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
- 6μs 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

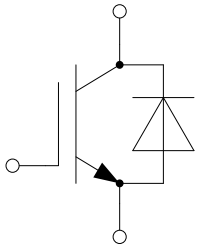
Typical Applications

- Inverter for motor drive
- UPS
- EV Air Conditioner

Validation

- Qualified according to AEC-Q101
- Qualified for Automotive application

Equivalent Circuit Schematic



Type	Package	Marking	Shipping
DG75X07T2L	TO-247-3L	DG75X07T2L	30Units/Tube

Absolute Maximum Ratings T_C=25°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°C @ T_C=100°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°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°C @ T_C=75°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	°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

(1) Value limited by bondwire

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=75A,V_{GE}=15V, T_j=25°C		1.50	1.95	V
		I_C=75A,V_{GE}=15V, T_j=125°C		1.60		
		I_C=75A,V_{GE}=15V, T_j=150°C		1.70		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.20mA,V_{CE}=V_{GE}, T_j=25°C	5.1	5.8	6.5	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			40	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		8.69		nF
C_{res}	Reverse Transfer Capacitance			0.17		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.52		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=75A, R_G=7.5Ω,V_{GE}=±15V, L_S=40nH,T_j=25°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}=300V,I_C=75A, R_G=7.5Ω,V_{GE}=±15V, L_S=40nH,T_j=150°C		110		ns
t_r	Rise Time			152		ns
$t_{d(off)}$	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}=300V,I_C=75A, R_G=7.5Ω,V_{GE}=±15V, L_S=40nH,T_j=175°C		113		ns
t_r	Rise Time			151		ns
$t_{d(off)}$	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≤6μs,V_{GE}=15V, T_j=150°C,V_{CC}=360V, V_{CEM}≤650V		375		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=75A,V_{GE}=0V,T_i=25°C		1.60	2.05	V
		I_F=75A,V_{GE}=0V,T_j=125°C		1.65		
		I_F=75A,V_{GE}=0V,T_i=150°C		1.70		
t_{rr}	Diode Reverse Recovery Time	V_R=300V,I_F=75A, -di/dt=350A/μs,V_{GE}=-15V L_S=40nH,T_j=25°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=300V,I_F=75A, -di/dt=348A/μs,V_{GE}=-15V L_S=40nH,T_j=150°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=300V,I_F=75A, -di/dt=335A/μs,V_{GE}=-15V L_S=40nH,T_j=175°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°C unless otherwise noted

