QT-Brightek Optocoupler Series

RANDOM-PHASE TRIAC OPTOCOUPLER

Part No.: Q301X/ Q302X/ Q305X series

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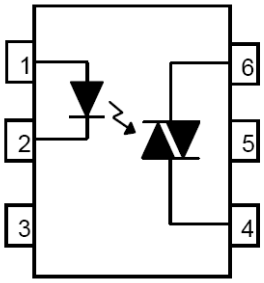
Introduction

Feature:

- High Isolation voltage between input and output (Viso = 5000V rms)
- Dual-in-line package
- Operating Temperature up to 100 ℃
- Available in Tube or Tape and reel
- Available with standard DIP-6, Wide lead bend, and SMD lead options.
- Conventional black housing package

Schematic:



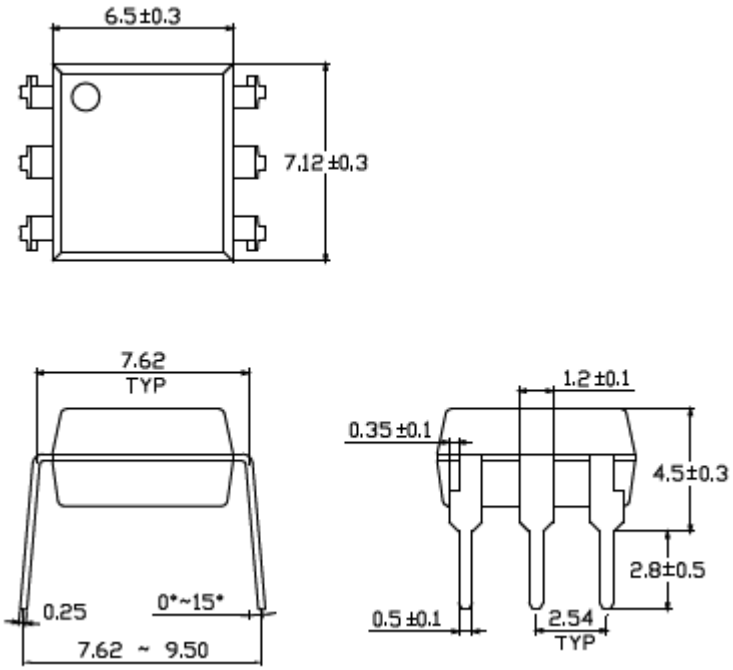
Pin Configuration
1. Anode
2. Cathode
3. No Connection
4. Terminal
5. Substrate
   (do not connect)
6. Terminal

Certification & Compliance:

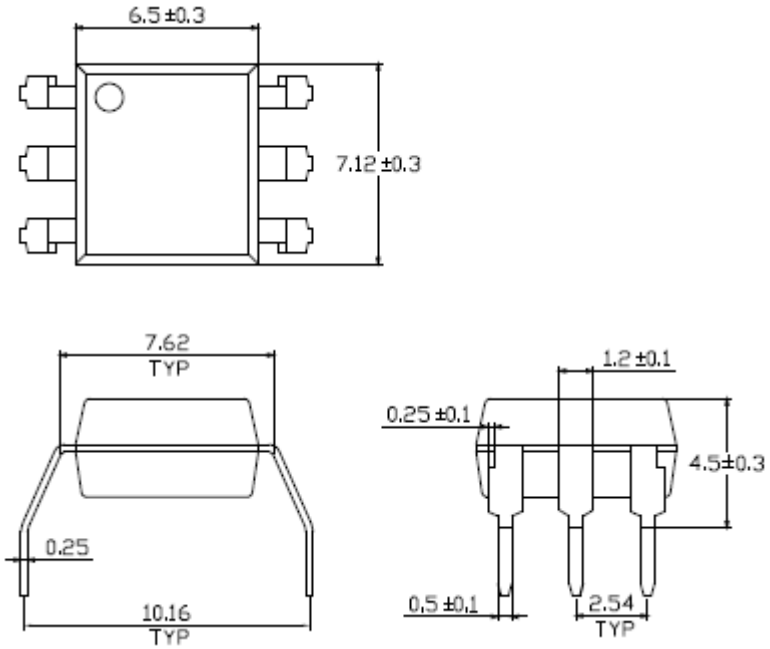
- Pb free and RoHS Compliant
- UL recognized (File # E338132)
- VDE recognized (File # 40030457)

Dimension: (Dot location indicates pin 1)

