

## **QT-Brightek Optocoupler Series**

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

**Part No.: QTM600, 601, 611**



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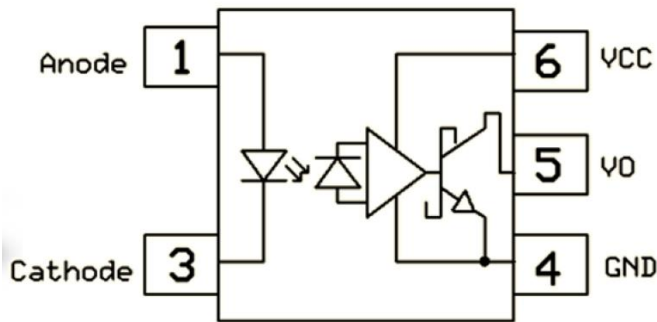
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## Introduction

### Feature:

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

### Schematic:

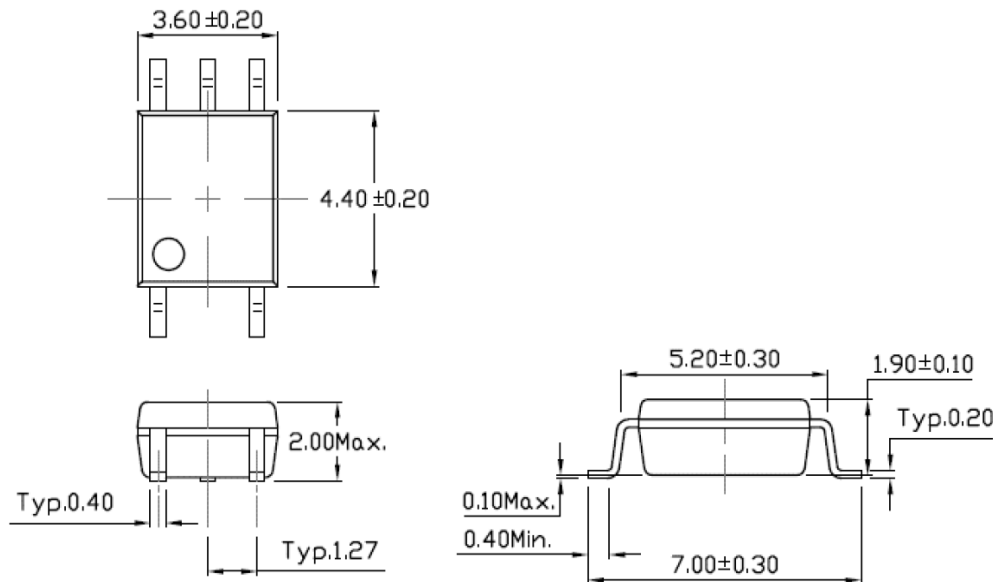


### Certification & Compliance:

- 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	°C
$T_{OPR}$	Operating Temperature	-55 ~ +125	°C
$T_{SOL}$	Lead Solder Temperature	260 for 10 sec	°C
<b>EMITTER</b>			
$I_F$	Forward Current	50	mA
$V_R$	Reverse Voltage	5	V
$P_D$	Power Dissipation	100	mW
<b>DETECTOR</b>			
$P_D$	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<sub>A</sub>=25 °C)

Recommended temperature (T<sub>A</sub>=-40°C to 85°C). All Typical at T<sub>A</sub>=25 °C

### Emitter

Symbol	Characteristics	Device	Test Condition	Range			Unit
				Min	Typ	Max	
V <sub>F</sub>	Forward Voltage	-	I <sub>F</sub> =10mA	-	1.6	1.8	V
V <sub>R</sub>	Reverse Voltage		I <sub>R</sub> = 5μA	5	-	-	V
ΔV <sub>F</sub> /ΔT <sub>A</sub>	Temperature coefficient of forward voltage		I <sub>F</sub> =10mA	-	-1.6	-	mV/°C

### Detector

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I <sub>CCL</sub>	Logic Low Supply Current	-	I <sub>F</sub> =10mA, V <sub>O</sub> =Open, V <sub>CC</sub> =5V	-	9	13	mA
I <sub>CCH</sub>	Logic High Supply Current	-	I <sub>F</sub> =0mA, V <sub>O</sub> =Open, V <sub>CC</sub> =5V	-	6	9	mA
R <sub>IO</sub>	Isolation Resistance	-	V <sub>IO</sub> =500V <sub>DC</sub>	5x10 <sup>10</sup>	-	-	Ω
C <sub>IO</sub>	Isolation Capacitance	-	f=1MHz	-	0.5	1.2	pF

