DOSEMI

IGBT

DG200A12T6B

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.

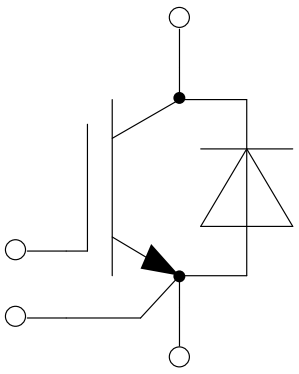
Features

- 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
- ROHS

Typical Applications

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

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°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°C @ T_C=100°C	400 200	A
I_{CM}	Pulsed Collector Current t_p limited by T_{jmax}	400	A
P_D	Maximum Power Dissipation @ T_{vj}=175°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_{vjmax}	Maximum Junction Temperature	175	°C
T_{vjop}	Operating Junction Temperature	-40 to +175	°C
T_{STG}	Storage Temperature Range	-40 to +125	°C
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500	V

IGBT Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=200A,V_{GE}=15V, T_{vj}=25°C		1.55	2.00	V
		I_C=200A,V_{GE}=15V, T_{vj}=150°C		1.90		
		I_C=200A,V_{GE}=15V, T_{vj}=175°C		1.95		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=5.2mA,V_{CE}=V_{GE}, T_{vj}=25°C		6.4		V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_{vj}=25°C			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_{vj}=25°C			400	nA
R_{Gint}	Internal Gate Resistance			4.0		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=100kHz, V_{GE}=0V		26.7		nF
C_{oes}	Output Capacitance			0.52		nF
C_{res}	Reverse Transfer Capacitance			0.18		nF
Q_G	Gate Charge	V_{GE}=-8…+15V		1.77		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=800V,I_C=200A, R_G=3.3Ω, V_{GE}=-8/+15V, L_S=60nH,T_{vj}=25°C		290		ns
t_r	Rise Time			69		ns
$t_{d(off)}$	Turn-Off Delay Time			712		ns
t_f	Fall Time			58		ns
E_{on}	Turn-On Switching Loss			39.6		mJ
E_{off}	Turn-Off Switching Loss			18.7		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=800V,I_C=200A, R_G=3.3Ω, V_{GE}=-8/+15V, L_S=60nH,T_{vj}=150°C		324		ns
t_r	Rise Time			97		ns
$t_{d(off)}$	Turn-Off Delay Time			836		ns
t_f	Fall Time			144		ns
E_{on}	Turn-On Switching Loss			54.3		mJ
E_{off}	Turn-Off Switching Loss			25.6		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=800V,I_C=200A, R_G=3.3Ω, V_{GE}=-8/+15V, L_S=60nH,T_{vj}=175°C		331		ns
t_r	Rise Time			98		ns
$t_{d(off)}$	Turn-Off Delay Time			854		ns
t_f	Fall Time			146		ns
E_{on}	Turn-On Switching Loss			55.4		mJ
E_{off}	Turn-Off Switching Loss			26.4		mJ
I_{SC}	SC Data	t_P≤6μs,V_{GE}=15V, T_{vj}=175°C,V_{CC}=800V, V_{CEM}≤1200V		700		A

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=200A,V_{GE}=0V,T_{vj}=25°C		1.95	2.40	V
		I_F=200A,V_{GE}=0V,T_{vj}=150°C		1.95		
		I_F=200A,V_{GE}=0V,T_{vj}=175°C		1.90		
t_{rr}	Reverse Recovery Time	V_R=800V,I_F=200A, -di/dt=1850A/μs,V_{GE}=-8V L_S=60nH,T_{vj}=25°C		334		ns
Q_r	Recovered Charge			12.6		μC
I_{RM}	Peak Reverse Recovery Current			83		A
E_{rec}	Reverse Recovery Energy			3.86		mJ
t_{rr}	Reverse Recovery Time	V_R=800V,I_F=200A, -di/dt=1400A/μs,V_{GE}=-8V L_S=60nH,T_{vj}=150°C		474		ns
Q_r	Recovered Charge			21.7		μC
I_{RM}	Peak Reverse Recovery Current			89		A
E_{rec}	Reverse Recovery Energy			6.79		mJ
t_{rr}	Reverse Recovery Time	V_R=800V,I_F=200A, -di/dt=1400A/μs,V_{GE}=-8V L_S=60nH,T_{vj}=175°C		511		ns
Q_r	Recovered Charge			23.4		μC
I_{RM}	Peak Reverse Recovery Current			95		A
E_{rec}	Reverse Recovery Energy			7.34		mJ

