STARPOWER

SEMICONDUCTOR **IGBT**

GD200DFS100F6S

1000V/200A in one-package

General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as solar power.

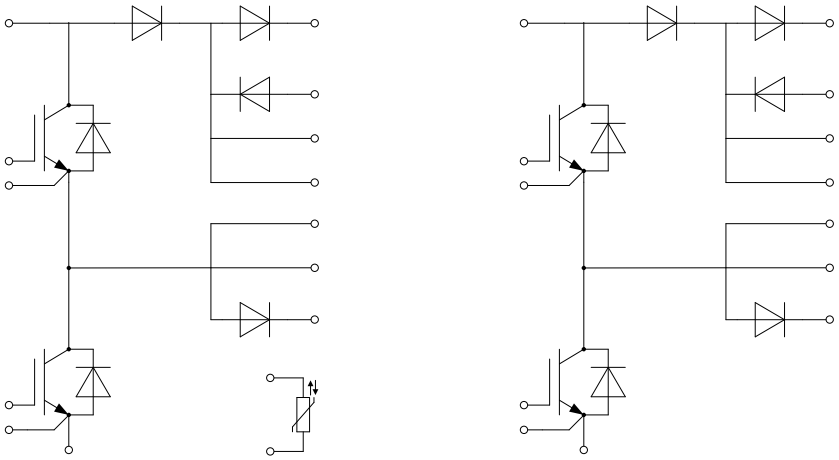
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175 ^{o}C
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

- Solar power

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°C unless otherwise noted

T11,T12,T21,T22 IGBT

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1000	V
V_{GES}	Gate-Emitter Voltage Transient Gate-Emitter Voltage	±20 ±30	V
I_{CN}	Implemented Collector Current	200	A
I_C	Collector Current @ T_C=100°C	120	A
I_{CM}	Pulsed Collector Current t_p=1ms	400	A

D11,D12,D21,D22 Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1000	V
I_{FN}	Implemented Forward Current	100	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	200	A

D13,D14,D23,D24 Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_{FN}	Implemented Forward Current	80	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	160	A

D15,D16,D25,D26 Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_{FN}	Implemented Forward Current	50	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	100	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	175	°C
T_{jop}	Operating Junction Temperature	-40 to +150	°C
T_{STG}	Storage Temperature Range	-40 to +125	°C
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	3200	V
CTI	Comperative tracking index	⩾600	
RTI	RTI Elec,housing	130	°C

T11,T12,T21,T22 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=200A,V_{GE}=15V, T_j=25°C		1.90	2.35	V
		I_C=200A,V_{GE}=15V, T_j=125°C		2.25		
		I_C=200A,V_{GE}=15V, T_j=150°C		2.30		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=3.00mA,V_{CE}=V_{GE}, T_j=25°C	3.25	4.0	4.75	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			400	nA
R_{Gint}	Internal Gate Resistance			1.5		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=100kHz, V_{GE}=0V		17.0		nF
C_{oes}	Onput Capacitance			0.48		nF
C_{res}	Reverse Transfer Capacitance			0.27		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		1.14		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=650V,I_C=120A, R_{Gon}=10Ω,R_{Goff}=15Ω, V_{GE}= ±15V,T_j=25°C		83		ns
t_r	Rise Time			56		ns
$t_{d(off)}$	Turn-Off Delay Time			715		ns
t_f	Fall Time			32		ns
E_{on}	Turn-On Switching Loss			4.64		mJ
E_{off}	Turn-Off Switching Loss			3.21		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=650V,I_C=120A, R_{Gon}=10Ω,R_{Goff}=15Ω, V_{GE}= ±15V,T_j=125°C		84		ns
t_r	Rise Time			58		ns
$t_{d(off)}$	Turn-Off Delay Time			775		ns
t_f	Fall Time			44		ns
E_{on}	Turn-On Switching Loss			5.05		mJ
E_{off}	Turn-Off Switching Loss			4.60		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=650V,I_C=120A, R_{Gon}=10Ω,R_{Goff}=15Ω, V_{GE}= ±15V,T_j=150°C		87		ns
t_r	Rise Time			59		ns
$t_{d(off)}$	Turn-Off Delay Time			787		ns
t_f	Fall Time			66		ns
E_{on}	Turn-On Switching Loss			5.26		mJ
E_{off}	Turn-Off Switching Loss			4.99		mJ

