



QT-Brightek Optocoupler Series

RANDOM-PHASE TRIAC OPTOCOUPLER

Part No.: QTM301X/ QTM302X/ QTM305X series

Product: QTM301X/ QTM302X/ QTM305X series	Date: February 08, 2018	Page 1 of 12
	Version# 1.0	



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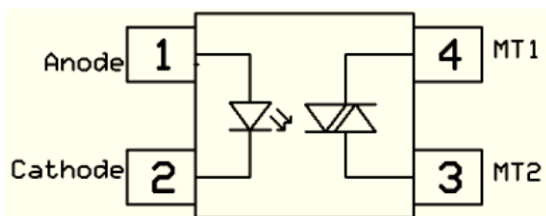
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Introduction

Feature:

- High Isolation voltage between input and output (Viso = 3750V rms)
- Peak Breakdown Voltage
 - 250V – QTM3010, 3011, 3012
 - 400V – QTM3020, 3021, 3022, 3023
 - 600V – QTM3051, 3052, 3053
- Operating Temperature up to 100 °C
- Conventional black housing package

Schematic:

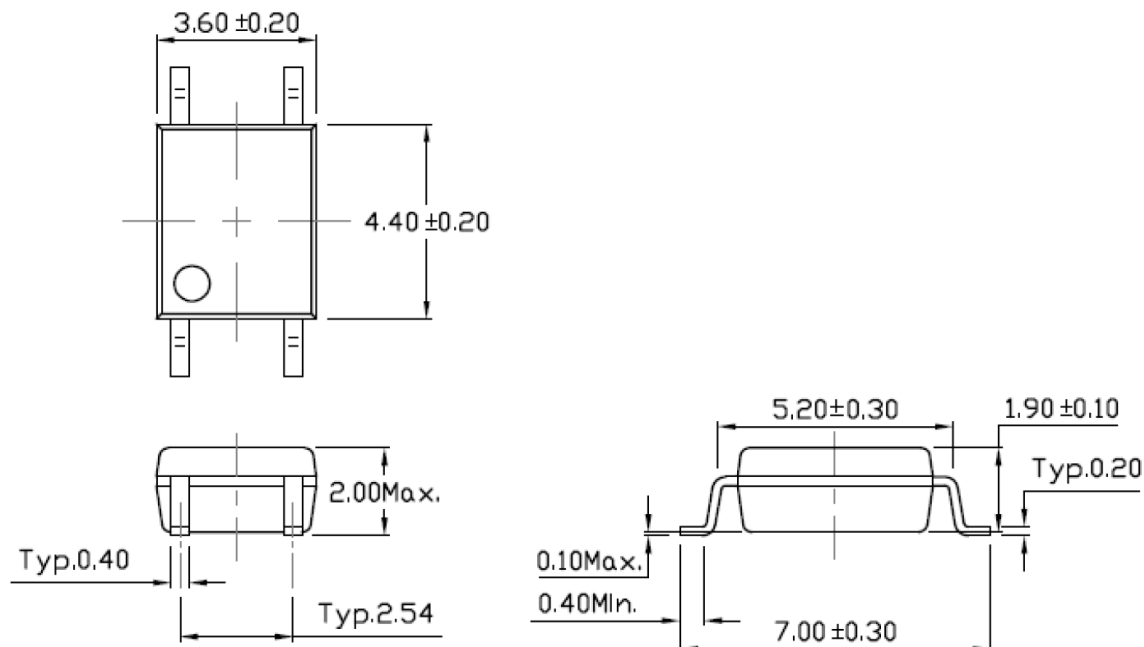


Certification & Compliance:

- 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 ~ 125			°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
	Power Dissipation Derated above 25 °C		4			mW/°C
V _{DRM}		Q301X series	250			V
	Off-state Output Terminal Voltage		Q302X series	400		
		Q305X series	600			
I _{TSM}	Peak Repetitive Surge Current		1			A

Electrical Characteristic (T_A=25 °C)

