

The technical drawing illustrates the M8-16-38 module in three views:

- Side View (Top):** Shows the module's profile with a total height of 38 mm. The screwing depth is indicated as a maximum of 8 mm. Key dimensions include 18 mm, 61.5 mm, and 5 mm.
- Side View (Bottom):** Shows the module's profile with a total height of 28 mm. The screwing depth is indicated as a maximum of 8 mm. Key dimensions include 31.5 mm, 5 mm, 35 mm, 11 mm, 14.5 mm, and 7 mm.
- Front View (Middle):** Shows the module's face with a total width of 130 mm and a total height of 140 mm. The screwing depth is indicated as a maximum of 16 mm. Key dimensions include 114 mm, 20 mm, 30 mm, 7 mm, 16.5 mm, 2.5 mm, and 18.5 mm. Components are labeled C, E, and G.
- Wiring Diagram (Bottom):** Shows the internal circuitry with two transistors and two diodes. The external connections are labeled C, E, and G. The diagram includes dashed lines for external connections to be done.

FZ 1200 R 12 KF4

Höchstzulässige Werte / Maximum rated values

Elektrische Eigenschaften / Electrical properties

Kollektor-Emitter-Sperrspannung	collector-emitter voltage		V_{CES}	1200 V
Kollektor-Dauergleichstrom	DC-collector current		I_C	1200 A
Periodischer Kollektor Spitzenstrom	repetitive peak collector current	$t_p=1\text{ ms}$	I_{CRM}	2400 A
Gesamt-Verlustleistung	total power dissipation	$t_c=25^\circ\text{C}$, Transistor /transistor	P_{tot}	7800 W
Gate-Emitter-Spitzenspannung	gate-emitter peak voltage		V_{GE}	$\pm 20\text{ V}$
Dauergleichstrom	DC forward current		I_F	1200 A
Periodischer Spitzenstrom	repetitive peak forw. current	$t_p=1\text{ms}$	I_{FRM}	2400 A
Isolations-Prüfspannung	insulation test voltage	RMS, $f=50\text{ Hz}$, $t=1\text{ min.}$	V_{ISOL}	2,5 kV

