Nell High Power Products

FRED
Ultrafast Soft Recovery Diode, 60A × 2

Pb Available
RoHS*
COMPLIANT

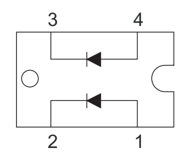
FEATURES

- 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

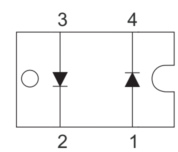
DESCRIPTION

This SOT-227 modules with FRED rectifier are available in two basic configurations. They are the antiparallel and the parallel configurations. The antiparallel configuration NST120F120-A is used for simple series rectifier and high voltage application. The parallel configuration NST120F120 is used for simple parallel rectifier and high current application. The semiconductor in the SOT-227 package is isolated from the copper base plate, allowing for common heatsinks and compact assemblies to be built. These modules are intended for general applications such as power supplies, battery chargers, electronic welders, motor control, DC chopper, and inverters.

CIRCUIT CONFIGURATION



Parallel
NST120F120



Anti-Parallel
NST120F120-A

APPLICATIONS

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

PRODUCT SUMMARY	
V_R	1200 V
V_F(typical) at 125 ºC	2.0 V
t_{rr} (typical)	38 ns
$I_{F(DC)}$ at T_C per diode	53A at 100 ºC

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Maximum continuous forward current per leg	I_F	T_c = 100 ºC	53	A
Maximum continuous forward current per module			106	
Single pulse forward current	I_{FSM}	T_J = 25 ºC	350	
RMS isolation voltage, any terminal to case	V_{ISOL}	t = 1 minute	2500	V
Maximum power dissipation	P_D	T_c = 25 ºC	337	W
		T_c = 100 ºC	135	
Operating junction and storage temperature range	T_J, T_{Stg}		- 55 to 150	°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	1200	-	-	V
Maximum forward voltage	V_{FM}	I_F = 60 A	-	2.0	2.5	V
		I_F = 120 A	-	2.3	-	V
		I_F = 60 A, T_J = 125 ºC	-	1.8	-	V
Maximum reverse leakage current	I_{RM}	V_R = V_R rated	-	2	250	µA
		T_J = 150°C, V_R = V_R rated	-	2.5	-	mA
Junction capacitance	C_T	V_R = 200V		60		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)		-	70	80	ns
		I_F = 1.0 A, dI_F/dt = -100 A/µs, V_R =30 V, T_J = 25°C		-	38	-	ns
	t_{rr1}	T_J = 25 ºC	I_F= 60A, dI_F/dt = -200 A/µs, V_R =800 V	-	400	-	ns
	t_{rr2}	T_J = 125 ºC		-	470	-	ns
Peak recovery current	I_{RRM1}	T_J = 25 ºC		-	6	-	A
	I_{RRM2}	T_J = 125 ºC		-	13	-	A
Reverse recovery charage	Q_{rr1}	T_J = 25 ºC		-	1200	-	nC
	Q_{rr2}	T_J = 125 ºC		-	4000	-	nC

THERMAL - MECHANICAL SPECIFICATIONS (T_J = 25 ºC unless otherwise specified)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Junction to case, single leg conducting	R_{thJC}	-	-	0.50	ºC/W K/W
Junction to case, both legs conducting		-	-	0.25	
Case to sink, flat, greased surface	R_{thCS}	-	0.05	-	
Weight		-	30	-	g
Mounting torque		-	-	1.1	Nm

Fig.1a Maximum effective transient thermal impedance, junction-to-case vs. pulse duration

