

DOSEMI**IGBT****DG200X12T6B****1200V/200A IGBT with Diode**

General Description

DOSEMI IGBT Power Discrete provides ultra low conduction loss as well as low switching loss. They are designed for the applications such as general inverters and UPS.

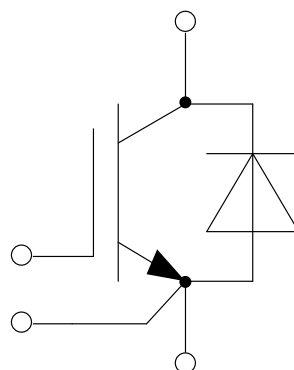
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- Low switching loss
- Maximum junction temperature 175°C
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Isolated heatsink using Si_3N_4 AMB technology
- Lead free package

Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Equivalent Circuit Schematic



Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted**IGBT**

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=100^{\circ}\text{C}$	323 200	A
I_{CM}	Pulsed Collector Current t_p limited by T_{jmax}	400	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	1470	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current t_p limited by T_{jmax}	400	A

Discrete

Symbol	Description	Values	Unit
T_{jmax}	Maximum Junction Temperature	175	$^{\circ}\text{C}$
T_{jop}	Operating Junction Temperature	-40 to +150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	2500	V

IGBT Characteristics $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=130\text{A}, V_{GE}=15\text{V}, T_j=25^\circ\text{C}$		1.70	2.15	V
		$I_C=130\text{A}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}$		2.05		
		$I_C=130\text{A}, V_{GE}=15\text{V}, T_j=175^\circ\text{C}$		2.15		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=8.0\text{mA}, V_{CE}=V_{GE}, T_j=25^\circ\text{C}$	5.6	6.2	6.8	V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0\text{V}, T_j=25^\circ\text{C}$			400	nA
R_{Gint}	Internal Gate Resistance			7.2		Ω
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, f=100\text{kHz}, V_{GE}=0\text{V}$		11.2		nF
C_{oes}	Output Capacitance			0.55		nF
C_{res}	Reverse Transfer Capacitance			0.27		nF
Q_G	Gate Charge	$V_{GE}=-15\dots+15\text{V}$		0.89		μC
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=200\text{A}, R_G=3.9\Omega, V_{GE}=-8\text{V}/+15\text{V}, T_j=25^\circ\text{C}$		145		ns
t_r	Rise Time			60		ns
$t_{d(off)}$	Turn-Off Delay Time			484		ns
t_f	Fall Time			178		ns
E_{on}	Turn-On Switching Loss			9.95		mJ
E_{off}	Turn-Off Switching Loss			15.9		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=200\text{A}, R_G=3.9\Omega, V_{GE}=-8\text{V}/+15\text{V}, T_j=150^\circ\text{C}$		157		ns
t_r	Rise Time			74		ns
$t_{d(off)}$	Turn-Off Delay Time			550		ns
t_f	Fall Time			246		ns
E_{on}	Turn-On Switching Loss			15.7		mJ
E_{off}	Turn-Off Switching Loss			20.4		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=200\text{A}, R_G=3.9\Omega, V_{GE}=-8\text{V}/+15\text{V}, T_j=175^\circ\text{C}$		163		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			565		ns
t_f	Fall Time			258		ns
E_{on}	Turn-On Switching Loss			17.2		mJ
E_{off}	Turn-Off Switching Loss			21.4		mJ
I_{SC}	SC Data	$t_p \leq 6\mu\text{s}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}, V_{CC}=800\text{V}, V_{CEM} \leq 1200\text{V}$		520		A

