

SKM 400GB176D



SEMITRANS® 3

Trench IGBT Modules

SKM 400GB176D

SKM 400GAL176D

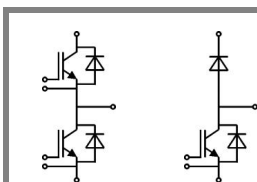
Preliminary Data

Features

- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

Typical Applications

- AC inverter drives
- mains 575 - 750 V AC
- Public transport (auxiliary syst.)
- Wind power

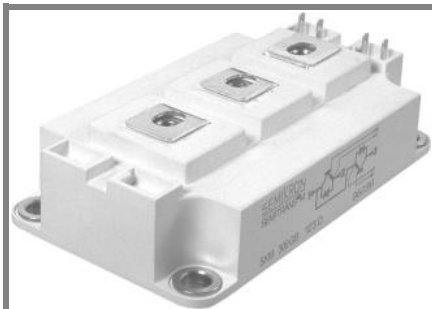


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Absolute Maximum Ratings		T _{case} = 25°C, unless otherwise specified		
Symbol	Conditions		Values	Units
IGBT				
V _{CES}	T _j = 25 °C		1700	V
I _C	T _j = 150 °C	T _c = 25 °C	430	A
		T _c = 80 °C	310	A
I _{CRM}	I _{CRM} =2xI _{Cnom}		600	A
V _{GES}			± 20	V
t _{psc}	V _{CC} = 1200 V; V _{GE} ≤ 20 V; T _j = 125 °C V _{CES} < 1700 V		10	μs
Inverse Diode				
I _F	T _j = 150 °C	T _c = 25 °C	440	A
		T _c = 80 °C	300	A
I _{FRM}	I _{FRM} =2xI _{Fnom}		600	A
I _{FSM}	t _p = 10 ms; sin. T _j = 150 °C		2200	A
Freewheeling Diode				
I _F	T _j = 150 °C	T _{case} = 25 °C	440	A
		T _{case} = 80 °C	300	A
I _{FRM}	I _{FRM} =2xI _{Fnom}		600	A
I _{FSM}	t _p = 10 ms; sin. T _j = 150 °C		2200	A
Module				
I _{t(RMS)}			500	A
T _{vj}			- 40 ... + 150	°C
T _{stg}			- 40 ... + 125	°C
V _{isol}	AC, 1 min.		4000	V

Characteristics		$T_{case} = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CES}, I_C = 12\text{ mA}$	5,2	5,8	6,4	V
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$		0,15	0,45	mA
V_{CE0}			$T_j = 25^\circ\text{C}$	1	V
			$T_j = 125^\circ\text{C}$	0,9	V
r_{CE}	$V_{GE} = 15\text{ V}$		$T_j = 25^\circ\text{C}$	3,3	m Ω
			$T_j = 125^\circ\text{C}$	5,2	m Ω
$V_{CE(sat)}$	$I_{Cnom} = 300\text{ A}, V_{GE} = 15\text{ V}$		$T_j = 25^\circ\text{C}_{chiplev.}$	2	V
			$T_j = 125^\circ\text{C}_{chiplev.}$	2,45	V
C_{ies}	$V_{CE} = 25, V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$		19,8	nF
C_{oes}				1,1	nF
C_{res}				0,88	nF
Q_G	$V_{GE} = -8\text{V}...+15\text{V}$		2500		nC
$t_{d(on)}$	$R_{Gon} = 4\ \Omega$	$V_{CC} = 1200\text{V}$ $I_C = 300\text{A}$	330		ns
t_r			55		ns
E_{on}	$R_{Goff} = 4\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{V}$	170		mJ
$t_{d(off)}$			880		ns
t_f			145		ns
E_{off}			118		mJ
$R_{th(j-c)}$	per IGBT			0,075	K/W



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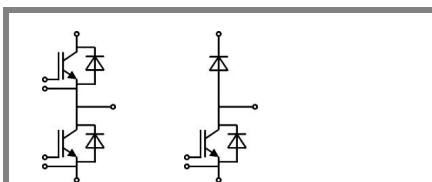
Typical Applications

