QT-Brightek Optocoupler Series

ZERO-CROSSING High Power TRIAC OPTOCOUPLER

Part No.: QTTX213 series

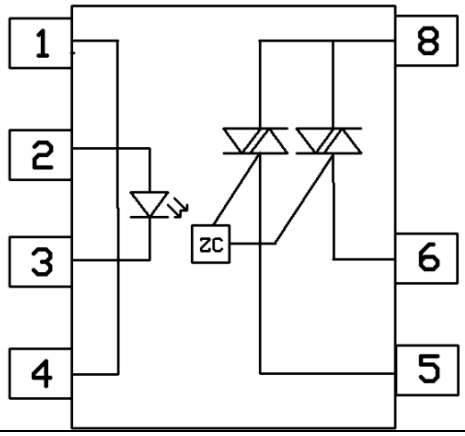
Table of Contents:

Introduction

Feature:

- High Isolation voltage between input and output (Viso = 5000V rms)
- Peak Breakdown Voltage – 600V
- Peak Current Load – 0.3A, 0.6A, 0.9A and 1.2A

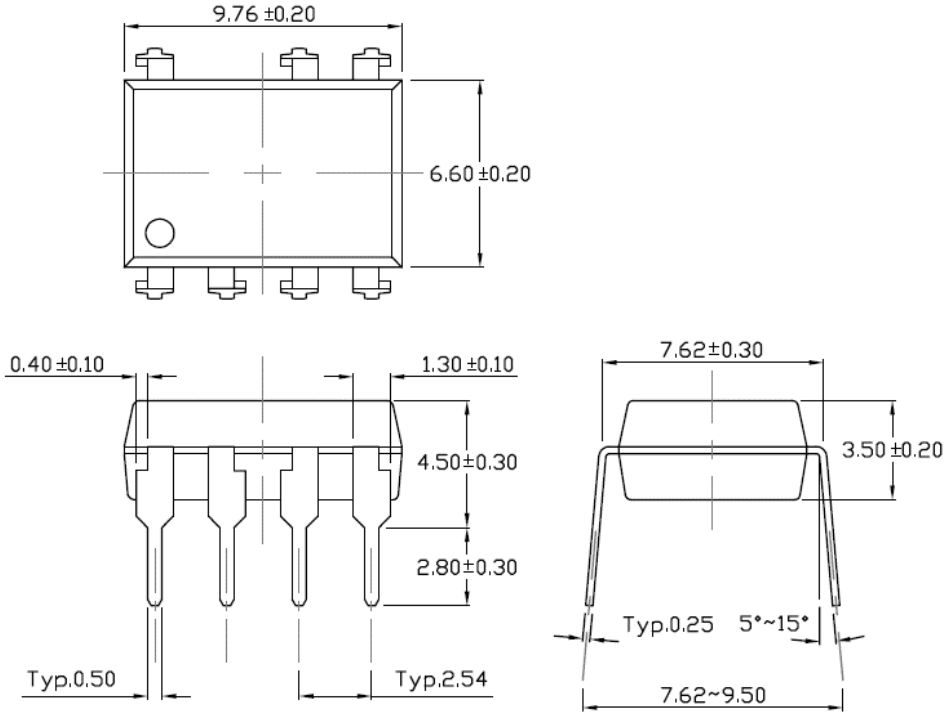
Schematic:



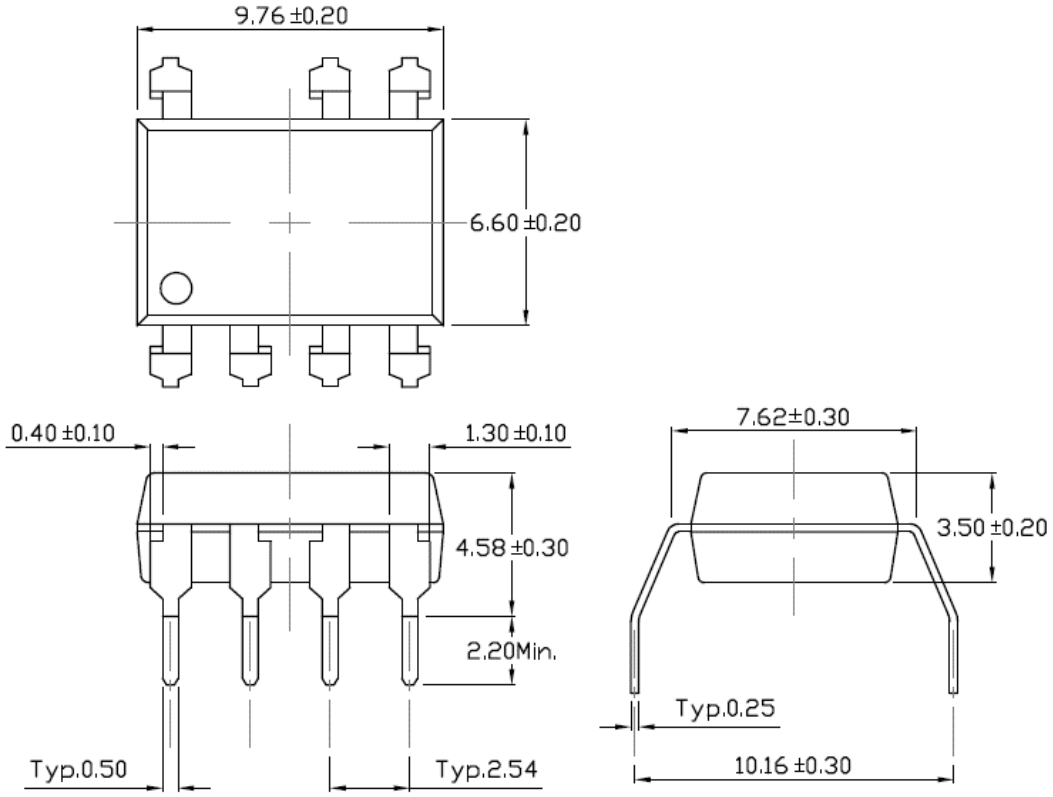
Certification & Compliance:

