STARPOWER

SEMICONDUCTOR **IGBT**

GD25FSY120L2S

1200V/25A 6 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 general inverters and UPS.

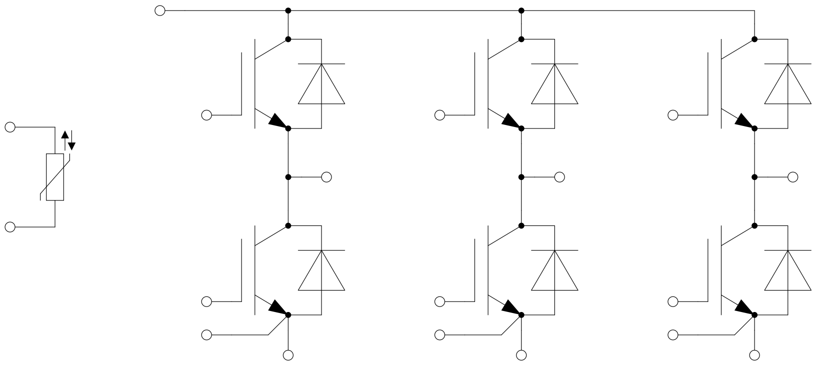
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- Low switching loss
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Isolated heatsink using DBC technology

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-inverter

Symbol	Description	Value	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	50 25	A
I_{CM}	Pulsed Collector Current t_p=1ms	50	A
P_D	Maximum Power Dissipation @ T_j=175°C	252	W

Diode-inverter

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	25	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	50	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	2500	V

IGBT-inverter 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=25A,V_{GE}=15V, T_j=25°C		1.70	2.15	V
		I_C=25A,V_{GE}=15V, T_j=125°C		1.95		
		I_C=25A,V_{GE}=15V, T_j=150°C		2.00		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=0.63mA,V_{CE}=V_{GE}, T_j=25°C	5.2	6.0	6.8	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			0		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		1.75		nF
C_{res}	Reverse Transfer Capacitance			0.10		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.24		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=25A, R_G=20Ω,V_{GE}=±15V, T_j=25°C		28		ns
t_r	Rise Time			17		ns
$t_{d(off)}$	Turn-Off Delay Time			196		ns
t_f	Fall Time			185		ns
E_{on}	Turn-On Switching Loss			1.71		mJ
E_{off}	Turn-Off Switching Loss			1.49		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=25A, R_G=20Ω,V_{GE}=±15V, T_j=125°C		28		ns
t_r	Rise Time			21		ns
$t_{d(off)}$	Turn-Off Delay Time			288		ns
t_f	Fall Time			216		ns
E_{on}	Turn-On Switching Loss			2.57		mJ
E_{off}	Turn-Off Switching Loss			2.21		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=25A, R_G=20Ω,V_{GE}=±15V, T_j=150°C		28		ns
t_r	Rise Time			22		ns
$t_{d(off)}$	Turn-Off Delay Time			309		ns
t_f	Fall Time			227		ns
E_{on}	Turn-On Switching Loss			2.78		mJ
E_{off}	Turn-Off Switching Loss			2.42		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=900V, V_{CEM}≤1200V		100		A

Diode-inverter Characteristics $T_C=25^oC$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=25A, V_{GE}=0V, T_j=25^oC$		2.10	2.55	V
		$I_F=25A, V_{GE}=0V, T_j=125^oC$		2.15		
		$I_F=25A, V_{GE}=0V, T_j=150^oC$		2.15		
Q_r	Recovered Charge	$V_R=600V, I_F=25A$, $-di/dt=800A/\mu s, V_{GE}=-15V$ $T_j=25^oC$		1.3		μC
I_{RM}	Peak Reverse Recovery Current			31		A
E_{rec}	Reverse Recovery Energy			0.68		mJ
Q_r	Recovered Charge	$V_R=600V, I_F=25A$, $-di/dt=800A/\mu s, V_{GE}=-15V$ $T_j=125^oC$		2.2		μC
I_{RM}	Peak Reverse Recovery Current			38		A
E_{rec}	Reverse Recovery Energy			1.46		mJ
Q_r	Recovered Charge	$V_R=600V, I_F=25A$, $-di/dt=800A/\mu s, V_{GE}=-15V$ $T_j=150^oC$		2.4		μC
I_{RM}	Peak Reverse Recovery Current			40		A
E_{rec}	Reverse Recovery Energy			1.91		mJ

