STARPOWER

SEMICONDUCTOR™

IGBT

GD35FSK120L1S

Molding Type Module

1200V/35A 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 $V_{CE(sat)}$ NPT IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD

Typical Applications

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

IGBT T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD35FSK120L1S	Units
V_{CES}	Collector-Emitter Voltage @ T_j=25℃	1200	V
V_{GES}	Gate-Emitter Voltage @ T_j=25℃	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=80℃	62 35	A
I_{CM}	Pulsed Collector Current t_p=1ms	70	A
P_{tot}	Total Power Dissipation @ T_j=150℃	261	W

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	T_j=25℃	1200			V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25℃			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=250μA,V_{CE}=V_{GE}, T_j=25℃	4.4	4.8	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=35A,V_{GE}=15V, T_j=25℃		2.40	2.85	V
		I_C=35A,V_{GE}=15V, T_j=125℃		2.80		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=35A, R_G=24Ω,V_{GE}=±15V, T_j=25℃		270		ns
t_r	Rise Time			54		ns
$t_{d(off)}$	Turn-Off Delay Time			273		ns
t_f	Fall Time			178		ns
E_{on}	Turn-On Switching Loss			3.71		mJ
E_{off}	Turn-Off Switching Loss			2.00		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=35A, R_G=24Ω,V_{GE}=±15V, T_j=125℃		270		ns
t_r	Rise Time			54		ns
$t_{d(off)}$	Turn-Off Delay Time			300		ns
t_f	Fall Time			325		ns
E_{on}	Turn-On Switching Loss			4.52		mJ
E_{off}	Turn-Off Switching Loss			3.91		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1Mhz, V_{GE}=0V		3.48		nF
C_{oes}	Output Capacitance			0.28		nF
C_{res}	Reverse Transfer Capacitance			0.11		nF
Q_G	Gate Charge	V_{CC}=600V,I_C=35A, V_{GE}=15V		255		nC
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		320		A

Diode T_C=25℃ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD35FSK120L1S	Units
V_{RRM}	Repetitive Peak Reverse Voltage @ T_j=25℃	1200	V
I_F	DC Forward Current @ T_C=80℃	35	A
I_{FRM}	Repetitive Peak Forward Current t_p=1ms	70	A

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=35A,V_{GE}=0V	T_j=25℃		2.00	2.45	V
			T_j=125℃		1.90		
Q_r	Recovered Charge	I_F=35A, V_R=600V, R_G=24Ω, V_{GE}=-15V	T_j=25℃		1.7		μC
			T_j=125℃		4.3		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		27		A
			T_j=125℃		29		
E_{rec}	Reverse Recovery Energy		T_j=25℃		1.16		mJ
			T_j=125℃		2.18		

NTC T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{25}	Rated Resistance			5.0		kΩ
ΔR/R	Deviation of R_{100}	T_C=100℃,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

IGBT Module

Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min		2500		V
L_{CE}	Stray Inductance		35		nH
$R_{CC'+EE'}$	Module Lead Resistance,Terminal to Chip @ T_C=25℃		4.00		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per diode)			0.479 1.115	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)		0.03		K/W
T_j	Maximum Junction Temperature			150	℃
T_{STG}	Storage Temperature Range	-40		125	℃
F	Mounting Force Per Clamp	40		80	N
G	Weight of Module		36		g

