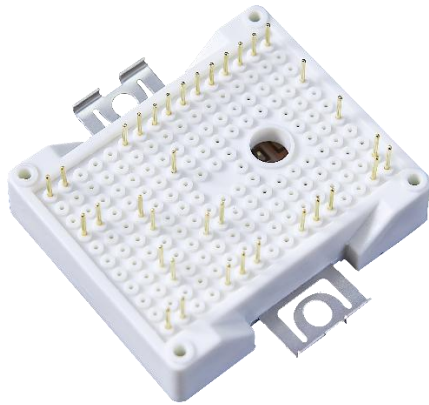




IGBT Modules

V_{CES}	650V
I_C	50A

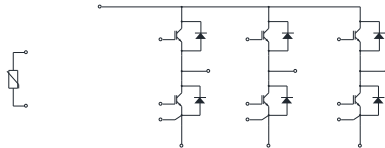
Applications

- Motor Drivers
- AC and DC Servo Drive Amplifier
- UPS (Uninterruptible Power Supplies)

Features

- Low switching losses
- Low $V_{CE(sat)}$ with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- High short circuit capability(5us)
- Isolated heatsink using DBC technology
- Maximum junction temperature 175°C

Circuit



● IGBT- inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	650	V
Continuous Collector Current	I_C	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	50	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	100	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C, T_{vjmax}=175^{\circ}C$	165	W



● **IGBT- inverter**
Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1mA, T_{vj}=25^{\circ}C$	4.0	5.1	6.5	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=50A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.65		V
		$I_C=50A, V_{GE}=15V, T_{vj}=150^{\circ}C$		1.90		
		$I_C=50A, V_{GE}=15V, T_{vj}=175^{\circ}C$		2.10		
Gate Charge	Q_G			0.25		uC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$		2.52		nF
Reverse Transfer Capacitance	C_{res}	$f=1MHz, T_{vj}=25^{\circ}C$		0.05		nF
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=50A$ $V_{CE}=300V$ $V_{GE}=\pm 15V$ $R_G=8.2\Omega$ $T_{vj}=25^{\circ}C$		23		ns
Rise Time	t_r			56		ns
Turn-off Delay Time	$t_{d(off)}$			87		ns
Fall Time	t_f			139		ns
Energy Dissipation During Turn-on Time	E_{on}			1.06		mJ
Energy Dissipation During Turn-off Time	E_{off}			0.89		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=50A$ $V_{CE}=300V$ $V_{GE}=\pm 15V$ $R_G=8.2\Omega$ $T_{vj}=150^{\circ}C$		22		ns
Rise Time	t_r			55		ns
Turn-off Delay Time	$t_{d(off)}$			101		ns
Fall Time	t_f			180		ns
Energy Dissipation During Turn-on Time	E_{on}			1.51		mJ
Energy Dissipation During Turn-off Time	E_{off}			1.1		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=50A$ $V_{CE}=300V$ $V_{GE}=\pm 15V$ $R_G=8.2\Omega$ $T_{vj}=175^{\circ}C$		22		ns
Rise Time	t_r			55		ns
Turn-off Delay Time	$t_{d(off)}$			103		ns
Fall Time	t_f			192		ns
Energy Dissipation During Turn-on Time	E_{on}			1.61		mJ
Energy Dissipation During Turn-off Time	E_{off}			1.2		mJ
SC Data	I_{SC}	$t_p \leq 5\mu s, V_{GE}=15V, T_{vj}=175^{\circ}C,$ $V_{CC}=300V, V_{CEM} \leq 650V$		200		A



