QT-Brightek Optocoupler Series

5-PIN 10 Mbit/s High Speed Logic Gate Optocoupler

Part No.: QTM600, 601, 611

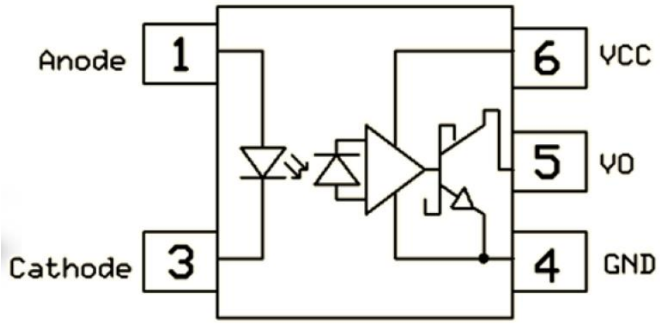
Table of Contents:

Introduction

Feature:

- High Speed 10Mbit/s
- High Isolation voltage between input and output (Viso = 3750V rms)
- Guaranteed performance from -40 ℃ to 85 ℃
- Wide operating temperature range from -55 ℃ to 125 ℃
- Mini-Flat package

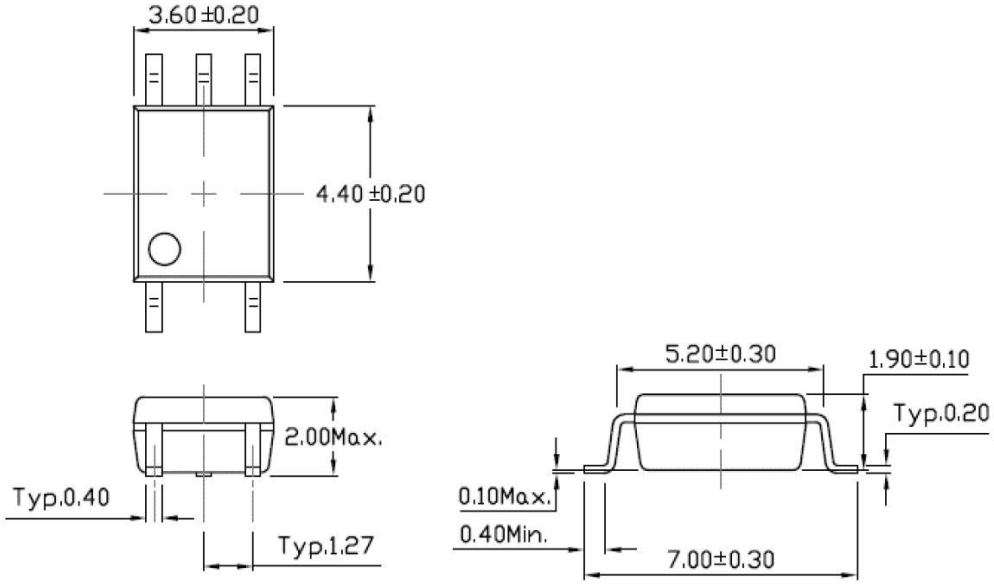
Schematic:



Certification & Compliance:

- Pb free and RoHS Compliant
- UL recognized (File #E338132)
- cUL recognized (File #E338132)
- VDE (File# 40049050)

Dimension: (Dot location indicates pin 1)



All Dimensions are in mm

Absolute Maximum Rating

Symbol	Parameter	Rating	Units
V_{ISO}	Isolation Voltage*	3750	V_{RMS}
T_{STG}	Storage Temperature	-55 ~ +150	ºC
T_{OPR}	Operating Temperature	-55 ~ +125	ºC
T_{SOL}	Lead Solder Temperature	260 for 10 sec	ºC
EMITTER			
I_F	Forward Current	50	mA
V_R	Reverse Voltage	5	V
P_D	Power Dissipation	100	mW
DETECTOR			
P_D	Power Dissipation	85	mW
$I_{O(AVG)}$	Average Output current	50	mA
V_O	Output voltage	7	V
V_{CC}	Supply voltage	7	V

*AC for 1 minute, RH =40~60%

Electrical Characteristic (T_A=25 °C)

Recommended temperature (T_A=-40°C to 85°C). All Typical at TA=25 °C

Emitter

Symbol	Characteristics	Device	Test Condition	Range			Unit
				Min	Typ	Max	
V_F	Forward Voltage	-	I_F =10mA	-	1.6	1.8	V
V_R	Reverse Voltage		I_R= 5μA	5	-	-	V
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage		I_F=10mA	-	-1.6	-	mV/°C

