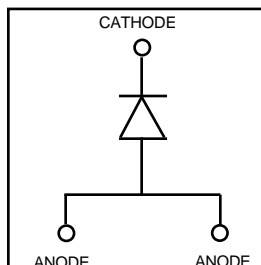


## HEXFRED™

## Ultrafast, Soft Recovery Diode

### Features

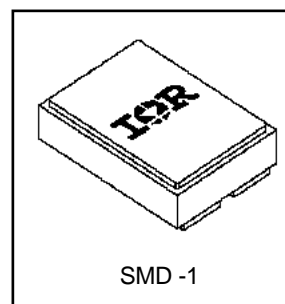
- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetic
- Surface Mount



$V_R = 200V$
$V_F = 0.96V$
$Q_{rr}^* = 640nC$
$di_{(rec)M}/dt^* = 980A/\mu s$
* 125°C

### Description

HEXFRED™ diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. An extensive characterization of the recovery behavior for different values of current, temperature and di/dt simplifies the calculations of losses in the operating conditions. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for power converters, motors drives and other applications where switching losses are significant portion of the total losses.



### Absolute Maximum Ratings (per Leg)

	Parameter	Max.	Units
$V_R$	D.C. Reverse Voltage	200	V
$I_F @ T_C = 100^\circ C$	Continuous Forward Current ①	50	A
$I_{FSM} @ T_C = 25^\circ C$	Single Pulse Forward Current ②	600	
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	125	W
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	°C

### Thermal - Mechanical Characteristics

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case, Single Leg Conducting	—	1.0	°C/W
Wt	Weight	2.6	—	g

**Note:** ① D.C. = 50% rect. wave

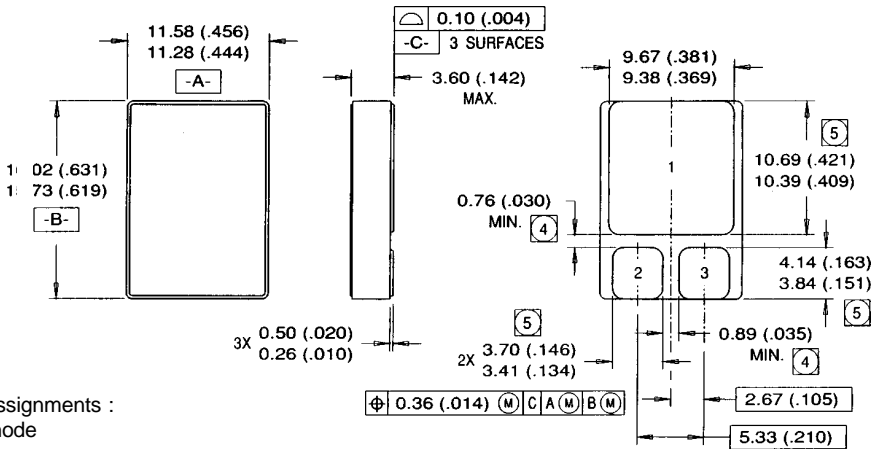
② 1/2 sine wave, 60 Hz , P.W. = 8.33 ms

## Electrical Characteristics (per Leg) @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{BR}$	Cathode Anode Breakdown Voltage	200	—	—	V	$I_R = 100\mu\text{A}$
$V_{FM}$	Max Forward Voltage	—	0.88	0.96	V	$I_F = 50\text{A}$
			0.98	1.11		$I_F = 100\text{A}$ See Fig. 1
			0.75	0.84		$I_F = 50\text{A}$ , $T_J = 125^\circ\text{C}$
$I_{RM}$	Max Reverse Leakage Current	—	—	10	$\mu\text{A}$	$V_R = V_R$ Rated
		—	—	1.0	mA	$T_J = 125^\circ\text{C}$ , $V_R = 160\text{V}$ See Fig. 2
$C_T$	Junction Capacitance	—	170	310	pF	$V_R = 200\text{V}$ See Fig. 3
$L_S$	Series Inductance	—	2.8	—	nH	Measured from center of bond pad to end of anode bonding wire