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

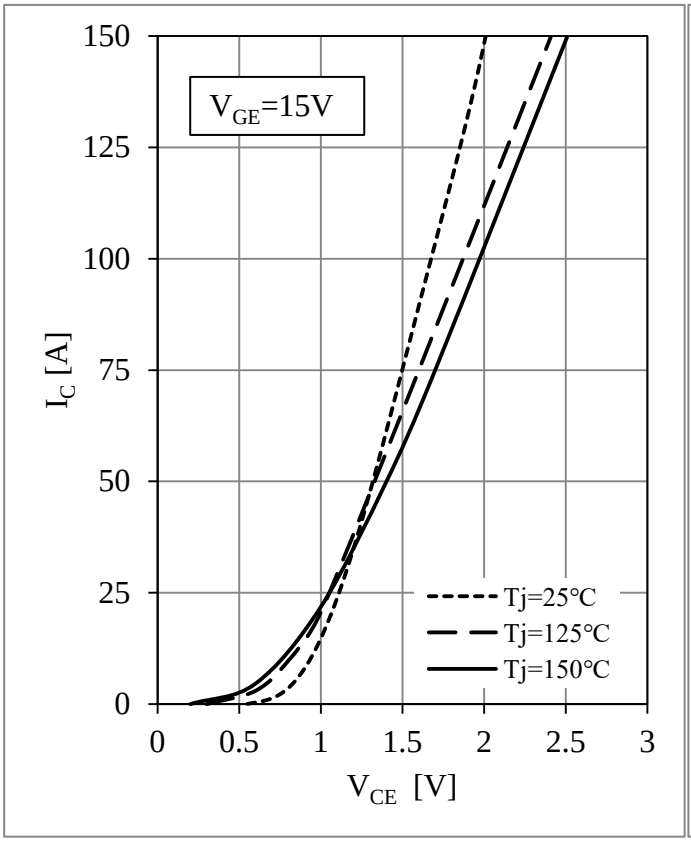


Fig 1. IGBT-inverter Output Characteristics

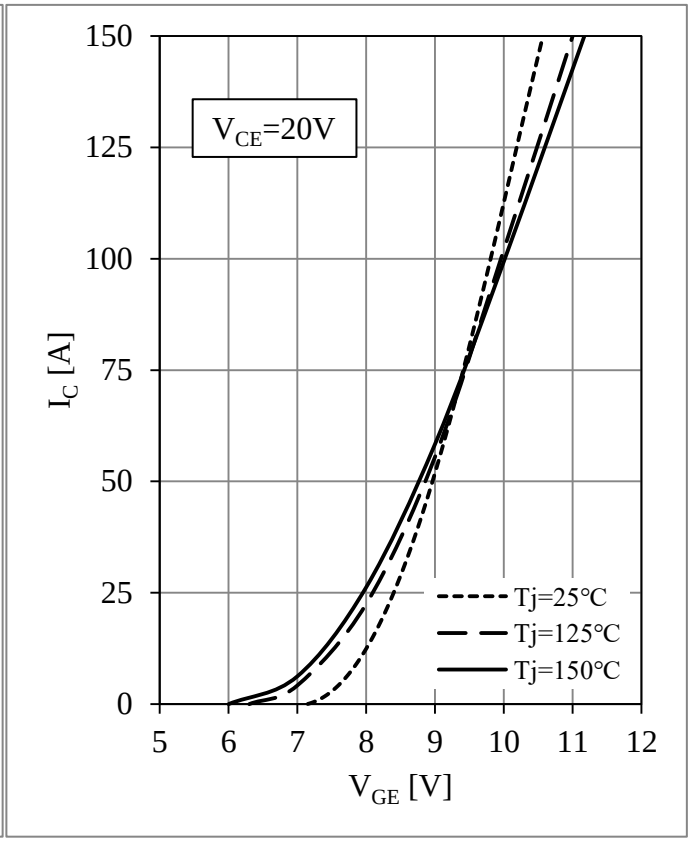


Fig 2. IGBT-inverter Transfer Characteristics