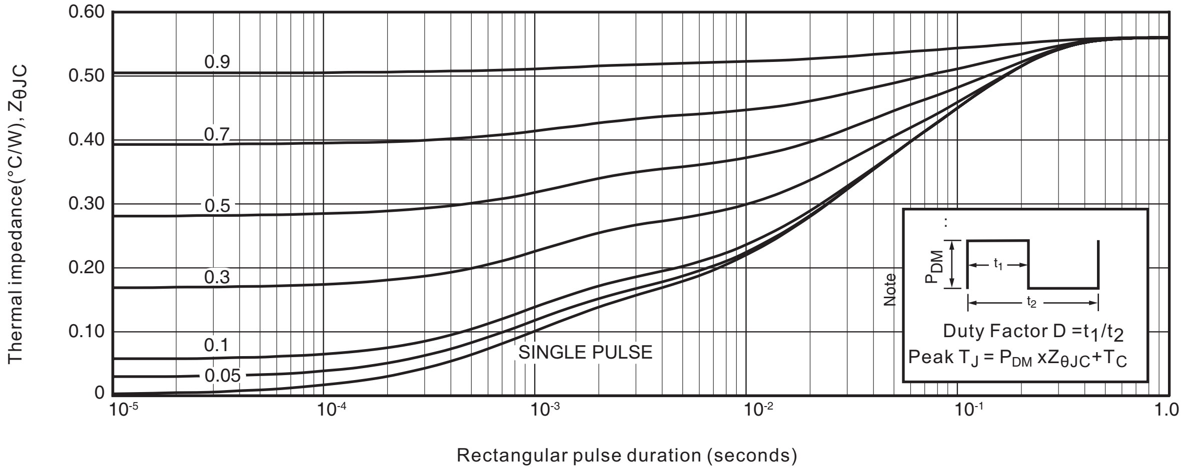


Fig.1b transient thermal impedance model

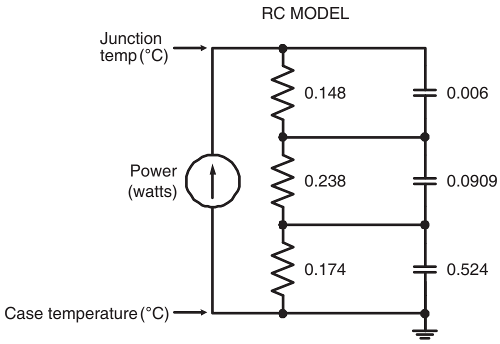


Fig.2 Forward current vs. forward voltage

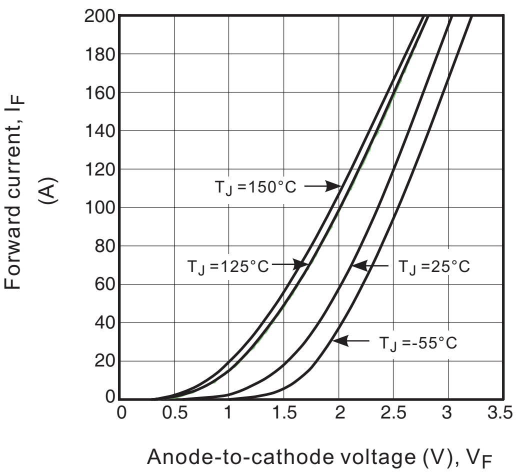


Fig.3 Reverse recovery time vs. current rate of change

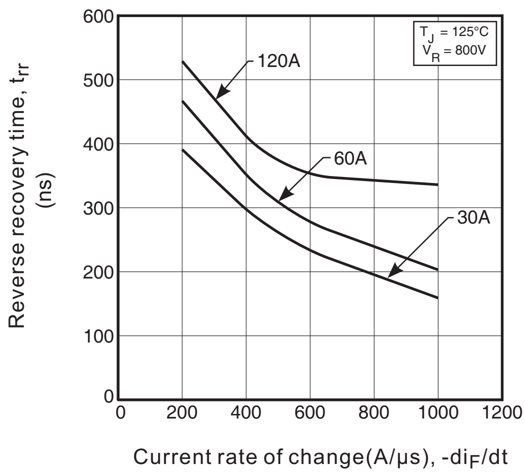


Fig.4 Reverse recovery charge vs. current rate of change

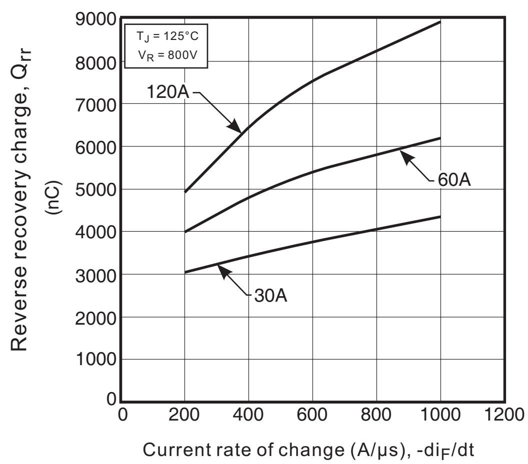


Fig 5. Reverse recovery current vs. current rate of change

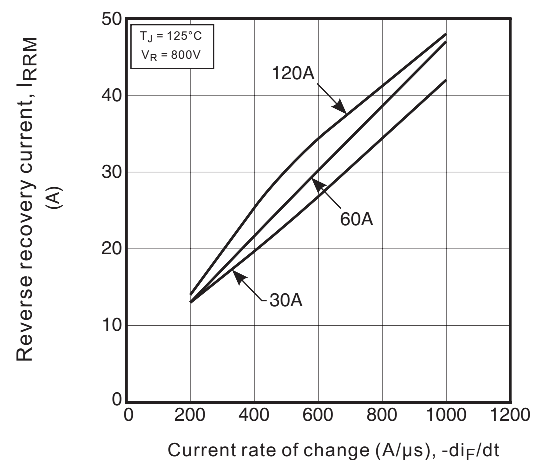