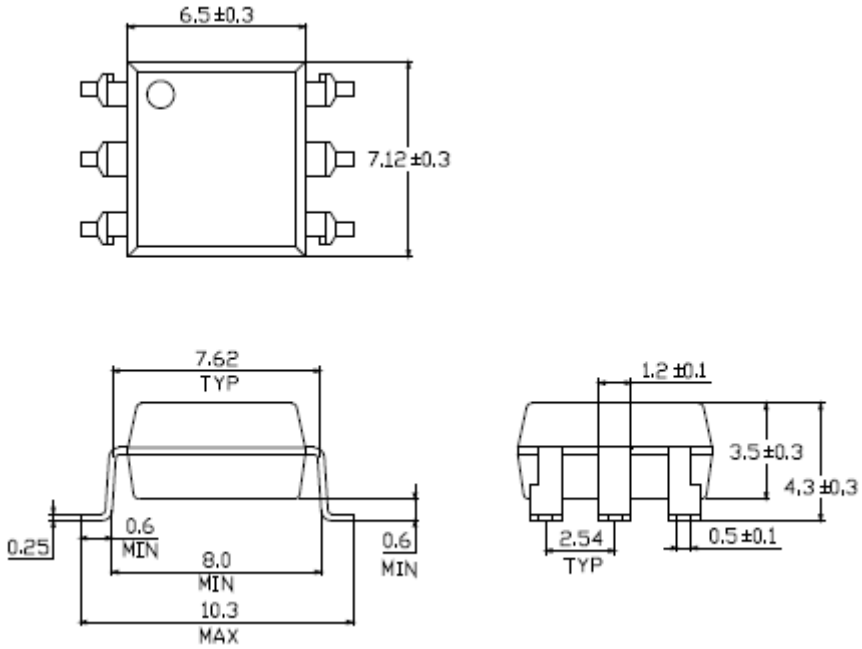
6-Pin Dip (standard):



Wide lead bend (Option W):



SMD lead bend (Option S):



- All Dimensions are in mm
- Tolerance = +/- 0.1mm

Absolute Maximum Rating

Symbol	Parameter		Rating			Units
			Q301X series	Q302X series	Q305X series	
T_{STG}	Storage Temperature		-55 ~ 150			ºC
T_{OPR}	Operating Temperature		-55 ~ 100			ºC
T_{SOL}	Lead Solder Temperature		260 for 10 sec			ºC
P_{TOT}	Total Power Dissipation		330			mW
EMITTER						
I_F	Continuous Forward Current		60			mA
V_R	Reverse Voltage		6			V
P_D	Power Dissipation		100			mW
	Power Dissipation Derated above 25ºC		1.33			mW/ºC
DETECTOR						
P_D	Power Dissipation		300			mW
	Power Dissipation Derated above 25 ºC		4			mW/ºC
V_{DRM}	Off-state Output Terminal Voltage	Q301X series	250			V
		Q302X series		400		
		Q305X series			600	
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	-	1.18	1.5	V
I_R	Reverse Current	V_R = 4V	-	-	10	μA

Detector

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I_{DRM}	Peak Blocking Current		V_{DRM} =Rated V_{DRM}, I_F =0mA	-	-	100	nA
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	Q301X series	V_{PEAK} = Rated V_{DRM}, I_F = 0 (refer to test circuit for dv/dt)	-	100	-	V/ μs
		Q302X series		-	100	-	
		Q305X series	V_{PEAK} = 400V, I_F = 0 (refer to test circuit for dv/dt)	1000	-	-	

Transfer Characteristic

Symbol	Characteristic	Device	Test Condition	Range			Unit
				Min	Typ	Max	
I_{FT}	LED Trigger Current	Q3010	Main terminal voltage = 3V	-	-	15	mA
		Q3021		-	-		
		Q3051		-	-		
		Q3011		-	-	10	
		Q3022		-	-		
		Q3052		-	-		
		Q3012		-	-	5	
		Q3023		-	-		
		Q3053		-	-		
I_H	Holding Current			-	250	-	μA
V_{ISO}	Isolation voltage			5000	-	-	V

