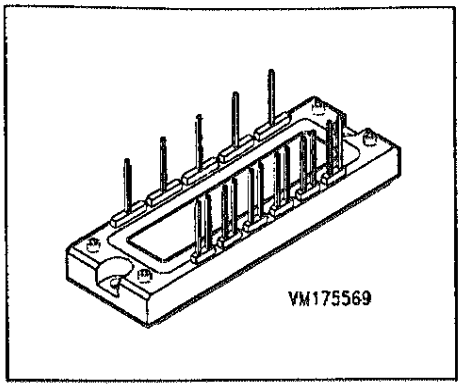
IGBT Power Module



- Power module
- 3-phase full-bridge
- Including fast free-wheel diodes
- Package with insulated metal base plate
- E3226: long terminals, limited current per terminal

Type	V_{CE}	I_C	Package	Ordering Code
BSM 50 GD120DN2E3226	1200V	50A	ECONOPACK 2	C67070-A2514-A67

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CE}	1200	V
Collector-gate voltage	V_{CGR}		
R_{GE} = 20 kΩ		1200	
Gate-emitter voltage	V_{GE}	± 20	
DC collector current	I_C		A
T_C = 25 °C		50	
T_C = 80 °C		45	
Pulsed collector current, t_p = 1 ms	I_{Cpuls}		
T_C = 25 °C		100	
T_C = 80 °C		90	
Power dissipation per IGBT	P_{tot}		W
T_C = 25 °C		350	
Chip temperature	T_j	+ 150	°C
Storage temperature	T_{stg}	-40...+125	

Thermal resistance, chip case	R_{thJC}	≤ 0.35	K/W
Diode thermal resistance, chip case	R_{thJCD}	≤ 0.7	
Insulation test voltage, t = 1min.	V_{is}	2500	Vac
Creepage distance	-	16	mm
Clearance	-	11	
DIN humidity category, DIN 40 040	-	F	-
IEC climatic category, DIN IEC 68-1	-	55 / 150 / 56	

Electrical Characteristics, at $T_j = 25$ °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Gate threshold voltage $V_{GE} = V_{CE}$, $I_C = 2$ mA	$V_{GE(th)}$	4.5	5.5	6.5	V
Collector-emitter saturation voltage $V_{GE} = 15$ V, $I_C = 50$ A, $T_j = 25$ °C $V_{GE} = 15$ V, $I_C = 50$ A, $T_j = 125$ °C	$V_{CE(sat)}$	- -	2.5 3.1	3 3.7	
Zero gate voltage collector current $V_{CE} = 1200$ V, $V_{GE} = 0$ V, $T_j = 25$ °C $V_{CE} = 1200$ V, $V_{GE} = 0$ V, $T_j = 125$ °C	I_{CES}	- -	0.8 4	1 -	mA
Gate-emitter leakage current $V_{GE} = 20$ V, $V_{CE} = 0$ V	I_{GES}	-	-	200	nA
AC Characteristics					
Transconductance $V_{CE} = 20$ V, $I_C = 50$ A	g_{fs}	23	-	-	S
Input capacitance $V_{CE} = 25$ V, $V_{GE} = 0$ V, $f = 1$ MHz	C_{iss}	-	3300	-	pF
Output capacitance $V_{CE} = 25$ V, $V_{GE} = 0$ V, $f = 1$ MHz	C_{oss}	-	500	-	
Reverse transfer capacitance $V_{CE} = 25$ V, $V_{GE} = 0$ V, $f = 1$ MHz	C_{rss}	-	220	-	

