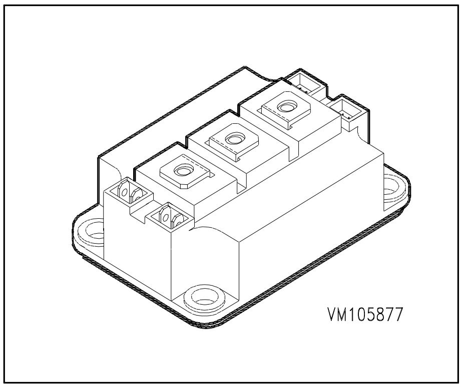
IGBT Power Module

Preliminary data

- Half-bridge
- Including fast free-wheeling diodes
- Package with insulated metal base plate
- $R_{G\ on,min}$ = 15 Ohm



Type	V_{CE}	I_C	Package	Ordering Code
BSM 100 GB 170 DN2	1700V	145A	HALF-BRIDGE 2	C67070-A2703-A67

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CE}	1700	V
Collector-gate voltage R_{GE} = 20 kΩ	V_{CGR}	1700	
Gate-emitter voltage	V_{GE}	± 20	
DC collector current T_C = 25 °C T_C = 80 °C	I_C	 145 100	A
Pulsed collector current, t_p = 1 ms T_C = 25 °C T_C = 80 °C	I_{Cpuls}	 290 200	
Power dissipation per IGBT T_C = 25 °C	P_{tot}	1000	W
Chip temperature	T_j	+ 150	°C
Storage temperature	T_{stg}	-55 ... + 150	

Parameter	Symbol	Values	Unit
Thermal resistance, chip case	R_{thJC}	≤ 0.13	K/W
Diode thermal resistance, chip case	$R_{thJC\mathbf{D}}$	≤ 0.4	
Insulation test voltage, t = 1min.	V_{is}	4000	Vac
Creepage distance	-	20	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 = 8 mA	$V_{GE(th)}$	4.8	5.5	6.2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$				
V_{GE} = 15 V, I_C = 100 A, T_j = 25 °C		-	3.4	3.9	
V_{GE} = 15 V, I_C = 100 A, T_j = 125 °C		-	4.5	5.3	
Zero gate voltage collector current	I_{CES}				mA
V_{CE} = 1700 V, V_{GE} = 0 V, T_j = 25 °C		-	0.8	1	
V_{CE} = 1700 V, V_{GE} = 0 V, T_j = 125 °C		-	3.2	-	
Gate-emitter leakage current V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	-	-	320	nA
AC Characteristics					
Transconductance V_{CE} = 20 V, I_C = 100 A	g_{fs}	36	-	-	S
Input capacitance V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	C_{iss}	-	16	-	nF
Output capacitance V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	C_{oss}	-	1.3	-	
Reverse transfer capacitance V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	C_{rss}	-	0.5	-	

