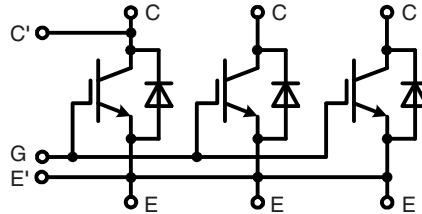


IGBT Module

Single switch

Short Circuit SOA Capability
Square RBSOA

$I_{C80} = 1800 \text{ A}$
 $V_{CES} = 1700 \text{ V}$
 $V_{CE(sat) \text{ typ.}} = 2.3 \text{ V}$



IGBT			
Symbol	Conditions	Maximum Ratings	
V_{CES} V	$V_{GE} = 0 \text{ V}$	1700	
V_{GES} V		± 20	
I_{C80} A	$T_C = 80^\circ\text{C}$	1800	
I_{CM} A	$t_p = 1 \text{ ms}; T_C = 80^\circ\text{C}$	3600	
Symbol	Conditions	Characteristic Values	
t_{SC} μS	$V_{CC} = 1000 \text{ V}; V_{CEM \text{ CHIP}} = \leq 1700 \text{ V};$ ($T_{VJ} = 25^\circ\text{C}$, unless otherwise specified)		
	$V_{GE} \leq 15 \text{ V}; T_{VI} \leq 125^\circ\text{C}$	min.	typ. max.
$V_{CE(sat)}^*$	$I_C = 1800 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	2.3	2.6 V
		2.6	2.9 V
$V_{GE(th)}$	$I_C = 240 \text{ mA}; V_{CE} = V_{GE}$	4.5	6.5 V
I_{CES}	$V_{CE} = 1700 \text{ V}; V_{GE} = 0 \text{ V}; T_{VJ} = 125^\circ\text{C}$		120 mA
I_{GES}	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}; T_{VJ} = 125^\circ\text{C}$		500 nA
$t_{d(on)}$	Inductive load; $T_{VJ} = 125^\circ\text{C};$ $V_{GE} = \pm 15 \text{ V}; V_{CC} = 900 \text{ V};$ $I_C = 1800 \text{ A}; R_G = 0.82 \Omega;$ $L_\sigma = 60 \text{ nH}$	285	ns
t_r		230	ns
$t_{d(off)}$		950	ns
t_f		240	ns
E_{on}		530	mJ
E_{off}		670	mJ
C_{ies}	$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$	166	nF
C_{oes}		16.5	nF
C_{res}		7.0	nF
Q_{ge}	$I_C = 1800 \text{ A}; V_{CE} = 900 \text{ V}; V_{GE} = \pm 15 \text{ V}$	15.1	μC
R_{thJC}			0.009 K/W

* Collector emitter saturation voltage is given at chip level

Features

- NPT³ IGBT
- Low-loss
- Smooth switching waveforms for good EMC
- Industry standard package
- High power density
- AISiC base-plate for high power cycling capacity
- AlN substrate for low thermal resistance

Typical Applications

- AC power converters for
 - industrial drives
 - windmills
 - traction
- LASER pulse generator

Diode

Symbol	Conditions	Maximum Ratings	
I_{F80}	$T_C = 80^\circ\text{C}$	1800	A
I_{FSM}	$V_R = 0\text{ V}; T_{VJ} = 125^\circ\text{C}; t_p = 10\text{ ms};$ half-sinewave	16500	A

Symbol	Conditions	Characteristic Values				
		min.	typ.	max.		
V_F *	$I_F = 1800\text{ A}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	1.65		2.0 V		
		1.70		V		
I_{RM} t_{rr} Q_{RR} E_{rec}	$V_{CC} = 900\text{ V}; I_C = 1800\text{ A};$ $V_{GE} = \pm 15\text{ V}; R_G = 1.5\ \Omega; T_{VJ} = 125^\circ\text{C}$ Inductive load; $L_\sigma = 60\text{ nH}$	1470		A		
				870	ns	
					770	μC
					530	mJ
R_{thJC}				0.017 K/W		

