

## High Performance Schottky Rectifier 320A/100V

### FEATURES

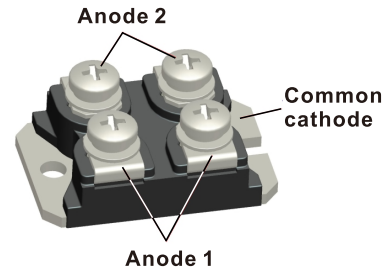
- 175°C T<sub>J</sub> operation
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead (Pb)-free
- Designed and qualified for industrial level
- International standard package SOT-227
- Low I<sub>RM</sub> values

### DESCRIPTION

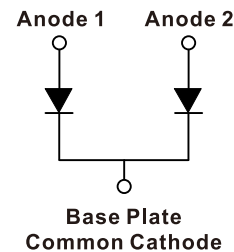
The NST320S100C Schottky rectifier module series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature.

### 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 <sub>F(AV)</sub> | 320A |
| V <sub>R</sub>     | 100V |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL             | CHARACTERISTICS                 | VALUES     | UNIT |
|--------------------|---------------------------------|------------|------|
| I <sub>F(AV)</sub> | Rectangular waveform            | 160 x 2    | A    |
| V <sub>R</sub>     |                                 | 100        | V    |
| I <sub>FSM</sub>   | t <sub>p</sub> = 5 μs sine      | 12000      | A    |
| V <sub>F</sub>     | 160 Apk, T <sub>J</sub> = 125°C | 0.80       | V    |
| T <sub>J</sub>     | Range                           | -55 to 175 | °C   |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL           | NST320S100C | UNIT |
|--------------------------------------|------------------|-------------|------|
| Maximum DC reverse voltage           | V <sub>R</sub>   | 100         | V    |
| Maximum working peak reverse voltage | V <sub>RWM</sub> |             |      |

| ABSOLUTE MAXIMUM RATINGS                            |                    |                                                                                                     |                                                                            |        |      |
|-----------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|--------|------|
| PARAMETER                                           | SYMBOL             | TEST CONDITIONS                                                                                     |                                                                            | VALUES | UNIT |
| Maximum average forward current per leg             | I <sub>F(AV)</sub> | 50% duty cycle at T <sub>C</sub> = 100°C, rectangular waveform                                      |                                                                            | 160    | A    |
| Maximum peak one cycle non-repetitive surge current | I <sub>FSM</sub>   | 5 μs sine or 3 μs rect. pulse                                                                       | Following any rated load condition and with rated V <sub>RRM</sub> applied | 12000  |      |
|                                                     |                    | 10 ms sine or 6 ms rect. pulse                                                                      |                                                                            | 1400   |      |
| Non- repetitive avalanche energy                    | E <sub>AS</sub>    | T <sub>J</sub> =25°C, I <sub>AS</sub> =15A, L=100μH                                                 |                                                                            | 11.3   | mJ   |
| Repetitive avalanche current                        | I <sub>AR</sub>    | Current decaying linearly to zero in 1 μs<br>f = 10 KHz, V <sub>A</sub> =1.5xV <sub>R</sub> typical |                                                                            | 1.5    | A    |

