Technische Information / technical information

IGBT-Module
IGBT-modules

FS10R06VL4 B2

power electronics in motion
eupec

Vorläufige Daten
preliminary data

IGBT-Wechselrichter / IGBT-inverter

Höchstzulässige Werte / maximum rated values

Kollektor-Emitter-Sperrspannung collector-emitter voltage	T_{vj} = 25°C	V_{CES}	600	V
Kollektor-Dauergleichstrom DC-collector current	T_C = 80°C T_C = 25°C	$I_{C\ nom}$ I_C	10 16	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_P = 1 ms, T_C = 80°C	I_{CRM}	20	A
Gesamt-Verlustleistung total power dissipation	T_C = 25°C	P_{tot}	78,0	W
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		V_{GES}	+/-20	V

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	I_C = 10 A, V_{GE} = 15 V, T_{vj} = 25°C I_C = 10 A, V_{GE} = 15 V, T_{vj} = 125°C	$V_{CE\ sat}$		1,95 2,20	2,55	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 0,40 mA, V_{CE} = V_{GE}, T_{vj} = 25°C	V_{GEth}	4,5	5,5	6,5	V
Gateladung gate charge	V_{GE} = -15 V ... +15 V	Q_G		0,05		µC
Interner Gatewiderstand internal gate resistor	T_{vj} = 25°C	R_{Gint}		0,0		Ω
Eingangskapazität input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		0,45		nF
Rückwirkungskapazität reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{res}		0,04		nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	V_{CE} = 600 V, V_{GE} = 0 V, T_{vj} = 25°C	I_{CES}			5,0	mA
Gate-Emitter Reststrom gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C	I_{GES}			400	nA
Einschaltverzögerungszeit (ind. Last) turn-on delay time (inductive load)	I_C = 10 A, V_{CE} = 300 V V_{GE} = ±15 V, R_{Gon} = 27 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 27 Ω, T_{vj} = 125°C	$t_{d\ on}$		0,012 0,012		µs µs
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 10 A, V_{CE} = 300 V V_{GE} = ±15 V, R_{Gon} = 27 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 27 Ω, T_{vj} = 125°C	t_r		0,012 0,013		µs µs
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	I_C = 10 A, V_{CE} = 300 V V_{GE} = ±15 V, R_{Goff} = 27 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 27 Ω, T_{vj} = 125°C	$t_{d\ off}$		0,085 0,105		µs µs
Fallzeit (induktive Last) fall time (inductive load)	I_C = 10 A, V_{CE} = 300 V V_{GE} = ±15 V, R_{Goff} = 27 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 27 Ω, T_{vj} = 125°C	t_f		0,017 0,03		µs µs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 10 A, V_{CE} = 300 V, L_S = 60 nH V_{GE} = ±15 V, R_{Gon} = 27 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 27 Ω, T_{vj} = 125°C	E_{on}		0,18 0,25		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 10 A, V_{CE} = 300 V, L_S = 60 nH V_{GE} = ±15 V, R_{Goff} = 27 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 27 Ω, T_{vj} = 125°C	E_{off}		0,18 0,27		mJ mJ
Kurzschlußverhalten SC data	t_P ≤ 10 µs, V_{GE} ≤ 15 V T_{vj}≤125°C, V_{CC} = 360 V, V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	I_{SC}		45		A
Innerer Wärmewiderstand thermal resistance, junction to case	pro IGBT per IGBT	R_{thJC}		1,60	1,80	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro IGBT / per IGBT λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		0,80		K/W

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Diode-Wechselrichter / diode-inverter

Höchstzulässige Werte / maximum rated values

Periodische Spitzensperrspannung repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	600	V
Dauergleichstrom DC forward current		I_F	10	A
Periodischer Spitzenstrom repetitive peak forward current	t_P = 1 ms	I_{FRM}	20	A
Grenzlastintegral I^2t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I^2t	12,0	A^2s

