

V<sub>CE</sub> = 4500  
I<sub>C</sub> = 1200

T<sub>c</sub> = 85 °C 1200



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Maximum values 1) Parameter Symbol Conditions min max

IC



V<sub>CE</sub> = 3400 V, V<sub>CEM-CHB</sub> = 4500 V, V<sub>CE</sub> = 15 V, T<sub>c</sub> = 125 °C, 10 μs

Power MOSFETs for high power applications - High power density - AISiC base-plate for high power cv

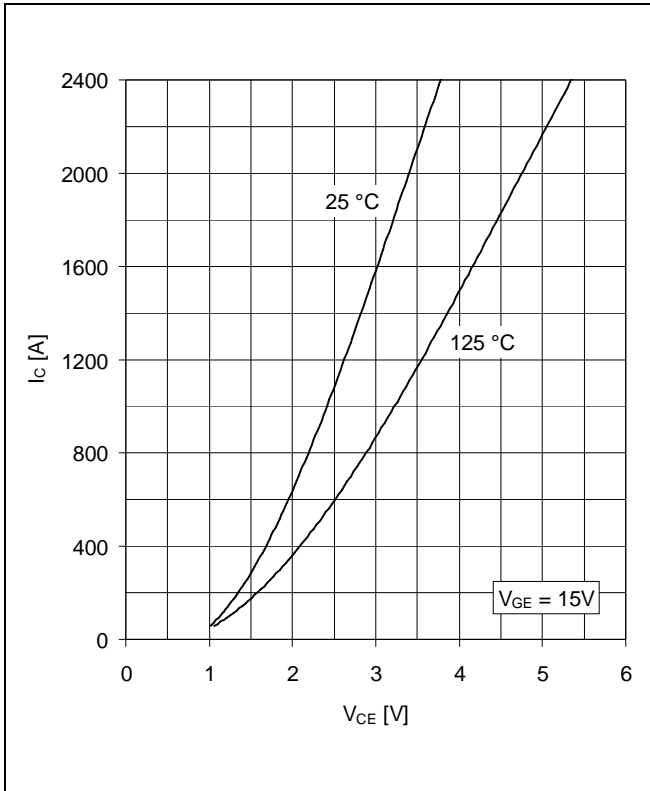
**IGBT characteristic values** <sup>3)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Collector (-emitter) breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}$ , $I_C = 10 \text{ mA}$ , $T_{vj} = 25 \text{ °C}$	4500			V
Collector-emitter <sup>4)</sup> saturation voltage	$V_{CE \text{ sat}}$	$I_C = 1200 \text{ A}$ , $V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$	2.6		V
			$T_{vj} = 125 \text{ °C}$		3.55	V
Collector cut-off current	$I_{CES}$	$V_{CE} = 4500 \text{ V}$ , $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$		12	mA
			$T_{vj} = 125 \text{ °C}$		120	mA
Gate leakage current	$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$ , $T_{vj} = 125 \text{ °C}$	-500		500	nA
Gate-emitter threshold voltage	$V_{GE(TO)}$	$I_C = 240 \text{ mA}$ , $V_{CE} = V_{GE}$ , $T_{vj} = 25 \text{ °C}$	4.5		6.5	V
Gate charge	$Q_{ge}$	$I_C = 1200 \text{ A}$ , $V_{CE} = 2800 \text{ V}$ , $V_{GE} = -15 \text{ V} \dots 15 \text{ V}$		8.86		$\mu\text{C}$
Input capacitance	$C_{ies}$	$V_{CE} = 25 \text{ V}$ , $V_{GE} = 0 \text{ V}$ , $f = 1 \text{ MHz}$ , $T_{vj} = 25 \text{ °C}$		120		nF
Output capacitance	$C_{oes}$			6.02		
Reverse transfer capacitance	$C_{res}$			2.58		
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 2800 \text{ V}$ , $I_C = 1200 \text{ A}$ , $R_{48 \text{ Tf7}}$	$T_{vj} = 25 \text{ °C}$	740		ns
			$T_{vj} = 125 \text{ °C}$		750	
Rise time	$t_r$	$R_{48 \text{ Tf7}}$ ie tim	$T_{vj} = 25 \text{ °C}$	210		