Detector

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I_{CCL}	Logic Low Supply Current	-	I_F=10mA, V_O=Open, V_{CC} =5V	-	9	13	mA
I_{CCH}	Logic High Supply Current	-	I_F=0mA, V_O=Open, V_{CC}=5V	-	6	9	mA
R_{IO}	Isolation Resistance	-	V_{IO}=500V_{DC}	$5x10^{10}$	-	-	Ω
C_{IO}	Isolation Capacitance	-	f=1MHz	-	0.5	1.2	pF

Transfer Characteristics

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I_{OH}	Logic High Output Current	-	I_F=250μA, V_O=5.5V	-	2	100	μA
I_{FT}	Input Threshold Current	-	I_F=13mA, V_O=0.6V, V_{CC}=5.5V	-	2	5	mA
V_{OL}	Logic Low Output Voltage	-	I_F=5mA, I_O=13mA, V_{CC}=5.5V	-	0.35	0.6	V

Switching Characteristics (TA=25°C)

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
T_{PHL}	Propagation Delay Time Logic High to Logic Low	-	C_L=15pF, R_L=350Ω,	-	40	75	ns
T_{PLH}	Propagation Delay Time Logic Low to Logic High	-		-	35	75	
T_r	Output Rise Time	-		-	40	-	
T_f	Output Fall Time	-		-	10	-	
CM_H	Common Mode Transient Immunity at Logic High	QTM600	I_F=0mA, V_{OH}=2.0V, R_L=350Ω, T_A=25°C, V_{CM}=10Vp-p	-	-	-	V/µs
		QTM601	I_F=0mA, V_{OH}=2.0V, R_L=350Ω, T_A=25°C, V_{CM}=50Vp-p	5000	-	-	
		QTM611	I_F=0mA, V_{OH}=2.0V, R_L=350Ω, T_A=25°C, V_{CM}=1000Vp-p	20000	-	-	
CM_L	Common Mode Transient Immunity at Logic Low	QTM600	I_F=7.5mA, V_{OL}= 0.8V, R_L=350Ω, T_A=25°C, V_{CM}=10Vp-p	-	-	-	
		QTM601	I_F=7.5mA, V_{OL}= 0.8V, R_L=350Ω, T_A=25°C, V_{CM}=50Vp-p	5000	-	-	
		QTM611	I_F=7.5mA, V_{OL}= 0.8V, R_L=350Ω, T_A=25°C, V_{CM}=1000Vp-p	20000	-	-	

