

FRED Ultrafast Soft Recovery Diode 100A x 2 / 1200V



FEATURES

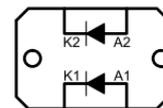
- Fast recovery time characteristic
- Electrically isolated base plate
- Large creepage distance between terminal
- Simplified mechanical designs, rapid assembly
- Compliant to RoHS
- Designed and for industrial level



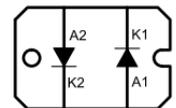
DESCRIPTION

This SOT-227 modules with FRED rectifier are available in two basic configurations. They are the antiparallel and the parallel configurations. The antiparallel configuration NST200F12-A is used for simple series rectifier and high voltage application. The parallel configuration NST200F12 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
NST200F12



Anti-Parallel
NST200F12-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 °C | 1.7 V |
| t_{rr} (typical) | 65 ns |
| $I_{F(DC)}$ at T_C per diode | 93A at 80 °C |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|----------------|-----------------------|-------------|-------|
| Cathode to anode voltage | V_R | | 1200 | V |
| Maximum continuous forward current $\frac{\text{per leg}}{\text{per module}}$ | I_F | $T_C = 80\text{ °C}$ | 93 | A |
| | | | 186 | |
| Single pulse forward current | I_{FSM} | $T_J = 25\text{ °C}$ | 1000 | |
| RMS isolation voltage, any terminal to case | V_{ISOL} | $t = 1\text{ minute}$ | 2500 | V |
| Maximum power dissipation | P_D | $T_C = 25\text{ °C}$ | 440 | W |
| | | $T_C = 100\text{ °C}$ | 260 | |
| Operating junction and storage temperature range | T_J, T_{Stg} | | - 55 to 175 | °C |

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| ELECTRICAL SPECIFICATIONS (T _J = 25 °C 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 = 100 A | - | 1.90 | 2.20 | |
| | | I _F = 200 A | - | 2.30 | - | |
| Maximum reverse leakage current | I _{RM} | V _R = V _R rated | - | 2 | 50 | μA |
| | | T _J = 125 °C, V _R = V _R rated | - | - | 1.0 | mA |
| Junction capacitance | C _J | V _R = 200V | 120 | | | pF |

| DYNAMIC RECOVERY CHARACTERISTICS PER LEG (T _J = 25 °C 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) | - | 105 | 120 | ns |
| | | I _F = 1.0 A, di _F /dt = -100 A/μs, V _R = 30 V, T _J = 25 °C | - | 65 | - | |
| | t _{rr1} | T _J = 25 °C | - | 420 | - | |
| Reverse recovery time | t _{rr2} | T _J = 125 °C | - | 580 | - | A |
| | I _{RRM1} | T _J = 25 °C | - | 7 | - | |
| | I _{RRM2} | T _J = 125 °C | - | 19 | - | |
| Reverse recovery time | Q _{rr1} | T _J = 25 °C | - | 1250 | - | nC |
| | Q _{rr2} | T _J = 125 °C | - | 5350 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS (T _J = 25 °C unless otherwise specified) | | | | | | |
|---|-------------------|------|------|------|-------------|--|
| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNITS | |
| Junction to case, single leg conducting | R _{thJC} | - | - | 0.40 | °C/W K/W | |
| Junction to case, both legs conducting | | - | - | 0.20 | | |
| Case to sink, flat, greased surface | R _{thCS} | - | 0.05 | - | | |
| Weight | | - | 30 | - | g | |
| Mounting torque | | - | - | 1.1 | Nm | |

