High Voltage Thyristor \ Diode Module

V_{RRM}	=	2x 2200 V
I_{TAV}	=	95 A
V_T	=	1.24 V

Phase leg

Part number

MCNA95PD2200TB
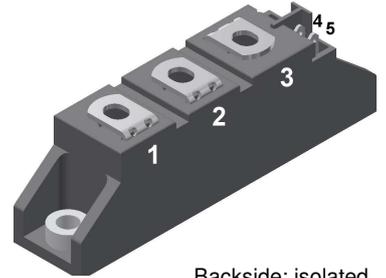
Backside: isolated

E72873
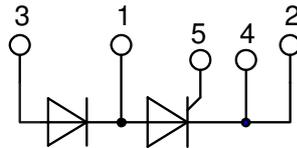
Features / Advantages:
- Thyristor for line frequency
- Planar passivated chip
- Long-term stability
- Direct Copper Bonded Al2O3-ceramic

Applications:
- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

Package: TO-240AA
- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Rectifier

Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25°C$				2300	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25°C$				2200	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 2200$ V	$T_{VJ} = 25°C$			100	µA
		$V_{R/D} = 2200$ V	$T_{VJ} = 140°C$			10	mA
V_T	forward voltage drop	$I_T = 95$ A	$T_{VJ} = 25°C$			1.26	V
		$I_T = 190$ A				1.54	V
		$I_T = 95$ A	$T_{VJ} = 125°C$			1.24	V
		$I_T = 190$ A				1.63	V
I_{TAV}	average forward current	$T_C = 85°C$	$T_{VJ} = 140°C$			95	A
$I_{T(RMS)}$	RMS forward current	180° sine				149	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 140°C$			0.84	V
r_T	slope resistance					4.1	mΩ
R_{thJC}	thermal resistance junction to case					0.3	K/W
R_{thCH}	thermal resistance case to heatsink				0.20		K/W
P_{tot}	total power dissipation	$T_C = 25°C$				383	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			1.70	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			1.84	kA
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 140°C$			1.45	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			1.56	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			14.5	kA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			14.0	kA²s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 140°C$			10.4	kA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			10.1	kA²s
C_J	junction capacitance	$V_R = 700$ V f = 1 MHz	$T_{VJ} = 25°C$	50			pF
P_{GM}	max. gate power dissipation	$t_P = 30$ µs	$T_C = 140°C$			10	W
		$t_P = 300$ µs				5	W
P_{GAV}	average gate power dissipation					0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 140°C$; f = 50 Hz repetitive, $I_T = 285$ A				150	A/µs
		$t_P = 200$ µs; $di_G/dt = 0.45$ A/µs;					
		$I_G = 0.45$ A; V = ⅔ V_{DRM} non-repet., $I_T = 95$ A				500	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V = ⅔ V_{DRM}	$T_{VJ} = 140°C$			1000	V/µs
		$R_{GK} = \infty$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6$ V	$T_{VJ} = 25°C$			1.5	V
			$T_{VJ} = -40°C$			1.6	V
I_{GT}	gate trigger current	$V_D = 6$ V	$T_{VJ} = 25°C$			150	mA
			$T_{VJ} = -40°C$			200	mA
V_{GD}	gate non-trigger voltage	$V_D = $ ⅔ V_{DRM}	$T_{VJ} = 140°C$			0.2	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	$t_p = 10$ µs	$T_{VJ} = 25°C$			200	mA
		$I_G = 0.45$ A; $di_G/dt = 0.45$ A/µs					
I_H	holding current	$V_D = 6$ V $R_{GK} = \infty$	$T_{VJ} = 25°C$			200	mA
t_{gd}	gate controlled delay time	$V_D = $ ½ V_{DRM}	$T_{VJ} = 25°C$			2	µs
		$I_G = 0.45$ A; $di_G/dt = 0.45$ A/µs					
t_q	turn-off time	$V_R = 100$ V; $I_T = 95$ A; V = ⅔ V_{DRM} $T_{VJ} = 125$ °C			500		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs $t_p = 200$ µs					

