Thyristor \ Diode Module

|		
V_{RRM}	=	2x 1800 V
I_{TAV}	=	220 A
V_T	=	1.18 V

Phase leg

Part number

MCD225-18io1
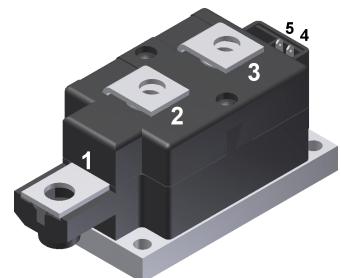
Backside: isolated

E72873
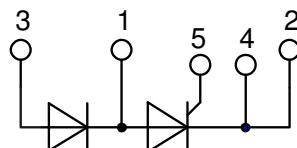
Features / Advantages:

- International standard package
- Direct copper bonded Al2O3-ceramic with copper base plate
- Planar passivated chip
- Isolation voltage 3600 V~
- Keyed gate/cathode twin pins

Applications:

- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Package: Y1

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: Copper internally DCB isolated
- Advanced power cycling

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20170116e

Rectifier						Ratings	
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25°C$				1900	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25°C$				1800	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1800$ V	$T_{VJ} = 25°C$			1	mA
		$V_{R/D} = 1800$ V	$T_{VJ} = 125°C$			40	mA
V_T	forward voltage drop	$I_T = 200$ A	$T_{VJ} = 25°C$			1.04	V
		$I_T = 400$ A				0.97	V
		$I_T = 200$ A	$T_{VJ} = 125°C$			1.18	V
		$I_T = 400$ A				1.14	V
I_{TAV}	average forward current	$T_C = 85°C$	$T_{VJ} = 140°C$			220	A
$I_{T(RMS)}$	RMS forward current	180° sine				400	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 140°C$			0.79	V
r_T	slope resistance					0.83	mΩ
R_{thJC}	thermal resistance junction to case					0.157	K/W
R_{thCH}	thermal resistance case to heatsink				0.040		K/W
P_{tot}	total power dissipation	$T_C = 25°C$				730	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			8.00	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			8.64	kA
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 140°C$			6.80	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			7.35	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			320.0	kA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			310.5	kA²s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 140°C$			231.2	kA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			224.4	kA²s
C_J	junction capacitance	$V_R = 400$ V f = 1 MHz	$T_{VJ} = 25°C$		366		pF
P_{GM}	max. gate power dissipation	$t_P = 30$ µs	$T_C = 140°C$			120	W
		$t_P = 500$ µs				60	W
P_{GAV}	average gate power dissipation					20	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 140°C$; f = 50 Hz repetitive, $I_T = 660$ A				100	A/µs
		$t_P = 200$ µs; $di_G/dt = 1$ A/µs;					
		$I_G = 1$ A; V = ⅔ V_{DRM} non-repet., $I_T = 220$ A				500	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V = ⅔ V_{DRM}	$T_{VJ} = 140°C$			1000	V/µs
		$R_{GK} = ∞$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6$ V	$T_{VJ} = 25°C$			2	V
			$T_{VJ} = -40°C$			3	V
I_{GT}	gate trigger current	$V_D = 6$ V	$T_{VJ} = 25°C$			150	mA
			$T_{VJ} = -40°C$			220	mA
V_{GD}	gate non-trigger voltage	$V_D = ⅔ V_{DRM}$	$T_{VJ} = 140°C$			0.25	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	$t_p = 30$ 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 $R_{GK} = ∞$	$T_{VJ} = 25°C$			150	mA
t_{gd}	gate controlled delay time	$V_D = ½ V_{DRM}$	$T_{VJ} = 25°C$			2	µs
		$I_G = 1$ A; $di_G/dt = 1$ A/µs					
t_q	turn-off time	$V_R = 100$ V; $I_T = 220$ A; V = ⅔ V_{DRM} $T_{VJ} = 125$ °C			200		µs
		di/dt = 10 A/µs dv/dt = 50 V/µs $t_p = 200$ µs					

