DOSEMI

IGBT

DG75A08TDFQ

750V/75A IGBT with SIC 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 solar power.

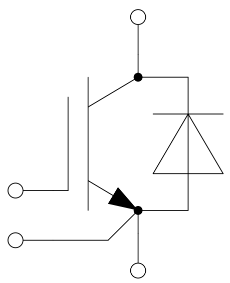
Features

- Low $V_{CE(sat)}$ Fast IGBT technology
- Low switching loss
- Maximum junction temperature 175°C
- $V_{CE(sat)}$ with positive temperature coefficient
- Very low reverse recovery loss based on SIC diode

Typical Applications

- Solar power
- UPS
- 3-level-application

Equivalent Circuit Schematic



Type	Package	Marking	Shipping
DG75A08TDFQ	TO-247PLUS-4L	DG75A08TDFQ	30Units/Tube

Absolute Maximum Ratings T_C=25°C unless otherwise noted

IGBT

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	750	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=100°C	100 75	A
I_{CRM}	Repetitive Peak Collector Current tp limited by T_{vjop}	225	A
P_D	Maximum Power Dissipation @ T_{vj}=175°C	378	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	750	V
I_F	Diode Continuous Forward Current @ T_C=25°C @ T_C=100°C	100 75	A
I_{FRM}	Repetitive Peak Forward Current tp limited by T_{vjop}	225	A

Discrete

Symbol	Description	Values	Unit
T_{vjop}	Operating Junction Temperature	-40 to +175	°C
T_{STG}	Storage Temperature Range	-55 to +150	°C
T_S	Soldering Temperature,1.6mm from case for 10s	260	°C

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=75A,V_{GE}=15V, T_{vj}=25°C		1.45	1.90	V
		I_C=75A,V_{GE}=15V, T_{vj}=150°C		1.80		
		I_C=75A,V_{GE}=15V, T_{vj}=175°C		1.90		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.5mA,V_{CE}=V_{GE}, T_{vj}=25°C	3.5	4.0	4.5	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_{vj}=25°C			200	μA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_{vj}=25°C			100	nA
R_{Gint}	Internal Gate Resistance			0		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=100kHz, V_{GE}=0V		2.89		nF
C_{res}	Reverse Transfer Capacitance			0.01		nF
C_{oes}	Output Capacitance			0.77		nF
Q_G	Gate Charge	V_{GE}=-10…+15V		0.17		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=400V,I_C=75A, R_G=5.1Ω,Ls=40nH, V_{GE}= ±15V,T_{vj}=25°C		30		ns
t_r	Rise Time			20		ns
$t_{d(off)}$	Turn-Off Delay Time			87		ns
t_f	Fall Time			27		ns
E_{on}	Turn-On Switching Loss			0.98		mJ
E_{off}	Turn-Off Switching Loss			1.05		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=400V,I_C=75A, R_G=5.1Ω,Ls=40nH, V_{GE}= ±15V,T_{vj}=150°C		34		ns
t_r	Rise Time			21		ns
$t_{d(off)}$	Turn-Off Delay Time			108		ns
t_f	Fall Time			71		ns
E_{on}	Turn-On Switching Loss			1.15		mJ
E_{off}	Turn-Off Switching Loss			1.55		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=400V,I_C=75A, R_G=5.1Ω,Ls=40nH, V_{GE}= ±15V,T_{vj}=175°C		36		ns
t_r	Rise Time			22		ns
$t_{d(off)}$	Turn-Off Delay Time			113		ns
t_f	Fall Time			82		ns
E_{on}	Turn-On Switching Loss			1.21		mJ
E_{off}	Turn-Off Switching Loss			1.63		mJ

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=75A,V_{GE}=0V,T_{vj}=25°C		1.55	2.00	V
		I_F=75A,V_{GE}=0V,T_{vj}=150°C		1.90		
		I_F=75A,V_{GE}=0V,T_{vj}=175°C		2.00		
Q_r	Recovered Charge	V_R=400V,I_F=75A, -di/dt=3080A/μs,Ls=40nH, V_{GE}=-15V,T_{vj}=25°C		0.26		μC
t_{rr}	Recovered Time			26		ns
I_{RM}	Peak Reverse Recovery Current			15		A
E_{rec}	Reverse Recovery Energy			0.01		mJ
Q_r	Recovered Charge	V_R=400V,I_F=75A, -di/dt=2850A/μs,Ls=40nH, V_{GE}=-15V,T_{vj}=150°C		0.26		μC
t_{rr}	Recovered Time			26		ns
I_{RM}	Peak Reverse Recovery Current			15		A
E_{rec}	Reverse Recovery Energy			0.02		mJ
Q_r	Recovered Charge	V_R=400V,I_F=75A, -di/dt=2860A/μs,Ls=40nH, V_{GE}=-15V,T_{vj}=175°C		0.25		μC
t_{rr}	Recovered Time			26		ns
I_{RM}	Peak Reverse Recovery Current			15		A
E_{rec}	Reverse Recovery Energy			0.02		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)			0.396 0.405	K/W
R_{thJA}	Junction-to-Ambient		40		K/W

