

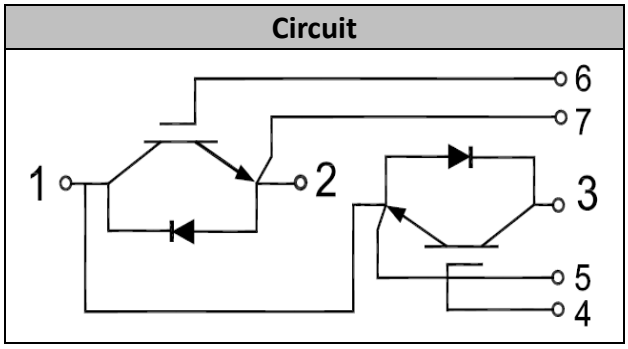
IGBT Modules

V_{CES} 650V
I_C 400A

Applications

- High frequency drivers
- Solar inverters
- UPS (Uninterruptible Power Supplies)
- Electric welding machine

Circuit



Features

- Low $V_{CE(sat)}$ with Trench technology
- Low switching losses
- High short circuit capability(6us)
- Including ultra fast & soft recovery anti-parallel FWD
- Low inductance
- Maximum junction temperature 175℃

IGBT

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	V_{GE}=0V, I_C=1mA, T_{vj}=25℃	650	V
Continuous Collector Current	I_C	T_C=100℃	400	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	800	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_C=25℃ T_{vjmax}=175℃	1250	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, I_C=10.0mA,T_{vj}=25℃	5.0	5.7	6.6	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=650V,V_{GE}=0V,T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=400A,V_{GE}=15V, T_{vj}=25℃		1.70		V
		I_C=400A,V_{GE}=15V, T_{vj}=125℃		2.00		
		I_C=400A,V_{GE}=15V, T_{vj}=150℃		2.10		
Gate Charge	Q_G			4.60		uC
Internal Gate Resistance	R_{gint}			0.6		Ω
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1MHz,T_{vj}=25℃		37.9		nF
Reverse Transfer Capacitance	C_{res}			0.76		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V,T_{vj}=25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C=400A V_{CE}=300V V_{GE}=±15V R_G=1.5Ω T_{vj}=25℃		48		ns
Rise Time	t_r			79		ns
Turn-off Delay Time	$t_{d(off)}$			247		ns
Fall Time	t_f			74		ns
Energy Dissipation During Turn-on Time	E_{on}			18.8		mJ
Energy Dissipation During Turn-off Time	E_{off}			10.2		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=400A V_{CE}=300V V_{GE}=±15V R_G=1.5Ω T_{vj}=150℃		53		ns
Rise Time	t_r			89		ns
Turn-off Delay Time	$t_{d(off)}$			252		ns
Fall Time	t_f			89		ns
Energy Dissipation During Turn-on Time	E_{on}			18.6		mJ
Energy Dissipation During Turn-off Time	E_{off}			11.4		mJ
SC Data	I_{sc}	t_p≤6us,V_{GE}=15V, T_{vj}=150℃,V_{CC}=300V, V_{CEM}≤650V		1700		A

Diode

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_{vj}=25℃	650	V
Continuous DC Forward Current	I_F		400	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	800	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=400A,T_{vj}=25℃		1.65		V
		I_F=400A,T_{vj}=125℃		1.40		
		I_F=400A,T_{vj}=150℃		1.35		
Recovered Charge	Q_{rr}	I_F=400A V_R=300V -di_F/dt =4000A/us T_{vj}=25℃		1.6		uC
Peak Reverse Recovery Current	I_{rr}			53		A
Reverse Recovery Energy	E_{rec}			0.22		mJ
Recovered Charge	Q_{rr}	I_F=400A V_R=300V -di_F/dt =4000A/us T_{vj}=150℃		6.9		uC
Peak Reverse Recovery Current	I_{rr}			83		A
Reverse Recovery Energy	E_{rec}			0.98		mJ

