Bulletin PD-21082 rev. A 02/06

International
IOR Rectifier

MURB1520PbF
MURB1520-1PbF

Ultrafast Rectifier

Features

- Ultrafast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Lead-Free ("PbF" suffix)

t_{rr} = 35ns
$I_{F(AV)}$ = 15Amp
V_R = 200V

Description/ Applications

International Rectifier's MUR.. series are the state of the art Ultra fast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultra fast recovery time.
The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics.
These devices are intended for use in the output rectification stage of SMPS, UPS, DC-DC converters as well as free-wheeling diode in low voltage inverters and chopper motor drives.
Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

Absolute Maximum Ratings

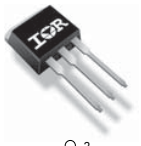
	Parameters	Max	Units
V_{RRM}	Peak Repetitive Peak Reverse Voltage	200	V
$I_{F(AV)}$	Average Rectified Forward Current Total Device, (Rated V_R), T_C = 150°C	15	A
I_{FSM}	Non Repetitive Peak Surge Current	200	
I_{FM}	Peak Repetitive Forward Current (Rated V_R, Square wave, 20 KHz), T_C = 150°C	30	
T_J, T_{STG}	Operating Junction and Storage Temperatures	-65 to 175	°C

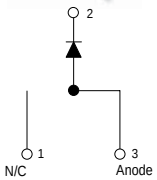
Case Styles

MURB1520PbF

D^2PAK

MURB1520-1PbF





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Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions
V_{BR}, V_r	Breakdown Voltage, Blocking Voltage	200	-	-	V	I_R = 100µA
V_F	Forward Voltage	-	-	1.05	V	I_F = 15A
		-	-	0.85	V	I_F = 15A, T_J = 150°C
I_R	Reverse Leakage Current	-	-	10	µA	V_R = V_R Rated
		-	-	500	µA	T_J = 150°C, V_R = V_R Rated
C_T	Junction Capacitance	-	55	-	pF	V_R = 200V
L_S	Series Inductance	-	8.0	-	nH	Measured lead to lead 5mm from package body

Dynamic Recovery Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions	
t_{rr}	Reverse Recovery Time	-	-	35	ns	I_F = 1.0A, di_F/dt = 50A/µs, V_R = 30V	
		-	22	-		T_J = 25°C	I_F = 15A V_R = 160V di_F/dt = 200A/µs
		-	39	-		T_J = 125°C	
I_{RRM}	Peak Recovery Current	-	1.6	-	A	T_J = 25°C	
		-	4.1	-		T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	-	19	-	nC	T_J = 25°C	
		-	90	-		T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameters	Min	Typ	Max	Units
T_J	Max. Junction Temperature Range	- 65	-	175	°C
T_{Stg}	Max. Storage Temperature Range	- 65	-	175	
R_{thJC}	Thermal Resistance, Junction to Case	-	-	1.5	°C/ W
R_{thJA}	Thermal Resistance, Junction to Ambient	-	-	50	
R_{thCS} ①	Thermal Resistance, Case to Heatsink	-	0.5	-	
Wt	Weight	-	2.0	-	g
		-	0.07	-	(oz)
	Mounting Torque	6.0	-	12	Kg-cm
		5.0	-	10	lbf.in
	Device Marking	MURB1520		Case style D^2Pak	
		MURB1520-1		Case style TO-262	

