Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Phase out

Thyristor \ Diode Module

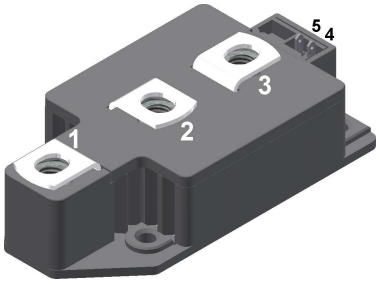
V_{RRM} = 2x 1400 V
I_{TAV} = 250 A
V_T = 1.14 V

PHASE OUT

Phase leg

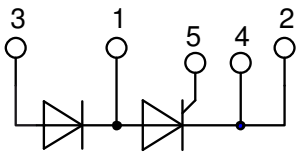
Part number

MCD220-14io1



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: Y2

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

Recommended replacement: MCD310-14io1

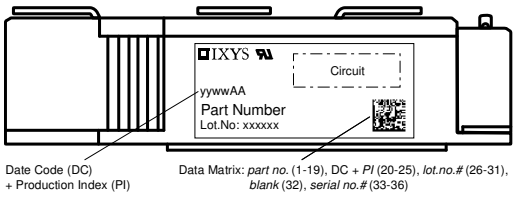
Phase out

Rectifier

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
$V_{RSM/DSM}$	*max. non-repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1500	V
$V_{RRM/DRM}$	*max. repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1400	V
$I_{R/D}$	*reverse current, drain current*	$V_{R/D}$ = 1400 V	T_{VJ} = 25°C			1	mA
		$V_{R/D}$ = 1400 V	T_{VJ} = 140°C			40	mA
V_T	*forward voltage drop*	I_T = 200 A	T_{VJ} = 25°C			1.24	V
		I_T = 400 A				1.39	V
		I_T = 200 A	T_{VJ} = 125°C			1.14	V
		I_T = 400 A				1.33	V
I_{TAV}	*average forward current*	T_C = 85°C	T_{VJ} = 140°C			250	A
$I_{T(RMS)}$	*RMS forward current*	180° sine				400	A
V_{T0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 140°C			0.90	V
r_T	*slope resistance* }					1	mΩ
R_{thJC}	*thermal resistance junction to case*					0.14	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.040		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			820	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			8.50	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			9.18	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			7.23	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			7.81	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			361.3	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			350.6	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			261.0	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			253.4	kA²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		438		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 = 750 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 = 250 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			200	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 = 250 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					

Phase out

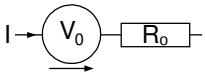
Package Y2				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal				600	A
T_{VJ}	*virtual junction temperature*			-40		140	°C
T_{op}	*operation temperature*			-40		125	°C
T_{stg}	*storage temperature*			-40		125	°C
Weight					255		g
M_D	*mounting torque*			2.5		5	Nm
M_T	*terminal torque*			12		15	Nm
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*		*terminal to terminal*	13.0			mm
$d_{Spb/Apb}$			*terminal to backside*	13.0			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3600			V
		t = 1 minute		3000			V



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCD220-14io1	MCD220-14io1	Box	2	419281