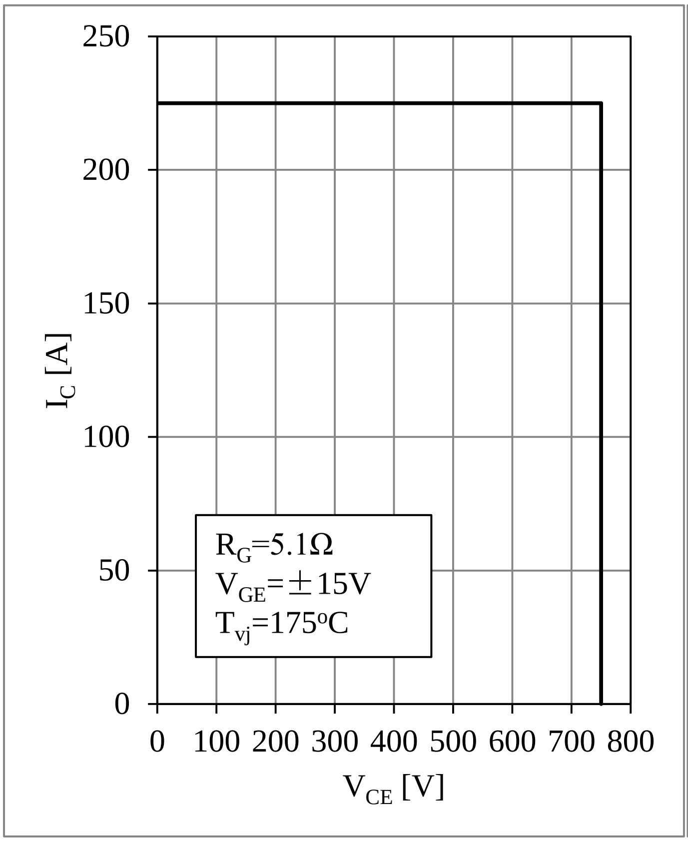


Fig 1. RBSOA

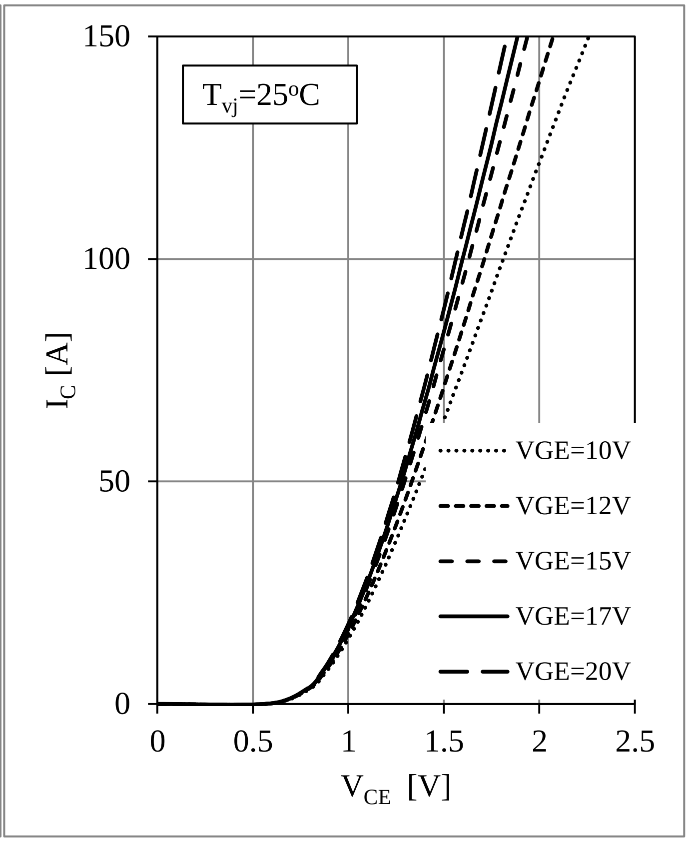


Fig 2. IGBT Output Characteristics

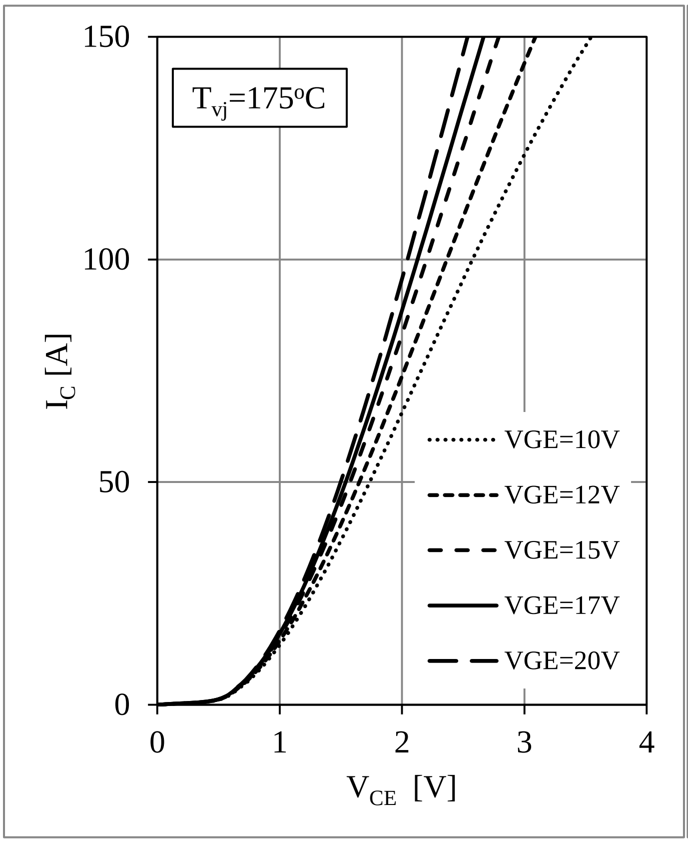


Fig 3. IGBT Output Characteristics

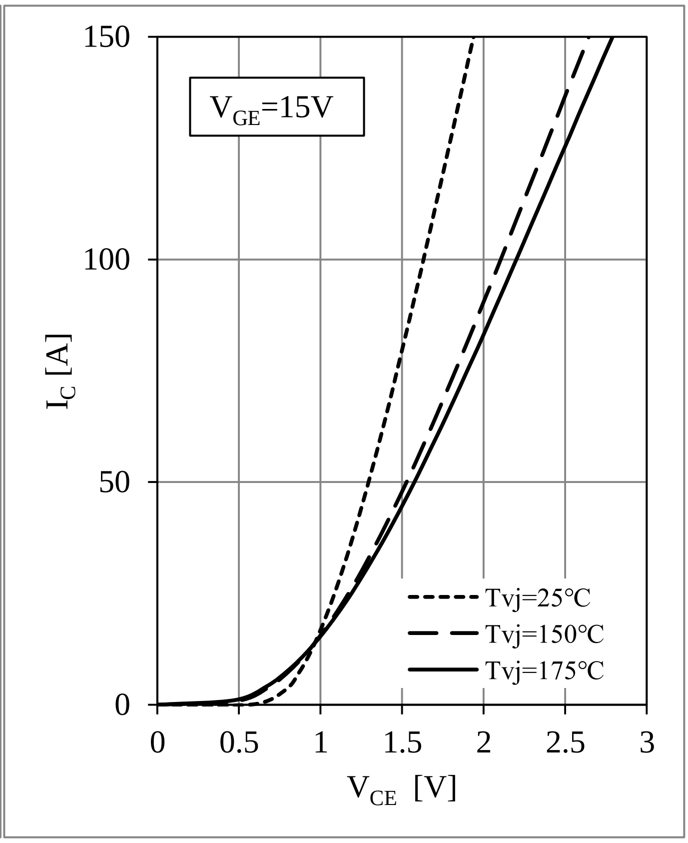
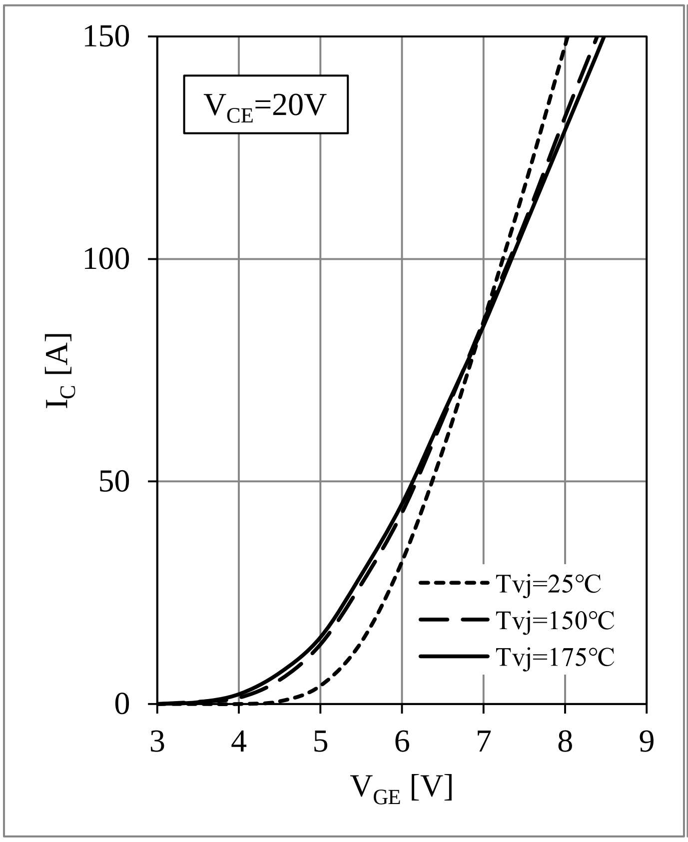


