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**QT-Brightek Optocoupler Series**

**ZERO-CROSSING TRIAC OPTOCOUPLER**

**Part No.: Q303X / Q304X Series**

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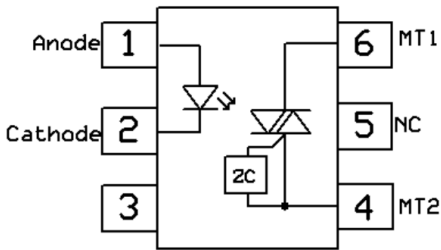
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**Introduction**

**Feature:**

- High isolation voltage between input and output (Viso=5000Vrms)
- Peak breakdown voltage  
250V: Q3031, Q3032, Q3033  
400V: Q3041, Q3042, Q3043
- Operating Temperature up to 100 °C
- Available in Tube or Tape and reel
- Available with standard DIP-6, Gullwing lead bend, SMD lead bend and SMD low profile

**Schematic:**



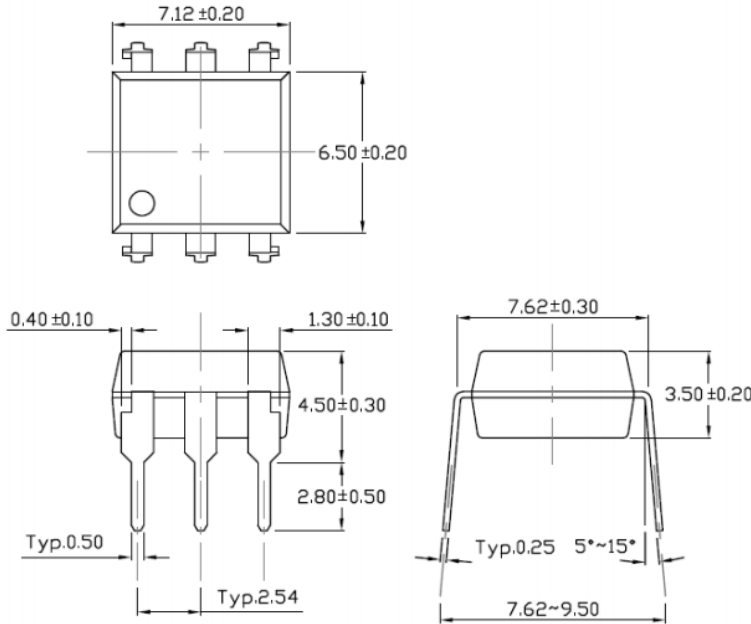
**Certification & Compliance:**

- Pb free and RoHS Compliant
- UL recognized (File # E338132)
- VDE recognized (File # 40030457)

