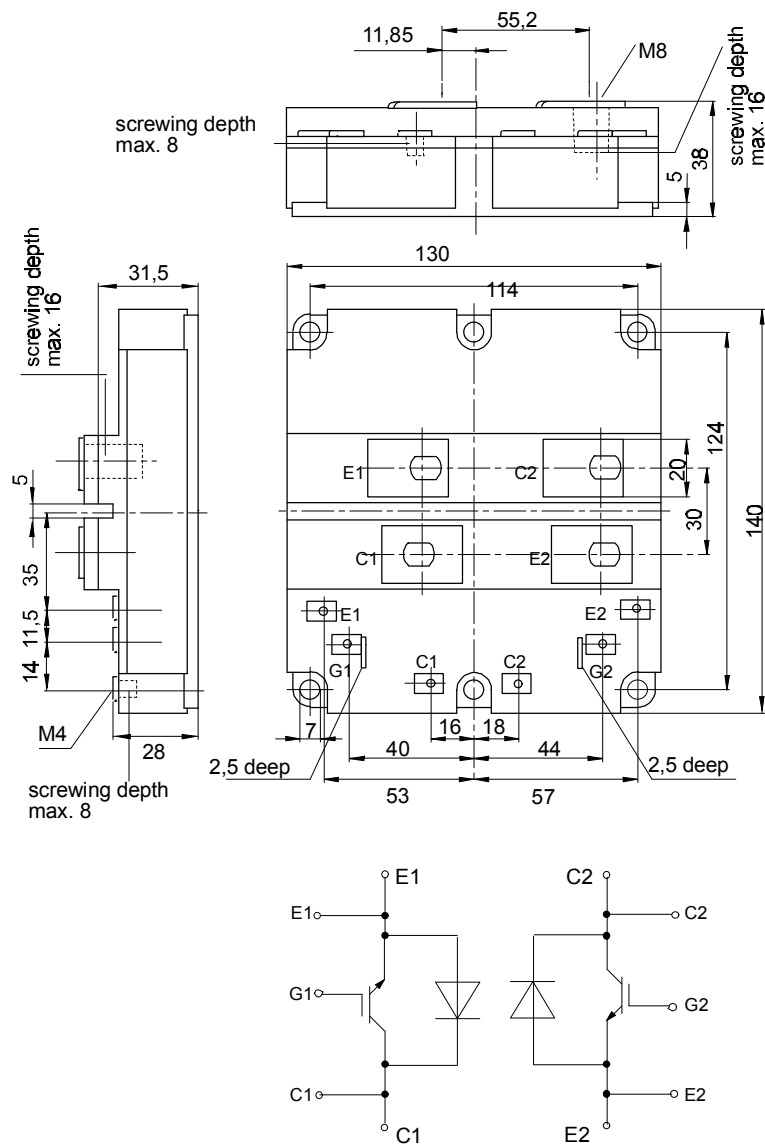




European Power-Semiconductor and Electronics Company

# Marketing Information

## FF 600 R 16 KF4



# IGBT-Module

FF 600 R 16 KF4

## Höchstzulässige Werte / Maximum rated values

### Elektrische Eigenschaften / Electrical properties

Kollektor-Emitter-Sperrspannung	collector-emitter voltage		$V_{CES}$	1600 V
Kollektor-Dauerstrom	DC-collector current		$I_C$	600 A
Periodischer Kollektor Spitzenstrom	repetitive peak collector current	$t_p=1\text{ ms}$	$I_{CRM}$	1200 A
Gesamt-Verlustleistung	total power dissipation	$t_C=25^\circ\text{C}$ , Transistor / transistor	$P_{tot}$	3900 W
Gate-Emitter-Spitzenspannung	gate-emitter peak voltage		$V_{GE}$	$\pm 20\text{ V}$
Dauerstrom	DC forward current		$I_F$	600 A
Periodischer Spitzenstrom	repetitive peak forw. current	$t_p=1\text{ ms}$	$I_{FRM}$	1200 A
Isolations-Prüfspannung	insulation test voltage	RMS, f=50 Hz, t= 1 min.	$V_{ISOL}$	3,4 kV