Fig 4. IGBT Output Characteristics



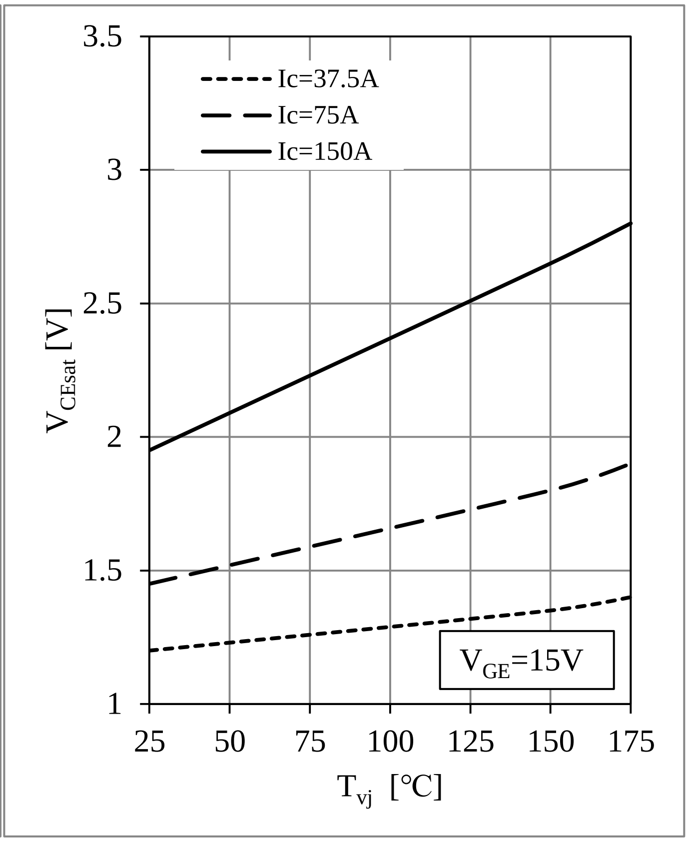
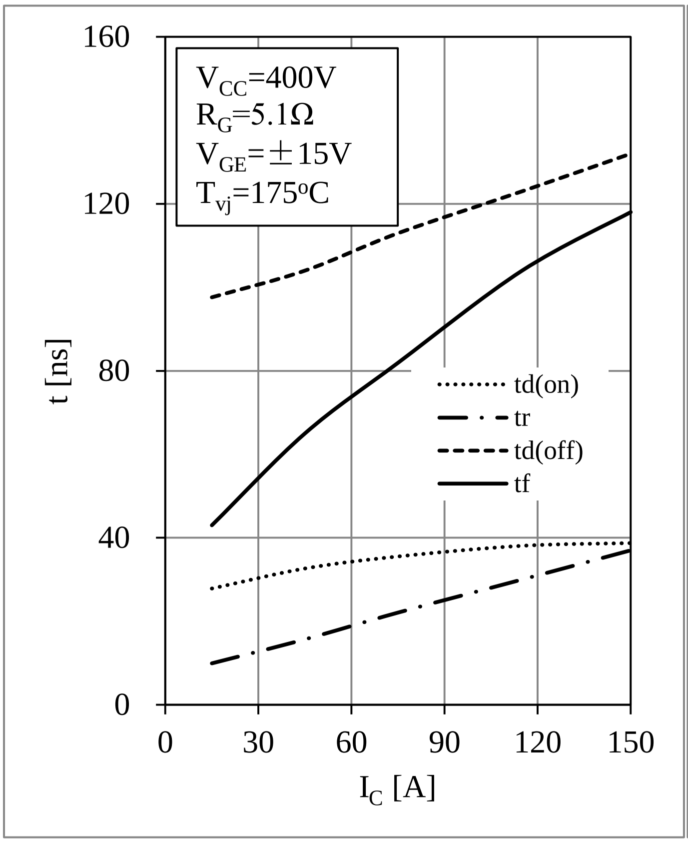