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

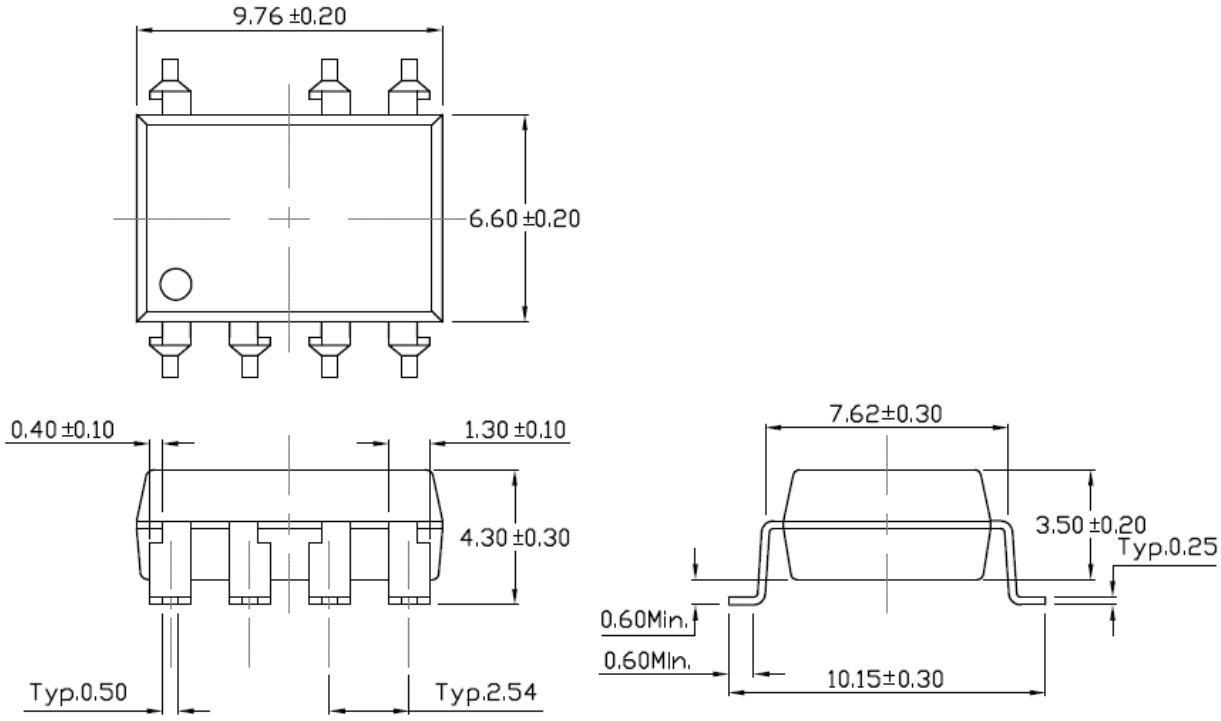
Dimension: (Dot location indicates pin 1)
7-Pin Dip (standard):



