DOSEMI

IGBT

DG50Q12T2

1200V/50A 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 Solar Power and UPS.

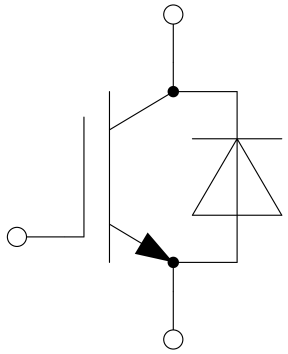
Features

- 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
- Lead free package

Typical Applications

- Solar Power
- Electronic welder
- 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=135°C	100 50	A
I_{CM}	Pulsed Collector Current t_p=1ms	150	A
P_D	Maximum Power Dissipation @ T_j=175°C	672	W

Diode

Symbol	Description	Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current @ T_C=25°C @ T_C=100°C	100 50	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	150	A

Discrete

Symbol	Description	Values	Unit
T_{jop}	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=50A,V_{GE}=15V, T_j=25°C		2.00	2.45	V
		I_C=50A,V_{GE}=15V, T_j=150°C		2.35		
		I_C=50A,V_{GE}=15V, T_j=175°C		2.55		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=2.0mA,V_{CE}=V_{GE}, T_j=25°C	5.6	6.2	6.8	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			350	μA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			100	nA
R_{Gint}	Internal Gate Resistance			0		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=100kHz, V_{GE}=0V		5.00		nF
C_{res}	Reverse Transfer Capacitance			0.14		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.37		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=15Ω,V_{GE}= ±15V, Ls=40nH,T_j=25°C		53		ns
t_r	Rise Time			96		ns
$t_{d(off)}$	Turn-Off Delay Time			151		ns
t_f	Fall Time			77		ns
E_{on}	Turn-On Switching Loss			7.57		mJ
E_{off}	Turn-Off Switching Loss			1.15		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=15Ω,V_{GE}= ±15V, Ls=40nH,T_j=150°C		56		ns
t_r	Rise Time			107		ns
$t_{d(off)}$	Turn-Off Delay Time			188		ns
t_f	Fall Time			136		ns
E_{on}	Turn-On Switching Loss			9.42		mJ
E_{off}	Turn-Off Switching Loss			2.13		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=15Ω,V_{GE}= ±15V, Ls=40nH,T_j=175°C		59		ns
t_r	Rise Time			113		ns
$t_{d(off)}$	Turn-Off Delay Time			200		ns
t_f	Fall Time			138		ns
E_{on}	Turn-On Switching Loss			9.88		mJ
E_{off}	Turn-Off Switching Loss			2.38		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=800V, V_{CEM}≤1200V		200		A

Diode Characteristics $T_C=25^oC$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=50A, V_{GE}=0V, T_j=25^oC$		1.85	2.30	V
		$I_F=50A, V_{GE}=0V, T_j=150^oC$		1.95		
		$I_F=50A, V_{GE}=0V, T_j=175^oC$		2.00		
t_{rr}	Diode Reverse Recovery Time	$V_R=600V, I_F=50A$, $-di/dt=350A/\mu s, V_{GE}=-15V$ $T_j=25^oC$		345		ns
Q_r	Recovered Charge			3.41		μC
I_{RM}	Peak Reverse Recovery Current			18.5		A
E_{rec}	Reverse Recovery Energy			1.25		mJ
t_{rr}	Diode Reverse Recovery Time	$V_R=600V, I_F=50A$, $-di/dt=350A/\mu s, V_{GE}=-15V$ $T_j=150^oC$		580		ns
Q_r	Recovered Charge			7.96		μC
I_{RM}	Peak Reverse Recovery Current			25.6		A
E_{rec}	Reverse Recovery Energy			3.55		mJ
t_{rr}	Diode Reverse Recovery Time	$V_R=600V, I_F=50A$, $-di/dt=350A/\mu s, V_{GE}=-15V$ $T_j=175^oC$		640		ns
Q_r	Recovered Charge			9.35		μC
I_{RM}	Peak Reverse Recovery Current			27.6		A
E_{rec}	Reverse Recovery Energy			4.21		mJ