● Diode-inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	650	V
Continuous DC Forward Current	I_F		50	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1\text{ms}$	100	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=50\text{A}, T_{vj}=25^{\circ}\text{C}$		1.75		V
		$I_F=50\text{A}, T_{vj}=150^{\circ}\text{C}$		1.50		
		$I_F=50\text{A}, T_{vj}=175^{\circ}\text{C}$		1.45		
Recovered Charge	Q_{rr}	$I_F=50\text{A}$ $V_R=300\text{V}$ $-di_F/dt = 700\text{A}/\mu\text{s}$ $T_{vj}=25^{\circ}\text{C}$		1.28		μC
Peak Reverse Recovery Current	I_{rr}			21		A
Reverse Recovery Energy	E_{rec}			0.22		mJ
Recovered Charge	Q_{rr}	$I_F=50\text{A}$ $V_R=300\text{V}$ $-di_F/dt = 700\text{A}/\mu\text{s}$ $T_{vj}=150^{\circ}\text{C}$		2.84		μC
Peak Reverse Recovery Current	I_{rr}			31		A
Reverse Recovery Energy	E_{rec}			0.5		mJ
Recovered Charge	Q_{rr}	$I_F=50\text{A}$ $V_R=300\text{V}$ $-di_F/dt = 700\text{A}/\mu\text{s}$ $T_{vj}=175^{\circ}\text{C}$		3.25		μC
Peak Reverse Recovery Current	I_{rr}			33		A
Reverse Recovery Energy	E_{rec}			0.57		mJ