Charakteristische Werte / Characteristic values: Transistor

			min.	typ.	max.
Kollektor-Emitter Sättigungsspannung	collector-emitter saturation voltage	$i_C=1,2\text{kA}$, $v_{GE}=15\text{V}$, $t_{vj}=25^\circ\text{C}$ $i_C=1,2\text{kA}$, $v_{GE}=15\text{V}$, $t_{vj}=125^\circ\text{C}$	$V_{CE\text{ sat}}$	- 2,7 - 3,3	3,2 V 3,9 V
Gate-Schwellenspannung	gate threshold voltage	$i_C=48\text{mA}$, $v_{CE}=v_{GE}$, $t_{vj}=25^\circ\text{C}$	$V_{GE(th)}$	4,5	5,5 6,5 V
Eingangskapazität	input capacity	$f_O=1\text{MHz}$, $t_{vj}=25^\circ\text{C}$, $v_{CE}=25\text{V}$, $v_{GE}=0\text{V}$	C_{ies}	- 90	- nF
Kollektor-Emitter Reststrom	collector-emitter cut-off current	$v_{CE}=1200\text{V}$, $v_{GE}=0\text{V}$, $t_{vj}=25^\circ\text{C}$ $v_{CE}=1200\text{V}$, $v_{GE}=0\text{V}$, $t_{vj}=125^\circ\text{C}$	i_{CES}	- 16 - 100	- mA 200 mA
Gate-Emitter Reststrom	gate leakage current	$v_{CE}=0\text{V}$, $v_{GE}=20\text{V}$, $t_{vj}=25^\circ\text{C}$	i_{GES}	- -	400 nA
Emitter-Gate Reststrom	gate leakage current	$v_{CE}=0\text{V}$, $v_{EG}=20\text{V}$, $t_{vj}=25^\circ\text{C}$	i_{EGS}	- -	400 nA
Einschaltzeit (induktive Last)	turn-on time (inductive load)	$i_C=1,2\text{kA}$, $v_{CE}=600\text{V}$ $v_L = \pm 15\text{V}$, $R_G = 0,82\text{W}$, $t_{vj}=25^\circ$ $v_L = \pm 15\text{V}$, $R_G = 0,82\text{W}$, $t_{vj}=125^\circ$	t_{on}	0,7 - 0,8	- μs - μs
Speicherzeit (induktive Last)	storage time (inductive load)	$i_C=1,2\text{kA}$, $v_{CE}=600\text{V}$ $v_L = \pm 15\text{V}$, $R_G = 0,82\text{W}$, $t_{vj}=25^\circ$ $v_L = \pm 15\text{V}$, $R_G = 0,82\text{W}$, $t_{vj}=125^\circ$	t_s	- 0,9 - 1,0	- μs - μs
Fallzeit (induktive Last)	fall time (inductive load)	$i_C=1,2\text{kA}$, $v_{CE}=600\text{V}$ $v_L = \pm 15\text{V}$, $R_G = 0,82\text{W}$, $t_{vj}=25^\circ$ $v_L = \pm 15\text{V}$, $R_G = 0,82\text{W}$, $t_{vj}=125^\circ$	t_f	- 0,10 - 0,15	- μs - μs
Einschaltverlustenergie pro Puls	turn-on energy loss per puls	$i_C=1,2\text{kA}$, $v_{CE}=600\text{V}$, $L_s=70\text{nH}$ $v_L=\pm 15\text{V}$, $R_G=0,82\text{W}$, $T_{vj}=125^\circ\text{C}$	E_{on}	- 170	- mWs
Abschaltverlustleistung pro Puls	turn-off energy loss per puls	$i_C=1,2\text{kA}$, $v_{CE}=600\text{V}$, $L_s=70\text{nH}$ $v_L=\pm 15\text{V}$, $R_G=0,82\text{W}$, $T_{vj}=125^\circ\text{C}$	E_{off}	- 190	- mWs

Charakteristische Werte / Characteristic values

Inversdiode / Inverse diode					
Durchlaßspannung	forward voltage	$i_F=1,2\text{kA}$, $v_{GE}=0\text{V}$, $t_{vj}=25^\circ\text{C}$ $i_F=1,2\text{kA}$, $v_{GE}=0\text{V}$, $t_{vj}=125^\circ\text{C}$	V_F	- 2,2 - 2,0	2,7 V 2,5 V
Rückstromspitze	peak reverse recovery current	$i_F=1,2\text{kA}$, $v_{RM}=600\text{V}$, $v_{EG}=10\text{V}$ $-di_F/dt = 6\text{ kA}/\mu\text{s}$, $t_{vj}=25^\circ\text{C}$ $t_{vj}=125^\circ\text{C}$	I_{RM}	- 400 - 700	- A - A
Sperrverzögerungsladung	recovered charge	$i_F=1,2\text{kA}$, $v_{RM}=600\text{V}$, $v_{EG}=10\text{V}$ $-di_F/dt = 6\text{ kA}/\mu\text{s}$, $t_{vj}=25^\circ\text{C}$ $t_{vj}=125^\circ\text{C}$	Q_r	- 50 - 150	- μAs - μAs

Thermische Eigenschaften / Thermal properties

Innere Wärmewiderstand	thermal resistance, junction to case	Transistor / transistor, DC Transistor, DC, pro Zweig/per arm	R_{thJC}	0,016 $^\circ\text{C}/\text{W}$ 0,032 $^\circ\text{C}/\text{W}$
Übergangs-Wärmewiderstand	thermal resistance, case to heatsink	pro Modul / per Module	R_{thCK}	0,008 $^\circ\text{C}/\text{W}$
Höchstzul. Sperschichttemperatur	max. junction temperature	pro Modul / per Module	$t_{vj\text{ max}}$	150 $^\circ\text{C}$
Betriebstemperatur	operating temperature	Transistor / transistor	$t_{c\text{ op}}$	-40...+125 $^\circ\text{C}$
Lagertemperatur	storage temperature		t_{stg}	-40...+125 $^\circ\text{C}$

