DOSEMI

IGBT

DG40X12T2

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.

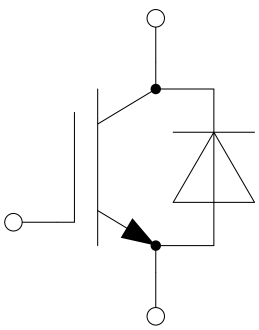
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs 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°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	80 40	A
I_{CM}	Pulsed Collector Current t_p limited by T_{jmax}	120	A
P_D	Maximum Power Dissipation @ T_j=175°C	468	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}	120	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
M	Mounting Torque, Screw M3	0.6	N.m

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=40A,V_{GE}=15V, T_j=25°C		1.90	2.35	V
		I_C=40A,V_{GE}=15V, T_j=125°C		2.15		
		I_C=40A,V_{GE}=15V, T_j=150°C		2.20		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.40mA,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			100	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=1MHz, V_{GE}=0V		3.62		nF
C_{res}	Reverse Transfer Capacitance			0.10		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.27		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=40A, R_G=40Ω,V_{GE}= ±15V, T_j=25°C		150		ns
t_r	Rise Time			28		ns
$t_{d(off)}$	Turn-Off Delay Time			355		ns
t_f	Fall Time			86		ns
E_{on}	Turn-On Switching Loss			3.67		mJ
E_{off}	Turn-Off Switching Loss			2.26		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=40A, R_G=40Ω,V_{GE}= ±15V, T_j=125°C		160		ns
t_r	Rise Time			38		ns
$t_{d(off)}$	Turn-Off Delay Time			495		ns
t_f	Fall Time			162		ns
E_{on}	Turn-On Switching Loss			4.88		mJ
E_{off}	Turn-Off Switching Loss			3.42		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=40A, R_G=40Ω,V_{GE}= ±15V, T_j=150°C		160		ns
t_r	Rise Time			38		ns
$t_{d(off)}$	Turn-Off Delay Time			485		ns
t_f	Fall Time			183		ns
E_{on}	Turn-On Switching Loss			5.44		mJ
E_{off}	Turn-Off Switching Loss			3.80		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=900V, V_{CEM}≤1200V		160		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=40A,V_{GE}=0V,T_j=25°C		1.95	2.40	V
		I_F=40A,V_{GE}=0V,T_j=125°C		2.00		
		I_F=40A,V_{GE}=0V,T_j=150°C		2.10		
Q_r	Recovered Charge	V_R=600V,I_F=40A, -di/dt=1200A/μs,V_{GE}=-15V T_j=25°C		3.5		μC
I_{RM}	Peak Reverse Recovery Current			36		A
E_{rec}	Reverse Recovery Energy			1.13		mJ
Q_r	Recovered Charge	V_R=600V,I_F=40A, -di/dt=1200A/μs,V_{GE}=-15V T_j=125°C		6.5		μC
I_{RM}	Peak Reverse Recovery Current			40		A
E_{rec}	Reverse Recovery Energy			2.32		mJ
Q_r	Recovered Charge	V_R=600V,I_F=40A, -di/dt=1200A/μs,V_{GE}=-15V T_j=150°C		7.3		μC
I_{RM}	Peak Reverse Recovery Current			41		A
E_{rec}	Reverse Recovery Energy			2.64		mJ

Discrete Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.320 0.810	K/W
$R_{\theta JA}$	Junction-to-Ambient		40		K/W