Emitter

Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
V _F	Forward Voltage	I _F = 10mA	-	-	1.5	V
I _R	Reverse Current	V _R = 6V	-	-	5	μA
C _{IN}	Input Capacitance	f = 1kHz	-	45	-	pF

Detector

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I _{DRM}	Peak Blocking Current		V _{DRM} = Rated V _{DRM} , I _F = 0mA	-	-	100	nA
V _{TM}	Peak on-state voltage		I _{TM} = 100mA peak, I _F = Rated I _{FT}	-	-	2.5	V
dv/dt	Critical Rate of Rise off-state voltage	QTM301X series	V _{PEAK} = Rated V _{DRM} , I _F = 0 (refer to test circuit for dv/dt)	-	100	-	V/ μs
		QTM302X series		-	100	-	
		QTM305X series	V _{PEAK} = 600V, I _F = 0 (refer to test circuit for dv/dt)	1000	-	-	

Transfer Characteristic

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I _{FT}	LED Trigger Current	QTM3020	Main terminal voltage = 3V	-	-	30	mA
		QTM3010		-	-	15	
		QTM3021		-	-		
		QTM3051		-	-		
		QTM3011		-	-		
		QTM3022		-	-	5	
		QTM3052		-	-		
		QTM3012		-	-		
		QTM3023		-	-		
		QTM3053		-	-		
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

