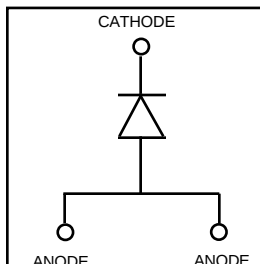


HEXFRED™

Ultrafast, Soft Recovery Diode

Features

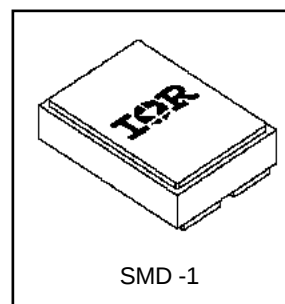
- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetic
- Surface Mount



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

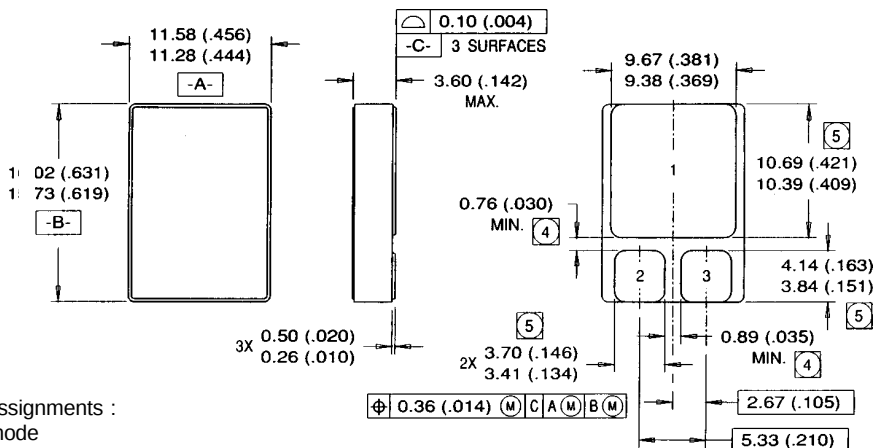
② 1/2 sine wave, 60 Hz , P.W. = 8.33 ms

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	μA	$V_R = V_R$ 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	$I_F = 1.0\text{A}$, $di_F/dt = 200\text{A}/\mu\text{s}$, $V_R = 30\text{V}$
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 During t_b	—	600	900	A/ μs	$T_J = 25^\circ\text{C}$ See Fig.
$di_{(rec)M}/dt2$		—	980	1500		$T_J = 125^\circ\text{C}$ 8

**IR Case Style SMD-1**

Dimensions in millimeters and (inches)