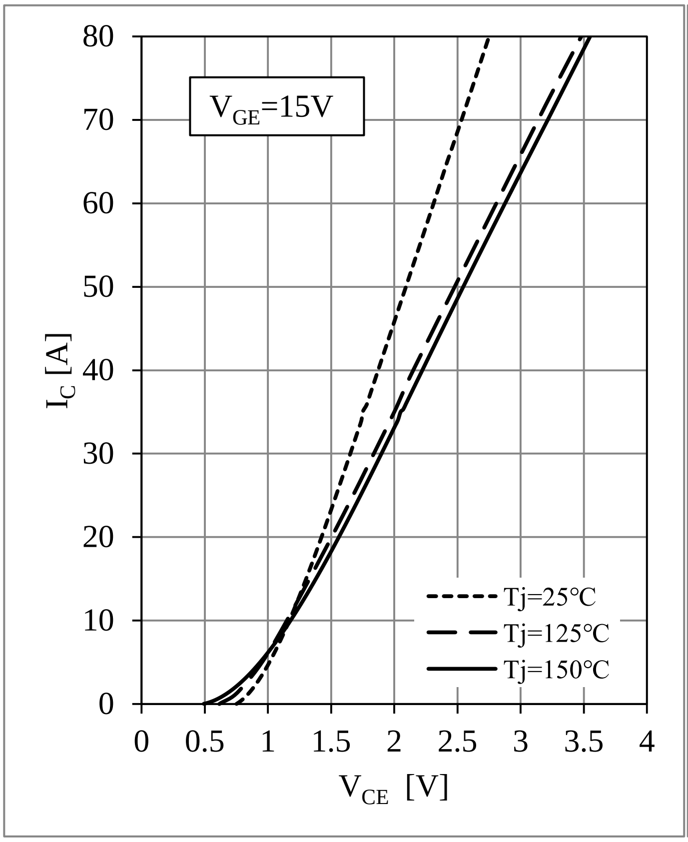


Fig 1. IGBT-inverter Output Characteristics

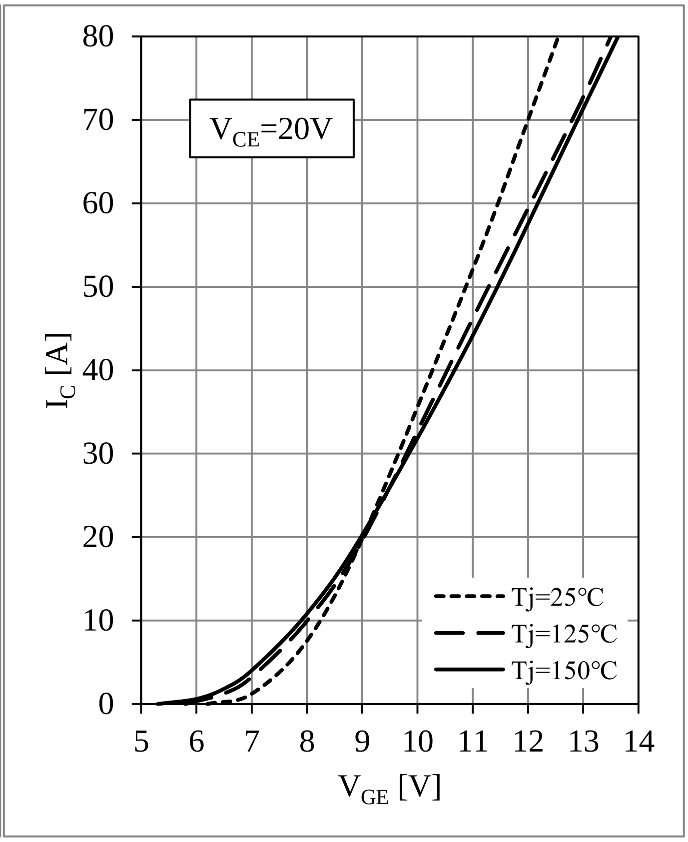


Fig 2. IGBT-inverter Transfer Characteristics