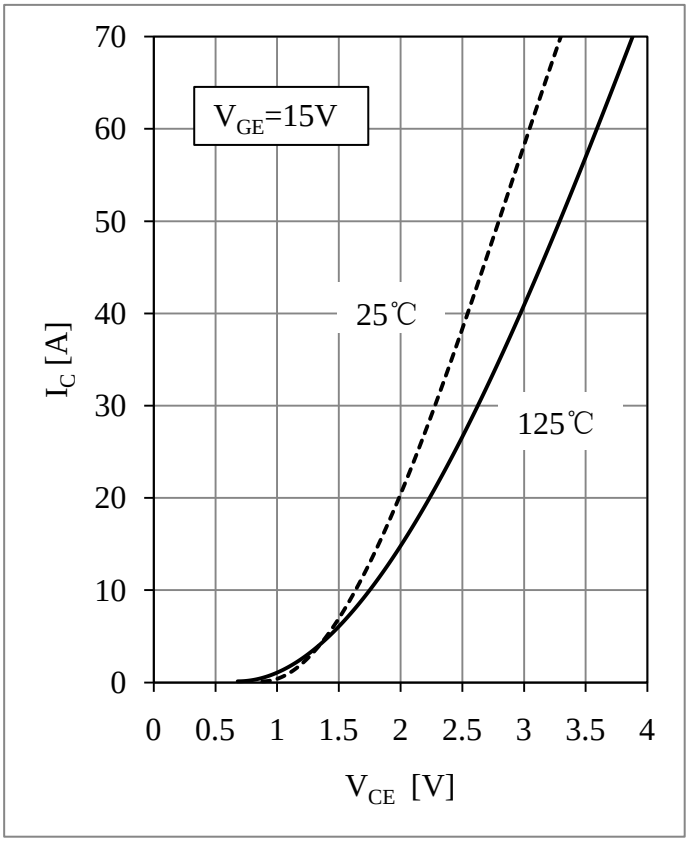


Fig 1. IGBT Output Characteristic

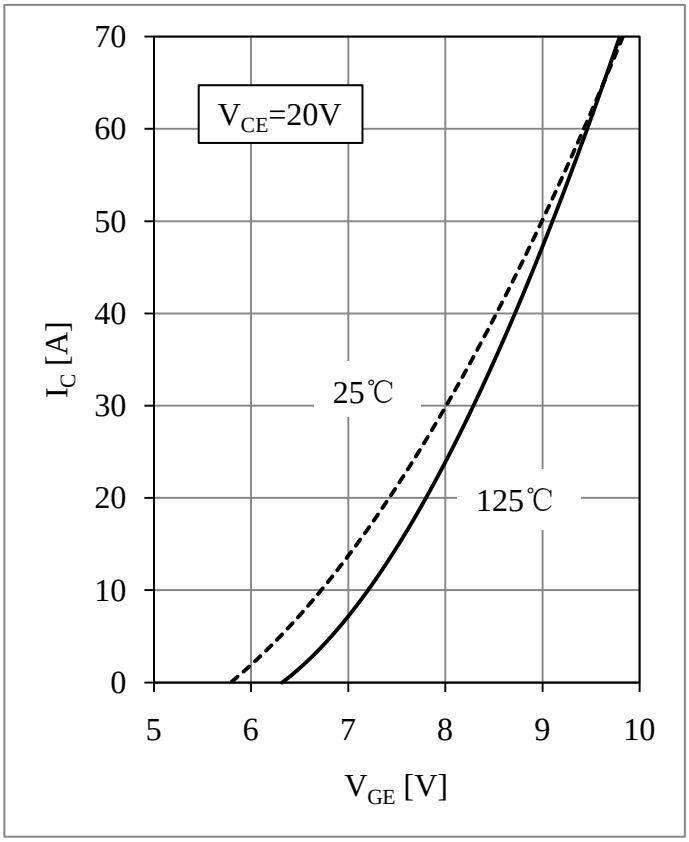


Fig 2. IGBT Transfer Characteristic