NTC Characteristics $T_C=25^oC$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated Resistance			5.0		kΩ
$\Delta R/R$	Deviation of R_{100}	$T_C=100\,^oC, R_{100}=493.3\Omega$	-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 $T_C=25^oC$ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		25		nH
$R_{CC'+EE'}$	Module Lead Resistance,Terminal to Chip		4.50		mΩ
R_{thJC}	Junction-to-Case (per IGBT-inverter) Junction-to-Case (per Diode-inverter)		0.541 0.904	0.595 0.994	K/W
R_{thCH}	Case-to-Heatsink (per IGBT-inverter) Case-to-Heatsink (per Diode-inverter) Case-to-Heatsink (per Module)		0.556 0.929 0.058		K/W
F	Mounting Force Per Clamp	20		50	N
G	Weight of Module		24		g

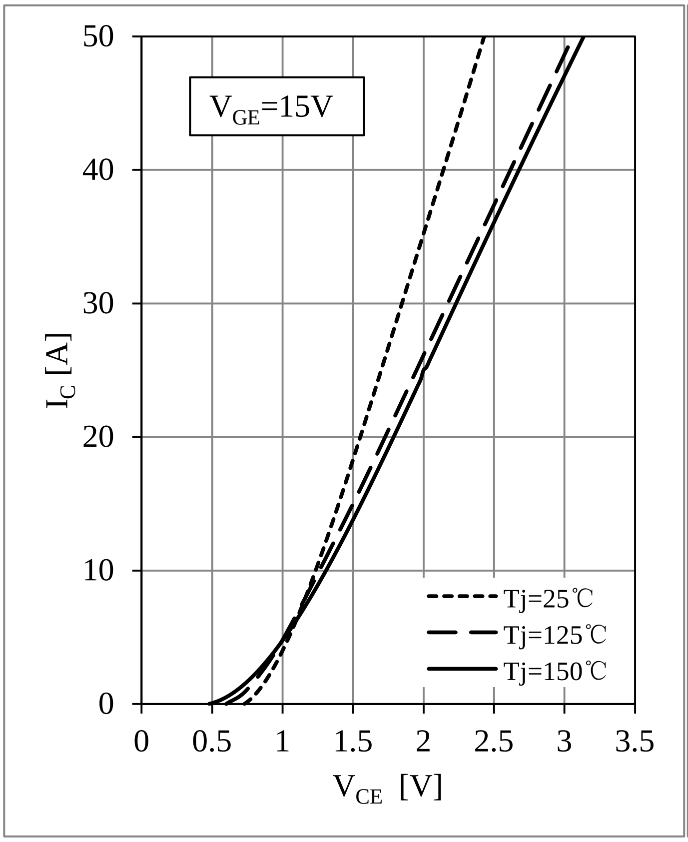


Fig 1. IGBT-inverter Output Characteristics

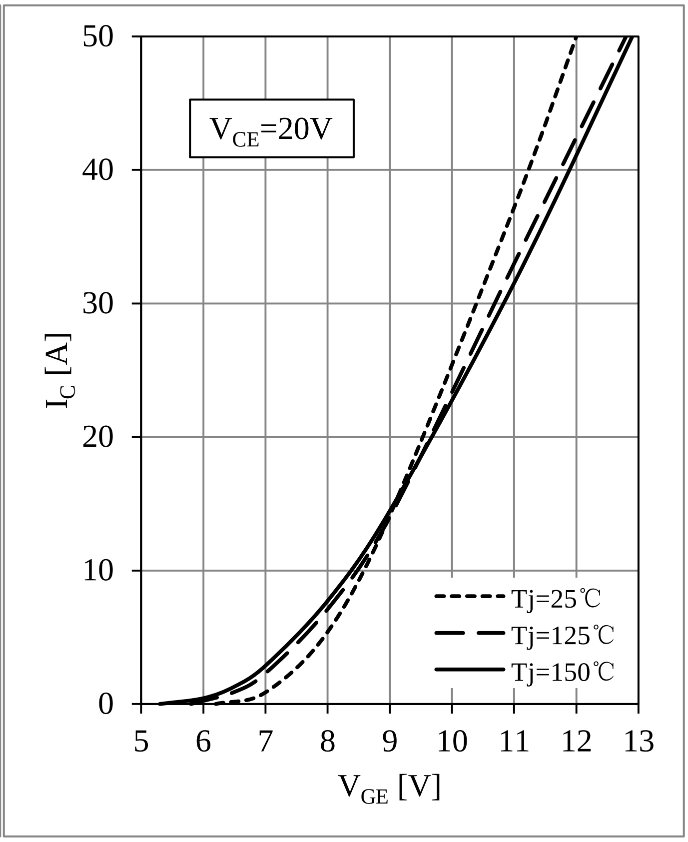


