DOSEMI

IGBT

DG50A12TASS

1200V/50A IGBT with Diode

General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and UPS.

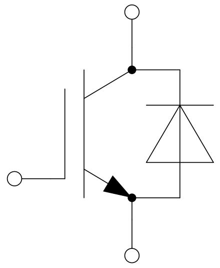
Features

- Low $V_{CE(sat)}$ Fast IGBT technology
- 8μs 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



Type	Package	Marking	Shipping
DG50A12TASS	TO-247-3L	DG50A12TASS	30Units/Tube

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	100(1) 50	A
I_{CRM}	Repetitive Peak Collector Current tp limited by T_{vjop}	150	A
P_D	Maximum Power Dissipation @ T_{vj}=175°C	428	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current @ T_C=25°C @ T_C=100°C	93 50	A
I_{FRM}	Repetitive Peak Forward Current tp limited by T_{vjop}	150	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
M	Mounting Torque, Screw M3	0.6	N.m

(1) limited by bondwire

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=50A,V_{GE}=15V, T_{vj}=25°C		1.40	1.85	V
		I_C=50A,V_{GE}=15V, T_{vj}=150°C		1.60		
		I_C=50A,V_{GE}=15V, T_{vj}=175°C		1.65		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.00mA,V_{CE}=V_{GE}, T_{vj}=25°C	5.4	6.2	7.0	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		5.57		nF
C_{res}	Reverse Transfer Capacitance			0.04		nF
C_{oes}	Output Capacitance			0.24		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.38		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=2.0Ω,L_S=40nH, V_{GE}= ±15V,T_{vj}=25 °C		35		ns
t_r	Rise Time			58		ns
$t_{d(off)}$	Turn-Off Delay Time			258		ns
t_f	Fall Time			177		ns
E_{on}	Turn-On Switching Loss			5.26		mJ
E_{off}	Turn-Off Switching Loss			4.49		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=2.0Ω,L_S=40nH, V_{GE}= ±15V,T_{vj}=150 °C		37		ns
t_r	Rise Time			59		ns
$t_{d(off)}$	Turn-Off Delay Time			340		ns
t_f	Fall Time			311		ns
E_{on}	Turn-On Switching Loss			6.82		mJ
E_{off}	Turn-Off Switching Loss			6.52		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=2.0Ω,L_S=40nH, V_{GE}= ±15V,T_{vj}=175 °C		39		ns
t_r	Rise Time			59		ns
$t_{d(off)}$	Turn-Off Delay Time			353		ns
t_f	Fall Time			336		ns
E_{on}	Turn-On Switching Loss			7.16		mJ
E_{off}	Turn-Off Switching Loss			6.88		mJ
I_{SC}	SC Data	t_P≤8μs,V_{GE}=15V, T_{vj}=150°C,V_{CC}=600V, V_{CEM}≤1200V		150		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=50A,V_{GE}=0V,T_{vj}=25°C		1.65	2.10	V
		I_F=50A,V_{GE}=0V,T_{vj}=150°C		1.70		
		I_F=50A,V_{GE}=0V,T_{vj}=175°C		1.70		
Q_r	Recovered Charge	V_R=600V,I_F=50A, -di/dt=450A/µs,Ls=40nH, V_{GE}=-15V,T_{vj}=25°C		3.83		µC
t_{rr}	Recovered Time			224		ns
I_{RM}	Peak Reverse Recovery Current			32		A
E_{rec}	Reverse Recovery Energy			1.26		mJ
Q_r	Recovered Charge	V_R=600V,I_F=50A, -di/dt=420A/µs,Ls=40nH, V_{GE}=-15V,T_{vj}=150°C		8.73		µC
t_{rr}	Recovered Time			393		ns
I_{RM}	Peak Reverse Recovery Current			38		A
E_{rec}	Reverse Recovery Energy			3.33		mJ
Q_r	Recovered Charge	V_R=600V,I_F=50A, -di/dt=420A/µs,Ls=40nH, V_{GE}=-15V,T_{vj}=175°C		9.75		µC
t_{rr}	Recovered Time			435		ns
I_{RM}	Peak Reverse Recovery Current			39		A
E_{rec}	Reverse Recovery Energy			3.77		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)			0.350 0.600	K/W
R_{thJA}	Junction-to-Ambient		40		K/W