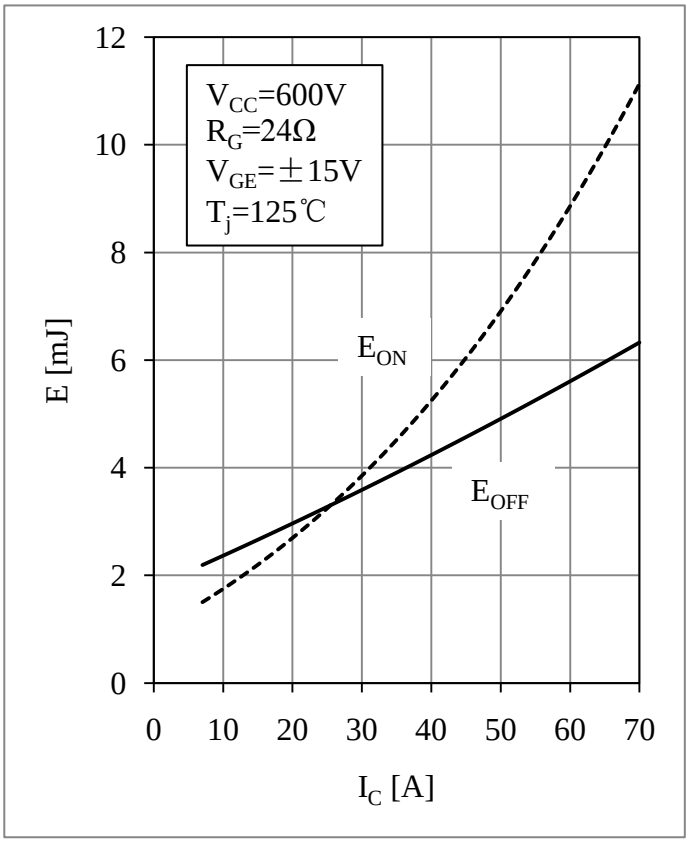


Fig 3. IGBT Switching Loss vs. I_C

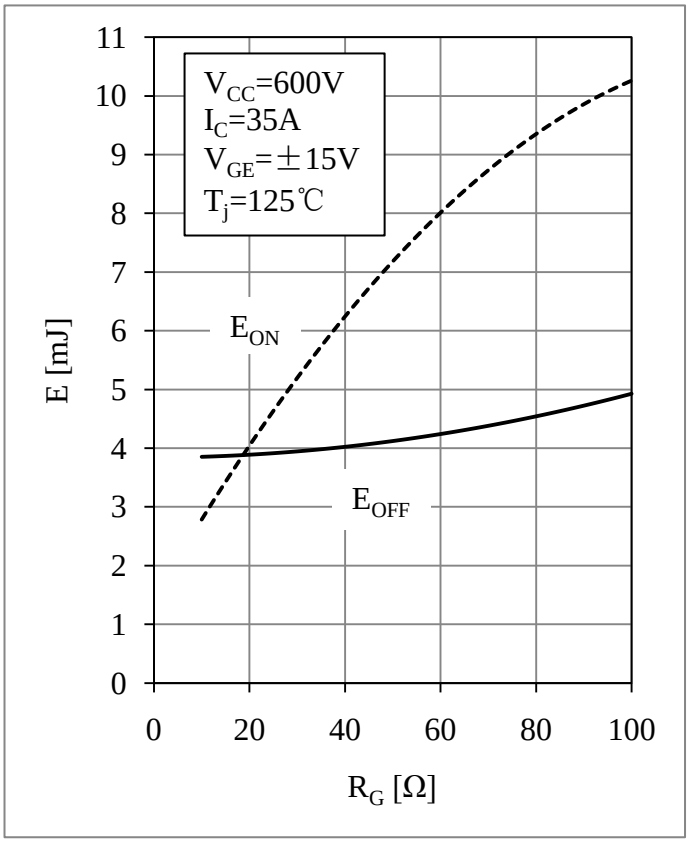


Fig 4. IGBT Switching Loss vs. R_G

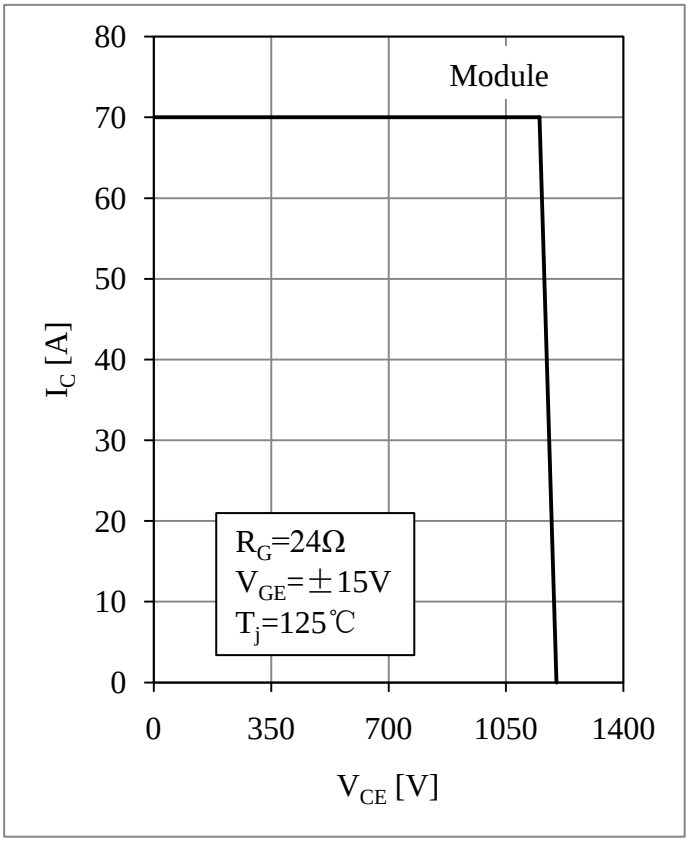