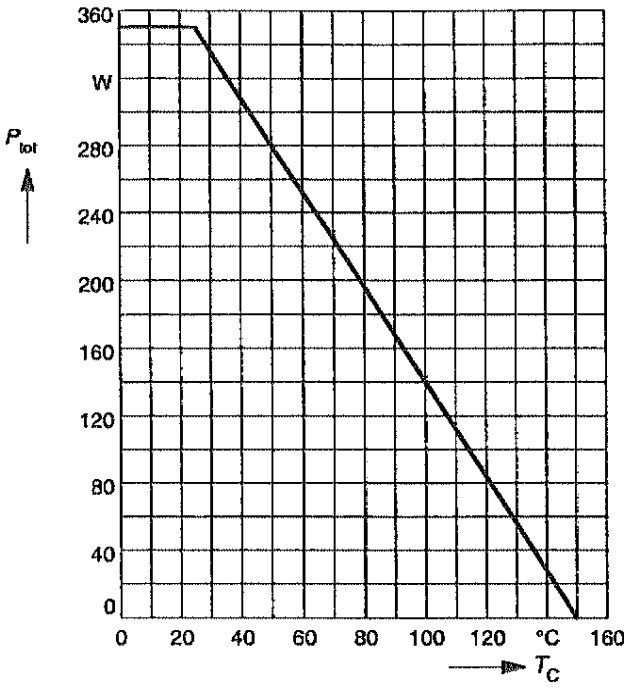
Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Switching Characteristics, Inductive Load at T_j = 125 °C					
Turn-on delay time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 50 A R_{Gon} = 22 Ω	$t_{d(on)}$	-	44	100	ns
Rise time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 50 A R_{Gon} = 22 Ω	t_r	-	56	100	
Turn-off delay time V_{CC} = 600 V, V_{GE} = -15 V, I_C = 50 A R_{Goff} = 22 Ω	$t_{d(off)}$	-	380	500	
Fall time V_{CC} = 600 V, V_{GE} = -15 V, I_C = 50 A R_{Goff} = 22 Ω	t_f	-	70	100	
Free-Wheel Diode					
Diode forward voltage I_F = 50 A, V_{GE} = 0 V, T_j = 25 °C I_F = 50 A, V_{GE} = 0 V, T_j = 125 °C	V_F	- -	2.3 1.8	2.8 -	V
Reverse recovery time I_F = 50 A, V_R = -600 V, V_{GE} = 0 V di_F/dt = -800 A/µs, T_j = 125 °C	t_{rr}	-	0.2	-	µs
Reverse recovery charge I_F = 50 A, V_R = -600 V, V_{GE} = 0 V di_F/dt = -800 A/µs T_j = 25 °C T_j = 125 °C	Q_{rr}	- -	2.8 8	- -	µC

Power dissipation

$P_{tot} = f(T_C)$

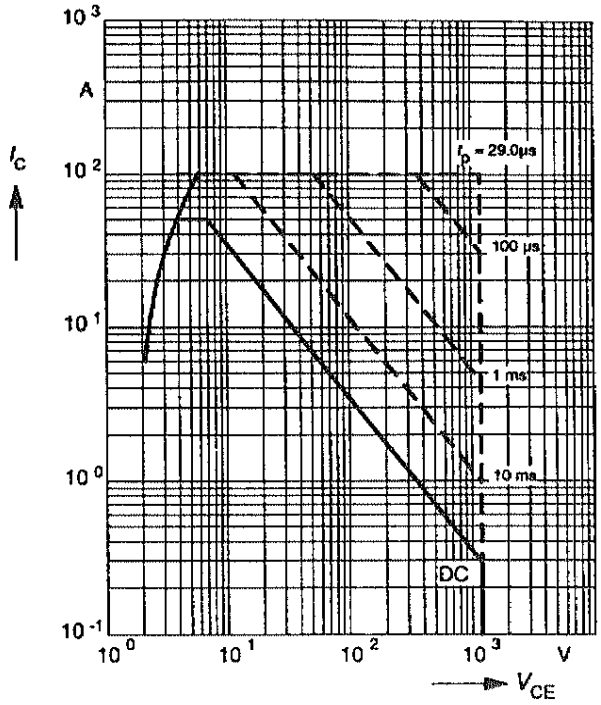
parameter: $T_j \leq 150$ °C



Safe operating area

$I_C = f(V_{CE})$

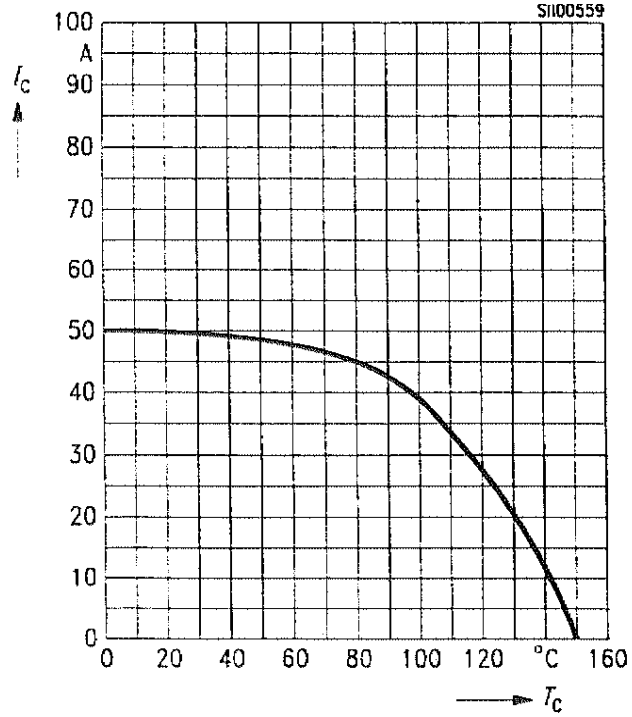
parameter: $D = 0$, $T_C = 25$°C , $T_j \leq 150$ °C