Diode Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=130\text{A}, V_{GE}=0\text{V}, T_j=25^{\circ}\text{C}$		1.65	2.10	V
		$I_F=130\text{A}, V_{GE}=0\text{V}, T_j=150^{\circ}\text{C}$		1.60		
		$I_F=130\text{A}, V_{GE}=0\text{V}, T_j=175^{\circ}\text{C}$		1.60		
t_{rr}	Reverse Recovery Time	$V_R=600\text{V}, I_F=200\text{A},$ $-di/dt=3000\text{A}/\mu\text{s}, V_{GE}=-8\text{V}$ $T_j=25^{\circ}\text{C}$		189		ns
Q_r	Recovered Charge			9.28		μC
I_{RM}	Peak Reverse Recovery Current			114		A
E_{rec}	Reverse Recovery Energy			4.76		mJ
t_{rr}	Reverse Recovery Time	$V_R=600\text{V}, I_F=200\text{A},$ $-di/dt=2600\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $L_S=40\text{nH}, T_j=150^{\circ}\text{C}$		320		ns
Q_r	Recovered Charge			17.5		μC
I_{RM}	Peak Reverse Recovery Current			133		A
E_{rec}	Reverse Recovery Energy			7.82		mJ
t_{rr}	Reverse Recovery Time	$V_R=600\text{V}, I_F=200\text{A},$ $-di/dt=2500\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $L_S=40\text{nH}, T_j=175^{\circ}\text{C}$		352		ns
Q_r	Recovered Charge			20.1		μC
I_{RM}	Peak Reverse Recovery Current			138		A
E_{rec}	Reverse Recovery Energy			9.24		mJ

Discrete Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per IGBT)			0.106	K/W
	Junction-to-Case (per Diode)			0.178	

