

Schottky Rectifier, 600A/200V

FEATURES

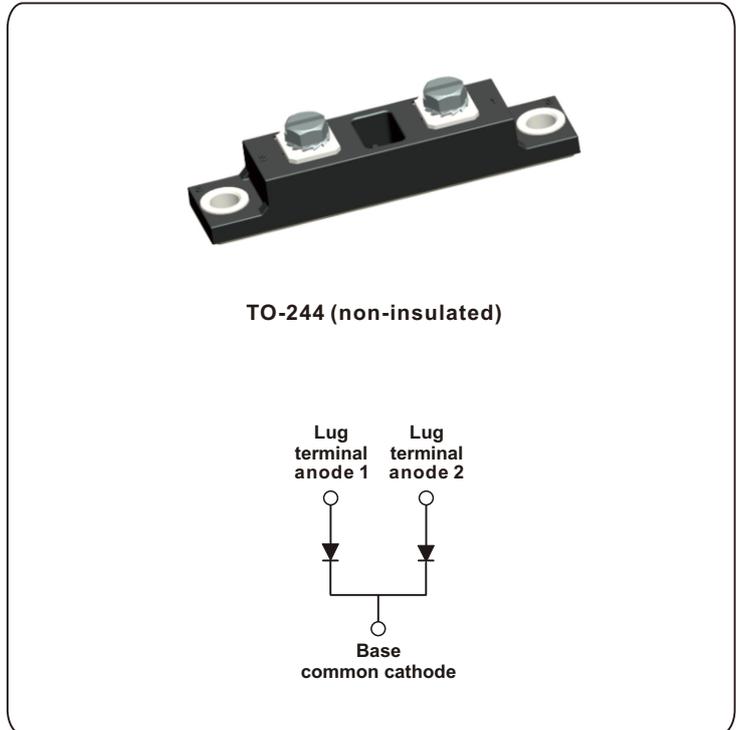
- 175°C T_J operation
- Center tap module
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead (Pb)-free
- Designed and qualified for industrial level

DESCRIPTION

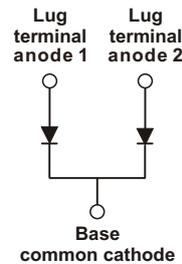
The NKSD601... Schottky rectifier common cathode module series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature.

TYPICAL APPLICATIONS

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



TO-244 (non-insulated)



PRODUCT SUMMARY

| | |
|--------------------|------|
| I _{F(AV)} | 600A |
| V _R | 200V |

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNIT |
|--------------------|---|------------|------|
| I _{F(AV)} | Rectangular waveform | 600 | A |
| V _{R(RM)} | | 200 | V |
| I _{F(SM)} | t _p = 5 μs sine | 30000 | A |
| V _F | 300 Apk, T _j = 125°C (per leg) | 0.75 | V |
| T _J | Range | -55 to 175 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | NKSD601-200 | UNIT |
|--------------------------------------|--------------------|-------------|------|
| Maximum DC reverse voltage | V _R | 200 | V |
| Maximum working peak reverse voltage | V _{R(WM)} | | |

Nell High Power Products

| ABSOLUTE MAXIMUM RATINGS | | | | | |
|---|-------------|---|---|--------|------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNIT |
| Maximum average forward current See fig.5 <small>per leg per device</small> | $I_{F(AV)}$ | 50% duty cycle at $T_C = 125^\circ\text{C}$, rectangular waveform | | 300 | A |
| | | | | 600 | |
| Maximum peak one cycle non-repetitive surge current per leg See fig.7 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | Following any rated load condition and with rated V_{RRM} applied | 30000 | |
| | | 10 ms sine or 6 ms rect. pulse | | 4500 | |
| Non- repetitive avalanche energy per leg | E_{AS} | $T_J = 25^\circ\text{C}$, $I_{AS} = 5.5\text{A}$, $L = 1.0\text{mH}$ | | 15 | mJ |
| Repetitive avalanche current per leg | I_{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | | 1 | A |

| ELECTRICAL SPECIFICATIONS | | | | | |
|--|-------------|--|---------------------------|--------|------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNIT |
| Maximum forward voltage drop per leg See fig.1 | $V_{FM(1)}$ | 300A | $T_J = 25^\circ\text{C}$ | 0.90 | V |
| | | 600A | | 1.10 | |
| | | 300A | $T_J = 125^\circ\text{C}$ | 0.78 | |
| | | 600A | | 0.95 | |
| Maximum reverse leakage current per leg See fig.2 | $I_{RM(1)}$ | $T_J = 25^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 100 | μA |
| | | $T_J = 125^\circ\text{C}$ | | 50 | mA |
| Maximum junction capacitance per leg | C_T | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) 25°C | | 7000 | pF |
| Typical series inductance per leg | L_S | From top of terminal hole to mounting plane | | 5 | nH |
| Maximum voltage rate of change | dV/dt | Rated V_R | | 10000 | V/ μs |