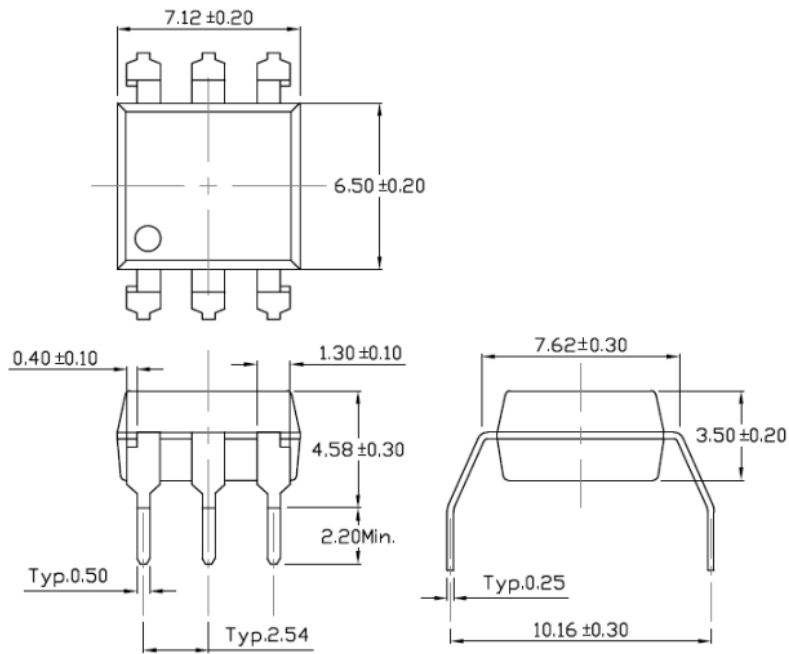


**Dimension: (Dot location indicates pin 1)**

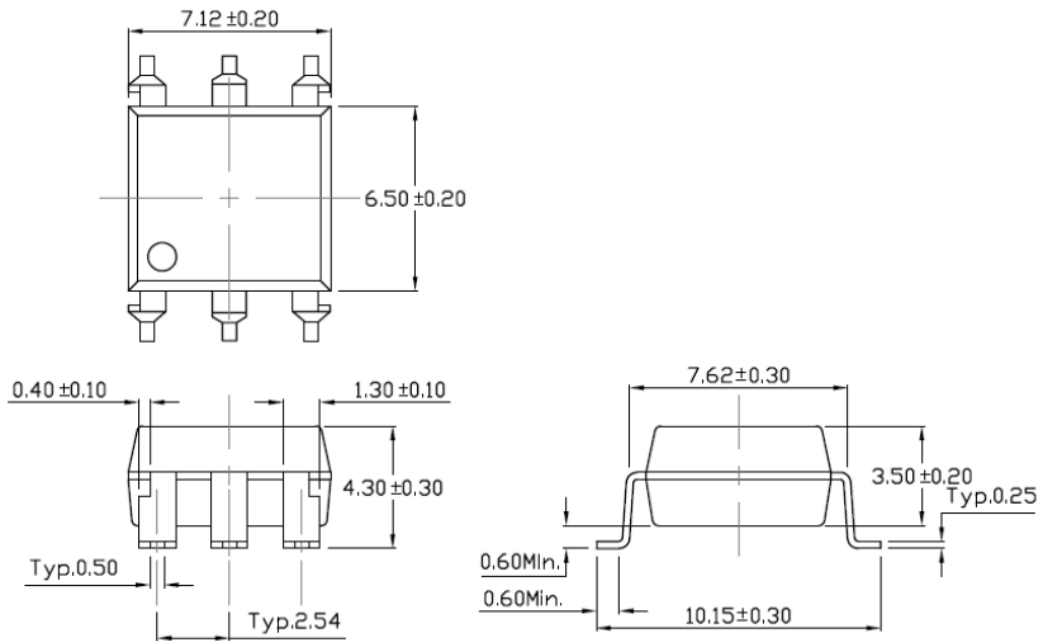
**6-Pin Dip (standard):**

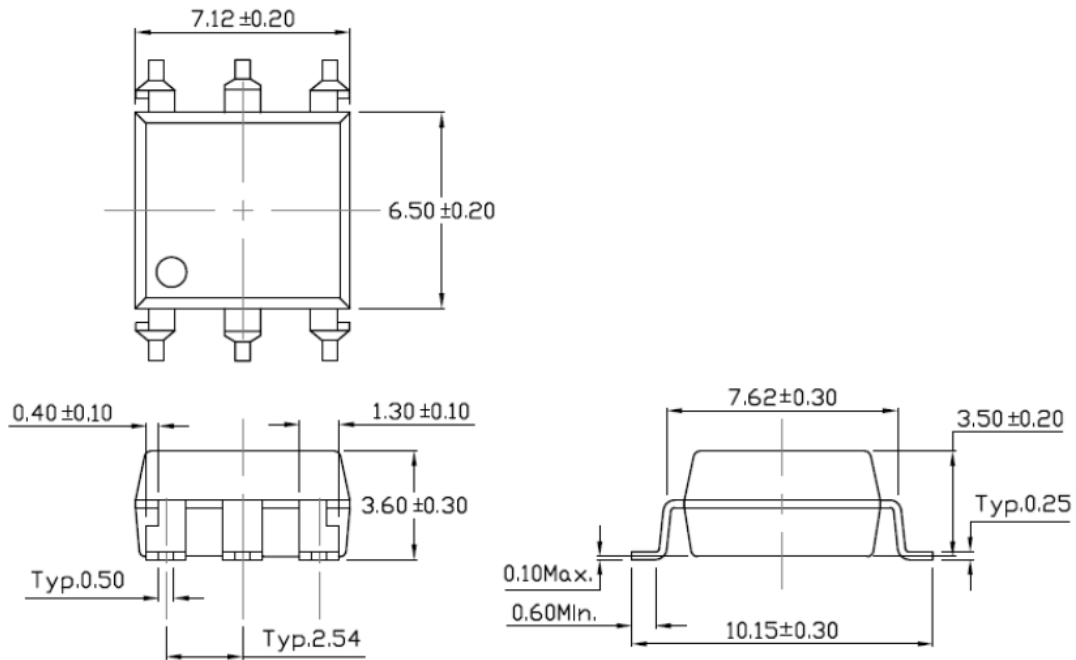


**Wide lead bend (Option M):**



**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	$V_{RMS}$	
$T_{OPR}$	Operating Temperature	-55 ~ +100	°C	
$T_{STG}$	Storage Temperature	-55 ~ +150	°C	
$T_{SOL}$	Lead Solder Temperature	260 for 10 sec	°C	
<b>EMITTER</b>				
$I_F$	Continuous Forward Current	60	mA	
$I_{FP}$	Peak Forward Current ( $\leq 1\mu s$ , P.W, 300pps)	1	A	
$V_R$	Reverse Voltage	6	V	
$P_D$	Power Dissipation	100	mW	
<b>DETECTOR</b>				
$P_D$	Power Dissipation	300	mW	
$V_{DRM}$	Off-state Output Terminal Voltage	Q303X series	250	V
		Q304X series	400	
$I_{TSM}$	Peak Repetitive Surge Current	1	A	

## Electrical Characteristic ( $T_A=25^\circ C$ )

### Emitter

Symbol	Characteristic	Test Condition	Range			Unit
			Min.	Typ.	Max.	