Discrete Characteristics T_C=25°C unless otherwise noted

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

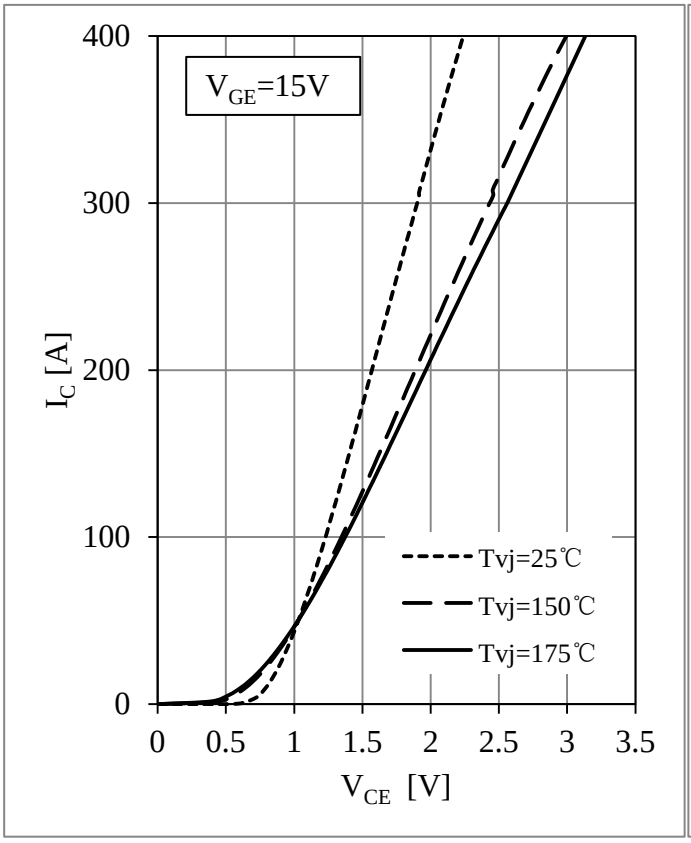


Fig 1. IGBT Output Characteristics

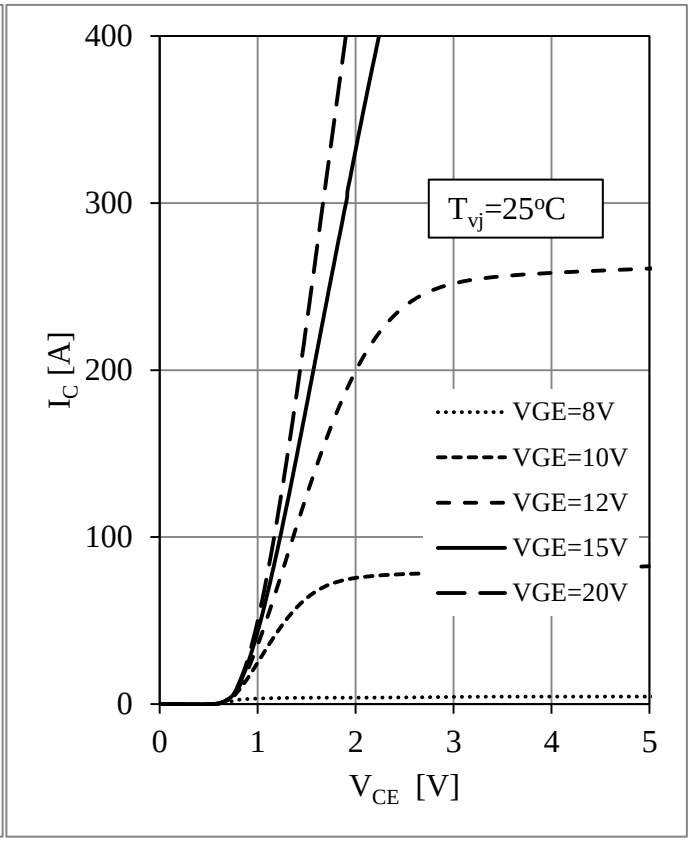


Fig 2. IGBT Output Characteristics

