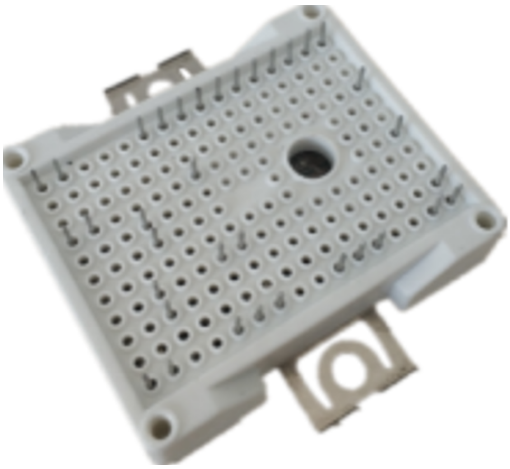
MG50TF12SCP3S

RoHS COMPLIANT



IGBT Modules

V_{CES}	1200V
I_C	50A

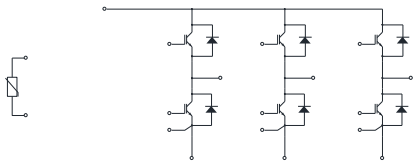
Applications

- 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
- Isolated heatsink using DBC technology
- Maximum junction temperature 175℃

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℃	1200	V
Continuous Collector Current	I_C	T_C=100℃, T_{vjmax}=175℃	50	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	100	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃,T_{vjmax}=175℃	472	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=1.5mA,T_{vj}=25℃	5.0	5.6	6.5	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=50A,V_{GE}=15V, T_{vj}=25℃		1.7		V
		I_C=50A,V_{GE}=15V, T_{vj}=150℃		2.1		
		I_C=50A,V_{GE}=15V, T_{vj}=175℃		2.2		
Gate Charge	Q_G			0.29		uC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1MHz, T_{vj}=25℃		5.29		nF
Reverse Transfer Capacitance	C_{res}			0.34		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V,T_{vj}=25℃			200	nA
Turn-on Delay Time	$t_{d(on)}$	I_C=50A V_{CE}=600V V_{GE}=±15V R_G=5.6Ω T_{vj}=25℃		58		ns
Rise Time	t_r			36		ns
Turn-off Delay Time	$t_{d(off)}$			260		ns
Fall Time	t_f			170		ns
Energy Dissipation During Turn-on Time	E_{on}			2.7		mJ
Energy Dissipation During Turn-off Time	E_{off}			3.6		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=50A V_{CE}=600V V_{GE}=±15V R_G=5.6Ω T_{vj}=150℃		66		ns
Rise Time	t_r			40		ns
Turn-off Delay Time	$t_{d(off)}$			300		ns
Fall Time	t_f			245		ns
Energy Dissipation During Turn-on Time	E_{on}			3.9		mJ
Energy Dissipation During Turn-off Time	E_{off}			5.2		mJ

Turn-on Delay Time	$t_{d(on)}$	I_C=50A V_{CE}=600V V_{GE}=±15V R_G=5.6Ω T_{vj}=175℃		70		ns
Rise Time	t_r			45		ns
Turn-off Delay Time	$t_{d(off)}$			312		ns
Fall Time	t_f			258		ns
Energy Dissipation During Turn-on Time	E_{on}			4.1		mJ
Energy Dissipation During Turn-off Time	E_{off}			5.4		mJ
SC Data	I_{SC}	t_p≤6us,V_{GE}=15V,T_{vj}=175℃, V_{CC}=600V,V_{CEM}≤1200V		210		A