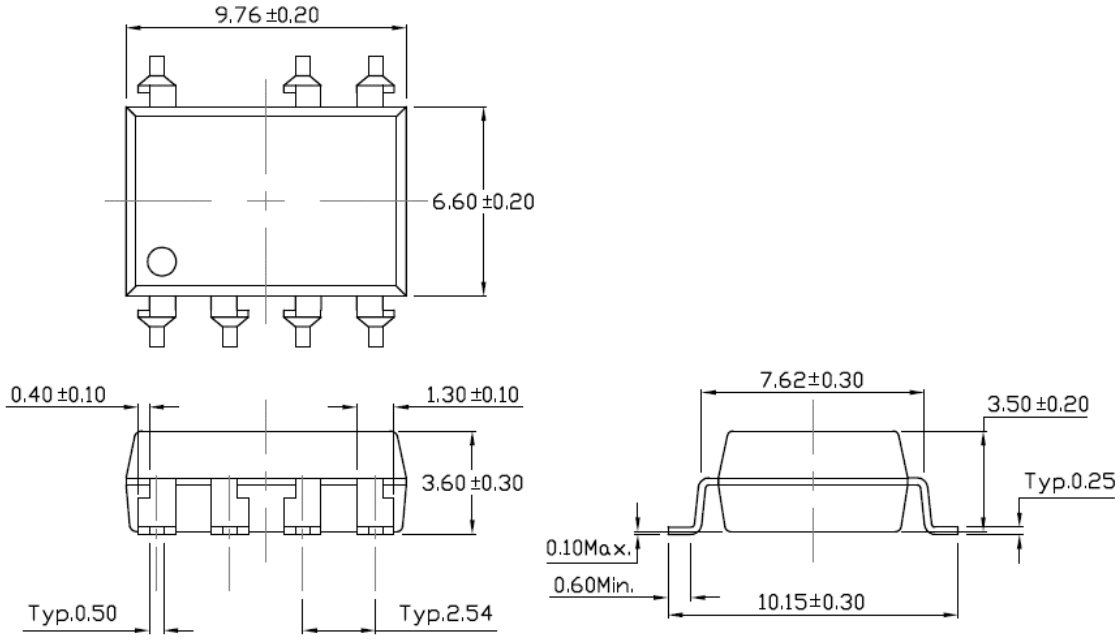
Gullwing (400mil) lead bend (Option M):



SMD lead bend (Option S):



SMD (Low Profile) bend (Option SL):



- All Dimensions are in mm

Absolute Maximum Rating

Symbol	Parameter		Rating	Units
V_{ISO}	Isolation Voltage*		5000	V_{RMS}
T_{STG}	Storage Temperature		-55 ~ 125	ºC
T_{OPR}	Operating Temperature		-55 ~ 85	ºC
T_{SOL}	Soldering Temperature		260 for 10 sec	ºC
EMITTER				
I_F	Continuous Forward Current		50	mA
I_{FP}	Peak Forward Current (≤ 1us, 300pps)		1	A
V_R	Reverse Voltage		6	V
P_D	Power Dissipation		75	mW
DETECTOR				
P_{OUT}	Power Dissipation		800	mW
P_T	Total Power Dissipation		850	mW
$I_{T(RMS)}$	Continuous Current Load	QTT0213	0.3	A
		QTT1213	0.6	
		QTT2213	0.9	
		QTT3213	1.2	
I_{TSM}	Peak Current Load	QTT0213	3	A
		QTT1213	6	
		QTT2213	9	
		QTT3213	12	
V_{DRM}	Off-state Output Terminal Voltage		600	V
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	-	-	1.3	V
I_R	Reverse Current	V_R = 6V	-	-	5	μA
C_{IN}	Input Capacitance	f =1kHz	-	45	-	pF

Detector

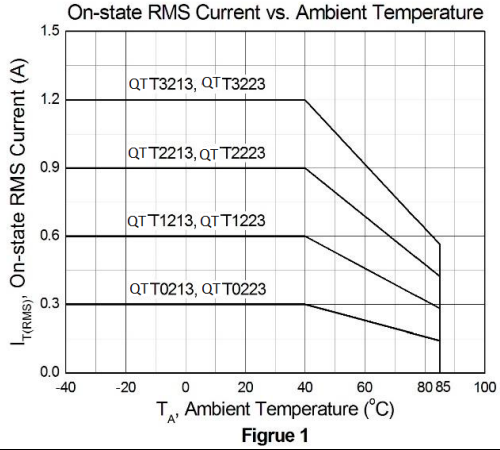
Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
I_{DRM1}	Peak Blocking Current	V_{DRM} =600V, I_F =0mA	-	-	100	μA
I_{DRM2}	Inhibit Leakage Current	I_F= Rated I_{FT}, V_{DRM}= 600V	-	-	500	μA
V_{INH}	Inhibit Voltage	I_F= Rated I_{FT}	-	-	20	V
V_{TM}	Peak on-state voltage	I_{TM} = 100mA peak, I_F = Rated I_{FT}	-	-	2.5	V
dv/dt	Critical Rate of Rise off-state voltage	V_{PEAK} = Rated V_{DRM}, I_F = 0 (refer to test circuit for dv/dt)	200	-	-	V/ μs