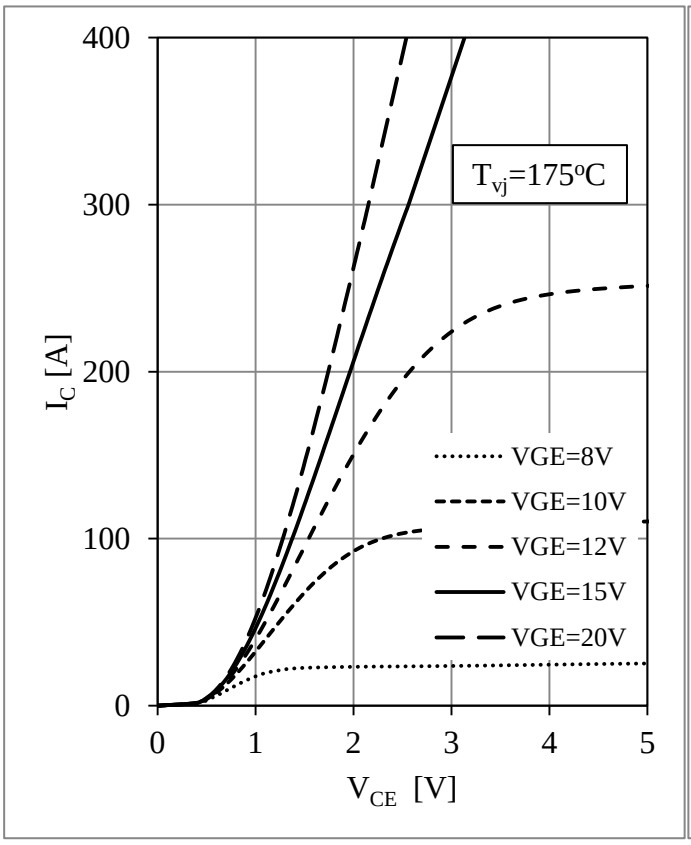


Fig 3. IGBT Output Characteristics

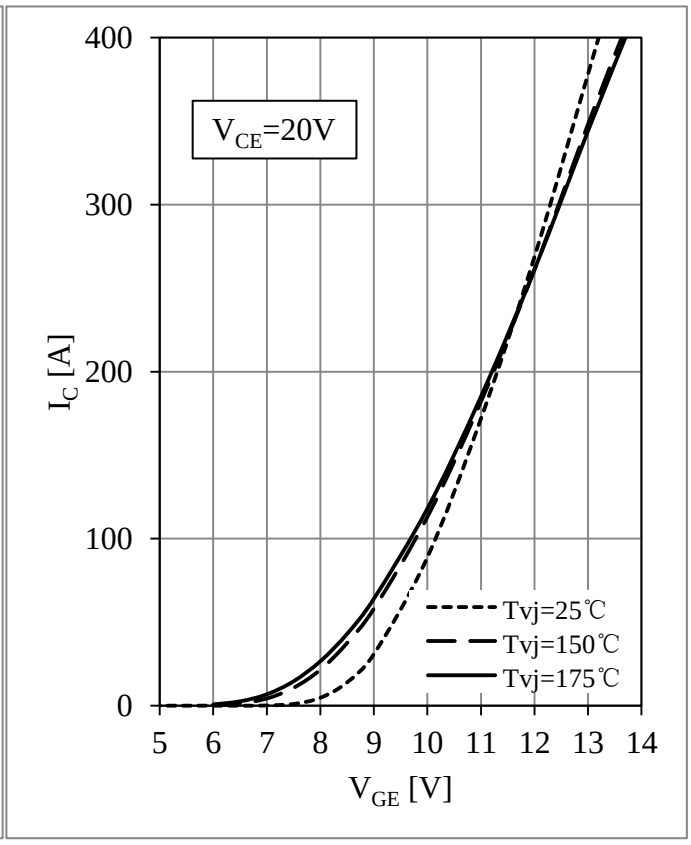


Fig 4. IGBT Transfer Characteristics

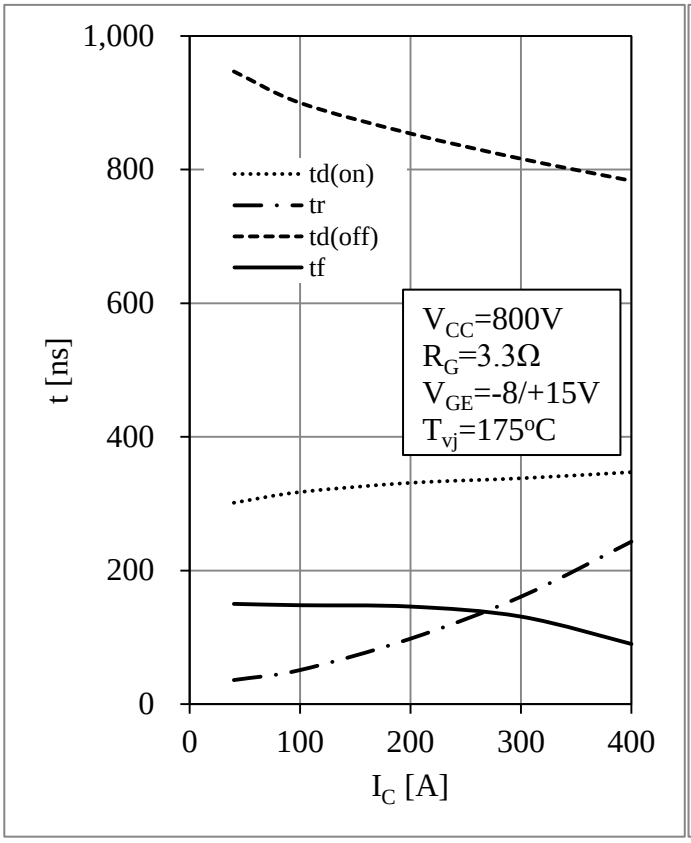


Fig 5. IGBT Switching Times as.I_C

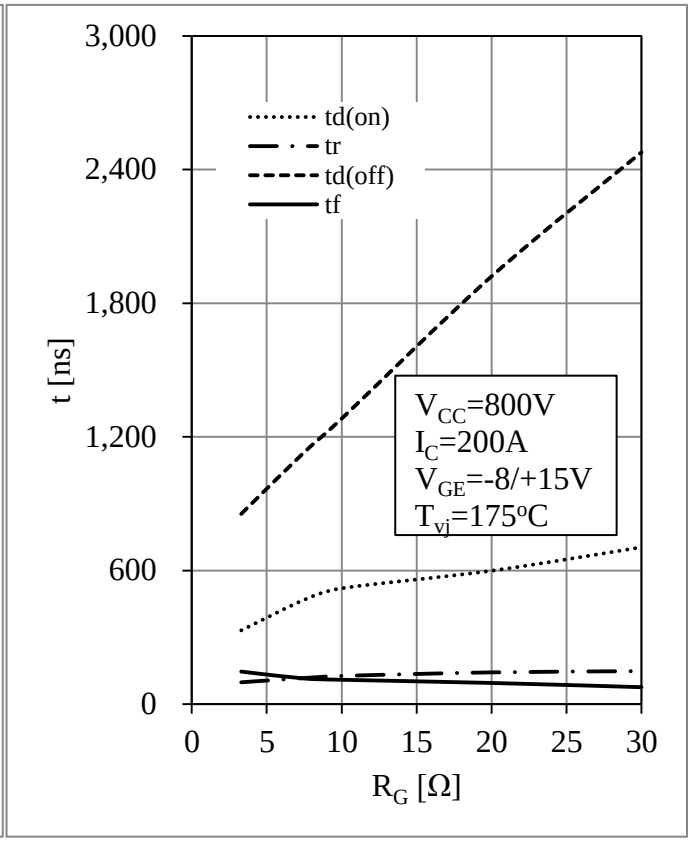