Characteristic Curves

Figure 1. Forward Current vs Forward Voltage

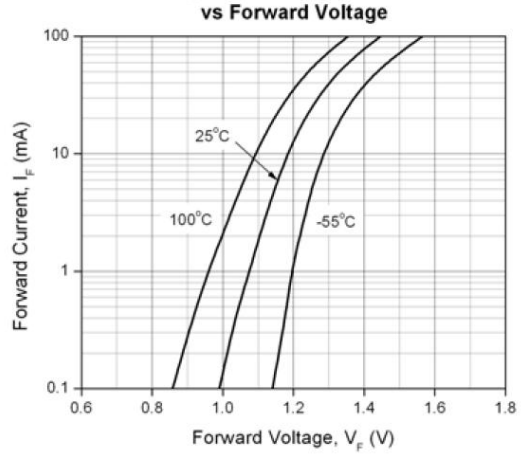


Figure 2. On-State Characteristics

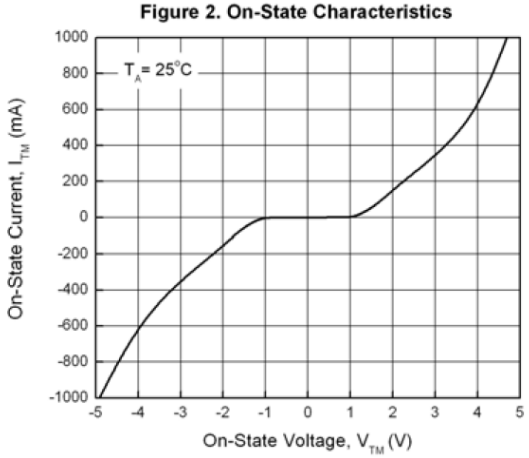


Figure 3. Holding Current vs. Ambient Temperature

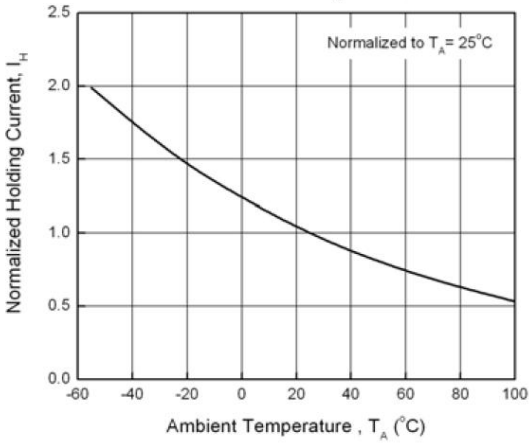