- AC inverter drives
- mains 575 - 750 V AC
- Public transport (auxiliary syst.)
- Wind power

Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
Inverse Diode					
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$				
	$T_j = 25^\circ \text{C}_{chiplev.}$		1,7	1,9	V
	$T_j = 125^\circ \text{C}_{chiplev.}$		1,8	2	V
V_{F0}	$T_j = 25^\circ \text{C}$		1,2	1,4	V
	$T_j = 125^\circ \text{C}$		0,9	1,1	V
r_F	$T_j = 25^\circ \text{C}$		1,7	1,7	mΩ
	$T_j = 125^\circ \text{C}$		3	3	mΩ
I_{RRM}	$I_F = 300 \text{ A}$		418		A
Q_{rr}	$di/dt = 5800 \text{ A}/\mu\text{s}$		117		μC
E_{rr}	$V_{GE} = -15 \text{ V}; V_{CC} = 1200 \text{ V}$		78		mJ
$R_{th(j-c)D}$	per diode			0,125	K/W
FWD					
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$				
	$T_j = 25^\circ \text{C}_{chiplev.}$		1,7	1,9	V
	$T_j = 125^\circ \text{C}_{chiplev.}$		1,8	2	V
V_{F0}	$T_j = 25^\circ \text{C}$		1,2	1,4	V
	$T_j = 125^\circ \text{C}$		0,9	1,1	V
r_F	$T_j = 25^\circ \text{C}$		1,7	1,7	V
	$T_j = 125^\circ \text{C}$		3	3	V
I_{RRM}	$I_F = 300 \text{ A}$		418		A
Q_{rr}	$di/dt = 5800 \text{ A}/\mu\text{s}$		117		μC
E_{rr}	$V_{GE} = -15 \text{ V}; V_{CC} = 1200 \text{ V}$		78		mJ
$R_{th(j-c)FD}$	per diode			0,125	K/W
Module					
L_{CE}			15	20	nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25^\circ \text{C}$	0,35		mΩ
		$T_{case} = 125^\circ \text{C}$	0,5		mΩ
$R_{th(c-s)}$	per module			0,038	K/W
M_s	to heat sink M6		3	5	Nm
M_t	to terminals M6		2,5	5	Nm
w				325	g

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.