Equivalent Circuits for Simulation

** on die level* T_{VJ} = 140 °C

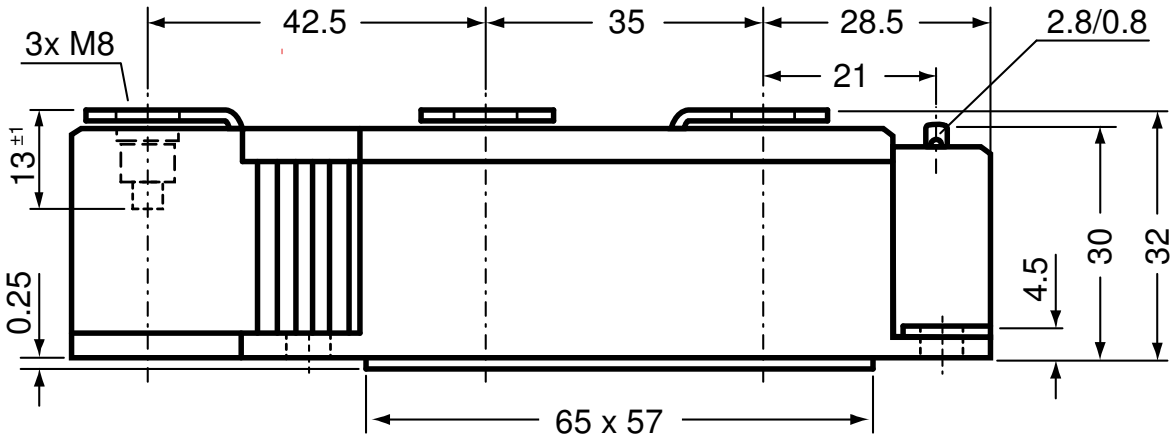


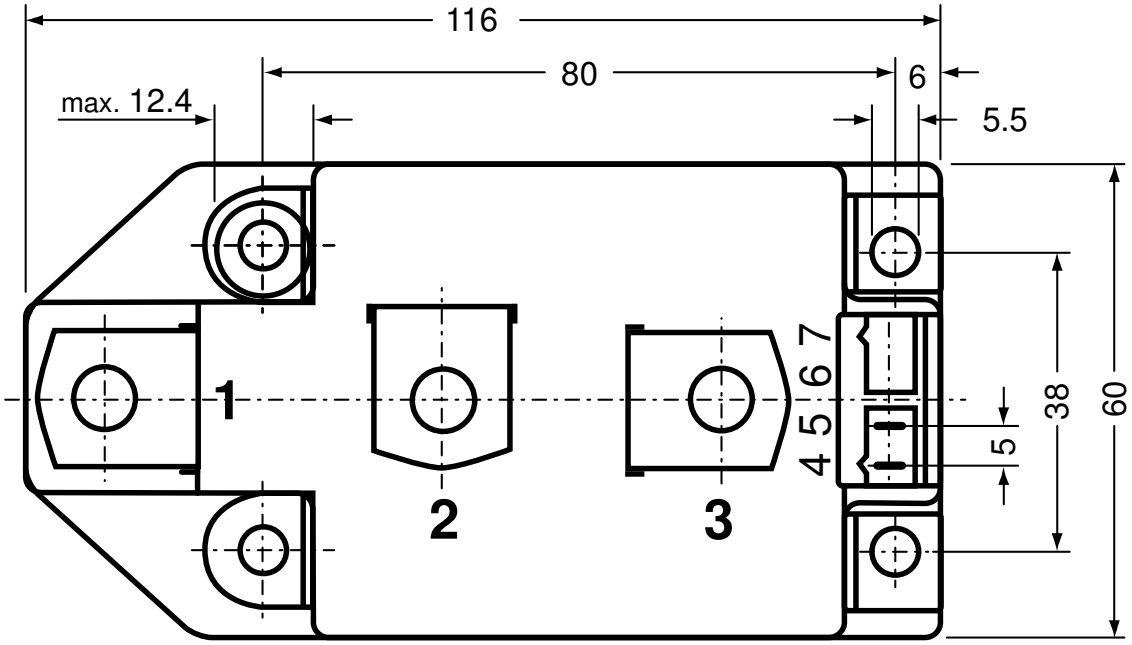
Thyristor

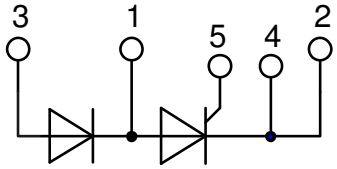
$V_{0\,max}$	*threshold voltage*	0.9	V
$R_{0\,max}$	*slope resistance **	0.5	mΩ

