QT-Brightek Optocoupler Series

5-PIN 1 Mbit/s High Speed Transistor Coupler

Part No.: QTM452, 453

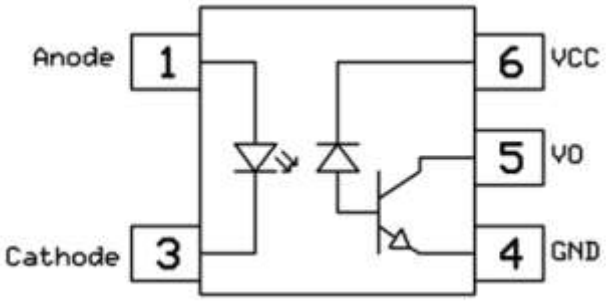
Table of Contents:

Introduction

Feature:

- High Speed 1Mbit/s
- High Isolation voltage between input and output (Viso = 3750V rms)
- Guaranteed CTR performance from 0 ℃ to 70 ℃
- Mini-Flat package

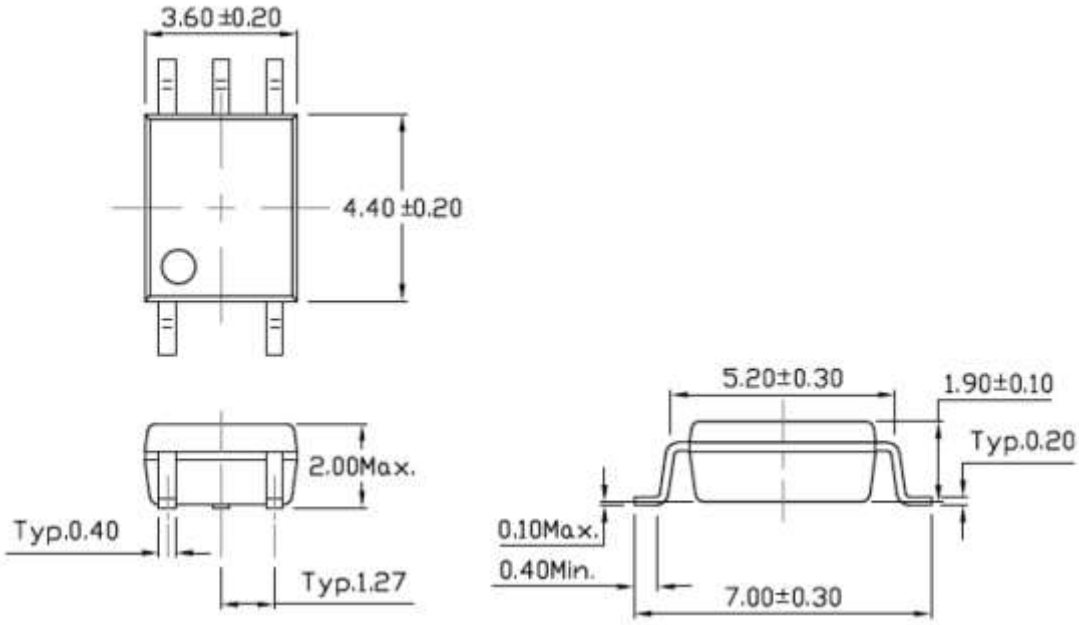
Schematic:



Certification & Compliance:

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

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 ~ +125	ºC
T_{OPR}	Operating Temperature	-55 ~ +100	ºC
T_{SOL}	Lead Solder Temperature	260 for 10 sec	ºC
EMITTER			
I_F	Continuous Forward Current	25	mA
I_{FP}	Peak Forward Current (50% duty, 1ms P.W)	50	mA
$I_{FP(TRANS)}$	Peak transient Current (≤ 1us P.W, 300pps)	1	A
V_R	Reverse Voltage	5	V
P_D	Power Dissipation	45	mW
	Power Dissipation Derated above 100ºC	-	mW/ºC
DETECTOR			
P_D	Power Dissipation	100	mW
$I_{O(AVG)}$	Average Output current	8	mA
$I_{O(Peak)}$	Peak Output current	16	mA
VO	Output voltage	-0.5 to 20	V
VCC	Supply voltage	-0.5 to 30	V

Electrical Characteristic (T_A=25 °C)

Emitter

Symbol	Characteristics	Device	Test Condition	Range			Unit
				Min	Typ	Max	
V_F	Forward Voltage	-	I_F = 16mA	-	1.45	1.6	V
V_R	Reverse Voltage		I_R= 10μA	5	-	-	V
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage		I_F = 16mA	-	-1.6	-	mV/°C