① Mounting Surface, Flat, Smooth and Greased

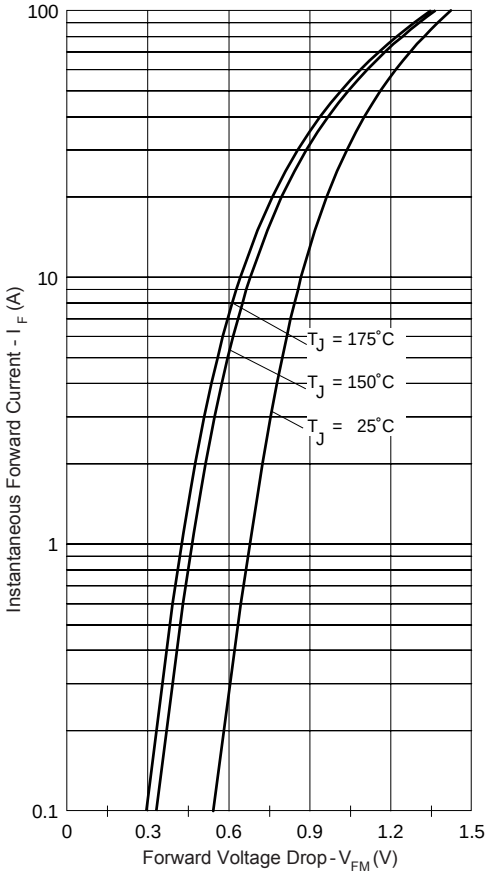


Fig. 1 - Typical Forward Voltage Drop Characteristics

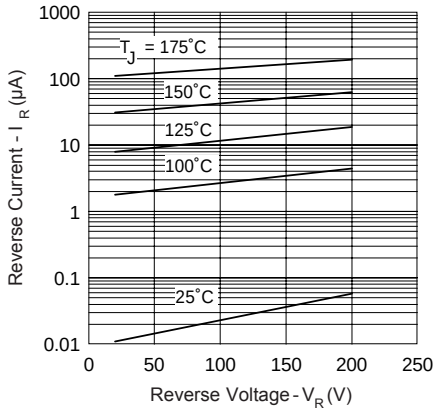


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

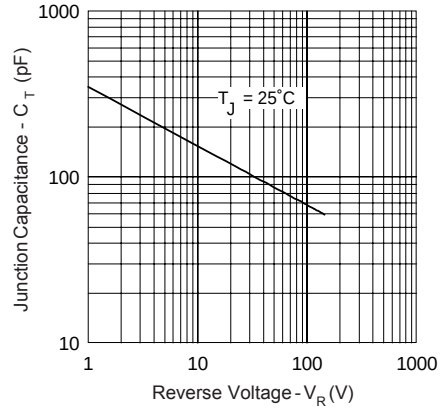


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

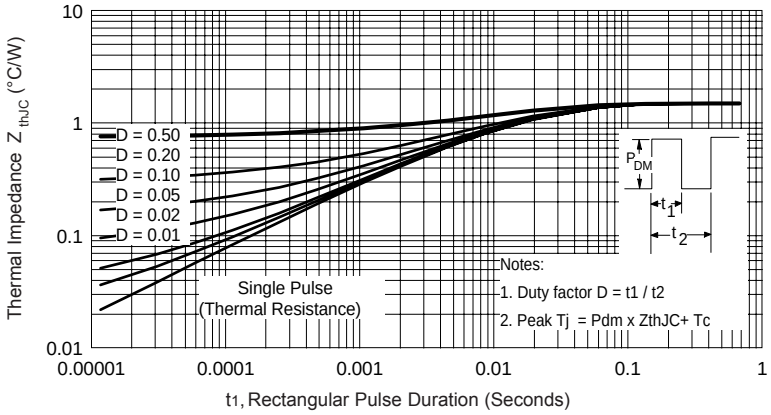