Fig 5. RBSOA

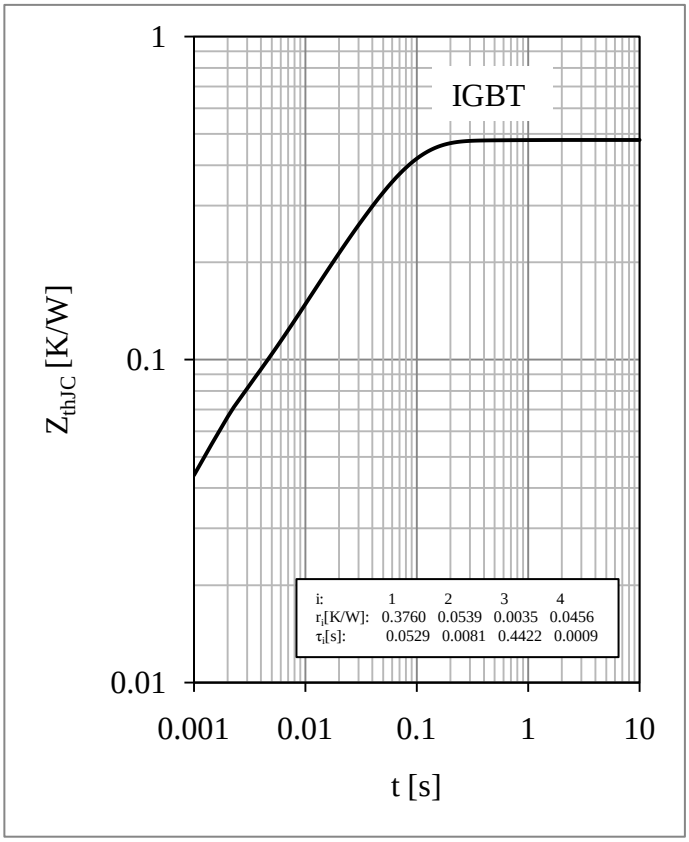


Fig 6. IGBT Transient Thermal Impedance

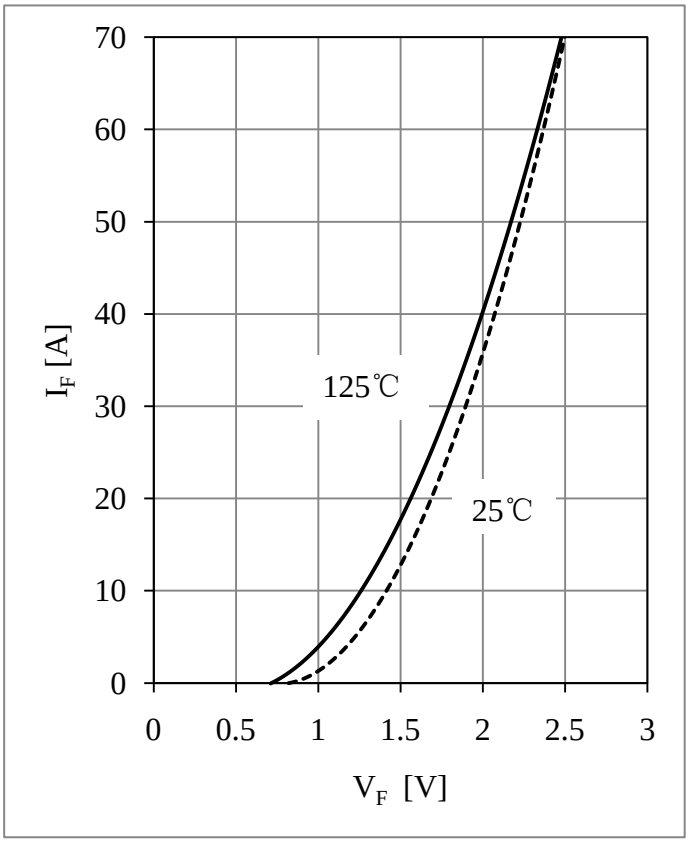


Fig 7. Diode Forward Characteristics

