

DOSEMI

IGBT

DG40Y12T2

1200V/40A 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.

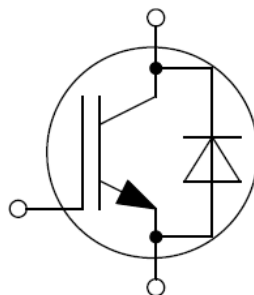
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10 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	Values	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=110^{\circ}\text{C}$	80	A
		40	
I_{CM}	Pulsed Collector Current t_p limited by T_{jmax}	160	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	337	W

Diode

Symbol	Description	Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	40	A
I_{FM}	Pulsed Collector Current t_p limited by T_{jmax}	160	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

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	$I_C=40\text{A}, V_{GE}=15\text{V}, T_j=25^\circ\text{C}$		1.70	2.15	V	
		$I_C=40\text{A}, V_{GE}=15\text{V}, T_j=125^\circ\text{C}$		1.95			
		$I_C=40\text{A}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}$		2.00			
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.00\text{mA}, V_{CE}=V_{GE}, T_j=25^\circ\text{C}$	5.2	6.0	6.8	V	
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$			1.0	mA	
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	$V_{CE}=25\text{V}, f=1\text{MHz}, V_{GE}=0\text{V}$		4.14		nF	
C_{res}	Reverse Transfer Capacitance				0.12		nF
Q_G	Gate Charge	$V_{GE}=-15\dots+15\text{V}$		0.31		μC	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=40\text{A}, R_G=12\Omega, V_{GE}=\pm 15\text{V}, T_j=25^\circ\text{C}$		145		ns	
t_r	Rise Time			28		ns	
$t_{d(off)}$	Turn-Off Delay Time			194		ns	
t_f	Fall Time			295		ns	
E_{on}	Turn-On Switching Loss			1.89		mJ	
E_{off}	Turn-Off Switching Loss			2.31		mJ	
$t_{d(on)}$	Turn-On Delay Time		$V_{CC}=600\text{V}, I_C=40\text{A}, R_G=12\Omega, V_{GE}=\pm 15\text{V}, T_j=125^\circ\text{C}$		146		ns
t_r	Rise Time				30		ns
$t_{d(off)}$	Turn-Off Delay Time			208		ns	
t_f	Fall Time			466		ns	
E_{on}	Turn-On Switching Loss			2.31		mJ	
E_{off}	Turn-Off Switching Loss			3.51		mJ	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=40\text{A}, R_G=12\Omega, V_{GE}=\pm 15\text{V}, T_j=150^\circ\text{C}$			148		ns
t_r	Rise Time				32		ns
$t_{d(off)}$	Turn-Off Delay Time			212		ns	
t_f	Fall Time			480		ns	
E_{on}	Turn-On Switching Loss			2.45		mJ	
E_{off}	Turn-Off Switching Loss			3.69		mJ	
I_{SC}	SC Data		$t_p \leq 10\mu\text{s}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}, V_{CC}=900\text{V}, V_{CEM} \leq 1200\text{V}$		160		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	$I_F=40\text{A}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$		2.00	2.45	V
		$I_F=40\text{A}, V_{GE}=0\text{V}, T_j=125^\circ\text{C}$		1.90		
		$I_F=40\text{A}, V_{GE}=0\text{V}, T_j=150^\circ\text{C}$		1.88		
Q_r	Recovered Charge	$V_R=600\text{V}, I_F=40\text{A},$ $-di/dt=1100\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $T_j=25^\circ\text{C}$		1.8		μC
I_{RM}	Peak Reverse Recovery Current			40		A
E_{rec}	Reverse Recovery Energy			0.93		mJ
Q_r	Recovered Charge	$V_R=600\text{V}, I_F=40\text{A},$ $-di/dt=1100\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $T_j=125^\circ\text{C}$		2.9		μC
I_{RM}	Peak Reverse Recovery Current			47		A
E_{rec}	Reverse Recovery Energy			2.19		mJ
Q_r	Recovered Charge	$V_R=600\text{V}, I_F=40\text{A},$ $-di/dt=1100\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $T_j=150^\circ\text{C}$		3.2		μC
I_{RM}	Peak Reverse Recovery Current			49		A
E_{rec}	Reverse Recovery Energy			2.56		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)			0.445	K/W
	Junction-to-Case (per Diode)			0.931	
R_{thJA}	Junction-to-Ambient		40		K/W