Mechanische Eigenschaften / Mechanical properties

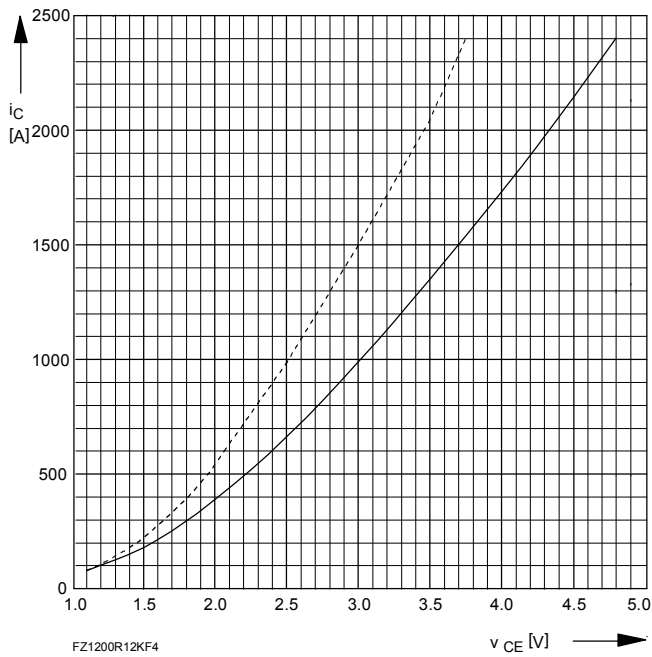
Innere Isolation	internal insulation			Al_2O_3
Anzugsdrehmoment f. mech. Befestigung	mounting torque	terminals M6 / tolerance +/-15%	M1	5 Nm
Anzugsdrehmoment f. elektr. Anschlüsse	terminal connection torque	terminals M4 / tolerance +/-15%	M2	2 Nm
		terminals M8		8...10 Nm
Gewicht	weight		G	ca. 1500 g

Bedingung für den Kurzschlußschutz / Conditions for short-circuit protection

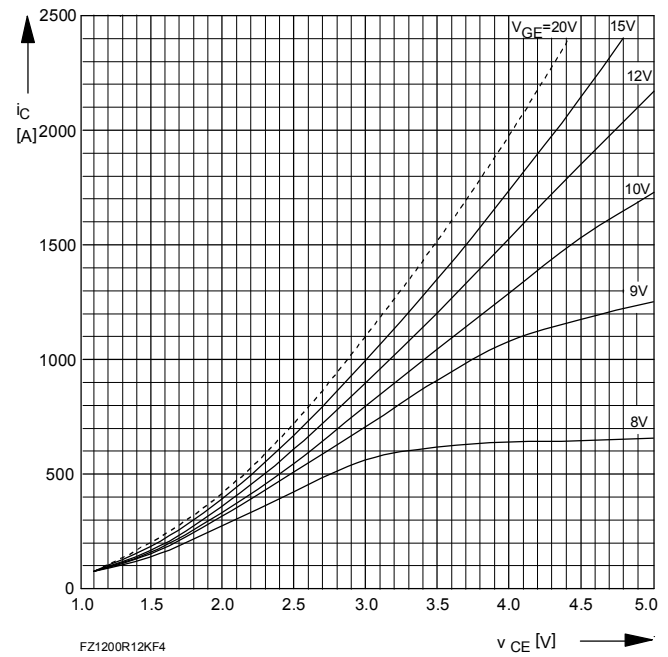
$t_{ig} = 10\text{ }\mu\text{s}$	$V_{CC} = 750\text{ V}$
$v_L = \pm 15\text{ V}$	$v_{CEM} = 900\text{ V}$
$R_{GF} = R_{GR} = 0,82\text{ W}$	$i_{CMK1} \gg 10000\text{ A}$
$t_{vj} = 125^\circ\text{C}$	$i_{CMK2} \gg 8000\text{ A}$