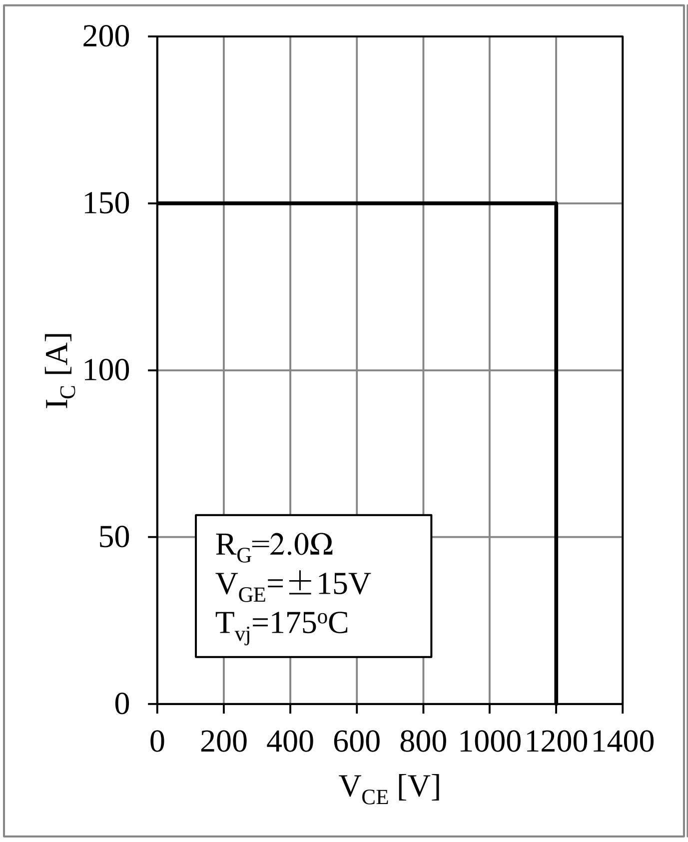


Fig 1. RBSOA

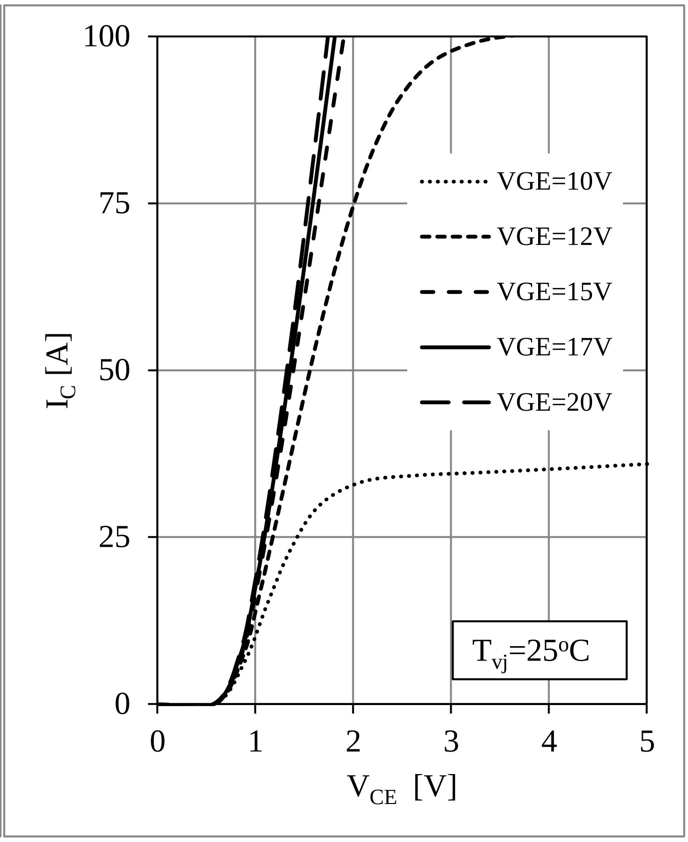


Fig 2. IGBT Output Characteristics

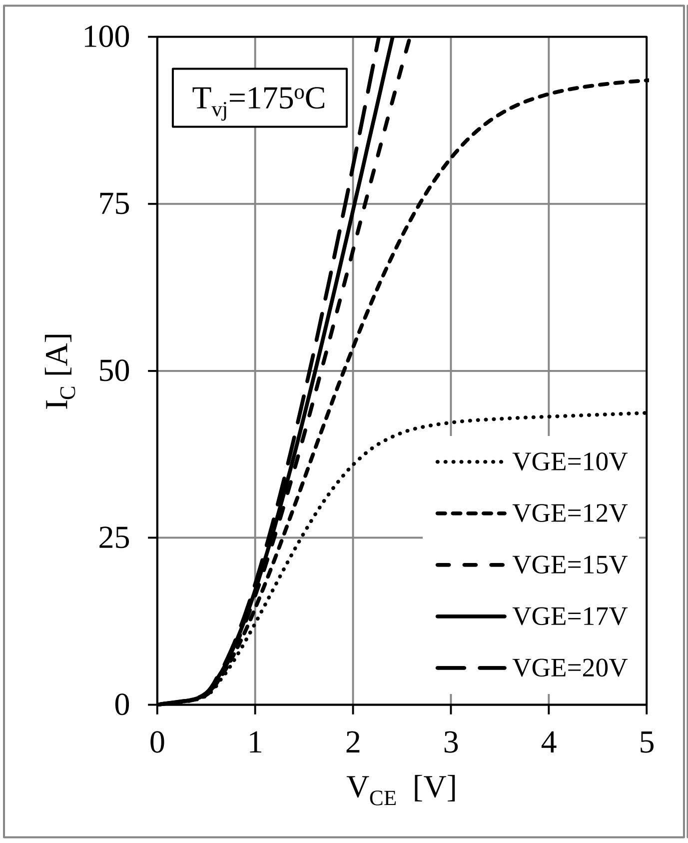


Fig 3. IGBT Output Characteristics

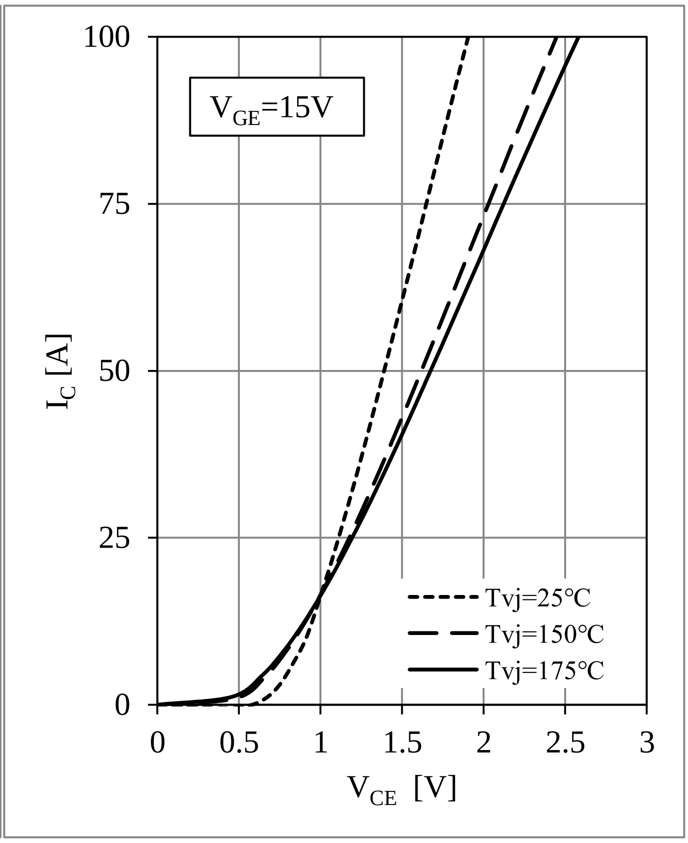


Fig 4. IGBT Output Characteristics

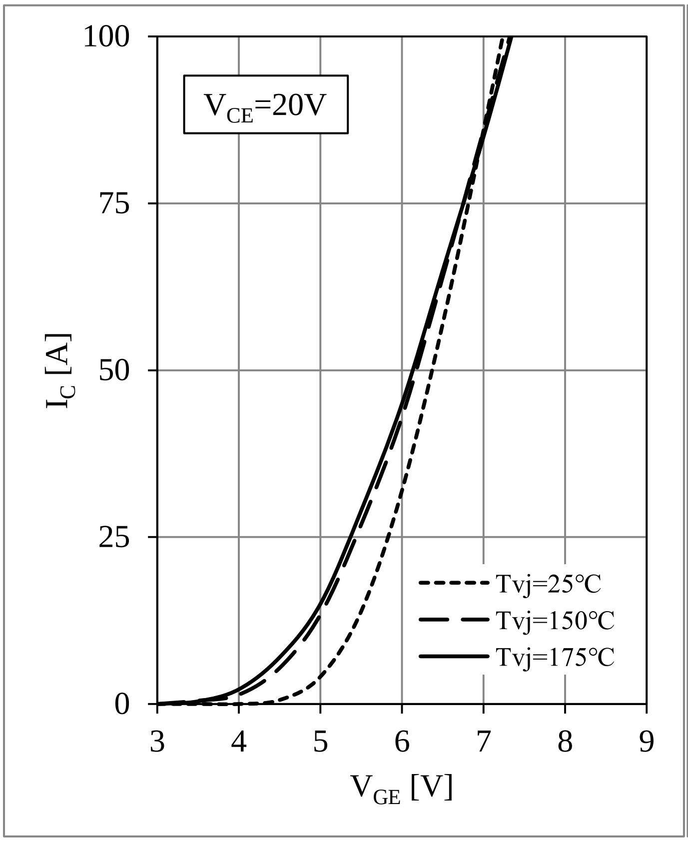


Fig 5. IGBT Transfer Characteristics

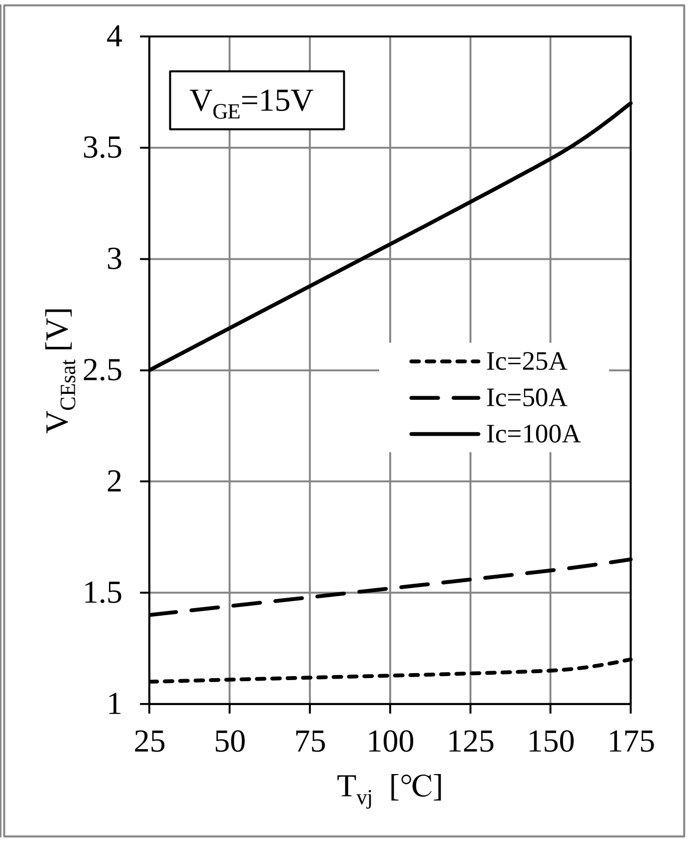


