# Schottky Rectifier, 800A/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 NKSD801… 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)

Lug terminal anode 1   Lug terminal anode 2

Base common cathode
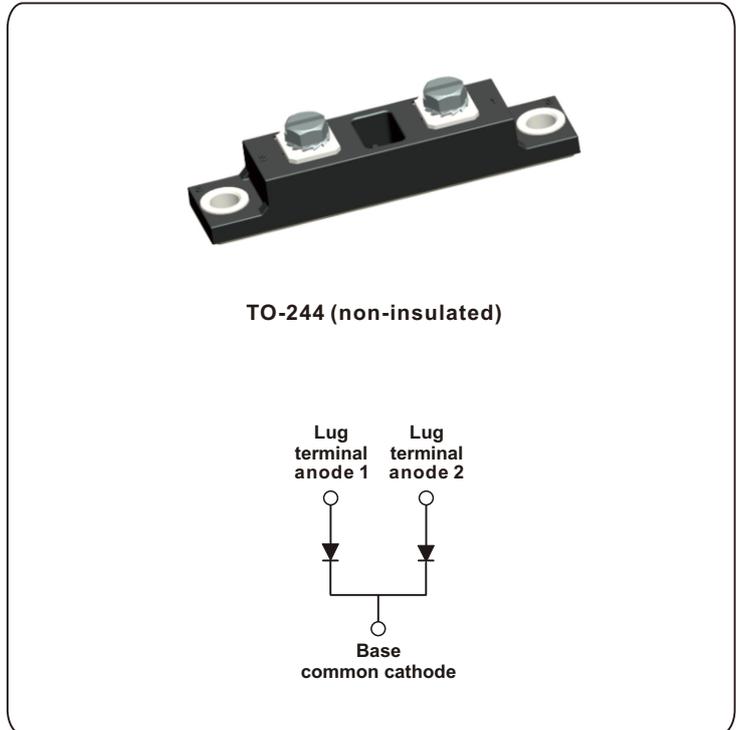
PRODUCT SUMMARY	
$I_{F(AV)}$	800A
V_R	200V

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNIT
$I_{F(AV)}$	Rectangular waveform	800	A
V_{RRM}		200	V
I_{FSM}	$t_p = 5$ µs sine	40000	A
V_F	400 Apk, $T_j = 125°C$ (per leg)	0.78	V
T_J	Range	-55 to 175	ºC

VOLTAGE RATINGS

PARAMETER	SYMBOL	NKSD801-200	UNIT
Maximum DC reverse voltage	V_R	200	V
Maximum working peak reverse voltage	V_{RWM}		

ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	TEST CONDITIONS		VALUES	UNIT
Maximum average forward current See fig.5	per leg	$I_{F(AV)}$	50% duty cycle at T_C = 110°C, rectangular waveform		400	A
	per device				800	
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	40000	
			10 ms sine or 6 ms rect. pulse		6000	
Non- repetitive avalanche energy per leg		E_{AS}	T_J=25°C, I_{AS}=5.5A, L=1.0mH		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=1.5xV_R typical		1	A

ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNIT
Maximum forward voltage drop per leg See fig.1	$V_{FM}^{(1)}$	400A	T_J = 25°C	0.90	V
		800A		1.10	
		400A	T_J = 125°C	0.78	
		800A		0.95	
Maximum reverse leakage current per leg See fig.2	$I_{RM}^{(1)}$	T_J = 25°C	V_R = Rated V_R	100	µA
		T_J = 125°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		7500	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	°C
Thermal resistance, junction to case per leg	TO-244 (non-insulated)	R_{thJC}	-	-	0.11	°C/W
Thermal resistance, junction to case per module	TO-244 (non-insulated)	R_{thJC}	-	-	0.055	
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	801	—	200
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
	"801" for 800A module in TO-244 Package
5	- Voltage rating (200 = 200V)