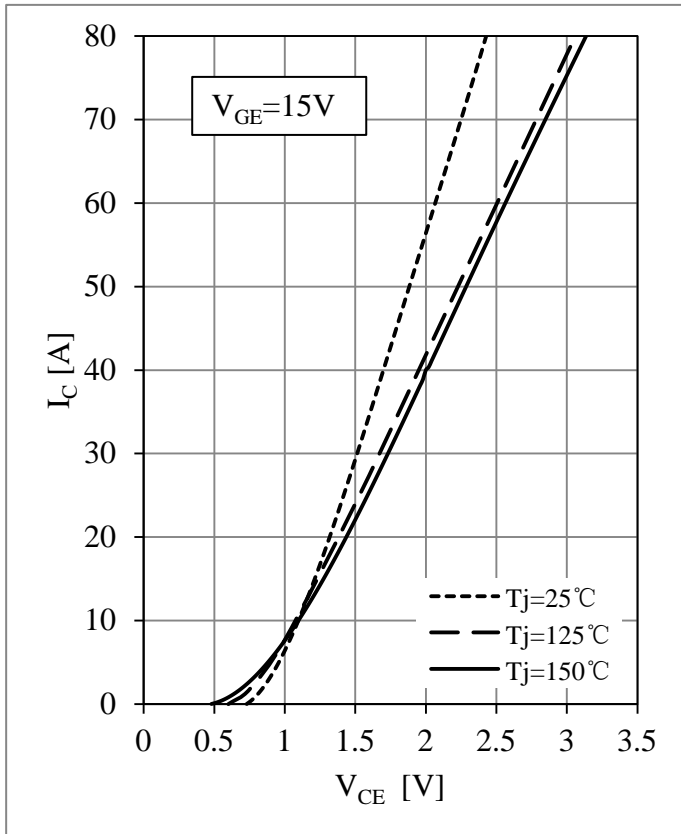


Fig 1. IGBT-inverter Output Characteristics

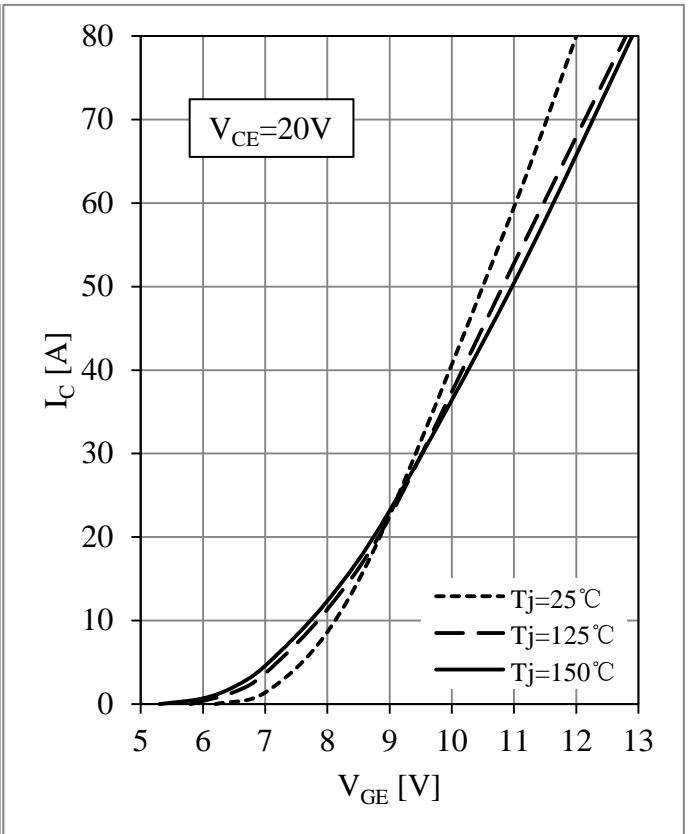


Fig 2. IGBT-inverter Transfer Characteristics

