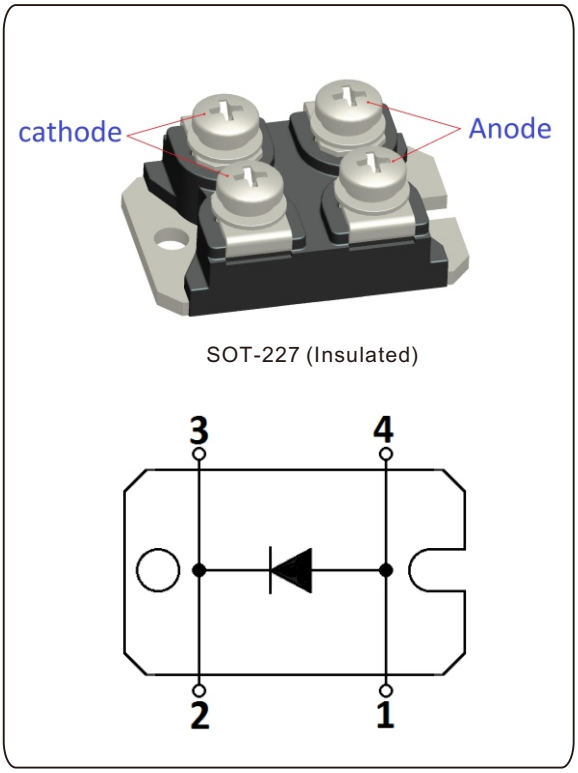
FRED
Ultrafast Soft Recovery Diode
100A / 600V

Pb Available RoHS* COMPLIANT



FEATURES

- Fast recovery time characteristic
- Electrically isolated base plate
- Large creepage distance between terminal
- Simplified mechanical designs, rapid assembly
- Compliant to RoHS
- Designed and for industrial level
- Planar FRED Chip

DESCRIPTION

This SOT-227 modules with FRED rectifier are available in single diode configuration.The semiconductor in the SOT-227 package is isolated from the copper base plate, allowing for common heatsinks and compact assemblies to be built.

APPLICATIONS

- Switching power supplies
- Inverters
- Motor controllers
- Converters
- Snubber diodes
- Uninterruptible power supplies (UPS)
- Induction heating
- High speed rectifiers
- Free wheeling
- Choppers

PRODUCT SUMMARY	
V_R	600 V
V_F(typical) at 125 °C	1.00V
Q_{rr} (typical)	450nC
I_{RRM} (typical)	10A
t_{rr} (typical)	70 ns
$I_{F(DC)}$ at T_C per diode	100A at 125 °C

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Maximum continuous forward current	I_F	T_c = 125 °C	100	A
Single pulse forward current	I_{FSM}	T_J = 25 °C	1200	
RMS isolation voltage, any terminal to case	V_{ISO}	t = 1 minute	2500	V
Maximum power dissipation	P_D	T_c = 25 °C	317	W
		T_c = 100 °C	144	
Operating junction and storage temperature range	T_J, T_{Stg}		- 55 to 175	°C

ELECTRICAL SPECIFICATIONS (T_J = 25 ºC unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Cathode to anode breakdown voltage	V_{BR}	I_R = 100 µA	600	-	-	V
Maximum forward voltage	V_{FM}	I_F = 100 A	-	1.20	1.35	
		I_F = 200 A	-	1.35	1.50	
		I_F = 100 A, T_J = 125 ºC	-	1.00	1.15	
Maximum reverse leakage current	I_{RM}	V_R = V_R rated	-	2	20	µA
		T_J = 125°C, V_R = V_R rated	-	-	1000	
Junction capacitance	C_J	V_R = 200V	-	-	300	pF

DYNAMIC RECOVERY CHARACTERISTICS PERLEG (T_J= 25 ºC unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 0.5A, I_R = 1.0A, I_{RR} = 250mA (RG#1 CKT)		-	80	90	ns
		I_F = 1.0 A, dI_F/dt = -200 A/µs, V_R =30 V, T_J = 25°C		-	70	-	
	t_{rr1}	T_J = 25 ºC	I_F= 100A dI_F/dt = -200 A/µs V_R =200 V	-	90	140	
	t_{rr2}	T_J = 125 ºC		-	160	240	
Reverse recovery current	I_{RRM1}	T_J = 25 ºC		-	10	18	A
	I_{RRM2}	T_J = 125 ºC		-	15	30	
Reverse recovery charge	Q_{rr1}	T_J = 25 ºC		-	450	1300	nC
	Q_{rr2}	T_J = 125 ºC		-	1200	3600	