D11,D12,D21,D22 Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=100A,V_{GE}=0V,T_j=25°C		2.15	2.60	V
		I_F=100A,V_{GE}=0V,T_j=125°C		2.30		
		I_F=100A,V_{GE}=0V,T_j=150°C		2.20		

D13,D14,D23,D24 Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=80A,V_{GE}=0V,T_j=25°C		1.40	1.85	V
		I_F=80A,V_{GE}=0V,T_j=125°C		1.70		
		I_F=80A,V_{GE}=0V,T_j=150°C		1.80		

D15,D16,D25,D26 Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=50A,V_{GE}=0V,T_j=25°C		1.45	1.90	V
		I_F=50A,V_{GE}=0V,T_j=125°C		1.50		
		I_F=50A,V_{GE}=0V,T_j=150°C		1.50		

NTC Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated Resistance			5.0		kΩ
ΔR/R	Deviation of R_{100}	T_C=100°C,R_{100}=493.3Ω	-5		5	%
P_{25}	Power Dissipation				20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K
$B_{25/80}$	B-value	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3411		K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$		3433		K

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		TBD		nH
R_{thJC}	Junction-to-Case (per T11,T12,T21,T22 IGBT) Junction-to-Case (per D11,D12,D21,D22 Diode) Junction-to-Case (per D13,D14,D23,D24 Diode) Junction-to-Case (per D15,D16,D25,D26 Diode)			0.280 0.625 0.339 0.697	K/W
R_{thCH}	Case-to-Heatsink (per T11,T12,T21,T22 IGBT) Case-to-Heatsink (per D11,D12,D21,D22 Diode) Case-to-Heatsink (per D13,D14,D23,D24 Diode) Case-to-Heatsink (per D15,D16,D25,D26 Diode)		0.077 0.109 0.062 0.108		K/W
M	Mounting Torque, Screw:M5	3.0		5.0	N.m
G	Weight of Module		180		g

