M305X: Min. 600V, M307X: Min. 800V
(4) High critical rate of rise of off-state voltage dv/dt :
M302X: Typ. 100V / μs , M305X/M307X:MIN . 1000V / μs
(5) Tape and reel packaging.
(6) Operating temperature -40 ℃to +110 ℃
(7) Safety approval
UL approved(No.E323844)
VDE approved(No.40029733)
CQC approved (No.CQC19001231256)
(8) In compliance with RoHS, REACH standards
(9) MSL Class I

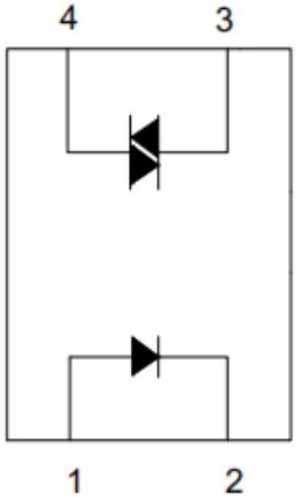
2. Description

The OR-M302X(L)/M305X(L)/M307X(L) consists of a non zero crossing photo triac, optically coupled to a gallium arsenide infrared emitting diode. They are housed in the SOP-4 package and guarantees insulation thickness.Therefore,they meets the reinforced insulation class requirements of international safety standards.

3. Application Range

- AC Motor Drives
- AC Motor Starters
- Static power switch
- Lighting Controls
- Solenoid/Valve Controls
- Solid State Relays
- Temperature Controls

4. Functional Diagram



1.Anode
2.Cathode
3.Main terminal
4.Main terminal

5. Absolute Maximum Ratings (Ta=25℃)

Parameter			Symbol	Rated Value	Unit
Input	Forward Current		I_F	50	mA
	Junction Temperature		T_J	125	℃
	Reverse Voltage		V_R	6	V
	Power Dissipation		P	100	mW
Output	Off-State Output Terminal Voltage	OR-M302X	V_{DRM}	400	V
		OR-M305X		600	
		OR-M307X		800	
	On state RMS current		$I_{T(RMS)}$	100	mA(RMS)
	Peak Repetitive Surge Current (PW=1ms，120 pps)		I_{TSM}	1	A
	Junction Temperature		T_J	125	℃
	Collector Power Dissipation		P_C	300	mW
Total Power Dissipation			P_{tot}	330	mW
*1 Insulation Voltage			V_{iso}	3750	Vrms
Working Temperature			T_{opr}	-40 ~ + 110	℃
Deposit Temperature			T_{stg}	-55 ~ + 125	
*2 Soldering Temperature			T_{sol}	260	

Notes:
*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2&3 are shorted together, and pins 4, 6 are shorted together.
* 2 For 10 seconds

6. Electrical Optical Characteristics at Ta=25°C

Parameter			Symbol	Min	Typ.*	Max	Unit	Condition
Input	Forward Voltage		V_F	---	1.2	1.6	V	I_F=10mA
	Reverse Current		I_R	---	---	5	μA	V_R=6V
Output	*1.Peak Blocking Current, Either Direction	OR-M302X OR-M305X	I_{DRM}	---	10	100	nA	V_{DRM} = Rated V_{DRM}
		OR-M307X		---	---	500		
	Peak On-State Voltage, Either Direction		V_{TM}	---	---	2.5	V	ITM=100mA Peak
	*2.Critical rate of Rise of Off-State Voltage	OR-M302X	dv/dt	---	100	---	V/μs	Vin=240Vrms
		OR-M305X OR-M307X		1000	---	---		
Transfer Characteristics	*3.Led Trigger Current,Current Required to Latch Output, Either Direction	OR-M3020 OR-M3050 OR-M3070	I_{FT}	---	---	30	mA	Main Terminal Voltage = 3V
		OR-M3021 OR-M3051 OR-M3071		---	---	15		
		OR-M3022 OR-M3052 OR-M3072		---	---	10		
		OR-M3023 OR-M3053 OR-M3073		---	---	5		
		OR-M3024 OR-M3054 OR-M3074		---	---	3.5		
	Holding Current, Either Direction		I_H	0.5	1.0	5.0	mA	
	Turn-On Time		T_{on}	---	---	100	μs	V_D=6V R_L=100Ω I_F=20mA

*1.Test voltage must be applied within dv/dt rating.
*2. This is static dv/dt. Commutating dv/dt is a function of the load-driving thyristor(s) only.
*3. All devices are guaranteed to trigger at an I_F value less than or equal to max I_{FT} . Therefore,recommended operating I_F lies between max I_{FT} , 30 mA for OR-M3020 and OR-M3050,15 mA for OR-M3021 and OR-M3051,10 mA for OR-M3022 and OR-M3052,5 mA for OR-M3023 and OR-M3053,3.5 mA for OR-M3024 and OR-M3054, and absolute max I_F (50mA).