* Forward voltage is given at chip level

Module

Symbol	Conditions	Maximum Ratings	
T_{JM}	max. junction temperature	+150	$^\circ\text{C}$
T_{VJ}	Operating temperature	-40...+125	$^\circ\text{C}$
T_{stg}	Storage temperature	-40...+125	$^\circ\text{C}$
V_{ISOL}	50 Hz	4000	V~
M_d	Mounting torque	Base-heatsink, M6 screws	4 - 6 Nm
		Main terminals, M8 screws	8 - 10 Nm

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
d_A	Clearance distance	terminal to base	23	mm
		terminal to terminal	19	mm
d_S	Surface creepage distance	terminal to base	33	mm
		terminal to terminal	33	mm
L_σ	Module stray inductance, C to E terminal		10	nH
$R_{term-chip}$ *)	Resistance terminal to chip		0.085	m Ω
R_{thCH}	per module; λ grease = 1 W/m \cdot K		0.006	K/W
Weight			1500	g

*) $V = V_{CE(sat)} + R_{term-chip} \cdot I_C$ resp. $V = V_F + R_{term-chip} \cdot I_F$

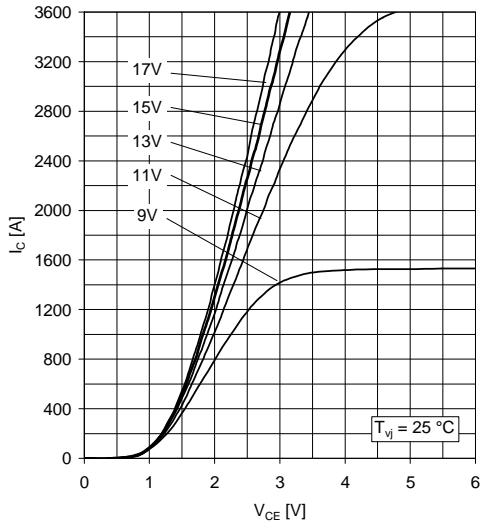


Fig. 1 Typical output characteristics, chip level

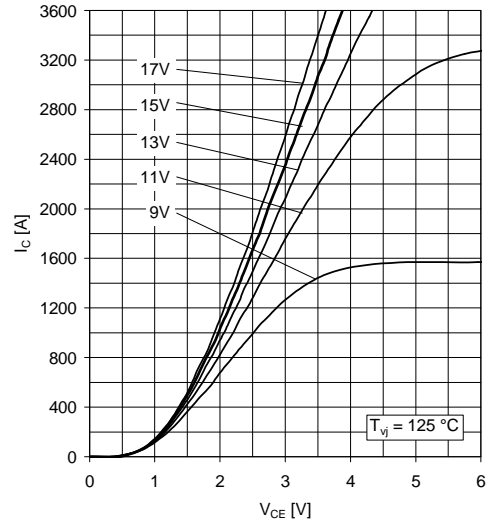


Fig. 2 Typical output characteristics, chip level

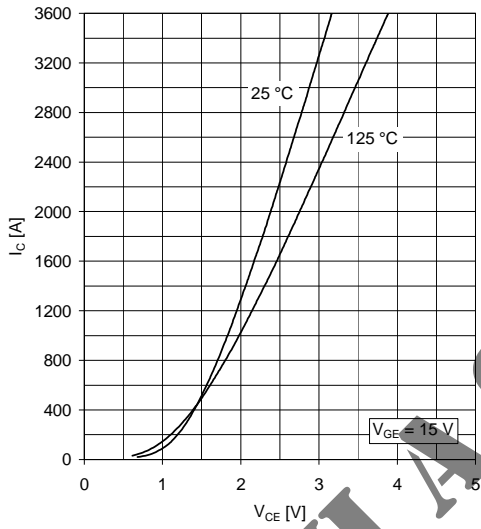


Fig. 3 Typical onstate characteristics, chip level

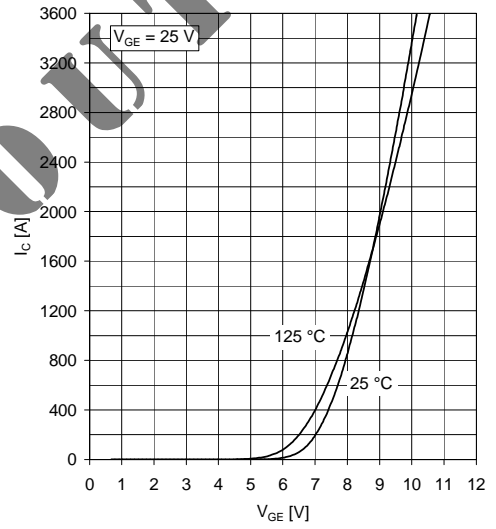


Fig. 4 Typical transfer characteristics, chip level

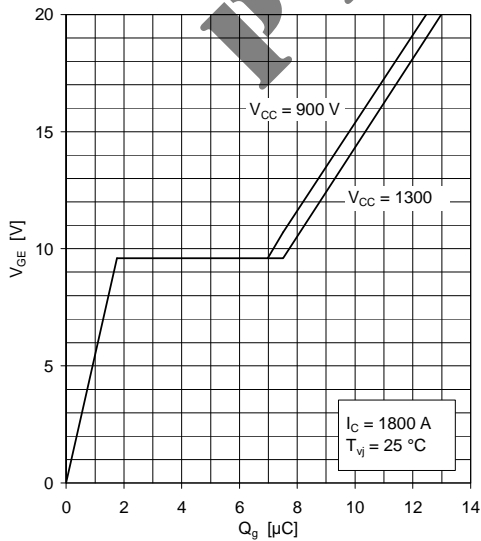