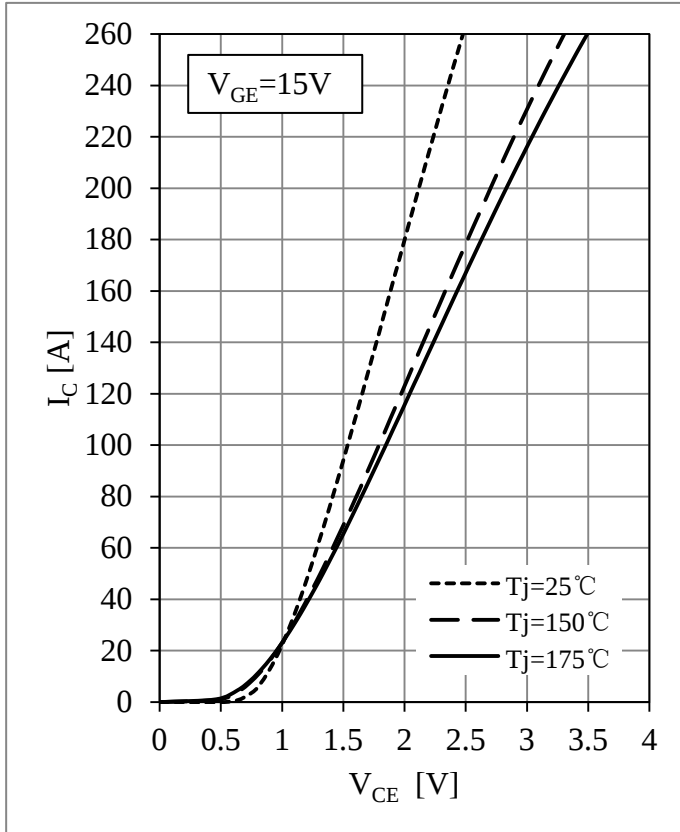


Fig 1. IGBT Output Characteristics

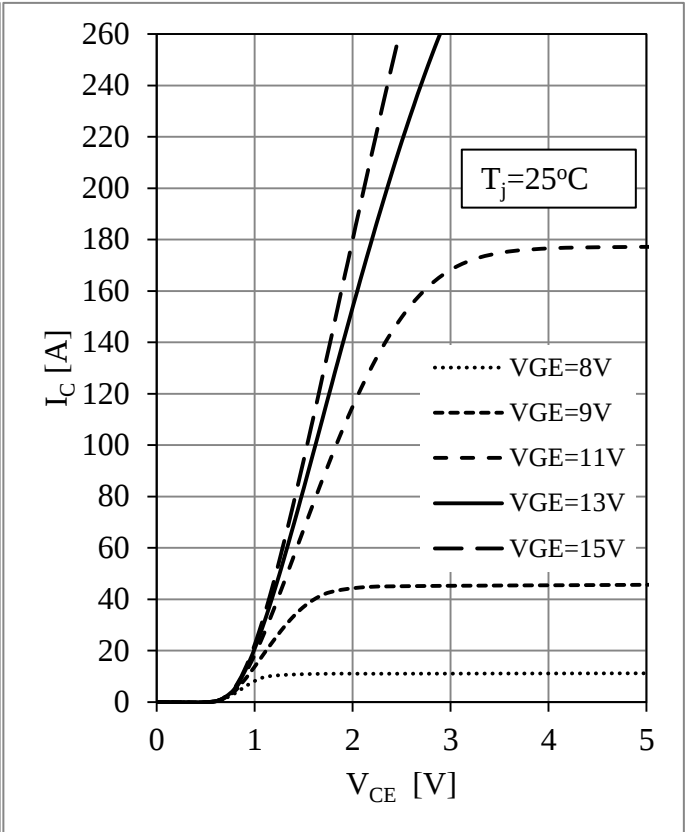


Fig 2. IGBT Output Characteristics

