



QTM303X/ QTM304X/ QTM306X/ QTM308X series

4-PIN Mini-Flat
ZERO-PHASE TRIAC OPTOCOUPLER

QT-Brightek Optocoupler Series

ZERO-PHASE TRIAC OPTOCOUPLER

Part No.: QTM303X/ QTM304X/ QTM306X/ QTM308X series

Product: QTM303X/ QTM304X/ QTM306X/ QTM308X series	Date: February 08, 2018	Page 1 of 16
	Version# 1.0	



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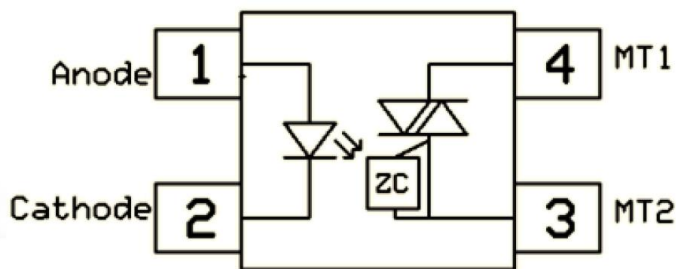
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Introduction

Feature:

- High Isolation voltage between input and output (Viso = 3750V rms)
- Peak Breakdown Voltage
 - 250V – QTM3031, 3032, 3033
 - 400V – QTM3041, 30422, 3043
 - 600V – QTM3061, 3062, 3063
 - 800V – QTM3081, 3082, 3083
- Operating Temperature up to 100 °C

Schematic:

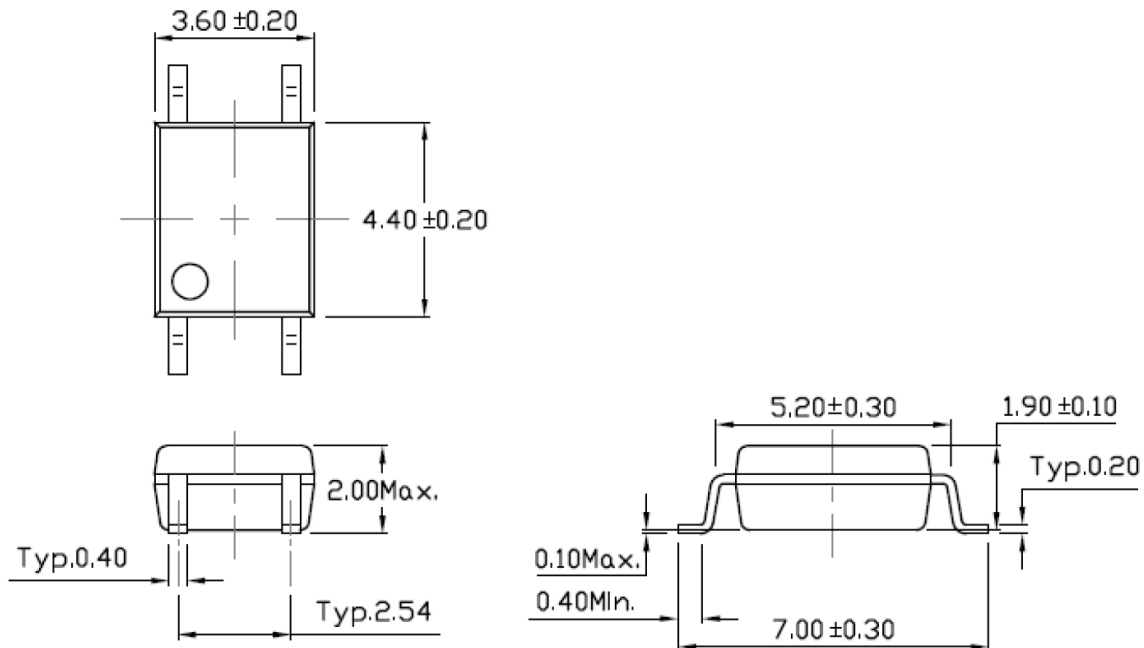


Certification & Compliance:

- Pb free and RoHS Compliant
- UL recognized (File #E338132)
- VDE (Pending Approval)



Dimension: (Dot location indicates pin 1)



All Dimensions are in mm

Absolute Maximum Rating

Symbol	Parameter		Rating			Units
			Q301X series	Q302X series	Q305X series	
T _{STG}	Storage Temperature		-55 ~ 150			°C
T _{OPR}	Operating Temperature		-55 ~ 100			°C
T _{SOL}	Lead Solder Temperature		260 for 10 sec			°C
P _{TOT}	Total Power Dissipation		200			mW
EMITTER						
I _F	Continuous Forward Current		60			mA
I _{FP}	Peak Forward Current (≤ 1us, 300pps)		1			A
V _R	Reverse Voltage		6			V
P _D	Power Dissipation		100			mW
DETECTOR						
P _D	Power Dissipation		300			mW
V _{DRM}		Q303X series	250			V
	Off-state Output Terminal Voltage	Q304X series	400			
		Q306X series	600			
		Q308X series	800			
I _{TSM}	Peak Repetitive Surge Current		1			A