Detector

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I_{OH}	Logic High Output Current	-	I_F=0mA, V_O=V_{CC}=5.5V, T_A=25°C	-	0.001	0.5	μA
			I_F=0mA, V_O=V_{CC}=15V, T_A=25°C	-	0.01	1	
			I_F=0mA, V_O=V_{CC}=15V	-	-	50	
I_{CCL}	Logic Low Supply CUrrent	-	I_F=16mA, V_O=Open, V_{CC} =15V	-	120	200	μA
I_{CCH}	Logic High Supply Current	-	I_F=0mA, V_O=Open, V_{CC}=15V, T_A=25°C	-	0.01	1	μA
			I_F=0mA, V_O=Open, V_{CC}=15V	-	-	2	

Transfer Characteristics (T_A=0 to 70C unless specified otherwise)

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
CTR	Current Transfer Ratio		I_F=16mA, V_O=0.4V, V_{CC}=4.5V, T_A=25°C	20	-	50	%
			I_F=16mA, V_O=0.5V, V_{CC}=4.5V	15	-	-	
V_{OL}	Logic Low Output Voltage		I_F=16mA, I_O=3mA, V_{CC}=4.5V, T_A=25°C	-	-	0.4	V
			I_F=16mA, I_O=2.4mA, V_{CC}=4.5V	-	-	0.5	Ω

Switching Characteristics (TA=25°C, Vcc=5V)

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
T_{PHL}	Propagation Delay Time Logic High to Logic Low		I_F=16mA, R_L=1.9KΩ, T_A=25°C	-	0.35	0.8	µs
			I_F=16mA, R_L=1.9KΩ	-	-	1.0	
T_{PLH}	Propagation Delay Time Logic Low to Logic High		I_F=16mA, R_L=1.9KΩ, T_A=25°C	-	0.3	0.8	µs
			I_F=16mA, R_L=1.9KΩ	-	-	1.0	
CM_H	Common Mode Transient Immunity at Logic High	CTM452	I_F = 0mA, V_{CM}=10Vp-p, R_L=1.9KΩ, T_A =25°C	5000	-	-	V/µs
		CTM453	I_F = 0mA, V_{CM}=1500Vp-p, R_L=1.9KΩ, T_A =25°C	15000	-		
CM_L	Common Mode Transient Immunity at Logic Low	CTM452	I_F = 0mA, V_{CM}=10Vp-p, R_L=1.9KΩ, T_A =25°C	5000	-	-	V/µs
		CTM453	I_F = 0mA, V_{CM}=1500Vp-p, R_L=1.9KΩ, T_A =25°C	15000	-		

Characteristic Curves

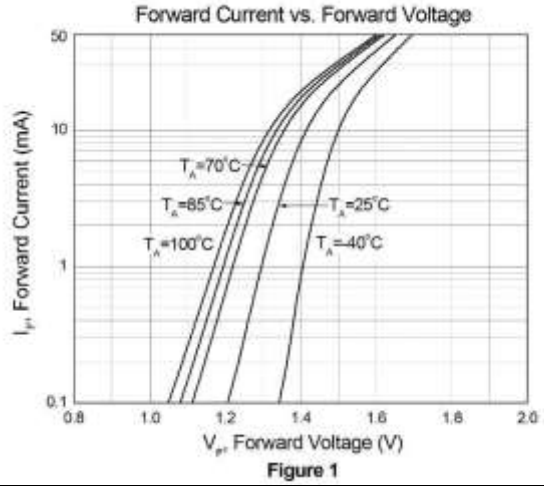


Figure 1

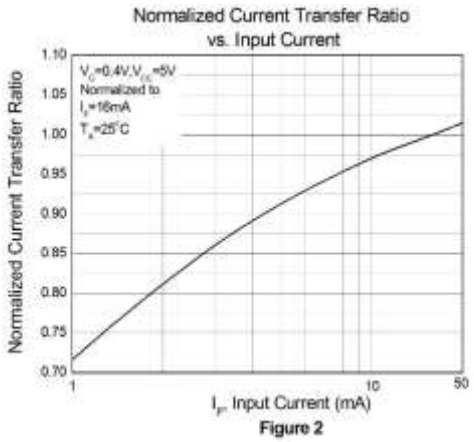
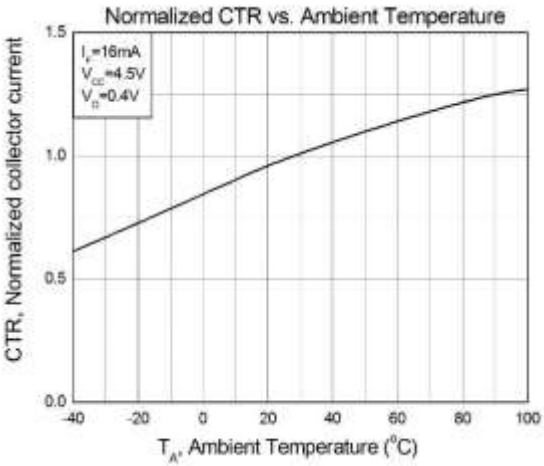