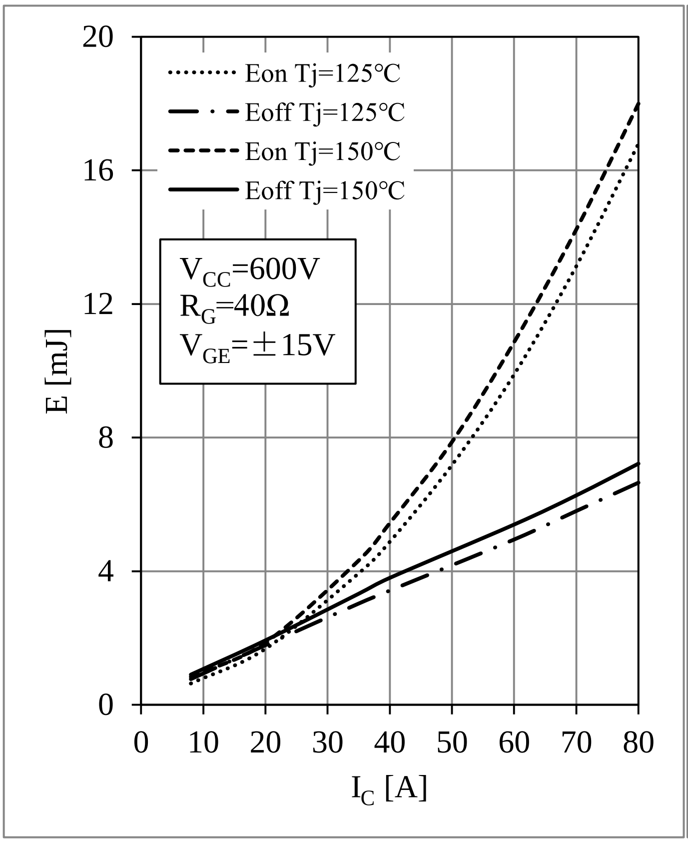


Fig 3. IGBT-inverter Switching Loss vs. I_C

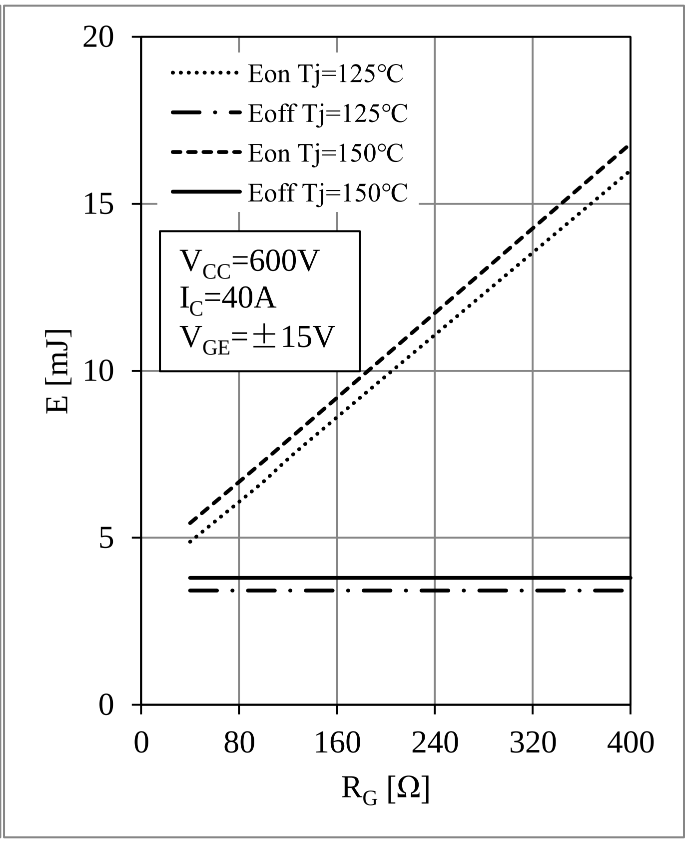


Fig 4. IGBT-inverter Switching Loss vs. R_G