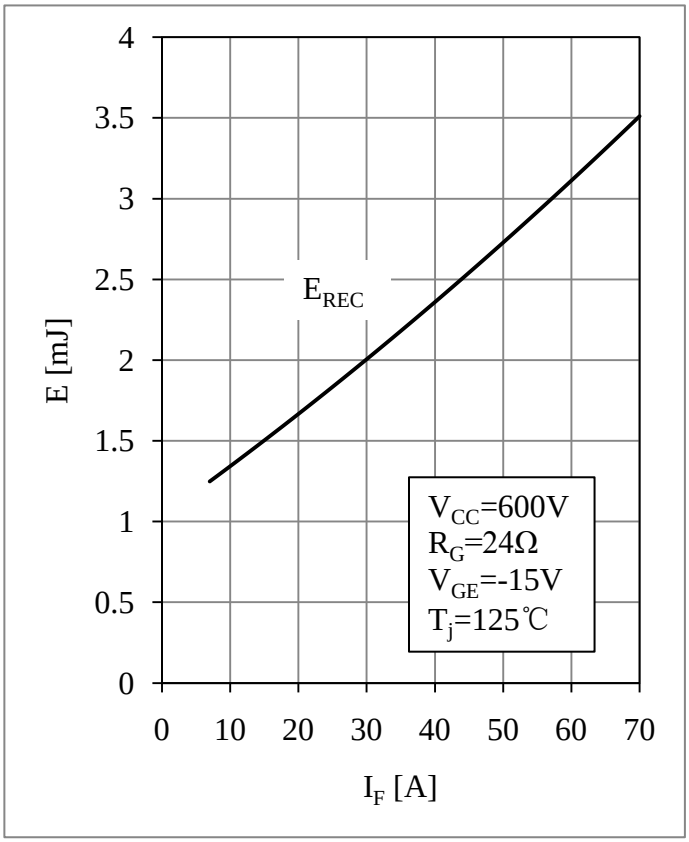


Fig 8. Diode Switching Loss vs. I_F

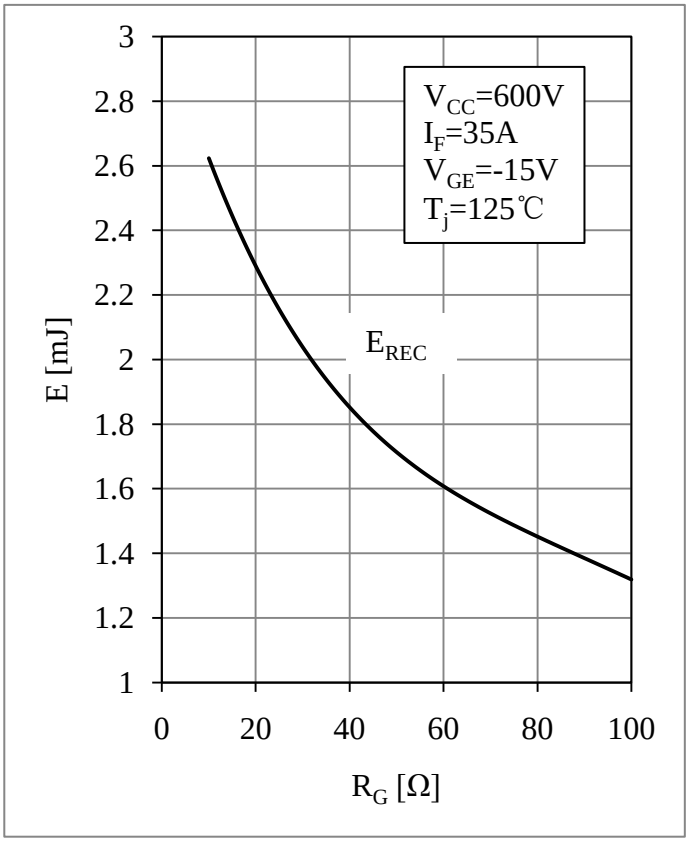


Fig 9. Diode Switching Loss vs. R_G