Transfer Characteristic

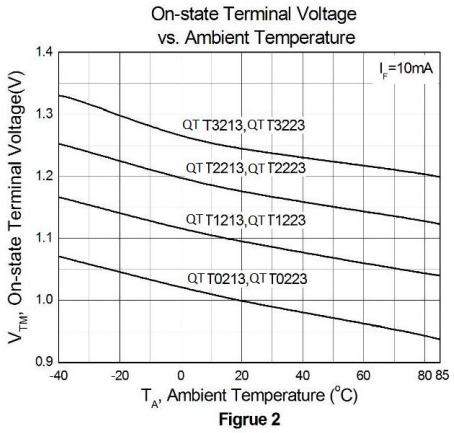
Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
I_{FT}	LED Trigger Current	Main terminal voltage = 3V	-	-	10	mA
I_H	Holding Current		-	-	25	mA
R_{IO}	Isolation Resistance	V_{IO}=500V_{DC}	$1x10^{11}$	-	-	Ω
C_{IO}	Isolation Capacitance	F=1MHz	-	0.25	-	pF

Characteristic Curves

QTTX213



Figrue 1



Figrue 2

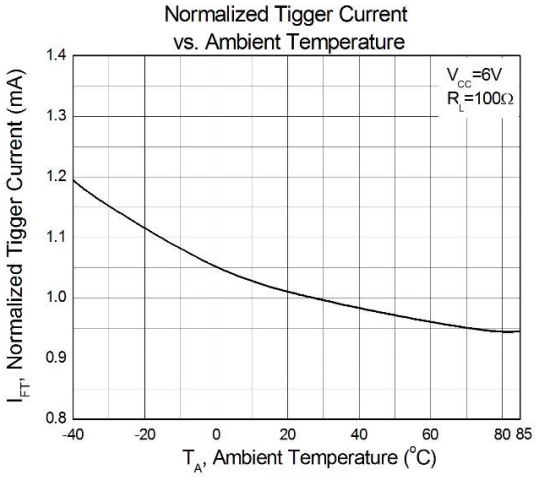


Figure 3

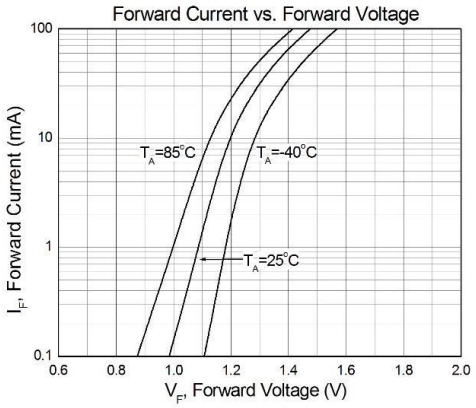


Figure 4

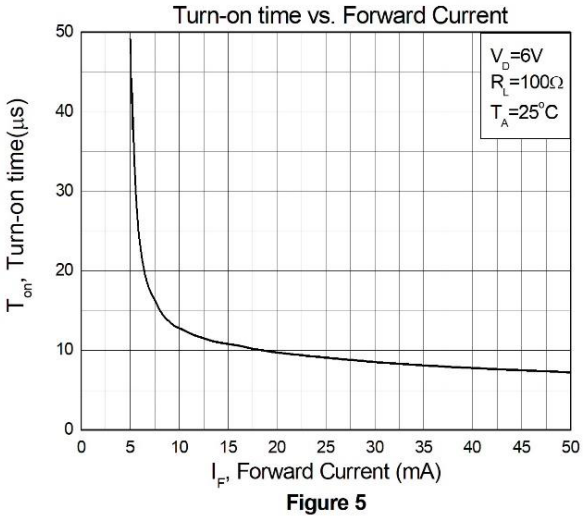


Figure 5

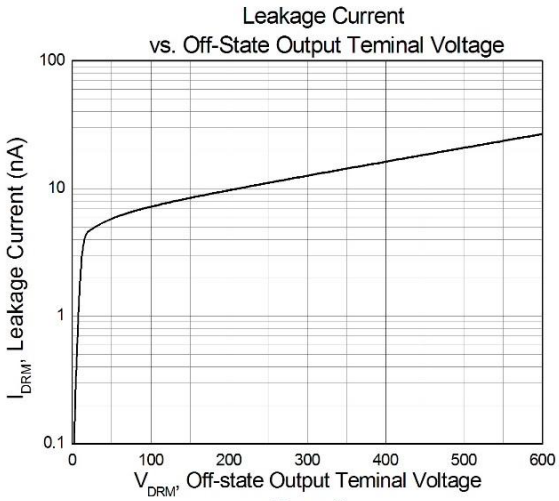


Figure 6

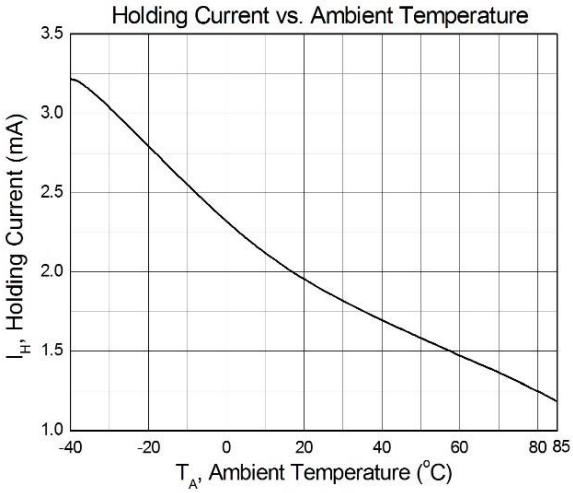


Figure 7

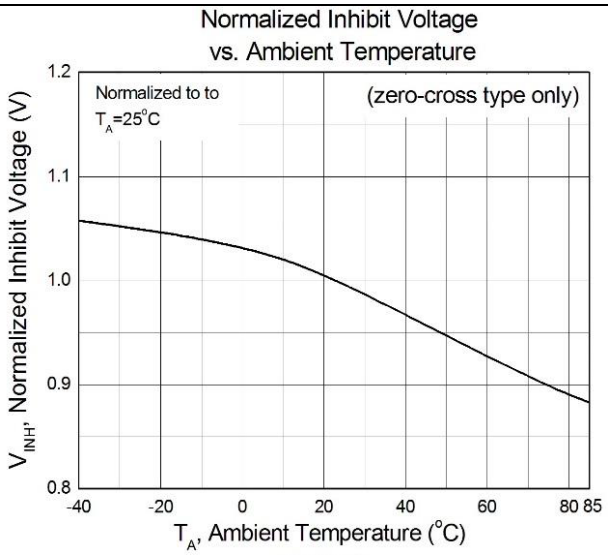
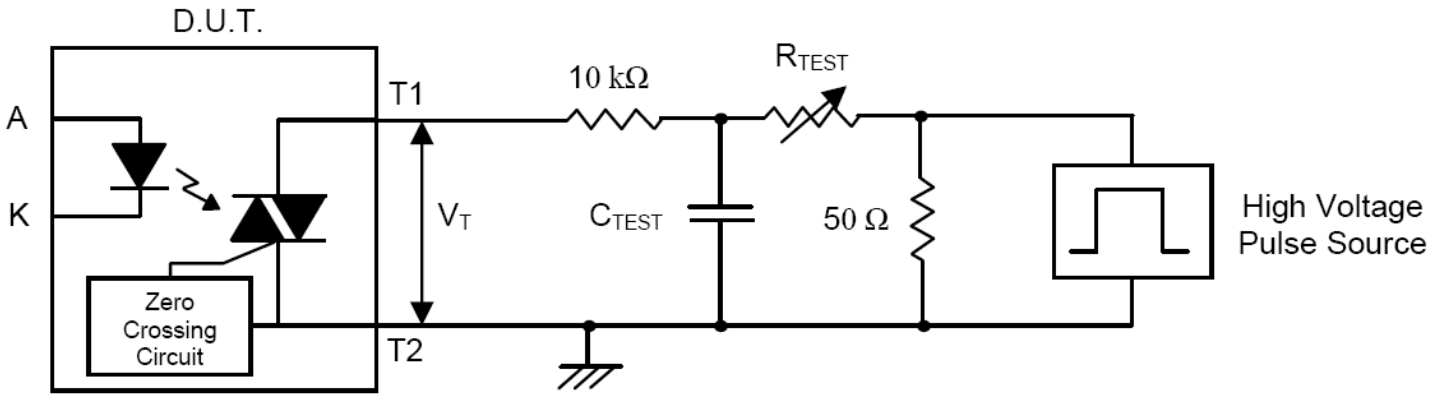
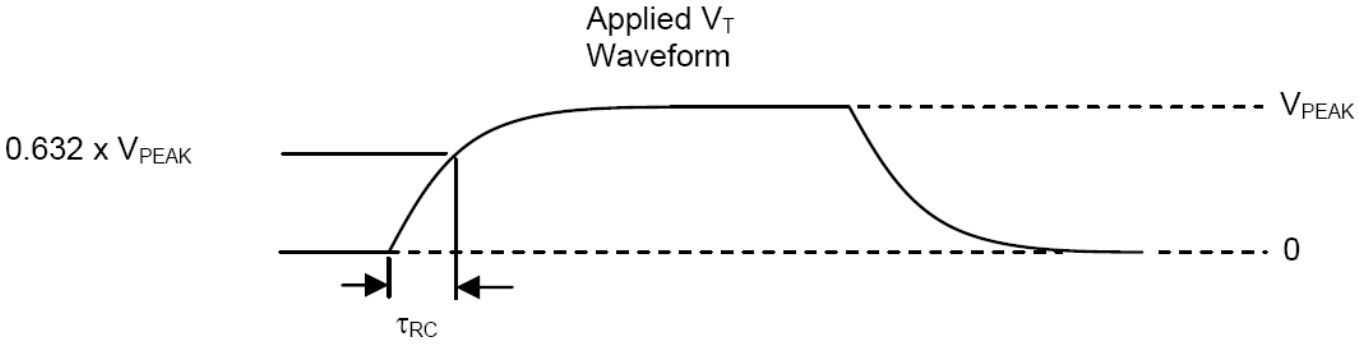


