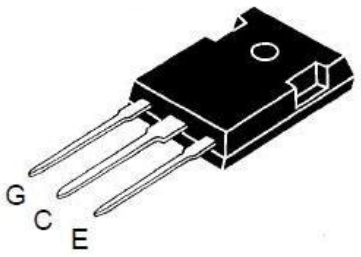
DOSEMI

IGBT

DG40T06T2

Molding Type Discretes

600V/40A IGBT with Anti-Parallel Diode



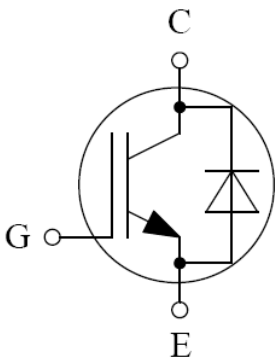
TO-247

General Description

DOSEMI IGBT Power Discretes provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and electronic welders.

Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- Low switching loss
- Maximum junction temperature 175℃
- 5μs short circuit capability
- Square RBSOA
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Tight parameter distribution
- Lead free package



Equivalent Circuit Schematic

Typical Applications

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

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	DG40T06T2	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	80 40	A
I_{CM}	Pulsed Collector Current t_p=1ms	80	A
I_F	Diode Continuous Forward Current	20	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	40	A
P_D	Maximum Power Dissipation @ T_j=175℃	378	W
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	-40 to +175	℃
T_{stg}	Storage Temperature Range	-40 to +125	℃
T_S	Soldering Temperature,1.6mm from case for 10s	260	℃

Electrical Characteristics of IGBT T_C=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	T_j=25℃	600			V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			25	μA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25℃			100	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.0mA,V_{CE}=V_{GE}, T_j=25℃	4.0	4.8	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=40A,V_{GE}=15V, T_j=25℃		1.65	2.10	V
		I_C=40A,V_{GE}=15V, T_j=175℃		2.20		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=400V,I_C=40A, R_G=10Ω,V_{GE}=15V, T_j=25℃		53		ns
t_r	Rise Time			38		ns
$t_{d(off)}$	Turn-Off Delay Time			120		ns
t_f	Fall Time			50		ns
E_{on}	Turn-On Switching Loss			0.44		mJ
E_{off}	Turn-Off Switching Loss			0.72		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=400V,I_C=40A, R_G=10Ω,V_{GE}=15V, T_j=175℃		55		ns
t_r	Rise Time			40		ns
$t_{d(off)}$	Turn-Off Delay Time			145		ns
t_f	Fall Time			70		ns
E_{on}	Turn-On Switching Loss			1.16		mJ
E_{off}	Turn-Off Switching Loss			1.06		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		2.11		nF
C_{oes}	Output Capacitance			0.20		nF
C_{res}	Reverse Transfer Capacitance			0.07		nF
Q_G	Gate Charge	V_{CC}=400V,I_C=40A, V_{GE}=15V		79		nC
I_{SC}	SC Data	t_P≤5μs,V_{GE}=15V, T_j=150℃,V_{CC}=400V, V_{CEM}≤600V		350		A
R_{Gint}	Internal Gate Resistance			/		Ω

Electrical Characteristics of Diode T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=20A,V_{GE}=0V	T_j=25℃		1.60	2.05	V
			T_j=175℃		1.60		
Q_r	Recovered Charge	I_F=20A, V_R=400V, R_G=10Ω, V_{GE}=-15V	T_j=25℃		0.6		μC
			T_j=175℃		1.5		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		15		A
			T_j=175℃		22		
E_{rec}	Reverse Recovery Energy		T_j=25℃		0.09		mJ
			T_j=175℃		0.23		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
R_{thJC}	Junction-to-Case (per IGBT)		0.397	K/W
R_{thJC}	Junction-to-Case (per Diode)		1.837	K/W
$R_{\theta JA}$	Junction-to-Ambient	40		K/W

