Random-Phase Triac Driver Output Optocoupler

1. Description

The UMW MOC302X series are optically coupled isolators consisting of a GaAs infrared emitting diode coupled with a light activated silicon bilateral switch, which functions like a triac.

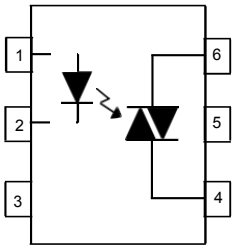
2. Features

- 400V peak blocking voltage
- High isolation voltage between input and output (Viso=5000Vms)
- Compact dual in-line package
- Pb free and RoHS compliant
- UL approved: UL1577, file No. E492440

3. Applications

- Solenoid/valve controls
- Lamp ballasts
- Static AC power switch
- Interfacing microprocessors to 115/240 Vac peripherals
- Incandescent lamp dimmers
- Temperature controls
- Motor controls

4. Schematic



Pin Configuration
1. Anode
2. Cathode
3. No Connection
4. Terminal
5. Substrate
(do not connect)
6. Terminal

5. Maximum Ratings

Parameter			Symbol	Value	Unit
Input	Forward current		I_F	60	mA
	Reverse voltage		V_R	6	V
	Power dissipation		P_D	100	mW
	Derating factor (above Ta=85°C)			3.8	mW/°C
Output	Off-state output terminal voltage	MOC302X	V_{DRM}	400	V
	Peak repetitive surge current (pw=100μs,120pps)		I_{TSM}	1	A
	On-state R.M.S. current		$I_{T(RMS)}$	100	mA
	Power dissipation		P_C	300	mW
	Derating factor (above Ta=85°C)			7.4	mW/°C
Total power dissipation			Ptot	330	mW
Isolation voltage *			Viso	5000	Vrms
Operating temperature			Topr	-55~+100	°C
Storage temperature			Tstg	-55~+125	°C
Welding temperature (10s)			Tsol	260	°C

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

6. Electrical characteristics (T_A=25°C unless otherwise specified)

Parameter			Symbol	Conditions	Min	Typ	Max	Unit
Input	Forward voltage		V_F	I_F=20mA	-	1.18	1.5	V
	Reverse current		I_R	V_R=6V	-	-	10	μA
Output	Peak off-state current		I_{DRM}	V_{DRM} =rated V_{DRM}, I_F = 0mA	-	-	100	nA
	On-state voltage		V_{TM}	I_{TM}=100mA peak, I_F=rated I_{FT}	-	-	2.5	V
	Critical rate of rise of off–state voltage	MOC302X	dv/dt	V_{PEAK} = rated V_{DRM}, I_F=0	-	100	-	V/μs
Transfer characteristics	LED trigger current	MOC3020	I_{FT}	Main terminal voltage = 3V	-	-	30	mA
		MOC3021			-	-	15	
		MOC3022			-	-	10	
		MOC3023			-	-	5	
	Holding current		I_H		-	250	-	μA