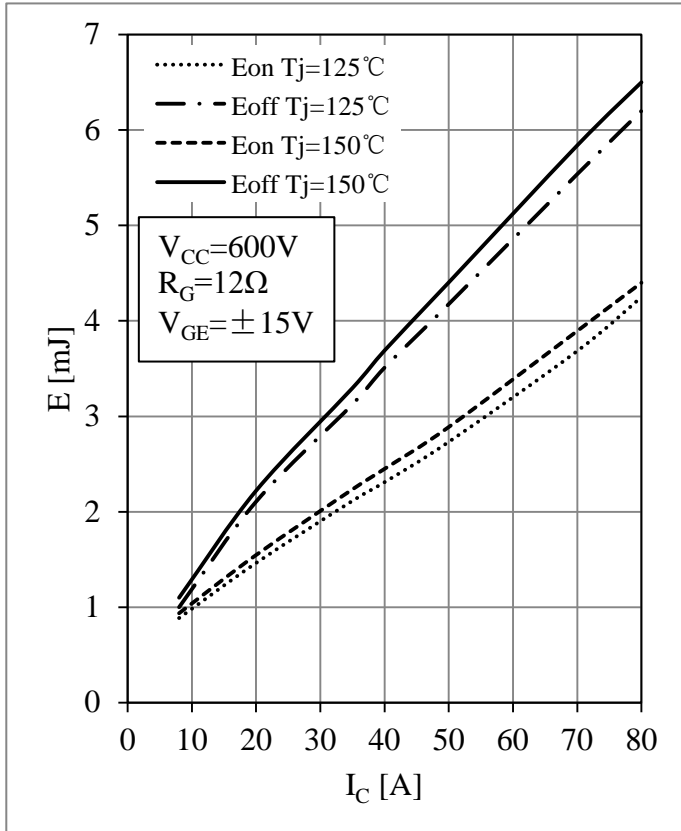


Fig 3. IGBT-inverter Switching Loss vs. I_c

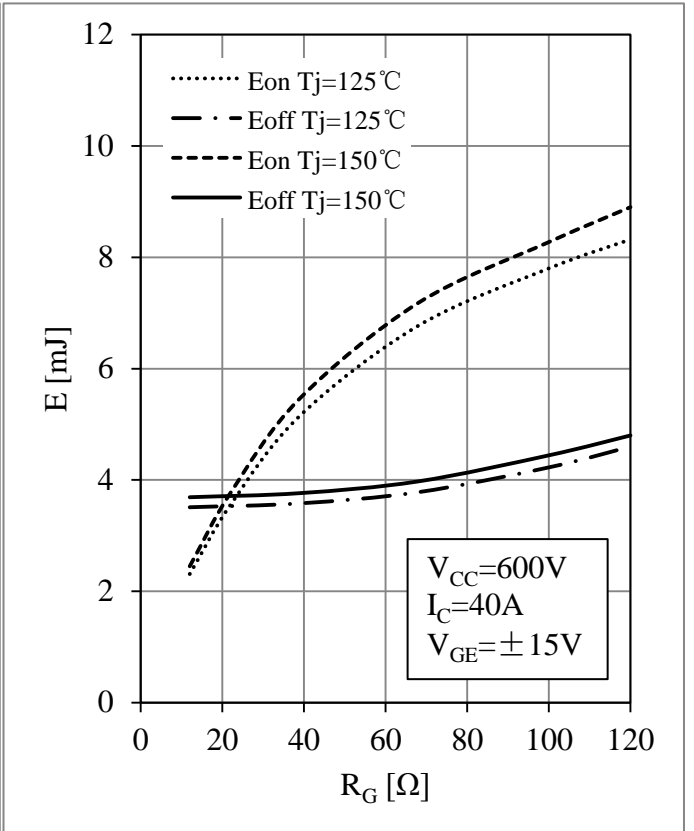


Fig 4. IGBT-inverter Switching Loss vs. R_g