Discrete Characteristics $T_C=25^oC$ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.223 0.420	K/W
R_{thJA}	Junction-to-Ambient		40		K/W

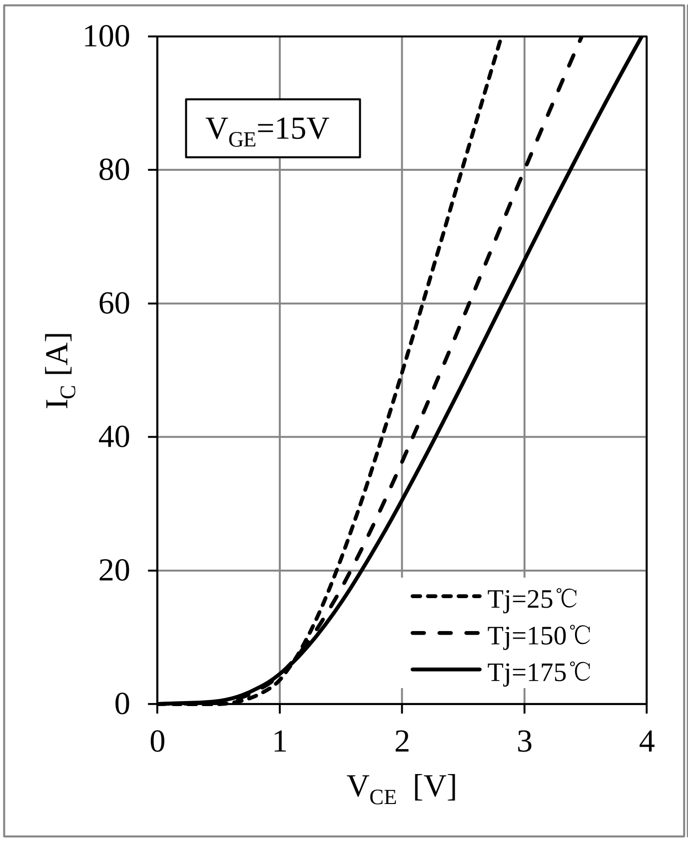