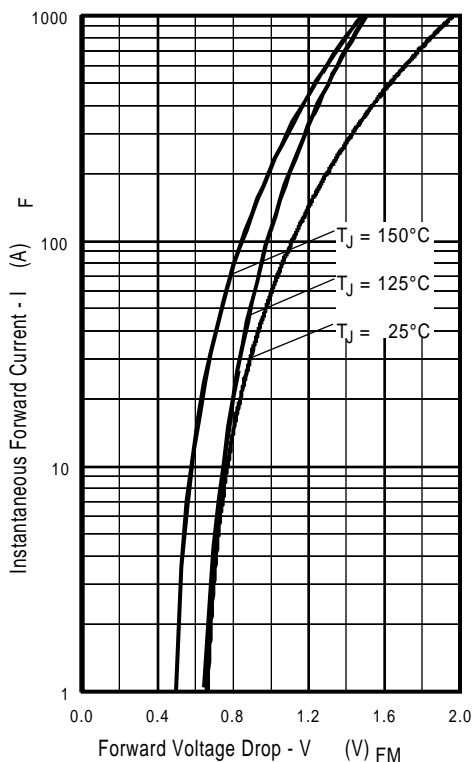
## Dynamic Recovery Characteristics (per Leg) @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{rr}$	Reverse Recovery Time	—	35	—	ns	$I_F = 1.0\text{A}$ , $di/dt = 200\text{A}/\mu\text{s}$ , $V_R = 30\text{V}$
$t_{rr1}$		—	62	93		$T_J = 25^\circ\text{C}$ See Fig.
$t_{rr2}$		—	98	150		$T_J = 125^\circ\text{C}$ 5
$I_{RRM1}$	Peak Recovery Current	—	10	18	A	$T_J = 25^\circ\text{C}$ See Fig.
$I_{RRM2}$		—	14	26		$T_J = 125^\circ\text{C}$ 6
$Q_{rr1}$	Reverse Recovery Charge	—	260	390	nC	$T_J = 25^\circ\text{C}$ See Fig.
$Q_{rr2}$		—	640	960		$T_J = 125^\circ\text{C}$ 7
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	600	900	A/ $\mu\text{s}$	$T_J = 25^\circ\text{C}$ See Fig.
$di_{(rec)M}/dt2$	During $t_b$	—	980	1500		$T_J = 125^\circ\text{C}$ 8

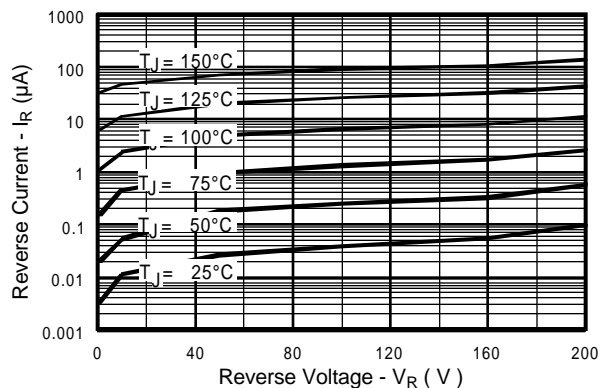


### IR Case Style SMD-1

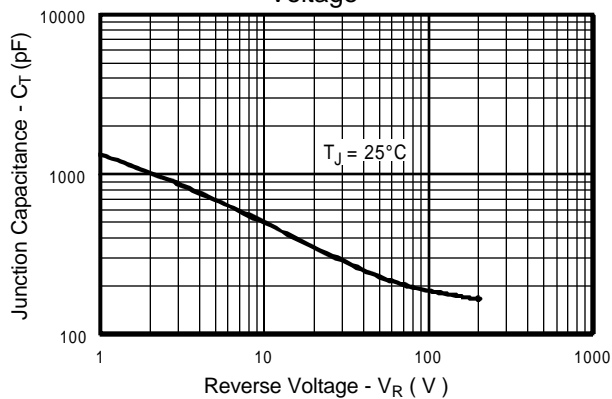
Dimensions in millimeters and (inches)