Figure 2



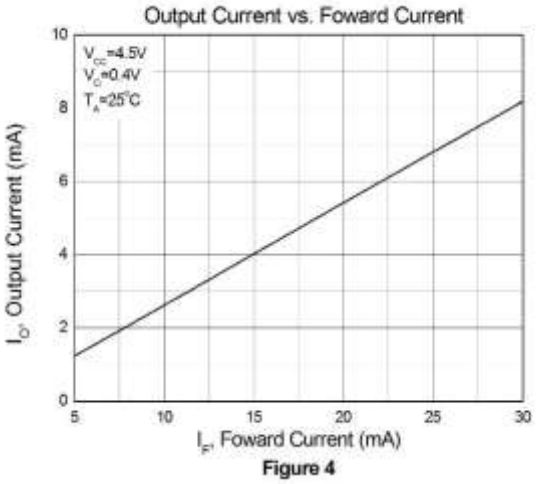


Figure 4

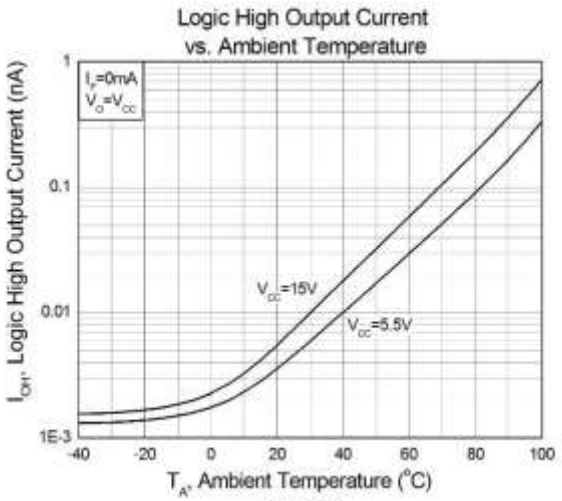


Figure 5

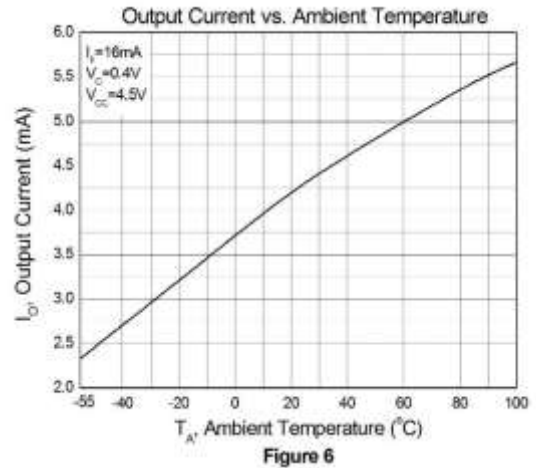


Figure 6

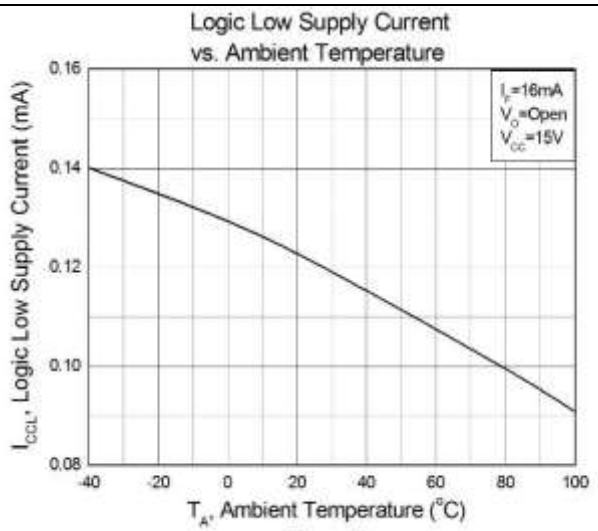
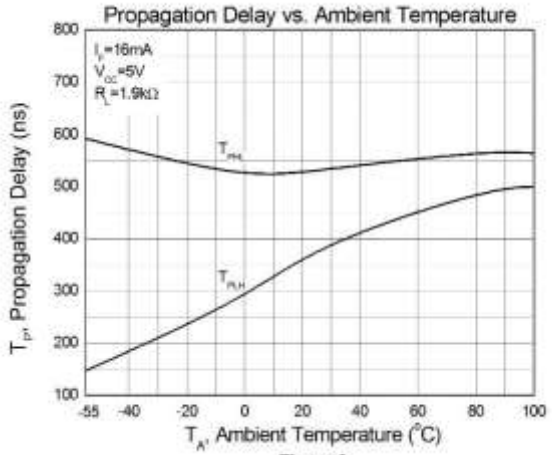


