

Thyristor/Diode and Thyristor/Thyristor, 90A (ADD-A-PAK Power Modules)



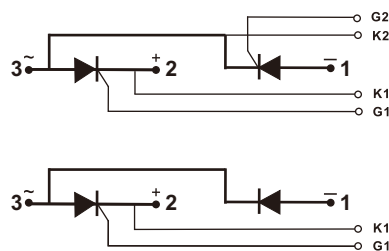
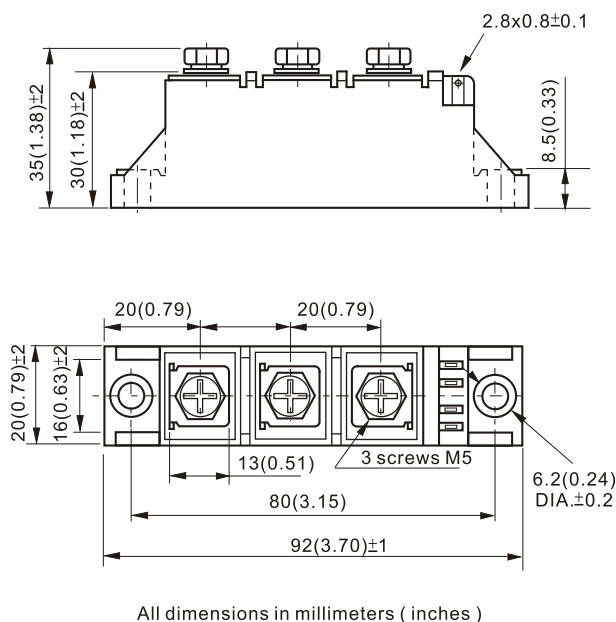
ADD-A-PAK

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

APPLICATIONS

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



PRODUCT SUMMARY

$I_{T(AV)} / I_{F(AV)}$	90 A
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MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUE	UNITS
$I_{T(AV)} / I_{F(AV)}$	85 °C	95	A
$I_{T(RMS)} / I_{F(RMS)}$	85 °C	149	A
I_{TSM} / I_{FSM}	50 Hz	2000	A
	60 Hz	2100	
I^2t	50 Hz	20	kA ² s
	60 Hz	18.3	
$I^2\sqrt{t}$		200	kA ² √s
$V_{\text{DRM}} / V_{\text{RRM}}$	Range	600 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
NKT90 NKH90	08	800	900	10
	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, 50Hz , $T_C = 85^{\circ}\text{C}$			95	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 , $T_C = 85^{\circ}\text{C}$			149	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	2000	
		t = 8.3 ms			2100	
		t = 10 ms	100% V_{RRM} reapplied		1680	
		t = 8.3 ms			1764	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		20	kA ² s
		t = 8.3 ms			18.3	
		t = 10 ms	100% V_{RRM} reapplied		14.1	
		t = 8.3 ms			12.9	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied			200	kA ² $\sqrt{s}$
Value of threshold voltage	$V_{T(TO)}$	$T_J = T_J$ Maximum			0.80	V
Value of on-state slope resistance	r_t				3.01	mΩ
Maximum on-state voltage drop	V_{TM}	$I_{TM} = 270\text{A}$, $T_J = 25^{\circ}\text{C}$, 180° conduction			1.7	V
Maximum forward voltage drop	V_{FM}	$I_{FM} = 270\text{A}$, $T_J = 25^{\circ}\text{C}$, 180° conduction			1.3	
Maximum holding current	I_H	Anode supply = 6V, resistive load $T_J = 25^{\circ}\text{C}$			250	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}	$T_J = 125^\circ\text{C}$	10	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}	800	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 negative gate voltage	- V _{GM}			10	V
Maximum required DC gate voltage to trigger	V _{GT}	T _J = 25 °C	Anode supply = 6 V, resistive load; R _a = 1 Ω	0.7~1.10	
Maximum required DC gate current to trigger	I _{GT}			30~100	
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 = 25°C ,Gate drive 20V, 20Ω, t _r ≤ 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 125	°C
Maximum storage temperature range		T _{Stg}		- 40 to 140	
Maximum thermal resistance, junction to case per junction		R _{thJC}	DC operation	0.28	°C/W
Maximum thermal resistance, case to heatsink per module		R _{thCS}	Mounting surface, smooth , flat and greased	0.10	
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				175	g
				6.2	oz.
Case style				ADD-A-PAK	

ORDERING INFORMATION TABLE

Device code	NKT	90	/	16
	①	②		③
①	- Module type: NKT for (Thyristor + Thyristor) module NKH for (Thyristor + Diode) module			
②	- Current rating: 90 for 95A			
③	- Voltage code $\times 100 = V_{RRM}$			