Diode-inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_{vj}=25℃	1200	V
Continuous DC Forward Current	I_F		50	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	100	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=50A,T_{vj}=25℃		1.75		V
		I_F=50A,T_{vj}=150℃		1.85		
		I_F=50A,T_{vj}=175℃		1.83		
Recovered Charge	Q_{rr}	I_F=50A V_R=600V -di_F/dt =2800A/us T_{vj}=25℃		5.74		uC
Peak Reverse Recovery Current	I_{rr}			39		A
Reverse Recovery Energy	E_{rec}			1.8		mJ
Recovered Charge	Q_{rr}	I_F=50A V_R=600V -di_F/dt =2800A/us T_{vj}=150℃		11.1		uC
Peak Reverse Recovery Current	I_{rr}			44		A
Reverse Recovery Energy	E_{rec}			4.1		mJ
Recovered Charge	Q_{rr}	I_F=50A V_R=600V -di_F/dt =2800A/us T_{vj}=175℃		12.85		uC
Peak Reverse Recovery Current	I_{rr}			48		A
Reverse Recovery Energy	E_{rec}			4.7		mJ

NTC-Thermistor

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		kΩ
Deviation of R100	ΔR/R	T_C=100,R_{100}=493.3Ω	-5		5	%
Power Dissipation	P_{25}				10.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\ K))]$		3380		K

Module Characteristics

T_C=25°C unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation Voltage	V_{isol}	t=1min,f=50Hz		4500		V
Maximum Junction Temperature	T_{jmax}				175	℃
Operating Junction Temperature	$T_{vj\ op}$		-40		150	℃
Storage Temperature	T_{stg}		-40		125	℃
Stray-inductance-module	L_{SCE}			30		nH
Module Lead Resistance, Terminals-chip	$R_{CC'+EE'}$	T_C=25℃, per switch		5.00		mΩ
	$R_{AA'+CC'}$			6.00		
Thermal Resistance Junction-to Case	$R_{\theta JC}$	per IGBT-inverter			0.75	K/W
		per Diode-inverter			1.04	
Mounting Torque for Module Mounting	Ms	Screw M4-Mounting according to valid application note	1.5		1.8	Nm
Weight of Module	G			40		g