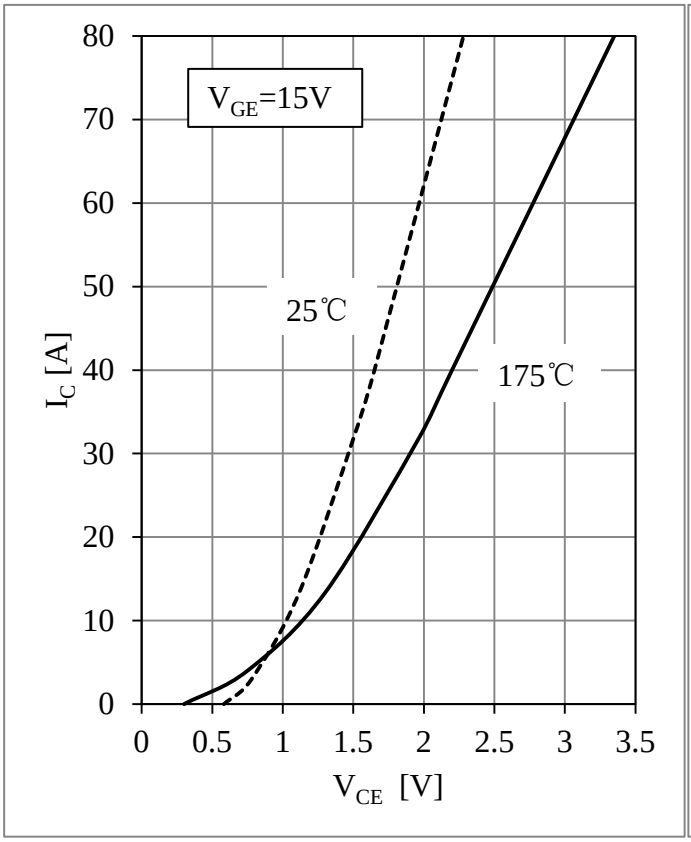


Fig 1. IGBT Output Characteristics

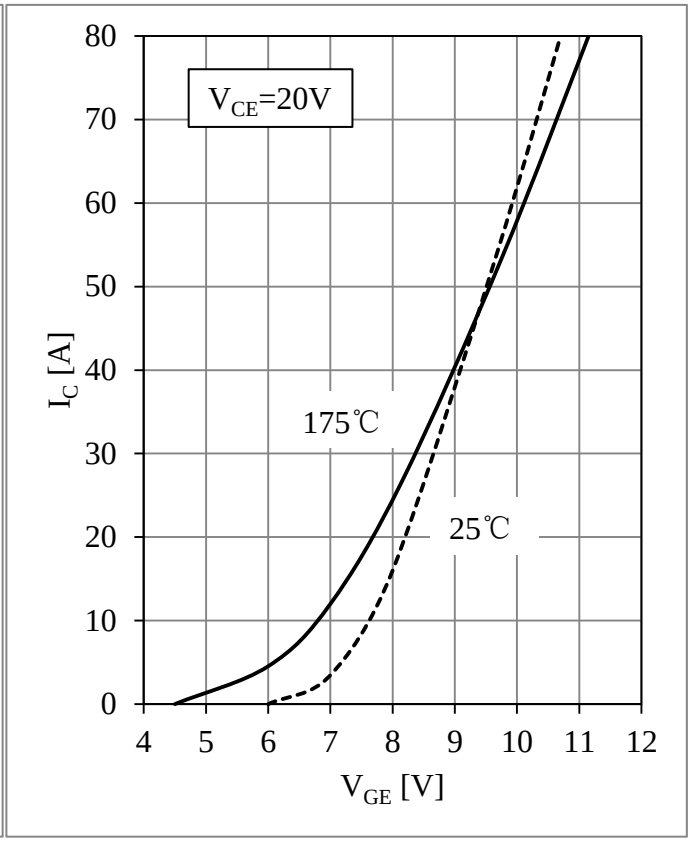


Fig 2. IGBT Transfer Characteristics

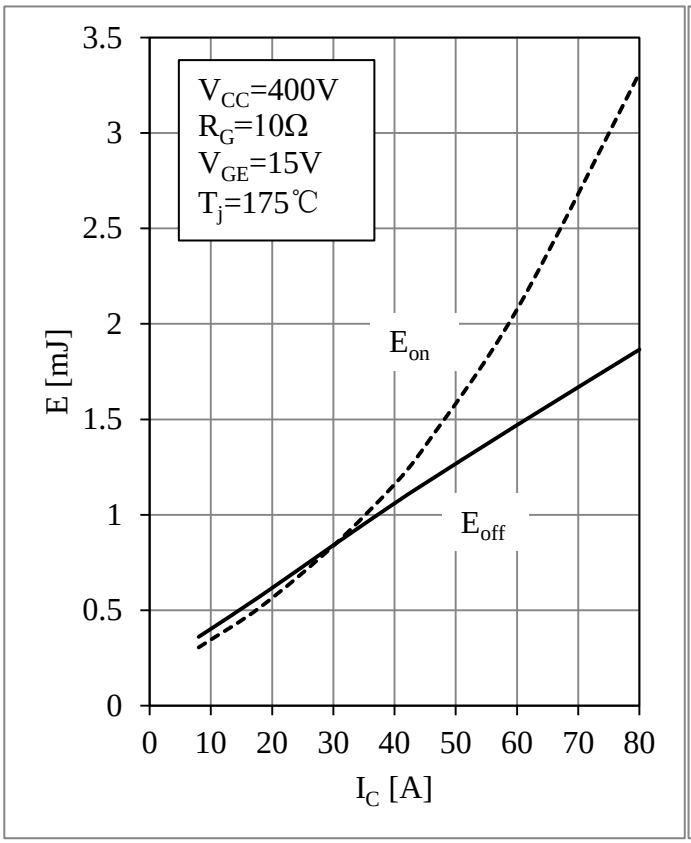


Fig 3. IGBT Switching Loss vs. I_C

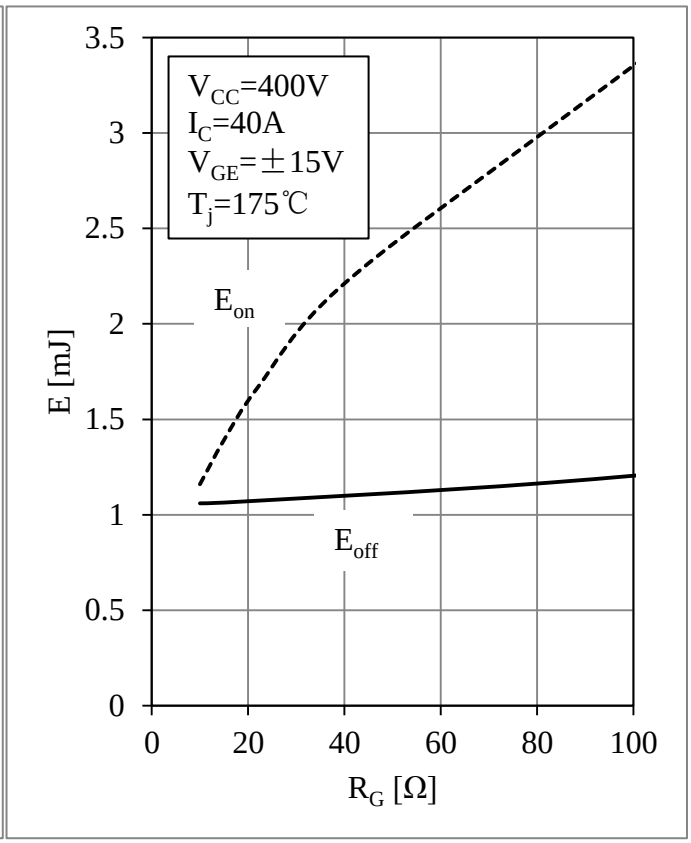