Fig 6. IGBT Switching Times as. R_G

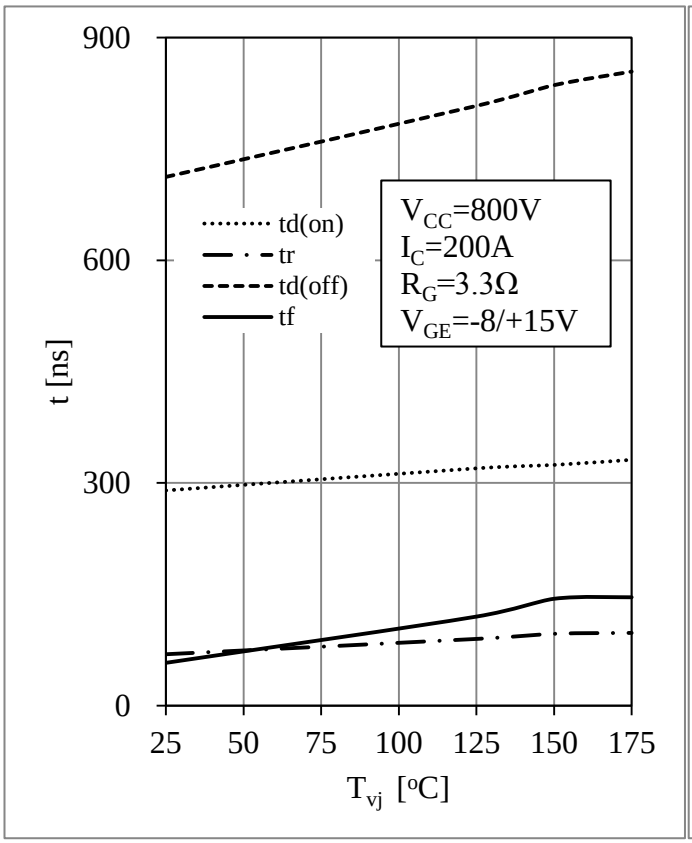


Fig 7. IGBT Switching Times vs. T_j

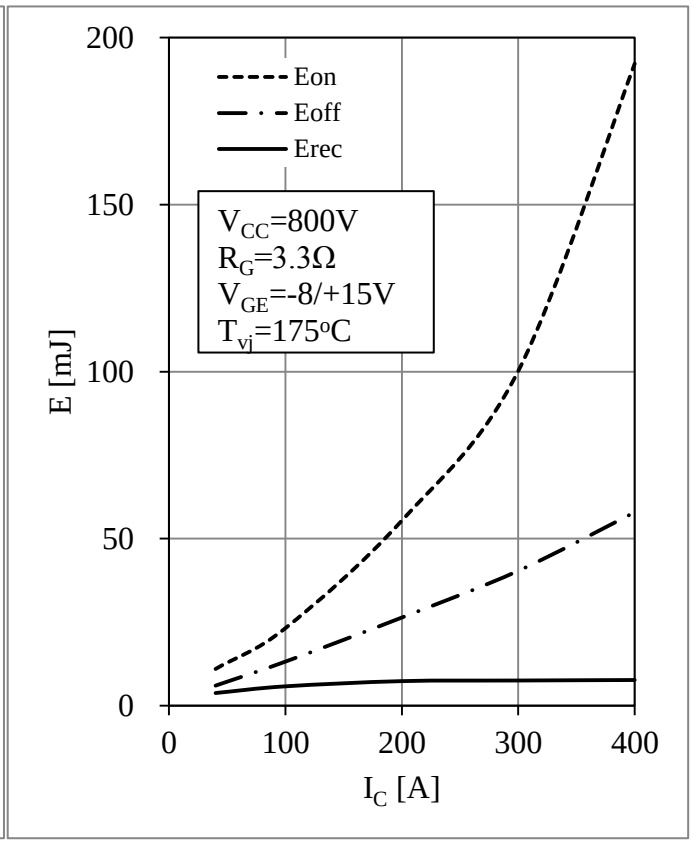


Fig 8. Switching Energy Loss vs. I_C

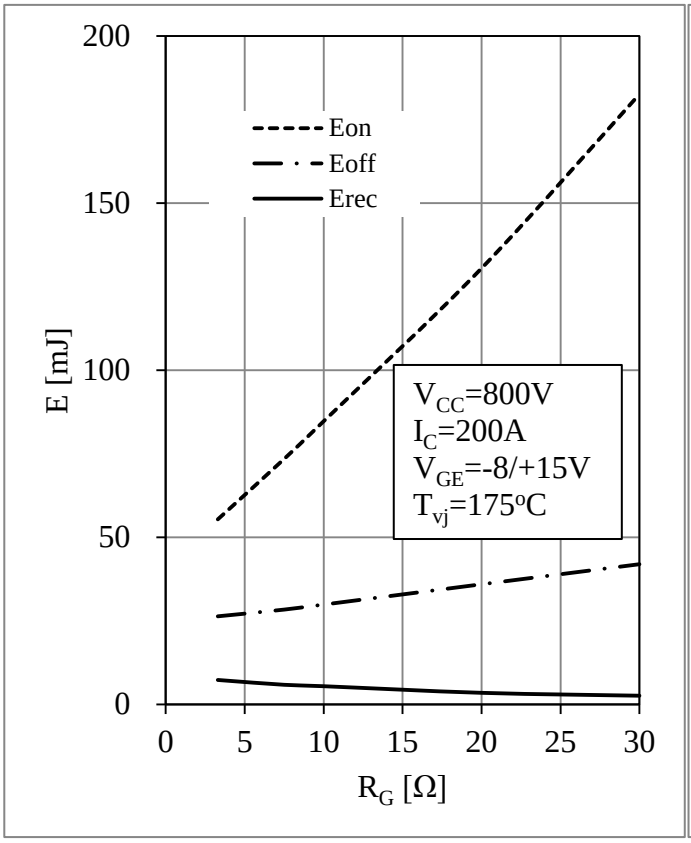


Fig 9. Switching Energy Loss vs. R_G