Fig6. Dynamic parameters vs. junction temperature

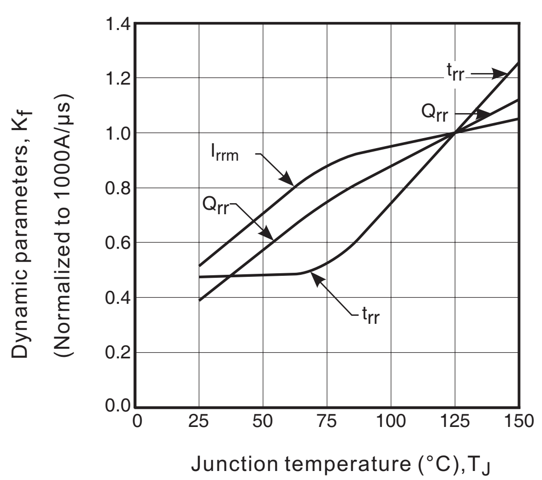


Fig.7 Maximum average forward current vs. case temperature

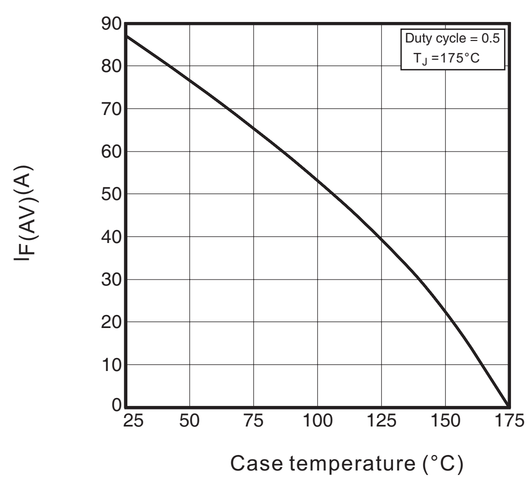


Fig.8 Junction capacitance vs. reverse voltage

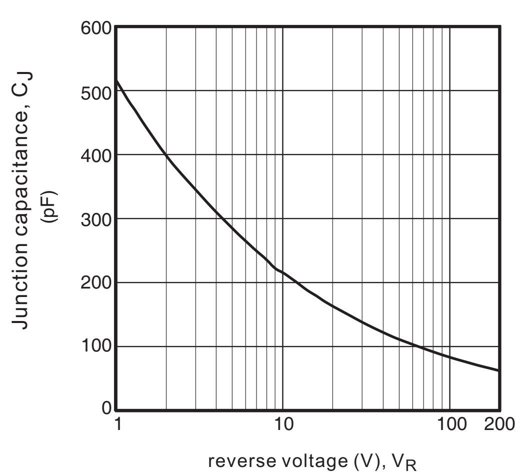


Fig.9 Reverse recovery parameter test circuit

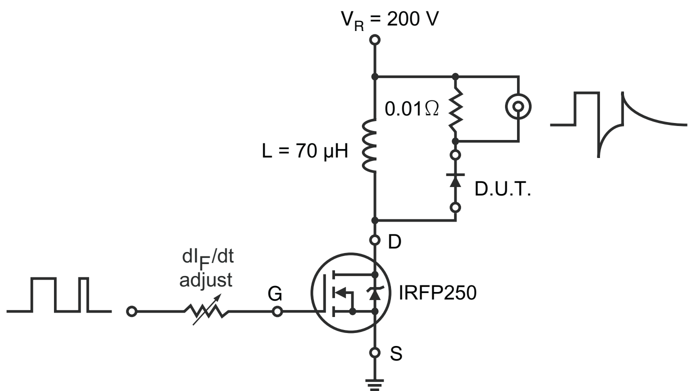
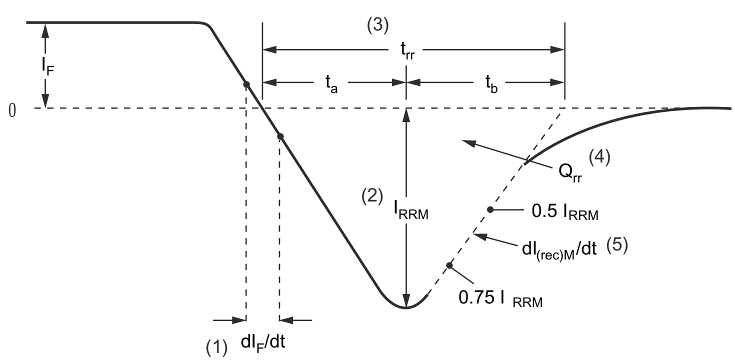


Fig.10 Reverse recovery waveform and definitions