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

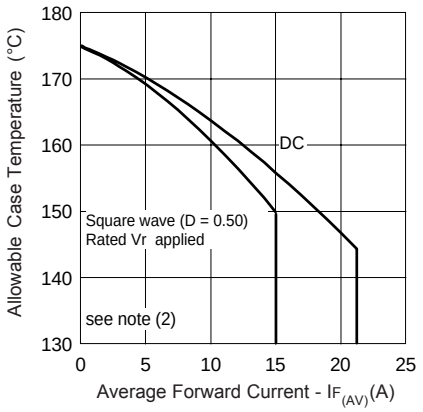


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

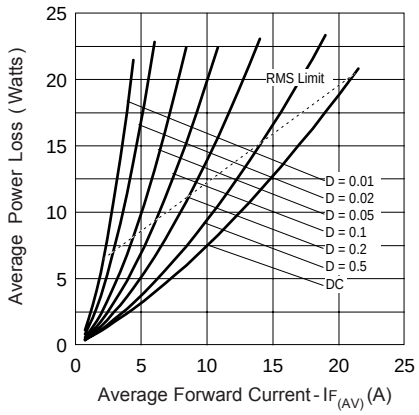


Fig. 6 - Forward Power Loss Characteristics

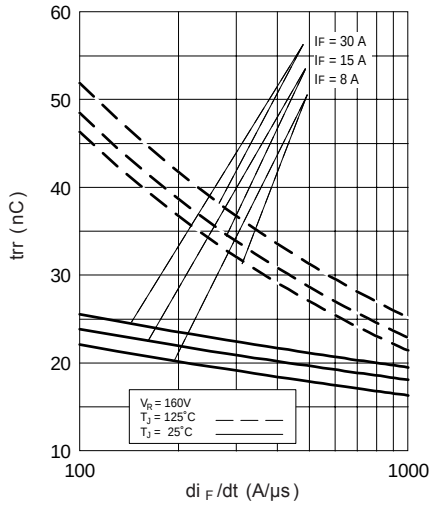


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

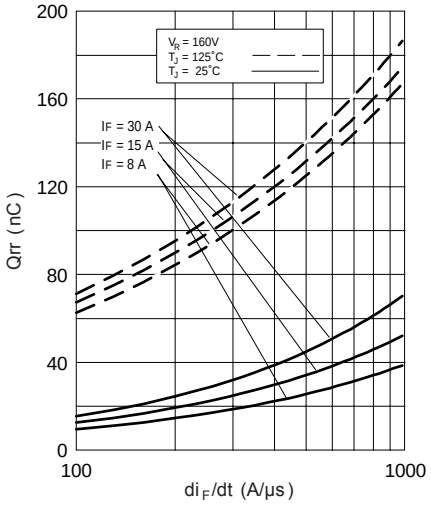