Note

(1) Pulse width < 300 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 | $^\circ\text{C}$ |
| Thermal resistance, junction to case per leg | TO-244 (non-insulated) | R_{thJC} | - | - | 0.15 | $^\circ\text{C/W}$ |
| Thermal resistance, junction to case per module | TO-244 (non-insulated) | R_{thJC} | - | - | 0.075 | |
| Thermal resistance, case to heatsink | | R_{thCS} | - | 0.10 | - | |
| Weight | TO-244 (non-insulated) | | - | 85 (3) | - | g(oz.) |
| Mounting torque | | | 35.4 (4) | - | 53.1 (6) | lbf • in (N•m) |
| Mounting torque center hole | | | 30 (3.4) | - | 40 (4.6) | |
| Terminal torque | | | 30 (3.4) | - | 44.2 (5) | |
| vertical pull | | | - | - | 80 | lbf • in |
| 2" lever pull | | | - | - | 35 | |
| Case style | | | JEDEC | | TO-244AA compatible | |

Ordering Information Table

| | | | | | | |
|-------------|-----------|----------|----------|------------|----------|------------|
| Device code | NK | S | D | 601 | — | 200 |
| | ① | ② | ③ | ④ | | ⑤ |
| | 1 | 2 | 3 | 4 | | 5 |

- 1 - Nell's power module
- 2 - S for Schottky Barrier Diode
- 3 - D for Dual Diodes
- 4 - Maximum average forward current, A
"601" for 600A module in TO-244 Package
- 5 - Voltage rating (200 = 200V)

Fig.1 Maximum forward voltage drop characteristics (Per Leg)

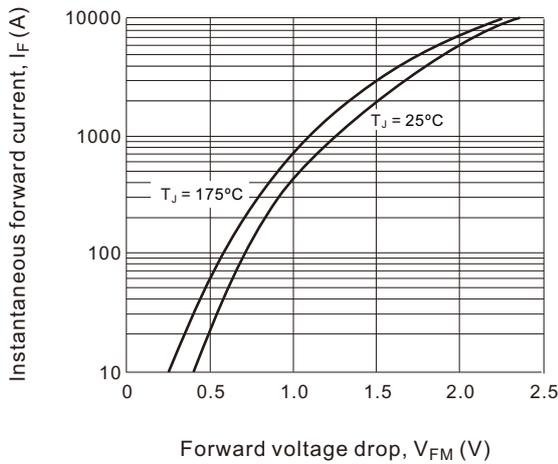


Fig.2 Typical values of reverse current vs. Reverse voltage (Per Leg)

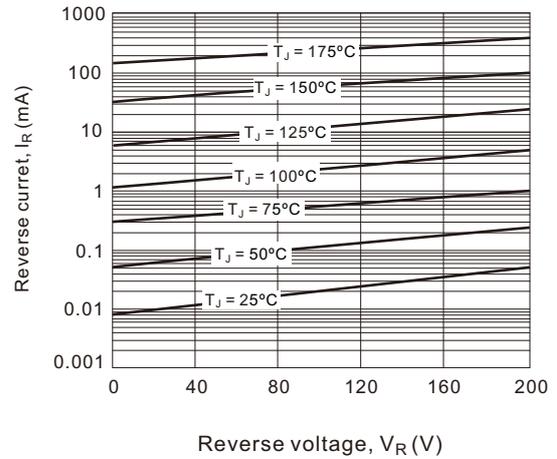


Fig.3 Maximum thermal impedance $R_{th(j-c)}$ characteristics (Per Leg, for TO-244 non-insulated)