Collector current

$I_C = f(T_C)$

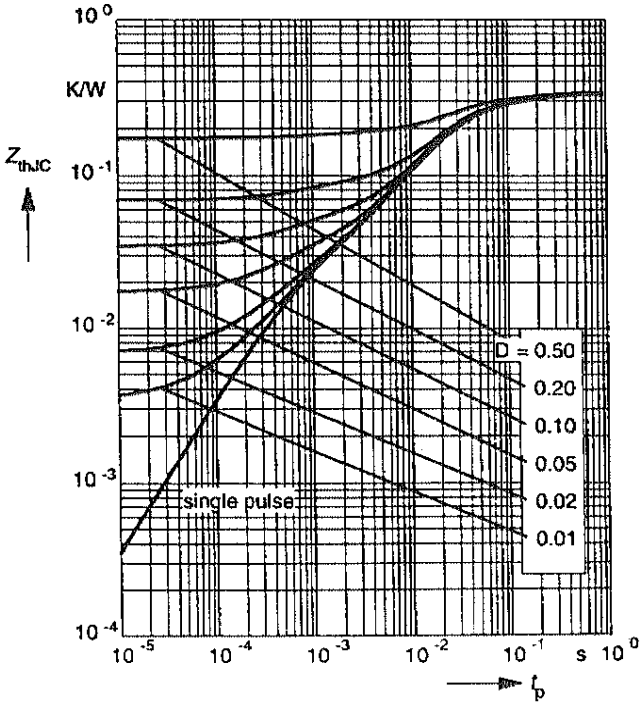
parameter: $V_{GE} \geq 15$ V, $T_j \leq 150$ °C