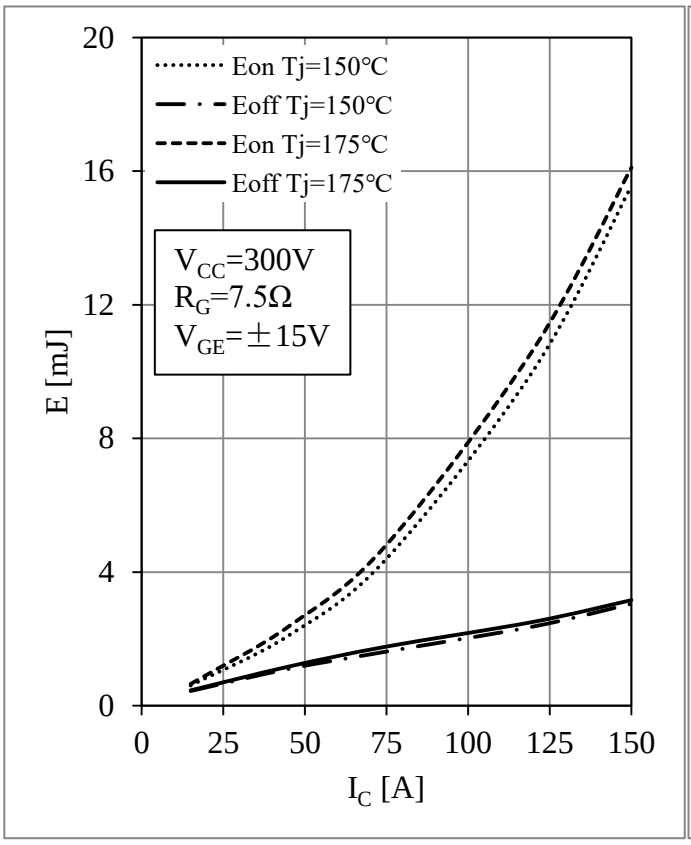


Fig 3. IGBT-inverter Switching Loss vs. I_C

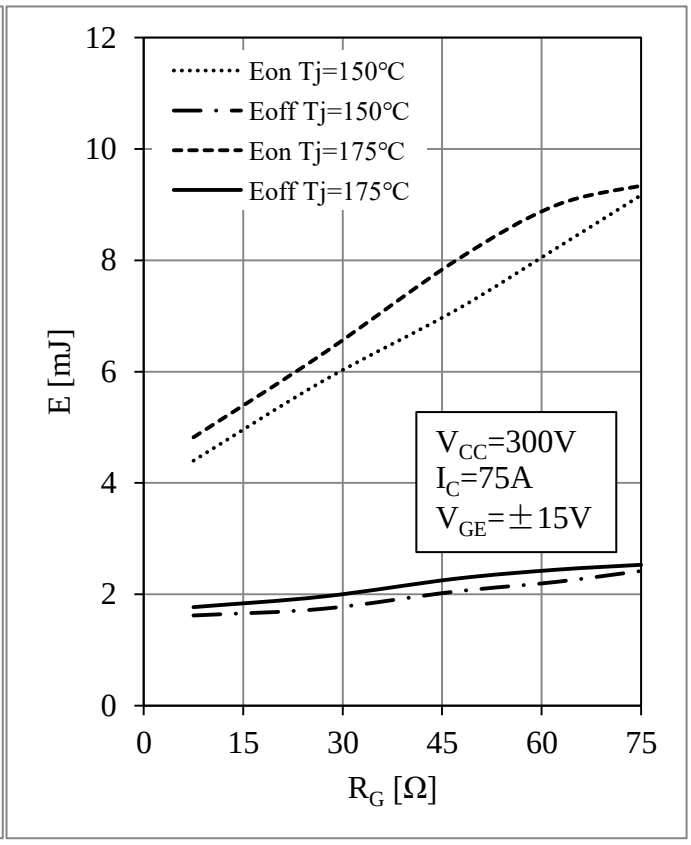


Fig 4. IGBT-inverter Switching Loss vs. R_G

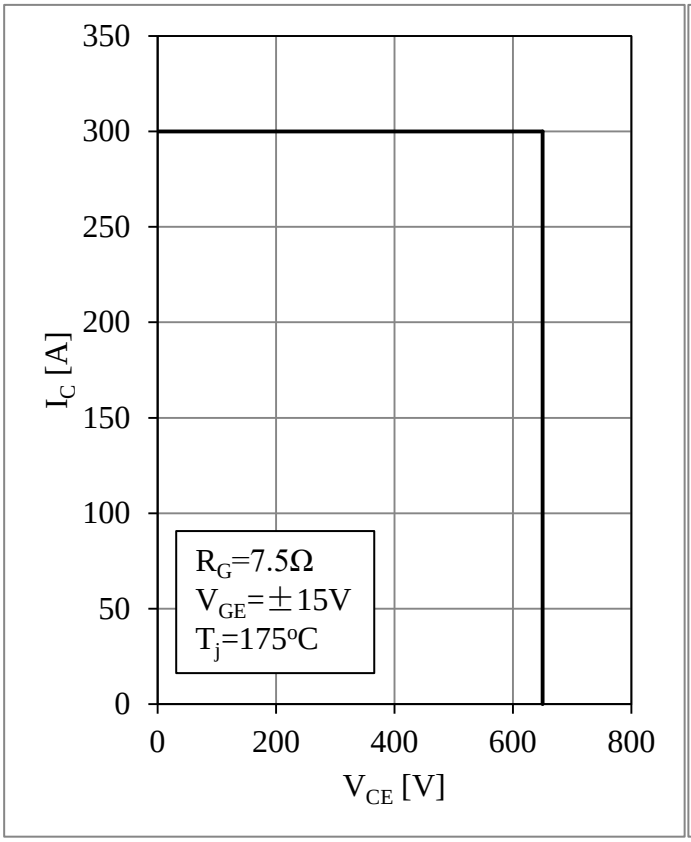