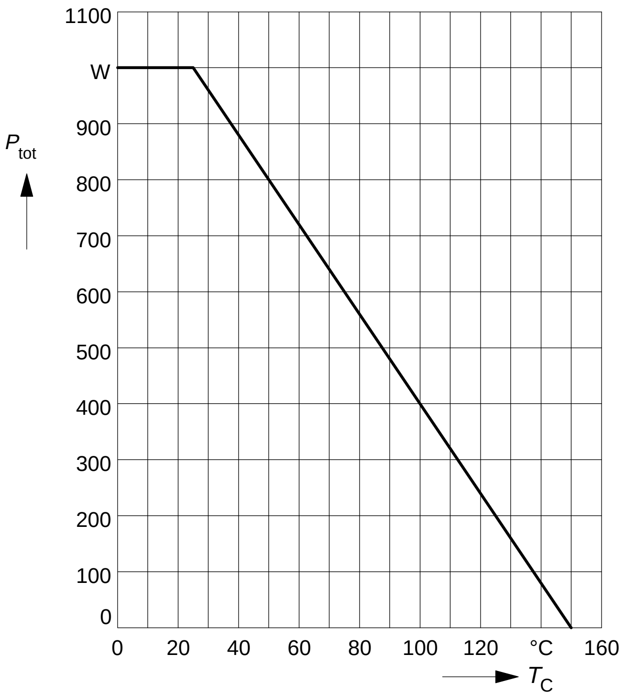
Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Switching Characteristics, Inductive Load at T_j = 125 °C					
Turn-on delay time V_{CC} = 1200 V, V_{GE} = 15 V, I_C = 100 A R_{Gon} = 15 Ω	$t_{d(on)}$	-	450	900	ns
Rise time V_{CC} = 1200 V, V_{GE} = 15 V, I_C = 100 A R_{Gon} = 15 Ω	t_r	-	200	400	
Turn-off delay time V_{CC} = 1200 V, V_{GE} = -15 V, I_C = 100 A R_{Goff} = 15 Ω	$t_{d(off)}$	-	850	1200	
Fall time V_{CC} = 1200 V, V_{GE} = -15 V, I_C = 100 A R_{Goff} = 15 Ω	t_f	-	110	160	
Free-Wheel Diode					
Diode forward voltage I_F = 100 A, V_{GE} = 0 V, T_j = 25 °C I_F = 100 A, V_{GE} = 0 V, T_j = 125 °C	V_F	- -	2.3 2.1	2.8 -	V
Reverse recovery time I_F = 100 A, V_R = -1200 V, V_{GE} = 0 V di_F/dt = -1000 A/µs, T_j = 125 °C	t_{rr}	-	0.5	-	µs
Reverse recovery charge I_F = 100 A, V_R = -1200 V, V_{GE} = 0 V di_F/dt = -1000 A/µs T_j = 25 °C T_j = 125 °C	Q_{rr}	- -	8 25	- -	µC

