# NST320S100C Series

## Nell High Power Products

# High Performance Schottky Rectifier
# 320A/100V

## FEATURES

- 175°C $T_J$ operation
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead (Pb)-free
- Designed and qualified for industrial level
- International standard package SOT-227
- Low $I_{RM}$ values

## DESCRIPTION

The NST320S100C Schottky rectifier module series has been optimized for low reverse leakage at high temperature.
The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature.

## TYPICAL APPLICATIONS

- High current switching power supplies
- Plating power supplies
- UPS system
- Converters
- Freewheeling diode
- Welder
- Reverse battery protection.



SOT-227（Non-insulated）
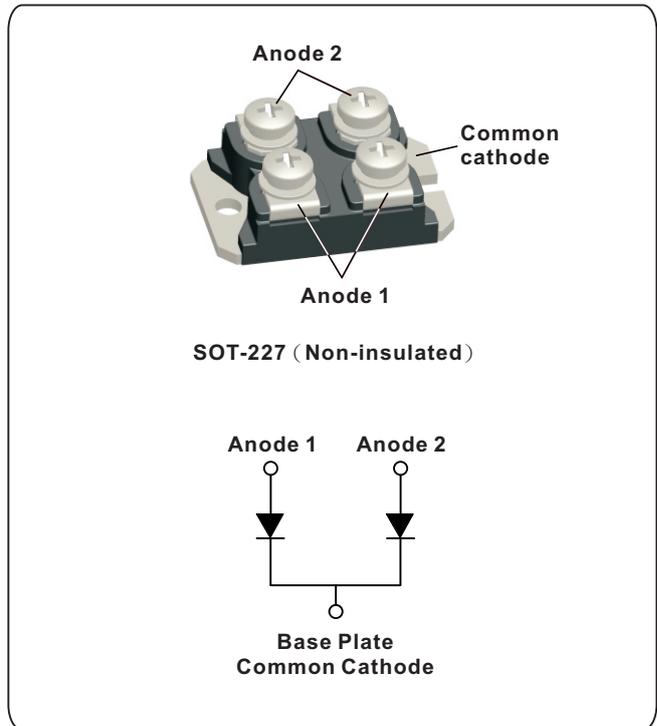
| PRODUCT SUMMARY | |
|---|---|
| $I_{F(AV)}$ | 320A |
| $V_R$ | 100V |

## MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNIT |
|---|---|---|---|
| $I_{F(AV)}$ | Rectangular waveform | 160 x 2 | A |
| $V_{RRM}$ | | 100 | V |
| $I_{FSM}$ | $t_p = 5$ µs sine | 12000 | A |
| $V_F$ | 160 Apk, $T_J = 125$°C | 0.80 | V |
| $T_J$ | Range | -55 to 175 | ºC |

## VOLTAGE RATINGS

| PARAMETER | SYMBOL | NST320S100C | UNIT |
|---|---|---|---|
| Maximum DC reverse voltage | $V_R$ | 100 | V |
| Maximum working peak reverse voltage | $V_{RWM}$ | | |

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNIT |
|---|---|---|---|---|---|
| Maximum average forward current per leg | $I_{F(AV)}$ | 50% duty cycle at $T_C$ = 100°C, rectangular waveform | | 160 | A |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$ | 5 µs sine or 3 µs rect. pulse | Following any rated load condition and with rated $V_{RRM}$ applied | 12000 | |
| | | 10 ms sine or 6 ms rect. pulse | | 1400 | |
| Non- repetitive avalanche energy | $E_{AS}$ | $T_J$=25°C, $I_{AS}$=15A, L=100µH | | 11.3 | mJ |
| Repetitive avalanche current | $I_{AR}$ | Current decaying linearly to zero in 1 µs f = 10 KHz, $V_A$=1.5x$V_R$ typical | | 1.5 | A |

## ELECTRICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNIT |
|---|---|---|---|---|---|
| Maximum forward voltage drop per leg | $V_{FM}$[1] | 160A | $T_J$ = 25°C | 0.98 | V |
| | | 320A | | 1.21 | |
| | | 160A | $T_J$ = 125°C | 0.80 | |
| | | 320A | | 1.05 | |
| Maximum reverse leakage current per leg | $I_{RM}$[1] | $T_J$ = 25°C | $V_R$ = Rated $V_R$ | 2 | mA |
| | | $T_J$ = 125°C | | 30 | |
| Maximum junction capacitance per leg | $C_T$ | $V_R$ = 5 $V_{DC}$ (test signal range 100 kHz to 1 MHz) 25°C | | 2500 | pF |
| Typical series inductance per leg | $L_S$ | From top of terminal hole to mounting plane | | 6.0 | nH |
| Maximum voltage rate of change | dV/dt | Rated $V_R$ | | 10000 | V/µs |