● NTC-Thermistor

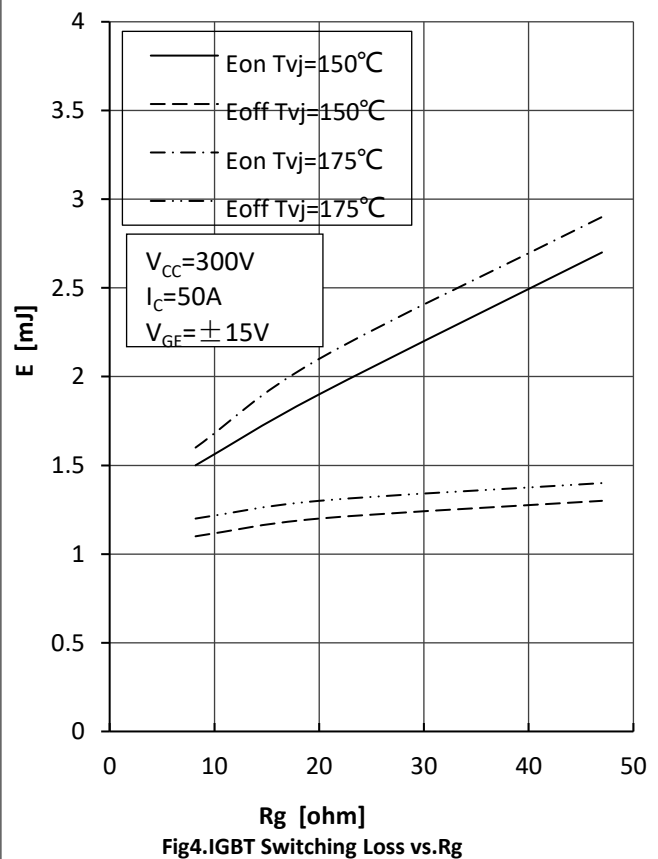
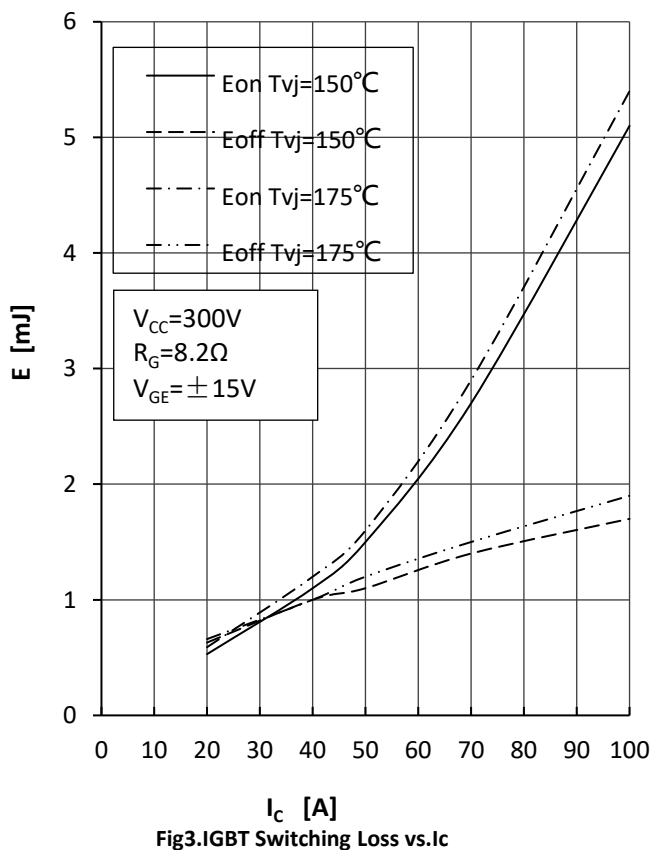