Fig 1. IGBT-inverter Output Characteristics

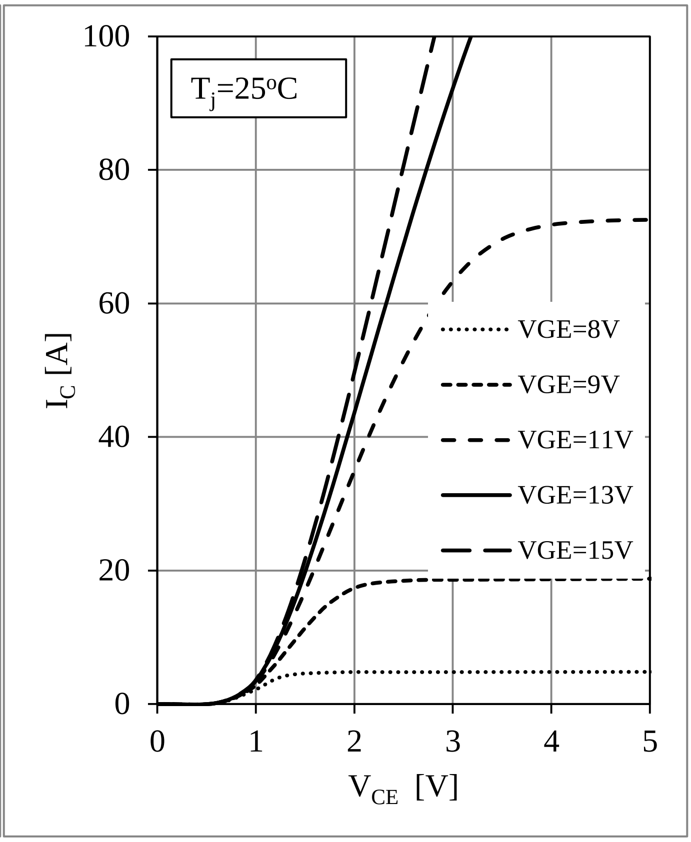


Fig 2. IGBT Output Characteristics

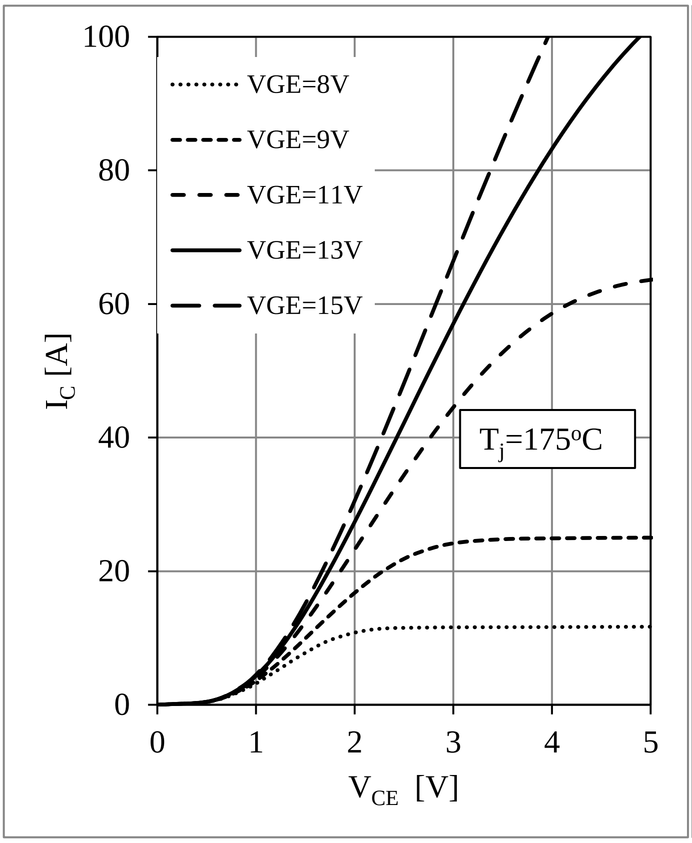


