

Electrical Features

- Trench/Fieldstop IGBT
- Low $V_{CE(sat)}$
- $V_{CE(sat)}$ with positive temperature coefficient
- 10 μ s short circuit capability
- Fast&soft reverse recovery anti-parallel FWD
- Low inductance case



Typical Applications

- Motor Drives
- High Power Converters
- UPS System

IGBT, Inverter

Maximum Rated Values							
Symbol	Item	Conditions	Rating			Unit	
IGBT							
V_{CES}	Collector-emitter voltage	$T_{vj}=25^{\circ}\text{C}$	650			V	
V_{GES}	Gate-emitter voltage	-	± 20			V	
I_C	Collector current,DC	$T_C=100^{\circ}\text{C}, T_{vj}=175^{\circ}\text{C}$	200			A	
I_{CRM}	Repetitive peak collector current	$t_p=1\text{ms}$	400			A	
t_{SC}	Short circuit withstand time	$V_{GE}=15\text{V}, V_{CC}=300\text{V}, T_{vj}\leq 150^{\circ}\text{C}$	10			μs	
P_{tot}	Total power dissipation	$T_C=25^{\circ}\text{C}, T_{vj}=175^{\circ}\text{C}$	652			W	
Characteristics Values							
Symbol	Item	Conditions	Values			Unit	
IGBT			Min.	Typ.	Max.		
I_{CES}	Collector-emitter cut-off current	$V_{CE}=650\text{V}, V_{GE}=0\text{V}, T_{vj}=25^{\circ}\text{C}$	-	-	1	mA	
I_{GES}	Gate leakage current	$V_{CE}=0\text{V}, V_{GE}=20\text{V}, T_{vj}=25^{\circ}\text{C}$	-	-	250	nA	
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=7.4\text{mA}, V_{CE}=V_{GE}, T_{vj}=25^{\circ}\text{C}$	5.0	5.9	7.0	V	
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_C=200\text{A}$ $V_{GE}=15\text{V}$	$T_{vj}=25^{\circ}\text{C}$	-	2.2		2.5
			$T_{vj}=125^{\circ}\text{C}$	-	2.6		-
			$T_{vj}=150^{\circ}\text{C}$	-	2.7	-	
C_{ies}	Input capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}$	-	17	-	nF	
C_{res}	Reverse transfer capacitance	$f=1\text{MHz}, T_{vj}=25^{\circ}\text{C}$	-	0.23	-		
Q_G	Gate charge	$V_{CC}=300\text{V}, I_C=200\text{A}, V_{GE}=15\text{V}$	-	892	-	μC	
R_g	Internal gate resistance	$T_{vj}=25^{\circ}\text{C}$		1.7		Ω	

$t_{d(on)}$	Turn-on delay time	$V_{CC}=300V,$ $I_C=200A,$ $V_{GE}=\pm 15V,$ $R_{G(on)}=15\ \Omega,$ $R_{G(off)}=15\ \Omega,$ $L_{load}=200\mu H$	$T_{vj}=25^\circ C$	-	258	-	ns
			$T_{vj}=125^\circ C$	-	264	-	
			$T_{vj}=150^\circ C$	-	280	-	
t_r	Rise time		$T_{vj}=25^\circ C$	-	185	-	
			$T_{vj}=125^\circ C$	-	176	-	
			$T_{vj}=150^\circ C$	-	172	-	
$t_{d(off)}$	Turn-off delay time		$T_{vj}=25^\circ C$	-	326	-	
			$T_{vj}=125^\circ C$	-	300	-	
			$T_{vj}=150^\circ C$	-	288	-	
t_f	Fall time		$T_{vj}=25^\circ C$	-	56	-	
			$T_{vj}=125^\circ C$	-	60	-	
			$T_{vj}=150^\circ C$	-	76	-	
E_{on}	Turn-on energy (per pulse)		$T_{vj}=25^\circ C$	-	5.8	-	mJ
			$T_{vj}=125^\circ C$	-	7.7	-	
			$T_{vj}=150^\circ C$	-	8.2	-	
E_{off}	Turn-off energy (per pulse)	$T_{vj}=25^\circ C$	-	5.1	-		
		$T_{vj}=125^\circ C$	-	5.5	-		
		$T_{vj}=150^\circ C$	-	5.8	-		
R_{thJC}	Thermal resistance, junction to case	per IGBT	-	-	0.23	K/W	
R_{thCH}	Thermal resistance, case to heatsink	per IGBT/ $\lambda_{grease}=1W/(m \cdot K)$	-	0.05	-	K/W	
T_{vjop}	Temperature under switching conditions		-40		150	$^\circ C$	