Fig. 8 - Typical Stored Charge vs. di_F/dt

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

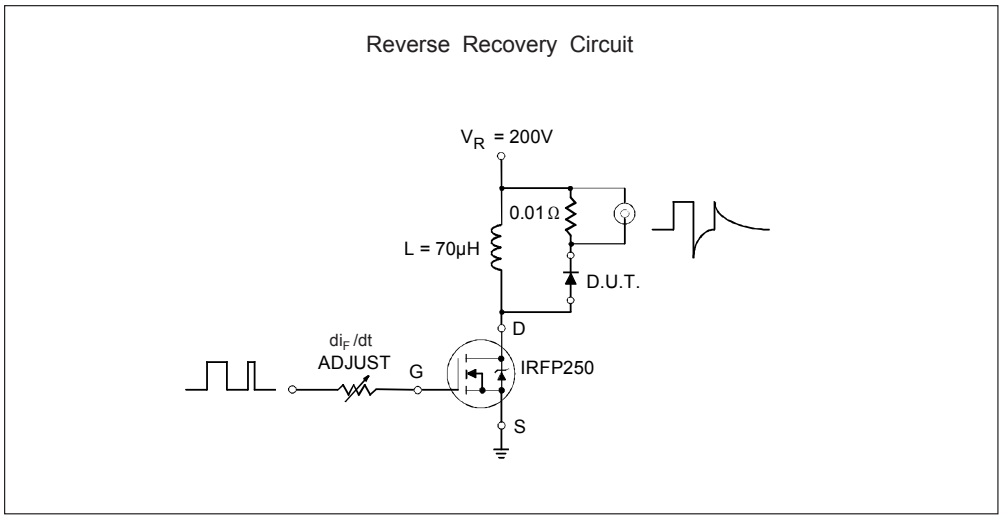
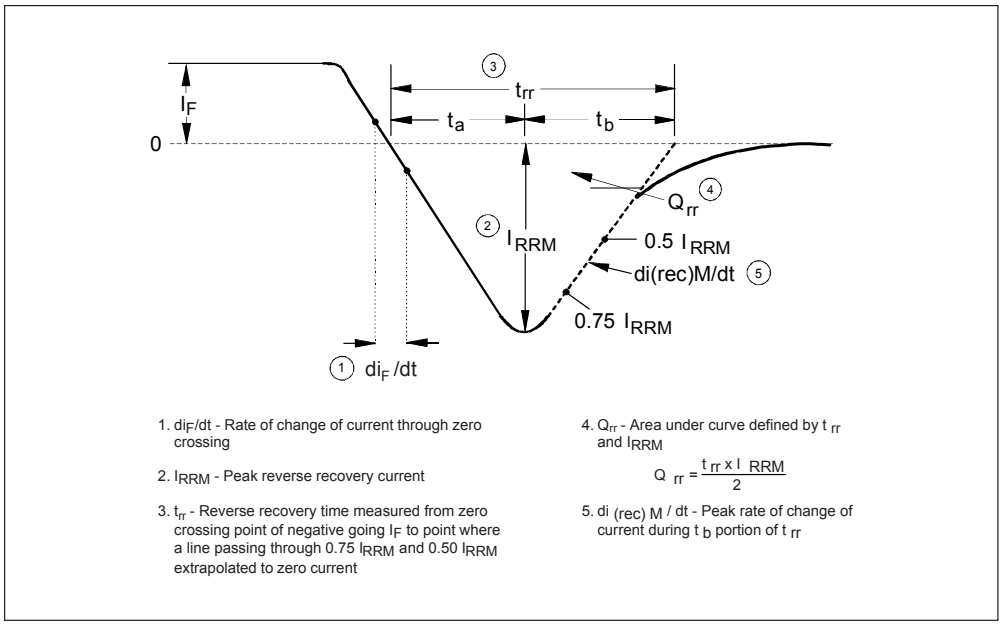


Fig. 9- Reverse Recovery Parameter Test Circuit



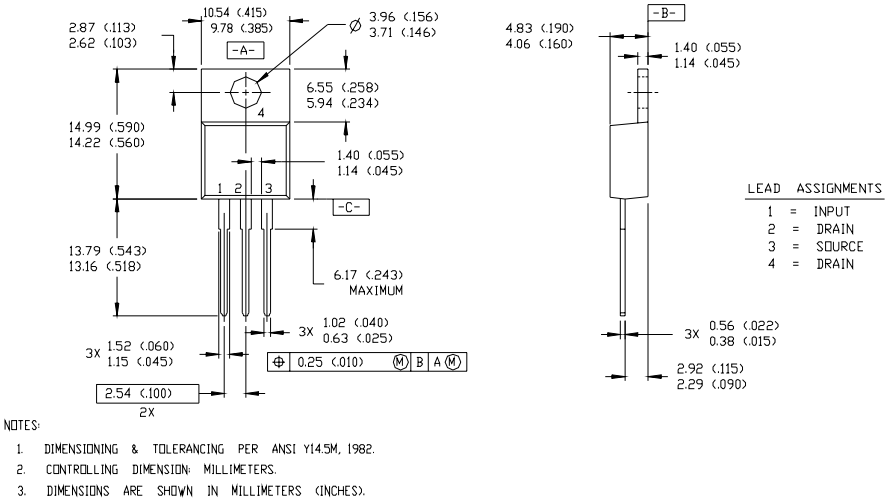
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - Area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