| ELECTRICAL SPECIFICATIONS               |                                |                                                                              |                                       |        |      |
|-----------------------------------------|--------------------------------|------------------------------------------------------------------------------|---------------------------------------|--------|------|
| PARAMETER                               | SYMBOL                         | TEST CONDITIONS                                                              |                                       | VALUES | UNIT |
| Maximum forward voltage drop per leg    | V <sub>FM</sub> <sup>(1)</sup> | 160A                                                                         | T <sub>J</sub> = 25°C                 | 0.98   | V    |
|                                         |                                | 320A                                                                         |                                       | 1.21   |      |
|                                         |                                | 160A                                                                         | T <sub>J</sub> = 125°C                | 0.80   |      |
|                                         |                                | 320A                                                                         |                                       | 1.05   |      |
| Maximum reverse leakage current per leg | I <sub>RM</sub> <sup>(1)</sup> | T <sub>J</sub> = 25°C                                                        | V <sub>R</sub> = Rated V <sub>R</sub> | 2      | mA   |
|                                         |                                | T <sub>J</sub> = 125°C                                                       |                                       | 30     |      |
| Maximum junction capacitance per leg    | C <sub>T</sub>                 | V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz) 25°C |                                       | 2500   | pF   |
| Typical series inductance per leg       | L <sub>S</sub>                 | From top of terminal hole to mounting plane                                  |                                       | 6.0    | nH   |
| Maximum voltage rate of change          | dV/dt                          | Rated V <sub>R</sub>                                                         |                                       | 10000  | V/μs |

### Note

(1) Pulse width < 500  $\mu\text{s}$ , duty cycle < 2%

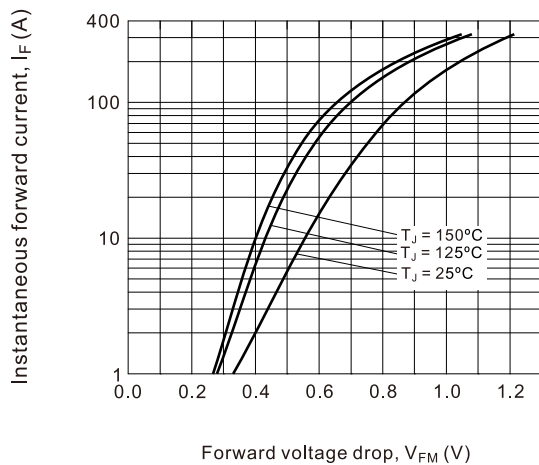
| THERMAL-MECHANICAL SPECIFICATIONS                                |                                   |                                      |           |      |                |
|------------------------------------------------------------------|-----------------------------------|--------------------------------------|-----------|------|----------------|
| PARAMETER                                                        | SYMBOL                            | MIN.                                 | TYP.      | MAX. | UNIT           |
| Maximum junction and storage temperature range                   | T <sub>J</sub> , T <sub>Stg</sub> | -55                                  | -         | 175  | °C             |
| Thermal resistance, junction to case                             | R <sub>thJC</sub>                 | -                                    | -         | 0.30 | °C/W           |
| Thermal resistance, case to heatsink                             | R <sub>thCS</sub>                 | -                                    | 0.15      | -    |                |
| Weight                                                           |                                   | -                                    | 30 (1.06) | -    | g(oz.)         |
| Mounting torque, ± 10% <div>to heatsink, M4<br/>busbar, M4</div> |                                   | -                                    | 1.1 (9.7) | -    | N•m (lbf • in) |
|                                                                  |                                   | -                                    | 1.1 (9.7) | -    |                |
| Case style                                                       |                                   | JEDEC SOT-227 module (Non-insulated) |           |      |                |

**Ordering Information Tabel**

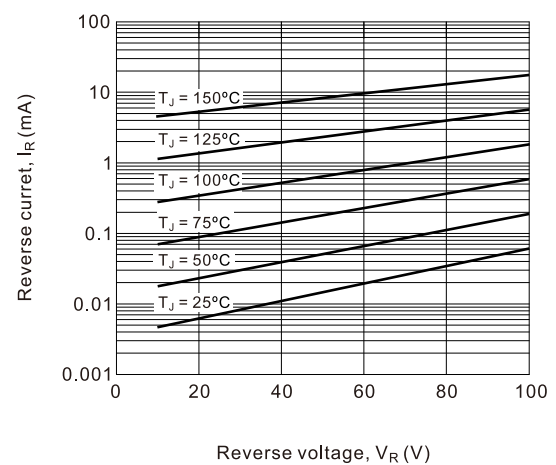
| Device code | N | ST | 320 | S | 100 | C |
|-------------|---|----|-----|---|-----|---|
|             | 1 | 2  | 3   | 4 | 5   | 6 |