Transient thermal impedance IGBT

$Z_{th\,JC} = f(t_p)$

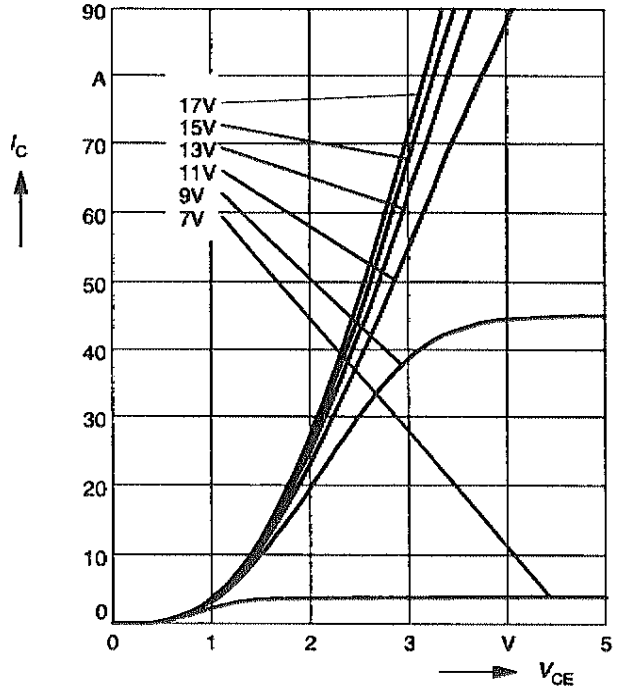
parameter: $D = t_p / T$



Typ. output characteristics

$I_C = f(V_{CE})$

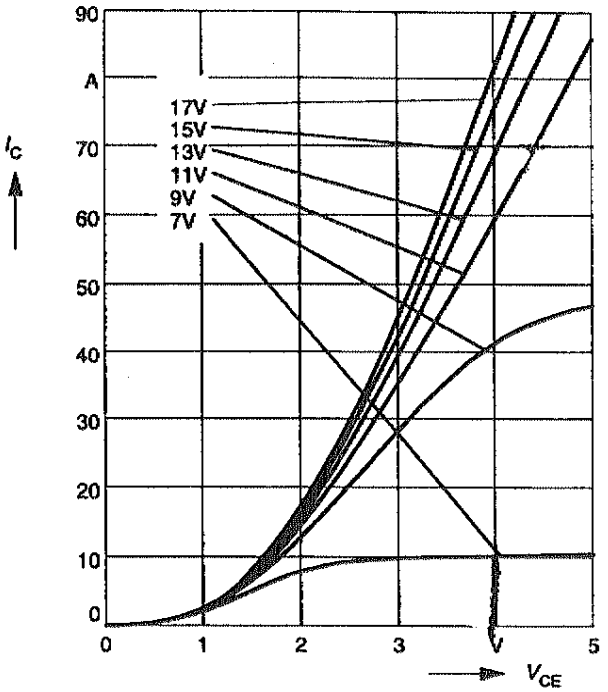
parameter: $t_p = 80\ \mu s$, $T_j = 25\ °C$



Typ. output characteristics

$I_C = f(V_{CE})$

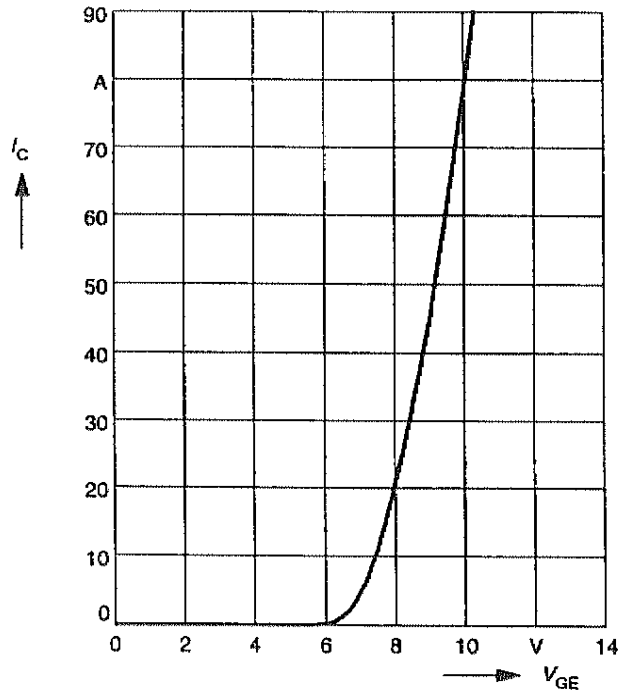
parameter: $t_p = 80\ \mu s$, $T_j = 125\ °C$



Typ. transfer characteristics

$I_C = f(V_{GE})$

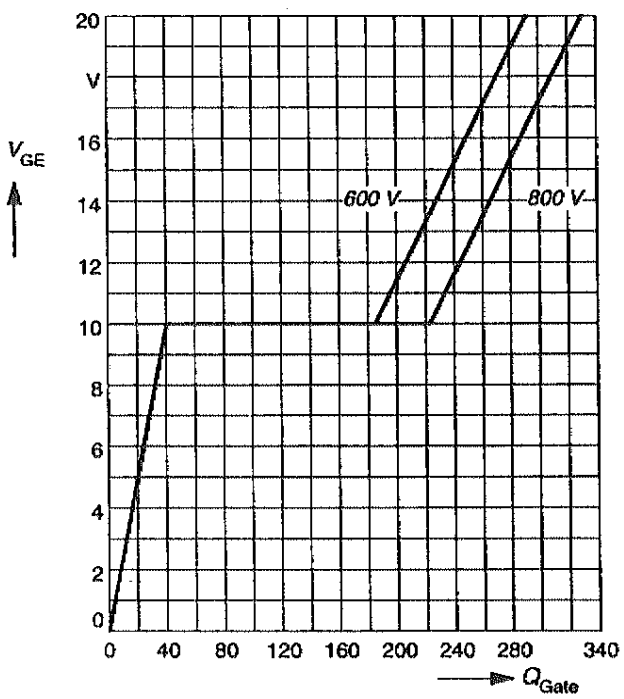
parameter: $t_p = 80\ \mu s$, $V_{CE} = 20\ V$



