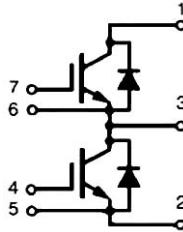
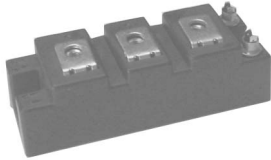
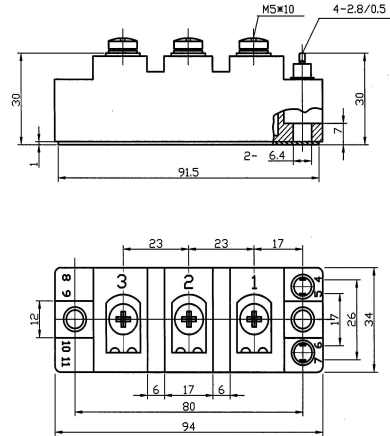


SII50N12

NPT IGBT Modules



Dimensions in mm (1mm = 0.0394")



Absolute Maximum Ratings

$T_c = 25^{\circ}\text{C}$, unless otherwise specified

Symbol	Conditions	Values	Units
V_{CES}		1200	V
I_C	$T_c = 25(80)^{\circ}\text{C}$	78(50)	A
I_{CRM}	$T_c = 25(80)^{\circ}\text{C}$, $t_P = 1\text{ms}$	156(100)	A
V_{GES}		± 20	V
P_{tot}		400	W
$T_{Vj}, (T_{stg})$	$T_{OPERATION} \leq T_{stg}$	$-40 \dots +125(150)$	$^{\circ}\text{C}$
V_{isol}	AC, 1min	2500	V
R_{thJC}		≤ 0.3	K/W
R_{thJCD}		≤ 0.6	

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NPT IGBT Modules

Electrical Characteristics

$T_c = 25^\circ\text{C}$, unless otherwise specified

Symbol	Conditions	min.	typ.	max.	Units
Static Characteristics					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_c = 2\text{mA}$	4.5	5.5	6.5	V
I_{CES}	$V_{GE} = 0$; $V_{CE} = 1200\text{V}$; $T_j = 25(125)^\circ\text{C}$		0.8(3.5)	1	mA
I_{GES}	$V_{GE} = 20\text{V}$, $V_{CE} = 0$			200	nA
$V_{CE(sat)}$	$I_c = 50\text{A}$; $V_{GE} = 15\text{V}$; $T_j = 25(125)^\circ\text{C}$; chip level		2.5(3.1)	3(3.7)	V
AC Characteristics					
C_{ies}	under following conditions		3.3		nF
C_{oes}	$V_{GE} = 0$, $V_{CE} = 25\text{V}$, $f = 1\text{MHz}$		0.5		
C_{res}			0.25		
g_{fs}	$V_{CE} = 20\text{V}$, $I_c = 50\text{A}$	23			S
Switching Characteristics					
$t_{d(on)}$	$V_{CC} = 600\text{V}$, $I_c = 50\text{A}$		44	100	ns
t_r	$R_{Gon} = R_{Goff} = 22\Omega$, $T_j = 125^\circ\text{C}$		56	100	
$t_{d(off)}$	$V_{GE} = \pm 15\text{V}$		380	500	
t_f			70	100	
FWD under following conditions:					
V_F	$I_F = 50\text{A}$, $V_{GE} = 0\text{V}$, $T_j = 25(125)^\circ\text{C}$		2.3(1.8)	2.8	V
t_{rr}	$I_F = 50\text{A}$, $V_R = -600\text{V}$, $V_{GE} = 0\text{V}$, $di/dt = -800\text{A}/\mu\text{s}$, $T_j = 125^\circ\text{C}$		0.2		μs
Q_{rr}	$I_F = 50\text{A}$, $V_{GE} = 0\text{V}$, $V_R = -600\text{V}$ $di/dt = -800\text{A}/\mu\text{s}$, $T_j = 25(125)^\circ\text{C}$		2.8(8)		μC
Mechanical Data					
M_s	to heatsink M6	3		5	Nm
M_t	to terminals M5	2.5		5	Nm
w				160	g