- 1** - NPS'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

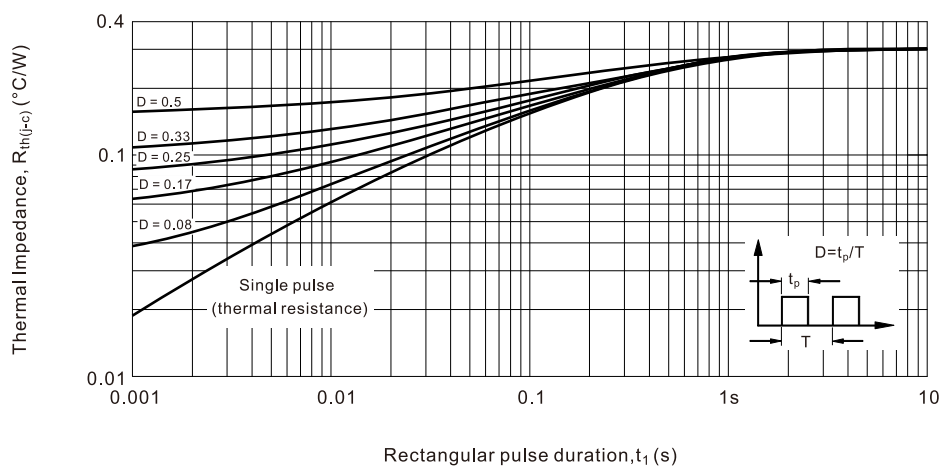
**Fig.1 Maximum forward voltage drop characteristics**



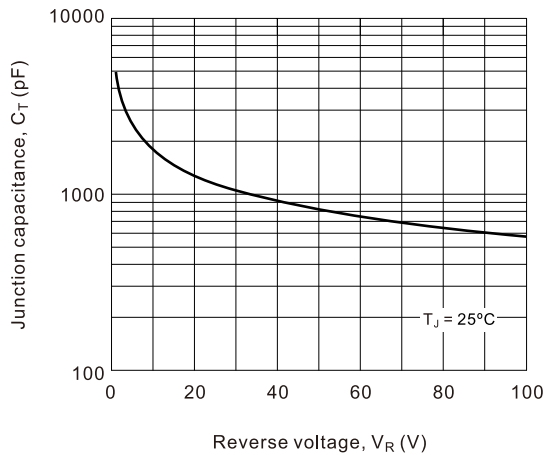
**Fig.2 Typical values of reverse current vs. reverse voltage**



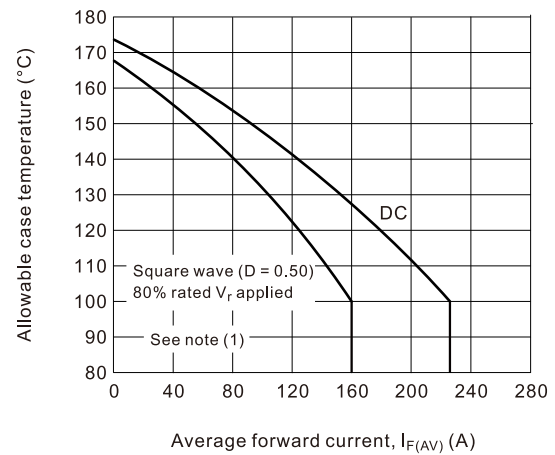
**Fig.3 Maximum thermal impedance  $R_{th(j-c)}$  characteristics**