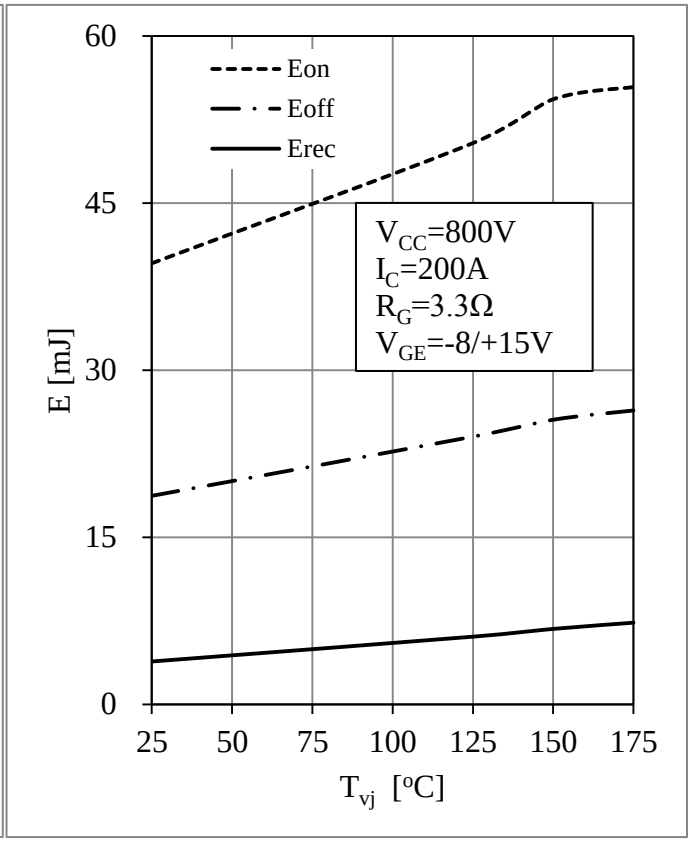


Fig 10. Switching Energy Loss vs. T_j

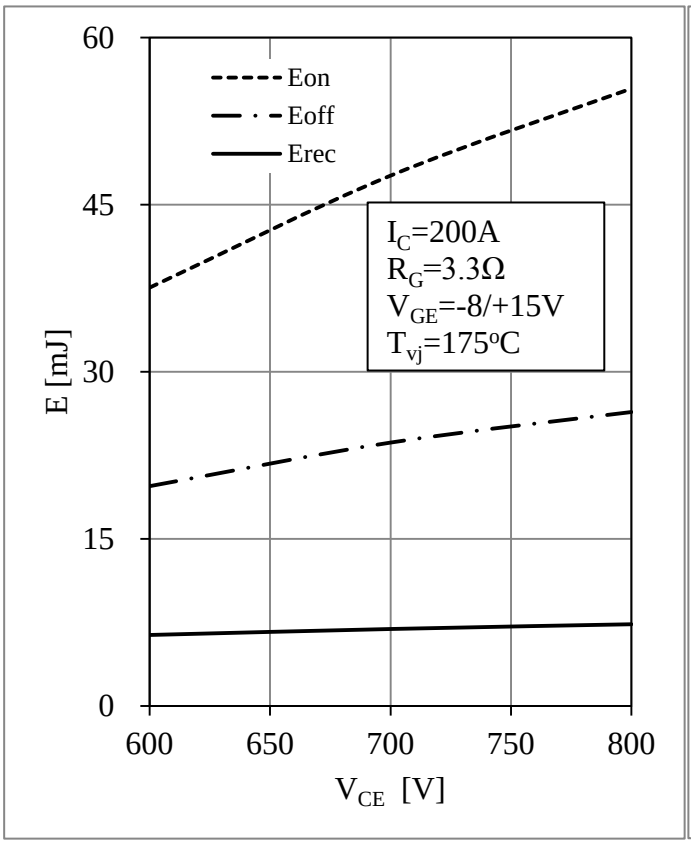


Fig 11. Switching Energy Loss vs.V_{CE}

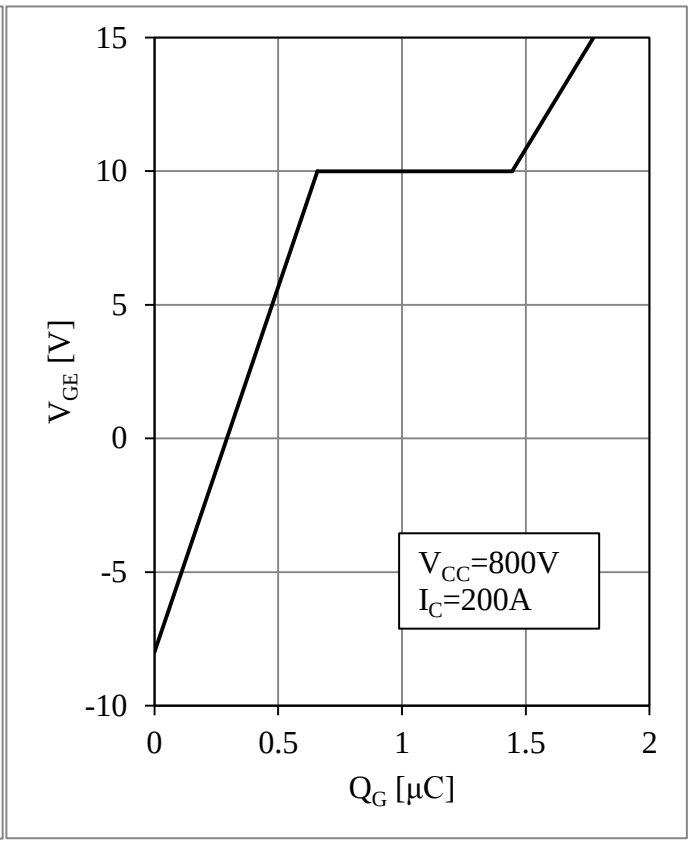


Fig 12. IGBT Gate Charge Characteristic

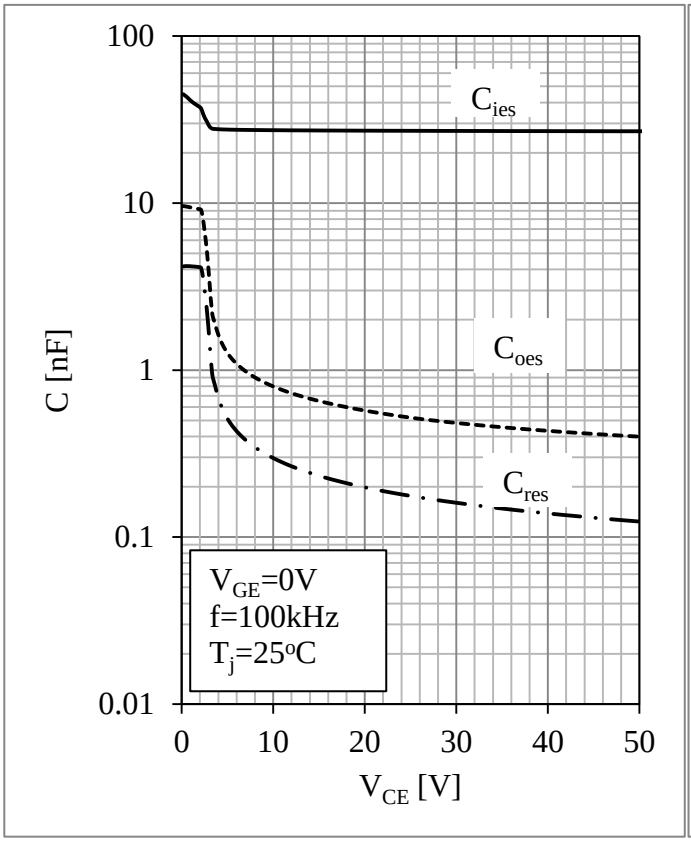