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Durchlassspannung forward voltage	I_F = 10 A, V_{GE} = 0 V, T_{vj} = 25°C I_F = 10 A, V_{GE} = 0 V, T_{vj} = 125°C	V_F		1,85 1,90	2,25	V V
Rückstromspitze peak reverse recovery current	I_F = 10 A, - di_F/dt = 1000 A/µs V_R = 300 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 300 V, V_{GE} = -15 V, T_{vj} = 125°C	I_{RM}		16,0 17,0		A A
Sperrverzögerungsladung recovered charge	I_F = 10 A, -di_F/dt = 1000 A/µs V_R = 300 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 300 V, V_{GE} = -15 V, T_{vj} = 125°C	Q_r		0,50 0,85		µC µC
Abschaltenergie pro Puls reverse recovery energy	I_F = 10 A, -di_F/dt = 1000 A/µs V_R = 300 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 300 V, V_{GE} = -15 V, T_{vj} = 125°C	E_{rec}		0,10 0,18		mJ mJ
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	R_{thJC}		3,60	3,95	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Diode / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		1,35		K/W

NTC-Widerstand / NTC-thermistor

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Nennwiderstand rated resistance	T_C = 25°C	R_{25}		5,00		kΩ
Abweichung von R_{100} deviation of R_{100}	T_C = 100°C, R_{100} = 493 Ω	ΔR/R	-5		5	%
Verlustleistung power dissipation	T_C = 25°C	P_{25}			20,0	mW
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15K))]$	$B_{25/50}$		3375		K

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Modul / module

Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	2,5			kV
Kollektor-Emitter-Gleichsperrspannung DC stability	T_{vj} = 25°C, 100 fit	$V_{CE\ D}$	600			V
Material für innere Isolation material for internal insulation			Al_2O_3			
Kriechstrecke creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		5,00 5,00			mm
Luftstrecke clearance distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		3,20 3,20			mm
Vergleichszahl der Kriechwegbildung comparative tracking index		CTI	> 225			
			min.	typ.	max.	
Modulinduktivität stray inductance module		L_{sCE}		25		nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	T_C = 25°C, pro Zweig / per arm	$R_{CC'+EE'}$		9,50		mΩ
Höchstzulässige Sperrschichttemperatur maximum junction temperature		$T_{vj\ max}$			150	°C
Temperatur im Schaltbetrieb temperature under switching conditions		$T_{vj\ op}$	-40		125	°C
Lagertemperatur storage temperature		T_{stg}	-40		125	°C
Anpreßkraft für mech. Bef. pro Feder mountig force per clamp		F	30	-	50	N
Gewicht weight		G		10		g

Mit dieser technischen Information werden Halbleite rbauelemente spezifiziert, jedoch keine Eigenschaften zugesichert. Sie gilt in Verbindung m it den zugehörigen technischen Erläuterungen.

This technical information specifies semiconductor devices but guarantees no characteristics. It is valid with the appropriate technical explanat ions.