7. Order Information

Part Number

OR-M302X(L)-W-Y-Z

OR-M305X(L)-W-Y-Z

Or OR-M307X(L)-W-Y-Z

Note

M302X(L)/M305X(L)/M307X(L) = Part Number(X = 0,1,2,3 or 4)

W = Tape and reel option (TP or TP1).

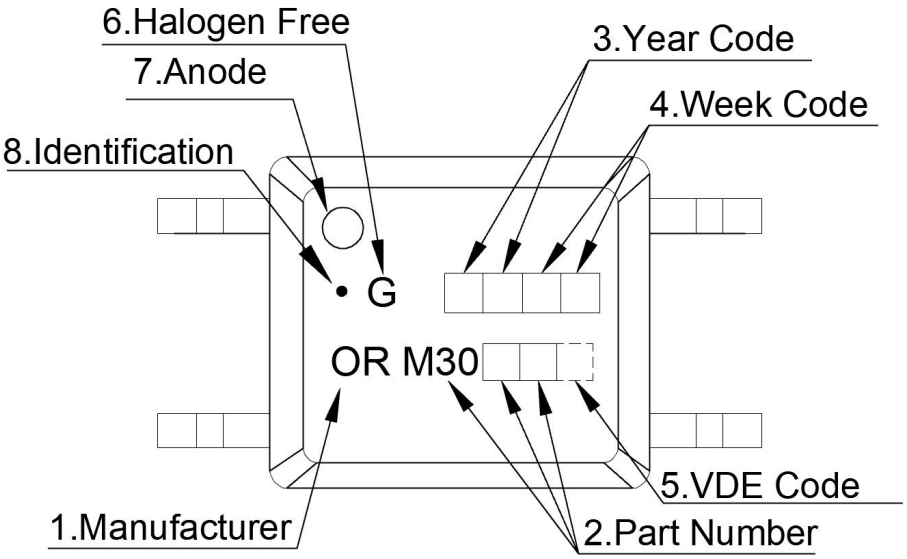
Y = 'V' code for VDE safety (This options is not necessary).

Z = 'G' code for Halogen free.

* VDE Code can be selected.

Option	Description	Packing quantity
TP	Surface mount lead form (low profile) + TP tape & reel option	3000 units per reel
TP1	Surface mount lead form (low profile) + TP1 tape & reel option	3000 units per reel