Diode, Inverter

Maximum Rated Values

Symbol	Item	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}=25^\circ C$	650	V
I_F	Forward current, DC	$T_C=100^\circ C, T_{vj}=150^\circ C$	200	A
I_{FRM}	Repetitive peak forward current	$t_p=1ms$	400	A

Characteristic Values

V_F	Continuous forward voltage	$I_F=200A$ $V_{GE}=0V$	$T_{vj}=25^\circ C$	-	1.76	-	V
			$T_{vj}=125^\circ C$	-	1.66	-	
			$T_{vj}=150^\circ C$	-	1.65	-	
I_{RM}	Peak reverse recovery current	$V_R=300V$ $I_F=200A$ $di_F/dt=-1400A/\mu s$	$T_{vj}=25^\circ C$	-	160	-	A
			$T_{vj}=125^\circ C$	-	64	-	
			$T_{vj}=150^\circ C$	-	71	-	
t_{rr}	Reverse recovery time		$T_{vj}=25^\circ C$	-	152	-	ns
			$T_{vj}=125^\circ C$	-	200	-	
			$T_{vj}=150^\circ C$	-	232	-	
Q_r	Repetitive peak forward current		$T_{vj}=25^\circ C$	-	5.45	-	μC
			$T_{vj}=125^\circ C$	-	7.07	-	
			$T_{vj}=150^\circ C$	-	9.58	-	
E_{rec}	Recovered charge	$T_{vj}=25^\circ C$	-	0.81	-	mJ	
		$T_{vj}=125^\circ C$	-	1.22	-		
		$T_{vj}=150^\circ C$	-	1.34	-		

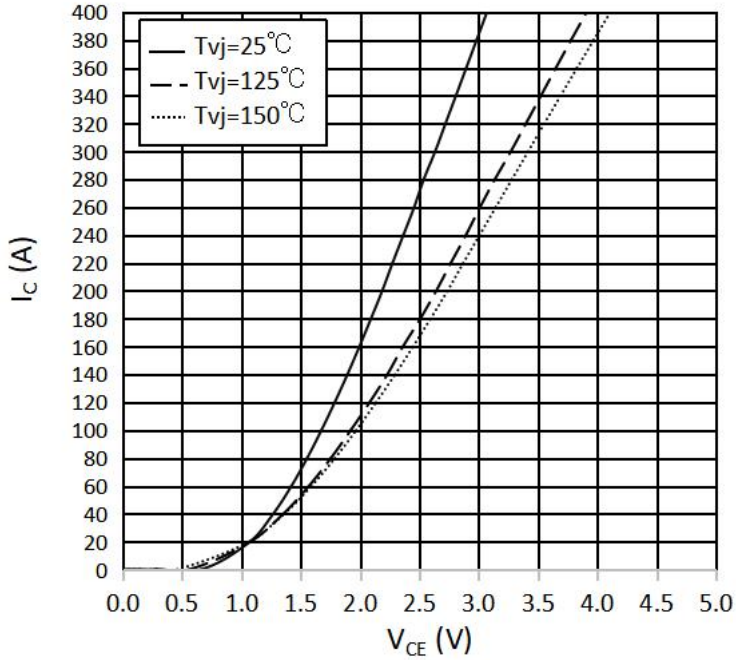
R_{thJC}	Thermal resistance, junction to case	per diode	-	-	0.4	K/W
R_{thCH}	Thermal resistance, case to heatsink	per IGBT/ $\lambda_{grease}=1W/(m \cdot K)$	-	0.05	-	K/W
T_{vjop}	Temperature under switching conditions		-40		150	°C