Unabhängig davon gilt bei abweichenden Bedingungen / with regard to other conditions $v_{CEM} = V_{CES} - 15\text{nH} \times |di_C/dt|$

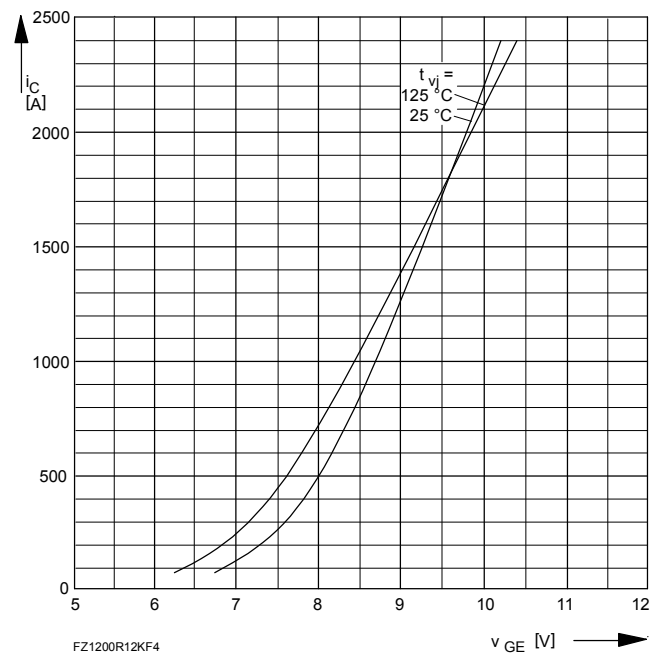
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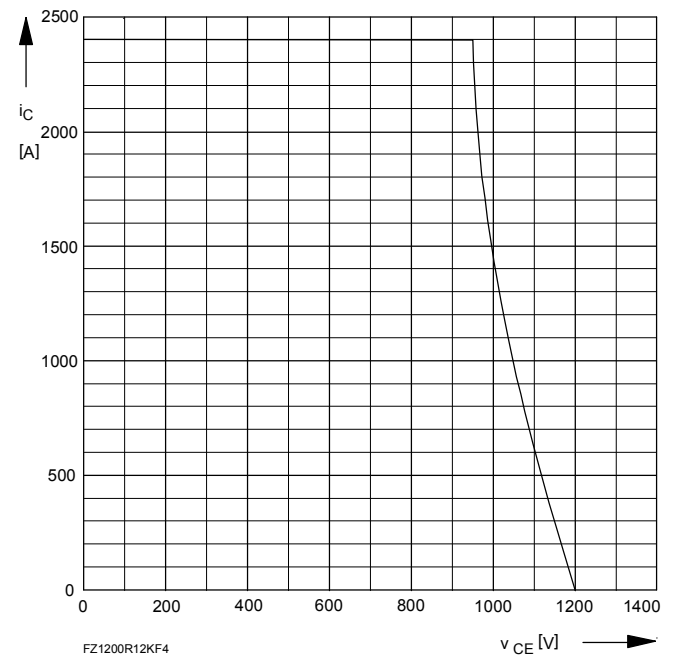
Bild/Fig. 1
Kollektor-Emitter-Spannung im Sättigungsbereich (typisch)
Collector-emitter-voltage in saturation region (typical)
 $V_{GE} = 15V$
--- $T_{vj} = 25\text{ °C}$
— $T_{vj} = 125\text{ °C}$