Fig. 5 Typical gate charge characteristics

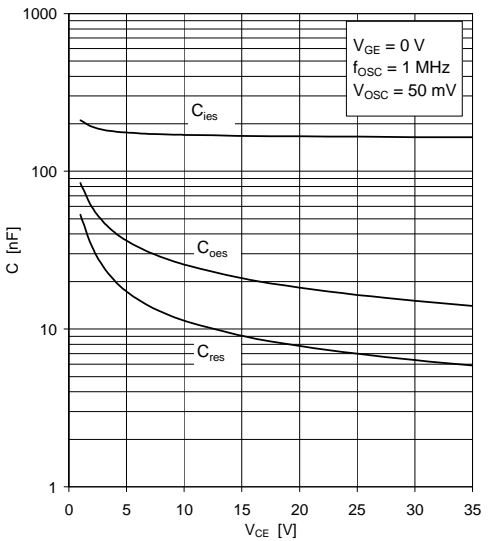


Fig. 6 Typical capacitances vs collector-emitter voltage

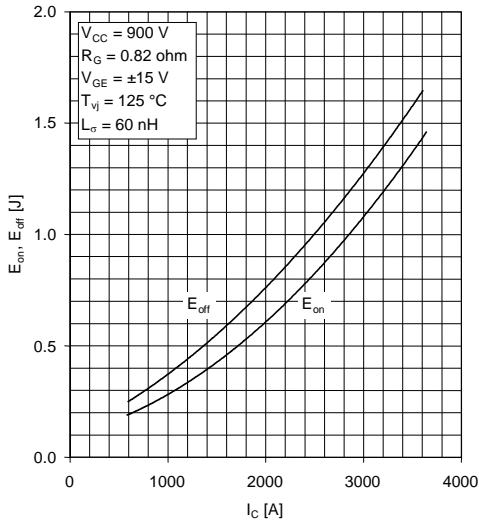


Fig. 7 Typical switching energies per pulse vs collector current

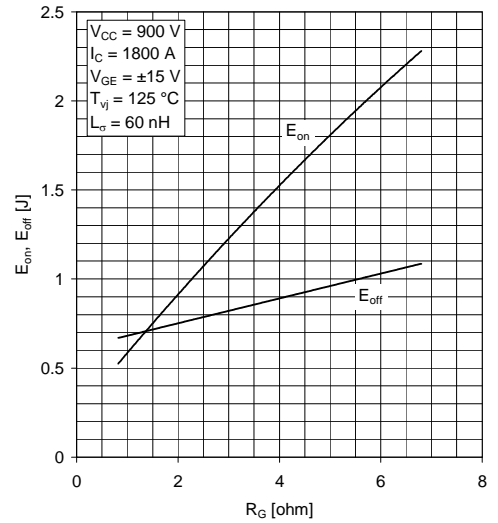


Fig. 8 Typical switching energies per pulse vs gate resistor

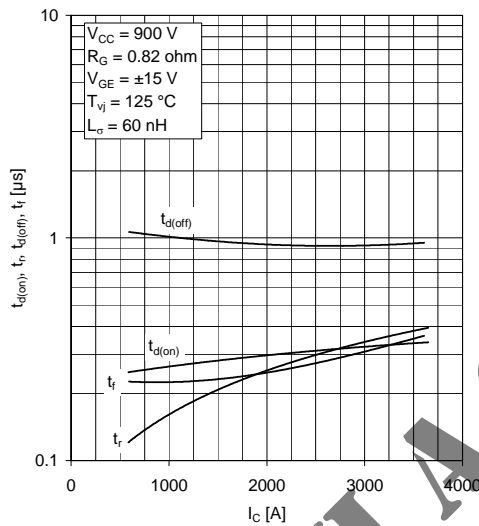


Fig. 9 Typical switching times vs collector current

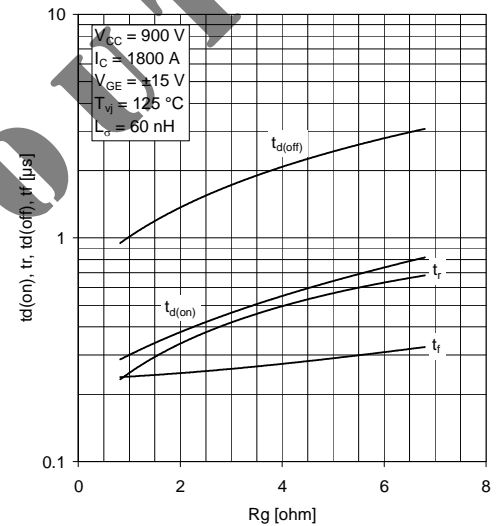


Fig. 10 Typical switching times vs gate resistor

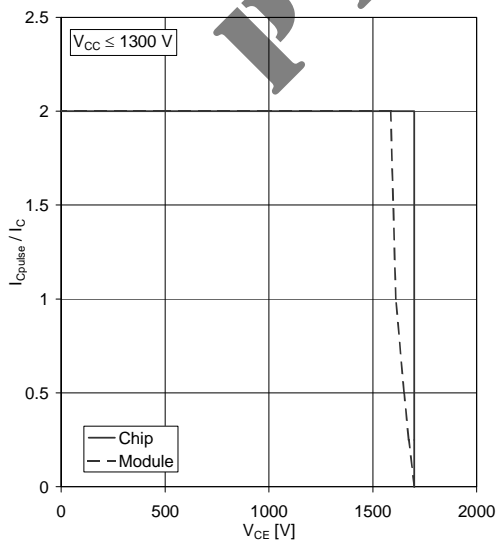


Fig. 11 Turn-off safe operating area (RBSOA)