Module

Symbol	Item	Conditions	Rating			Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate, RMS, $f=50Hz, t=1min$	2500			V
-	Material of module baseplate	-	Cu			-
-	Internal isolation	Basic insulation(class 1, IEC 61140)	Al_2O_3			-
T_{stg}	Storage temperature	-	-40~125			°C
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
M	Mounting torque for module mounting	Screw M6	3.0	-	5.0	Nm
	Terminal connection torque	Screw M6	2.5	-	5.0	Nm
ds	Creepage distance	Terminal to terminal	-	23	-	mm
		Terminal to base plate	-	29	-	
da	Clearance	Terminal to terminal	-	11	-	mm
		Terminal to base plate	-	23	-	
m	Weight	-	-	147	-	g

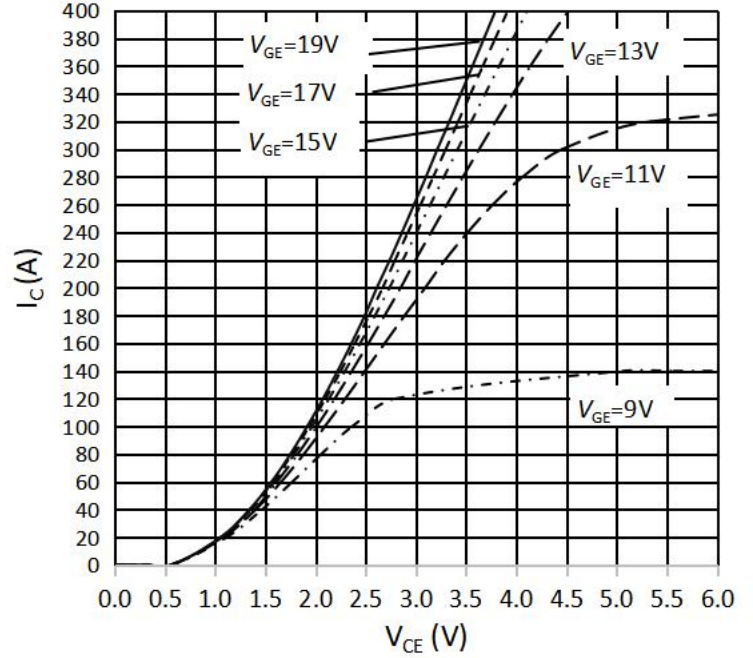
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



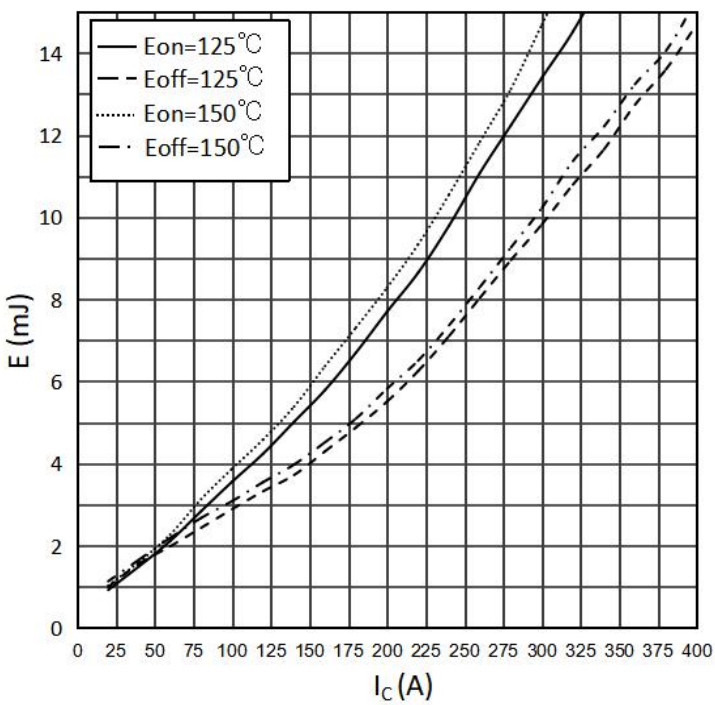
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$
 $T_{vj} = 150^\circ\text{C}$