$V_F$	Forward Voltage	$I_F=10mA$	-	-	1.5	V
$I_R$	Reverse Current	$V_R=6V$	-	-	5	$\mu A$
$C_{IN}$	Input Capacitance	$f=1MHz$	-	45	-	pF

### Detector

Symbol	Characteristic	Test Condition	Range			Unit
			Min	Typ	Max	
$I_{DRM1}$	Peak Blocking Current	$V_{DRM}=\text{Rated } V_{DRM}, I_F=0mA$	-	-	100	nA
$I_{DRM2}$	Inhibit Leakage Current	$V_{DRM}=\text{Rated } V_{DRM}, I_F=0mA$			500	$\mu A$
$V_{INH}$	Inhibit Voltage	$I_F=\text{Rated } I_{FT}$	-	-	20	V
$V_{TM}$	Peak On-state Voltage	$I_{TM}=100mA, I_F=\text{Rated } I_{FT}$	-	-	3	V
dv/dt	Critical Rate of Rise Off-State Voltage	$V_{PEAK}=\text{Rated } V_{DRM}$	1000	-	-	V/ $\mu s$

**Transfer Characteristic**

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I <sub>FT</sub>	LED Trigger Current	Q3031, Q3041	Main terminal voltage=3V, I <sub>TM</sub> =100mA	-	-	15	mA
		Q3032, Q3042		-	-	10	
		Q3033, Q3043		-	-	5	
I <sub>H</sub>	Holding Current			-	270	-	μA
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**