Fig 3. IGBT Output Characteristics

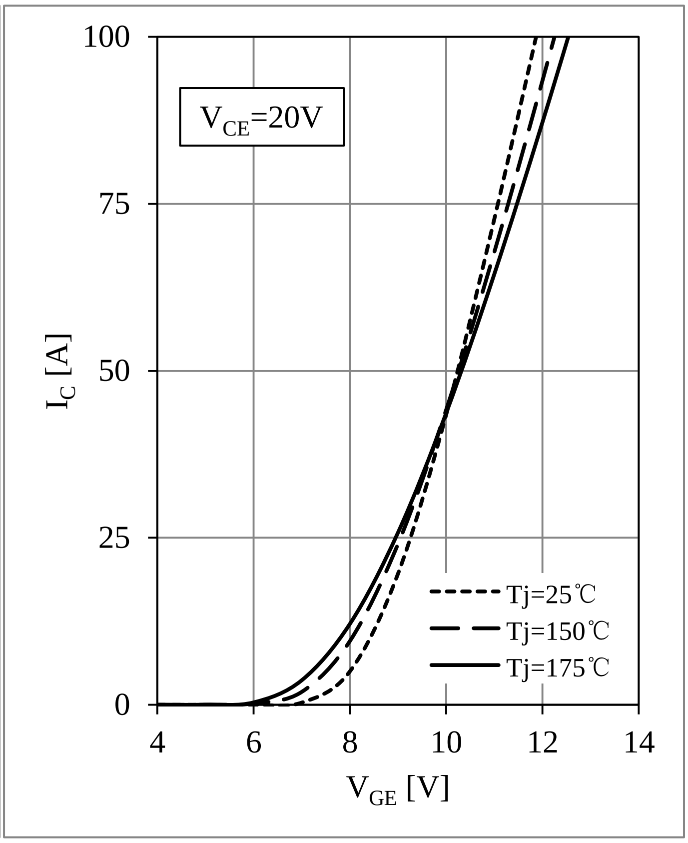


Fig 4. IGBT Transfer Characteristics

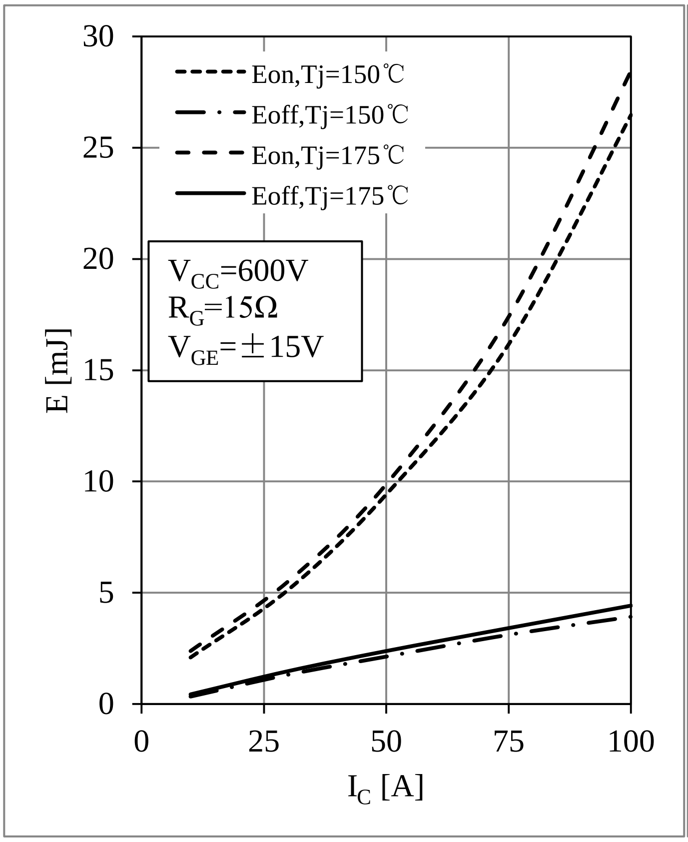


Fig 5. IGBT Switching Loss vs. I_C