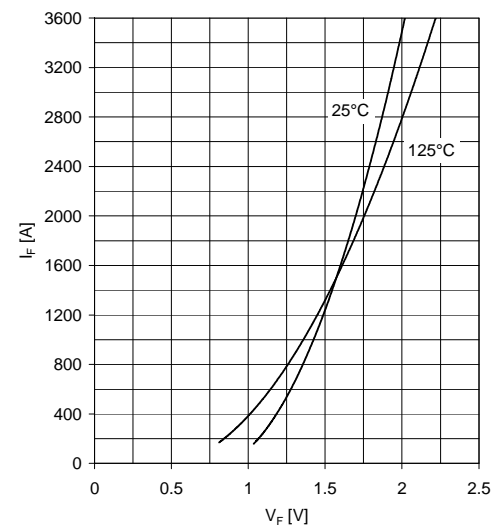


Fig. 12 Typical diode forward characteristics, chip level

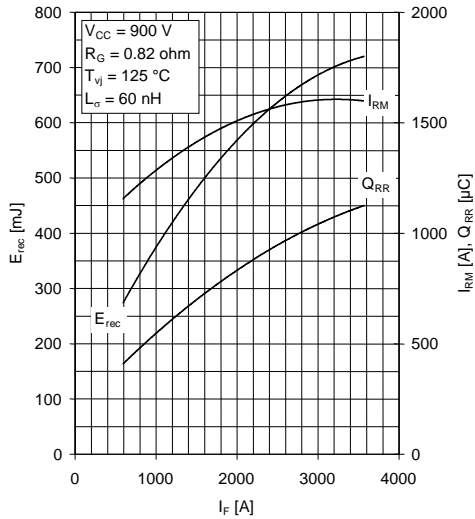


Fig. 13 Typical reverse recovery characteristics vs forward current

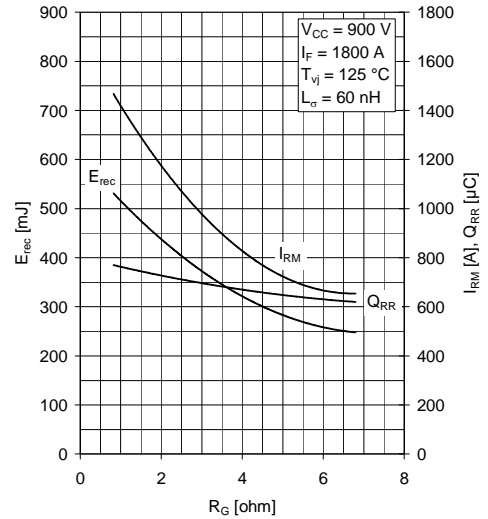


Fig. 14 Typical reverse recovery characteristics vs gate resistor

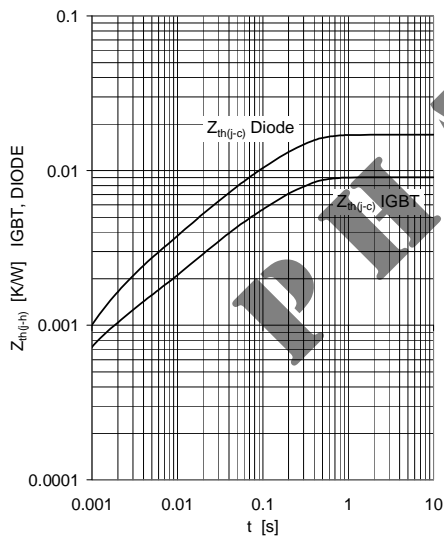