Fig 5. IGBT Transfer Characteristics

Fig 6. Collector-emitter saturation voltage vs T_{vj}



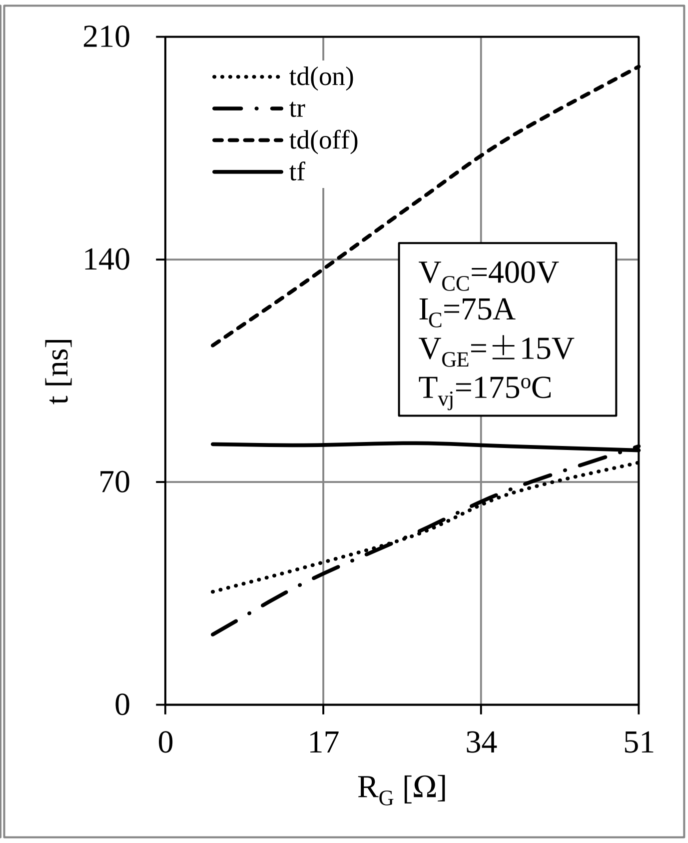


Fig 7. IGBT Switching Times as. Ic

Fig 8. IGBT Switching Times as.R_G

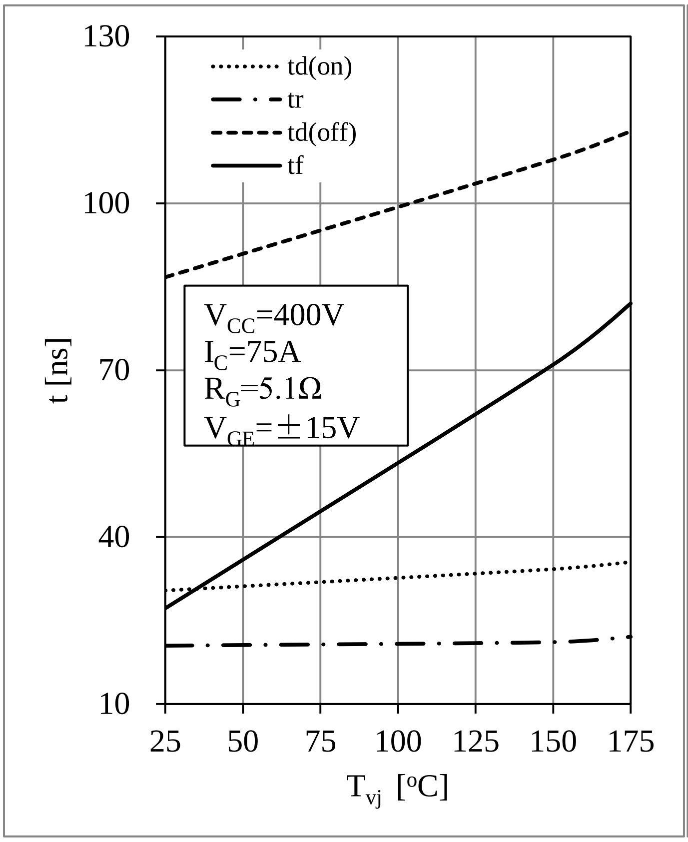


Fig 9. IGBT Switching Times as. T_{vj}

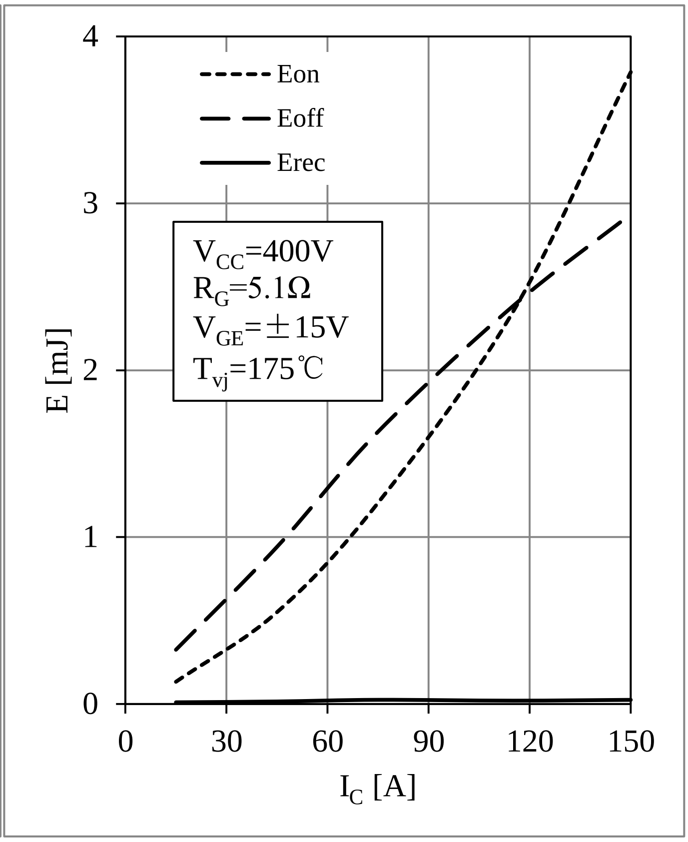