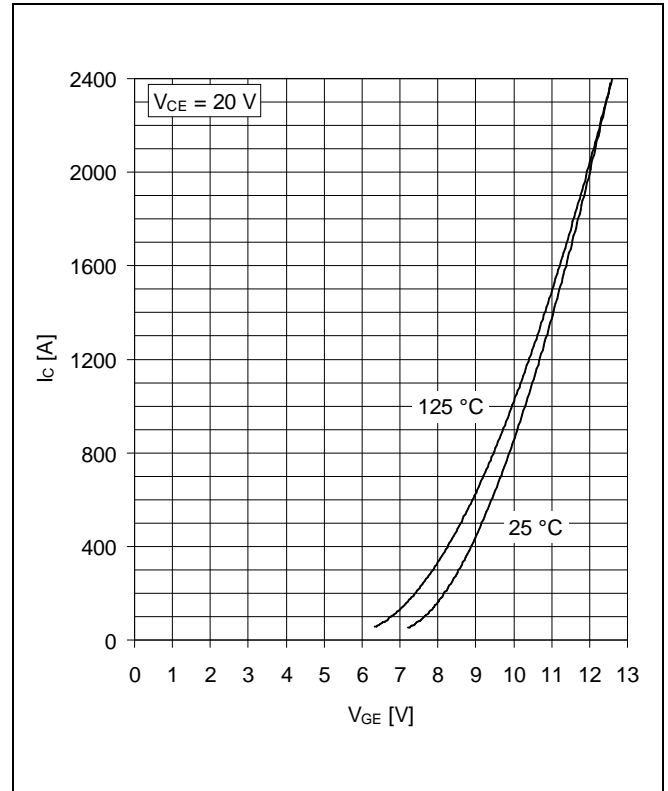
Diode characteristic values <sup>5)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Forward voltage <sup>6)</sup>	$V_F$	$I_F = 1200 \text{ A}$	$T_{vj} = 25 \text{ °C}$	3.2		V
			$T_{vj} = 125 \text{ °C}$		3.5	
Reverse recovery current	$I_{rr}$	$V_{ccj}/F1 \text{ 9.96 605.4 TD ( ) } T_{vj} = 25 \text{ °C}$	$T_{vj} = 25 \text{ °C}$	1460		A
			$T_{vj} = 125 \text{ °C}$		1600	
Recovered charge	$Q_{rr}$	$V_{ccj}/F1 \text{ 9.96 605.4 TD ( ) } T_{vj} = 25 \text{ °C}$	$T_{vj} = 25 \text{ °C}$	1030		$\mu\text{C}$
			$T_{vj} = 125 \text{ °C}$		1660	
Reverse recovery time	$t_{rr}$	$V_{ccj}/F1 \text{ 9.96 605.4 TD ( ) } T_{vj} = 25 \text{ °C}$	$T_{vj} = 25 \text{ °C}$	1270		ns
			$T_{vj} = 125 \text{ °C}$		1860	
Reverse recovery energy	$E_{rec}$	$V_{ccj}/F1 \text{ 9.96 605.4 TD ( ) } T_{vj} = 25 \text{ °C}$		1630		