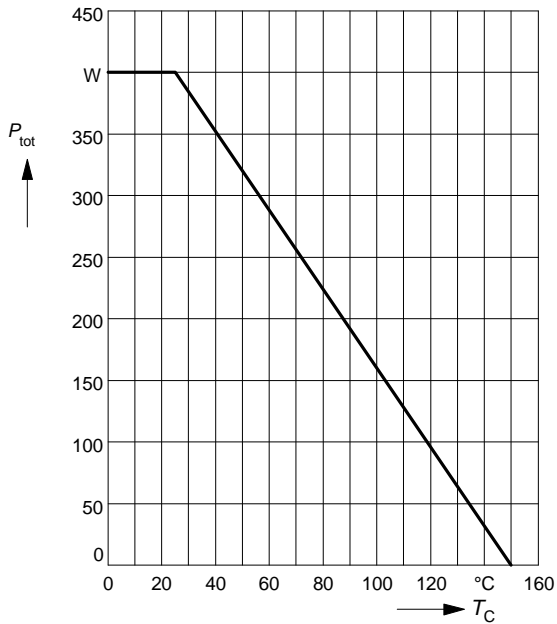
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NPT IGBT Modules

Power dissipation

$$P_{\text{tot}} = f(T_C)$$

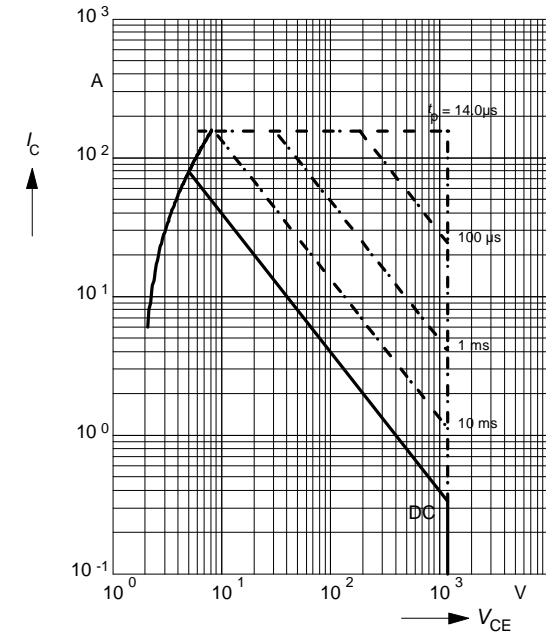
parameter: $T_j \leq 150^\circ\text{C}$



Safe operating area

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

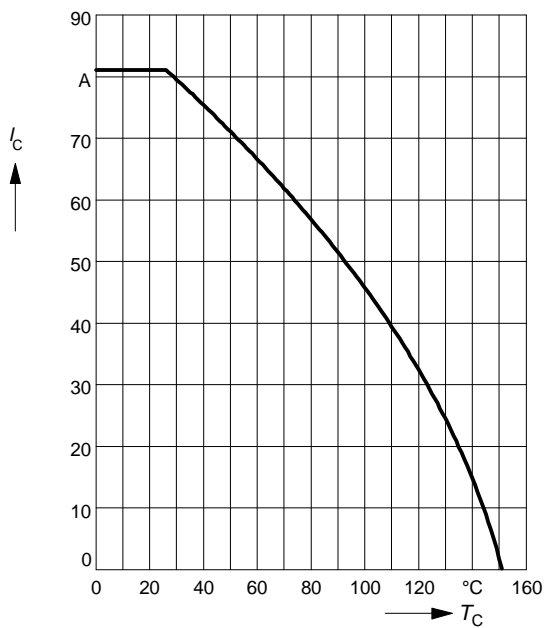
parameter: $D = 0$, $T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$