Fig 10. Switching Energy Loss vs. I_C

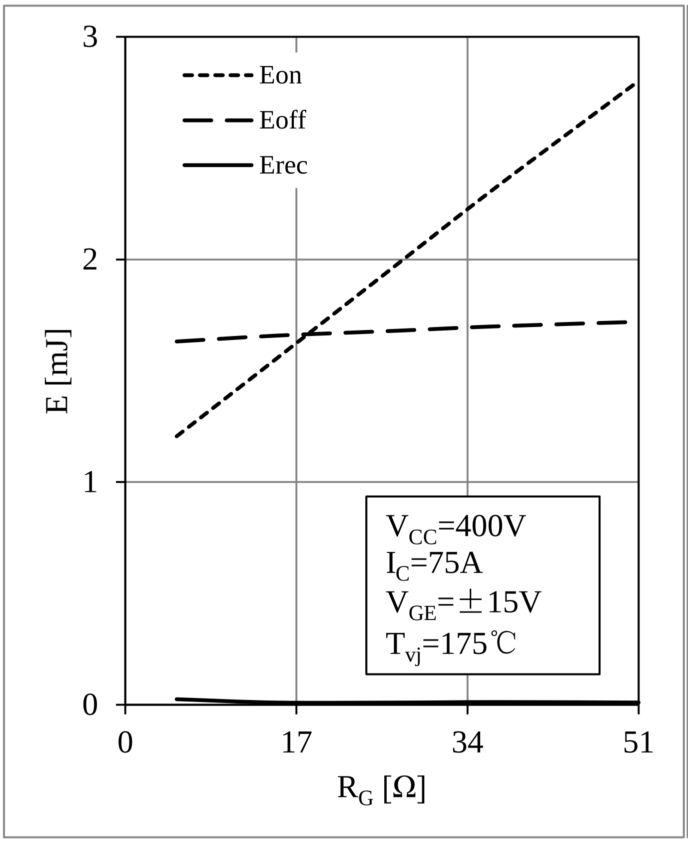


Fig 11. Switching Energy Loss vs. R_G

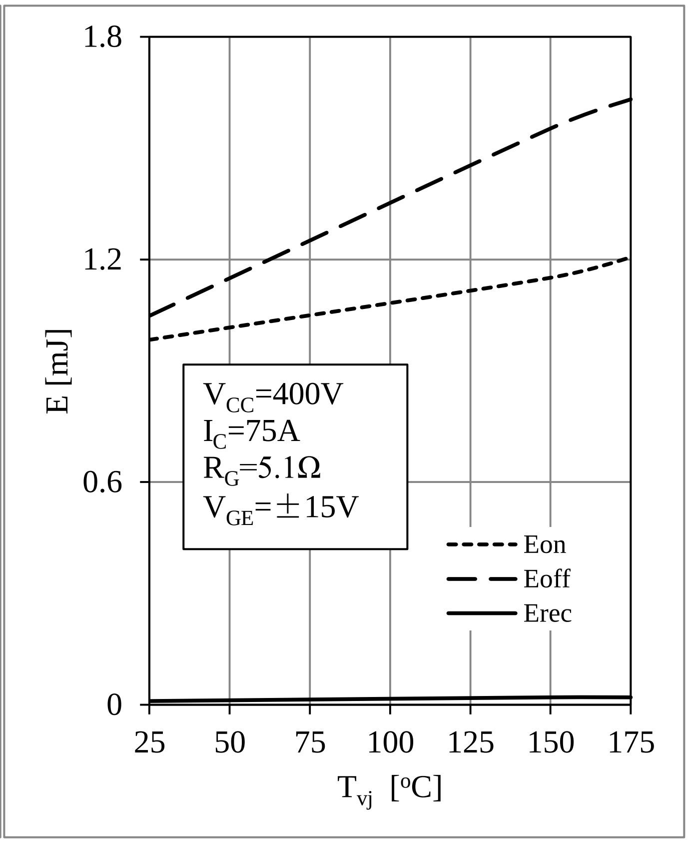


Fig 12. Switching Energy Loss vs. T_{vj}

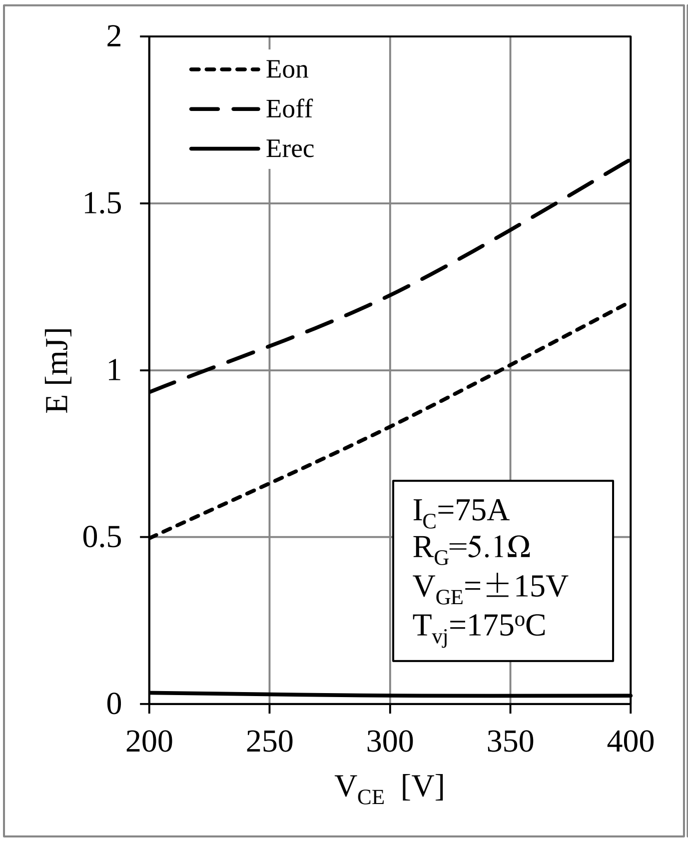


Fig 13. Switching Energy Loss vs.V_{CE}

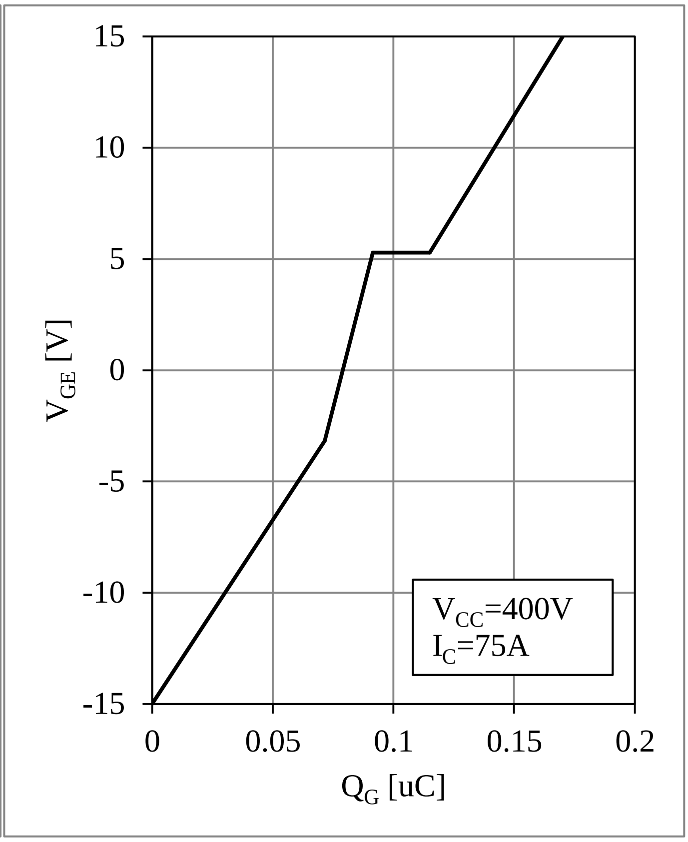


