DOSEMI

IGBT

DG40Q12T2LZ

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 solar power.

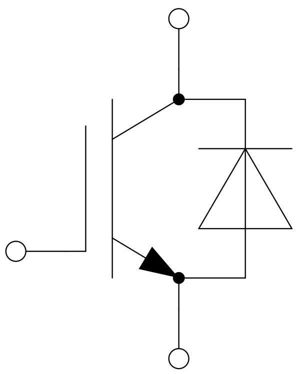
Features

- Low $V_{CE(sat)}$ Fast IGBT technology
- 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
- UPS
- 3-level-application

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 Transient Gate-Emitter Voltage	±20 -25/+30	V
I_C	Collector Current @ T_C=25°C @ T_C=100°C	80 40	A
I_{CM}	Pulsed Collector Current t_p=1ms	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 @ T_C=25°C @ T_C=100°C	70 40	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	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		2.10	2.50	V
		I_C=40A,V_{GE}=15V, T_j=150°C		2.70		
		I_C=40A,V_{GE}=15V, T_j=175°C		2.80		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.60mA,V_{CE}=V_{GE}, T_j=25°C	5.0	6.2	6.5	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			0.25	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			600	nA
R_{Gint}	Internal Gate Resistance			0		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=100kHz, V_{GE}=0V		4.21		nF
C_{oes}	Output Capacitance			0.27		nF
C_{res}	Reverse Transfer Capacitance			0.11		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.32		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=40A, R_G=8.2Ω, L_S=40nH, V_{GE}= ±15, T_j=25°C		32		ns
t_r	Rise Time			105		ns
$t_{d(off)}$	Turn-Off Delay Time			105		ns
t_f	Fall Time			118		ns
E_{on}	Turn-On Switching Loss			4.04		mJ
E_{off}	Turn-Off Switching Loss			1.12		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=40A, R_G=8.2Ω, L_S=40nH, V_{GE}= ±15, T_j=150°C		34		ns
t_r	Rise Time			110		ns
$t_{d(off)}$	Turn-Off Delay Time			115		ns
t_f	Fall Time			177		ns
E_{on}	Turn-On Switching Loss			5.62		mJ
E_{off}	Turn-Off Switching Loss			1.69		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=40A, R_G=8.2Ω, L_S=40nH, V_{GE}= ±15, T_j=175°C		37		ns
t_r	Rise Time			113		ns
$t_{d(off)}$	Turn-Off Delay Time			118		ns
t_f	Fall Time			185		ns
E_{on}	Turn-On Switching Loss			5.78		mJ
E_{off}	Turn-Off Switching Loss			1.76		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=800V, V_{CEM}≤1200V		160		A

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_C=40A,V_{GE}=0V,T_j=25°C		2.40	2.85	V
		I_C=40A,V_{GE}=0V,T_j=150°C		1.80		
		I_C=40A,V_{GE}=0V,T_j=175°C		1.75		
t_{rr}	Diode Reverse Recovery Time	V_R=600V,I_F=40A, -di/dt=228A/µs,V_{GE}=-15V, L_S=40nH,T_j=25°C		226		ns
Q_r	Recovered Charge			1.12		µC
I_{RM}	Peak Reverse Recovery Current			9.35		A
E_{rec}	Reverse Recovery Energy			0.41		mJ
t_{rr}	Diode Reverse Recovery Time	V_R=600V,I_F=40A, -di/dt=250A/µs,V_{GE}=-15V, L_S=40nH,T_j=150°C		285		ns
Q_r	Recovered Charge			2.10		µC
I_{RM}	Peak Reverse Recovery Current			12.3		A
E_{rec}	Reverse Recovery Energy			0.69		mJ
t_{rr}	Diode Reverse Recovery Time	V_R=600V,I_F=40A, -di/dt=235A/µs,V_{GE}=-15V, L_S=40nH,T_j=175°C		304		ns
Q_r	Recovered Charge			2.40		µC
I_{RM}	Peak Reverse Recovery Current			13.6		A
E_{rec}	Reverse Recovery Energy			0.76		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)			0.320 0.757	K/W
R_{thJA}	Junction-to-Ambient		40		K/W