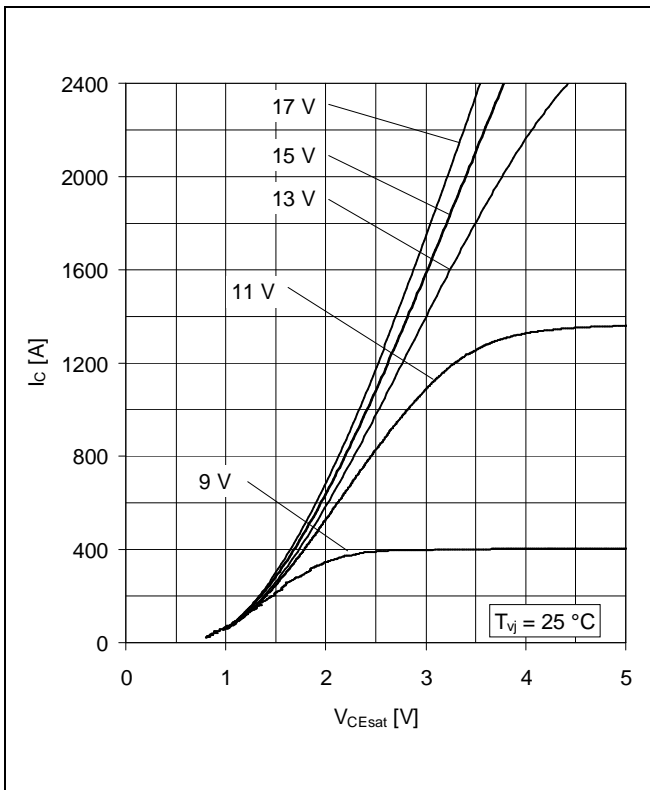




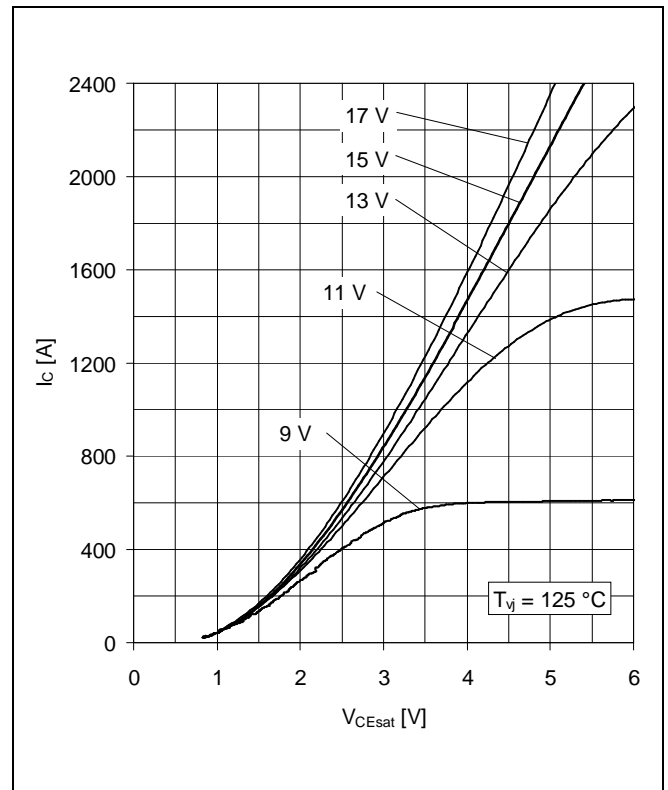
**Fig. 1** Typical on-state characteristics, chip level



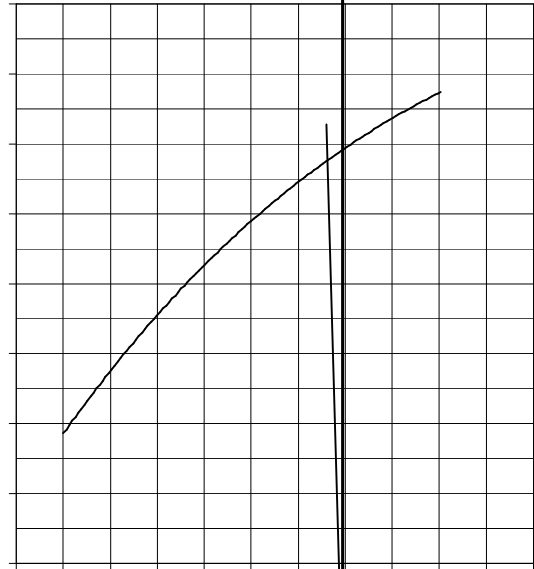
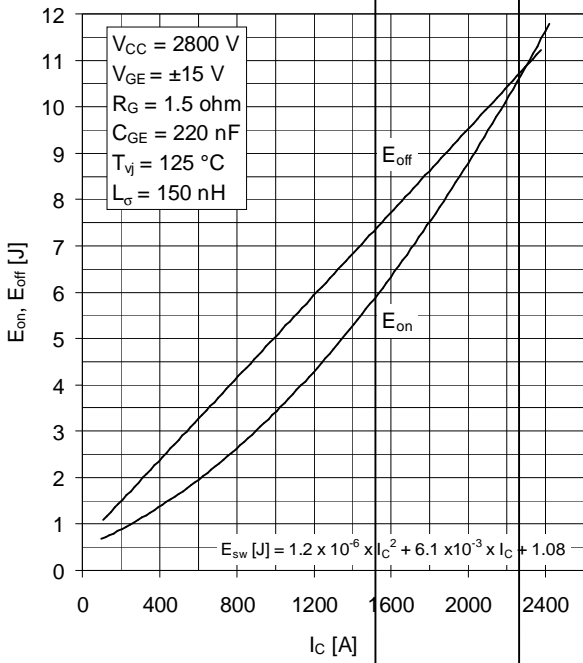
**Fig. 2** Typical transfer characteristics, chip level



