

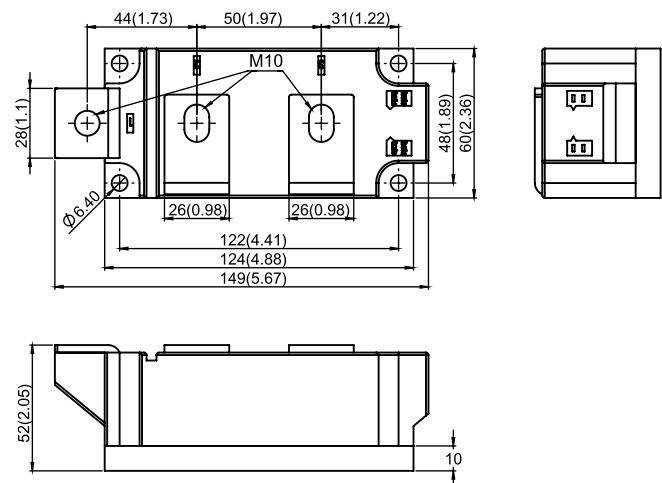
Thyristor/Diode and Thyristor/Thyristor, 500A (SUPER MAGN-A-PAK Power Modules)



SUPER MAGN - A - PAK (Vishay)

FEATURES

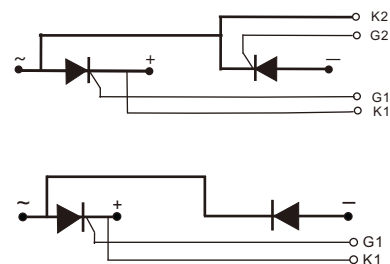
- High voltage
- Electrically isolated by DBC ceramic (Al_2O_3)
- 3500 V_{RMS} isolating voltage
- Industrial standard package
- High surge capability
- Modules uses high voltage power thyristor/diodes in two basic configurations
- Simple mounting
- UL approved file E320098 
- Compliant to RoHS
- Designed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



All dimensions in millimeters(inches)

APPLICATIONS

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



NKT

NKH

PRODUCT SUMMARY

$I_{T(AV)}$	500 A
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MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUE	UNITS
$I_{T(AV)}$	85 °C	500	A
$I_{T(RMS)}$	85 °C	785	A
I_{TSM}	50 Hz	16000	A
	60 Hz	16800	
i^2_t	50 Hz	1280	kA^2s
	60 Hz	1167	
i^2_{vt}		12800	kA^2/s
$V_{\text{DRM}} / V_{\text{RRM}}$	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
NKT500/xx-1 NKH500/xx-1	04	400	500	40
	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)}	180° conduction, half sine wave ,50Hz			500	A
					85	°C
Maximum RMS on-state current	I _{T(RMS)}	180° conduction, half sine wave ,50Hz ,T _C = 85°C			785	A
Maximum peak, one-cycle, on-state non-repetitive surge current	I _{TSM}	t = 10 ms	No voltage reappplied	Sine half wave, initial T _J = T _J maximum	16000	
		t = 8.3 ms			16800	
Maximum I ² t for fusing	I ² t	t = 10 ms	No voltage reappplied	Sine half wave, initial T _J = T _J maximum	1280	kA ² s
		t = 8.3 ms			1167	
		t = 10 ms	100%V _{RRM} reappplied		896	
		t = 8.3 ms			818	
Maximum I ² √t for fusing	I ² √t	t = 0.1 ms to 10 ms, no voltage reappplied			12800	kA ² √s
Maximum on-state voltage drop	V _{TM}	I _{TM} = 1500A, T _J = 25 °C, 180° conduction			1.7	V
Maximum forward voltage drop	V _{FM}	I _{FM} = 1500A, T _J = 25 °C, 180° conduction			1.4	
Maximum holding current	I _H	Anode supply = 12 V initial I _T = 30 A, T _J = 25 °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 °C			500	