THERMAL - MECHANICAL SPECIFICATIONS (T_J = 25 ºC unless otherwise specified)					
PARAMETER	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Junction to case	R_{thJC}	-	-	0.30	ºC/W K/W
Case to sink, flat, greased surface	R_{thCS}	-	0.05	-	
Isolation RMS voltage (50~60Hz sinusoidal waveform from terminals to mounting base for 1 Min.)	V_{ISO}	2500	-	-	V
Weight		-	30	-	g
Mounting torque		-	-	1.1	N·m
				10	lb·in

Fig.1 Maximum forward voltage drop vs. Instantaneous forward current

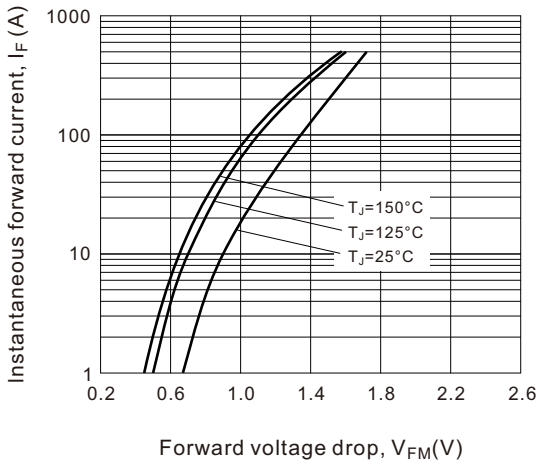


Fig.2 Typical reverse current vs. reverse voltage

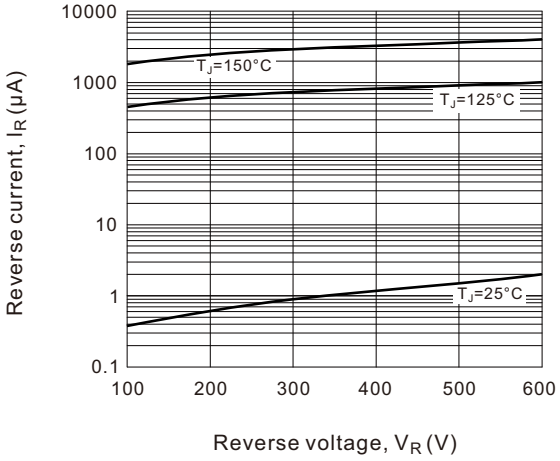


Fig.3 Typical junction capacitance vs. reverse voltage