**Note**
(1) Pulse width < 500 µs, duty cycle < 2%

## THERMAL-MECHANICAL SPECIFICATIONS

| PARAMETER | | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Maximum junction and storage temperature range | | $T_J$,$T_{Stg}$ | -55 | - | 175 | °C |
| Thermal resistance, junction to case | | $R_{thJC}$ | - | - | 0.30 | °C/W |
| Thermal resistance, case to heatsink | | $R_{thCS}$ | - | 0.15 | - | |
| Weight | | | - | 30 (1.06) | - | g(oz.) |
| Mounting torque, ± 10% | to heatsink, M4 | | - | 1.1 (9.7) | - | N•m (lbf • in) |
| | busbar, M4 | | - | 1.1 (9.7) | - | |
| Case style | | | JEDEC SOT-227 module (Non-insulated) | | | |

## Ordering Information Tabel

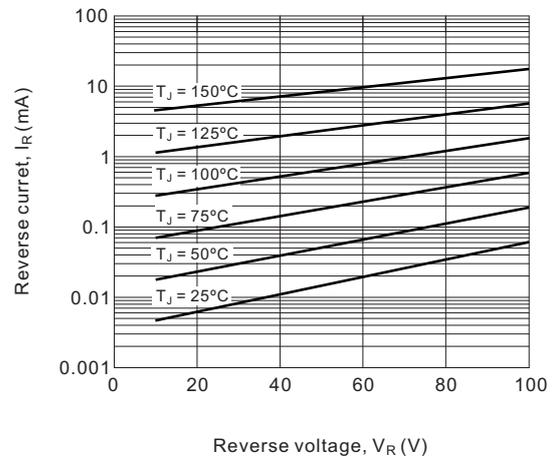| Device code | N | ST | 320 | S | 100 | C |
|---|---|---|---|---|---|---|
| | ① | ② | ③ | ④ | ⑤ | ⑥ |
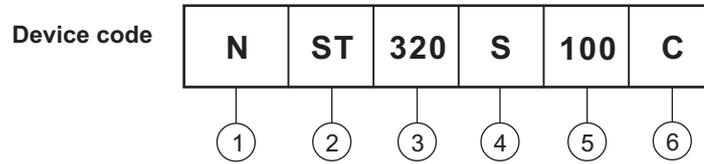
1 - Nell's high power module

2 - Package indicator, "ST" for SOT-227

3 - Maximum average forward current, 320 = 160A x 2

4 - S = Schottky family

5 - Voltage rating (100 = 100V)