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	2500			V
Maximum Junction Temperature	T_{jmax}				175	℃
Operating Junction Temperature	$T_{vj\ op}$		-40		150	℃
Storage Temperature	T_{stg}		-40		150	℃
Comparative Tracking Index	CTI		400			
Thermal Resistance Junction to Case	$R_{\theta JC}$	per IGBT			0.12	K/W
		per Diode			0.21	
Thermal Resistance Case to Sink	$R_{\theta CS}$	Conductive grease applied		0.012	0.035	K/W
Module Electrodes Torque	M_t	Recommended(M6)	3.0		5.0	N·m
Module-to-Sink Torque	M_s	Recommended(M6)	3.0		5.0	N·m
Weight of Module	G			315		g

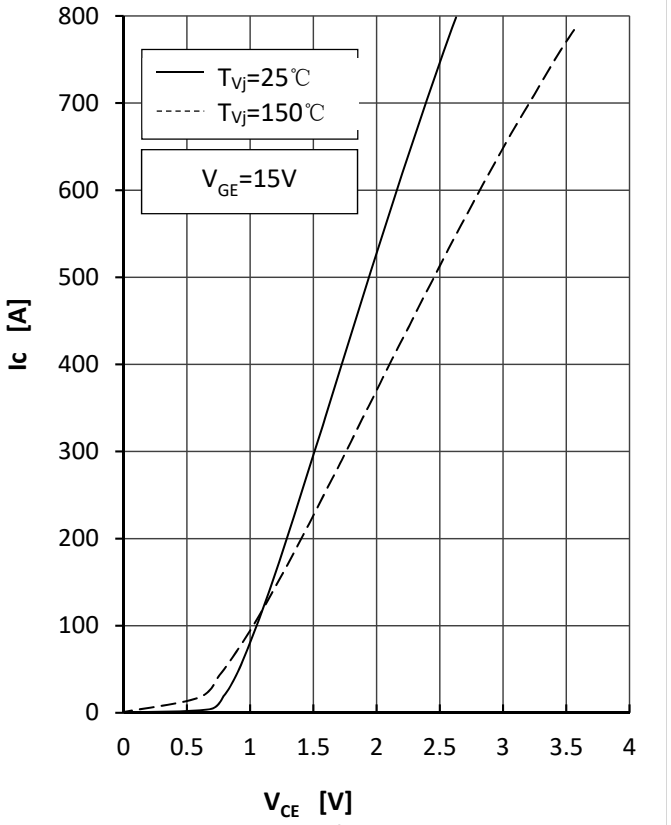


Fig1.IGBT Output Characteristics

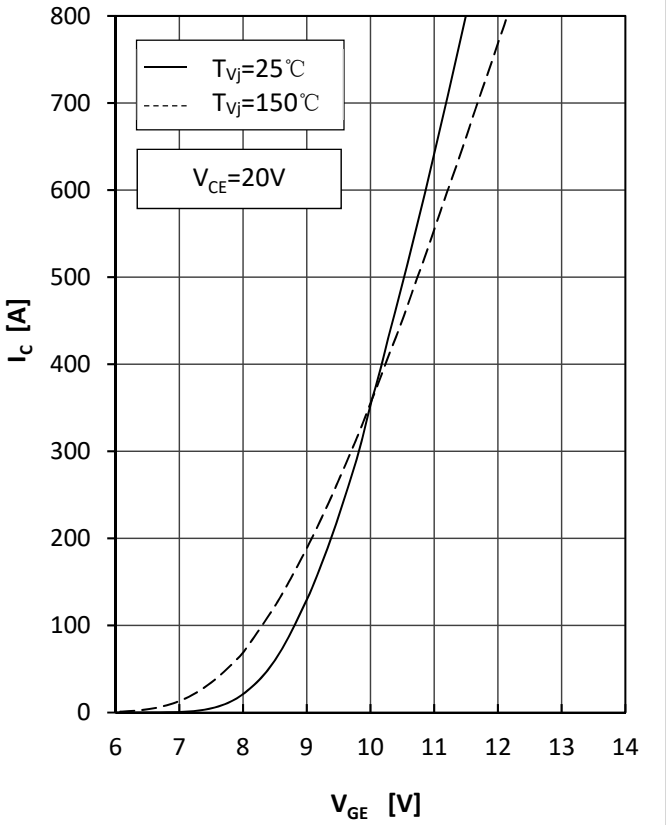


Fig2.IGBT Transfer Characteristics

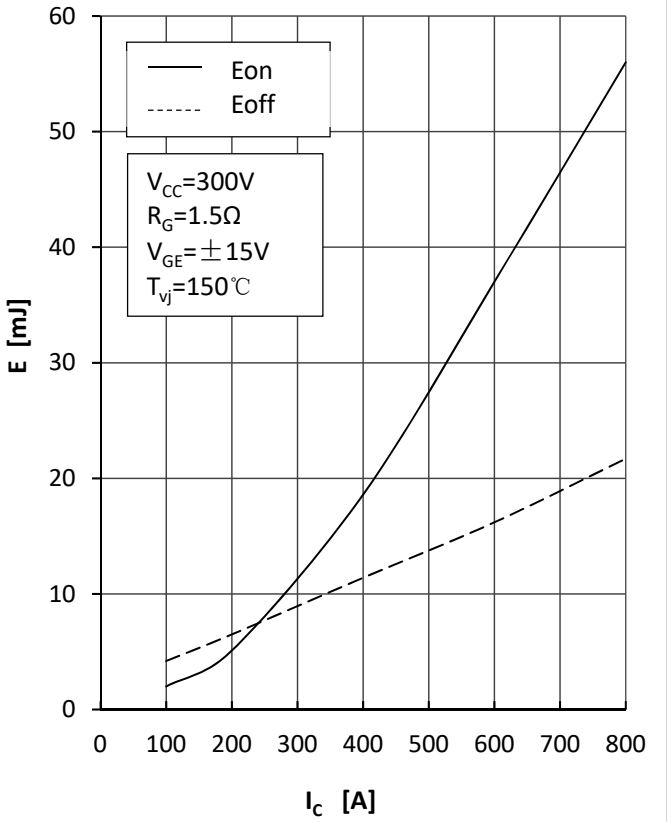


Fig3.IGBT Switching Loss vs.Ic