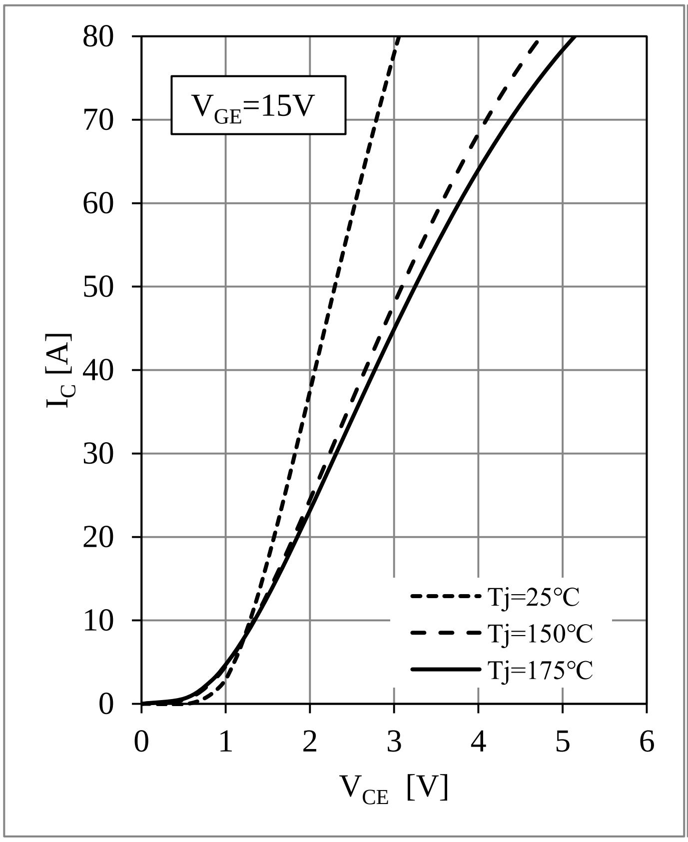


Fig 1. IGBT-inverter Output Characteristics

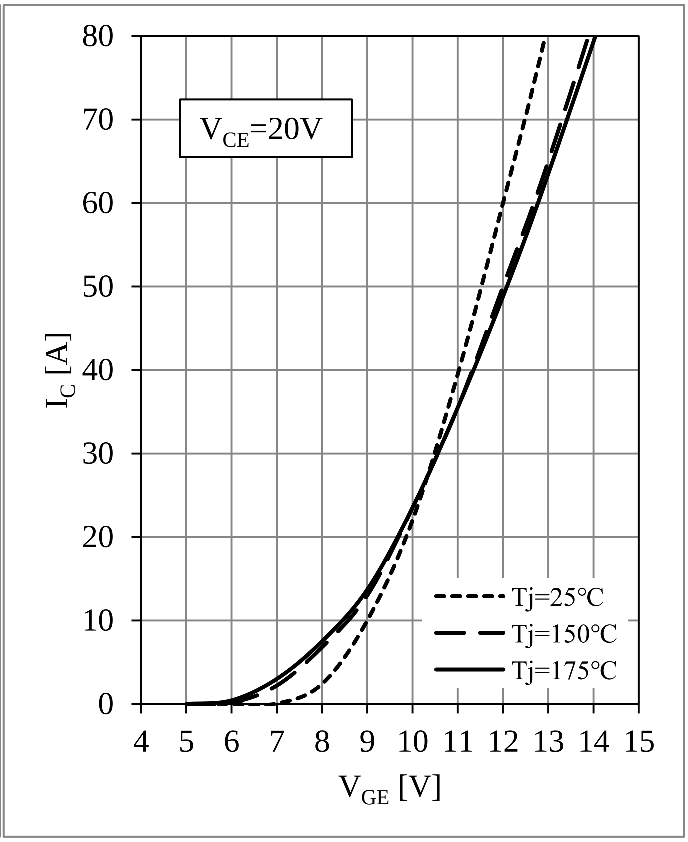


Fig 2. IGBT-inverter Transfer Characteristics