7. Typical Performance Curves

Figure 1 LED forward voltage vs forward current

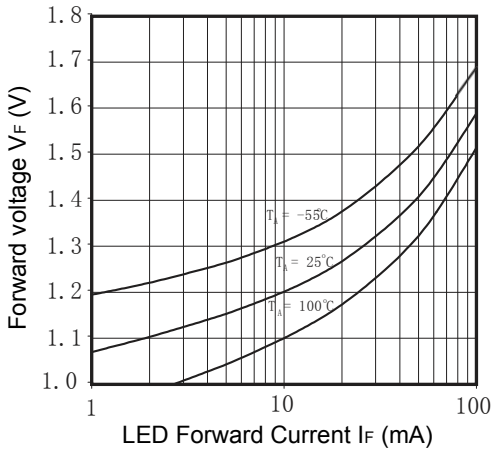


Figure 2 On-state characteristics

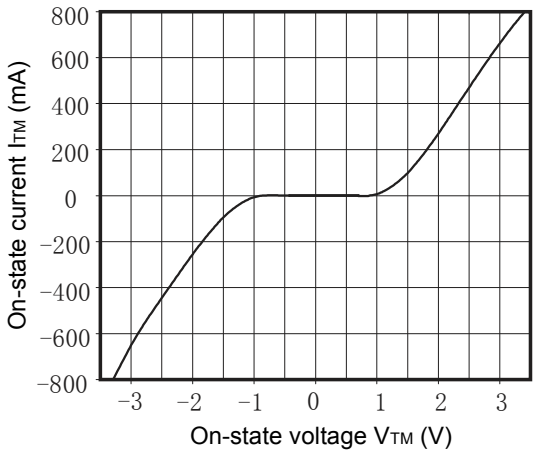


Figure 3 LED trigger current vs ambient temperature

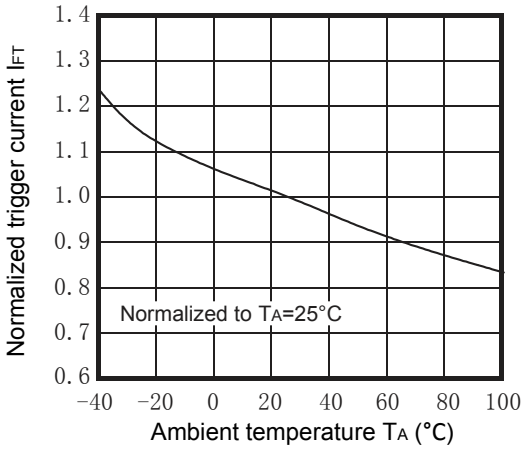


Figure 4 LED trigger current vs. LED pulse width

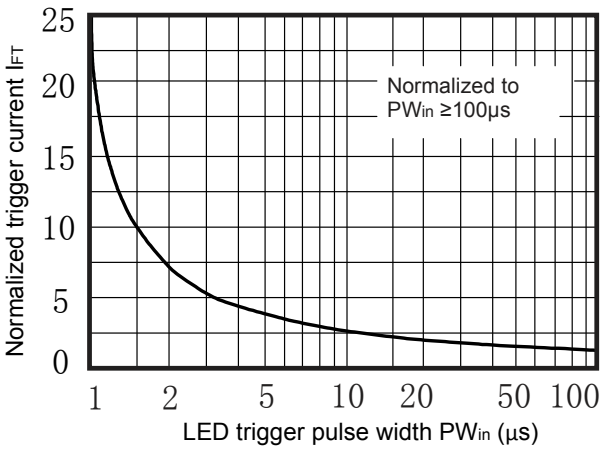


Figure 5 Holding current vs ambient temperature

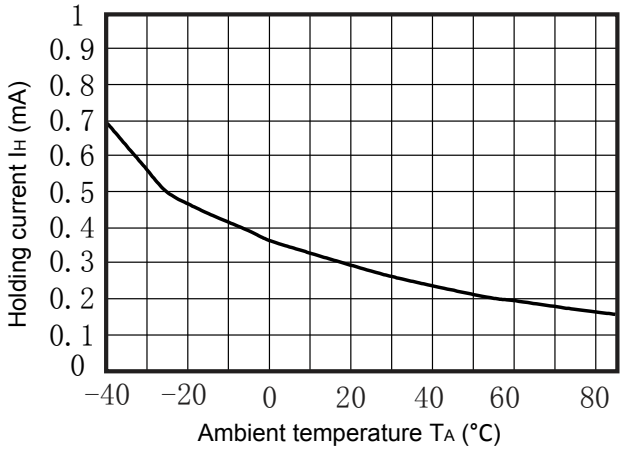


Figure 6 Leakage current vs ambient temperature

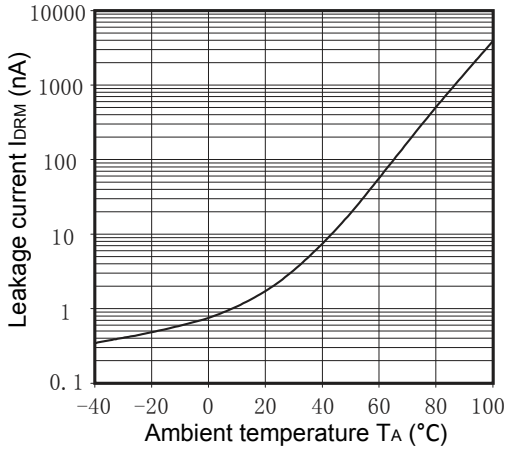
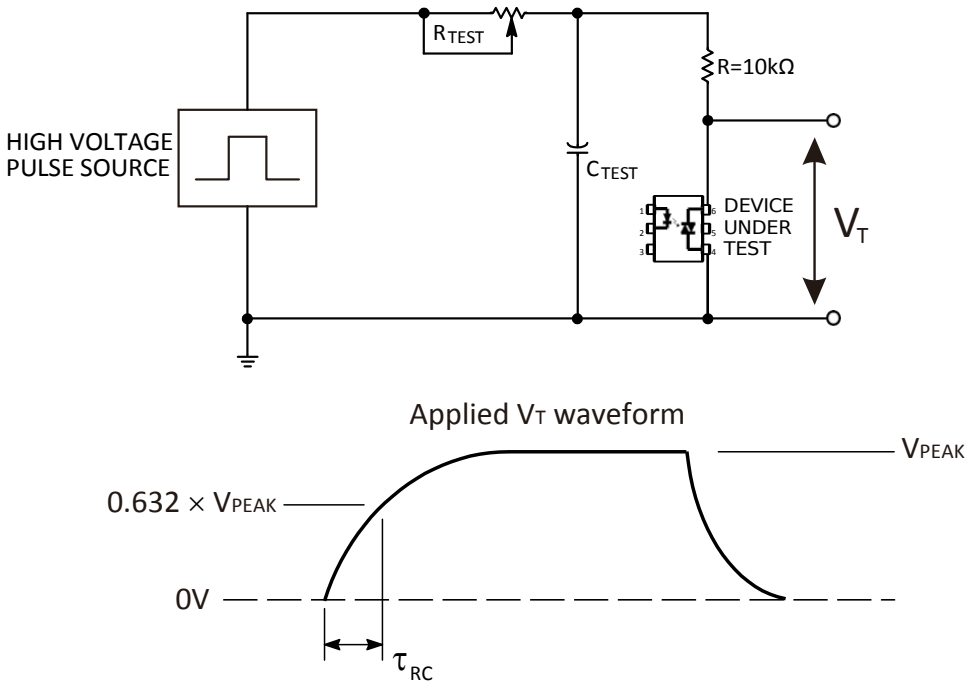