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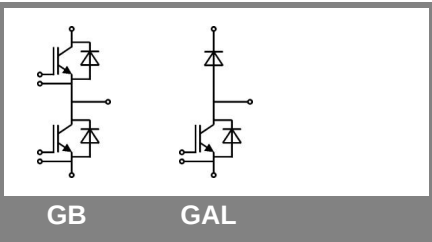
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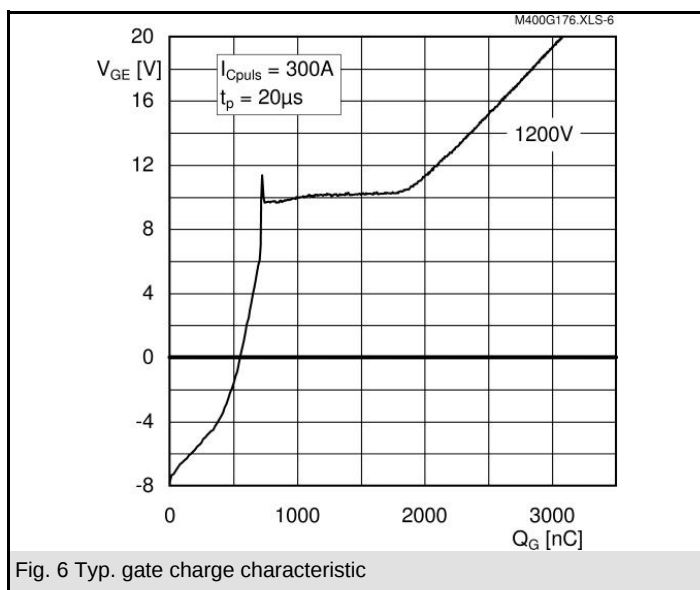
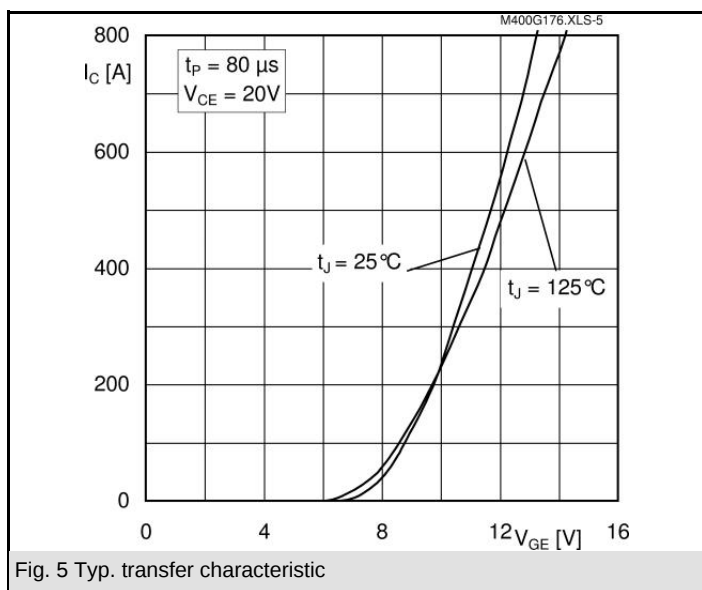
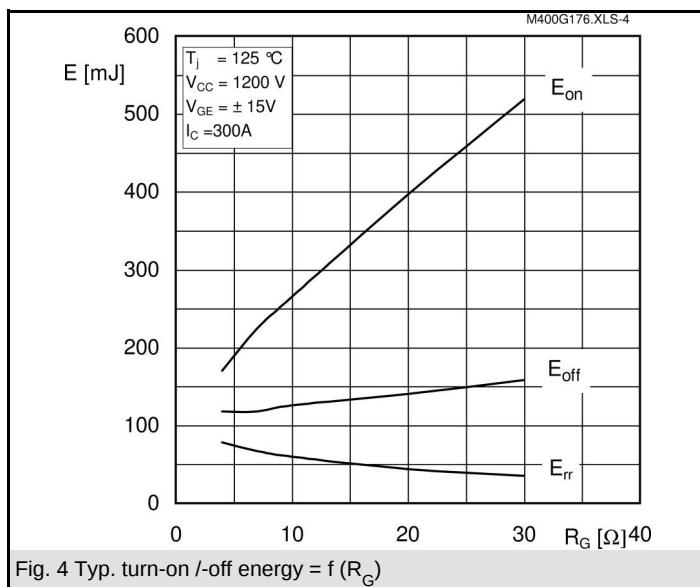
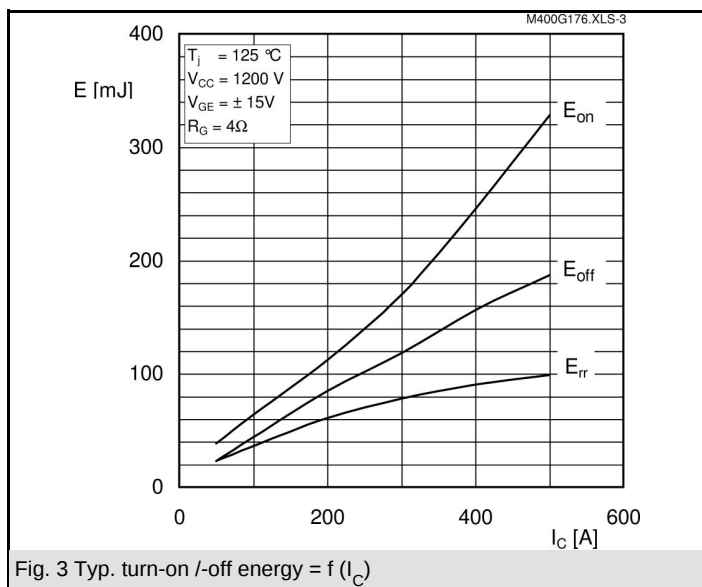