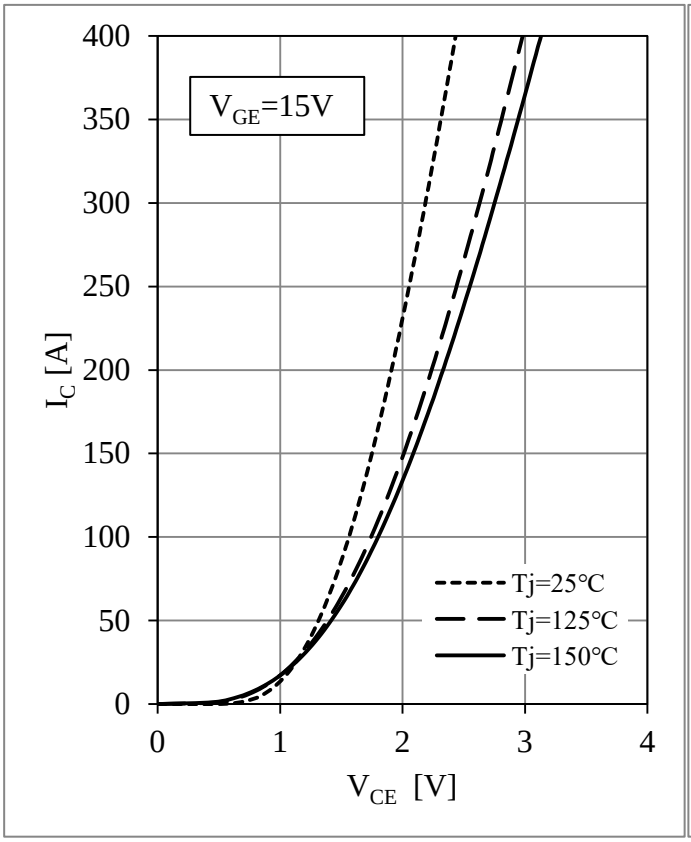


Fig 1. T11,T12,T21,T22 IGBT Output Characteristics

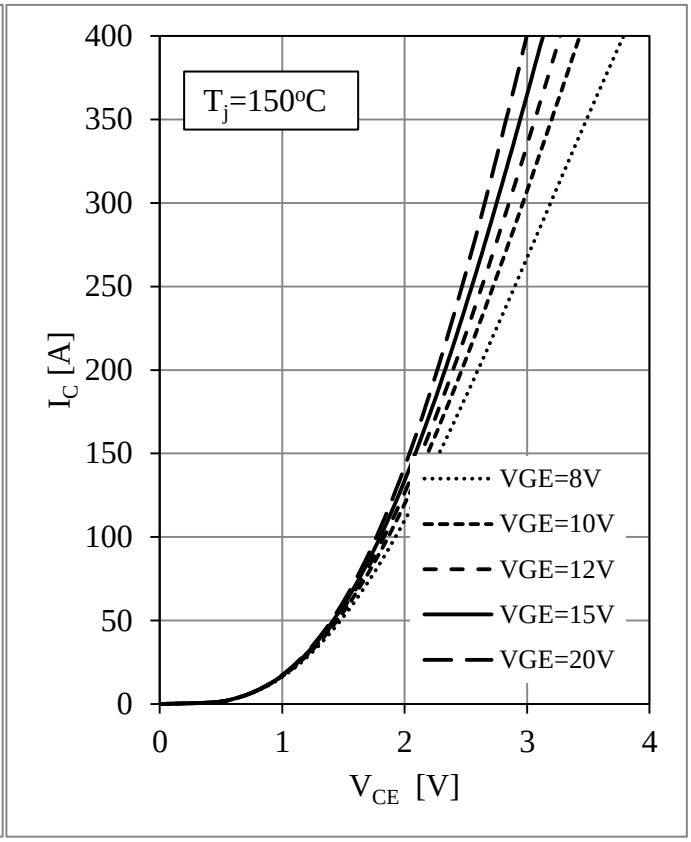


Fig 2. T11,T12,T21,T22 IGBT Output Characteristics

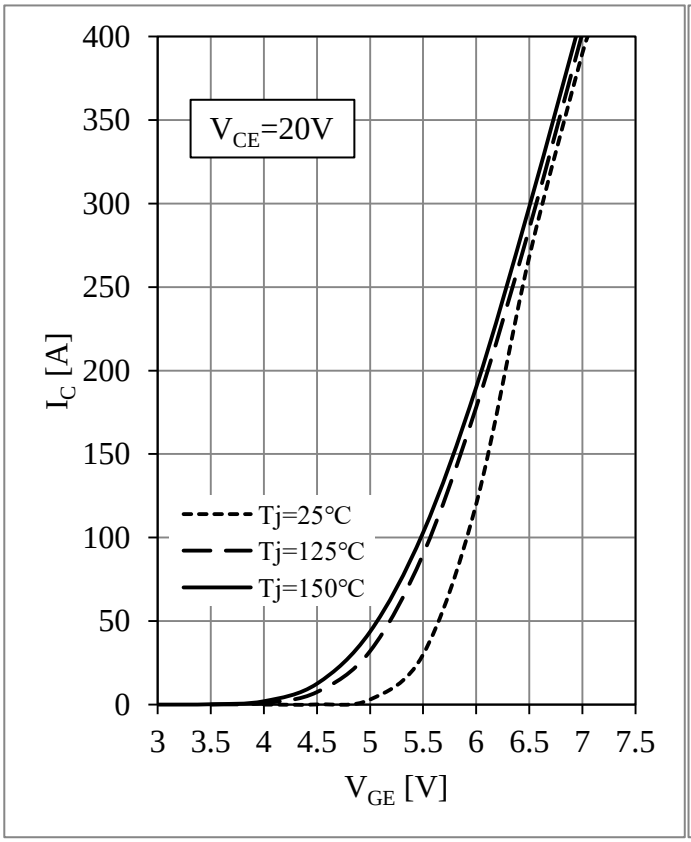