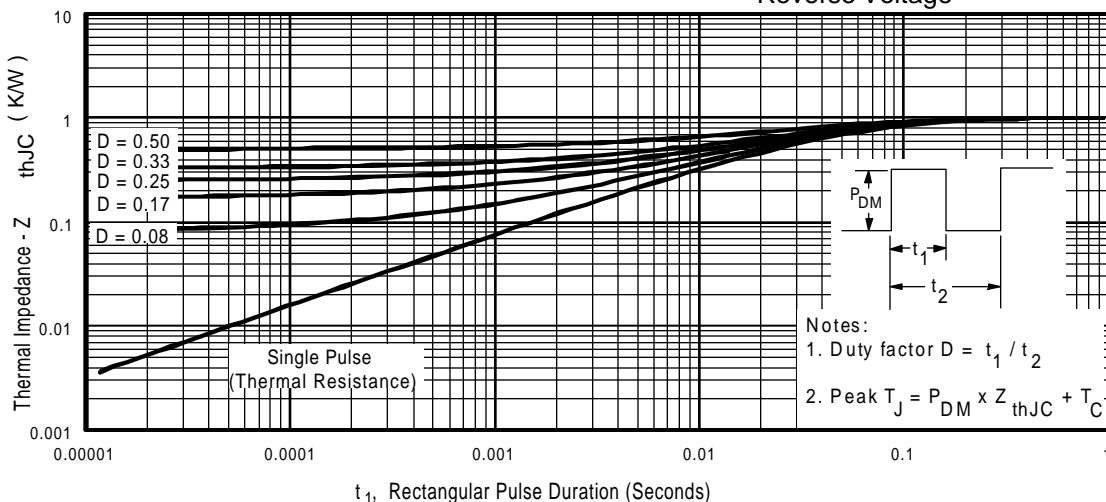
**Fig. 1** - Maximum Forward Voltage Drop vs. Instantaneous Forward Current



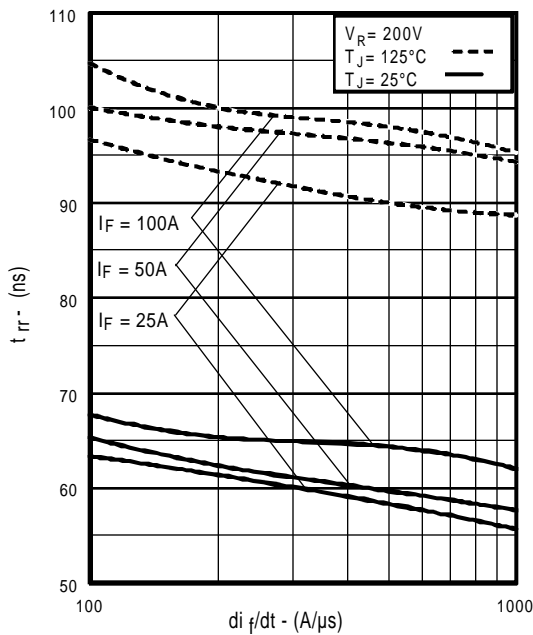
**Fig. 2** - Typical Reverse Current vs. Reverse Voltage



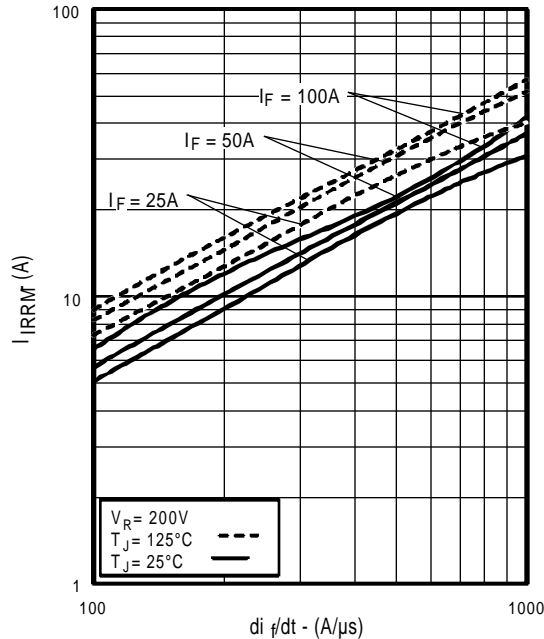
**Fig. 3** - Typical Junction Capacitance vs. Reverse Voltage