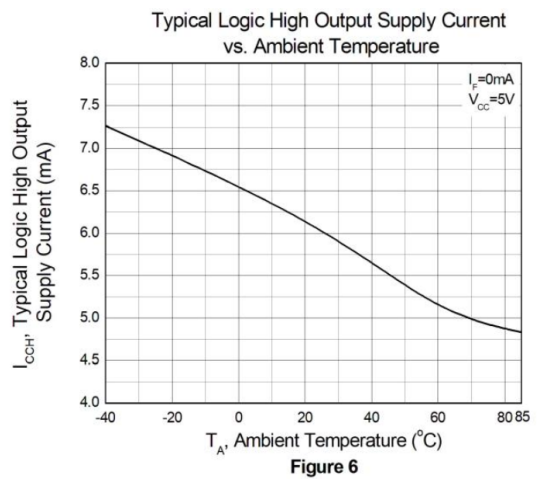
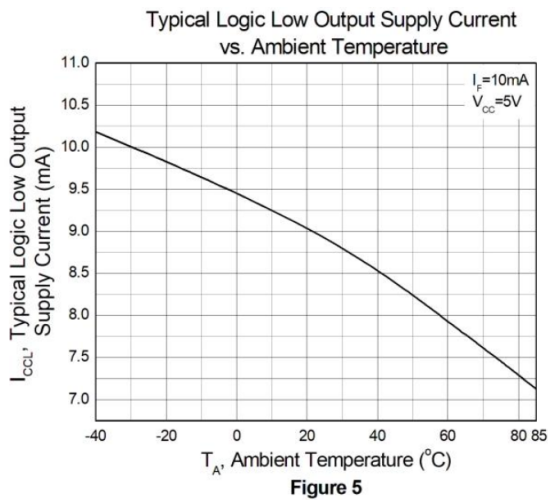
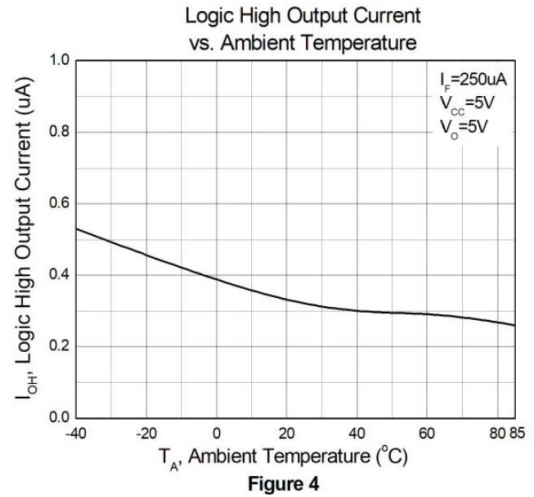
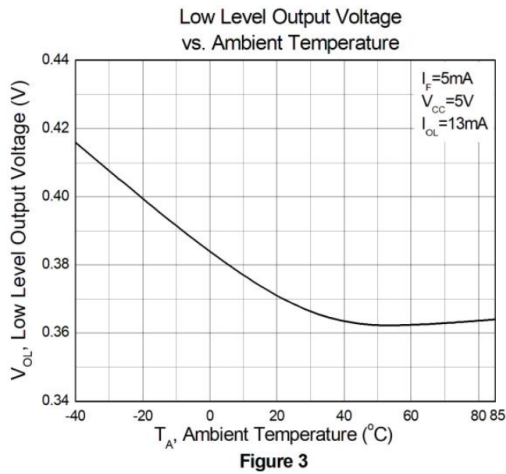
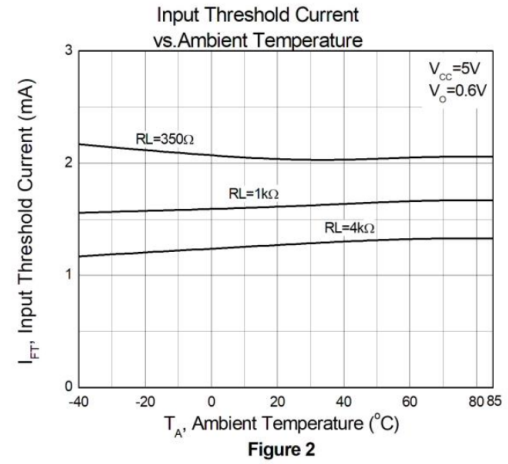
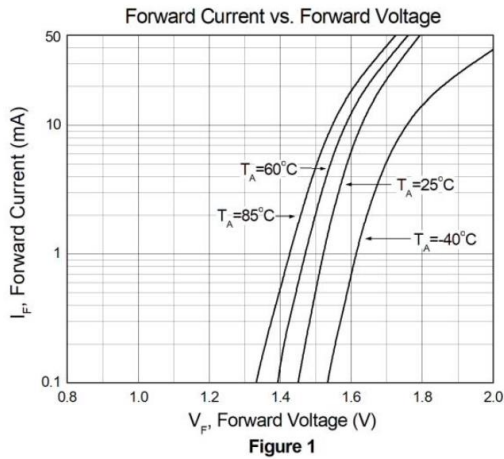
## Transfer Characteristics