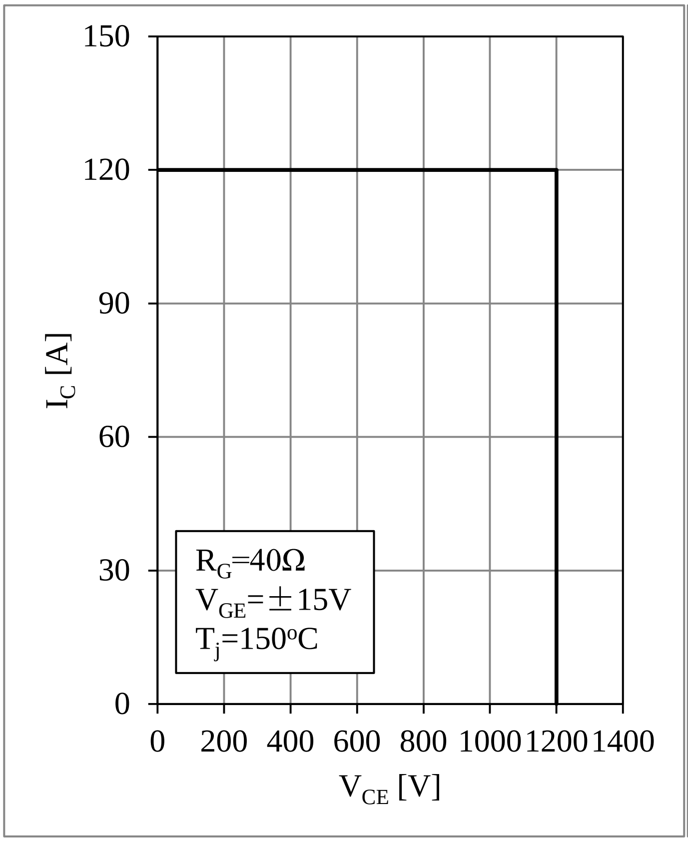


Fig 5. IGBT-inverter RBSOA

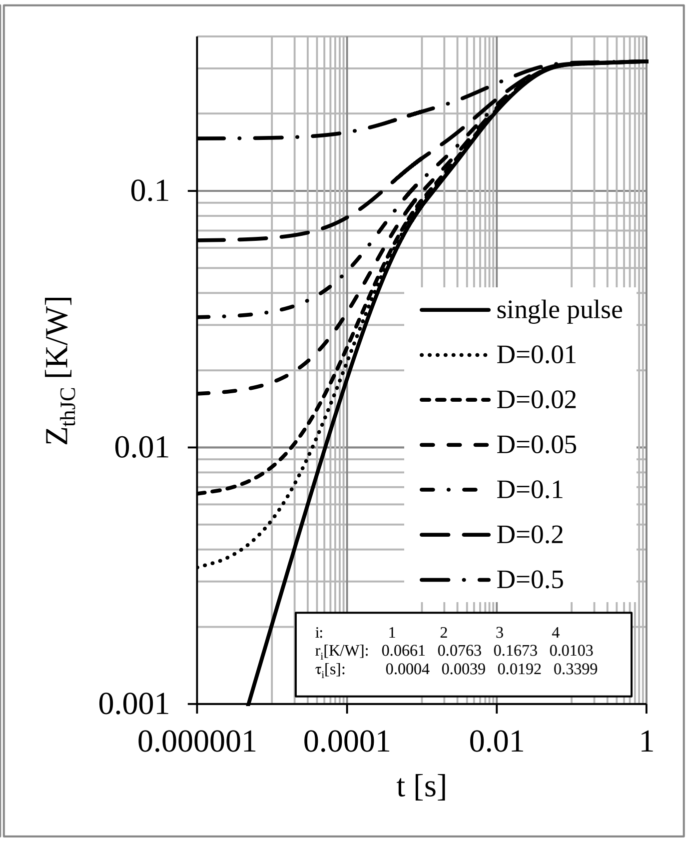


Fig 6. IGBT-inverter Transient Thermal Impedance