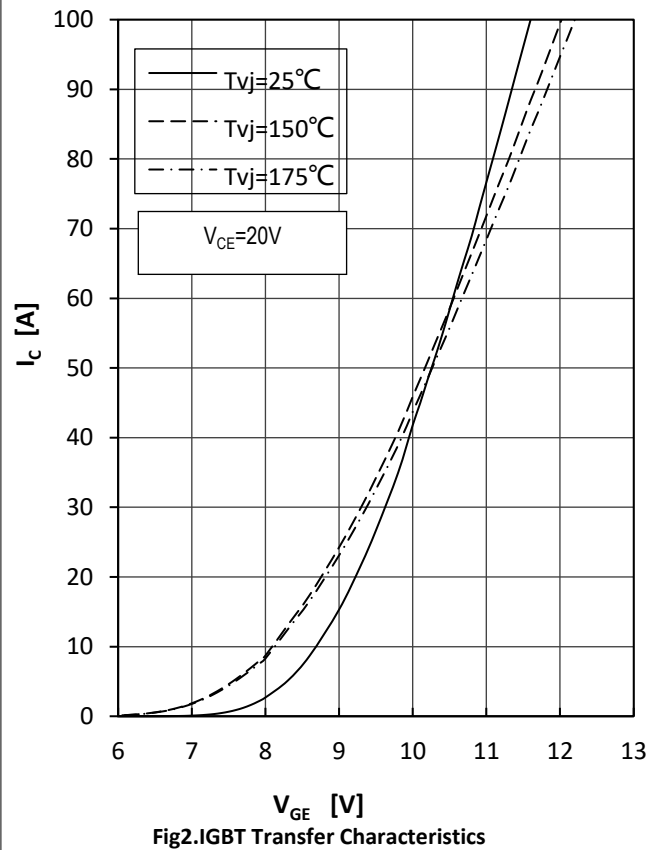
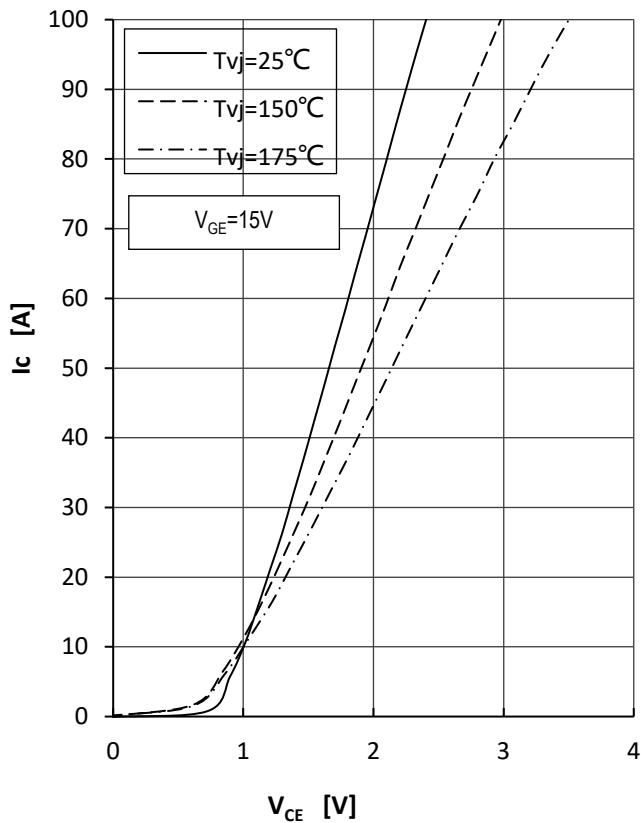
Characteristic values