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20171129a

Package	TO-240AA			Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	RMS current	per terminal				200	A
T_{VJ}	virtual junction temperature			-40		140	°C
T_{op}	operation temperature			-40		125	°C
T_{stg}	storage temperature			-40		125	°C
Weight					81		g
M_D	mounting torque			2.5		4	Nm
M_T	terminal torque			2.5		4	Nm
$d_{Spp/App}$	creepage distance on surface | striking distance through air	terminal to terminal	13.0	9.7			mm
$d_{Spb/Apb}$		terminal to backside	16.0	16.0			mm
V_{ISOL}	isolation voltage	t = 1 second	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	4800			V
		t = 1 minute		4000			V
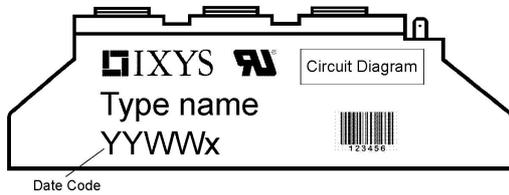
Part description

- M = Module
- C = Thyristor (SCR)
- N = High Voltage Thyristor
- A = (>= 2000V)
- 95 = Current Rating [A]
- PD = Phase leg
- 2200 = Reverse Voltage [V]
- TB = TO-240AA-1B

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCNA95PD2200TB	MCNA95PD2200TB	Box	36	523300

Equivalent Circuits for Simulation	*on die level*	$T_{VJ} = 140\,°C$
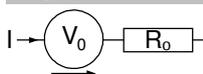
 Thyristor

$V_{0\,max}$	threshold voltage	0.84	V
$R_{0\,max}$	slope resistance *	2.9	mΩ

Outlines   TO-240AA

A 2.8 - 0.8
DIN 46244
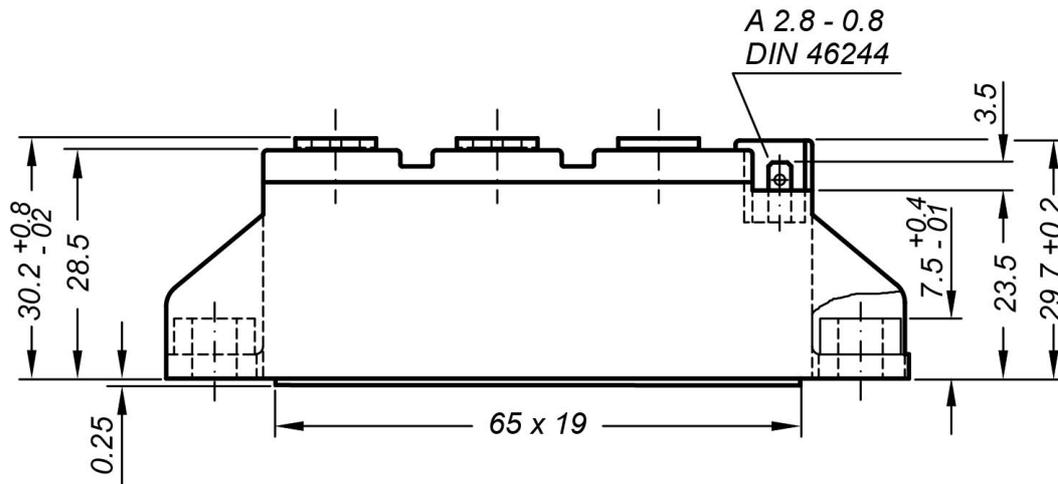
General tolerance: DIN ISO 2768 class „c"