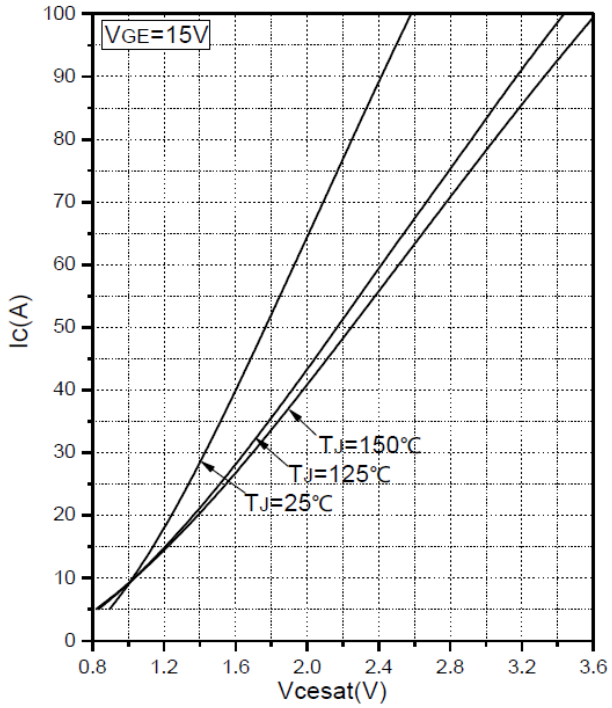


Fig.1 Typical Saturation Voltage Characteristics

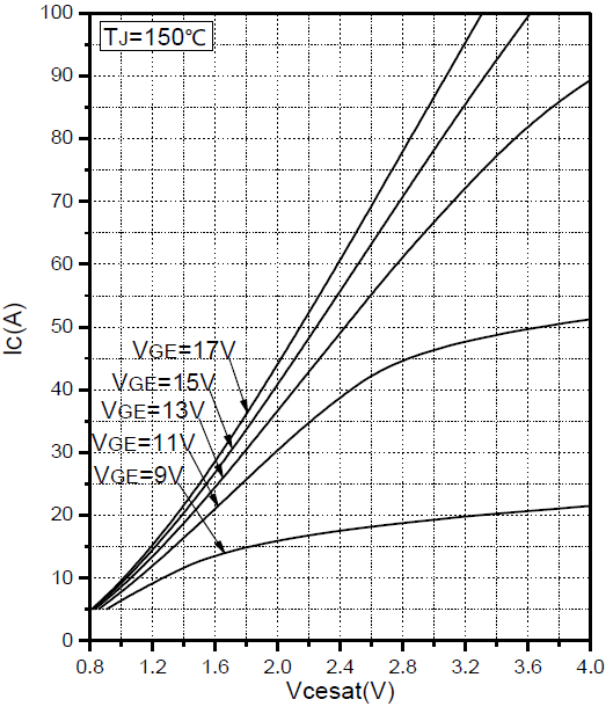


Fig.2 Typical Output Characteristics

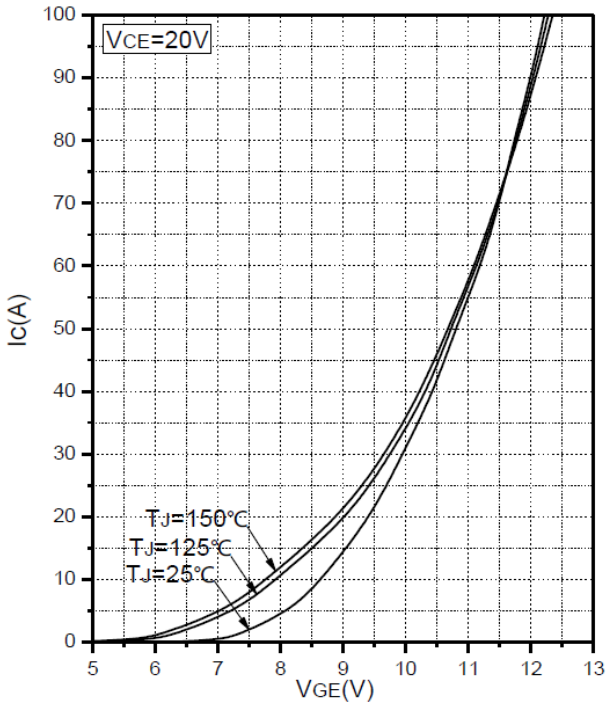


Fig.3 Transfer Characteristics

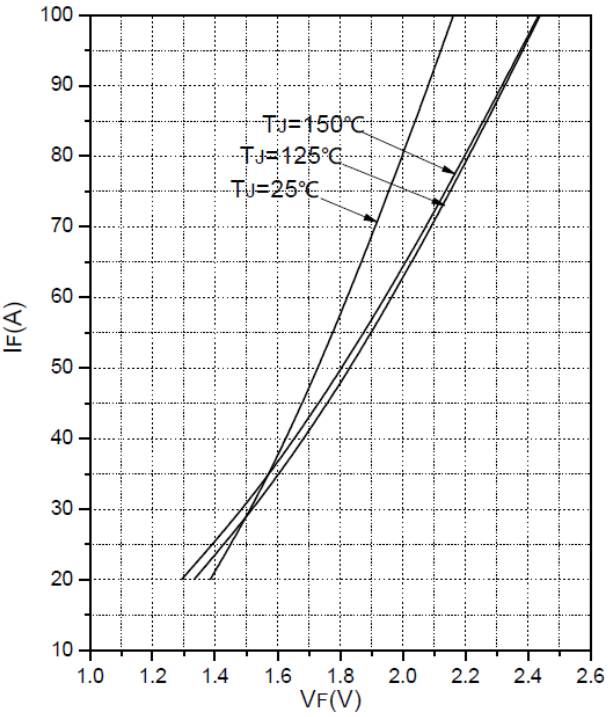