Fig 3. T11,T12,T21,T22 IGBT Transfer Characteristics

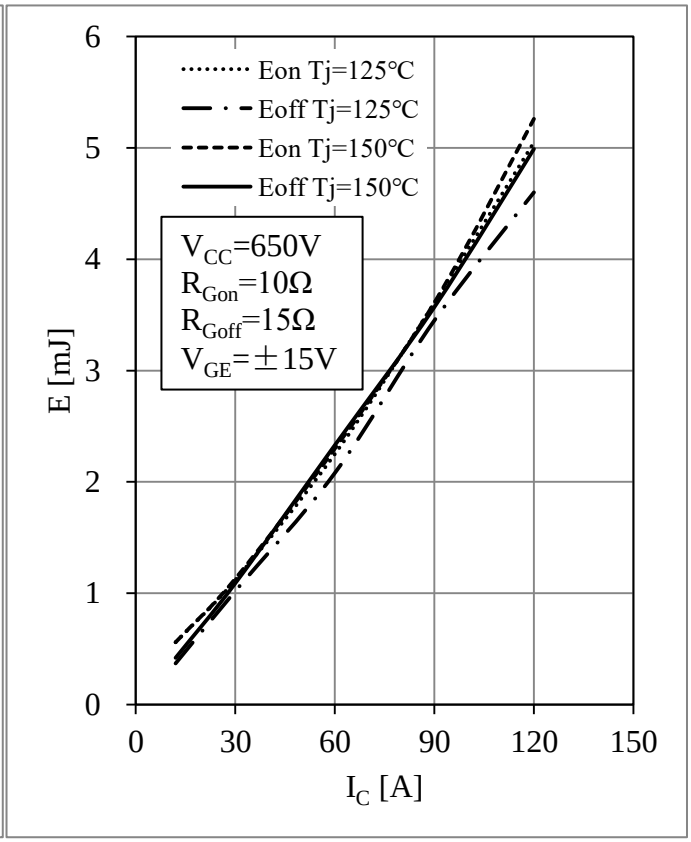


Fig 4. T11,T12,T21,T22 IGBT Switching Loss vs. I_C

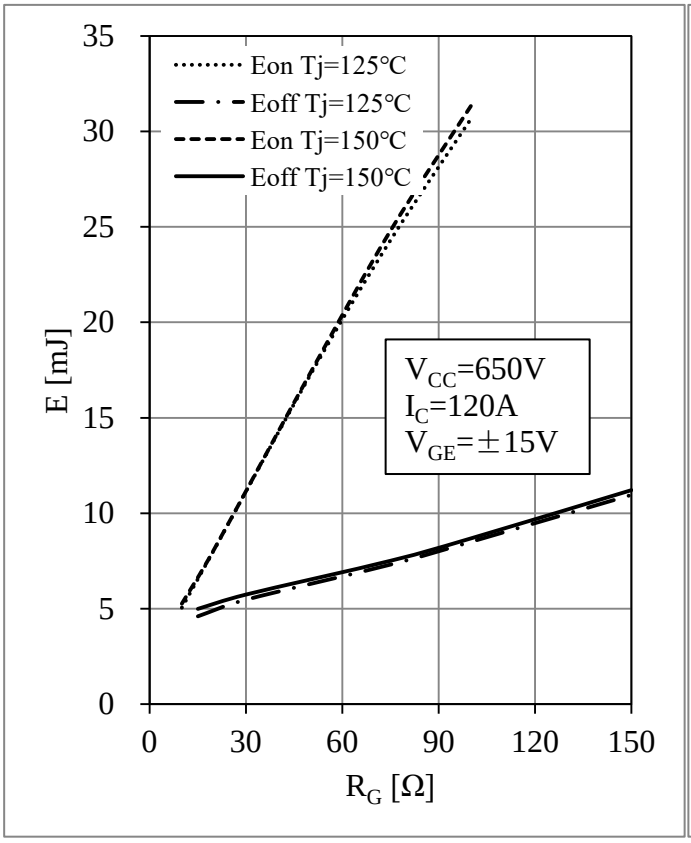


Fig 5. T11,T12,T21,T22 IGBT Switching Loss vs. R_G