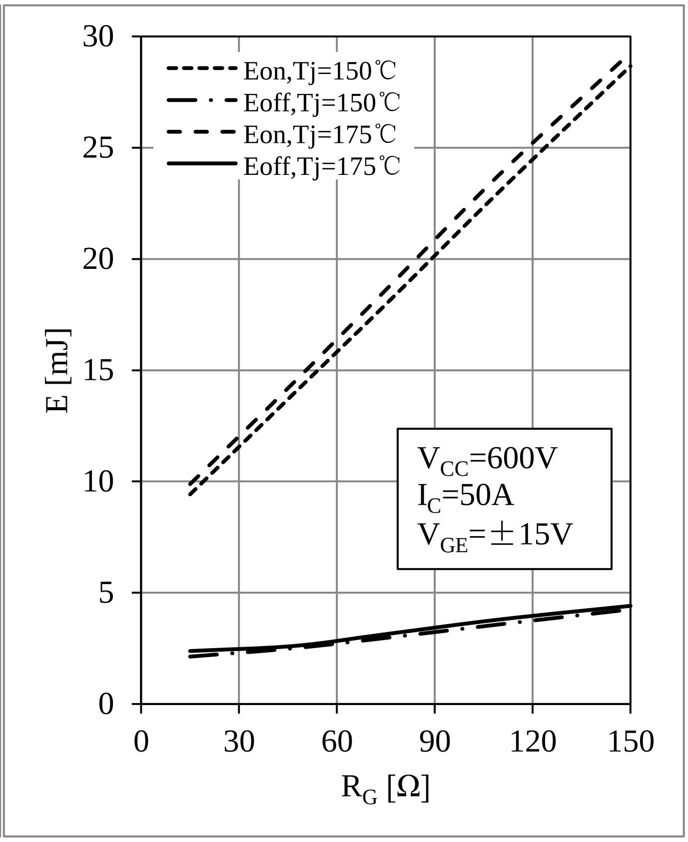


Fig 6. IGBT Switching Loss vs. R_G

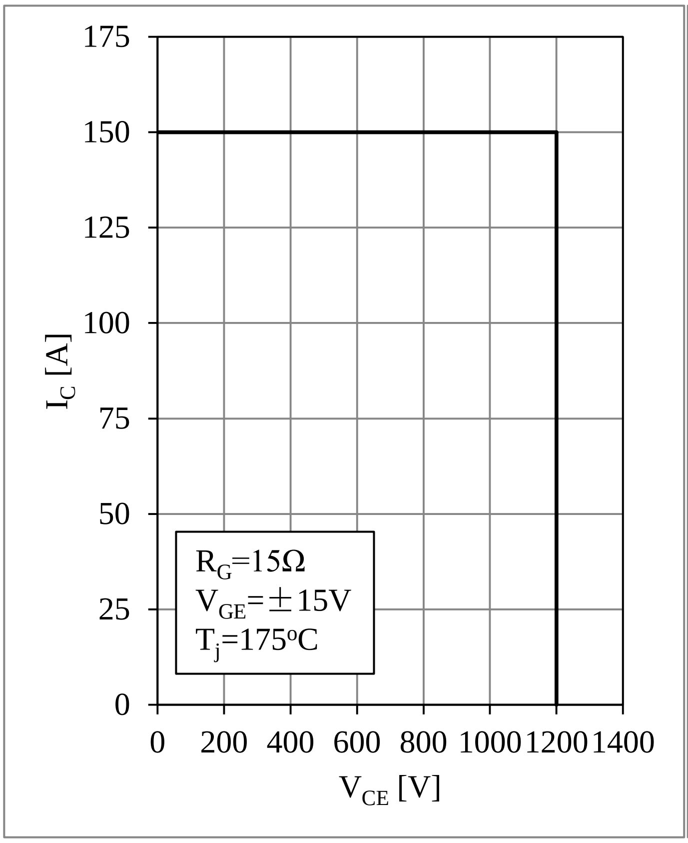


Fig 7. RBSOA

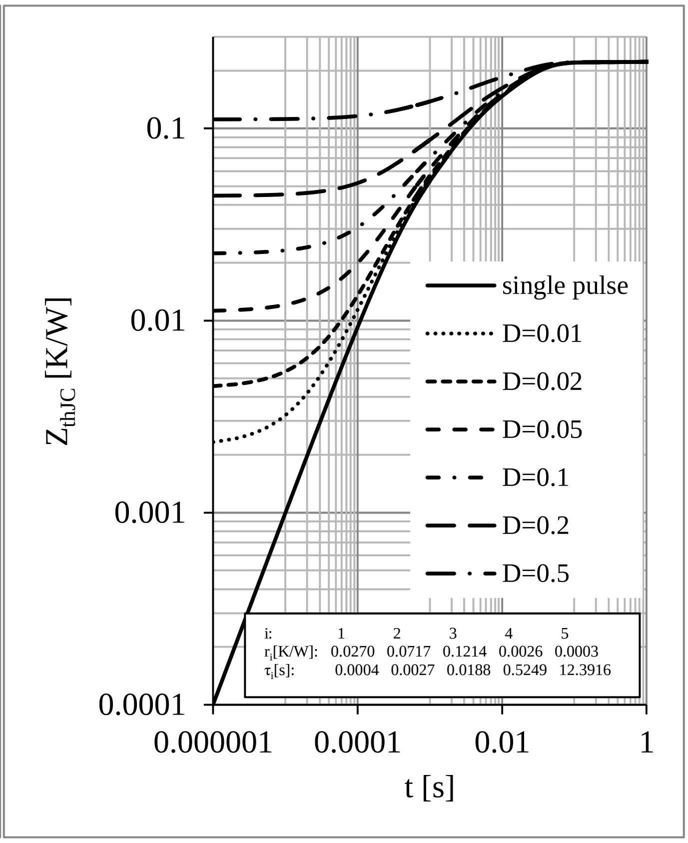