Fig 14. IGBT Gate Charge Characteristic

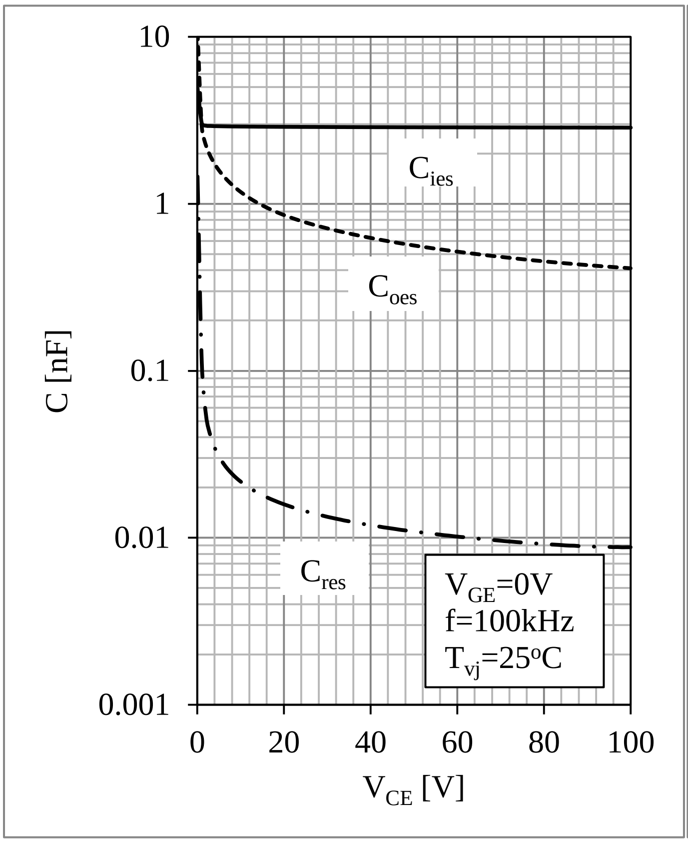


Fig 15. IGBT Capacity Charcteristic

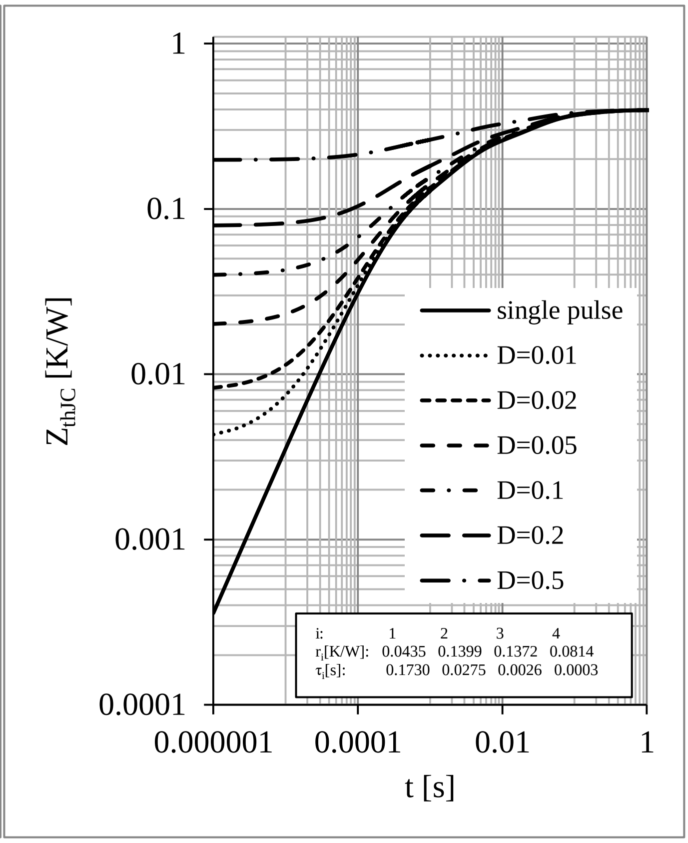


Fig 16. IGBT Transient Thermal Impedance

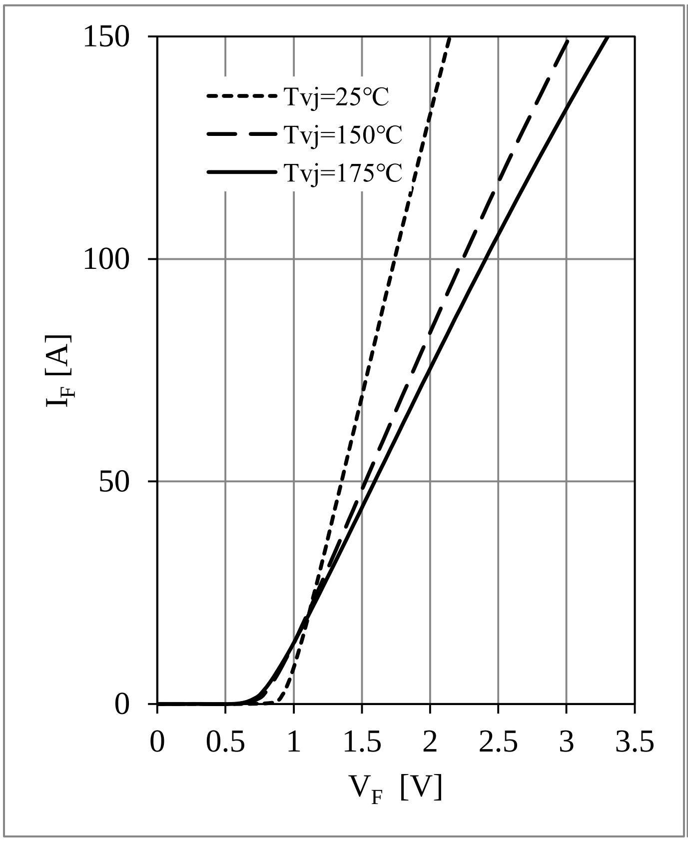


Fig 17. Diode Forward Characteristics

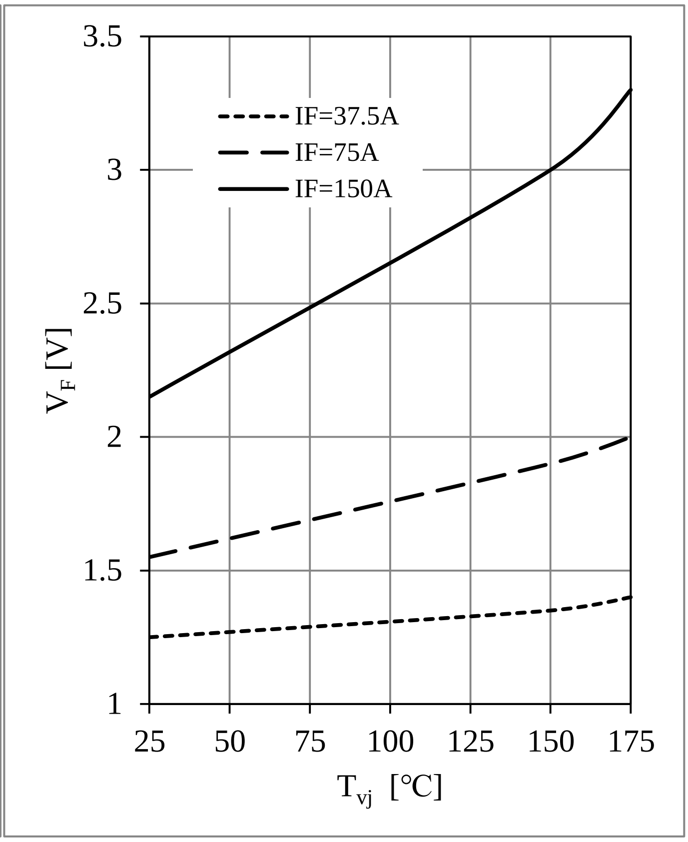