Power dissipation

$P_{tot} = f(T_C)$

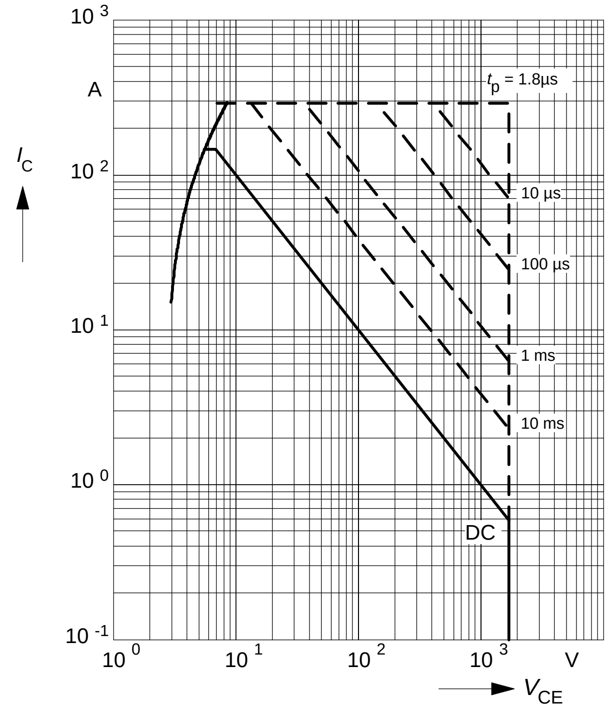
parameter: $T_j \leq 150$ °C



Safe operating area

$I_C = f(V_{CE})$

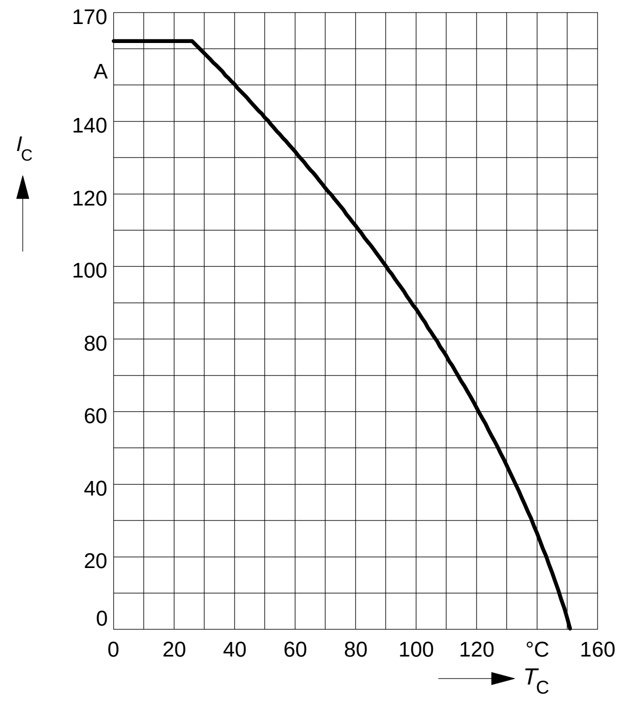
parameter: $D = 0$, $T_C = 25$°C , $T_j \leq 150$ °C



Collector current

$I_C = f(T_C)$

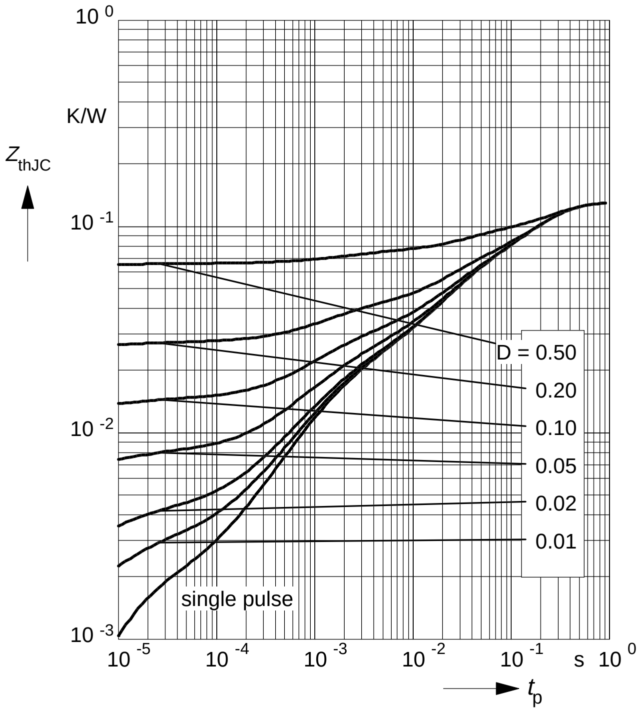
parameter: $V_{GE} \geq 15$ V , $T_j \leq 150$ °C