Fig 8. IGBT Transient Thermal Impedance

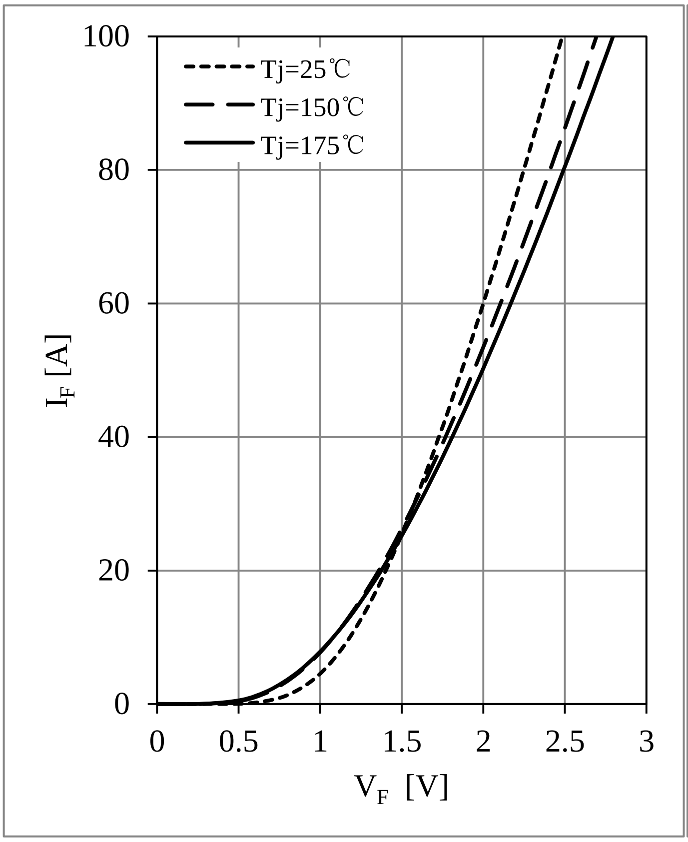


Fig 9. Diode Forward Characteristics

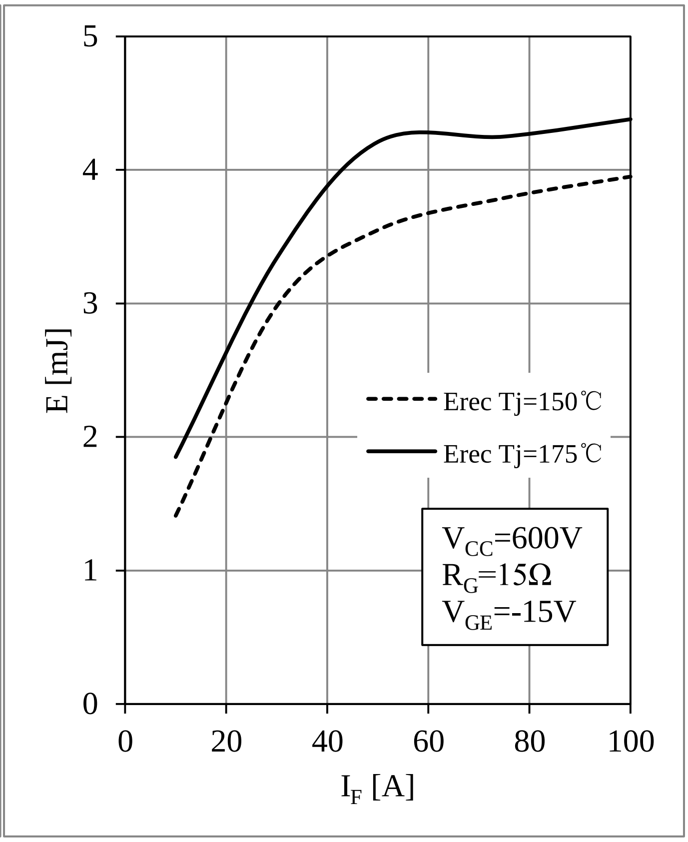


Fig 10. Diode Switching Loss vs. I_F