IXYS

Package Y1				Ratings		
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			600	A
T_{VJ}	virtual junction temperature		-40		140	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage temperature		-40		125	°C
Weight				680		g
M_D	mounting torque		4.5		7	Nm
M_T	terminal torque		11		13	Nm
$d_{Spp/App}$	creepage distance on surface | striking distance through air	terminal to terminal	16.0			mm
$d_{Spb/Apb}$		terminal to backside	16.0			mm
V_{ISOL}	isolation voltage	t = 1 second — 50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3600			V
		t = 1 minute	3000			V

Production Index (PI)
Date Code (DC)

IXYS ℞
Circuit

yywwAA
Part Number
Lot.No: xxxxxx
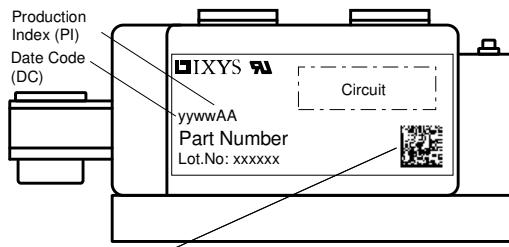
Data Matrix: *part no.* (1-19), DC + *PI* (20-25), *lot.no.#* (26-31), *blank* (32), *serial no.#* (33-36)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCD225-18io1	MCD225-18io1	Box	3	473596

Equivalent Circuits for Simulation	* on die level	T_{VJ} = 140 °C
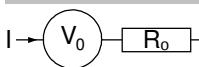
I → V_0 — R_0 — **Thyristor**

$V_{0\,max}$	threshold voltage	0.79	V
$R_{0\,max}$	slope resistance *	0.64	mΩ

Outlines   Y1

3x M8

2.8 x 0.8

15 ±1

52 $^{+0}_{-1,4}$ 49

2

32 $^{+0}_{-1,9}$

43   45

10

20   22.5   35   28.5

18

4 5 6 7

1

2   3

5

38   50

6.2

80

92

115
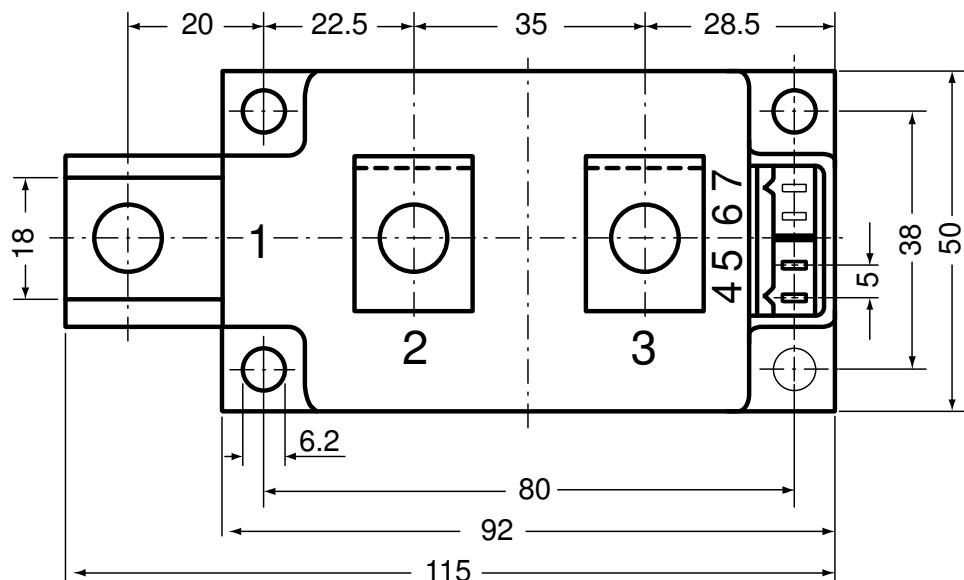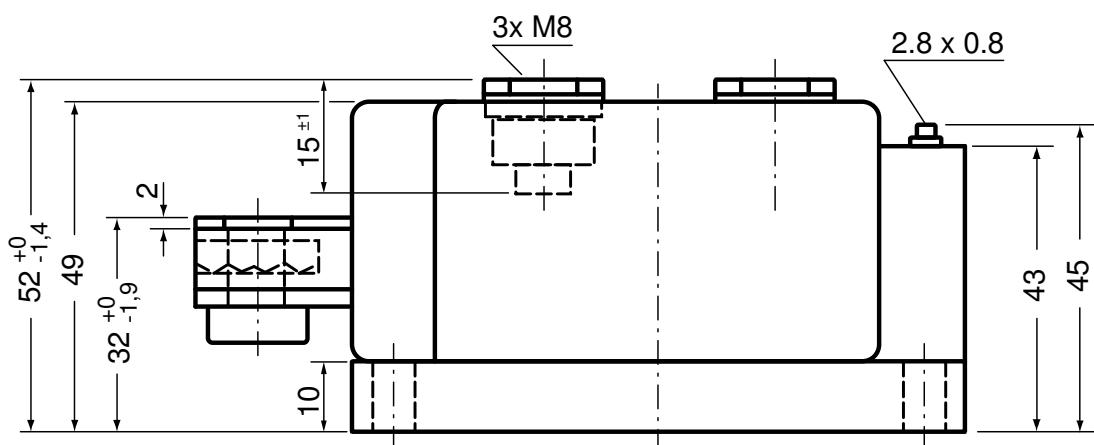
Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red
Type ZY 180L (L = Left for pin pair 4/5)
Type ZY 180R (R = Right for pin pair 6/7)   } UL 758, style 3751