6 - Circuit configuration, Center tap common cathode, non-insulated
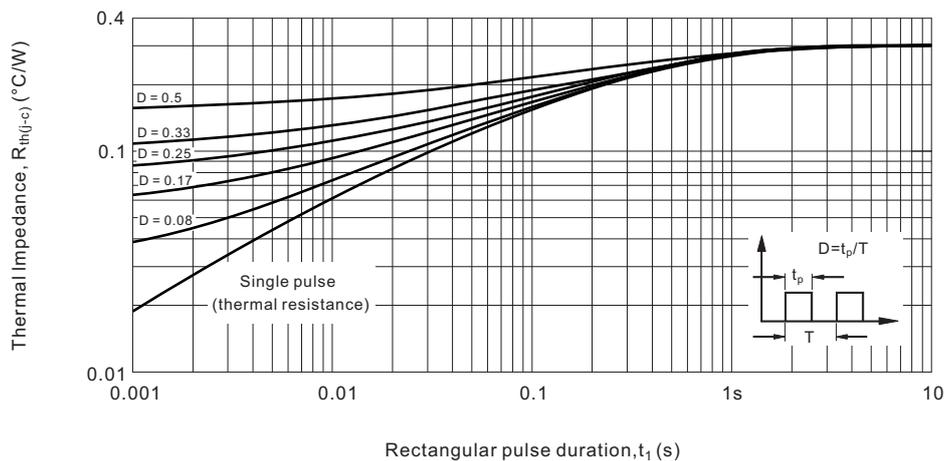
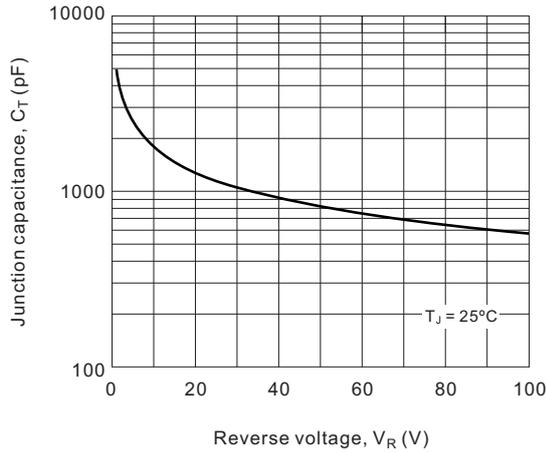**Fig.1 Maximum forward voltage drop characteristics**
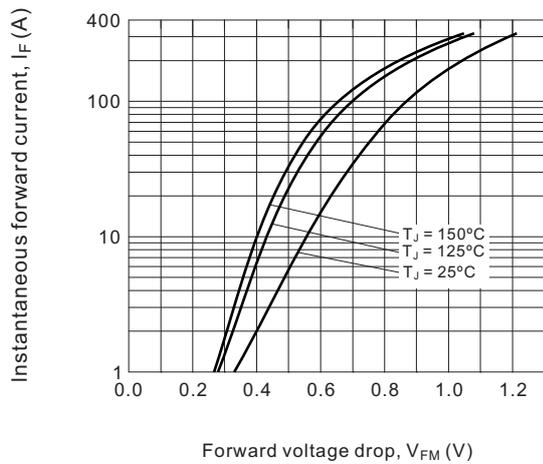


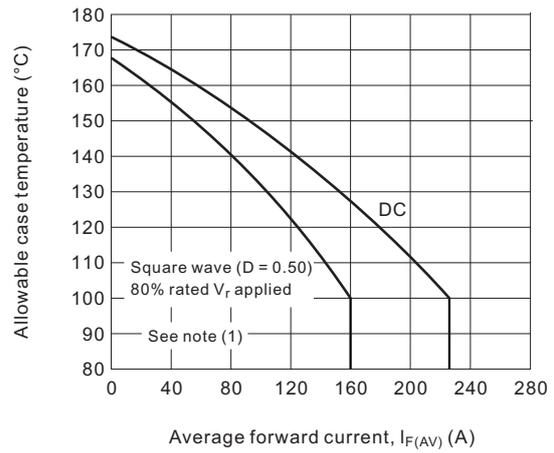**Fig.2 Typical values of reverse current vs. reverse voltage**



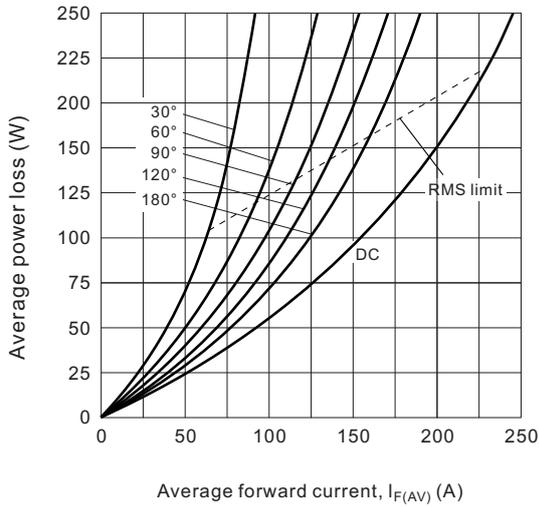**Fig.3 Maximum thermal impedance $R_{th(j-c)}$ characteristics**

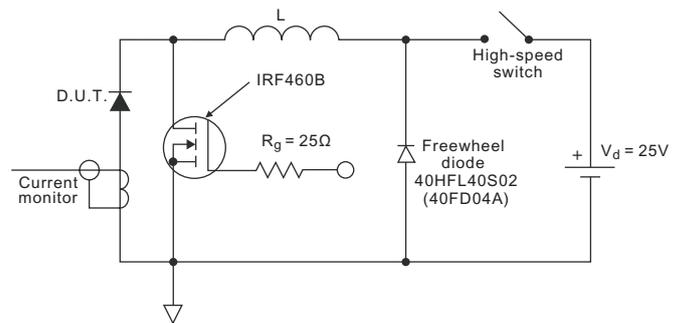**Fig.4 Typical junction capacitance vs. reverse voltage**