**Fig. 3** Typical output characteristics, chip level



**Fig. 4** Typical output characteristics, chip level



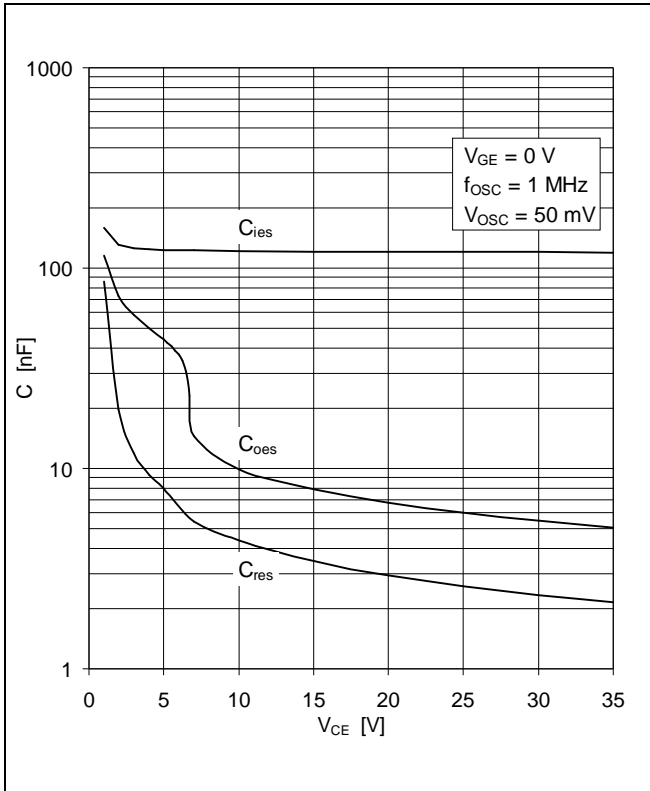
E o f f

R\_G [ohm]

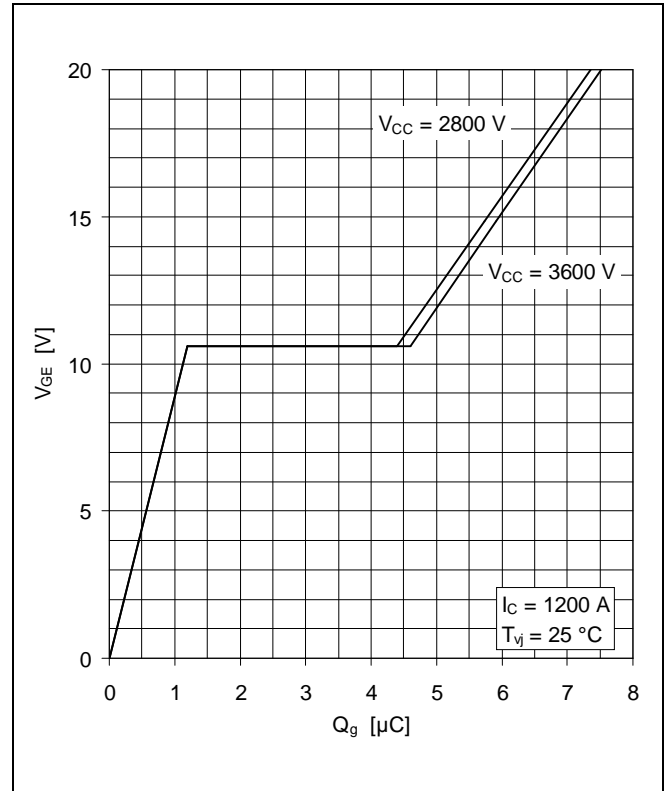
t\_d(off)