Phase out

Outlines Y2







Thyristor

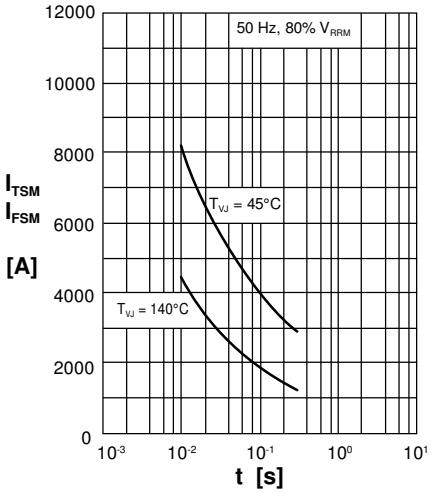


Fig. 1 Surge overload current
$I_{T(F)SM}$: crest value, t: duration

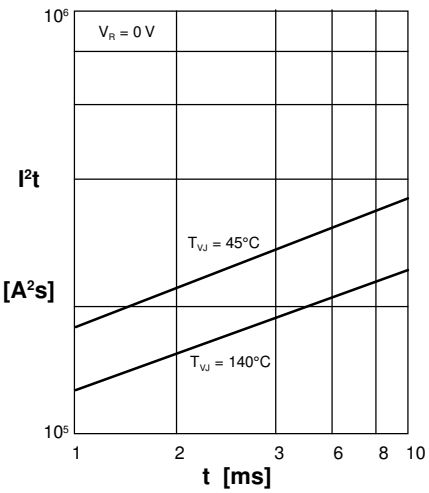


Fig. 2 I^2t versus time (1-10 ms)

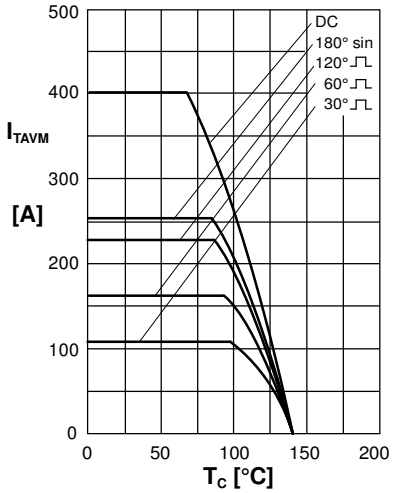


Fig. 3 Max. forward current at case temperature

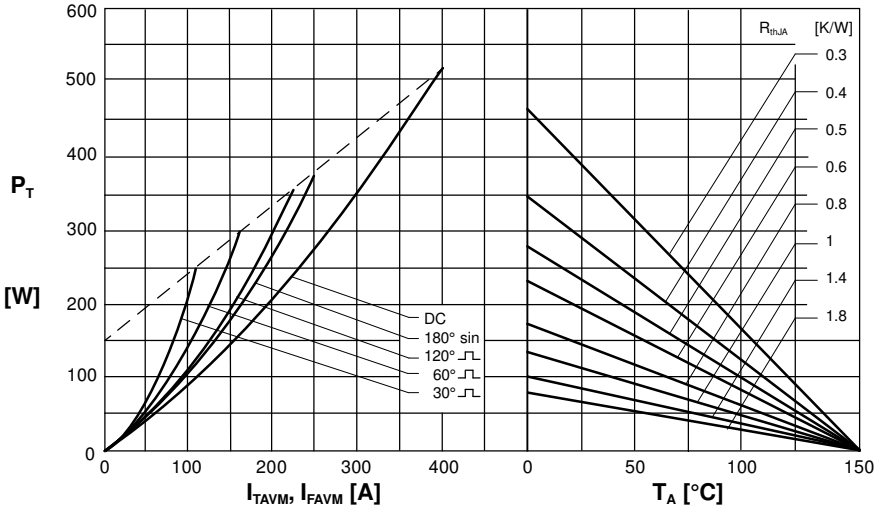


Fig. 4 Power dissipation versus onstate current and• ambient temperature (per thyristor/diode)