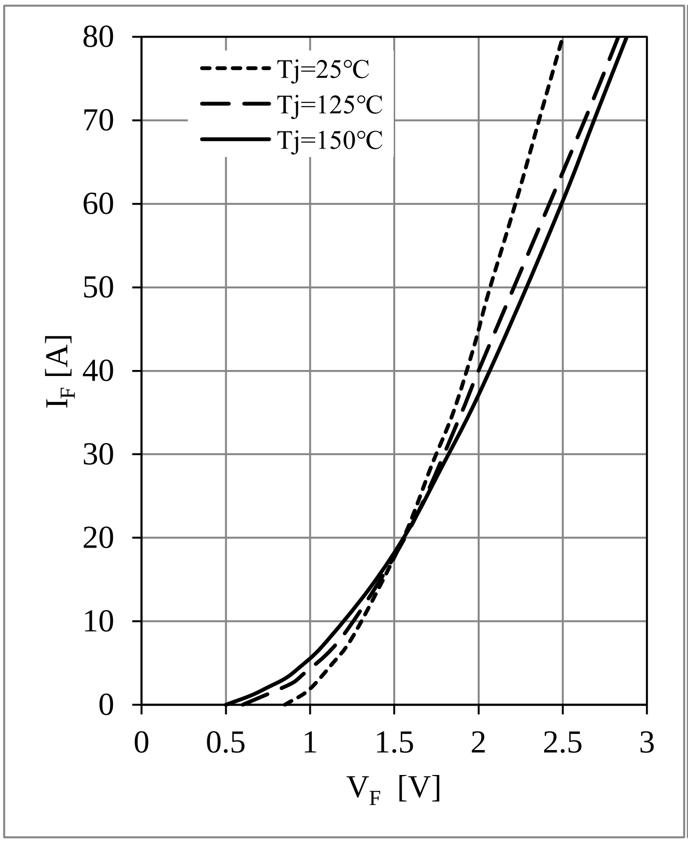


Fig 7. Diode-inverter Forward Characteristics

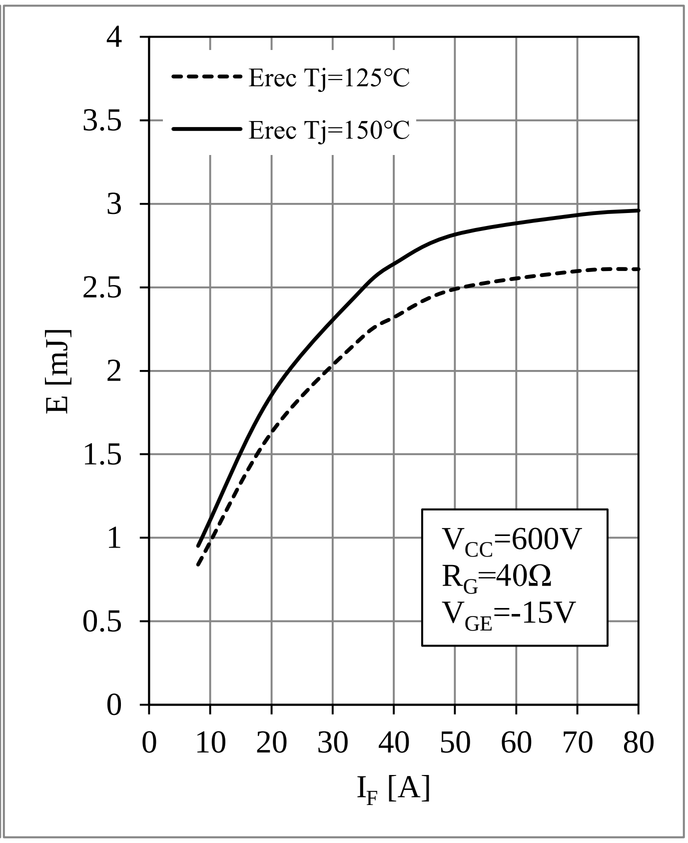


Fig 8. Diode-inverter Switching Loss vs. I_F