Electrical Characteristic ($T_A=25\text{ }^{\circ}\text{C}$)

Emitter

Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
V_F	Forward Voltage	$I_F = 10\text{mA}$	-	-	1.5	V
I_R	Reverse Current	$V_R = 6\text{V}$	-	-	5	μA
C_{IN}	Input Capacitance	$f = 1\text{kHz}$	-	45	-	pF

Detector

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I_{DRM1}	Peak Blocking Current	QTM303X/ QTM304X Series	$V_{DRM} = \text{Rated } V_{DRM},$ $I_F = 0\text{mA}$	-	-	100	nA
		QTM306X/ QTM308X Series		-	-	500	
I_{DRM2}	Inhibit Leakage Current		$I_F = \text{Rated } I_{FT}, V_{DRM} = \text{Rated } V_{DRM}$	-	-	500	μA
V_{INH}	Inhibit Voltage		$I_F = \text{Rated } I_{FT}$	-	-	20	V
V_{TM}	Peak on-state voltage		$I_{TM} = 100\text{mA peak},$ $I_F = \text{Rated } I_{FT}$	-	-	3	V
dv/dt	Critical Rate of Rise off-state voltage	QTM303X series	$V_{PEAK} = \text{Rated } V_{DRM}, I_F = 0$ (refer to test circuit for dv/dt)	1000	-	-	V/ μs
		QTM304X series					
		QTM306X series					
		QTM308X series	$V_{PEAK} = \text{Rated } V_{DRM},$ $I_F = 0$ (refer to test circuit for dv/dt)	600	-	-	

Transfer Characteristic

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I _{FT}	LED Trigger Current	QTM3031	Main terminal voltage = 3V, I _{TM} =100mA	-	-	15	mA
		QTM3041		-	-		
		QTM3061		-	-		
		QTM3081		-	-		
		QTM3032		-	-	10	
		QTM3042		-	-		
		QTM3062		-	-		
		QTM3082		-	-		
		QTM3033		-	-	5	
		QTM3043		-	-		
		QTM3063		-	-		
		QTM3083		-	-		
I _H	Holding Current		-	250	-	μA	
R _{IO}	Isolation Resistance		V _{IO} =500V _{DC}	1x10 ¹¹	-	-	Ω
C _{IO}	Isolation Capacitance		F=1MHz	-	0.25	-	pF