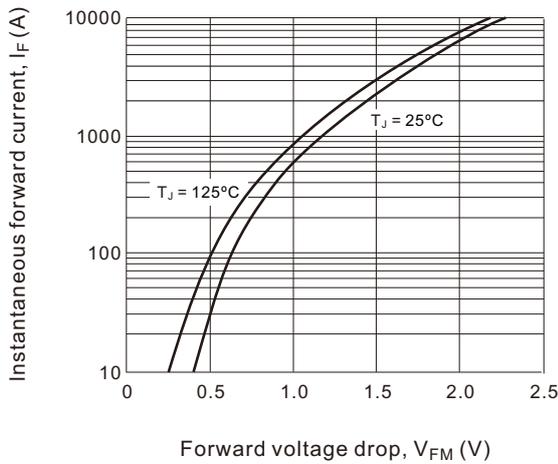**Fig.1 Maximum forward voltage drop characteristics (Per Leg)**
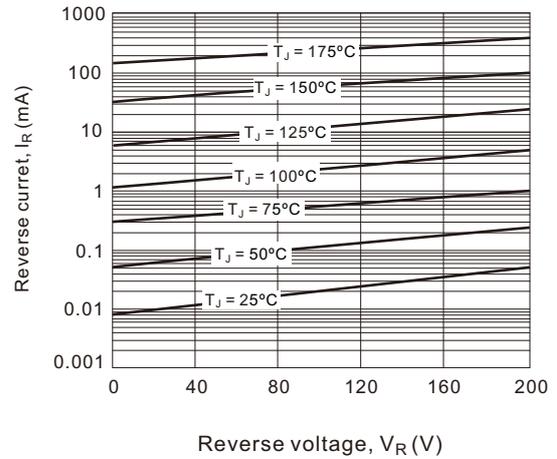

Fig.2 Typical values of reverse current vs. Reverse voltage (Per Leg)

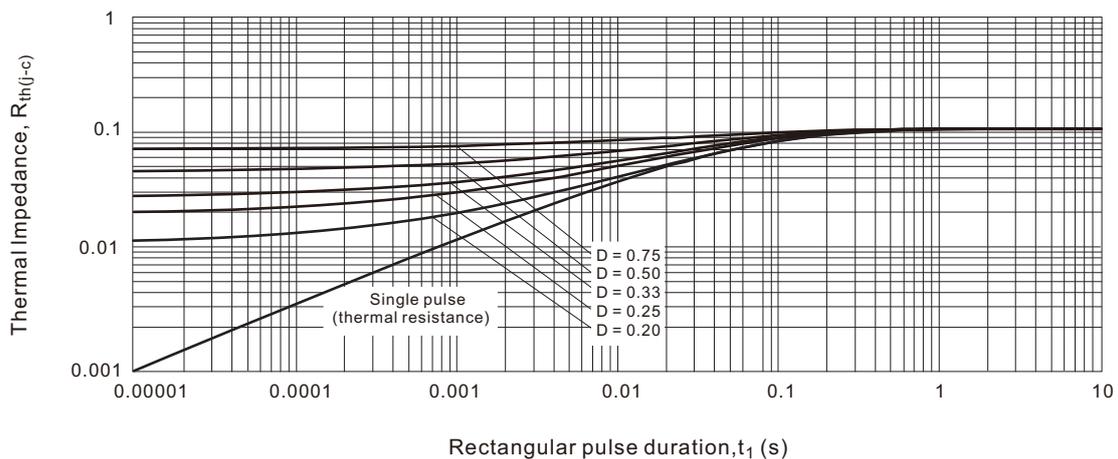**Fig.3 Maximum thermal impedance $R_{th(j-c)}$ characteristics (Per Leg, for TO-244 non-insulated)**