Transient thermal impedance IGBT

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

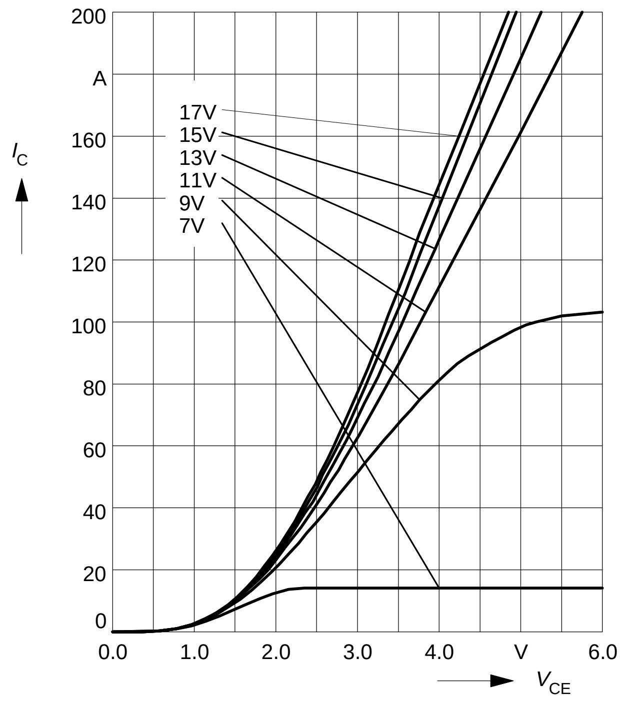
parameter: $D = t_p / T$



Typ. output characteristics

$I_C = f\,(V_{CE})$

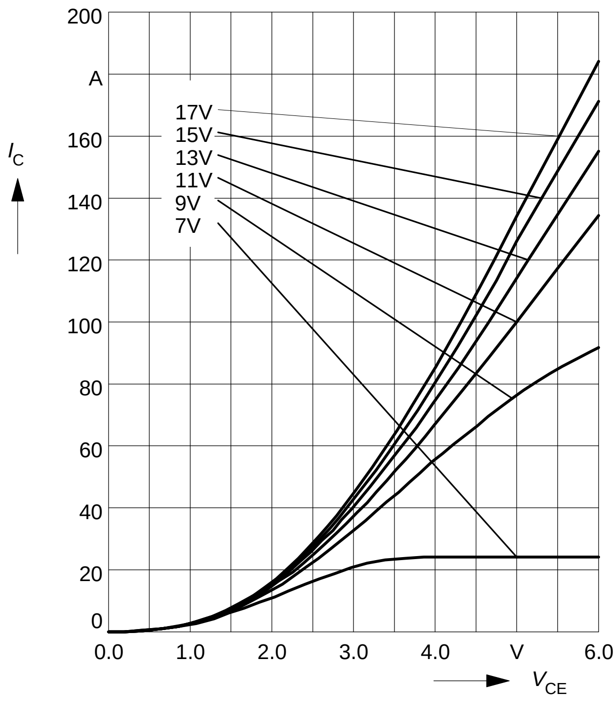
parameter: t_p = 80 µs, T_j = 25 °C



Typ. output characteristics

$I_C = f\,(V_{CE})$

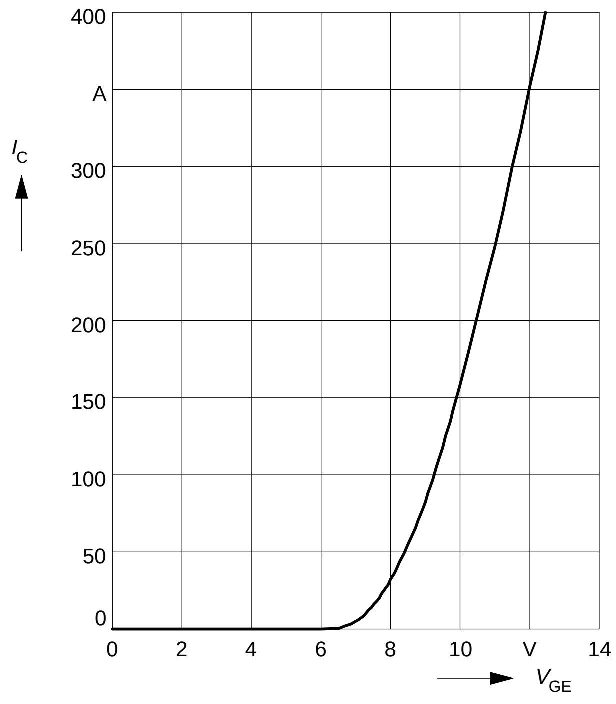
parameter: t_p = 80 µs, T_j = 125 °C



