Thyristor \ Diode Module

$V_{RRM} = 2 \times 1600\ V$
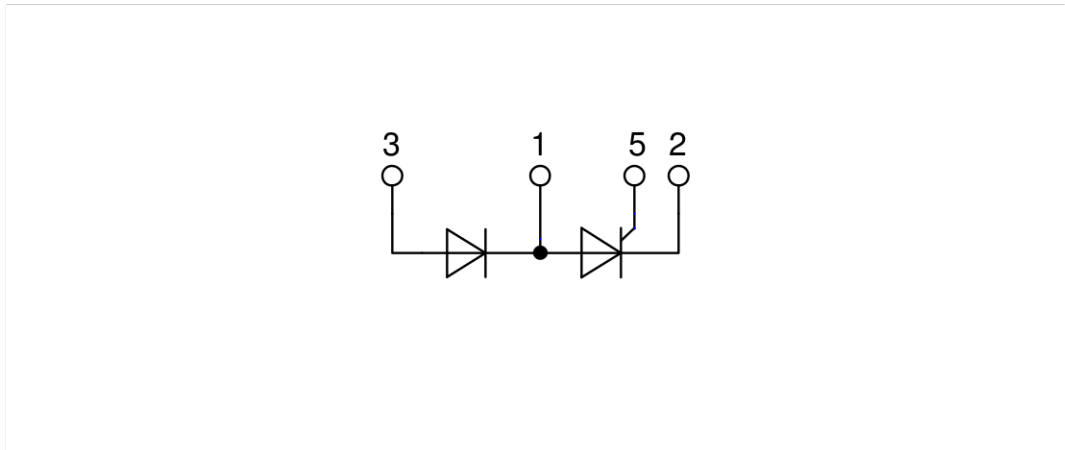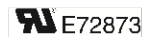
$I_{TAV} = 27\ A$

$V_T = 1.27\ V$

Phase leg

Part number

MCD26-16io8B

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: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Rectifier | Ratings

Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	T_{VJ} = 25°C				1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	T_{VJ} = 25°C				1600	V
$I_{R/D}$	reverse current, drain current	$V_{R/D}$ = 1600 V	T_{VJ} = 25°C			100	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 125°C			3	mA
V_T	forward voltage drop	I_T = 40 A	T_{VJ} = 25°C			1.27	V
		I_T = 80 A				1.64	V
		I_T = 40 A	T_{VJ} = 125°C			1.27	V
		I_T = 80 A				1.65	V
I_{TAV}	average forward current	T_C = 85°C	T_{VJ} = 125°C			27	A
$I_{T(RMS)}$	RMS forward current	180° sine				42	A
V_{T0}	threshold voltage } for power loss calculation only		T_{VJ} = 125°C			0.85	V
r_T	slope resistance					11	mΩ
R_{thJC}	thermal resistance junction to case					0.88	K/W
R_{thCH}	thermal resistance case to heatsink				0.20		K/W
P_{tot}	total power dissipation	T_C = 25°C				115	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			520	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			560	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 125°C			440	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			475	A
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.35	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.31	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 125°C			970	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			940	A²s
C_J	junction capacitance	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		22		pF
P_{GM}	max. gate power dissipation	t_P = 30 µs	T_C = 125°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} = 125°C; f = 50 Hz repetitive, I_T = 45 A t_P = 200 µs; di_G/dt = 0.45 A/µs;				150	A/µs
		I_G = 0.45 A; V = ⅔ V_{DRM} non-repet., I_T = 27 A				500	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V = ⅔ V_{DRM} R_{GK} = ∞; method 1 (linear voltage rise)	T_{VJ} = 125°C			1000	V/µs
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			100	mA
			T_{VJ} = -40°C			200	mA
V_{GD}	gate non-trigger voltage	V_D = ⅔ V_{DRM}	T_{VJ} = 125°C			0.2	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	t_p = 10 µs I_G = 0.45 A; di_G/dt = 0.45 A/µs	T_{VJ} = 25°C			450	mA
I_H	holding current	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			200	mA
t_{gd}	gate controlled delay time	V_D = ½ V_{DRM} I_G = 0.45 A; di_G/dt = 0.45 A/µs	T_{VJ} = 25°C			2	µs
t_q	turn-off time	V_R = 100 V; I_T = 20 A; V = ⅔ V_{DRM} T_{VJ} = 100 °C di/dt = 10 A/µs dv/dt = 20 V/µs t_p = 200 µs			150		µs
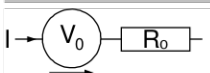
Package   TO-240AA