Fig 18. Diode Forward Voltage Vs T_{vj}

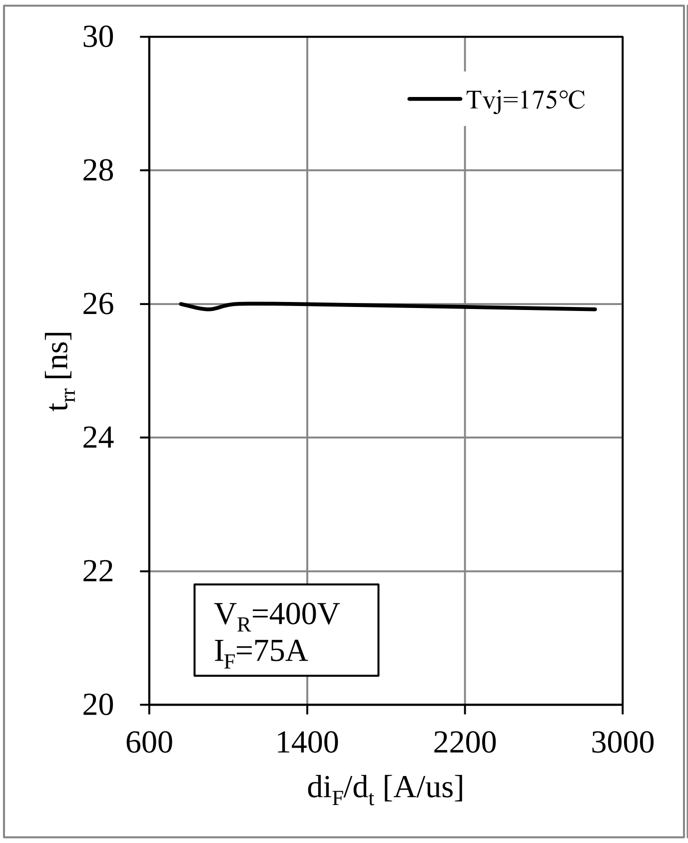


Fig 19. Reverse Recovery Time vs. diF/dt

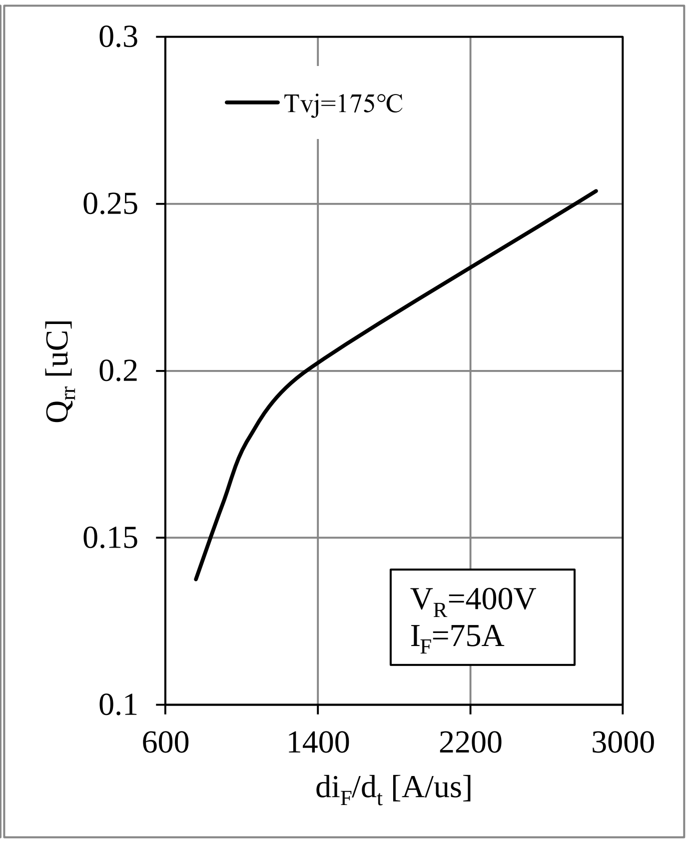


Fig 20. Reverse Recovery Charge vs. diF/dt

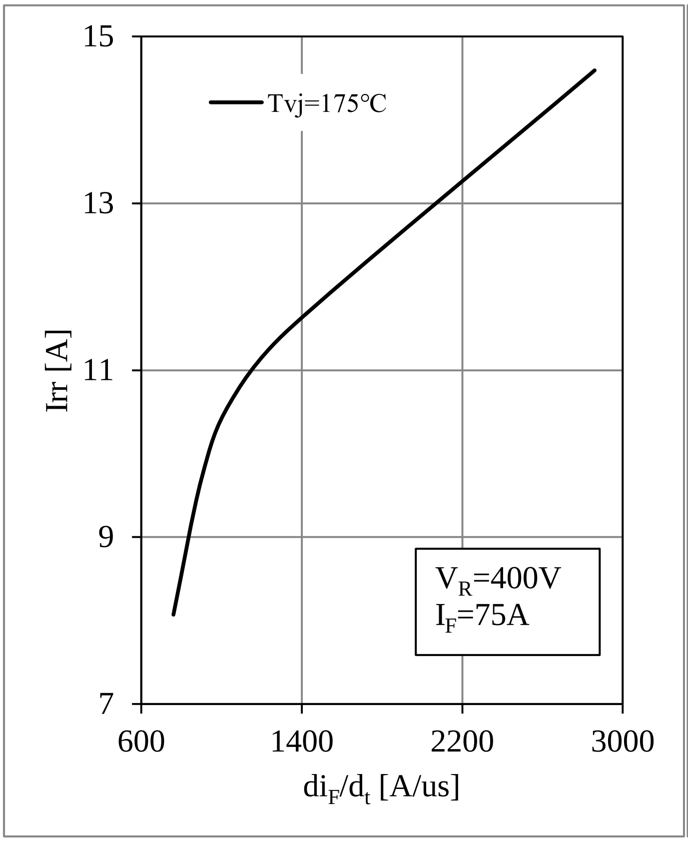


Fig 21. Reverse Recovery Current vs. di_F/d_t

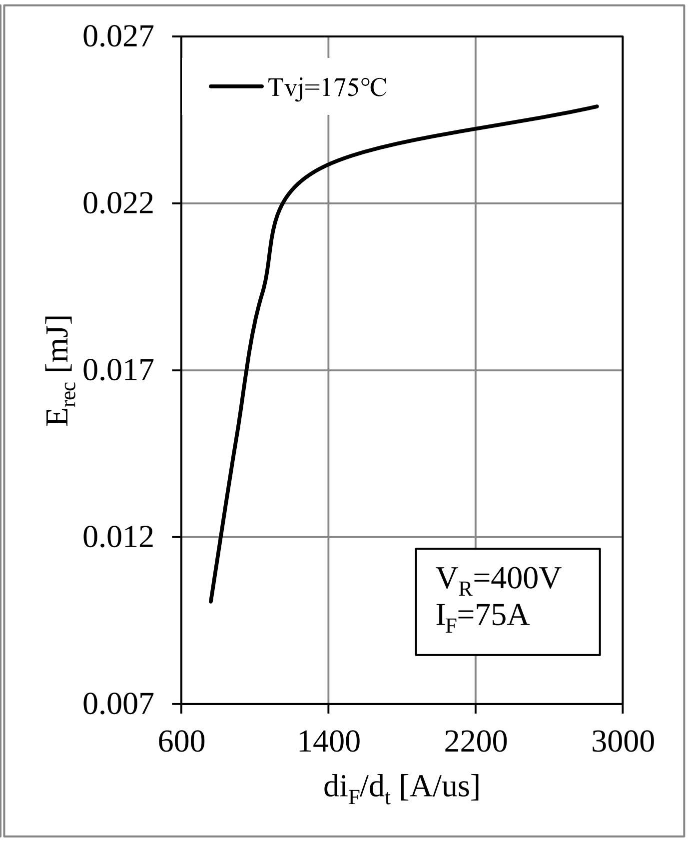