Fig 13. IGBT Capacity Charcteristic

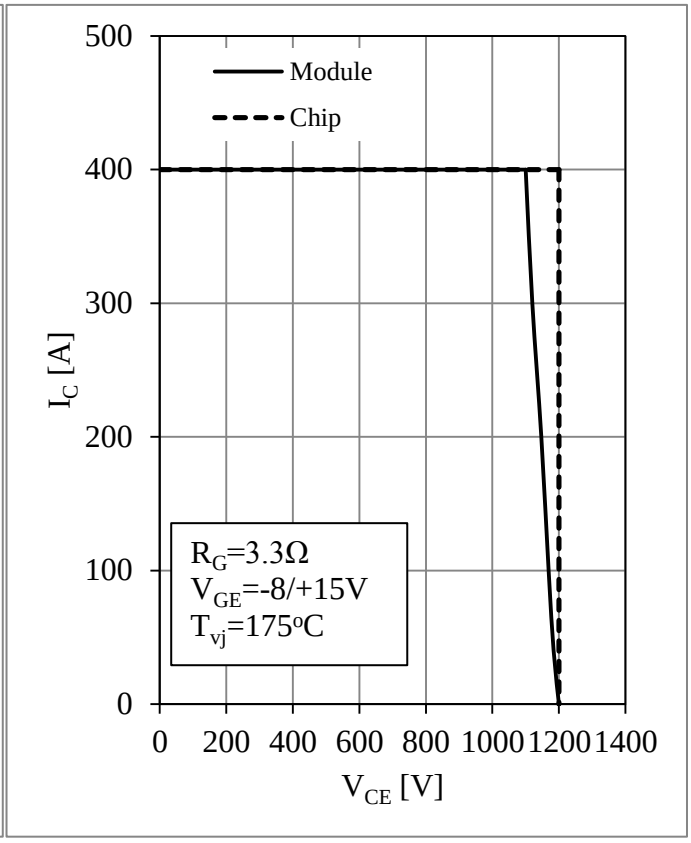


Fig 14. RBSOA

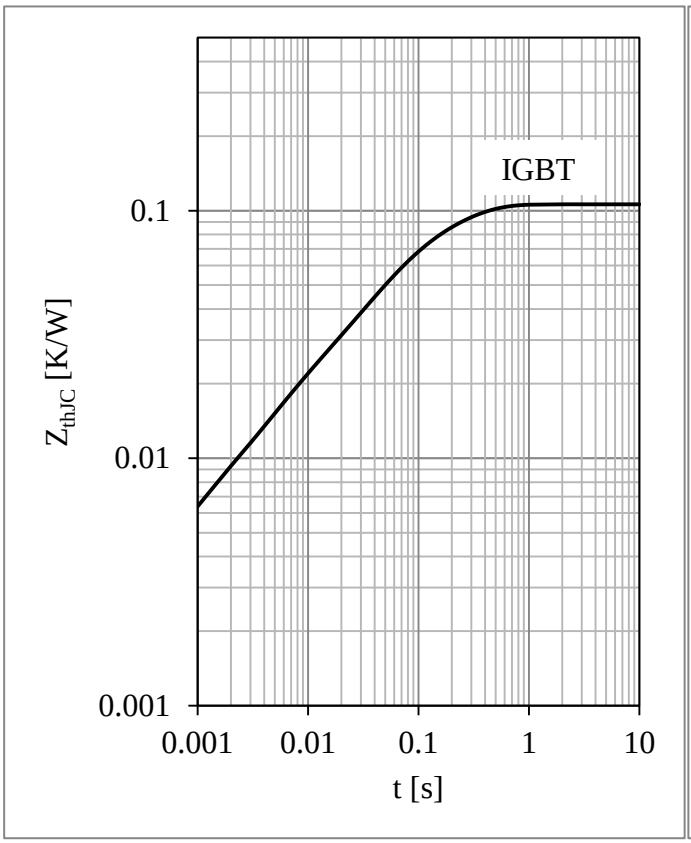


Fig 15. IGBT Transient Thermal Impedance

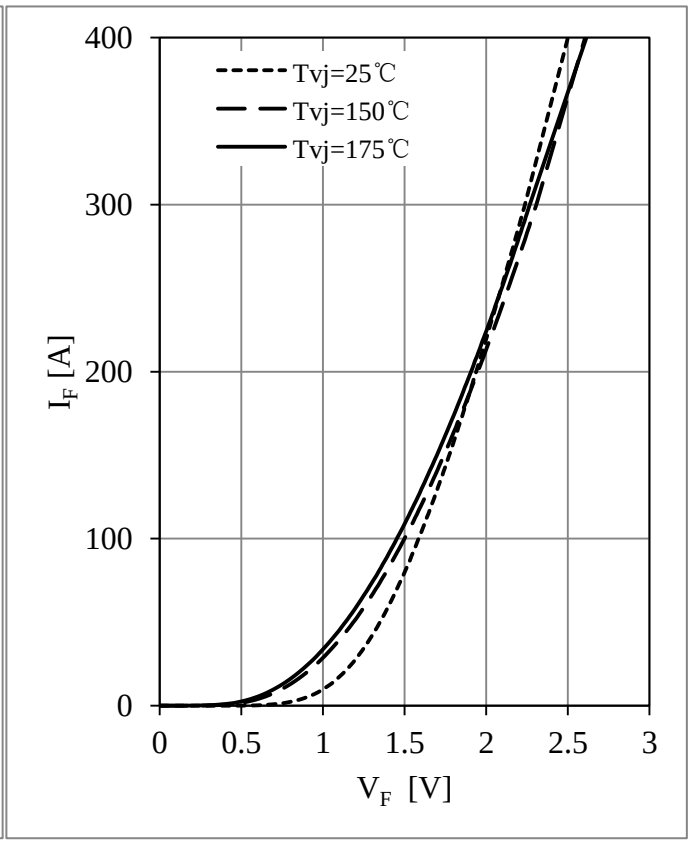


Fig 16. Diode Forward Characteristics

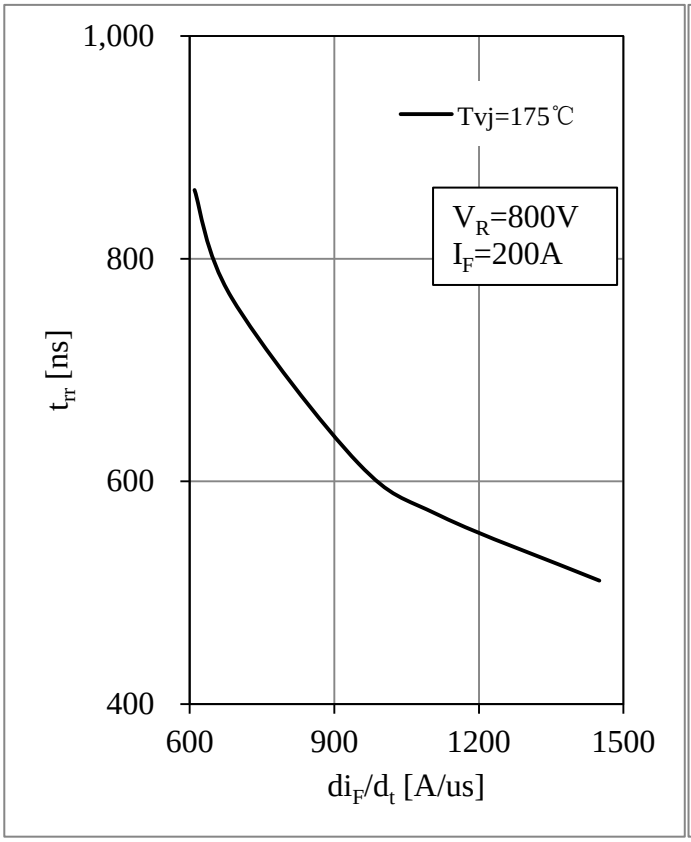