8. Naming Rule

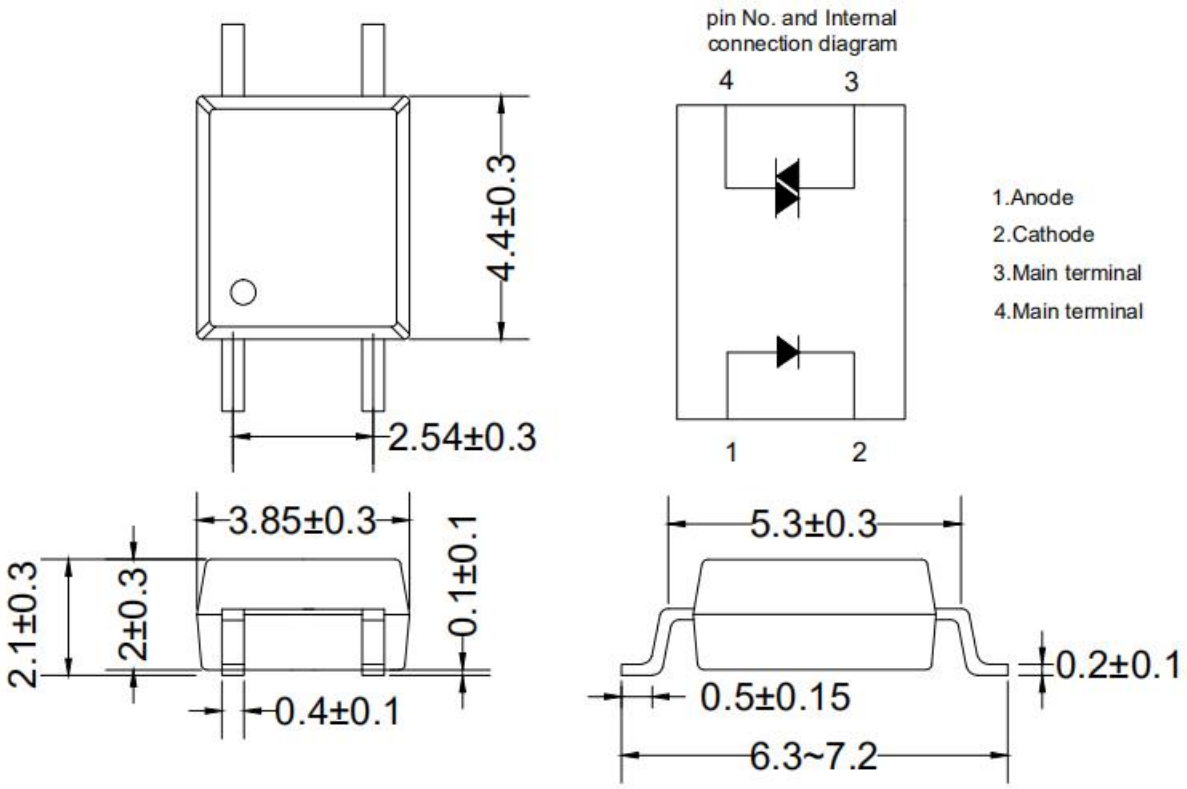


1. Manufacturer : ORIENT.
2. Part Number : M30□□.
3. Year Code □□ : '21' means '2021' and so on.
4. Week Code □□: 01 means the first week, 02 means the second week and so on.
5. VDE Code ⬚. (Optional)
6. HF Code 'G': Halogen Free.
7. Anode.
8. Identification.

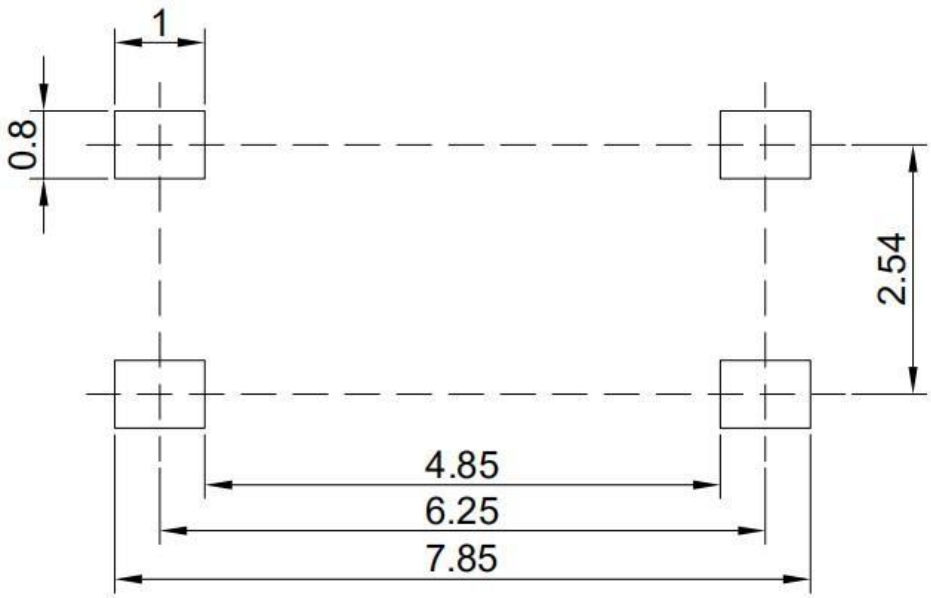
* VDE Code can be selected.

