

DOSEMI

IGBT

DG75X07T2L

650V/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.

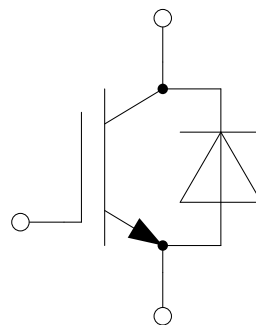
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 6 μ s short circuit capability
- Low switching loss
- Maximum junction temperature 175°C
- Low inductance case
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Lead free package

Typical Applications

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

Equivalent Circuit Schematic



Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted**IGBT**

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage Transient Gate-Emitter Voltage	+20 +25	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=100^{\circ}\text{C}$	90 ⁽¹⁾ 75	A
I_{CM}	Pulsed Collector Current t_p limited by T_{jmax}	300	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	428	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	650	V
I_F	Diode Continuous Forward Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=75^{\circ}\text{C}$	90 ⁽¹⁾ 75	A
I_{FM}	Diode Maximum Forward Current t_p limited by T_{jmax}	300	A

Discrete

Symbol	Description	Values	Unit
T_{jop}	Operating Junction Temperature	-40 to +175	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^{\circ}\text{C}$
T_S	Soldering Temperature, 1.6mm from case for 10s	260	$^{\circ}\text{C}$
M	Mounting Torque, Screw M3	0.6	N.m

(1) Value limited by bondwire

IGBT Characteristics $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=75\text{A}, V_{GE}=15\text{V}, T_j=25^\circ\text{C}$		1.50	1.95	V	
		$I_C=75\text{A}, V_{GE}=15\text{V}, T_j=125^\circ\text{C}$		1.60			
		$I_C=75\text{A}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}$		1.70			
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.20\text{mA}, V_{CE}=V_{GE}, T_j=25^\circ\text{C}$	5.1	5.8	6.5	V	
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$			40	μA	
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0\text{V}, T_j=25^\circ\text{C}$			100	nA	
R_{Gint}	Internal Gate Resistance			0		Ω	
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, f=100\text{kHz}, V_{GE}=0\text{V}$		8.69		nF	
C_{res}	Reverse Transfer Capacitance				0.17		nF
Q_G	Gate Charge	$V_{GE}=-15\dots+15\text{V}$		0.52		μC	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300\text{V}, I_C=75\text{A}, R_G=7.5\Omega, V_{GE}=\pm 15\text{V}, L_S=40\text{nH}, T_j=25^\circ\text{C}$		106		ns	
t_r	Rise Time				156		ns
$t_{d(off)}$	Turn-Off Delay Time				182		ns
t_f	Fall Time				119		ns
E_{on}	Turn-On Switching Loss				3.94		mJ
E_{off}	Turn-Off Switching Loss				1.29		mJ
$t_{d(on)}$	Turn-On Delay Time		$V_{CC}=300\text{V}, I_C=75\text{A}, R_G=7.5\Omega, V_{GE}=\pm 15\text{V}, L_S=40\text{nH}, T_j=150^\circ\text{C}$		110		ns
t_r	Rise Time					152	
$t_{d(off)}$	Turn-Off Delay Time				189		ns
t_f	Fall Time				166		ns
E_{on}	Turn-On Switching Loss				4.4		mJ
E_{off}	Turn-Off Switching Loss				1.62		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300\text{V}, I_C=75\text{A}, R_G=7.5\Omega, V_{GE}=\pm 15\text{V}, L_S=40\text{nH}, T_j=175^\circ\text{C}$			113		ns
t_r	Rise Time					151	
$t_{d(off)}$	Turn-Off Delay Time				217		ns
t_f	Fall Time				152		ns
E_{on}	Turn-On Switching Loss				4.82		mJ
E_{off}	Turn-Off Switching Loss				1.77		mJ
I_{SC}	SC Data		$t_p \leq 6\mu\text{s}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}, V_{CC}=360\text{V}, V_{CEM} \leq 650\text{V}$		375		A

