DOSEMI

IGBT

DG75X12T2

1200V/75A 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.

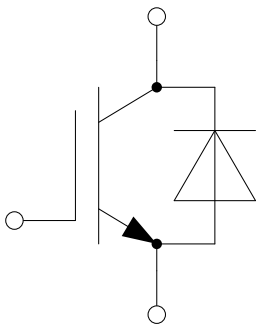
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs short circuit capability
- Low switching loss
- Maximum junction temperature 175°C
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD

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	Values	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	150 75	A
I_{CM}	Pulsed Collector Current t_p limited by T_{vjmax}	225	A
P_D	Maximum Power Dissipation @ T_{vj}=175°C	852	W

Diode

Symbol	Description	Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	75	A
I_{FM}	Pulsed Collector Current t_p limited by T_{vjmax}	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		1.75	2.20	V
		I_C=75A,V_{GE}=15V, T_{vj}=150°C		2.10		
		I_C=75A,V_{GE}=15V, T_{vj}=175°C		2.20		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=3.00mA,V_{CE}=V_{GE}, T_{vj}=25°C	5.0	5.8	6.5	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_{vj}=25°C			250	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			2.0		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=100kHz, V_{GE}=0V		6.58		nF
C_{oes}	Output Capacitance			0.40		
C_{res}	Reverse Transfer Capacitance			0.19		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.49		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=4.7Ω,V_{GE}=±15V, Ls=40nH, T_{vj}=25°C		41		ns
t_r	Rise Time			135		ns
$t_{d(off)}$	Turn-Off Delay Time			87		ns
t_f	Fall Time			255		ns
E_{on}	Turn-On Switching Loss			12.5		mJ
E_{off}	Turn-Off Switching Loss			3.6		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=4.7Ω,V_{GE}=±15V, Ls=40nH, T_{vj}=150°C		46		ns
t_r	Rise Time			140		ns
$t_{d(off)}$	Turn-Off Delay Time			164		ns
t_f	Fall Time			354		ns
E_{on}	Turn-On Switching Loss			17.6		mJ
E_{off}	Turn-Off Switching Loss			6.3		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=4.7Ω,V_{GE}=±15V, Ls=40nH, T_{vj}=175°C		46		ns
t_r	Rise Time			140		ns
$t_{d(off)}$	Turn-Off Delay Time			167		ns
t_f	Fall Time			372		ns
E_{on}	Turn-On Switching Loss			18.7		mJ
E_{off}	Turn-Off Switching Loss			6.7		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_{vj}=175°C,V_{CC}=800V, V_{CEM}≤1200V		300		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=75A,V_{GE}=0V,T_{vj}=25°C		1.75	2.20	V
		I_F=75A,V_{GE}=0V,T_{vj}=150°C		1.75		
		I_F=75A,V_{GE}=0V,T_{vj}=175°C		1.75		
trr	Diode Reverse Recovery Time	V_R=600V,I_F=75A, -di/dt=370A/μs,V_{GE}=-15V, Ls=40nH, T_{vj}=25°C		267		ns
Q_r	Recovered Charge			4.2		μC
I_{RM}	Peak Reverse Recovery Current			22		A
E_{rec}	Reverse Recovery Energy			1.1		mJ
trr	Diode Reverse Recovery Time	V_R=600V,I_F=75A, -di/dt=340A/μs,V_{GE}=-15V, Ls=40nH, T_{vj}=150°C		432		ns
Q_r	Recovered Charge			9.80		μC
I_{RM}	Peak Reverse Recovery Current			33		A
E_{rec}	Reverse Recovery Energy			2.7		mJ
trr	Diode Reverse Recovery Time	V_R=600V,I_F=75A, -di/dt=320A/μs,V_{GE}=-15V, Ls=40nH, T_{vj}=175°C		466		ns
Q_r	Recovered Charge			11.2		μC
I_{RM}	Peak Reverse Recovery Current			35		A
E_{rec}	Reverse Recovery Energy			3.1		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)			0.176 0.371	K/W
R_{thJA}	Junction-to-Ambient		40		K/W