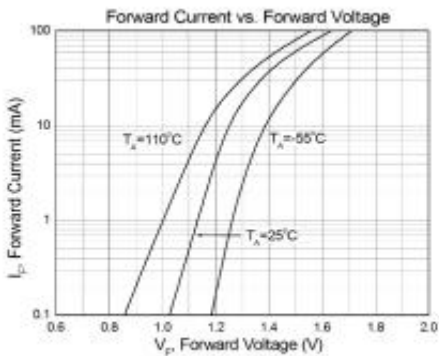


Figure 1

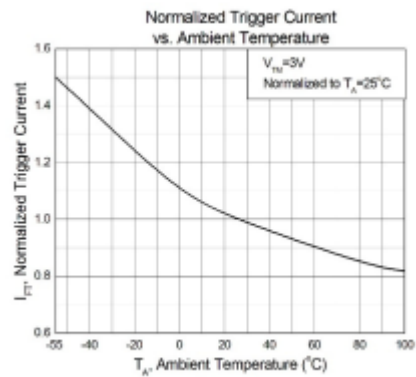


Figure 2

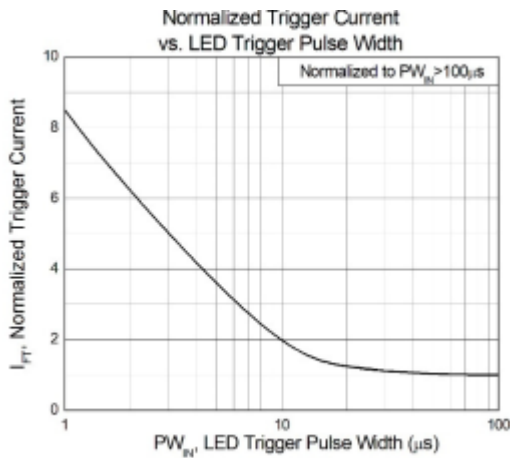


Figure 3

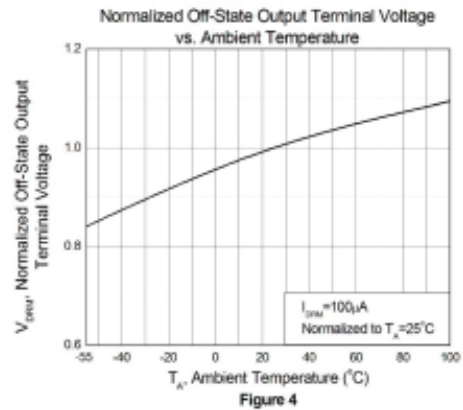


Figure 4

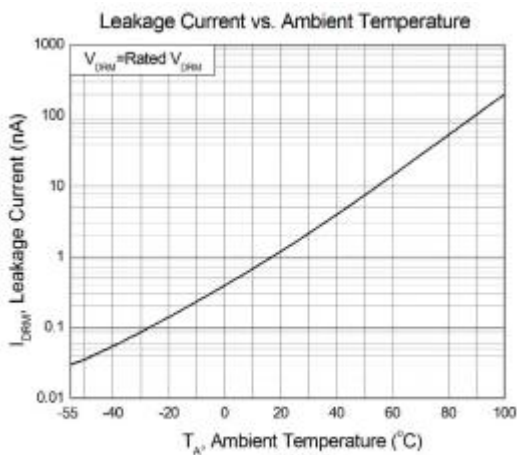