Fig 6. Collector-emitter saturation voltage vs. T_{vj}

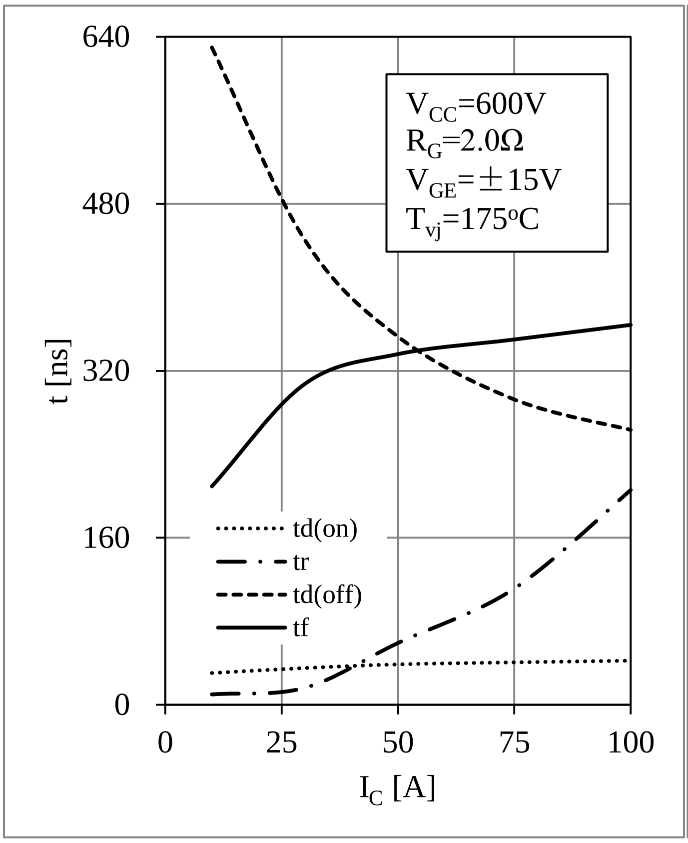


Fig 7. IGBT Switching Times vs. Ic

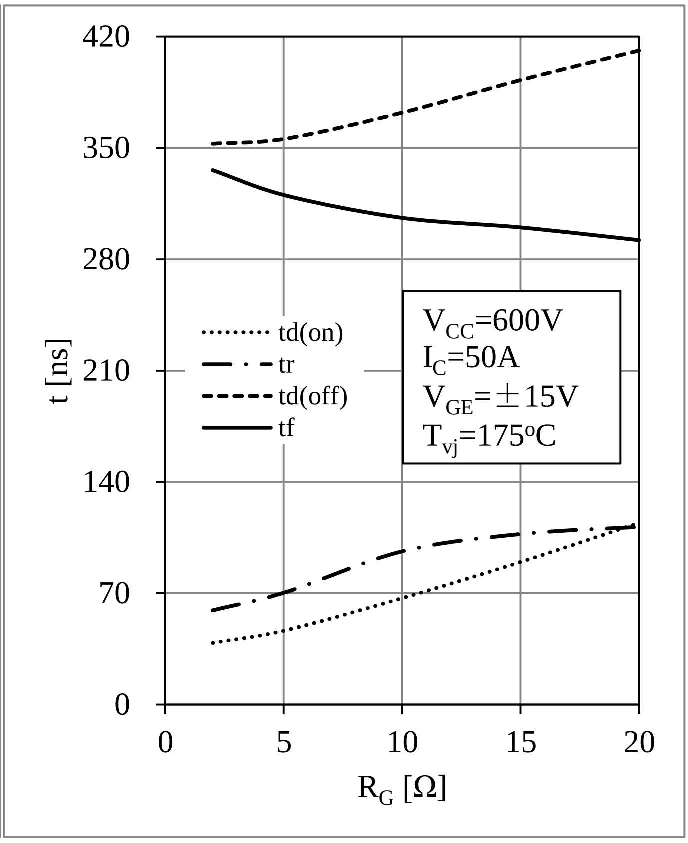


Fig 8. IGBT Switching Times vs. R_G

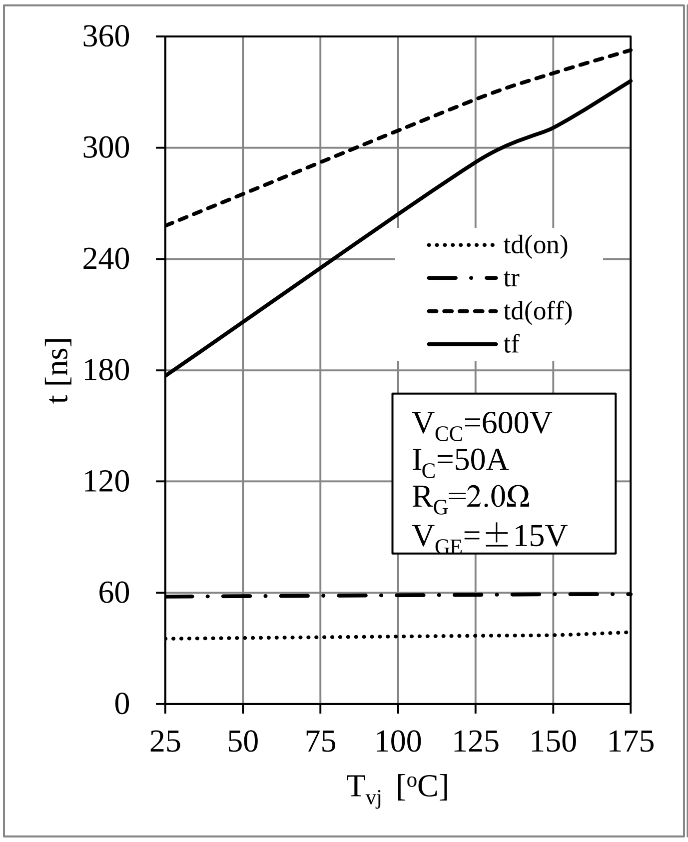


Fig 9. IGBT Switching Times vs. T_{vj}

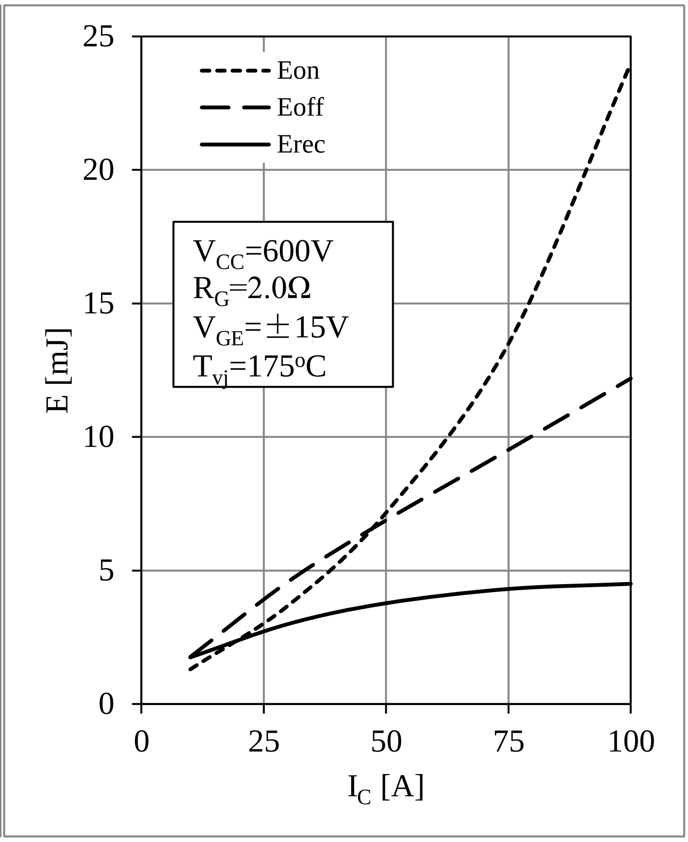


Fig 10. Switching Energy Loss vs. I_C