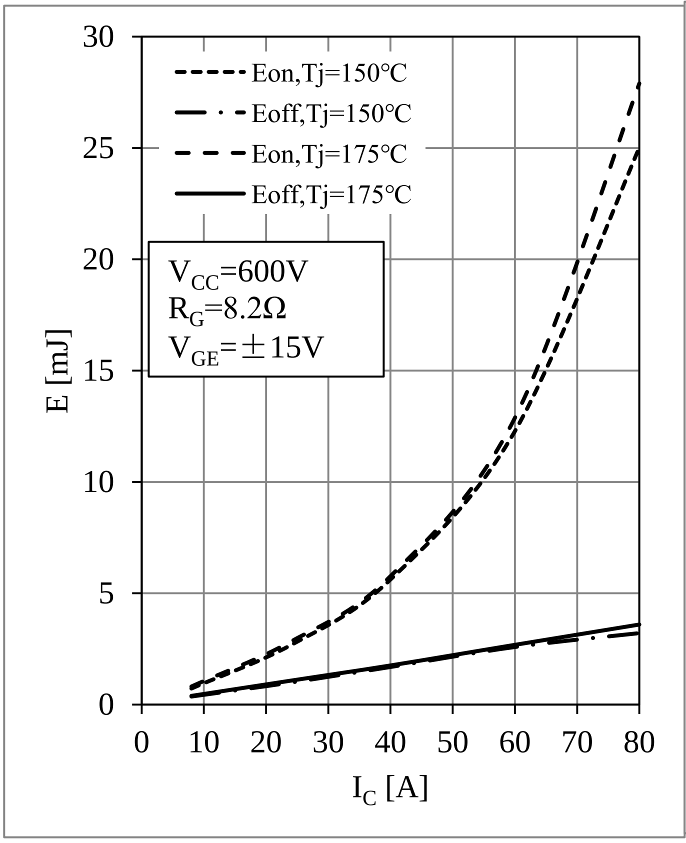


Fig 3. IGBT-inverter Switching Loss vs. I_C

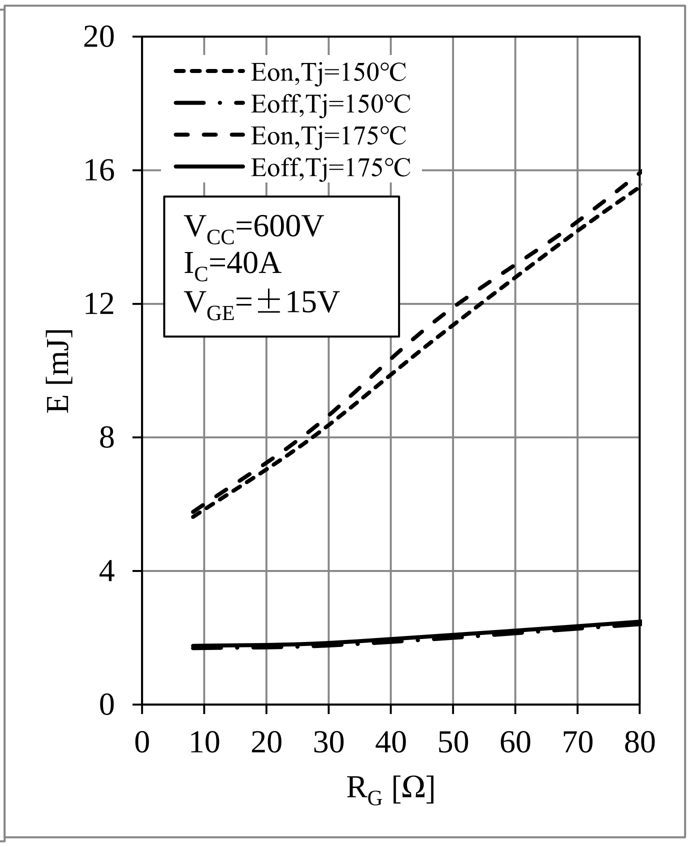


Fig 4. IGBT-inverter Switching Loss vs. R_G

