

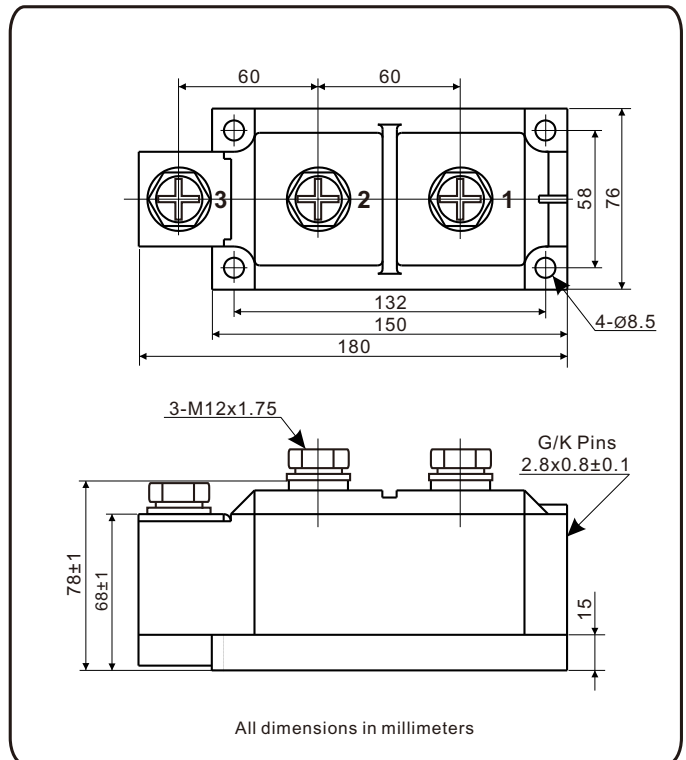
Thyristor/Diode and Thyristor/Thyristor, 1000A (SUPER MAGN-A-PAK Power Modules)



SUPER MAGN - A - PAK(1)

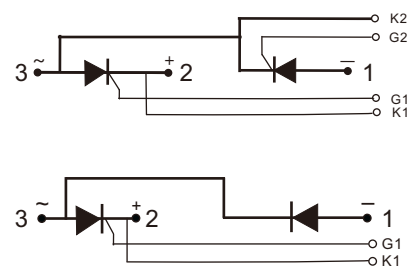
FEATURES

- High voltage
- Electrically isolated by DBC ceramic (Al_2O_3)
- 3500 V_{RMS} isolating voltage
- Industrial standard package
- High surge capability
- Modules uses high voltage power thyristor/diodes in two basic configurations
- Simple mounting
- UL approved file E320098 
- Compliant to RoHS 
- Designed and qualified for multiple level



APPLICATIONS

- DC motor control and drives
- Battery charges
- Welders
- Power converters
- Lighting control
- Heat and temperature control
- Ups



NKT

NKH

PRODUCT SUMMARY

$I_{T(AV)}/I_{F(AV)}$	800 A
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MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUE	UNITS
$I_{T(AV)}/I_{F(AV)}$	85 °C	1000/1000	A
$I_{T(RMS)}/I_{F(RMS)}$	85 °C	1570/1570	A
I_{TSM}/I_{FSM}	50 Hz	30000/40000	
	60 Hz	31410/41880	
i_{Tt} (SCR/Diode)	50 Hz	4500/8000	kA ² s
	60 Hz	4090 / 7280	
$i_{T\sqrt{t}}$ (SCR/Diode)		45000/80000	kA ² √s
V_{DRM} / V_{RRM}	Range	400 to 1600	V
T_J	Range	-40 to 125	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS				
TYPE NUMBER	VOLTAGE CODE	V_{RRM}/V_{DRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V_{RSM}/V_{DSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM}/I_{DRM} AT 125 °C mA
NKT1000 NKH1000	04	400	500	50
	08	800	900	
	10	1000	1100	
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

