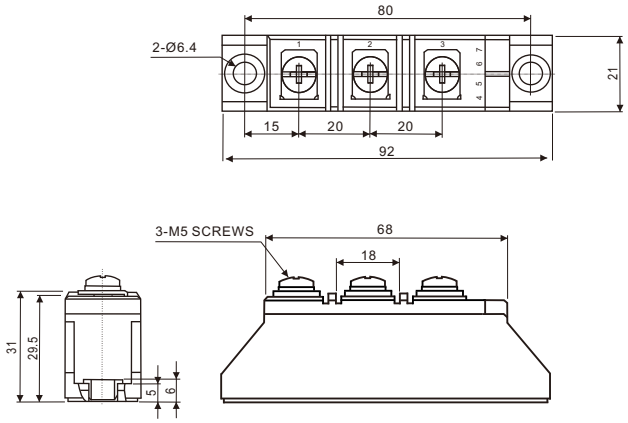
Standard Recovery Diodes, 110A
(ADD-A-PAK Power Modules)

ADD-A-PAK



All dimensions in millimeters

FEATURES

- High voltage
- 3000 V_{RMS} isolating voltage
- Industrial standard package
- UL approved file E320098
- Glass passivated chips
- Low thermal resistance
- Designed and qualified for industrial level
- Compliant to RoHs

BENEFITS

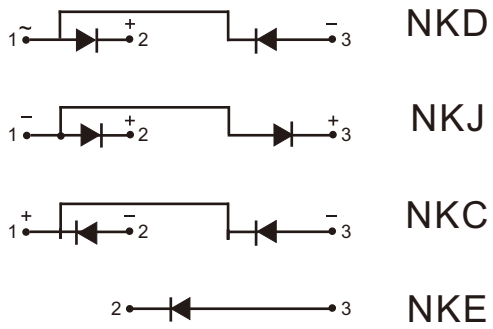
- Excellent thermal performances obtained by the usage of exposed direct bonded copper substrate
- Up to 1600V
- High surge capability
- Easy mounting on heatsink

MECHANICAL DESCRIPTION

The new generation of ADD-A-PAK module, combines the excellent thermal performances obtained by the usage of exposed direct bonded copper substrate, with advanced compact simple package solution and simplified internal structure with minimized number of interfaces.

ELECTRICAL DESCRIPTION (APPLICATIONS)

These modules are intended for general purpose high voltage applications such as high voltage regulated power supplies, lighting circuits, temperature and motor speed control circuits, UPS and battery charger.



PRODUCT SUMMARY	
$I_{F(AV)}$	110A
Type	Modules-Diode, High Voltage

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	T_C = 100°C	110	A
$I_{F(RMS)}$		173	
I_{FSM}	50 HZ	2600	
	60 HZ	2722	
I^2t	50 HZ	33.8	kA^2s
	60 HZ	30.7	
$I^2\sqrt{t}$		338	$kA^2\sqrt{s}$
V_{RRM}	Range	400 to 1600	V
t_J		-40 to 150	°C
T_{stg}			

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	V_{RRM}, MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V_{RSM}, MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM}, MAXIMUM AT T_J = 150°C mA
NKD110..A NKJ110..A NKC110..A NKE110..A	04	400	500	8
	08	800	900	
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

FORWARD CONDUCTION

PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave			110	A
					100	°C
Maximum RMS forward current	$I_{F(RMS)}$	DC at 100°C case temperature			173	A
Maximum peak, one-cycle forward, non-reptitive surge current	I_{FSM}	t = 10ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	2600	A
		t = 8.3ms			2722	
		t = 10ms	100%V_{RRM} reapplied		2189	
		t = 8.3ms			2291	
Maximum I^2t for fusing	I^2t	t = 10ms	No voltage reapplied		33.8	kA^2s
		t = 8.3ms			30.7	
		t = 10ms	100%V_{RRM} reapplied		23.9	
		t = 8.3ms			21.8	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied			338	$kA^2\sqrt{s}$
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7% x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.78	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.92	
Low level value of forward slope resistance	r_{f1}	(16.7% x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			2.0	mΩ
High level value of forward slope resistance	r_{f2}	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			1.65	
Maximum forward voltage drop	V_{FM}	I_{FM} =330A, T_J = 25°C, t_p = 400 µs square wave			1.35	V