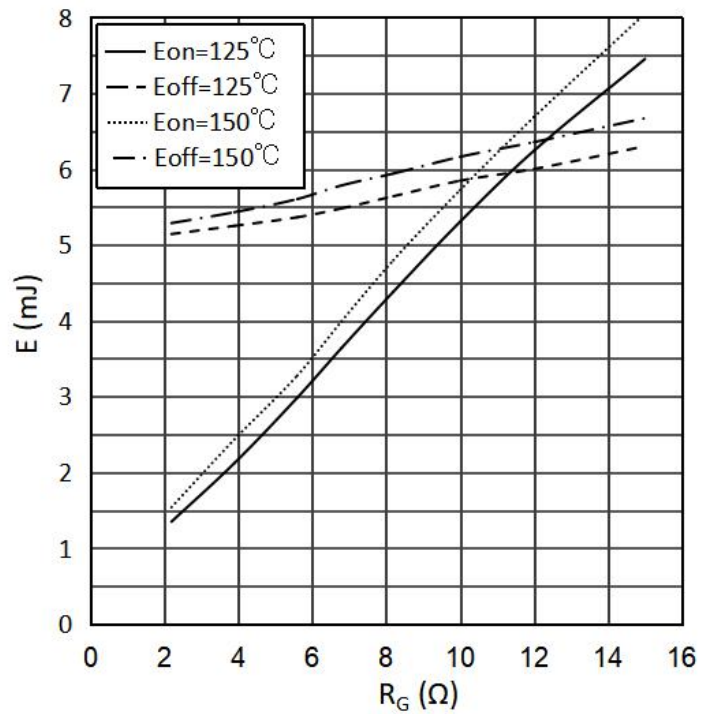
switching losses IGBT, Inverter (typical)

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 15\Omega$, $R_{Goff} = 15\Omega$, $V_{CE} = 300\text{ V}$



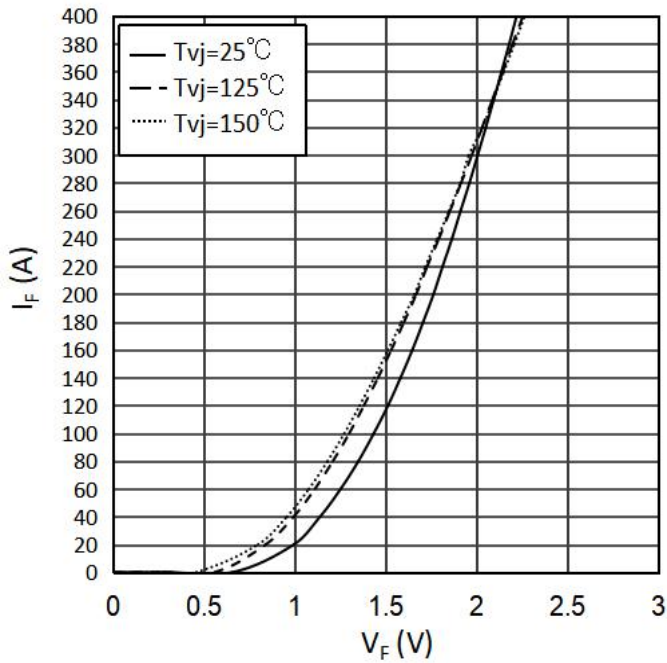
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 200\text{ A}$, $V_{CE} = 300\text{ V}$



forward characteristic of Diode, Inverter (typical)