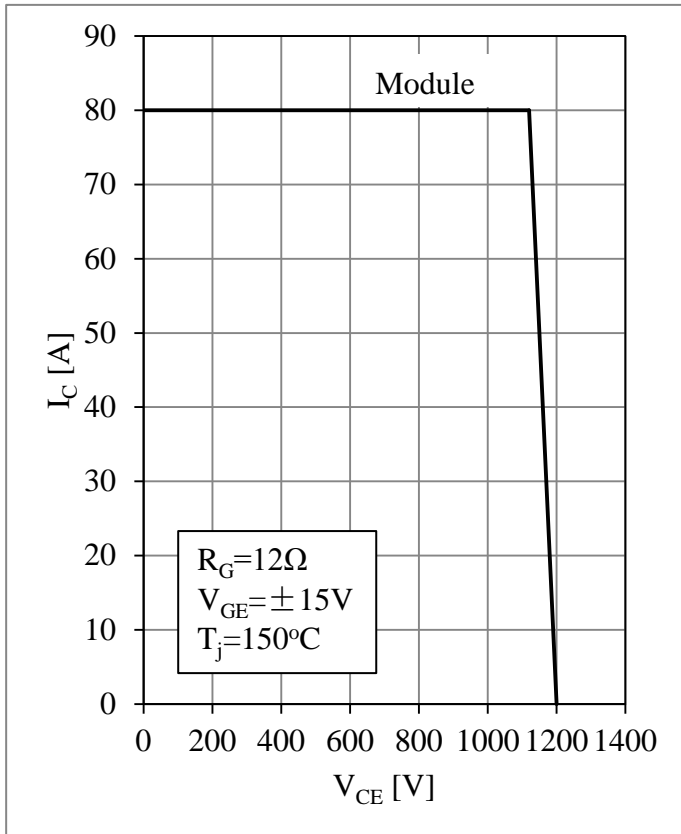


Fig 5. IGBT-inverter RBSOA

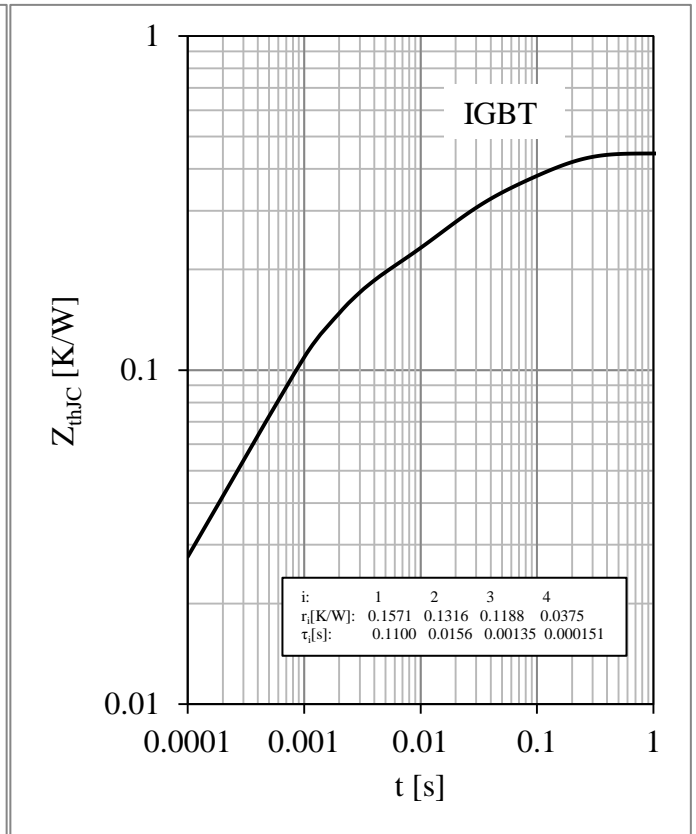


Fig 6. IGBT-inverter Transient Thermal Impedance