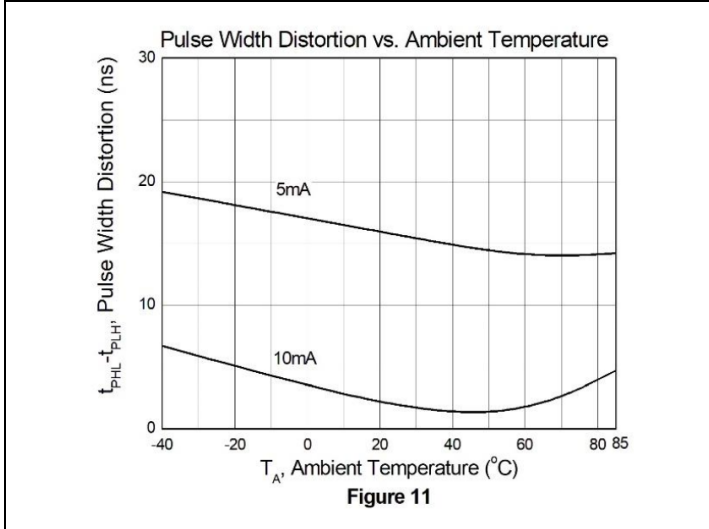
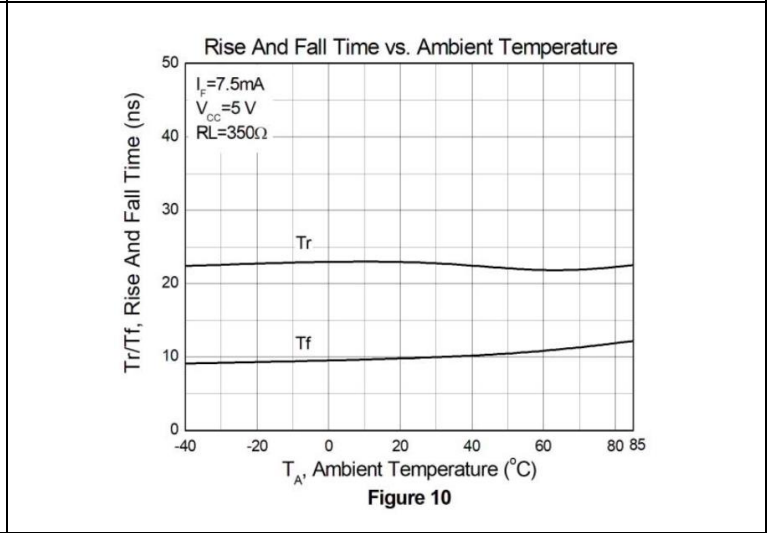
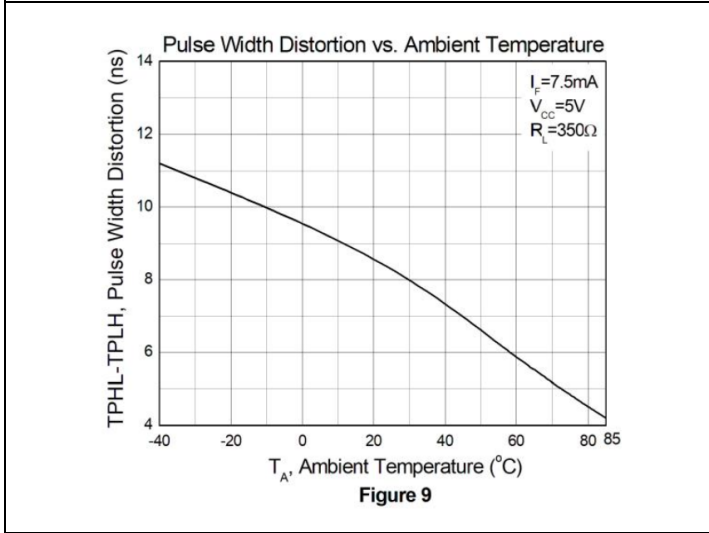
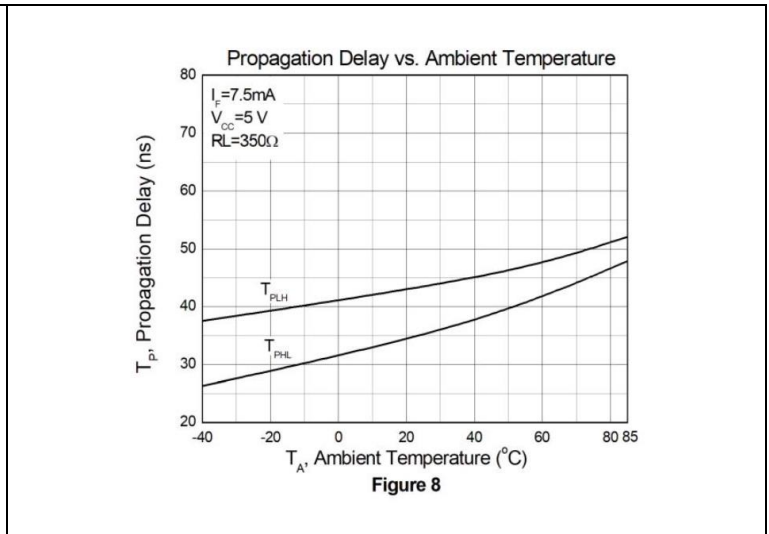
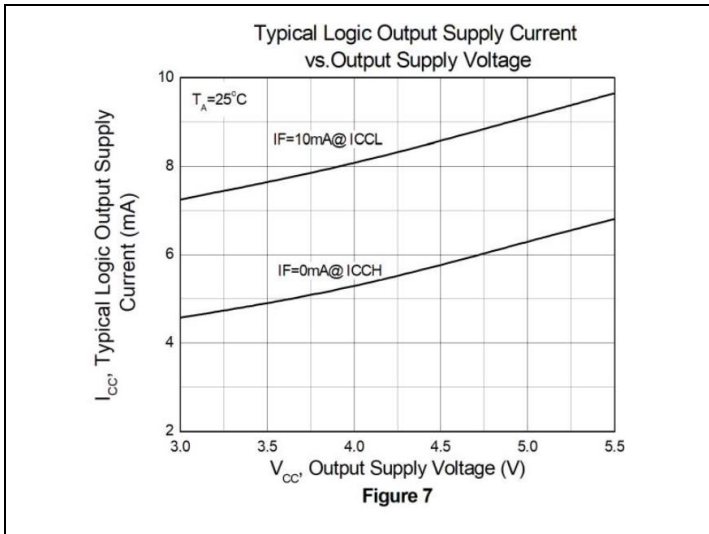
Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I <sub>OH</sub>	Logic High Output Current	-	I <sub>F</sub> =250μA, V <sub>O</sub> =5.5V	-	2	100	μA
I <sub>FT</sub>	Input Threshold Current	-	I <sub>F</sub> =13mA, V <sub>O</sub> =0.6V, V <sub>CC</sub> =5.5V	-	2	5	mA
V <sub>OL</sub>	Logic Low Output Voltage	-	I <sub>F</sub> =5mA, I <sub>O</sub> =13mA, V <sub>CC</sub> =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	-	$C_L=15pF, R_L=350\Omega,$	-	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	$I_F=0mA, V_{OH}=2.0V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=10Vp-p$	-	-	-	V/ $\mu s$
		QTM601	$I_F=0mA, V_{OH}=2.0V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=50Vp-p$	5000	-	-	
		QTM611	$I_F=0mA, V_{OH}=2.0V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=1000Vp-p$	20000	-	-	
$CM_L$	Common Mode Transient Immunity at Logic Low	QTM600	$I_F=7.5mA, V_{OL}=0.8V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=10Vp-p$	-	-	-	
		QTM601	$I_F=7.5mA, V_{OL}=0.8V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=50Vp-p$	5000	-	-	
		QTM611	$I_F=7.5mA, V_{OL}=0.8V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=1000Vp-p$	20000	-	-	