Figure 7 LED Static dv/dt test circuit & waveform



The high voltage pulse is set to the required V_{PEAK} value and applied to the output terminal of the device under test 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 device under test is observed to trigger (waveform collapses). The dv/dt is then decreased until the device under test stops triggering. At this point τ_{RC} is recorded and the dv/dt calculated.

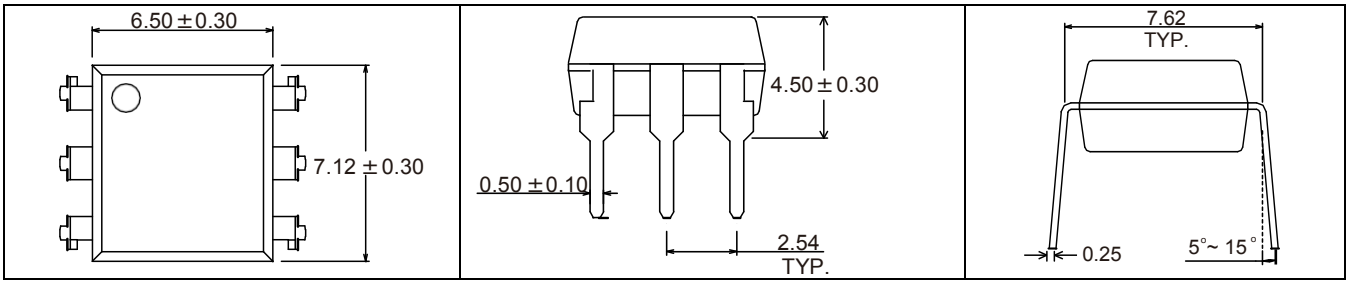
$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

For example, V_{PEAK} = 400V for MOC302X series. The dv/dt value is calculated as follows:

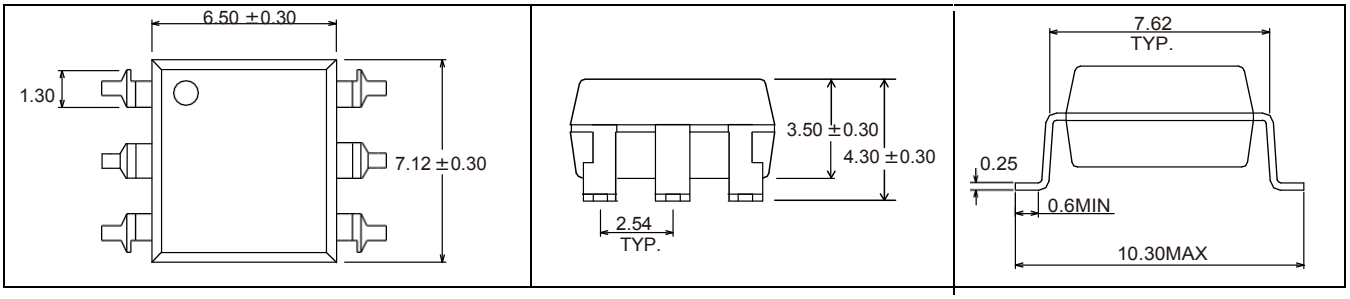
$$dv/dt = \frac{0.632 \times 400}{\tau_{RC}} = \frac{252}{\tau_{RC}}$$

8. Package dimensions

Unit: mm

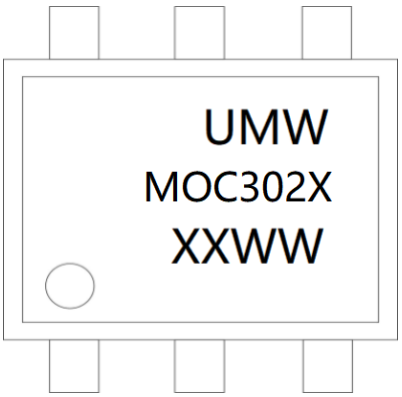


6-pin DIP



6-pin SOP

9. Marking information



- "X" in the second line represents I_{FT}: 0/1/2/3
- "XX" in the third line represents year code
- "WW" in the third line represents week code

10. Ordering information

Part number	Package	Minimum packing quantity	Packing
UMW MOC302XM	DIP-6	3250	box
UMW MOC302XS	SOP-6	1000	reel

■ SOP-6 Tape & Reel Packing Specifications

1) Schematic diagram