Ratings

Symbol	Definition	Conditions			min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal					200	A
T_{VJ}	virtual junction temperature				-40		125	°C
T_{op}	operation temperature				-40		100	°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		3600			V
		t = 1 minute			3000			V
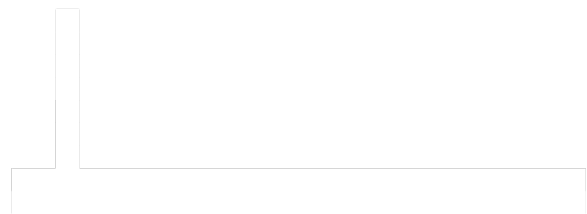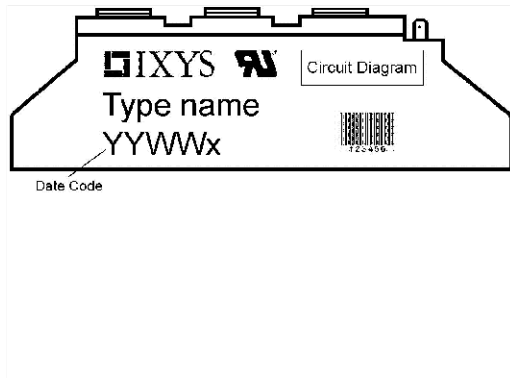
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCD26-16io8B	MCD26-16io8B	Box	36	453277

Similar Part	Package	Voltage class
MCMA35PD1600TB	TO-240AA-1B	1600
MCMA50PD1600TB	TO-240AA-1B	1600

Equivalent Circuits for Simulation   *on die level* $T_{VJ} = 125\,°C$

Thyristor

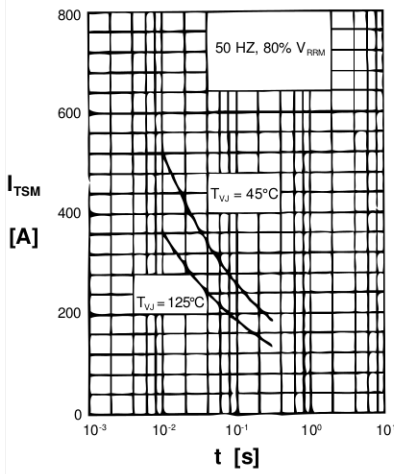|				
$V_{0\ max}$	threshold voltage	0.85		V
$R_{0\ max}$	slope resistance *	9.8		mΩ