9. Package Dimension

OR-M30XX



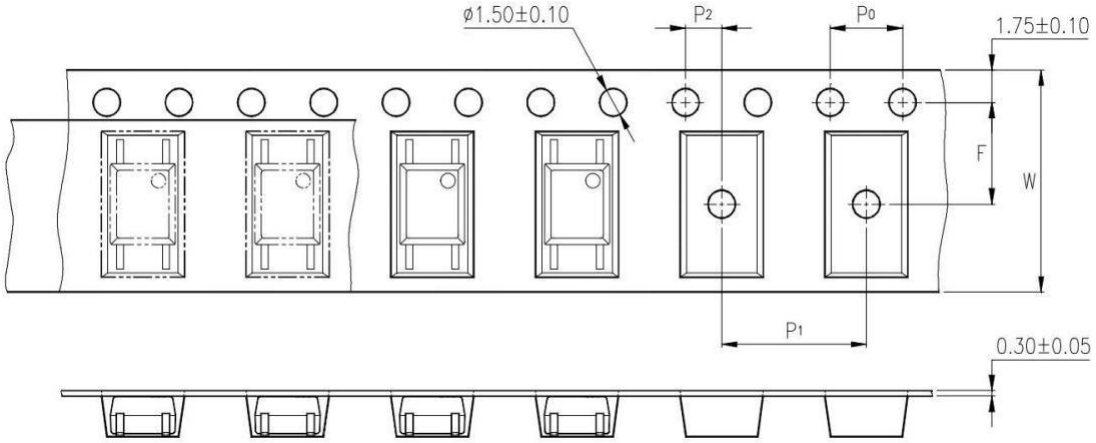
10. Recommended Foot Print Patterns (Mount Pad)



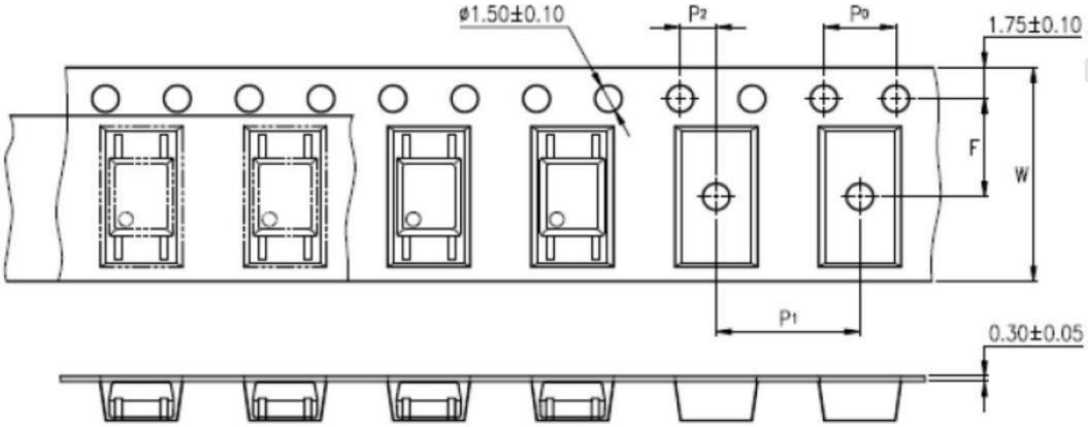
unit：mm

11. Taping Dimensions

(1)TP Type



(2)TP1 Type



Description	Symbol	Dimension in mm (inch)
Tape wide	W	12±0.3（0.472）
Pitch of sprocket holes	P0	4±0.1（0.157）
Distance of compartment	F	5.5±0.1（0.217）
	P2	2±0.1（0.079）
Distance of compartment to compartment	P1	8±0.1（0.315）

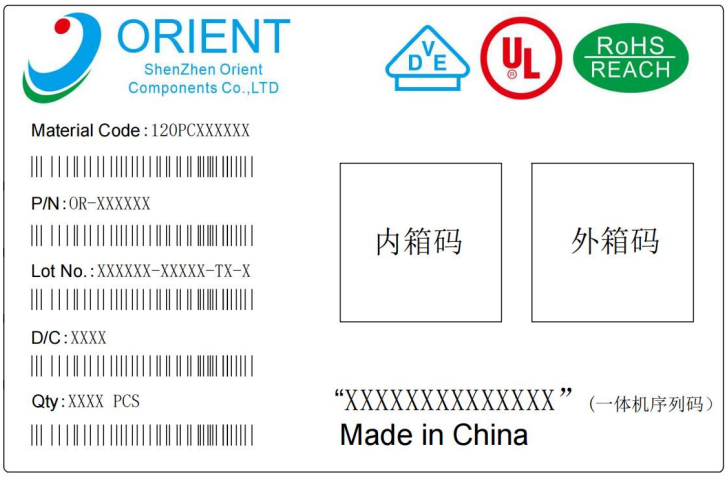
Package Type	TP/TP1
Quantities(pcs)	3000