Diode Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=75\text{A}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$		1.60	2.05	V
		$I_F=75\text{A}, V_{GE}=0\text{V}, T_j=125^\circ\text{C}$		1.65		
		$I_F=75\text{A}, V_{GE}=0\text{V}, T_j=150^\circ\text{C}$		1.70		
t_{rr}	Diode Reverse Recovery Time	$V_R=300\text{V}, I_F=75\text{A},$ $-di/dt=350\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $L_S=40\text{nH}, T_j=25^\circ\text{C}$		168		ns
Q_r	Recovered Charge			1.29		μC
I_{RM}	Peak Reverse Recovery Current			12.4		A
E_{rec}	Reverse Recovery Energy			0.19		mJ
t_{rr}	Diode Reverse Recovery Time	$V_R=300\text{V}, I_F=75\text{A},$ $-di/dt=348\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $L_S=40\text{nH}, T_j=150^\circ\text{C}$		224		ns
Q_r	Recovered Charge			2.55		μC
I_{RM}	Peak Reverse Recovery Current			17.4		A
E_{rec}	Reverse Recovery Energy			0.41		mJ
t_{rr}	Diode Reverse Recovery Time	$V_R=300\text{V}, I_F=75\text{A},$ $-di/dt=335\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $L_S=40\text{nH}, T_j=175^\circ\text{C}$		251		ns
Q_r	Recovered Charge			3.36		μC
I_{RM}	Peak Reverse Recovery Current			21.4		A
E_{rec}	Reverse Recovery Energy			0.54		mJ

Discrete Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per IGBT)			0.350	K/W
	Junction-to-Case (per Diode)			0.600	
R_{thJA}	Junction-to-Ambient		40		K/W