Characteristic Curves

QTM303X/ QTM304X

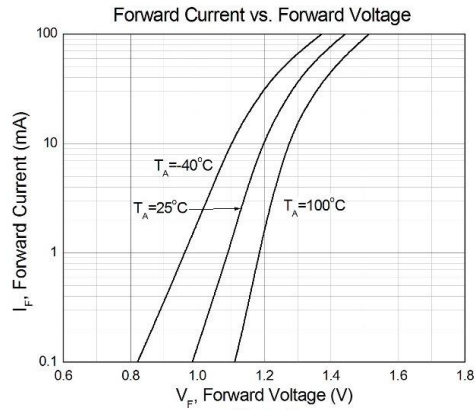


Figure 1

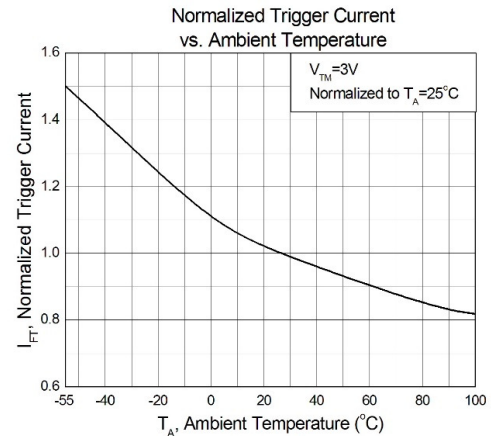


Figure 2

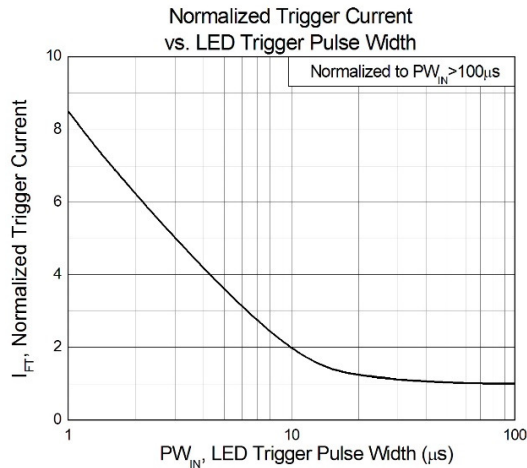


Figure 3

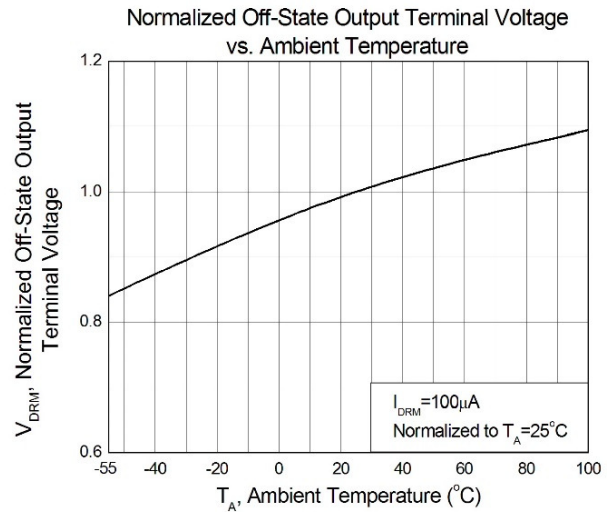


Figure 4

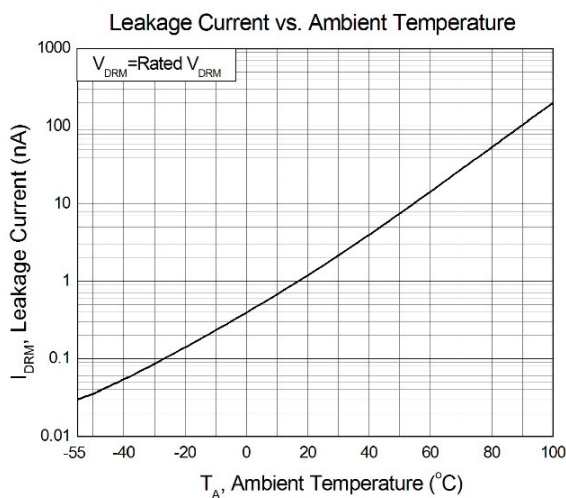


Figure 5

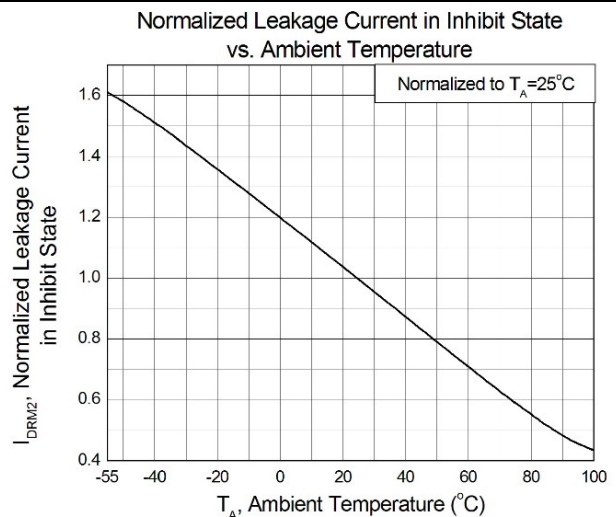


Figure 6