Fig 5. IGBT-inverter RBSOA

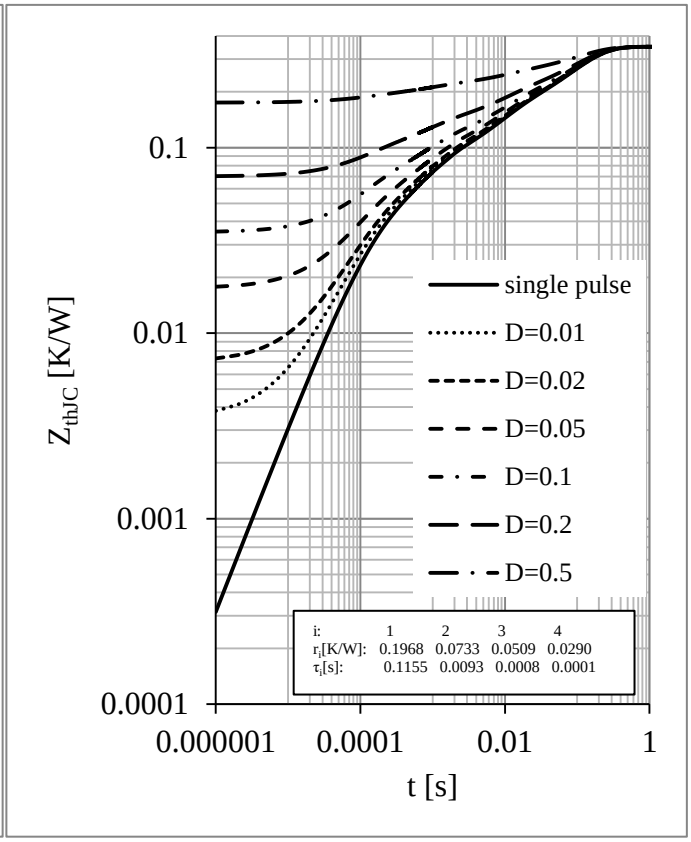


Fig 6. IGBT-inverter Transient Thermal Impedance

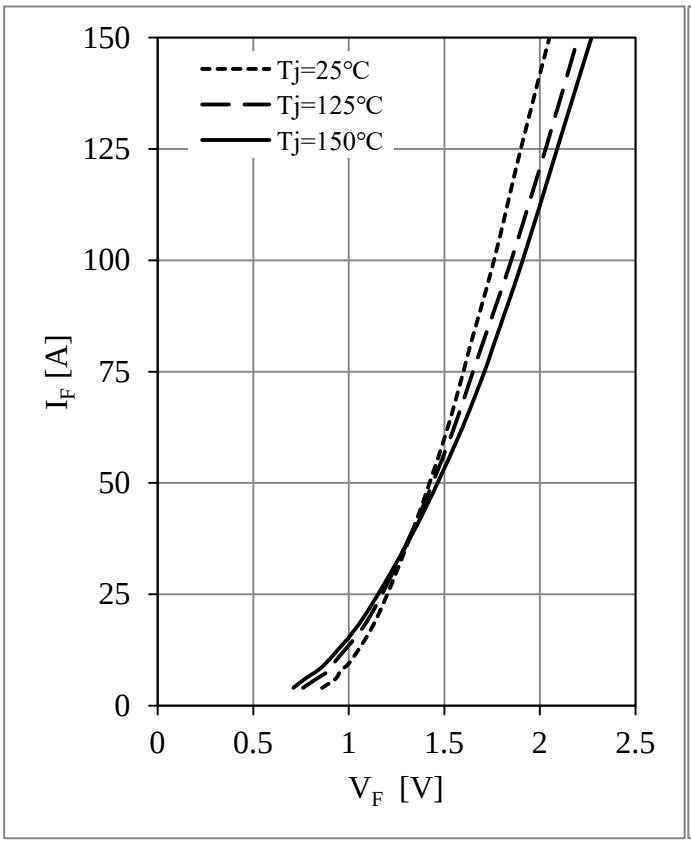


Fig 7. Diode-inverter Forward Characteristics

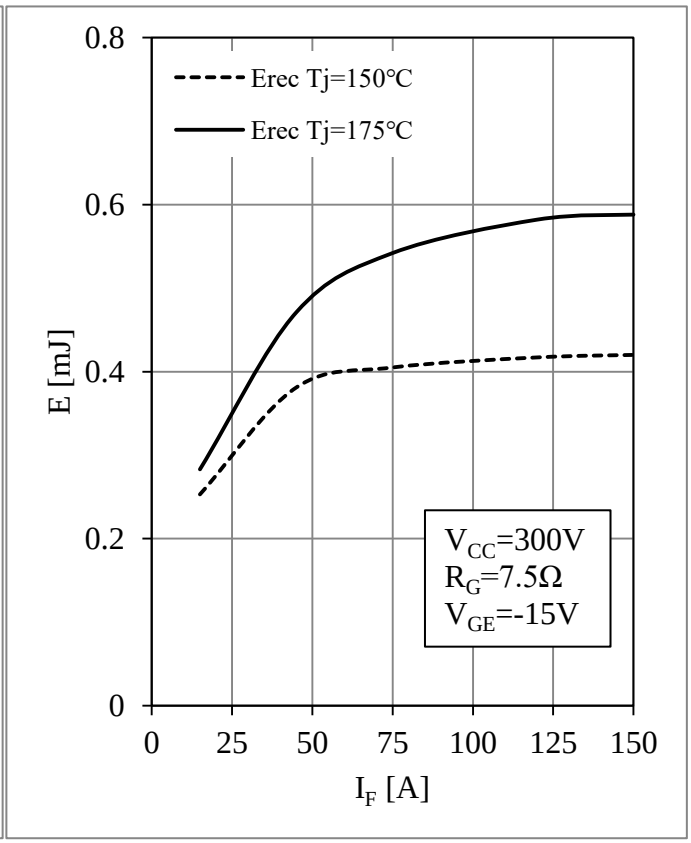