Collector current

$$I_C = f(T_C)$$

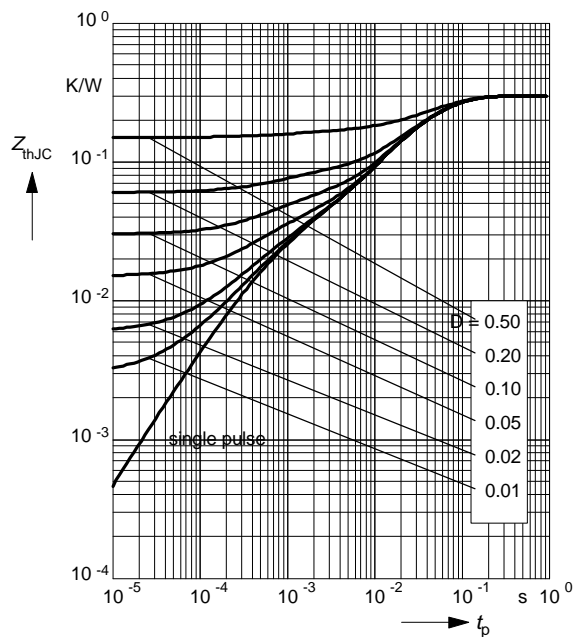
parameter: $V_{\text{GE}} \geq 15\text{ V}$, $T_j \leq 150^\circ\text{C}$



Transient thermal impedance IGBT

$$Z_{\text{thJC}} = f(t_p)$$

parameter: $D = t_p / T$



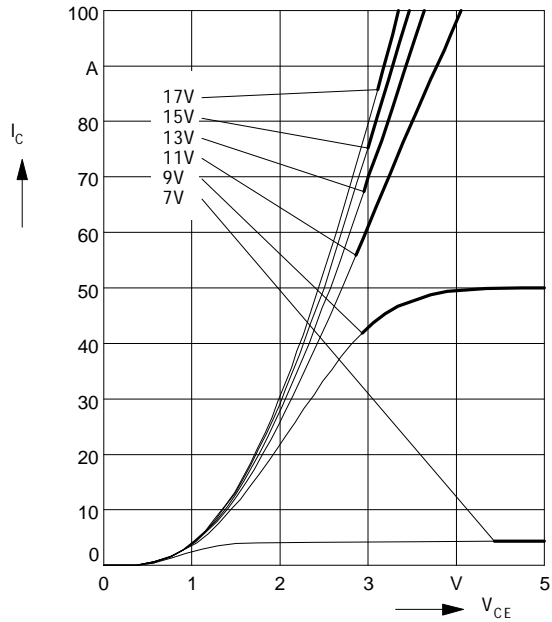
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NPT IGBT Modules

Typ. output characteristics

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

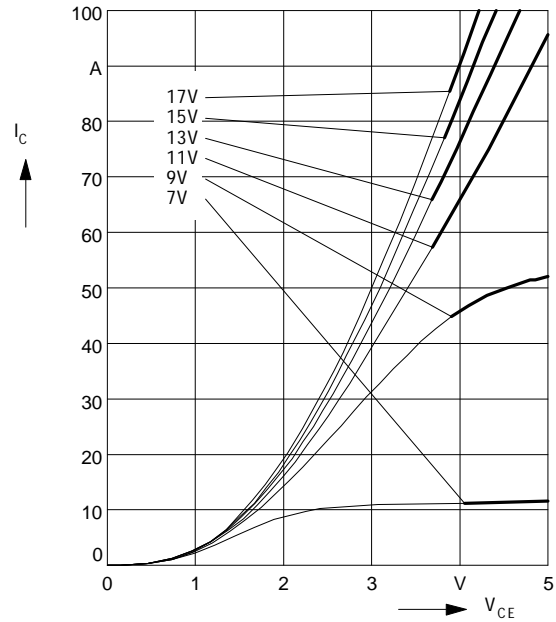
parameter: $t_p = 80 \mu s$, $T_j = 25^\circ C$



Typ. output characteristics

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

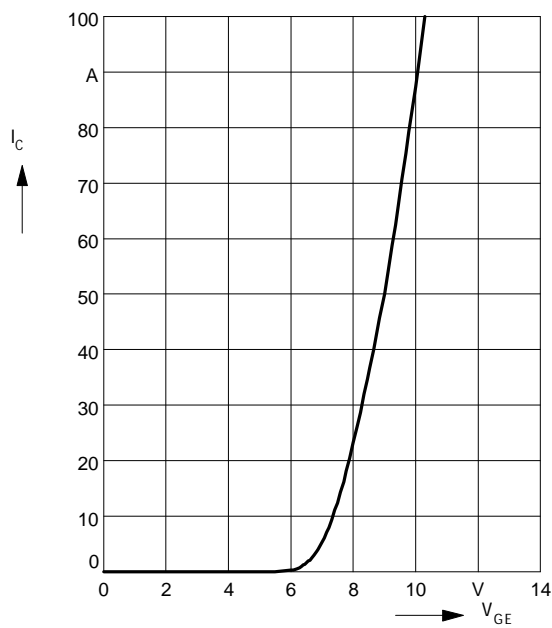
parameter: $t_p = 80 \mu s$, $T_j = 125^\circ C$