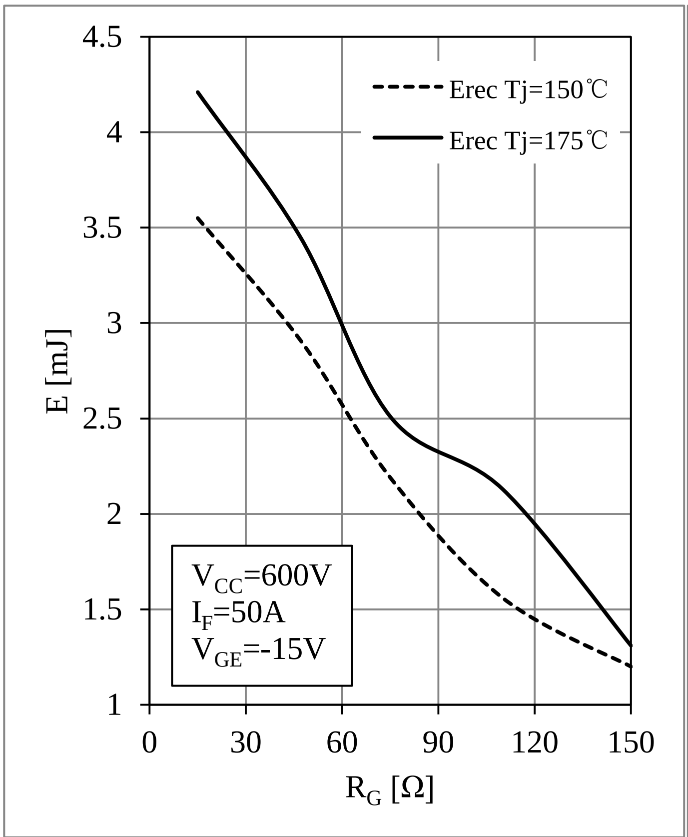


Fig 11. Diode Switching Loss vs. R_G

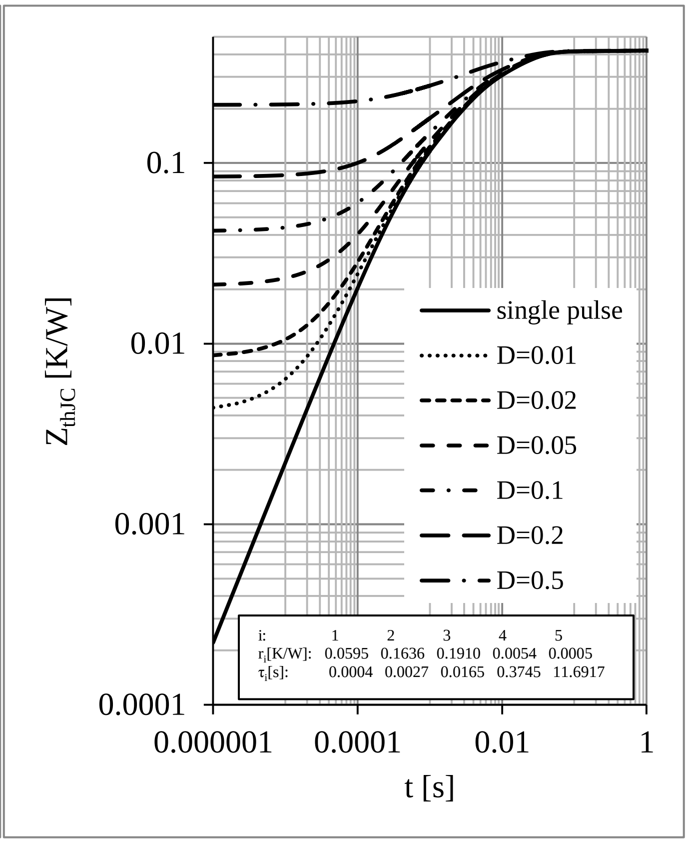
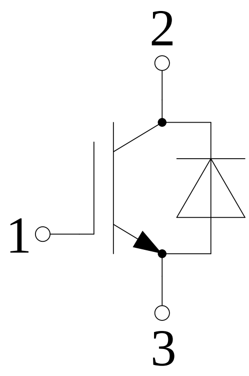