Figure 8

Test Circuit for static dv/dt



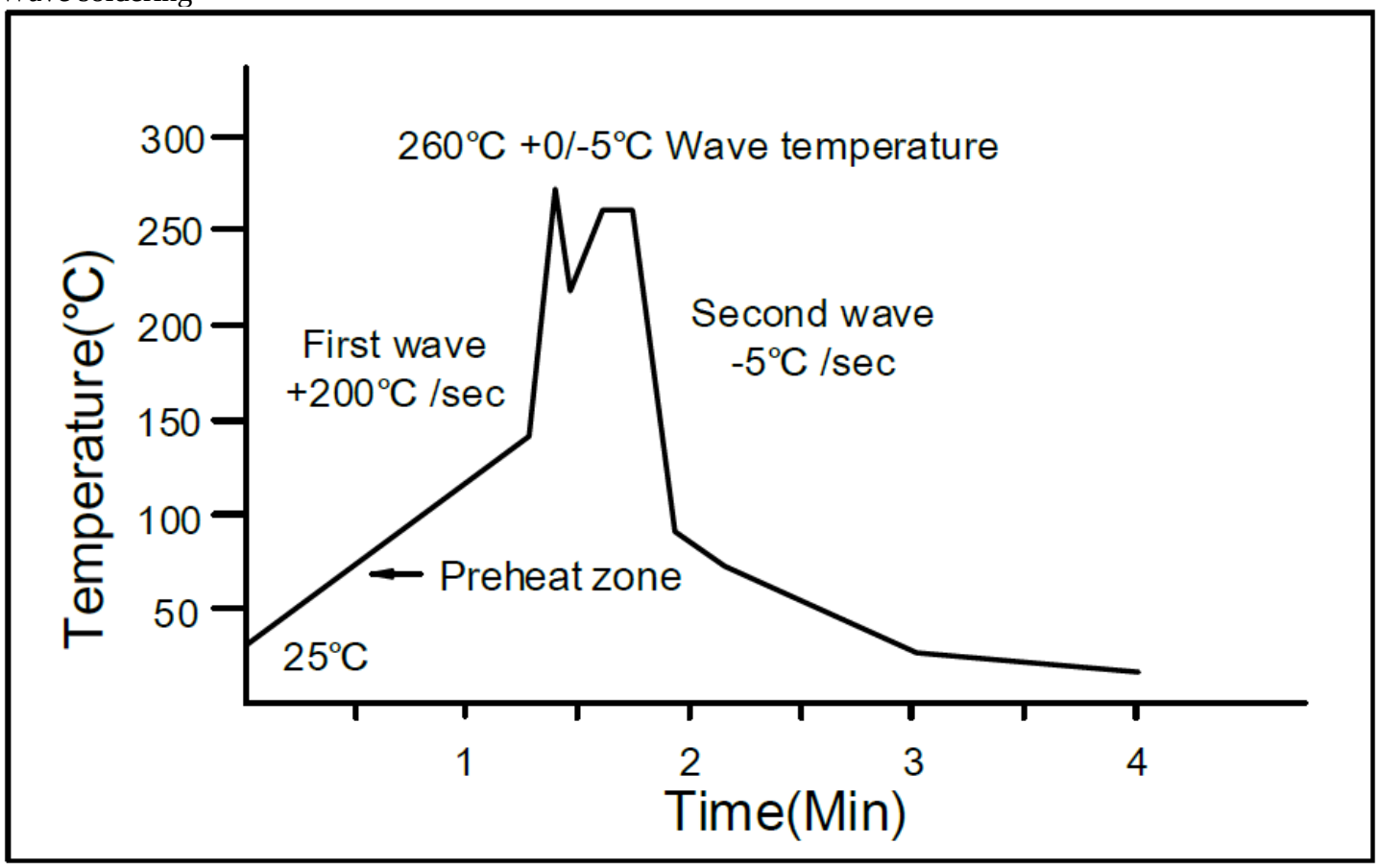


The high voltage pulse is set to the required V_{PEAK} value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform V_T is monitored using a x100 scope probe. By varying R_{TEST}, the dv/dt (slope) is increased, until the D.U.T. is observed to trigger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