1200 2600 2400

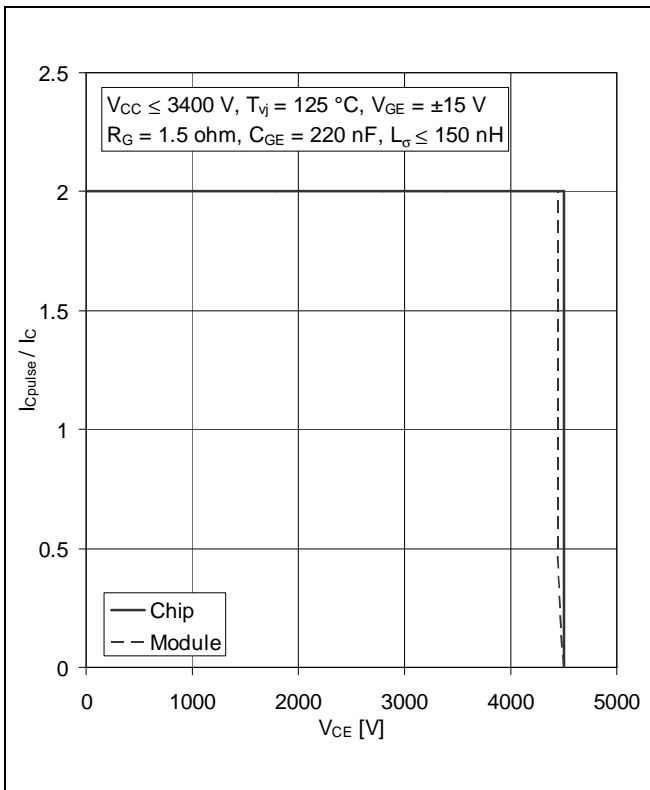
0400 800



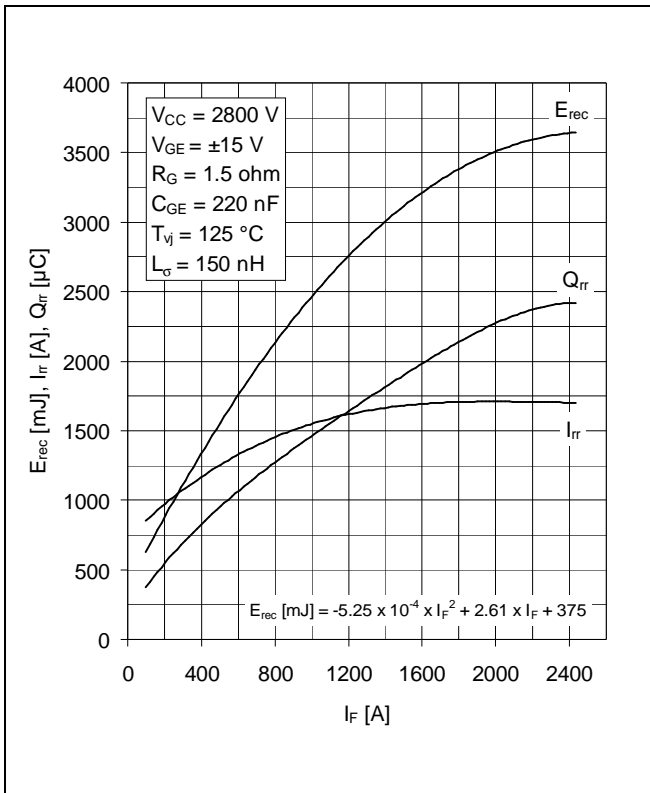
**Fig. 9** Typical capacitances vs collector-emitter voltage



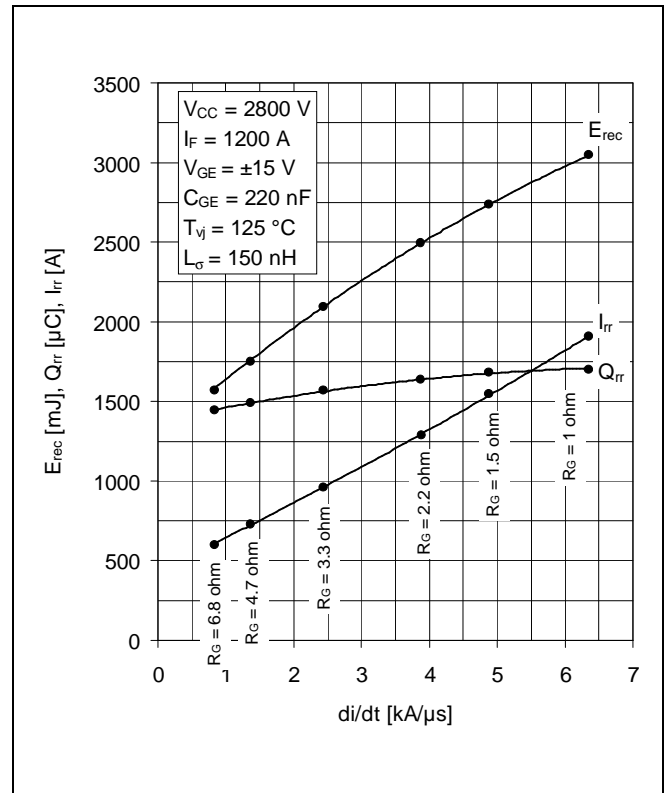
**Fig. 10** Typical gate charge characteristics