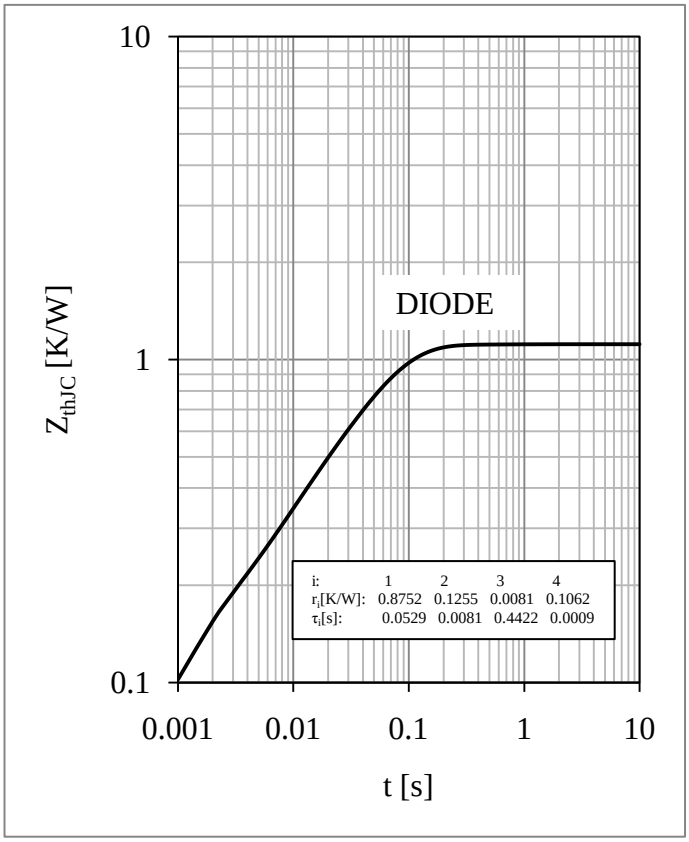


Fig 10. Diode Transient Thermal Impedance

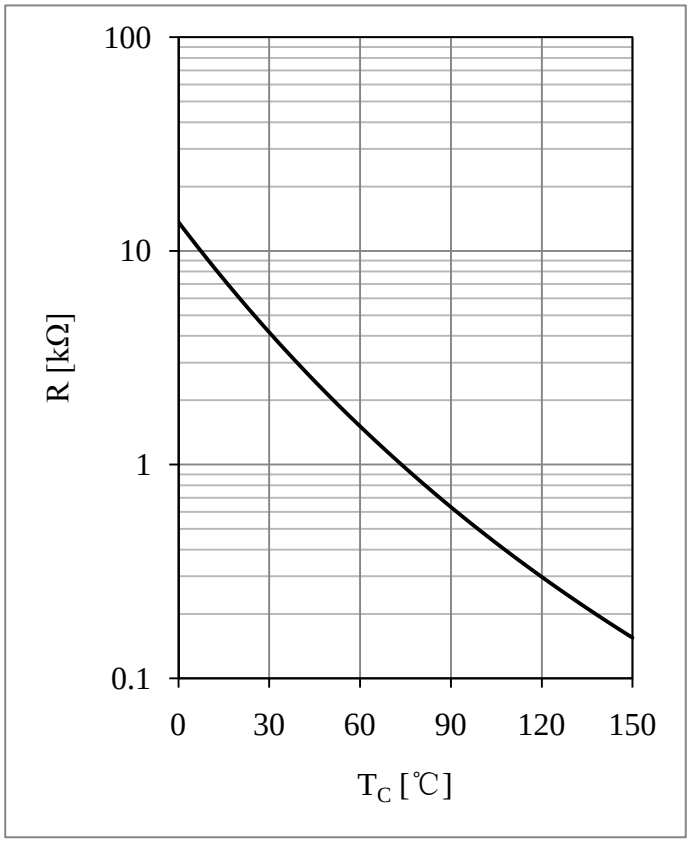
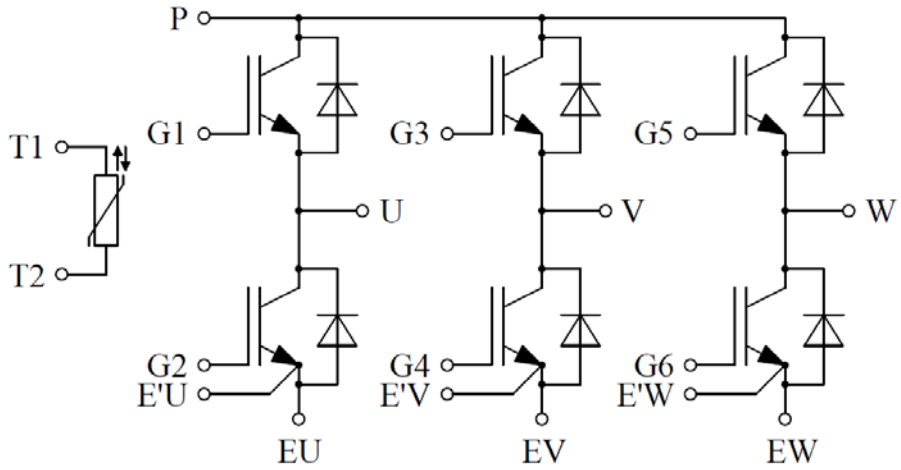


