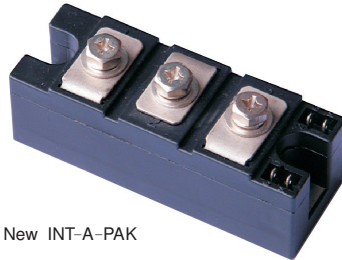


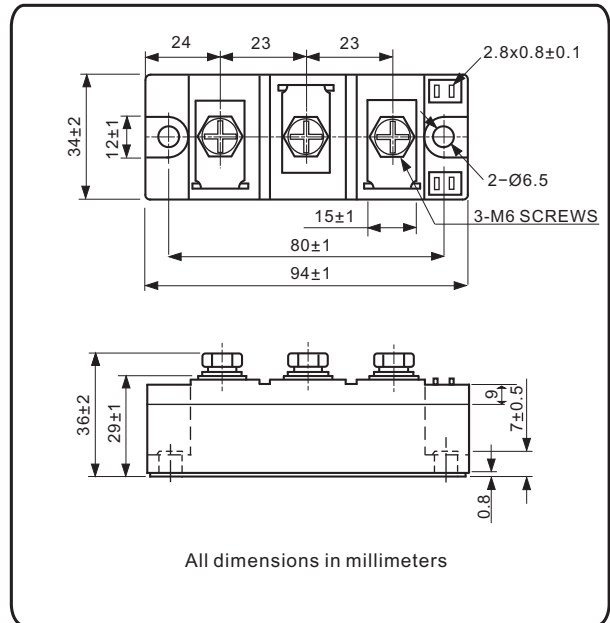
### Thyristor/Diode and Thyristor/Thyristor, 160A (New INT-A-PAK Power Modules)



New INT-A-PAK

#### FEATURES

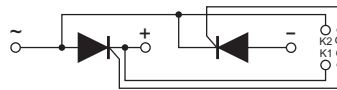
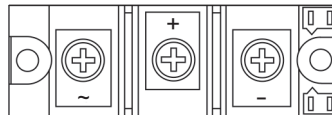
- High voltage
- Electrically isolated by DBC ceramic ( $Al_2O_3$ )
- 3500  $V_{RMS}$  isolating voltage
- Industrial standard package
- High surge capability
- Glass passivated chips
- Modules uses high voltage power thyristor/diodes in two basic configurations
- Simple mounting
- UL approved file E320098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



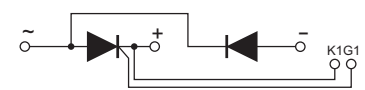
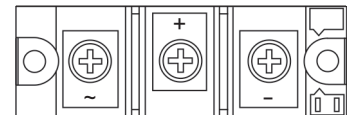
#### APPLICATIONS

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

NKT



NKH



#### PRODUCT SUMMARY

$I_{T(AV)}$	160 A
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#### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUE	UNITS
$I_{T(AV)}$	85 C	160	A
$I_{T(RMS)}$	85 C	251	A
$I_{TSM}$	50 Hz	5400	
	60 Hz	5670	
$I^2t$	50 Hz	146	$kA^2s$
	60 Hz	133	
$I^2\sqrt{t}$		1458	$kA^2\sqrt{s}$
$V_{DRM} / V_{RRM}$	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
NKT160 NKH160	04	400	500	20
	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 at case temperature	$I_{T(AV)}$	180 conduction, half sine wave ,50Hz		160	A			
				85	°C			
Maximum RMS on-state current	$I_{T(RMS)}$	180 conduction, half sine wave ,50Hz , $T_C = 85^\circ\text{C}$		251				
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	5400	A		
		t = 8.3 ms			5670			
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms			100% $V_{RRM}$ reappplied		146	kA <sup>2</sup> s
		t = 8.3 ms					133	
		t = 10 ms	102					
		t = 8.3 ms	93					
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reappplied		1458	kA <sup>2</sup> $\sqrt{s}$			
Maximum on-state voltage drop	$V_{TM}$	$I_{TM} = 480\text{A}$ , $T_J = 25^\circ\text{C}$ , 180 conduction		1.7	V			
Maximum forward voltage drop	$V_{FM}$	$I_{FM} = 480\text{A}$ , $T_J = 25^\circ\text{C}$ , 180 conduction		1.4				
Maximum holding current	$I_H$	Anode supply = 6 V initial $I_T = 30\text{A}$ , $T_J = 25^\circ\text{C}$		40~150	mA			
Maximum latching current	$I_L$	Anode supply = 6 V resistive load = 1 $\Omega$ Gate pulse: 10 V, 100 $\mu\text{s}$ , $T_J = 25^\circ\text{C}$		400				