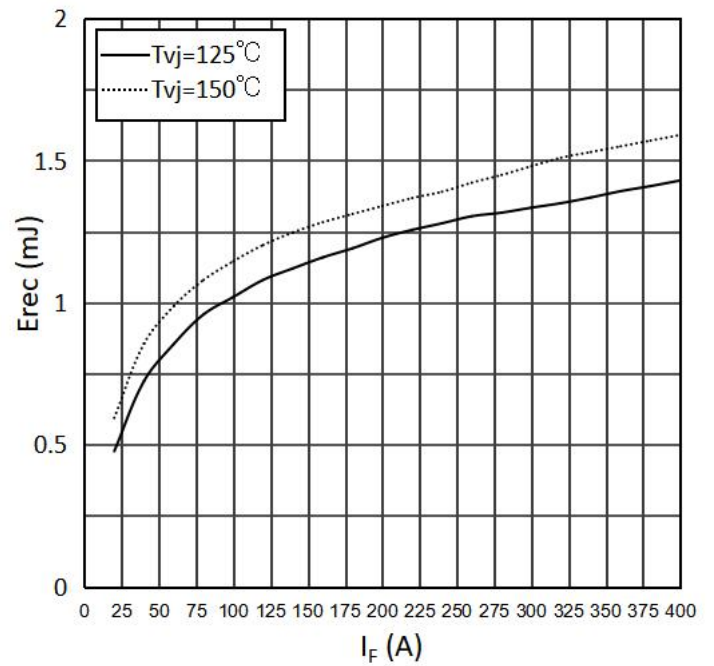
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

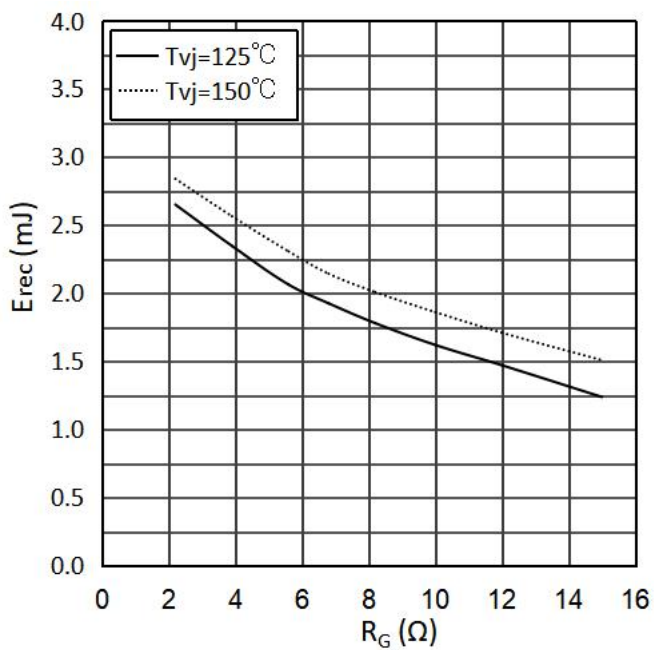
$R_{Gon}=15\Omega, V_{CE}=300V$



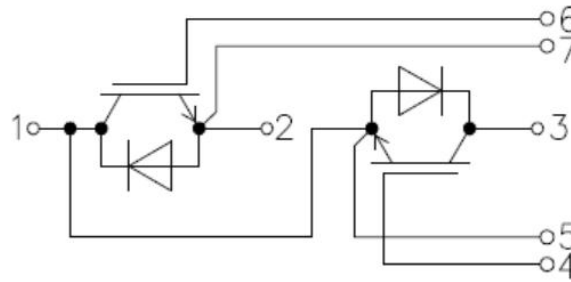
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