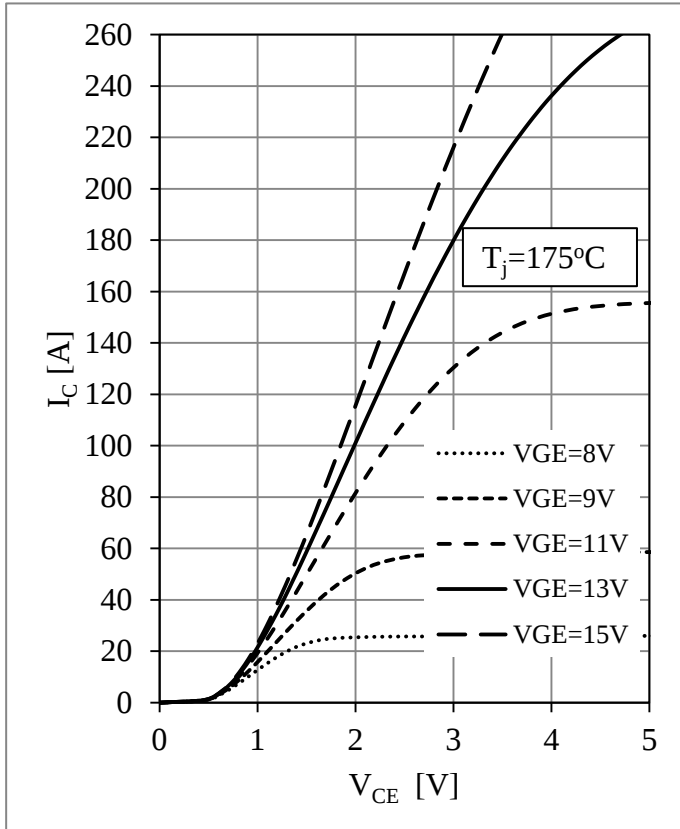


Fig 3. IGBT Output Characteristics

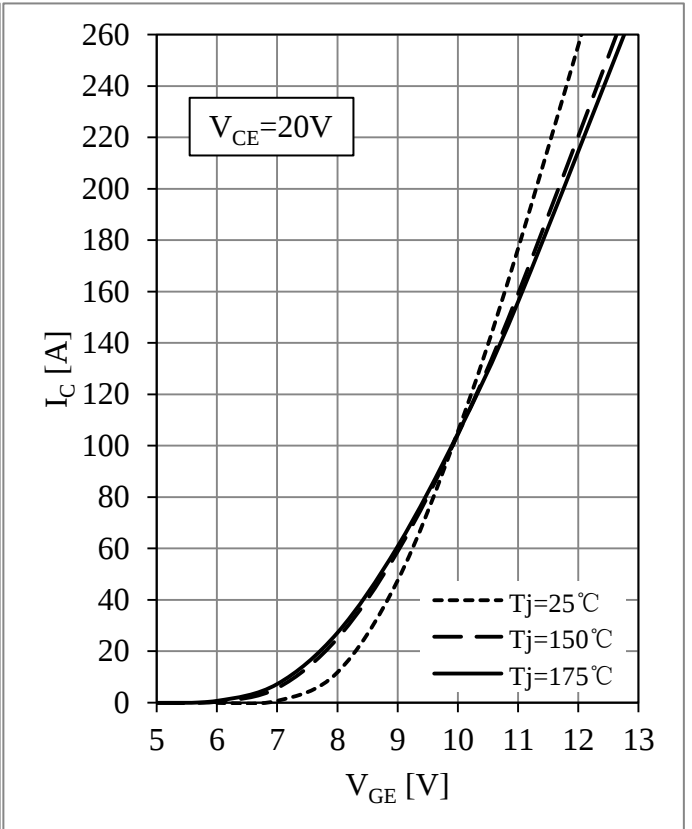


Fig 4. IGBT Transfer Characteristics

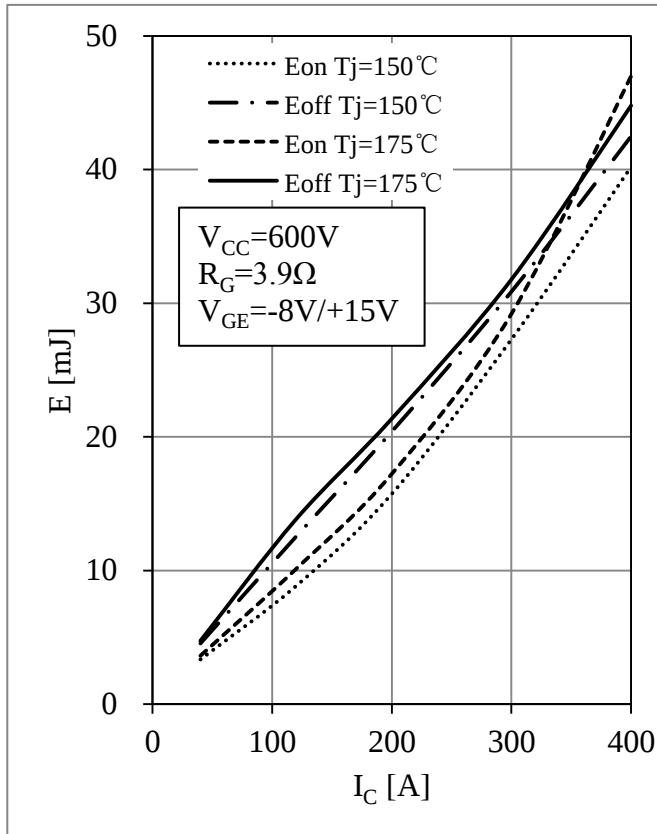