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

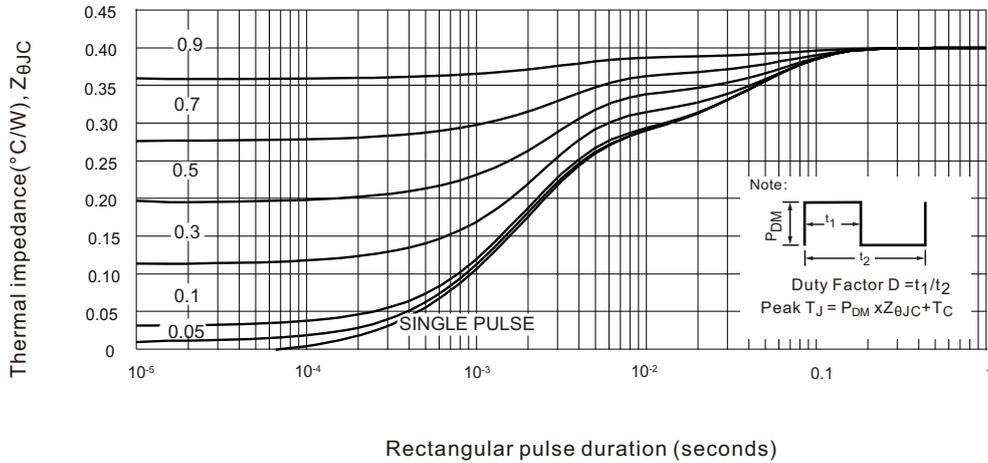


Fig.2 Forward current vs. forward voltage

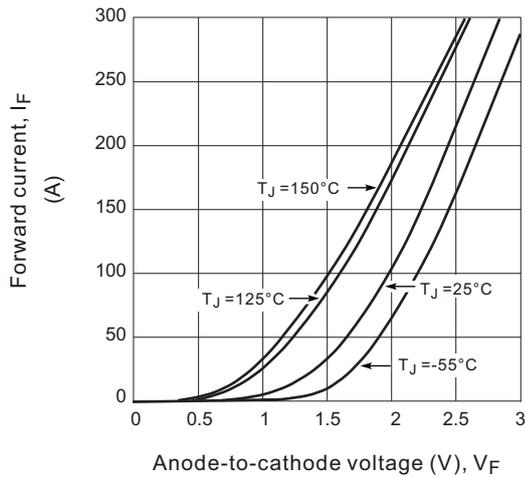


Fig.3 Reverse recovery time vs. current rate of change

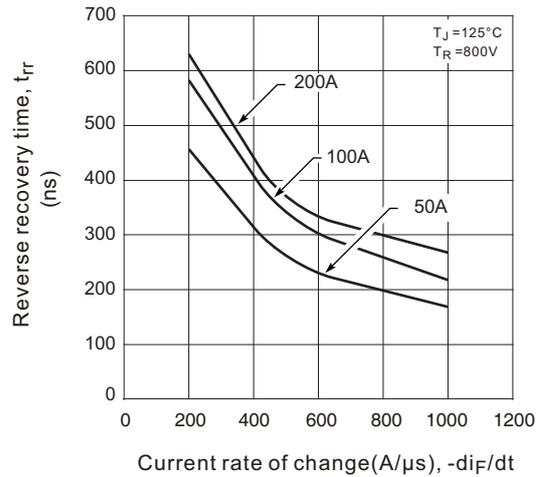


Fig.4 Reverse recovery charge vs. current rate of change

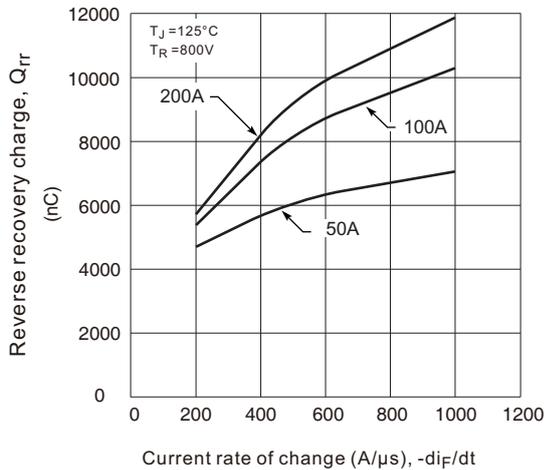
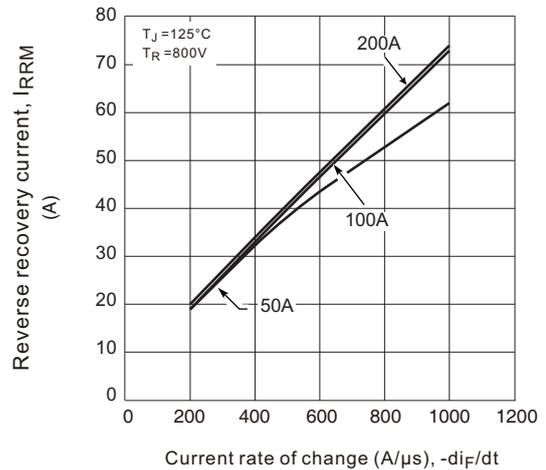


Fig.5 Reverse recovery current vs. current rate of change



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Fig.6. Dynamic parameters vs. junction temperature