SWITCHING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Typical delay time	t_d	$T_J = 25^{\circ}C$,gate current = 1A, $dI_g/dt = 1 A/\mu s$ $V_d = 0.67 V_{DRM}$	2	μs
Typical rise time	t_r		4	
Typical turn-off time	t_q	$I_{TM} = 750A$; $dI/dt = -60 A/\mu s$; $T_J = T_J$ maximum, $V_R = 50V$; $dV/dt = 20V/\mu s$; gate 0V ,100Ω	200	

BLOCKING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak reverse and off-state leakage current	I_{RRM} , I_{DRM}	$T_J = 125^{\circ}C$	40	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		3	
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	0.065	°C/W
Typical thermal resistance, case to heatsink per module		R _{thCS}	Mounting surface, smooth , flat and greased	0.01	
Mounting torque ± 10 %	SMAP to heatsink , M6		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 , M10			12 to 15	
Approximate weight				1800	g
				63.5	oz.
Case style				Vishay SUPER MAGN-A-PAK	

ORDERING INFORMATION TABLE

Device code	NKT	500	/	16	—	1
	①	②		③		④

- ① - Module type: NKT for (Thyristor + Thyristor) module
NKH for (Thyristor + Diode) module
- ② - Current rating: $I_{T(AV)}$
- ③ - Voltage code $\times 100 = V_{RRM}$
- ④ - "1" for Vishay super MAP outline

Nell High Power Products

Fig.1 On-state current vs. voltage characteristics

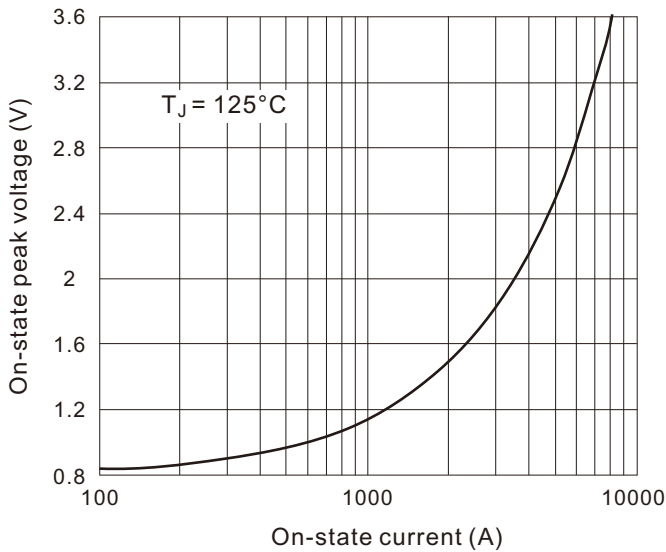


Fig.2 Transient thermal impedance(junction-case)