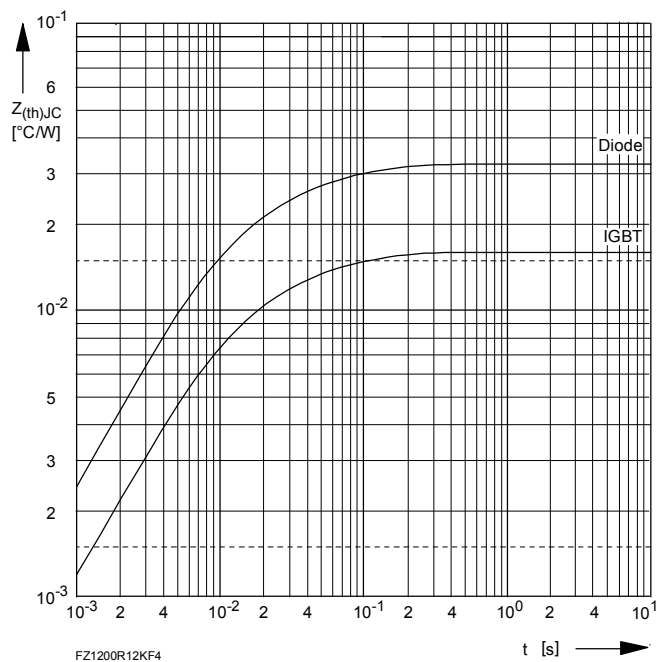
Bild/Fig. 2
Kollektor-Emitter-Spannung im Sättigungsbereich (typisch)
Collector-emitter-voltage in saturation region (typical)
 $T_{vj} = 125\text{ °C}$



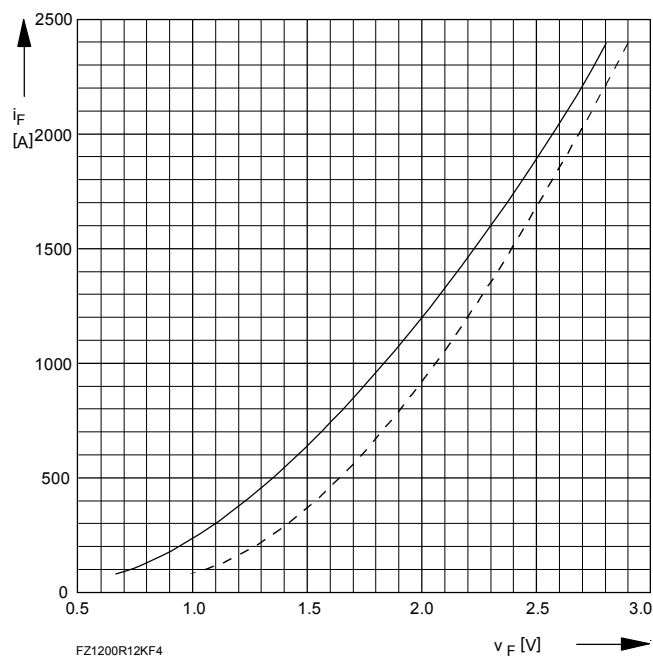
Bild/Fig. 3
Übertragungscharakteristik (typisch)
Transfer characteristic (typical)
 $V_{CE} = 20\text{ V}$



Bild/Fig. 4
Rückwärts-Arbeitsbereich
Reverse biased safe operating area
 $t_{vj} = 125\text{ °C}$, $v_{LF} = v_{LR} = 15\text{ V}$, $R_G = 0,82\Omega$



Bild/Fig. 5
 Transienter innerer Wärmewiderstand (DC)
 Transient thermal impedance (DC)



Bild/Fig. 6
 Durchlaßkennlinie der Inversdiode (typisch)
 Forward characteristic of the inverse diode (typical)
 $t_{vj} = 25^{\circ}\text{C}$
 — $t_{vj} = 125^{\circ}\text{C}$

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