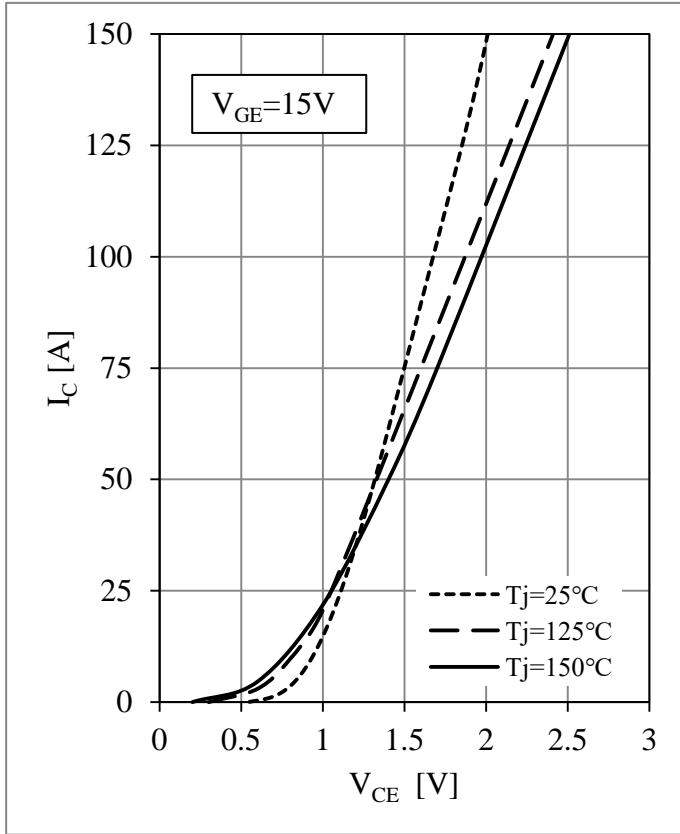


Fig 1. IGBT-inverter Output Characteristics

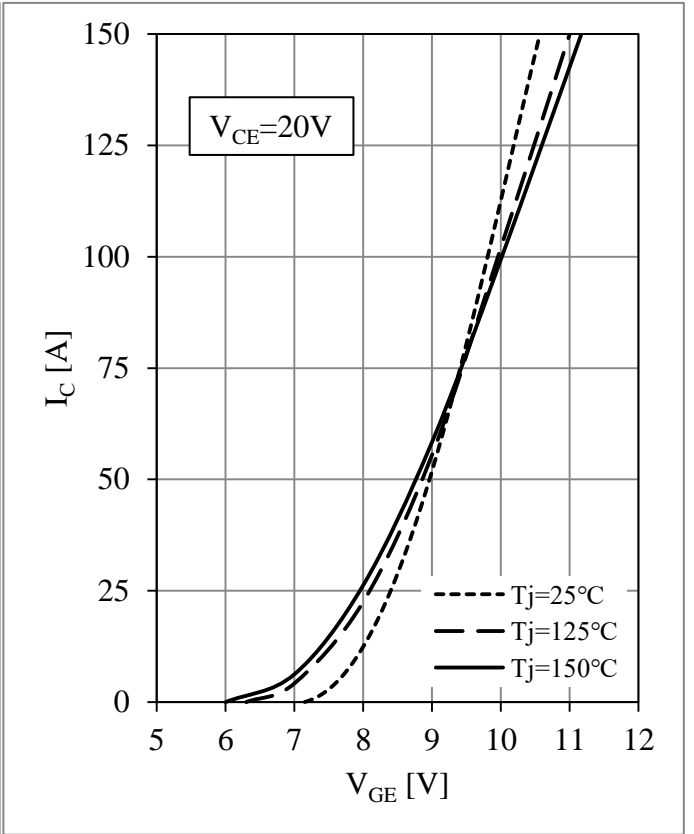


Fig 2. IGBT-inverter Transfer Characteristics

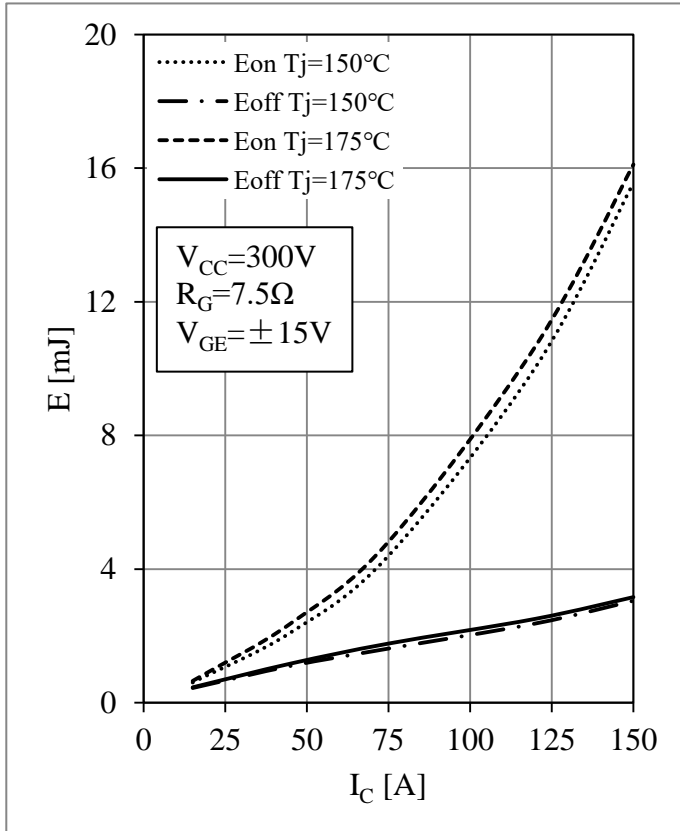


