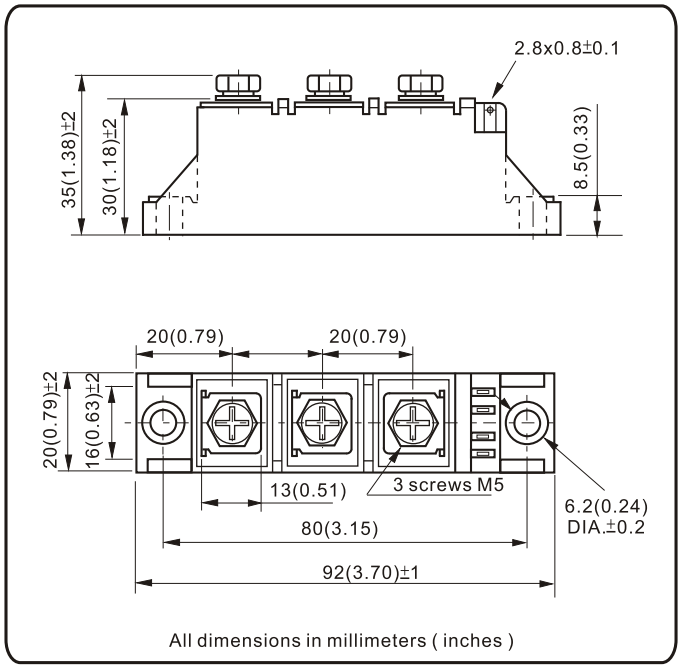
Thyristor/Diode and Thyristor/Thyristor, 60A (ADD-A-PAK Power Modules)

ADD-A-PAK



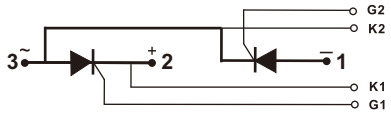
FEATURES

- High voltage
- Electrically isolated by DBC ceramic (Al_2O_3)
- 3000 V_{RMS} isolating voltage
- Industrial standard package
- High surge capability
- Two elements in one package
- Modules uses high voltage power thyristors/diodes in two basic configurations
- Simple mounting
- UL approved file E320098
- Compliant to RoHS
- Designed and qualified for multiple level

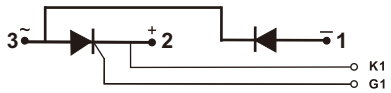
RoHS COMPLIANT

APPLICATIONS

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



NKT



NKH

PRODUCT SUMMARY	
$I_{T(AV)}$ / $I_{F(AV)}$	60 A

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUE	UNITS
$I_{T(AV)}$ / $I_{F(AV)}$	85 °C	60	A
$I_{T(RMS)}$ / $I_{F(RMS)}$	85 °C	94	
I_{TSM} / I_{FSM}	50 Hz	1250	
	60 Hz	1313	
I^2t	50 Hz	7.81	kA^2s
	60 Hz	7.13	
$I^2\sqrt{t}$		78.1	$kA^2\sqrt{s}$
V_{DRM} / V_{RRM}	Range	600 to 1600	V
T_J	Range	-40 to 150	°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 150 °C mA
NKT55 NKH55	06	600	700	8
	08	800	900	
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