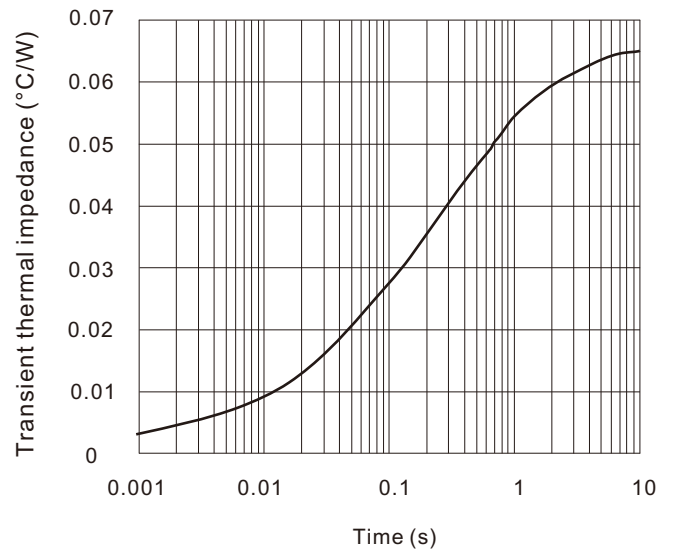


Fig.3 Power consumption vs. average current

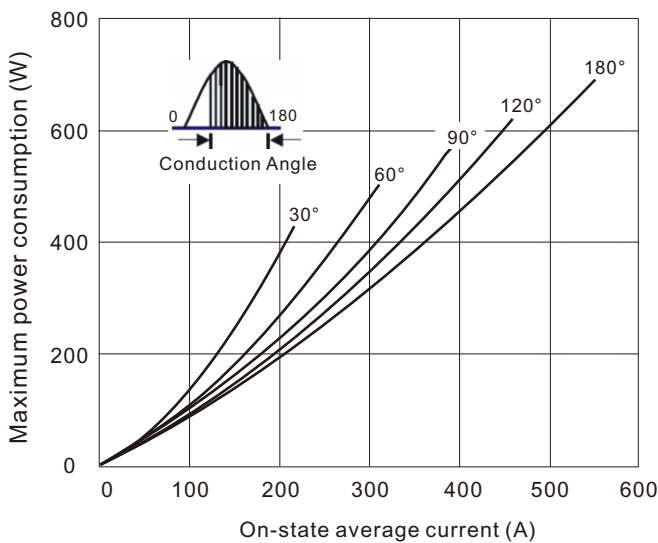


Fig.4 Case temperature vs. on-state average current

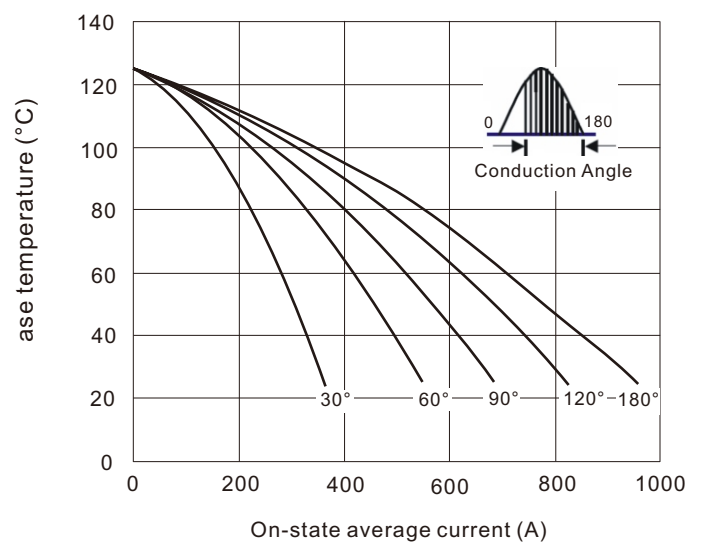


Fig.5 On-state surge current vs cycles

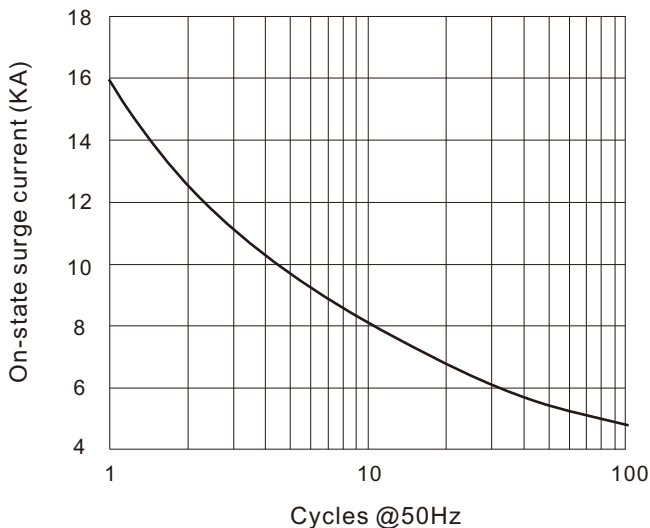


Fig.6 I^2t characteristics