Fig 3. IGBT-inverter Switching Loss vs. I_c

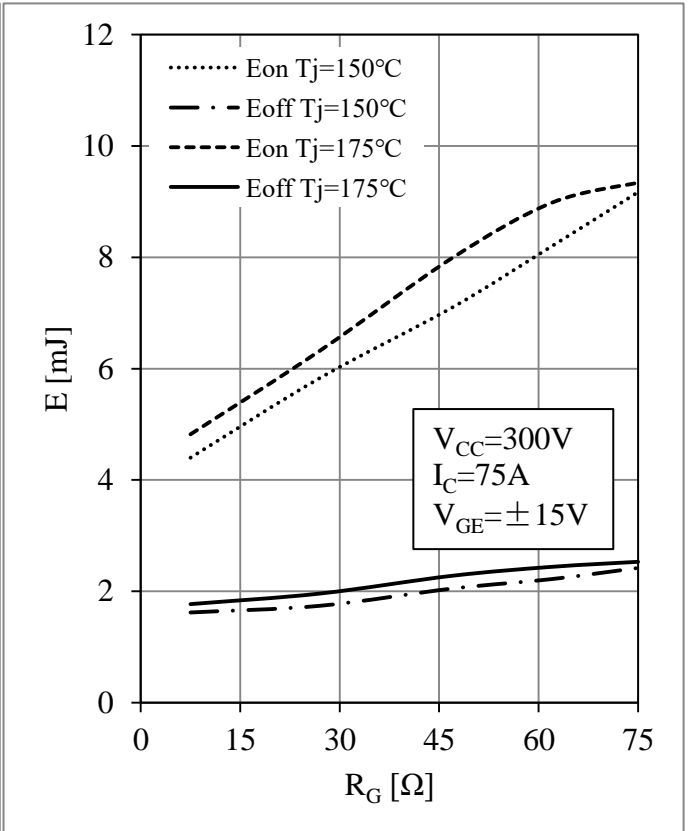


Fig 4. IGBT-inverter Switching Loss vs. R_g

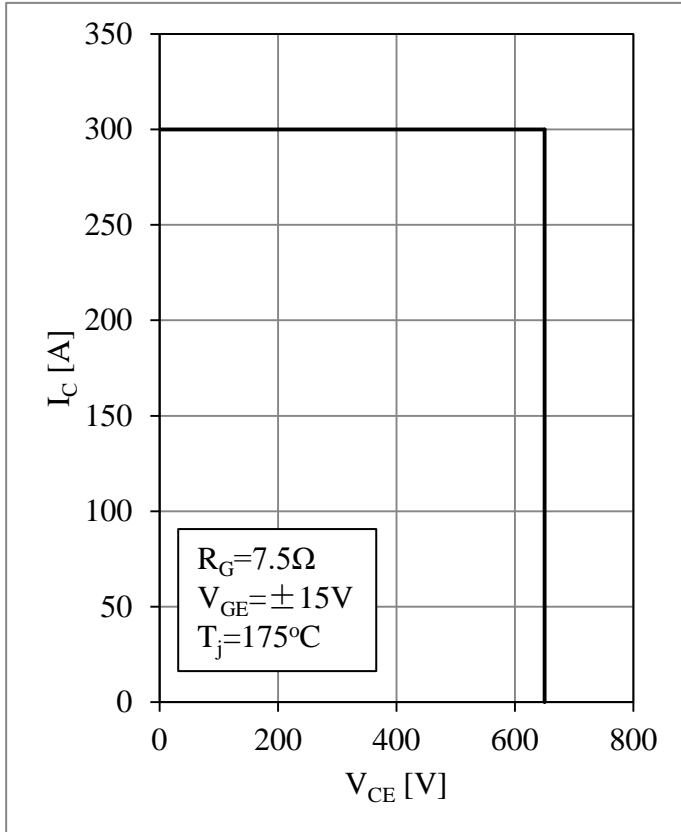


Fig 5. IGBT-inverter RBSOA