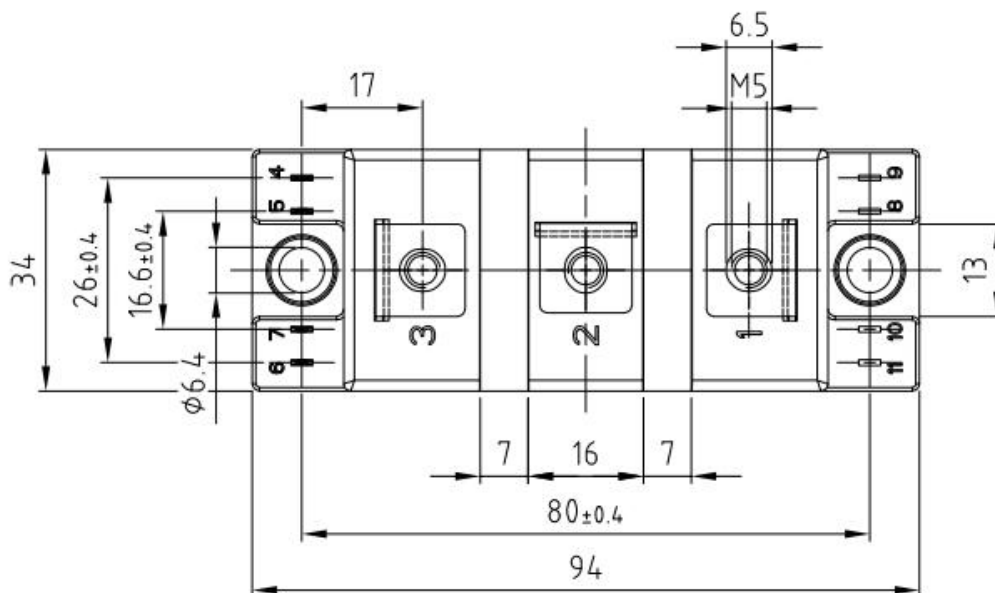
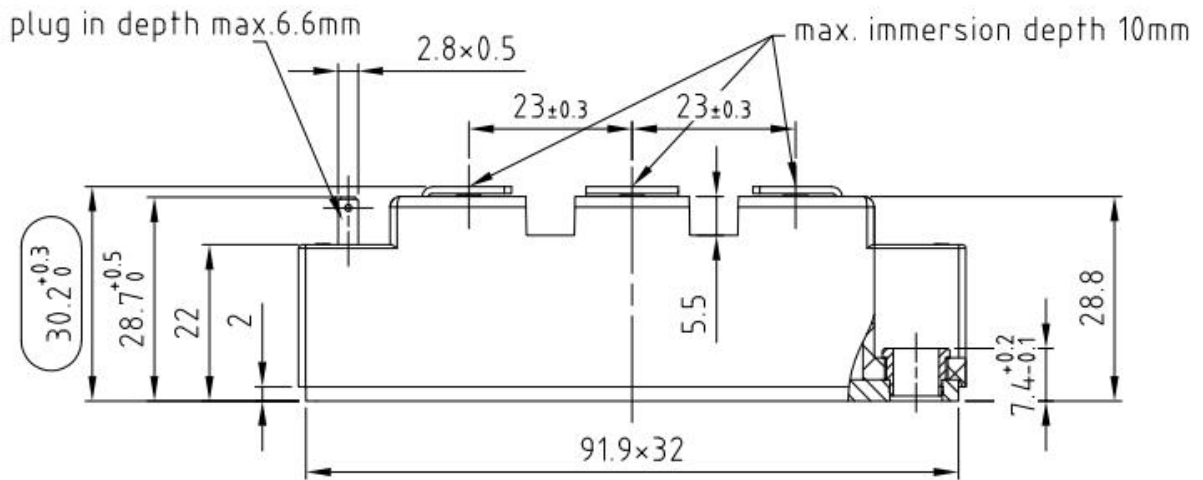
$I_F=200A, V_{CE}=300V$



Circuit diagram headline



Package outlines (Unit: mm)



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