

勝特力材料 886-3-5753170  
 勝特力电子(上海) 86-21-54151736  
 勝特力电子(深圳) 86-755-83298787  
 Http://www.100y.com.tw

Bulletin PD-20745 rev. D 07/01

# International **IR** Rectifier

60EPU04  
 60APU04

## Ultrafast Soft Recovery Diode

### Features

- Ultrafast Recovery
- 175°C Operating Junction Temperature

### Benefits

- Reduced RFI and EMI
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count

$$t_{rr} = 50\text{ns (typ)}$$

$$I_{F(AV)} = 60\text{Amp}$$

$$V_R = 400\text{V}$$

### Description/ Applications

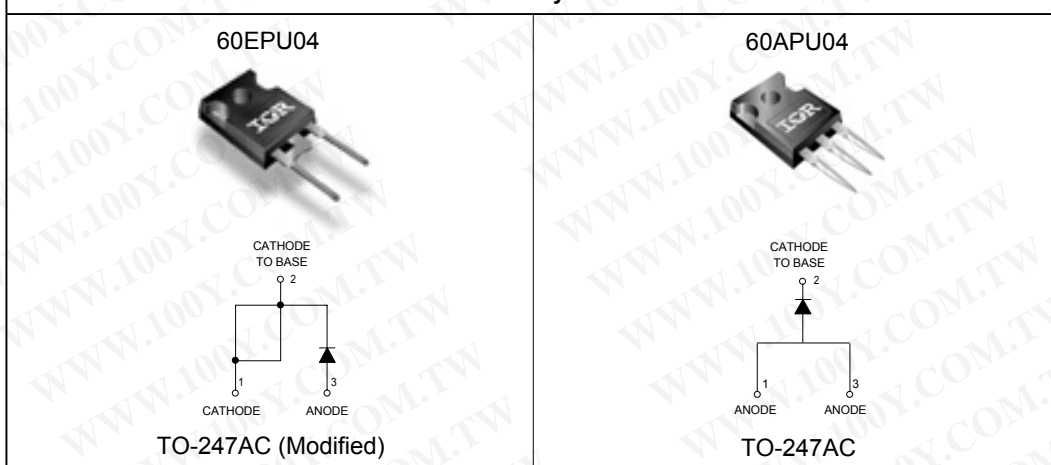
These diodes are optimized to reduce losses and EMI/ RFI in high frequency power conditioning systems. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for HF welding, power converters and other applications where switching losses are not significant portion of the total losses.

### Absolute Maximum Ratings

Parameters	Max	Units
$V_R$ Cathode to Anode Voltage	400	V
$I_{F(AV)}$ Continuous Forward Current, $T_C = 127^\circ\text{C}$	60	A
$I_{FSM}$ Single Pulse Forward Current, $T_C = 25^\circ\text{C}$	600	
$I_{FRM}$ ① Maximum Repetitive Forward Current	120	
$T_J, T_{STG}$ Operating Junction and Storage Temperatures	- 55 to 175	$^\circ\text{C}$

① Square Wave, 20kHz

### Case Styles



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**Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Parameters	Min	Typ	Max	Units	Test Conditions
V <sub>BR</sub> , V <sub>r</sub> Breakdown Voltage, Blocking Voltage	400	-	-	V	I <sub>R</sub> = 100μA
V <sub>F</sub> Forward Voltage	-	1.05	1.25	V	I <sub>F</sub> = 60A
	-	0.87	1.03	V	I <sub>F</sub> = 60A, T <sub>J</sub> = 175°C
	-	0.93	1.10	V	I <sub>F</sub> = 60A, T <sub>J</sub> = 125°C
I <sub>R</sub> Reverse Leakage Current	-	-	50	μA	V <sub>R</sub> = V <sub>R</sub> Rated
	-	-	2	mA	T <sub>J</sub> = 150°C, V <sub>R</sub> = V <sub>R</sub> Rated
C <sub>T</sub> Junction Capacitance	-	50	-	pF	V <sub>R</sub> = 400V
L <sub>S</sub> Series Inductance	-	3.5	-	nH	Measured lead to lead 5mm from package body