Figure 5

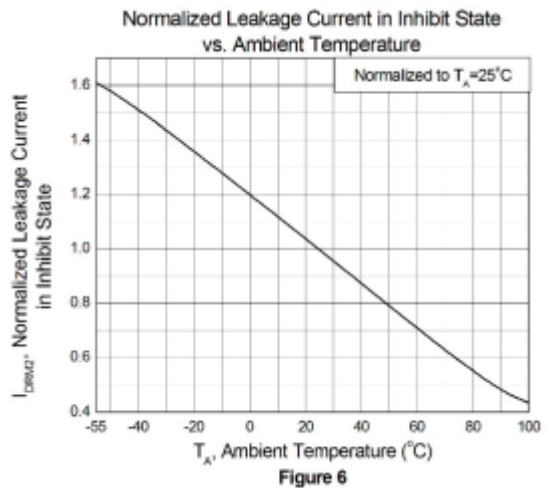
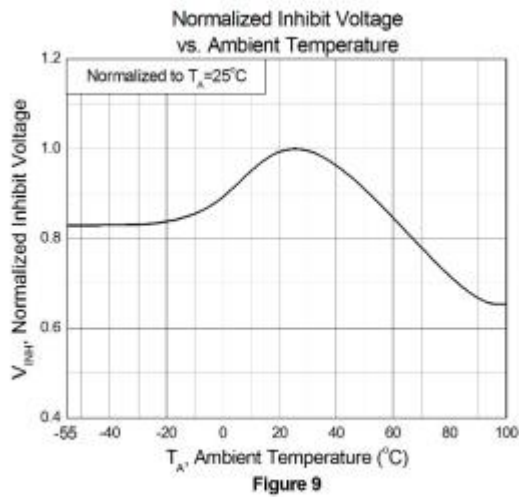
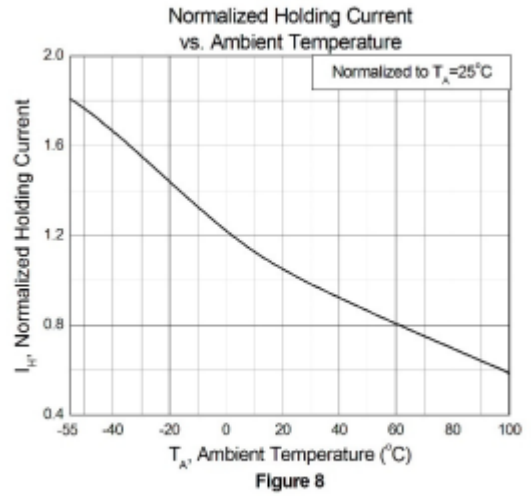
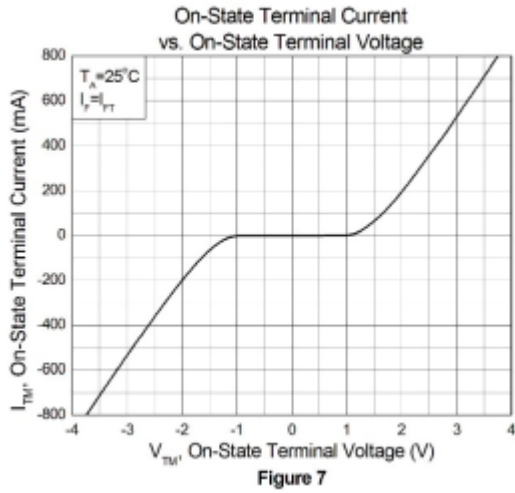
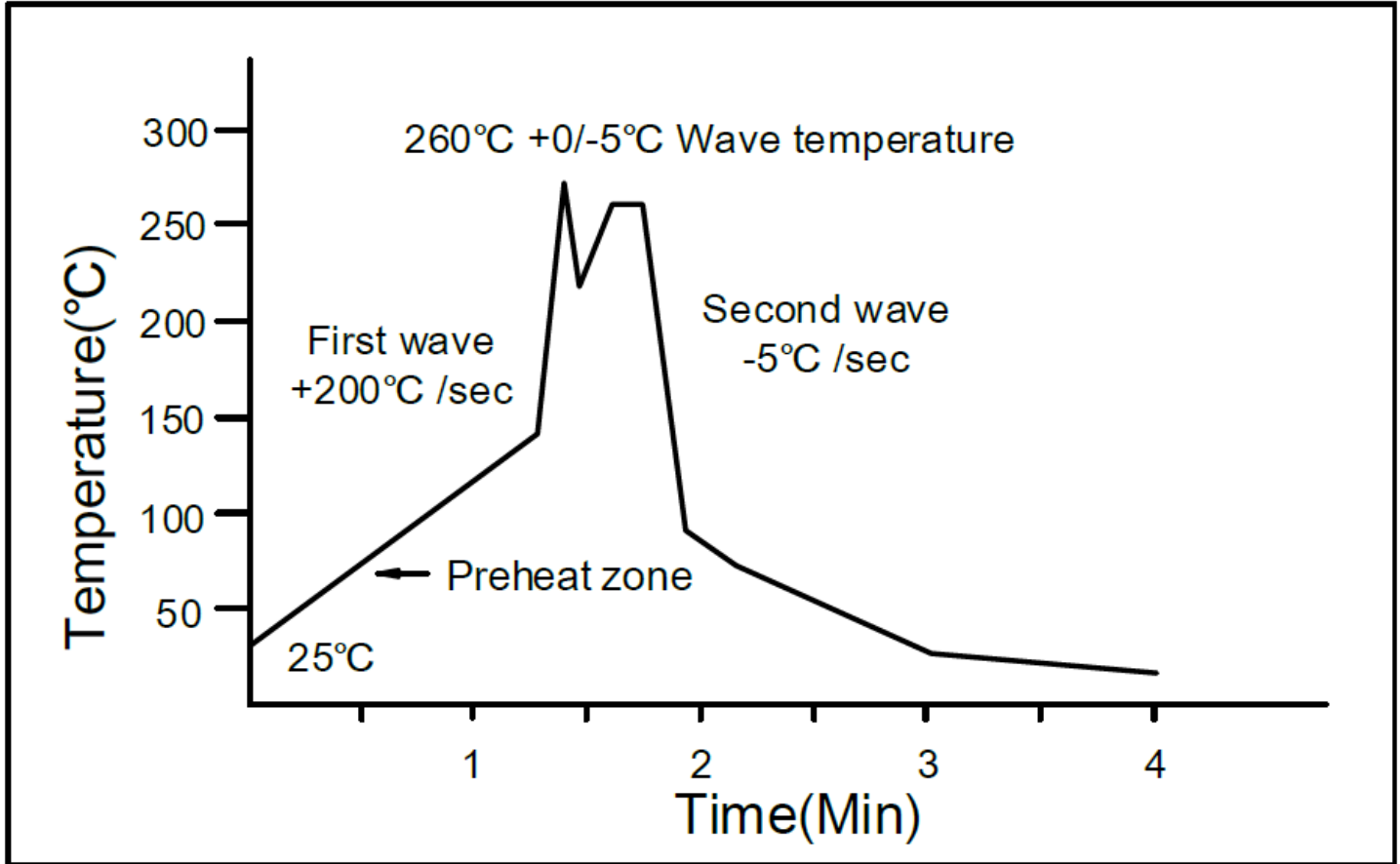


