Schottky Rectifier, 400A/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

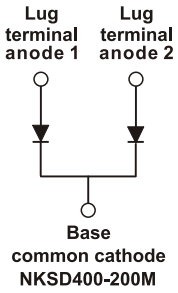
DESCRIPTION

The NKSD400... 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-244M (non-insulated)



PRODUCT SUMMARY	
$I_{F(AV)}$	400 A
V_R	200 V

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNIT
$I_{F(AV)}$	Rectangular waveform	400	A
V_{RRM}		200	V
I_{FSM}	t_p = 5 µs sine	20000	A
V_F	200 Apk, T_j = 125°C (per leg)	0.75	V
T_J	Range	-55 to 175	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	VALUES	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 per leg See fig.5	$I_{F(AV)}$	50% duty cycle at T_C = 125°C, rectangular waveform		200	A
Maximum average forward current per device See fig.5	$I_{F(AV)}$	50% duty cycle at T_C = 125°C, rectangular waveform		400	A
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	20000	A
		10 ms sine or 6 ms rect. pulse		2300	A
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)	200A	T_J = 25°C	1.0	V
		400A		1.3	V
		200A	T_J = 125°C	0.75	V
		400A		0.85	V
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		6000	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-244M (non-insulated)	R_{thJC}	-	-	0.18	°C/W
Thermal resistance, junction to case per module	TO-244M (non-insulated)	R_{thJC}	-	-	0.09	°C/W
Thermal resistance, case to heatsink		R_{thCS}	-	0.10	-	°C/W
Weight	TO-244M (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)	lbf • in (N•m)
Terminal torque			30 (3.4)	-	44.2 (5)	lbf • in (N•m)
vertical pull			-	-	80	lbf • in
2" lever pull			-	-	35	lbf • in

Ordering Information Table

Device code

NK	S	D	400	–	200	M
①	②	③	④		⑤	⑥

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

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

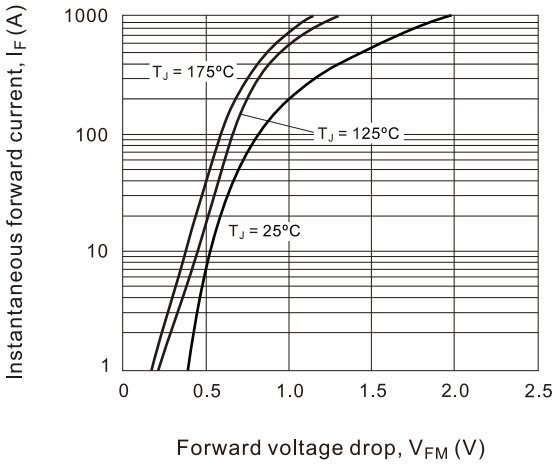


Fig.2 Typical values of reverse current vs. Reverse voltage (Per Leg)

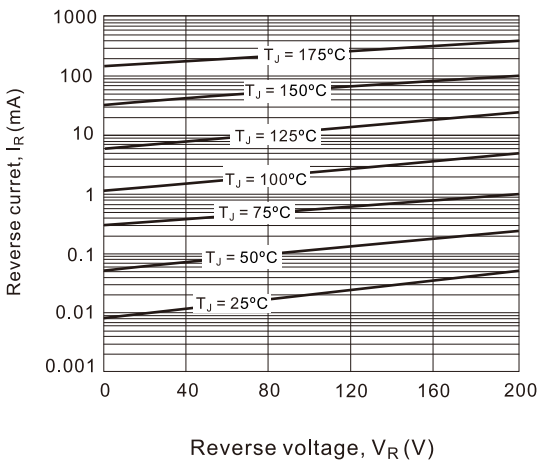


Fig.3 Maximum thermal impedance $R_{th(j-c)}$ characteristics (Per Leg, for TO-244M non-insulated)