M5
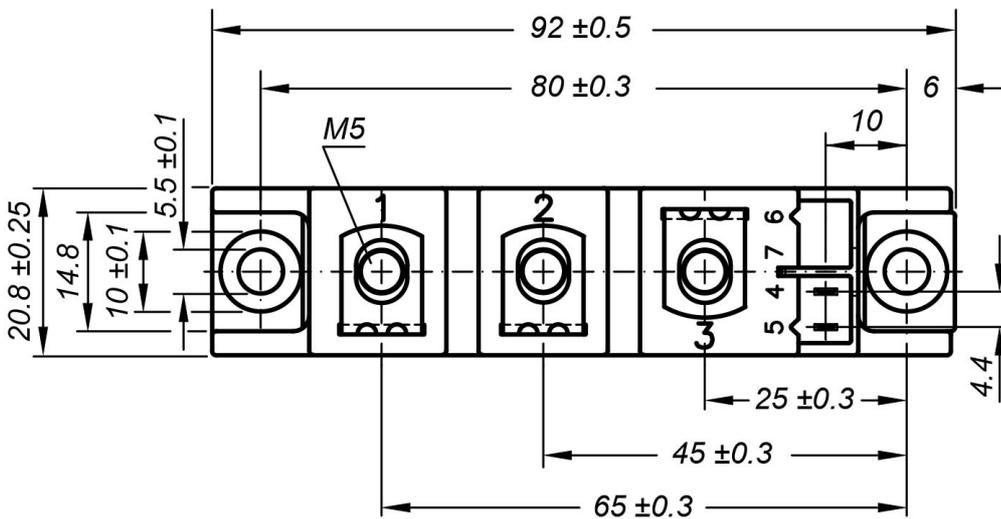
Optional accessories: Keyed gate/cathode twin plugs
Wire length: 350 mm, gate = white, cathode = red
UL 758, style 3751
*Type **ZY 200L** (L = Left   for pin pair 4/5)*

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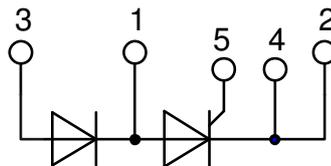
Thyristor
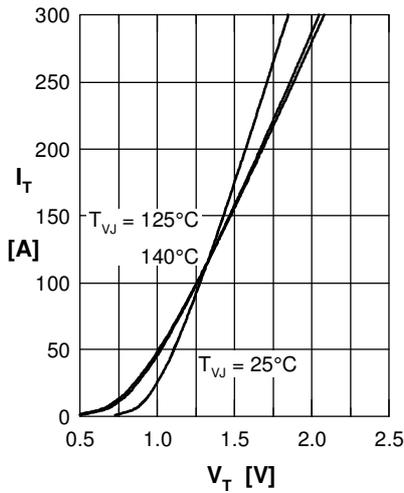
Fig. 1 Forward characteristics
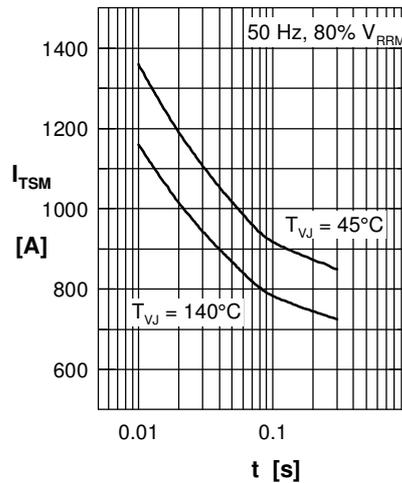
Fig. 2 Surge overload current
I_{TSM}: crest value, t: duration
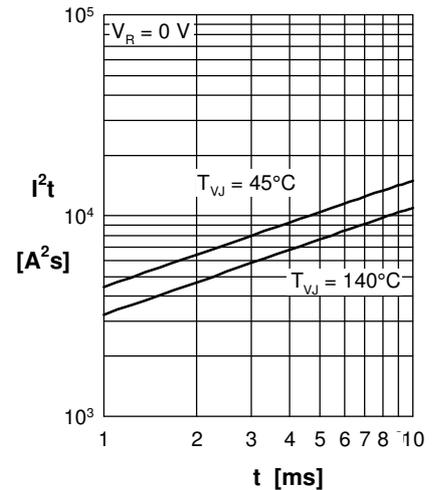