Figure 7



Figurt 8

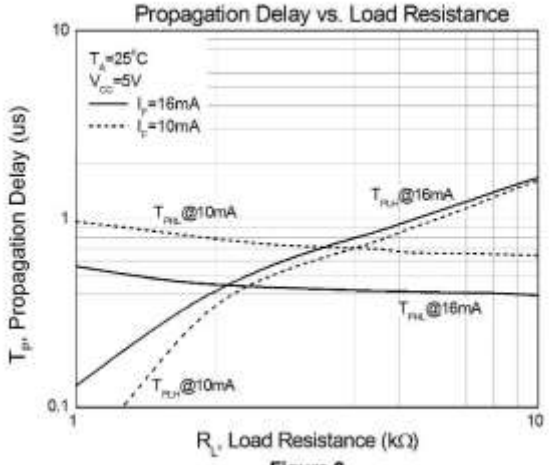


Figure 9

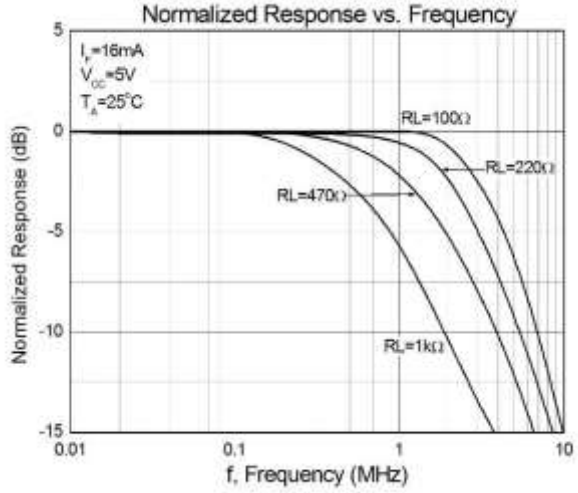