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

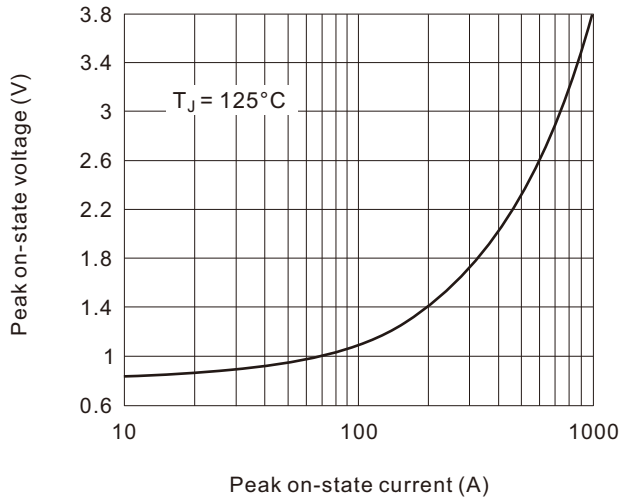


Fig.2 Max. thermal impedance (junction to case) vs. time

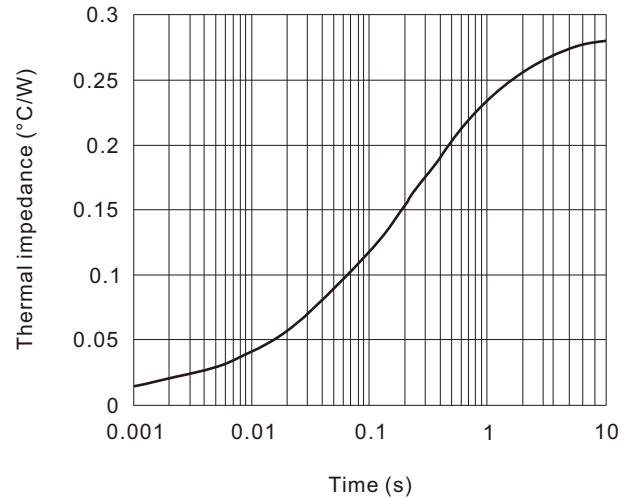


Fig.3 Power dissipation vs. average on-state current

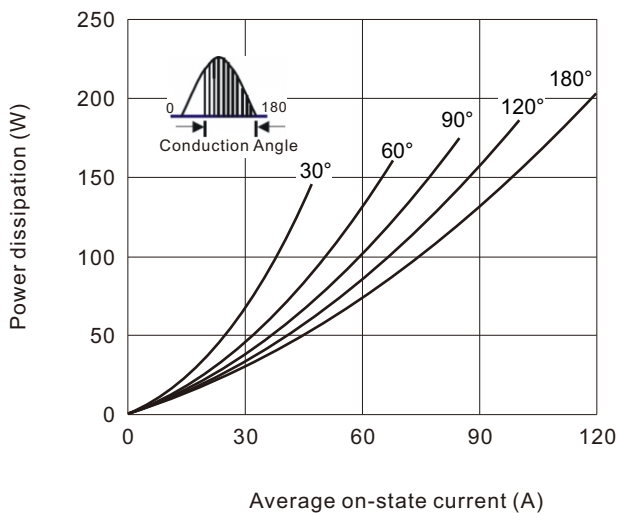


Fig.4 Case temperature vs. average on-state current

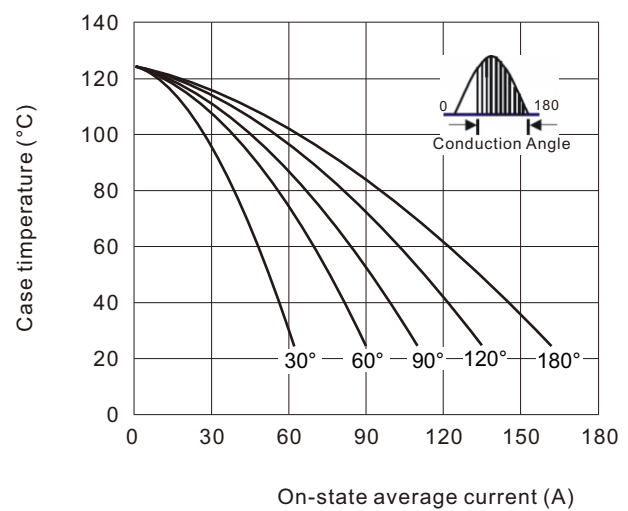


Fig.5 Surge on-state current vs. cycles

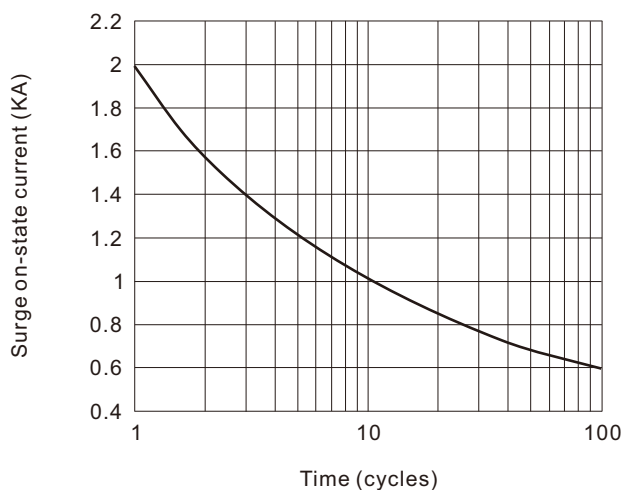


Fig.6 Gate characteristics