Typ. transfer characteristics

$I_C = f\,(V_{GE})$

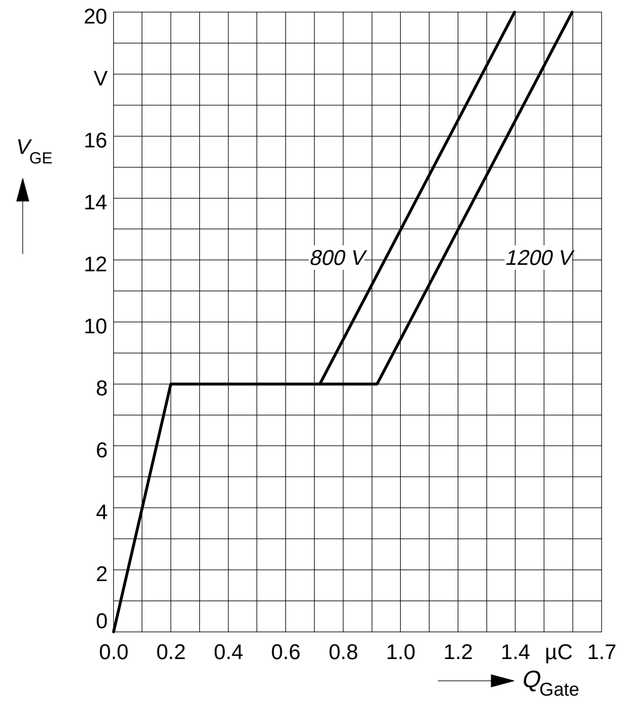
parameter: t_p = 80 µs, V_{CE} = 20 V



Typ. gate charge

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

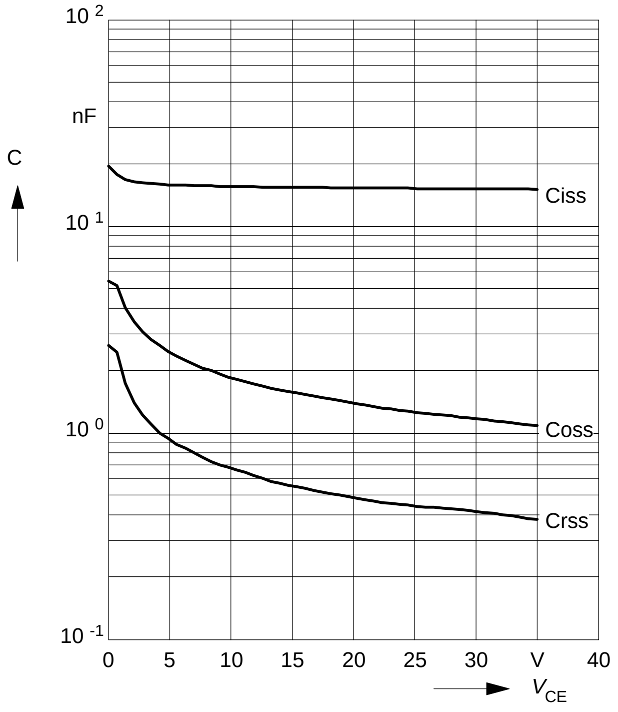
parameter: $I_{C\ puls} = 100$ A



Typ. capacitances

$C = f(V_{CE})$

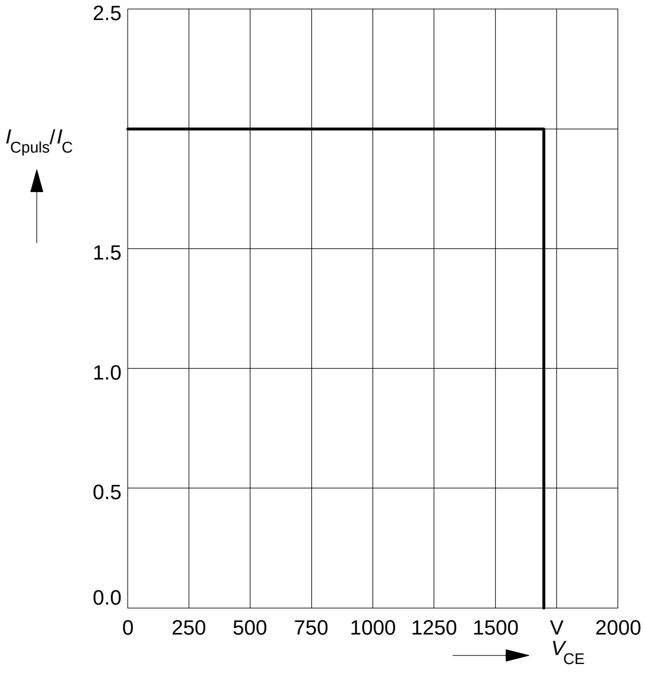
parameter: $V_{GE} = 0$, f = 1 MHz