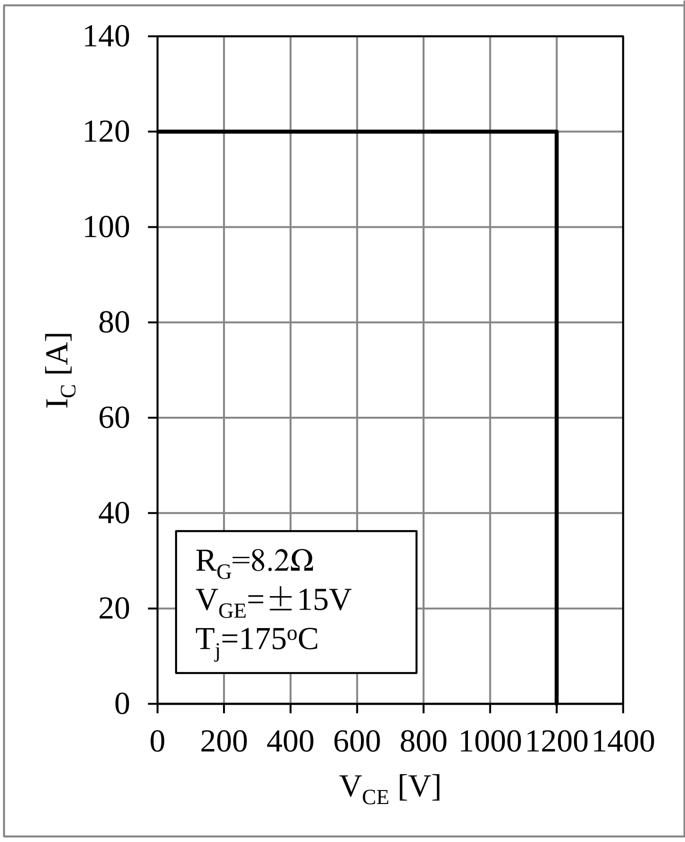


Fig 5. IGBT-inverter RBSOA

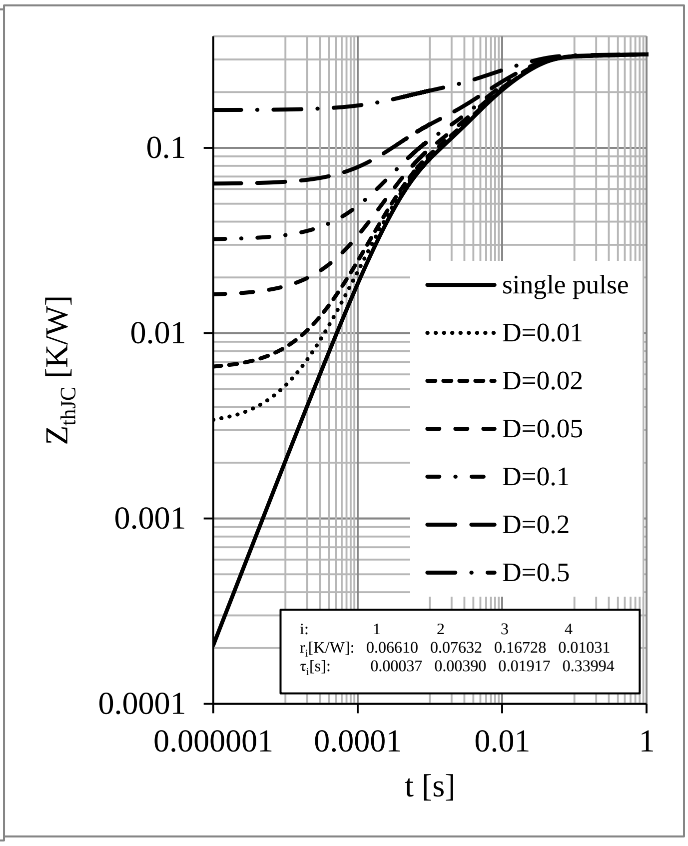


Fig 6. IGBT-inverter Transient Thermal Impedance