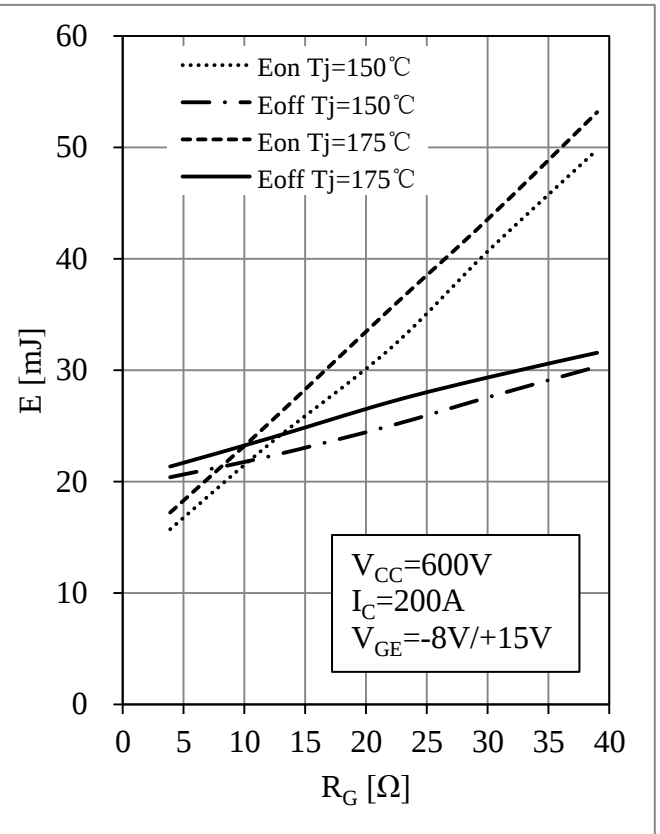
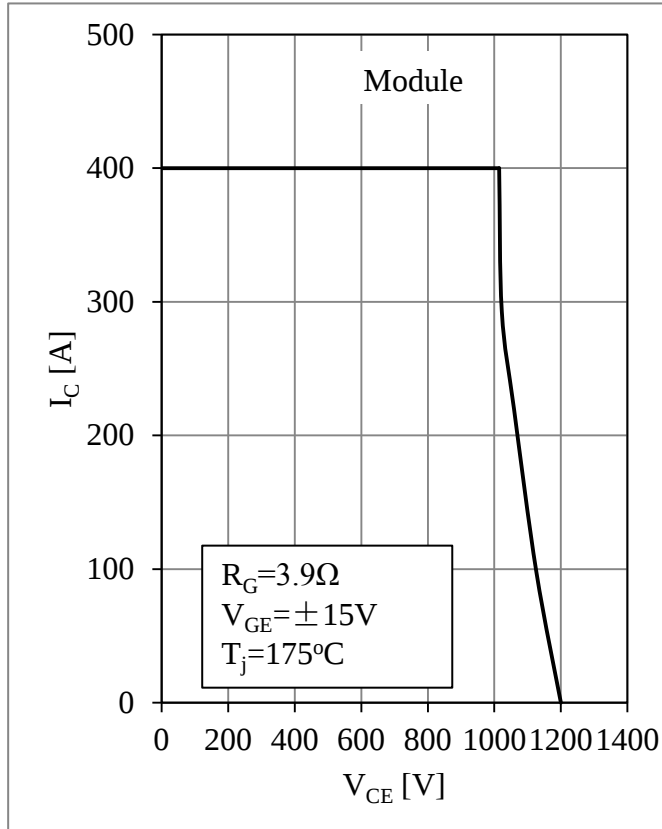
Fig 5. IGBT Switching Loss vs. I_C Fig 6. IGBT Switching Loss vs. R_G 