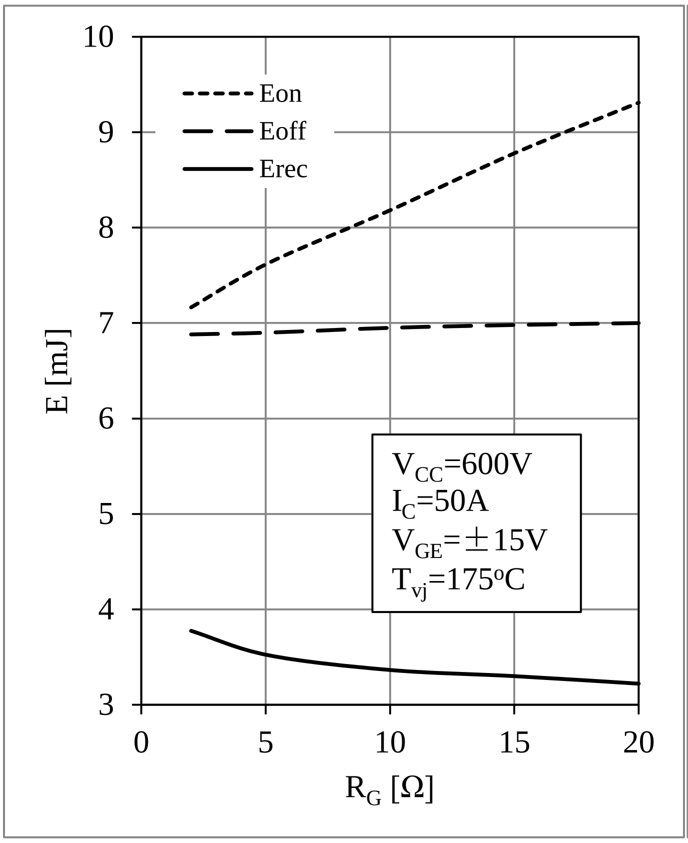


Fig 11. Switching Energy Loss vs. R_G

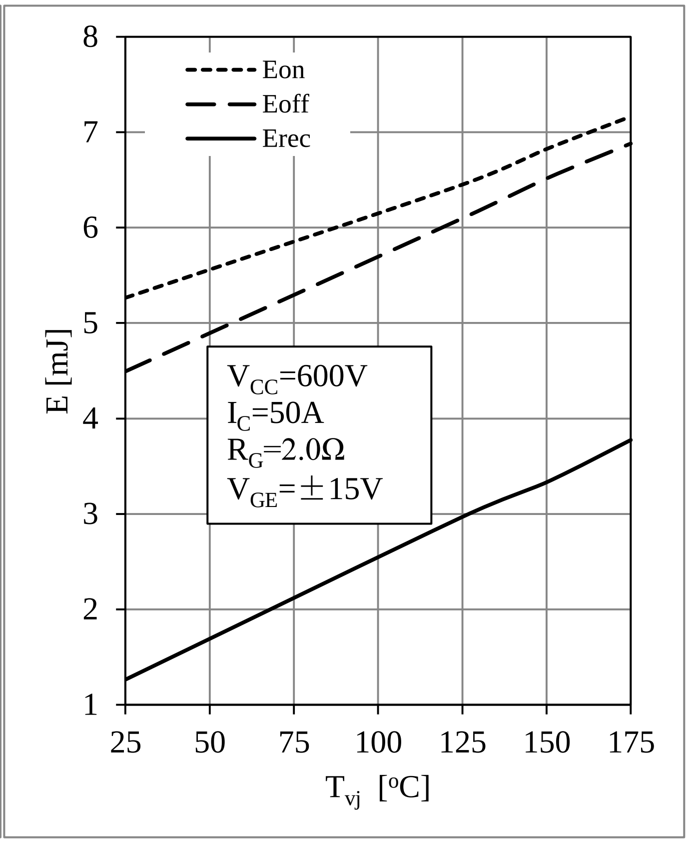


Fig 12. Switching Energy Loss vs. T_{vj}

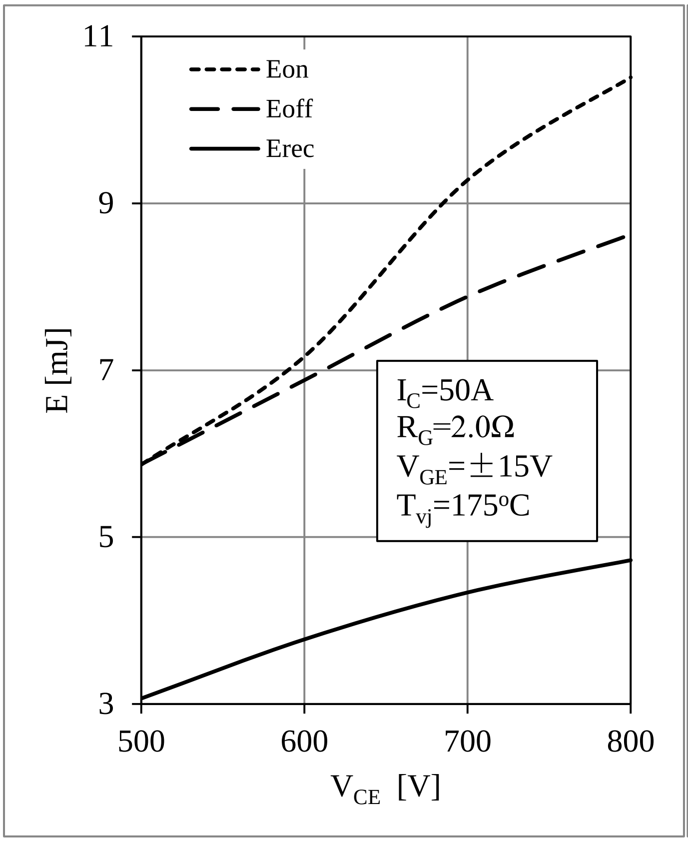


Fig 13. Switching Energy Loss vs. V_{CE}

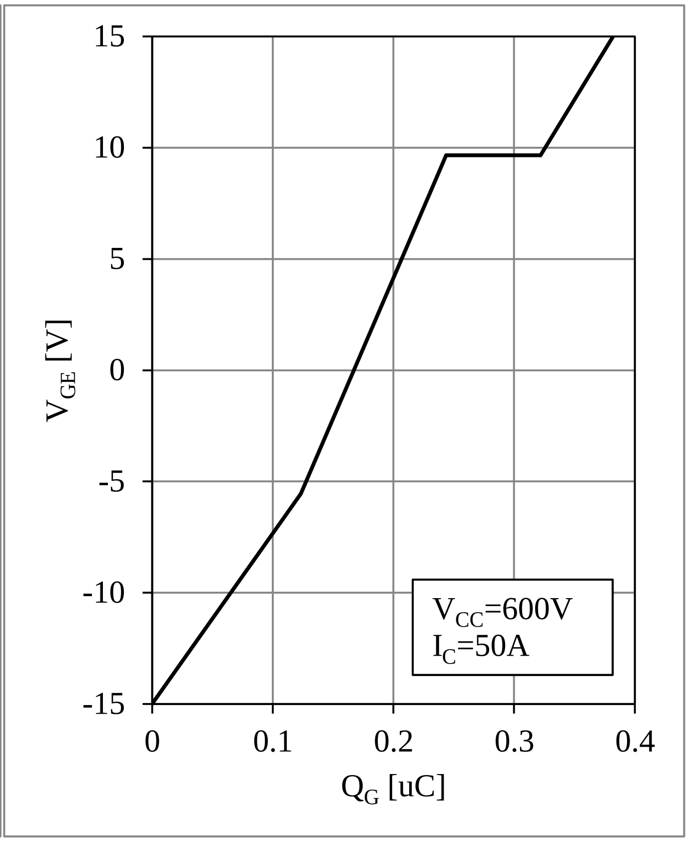


Fig 14. IGBT Gate Charge Characteristic

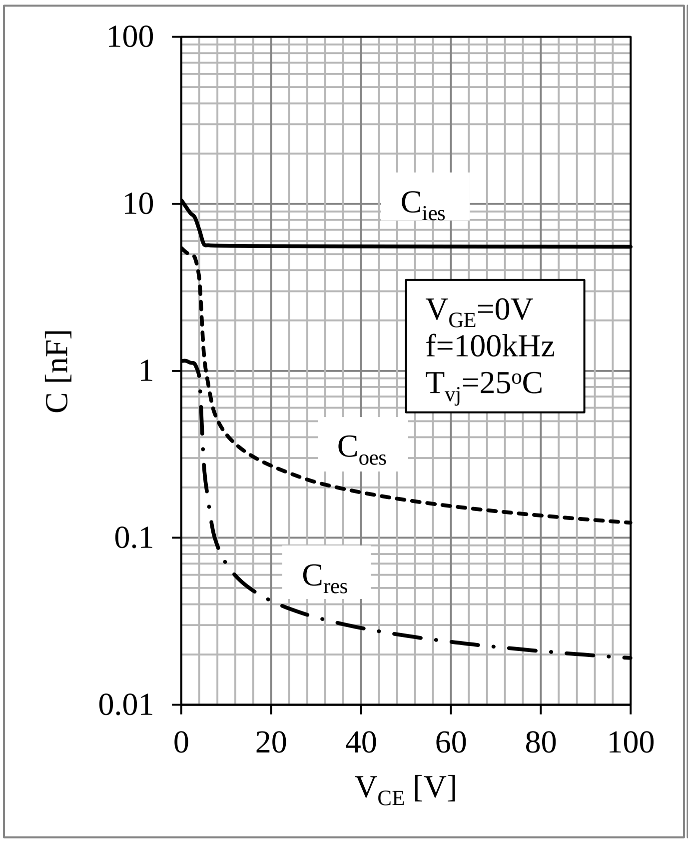


Fig 15. IGBT Capacity Charcteristic