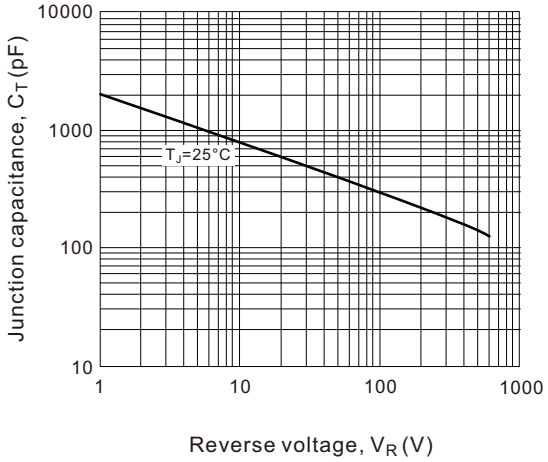


Fig.4 Maximum average forward current vs. case temperature

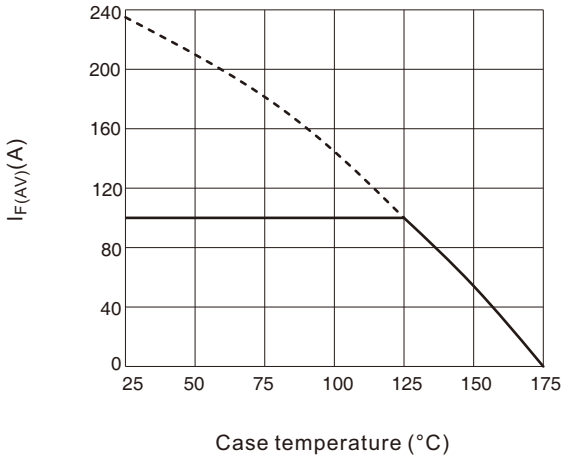


Fig.5 Typical reverse recovery time vs. dI_F/dt

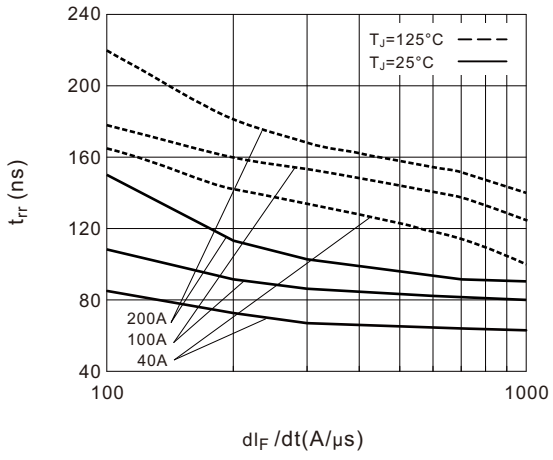


Fig.6 Typical recovery current vs. dI_F/dt

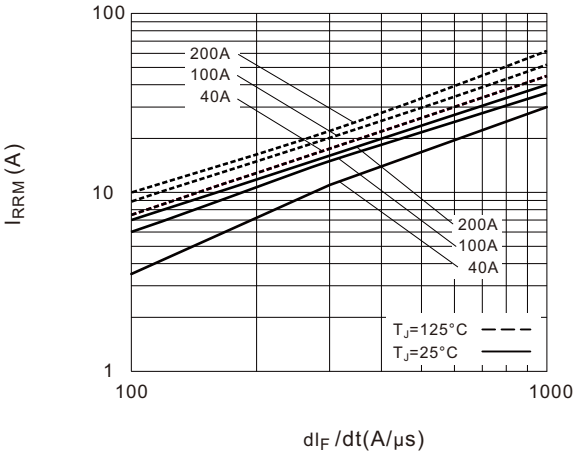


Fig.7 Typical stored charge vs. dI_F/dt

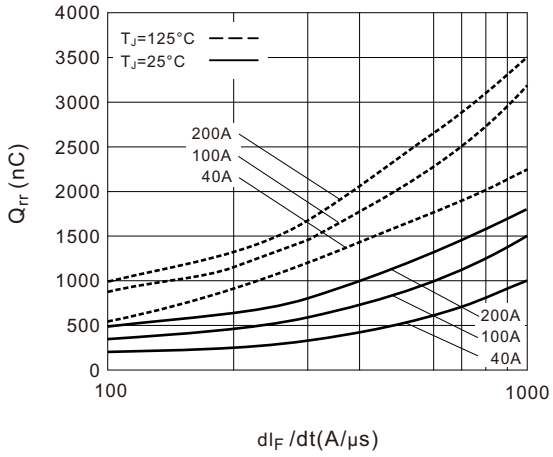


Fig.8 Typical $dI_{(rec)M}/dt$ vs. dI_F/dt

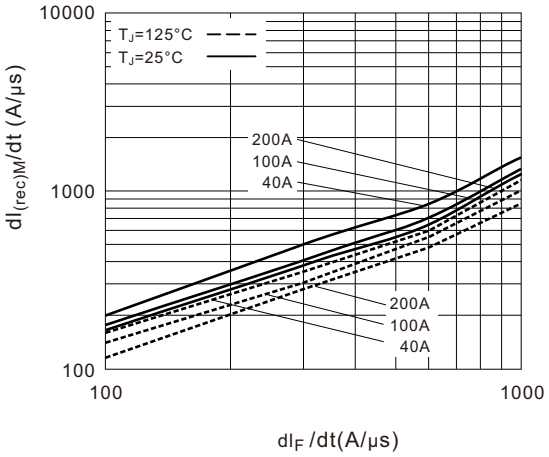


Fig.9 Maximum thermal impedance $R_{th(j-c)}$ characteristics

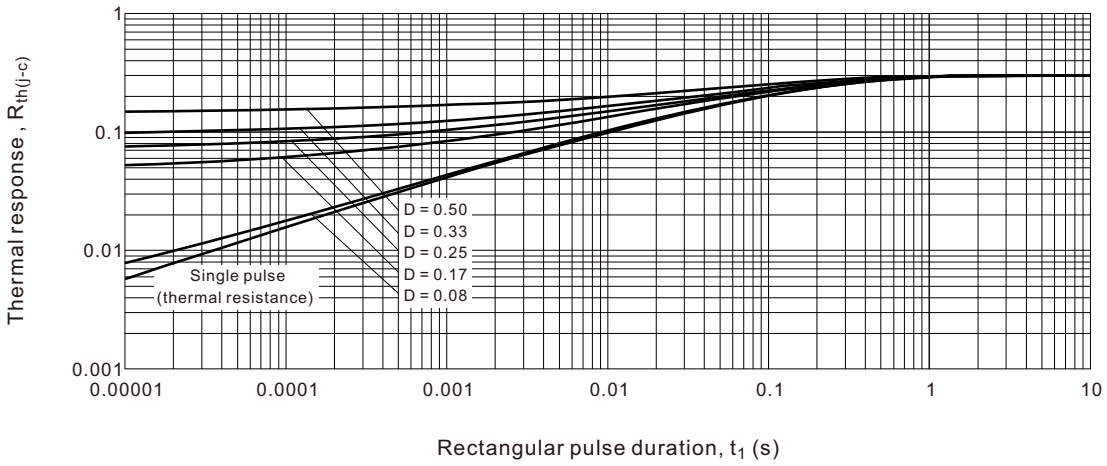


Fig.10 Reverse recovery parameter test circuit

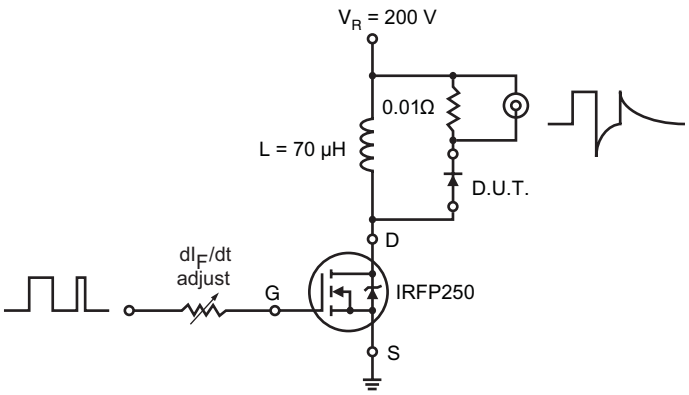