Fig 8. Diode-inverter Switching Loss vs. I_F

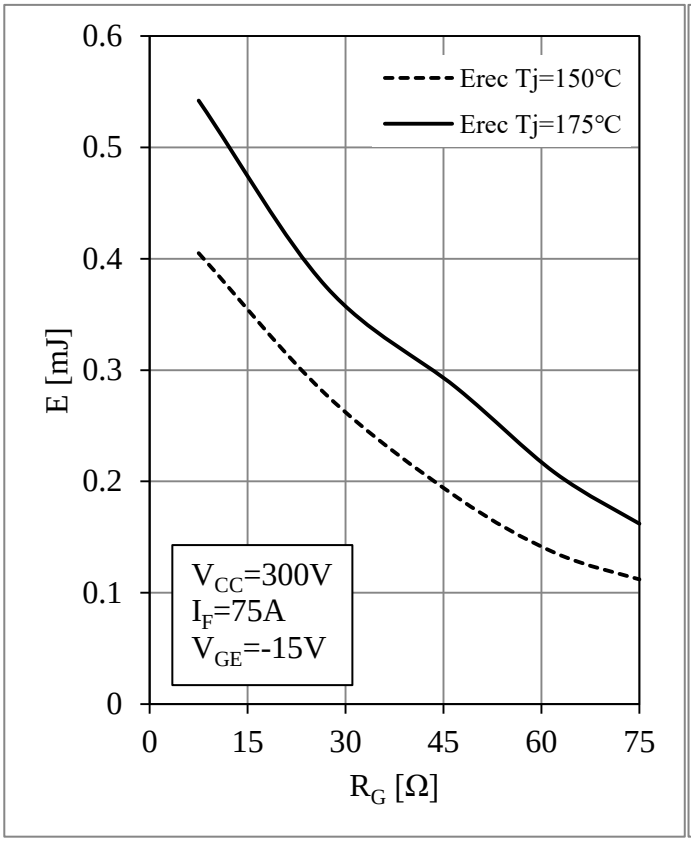


Fig 9. Diode-inverter Switching Loss vs. R_G

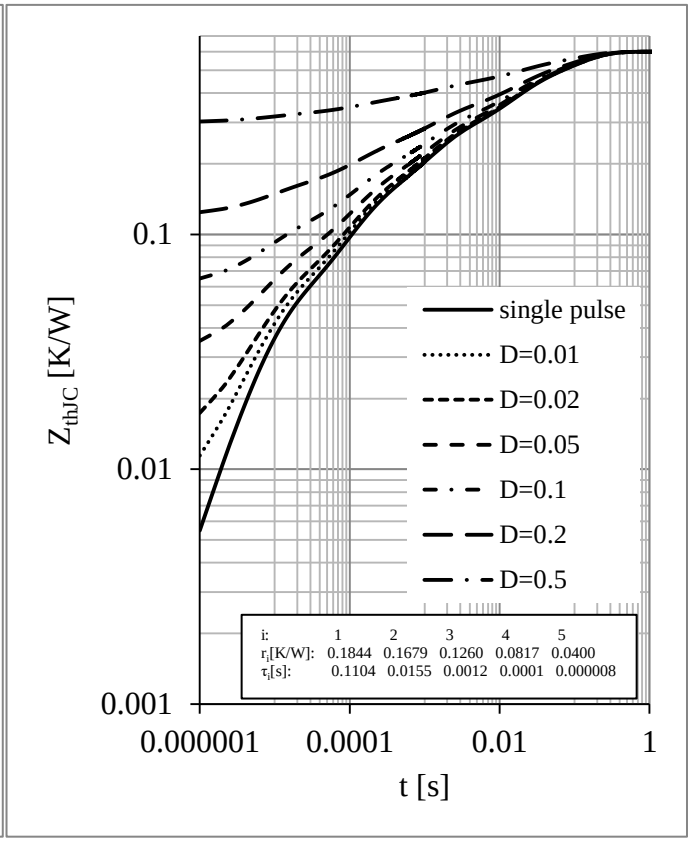
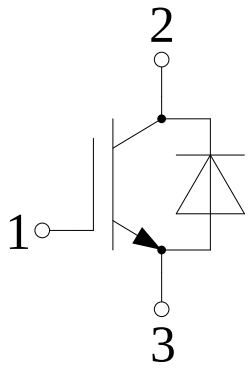