**Dynamic Recovery Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Parameters	Min	Typ	Max	Units	Test Conditions
t <sub>rr</sub> Reverse Recovery Time	-	50	60	ns	I <sub>F</sub> = 1A, di <sub>F</sub> /dt = 200A/μs, V <sub>R</sub> = 30V
	-	85	-		T <sub>J</sub> = 25°C
	-	145	-		T <sub>J</sub> = 125°C
I <sub>RRM</sub> Peak Recovery Current	-	8.8	-	A	T <sub>J</sub> = 25°C
	-	15.4	-		T <sub>J</sub> = 125°C
Q <sub>rr</sub> Reverse Recovery Charge	-	375	-	nC	T <sub>J</sub> = 25°C
	-	1120	-		T <sub>J</sub> = 125°C

**Thermal - Mechanical Characteristics**

Parameters	Min	Typ	Max	Units
R <sub>thJC</sub> Thermal Resistance, Junction to Case			0.70	K/W
R <sub>thCS</sub> ② Thermal Resistance, Case to Heatsink		0.2		
Wt Weight		5.5		g
		0.2		(oz)
T Mounting Torque	1.2		2.4	N * m
	10		20	lbf.in

② Mounting Surface, Flat, Smooth and Greased

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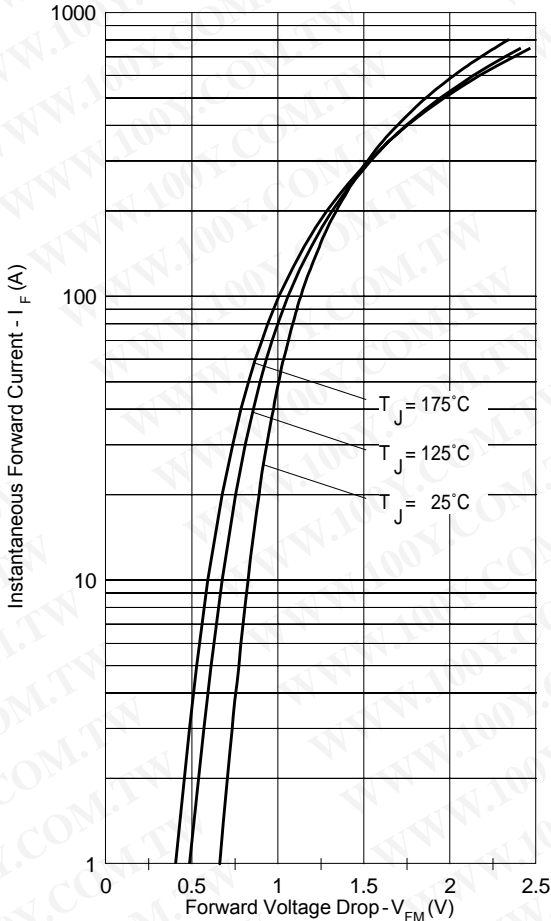