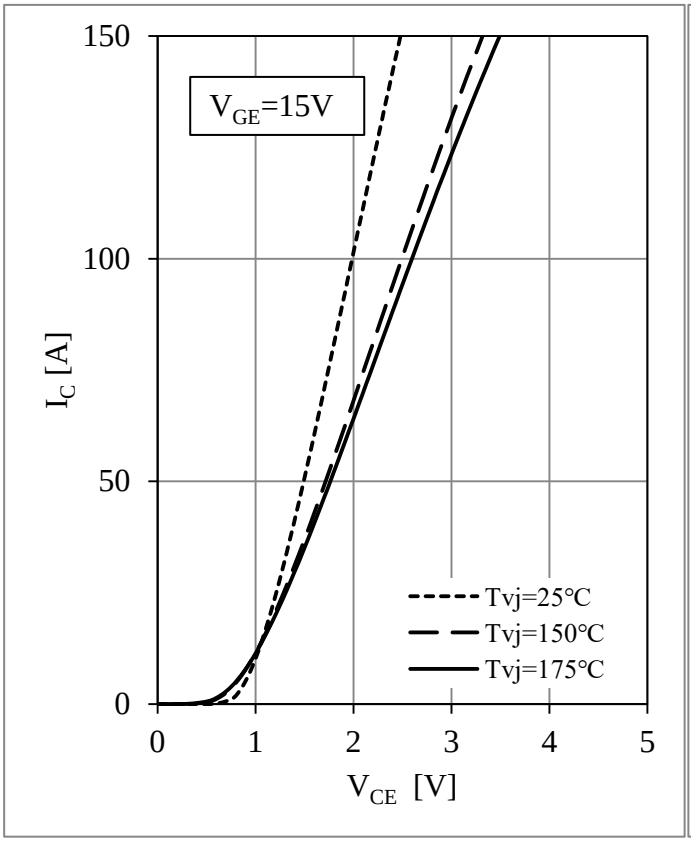


Fig 1. IGBT-inverter Output Characteristics

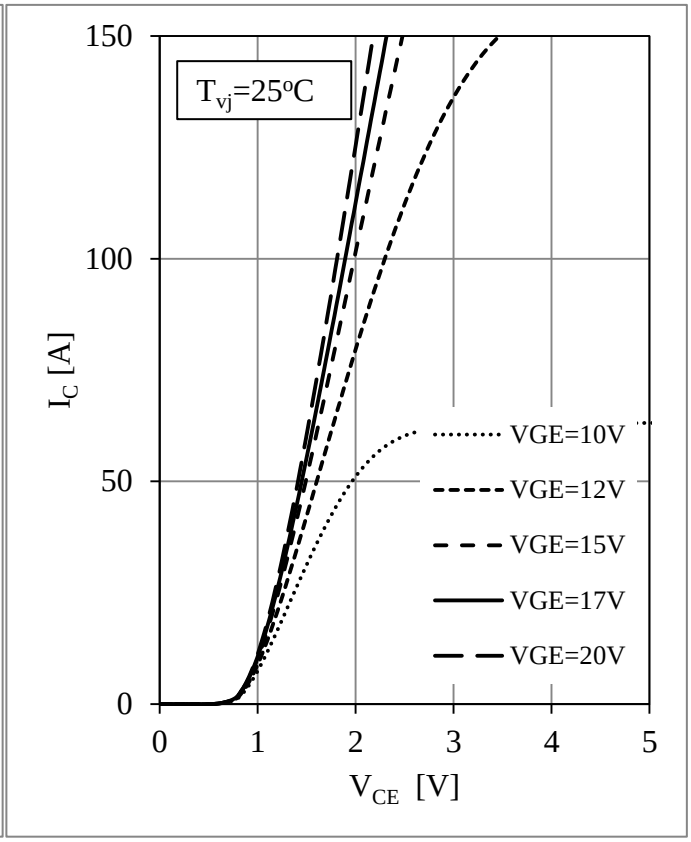


Fig 2. IGBT Output Characteristics

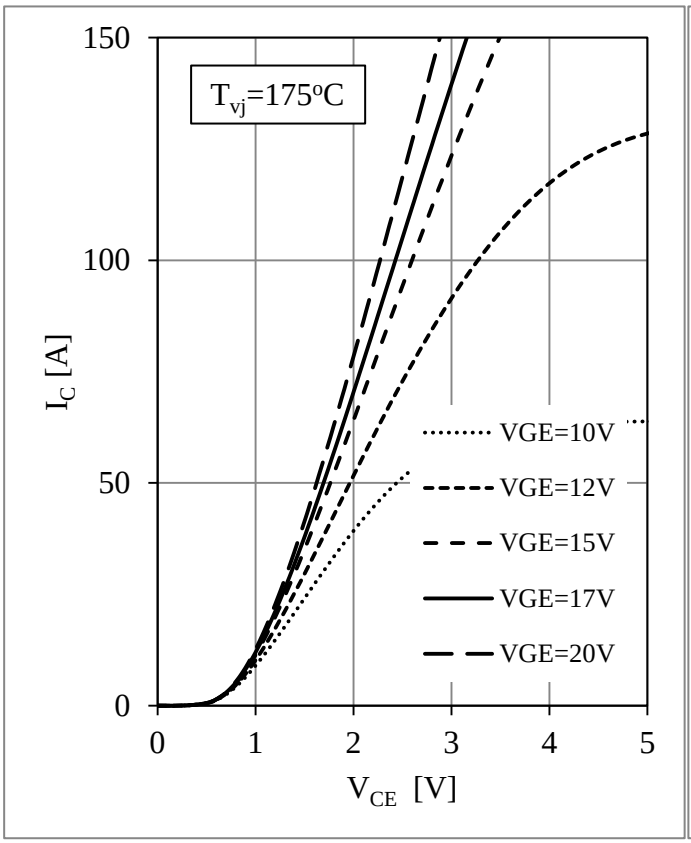


Fig 3. IGBT Output Characteristics

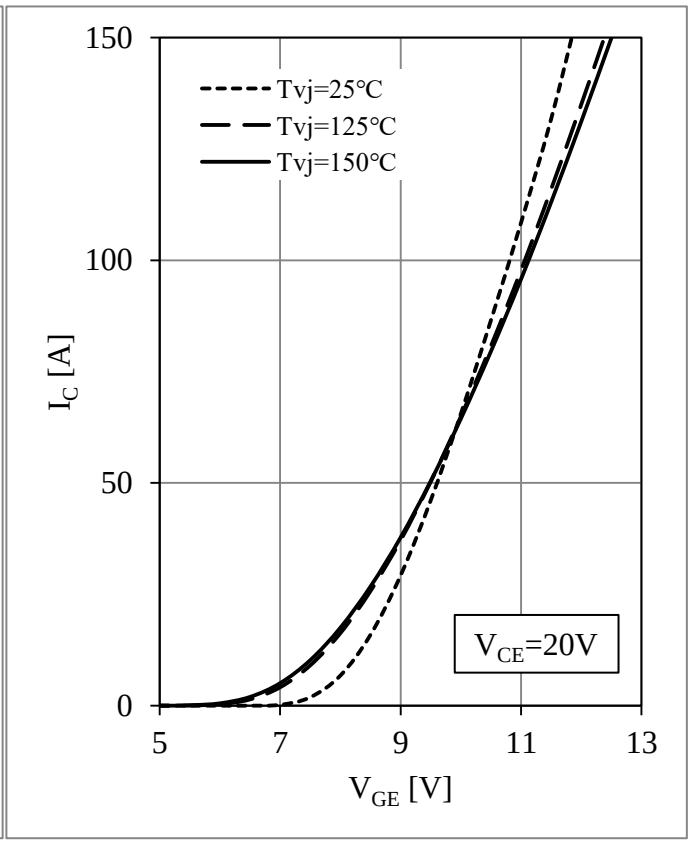