12. Package Dimension

(1) package dimension

Packing Information	
Packing type	Reel type
Tape Width	12mm
Qty per Reel	3,000pcs
Small box (inner) Dimension	345*345*45mm
Large box (Outer) Dimension	480x360x360mm
Max qty per small box	6,000pcs
Max qty per large box	60,000pcs

(2)Packing Label Sample



Note:

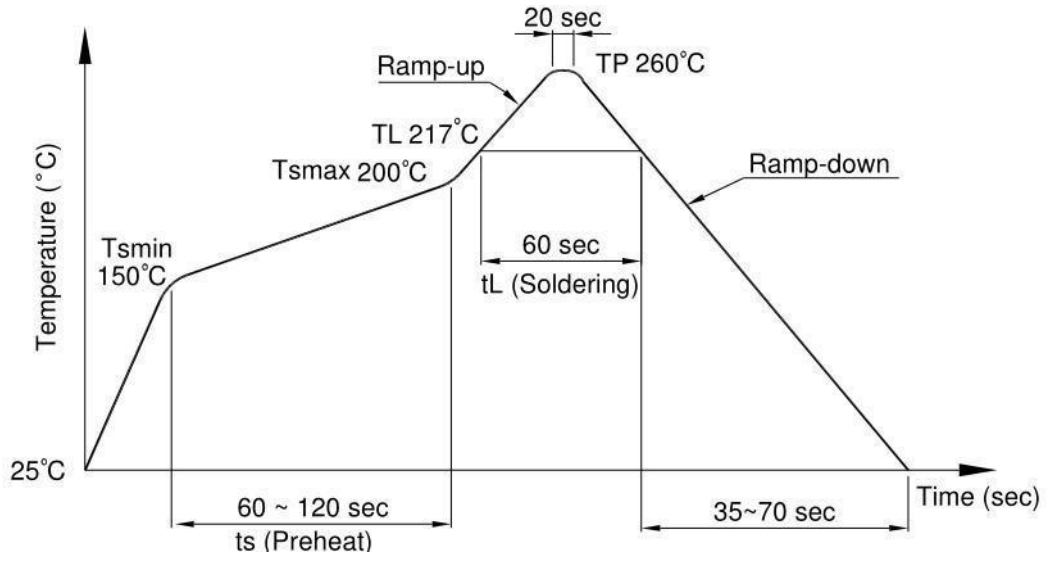
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

13. Temperature Profile Of Soldering

（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.

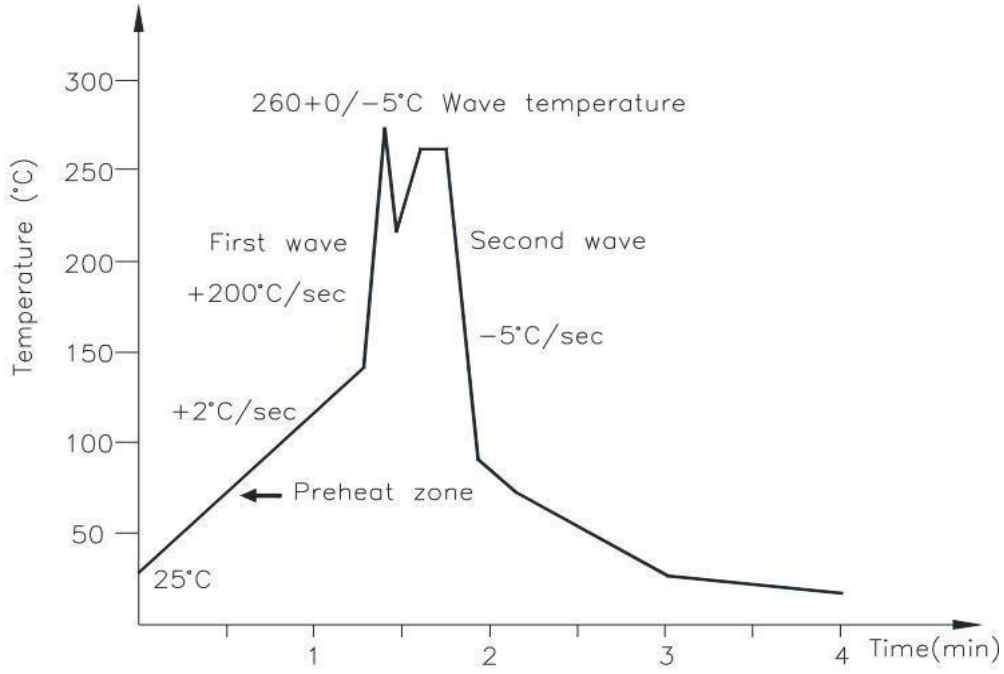
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	 150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	 217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature	3~6˚C / sec
Reflow times	≤3