Typ. gate charge

$V_{GE} = f(Q_{Gate})$

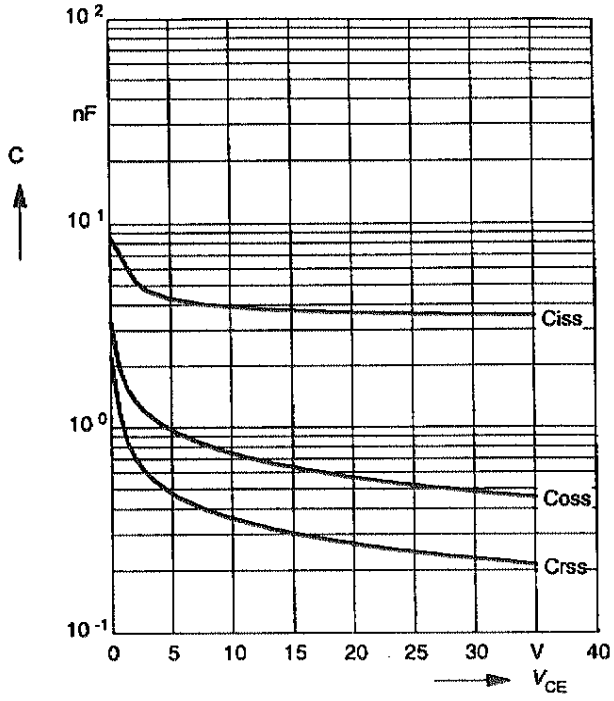
parameter: $I_{C\ puls} = 50$ A



Typ. capacitances

$C = f(V_{CE})$

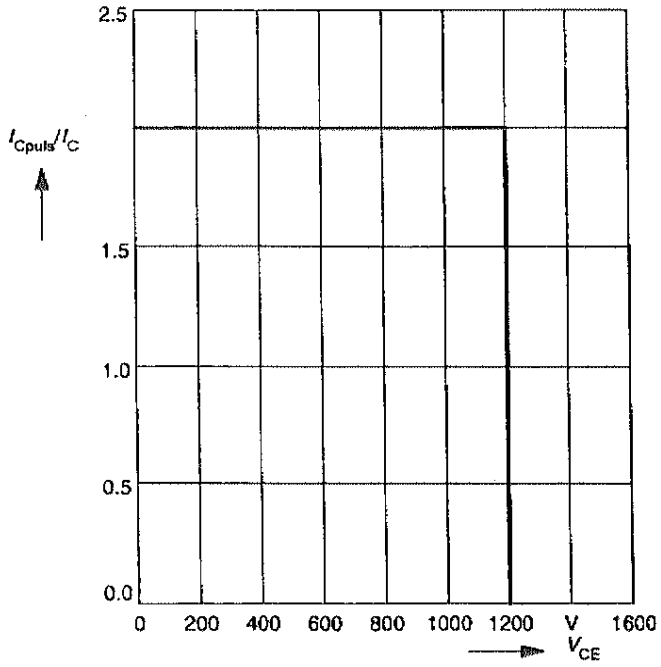
parameter: $V_{GE} = 0$ V, f = 1 MHz



Reverse biased safe operating area

$I_{Cpuls} = f(V_{CE})$, $T_j = 150°C$

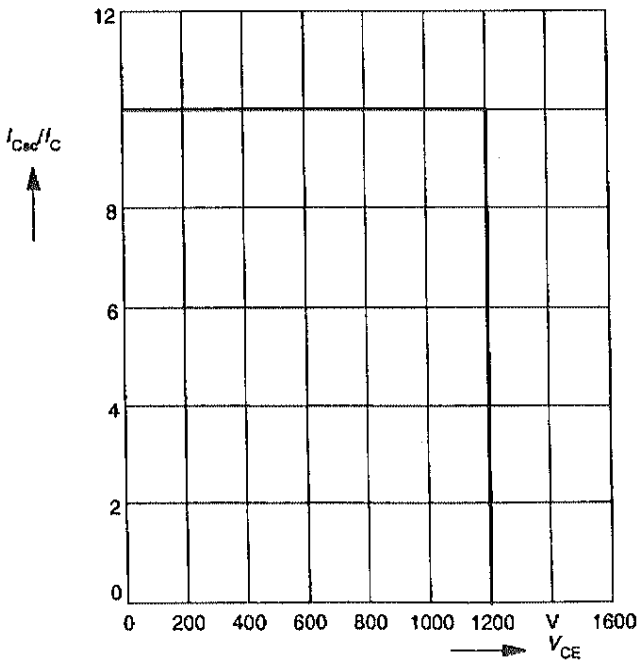
parameter: $V_{GE} = 15$ V