Fig 4. IGBT-inverter Transfer Characteristics

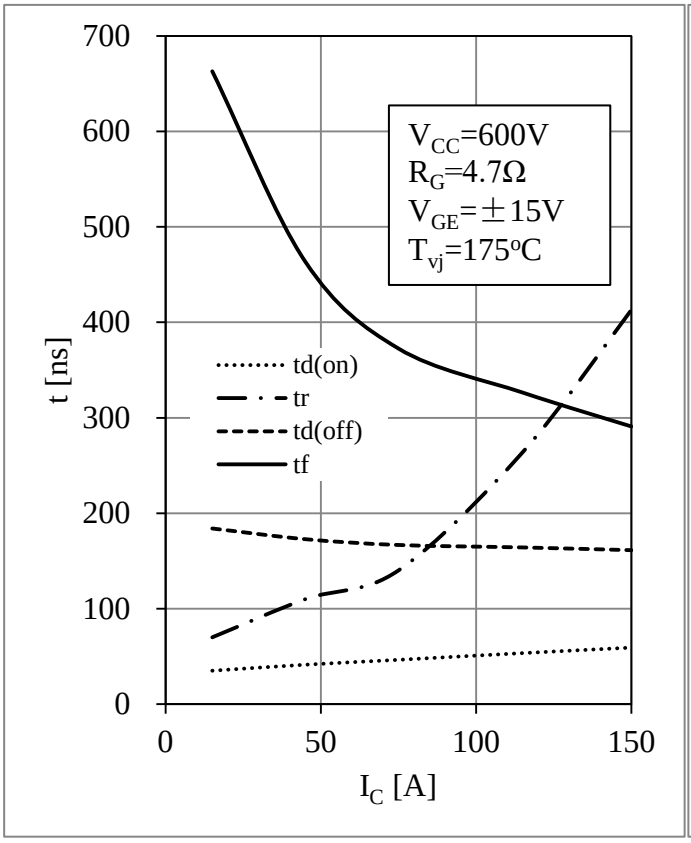


Fig 5. IGBT Switching Times as. Ic

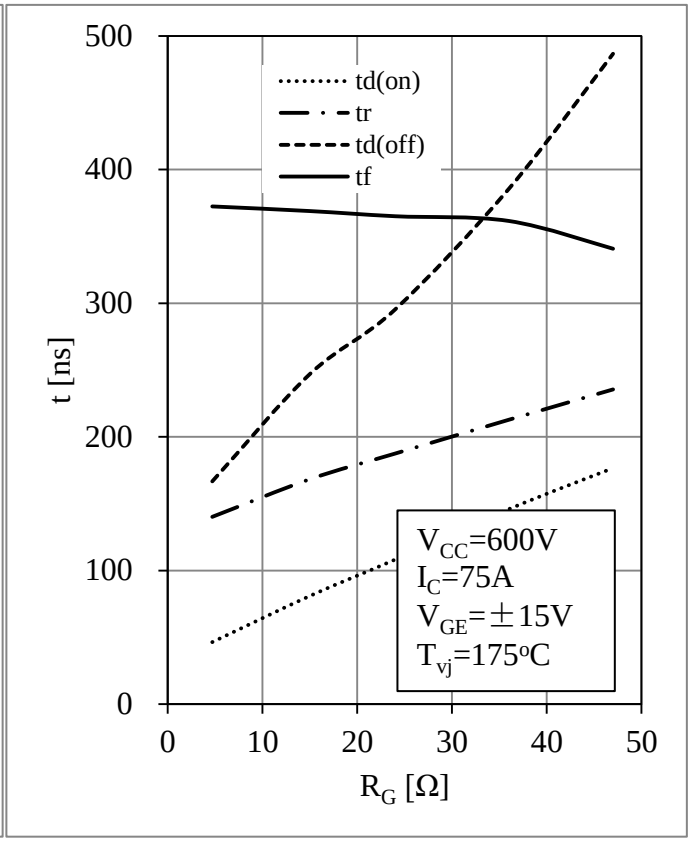


Fig 6. IGBT Switching Times as. R_G

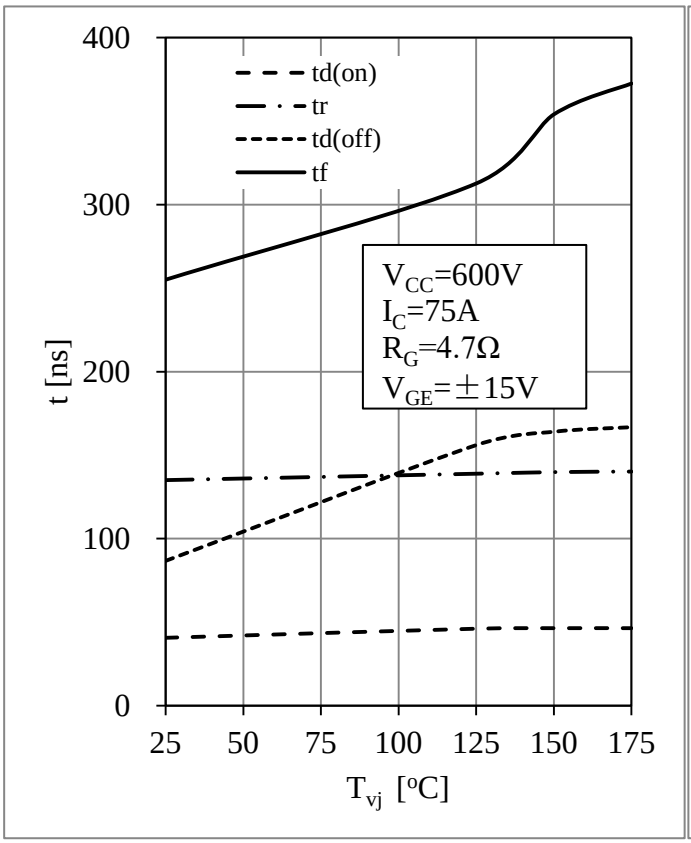