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak reverse and off-state leakage current	$I_{RRM}$ , $I_{DRM}$	$T_J = 125^\circ\text{C}$		20	mA
RMS isolation Voltage	$V_{ISO}$	50 Hz, circuit to base, all terminals shorted		2500 (1min) 3500 (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/ $\mu\text{s}$

TRIGGERING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	$P_{GM}$	$t_p \leq 5 \text{ ms}, T_J = T_J \text{ maximum}$		10	W
Maximum average gate power	$P_{G(AV)}$	$f = 50 \text{ Hz}, T_J = T_J \text{ maximum}$		3	
Maximum peak gate current	$I_{GM}$	$t_p \leq 5 \text{ ms}, T_J = T_J \text{ maximum}$		3	A
Maximum peak negative gate voltage	$-V_{GT}$			10	
Maximum required DC gate voltage to trigger	$V_{GT}$	$T_J = 25 \text{ }^\circ\text{C}$	Anode supply = 6 V, resistive load; $R_a = 1 \Omega$	0.7~1.8	V
Maximum required DC gate current to trigger	$I_{GT}$			30~150	
Maximum gate voltage that will not trigger	$V_{GD}$	$T_J = T_J \text{ maximum}, 66.7\% V_{DRM} \text{ applied}$		0.25	V
Maximum gate current that will not trigger	$I_{GD}$			10	mA
Maximum rate of rise of turned-on current	$di/dt$	$T_J = 25^\circ\text{C}, I_{GM} = 1.5\text{A}, t_r \leq 0.5 \mu\text{s}$		150	A/ $\mu\text{s}$

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 150	
Maximum thermal resistance, junction to case per junction	$R_{thJC}$	DC operation		0.17	C/W
Maximum thermal resistance, case to heatsink per module	$R_{thCS}$	Mounting surface, smooth, flat and greased		0.055	
Mounting torque 10 %	IAP to heatsink, M6 busbar to IAP, M6	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 to 6	N.m
Approximate weight				220	g
				7.05	oz.
Case style				New INT-A-PAK	

### ORDERING INFORMATION TABLE

Device code	<b>NKT</b>	<b>160</b>	<b>/</b>	<b>16</b>	<b>A</b>
	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 x 100 = $V_{RRM}$				
④	- Assembly type, "A" for soldering type				

Nell High Power Products

Fig.1 On-state current vs. voltage characteristic

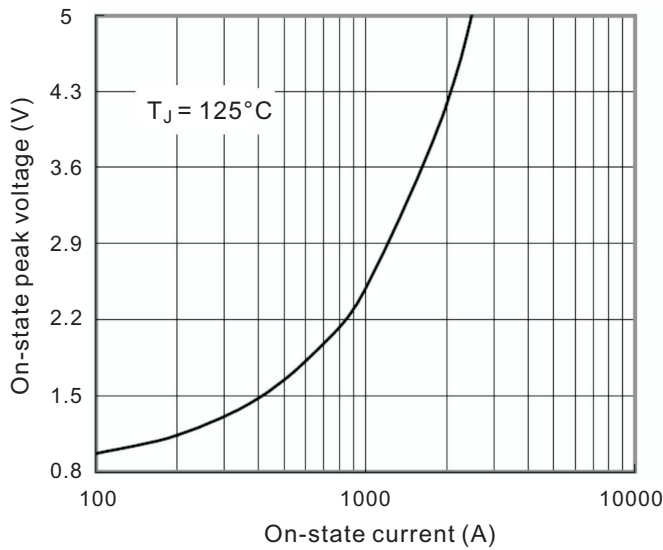


Fig.2 Transient thermal impedance(junction-case)