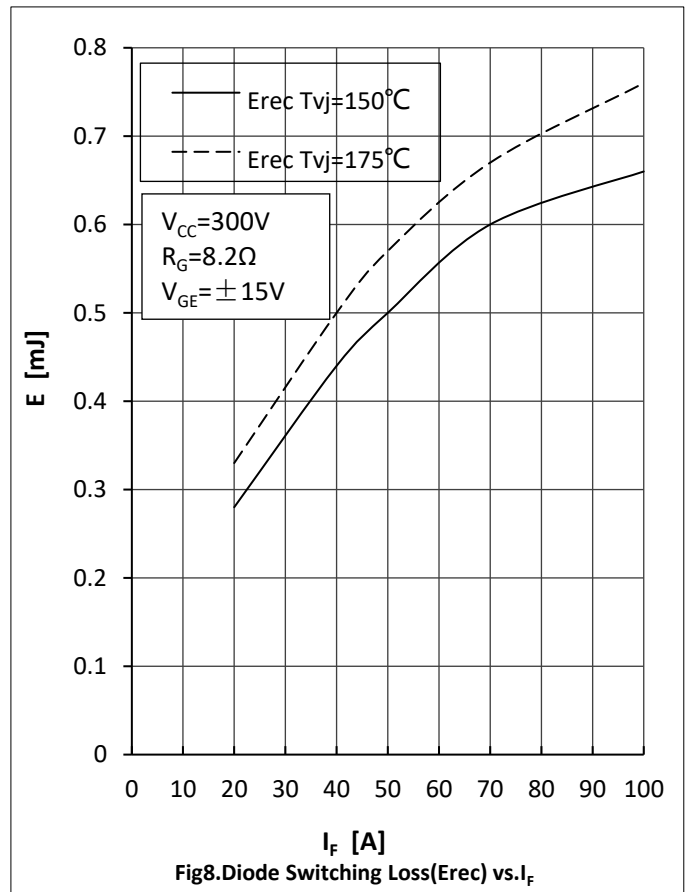
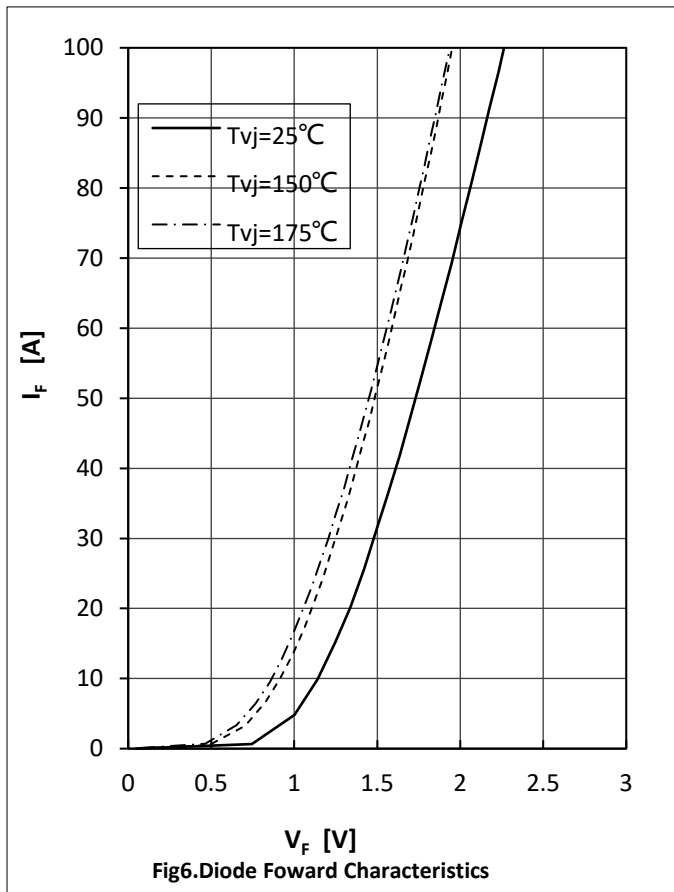
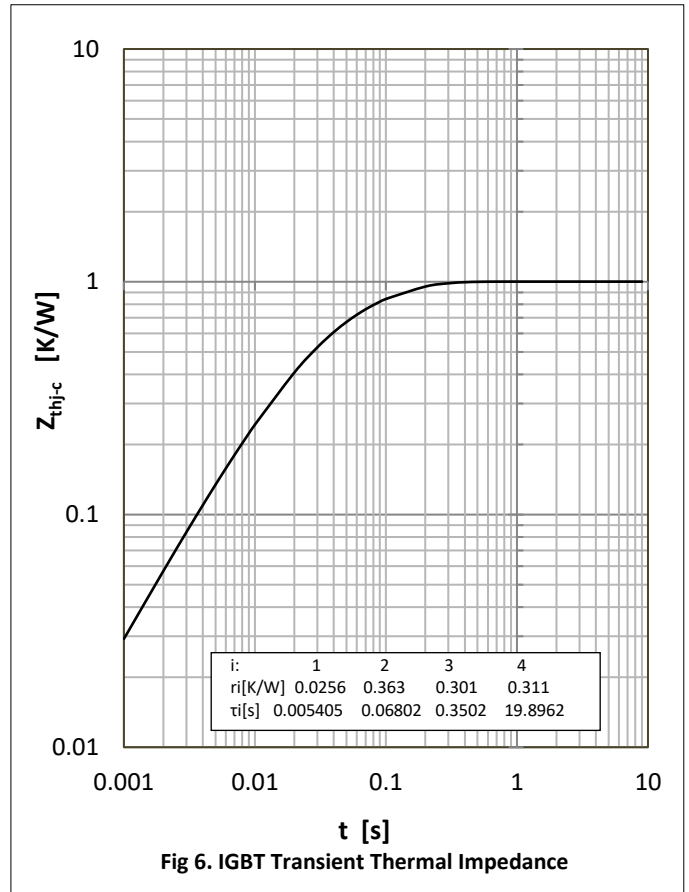
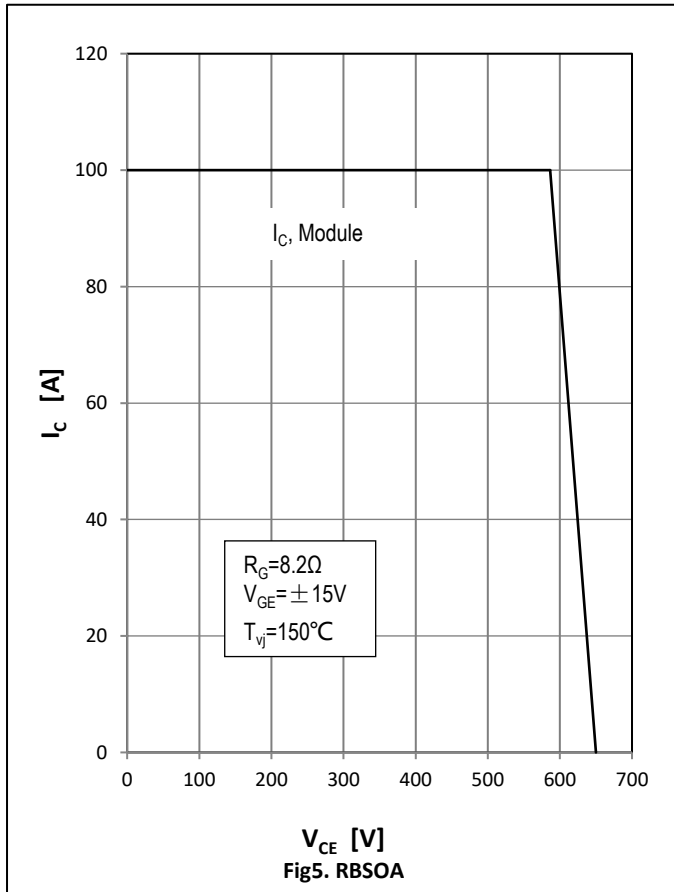
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		k Ω
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{ K}))]$		3375		K