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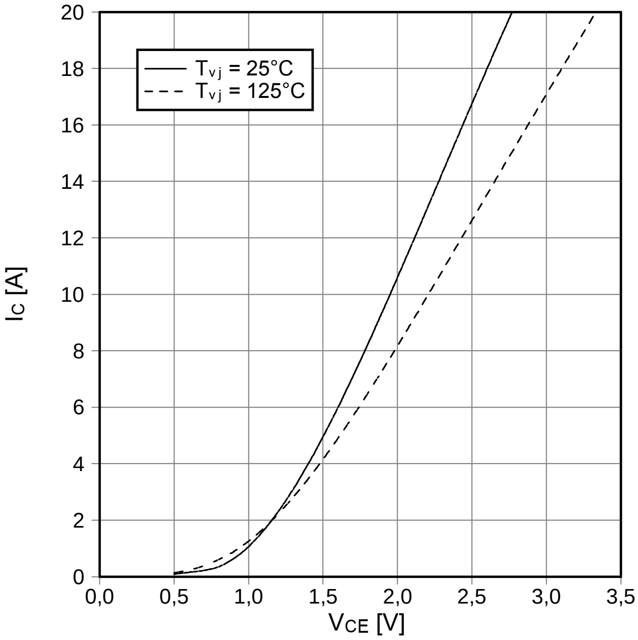
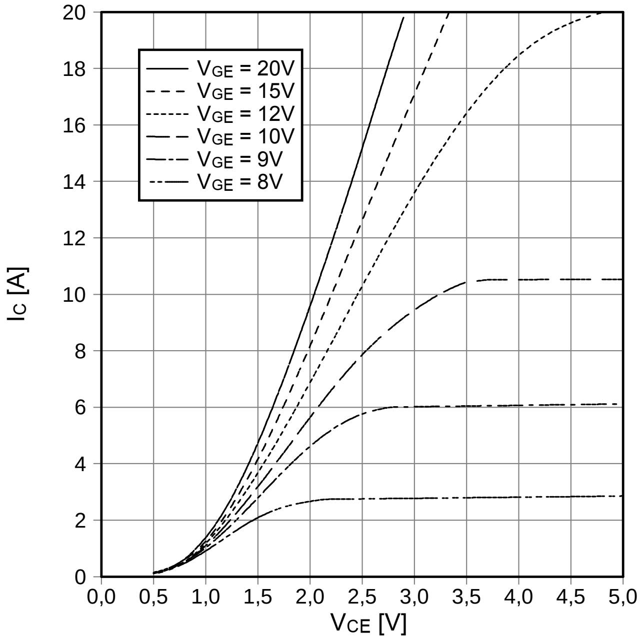
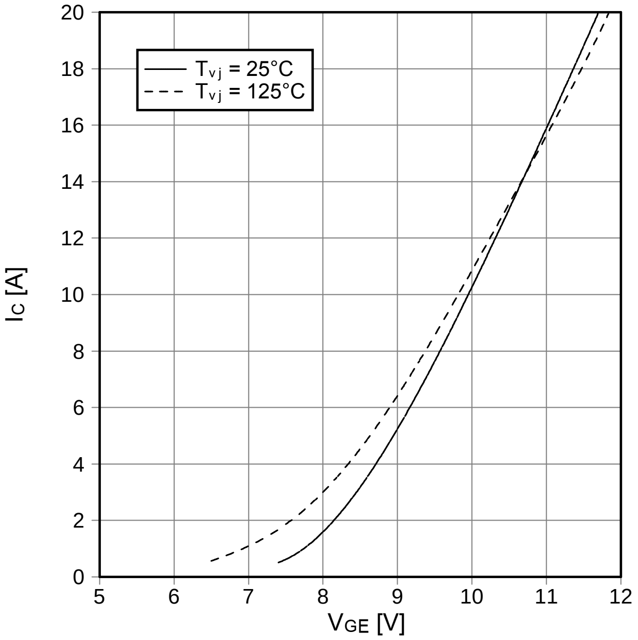
Ausgangskennlinie IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



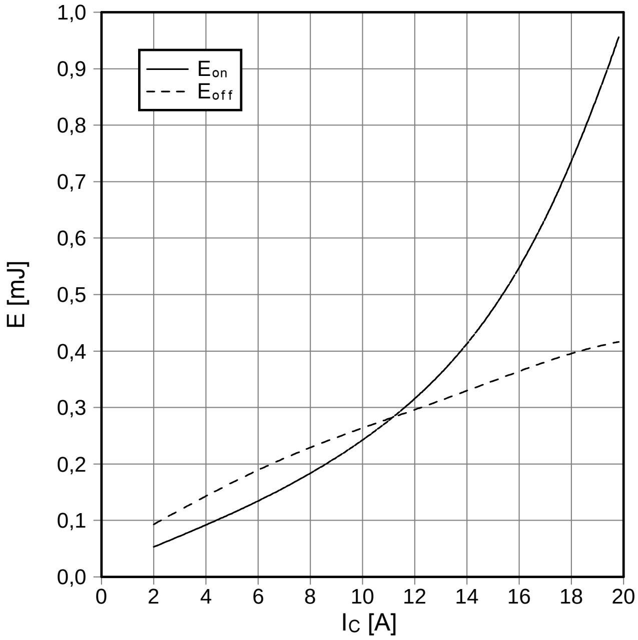
Ausgangskennlinienfeld IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
$T_{vj} = 125°C$