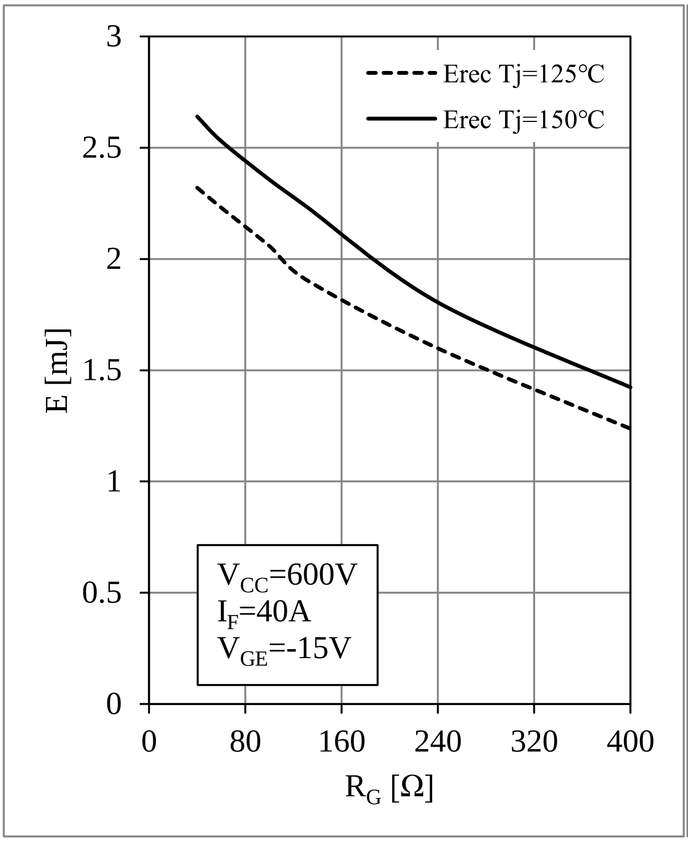


Fig 9. Diode-inverter Switching Loss vs. R_G

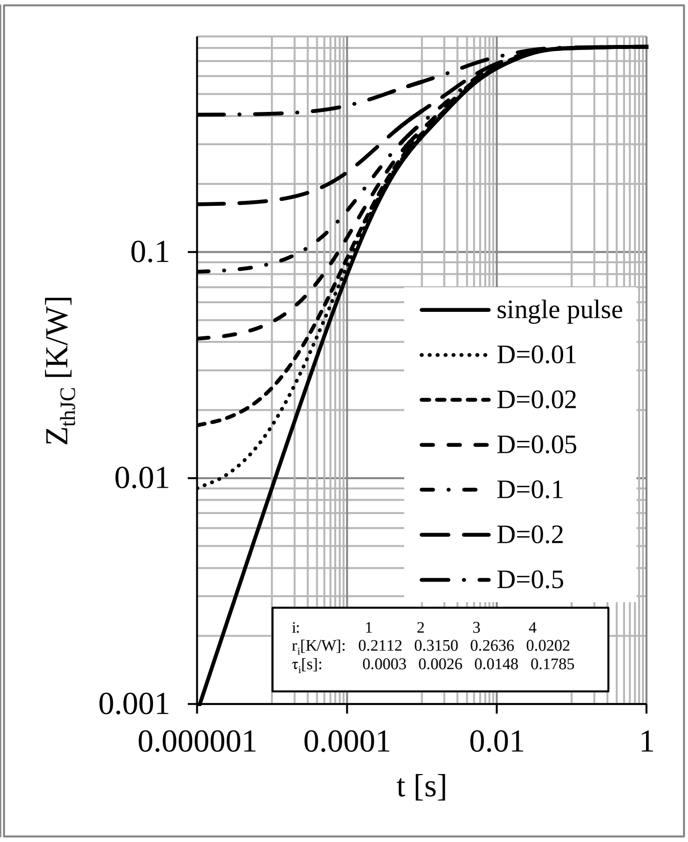
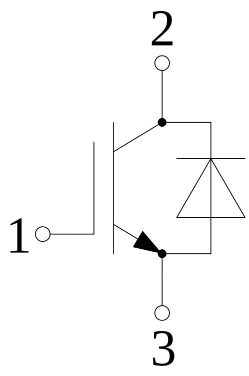