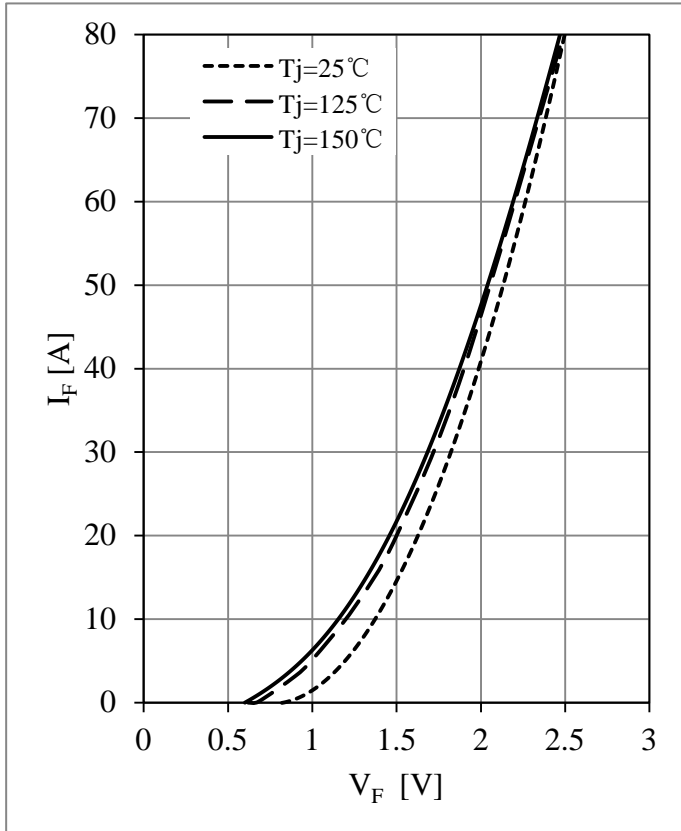


Fig 7. Diode-inverter Forward Characteristics

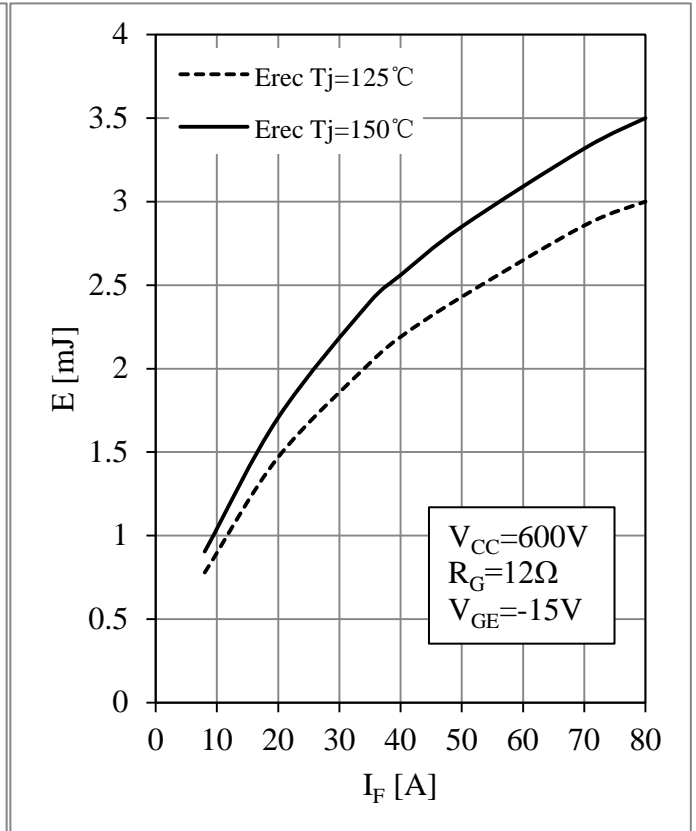


Fig 8. Diode-inverter Switching Loss vs. I_F