Characteristic Curves

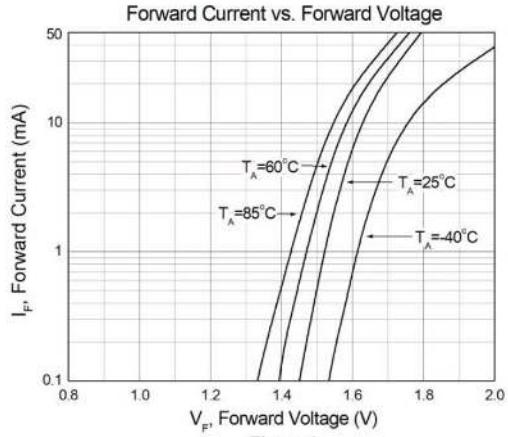


Figure 1

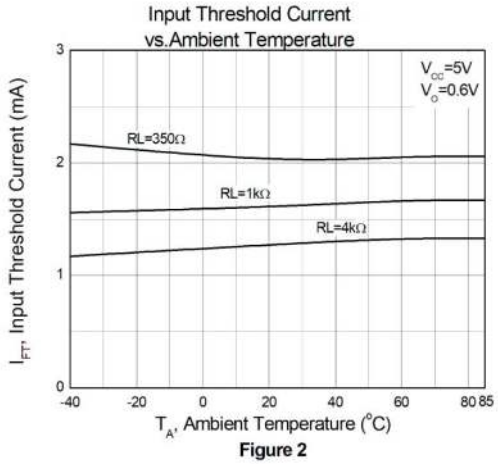


Figure 2

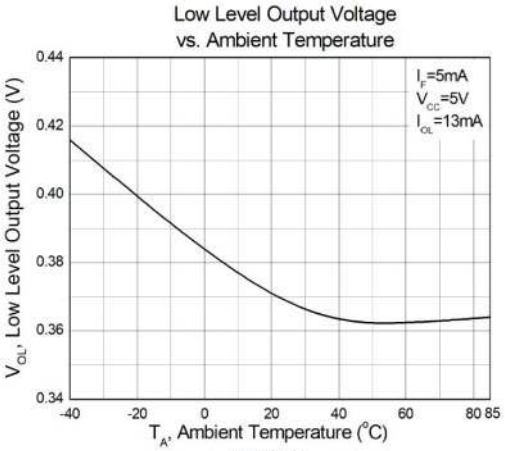


Figure 3