Junction capacitance, $C_T$ (pF) vs. Reverse voltage, $V_R$ (V)

$T_J = 25°C$

**Fig.5 Maximum allowable case temperature vs. Average forward current**

Allowable case temperature (°C) vs. Average forward current, $I_{F(AV)}$ (A)

DC

Square wave (D = 0.50)
80% rated $V_r$ applied

See note (1)

**Fig.6 Forward power loss characteristics**

Average power loss (W) vs. Average forward current, $I_{F(AV)}$ (A)

30°
60°
90°
120°
180°

RMS limit

DC

**Fig.7 Unclamped Inductive test circuit**

L

IRF460B

High-speed switch

D.U.T.

$R_g = 25\Omega$

Freewheel diode
40HFL40S02
(40FD04A)

$+$ $V_d = 25V$

Current monitor

**Note**
(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;

Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}/D$)(see fig.6)
$Pd_{REV}$ = Inverse power loss = $V_{R1} \times I_R$ (1-D); $I_R$ at $V_{R1}$ = rated $V_R$

## SOT-227



38.30 (1.508)
37.80 (1.488)

Ø 4.40 (0.173)
Ø 4.20 (0.165)

4 x M4 nuts

Chamfer
2.00 (0.079) x 45

-A-

3      4

12.50 (0.492)

6.25 (0.246)

25.70 (1.012)
25.20 (0.992)

-B-

2      1

7.50 (0.295)

15.00 (0.590)

R full

30.20 (1.189)
29.80 (1.173)

⊕ | 0.25 (0.010) Ⓜ | C | A Ⓜ | B Ⓜ

4 x  8.10 (0.319)
7.70 (0.303)

2.10 (0.082)
1.90 (0.075)

2.10 (0.082)
1.90 (0.075)

-C-

0.12 (0.005)

12.30 (0.484)
11.80 (0.464)
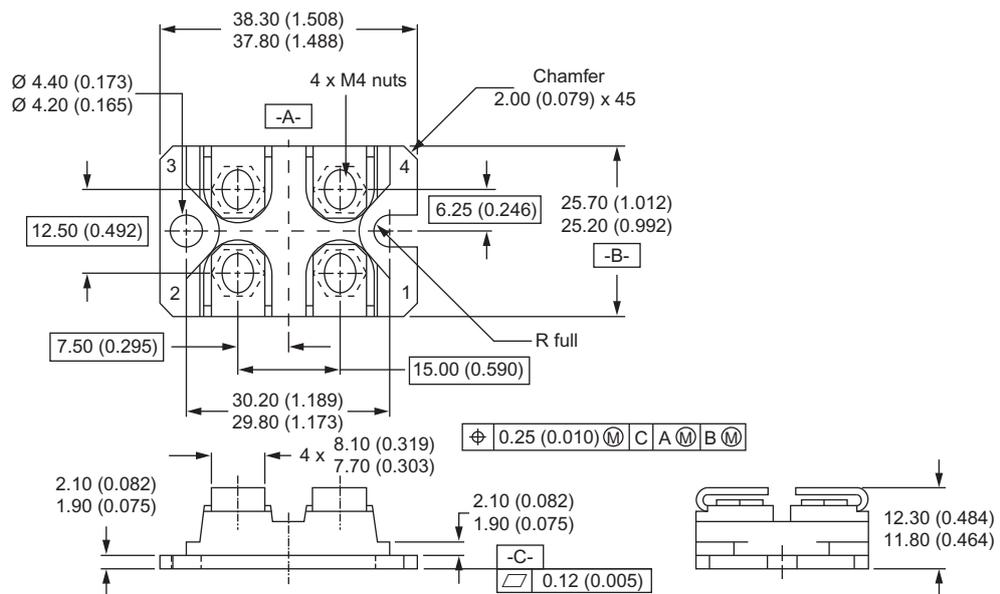
All dimensions in millimeters (inches)

Notes
• Dimensioning and toleranc ing per ANSI Y14.5M-1982
• Controlling dimension: millimeter