Reverse biased safe operating area

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

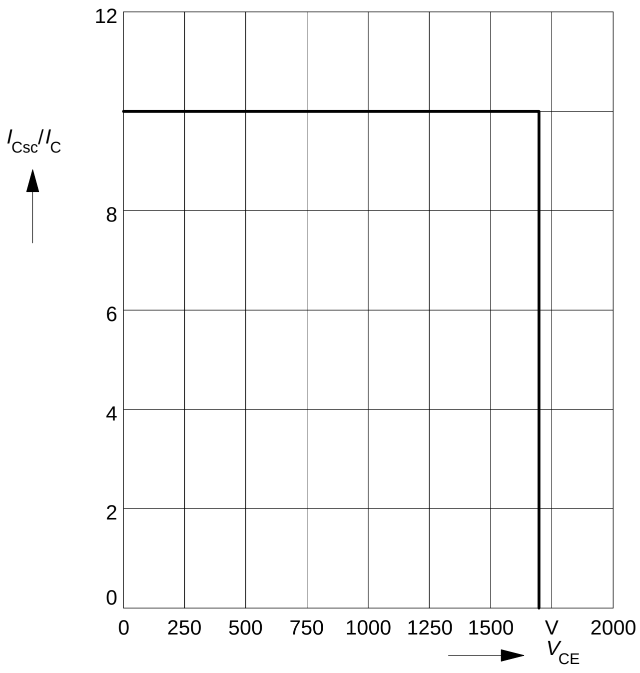
parameter: $V_{GE} = 15$ V



Short circuit safe operating area

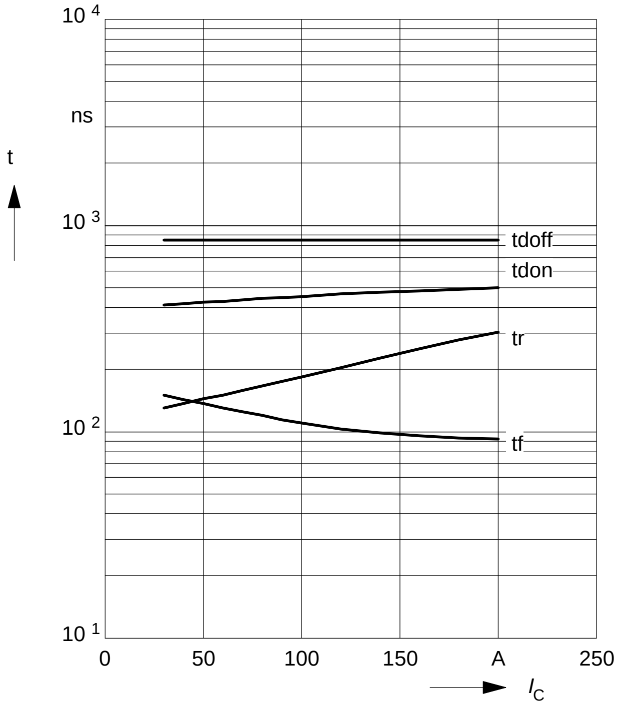
$I_{Csc} = f(V_{CE})$, $T_j = 150$°C

parameter: $V_{GE} = \pm 15$ V, $t_{SC} \leq 10$ µs, L < 25 nH



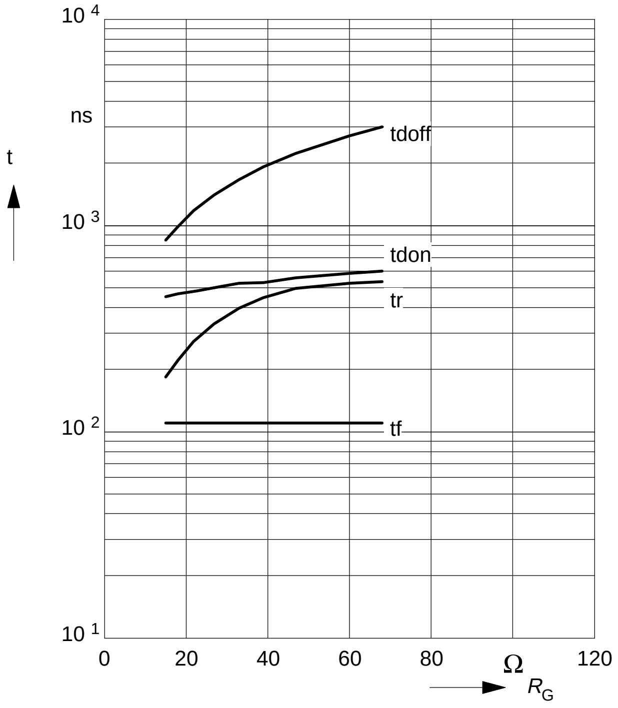
Typ. switching time