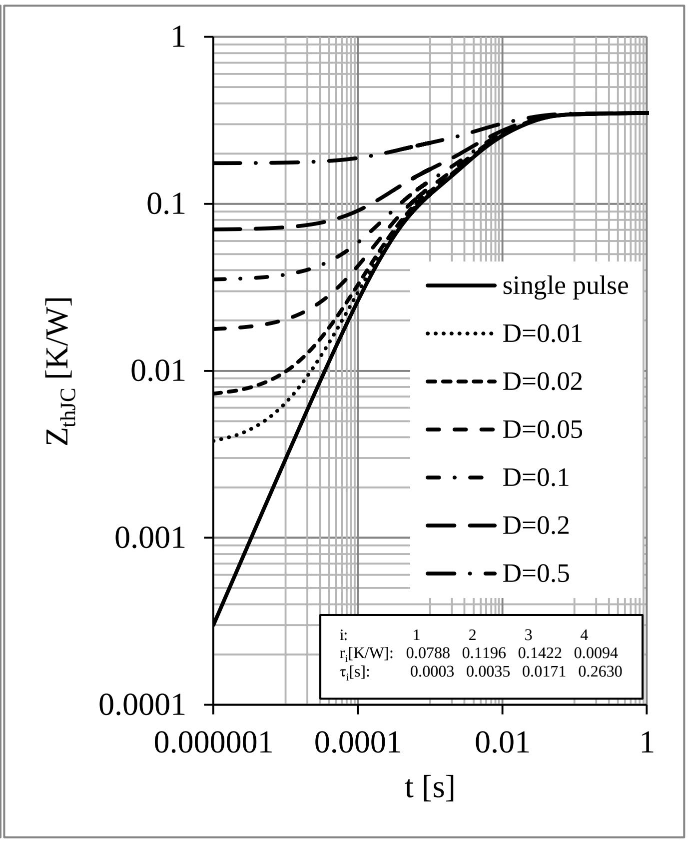


Fig 16. IGBT Transient Thermal Impedance

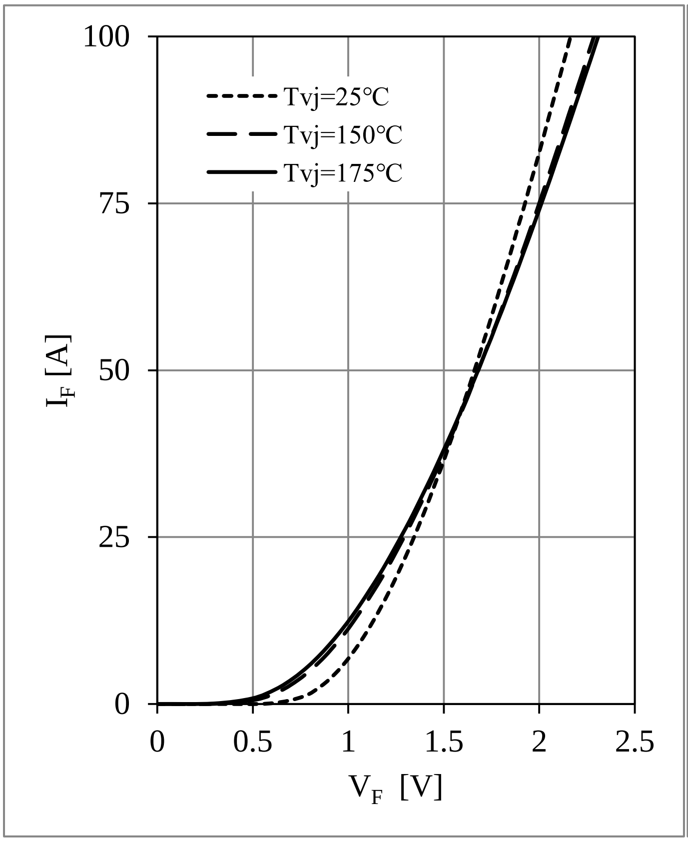


Fig 17. Diode Forward Characteristics

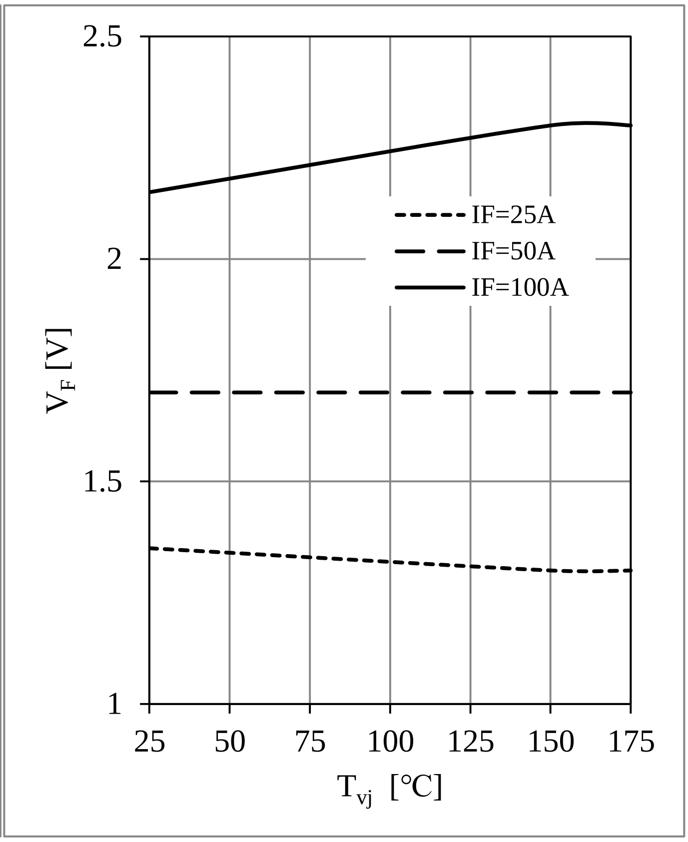


Fig 18. Diode Forward Voltage vs. T_{vj}

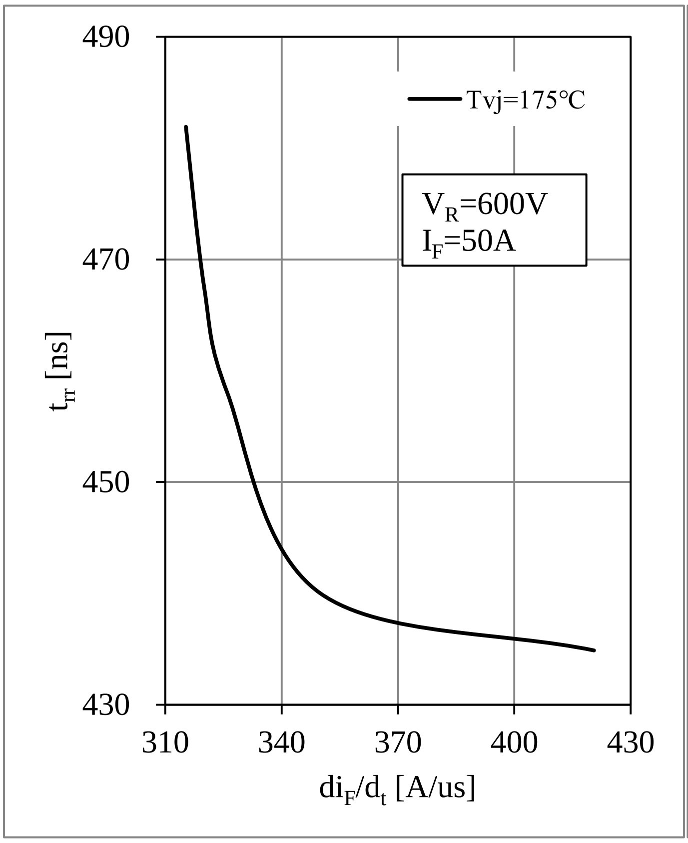


Fig 19. Reverse Recovery Time vs. diF/dt

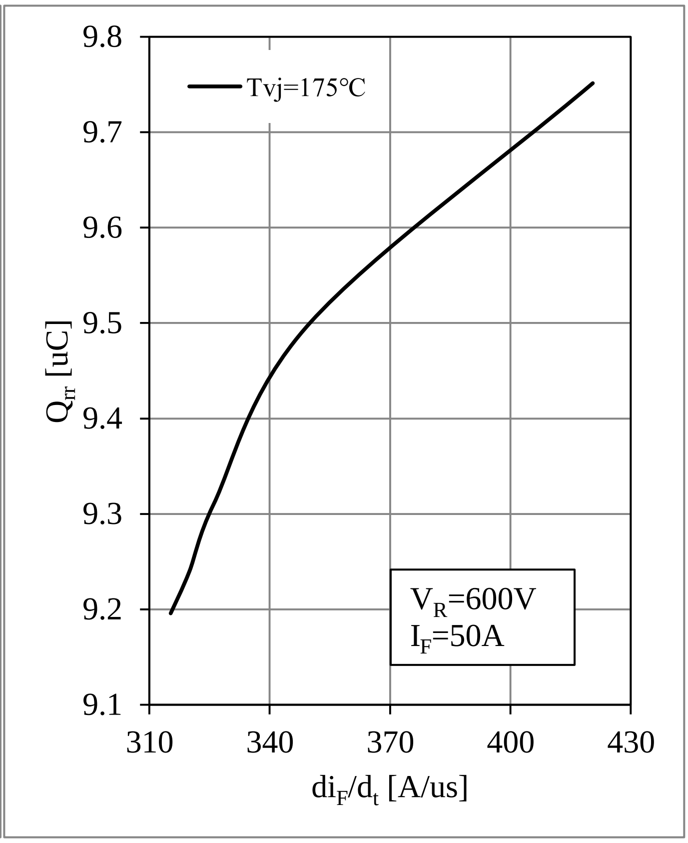