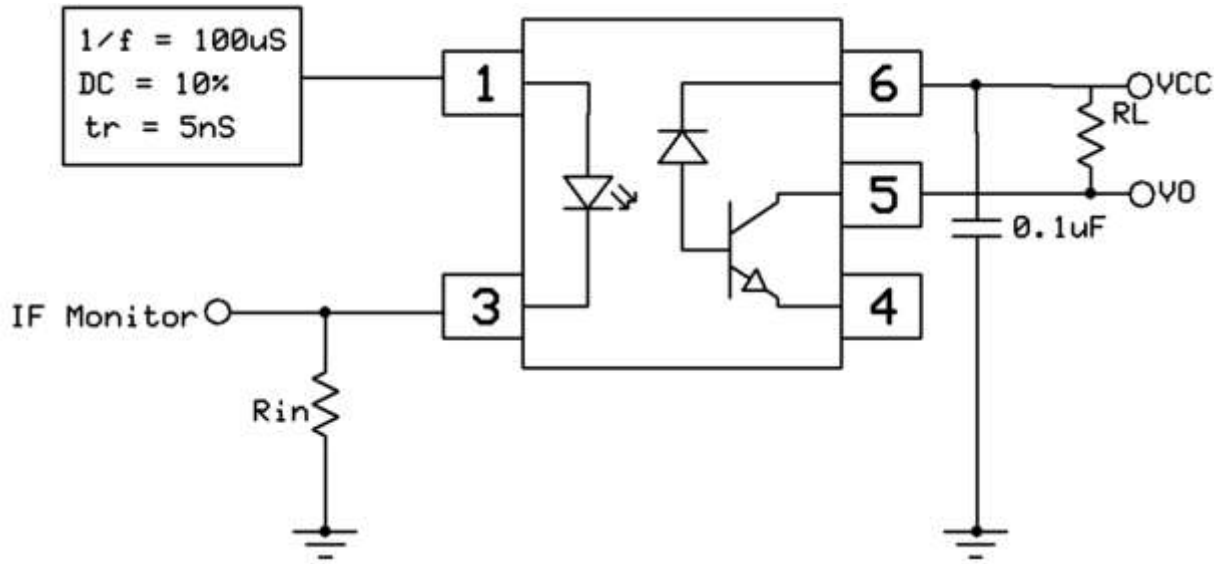
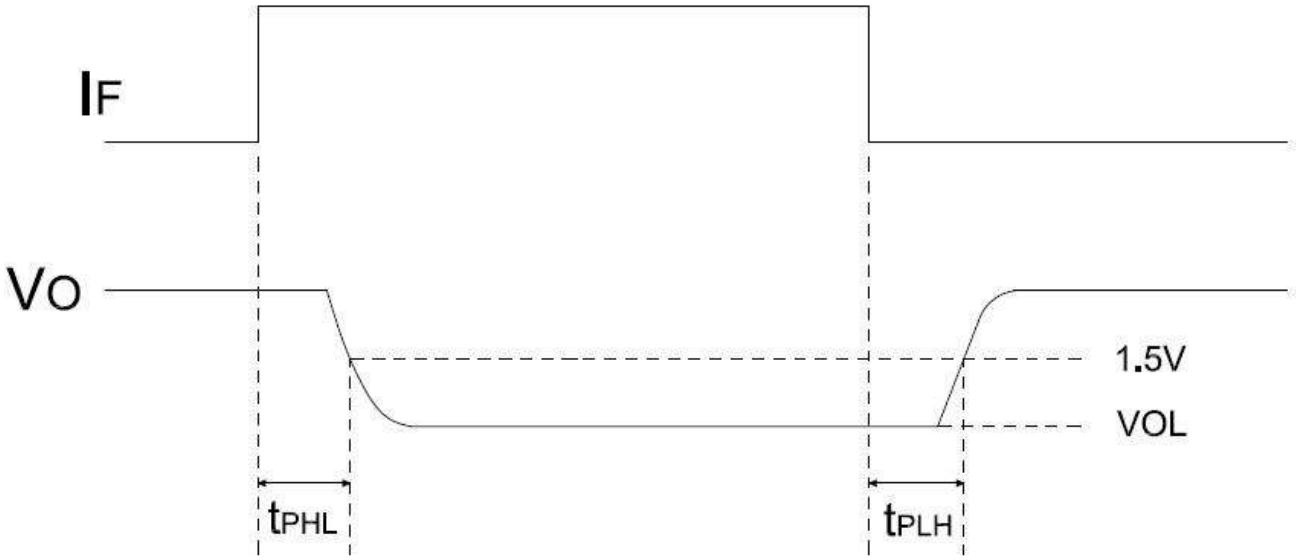


