

## **QT-Brightek Optocoupler Series**

# **ZERO-CROSSING High Power TRIAC OPTOCOUPLER**

**Part No.: QTTX213 series**

Product: QTTX213 series	Date: March 27, 2023	Page 1 of 15
	Version# 1.1	



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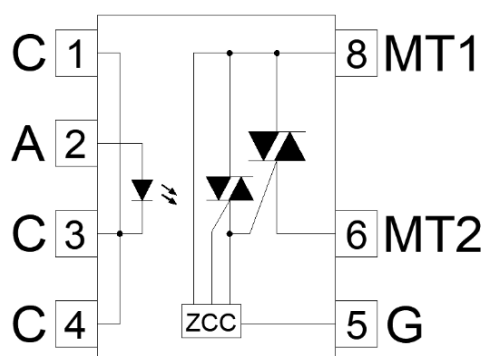
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## Introduction

### Feature:

- High Isolation voltage between input and output (Viso = 5000 Vrms)
- Peak Breakdown Voltage: 600V
- Peak Current Load: 0.3A, 0.6A, 0.9A and 1.2A
- External creepage distance  $\geq 7.0\text{mm}$
- Distance through isolation  $\geq 0.4\text{mm}$
- External creepage  $\geq 8\text{mm}$

### Schematic:



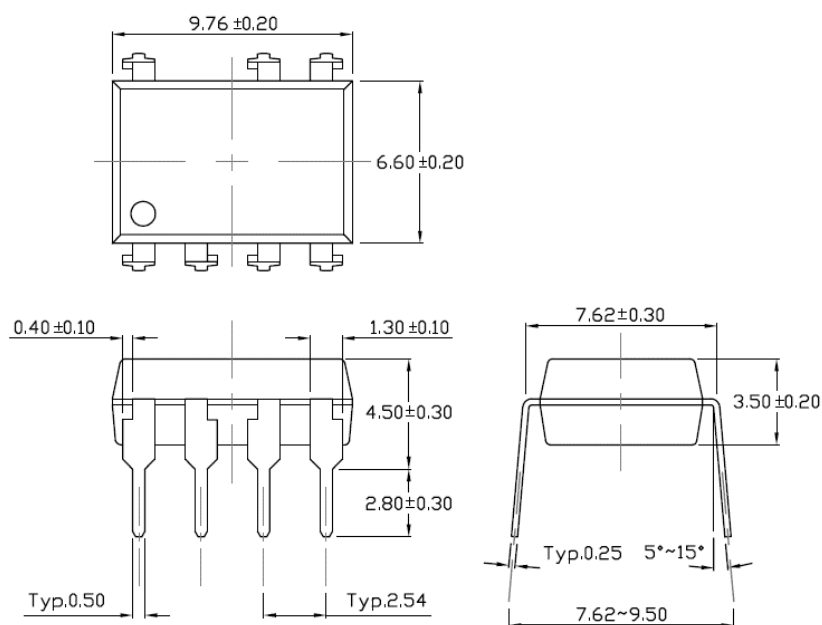
### Certification & Compliance:

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

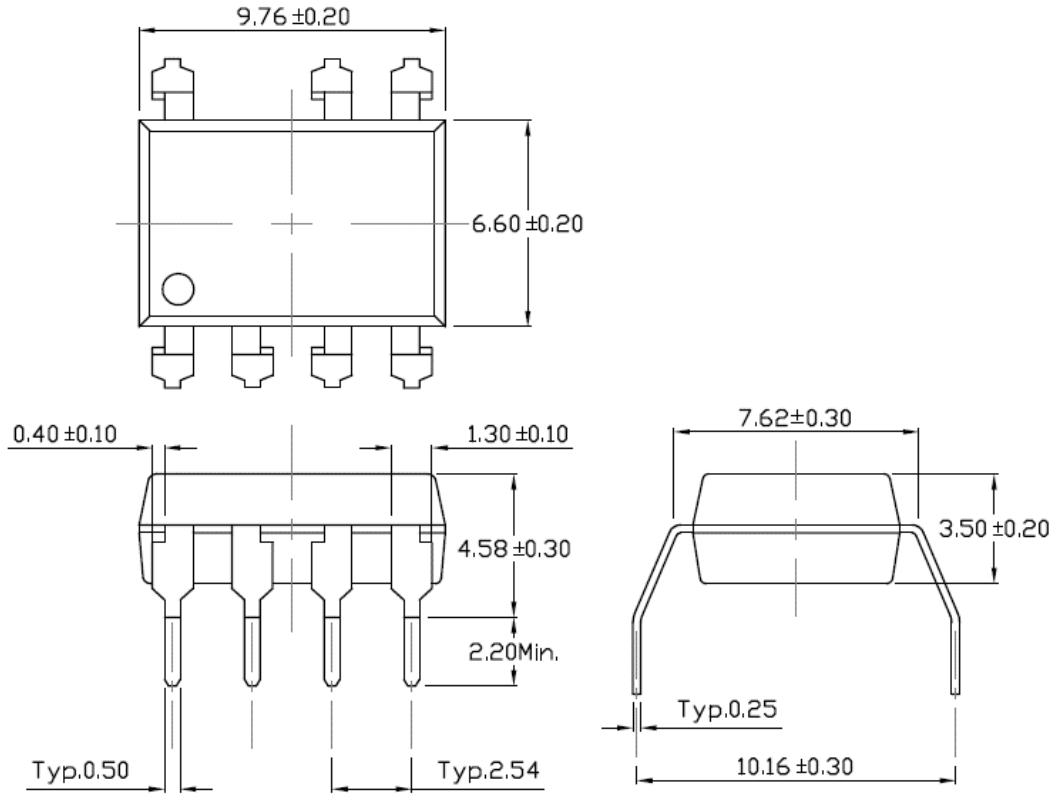


### Dimension: (Dot location indicates pin 1)

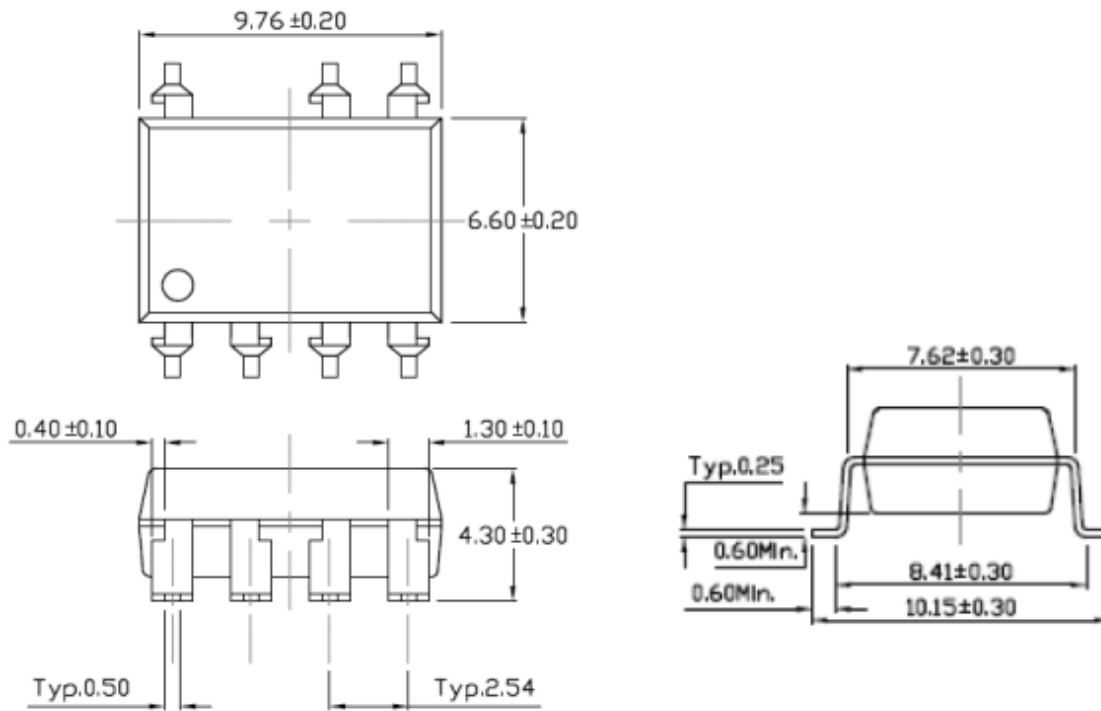
#### 7-Pin Dip (standard):