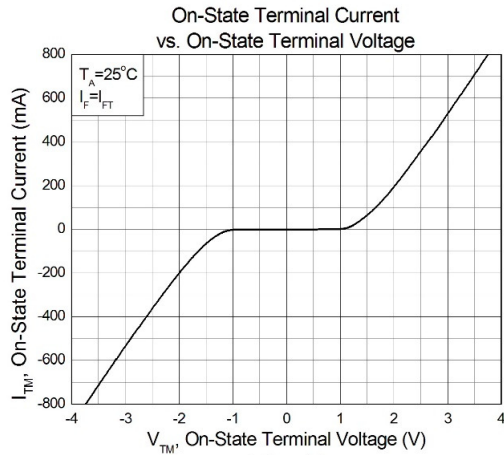


Figure 7

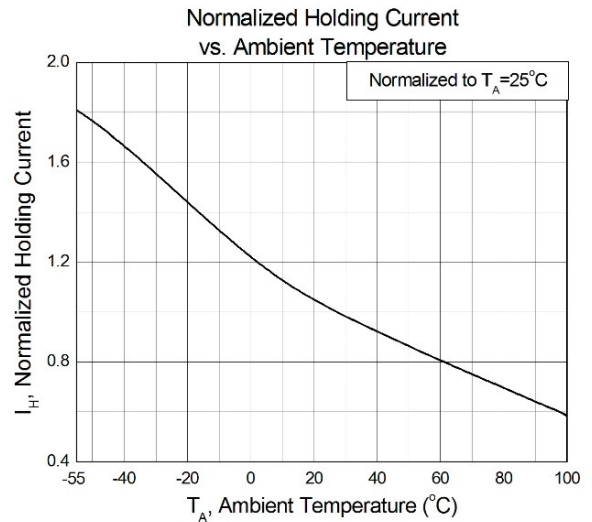


Figure 8

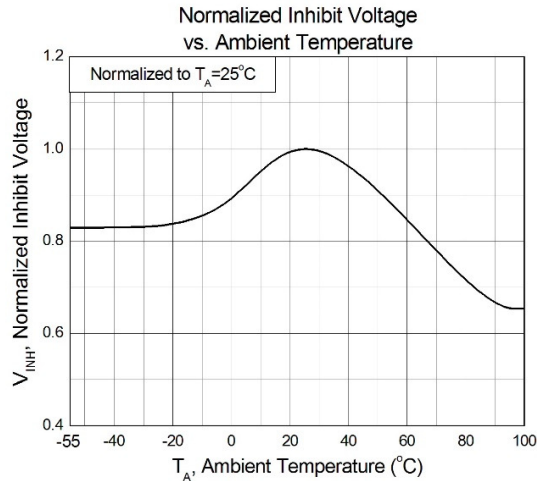


Figure 9

QTM306X/ QTM308X

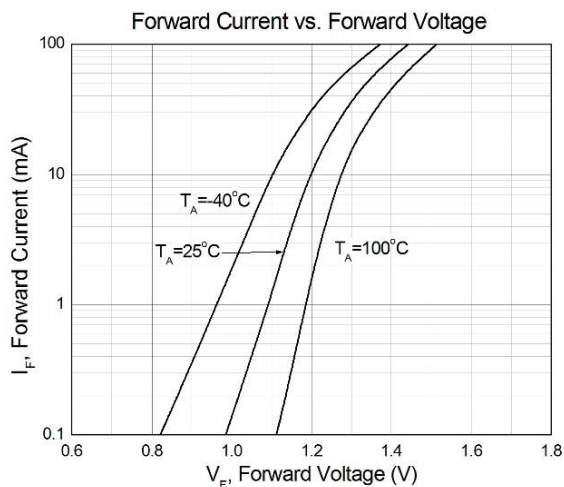


Figure 1

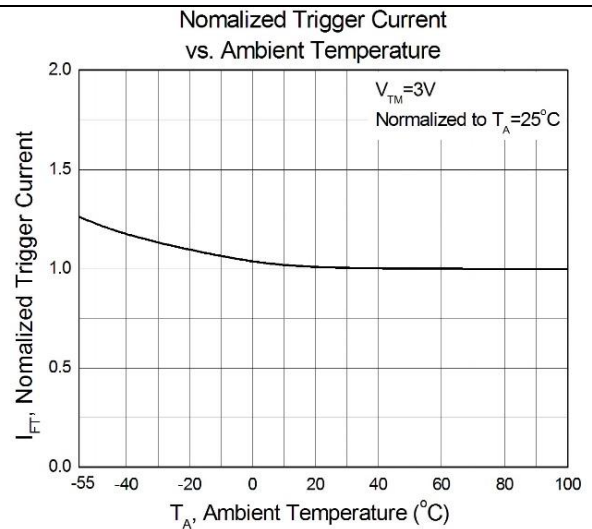


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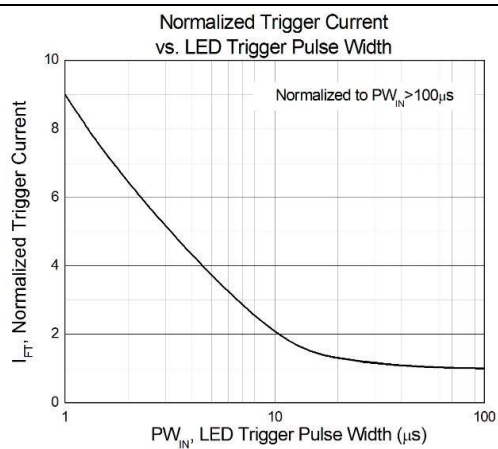