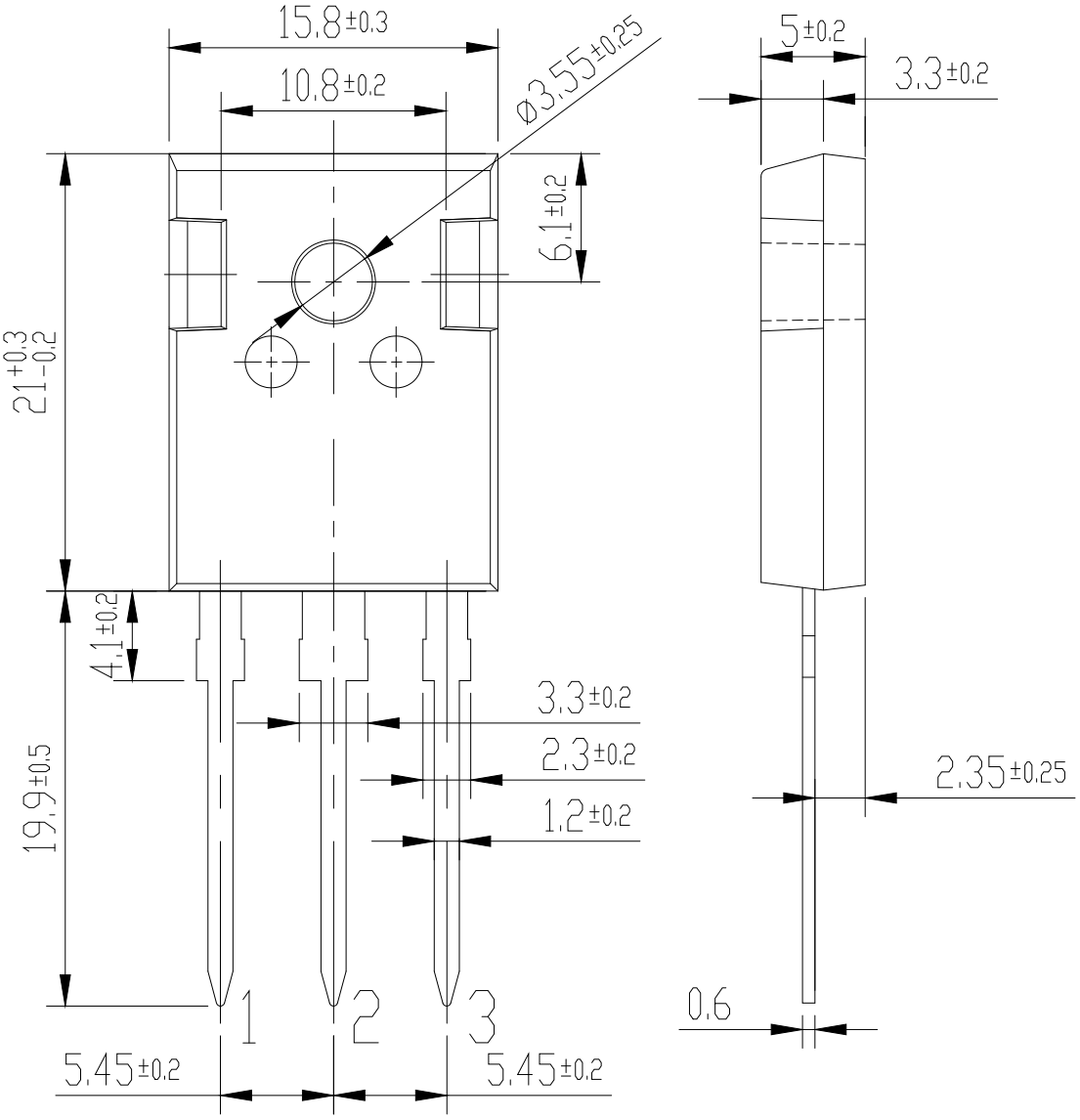
Fig 10. Diode-inverter Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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