Outlines   TO-240AA
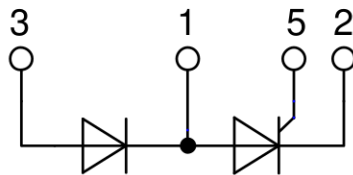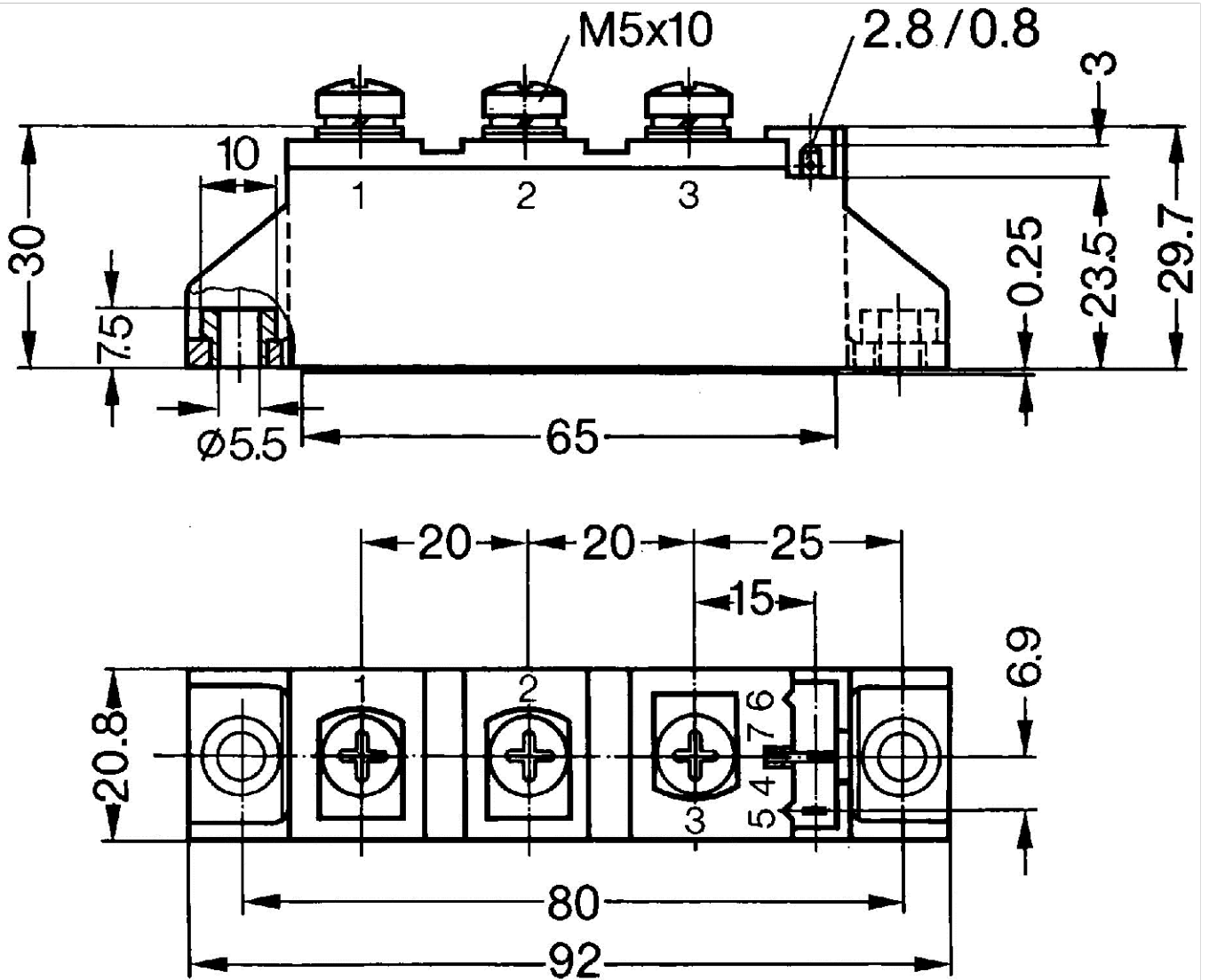
Thyristor

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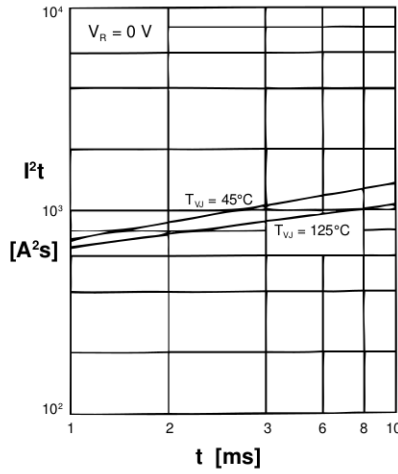I_{TSM}: Crest value, t: duration

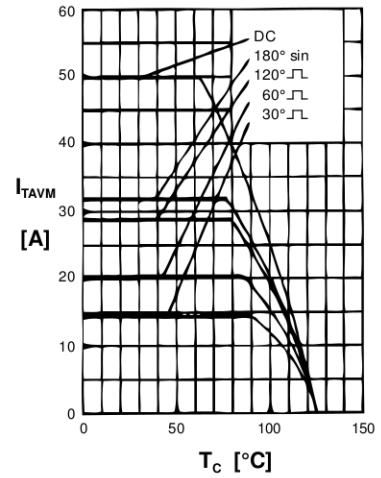Fig. 2 I²t versus time (1-10 ms)

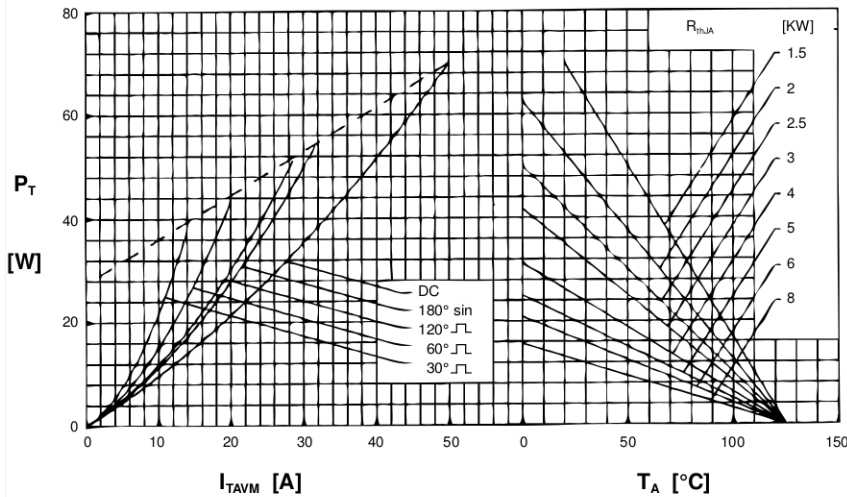
Fig. 3 Max. forward current
at case temperature