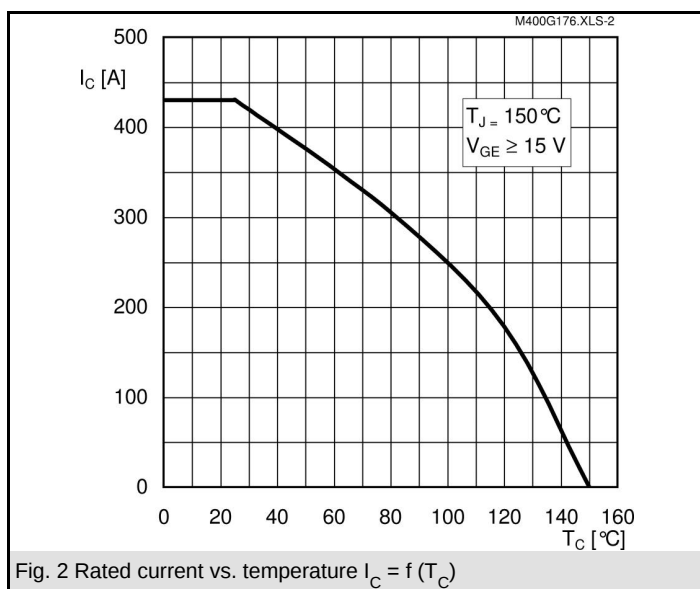
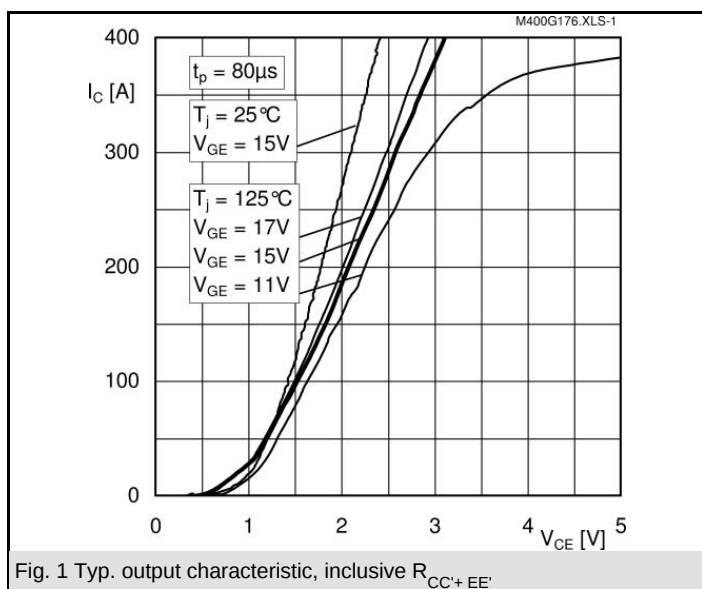
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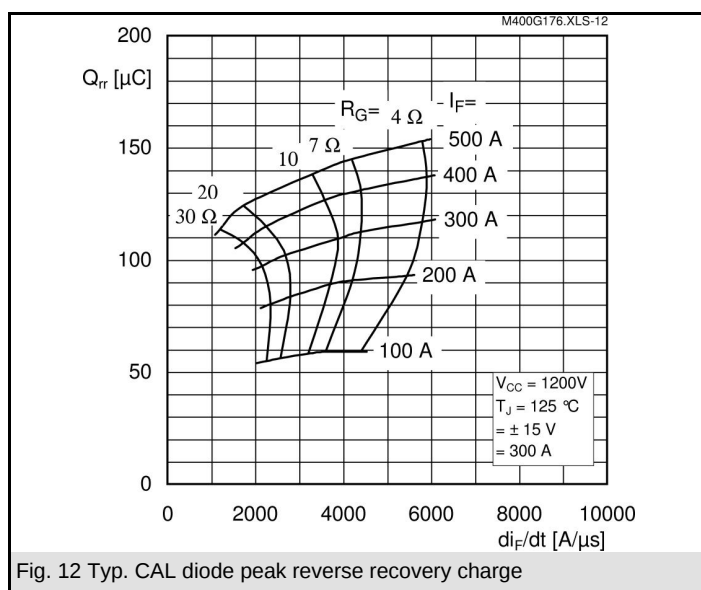
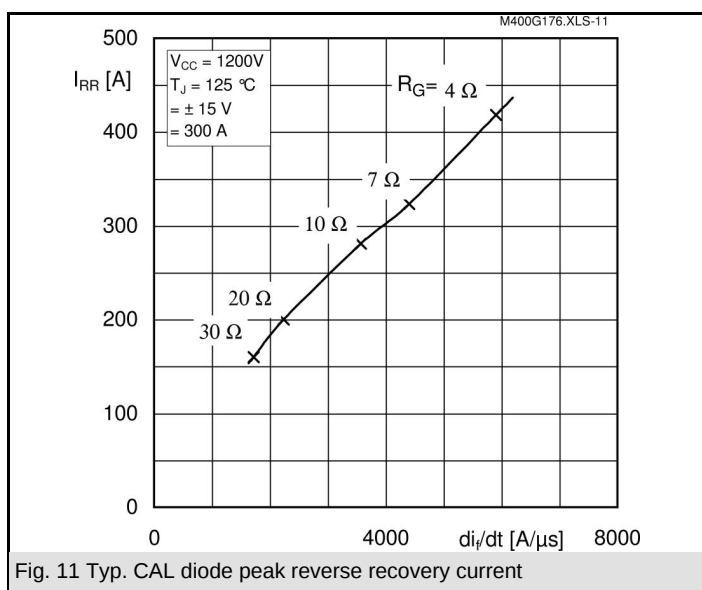
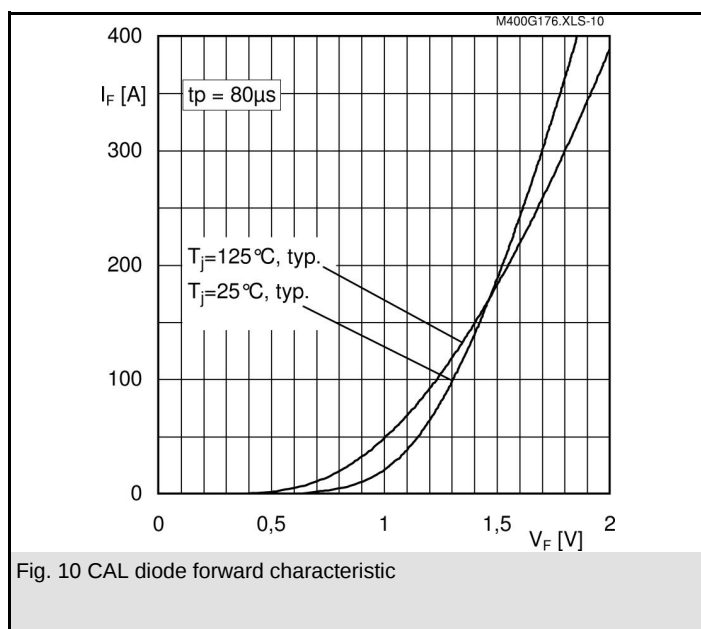