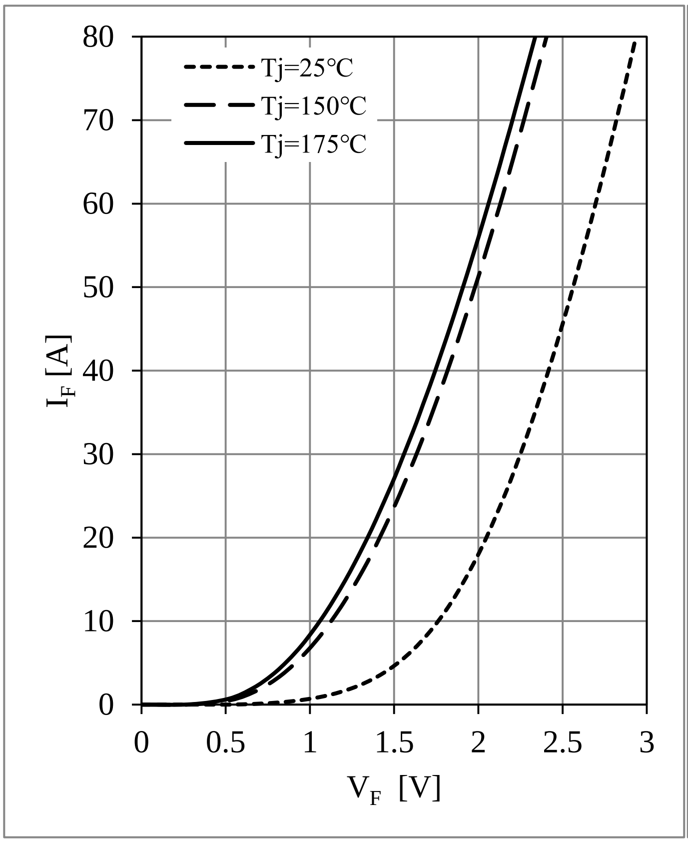


Fig 7. Diode-inverter Forward Characteristics

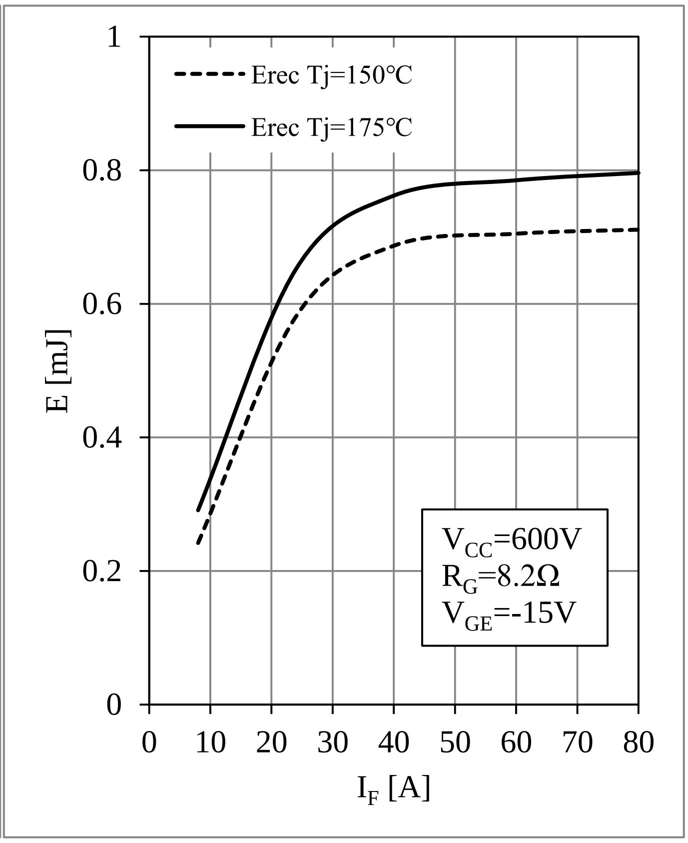


Fig 8. Diode-inverter Switching Loss vs. I_F