3   1   5   4   2
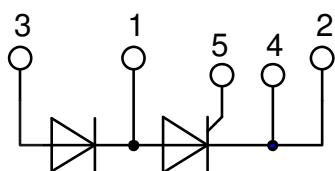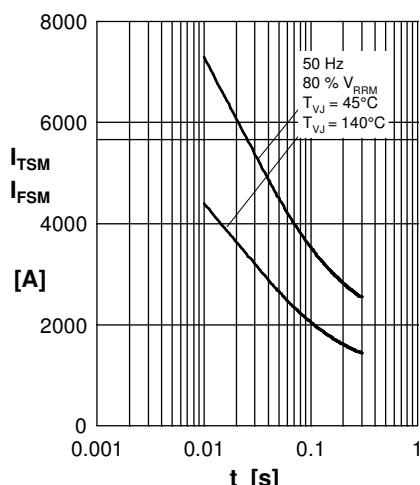
Thyristor

Fig. 1 Surge overload current
$I_{TSM/FSM}$: Crest value, t: duration
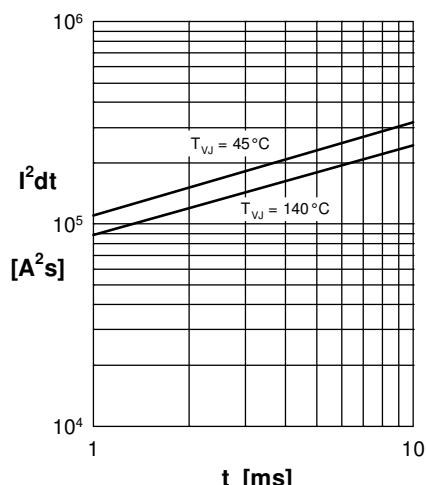

