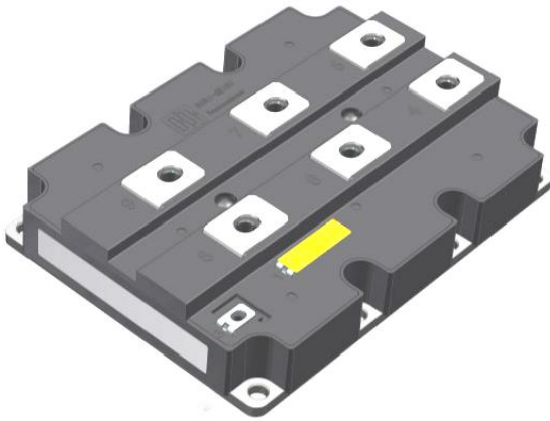




Key Parameters

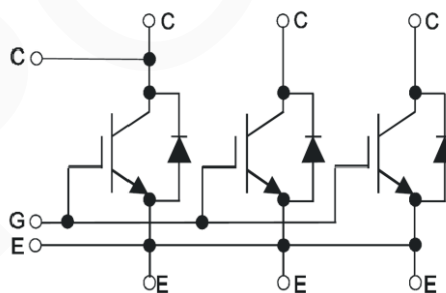
V_{CE}	= 3300V
I_C	= 1500A

Features

- Low $V_{CE(sat)}$
- High Robustness
- High Reliability
- Standard H Package
- Junction Operating Temperature: 150°C

Applications

- Smart GridAC and DC servo drive amplifier
- Static Var Generator, SVG
- Traction Drives
- Motor Drives



Equivalent Circuit Schematic

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Absolute Maximum Ratings						
Symbol	Characteristic	Value			Unit	
V _{CES}	Collector-Emitter Voltage	3300			V	
I _{CDC}	Continuous DC Collector Current (T _c =100°C, T _j =150°C)	1500			A	
I _{CRM}	Peak Collector Current (tp=1ms)	3000			A	
V _{GES}	Gate-Emitter Voltage	±20			V	
P _{tot}	Total Power Dissipation (T _c =25°C, T _j =150°C)	16			KW	
IGBT Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
BV _{CES}	Collector-Emitter breakdown Voltage	V _{GE} =0V, I _C =10mA, T _{vj} =25°C	3300			V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =1500A, V _{GE} =15V, T _{vj} =25°C		2.45	2.95	V
		I _C =1500A, V _{GE} =15V, T _{vj} =125°C		3.10	3.60	
		I _C =1500A, V _{GE} =15V, T _{vj} =150°C		3.30	3.80	V
V _{GE(th)}	Gate-emitter Threshold Voltage	V _{GE} =V _{CE} , I _C =240mA, T _{vj} =25°C	5.8	6.8	7.8	V
I _{CES}	Collector-Emitter leakage Current	V _{CE} =3300V, V _{GE} =0V, T _{vj} =25°C			1.0	mA
		V _{CE} =3300V, V _{GE} =0V, T _{vj} =125°C		15	40	mA
		V _{CE} =3300V, V _{GE} =0V, T _{vj} =150°C		25		mA
I _{GES}	Gate-Emitter leakage Current	V _{CE} =0V, V _{GE} =±20V, T _{vj} =125°C	-500		500	ηA
R _{gint}	Internal Gate Resistance			0.8		Ω
Q _G	Gate Charge	V _{GE} =±15V, T _{vj} =25°C		6.5		μC
R _{gint}	Internal Gate Resistance			0.8		Ω
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=200KHz, T _{vj} =25°C		153		ηF
C _{oes}	Output Capacitance			12		ηF
C _{res}	Reverse Transfer Capacitance			3		ηF
t _{d(on)}	Turn-on Delay Time	I _C =1500A V _{CE} = 1800 V V _{GE} = ±15V R _{Gon} = 1.0Ω R _{Goff} = 1.5Ω C _{ge} =330nF L _S =150nH Inductive Load	T _{vj} =25°C	600		ηs
			T _{vj} =125°C	660		
			T _{vj} =150°C	680		
t _r	Rise Time		T _{vj} =25°C	260		ηs
			T _{vj} =125°C	290		
			T _{vj} =150°C	300		
t _{d(off)}	Turn-off Delay Time		T _{vj} =25°C	1700		ηs
			T _{vj} =125°C	1850		
			T _{vj} =150°C	1900		
t _f	Fall Time		T _{vj} =25°C	1000		ηs
			T _{vj} =125°C	1200		
			T _{vj} =150°C	1500		
E _{on}	Energy Dissipation During Turn-on Time		T _{vj} =25°C	1600		mJ
			T _{vj} =125°C	2000		
			T _{vj} =150°C	2200		
E _{off}	Energy Dissipation During Turn-off Time		T _{vj} =25°C	2100		mJ
			T _{vj} =125°C	2500		
			T _{vj} =150°C	2700		
I _{sc}	SC Data	t _{sc} ≤10μs, V _{GE} ≤15V, T _{vj} =150°C, V _{cc} ≤2500V		6500		A
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Diode Characteristics							
Symbol	Characteristic	Conditions		Value			Unit
				Min.	Typ.	Max.	
I _F	Diode DC Forward Current				1500		A
I _{FRM}	Diode Peak Forward Current	tp=1ms			3000		A
V _F	Forward Voltage	I _F =1500A,T _{vj} =25°C			2.10		V
		I _F =1500A,T _{vj} =125°C			2.30		V
		I _F =1500A,T _{vj} =150°C			2.30		V
I _{rr}	Peak Reverse Recovery Current	I _F =1500A V _R =1800V -di _F /dt =2500A/μs, Inductive Load	T _{vj} =25°C		900		A
			T _{vj} =125°C		980		
			T _{vj} =150°C		980		
Q _{rr}	Recovered Charge		T _{vj} =25°C		980		μC
			T _{vj} =125°C		1370		
			T _{vj} =150°C		1500		
t _{rr}	Reverse Recovery time		T _{vj} =25°C		2.95		μsec
			T _{vj} =125°C		4.40		
			T _{vj} =150°C		4.95		
E _{rec}	Reverse Recovery Energy		T _{vj} =25°C		1060		mJ
			T _{vj} =125°C		1600		
			T _{vj} =150°C		1700		