### Charakteristische Werte / Characteristic values: Transistor

				min.	typ.	max.
Kollektor-Emitter Sättigungsspannung	collector-emitter saturation voltage	$i_C=600\text{A}, v_{GE}=15\text{V}, t_{vj}=25^\circ\text{C}$	$V_{CE\text{ sat}}$	-	3,5	3,9 V
		$i_C=600\text{A}, v_{GE}=15\text{V}, t_{vj}=125^\circ\text{C}$		-	4,6	5 V
Gate-Schwellenspannung	gate threshold voltage	$i_C=40\text{mA}, v_{CE}=v_{GE}, t_{vj}=25^\circ\text{C}$	$v_{GE( TO)}$	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	$v_{CE}=1600\text{V}, v_{GE}=0\text{V}, t_{vj}=25^\circ\text{C}$	$i_{CES}$	-	4	- mA
		$v_{CE}=1600\text{V}, v_{GE}=0\text{V}, t_{vj}=125^\circ\text{C}$		-	40	- 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)	$i_C=600\text{A}, v_{CE}=900\text{V}, v_L=\pm 15\text{V}$	$t_{on}$	-	0,8	- $\mu\text{s}$
		$v_L=\pm 15\text{V}, R_G=3,3\Omega, t_{vj}=25^\circ\text{C}$		-	1	- $\mu\text{s}$
		$v_L=\pm 15\text{V}, R_G=3,3\Omega, t_{vj}=125^\circ\text{C}$		-	-	- $\mu\text{s}$
Speicherzeit (induktive Last)	storage time (inductive load)	$i_C=600\text{A}, v_{CE}=900\text{V}, v_L=\pm 15\text{V}$	$t_s$	-	1,1	- $\mu\text{s}$
		$v_L=\pm 15\text{V}, R_G=3,3\Omega, t_{vj}=25^\circ\text{C}$		-	1,3	- $\mu\text{s}$
		$v_L=\pm 15\text{V}, R_G=3,3\Omega, t_{vj}=125^\circ\text{C}$		-	-	- $\mu\text{s}$
Fallzeit (induktive Last)	fall time (inductive load)	$i_C=600\text{A}, v_{CE}=900\text{V}, v_L=\pm 15\text{V}$	$t_f$	-	0,25	- $\mu\text{s}$
		$v_L=\pm 15\text{V}, R_G=3,3\Omega, t_{vj}=25^\circ\text{C}$		-	0,3	- $\mu\text{s}$
		$v_L=\pm 15\text{V}, R_G=3,3\Omega, t_{vj}=125^\circ\text{C}$		-	-	- $\mu\text{s}$

### Charakteristische Werte / Characteristic values

#### Transistor / Transistor

Einschaltverlustenergie pro Puls	turn-on energy loss per pulse	$i_C=600\text{A}, v_{CE}=900\text{V}, v_L=\pm 15\text{V}$	$E_{on}$	-	240	- mWs
		$R_G=3,3\Omega, t_{vj}=125^\circ\text{C}, L_S=70\text{nH}$		-	-	- mWs
Abschaltverlustenergie pro Puls	turn-off energy loss per pulse	$i_C=600\text{A}, v_{CE}=900\text{V}, v_L=\pm 15\text{V}$	$E_{off}$	-	140	- mWs
		$R_G=3,3\Omega, t_{vj}=125^\circ\text{C}, L_S=70\text{nH}$		-	-	- mWs
Inversdiode / Inverse diode						
Durchlaßspannung	forward voltage	$i_F=600\text{A}, v_{GE}=0\text{V}, t_{vj}=25^\circ\text{C}$	$v_F$	-	2,4	2,8 V
		$i_F=600\text{A}, v_{GE}=0\text{V}, t_{vj}=125^\circ\text{C}$		-	2,2	- V
Rückstromspitze	peak reverse recovery current	$i_F=600\text{A}, -di_F/dt=3\text{kA}/\mu\text{s}$	$I_{RM}$	-	230	- A
		$v_{RM}=900\text{V}, v_{EG}=10\text{V}, t_{vj}=25^\circ\text{C}$		-	320	- A
		$v_{RM}=900\text{V}, v_{EG}=10\text{V}, t_{vj}=125^\circ\text{C}$		-	-	- A
Sperrverzögerungsladung	recovered charge	$i_F=600\text{A}, -di_F/dt=3\text{kA}/\mu\text{s}$	$Q_r$	-	50	- $\mu\text{As}$
		$v_{RM}=900\text{V}, v_{EG}=10\text{V}, t_{vj}=25^\circ\text{C}$		-	110	- $\mu\text{As}$
		$v_{RM}=900\text{V}, v_{EG}=10\text{V}, t_{vj}=125^\circ\text{C}$		-	-	- $\mu\text{As}$