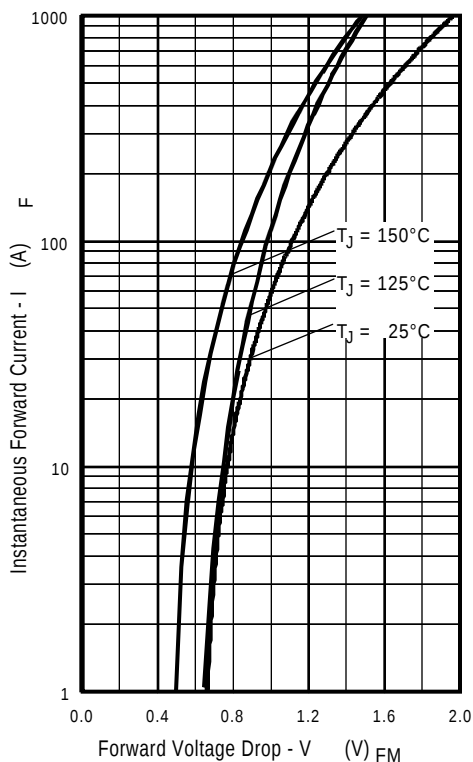


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

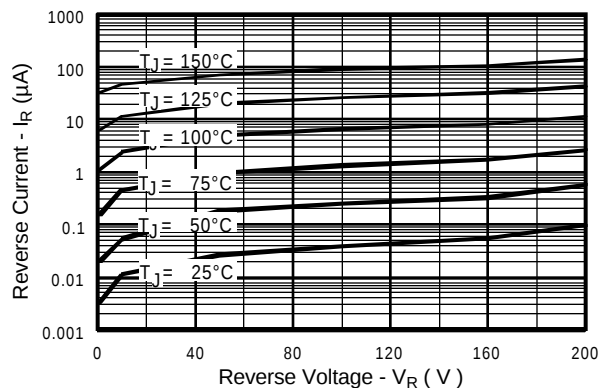


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

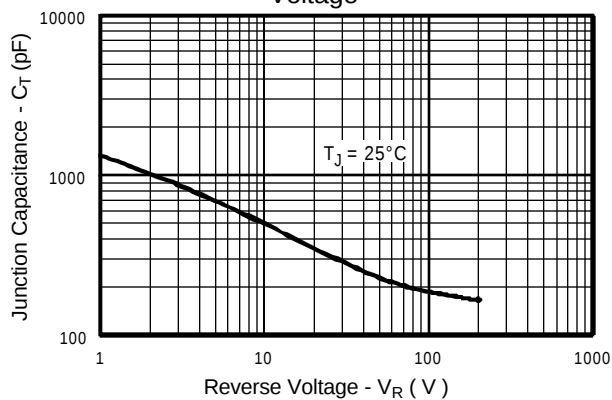


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

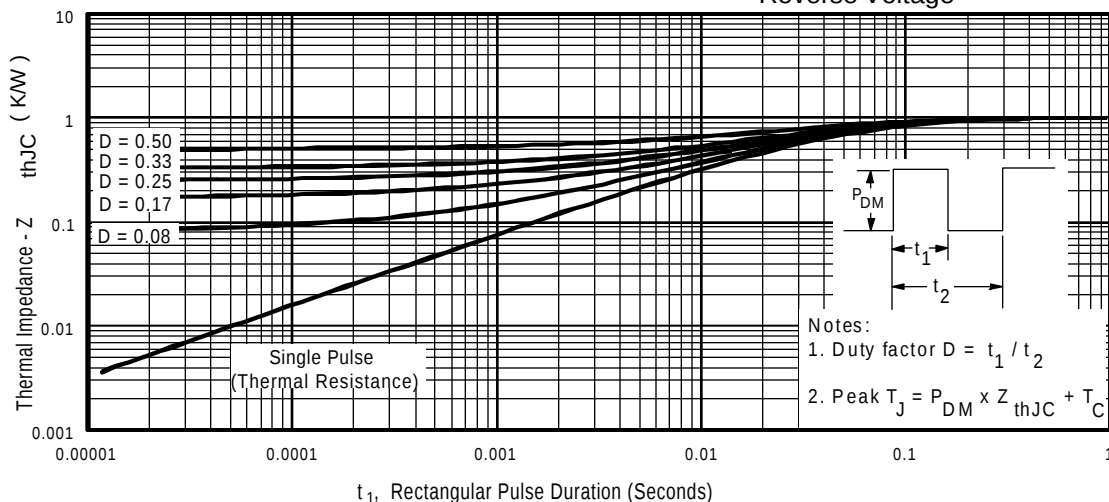


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics

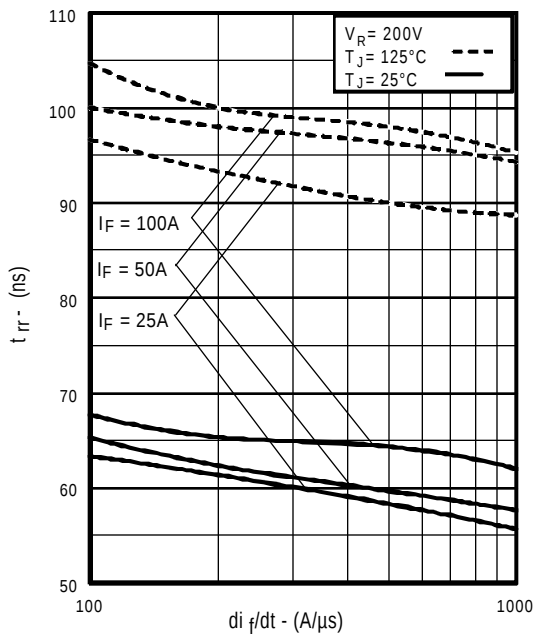


Fig. 5 - Typical Reverse Recovery vs. di_f/dt ,