Module Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V _{isol}	Isolation voltage	t=1min,f=50Hz	6000			V
T _{jmax}	Maximum Junction Temperature				150	°C
T _{vj op}	Operating Junction Temperature		-40		150	°C
T _{stg}	Storage Temperature		-40		125	°C
R _{CC'+EE'}	Module lead resistance terminal to chip			0.12		mΩ
L _{SCE}	Stray Inductance, Module			8.0		nH
R _{θjc}	Junction-to Case	per IGBT-inverter		0.0078		°C/W
		per Diode-inverter		0.016		°C/W
R _{θcs}	Case to Sink	per IGBT-inverter		0.009		°C/W
		per Diode-inverter		0.018		°C/W
M _t	Module Electrodes Torque	Recommended(M8)	8.0		10.0	N·m
		Recommended(M4)	2.0		3.0	N·m
M _s	Module-to-Sink Torque	Recommended(M6)	4.0		6.0	N·m
G	Weight of Module			1400		g

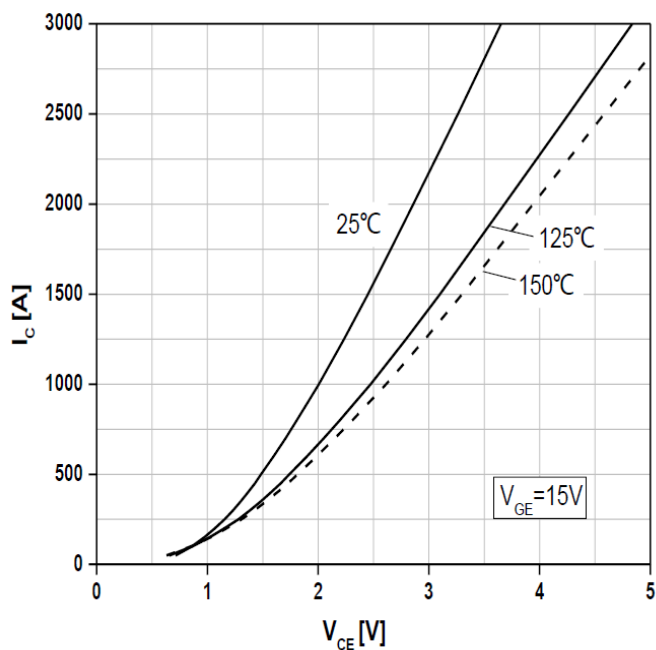
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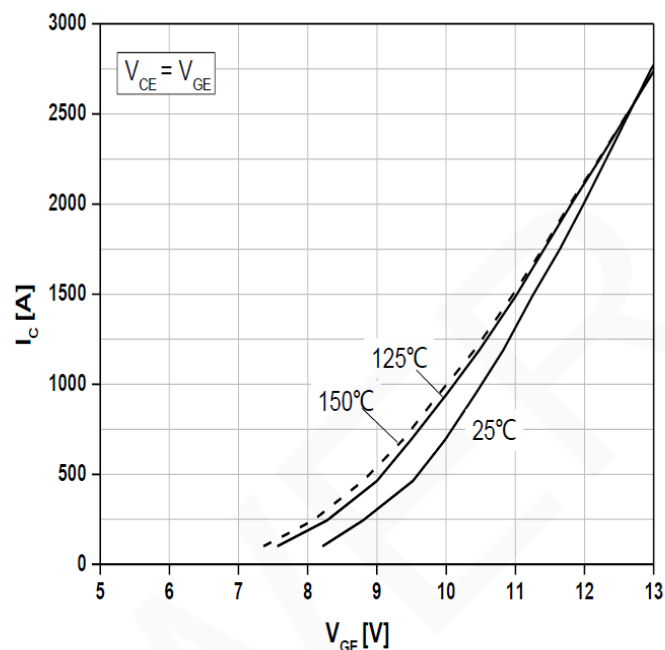
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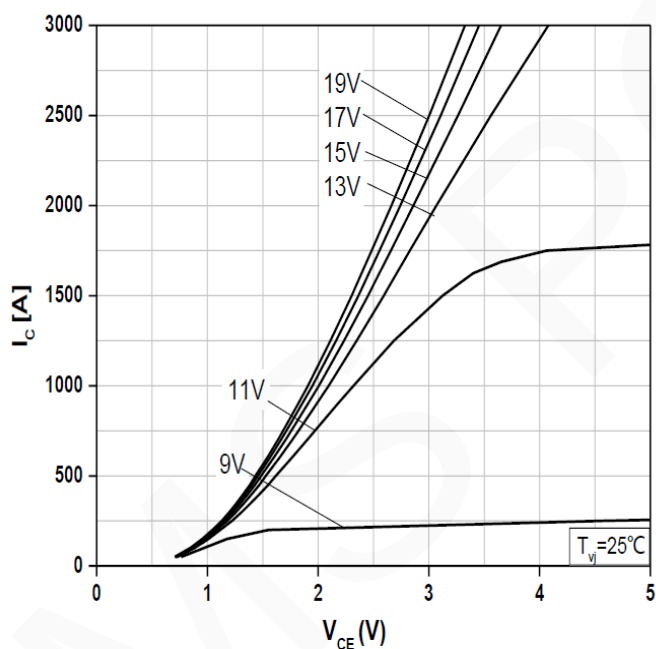
Typical output characteristics,chip level



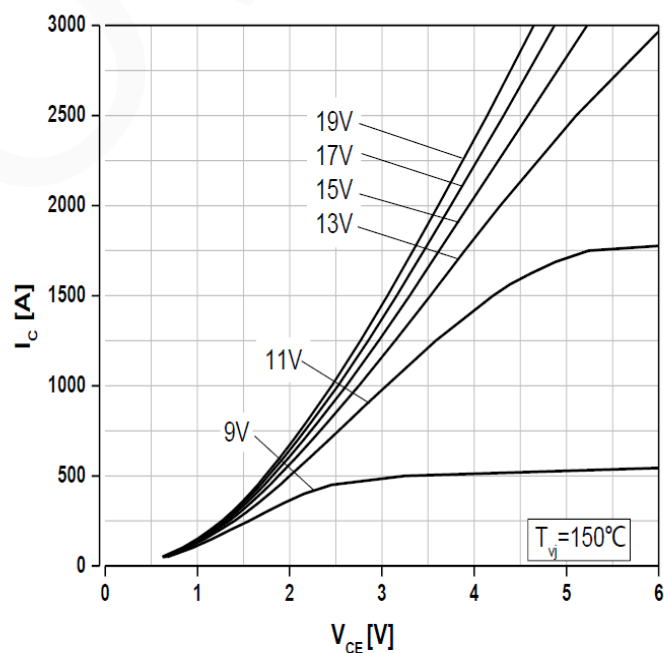
Typical transfer characteristics,chip level