Fig 4. IGBT Switching Loss vs. R_G

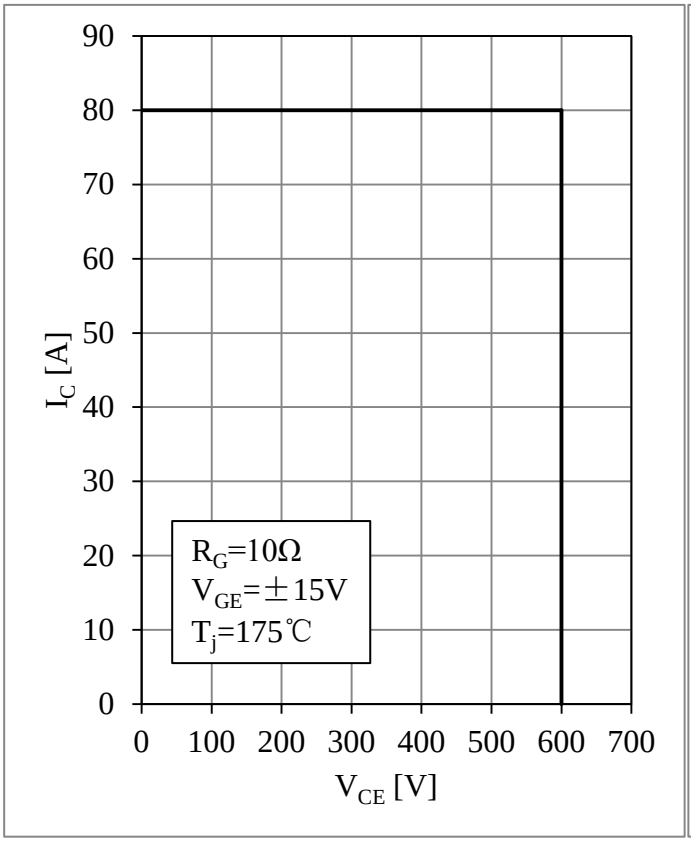


Fig 5. RBSOA

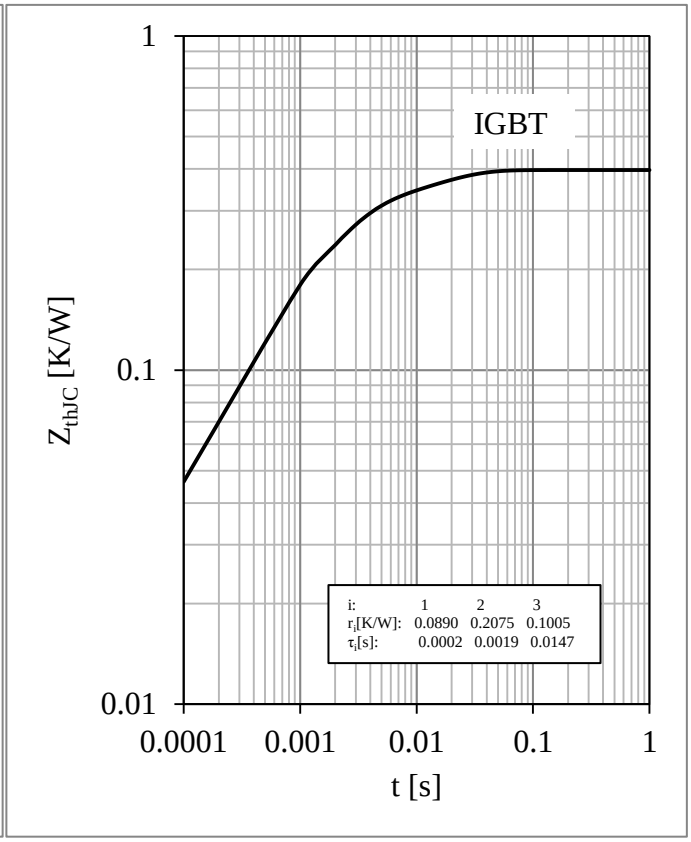


Fig 6. IGBT Transient Thermal Impedance

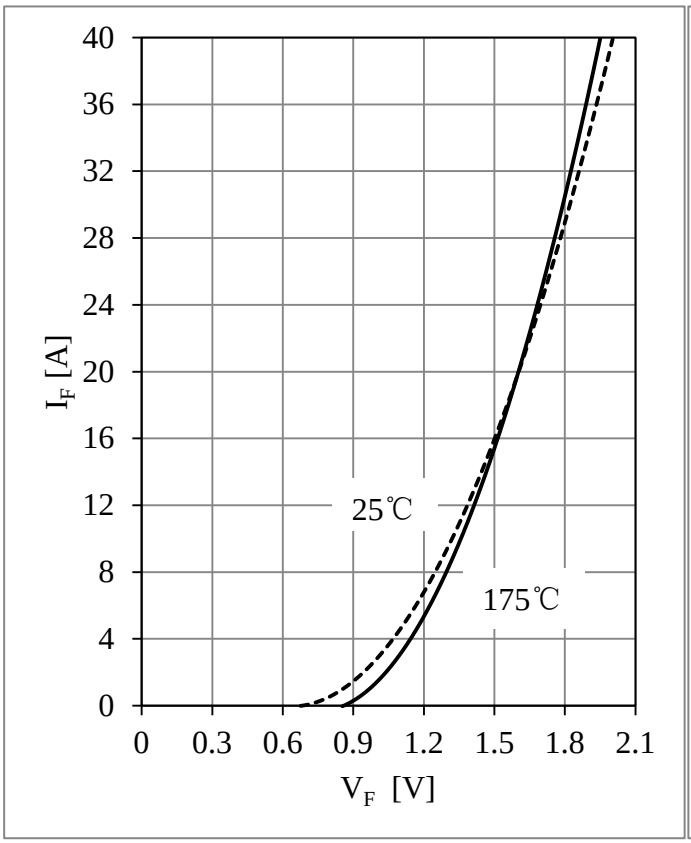


Fig 7. Diode Forward Characteristics

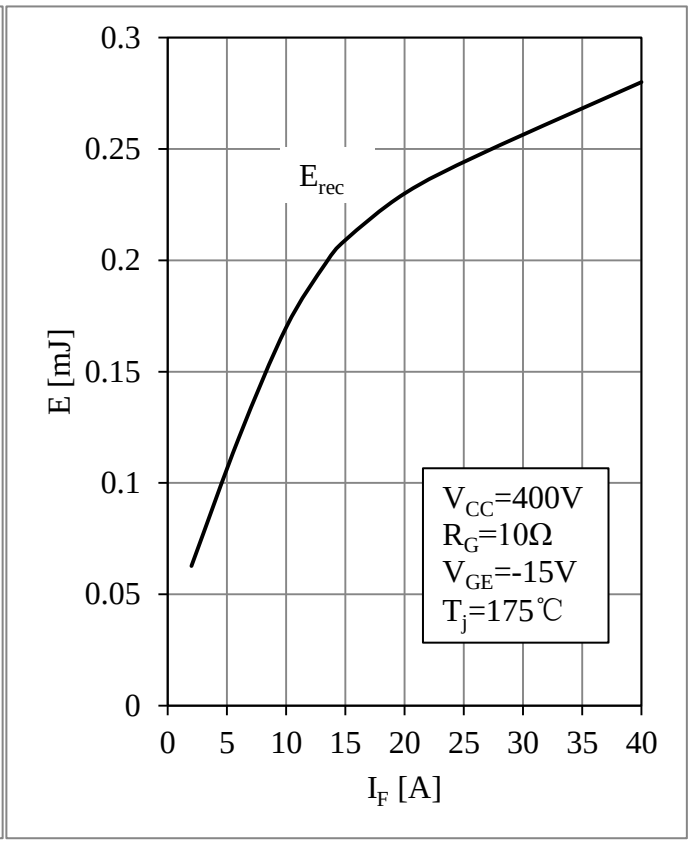