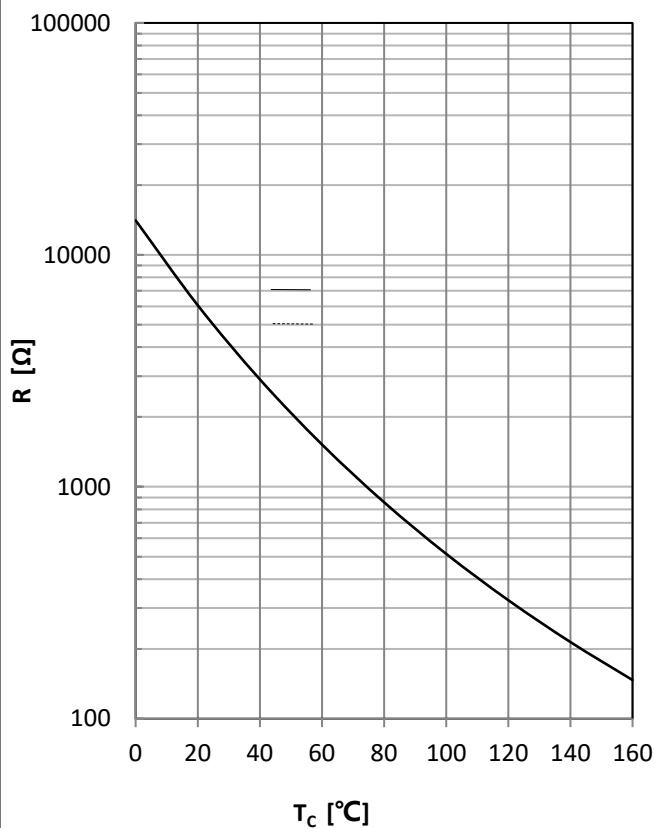
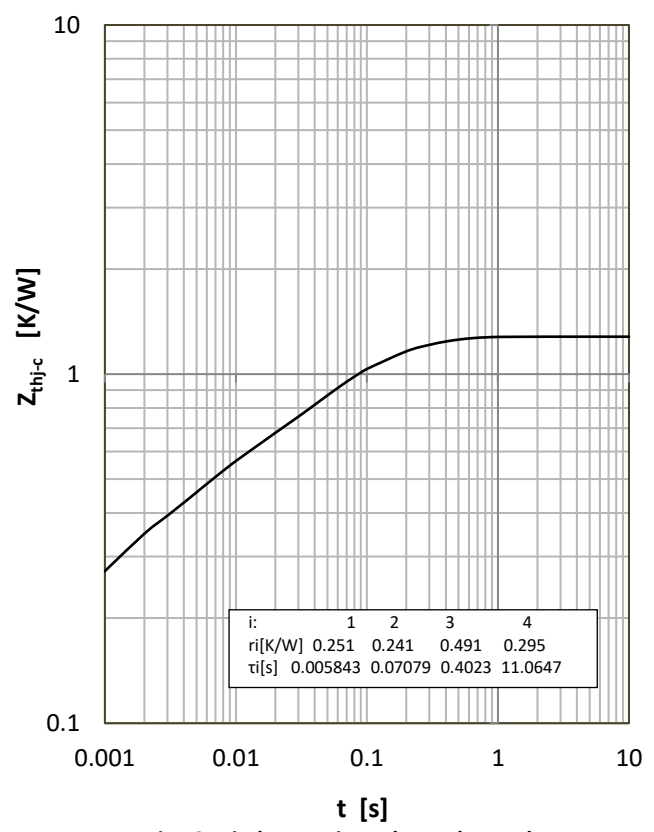
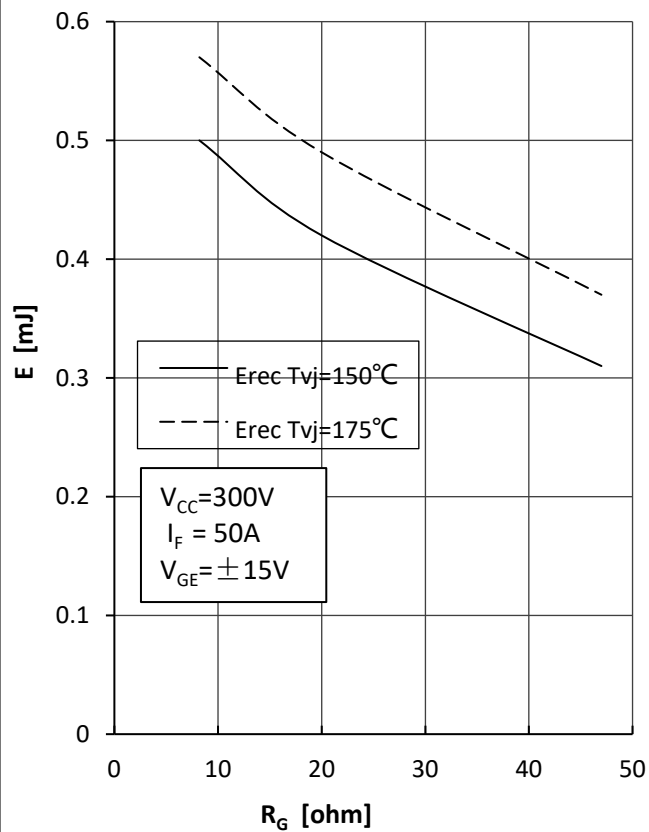
● Module Characteristics