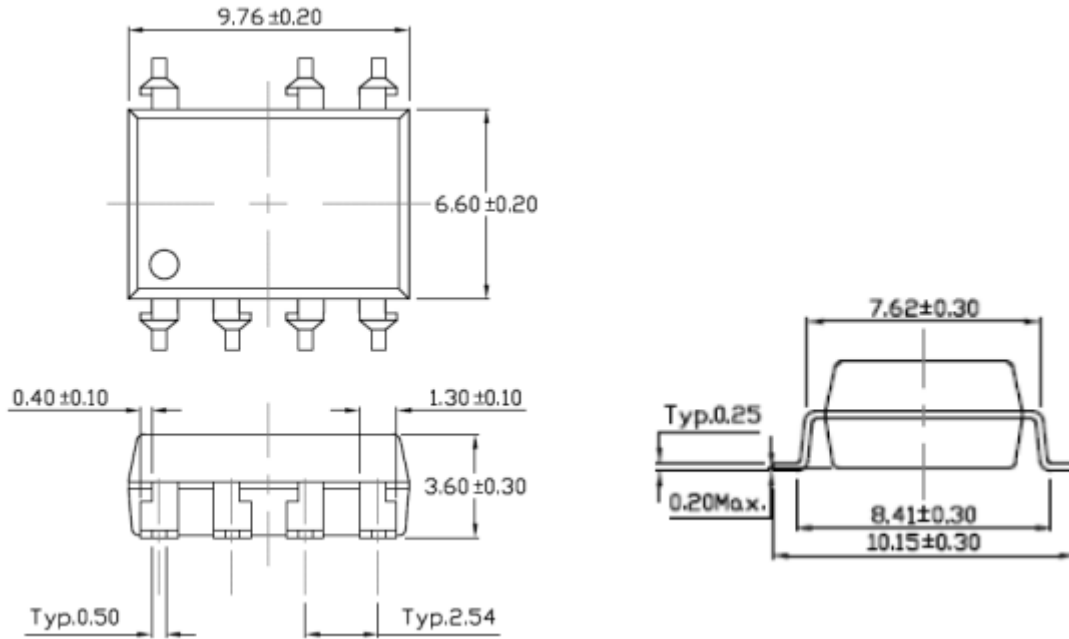
**Gullwing (400mil) lead bend (Option M):**



**SMD lead bend (Option S):**



**SMD (Low Profile) bend (Option SL):**



All Dimensions are in mm

### Absolute Maximum Rating

Symbol	Parameter	Rating	Units	
V <sub>ISO</sub>	Isolation Voltage*	5000	V <sub>RMS</sub>	
T <sub>STG</sub>	Storage Temperature	-40 ~ +85	°C	
T <sub>OPR</sub>	Operating Temperature	-40 ~ +125	°C	
T <sub>SOL</sub>	Soldering Temperature	260 for 10 sec	°C	
<b>EMITTER</b>				
I <sub>F</sub>	Continuous Forward Current	50	mA	
I <sub>FP</sub>	Peak Forward Current (≤ 1us, 300pps)	1	A	
V <sub>R</sub>	Reverse Voltage	6	V	
P <sub>D</sub>	Power Dissipation	75	mW	
<b>DETECTOR</b>				
P <sub>OUT</sub>	Power Dissipation	800	mW	
P <sub>T</sub>	Total Power Dissipation	850	mW	
I <sub>T(RMS)</sub>	Continuous Current Load	QTT0213	0.3	A
		QTT1213	0.6	
		QTT2213	0.9	
		QTT3213	1.2	
I <sub>TSM</sub>	Peak Current Load	QTT0213	3	A
		QTT1213	6	
		QTT2213	9	
		QTT3213	12	
V <sub>DRM</sub>	Off-state Output Terminal Voltage	600	V	
I <sub>TSM</sub>	Peak Repetitive Surge Current	1	A	

**Electrical Characteristic (T<sub>A</sub>=25 °C)**
**Emitter**

Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
V <sub>F</sub>	Forward Voltage	I <sub>F</sub> =10mA	-	-	1.4	V
I <sub>R</sub>	Reverse Current	V <sub>R</sub> =6V	-	-	5	μA
C <sub>IN</sub>	Input Capacitance	f=1kHz	-	45	-	pF

**Detector**

Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
I <sub>DRM1</sub>	Peak Blocking Current	V <sub>DRM</sub> =600V, I <sub>F</sub> =0mA	-	-	100	μA
I <sub>DRM2</sub>	Inhibit Leakage Current	I <sub>F</sub> = Rated I <sub>FT</sub> , V <sub>DRM</sub> = 600V	-	-	500	μA
V <sub>INH</sub>	Inhibit Voltage	I <sub>F</sub> = Rated I <sub>FT</sub> , V <sub>DRM</sub> = 600V	-	-	50	V
V <sub>TM</sub>	Peak on-state voltage	I <sub>TM</sub> = 100mA peak, I <sub>F</sub> = Rated I <sub>FT</sub>	-	-	2.5	V
dv/dt	Critical Rate of Rise off-state voltage	V <sub>PEAK</sub> = Rated V <sub>DRM</sub>	200	-	-	V/μs