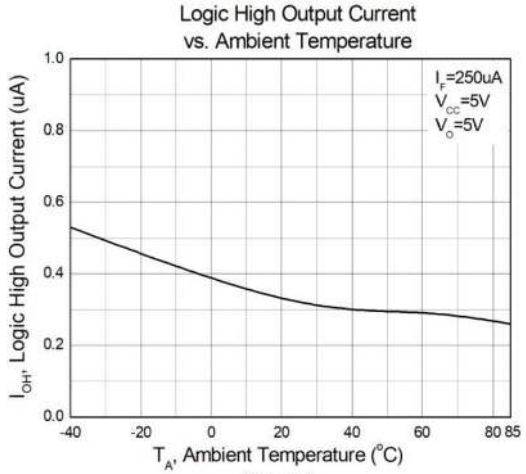


Figure 4

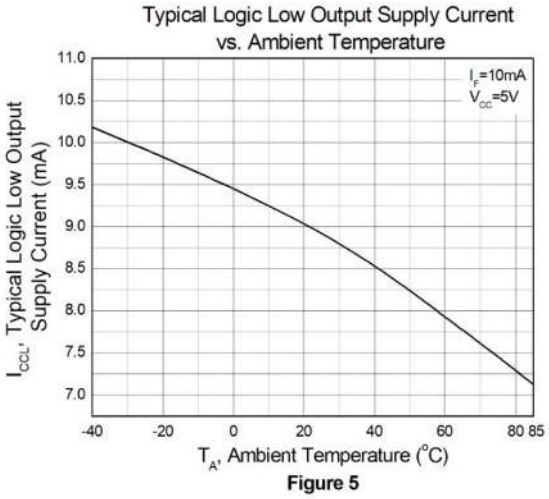


Figure 5

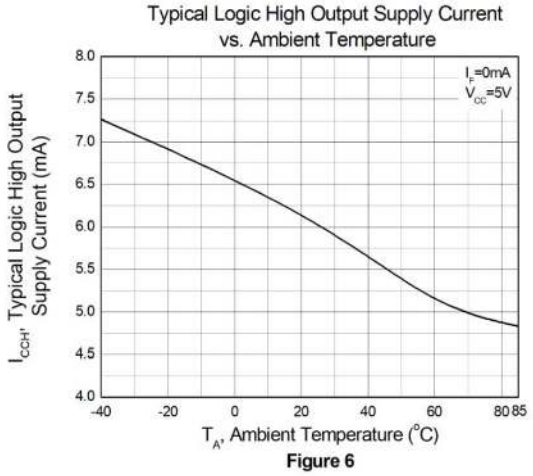


Figure 6