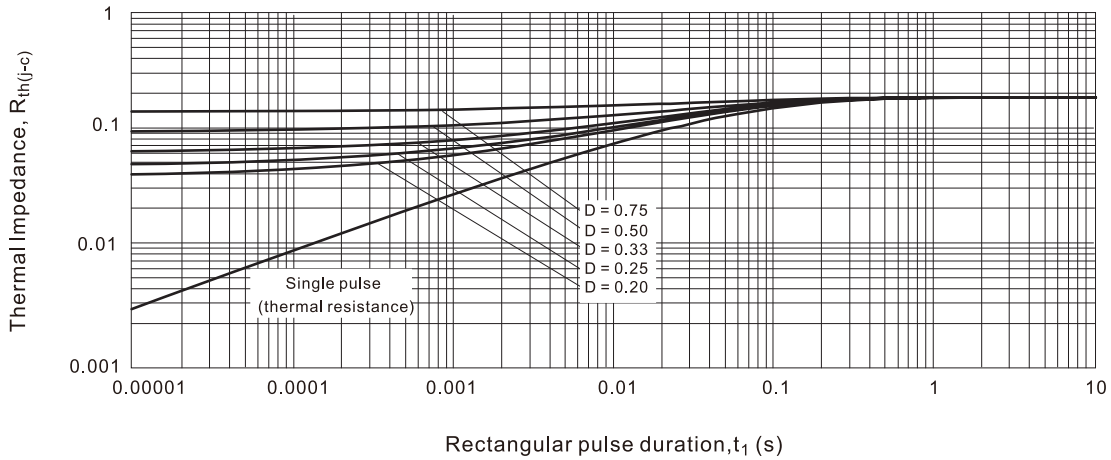


Fig.4 Typical junction capacitance vs. Reverse voltage (Per Leg)

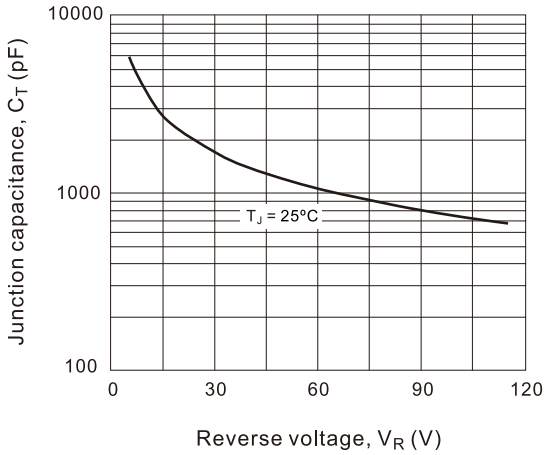


Fig.5 Maximum allowable case temperature vs. Average forward current (Per Leg)

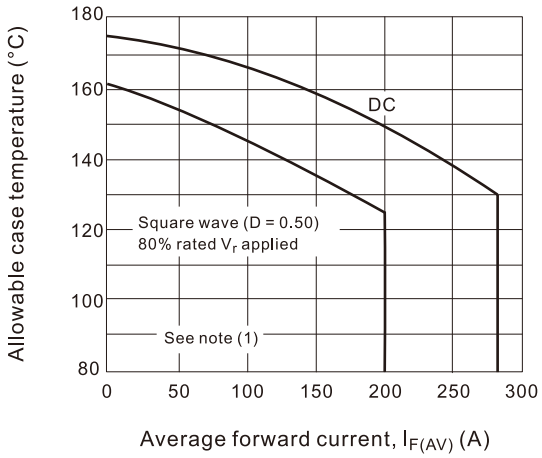


Fig.6 Forward power loss characteristics (Per Leg)

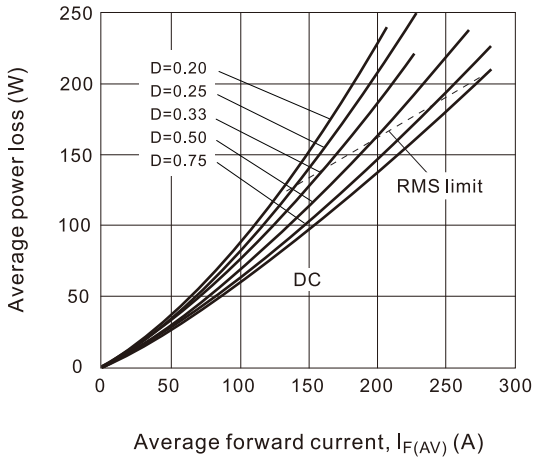


Fig.7 Maximum non-repetitive surge current (Per Leg)