Short circuit safe operating area

$I_{Csc} = f(V_{CE})$, $T_j = 150°C$

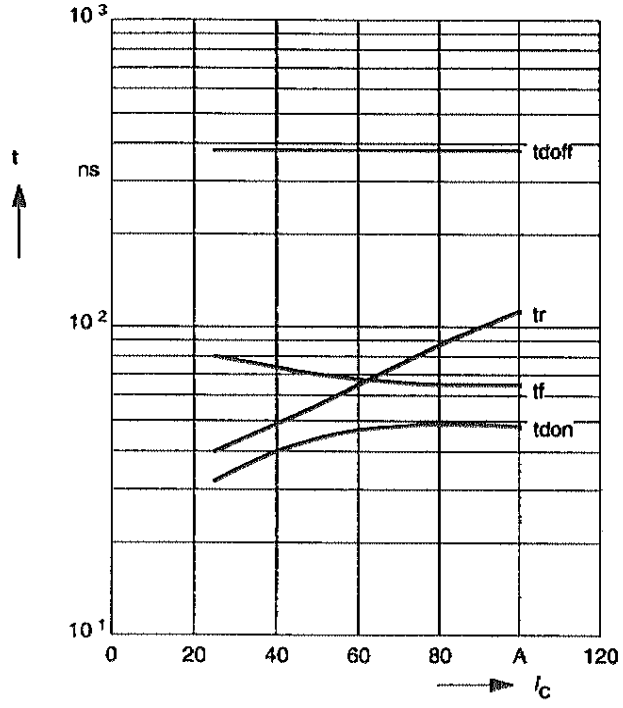
parameter: $V_{GE} = \pm 15$ V, $t_{SC} \leq 10$ µs, L < 50 nH



Typ. switching time

$t = f(I_C)$, inductive load, $T_j = 125°C$

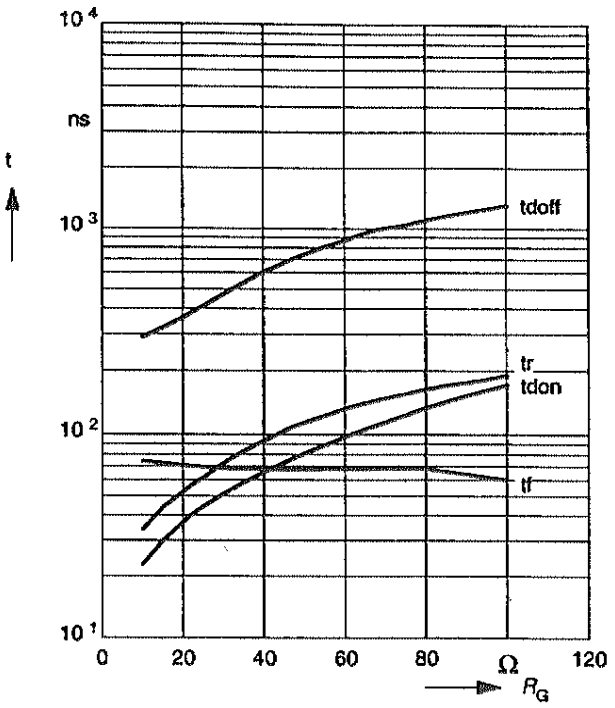
par.: $V_{CE} = 600$ V, $V_{GE} = \pm 15$ V, $R_G = 22\ \Omega$