Fig.4 Forward Characteristics of Diode

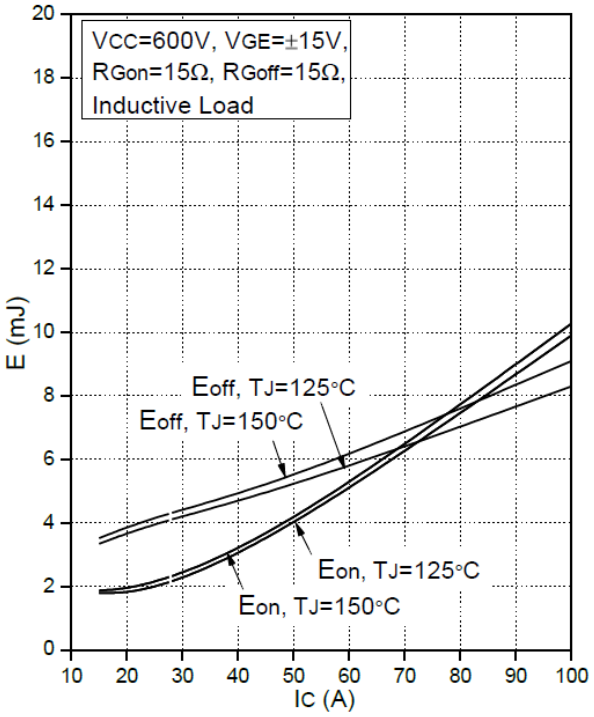


Fig.5 Typical Switching Loss vs. Collector Current

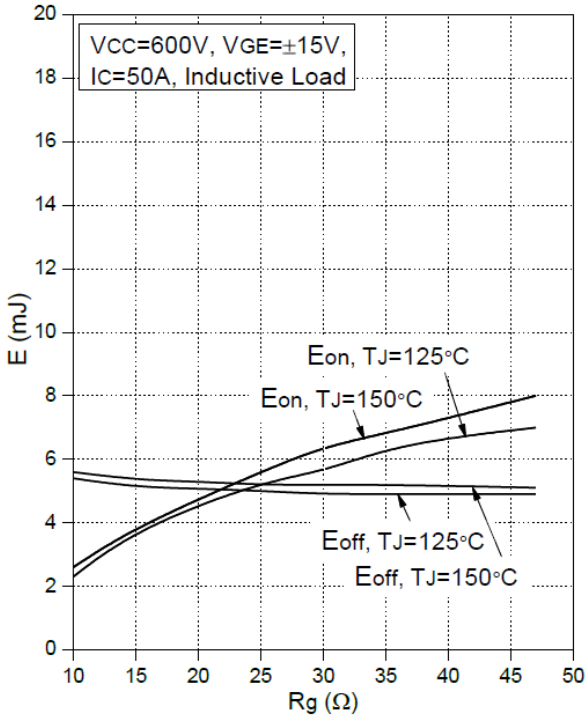


Fig.6 Typical Switching Loss vs. Gate Resistance

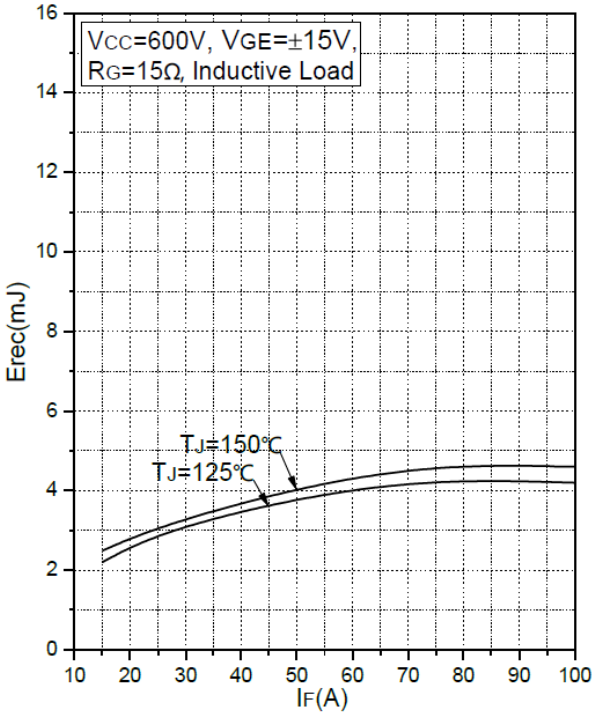