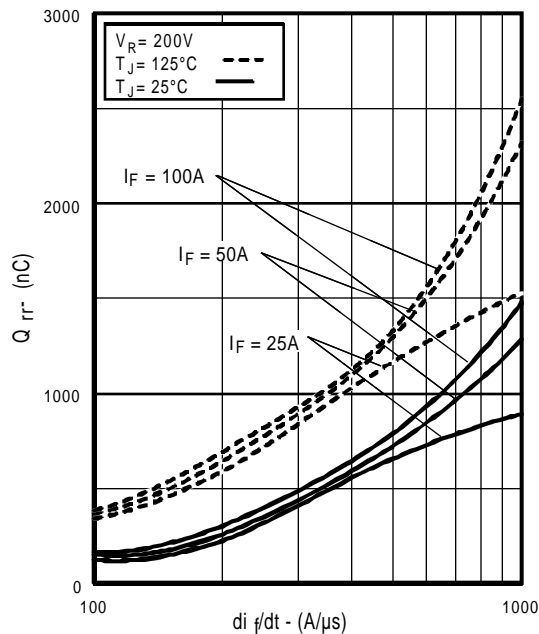
**Fig. 4** - Maximum Thermal Impedance  $Z_{thjc}$  Characteristics



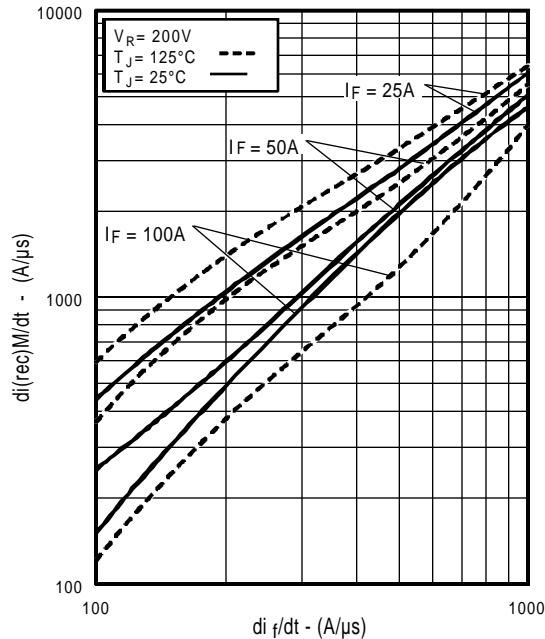
**Fig. 5** - Typical Reverse Recovery vs.  $di_f/dt$ ,



**Fig. 6** - Typical Recovery Current vs.  $di_f/dt$ ,

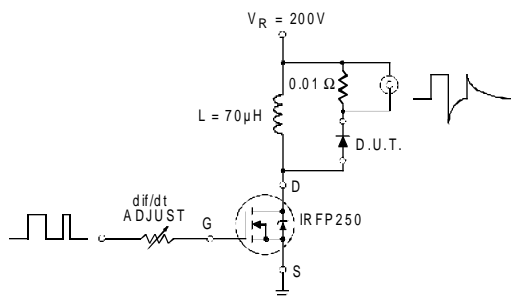


**Fig. 7** - Typical Stored Charge vs.  $di_f/dt$

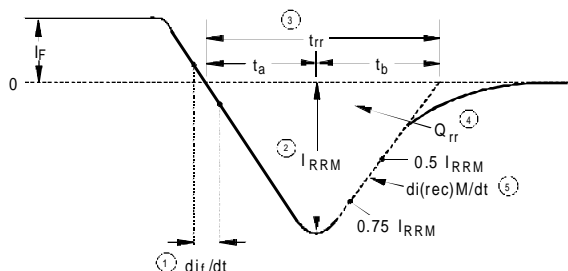


**Fig. 8** - Typical  $di_{(rec)M}/dt$  vs.  $di_f/dt$

REVERSE RECOVERY CIRCUIT



**Fig. 9** - Reverse Recovery Parameter Test Circuit



1.  $di/dt$  - 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