Figure 3

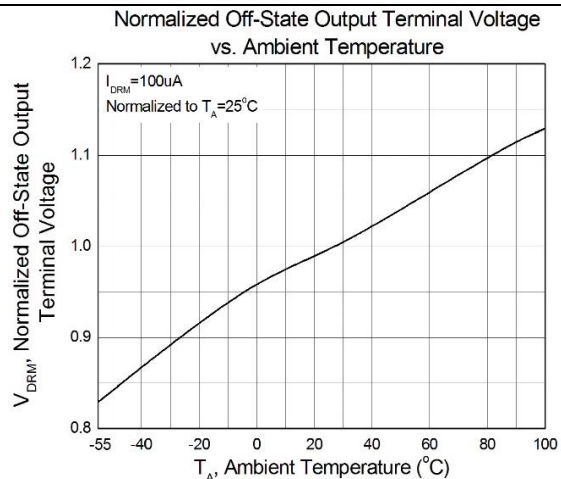


Figure 4

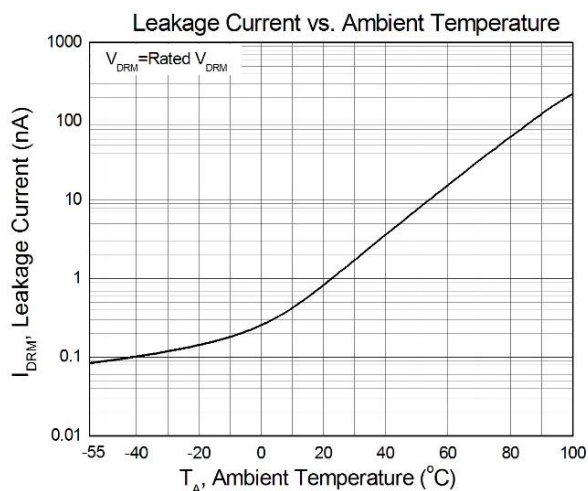


Figure 5

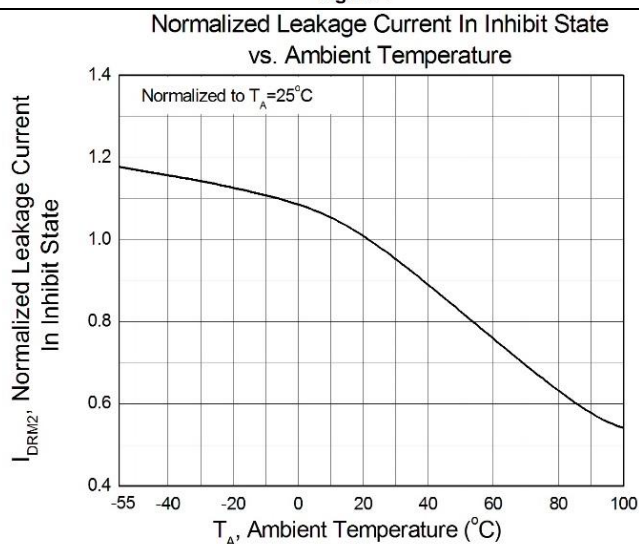


Figure 6

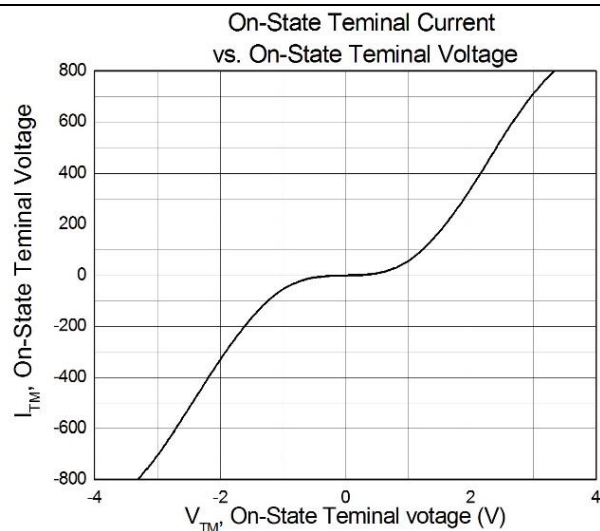