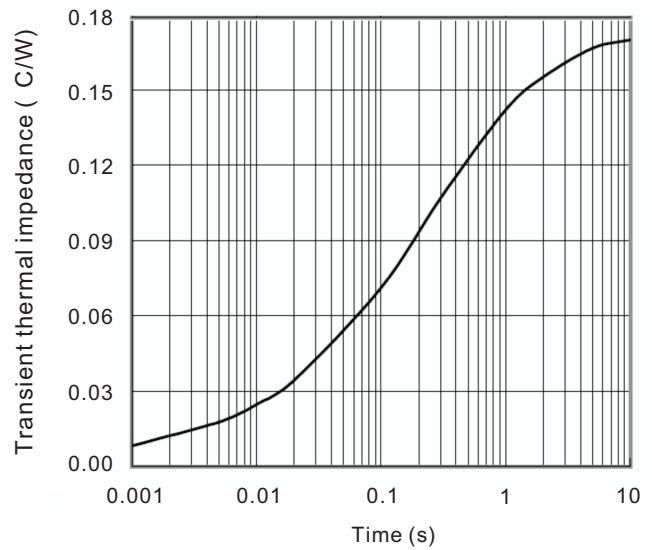


Fig.3 Power consumption vs. average current

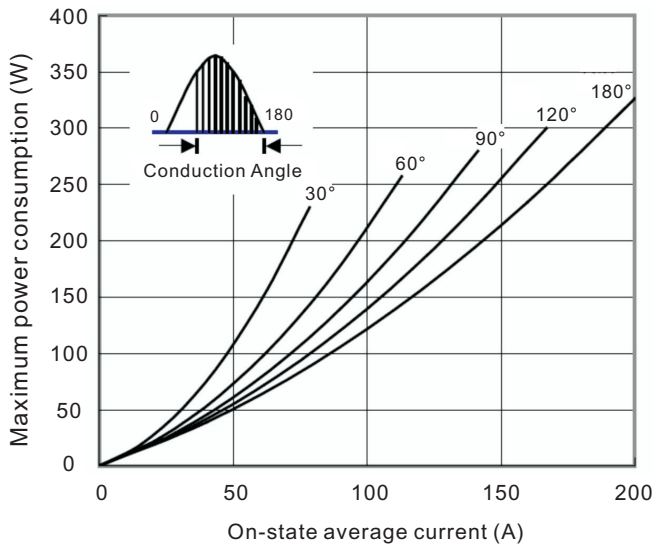


Fig.4 Case temperature vs. on-state average current

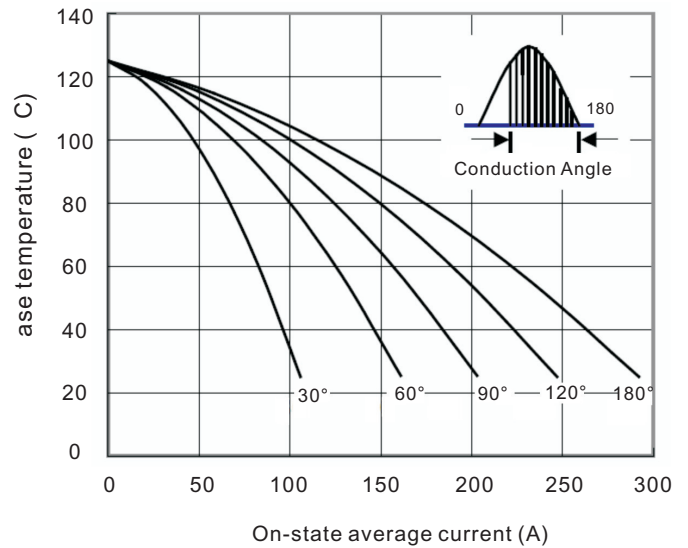


Fig.5 On-state surge current vs cycles

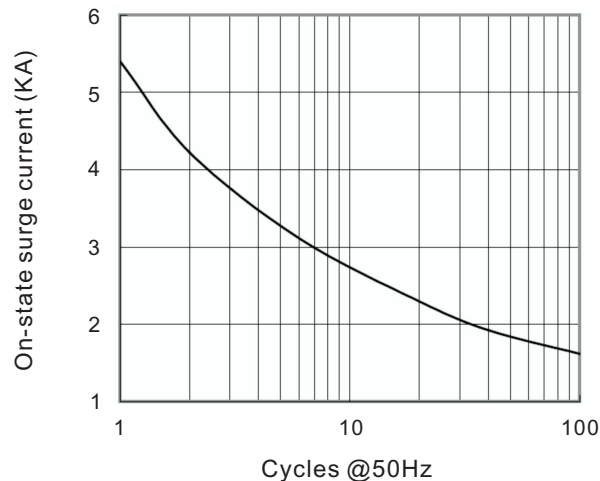


Fig.6 Gate characteristics