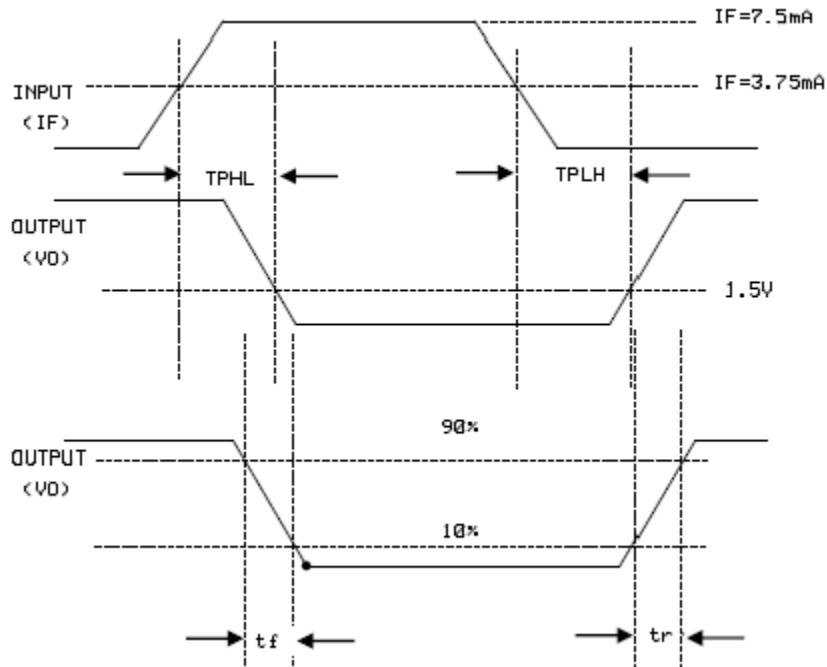
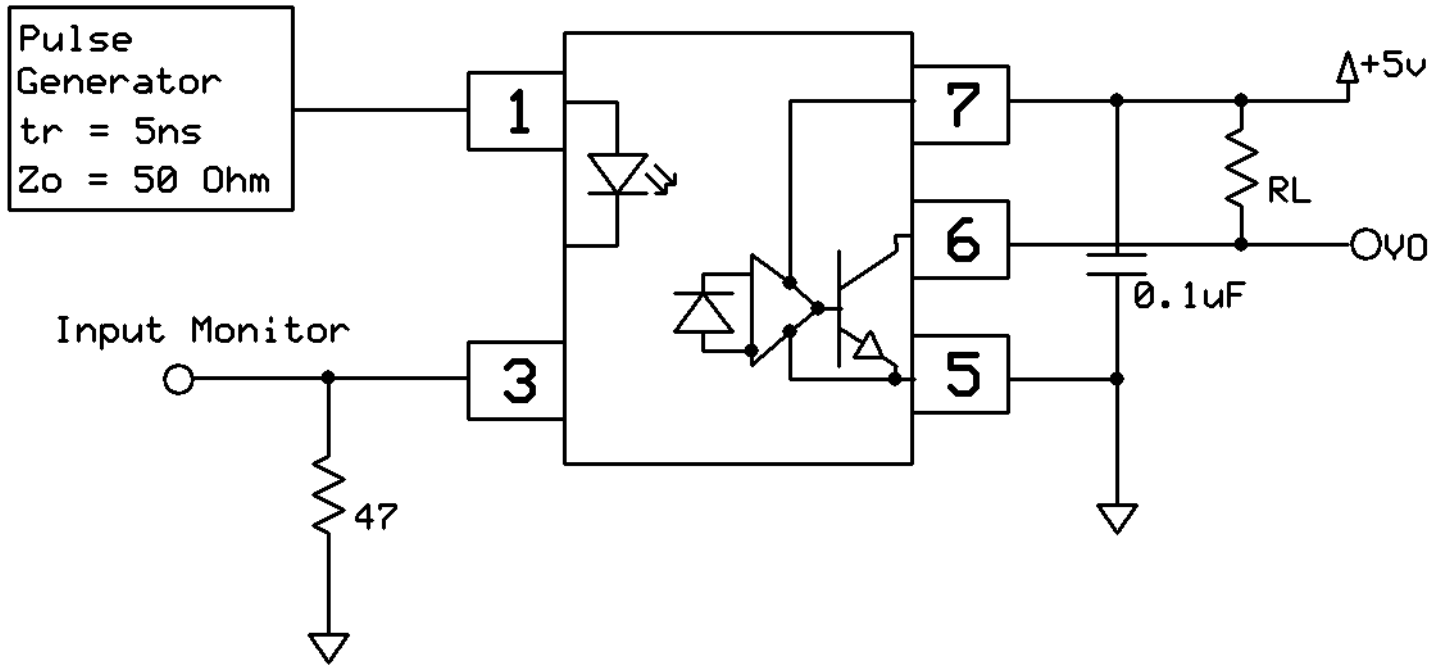
## Characteristic Curves