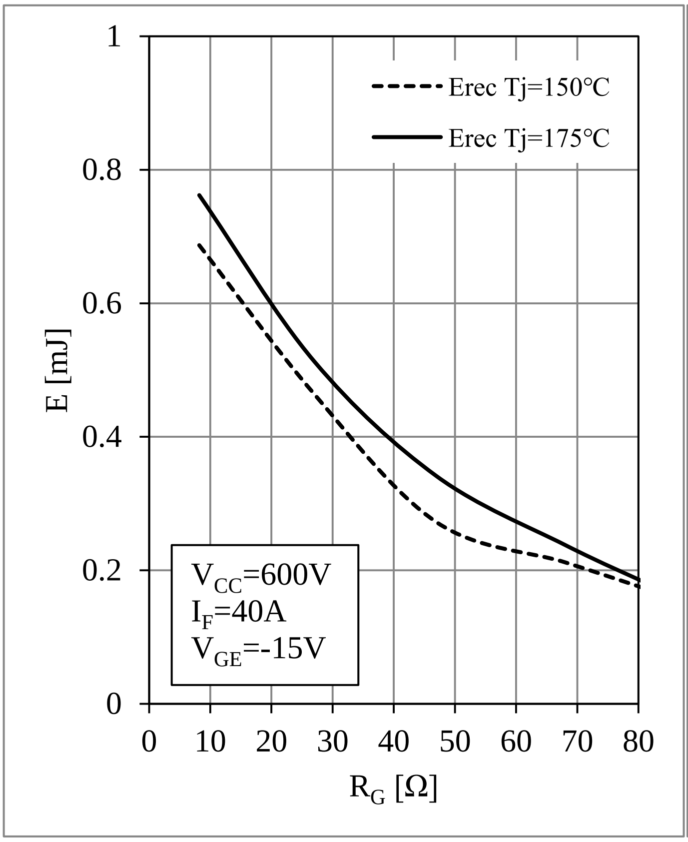


Fig 9. Diode-inverter Switching Loss vs. R_G

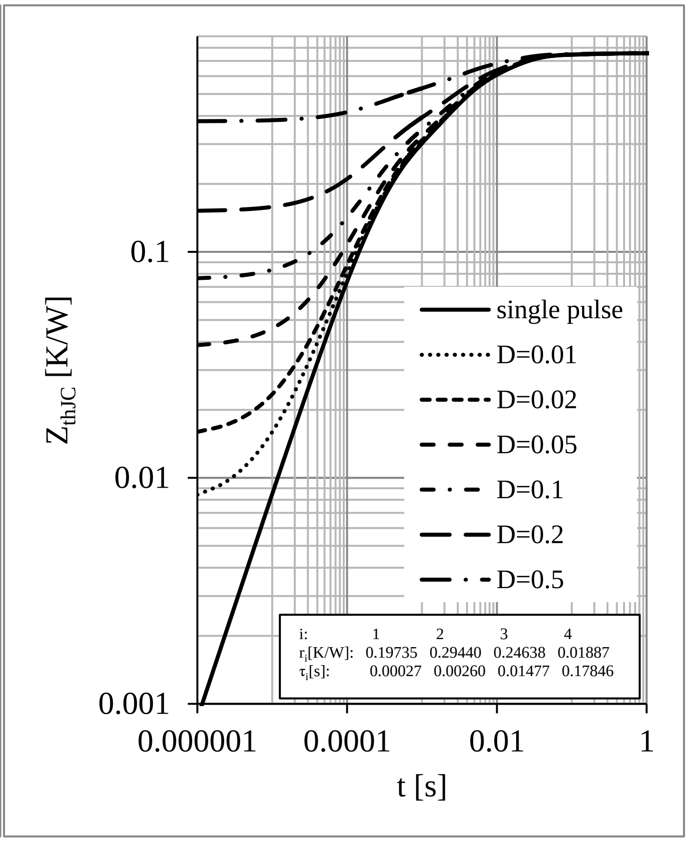
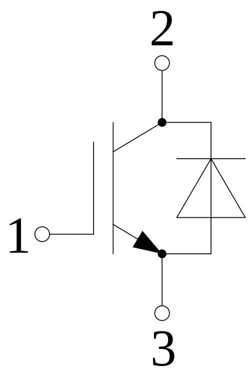