Fig.7 Typical Switching Loss vs. Forward Current

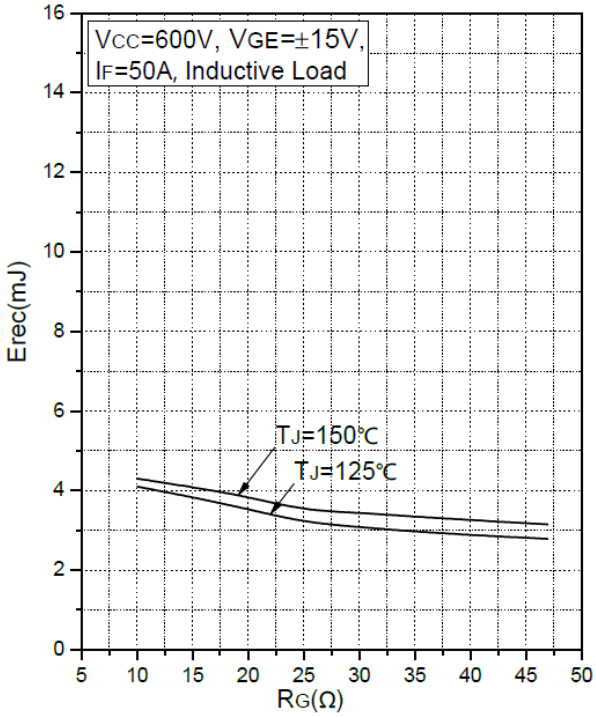


Fig.8 Typical Switching Loss vs. Gate Resistance

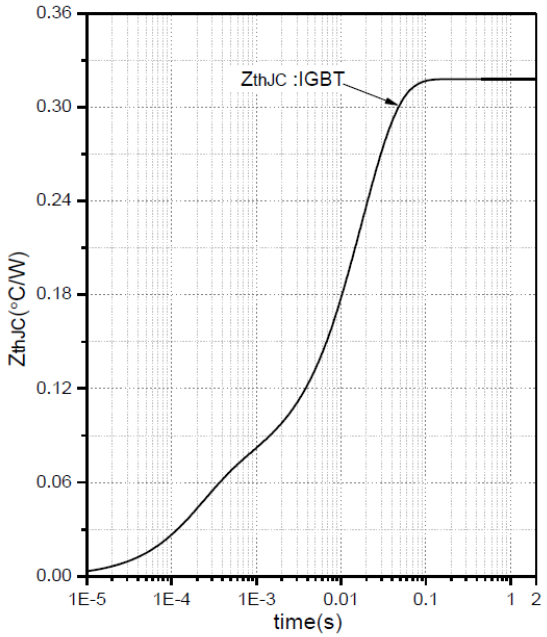


Fig.9 Transient Thermal Impedance (IGBT)

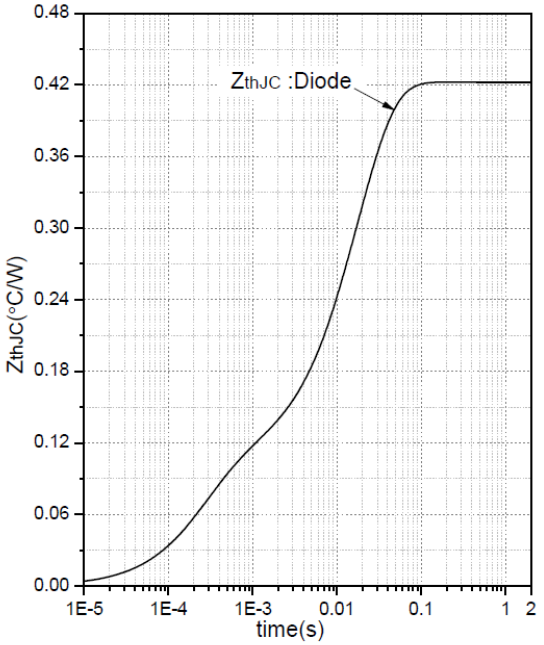


Fig.10 Transient Thermal Impedance (Diode)