Typ. transfer characteristics

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

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



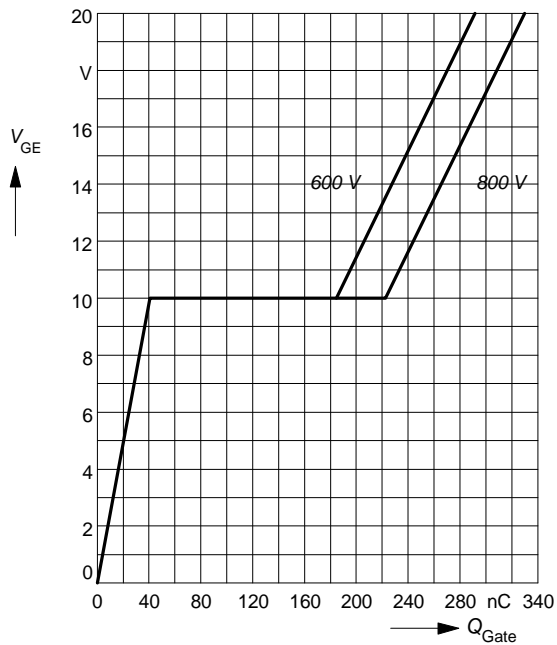
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NPT IGBT Modules

Typ. gate charge

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

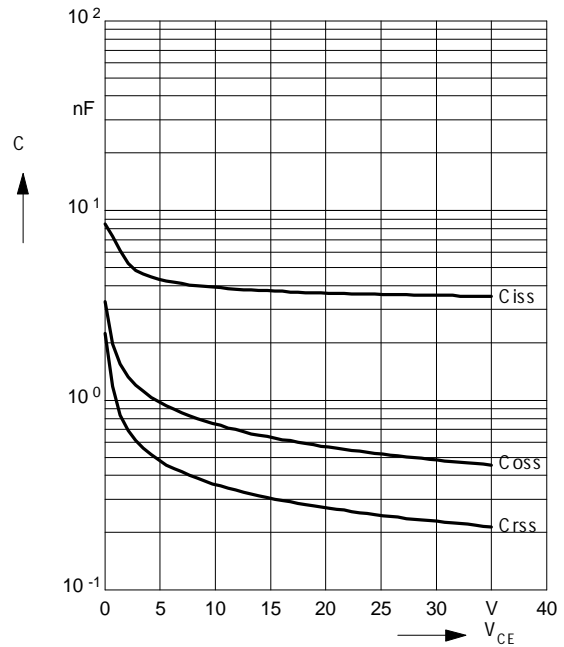
parameter: $I_{C\ puls} = 50\ A$



Typ. capacitances

$$C = f(V_{CE})$$

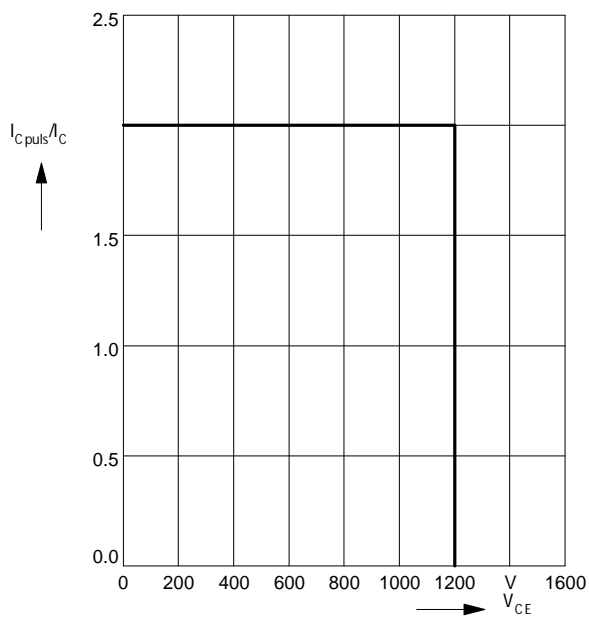
parameter: $V_{GE} = 0, f = 1\ MHz$



Reverse biased safe operating area