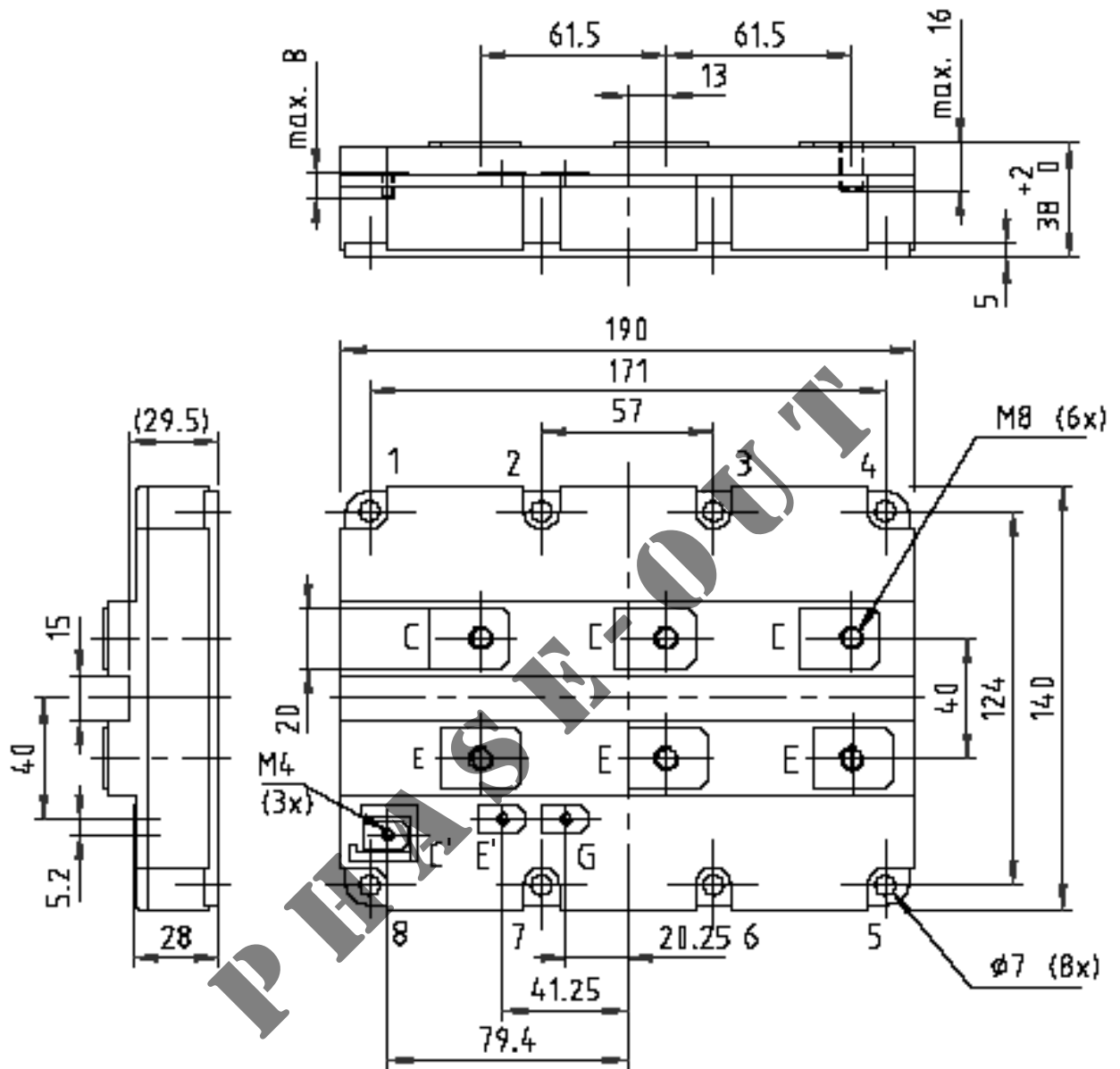


Fig. 15 Thermal impedance vs time

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

i	1	2	3	4
IGBT				
R _i (K/kW)	5.97	1.99	0.619	0.465
τ _i (ms)	179	22	2.4	0.54
DIODE				
R _i (K/kW)	11.1	3.36	1.27	1.34
τ _i (ms)	189	30	7.4	1.4

Outline drawing



Note: all dimensions are shown in mm