Fig 7. RBSOA

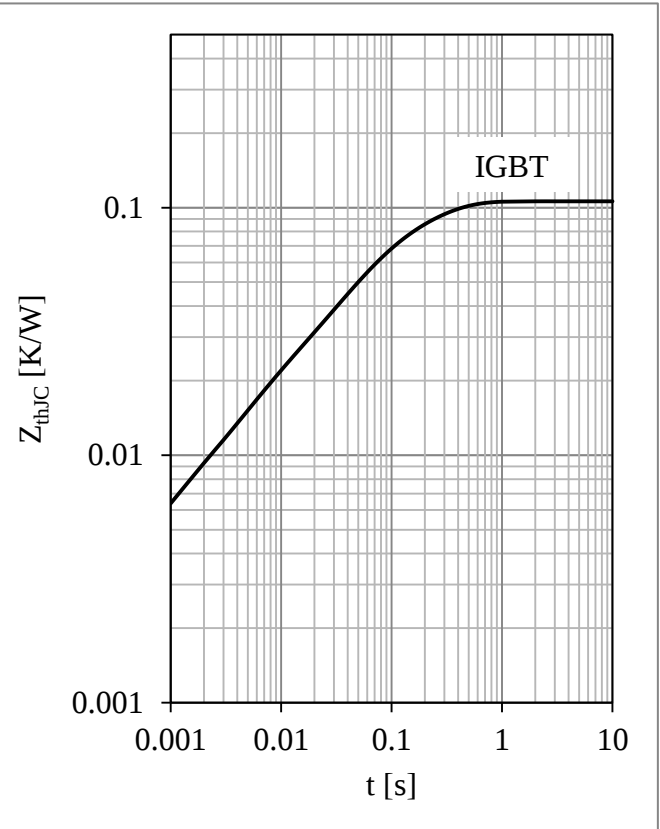


Fig 8. IGBT Transient Thermal Impedance

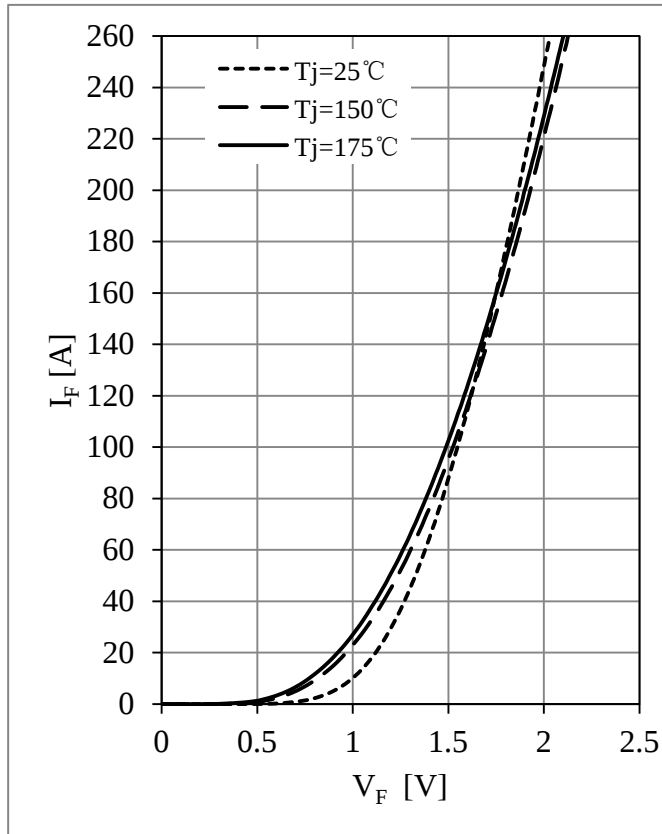


Fig 9. Diode Forward Characteristics

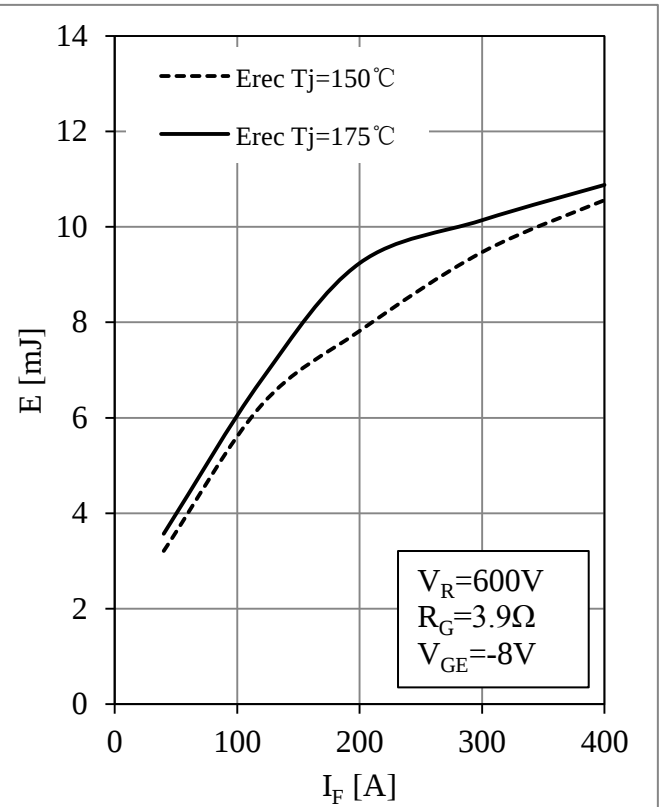