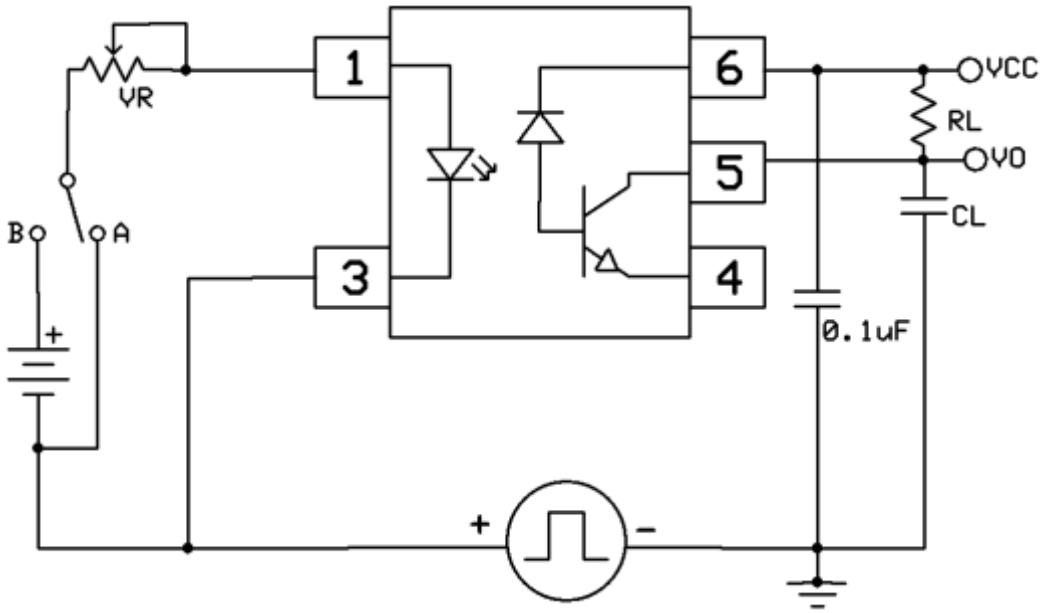
Figure 10

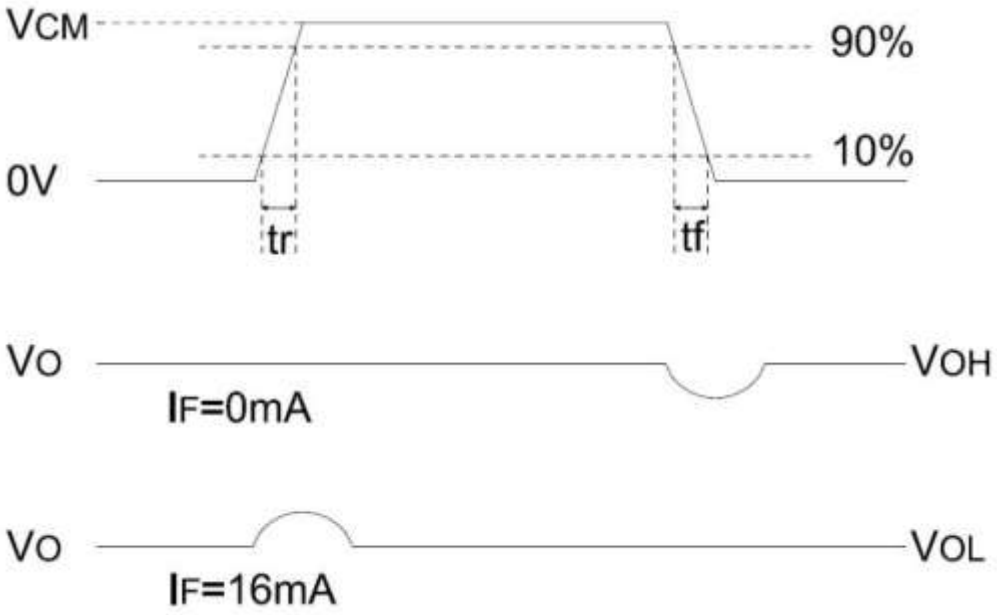
Test Circuits





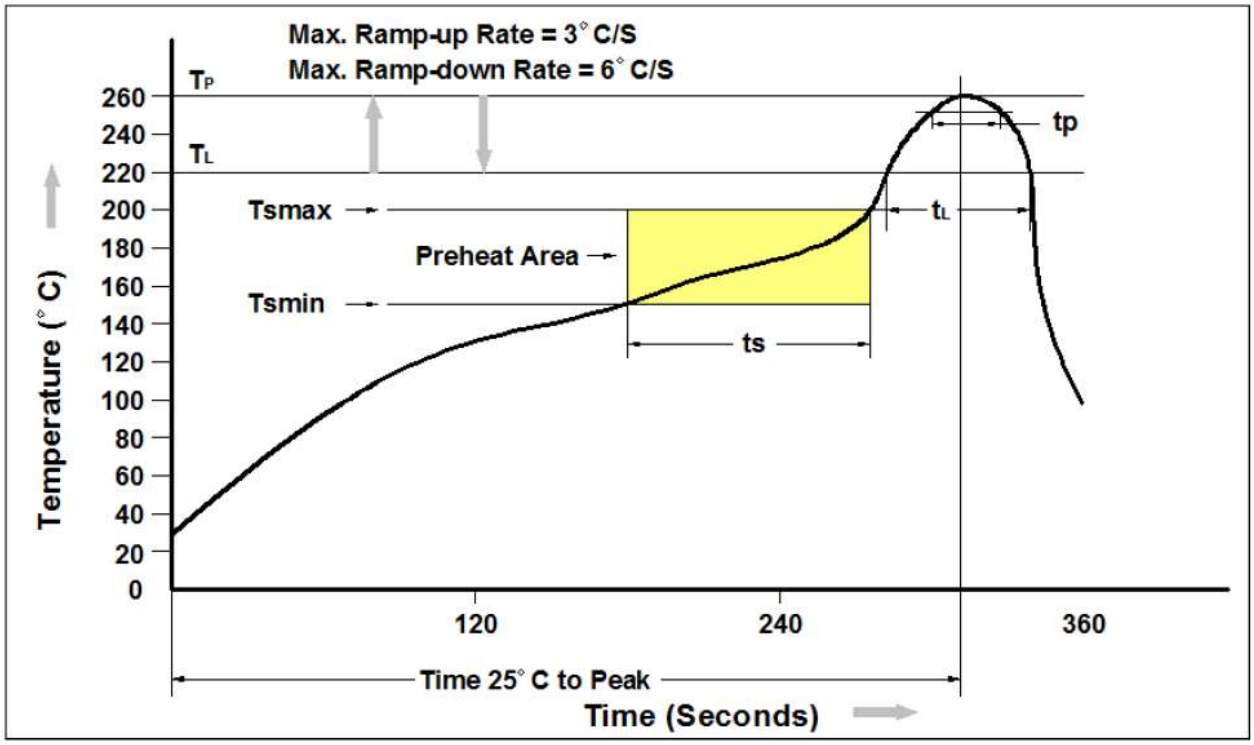