BLOCKING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak reverse leakage current	I_{RRM}	T_J = 150°C	8	mA
Maximum RMS insulation Voltage	V_{INS}	50 Hz	3000 (1 min) 3600 (1 s)	V

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER		**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNIT**
Junction and storage temperature range		T_J,T_{stg}		-40 to 150	°C
Maximum internal thermal resistance, junction to case per leg		R_{thJC}	DC operation	0.18	°C/W
Typical thermal resistance, case to heatsink per module		R_{thCS}	Mounting surface flat, smooth and greased	0.1	°C/W
Mounting force, ±10%	to heatsink, 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.	4	Nm
	busbar, M5			3	Nm
Approximate weight				115	g
				4.06	oz.
Case style			JEDEC	ADD-A-PAK (TO-240AA)	

ΔR_{thJC} CONDUCTION											
DEVICES	**SINE HALF WAVE CONDUCTION**					**RECTANGULAR WAVE CONDUCTION**					**UNITS**
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
NKD110/NKJ110 NKC110/NKE110	0.039	0.048	0.061	0.085	0.152	0.030	0.062	0.080	0.106	0.152	°C/W

Note
• Table shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC

Ordering Information Tabel

Device code

NKD	110	/	16	A
①	②		③	④

1 - Module type, NKD, NKJ, NKC for (Diode + Diode) module
NKE for single diode
2 - Current rating : $I_{F(AV)}$
3 - Voltage code x 100 = V_{RRM}
4 - Assembly type, "A" for soldering type