Typ. switching time

$t = f(R_G)$, inductive load, $T_j = 125°C$

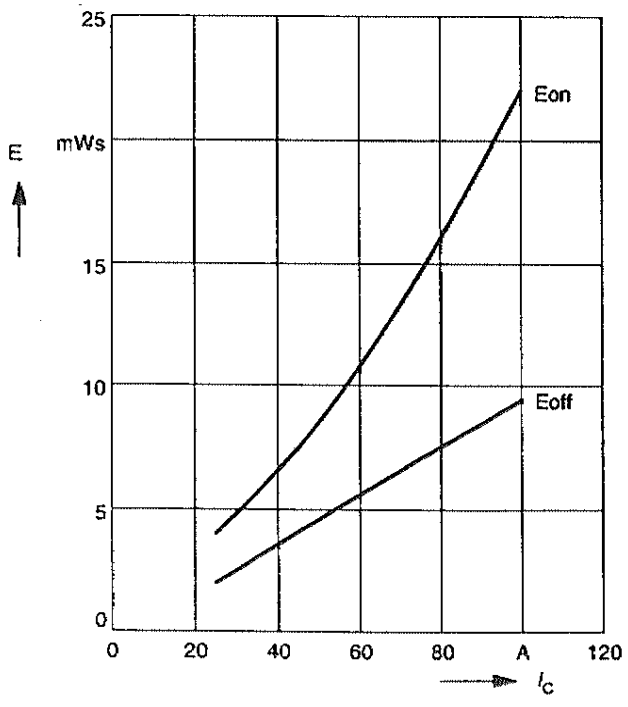
par.: $V_{CE} = 600$ V, $V_{GE} = \pm 15$ V, $I_C = 50$ A



Typ. switching losses

$E = f(I_C)$, inductive load, $T_j = 125°C$

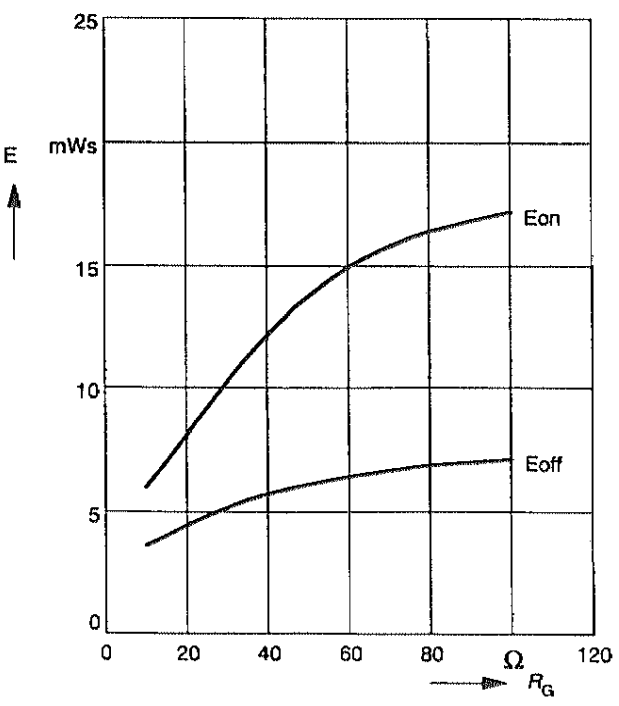
par.: $V_{CE} = 600$ V, $V_{GE} = \pm 15$ V, $R_G = 22\ \Omega$