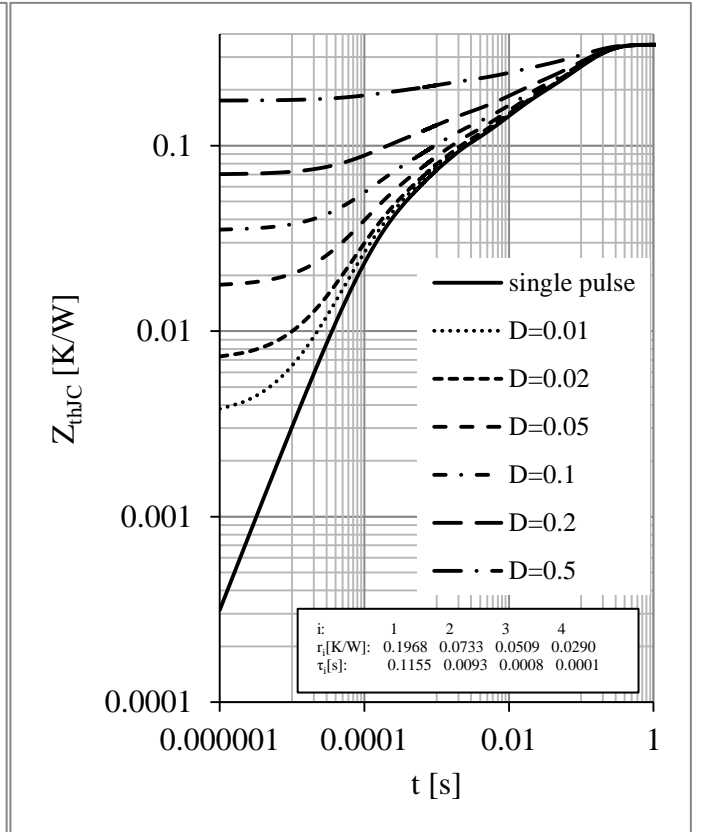


Fig 6. IGBT-inverter Transient Thermal Impedance

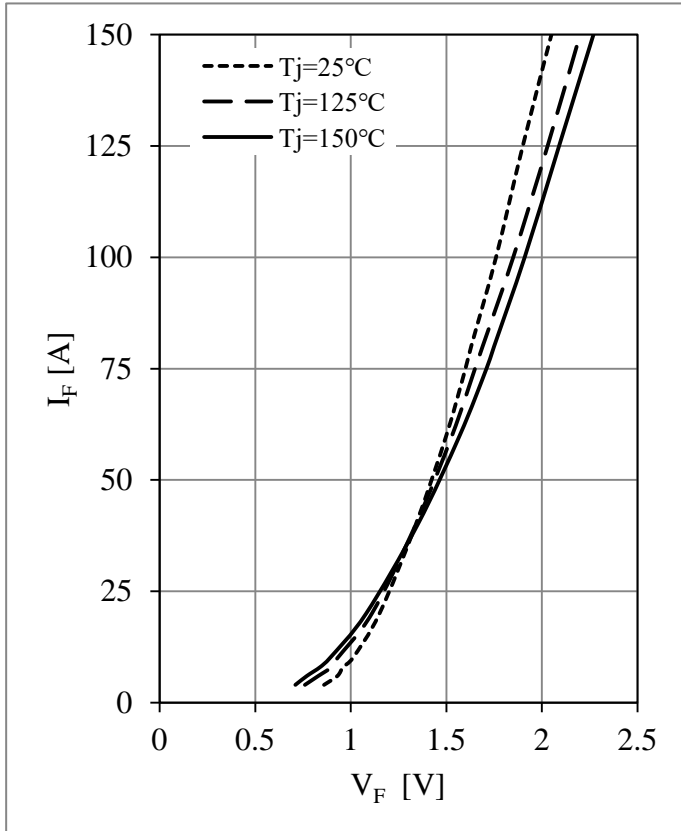


Fig 7. Diode-inverter Forward Characteristics

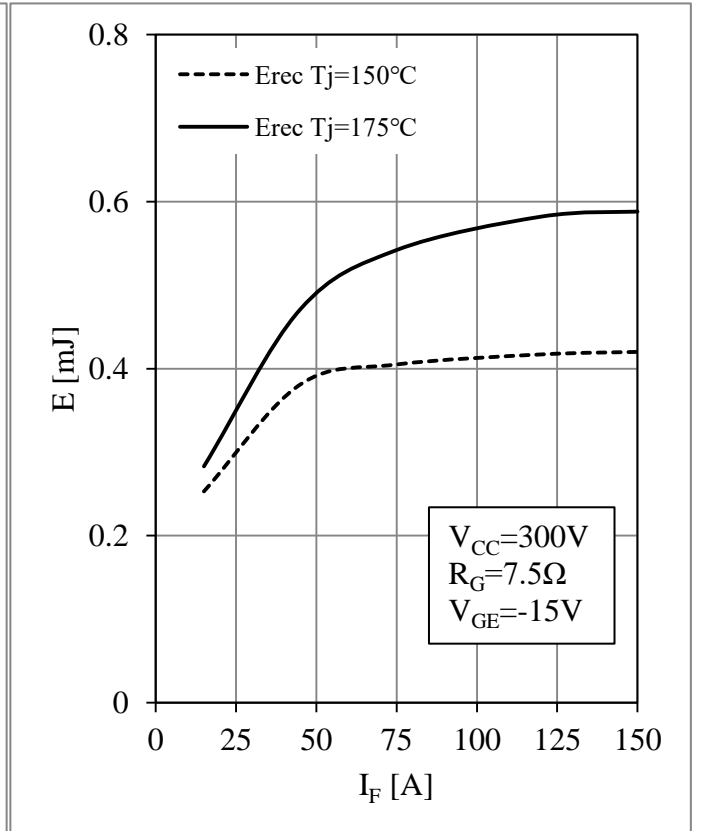