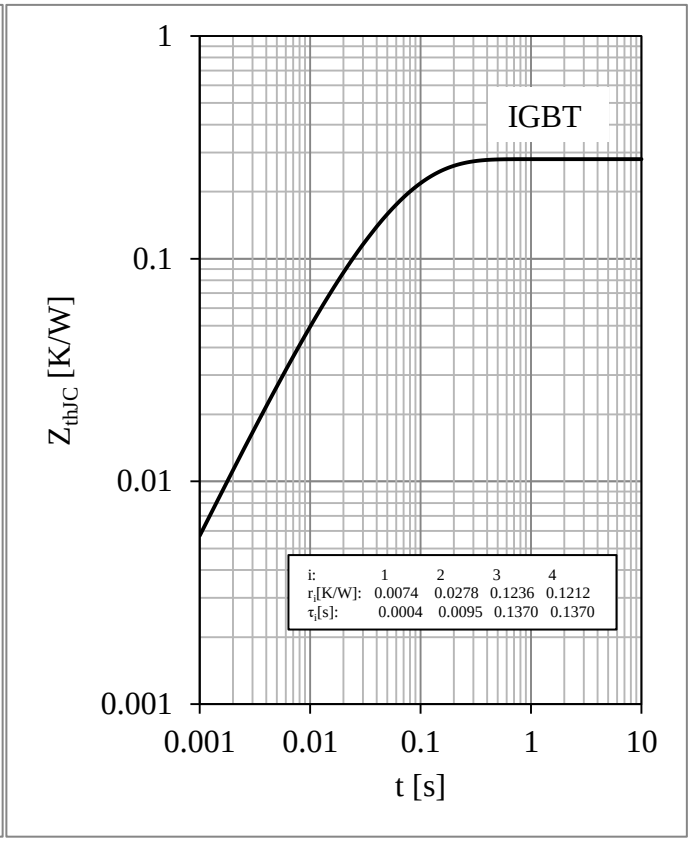


Fig 6. T11,T12,T21,T22 IGBT Transient Thermal Impedance

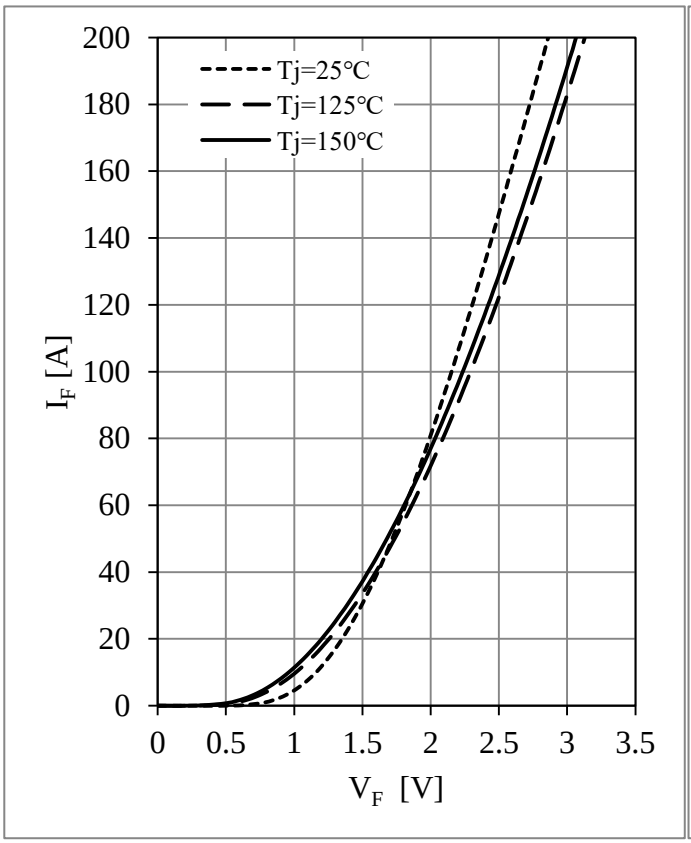


Fig 7. D11,D12,D21,D22 Diode Forward Characteristics

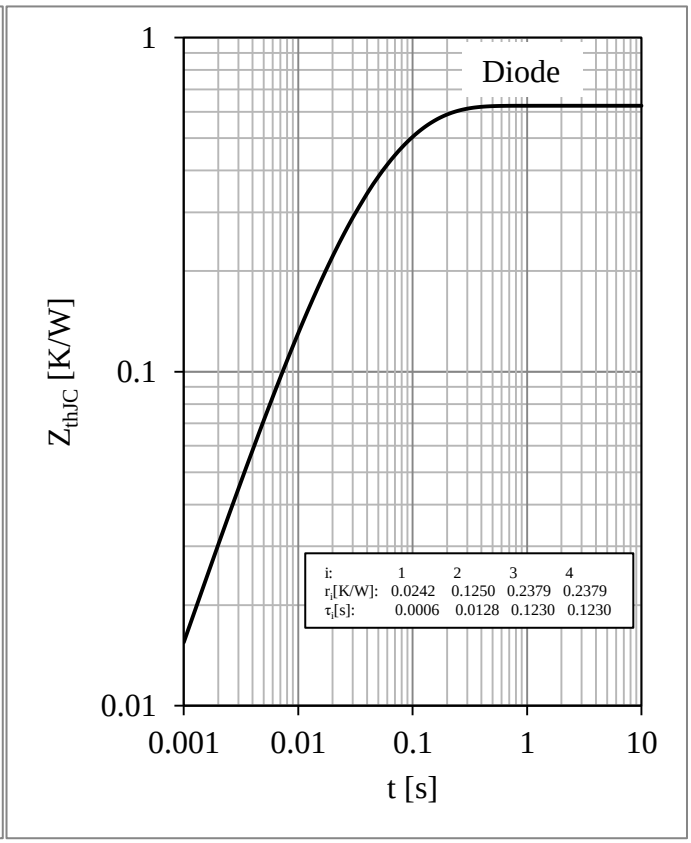