Fig 20. Reverse Recovery Charge vs. diF/dt

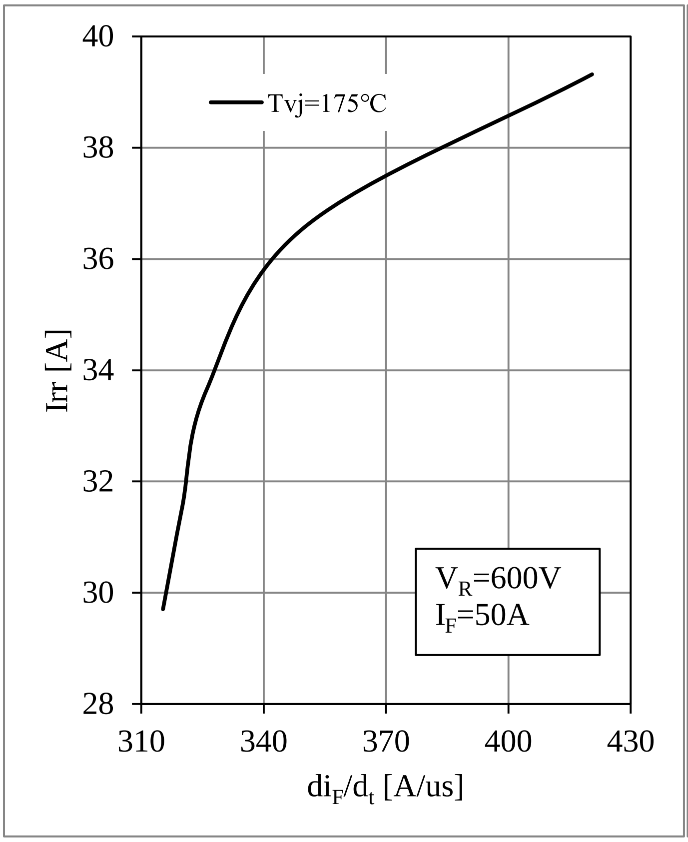


Fig 21. Reverse Recovery Current vs. di_F/d_t

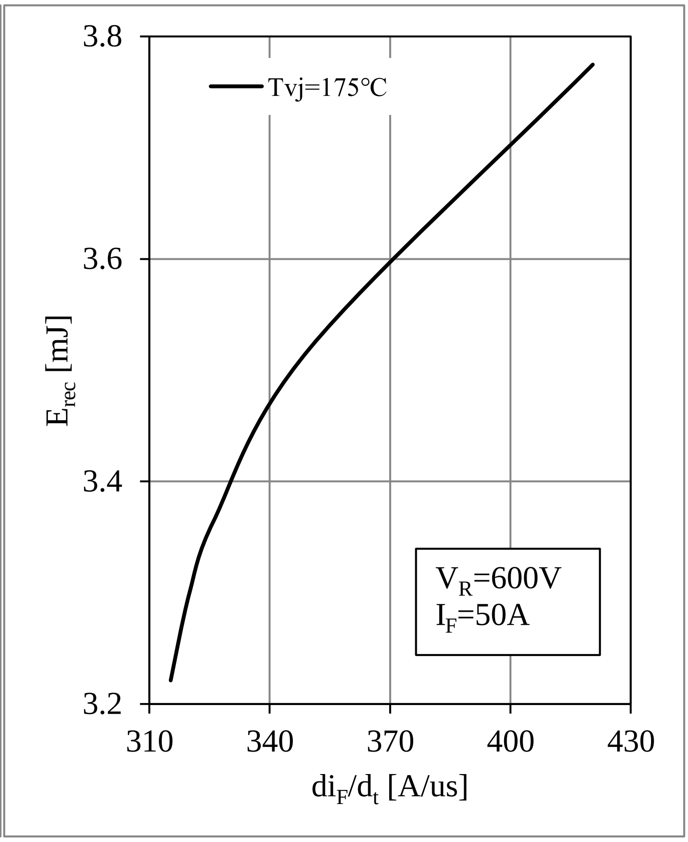


Fig 22. Reverse Energy Losses vs. diF/dt

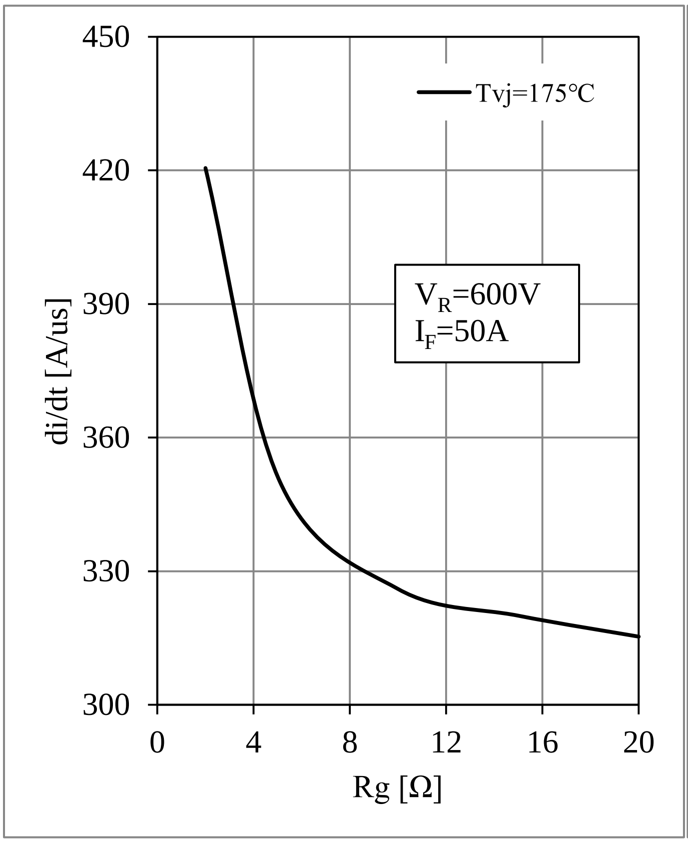


Fig 23. diF/dt vs. Rg

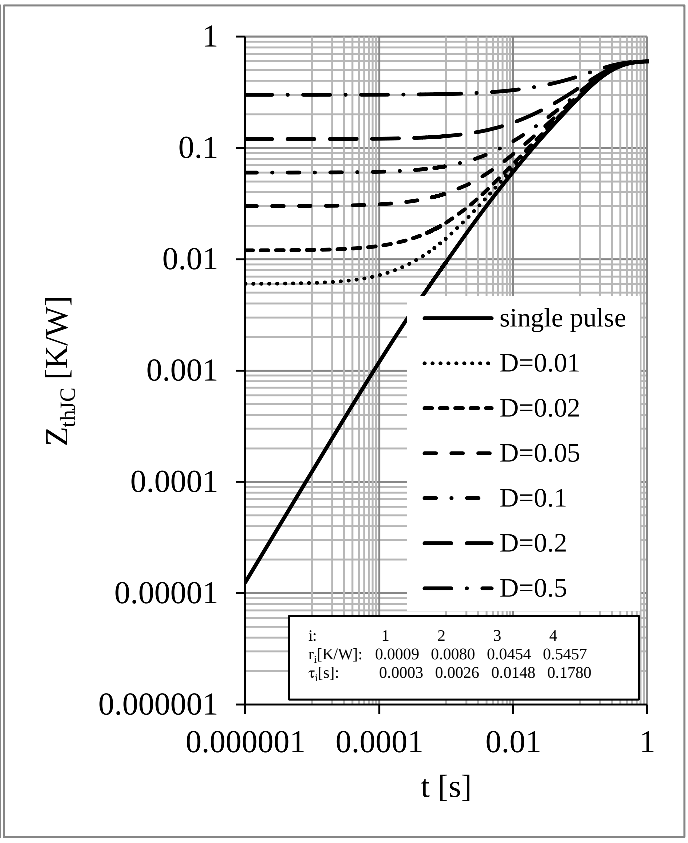
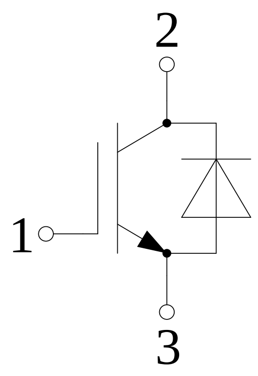


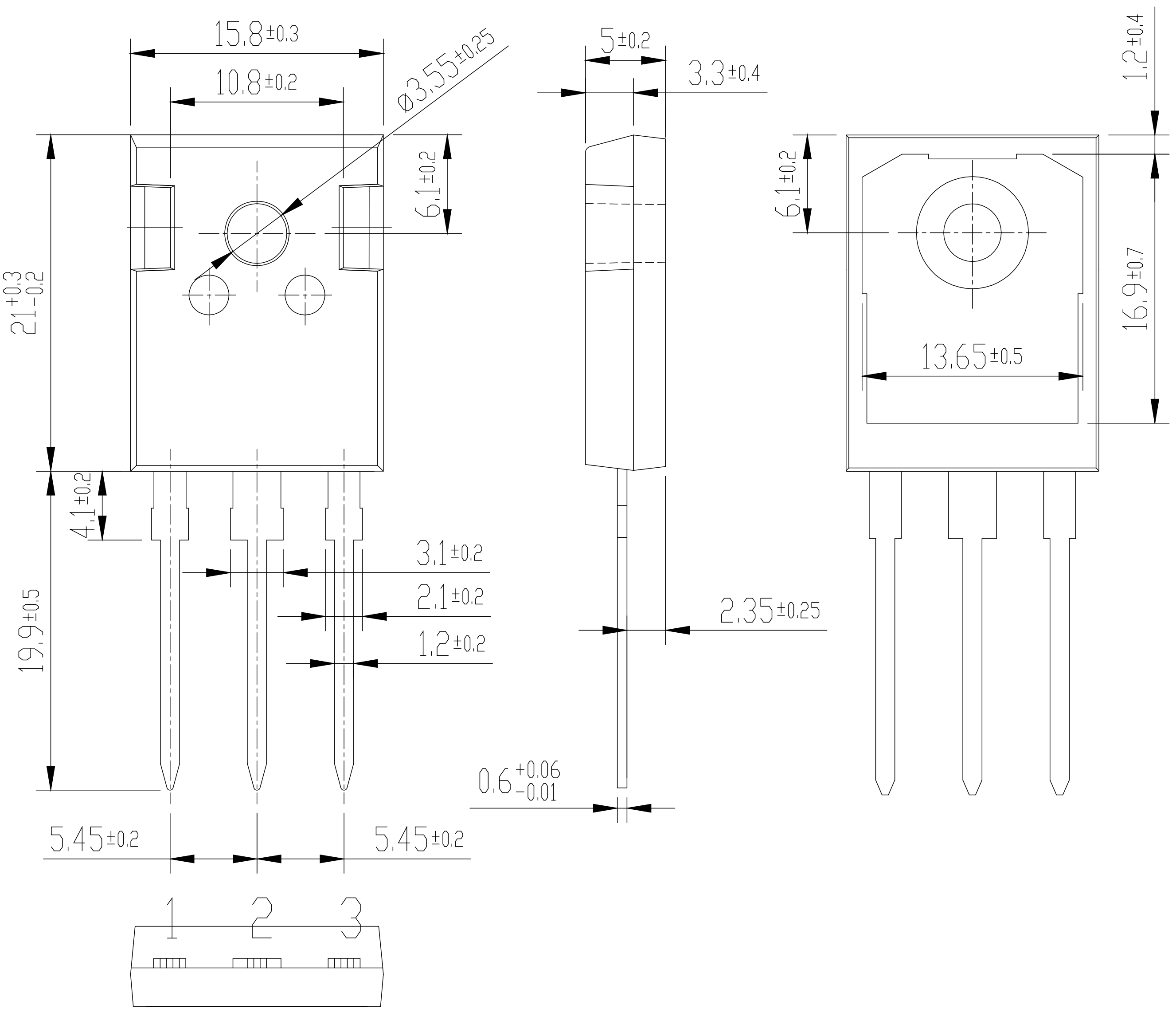
Fig 24. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



Terms and Conditions of Usage

The data contained in this product datasheet is exclusively intended for technically trained staff. you and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application.

This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics.

Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of our product, please contact the sales office, which is responsible for you (see www.powersemi.cc), For those that are specifically interested we may provide application notes.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or live endangering or life support applications, please notify.

If and to the extent necessary, please forward equivalent notices to your customers.
Changes of this product data sheet are reserved.