Fig 7. IGBT Switching Times vs. T_{vj}

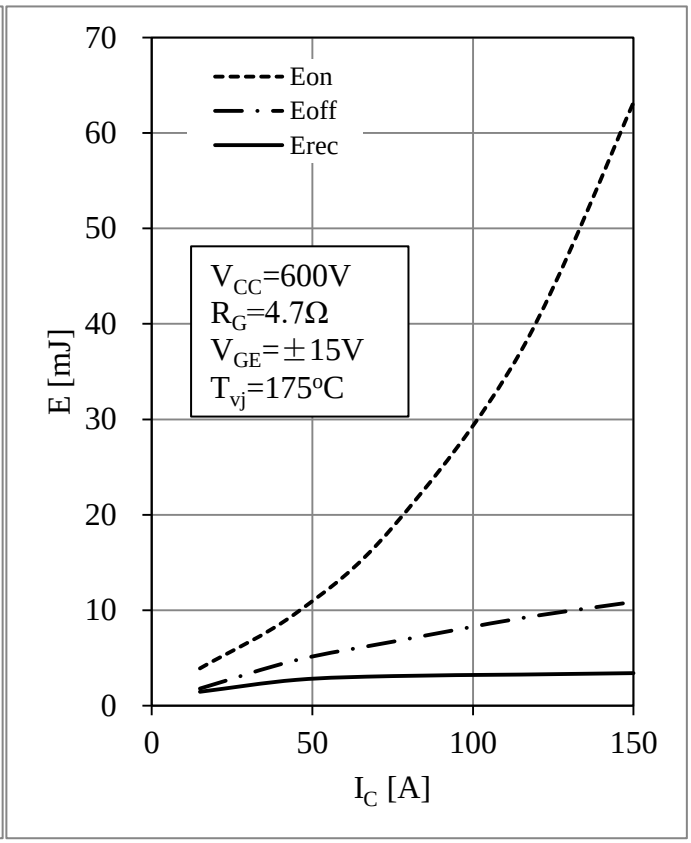


Fig 8. Switching Energy Loss vs. I_C

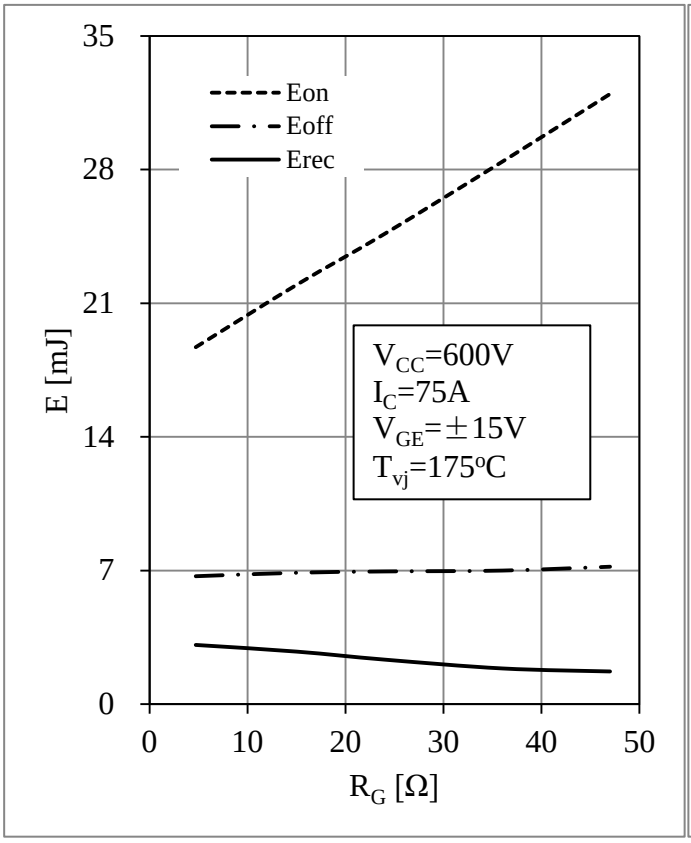


Fig 9. Switching Energy Loss vs. R_G

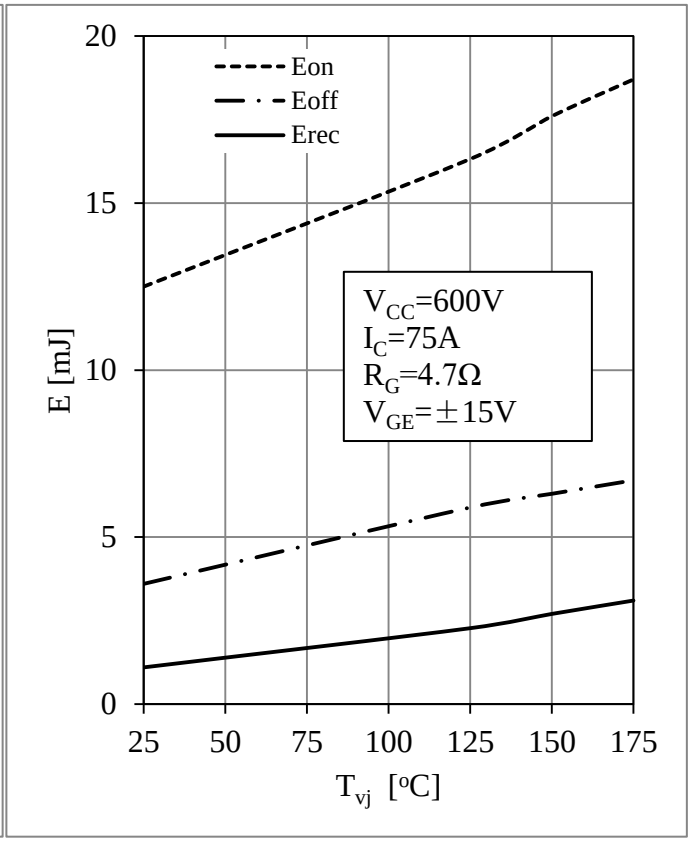


Fig 10. Switching Energy Loss vs. T_{vj}