Typical output characteristics,chip level



Typical output characteristics,chip level



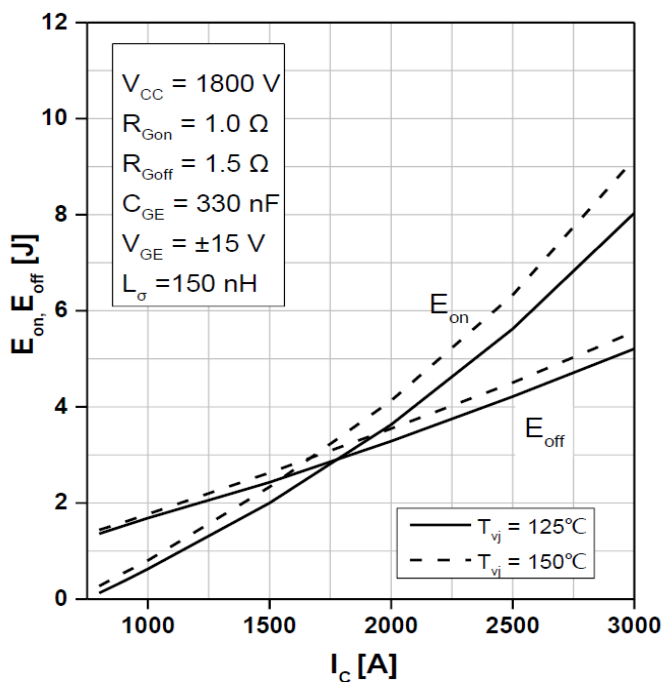
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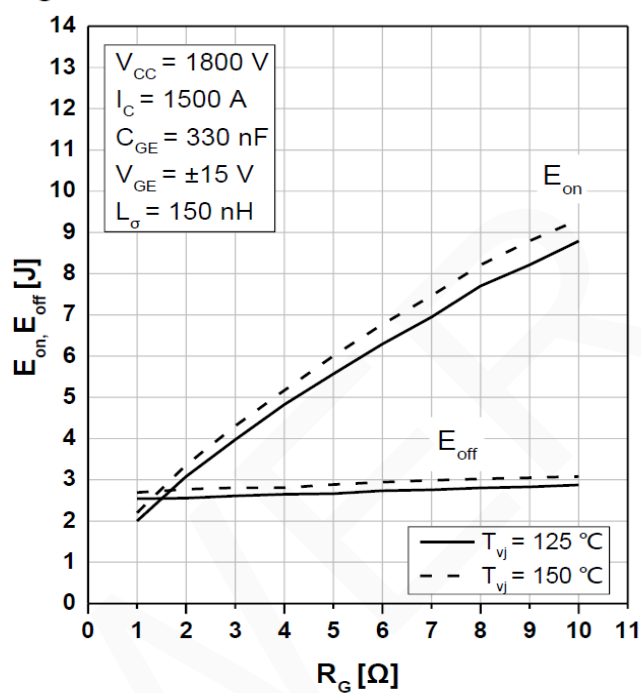
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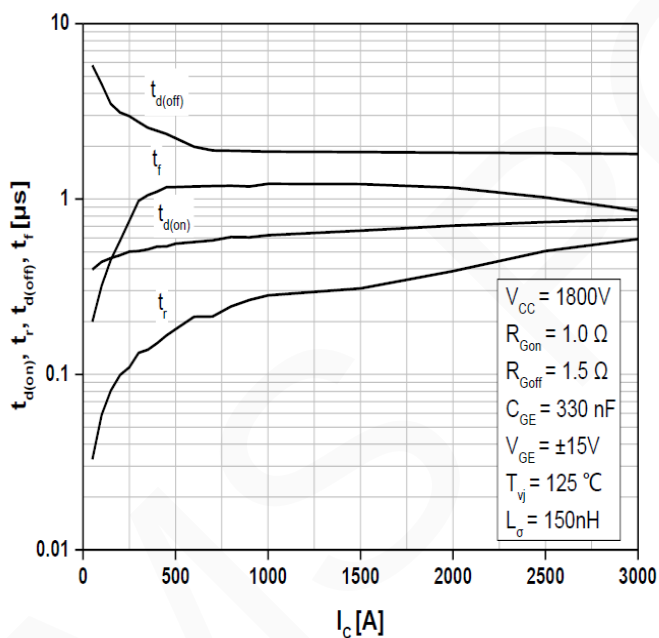
Typical switching energies per pulse vs. collector current