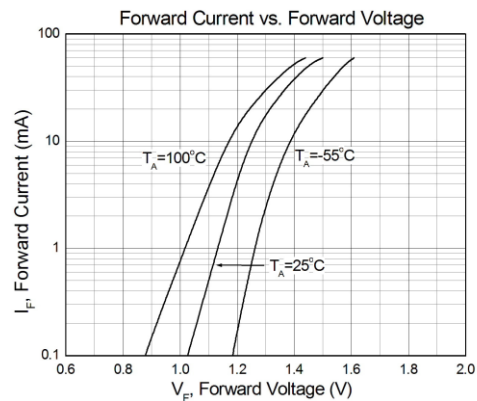


Figure 1

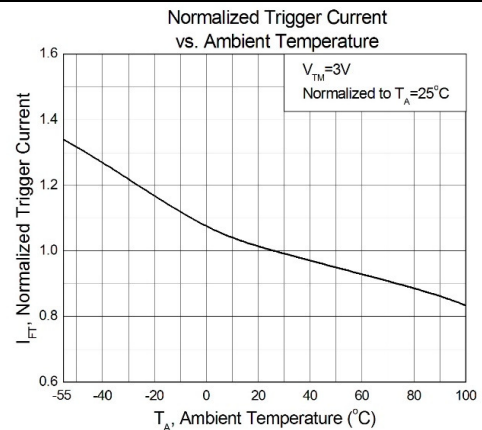


Figure 2

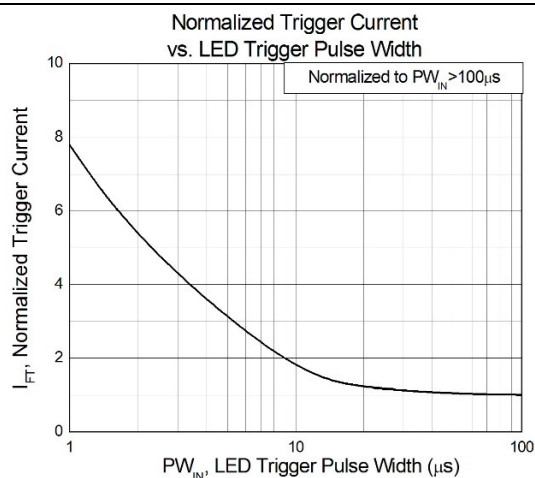


Figure 3

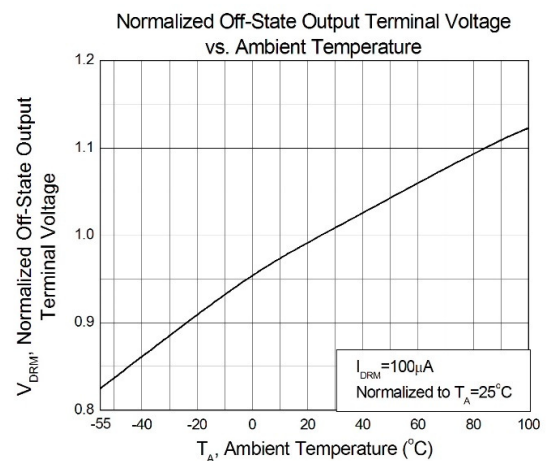