$I = f(I_C)$, inductive load , T_j = 125°C
par.: V_{CE} = 1200 V, V_{GE} = ± 15 V, R_G = 15 Ω



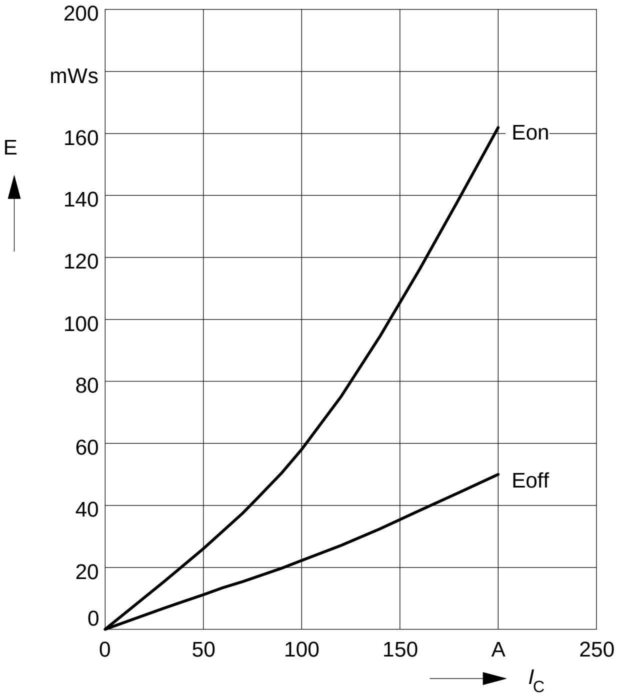
Typ. switching time

$t = f(R_G)$, inductive load , T_j = 125°C
par.: V_{CE} = 1200 V, V_{GE} = ± 15 V, I_C = 100 A



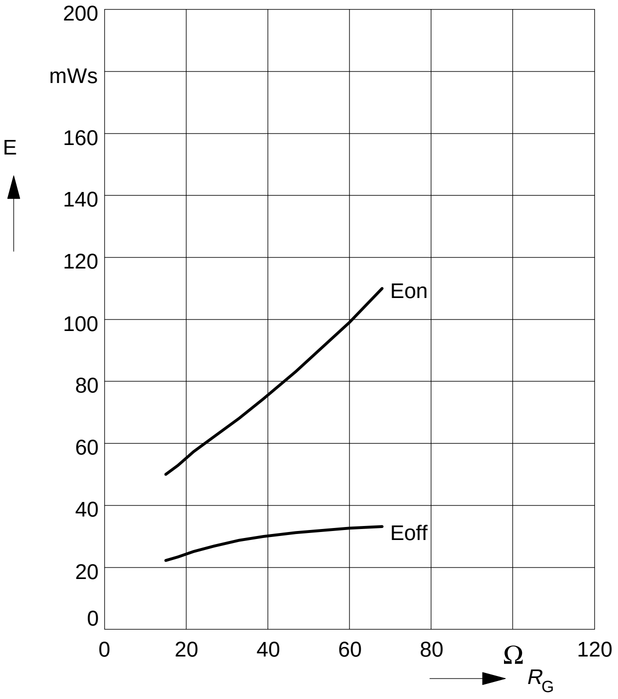
Typ. switching losses

$E = f(I_C)$, inductive load , T_j = 125°C
par.: V_{CE} = 1200 V, V_{GE} = ± 15 V, R_G = 15 Ω