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

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

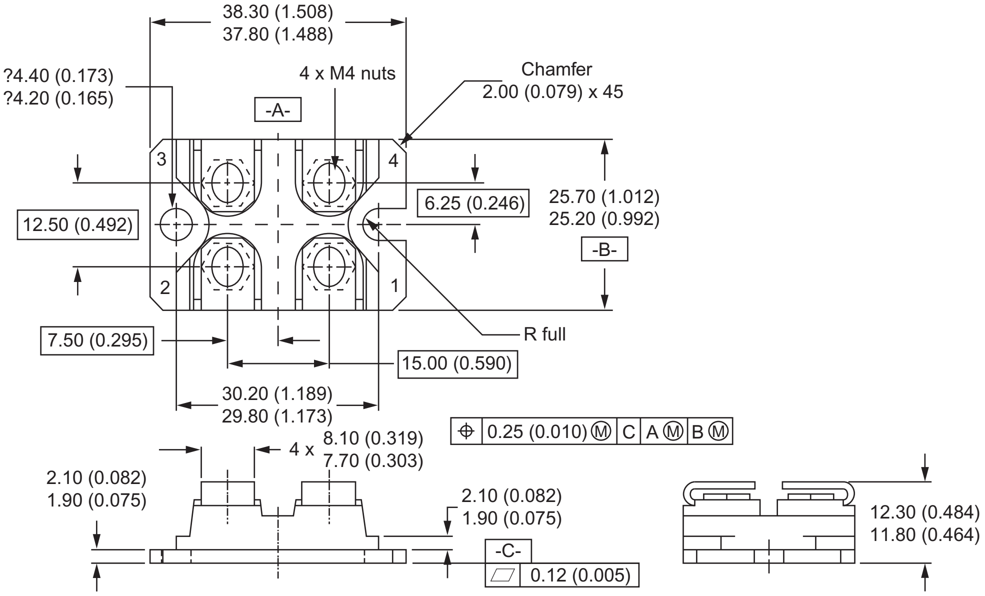
(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.

(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	120	F	120	–	A
	1	2	3	4	5		6

1 - Nell High Power Products
2 - Package indicator (SOT-227)
3 - Current rating (120 = 120A, 60A x 2)
4 - F = FRED family
5 - Voltage rating (120 = 1200 V)
6 - Circuit type, A for Anti-Parallel type
Blank for parallel type.