（2）Wave soldering (JEDEC22A111 compliant)

One time soldering is recommended within the condition of temperature.

Temperature Time	260+0/-5˚C 10 sec
Preheat temperature Preheat time	5 to 140˚C 30 to 80 sec



（3）Hand soldering by soldering iron

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

Temperature Time	380+0/-5˚C 3 sec max

14. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

Fig.1 Forward current vs Ambient temperature

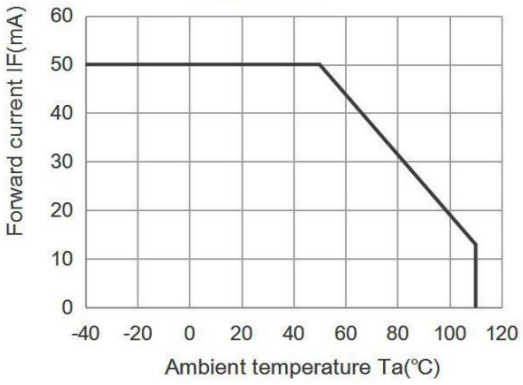


Fig.2 On-state current vs. Ambient temperature

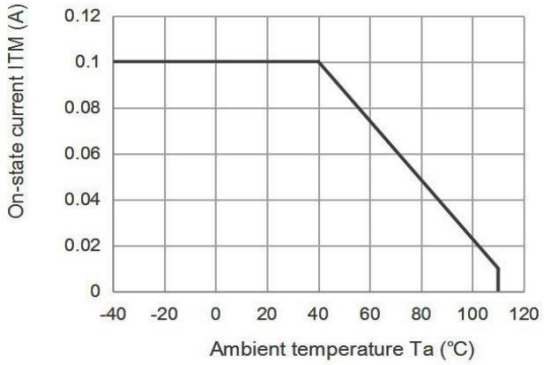


Fig.3 Minimun Trigger Current vs. Ambient temperature

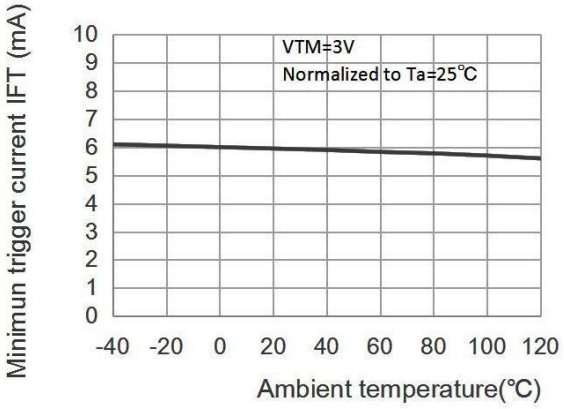