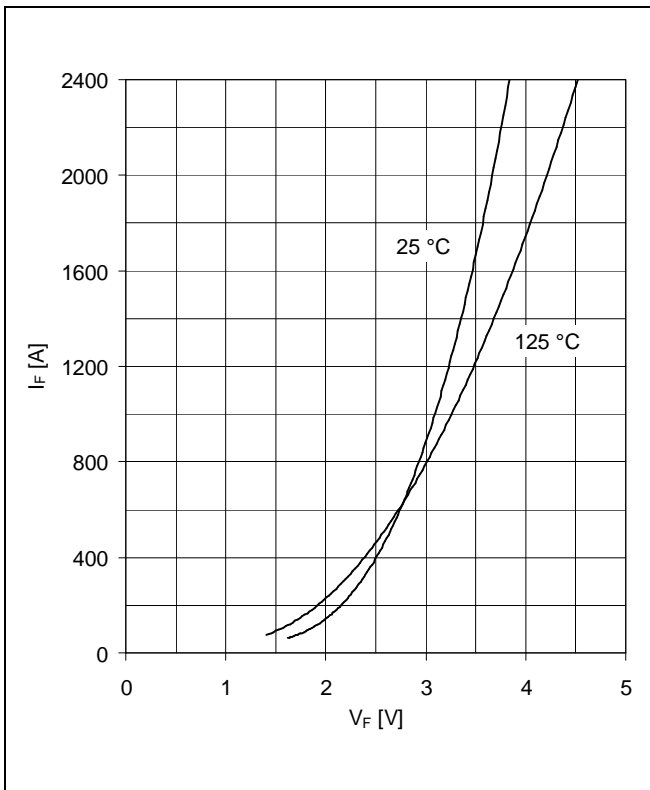
**Fig. 11** Turn-off safe operating area (RBSOA)



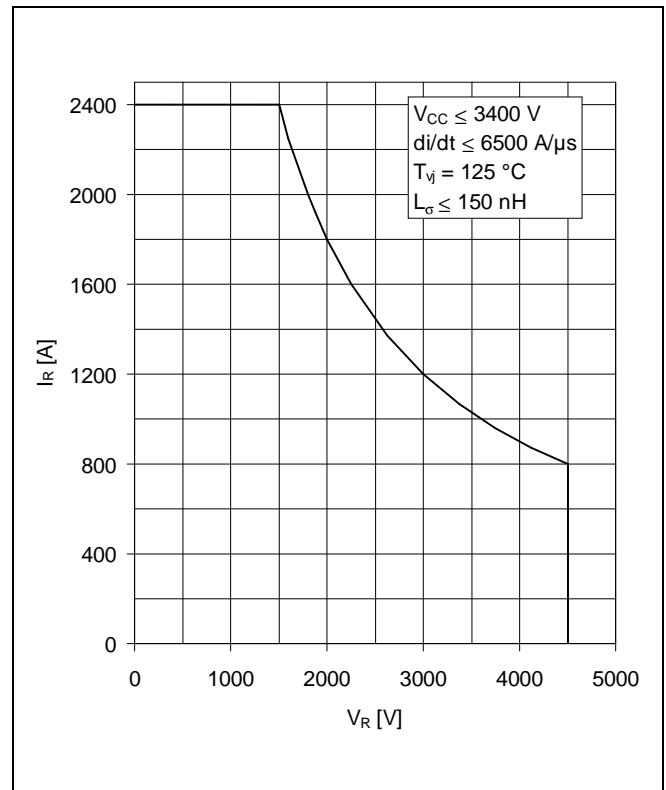
**Fig. 12** Typical reverse recovery characteristics vs forward current



**Fig. 13** Typical reverse recovery characteristics vs di/dt



**Fig. 14** Typical diode forward characteristics, chip level



**Fig. 15** Safe operating area diode (SOA)



Analytical function for transient thermal impedance:

$$Z_{th(j-c)}(t) = \sum_{i=1}^n R_i (1 - e^{-t/t_i})$$

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