Fig. 2 I²dt versus time
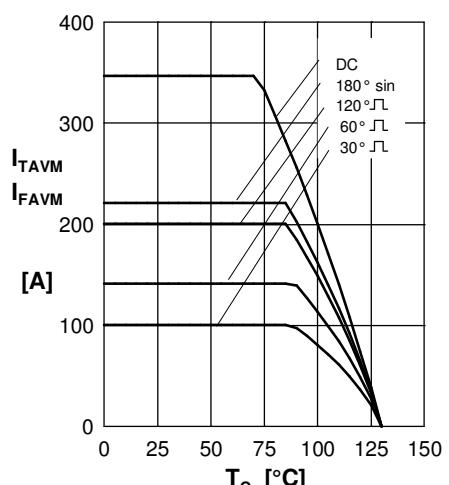
Fig. 3 Max. forward current
at case temperature
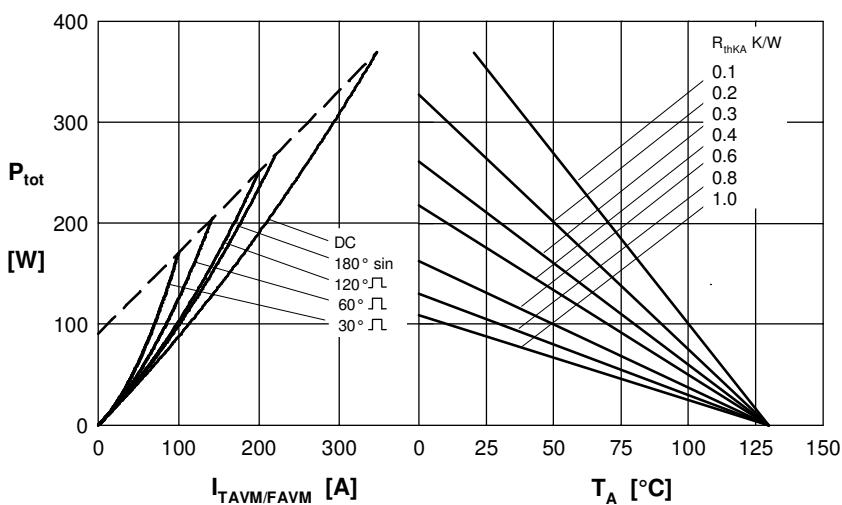
Fig. 4 Power dissipation versus on-state current and
ambient temperature (per thyristor or diode)
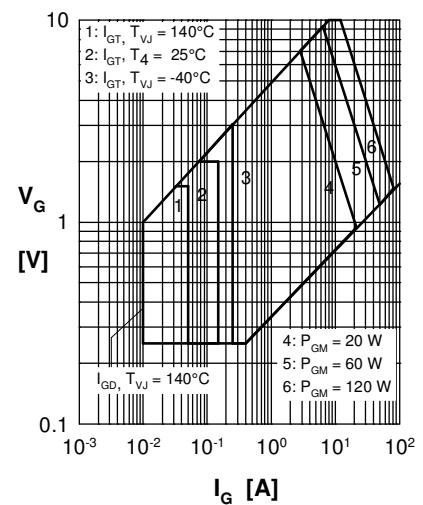

Fig. 5 Gate voltage and current
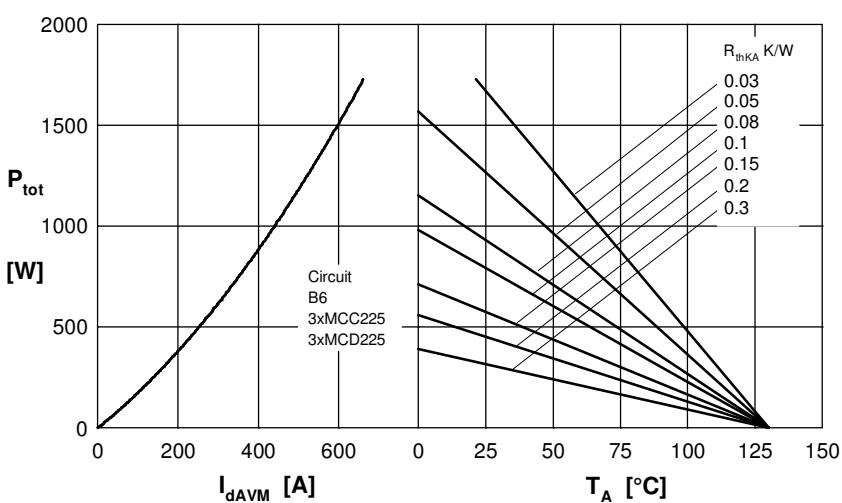
Fig. 6 Three phase rectifier bridge: Power dissipation versus direct
output current and ambient temperature
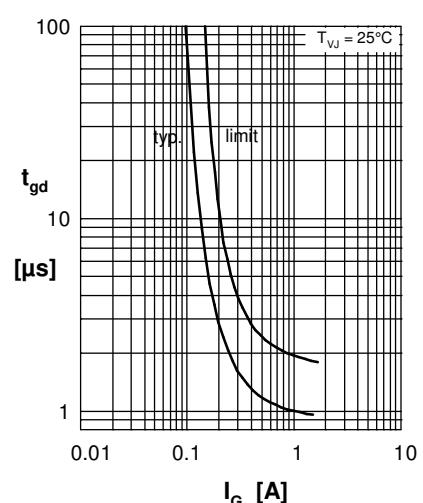
Fig. 7 Gate trigger characteristics