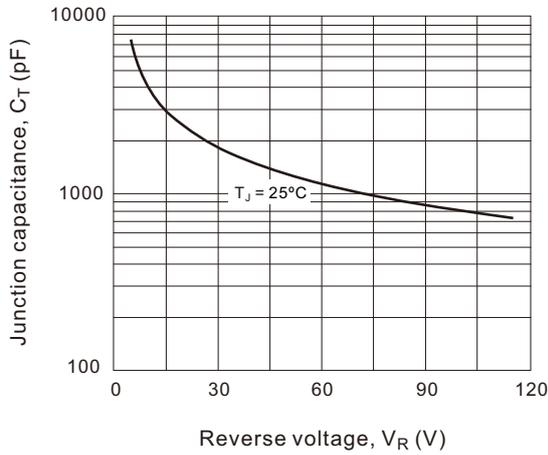## Fig.4 Typical junction capacitance vs. Reverse voltage (Per Leg)

Junction capacitance, C_T (pF)

$T_J = 25°C$

Reverse voltage, V_R (V)

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

Allowable case temperature (°C)

DC

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

See note (1)

Average forward current, $I_{F(AV)}$ (A)
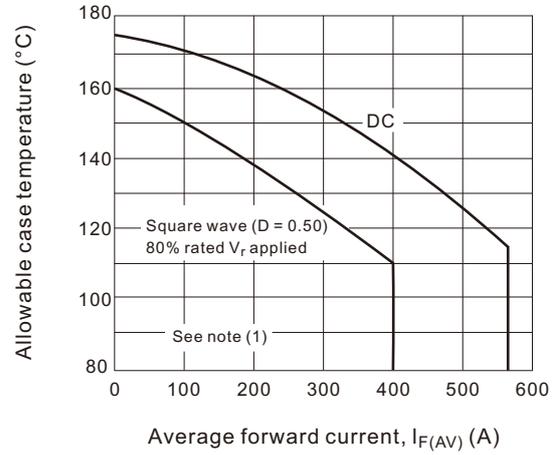
Fig.6 Forward power loss characteristics (Per Leg)

Average power loss (W)

D=0.20
D=0.25
D=0.33
D=0.50
D=0.75

RMS limit

Average forward current, $I_{F(AV)}$ (A)
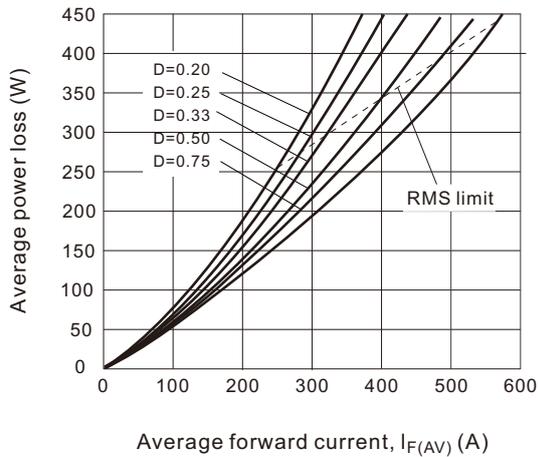
Fig.7 Maximum non-repetitive surge current (Per Leg)

Non-Repetitive surge current, I_{FSM} (A)

At any rated load condition and with rated V_{RRM} applied following surge

Square wave pulse duration, t_p (µs)
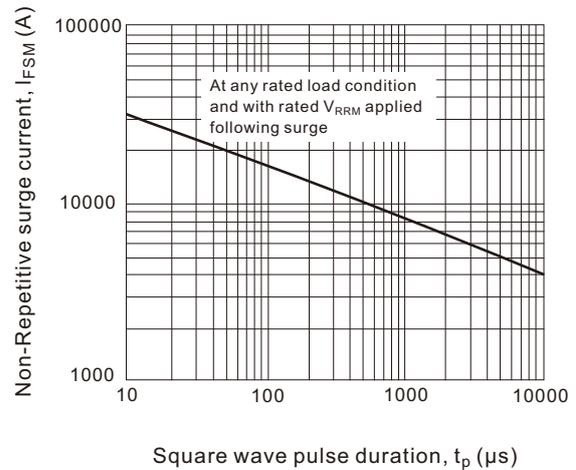
Fig.8 Unclamped Inductive test circuit

L

High-speed switch

D.U.T.