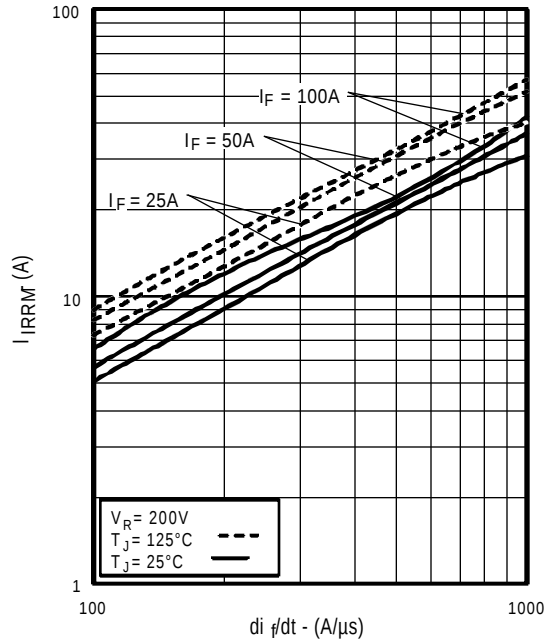


Fig. 6 - Typical Recovery Current vs. di_f/dt ,

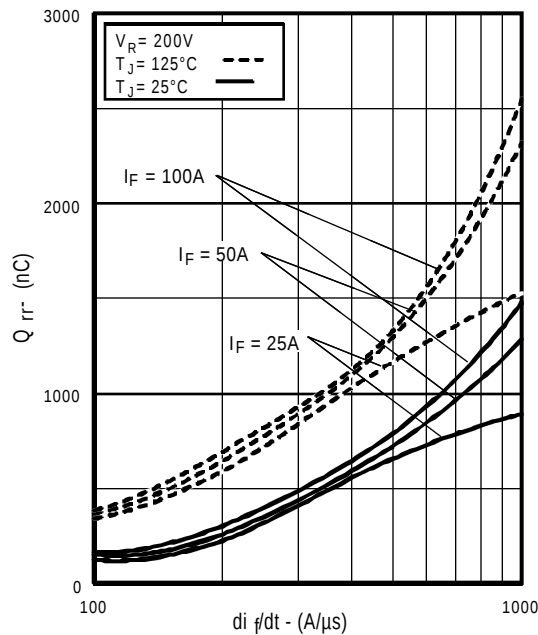


Fig. 7 - Typical Stored Charge vs. di_f/dt

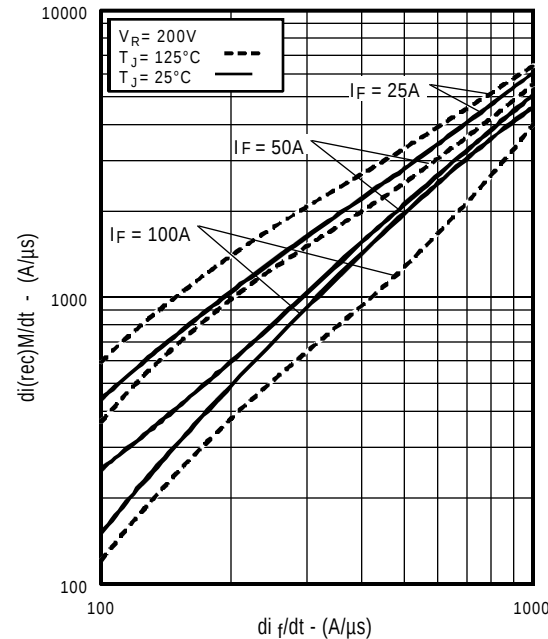


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt

REVERSE RECOVERY CIRCUIT

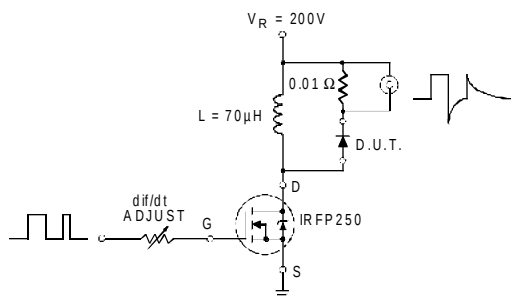
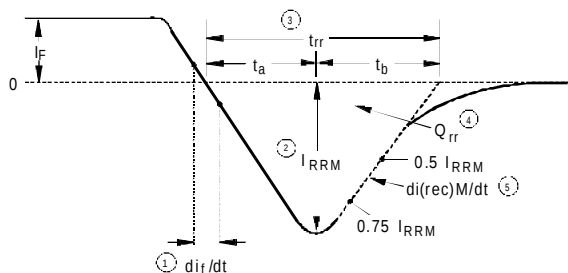


Fig. 9 - Reverse Recovery Parameter Test Circuit



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