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Rectifier
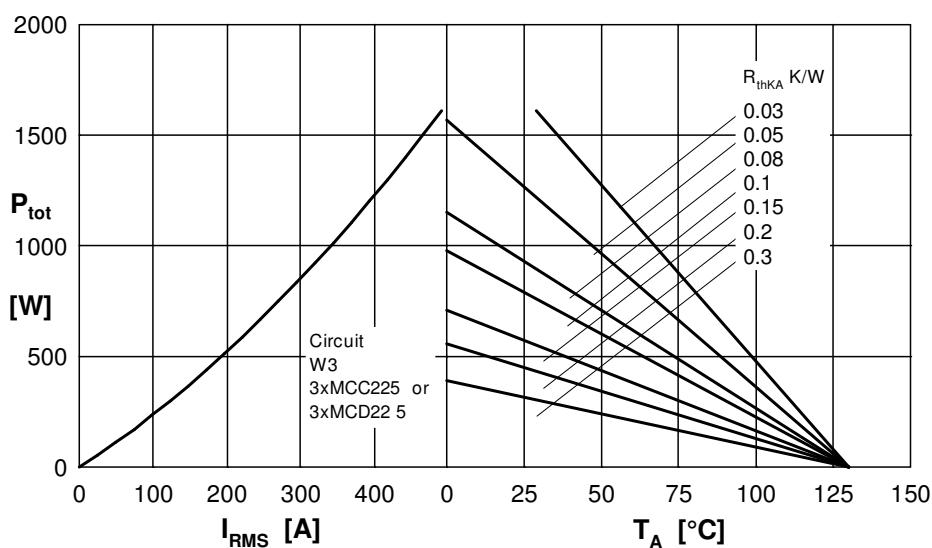
Fig. 8 Three phase AC-controller: Power dissipation versus R_{MS} output current and ambient temperature
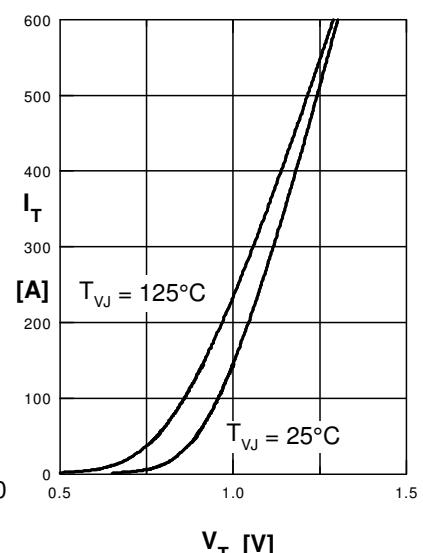