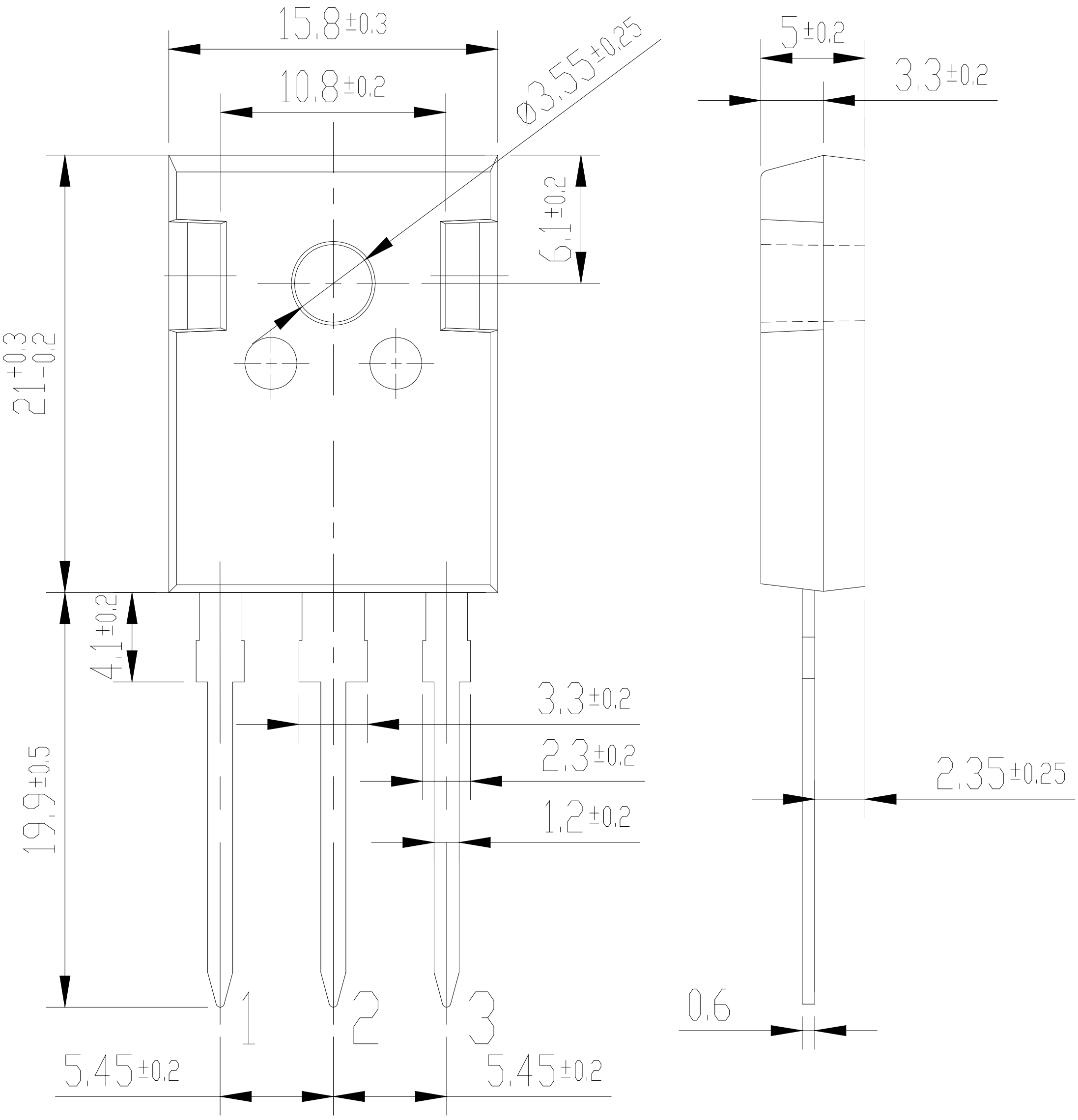
Fig 10. Diode-inverter Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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