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

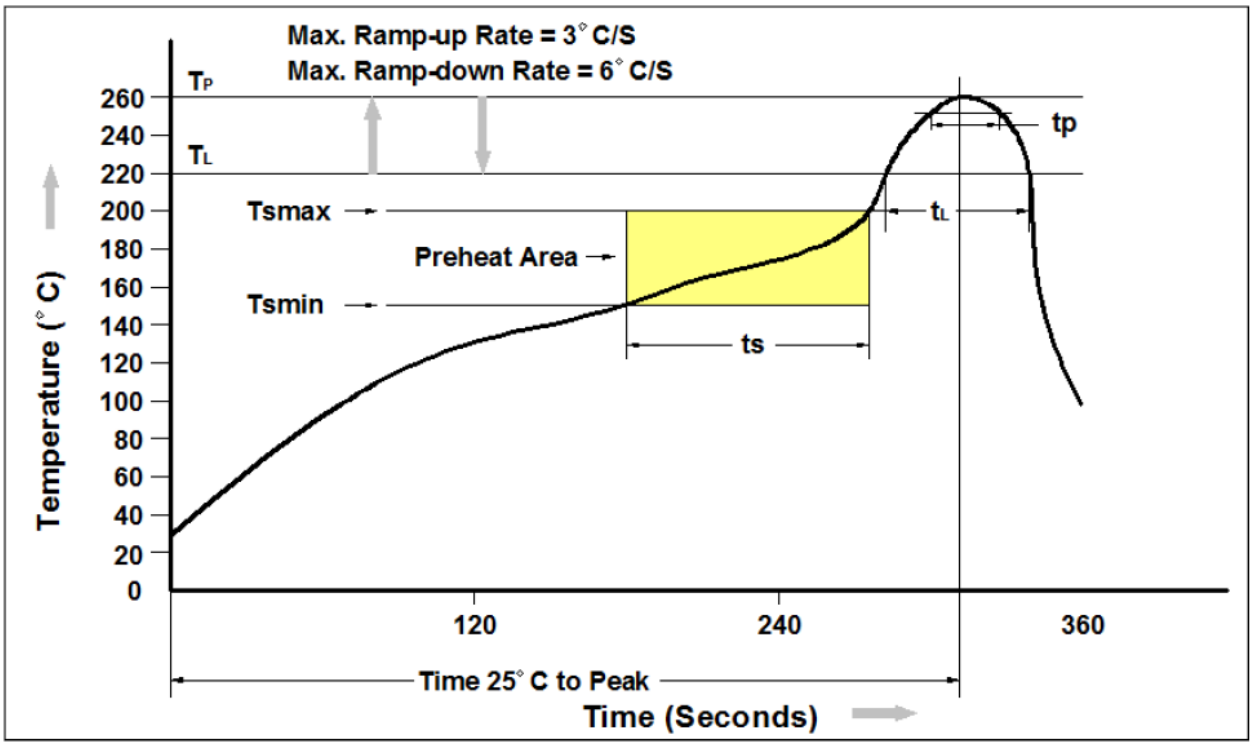
Solder Profile & Footprint

Wave soldering



Temperature: 260 +0/-5 ºC
Time: 10 Sec
Preheat temperature: 25 to 140 ºC
Preheat time: 30 to 80 sec.

Reflow soldering



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.

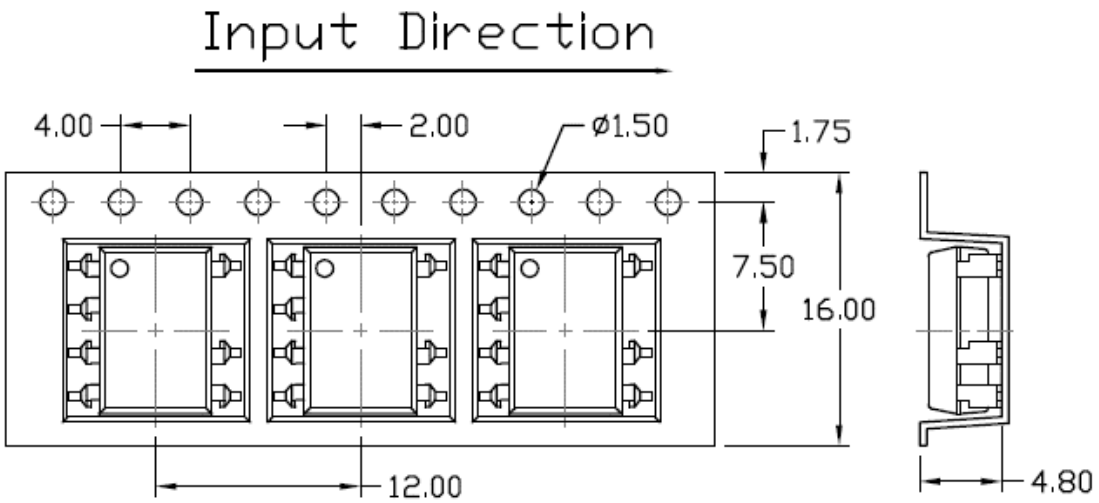
Recommended Solder Footprint for SMD Leadform