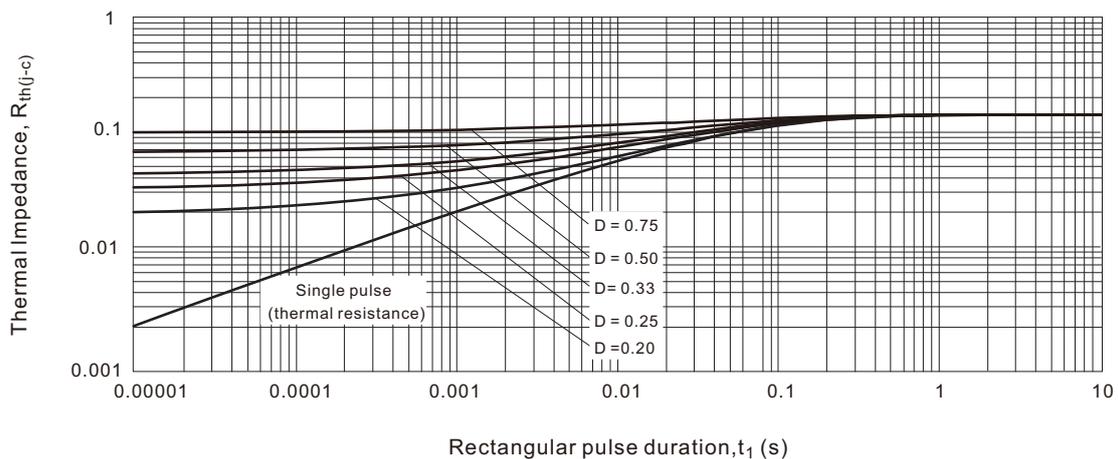


Fig.4 Typical junction capacitance vs. Reverse voltage (Per Leg)

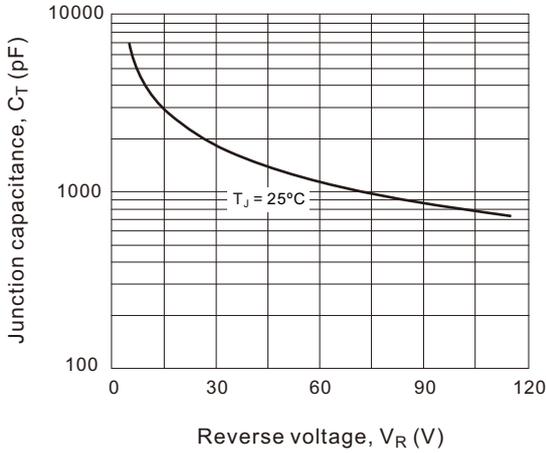


Fig.5 Maximum allowable case temperature vs. Average forward current (Per Leg)

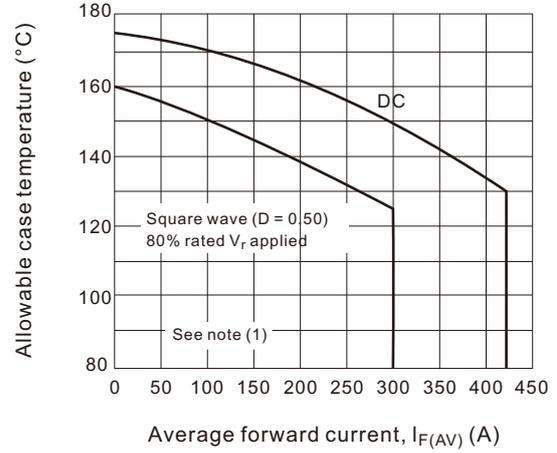


Fig.6 Forward power loss characteristics (Per Leg)

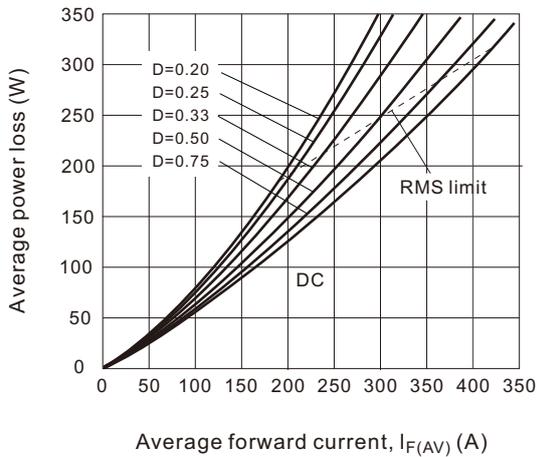


Fig.7 Maximum non-repetitive surge current (Per Leg)