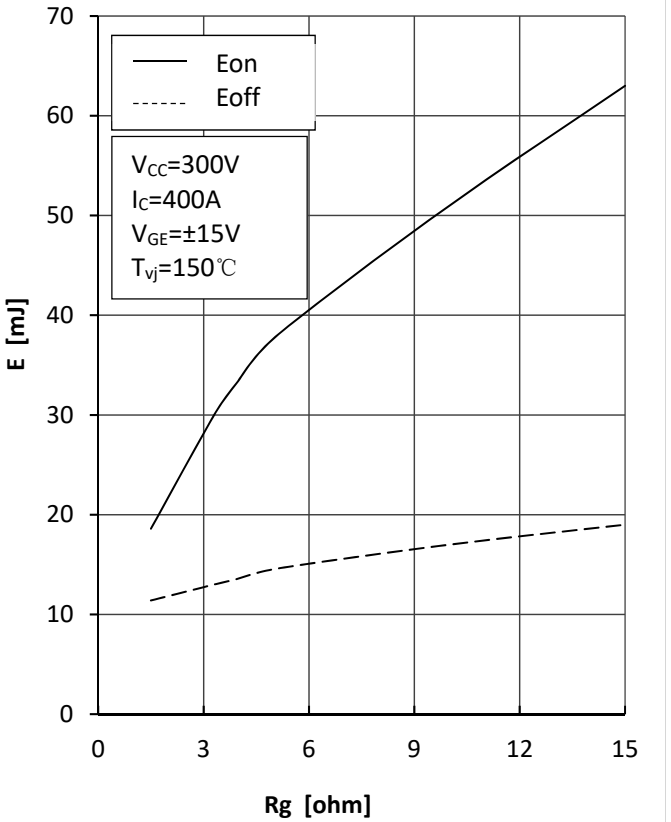


Fig4.IGBT Switching Loss vs.Rg

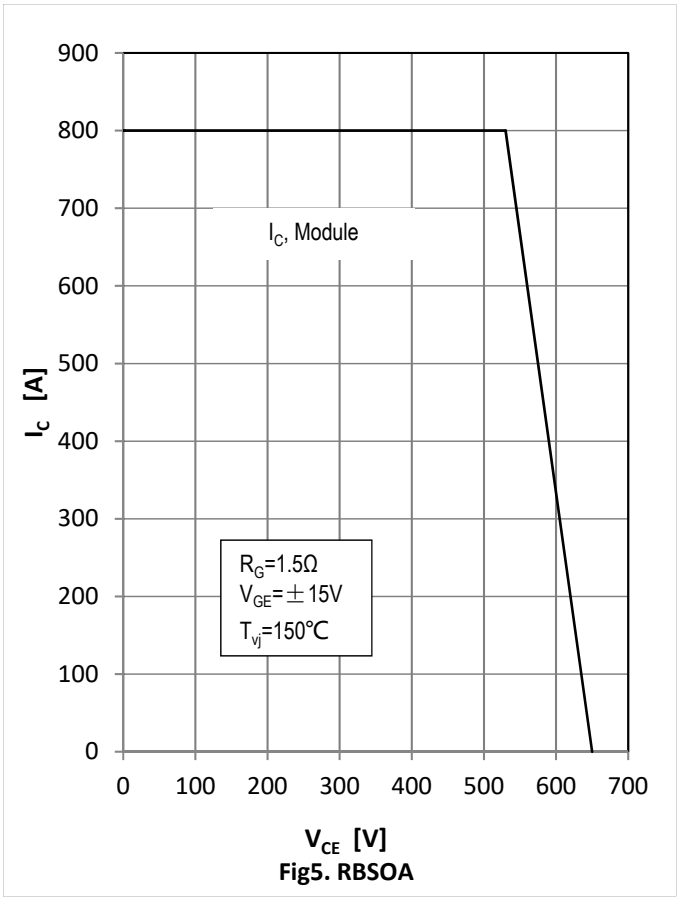


Fig5. RBSOA

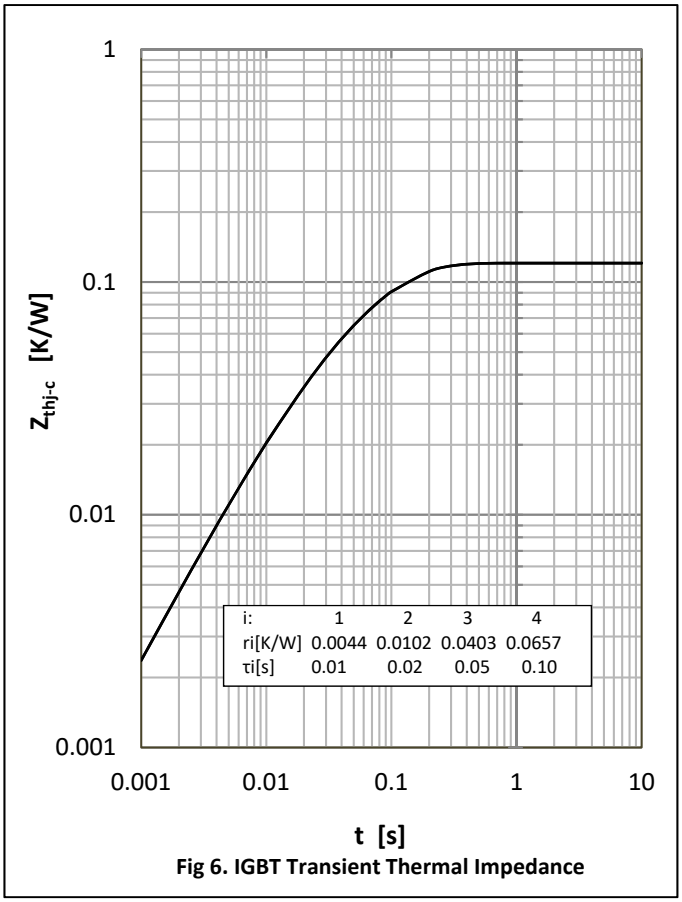


Fig 6. IGBT Transient Thermal Impedance

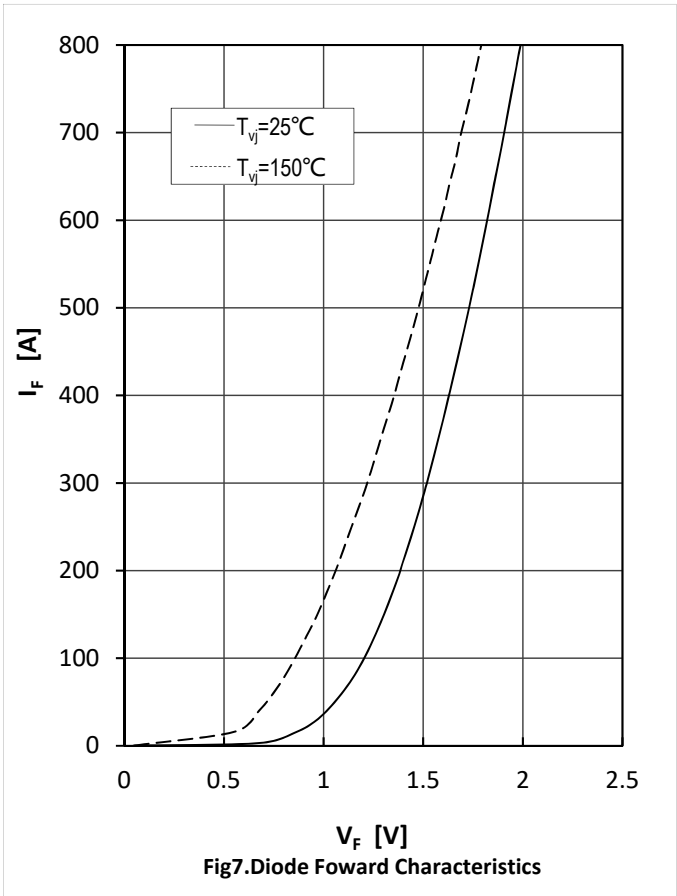