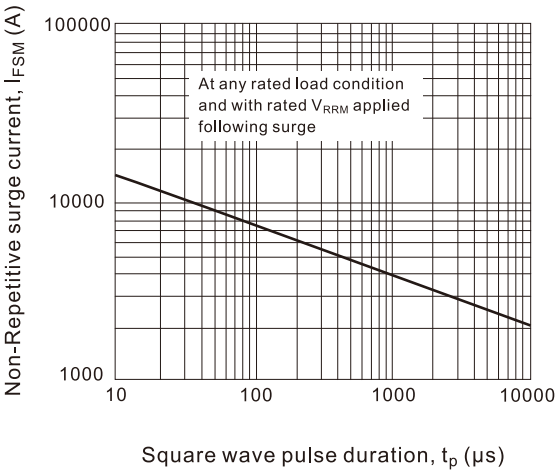
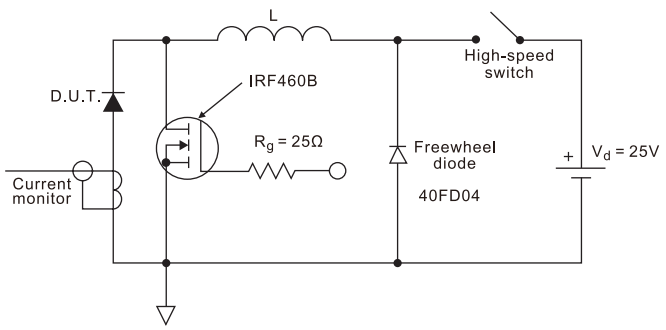


Fig.8 Unclamped Inductive test circuit



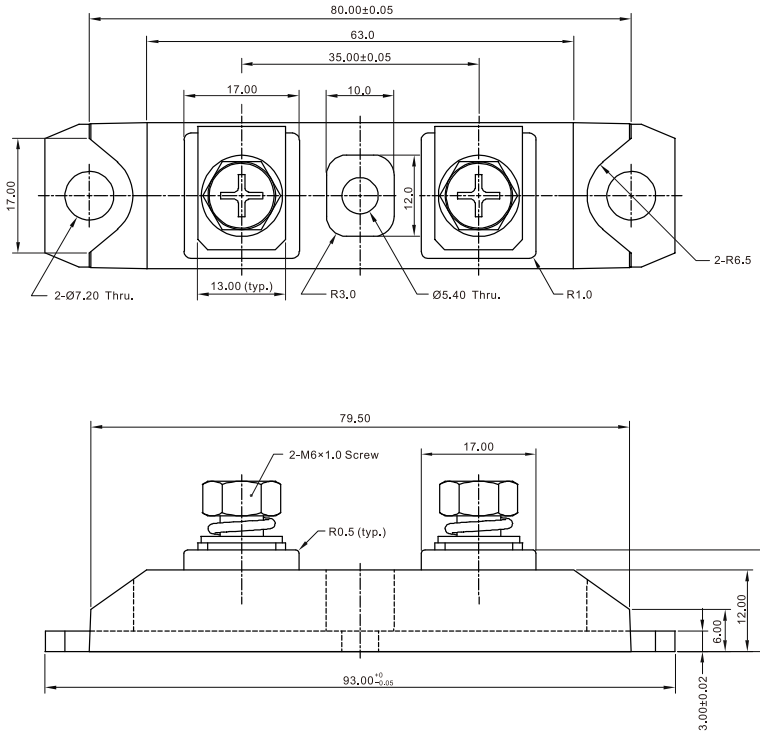
Note

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

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

TO-244M (Non-Insulated)



All dimensions in millimeters