Switching Time Test Circuit



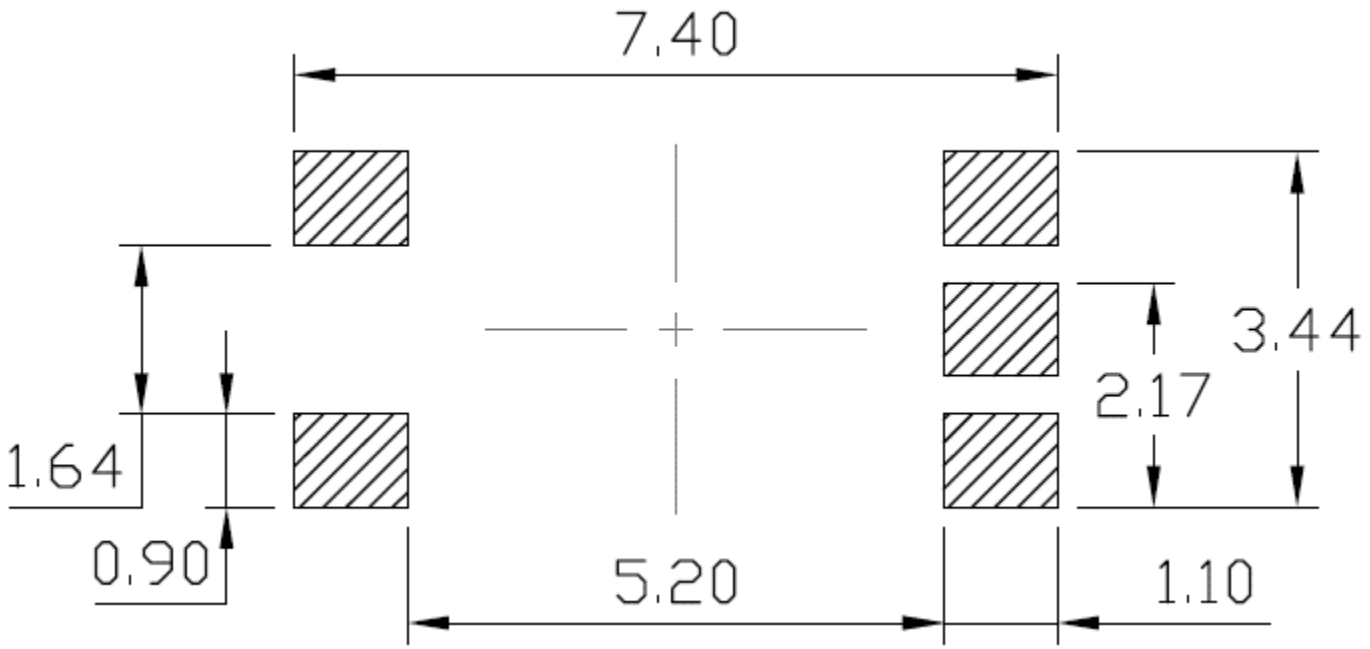


CMR Test Circuit

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.