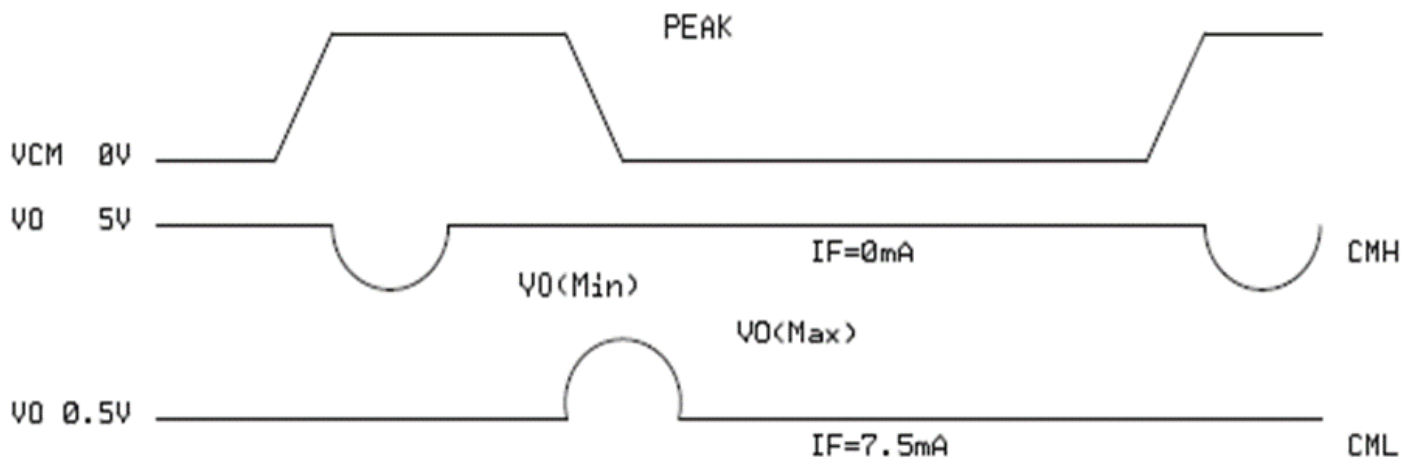
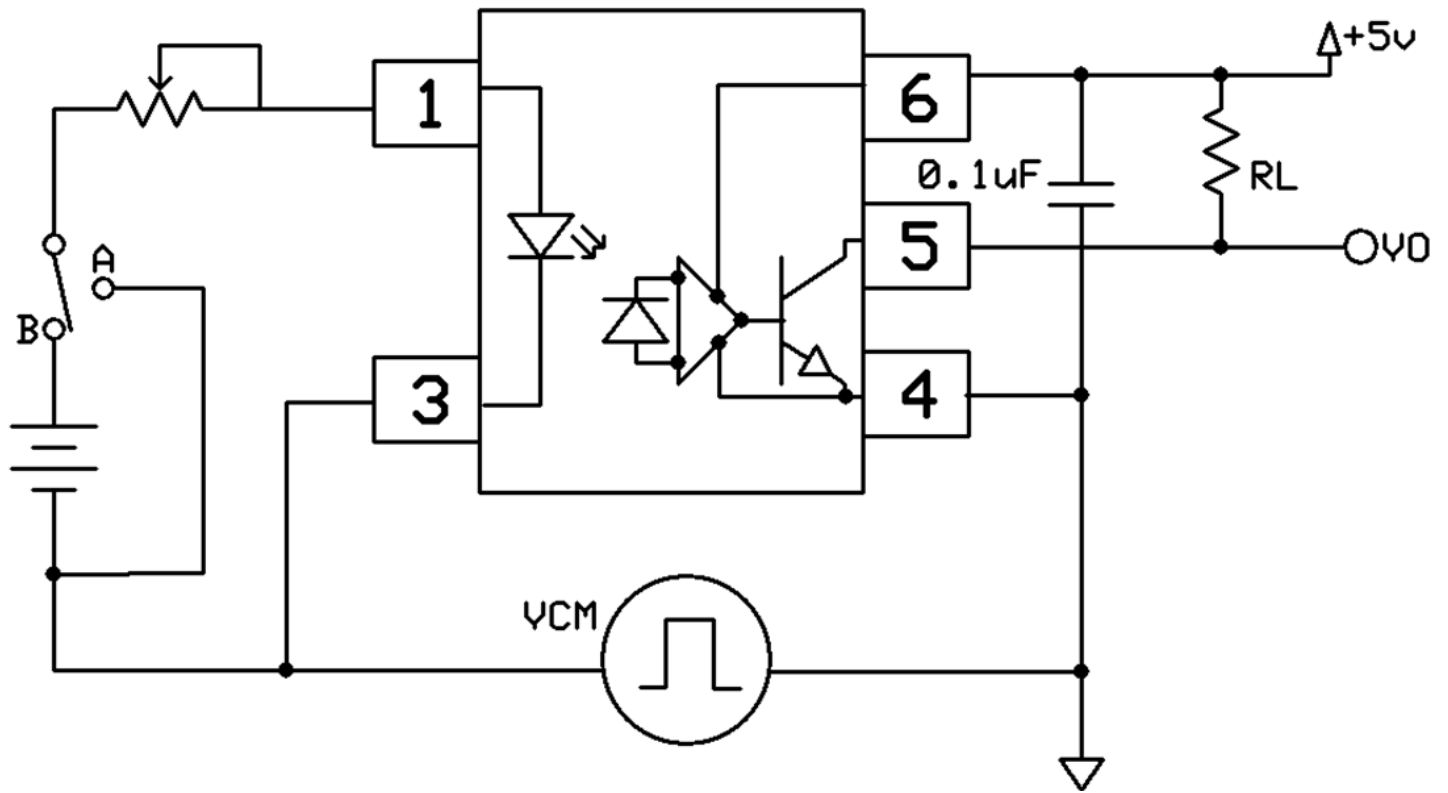