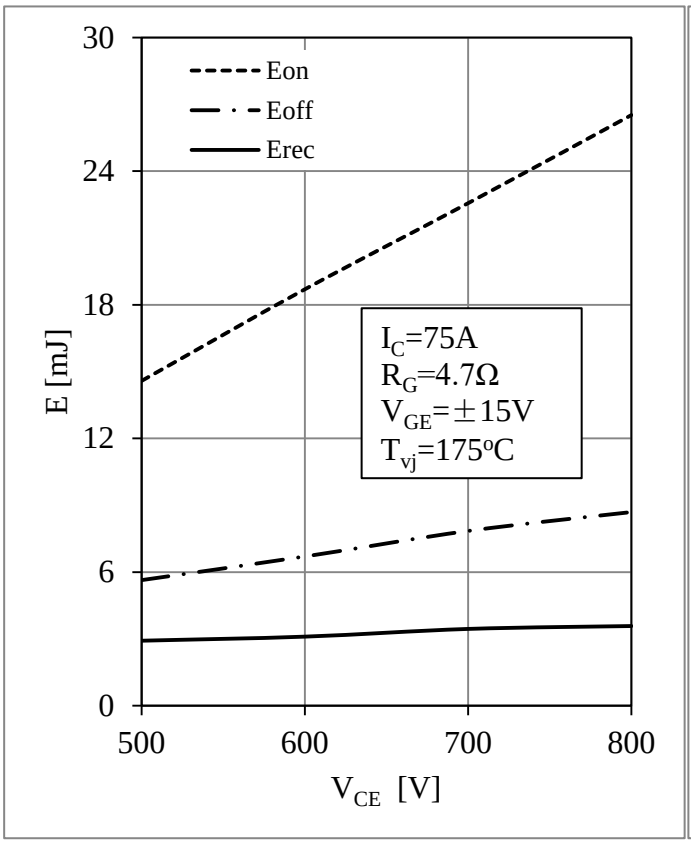


Fig 11. Switching Energy Loss vs. V_{CE}

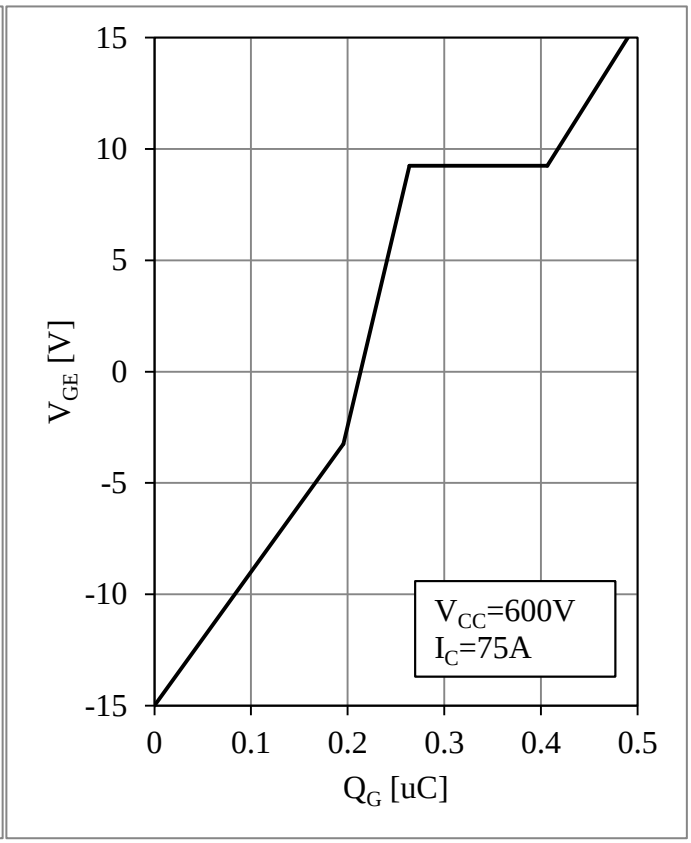


Fig 12. IGBT Gate Charge vs. V_{GE}

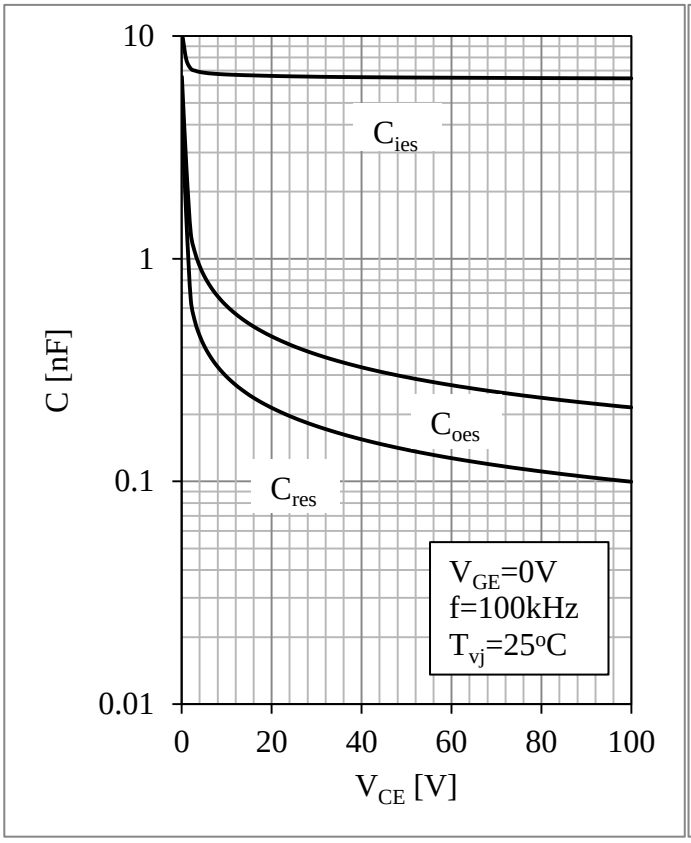


Fig 13. IGBT Capacity Charcteristic