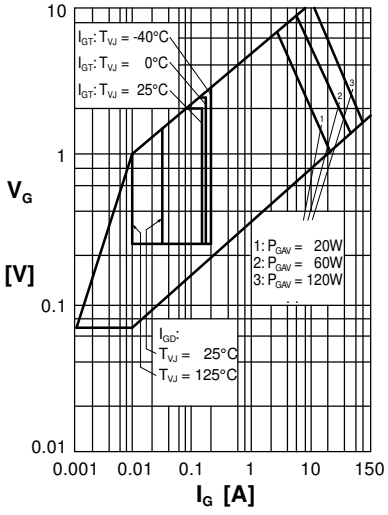


Fig. 5 Gate trigger characteristics

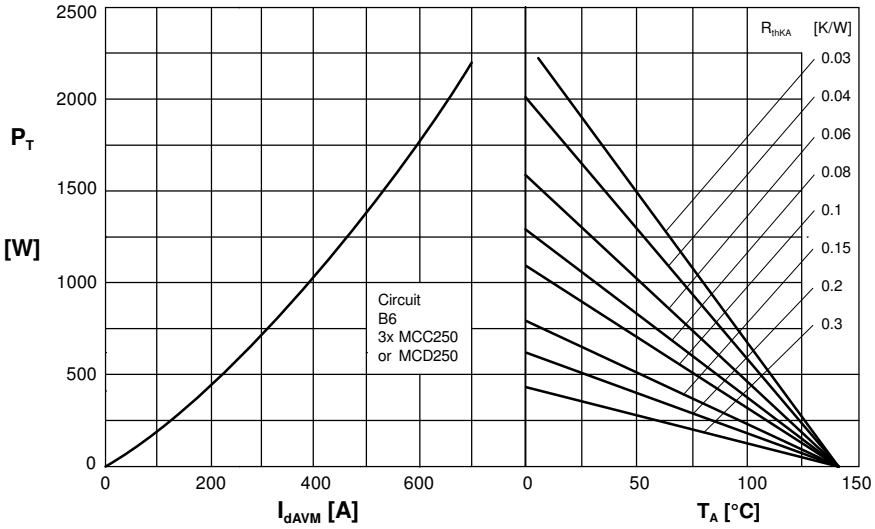


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

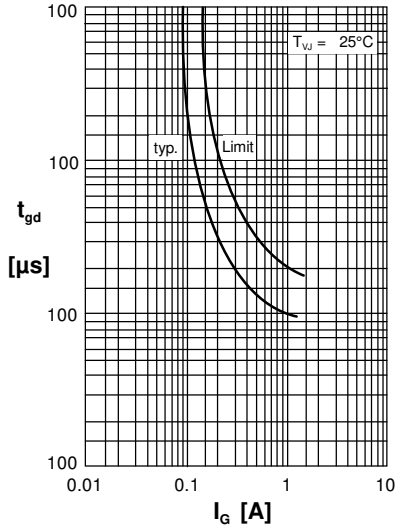


Fig. 7 Gate trigger delay time

Rectifier

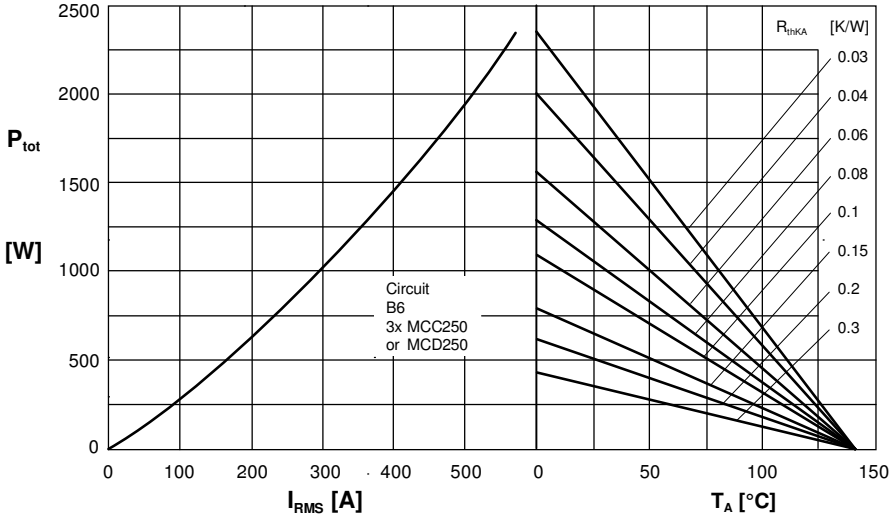


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

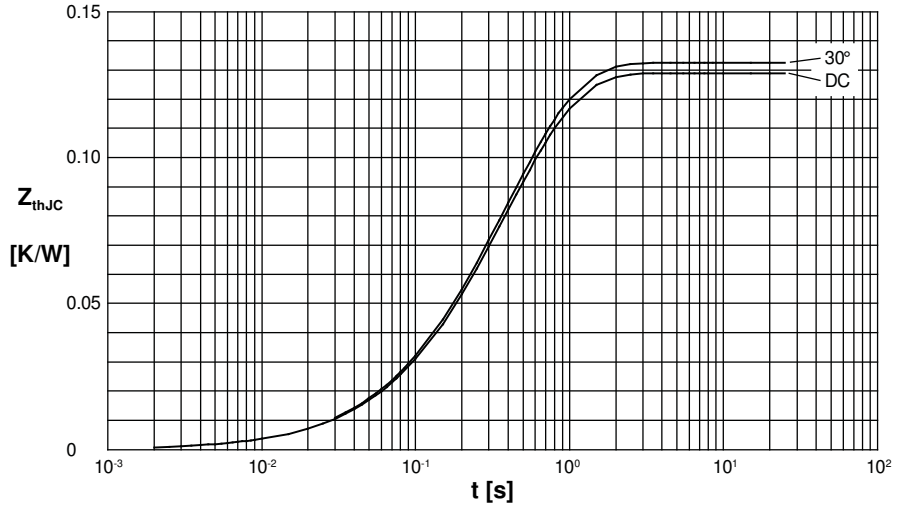


Fig. 8 Transient thermal impedance junction to case (per thyristor/diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.139