Figure 6





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**Solder Profile & Footprint****Recommended Wave Soldering Profile**

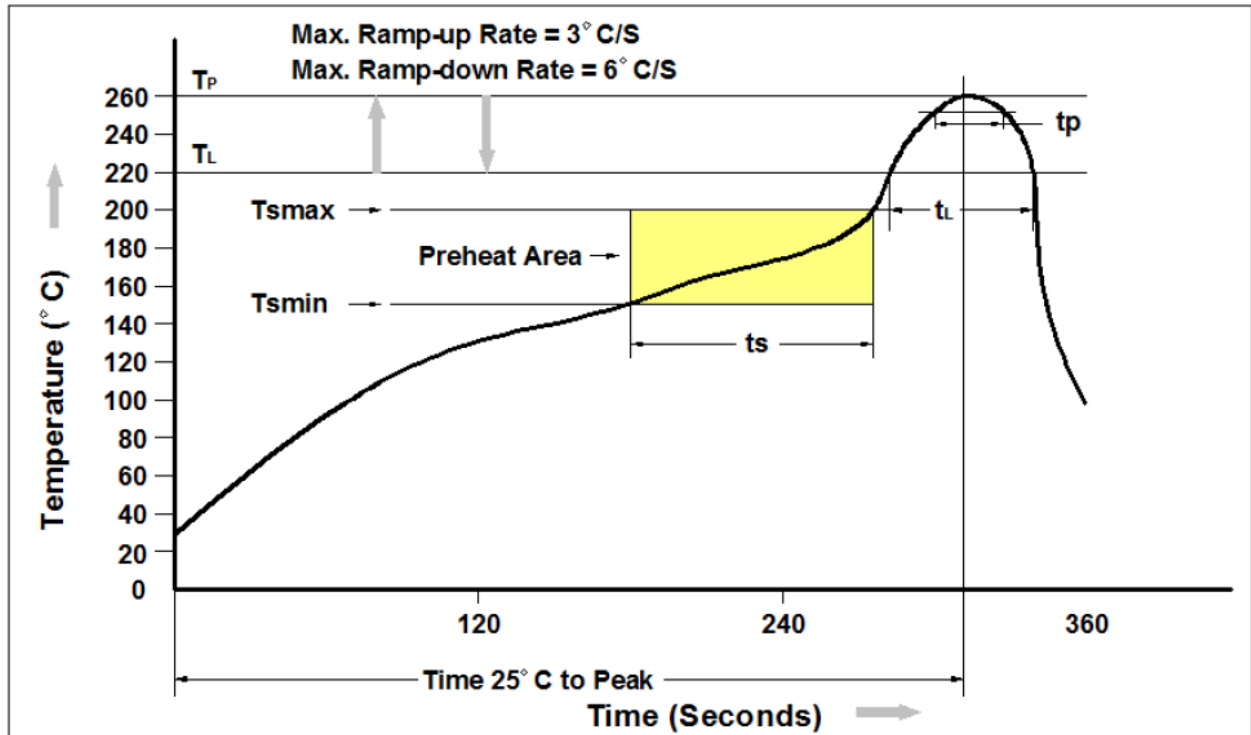
Temperature: 260 +0/-5 °C