Figure 7

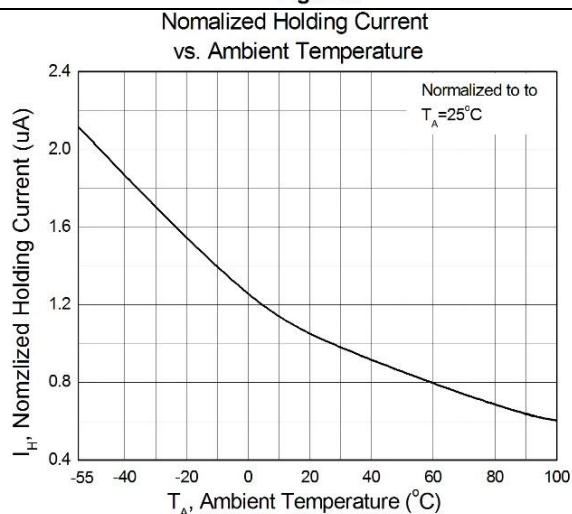
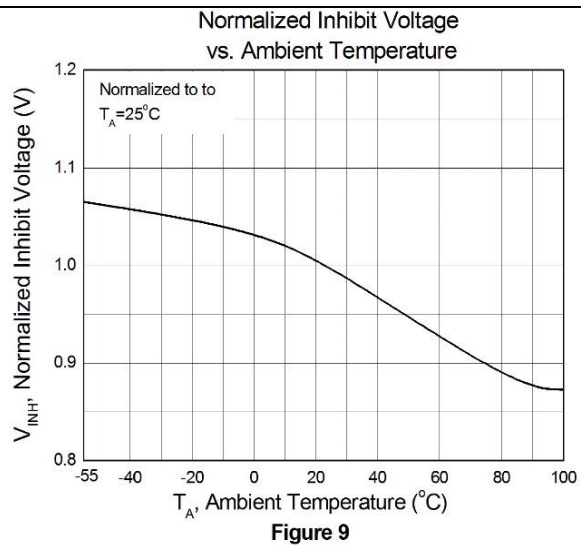
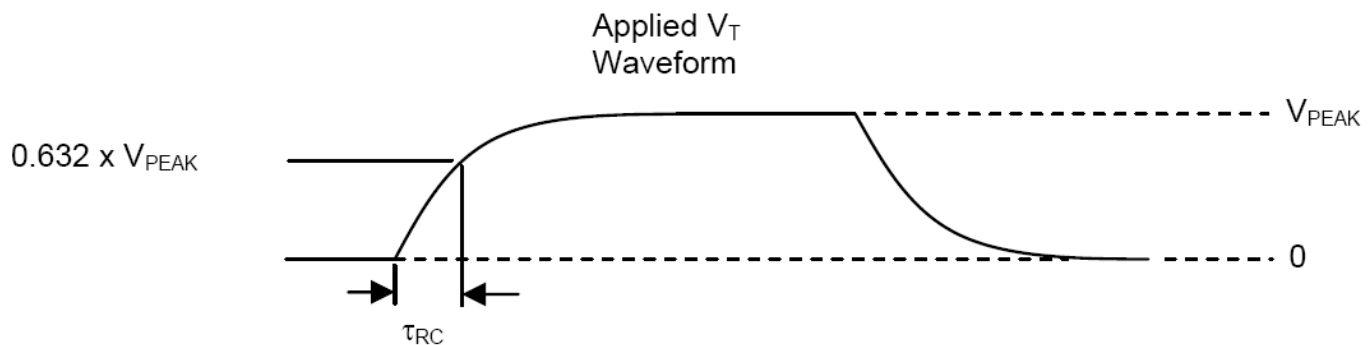
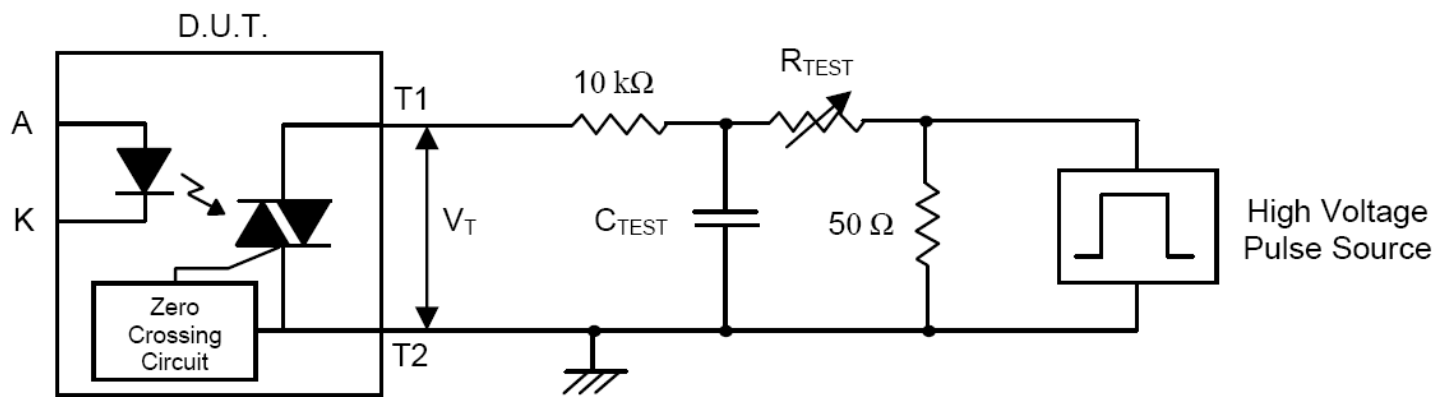