Fig 2. IGBT-inverter Transfer Characteristics

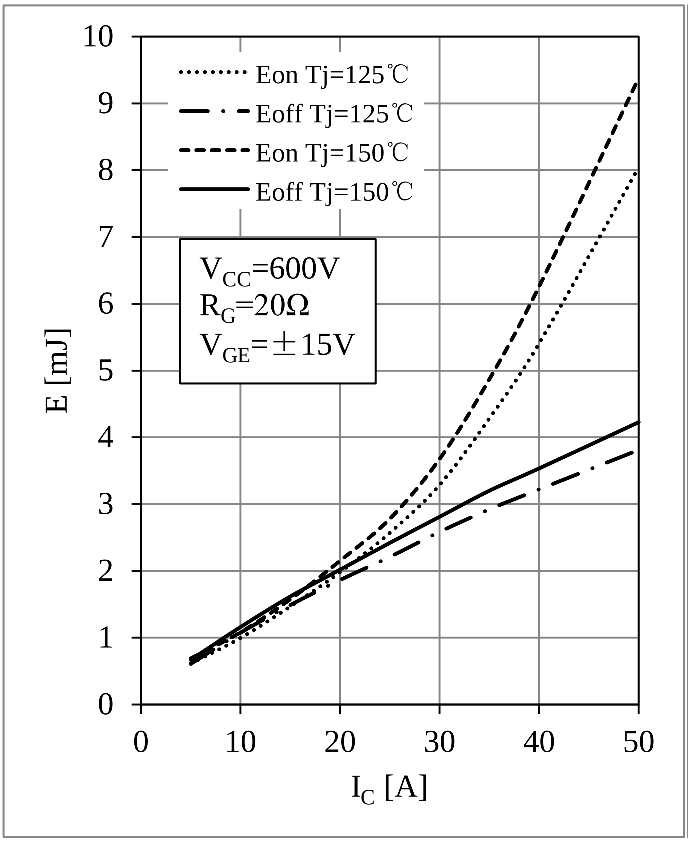


Fig 3. IGBT-inverter Switching Loss vs. I_C

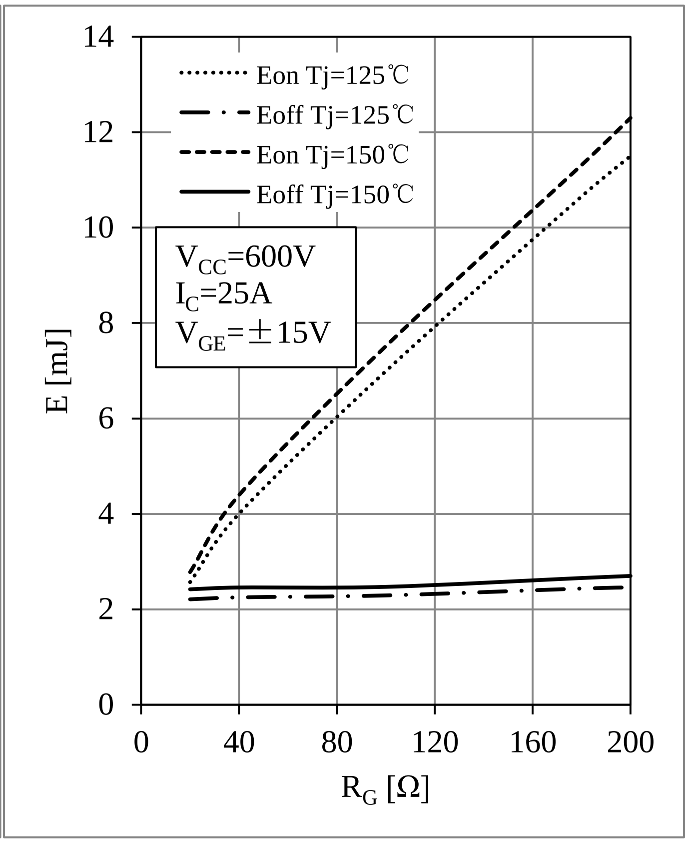


Fig 4. IGBT-inverter Switching Loss vs. R_G

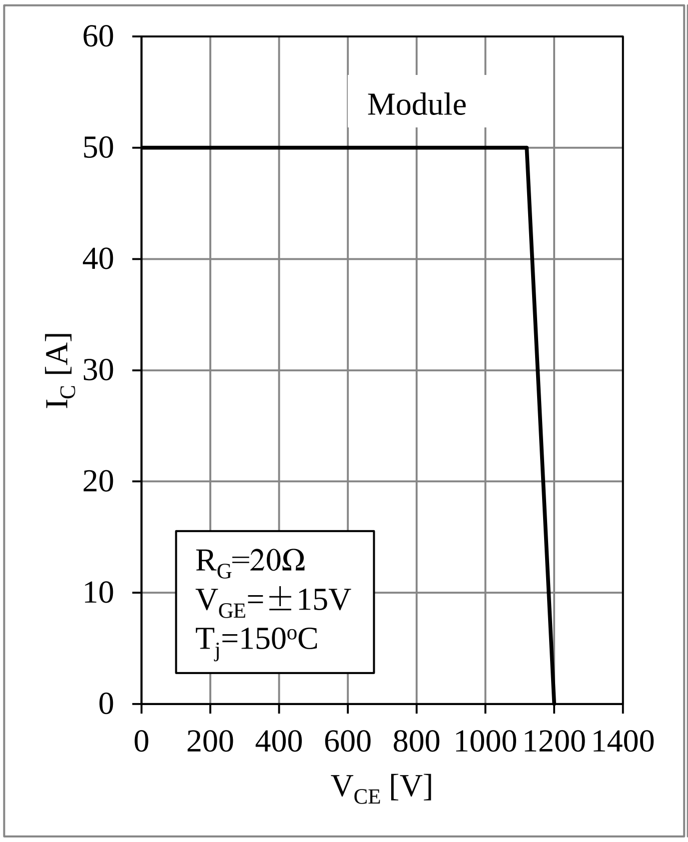


Fig 5. IGBT-inverter RBSOA