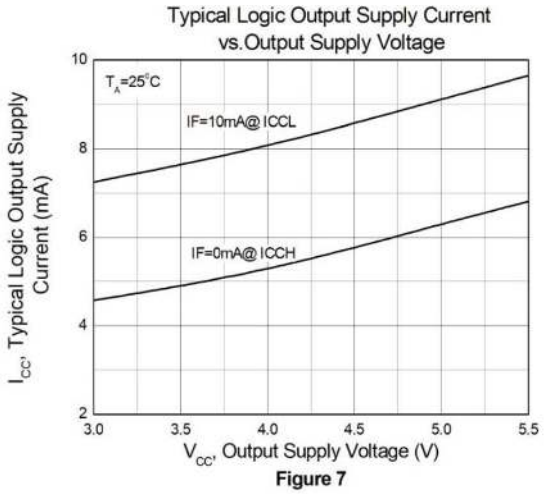


Figure 7

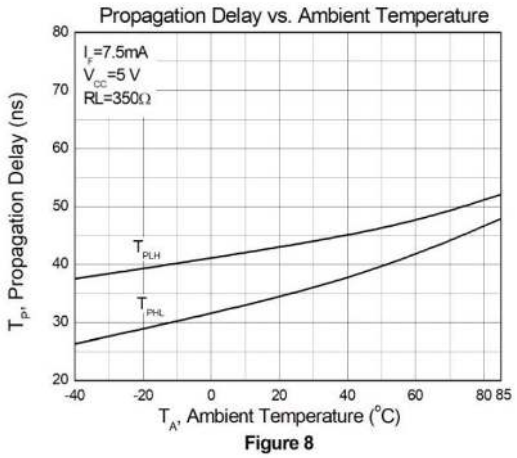


Figure 8

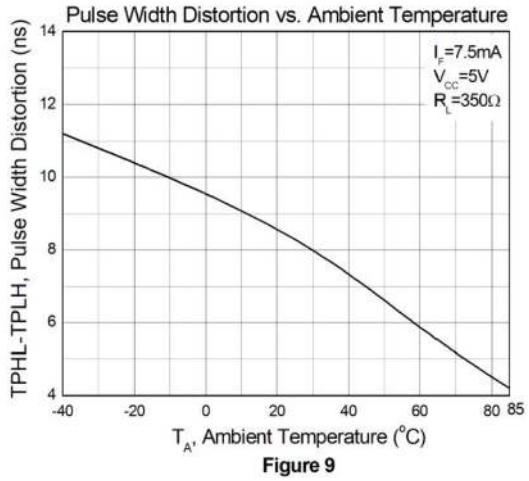


Figure 9

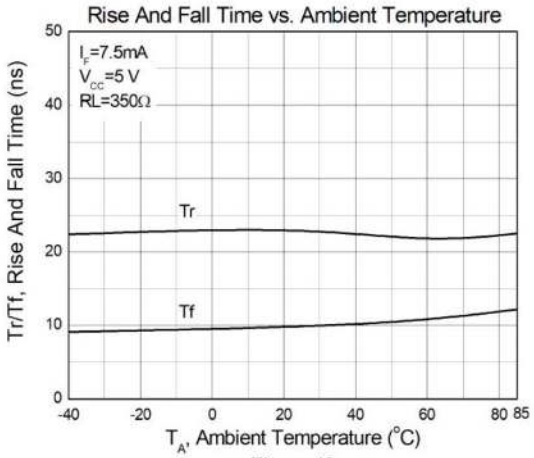