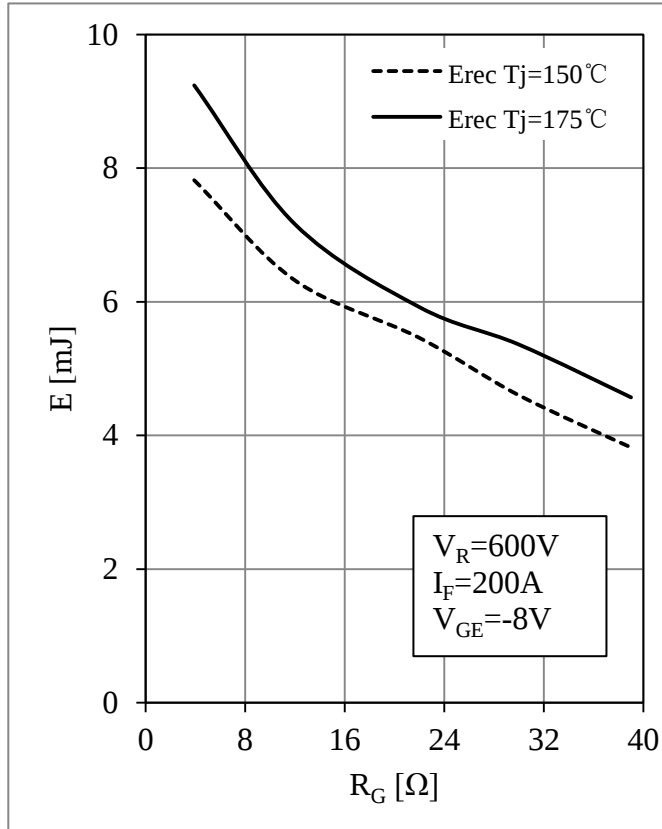
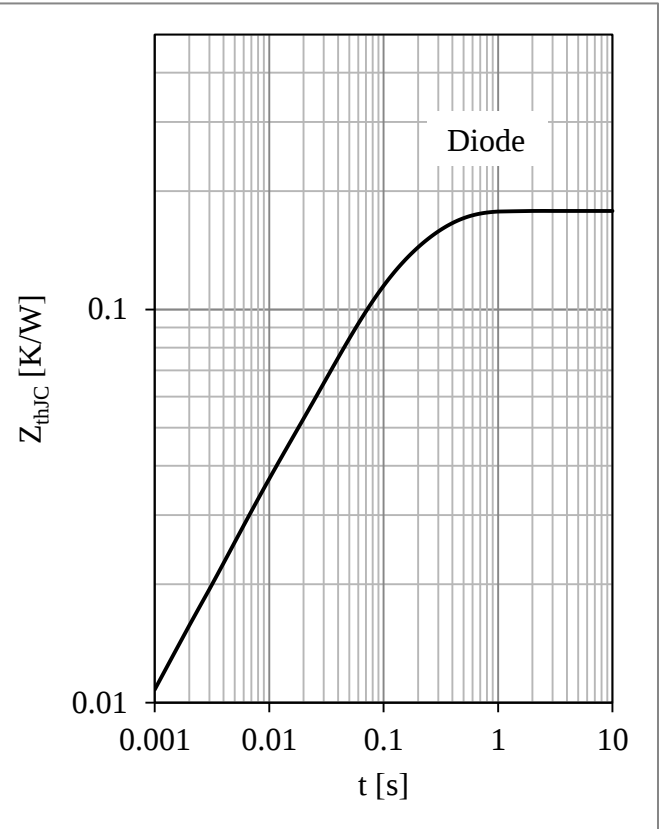
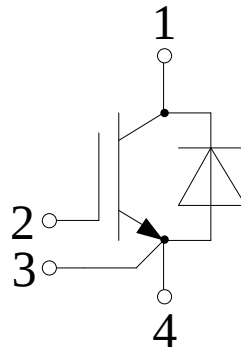
Fig 10. Diode Switching Loss vs. I_F Fig 11. Diode Switching Loss vs. R_G 