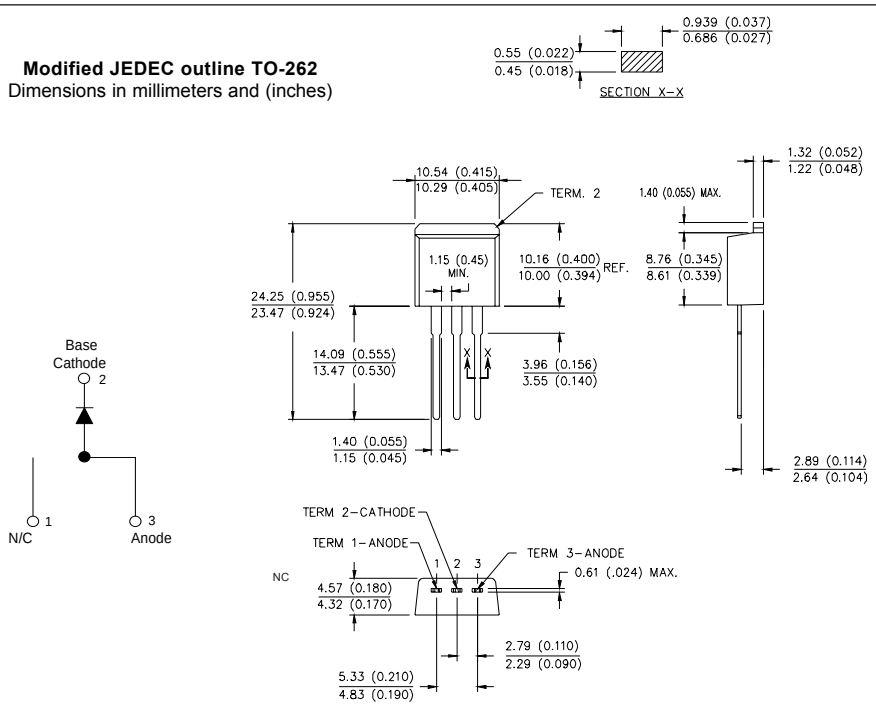
5. $di_{(rec)M}/dt$ - Peak rate of change of current during t_b portion of t_{rr}

Fig. 10 - Reverse Recovery Waveform and Definitions

Outlines Table



Conform to JEDEC outline D²Pak (SMD-220)

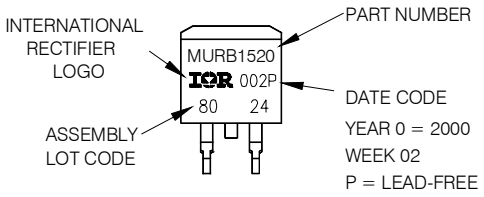


Part Marking Information

D²PAK

EXAMPLE: THIS IS A MURB1520
LOT CODE 8024
ASSEMBLED ON WW 02, 2000

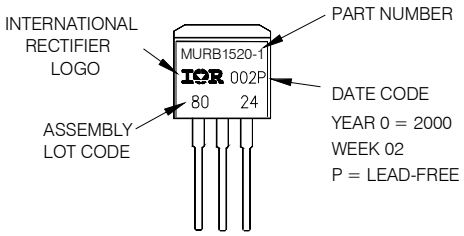
Note: "P" in assembly line position indicates "Lead-Free"