Figure 4. LED Current Required to Trigger vs. LED Pulse Width

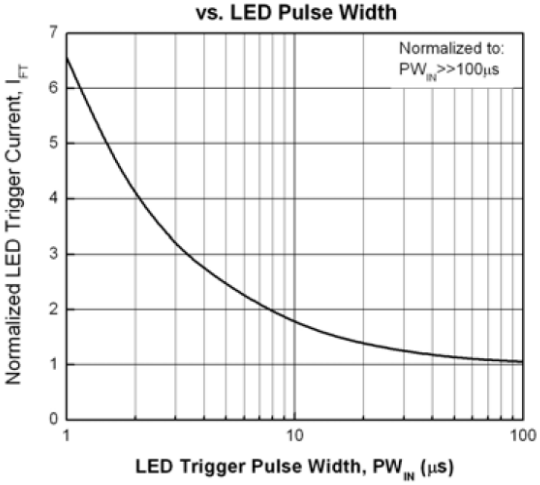


Figure 5. Leakage Current vs. Ambient Temperature

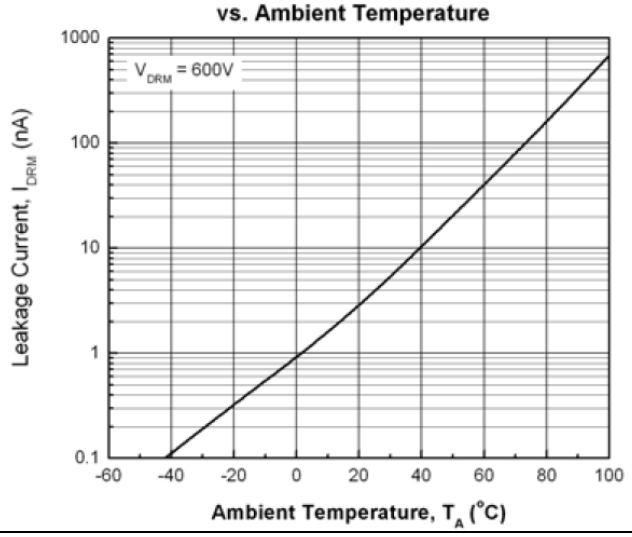
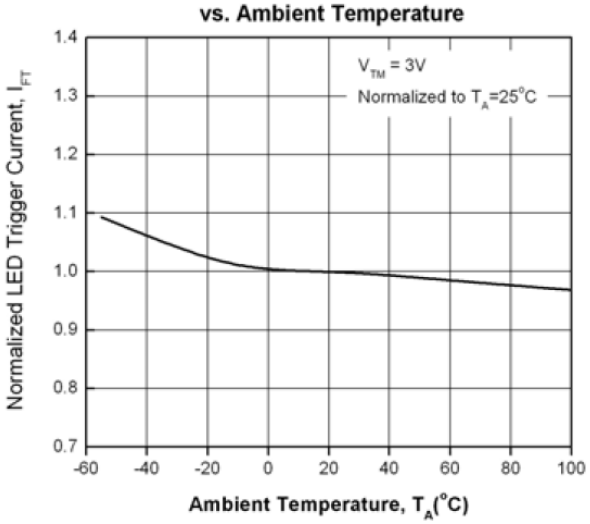
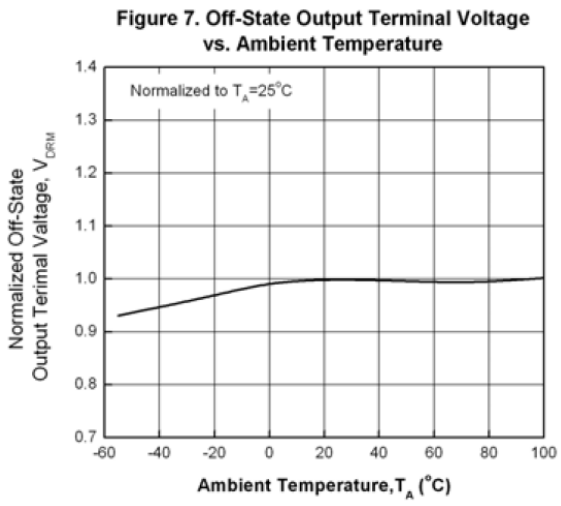
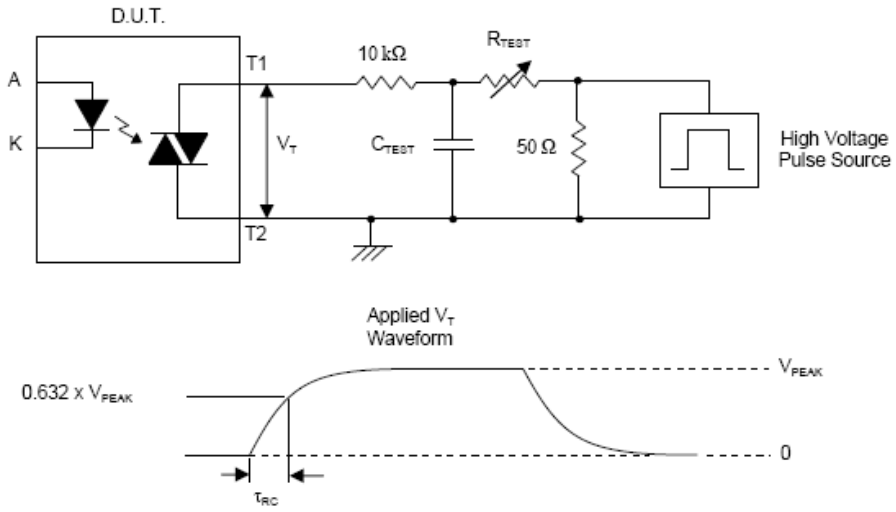