$T_C=25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation Voltage	V_{isol}	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	$T_{j\text{max}}$				175	$^\circ\text{C}$
Operating Junction Temperature	$T_{vj\text{op}}$		-40		150	$^\circ\text{C}$
Storage Temperature	T_{stg}		-40		125	$^\circ\text{C}$
Stray-inductance-module	L_{SCE}			30		nH
Module Lead Resistance, terminals-chip	$R_{\text{CC}'+\text{EE}'}$	$T_C=25^\circ\text{C}$, per switch		5.00		m Ω
	$R_{\text{AA}'+\text{CC}'}$			6.00		
Thermal Resistance Junction to Case	$R_{\theta\text{JC}}$	per IGBT-inverter			0.90	K/W
		per Diode-inverter			1.17	
Mounting Force Per Clamp	F		30		80	N
Weight of Module	G			45		g

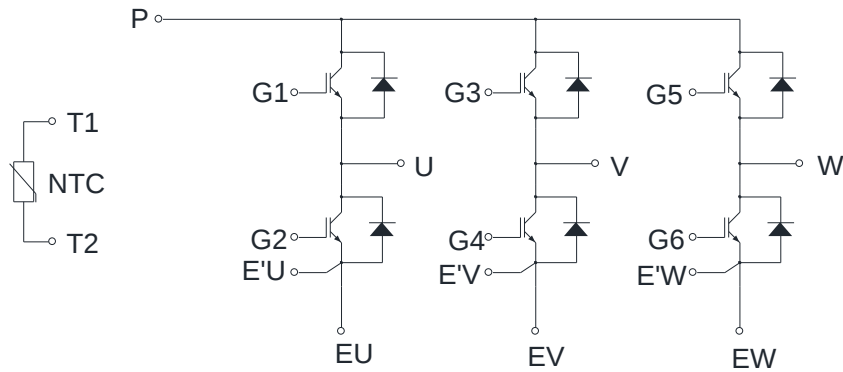




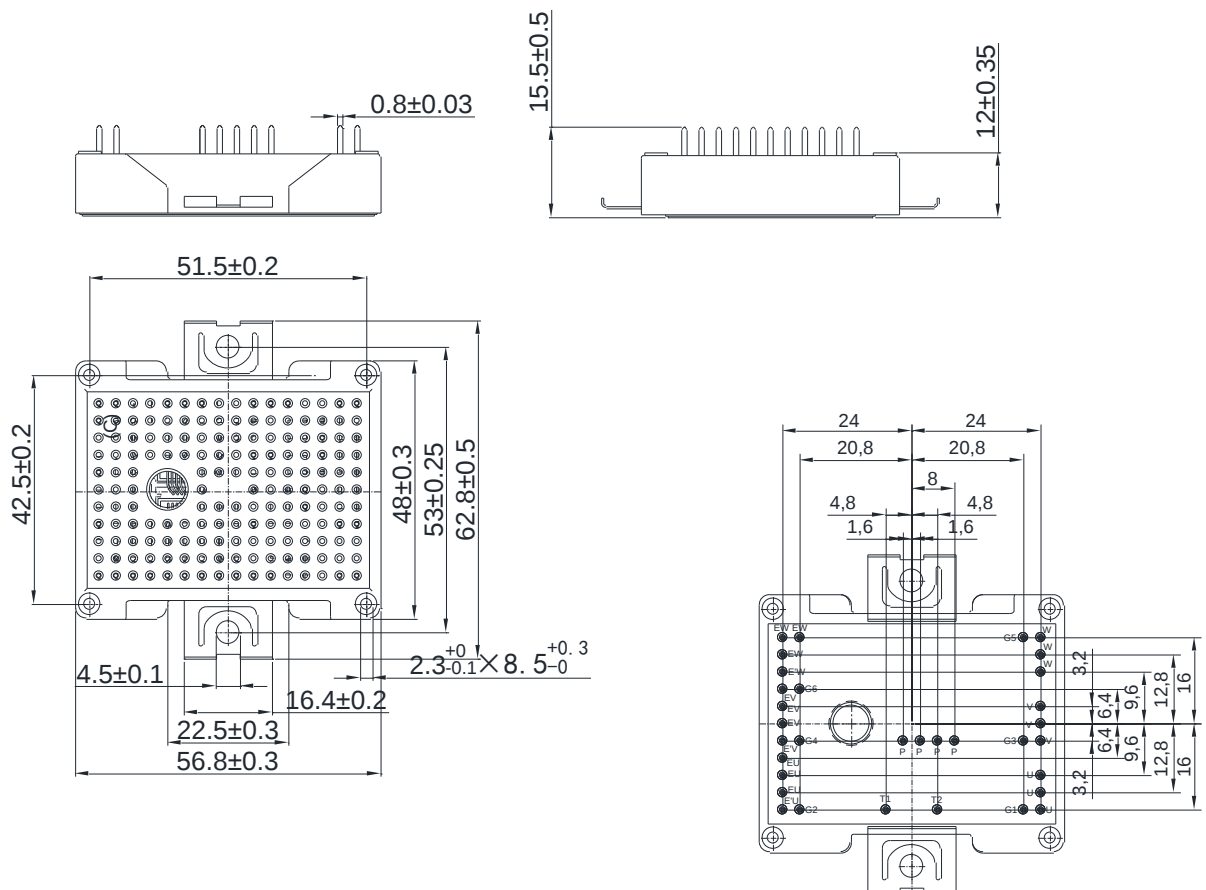




Circuit Diagram



● Package Dimensions





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