Fig 17. Reverse Recovery Time vs. di_F/d_t

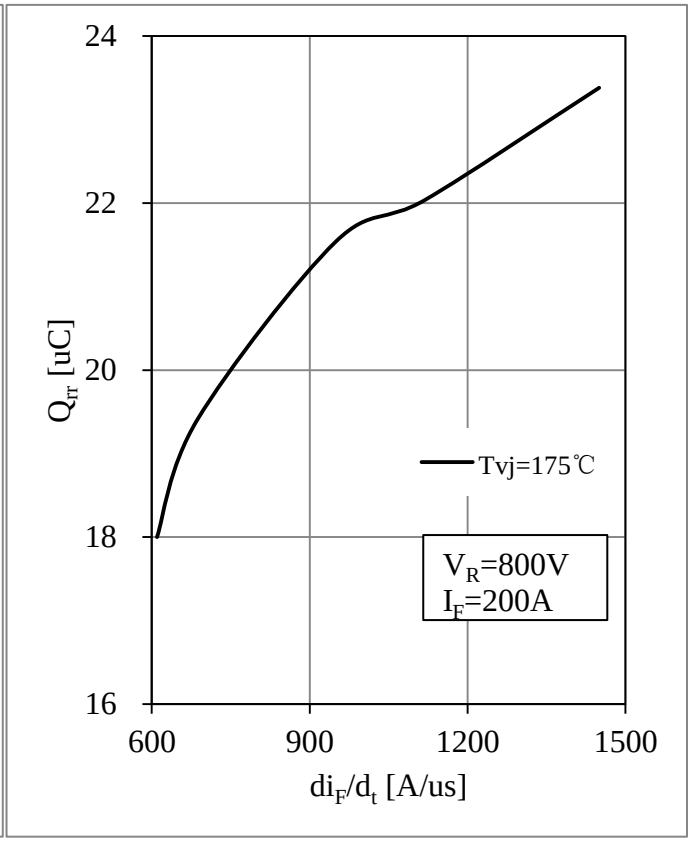


Fig 18. Reverse Recovery Charge vs. di_F/d_t

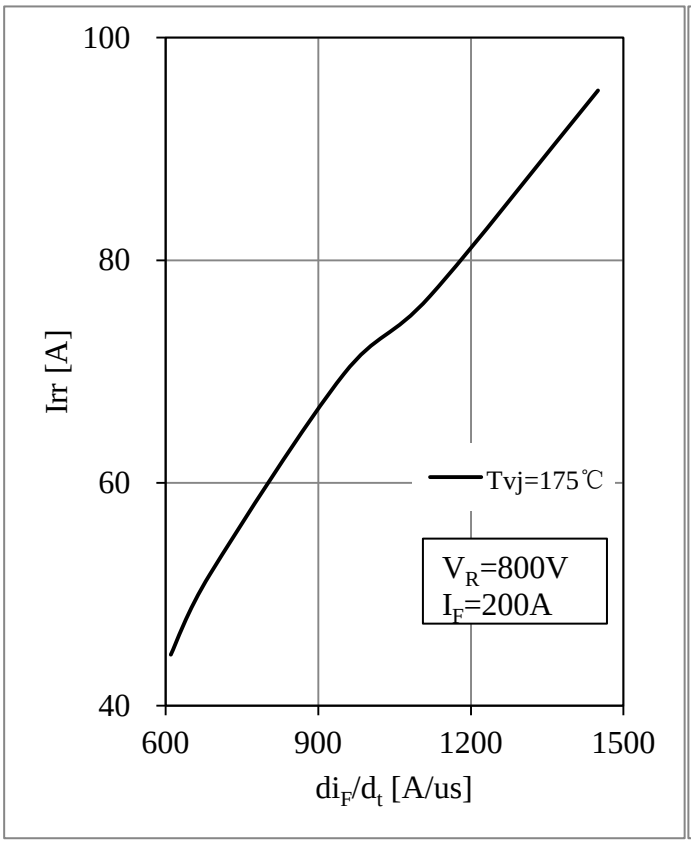


Fig 19. Reverse Recovery Current vs. di_F/d_t

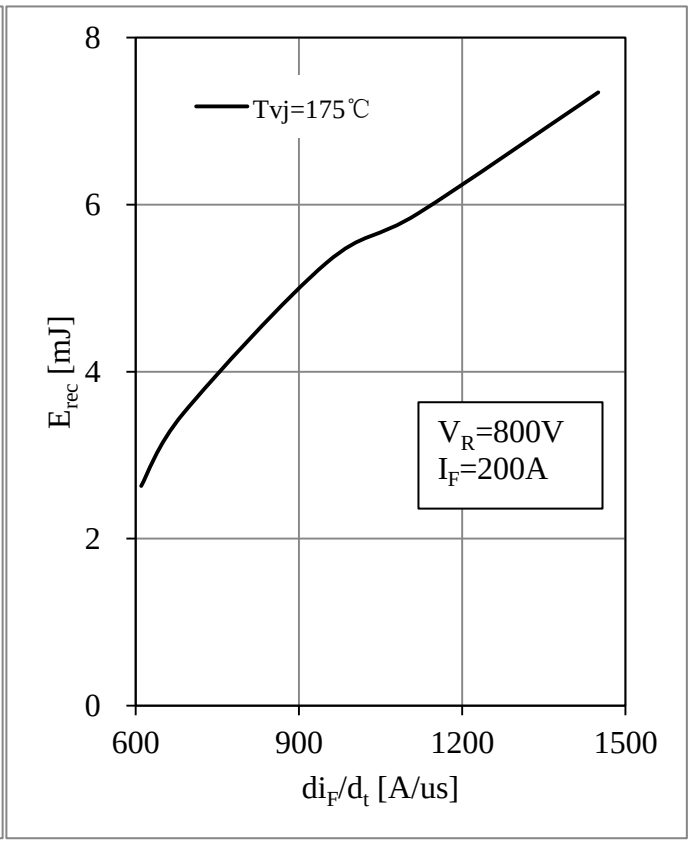