Fig.4 Forward current vs. Forward voltage

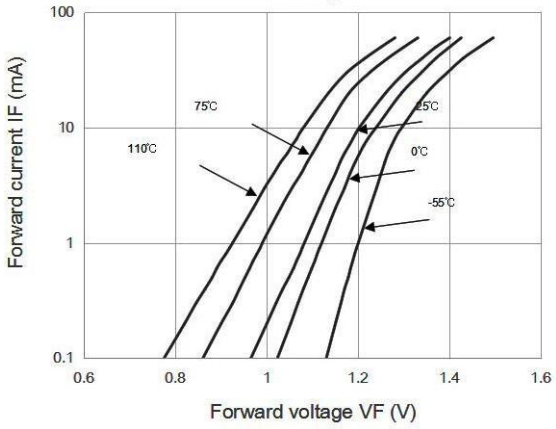


Fig.5 On-state voltage vs. Ambientn temperature

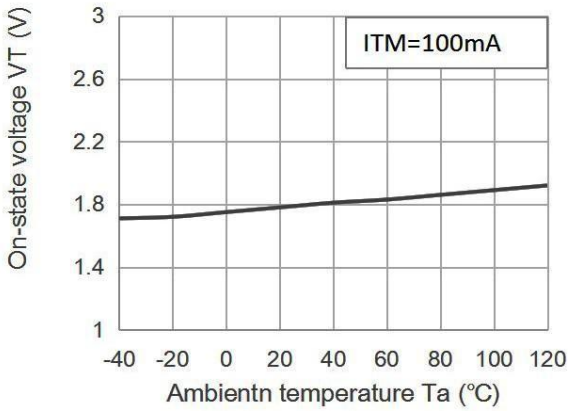


Fig.6 Holding current vs. Ambient temperature

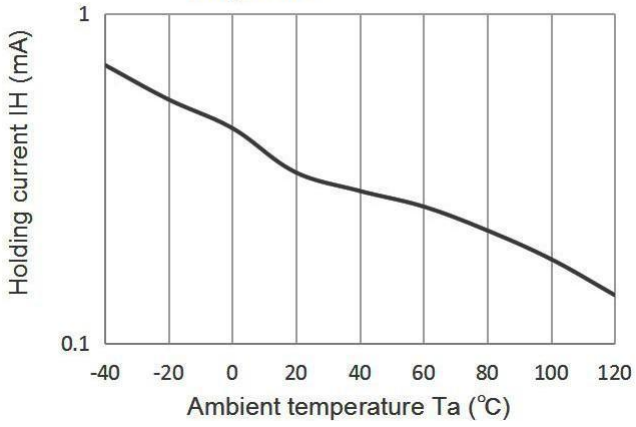


Fig.7 Repetitive peak off-state current vs. Temperature

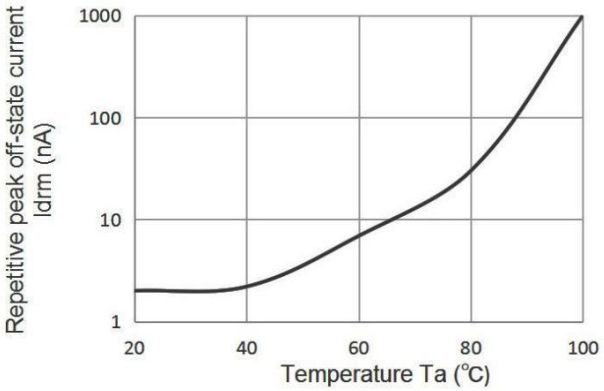


Fig.8 On-state current vs. On-state voltage

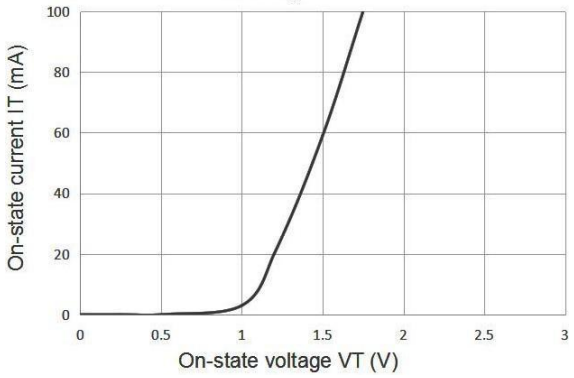


Fig9. Basic Operation Circuit Medium/High Power Triac Drive Circuit

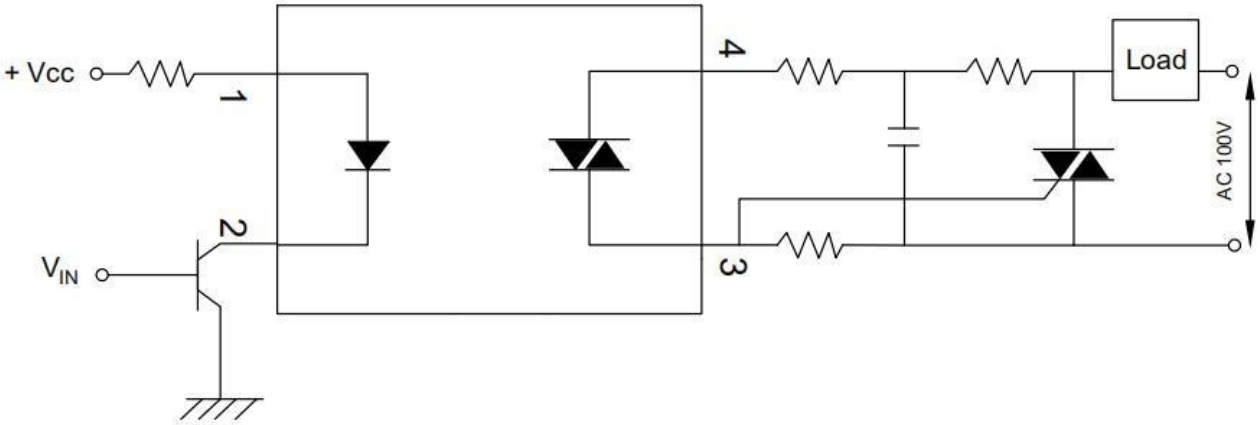
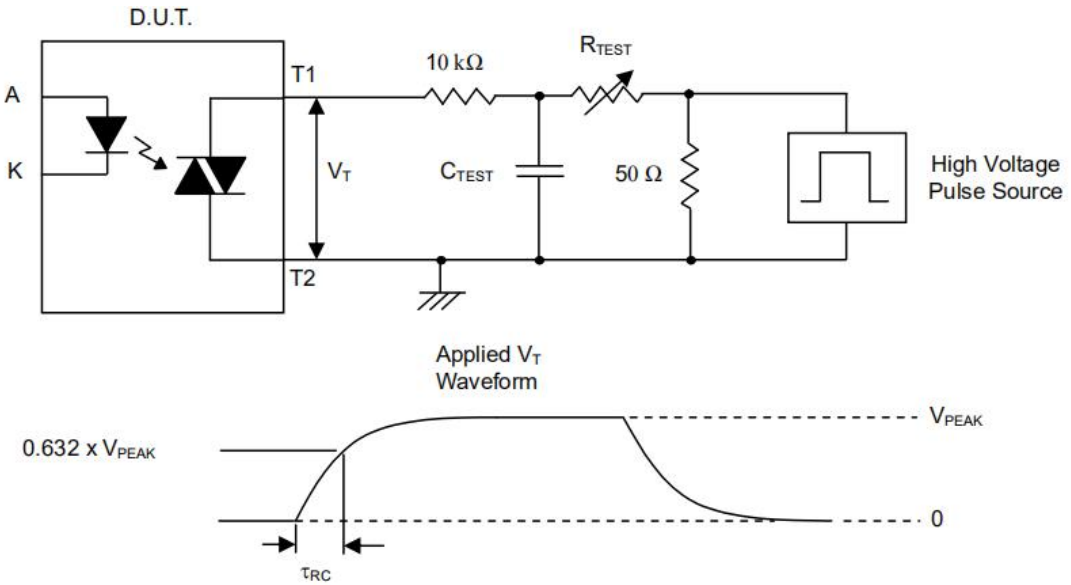


Fig10.Static dv/dt Test Circuit & Waveform



Measurement Method

The high voltage pulse is set to the required V_{PEAK} value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform V_T is monitored using a x100 scope probe. By varying R_{TEST}, the dv/dt (slope) is increased, until the D.U.T. is observed to trigger (waveform collapses). The dv/dt is then decreased until the D.U.T. stops triggering. At this point, τ_{RC} is recorded and the dv/dt calculated.

$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

For example, V_{PEAK} = 600V for EL306X series. The dv/dt value is calculated as follows:

$$dv/dt = \frac{0.63 \times 600}{\tau_{RC}} = \frac{378}{\tau_{RC}}$$

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