Übertragungscharakteristik IGBT-Wechselr. (typisch)
transfer characteristic IGBT-inverter (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 27\ \Omega$, $R_{Goff} = 27\ \Omega$, $V_{CE} = 300$ V,
$T_{vj} = 125°C$



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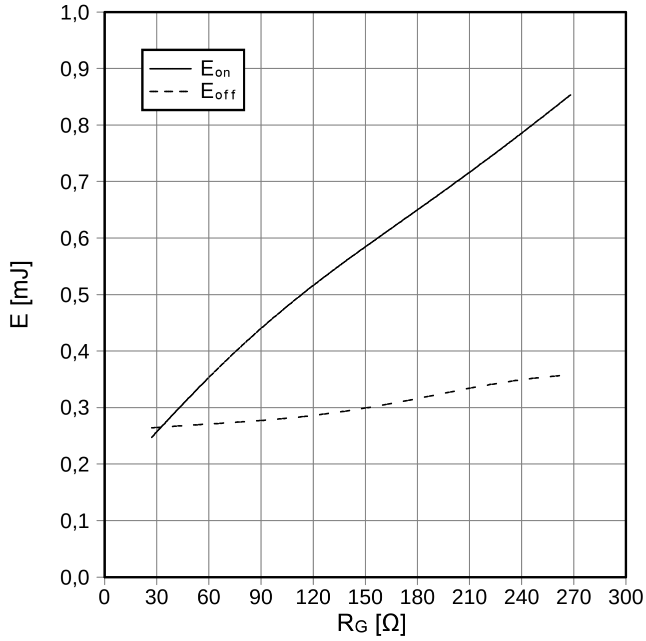
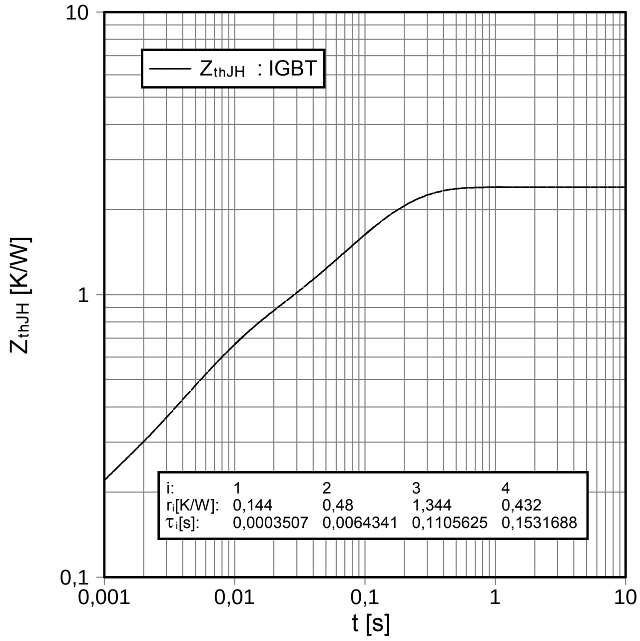
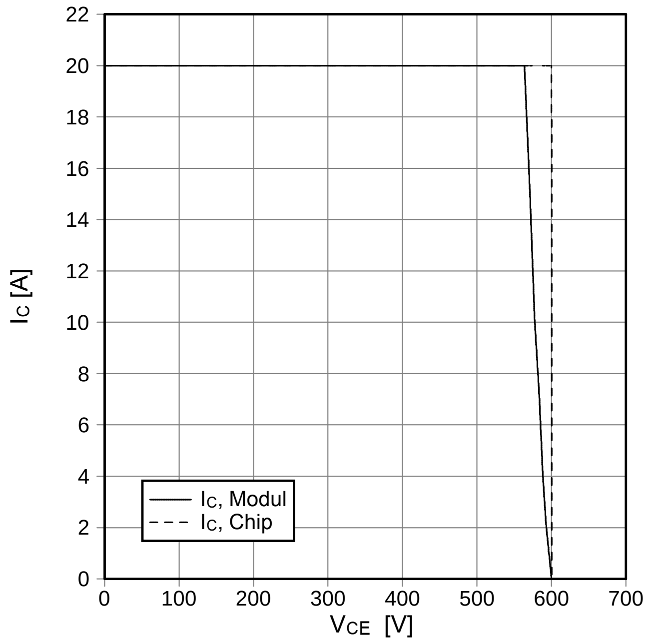
Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-Inverter (typical)
E_{on} = f (R_G), E_{off} = f (R_G)
V_{GE} = ±15 V, I_C = 10 A, V_{CE} = 300 V, T_{vj} = 125°C