Fig. 4 Power dissipation versus onstate current & ambient temp. (per thyristor)
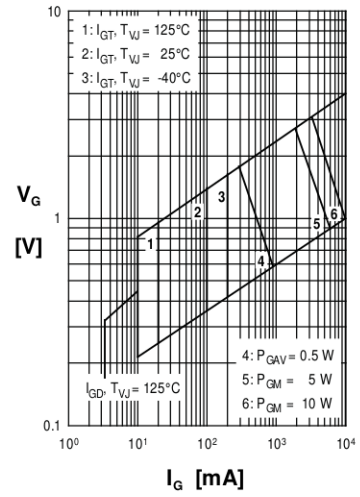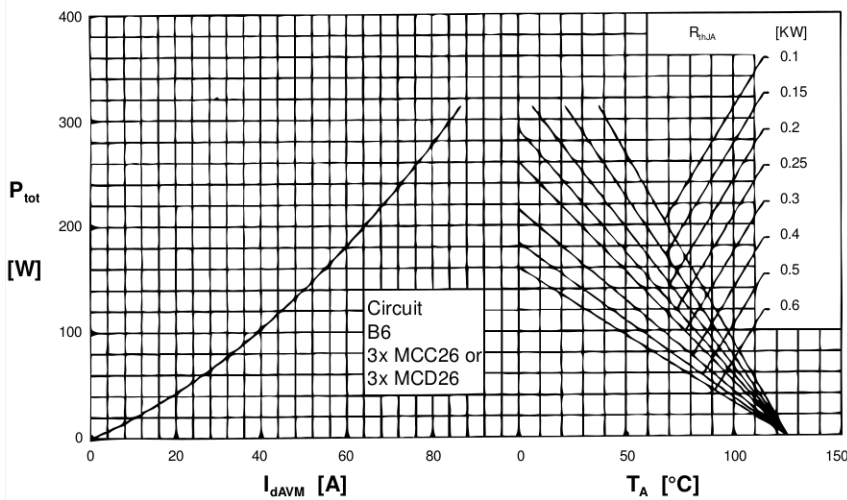

Fig. 5 Gate trigger charact.

Fig. 6 Three phase rectifier bridge: Power dissipation versus direct
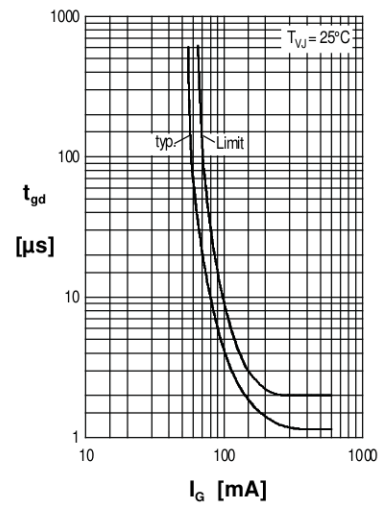output current and ambient temperature

Fig. 7 Gate trigger delay time
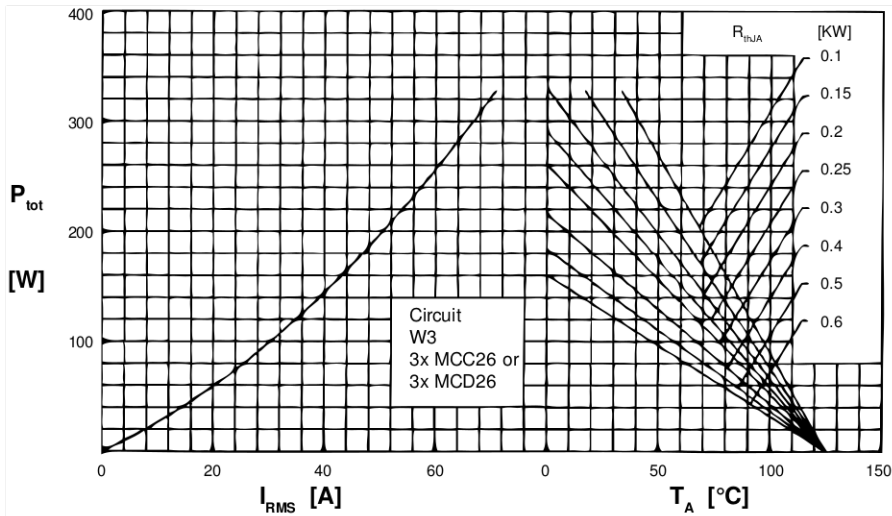
Rectifier