### Thermische Eigenschaften / Thermal properties

Innerer Wärmewiderstand	thermal resistance, junction to case	Transistor, DC, pro Modul / per module	$R_{thJC}$	0,016 $^\circ\text{C}/\text{W}$
		Transistor, DC, pro Zweig / per arm		0,032 $^\circ\text{C}/\text{W}$
		Diode /diode, DC, pro Modul / per module		0,04 $^\circ\text{C}/\text{W}$
		Diode /diode, DC, pro Zweig / per arm		0,08 $^\circ\text{C}/\text{W}$
Übergangs-Wärmewiderstand	thermal resistance, case to heatsink	pro Module / per Module	$R_{thCK}$	0,008 $^\circ\text{C}/\text{W}$
		pro Zweig / per arm		0,016 $^\circ\text{C}/\text{W}$
Höchstzul. Sperrschichttemperatur	max. junction temperature		$t_{vj\text{ max}}$	150 $^\circ\text{C}$
Betriebstemperatur	operating temperature		$t_{c\text{ op}}$	-40...+125 $^\circ\text{C}$
Lagertemperatur	storage temperature		$t_{stg}$	-40...+125 $^\circ\text{C}$

### Mechanische Eigenschaften / Mechanical properties

Innere Isolation	internal insulation			$\text{Al}_2\text{O}_3$
Anzugsdrehmoment f. mech. Befestigung / mounting torque		terminals M6 / tolerance $\pm 10\%$	M1	3 Nm
Anzugsdrehmoment f. elektr. Anschlüsse / terminal connection torque		terminals M4 / tolerance $\pm 5/-10\%$	M2	2 Nm
		terminals M8		8...10 Nm
Gewicht	weight		G	ca. 1500 g

Mit dieser technischen Information werden Halbleiterbauelemente spezifiziert, jedoch keine Eigenschaften zugesichert. Sie gilt in Verbindung mit den zugehörigen Technischen Erläuterungen. This technical information specifies semiconductor devices but promises no characteristics. It is valid in combination with the belonging technical notes.

#### Bedingung für den Kurzschlußschutz / Conditions for short-circuit protection

$t_{sg} = 10\ \mu\text{s}$	$V_{CC} = 1000\text{ V}$
$v_L = \pm 15\text{V}$	$v_{CEM} = 1300\text{ V}$
$R_{GF} = R_{GR} = 3,3\ \Omega$	$i_{CMK1} = 6000\text{ A}$
$t_{vj} = 125^\circ\text{C}$	$i_{CMK2} = 4500\text{ A}$

Unabhängig davon gilt bei abweichenden Bedingungen / with regard to other conditions  $i_{CEM} = V_{CES} - 20\text{nH} \times |di_C/dt|$