Units: mm tolerance: +/- 0.1mm

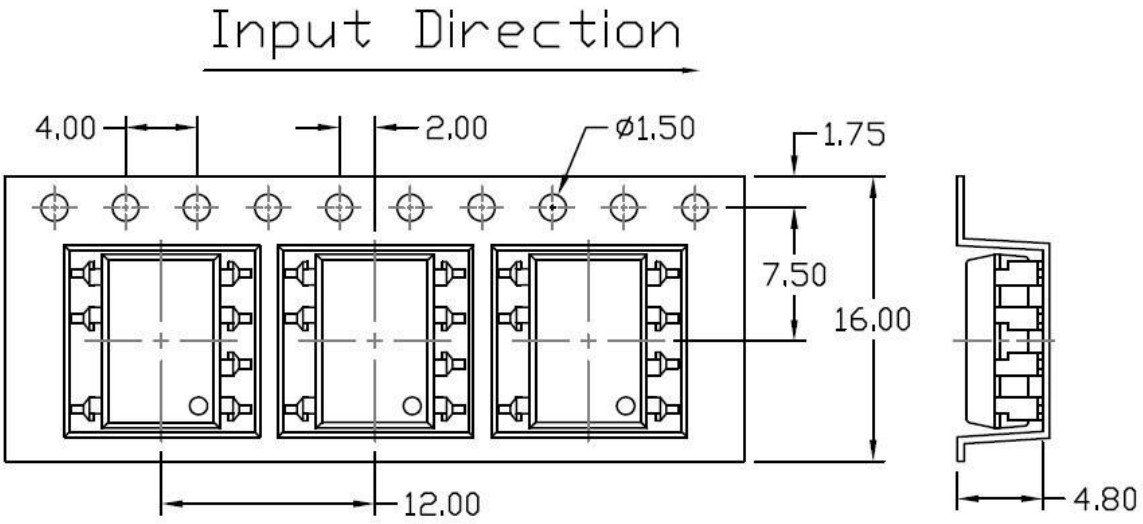
Packing & Labeling

Tape Dimension:

Option S(T1) & SL(T1)

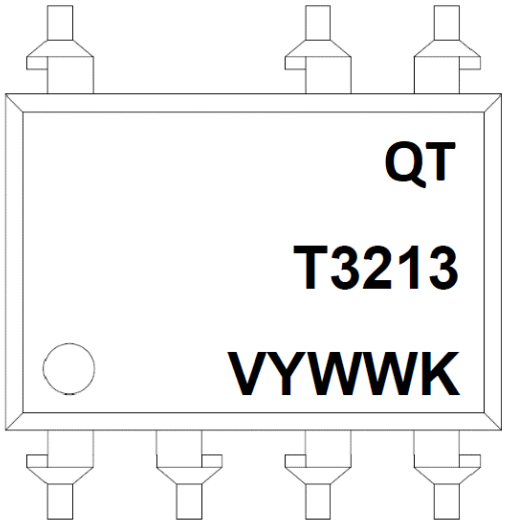


Option S(T2) & SL(T2)



Unit: mm

Device Marking:



QT = QT-Brightek Corporation
T3213 = part number
Y = Year
WW = Week
V = VDE Option
K= Manufacturing code

Ordering Information

QTTX213 (V)(Y)(Z)
TX213 = Part number (X=0, 1, 2, or 3)
V = VDE option (V or None)
Y = Lead form option (S, SL, M or none)
Z = Tape and reel option (T1 or T2 or none)

Option	Description	Quantity
None	Standard 8-Pin DIP	40 Units/Tube
M	Gullwing	40 Units/Tube
S(T1)	Surface Mount Lead Forming – with Option 1 Taping	1000 pcs/ reel
S(T2)	Surface Mount Lead Forming – with Option 2 Taping	1000 pcs/ reel
SL(T1)	SMD (Low Profile) Lead Forming – with Option 1 Taping	1000 pcs/ reel
SL(T2)	SMD (Low Profile) Lead Forming – with Option 2 Taping	1000 pcs/ reel

Revision History

Description:	Revision #	Revision Date
Initial of QTTX213 series	1.0	02/02/2018

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.