**Transfer Characteristic**

Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
I <sub>FT</sub>	LED Trigger Current	Main terminal voltage = 3V	-	-	10	mA
I <sub>H</sub>	Holding Current	Terminal Voltage from "ON" to "OFF" "ON" state I <sub>F</sub> =0mA	-	-	25	mA
T <sub>on</sub>	Turn On Time	I <sub>F</sub> = 20mA, V <sub>D</sub> = 6V, R <sub>L</sub> =100Ω		10	100	μs
R <sub>IO</sub>	Isolation Resistance	V <sub>IO</sub> =500V <sub>DC</sub>	1x10 <sup>11</sup>	-	-	Ω
C <sub>IO</sub>	Isolation Capacitance	f=1MHz	-	0.25	-	pF

## Characteristic Curves

QTTX213

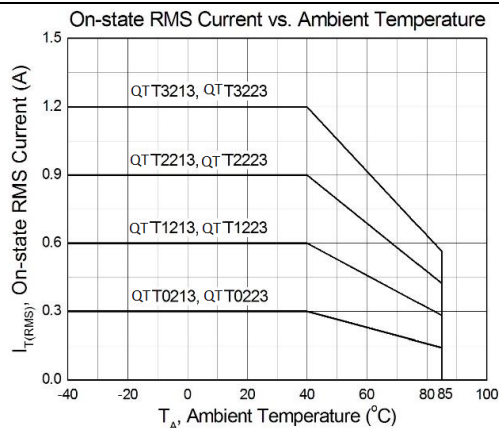


Figure 1

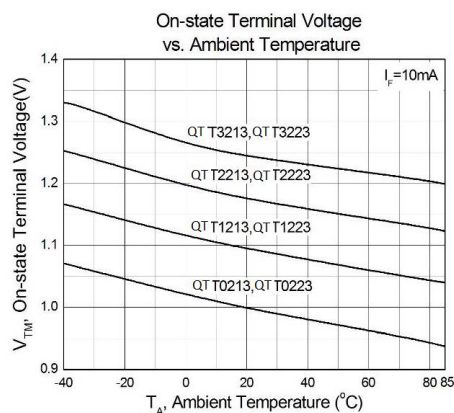


Figure 2

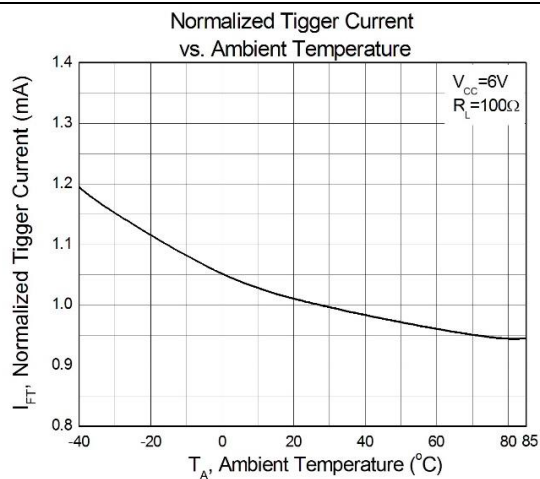


Figure 3

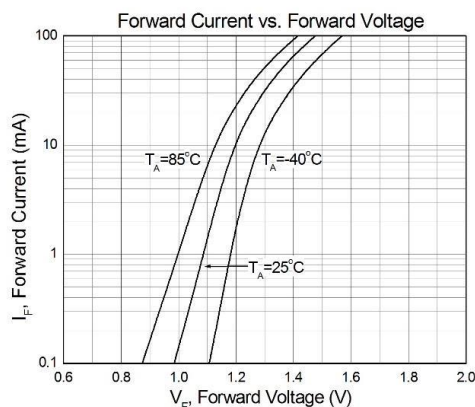


Figure 4

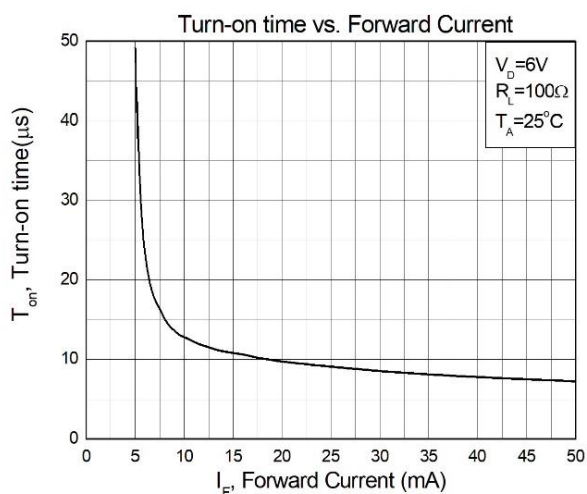


Figure 5

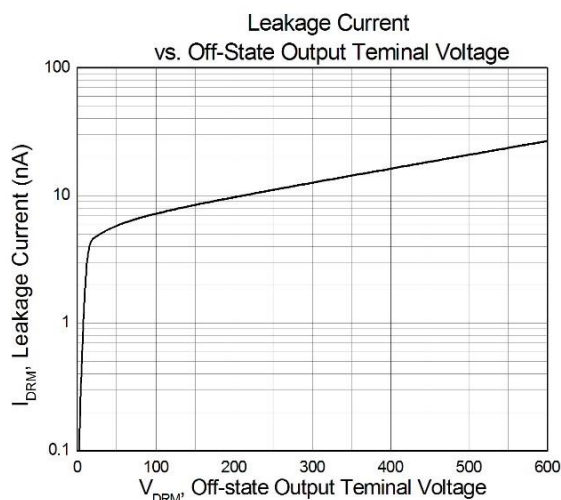
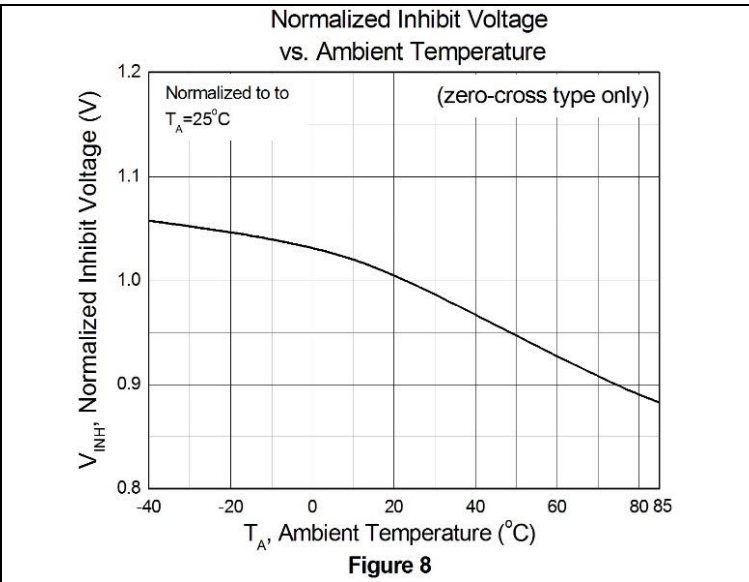
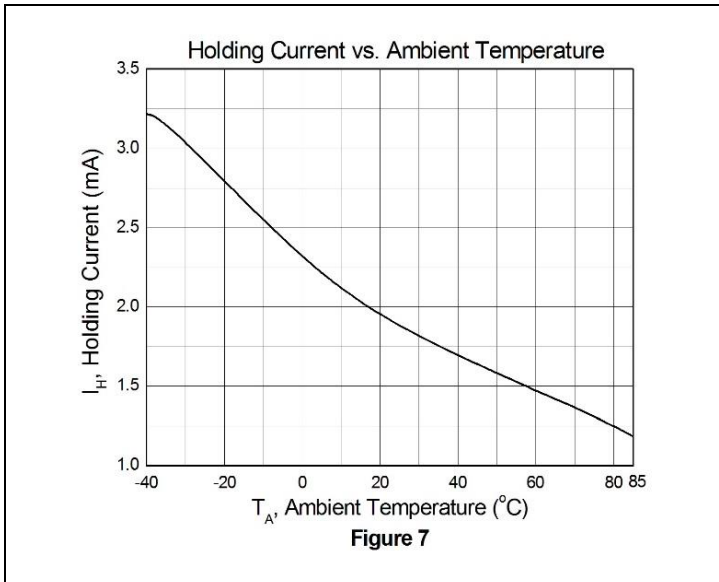