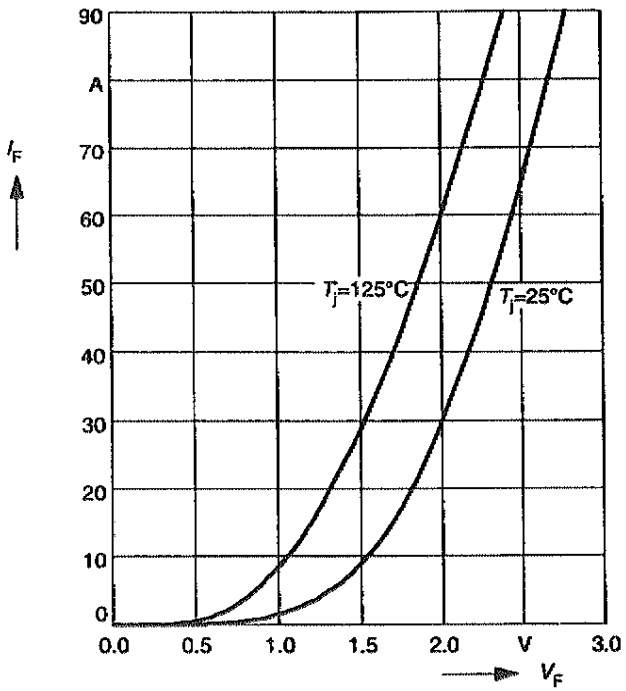
Typ. switching losses

$E = f(R_G)$, inductive load, $T_j = 125°C$

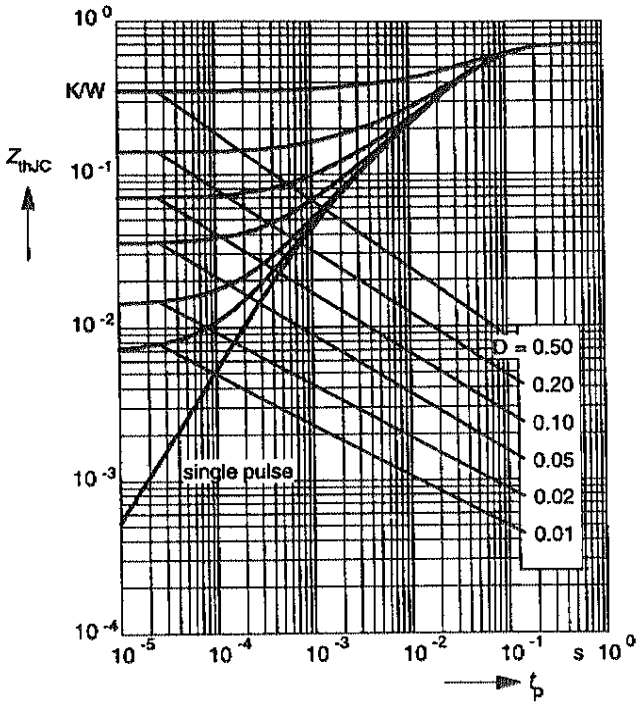
par.: $V_{CE} = 600$V, $V_{GE} = \pm 15$ V, $I_C = 50$ A



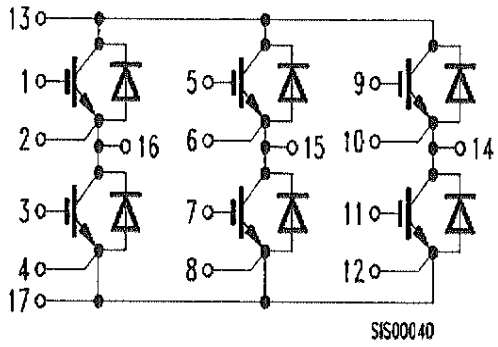
Forward characteristics of fast recovery reverse diode $I_F = f(V_F)$
parameter: T_j



Transient thermal impedance Diode
$Z_{th\,JC} = f(t_p)$
parameter: $D = t_p / T$



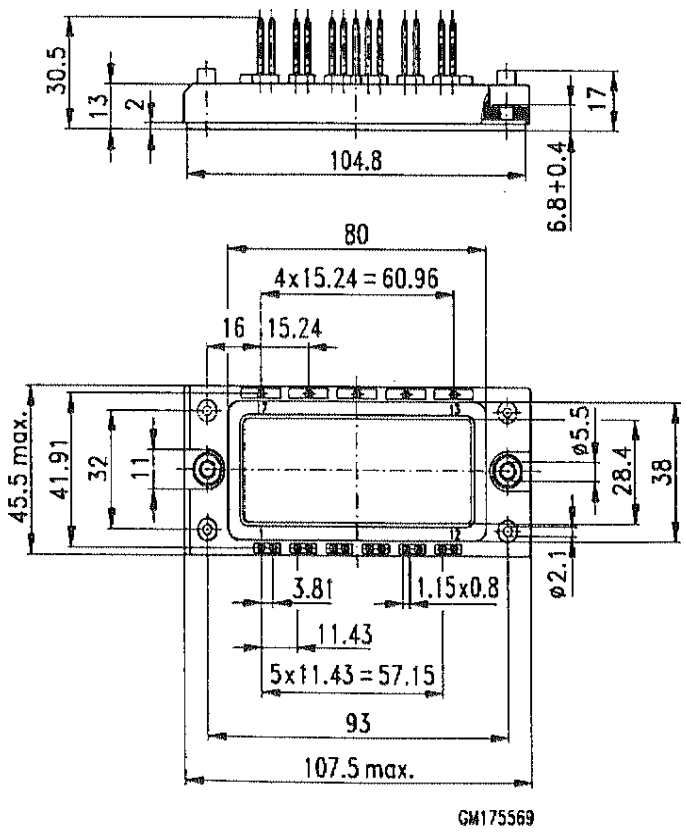
Circuit Diagram



Package Outlines

Dimensions in mm

Weight: 180 g



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".

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".