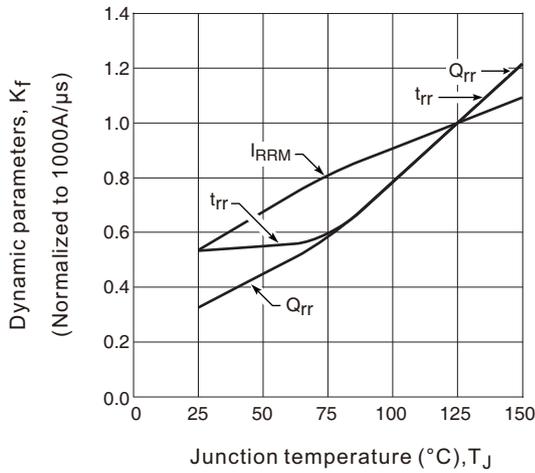


Fig.7 Maximum average forward current vs. case temperature

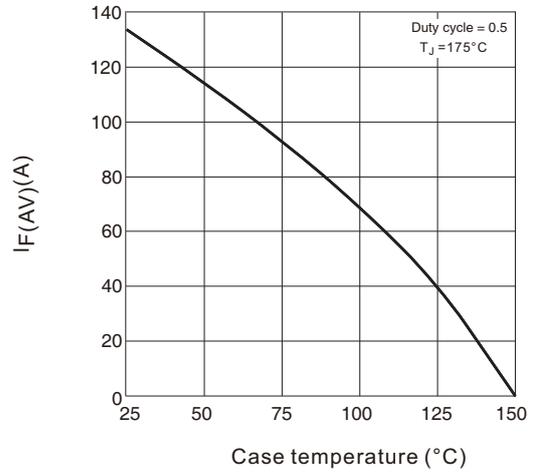


Fig.8 Junction capacitance vs. reverse voltage

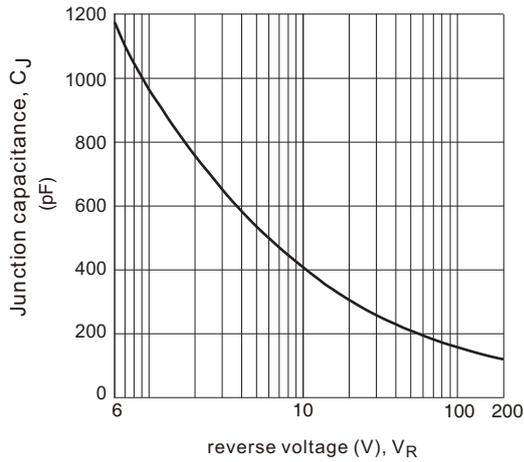


Fig.9 Reverse recovery parameter test circuit

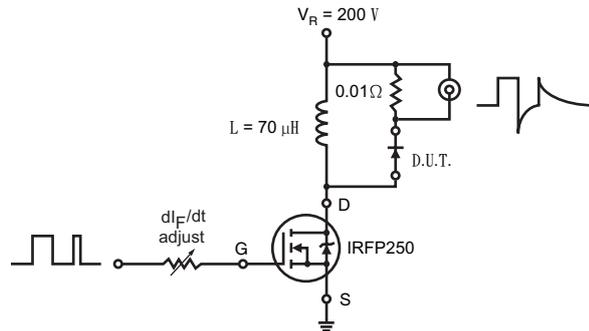
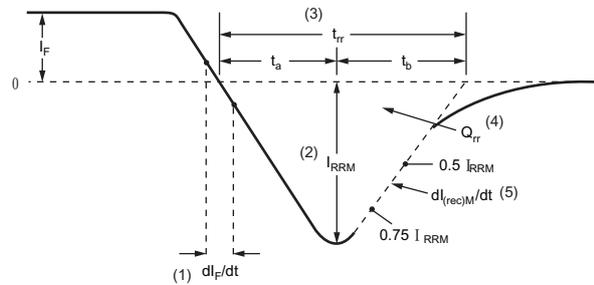


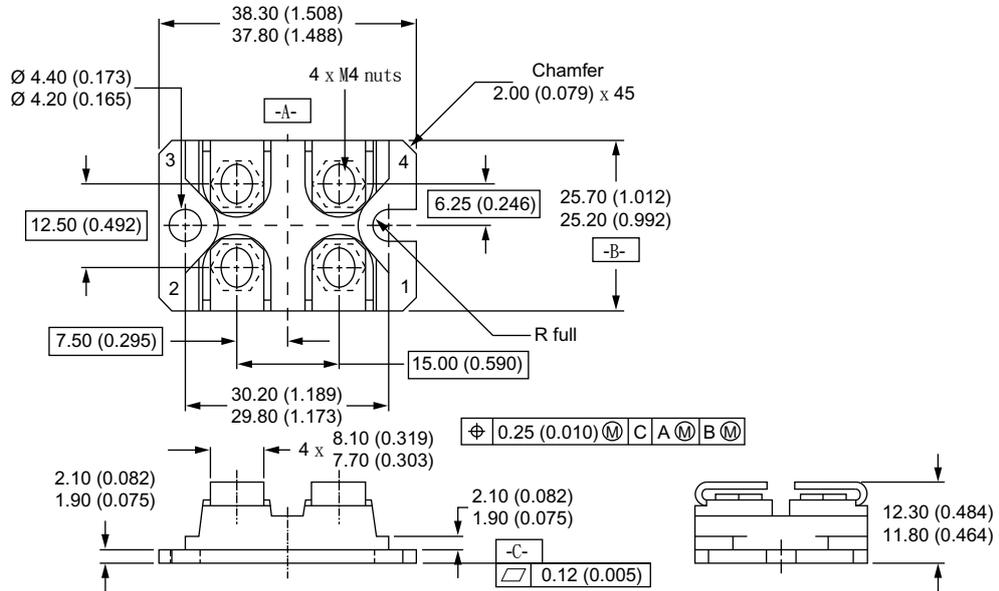
Fig.10 Reverse recovery waveform and definitions



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

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

SOT-227



All dimensions in millimeters (inches)

Notes

- Dimensioning and tolerancing per ANSI Y14.5M-1982
- Controlling dimension: millimeter

ORDERING INFORMATION TABLE

| | | | | | | | |
|-------------|----------|-----------|------------|----------|-----------|----------|----------|
| Device code | N | ST | 200 | F | 12 | - | A |
| | ① | ② | ③ | ④ | ⑤ | | ⑥ |

- ① - Nell High Power Products
- ② - Package indicator (SOT-227)
- ③ - Current rating (200 = 200A, 100A x 2)
- ④ - F = FRED family
- ⑤ - Voltage rating (12 = 1200 V)
- ⑥ - Circuit type, A for Anti-Parallel type
Blank for parallel type.