Fig.1 Current ratings characteristics

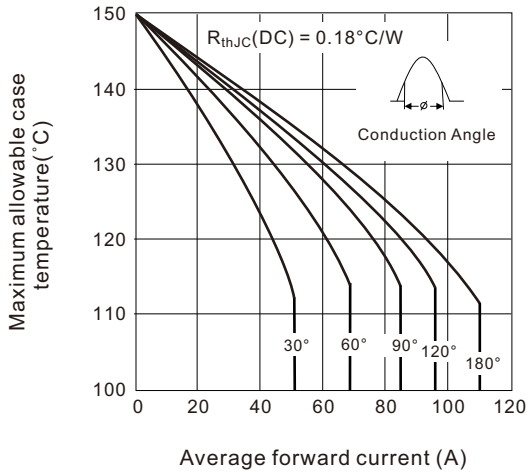


Fig.2 Current ratings characteristics

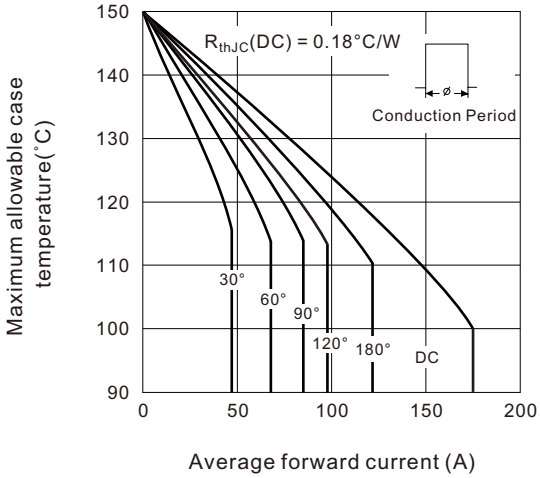


Fig.3 Forward Power Loss characteristics

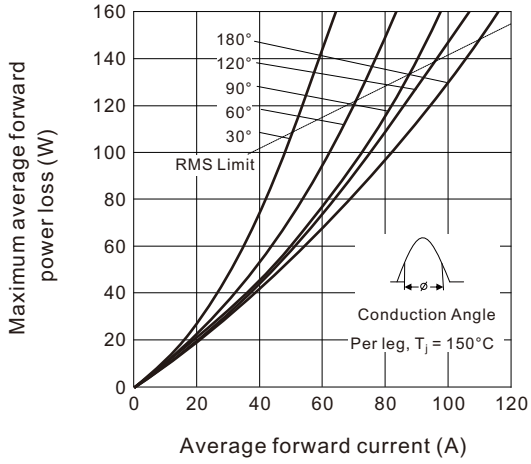


Fig.4 On-state power loss characteristics

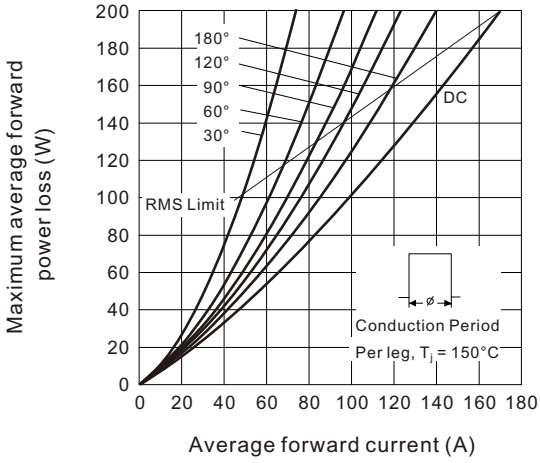


Fig.5 Maximum non-repetitive surge current

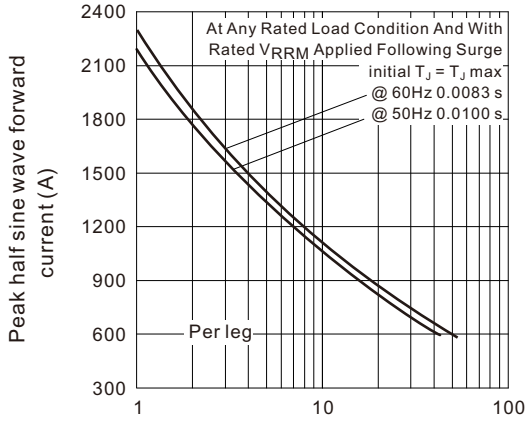


Fig.6 Maximum non-repetitive surge current