Fig. 1 - Typical Forward Voltage Drop Characteristics

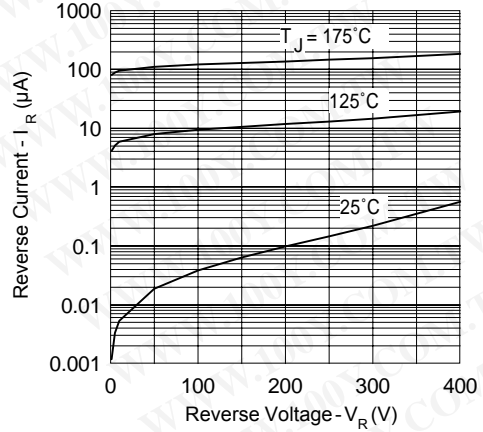


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

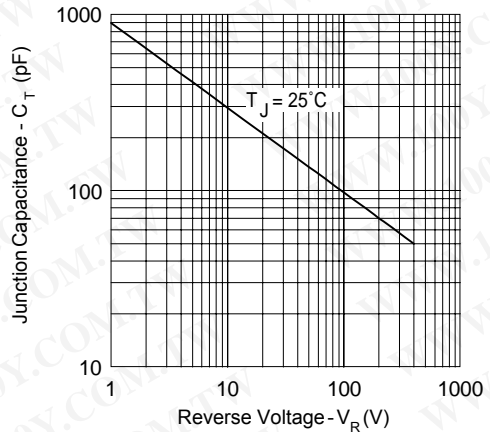


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

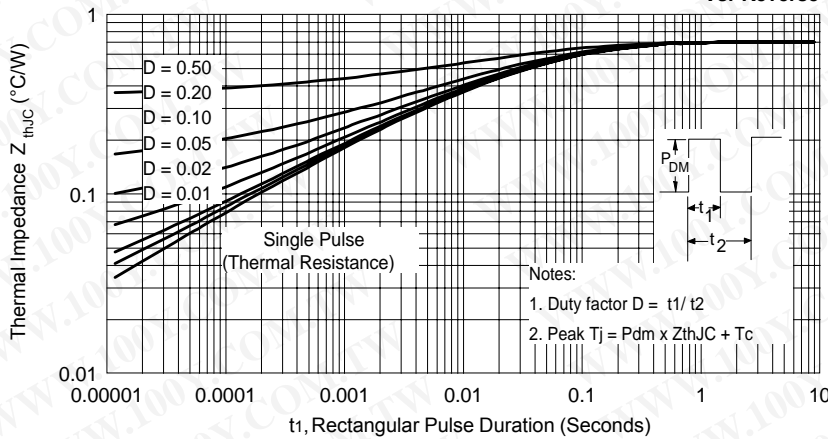


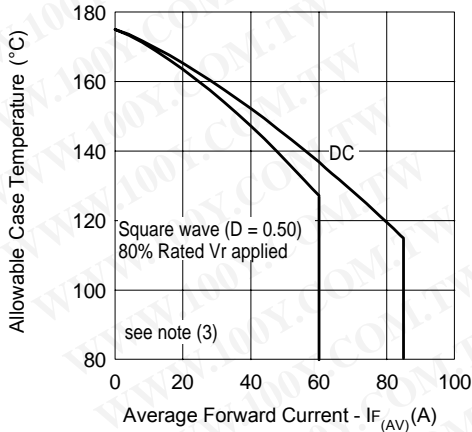
Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics

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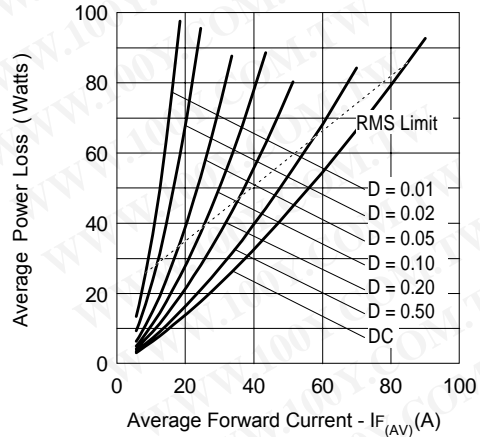
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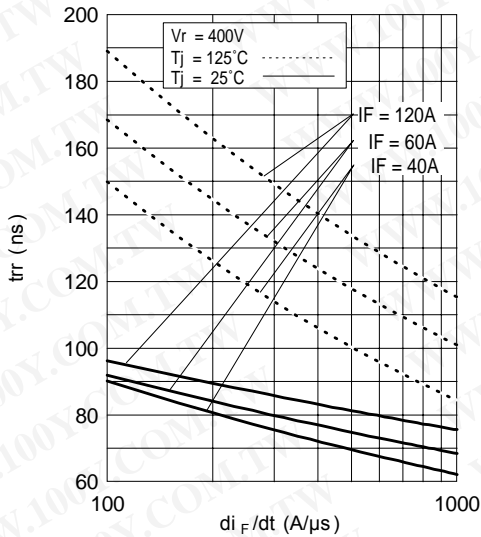
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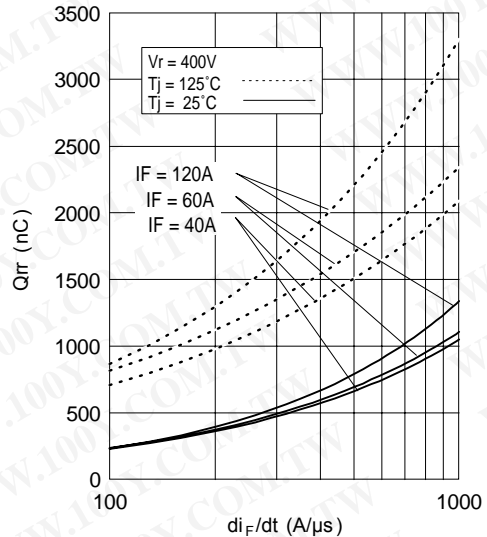
**Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current**