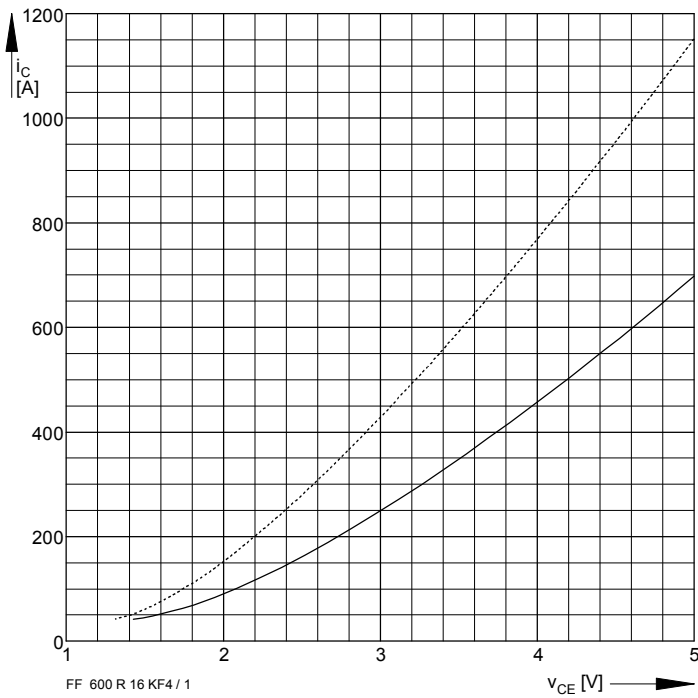


Bild / Fig. 1  
 Kollektor-Emitter-Spannung im Sättigungsbereich (typisch) /  
 Collector-emitter-voltage in saturation region (typical)  
 $V_{GE} = 15 \text{ V}$   
 - - - - -  $t_{vj} = 25^\circ\text{C}$   
 ————  $t_{vj} = 125^\circ\text{C}$

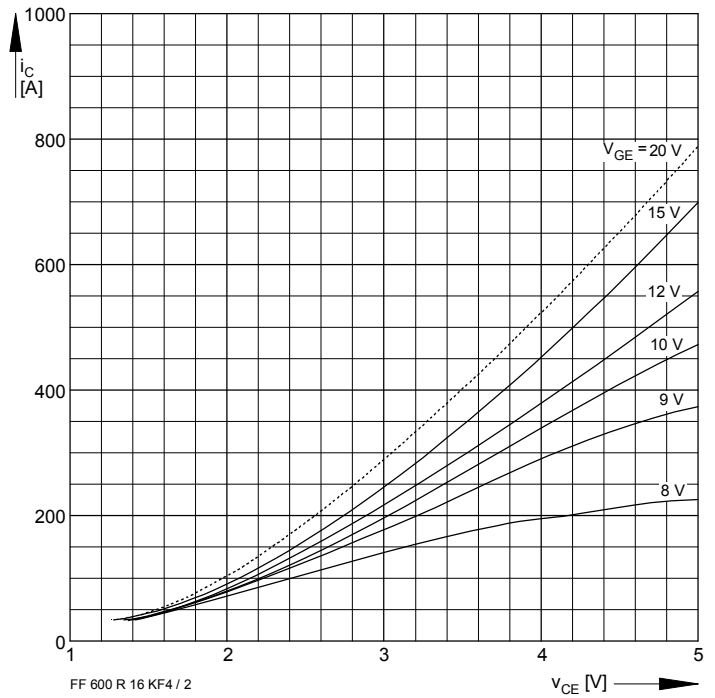


Bild / Fig. 2  
 Kollektor-Emitter-Spannung im Sättigungsbereich (typisch) /  
 Collector-emitter-voltage in saturation region (typical)  
 $t_{vj} = 125^\circ\text{C}$