Figure 6

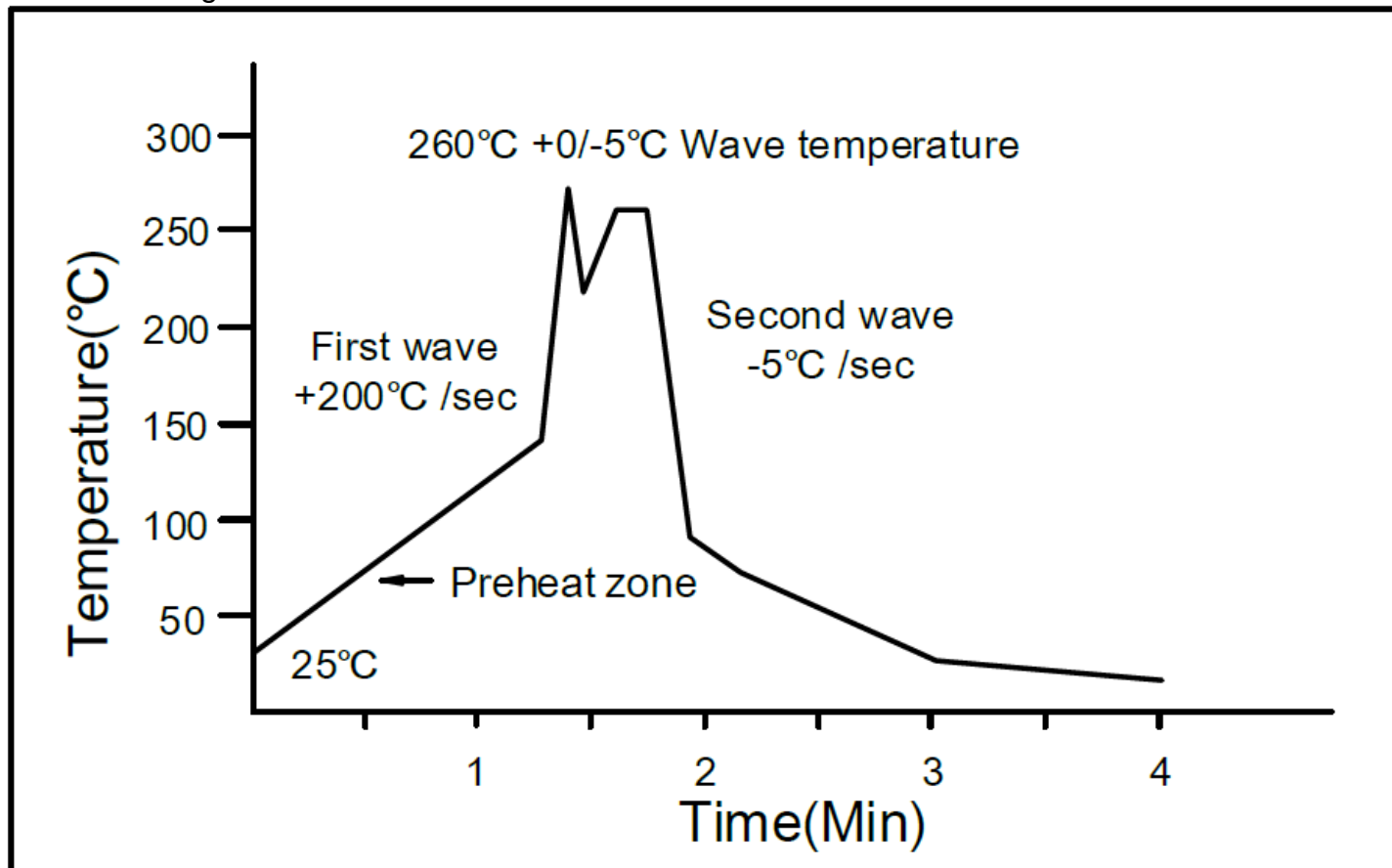




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## Solder Profile & Footprint