Fig 20. Reverse Energy Losses vs. di_F/d_t

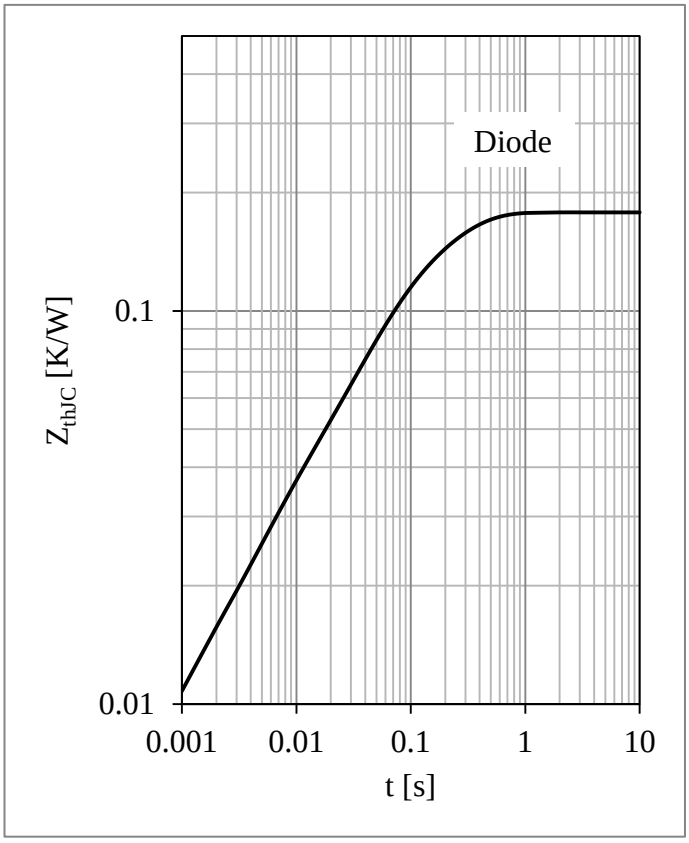
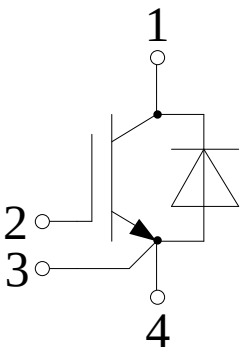


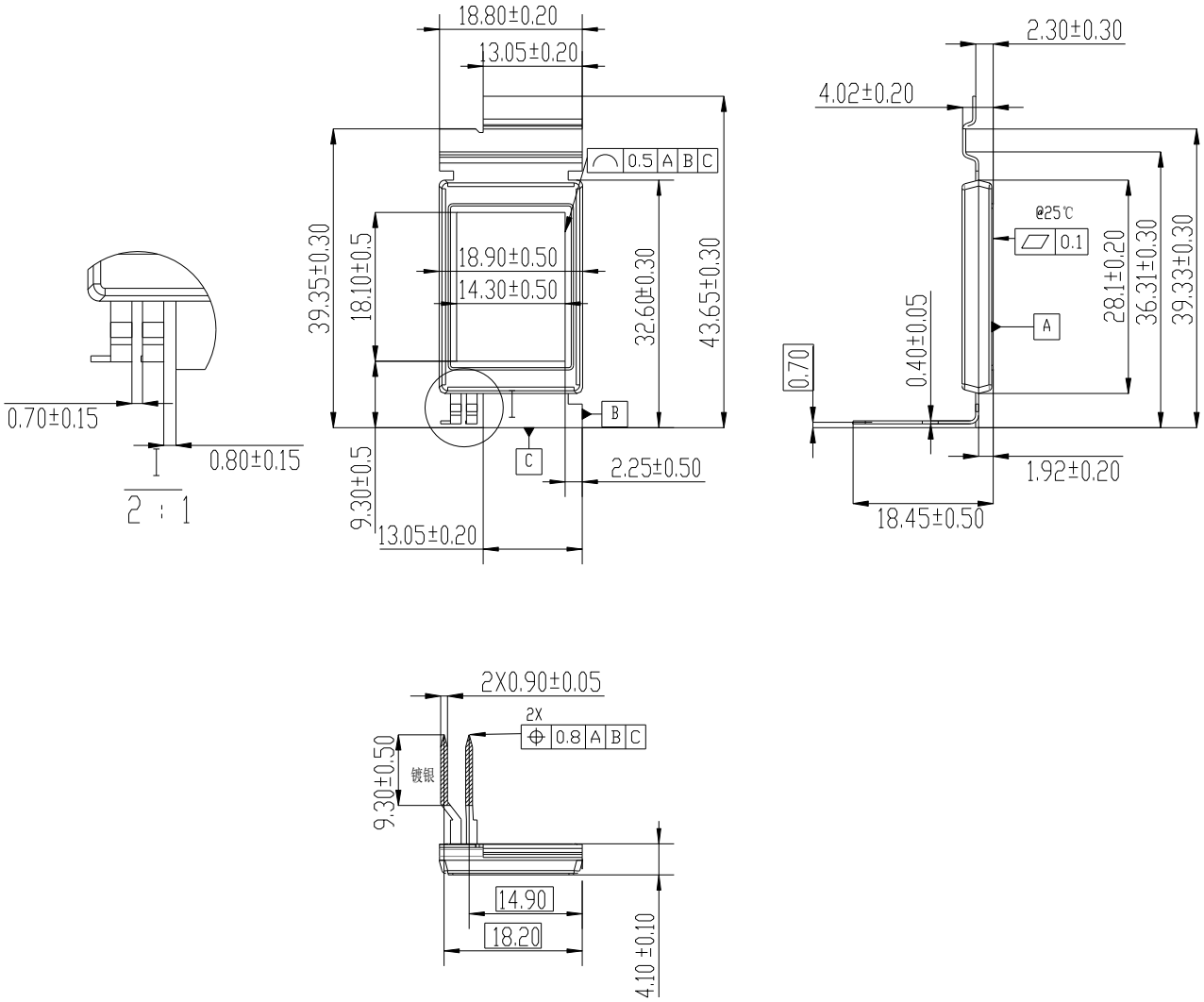
Fig 21. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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