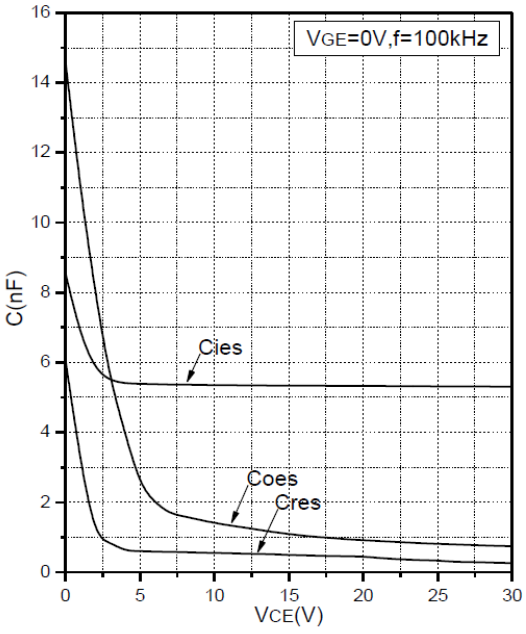


Fig.11 Capacitance Characteristics

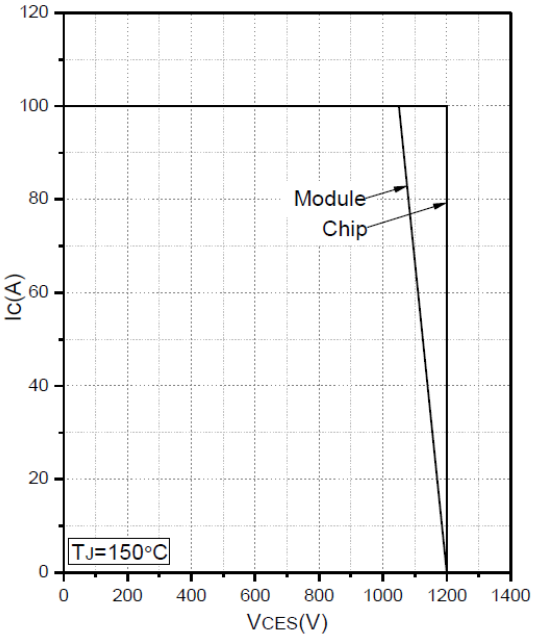
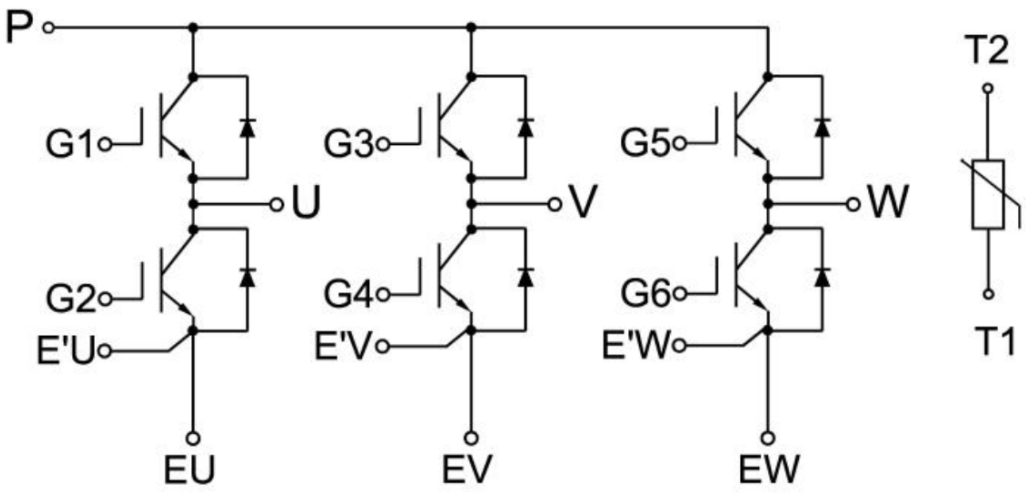