Figure 8



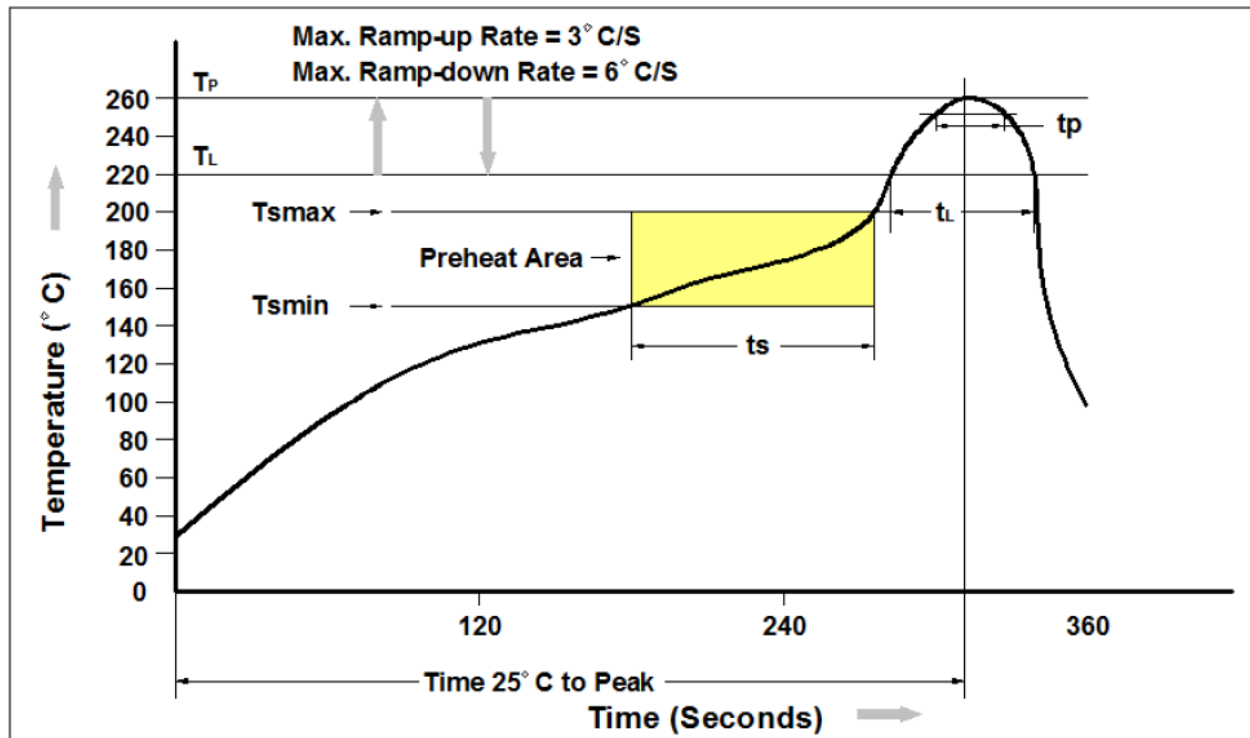
Test Circuit for static dv/dt



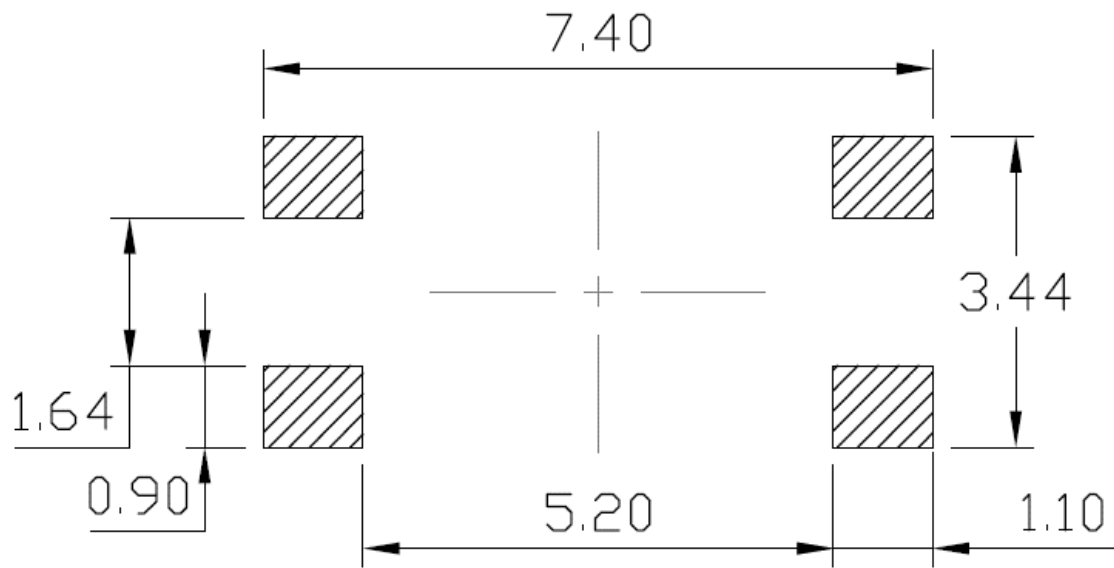
The high voltage pulse is set to the required V_{PEAK} value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform V_T is monitored using a x100 scope probe. By varying R_{TEST} , the dv/dt (slope) is increased, until the D.U.T. is observed to trigger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

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

Solder Profile & Footprint



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	150 °C
Temperature Max. (T_{smax})	200 °C
Time (t_s) from (T_{smin} to T_{smax})	60-120 seconds
Ramp-up Rate (t_L to t_P)	3 °C/second max.
Liquidous Temperature (T_L)	217 °C
Time (t_L) Maintained Above (T_L)	60 – 150 seconds
Peak Body Package Temperature	260 °C +0 °C / -5 °C
Time (t_P) within 5 °C of 260 °C	30 seconds
Ramp-down Rate (T_P to T_L)	6 °C/second max
Time 25 °C to Peak Temperature	8 minutes max.