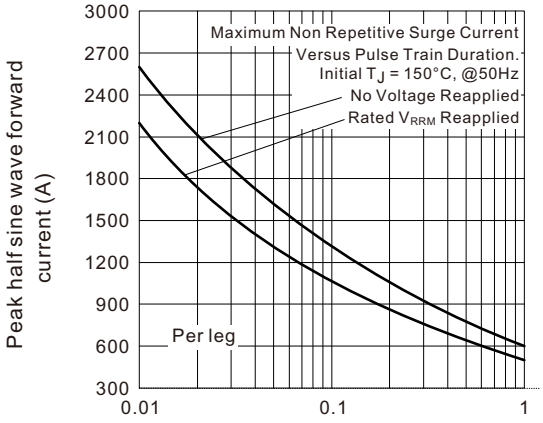


Fig.7 Forward power loss characteristics

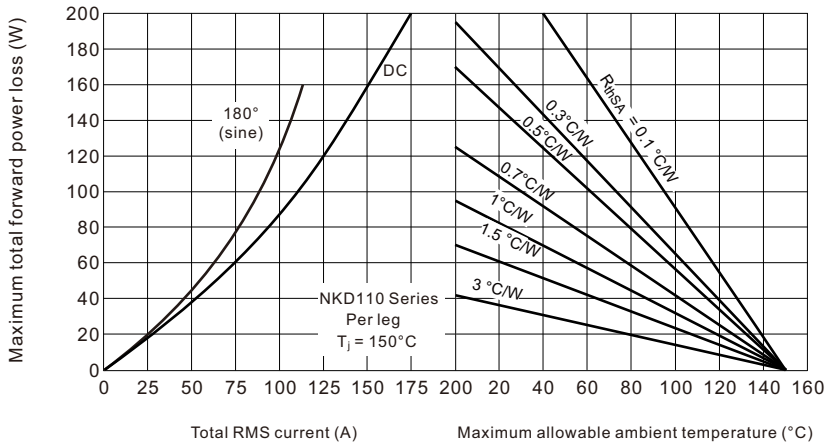


Fig.8 Forward power loss characteristics

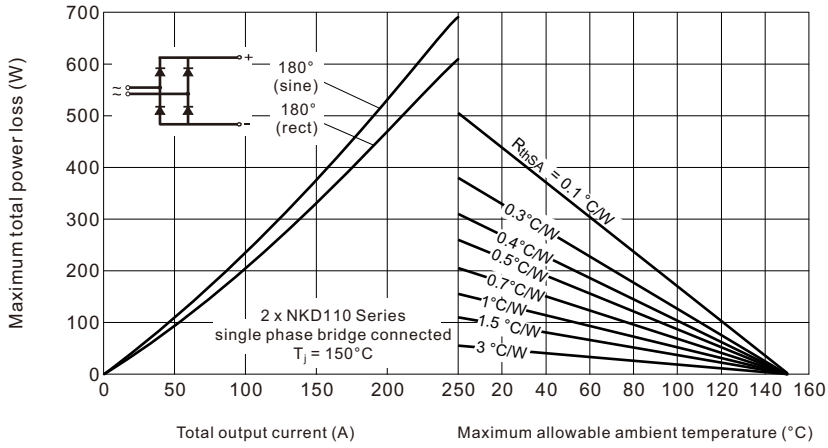


Fig.9 Forward power loss characteristics

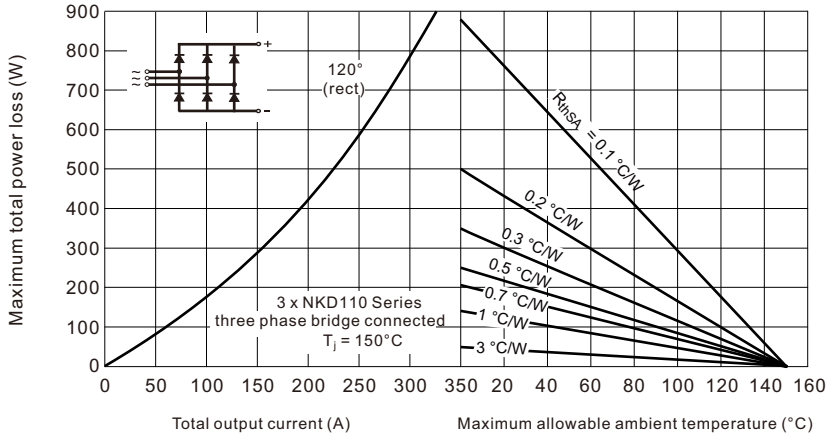


Fig.10 Forward voltage characteristics

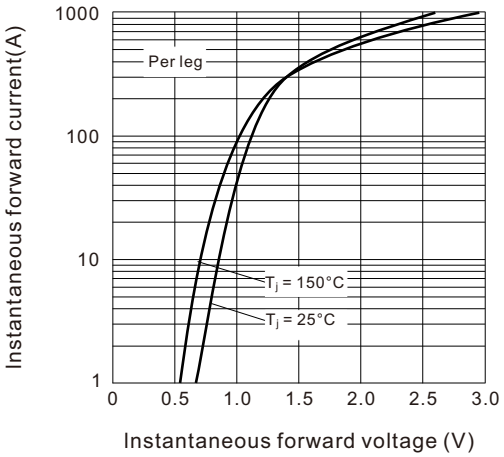


Fig.11 Thermal Impedance Z_{thJC} characteristics