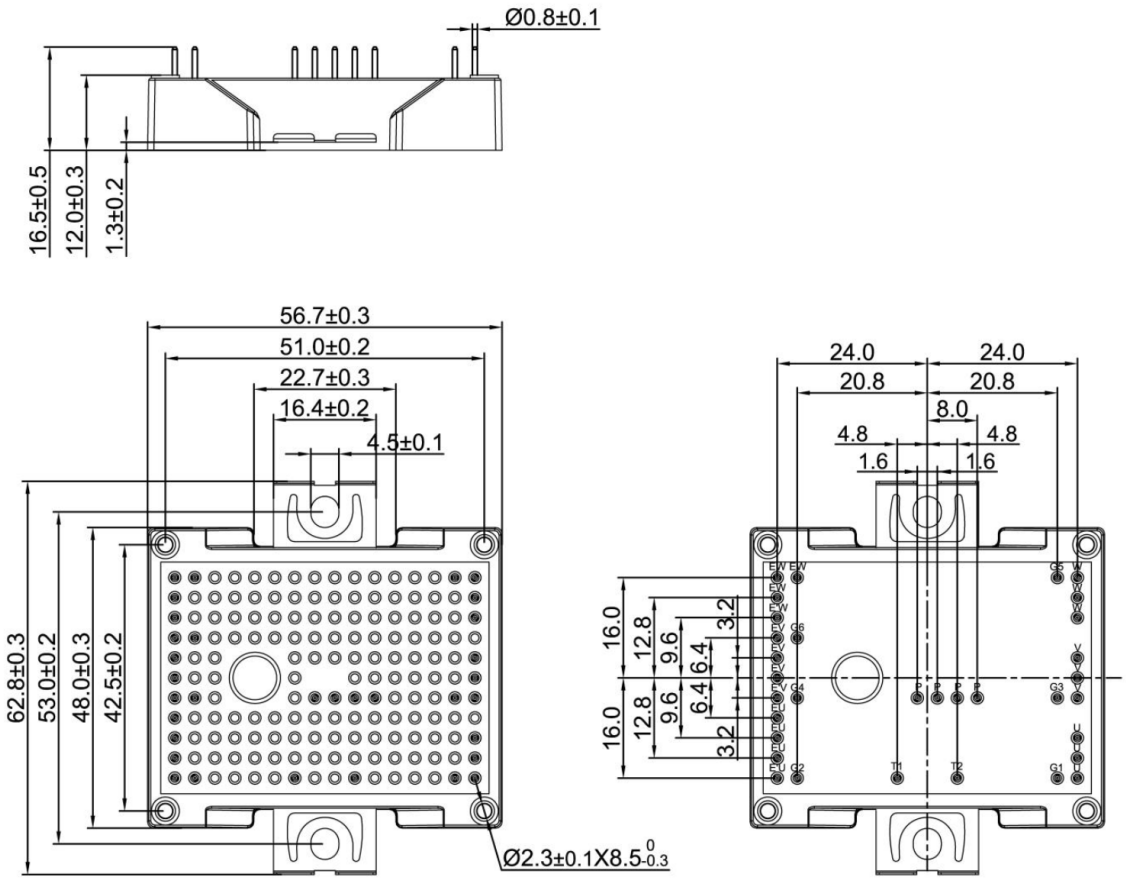


Fig.12 Transient Thermal Impedance (IGBT)

- **Circuit Diagram**



- **Package Dimensions**



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