Wave soldering



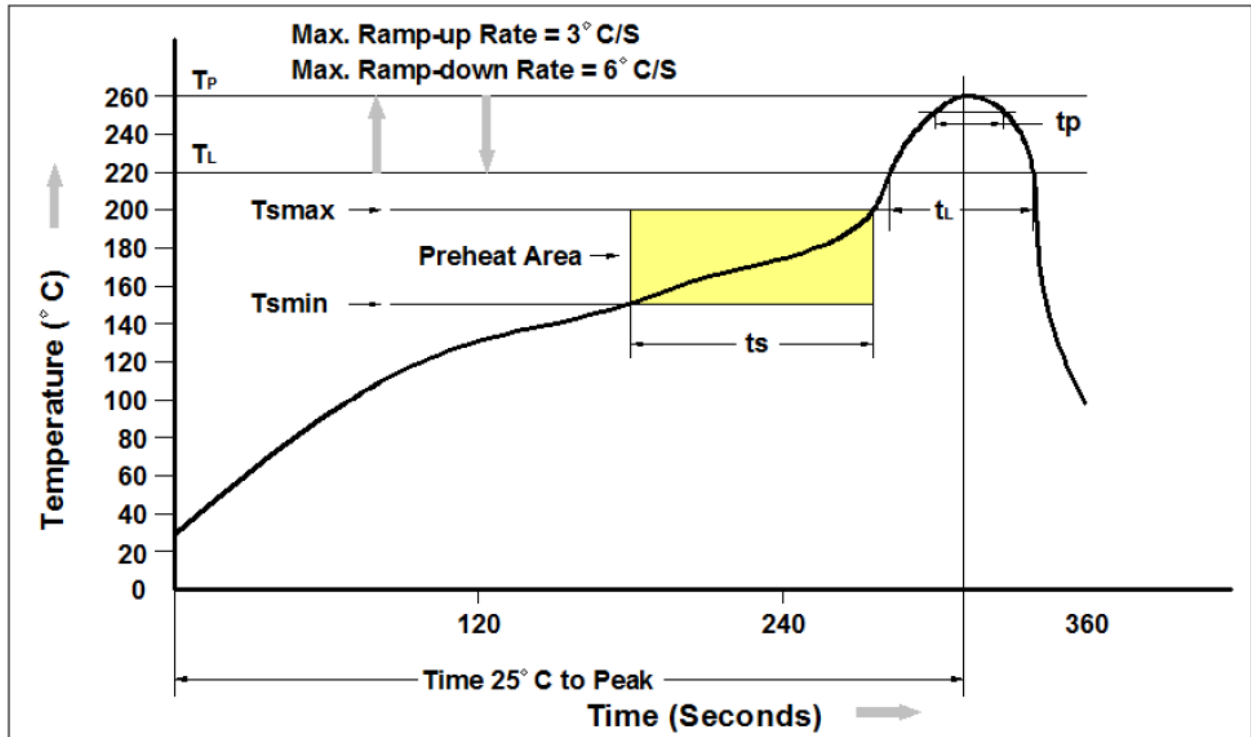
Temperature: 260 +0/-5 °C

Time: 10 Sec

Preheat temperature: 25 to 140 °C

Preheat time: 30 to 80 sec.

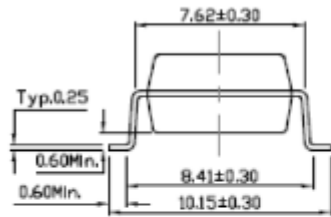
Reflow soldering



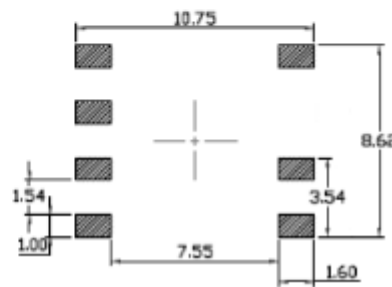
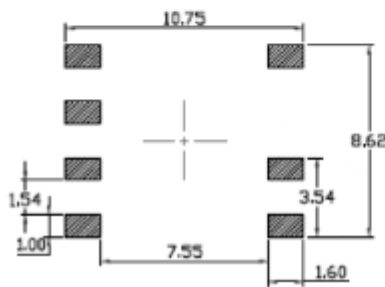
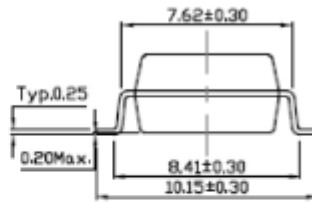
Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	150 °C
Temperature Max. (T <sub>smax</sub> )	200 °C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.
Liquidous Temperature (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.