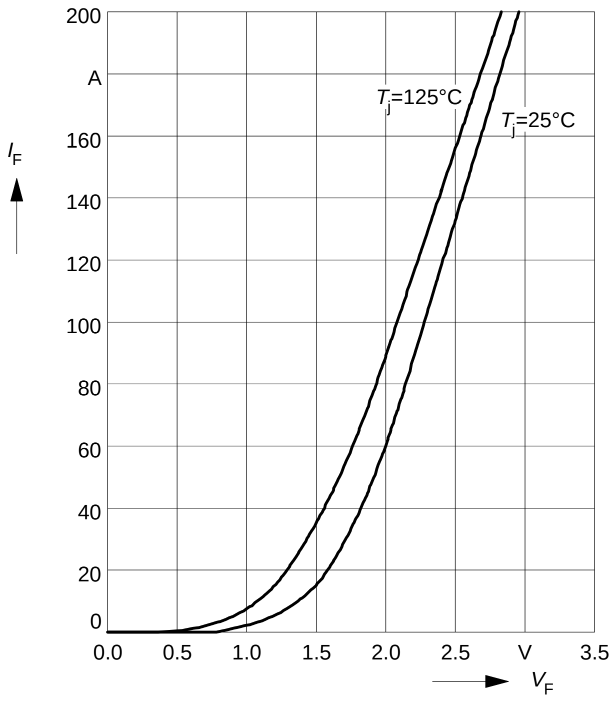
Typ. switching losses

$E = f(R_G)$, inductive load , T_j = 125°C
par.: V_{CE} = 1200 V, V_{GE} = ± 15 V, I_C = 100 A



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

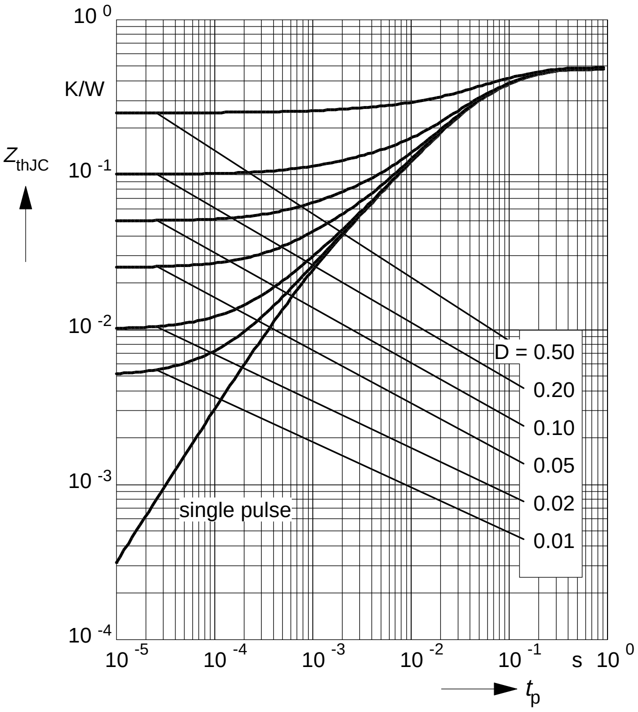
parameter: T_j



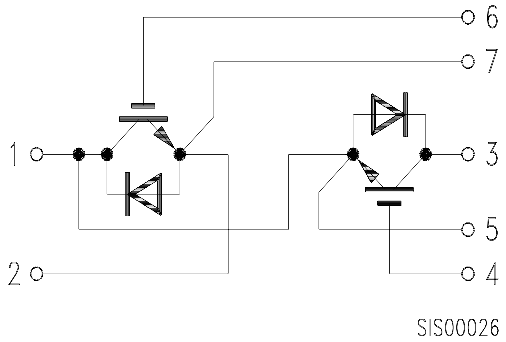
Transient thermal impedance Diode

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

parameter: $D = t_p / T$



Circuit Diagram



Package Outlines

Dimensions in mm

Weight: 420 g