**Fig. 6 - Forward Power Loss Characteristics**



**Fig. 7 - Typical Reverse Recovery time vs.  $di_F/dt$**



**Fig. 8 - Typical Stored Charge vs.  $di_F/dt$**

- (3) Formula used:  $T_c = T_j - (Pd + Pd_{REV}) \times R_{thJC}$ ;  
 $Pd = \text{Forward Power Loss} = I_{F(AV)} \times V_{FM} \times (I_{F(AV)} / D)$  (see Fig. 6);  
 $Pd_{REV} = \text{Inverse Power Loss} = V_{R1} \times I_R \times (1 - D)$ ;  $I_R @ V_{R1} = 80\% \text{ rated } V_R$

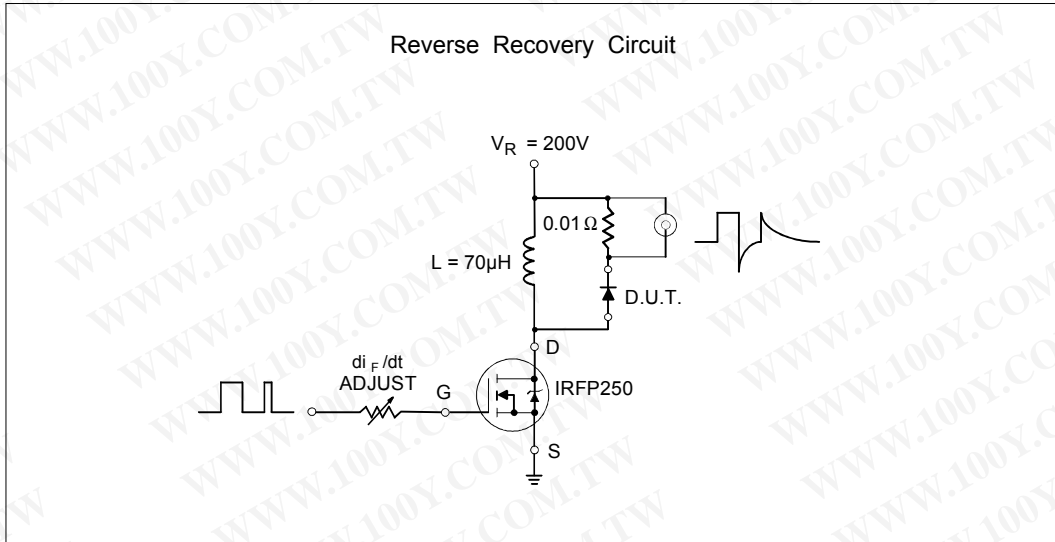


Fig. 9- Reverse Recovery Parameter Test Circuit

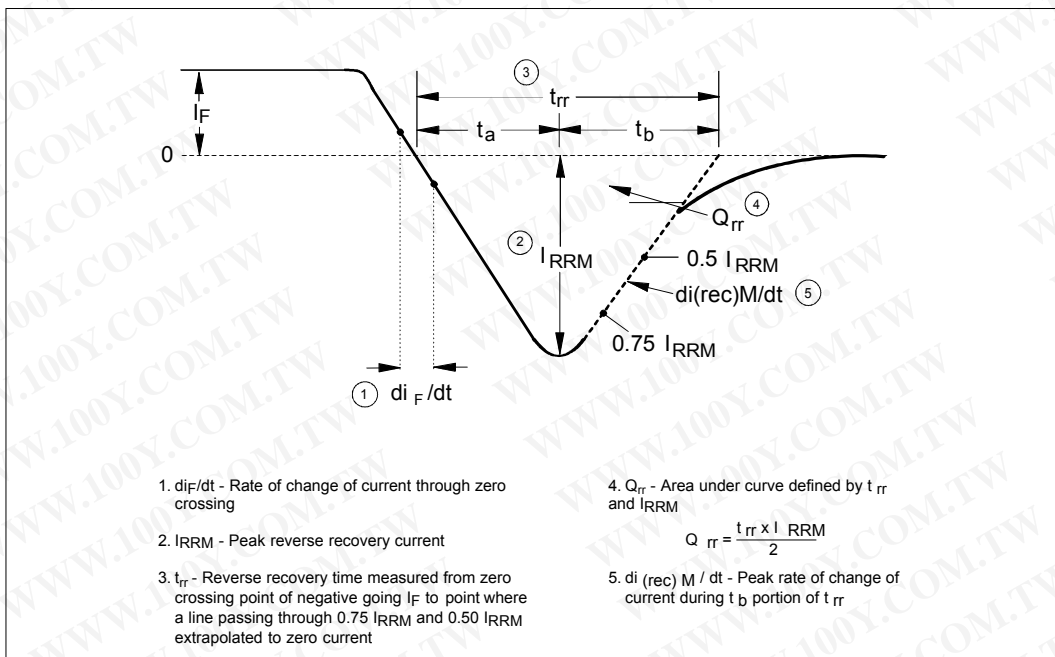


Fig. 10 - Reverse Recovery Waveform and Definitions

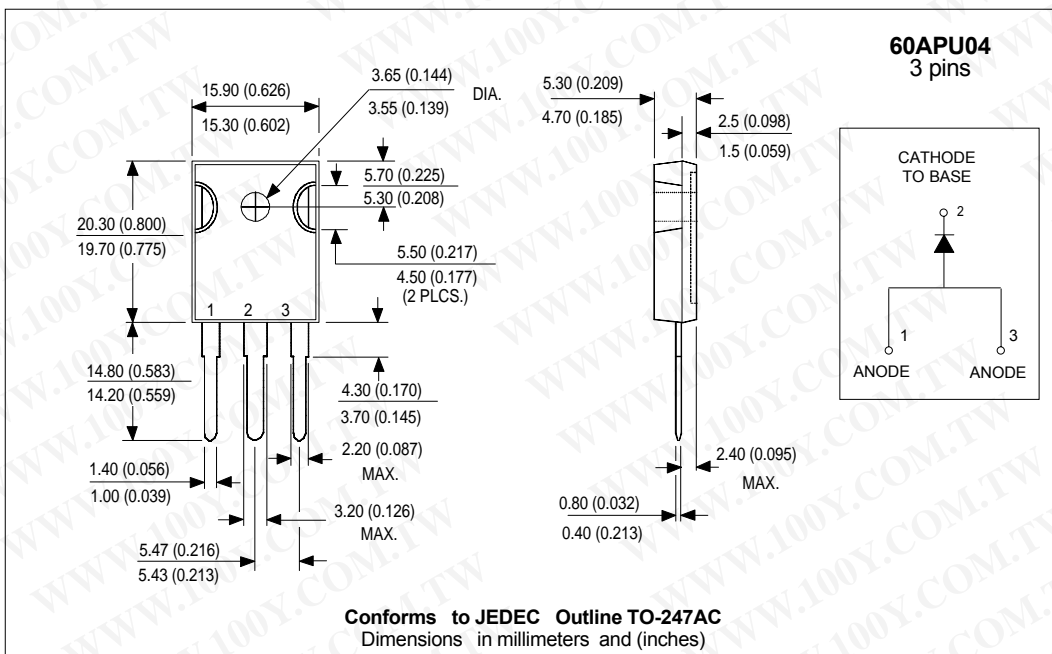
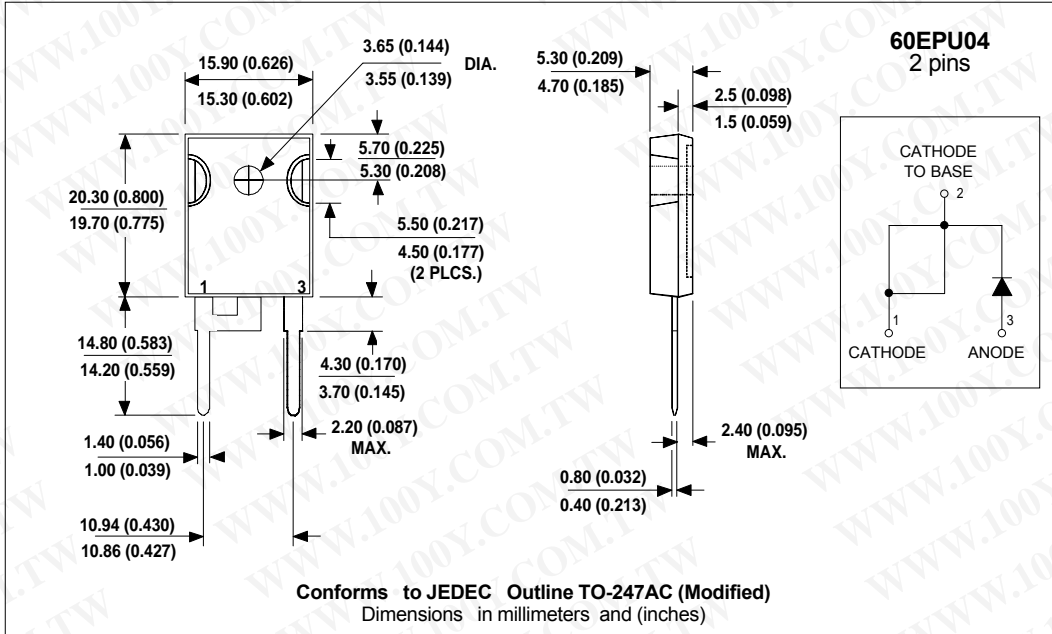
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Outline Table