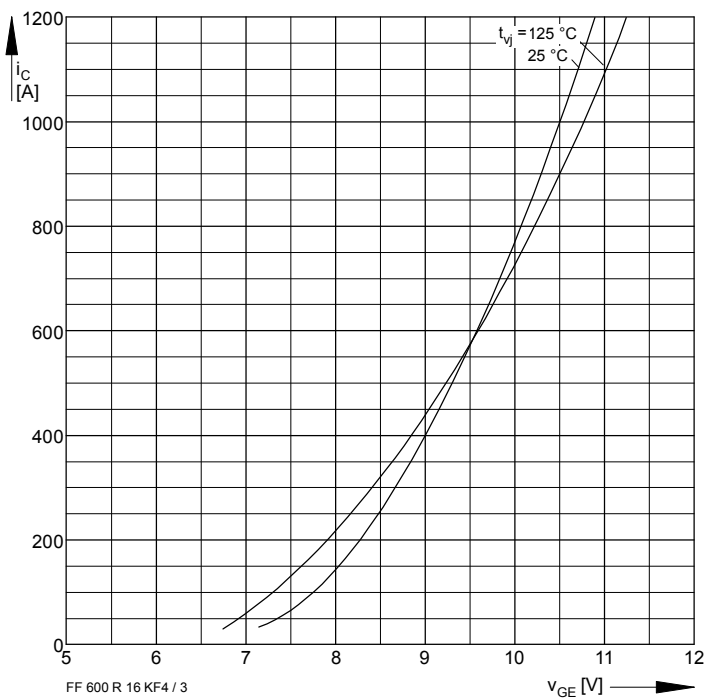


Bild / Fig. 3  
 Übertragungscharakteristik (typisch) /  
 Transfer characteristic (typical)  
 $V_{CE} = 20 \text{ V}$

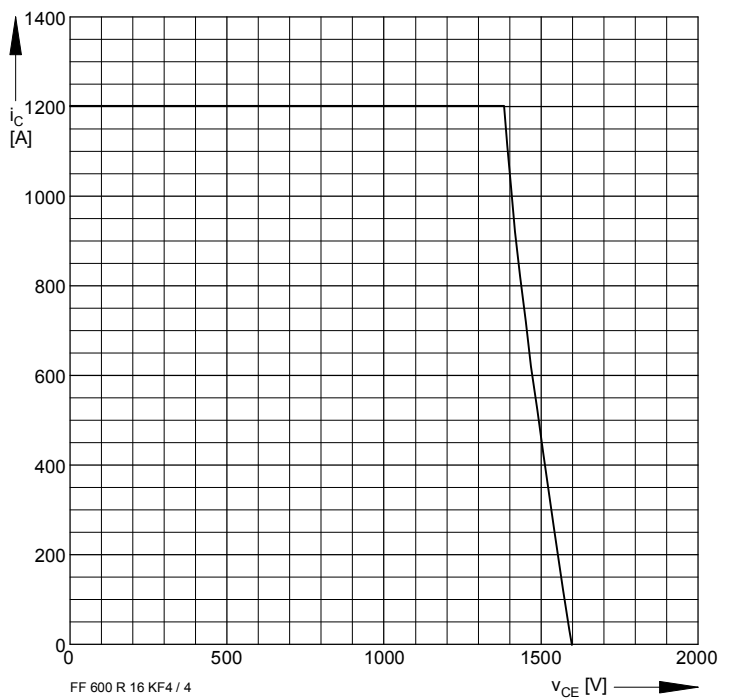


Bild / Fig. 4  
 Rückwärts-Arbeitsbereich /  
 Reverse biased safe operating area  
 $t_{vj} = 125^\circ\text{C}$   
 $v_{LF} = v_{LR} = 15 \text{ V}$   
 $R_G = 3,3 \Omega$