Fig 8. Diode-inverter Switching Loss vs. I_F

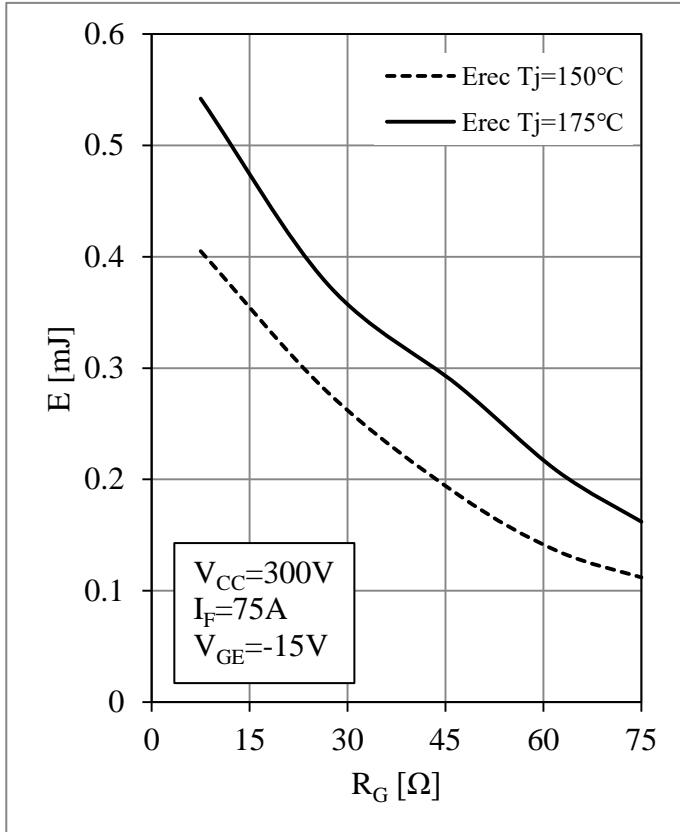


Fig 9. Diode-inverter Switching Loss vs. R_G

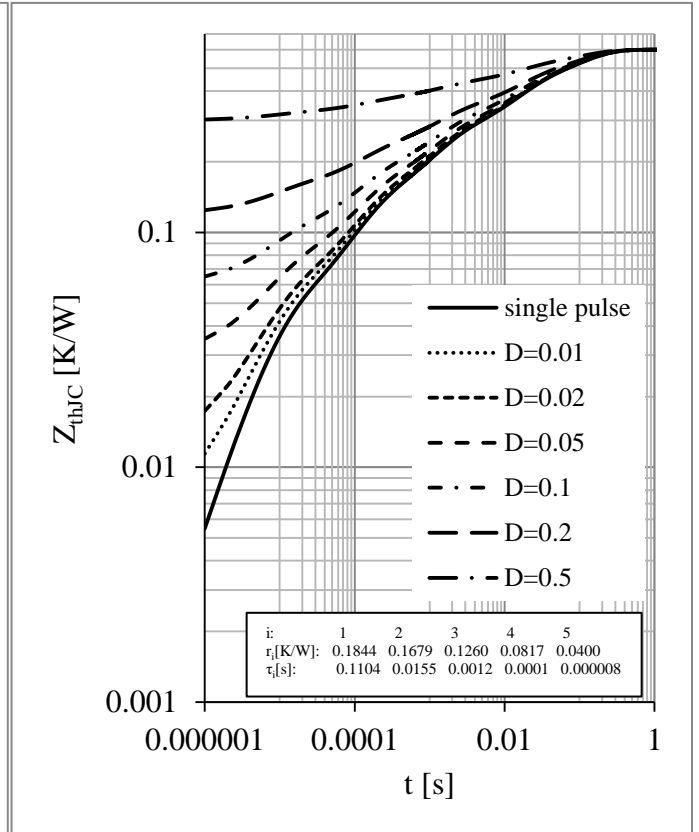
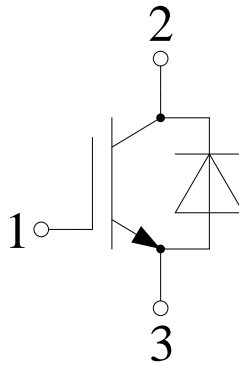