Fig 8. D11,D12,D21,D22 Diode Transient Thermal Impedance

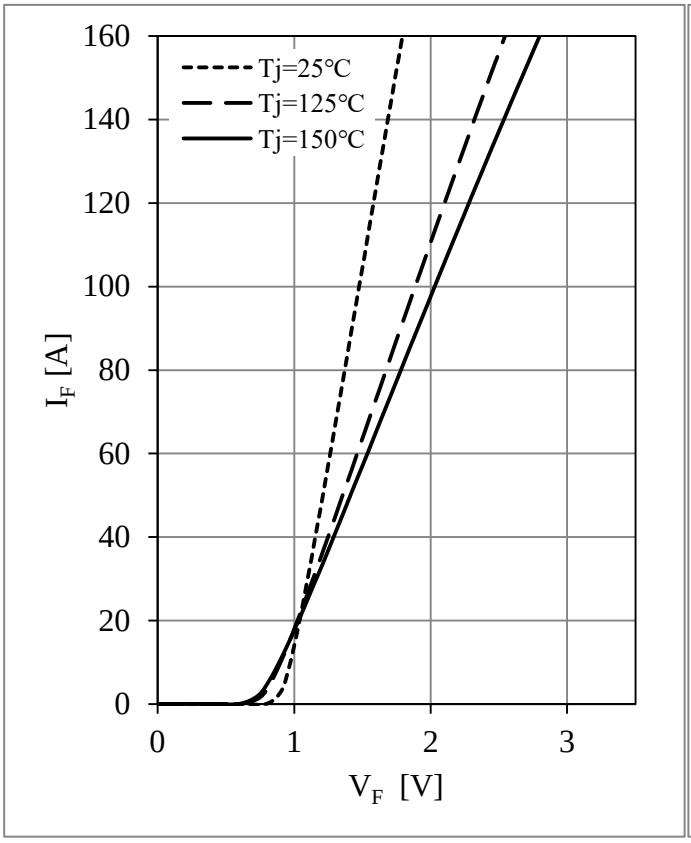


Fig 9. D13,D14,D23,D24 Diode Forward Characteristics

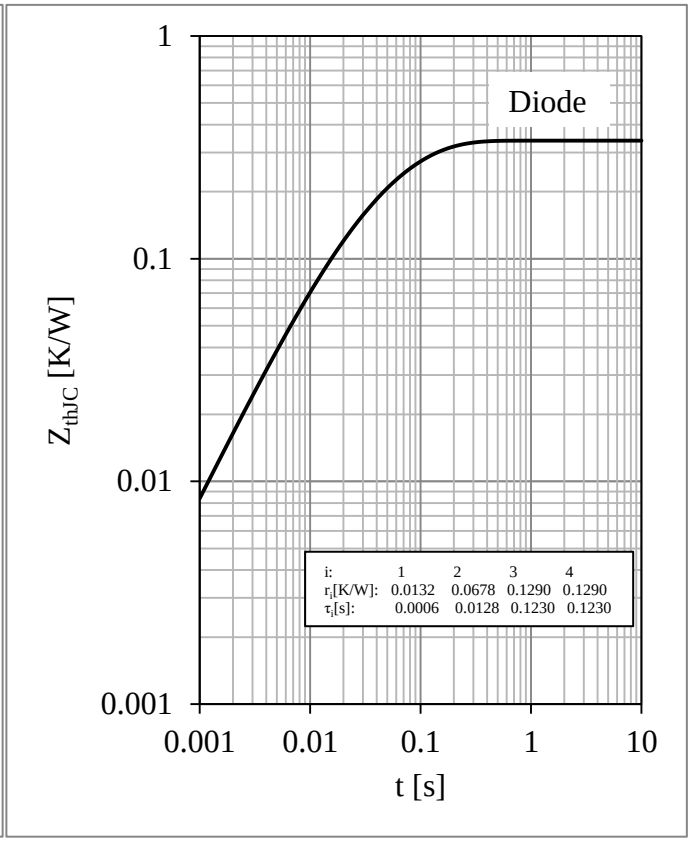


Fig 10. D13,D14,D23,D24 Diode Transient Thermal Impedance