Time: 10 Sec

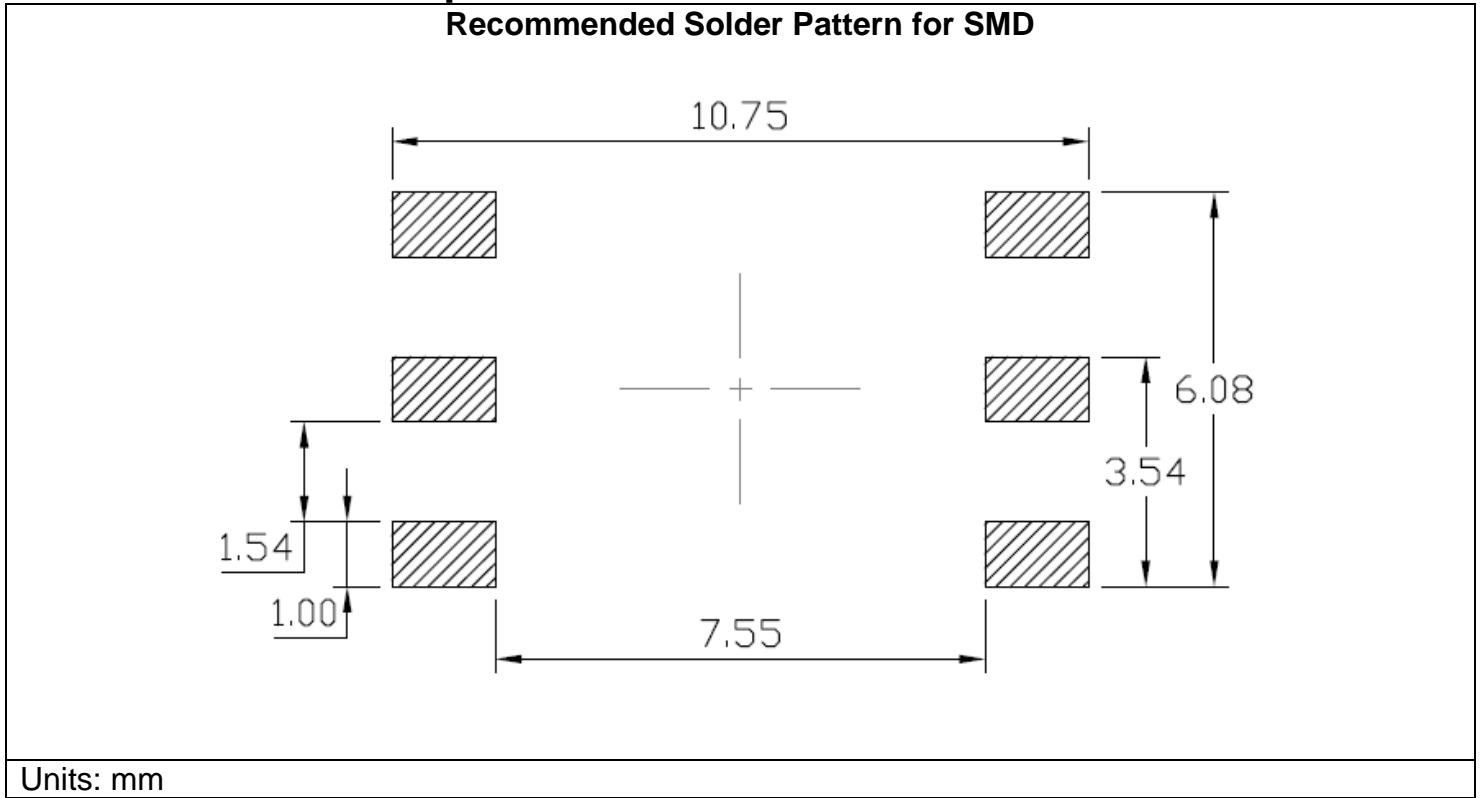
Preheat temperature: 25 to 140 °C

Preheat time: 30 to 80 sec.

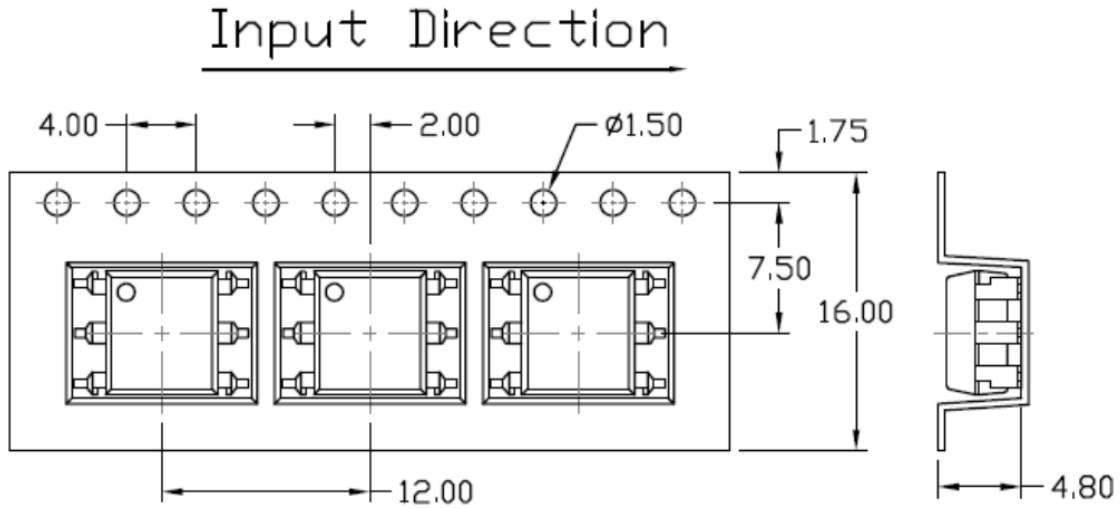
**Recommended Reflow Soldering Profile**