Figure 4

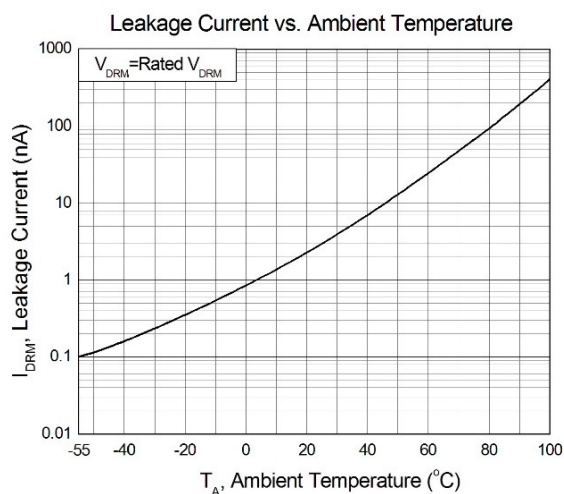


Figure 5

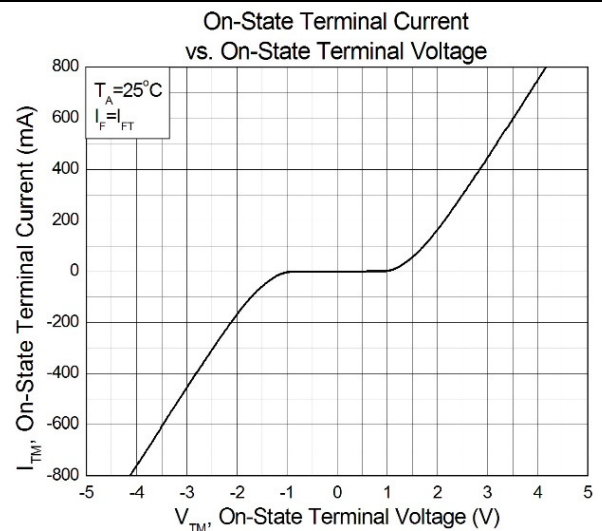


Figure 6

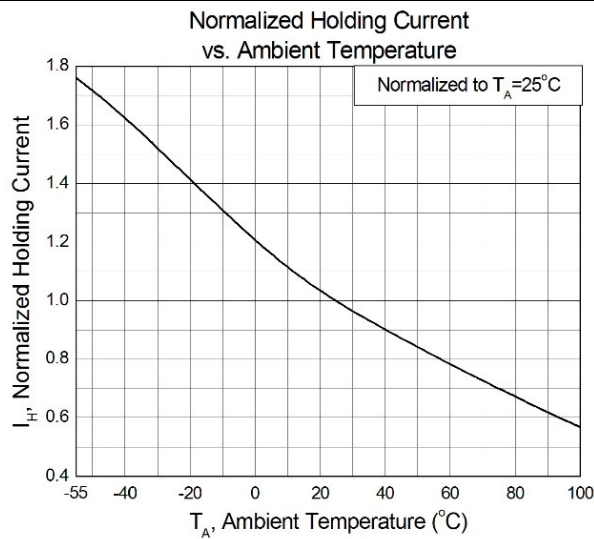
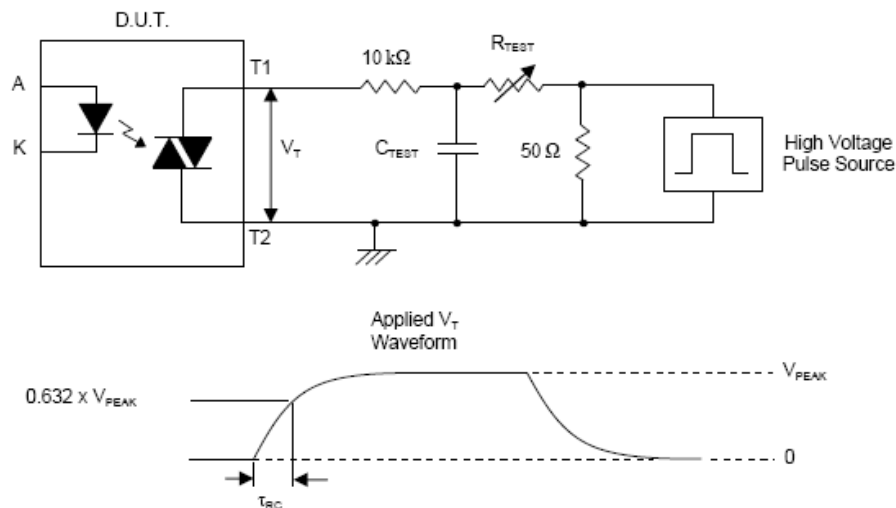