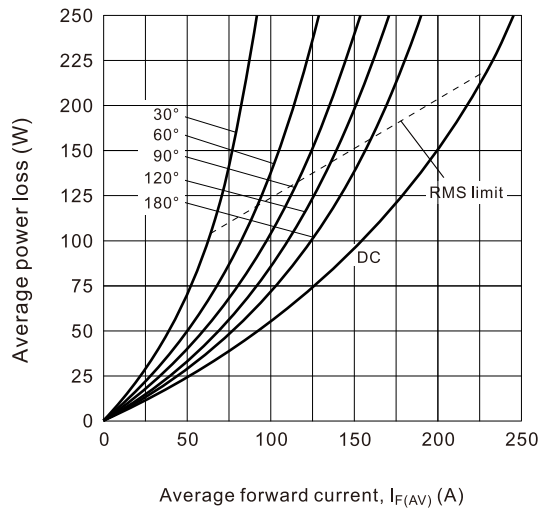
**Fig.4 Typical junction capacitance vs. reverse voltage**



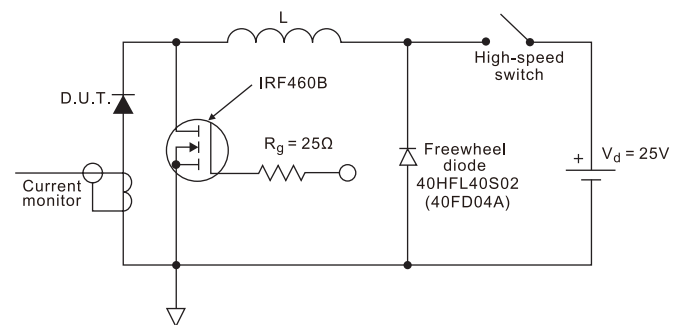
**Fig.5 Maximum allowable case temperature vs. Average forward current**



**Fig.6 Forward power loss characteristics**



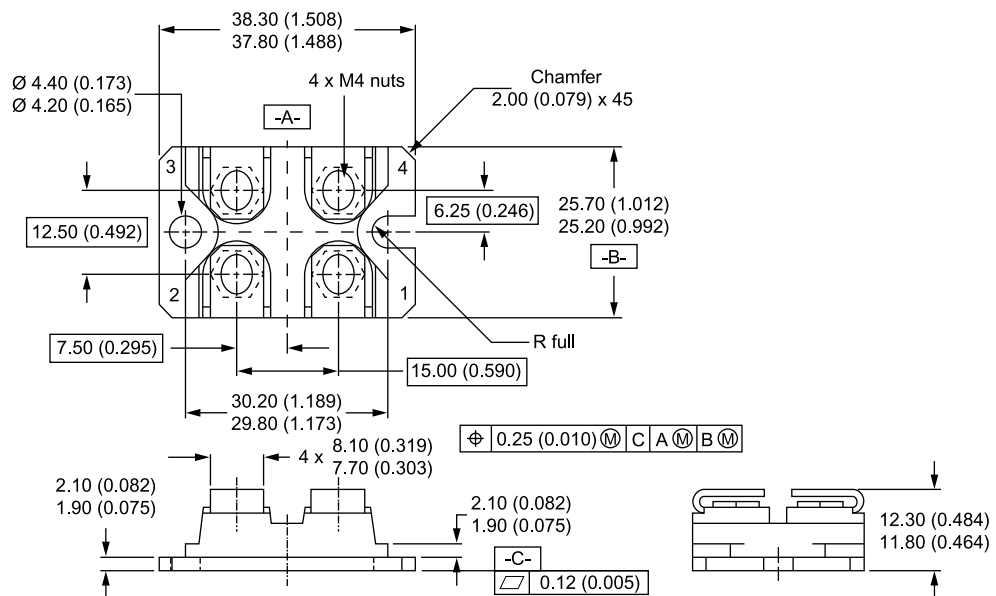
**Fig.7 Unclamped Inductive test circuit**



**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig.6)  
 $P_{dREV}$  = Inverse power loss =  $V_{R1} \times I_R (1-D)$ ;  $I_R$  at  $V_{R1}$  = rated  $V_R$

## SOT-227



All dimensions in millimeters (inches)

## Notes

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