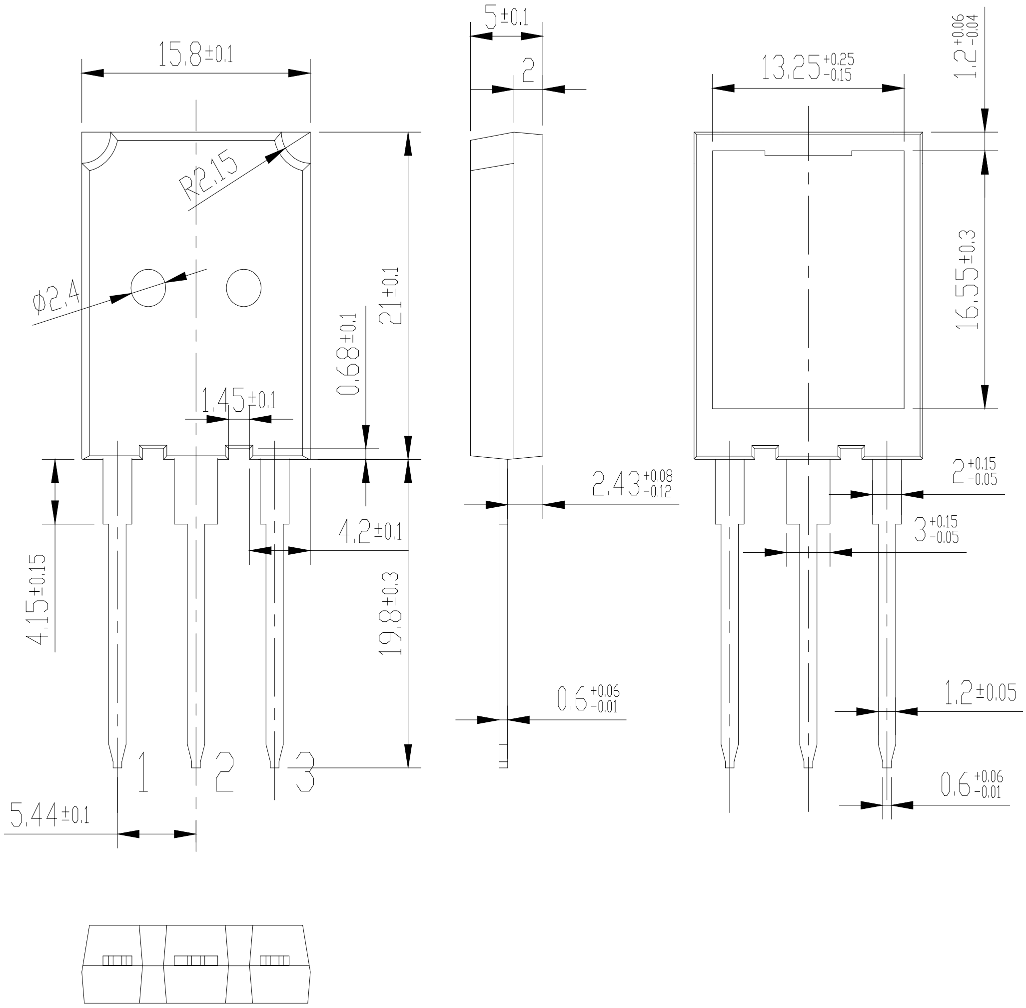
Fig 12. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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