FORWARD CONDUCTION							
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS	
Maximum average on-state current at case temperature	$I_{T(AV)}$ $I_{F(AV)}$	180° conduction, half sine wave ,50Hz			1000	A	
					85	°C	
Maximum RMS on-state current	$I_{T(RMS)}$ $I_{F(RMS)}$	180° conduction, half sine wave ,50Hz , $T_C = 85^{\circ}C$			1570	A	
Maximum peak, one-cycle, on-state non-repetitive surge current	I_{TSM}/I_{FSM}	t = 10 ms	No voltage reapplied	Sine half wave, initial $T_J = T_J$ maximum	30000/40000		
		t = 8.3 ms			31410/41880		
		t = 10 ms	100% V_{RRM} reapplied		25200/33600		
		t = 8.3 ms			26380/35180		
Maximum I^2t for fusing	I^2t (SCR/Diode)	t = 10 ms	No voltage reapplied		4500/8000	kA ² s	
		t = 8.3 ms			4090/7280		
		t = 10 ms	100% V_{RRM} reapplied		3180/5640		
		t = 8.3 ms			2890/5140		
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$ (SCR/Diode)	t = 0.1 ms to 10 ms, no voltage reapplied			45000/80000	kA ² √s	
Maximum on-state voltage drop	V_{TM}	I_{TM} = 3000A, $T_J = 25^{\circ}C$, 180° conduction			2.0	V	
Maximum forward voltage drop	V_{FM}	$I_{FM} = 3000A$, $T_J = 25^{\circ}C$, 180° conduction			1.7		
Maximum holding current	I_H	Anode supply = 12 V initial $I_T = 30$ A, $T_J = 25^{\circ}C$			300	mA	
Maximum latching current	I_L	Anode supply = 12 V resistive load = 1 Ω Gate pulse: 10 V, 100 μs, $T_J = 25^{\circ}C$			500		

SWITCHING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Typical delay time	t_d	$T_J = 25^\circ\text{C}$, gate current = 1 A, $dI_g/dt = 1\text{A}/\mu\text{s}$ $V_d = 0.67 V_{DRM}$	2.0	μs
Typical rise time	t_r		4.0	
Typical turn-off time	t_q	$I_{TM} = 750\text{A}$, $dI/dt = -60\text{A}/\mu\text{s}$, $T_J = T_J$ maximum $V_R = 50\text{V}$, $dV/dt = 20\text{V}/\mu\text{s}$, gate 0V, 100Ω	200	

BLOCKING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak reverse and off-state leakage current	I_{RRM} I_{DRM}	$T_J = 125^\circ\text{C}$	50	mA
RMS isolation Voltage	V_{ISO}	50 Hz, circuit to base, all terminals shorted, 25°C , 1s	3500	V
Critical rate of rise of off-state voltage	dV/dt	$T_J = T_J$ maximum, linear to $V_D = 80\% V_{DRM}$	1000	V/μs

TRIGGERING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	P _{GM}	t _p ≤ 5 ms, T _J = T _J maximum		10	W
Maximum average gate power	P _{G(AV)}	f = 50 Hz, T _J = T _J maximum		2	
Maximum peak gate current	I _{GM}	t _p ≤ 5 ms, T _J = T _J maximum		3	A
Maximum peak positive gate voltage	+V _{GM}			20	V
Maximum peak negative gate voltage	- V _{GM}			5.0	
Maximum required DC gate voltage to trigger	V _{GT}	T _J = 25 °C	Anode supply = 12 V, resistive load; R _a = 1 Ω	2	mA
Maximum required DC gate current to trigger	I _{GT}			200	
Maximum gate voltage that will not trigger	V _{GD}	T _J = T _J maximum, 67% V _{DRM} applied		0.25	V
Maximum gate current that will not trigger	I _{GD}			10	mA
Maximum rate of rise of turned-on current	dI/dt	T _J = T _J maximum, I _{TM} = 400A rated V _{DRM} applied		1000	A/μs

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
junction operating and storage temperature range		T _J , T _{stg}		- 40 to 125	°C
Maximum thermal resistance, junction to case per junction		R _{thJC}	DC operation	0.043	°C/W
Typical thermal resistance, case to heatsink per module		R _{thCS}	Mounting surface, smooth , flat and greased	0.008	
Mounting torque ± 10 %	SMAP to heatsink , M8		A mounting compound is recommended and the torque should be rechecked after a period of about 3 hours to allow for the spread of the compound.	6 to 8	N·m
	busbar to SMAP , M12			13 to 16	
Approximate weight				3500	g
				123	oz.
Case style				SUPER MAGN-A-PAK(1)	

ORDERING INFORMATION TABLE

Device code	NKT	1000	/	16
	①	②		③
①	- Module type: NKT for (Thyristor + Thyristor) module NKH for (Thyristor + Diode) module			
②	- Current rating: $I_{T(AV)}$ / $I_{F(AV)}$			
③	- Voltage code x 100 = V_{RRM}			

Nell High Power Products

Fig.1 On-state current vs. voltage characteristics

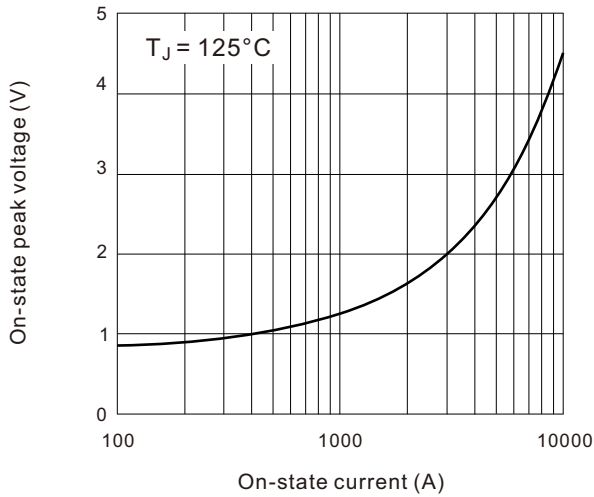


Fig.2 Transient thermal impedance (junction-case)