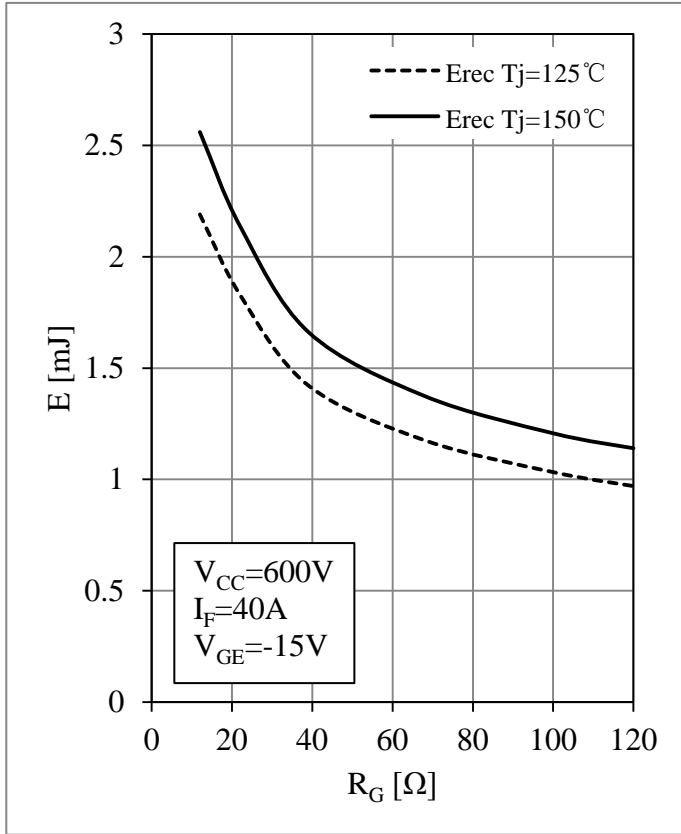


Fig 9. Diode-inverter Switching Loss vs. R_G

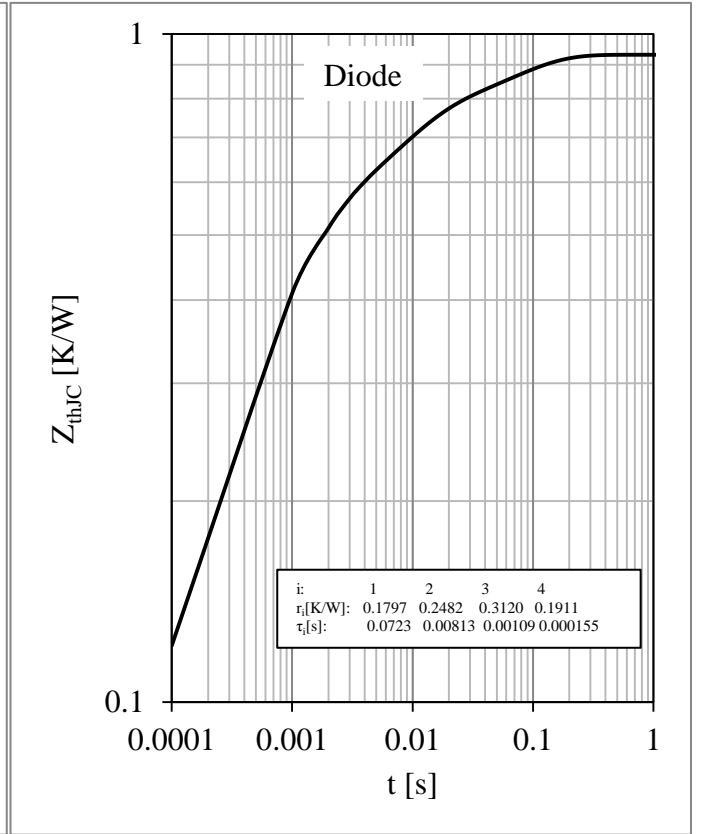
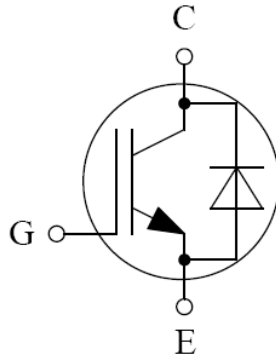