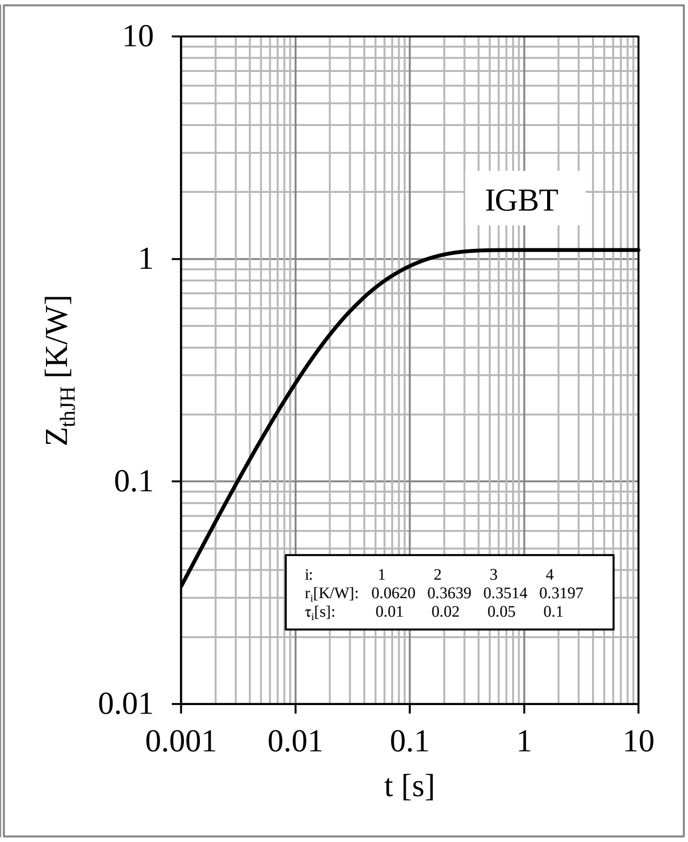


Fig 6. IGBT-inverter Transient Thermal Impedance

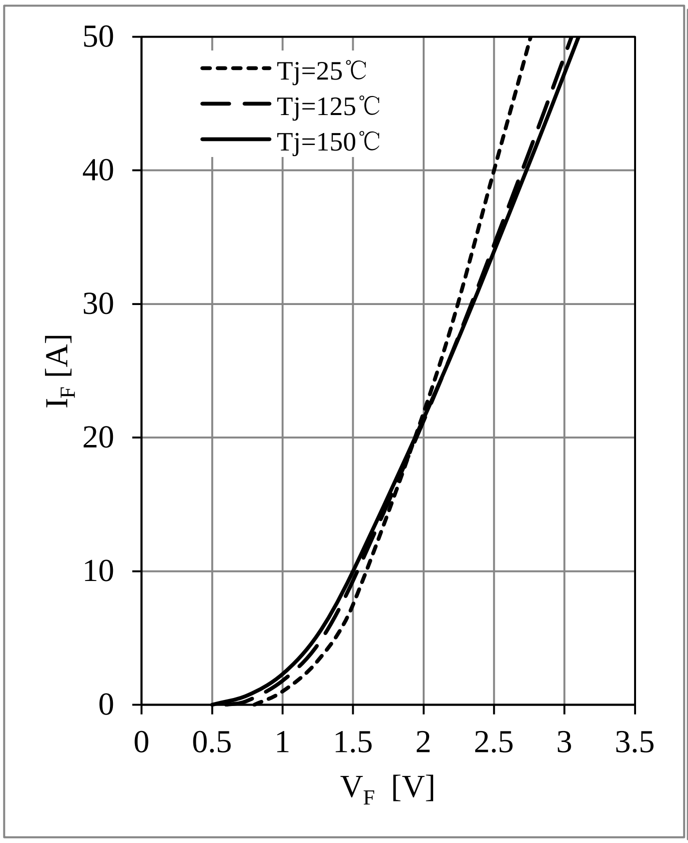


Fig 7. Diode-inverter Forward Characteristics

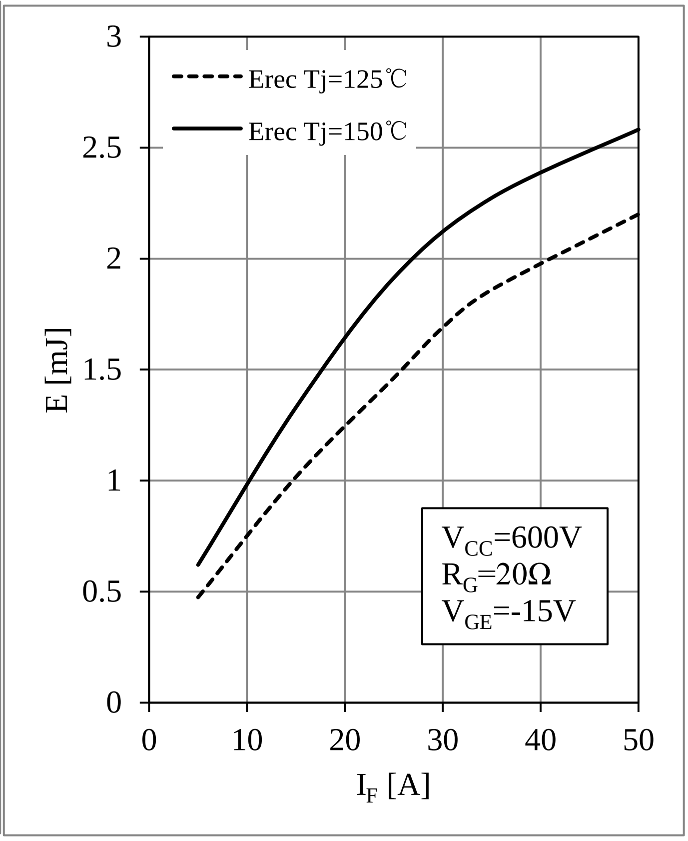


Fig 8. Diode-inverter Switching Loss vs. I_F