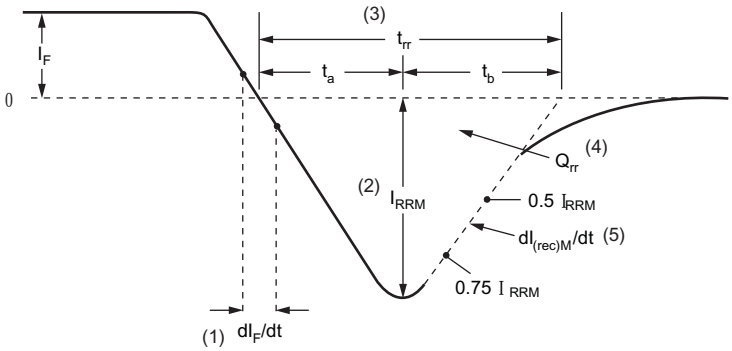


Fig.11 Reverse recovery waveform and definitions



(1) dI_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

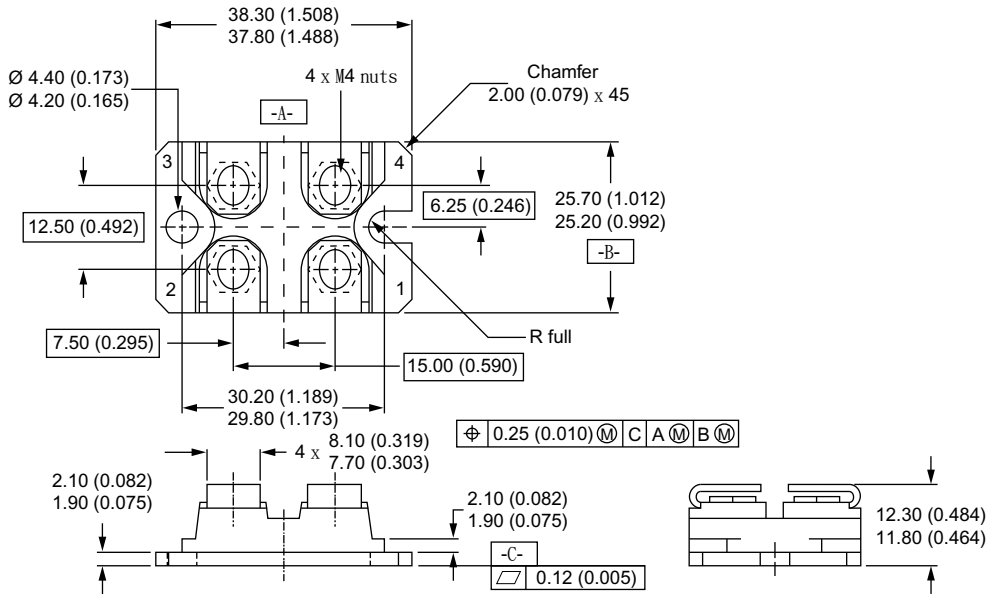
(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.

(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}

SOT-227



All dimensions in millimeters (inches)

Notes

- Dimensioning and toleranc ing per ANSI Y14.5M-1982
- Controlling dime nsion: millimeter

ORDERING INFORMATION TABLE

Device code

N	ST	100	F	06	E
①	②	③	④	⑤	⑥

1 - Nell High Power Products
2 - Package indicator (SOT-227)
3 - Current rating (100 = 100A)
4 - F = FRED family
5 - Voltage rating (06 = 600 V)
6 - Circuit type, Single diode, insulated