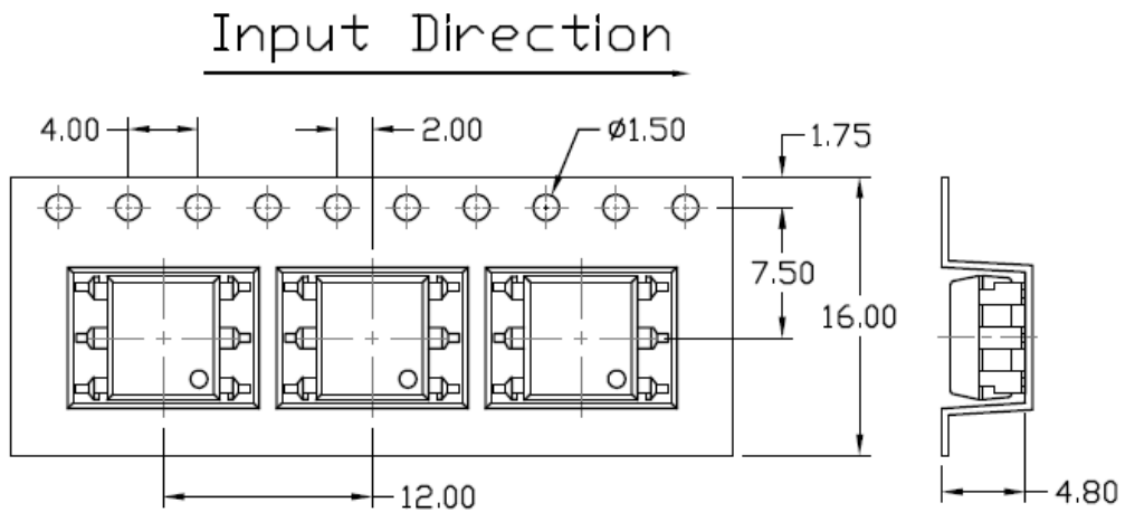
Profile Feature	Pb-Free Assembly Profile
Temperature Min. ( $T_{smin}$ )	150 °C
Temperature Max. ( $T_{smax}$ )	200 °C
Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )	60-120 seconds
Ramp-up Rate ( $t_L$ to $t_P$ )	3°C/second max.
Liquidous Temperature ( $T_L$ )	217 °C
Time ( $t_L$ ) Maintained Above ( $T_L$ )	60 – 150 seconds
Peak Body Package Temperature	260 °C +0 °C / -5 °C
Time ( $t_P$ ) within 5 °C of 260 °C	30 seconds
Ramp-down Rate ( $T_P$ to $T_L$ )	6°C/second max
Time 25 °C to Peak Temperature	8 minutes max.

**Solder Profile & Footprint**

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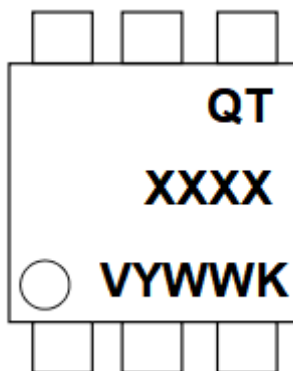
**Packing & Labeling****Option 1: ST1 & SLT1**

Unit: mm

**Option 2: ST2 & SLT2**

Unit: mm

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**Device Marking****Example**

QT = QT-Brightek Corporation

XXXX = Part Number (3031, 3032, 3033, 3041, 3042, 3043)

V = VDE Option

Y = Year

WW = Week

K = Manufacturing code

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## Ordering Information

Q303XVYZ, Q304XVYZ

X = Part number (X=1, 2, 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 6-Pin DIP	50 units/tube
M	Gullwing Lead Bend	50 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

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## Revision History

Description:	Revision #	Revision Date
Initial release of Q303X/Q304X/Q306X/Q308X series	1.0	4/22/2010
Feature, certification & compliance and ordering information updates	1.1	02/01/2011
Update format	1.2	05/15/2013
Update specs, format, and packing method, and part number	2.0	04/02/2018

## 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.