FORWARD CONDUCTION						
PARAMETER	SYMBOL	TEST CONDITIONS			VALUE	UNITS
Maximum average on-state current (thyristors)	$I_{T(AV)}$	180° conduction, half sine wave, T_C = 85°C			60	A
Maximum average forward current (diodes)	$I_{F(AV)}$					
Maximum RMS on-state current	$I_{T(RMS)}$ $I_{F(RMS)}$	180° conduction, half sine wave ,50Hz ,T_C = 85°C			94	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	1250	
		t = 8.3 ms			1313	
		t = 10 ms	100%V_{RRM} reapplied		1050	
		t = 8.3 ms			1103	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		7.81	kA^2s
		t = 8.3 ms			7.13	
		t = 10 ms	100%V_{RRM} reapplied		5.51	
		t = 8.3 ms			5.05	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied			78.1	$kA^2\sqrt{s}$
Maximum value of threshold voltage	$V_{T(TO)}$	T_J = T_J Maximum			1.05	V
Maximum value of on-state slope resistance	r_t				4.25	mΩ
Maximum on-state voltage drop	V_{TM}	I_{TM} = 165A, T_J = 25°C, 180° conduction			1.6	V
Maximum forward voltage drop	V_{FM}	I_{FM} = 165A, T_J = 25°C, 180° conduction			1.3	
Maximum holding current	I_H	Anode supply = 6V, resistive load T_J = 25°C			150	mA
Maximum latching current	I_L				400	

BLOCKING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak reverse and off-state leakage current	I_{RRM} I_{DRM}	T_J = 150 °C	8	mA
RMS isolation Voltage	V_{ISO}	50 Hz, circuit to base, all terminals shorted	2500 (1min) 3000 (1s)	V
Critical rate of rise of off-state voltage	dV/dt	T_J = T_J Maximum exponential to 67 % rated V_{DRM}	1000	V/µs

TRIGGERING					
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**VALUES**	**UNITS**
Maximum peak gate power	P_{GM}	$t_p \leq 5$ 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}	$t_p \leq 5$ ms, $T_J = T_J$ maximum		3	A
Maximum peak negative gate voltage	$-V_{GM}$			10	V
Maximum required DC gate voltage to trigger	V_{GT}	T_J = -40ºC	Anode supply = 6 V, resistive load; R_a = 1 Ω	2.40	
		T_J = 25ºC		1.50	
		T_J = 125ºC		1.00	
Maximum required DC gate current to trigger	I_{GT}	T_J = -40ºC		200	mA
		T_J = 25ºC		100	
		T_J = 125ºC		50	
Maximum gate voltage that will not trigger	V_{GD}	$T_J = T_J$ maximum, 66.7% 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 = 25ºC, I_{GM} = 1.5A, $t_r \leq 0.5$ µs		150	A/µs

THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Maximum junction operating temperature range	T_J		- 40 to 150	°C
Maximum storage temperature range	T_{Stg}		- 40 to 150	
Maximum thermal resistance, junction to ca se per junction	R_{thJC}	DC operation	0.35	°C/W
Maximum thermal resistance, case to heatsink per module	R_{thCS}	Mounting surface, smooth , flat and greased	0.1	
Mounting torque ± 10 % — AAP to heatsink, M6 / busbar to AAP, M5		A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound. Lubricated threads.	4	N.m
Approximate weight			120	g
			4.23	oz.
Case style			ADD-A-PAK	