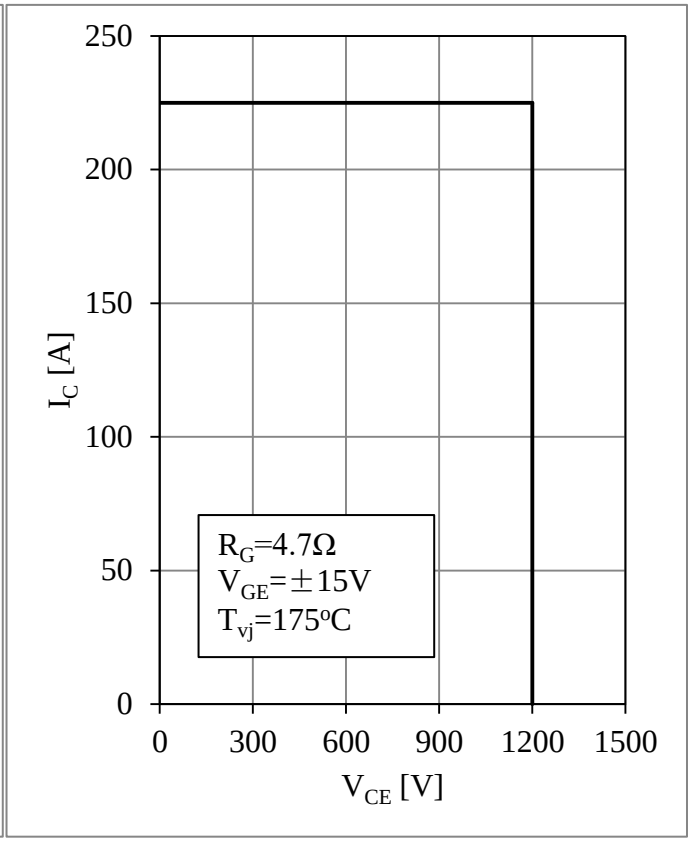


Fig 14. RBSOA

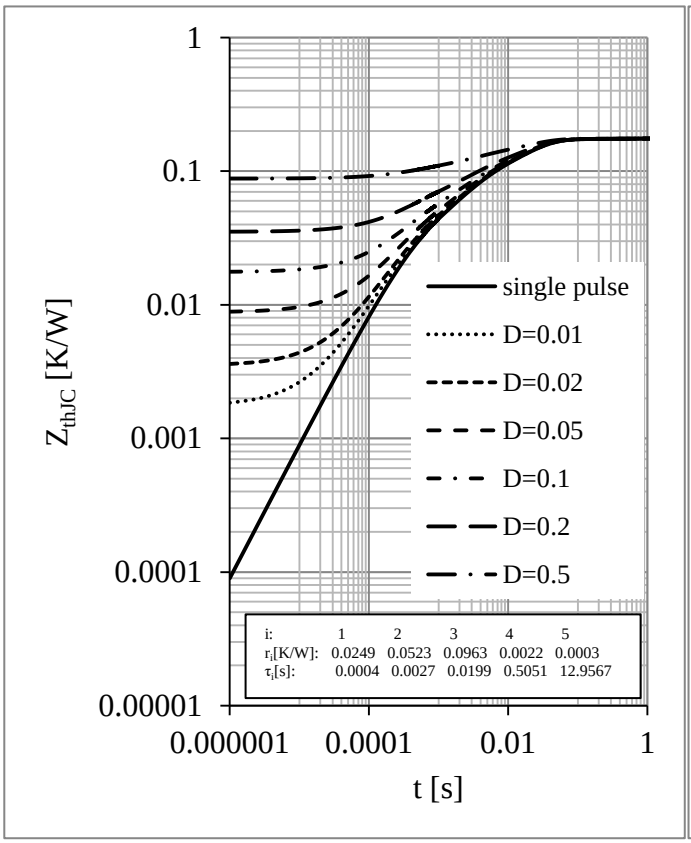


Fig 15. IGBT Transient Thermal Impedance

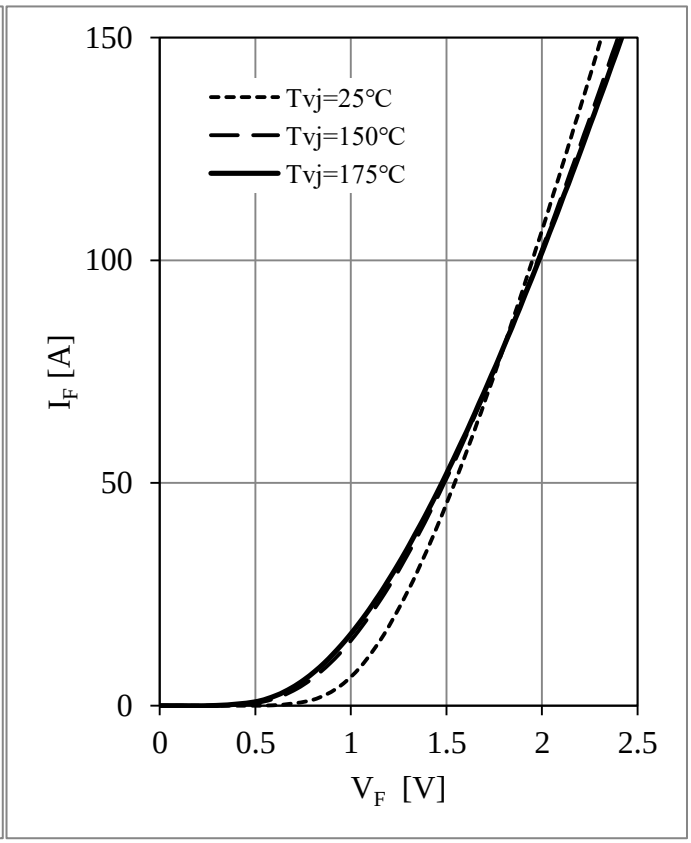


Fig 16. Diode Forward Characteristics

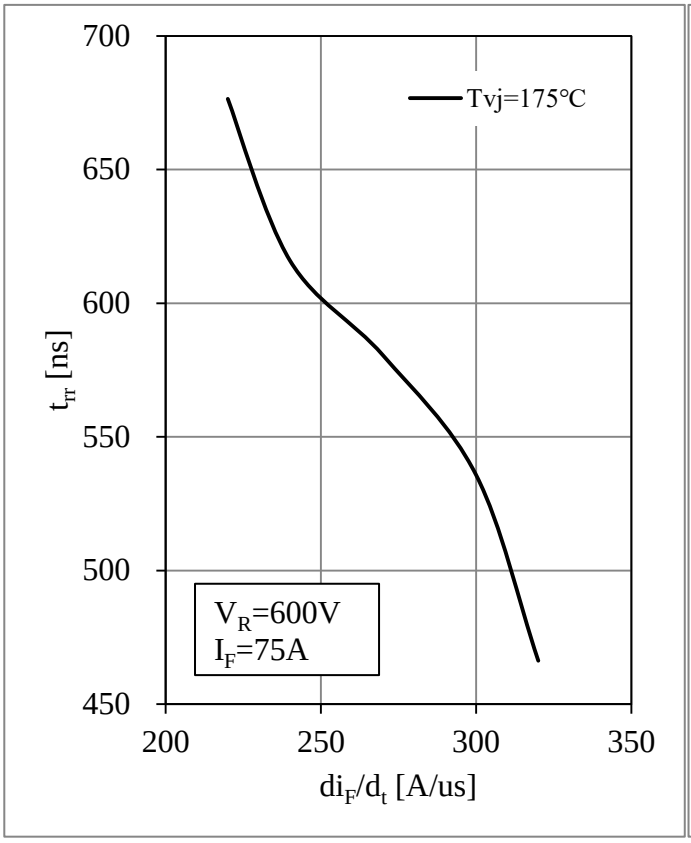