Figure 10

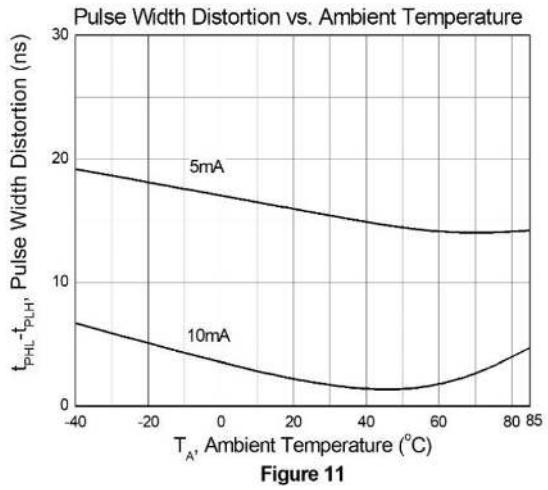
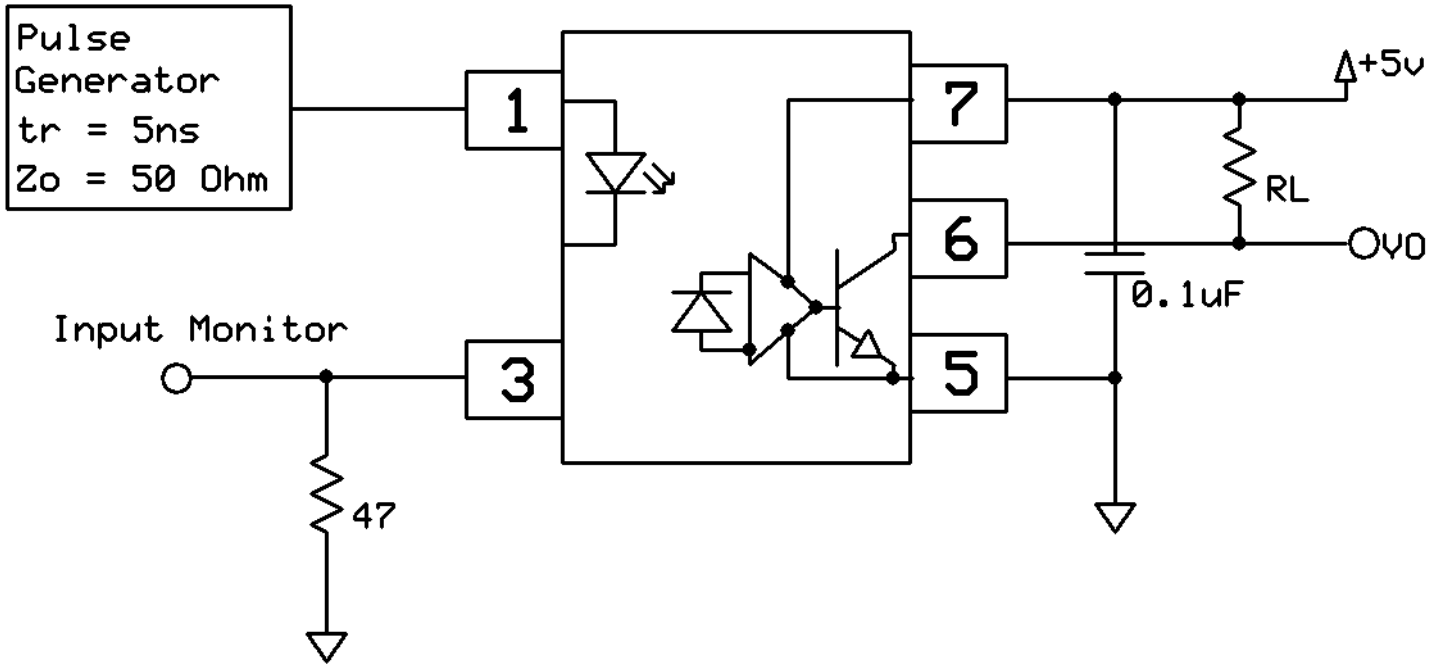
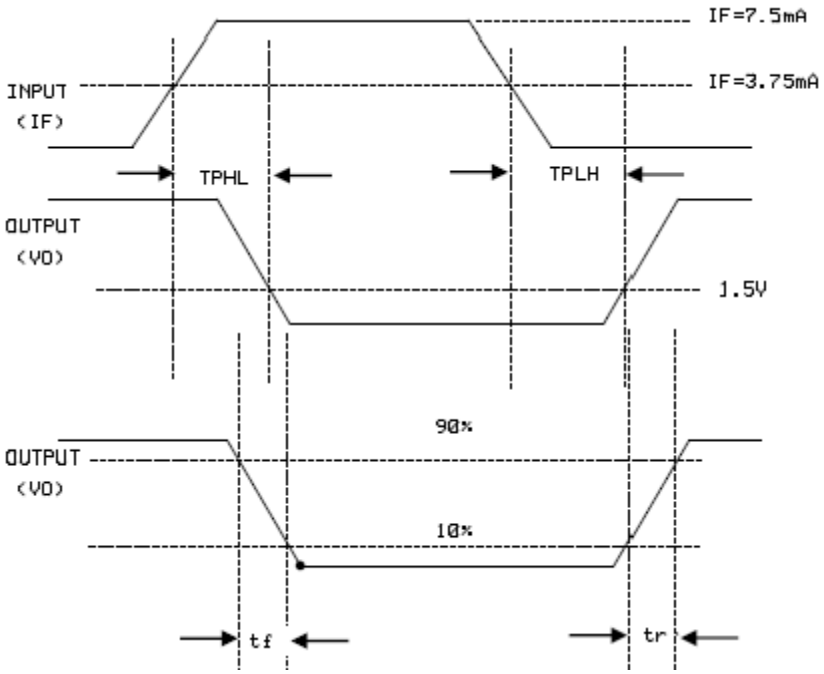
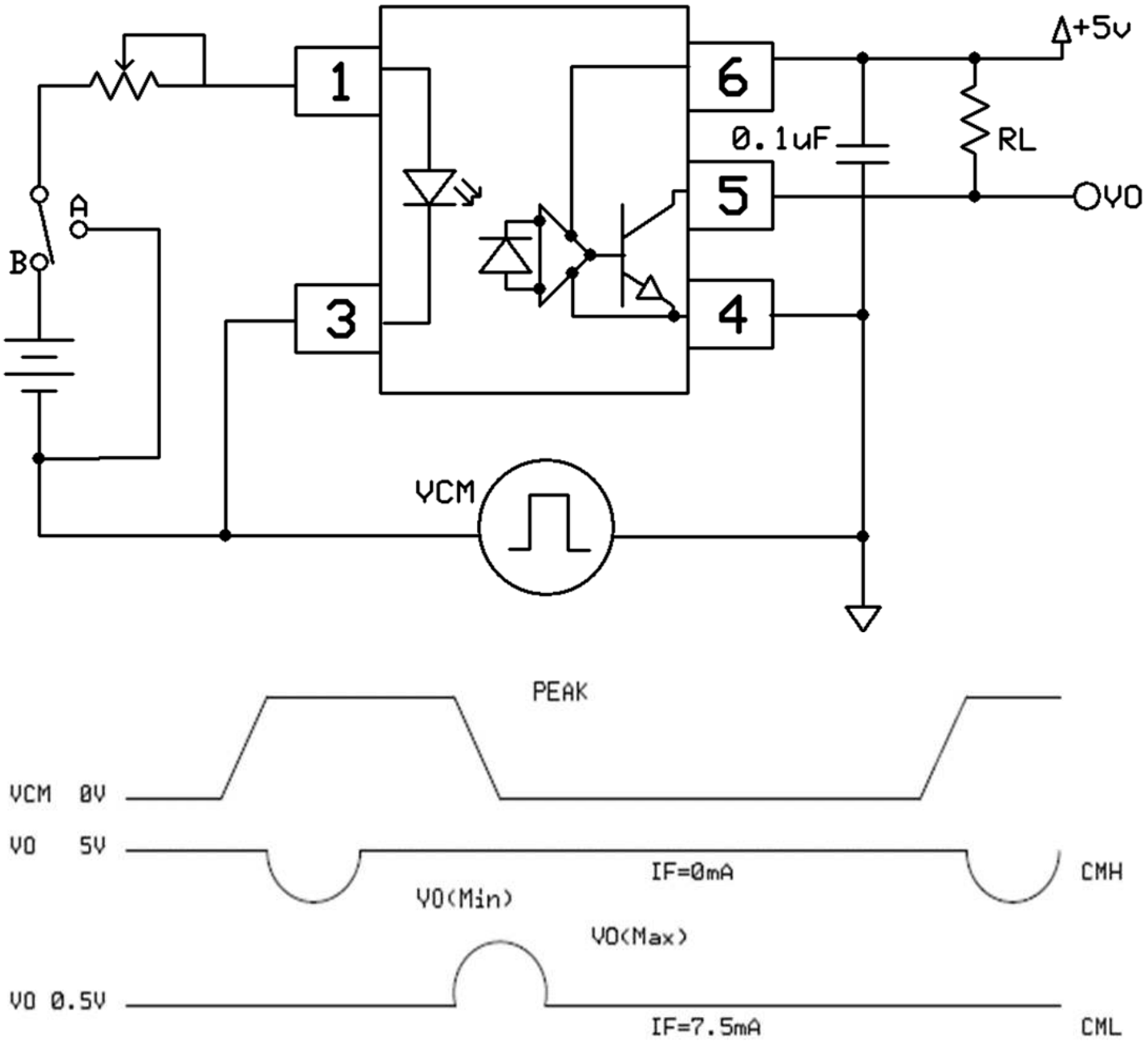