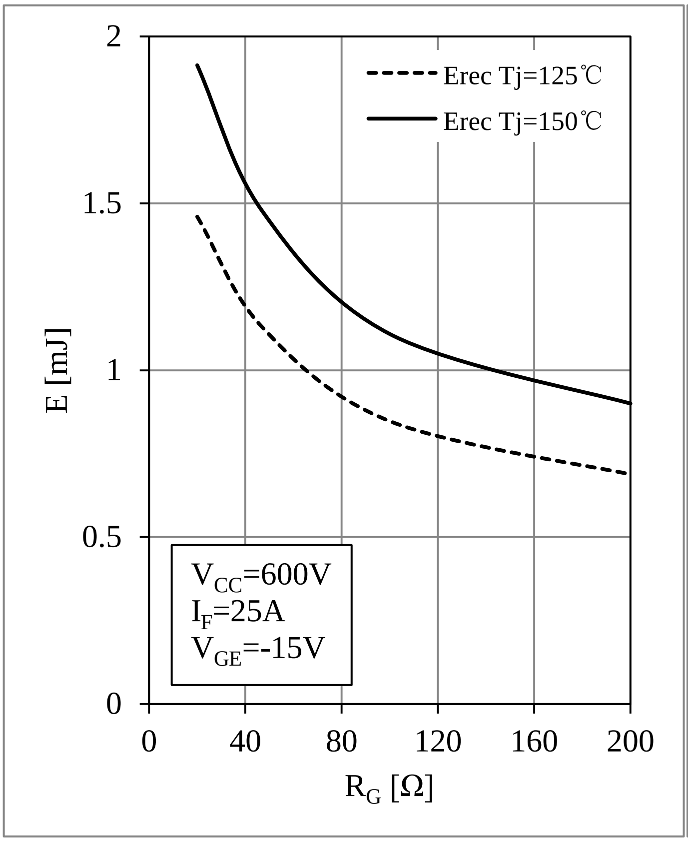


Fig 9. Diode-inverter Switching Loss vs. R_G

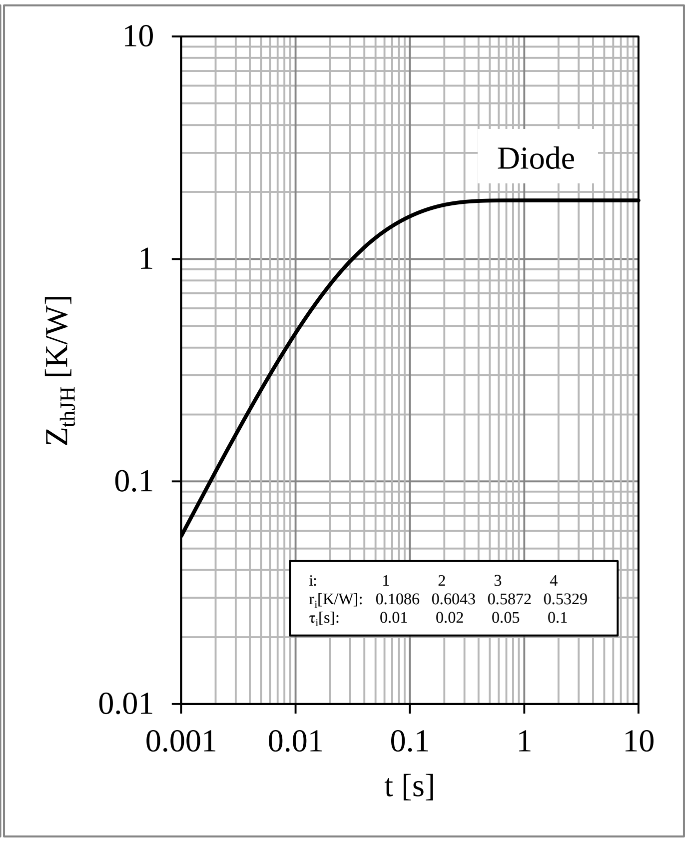


Fig 10. Diode-inverter Transient Thermal Impedance

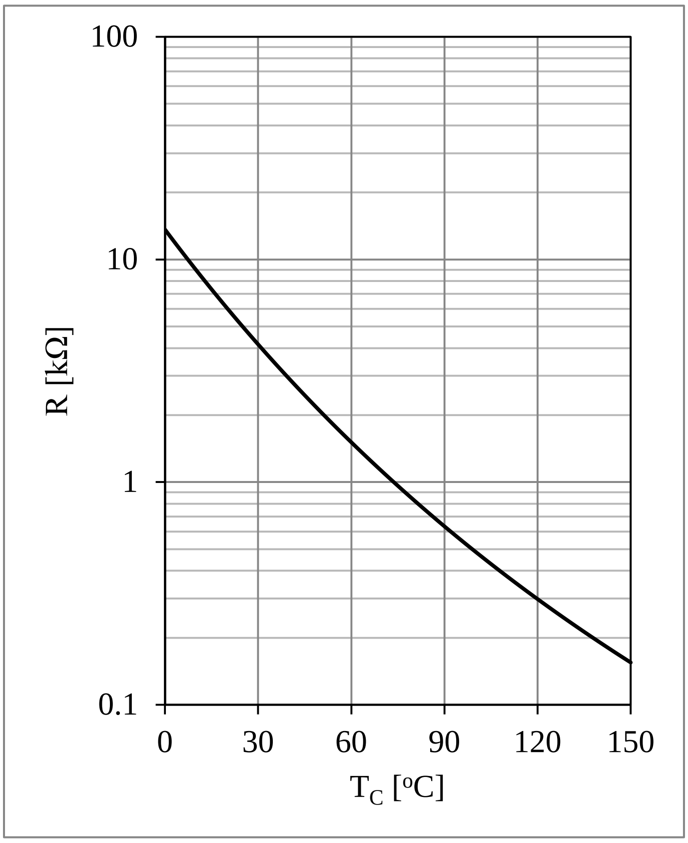
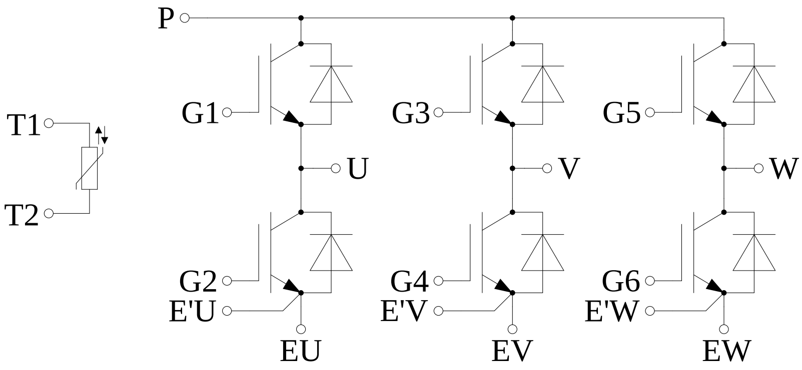