Fig 22. Reverse Energy Losses vs. diF/dt

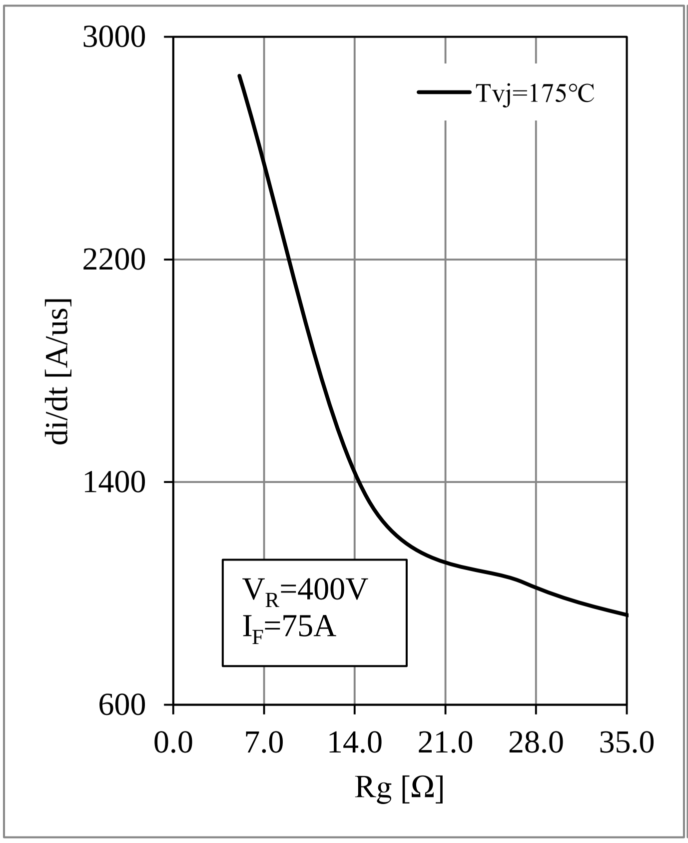


Fig 23. diF/dt vs Rg

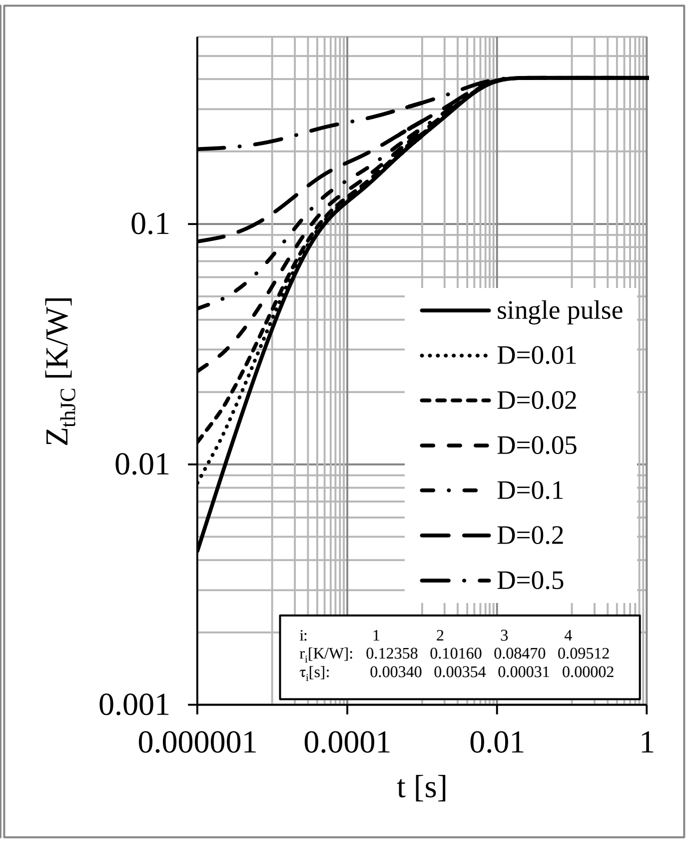
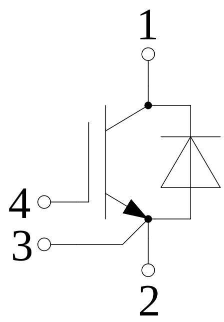


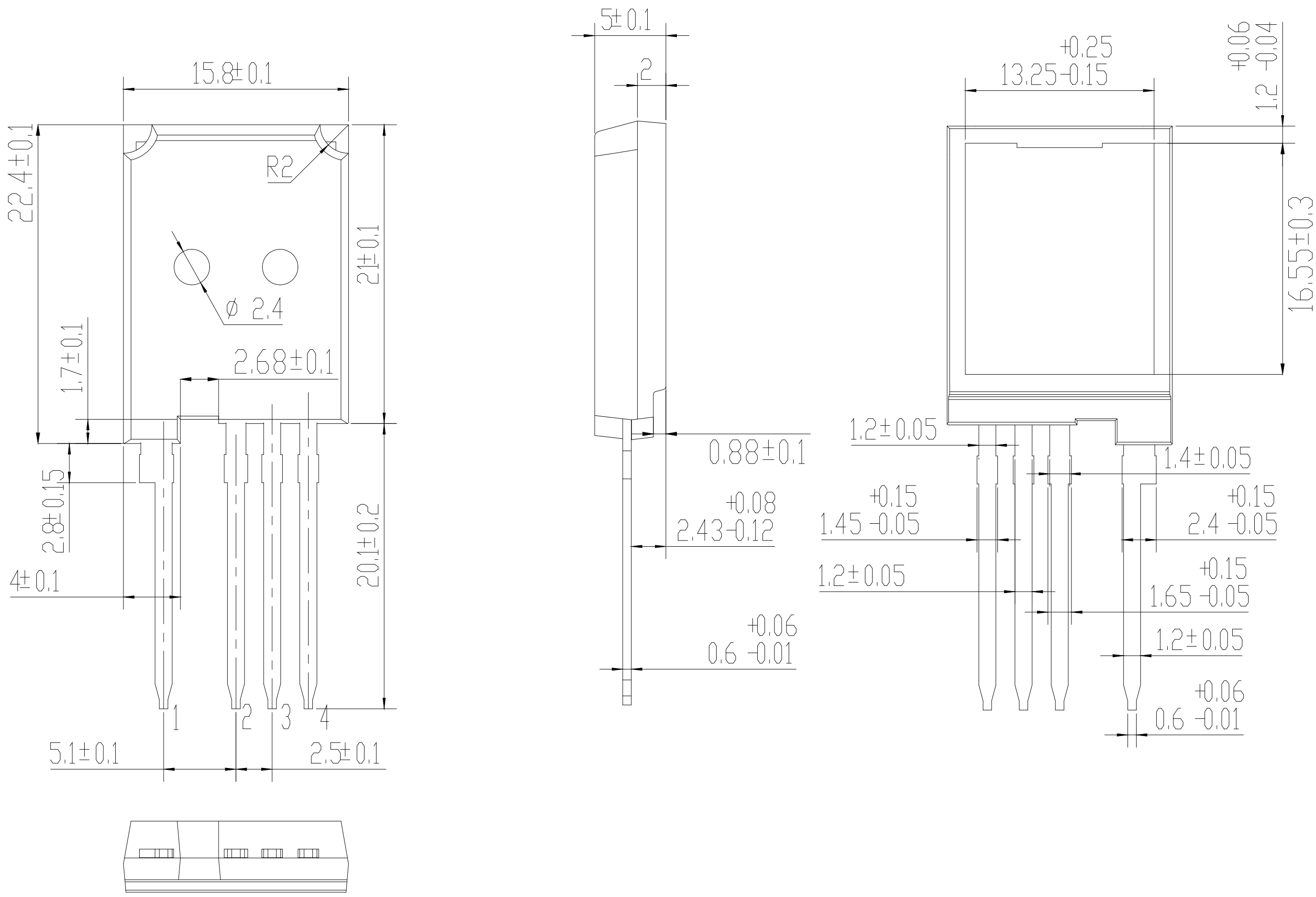
Fig 24. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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