Figure 6. LED Trigger Current vs. Ambient Temperature





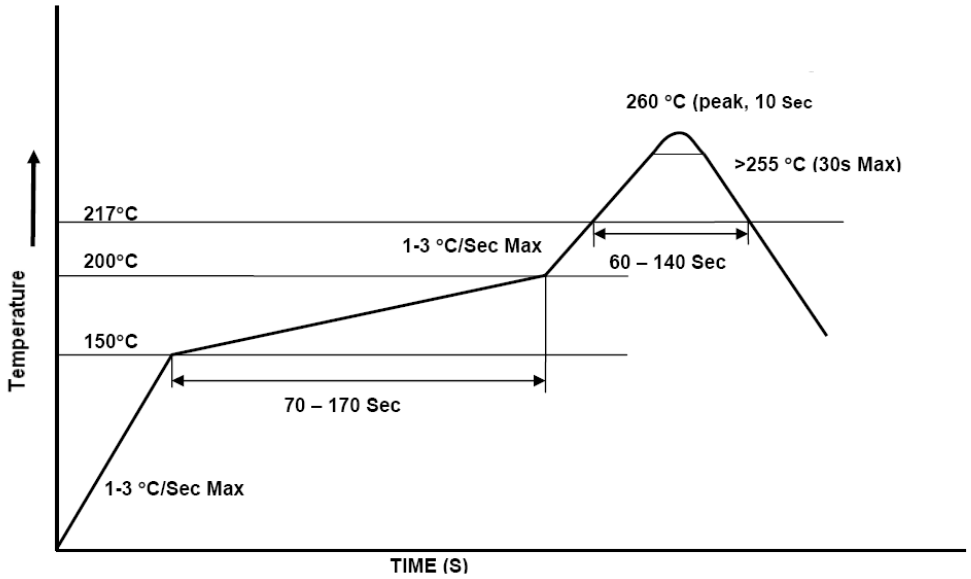
Test Circuit for static dv/dt

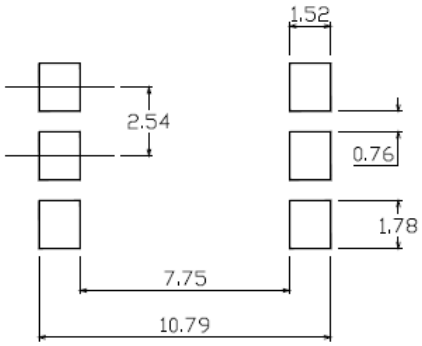


The high voltage pulse is set to the required V_{PEAK} value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform V_T is monitored using a x100 scope probe. By varying R_{TEST}, the dv/dt (slope) is increased, until the D.U.T. is observed to trigger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