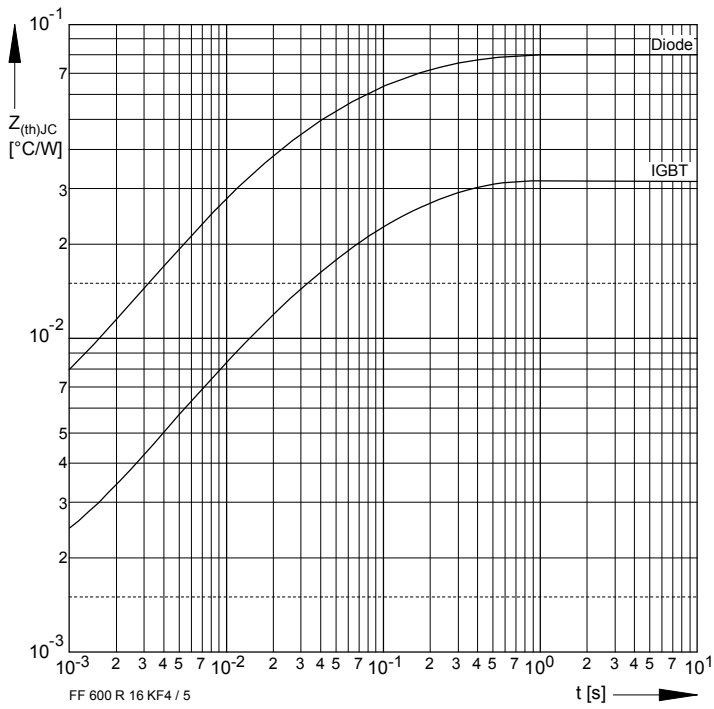


Bild / Fig. 5  
 Transienter innerer Wärmewiderstand (DC) /  
 Transient thermal impedance (DC)

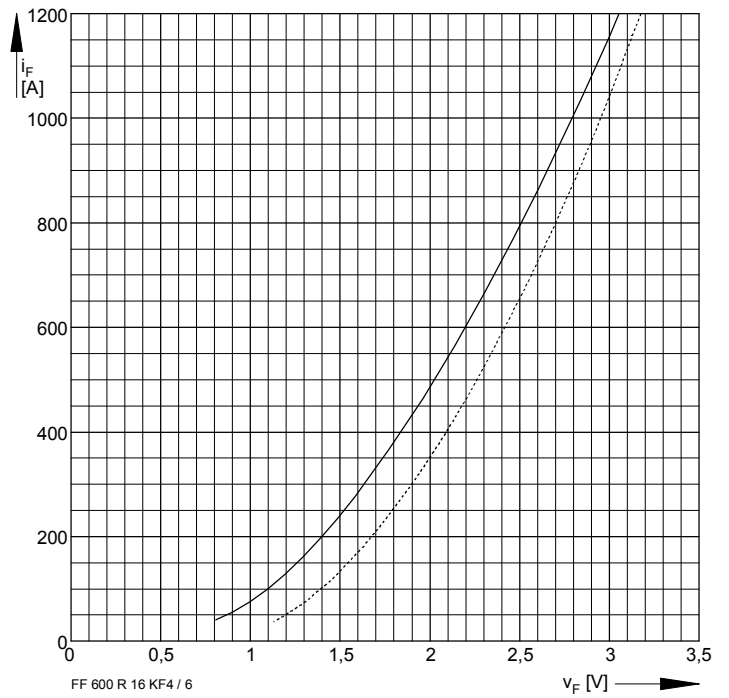


Bild / Fig. 6  
 Durchlaßkennlinie der Inversdiode (typisch) /  
 Forward characteristic of the inverse diode (typical)  
 .....  $t_{vj} = 25^{\circ}C$   
 ———  $t_{vj} = 125^{\circ}C$

## **Terms & Conditions of Usage**

### **Attention**

The present product data is exclusively subscribed to technically experienced staff. This Data Sheet is describing the specification of the products for which a warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its specifications. Changes to the Data Sheet are reserved.

You and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application. Should you require product information in excess of the data given in the Data Sheet, please contact your local Sales Office via "[www.eupec.com / sales & contact](http://www.eupec.com / sales & contact)".

### **Warning**

Due to technical requirements the products may contain dangerous substances. For information on the types in question please contact your local Sales Office via "[www.eupec.com / sales & contact](http://www.eupec.com / sales & contact)".