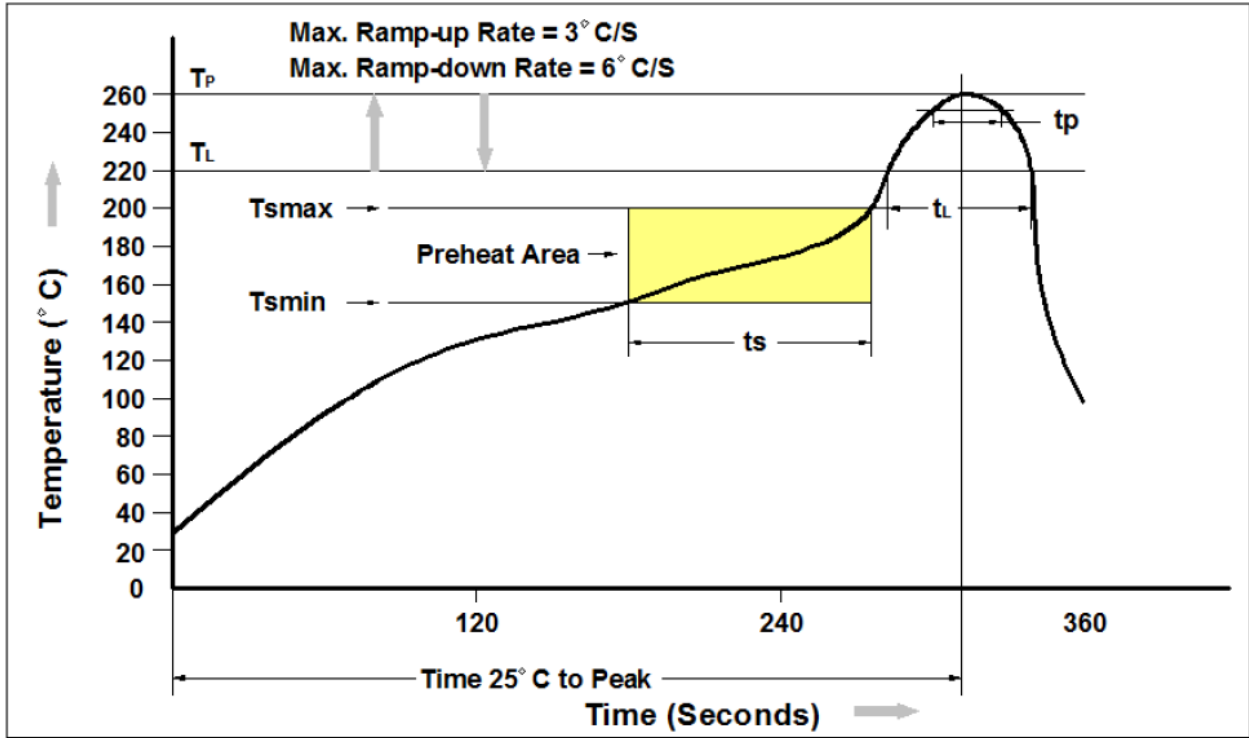
## Test Circuits



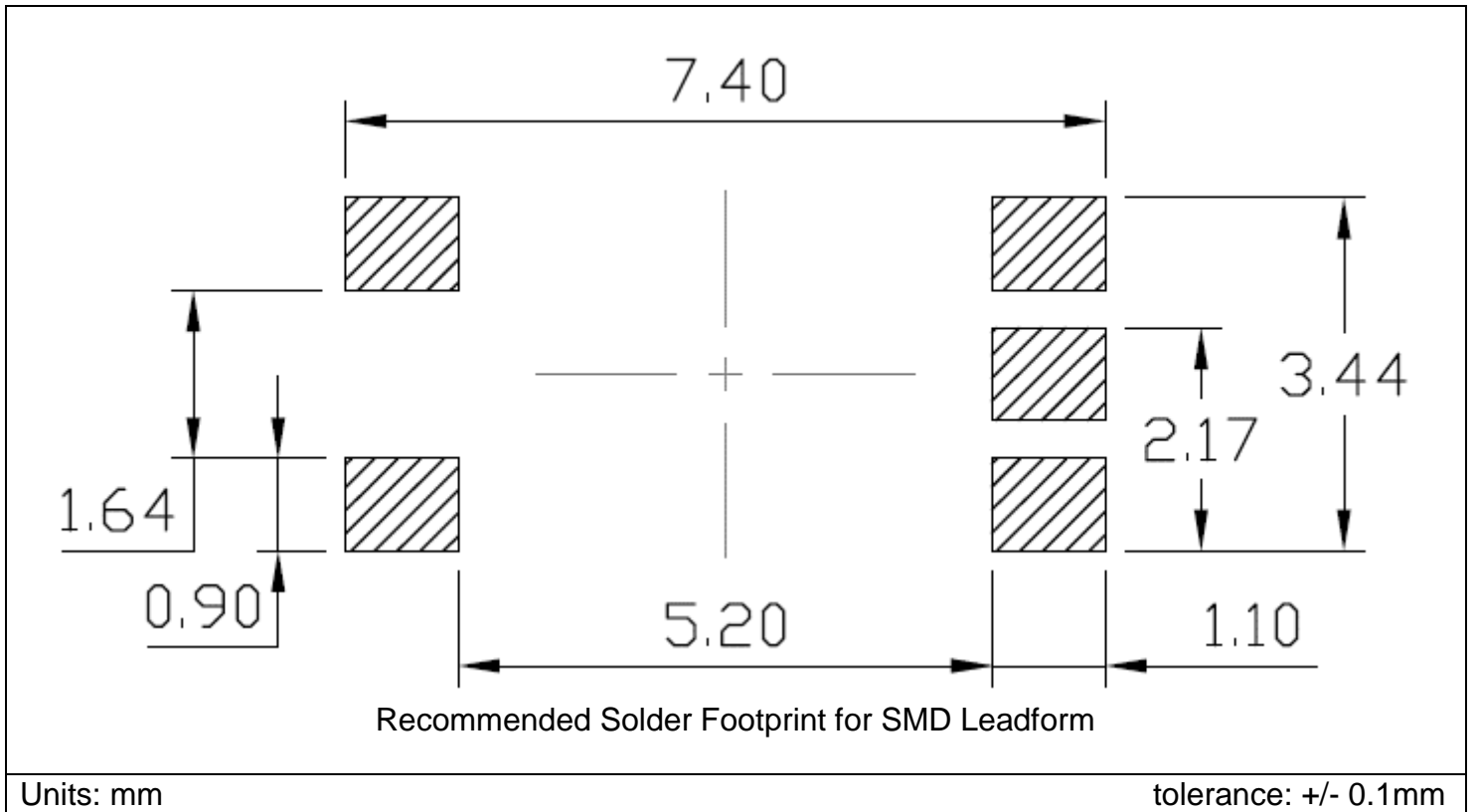


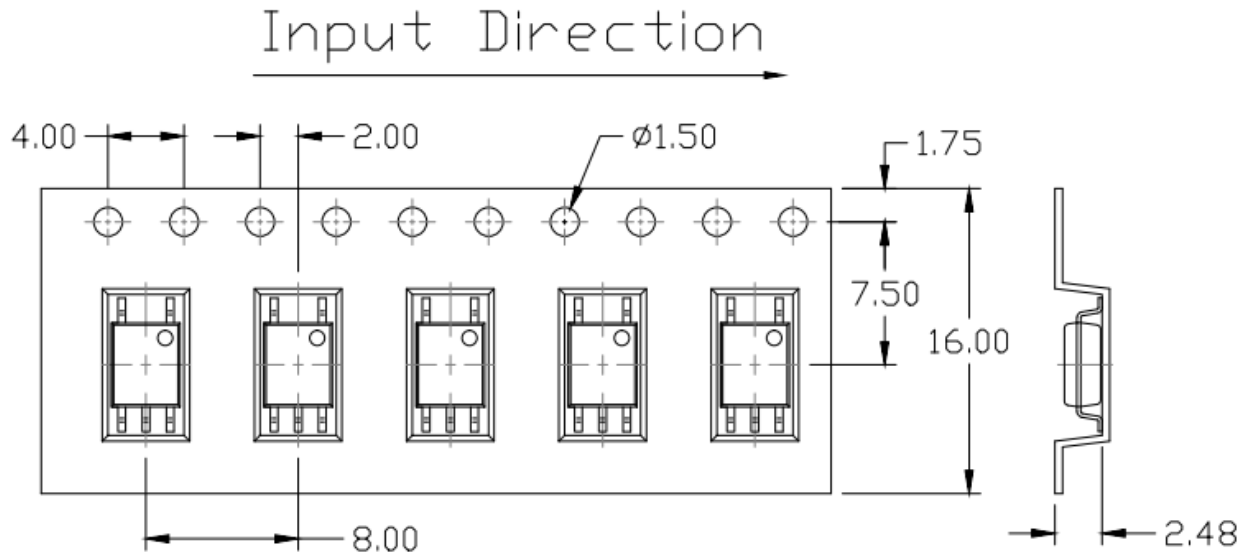
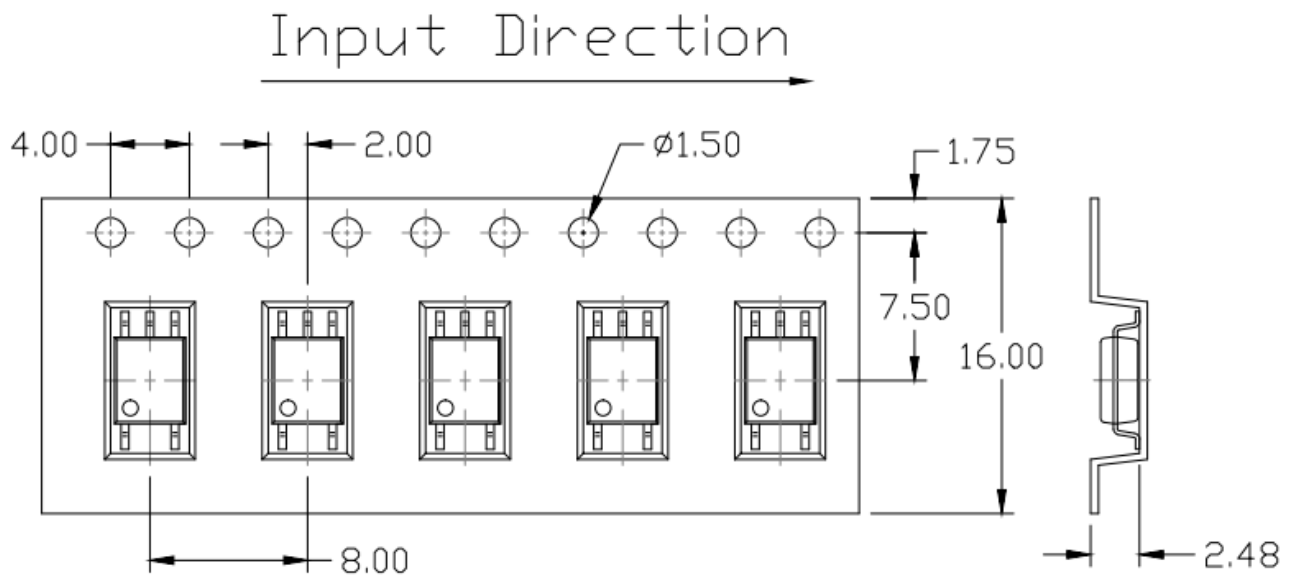
CMR Test Circuit

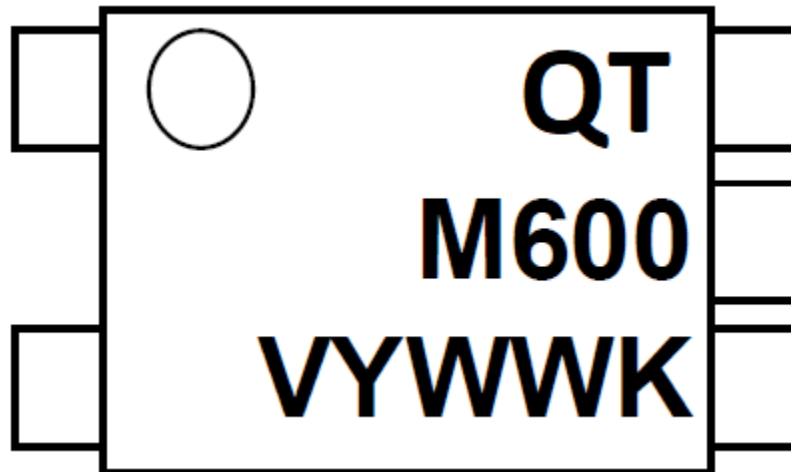
**Solder Profile & Footprint**



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	150 °C
Temperature Max. (T <sub>smax</sub> )	200 °C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	217 °C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds
Peak Body Package Temperature	260 °C +0 °C / -5 °C
Time (t <sub>P</sub> ) within 5 °C of 260 °C	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.



**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

## 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.