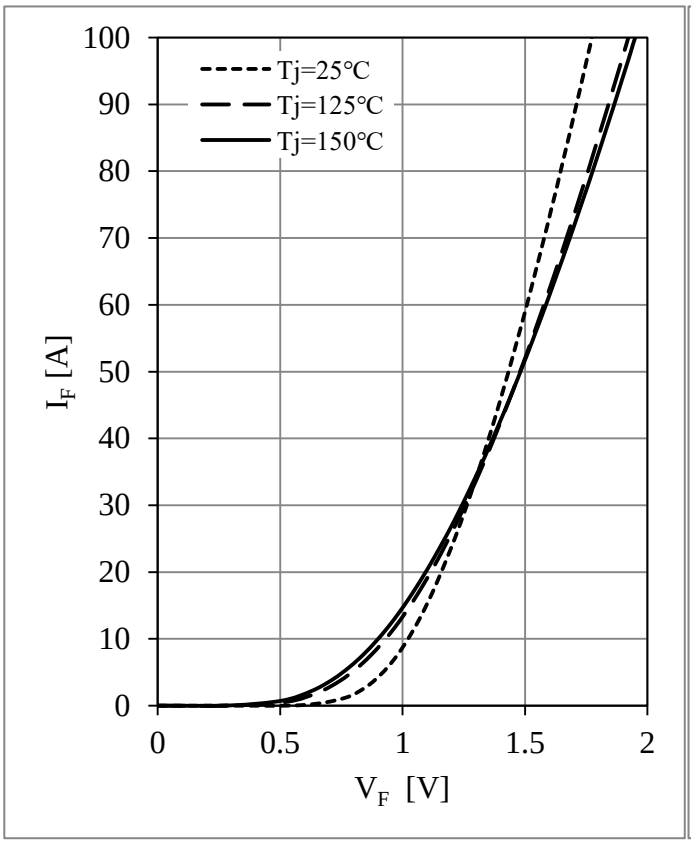


Fig 11. D15,D16,D25,D26 Diode Forward Characteristics

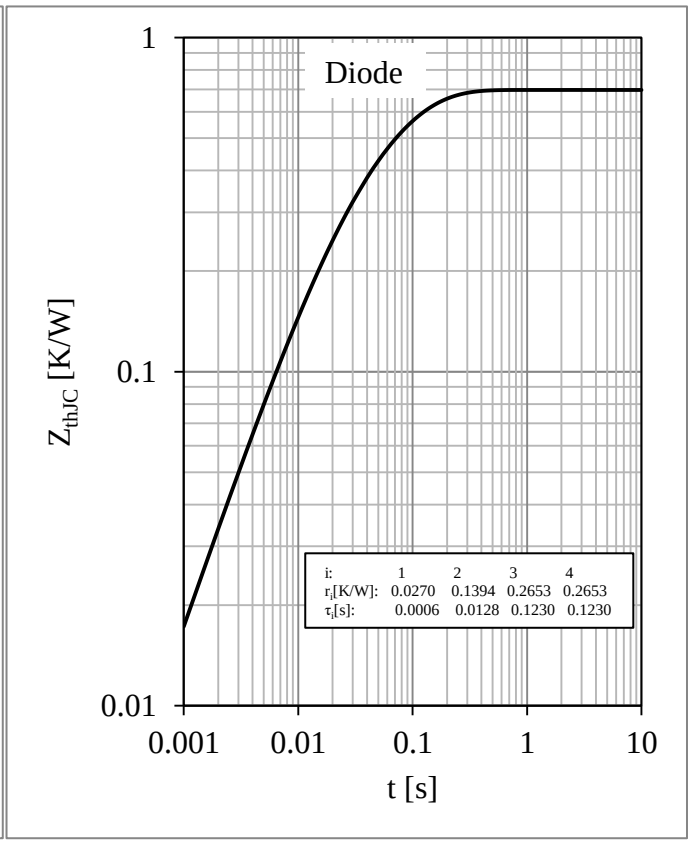
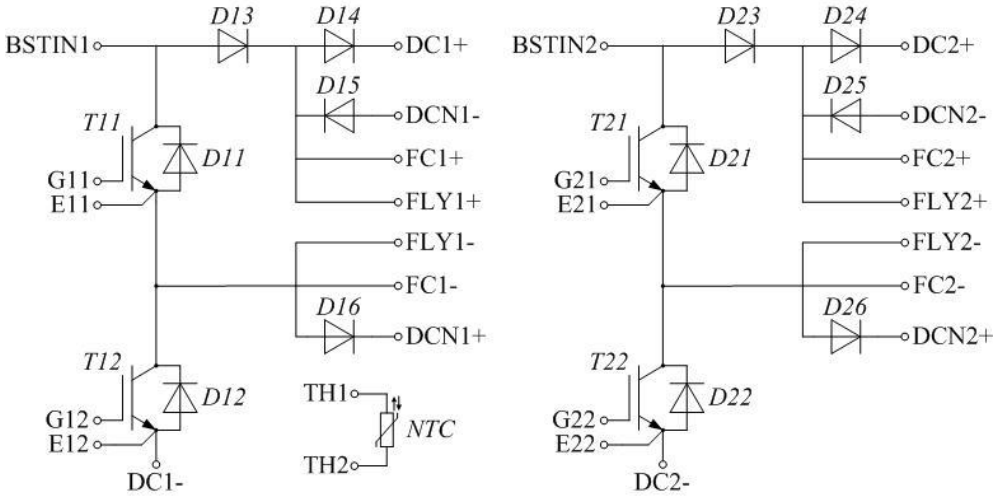


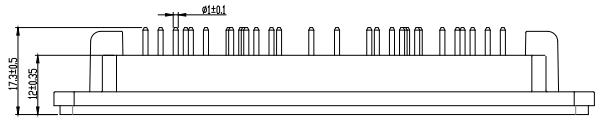