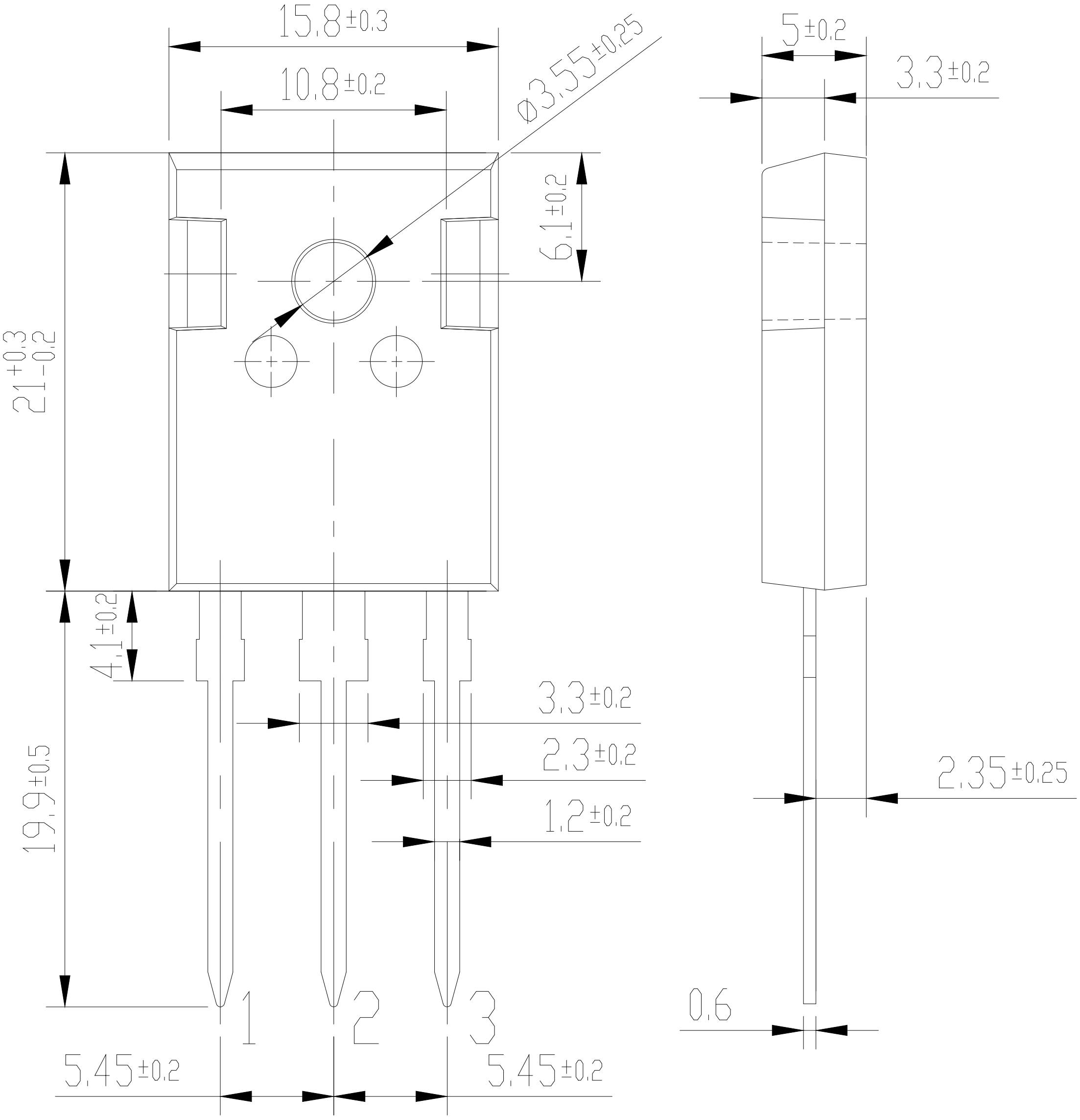
Fig 10. Diode-inverter Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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