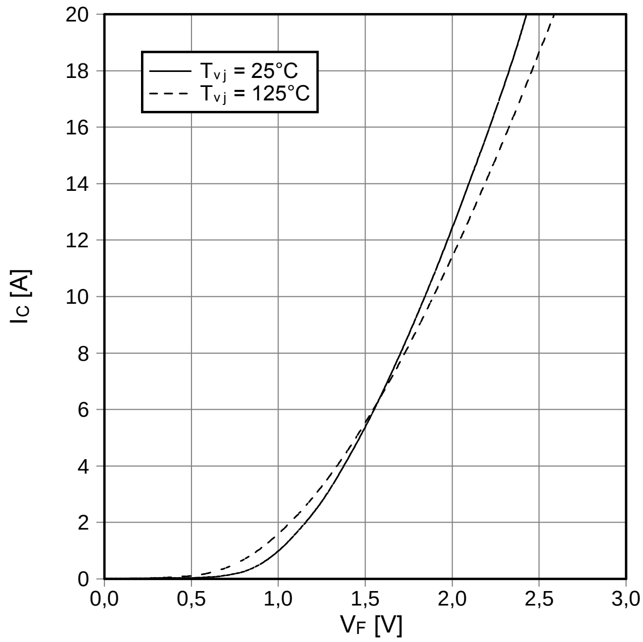
Transienter Wärmewiderstand IGBT-Wechselr.
transient thermal impedance IGBT-inverter
Z_{thJH} = f (t)



Sicherer Rückwärts-Arbeitsbereich IGBT-Wr. (RBSOA)
reverse bias safe operating area IGBT-inv. (RBSOA)
I_C = f (V_{CE})
V_{GE} = ±15 V, R_{Goff} = 27 Ω, T_{vj} = 125°C



Durchlaßkennlinie der Diode-Wechselr. (typisch)
forward characteristic of diode-inverter (typical)
I_F = f (V_F)