Fig 12. D15,D16,D25,D26 Diode Transient Thermal Impedance

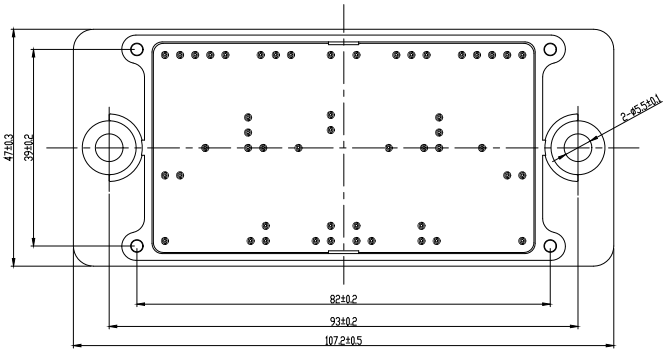
Circuit Schematic

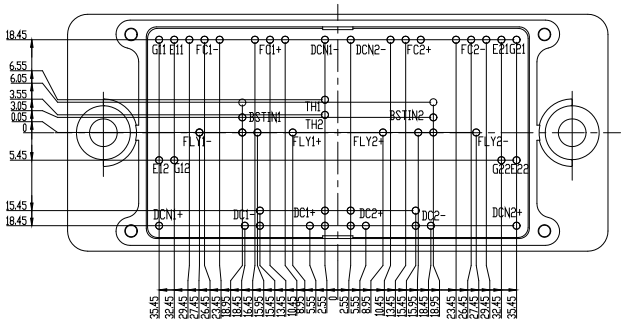


Package Dimensions

Dimensions in Millimeters







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