Fig. 3 I^2t versus time (1-10 s)
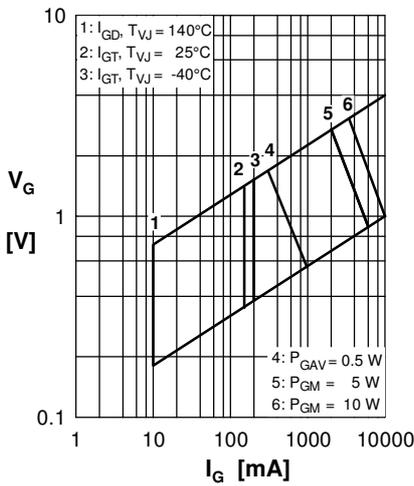
Fig. 4 Gate voltage & gate current
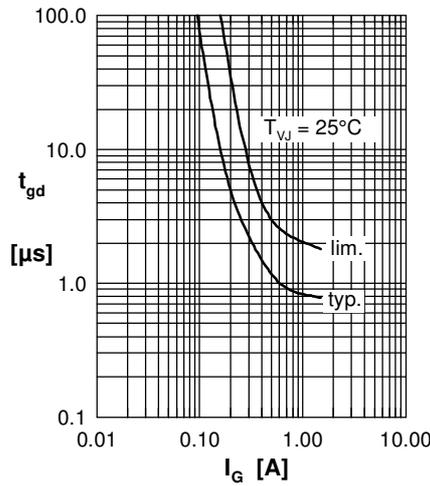

Fig. 5 Gate controlled delay time t_{gd}
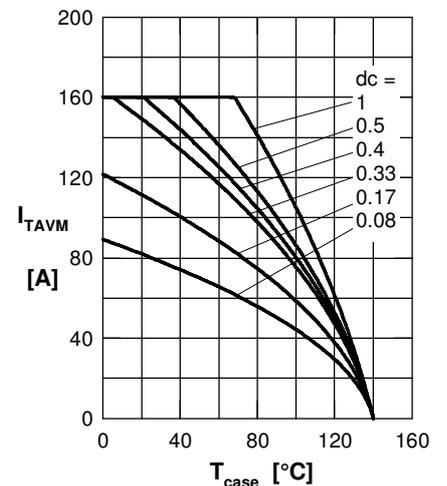

Fig. 6 Max. forward current at
case temperature
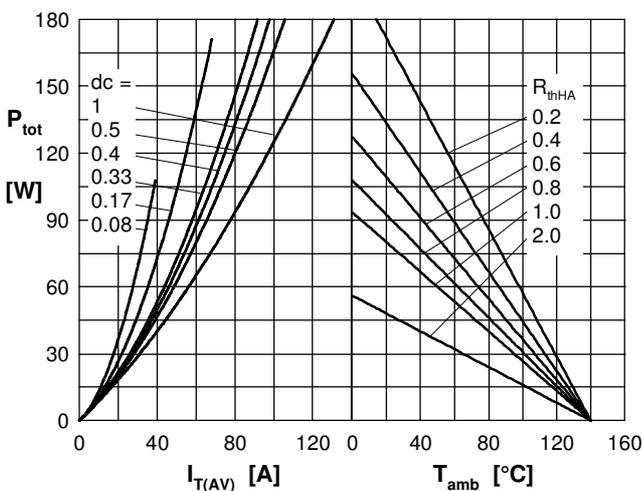
Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature

| i	R_{thi} (K/W)	t_i (s)
1	0.0073	0.0001
2	0.0128	0.0031
3	0.1779	0.1000
4	0.1020	0.4400
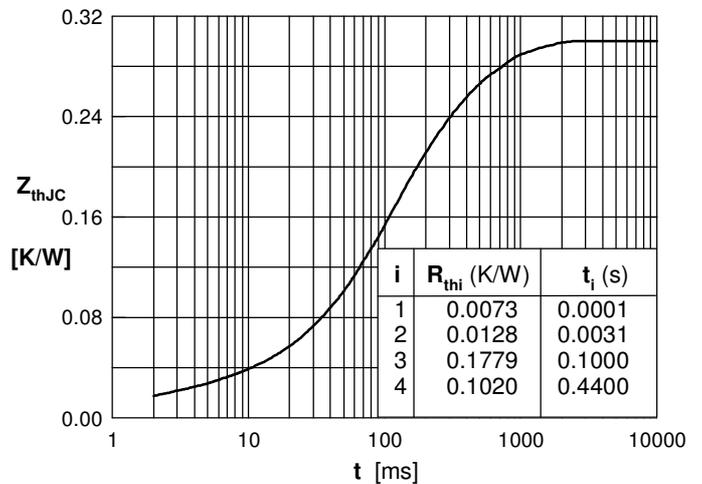
Fig. 8 Transient thermal impedance junction to case