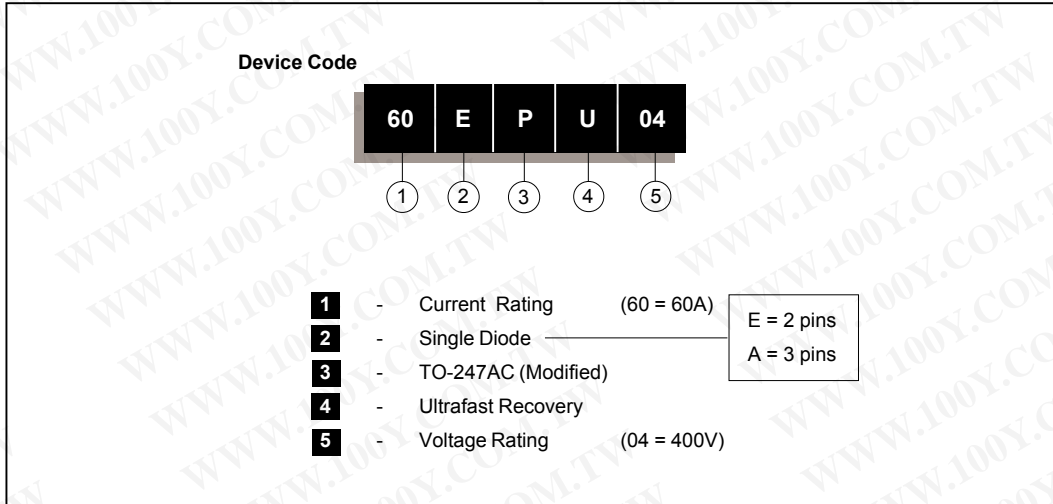
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### Ordering Information Table



Data and specifications subject to change without notice.  
 This product has been designed and qualified for Industrial Level.  
 Qualification Standards can be found on IR's Web site.

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**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
 TAC Fax: (310) 252-7309  
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