Fig7.Diode Foward Characteristics

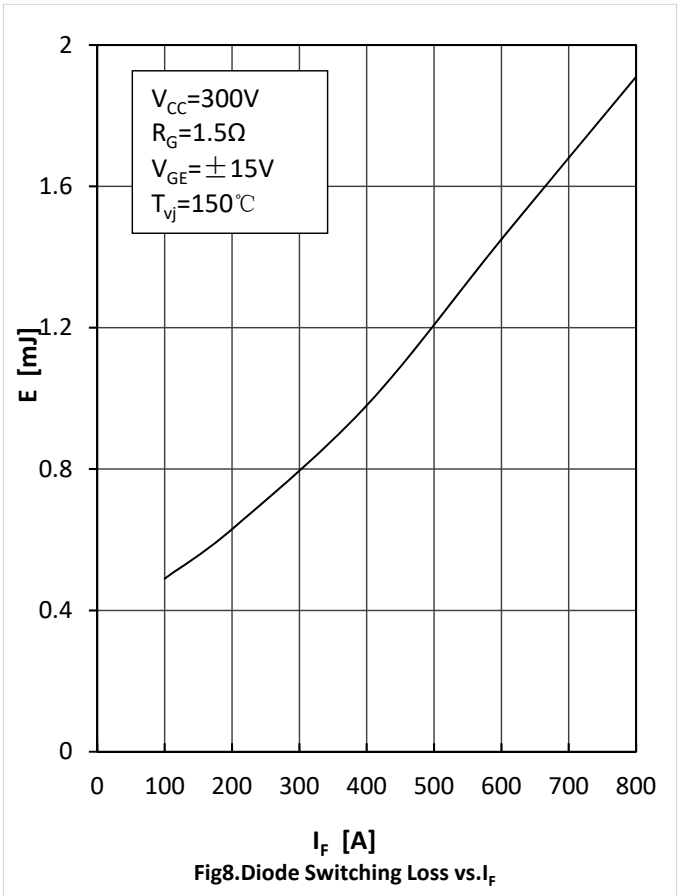


Fig8.Diode Switching Loss vs.I_F

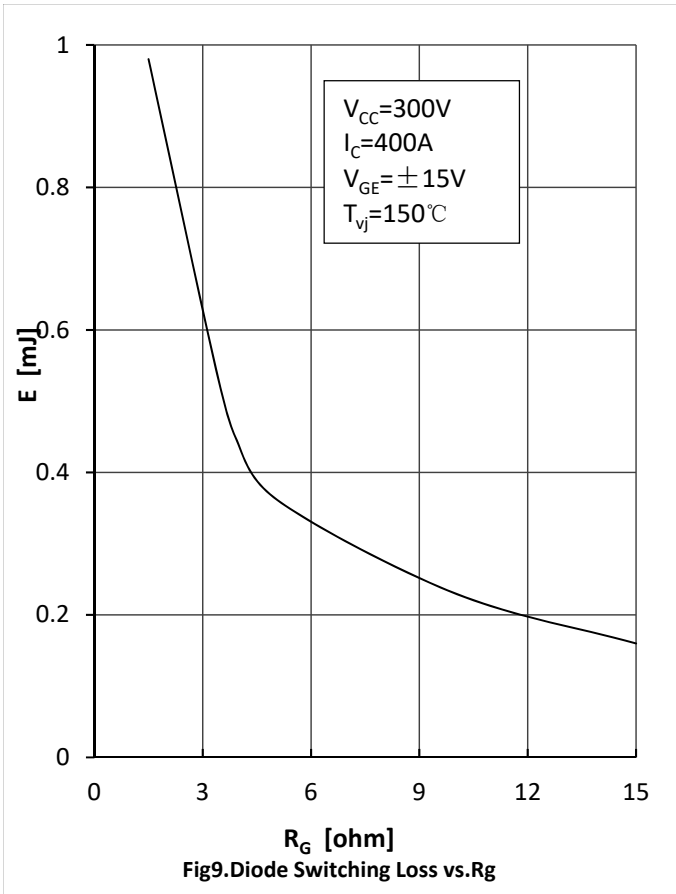


Fig9.Diode Switching Loss vs.Rg

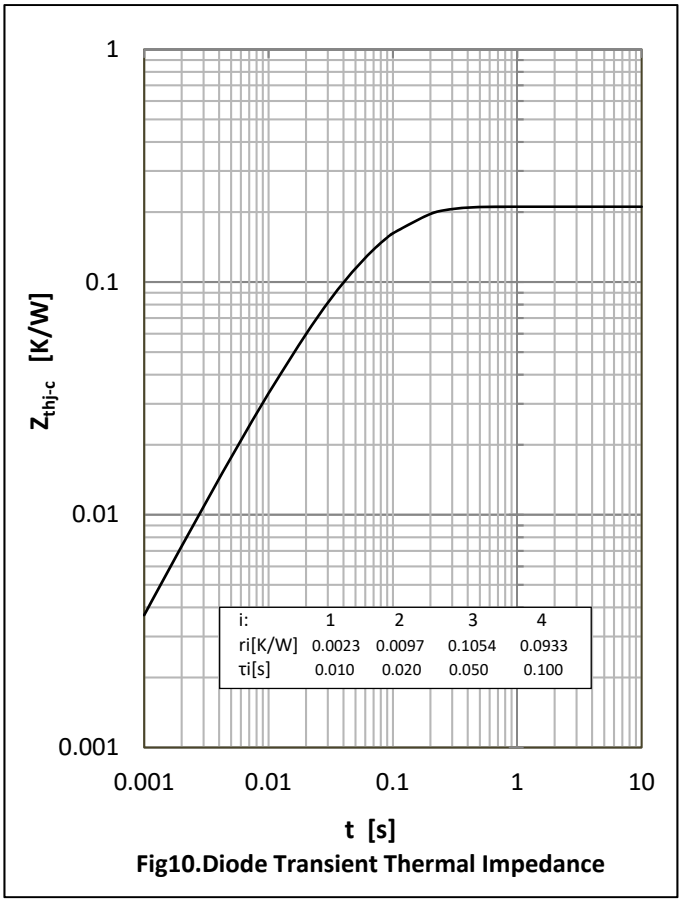
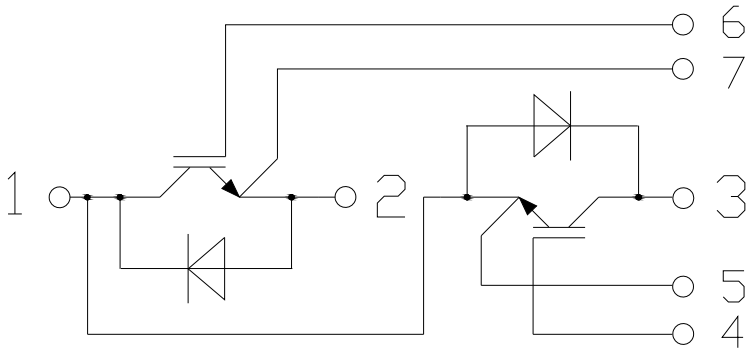