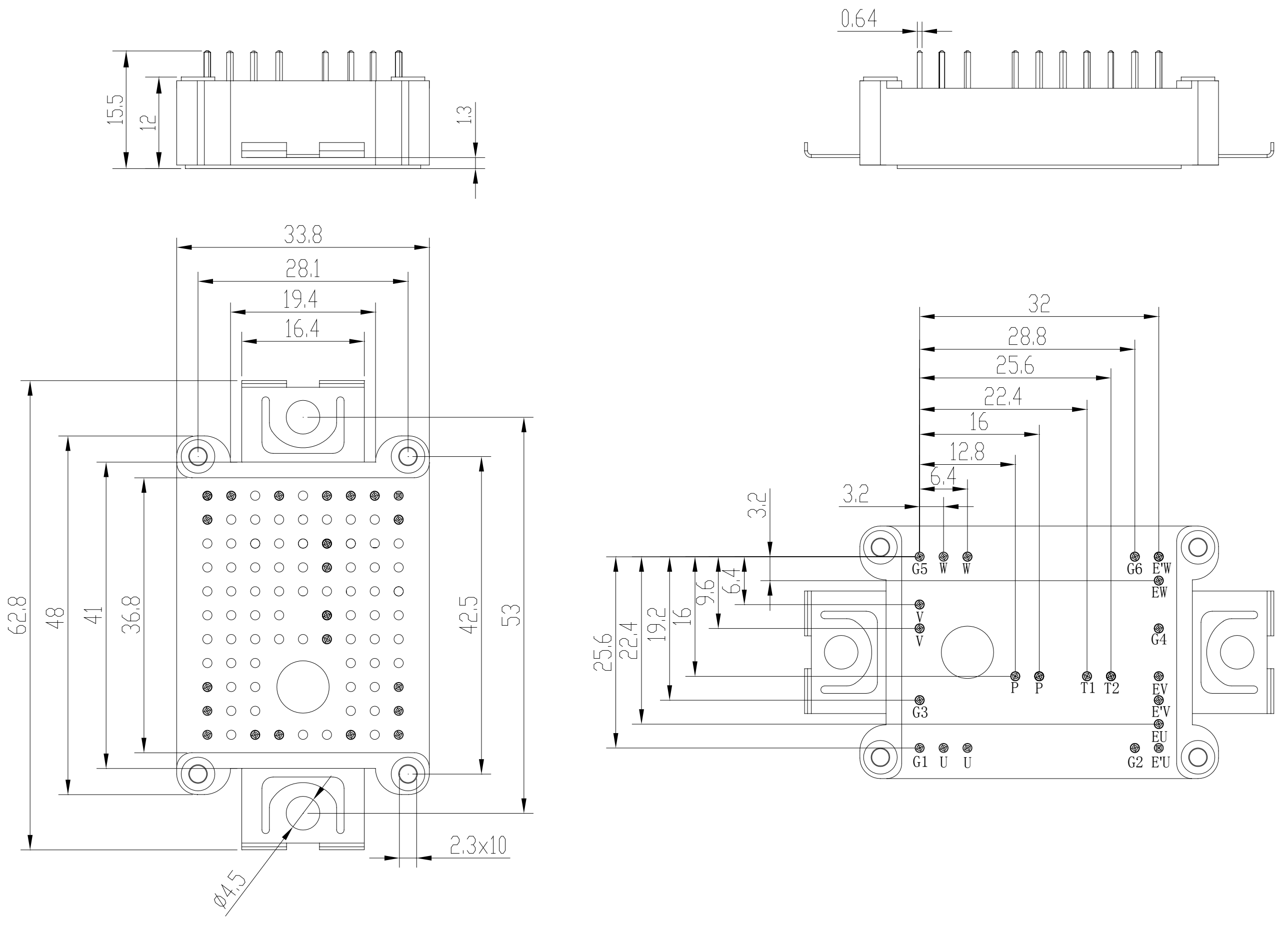
Fig 11. NTC Temperature Characteristic

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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