$$I_{C\ puls} = f(V_{CE}), T_j = 150^\circ C$$

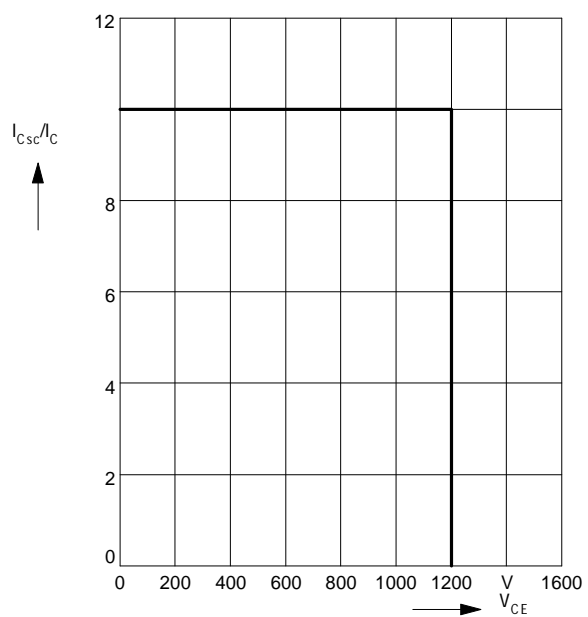
parameter: $V_{GE} = 15\ V$



Short circuit safe operating area

$$I_{C\ sc} = f(V_{CE}), T_j = 150^\circ C$$

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



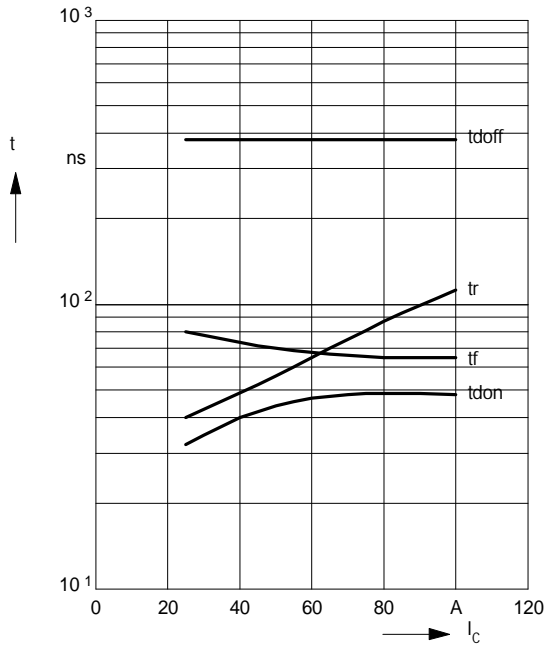
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NPT IGBT Modules

Typ. switching time

$t = f(I_C)$, inductive load, $T_j = 125^\circ\text{C}$

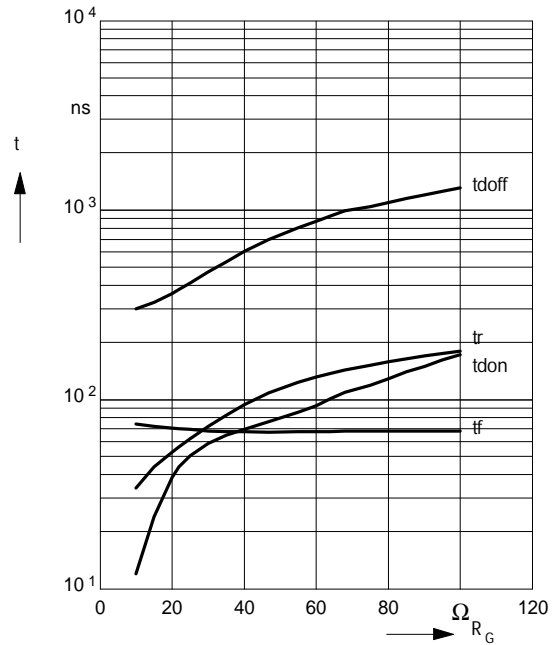
par.: $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_G = 22\ \Omega$