Fig 8. Diode Switching Loss vs. I_F

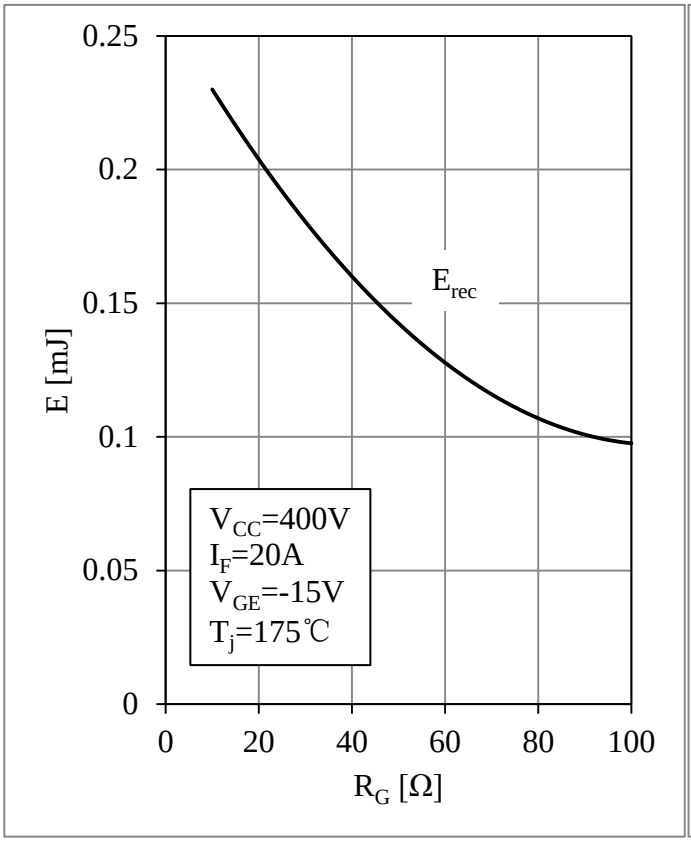


Fig 9. Diode Switching Loss vs. R_G

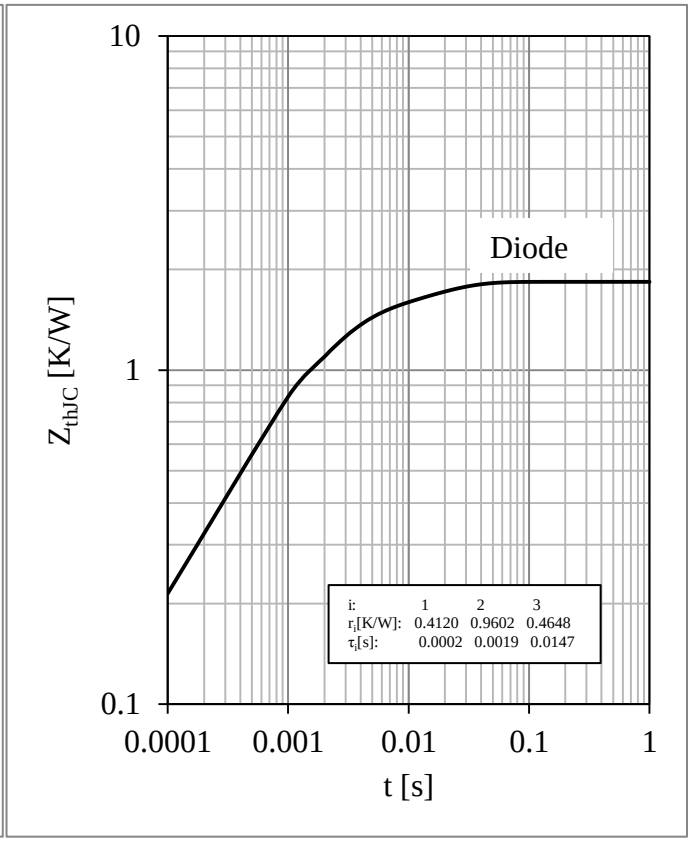
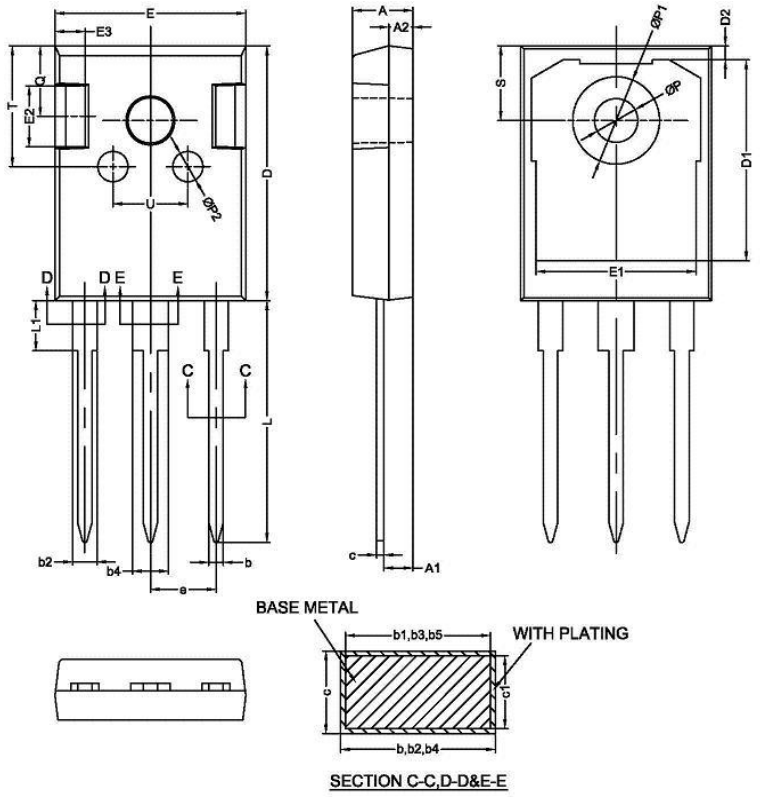


Fig 10. Diode Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
b	1.16	-	1.26
b1	1.15	1.2	1.22
b2	1.96	-	2.06
b3	1.95	2.00	2.02
b4	2.96	-	3.06
b5	2.95	3.00	3.02
c	0.59	-	0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.20	1.35
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	5.44BSC		
L	19.80	19.92	20.10
L1	-	-	4.30
P	3.50	3.60	3.70
P1	-	-	7.40
P2	2.40	2.50	2.60
Q	5.60	-	6.00
S	6.15BSC		
T	9.80	-	10.20
U	6.00	-	6.40

NOTES:
1.ALL DIMENSIONS REFER TO JEDEC STANDARD TO-247 AD DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
2.EJECTION MARK DEPTH $0.10^{+0.15}_{-0.05}$.

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