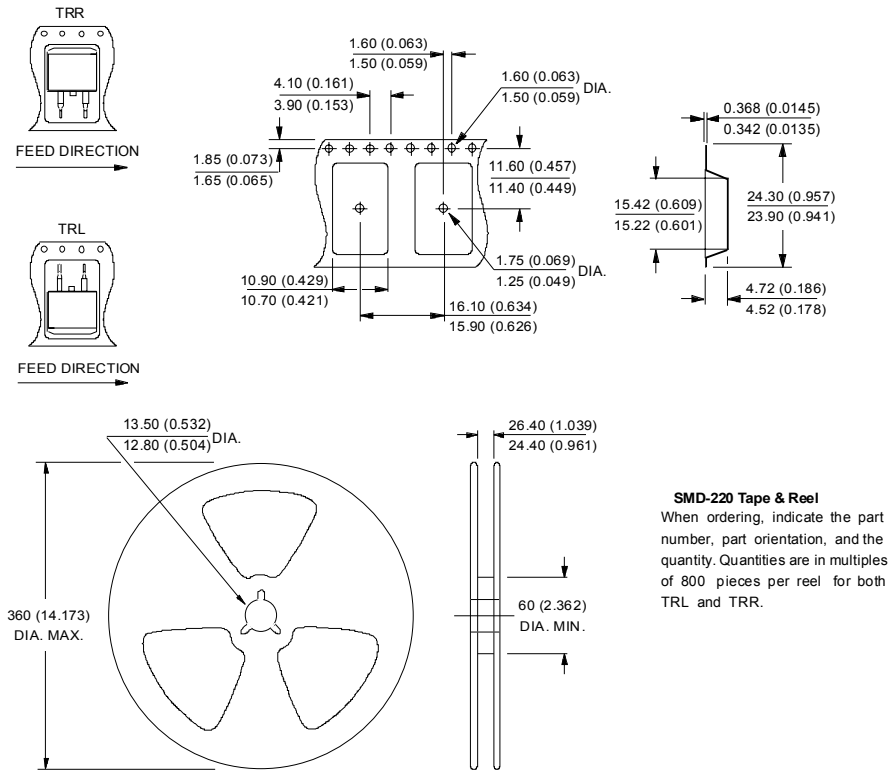
TO-262

EXAMPLE: THIS IS A MURB1520-1
LOT CODE 8024
ASSEMBLED ON WW 02, 2000

Note: "P" in assembly line position indicates "Lead-Free"



Tape & Reel Information

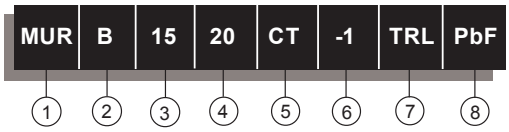


SMD-220 Tape & Reel
When ordering, indicate the part number, part orientation, and the quantity. Quantities are in multiples of 800 pieces per reel for both TRL and TRR.

Dimensions in millimeters and (inches)

Ordering Information Table

Device Code



1 - Ultrafast MUR Series

2 - B = D^2Pak/ TO-262

3 - Current Rating (15 = 15A)

4 - Voltage Rating (20 = 200V)

5 - CT = Center Tap (Dual) TO-220 /D^2PAK/ TO-262

6 - -1 = TO-262

7 - • none = Tube (50 pieces)
• TRL = Tape & Reel (Left Oriented, for D^2PAk package)
• TRR = Tape & Reel (Right Oriented, for D^2PAk package)

8 - • none = Standard Production
• PbF = Lead-Free

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MUR1520
**********************************************
* SPICE Model Diode                  *
**********************************************
.SUBCKT MUR1520 ANO CAT
D1 ANO 1 CAT
*Define diode model
.MODEL DMOD D Is=16.9E-09 N=1.332 Rs=4.439E-03 Ikf=.232 Xti=2 Eg=1.11
                Cjo=700.3E-09 M=.3715 Vj=.1784 Fc=.5 Isr=1.389E-09
                Nr=3.002 Bv=270 Ibv=95.79E-6 Tt=10.49E-9)

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.ENDS MUR1520


Thermal Model Subcircuit
.SUBCKT MUR1520  5 1

CTHERM1     5     4     2.23E+01
CTHERM2     4     3     1.23E+02
CTHERM3     3     2     3.35E+02
CTHERM4     2     1     4.75E+02

RTHERM1     5     4     7.55E-01
RTHERM2     4     3     5.90E-02
RTHERM1     3     2     1.01E-01
RTHERM1     2     1     5.43E-02


.ENDS MUR1520
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Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level and Lead-Free.
Qualification Standards can be found on IR's Web site.

International
IOR Rectifier

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02/06

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