ORDERING INFORMATION TABLE

Device code

NKT	55	/	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}

Fig.1 Peak on-state voltage vs. peak on-state current

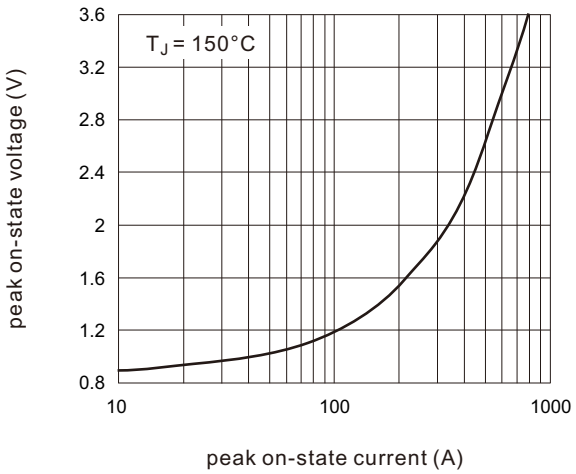


Fig.2 Max. junction to case thermal Impedance vs. time

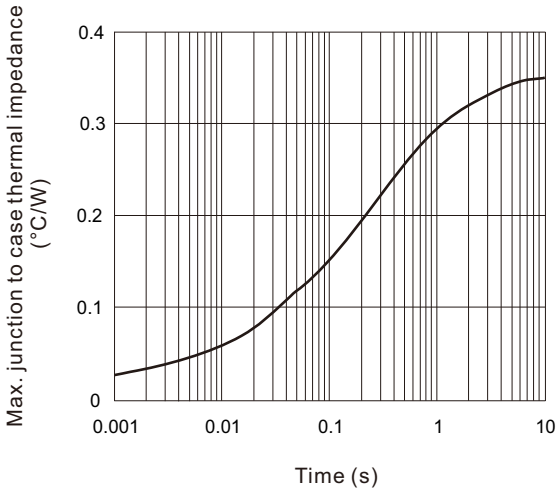


Fig.3 Power dissipation vs. average on-state current

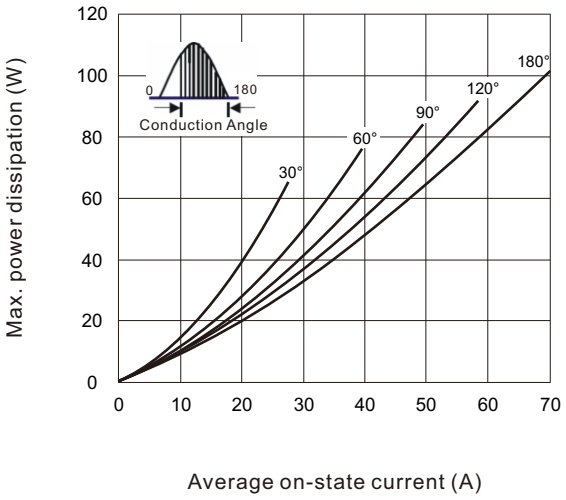


Fig.4 Case Temperature Vs. Average On-state Current

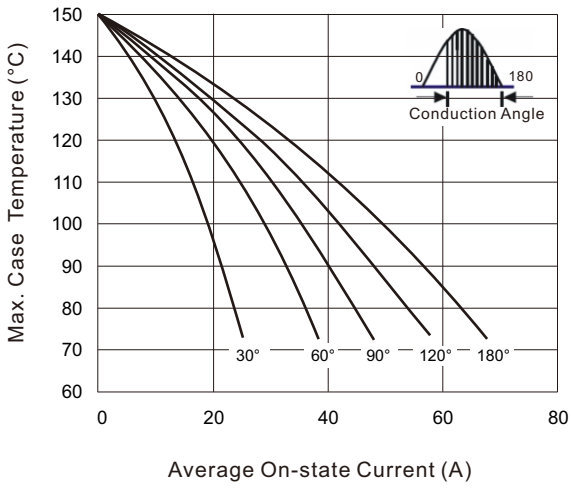


Fig.5 Surge on-state current vs. cycles

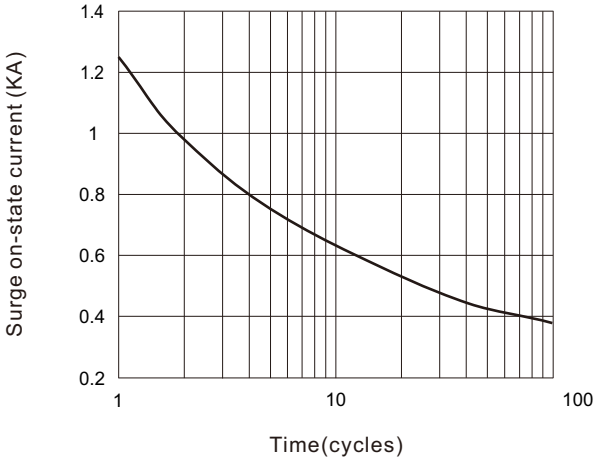


Fig.6 Gate characteristics