Recommended Solder Footprint for SMD Leadform

S Type



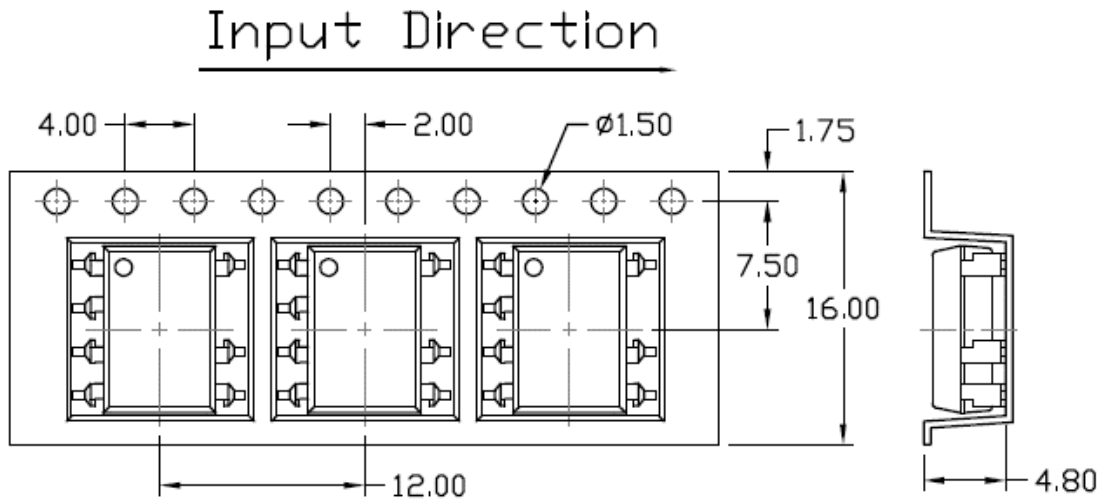
SL Type



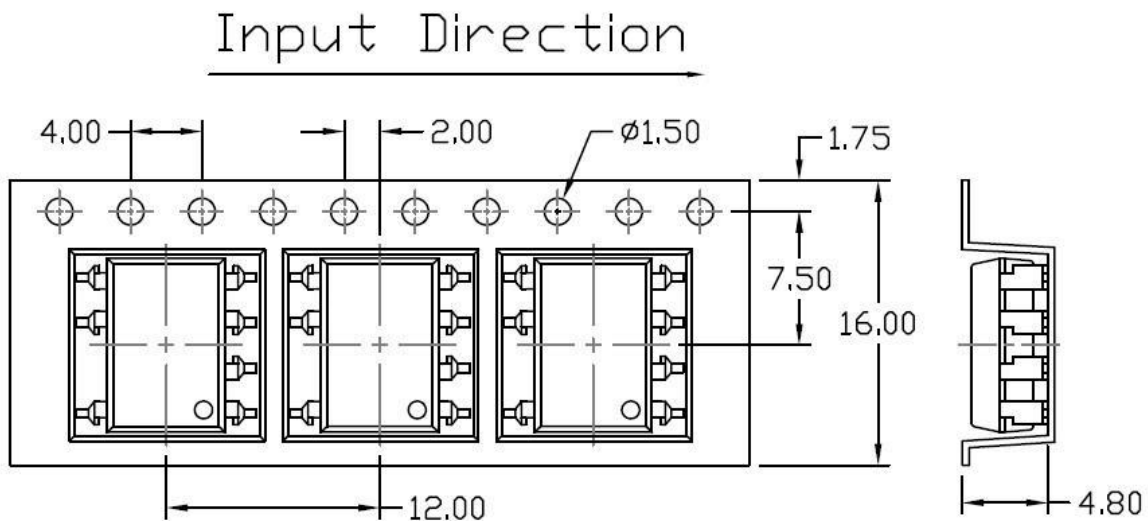
Units: mm

## Packing & Labeling

Tape Dimension:  
Option ST1 & SLT1



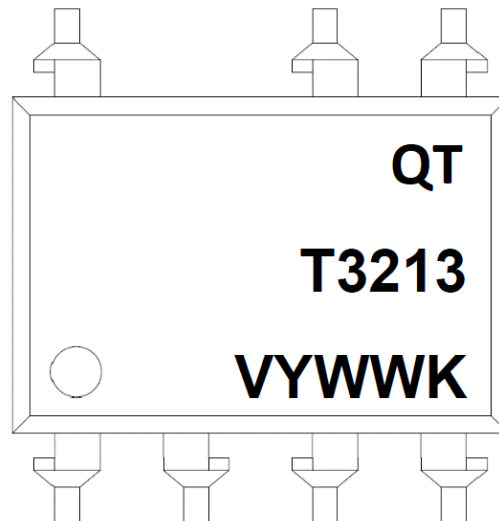
Option ST2 & SLT2



Unit: mm

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### Device Marking:



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

### Ordering Information

QTTX213VY(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
ST1	Surface Mount Lead Forming – with Option 1 Taping	1000 pcs/ reel
ST2	Surface Mount Lead Forming – with Option 2 Taping	1000 pcs/ reel
SLT1	SMD (Low Profile) Lead Forming – with Option 1 Taping	1000 pcs/ reel
SLT2	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
Update schematic	1.1	03/27/2023

## 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.