Fig 17. Reverse Recovery Time vs. di_F/d_t

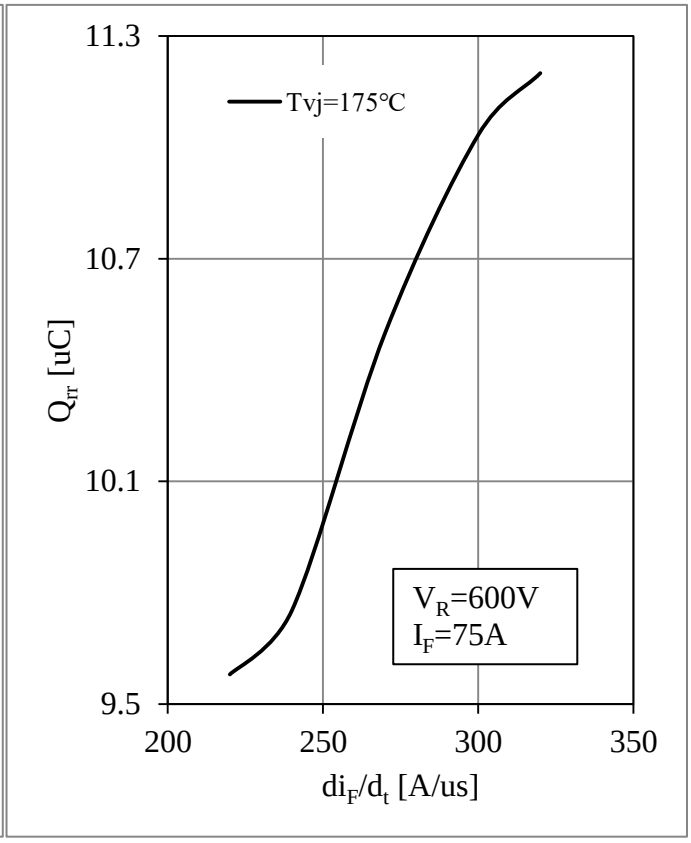


Fig 18. Reverse Recovery Charge vs. di_F/d_t

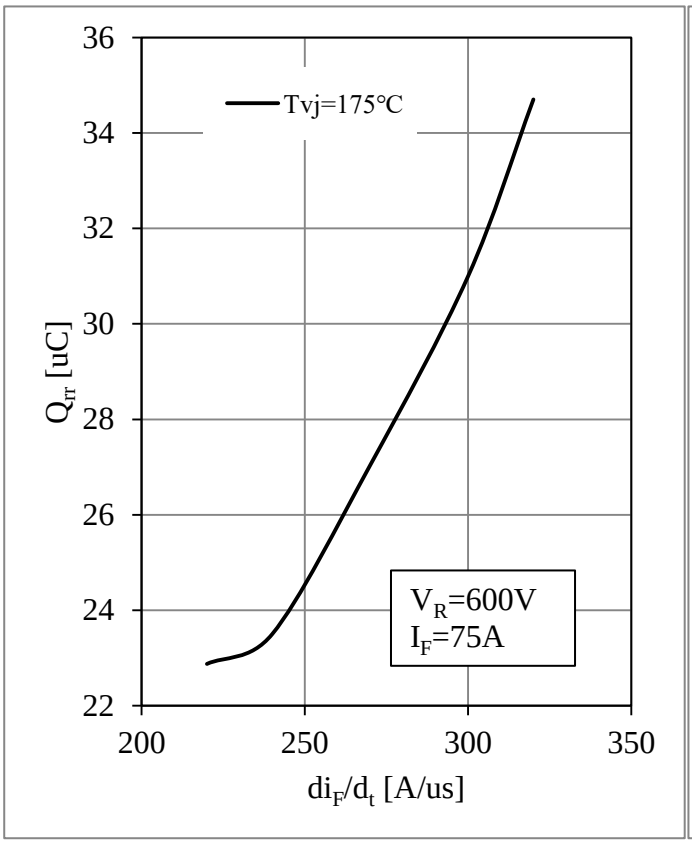


Fig 19. Reverse Recovery Current vs. di_F/d_t

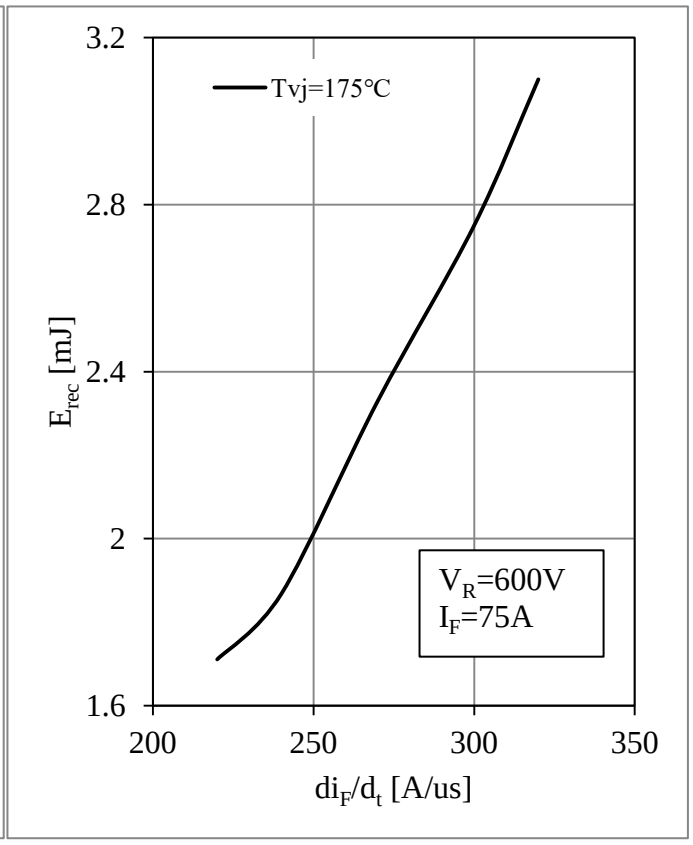