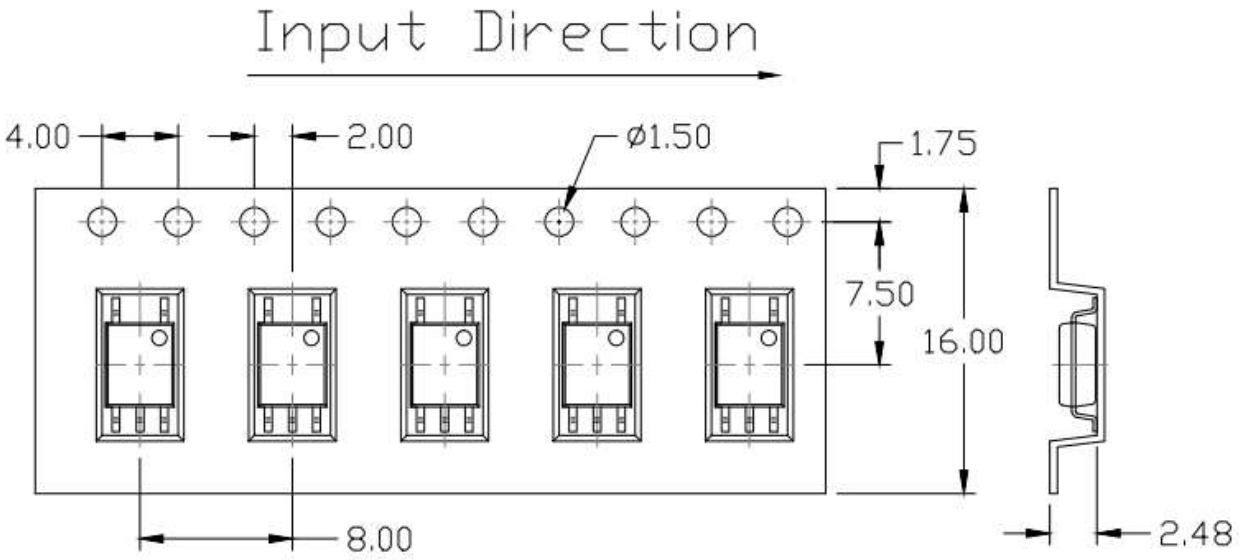
Recommended Solder Footprint for SMD Leadform

Units: mm tolerance: +/- 0.1mm

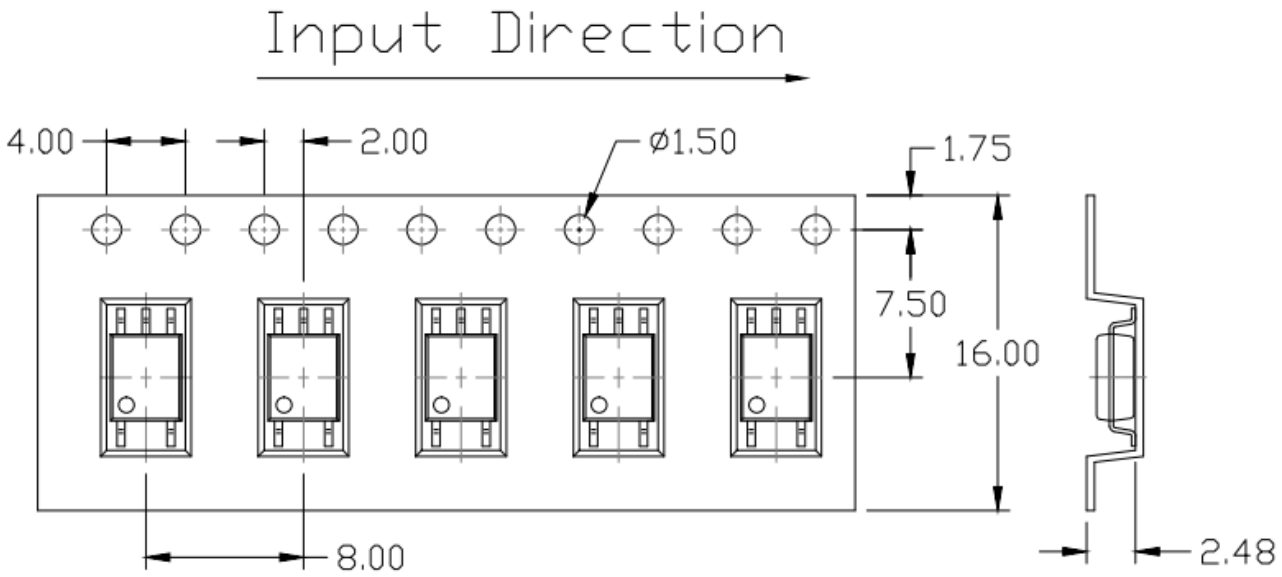
Packing & Labeling

Tape Dimension:

Option T1



Option T2



Device Marking

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

Ordering Information

QTM45X(V)(Z)
X = Part number (X=2 or 3)
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 QTM452_453	1.0	02/12/2018

Disclaimer

QT-BRIGHTEK reserves the right to make changes without further notice to any products herein to improve reliability, function or design. QT-BRIGHTEK does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights, nor the rights of others.

Life Support Policy

QT-BRIGHTEK's products are not authorized for use as critical components in life support devices or systems without the express written approval of QT-BRIGHTEK. As used herein:

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.