180°C	0.141
120°C	0.142
60°C	0.142
30°C	0.143

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.0037	0.0099
2	0.0177	0.168
3	0.1175	0.456

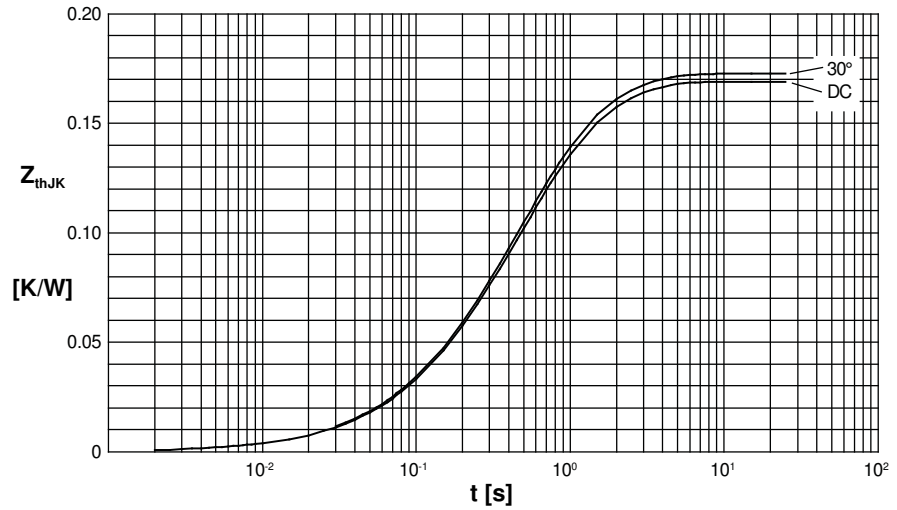


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor/diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.179
180°C	0.181
120°C	0.182
60°C	0.183
30°C	0.183

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.0033	0.0099
2	0.0159	0.168
3	0.1053	0.456
4	0.04	1.36