Figure 11

Test Circuits

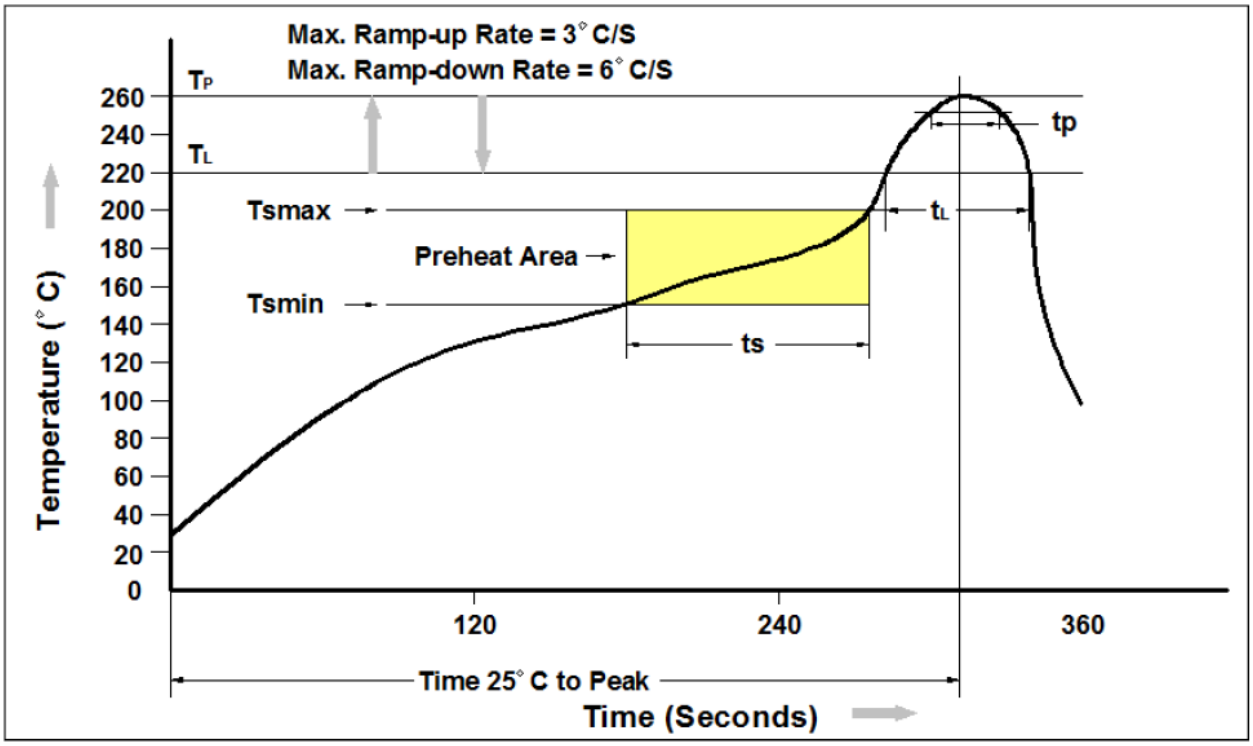




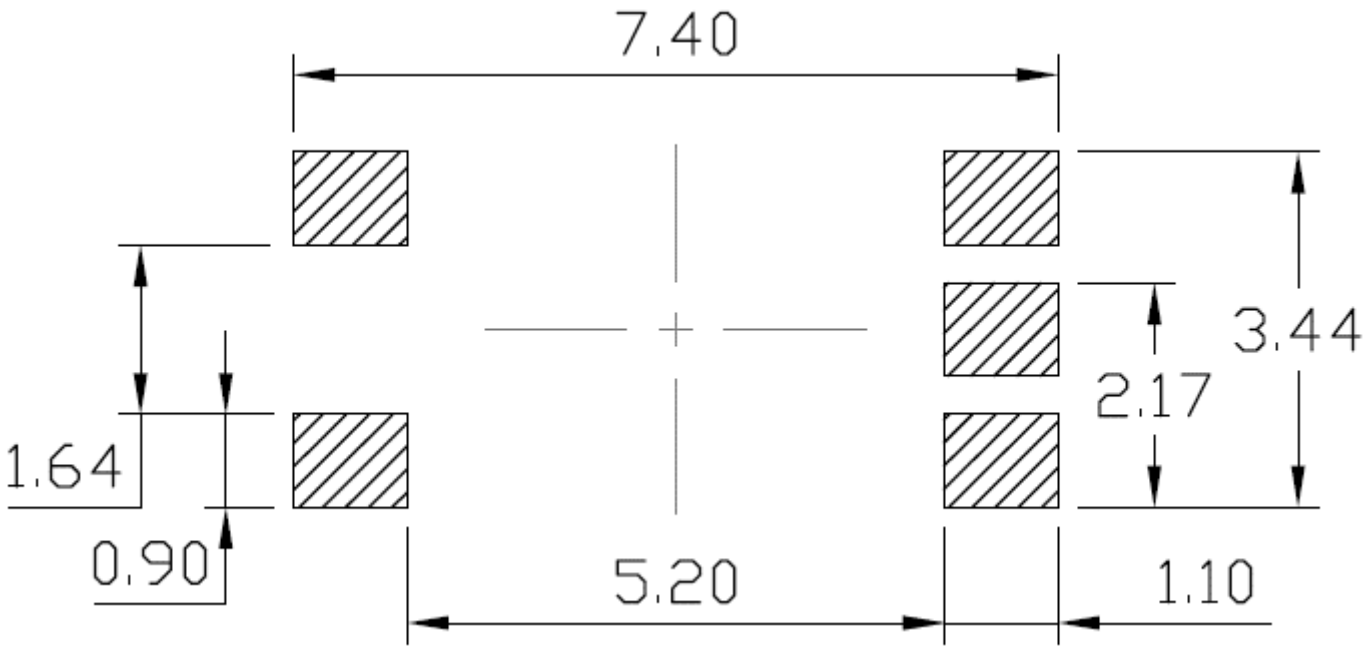


CMR Test Circuit

Solder Profile & Footprint



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



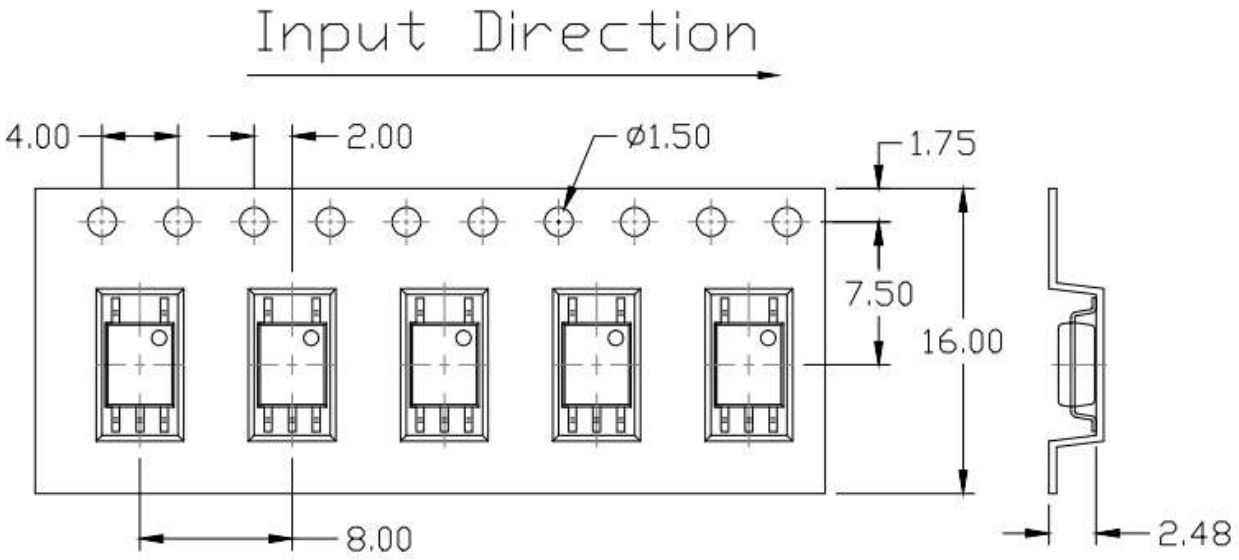
Recommended Solder Footprint for SMD Leadform

Units: mm tolerance: +/- 0.1mm

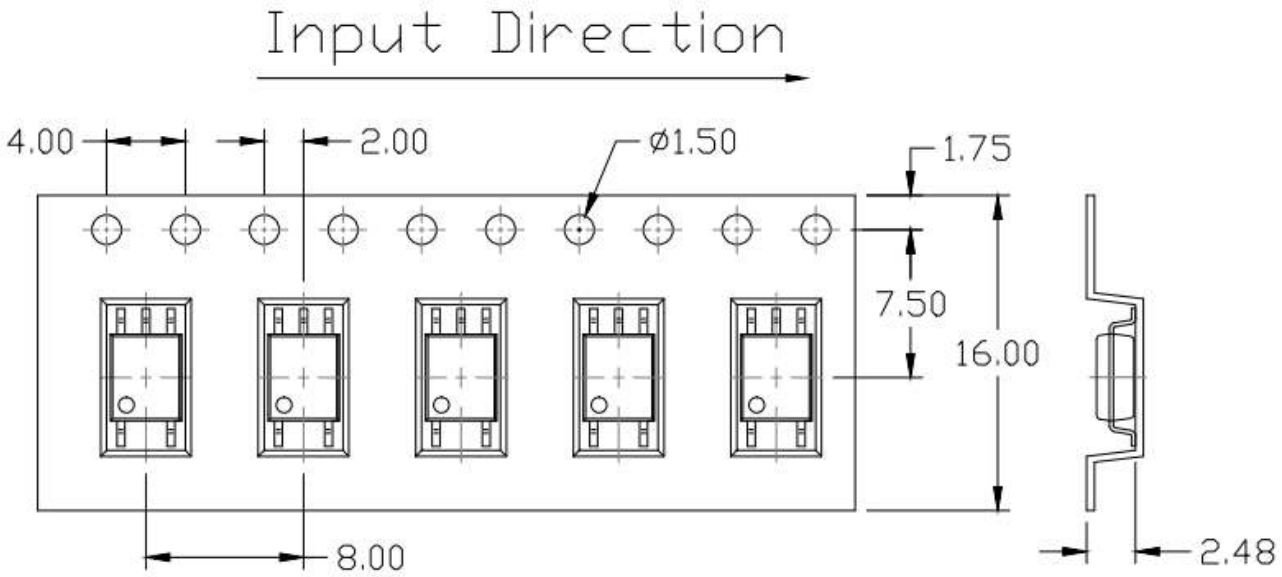
Packing & Labeling

Tape Dimension:

Option T1



Option T2



Device Marking

QT = QT-Brightek Corporation
M= Mini-Flat Package
600 = part number
Y = Year
WW = Week
V = VDE Option
K= Manufacturing code

Ordering Information

QTM6XXVZ
XX = Part number (X=00, 01, or 11)
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 release of QTM600_601_611	1.0	02/12/2018
Update Top and characteristic curve	1.1	04/24/2020

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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.