Recommended Solder Footprint for SMD Leadform

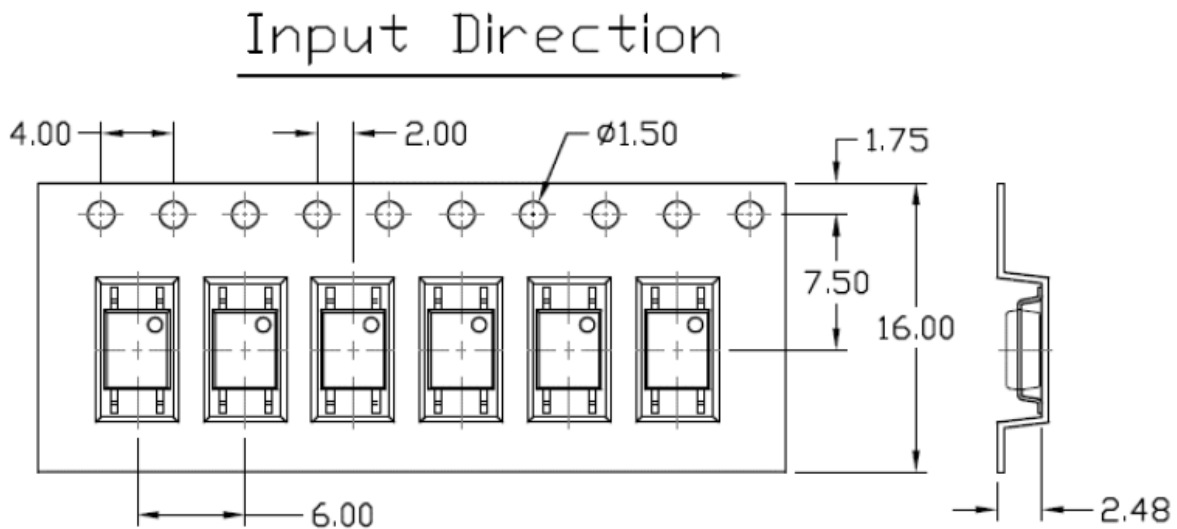
Units: mm

tolerance: +/- 0.1mm

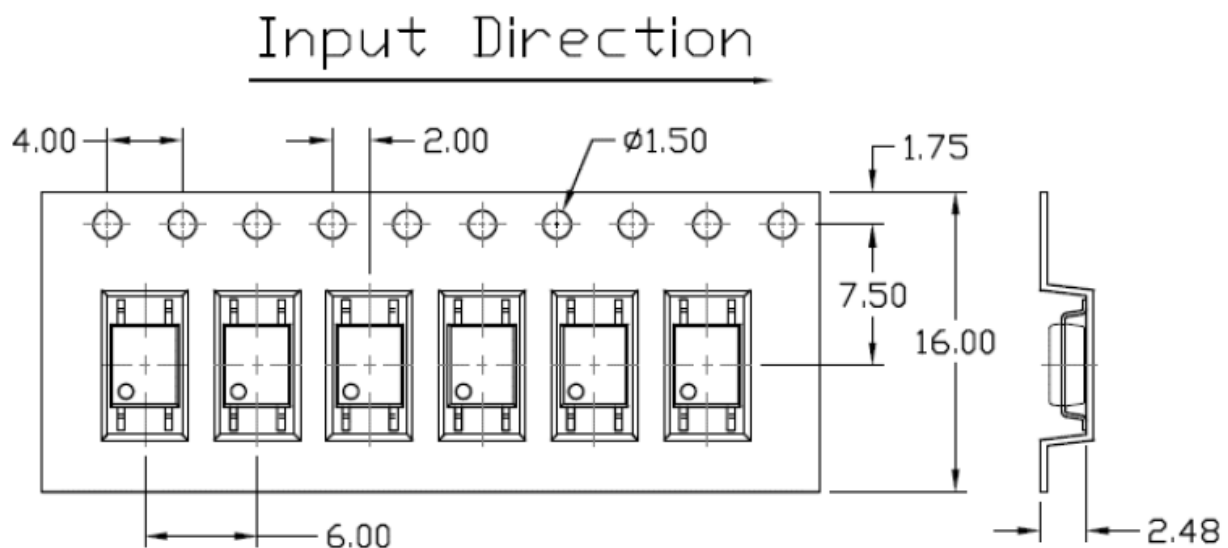
Packing & Labeling

Tape Dimension:

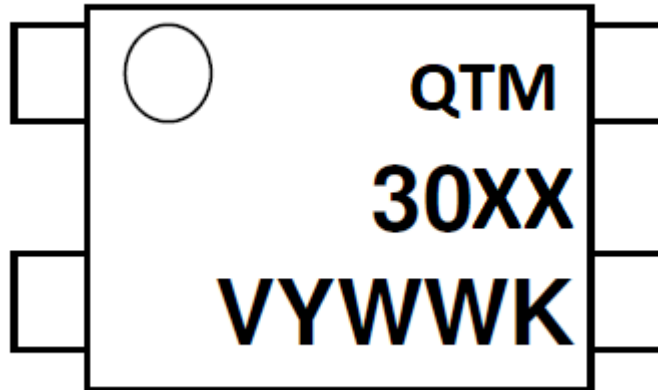
Option T1



Option T2



Unit: mm

Device Marking:

QT = QT-Brightek Corporation
M= Mini-Flat Package
30XX = part number
R= CTR Rank
Y = Year
WW = Week
V = VDE Option
K= Manufacturing code

Ordering Information

QTM30XX(V)(Z)

XX = Part number (X=31, 32, 33, 41, 42, 43, 61, 62, 63, 81, 82, or 83)

V = VDE option (V or None)

Z = Tape and reel option (T1 or T2)

Option	Description	Quantity
T1	Surface Mount Lead Forming – with Option 1 Taping	3000 pcs/ reel
T2	Surface Mount Lead Forming – with Option 2 Taping	3000 pcs/ reel



Revision History

Description:	Revision #	Revision Date
Initial of QTM302X /QTM304X/QTM306X/ QTM308X series	1.0	02/08/2018

Disclaimer

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.