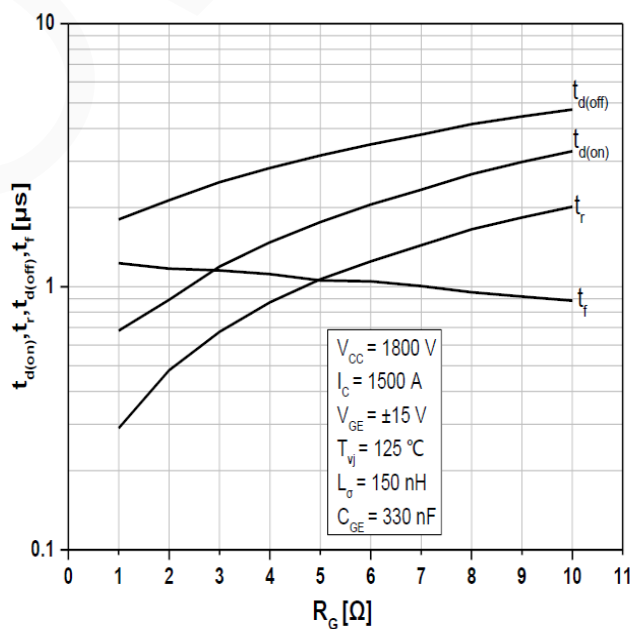
Typical switching energies per pulse vs. gate resistor



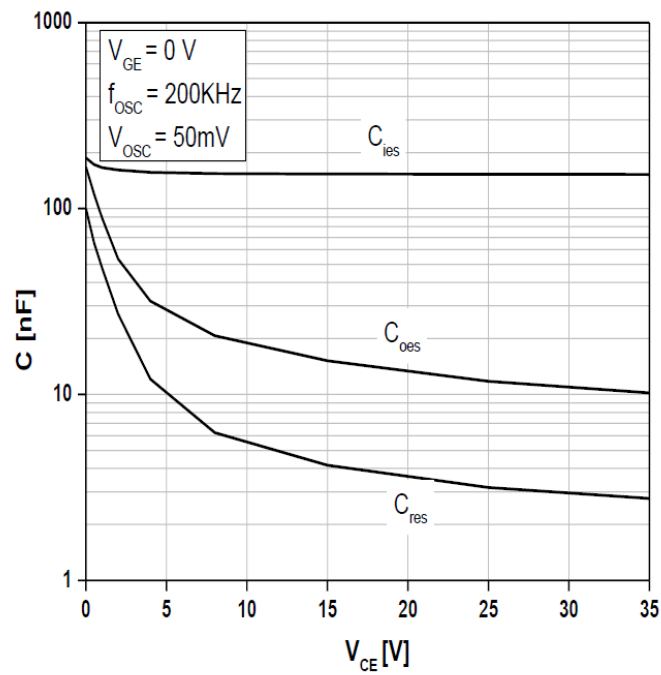
Typical switching times vs. collector current



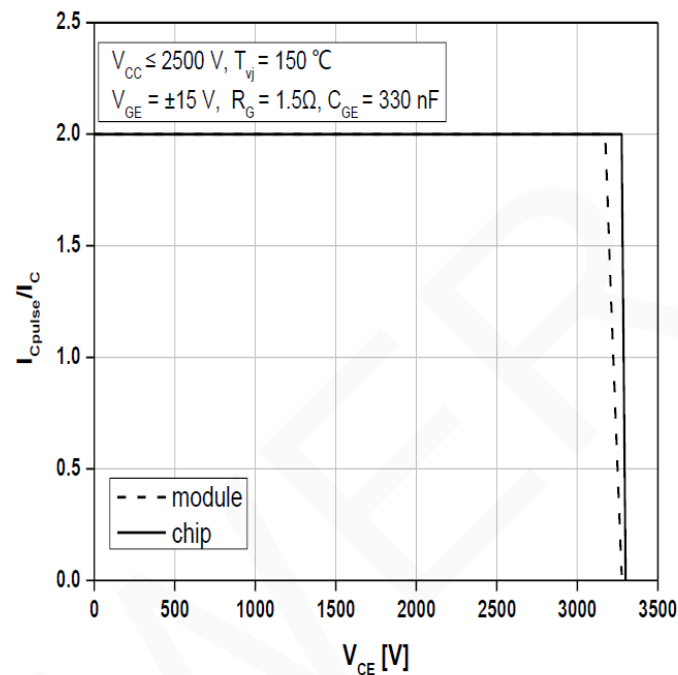
Typical switching times vs. gate resistor