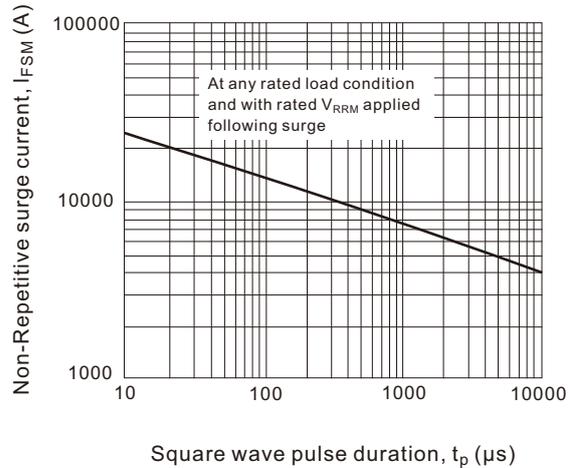
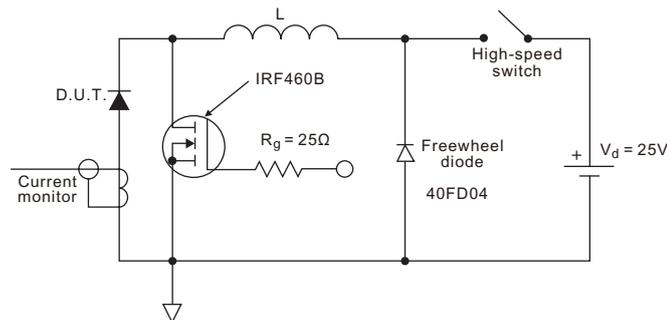


Fig.8 Unclamped Inductive test circuit



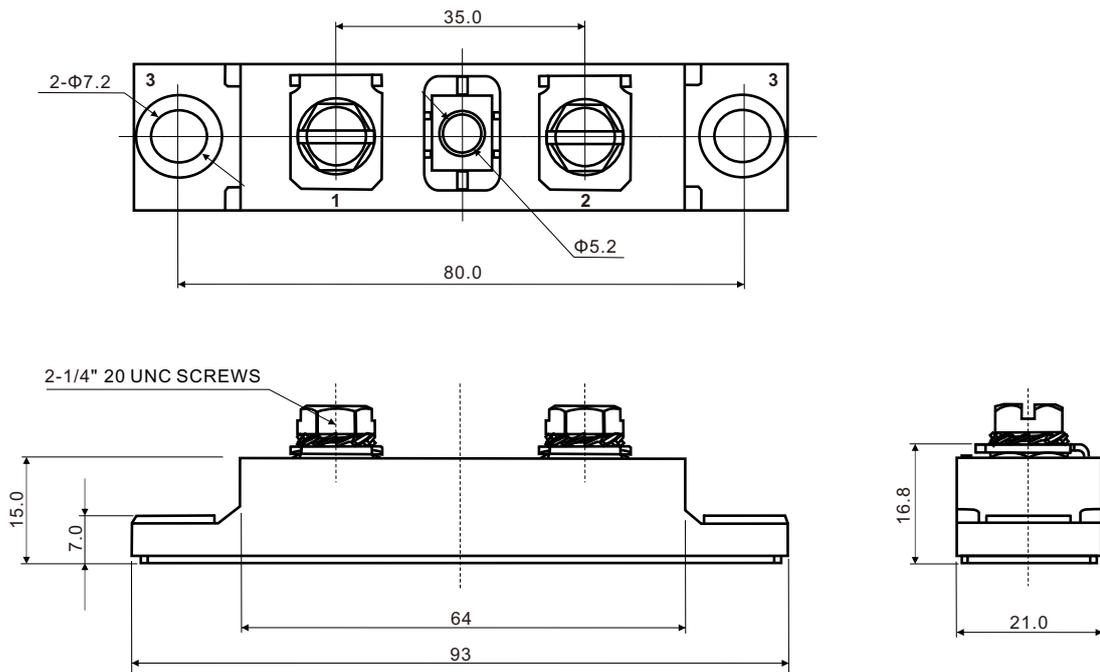
Note

(1) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$;

P_d = Forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig.6)

$P_{d_{REV}}$ = Inverse power loss = $V_{R1} \times I_R (1-D)$; I_R at $V_{R1} = 80\%$ rated V_R

TO-244 (Non-Insulated)



All dimensions in millimeters