Figure 7

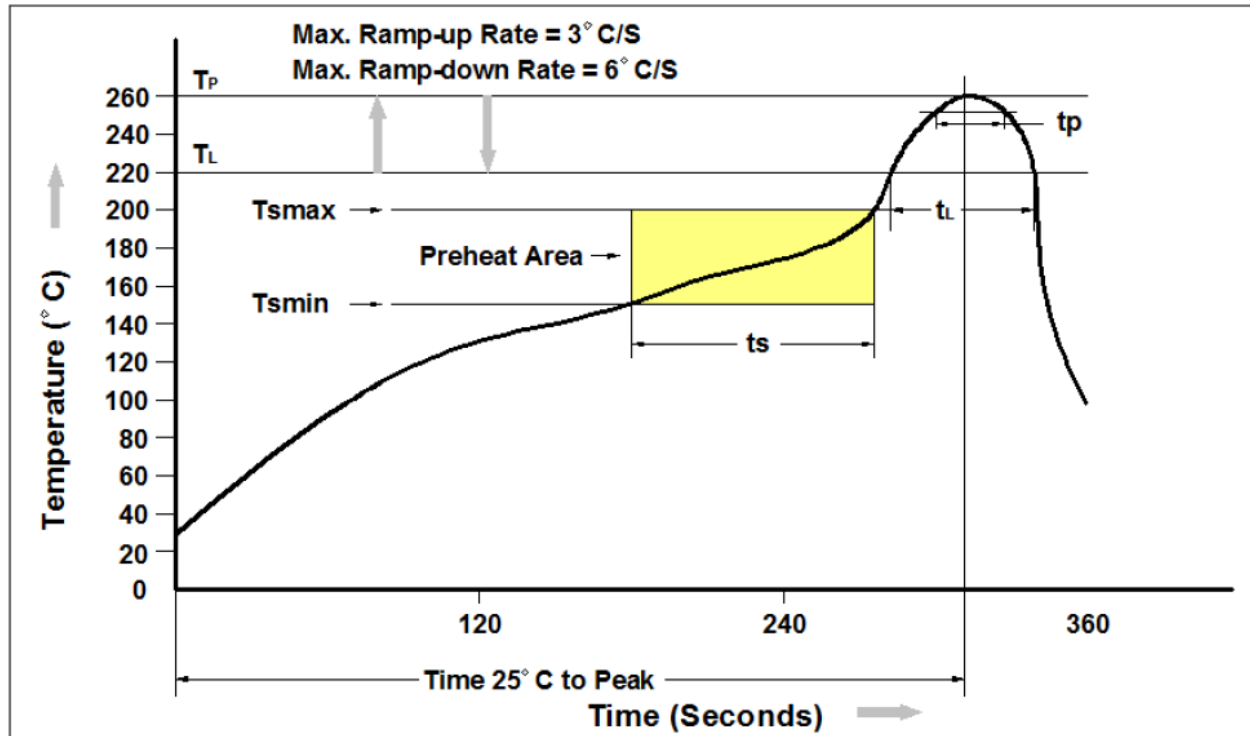
Test Circuit for static dv/dt



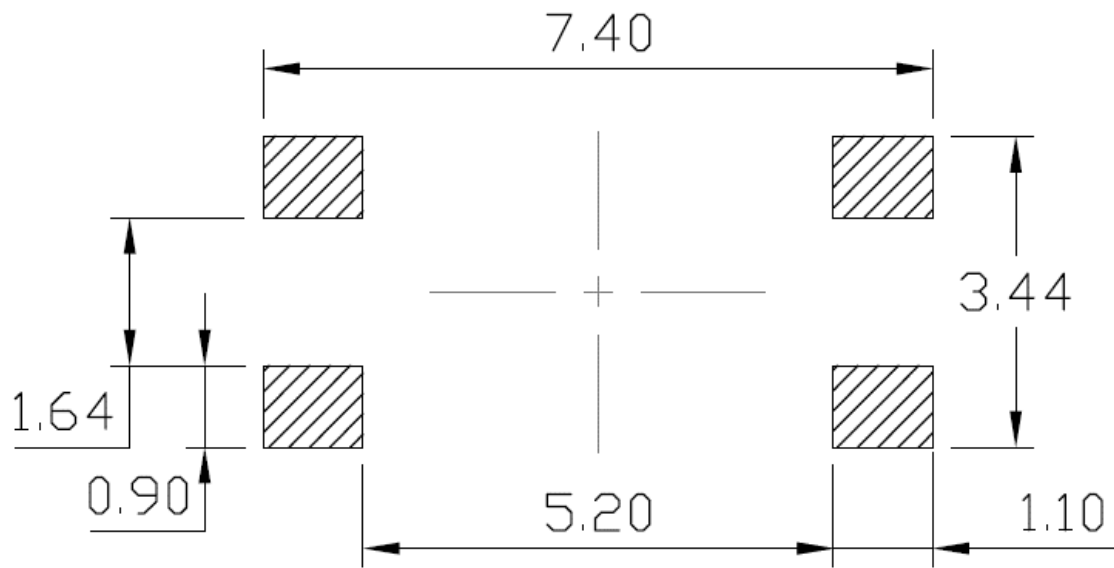
The high voltage pulse is set to the required V_{PEAK} value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform V_T is monitored using a x100 scope probe. By varying R_{TEST} , the dv/dt (slope) is increased, until the D.U.T. is observed to trigger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