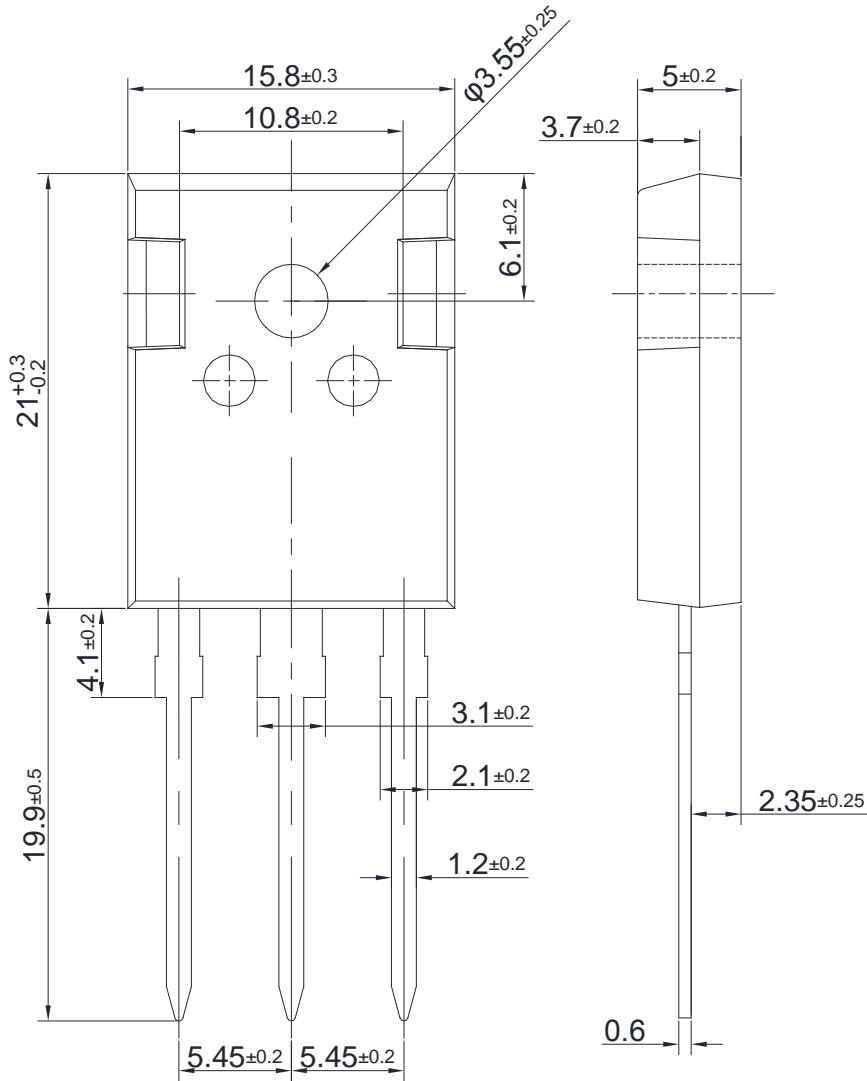
Fig 10. Diode-inverter Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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