Typical capacitances vs. collector-emitter voltage

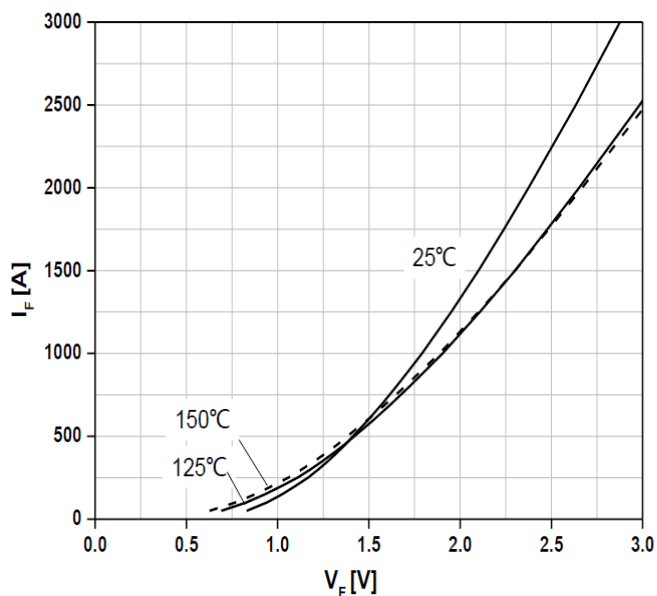


Turn-off safe operating area (RBSOA)

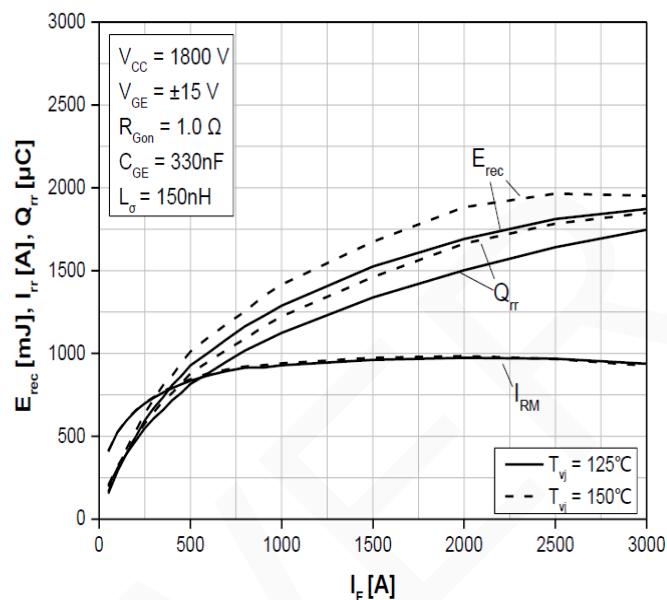


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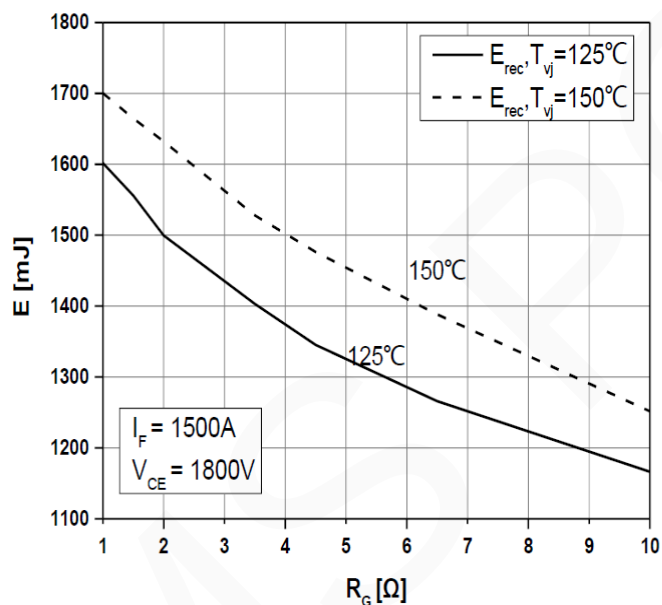
Typical diode forward characteristic, chip level