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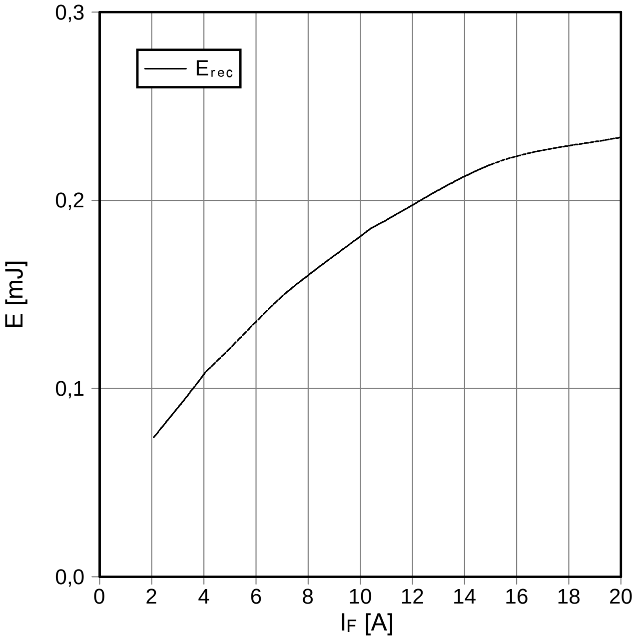
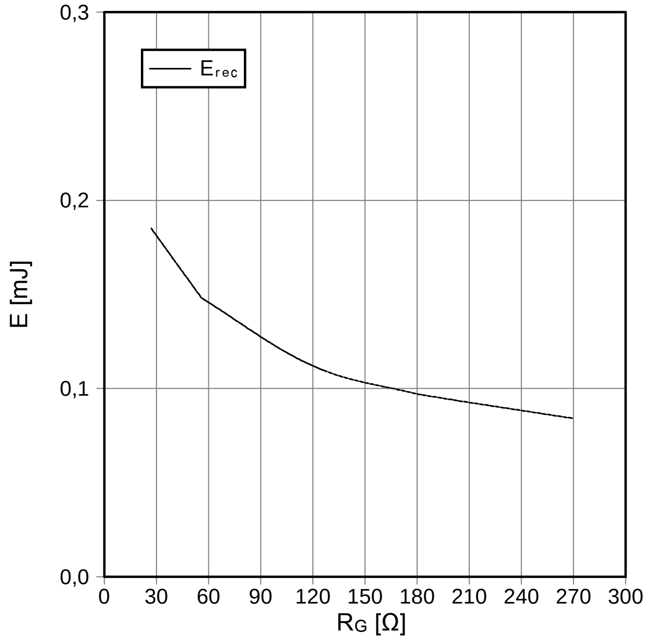
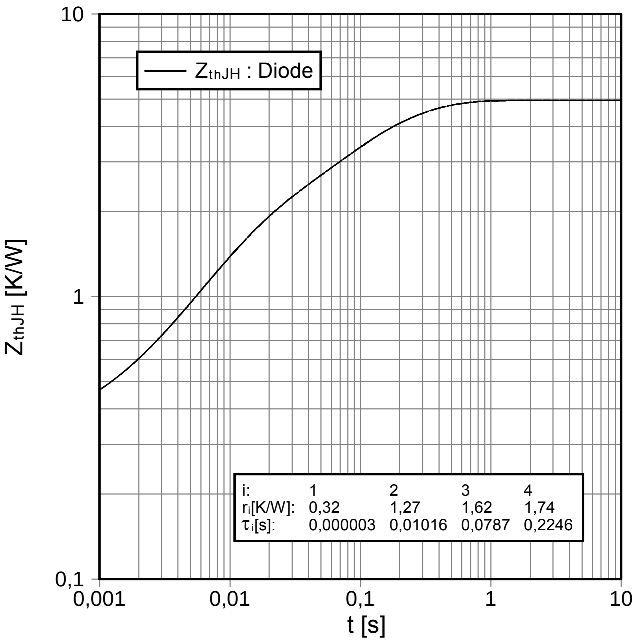
Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 27\ \Omega$, $V_{CE} = 300$ V, $T_{vj} = 125$°C



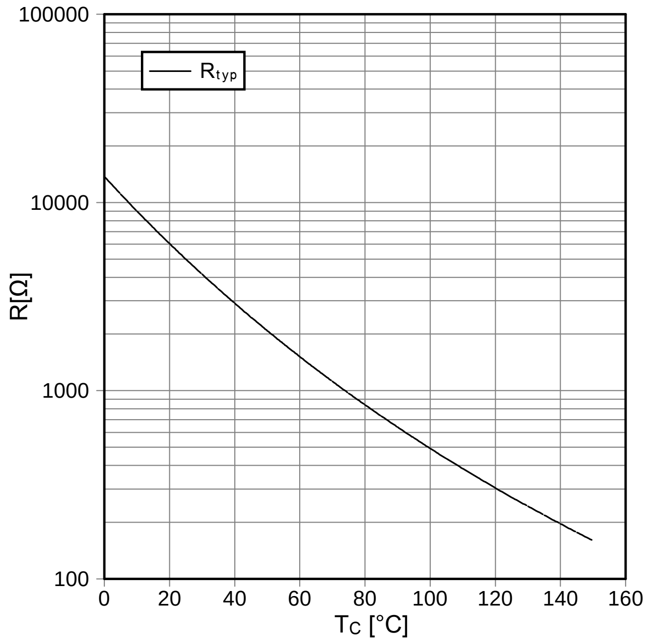
Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
$E_{rec} = f(R_G)$
$I_F = 10$ A, $V_{CE} = 300$ V, $T_{vj} = 125$°C



Transienter Wärmewiderstand Diode-Wechselr.
transient thermal impedance diode-inverter
$Z_{thJH} = f(t)$