Fig. 9 Forward characteristics
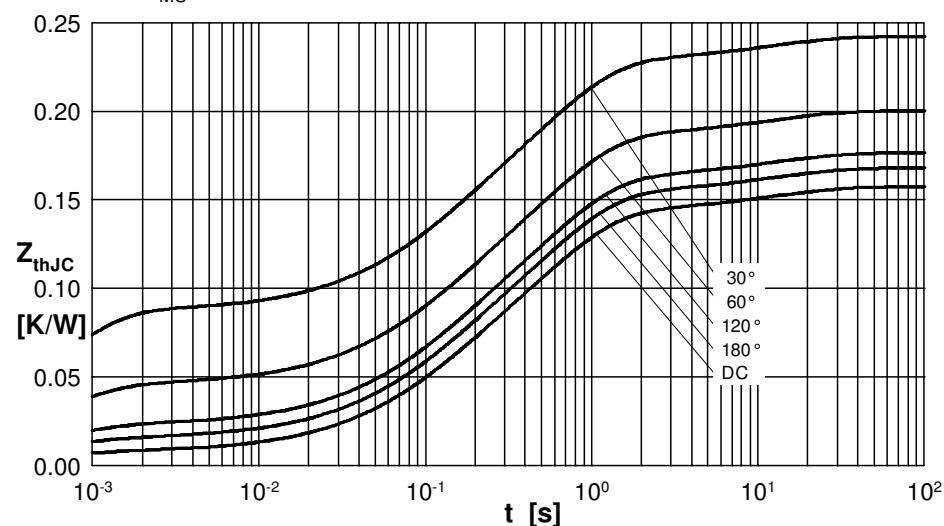
Fig. 10 Transient thermal impedance junction to case (per thyristor/diode)

R_{thJC} for various conduct. angles d:

d	R_{thJC} (K/W)
DC	0.157
180°	0.168
120°	0.177
60°	0.200
30°	0.243

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t (s)
1	0.0076	0.00054
2	0.0406	0.09800
3	0.0944	0.54000
4	0.0147	12.0000
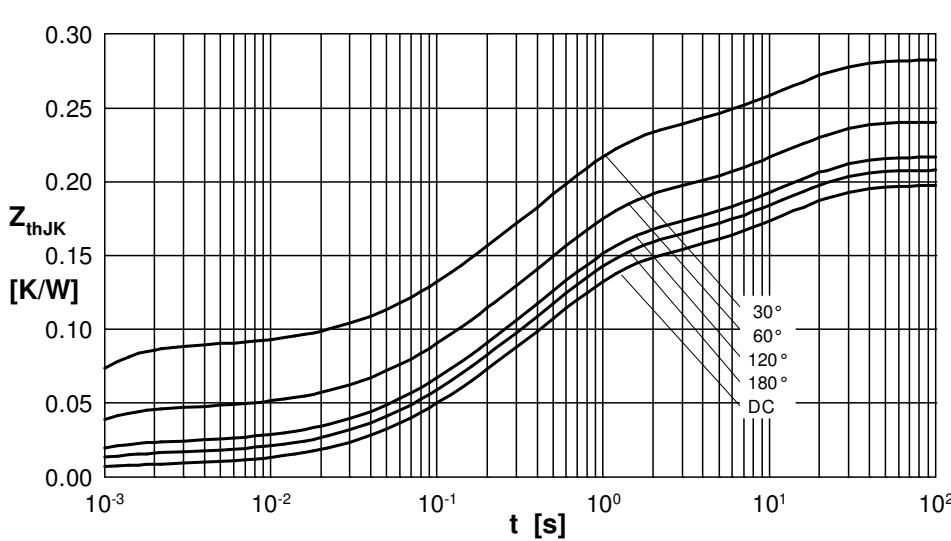


Fig. 11 Transient thermal impedance junction to heatsink (per thyristor/diode)

R_{thJK} for various conduct. angles d:

d	R_{thJK} (K/W)
DC	0.197
180°	0.208
120°	0.217
60°	0.240
30°	0.283

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t (s)
1	0.0076	0.00054
2	0.0406	0.09800
3	0.0944	0.54000
4	0.0147	12.0000
5	0.0400	12.0000