IRF460B

$R_g = 25Ω$

Freewheel diode

$V_d = 25V$

Current monitor

40FD04
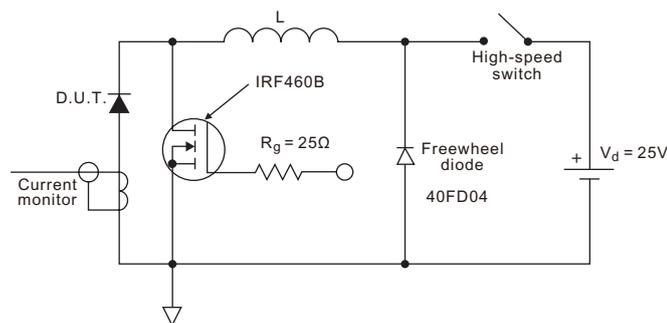
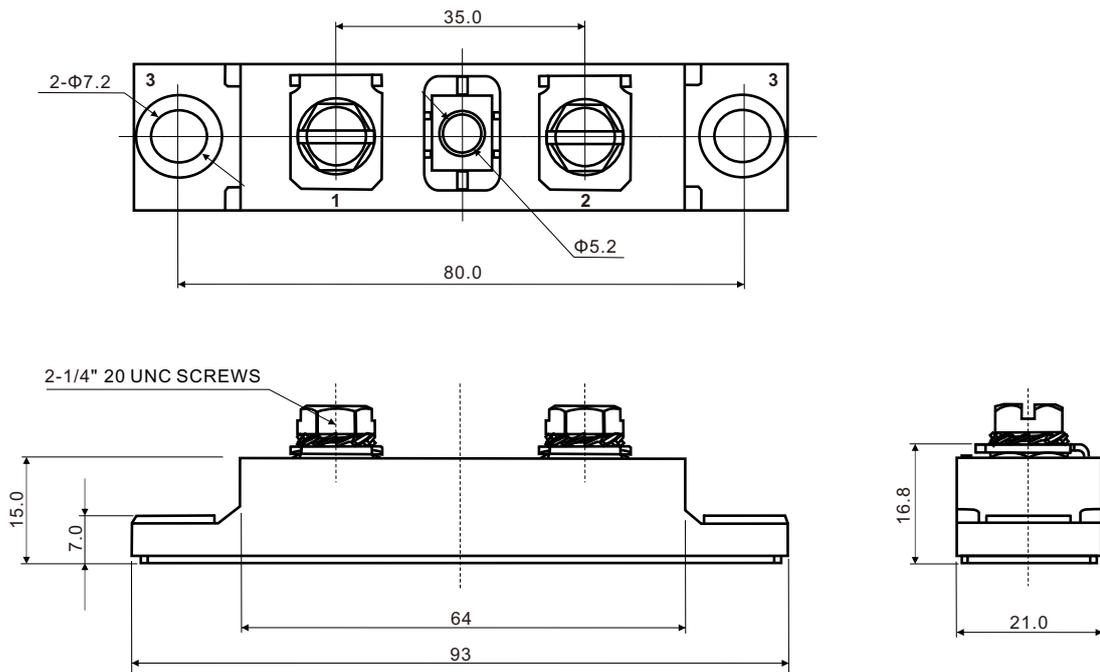**Note**
(1) Formula used: $T_C = T_J - (Pd+Pd_{REV}) \times R_{thJC}$;
  Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at($I_{F(AV)}$/D)(see fig.6)
  Pd_{REV} = Inverse power loss = $V_{R1} \times I_R$ (1-D); I_R at V_{R1} = 80% rated V_R

Nell High Power Products

TO-244 (Non-Insulated)

35.0

2-Φ7.2

3

1

2

3

Φ5.2

80.0

2-1/4" 20 UNC SCREWS

15.0

7.0

64

93

16.8

21.0

All dimensions in millimeters