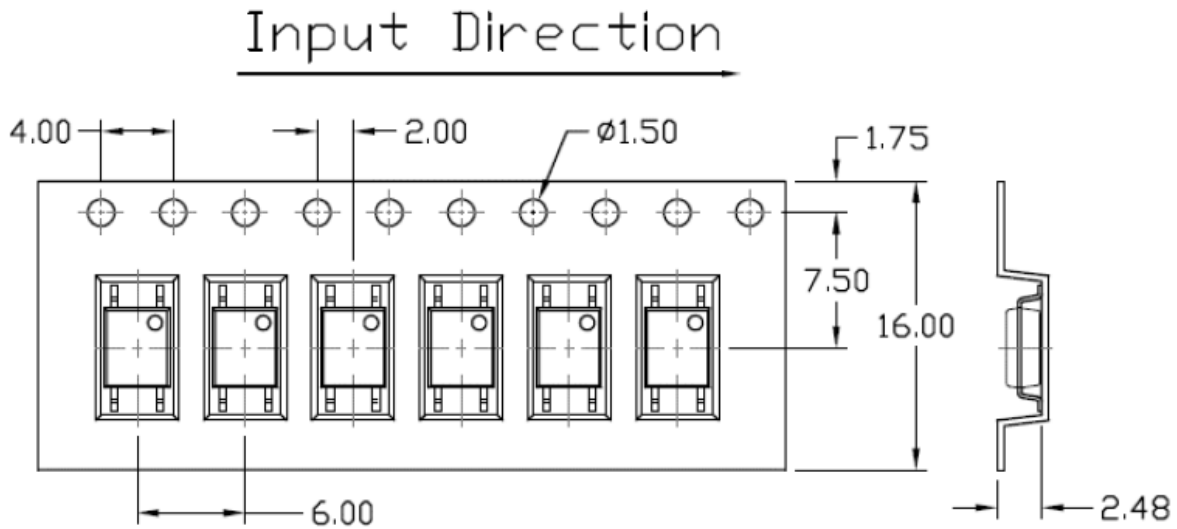
Units: mm

tolerance: +/- 0.1mm

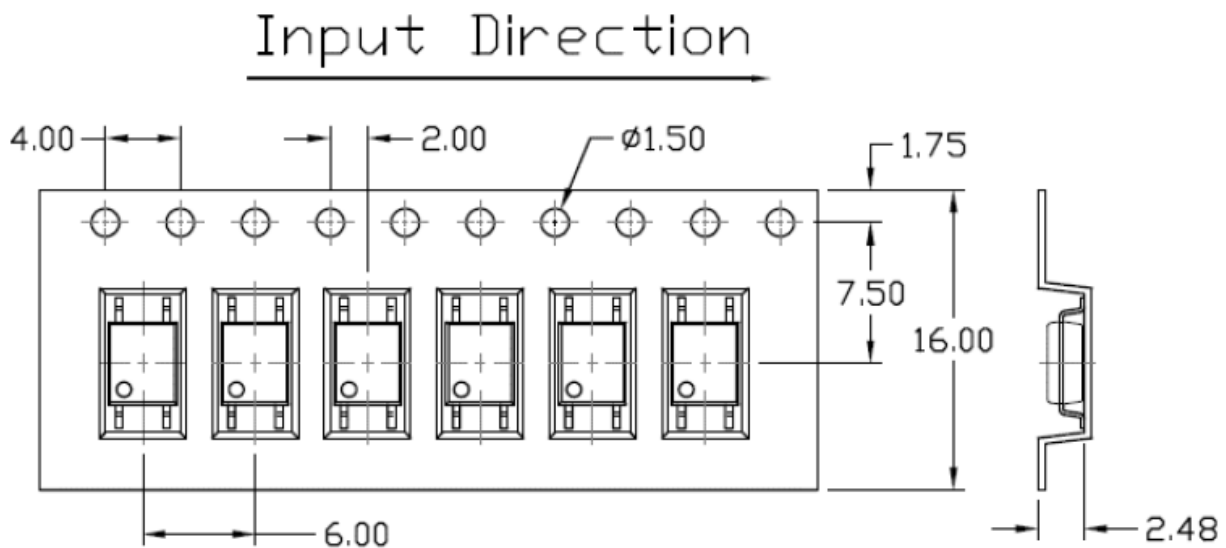
Packing & Labeling

Tape Dimension:

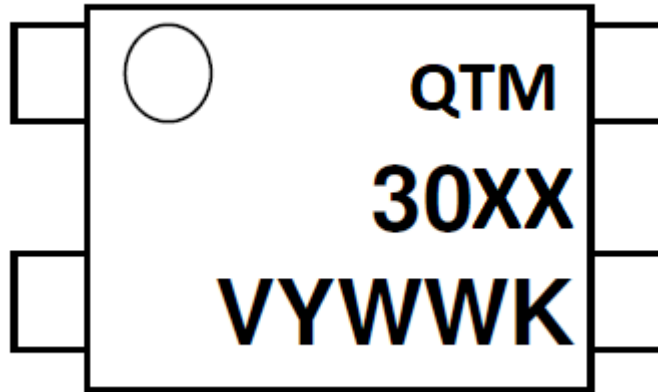
Option T1



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=10, 11, 12, 20, 21, 22, 23, 51, 52 or 53)

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 QTM301X /QTM302X/QTM305X series	1.0	02/08/2018

Disclaimer

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
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.

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