NTC-Temperaturkennlinie (typisch)
NTC-temperature characteristic (typical)
R = f (T)



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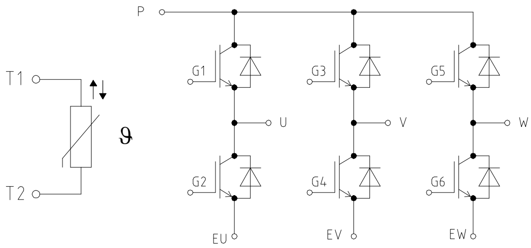
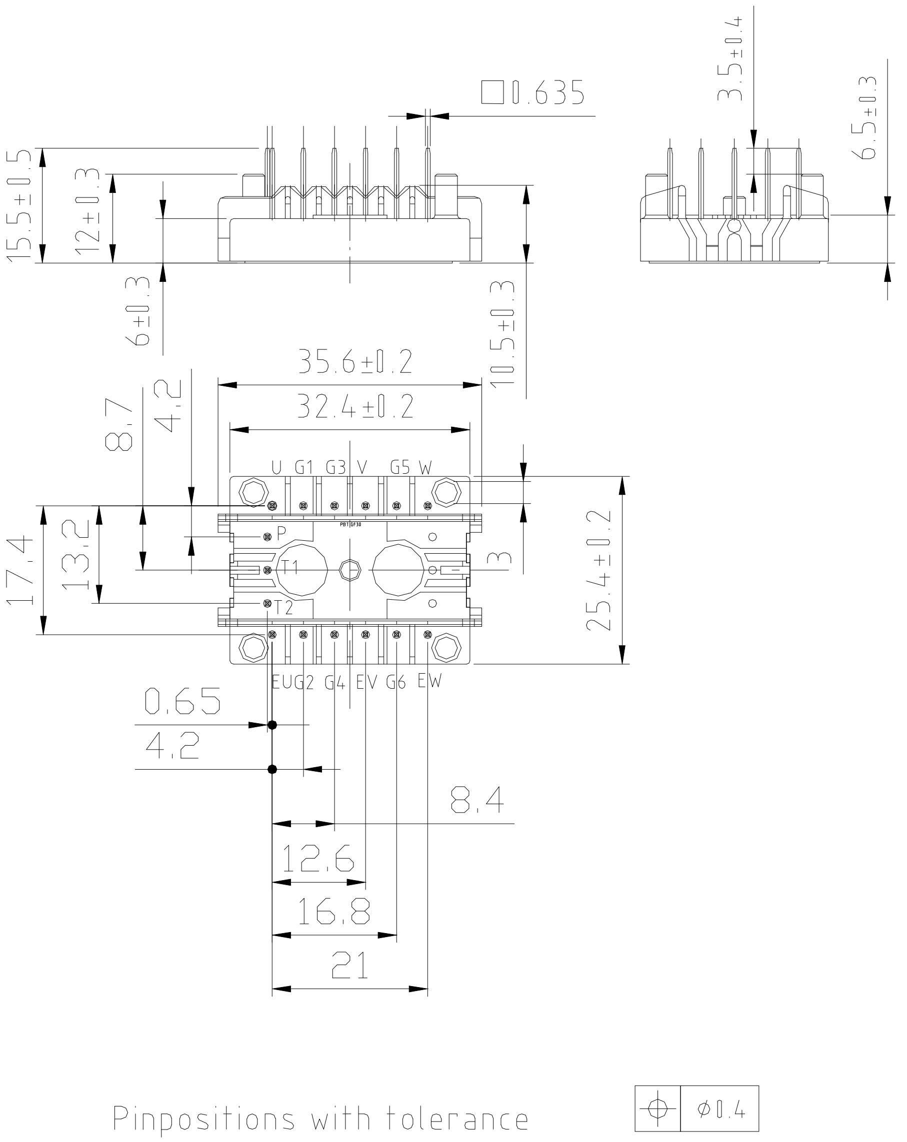
Schaltplan / circuit diagram



Gehäuseabmessungen / package outlines



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