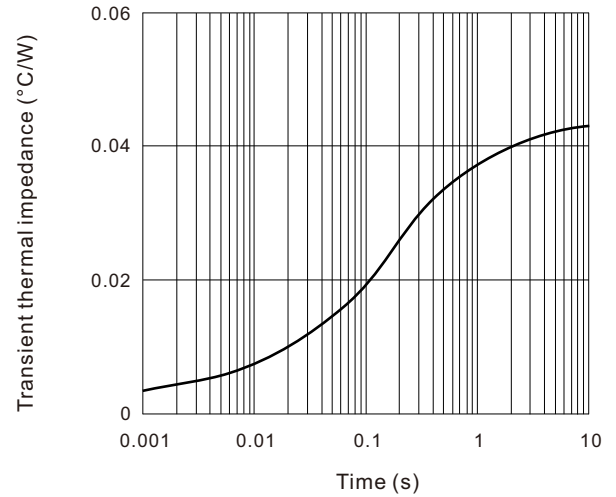


Fig.3 Power consumption vs. average current

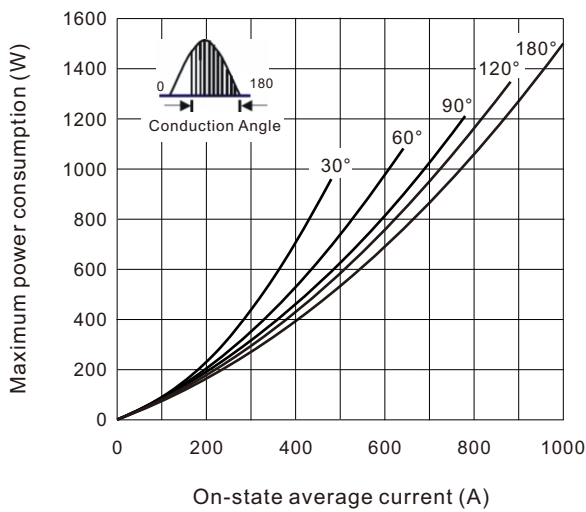


Fig.4 Case temperature vs. on-state average current

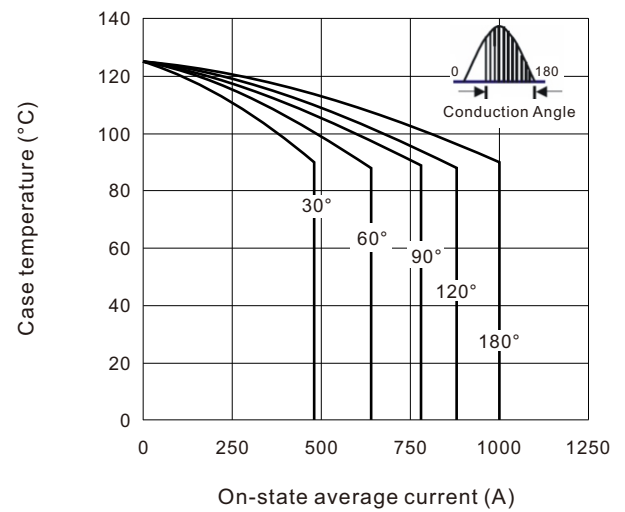


Fig.5 On-state surge current vs cycles

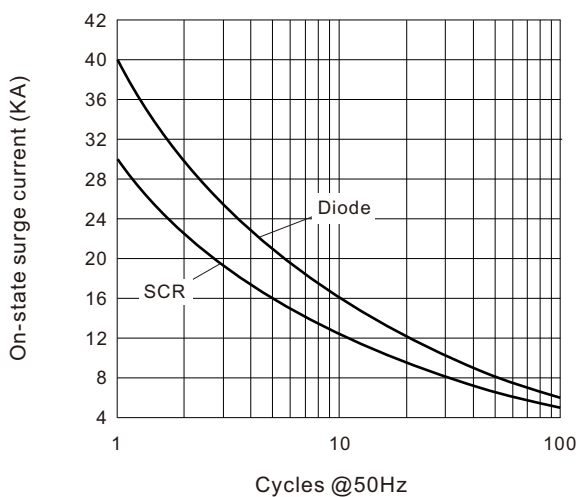


Fig.6 I^2t characteristics