Fig. 8 Three phase AC-controller: Power dissipation vs. RMS output current and ambient temperature
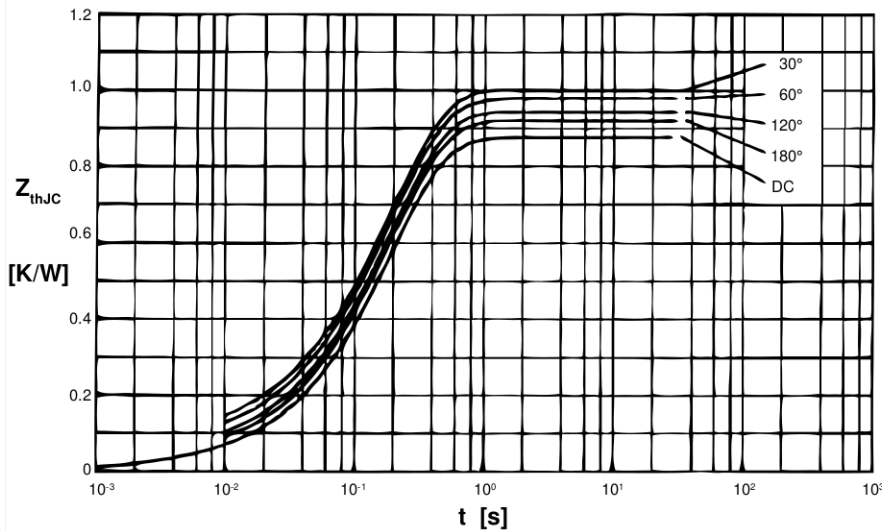

Fig. 9 Transient thermal impedance junction to case (per thyristor)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.88
180°	0.92
120°	0.95
60°	0.98
30°	1.01

Constants for Z_{thJC} calculation:

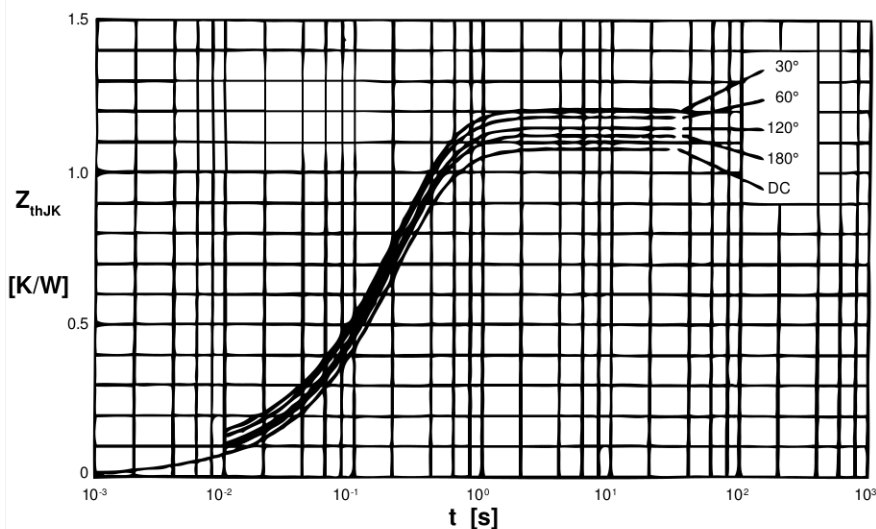| i	R_{thi} [K/W]	t_i [s]
1	0.019	0.0031
2	0.029	0.0216
3	0.832	0.1910

Fig. 10 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	1.08
180°	1.12
120°	1.15
60°	1.18
30°	1.21

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.019	0.0031
2	0.029	0.0216
3	0.832	0.1910
4	0.200	0.4500