Typ. switching time

$t = f(R_G)$, inductive load, $T_j = 125^\circ\text{C}$

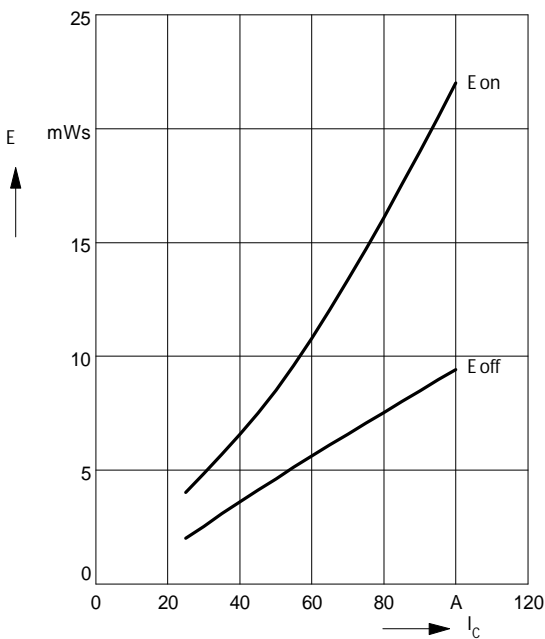
par.: $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $I_C = 50\text{ A}$



Typ. switching losses

$E = f(I_C)$, inductive load, $T_j = 125^\circ\text{C}$

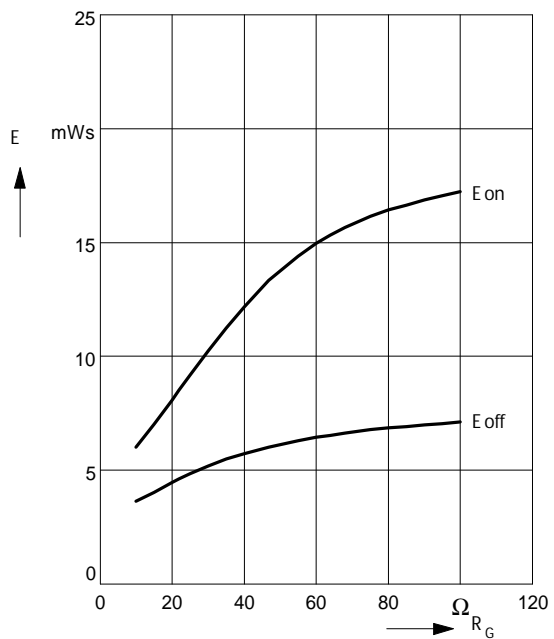
par.: $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_G = 22\ \Omega$



Typ. switching losses

$E = f(R_G)$, inductive load, $T_j = 125^\circ\text{C}$

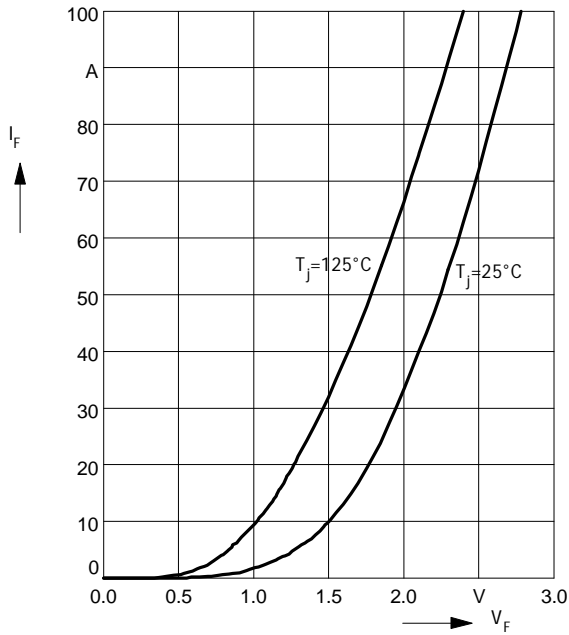
par.: $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $I_C = 50\text{ A}$



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NPT IGBT Modules

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: $D = t_p / T$