Fig 20. Reverse Energy Losses vs. di_F/d_t

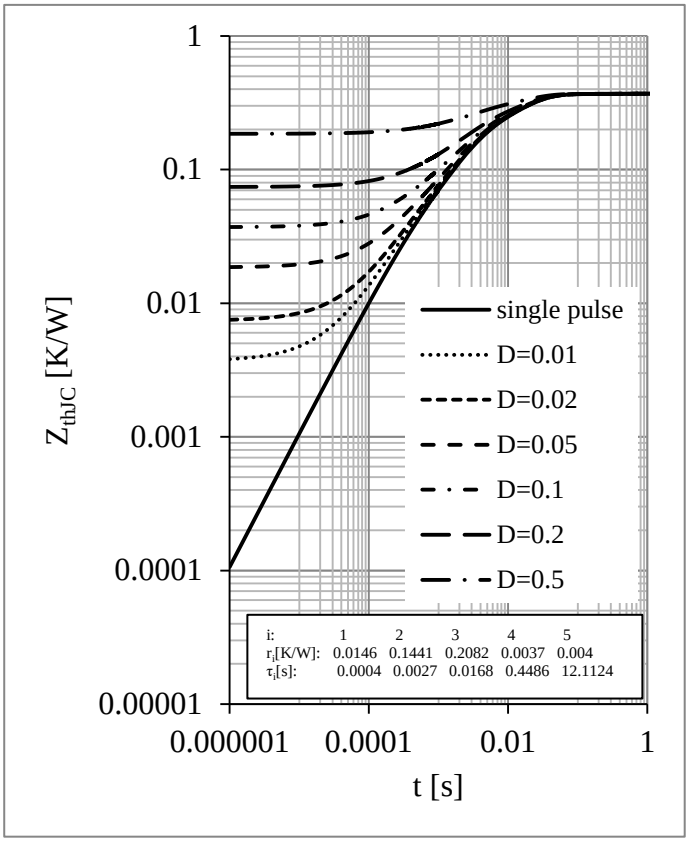
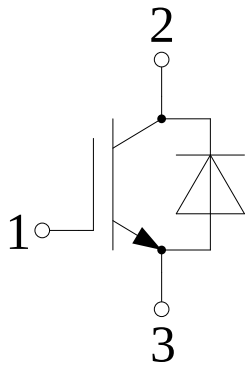


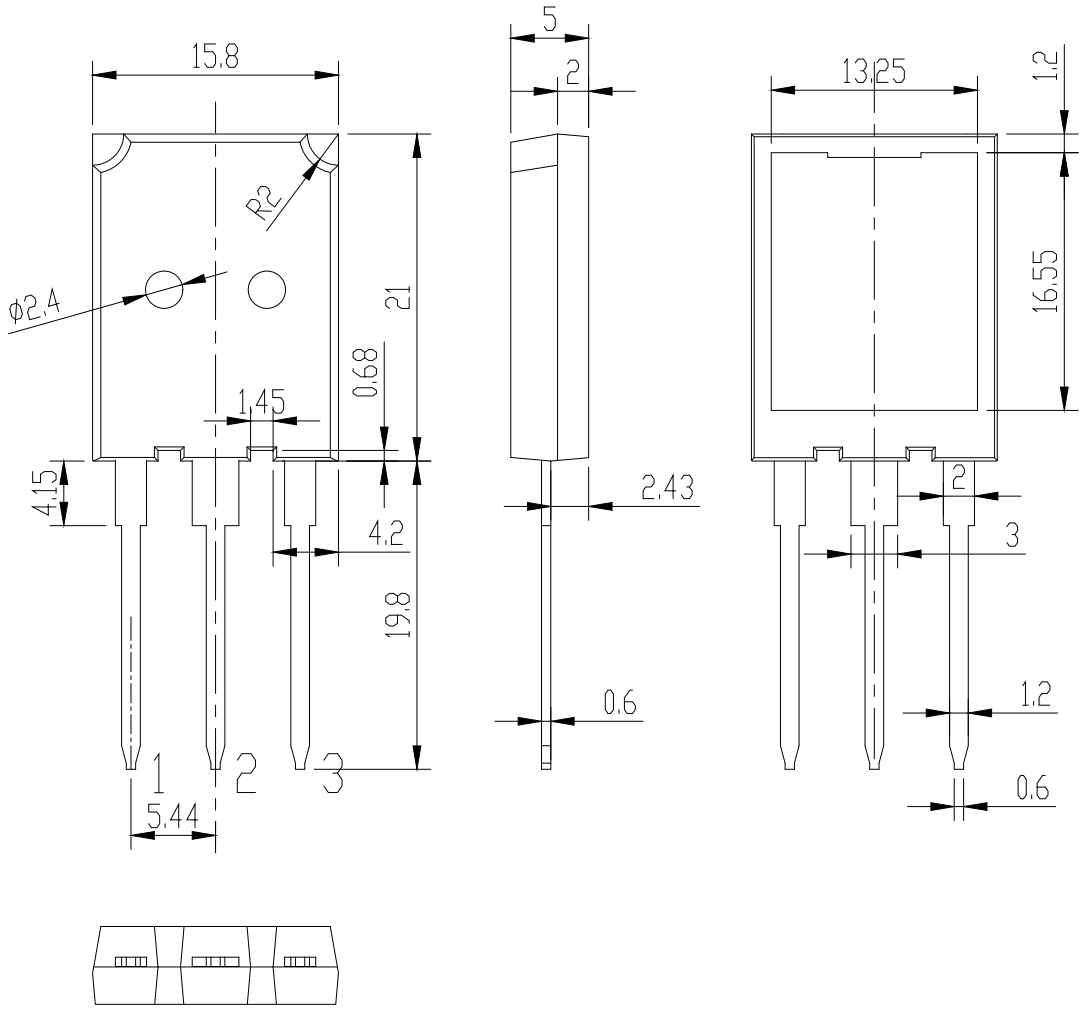
Fig 21. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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