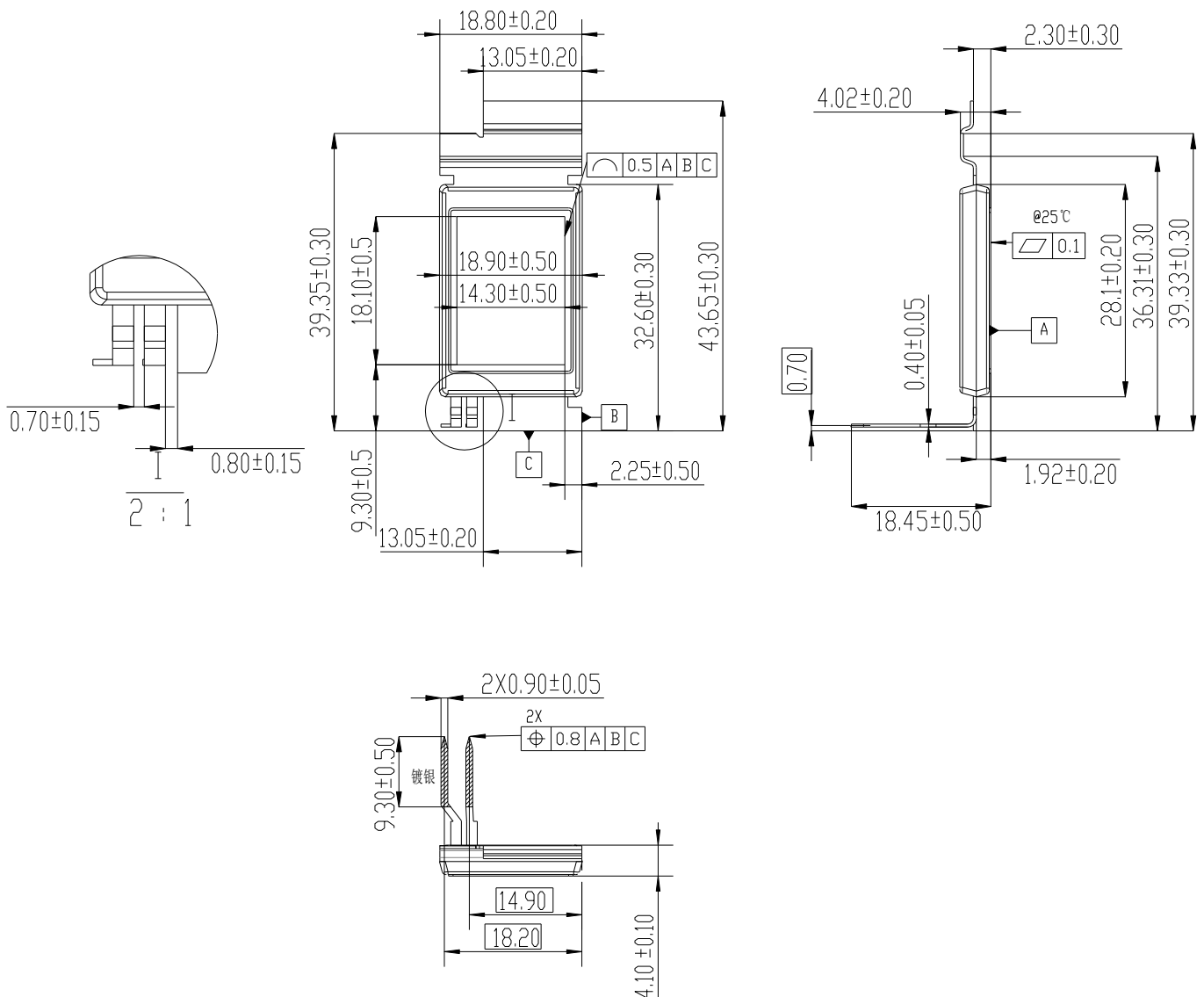
Fig 12. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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