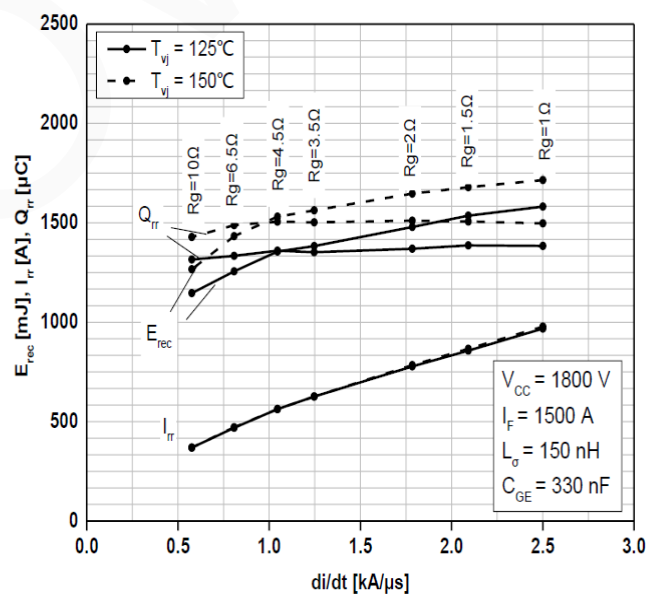
Typical reverse recovery characteristics vs. forward current



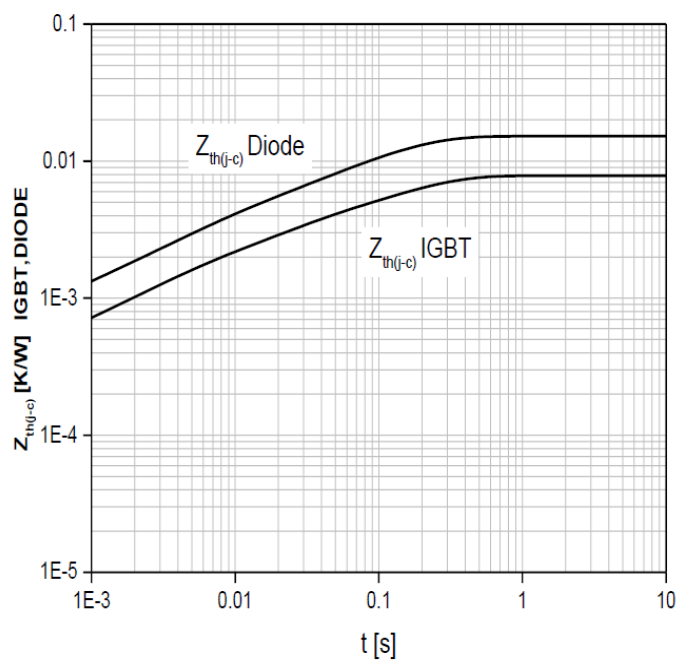
Typical reverse recovery characteristics vs. R_G



Typical reverse recovery characteristics vs. di/dt



Thermal impedance vs. time



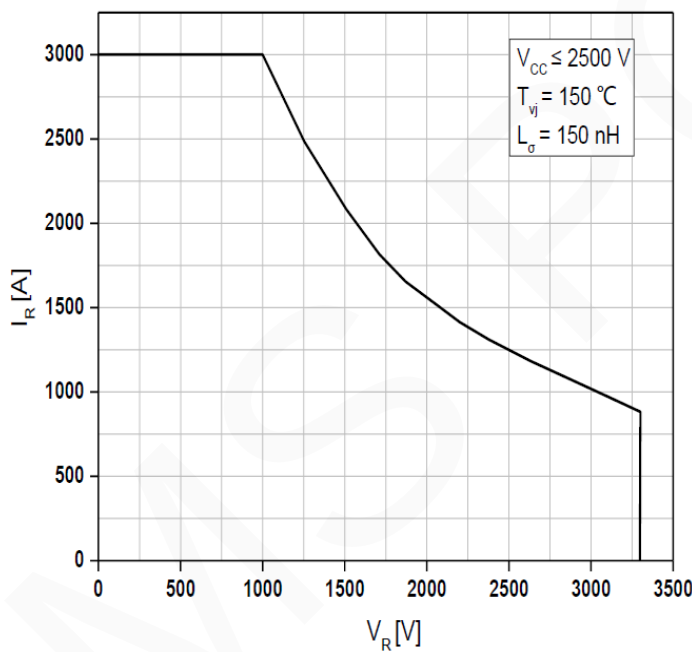
Analytical function for transient thermal impedance:

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

IGBT	i	1	2	3	4
	Ri (K/kW)	4.840	1.879	0.885	0.232
	τi (ms)	167.060	18.908	2.033	0.045

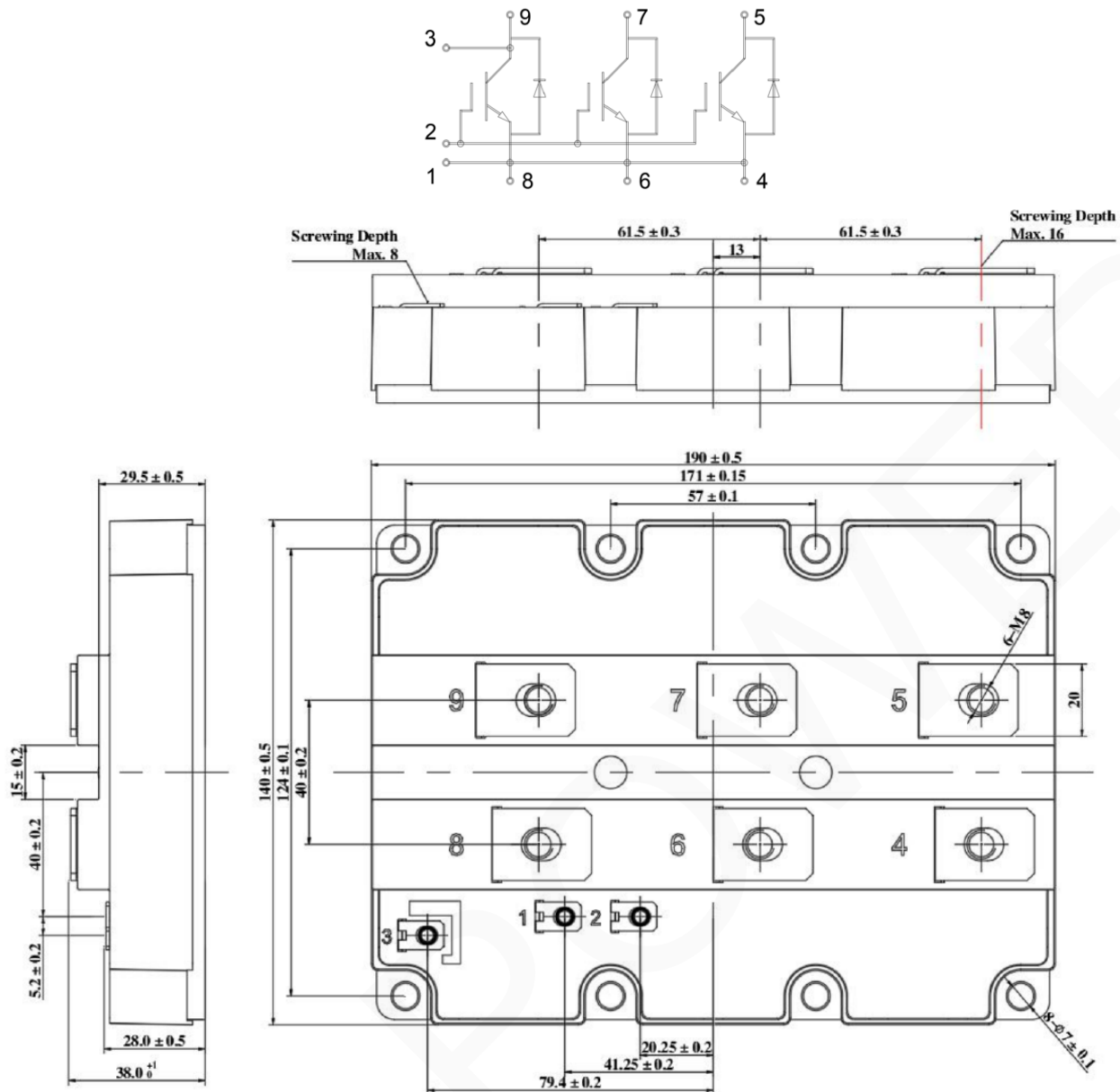
DIODE	Ri (K/kW)	10.616	3.083	1.146	0.356
	τi (ms)	121.520	12.149	1.244	0.031

Safe operating area diode



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