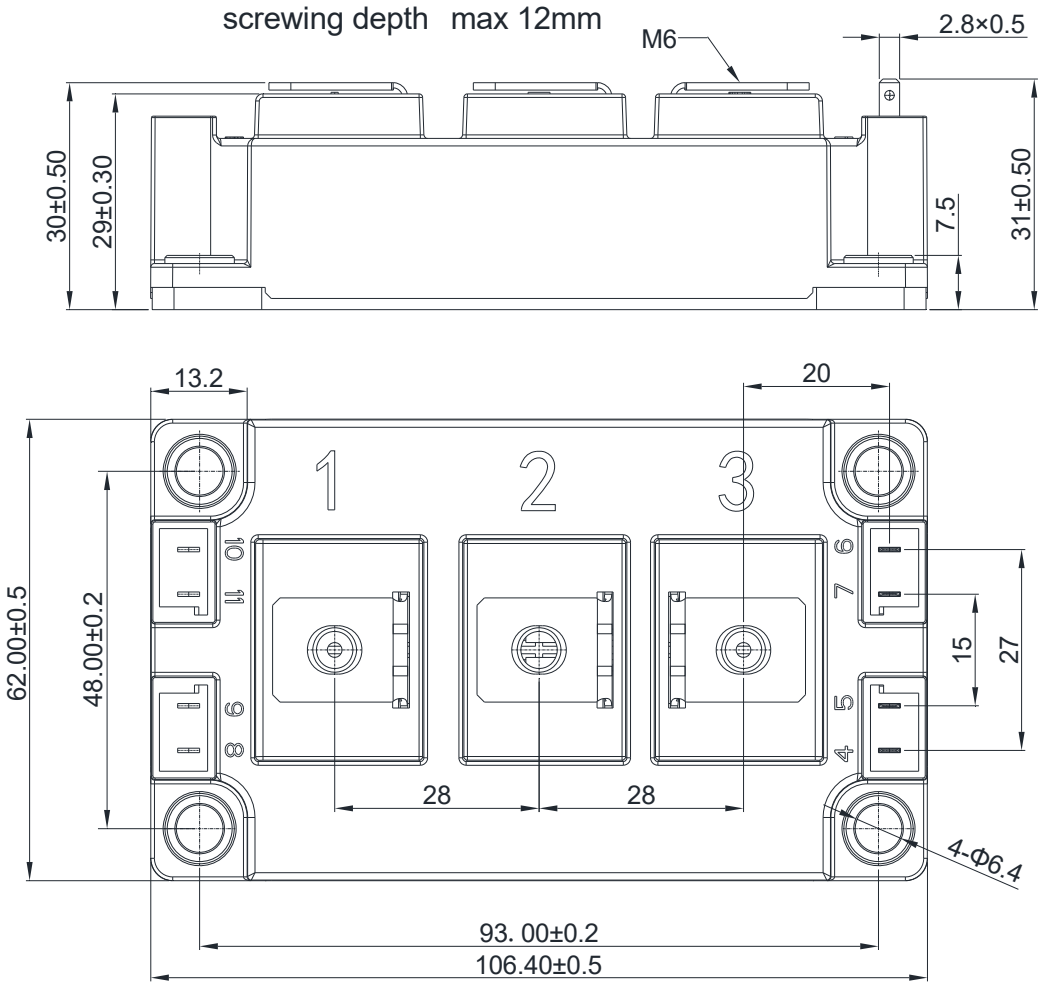
Fig10.Diode Transient Thermal Impedance

- Circuit Diagram



- **Package Outline Information**

Dimensions in Millimeters



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