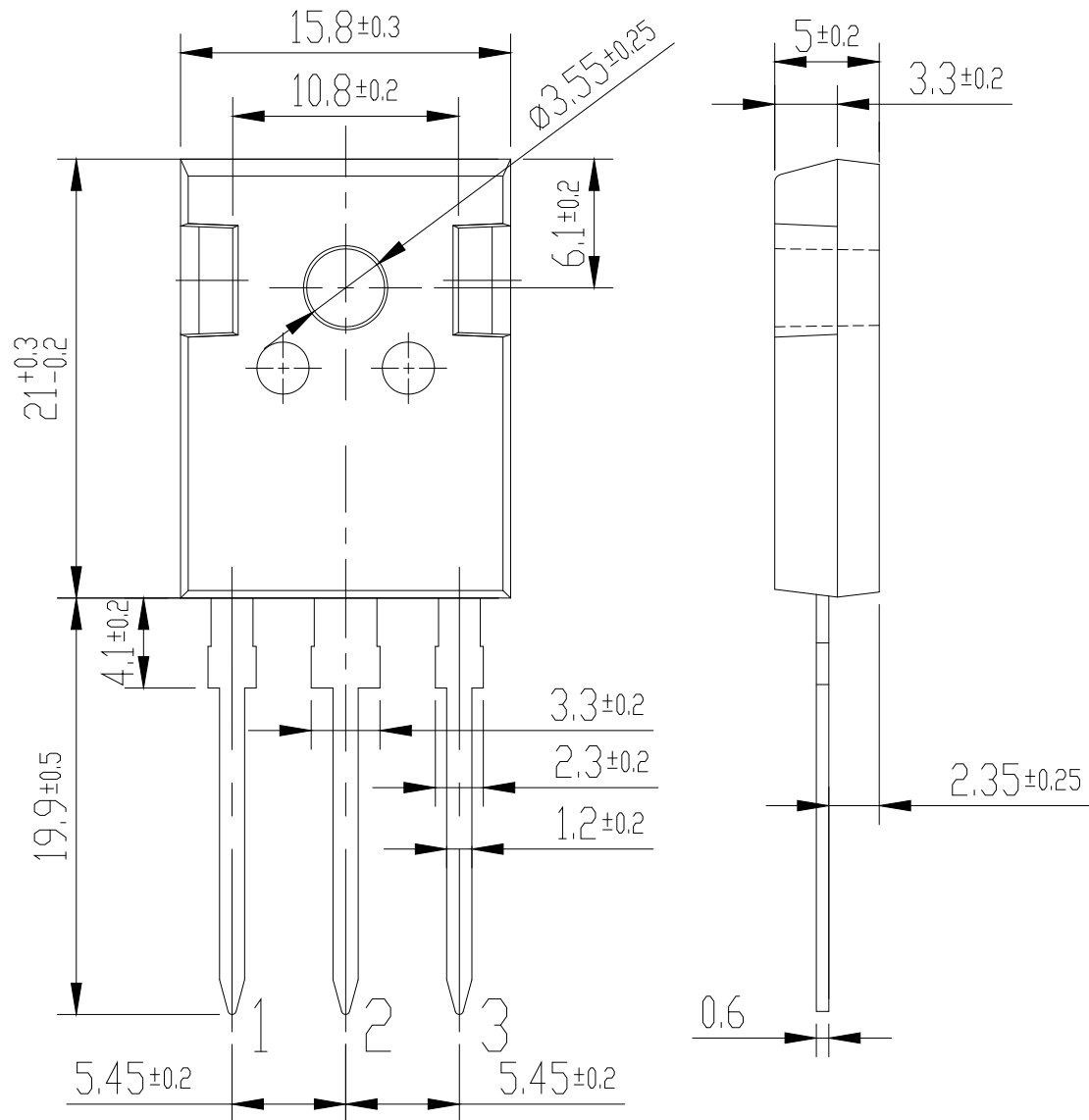
Fig 10. Diode-inverter Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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