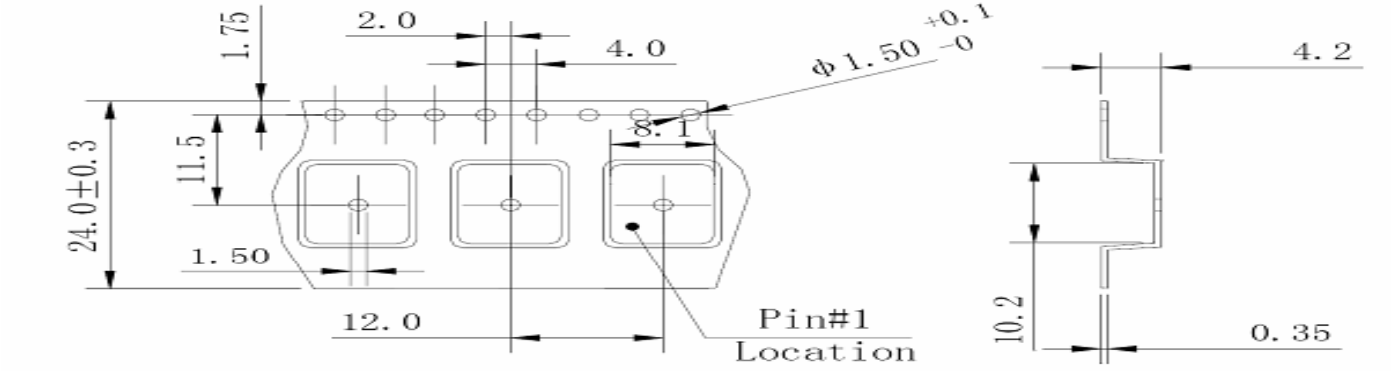


Recommended Solder Footprint for SMD Leadform

Units: mm tolerance: +/- 0.1mm

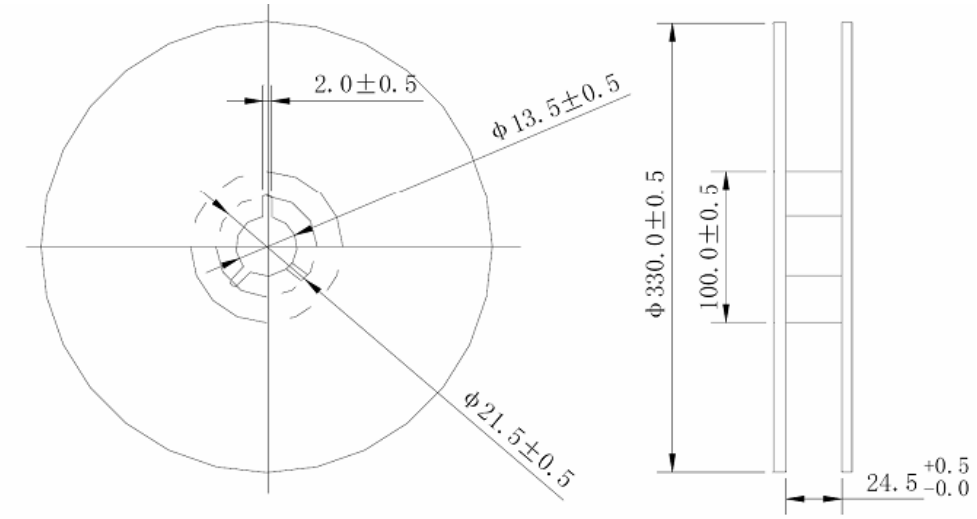
Packing & Labeling

Tape Dimension:



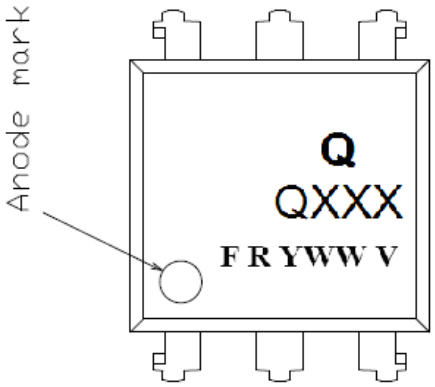
Unit: mm

Reel Dimension:



Unit: mm

Device Marking:



Q = QT-Brightek Corporation
QXXX = Device Part Number
F = Country of Origin
R = Binning Option
Y = Year
WW = Week
V = VDE Option

Ordering Information

Part Number	Orderable Part Number	Options	Description	Quantity per packing
Q301X series	Q3010 / Q3011 / Q3012	None	Standard 6pin DIP	60pcs / Tube
	Q3010V / Q3011V / Q3012V	None	Standard 6 pin Dip + With VDE marking	60pcs / Tube
	Q3010W / Q3011W / Q3012W	W	Wide lead bend (0.4 inch spacing)	60pcs / Tube
	Q3010WV / Q3011WV / Q3012WV	W	Wide lead bend (0.4 inch spacing) + VDE marking	60pcs / Tube
	Q3010STA / Q3011STA / Q3012STA	S	SMD lead form with tape and reel option	1000pcs / reel
	Q3010STAV / Q3011STAV / Q3012STAV	S	SMD lead form with tape and reel option + VDE marking	1000pcs / reel
Q302X series	Q3021 / Q3022 / Q3023	None	Standard 6pin DIP	60pcs / Tube
	Q3021V / Q3022V / Q3023V	None	Standard 6 pin Dip + With VDE marking	60pcs / Tube
	Q3021W / Q3022W / Q3023W	W	Wide lead bend (0.4 inch spacing)	60pcs / Tube
	Q3021WV / Q3022WV / Q3023WV	W	Wide lead bend (0.4 inch spacing) + VDE marking	60pcs / Tube
	Q3021STA / Q3022STA / Q3023STA	S	SMD lead form with tape and reel option	1000pcs / reel
	Q3021STAV / Q3022STAV / Q30123STAV	S	SMD lead form with tape and reel option + VDE marking	1000pcs / reel
Q305X series	Q3051 / Q3052 / Q3053	None	Standard 6pin DIP	60pcs / Tube
	Q3051V / Q3052V / Q3053V	None	Standard 6 pin Dip + With VDE marking	60pcs / Tube
	Q3051W / Q3052W / Q3053W	W	Wide lead bend (0.4 inch spacing)	60pcs / Tube
	Q3051WV / Q3052WV / Q3053WV	W	Wide lead bend (0.4 inch spacing) + VDE marking	60pcs / Tube
	Q3051STA / Q3052STA / Q3053STA	S	SMD lead form with tape and reel option	1000pcs / reel
	Q3051STAV / Q3052STAV / Q30153STAV	S	SMD lead form with tape and reel option + VDE marking	1000pcs / reel

Revision History

Description:	Revision #	Revision Date
Initial of Q301X /Q302X/Q305X series	1.0	4/22/2010
Feature, Certification & Compliance, and ordering information updates	1.1	02/01/2011
Update format and packing spec	1.2	02/19/2014

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.