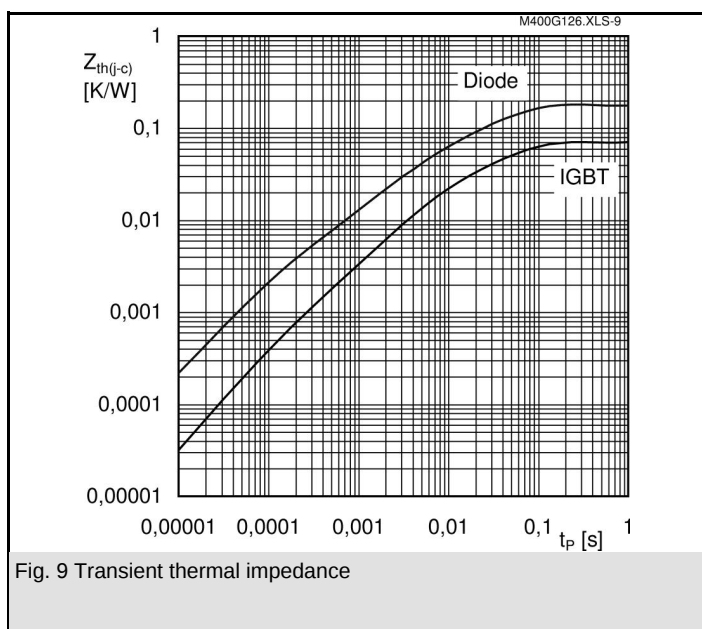
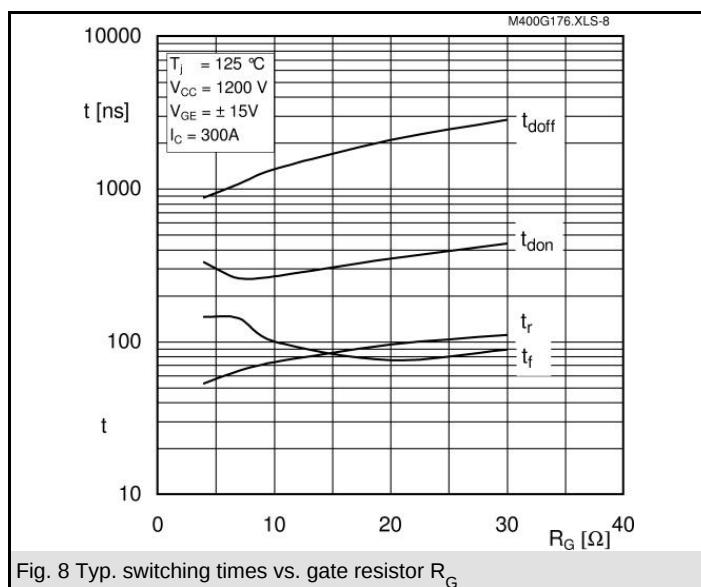
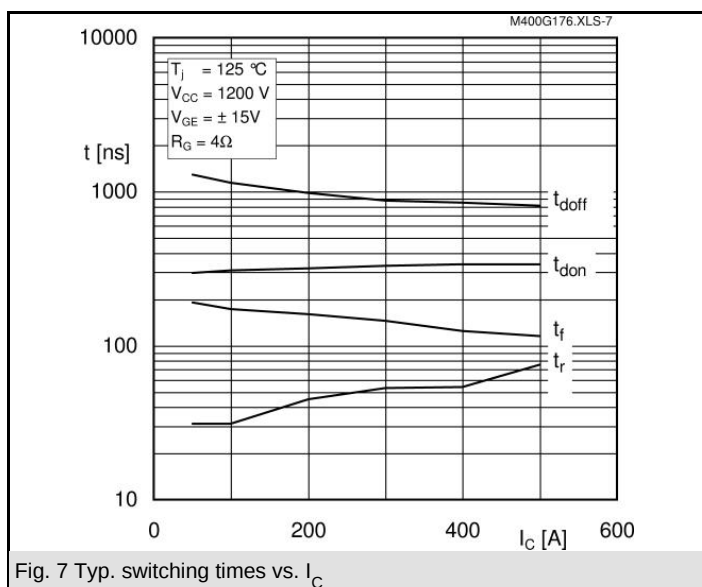
Z_{th}			
Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	$i = 1$	52	mk/W
R_i	$i = 2$	18	mk/W
R_i	$i = 3$	4,6	mk/W
R_i	$i = 4$	0,4	mk/W
τ_{ui}	$i = 1$	0,0569	s
τ_{ui}	$i = 2$	0,0122	s
τ_{ui}	$i = 3$	0,002	s
τ_{ui}	$i = 4$	0,02	s
$Z_{th(j-c)D}$			
R_i	$i = 1$	85	mk/W
R_i	$i = 2$	28	mk/W
R_i	$i = 3$	10,5	mk/W
R_i	$i = 4$	1,5	mk/W
τ_{ui}	$i = 1$	0,054	s
τ_{ui}	$i = 2$	0,0075	s
τ_{ui}	$i = 3$	0,0018	s
τ_{ui}	$i = 4$	0,0002	s



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