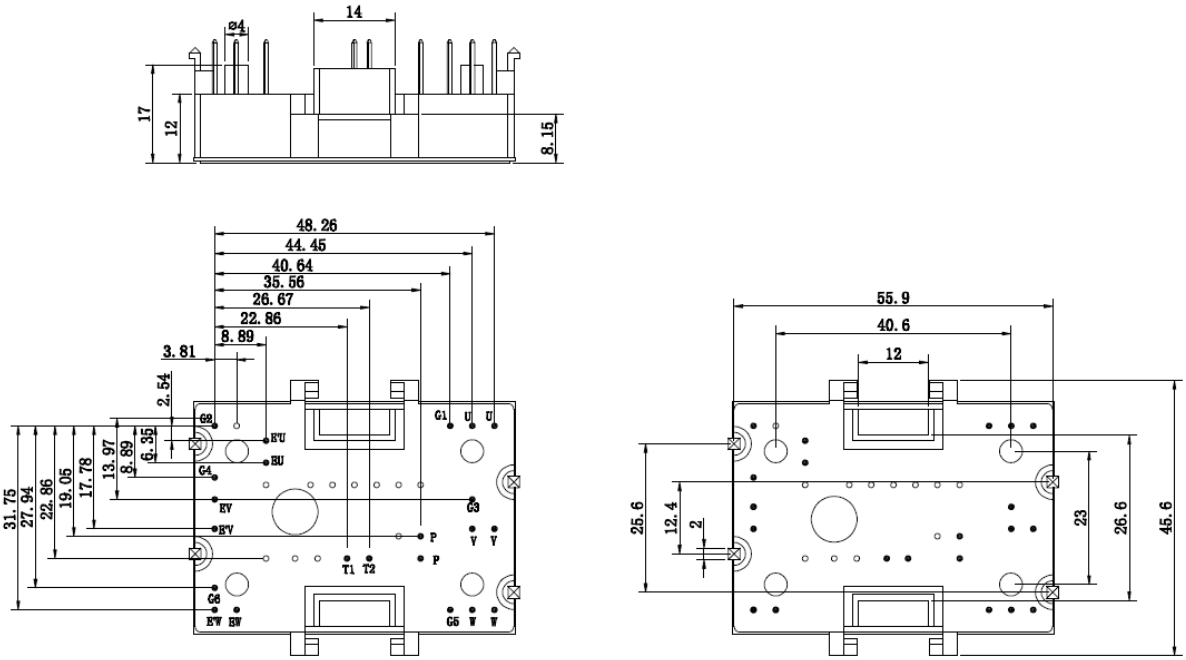
Fig 11. NTC Temperature Characteristic

Equivalent Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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