MG300HF12TLC2

RoHS COMPLIANT

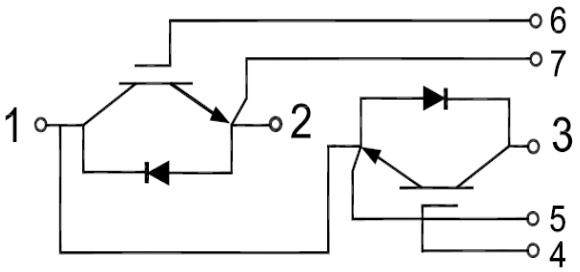
IGBT Modules

V_{CES} 1200V
I_C 300A

Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)
- Soft switching welding machine

Circuit



Features

- Low $V_{ce(sat)}$ with Trench technology
- $V_{ce(sat)}$ with positive temperature coefficient
- High short circuit capability(10us)
- 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℃	1200	V
Continuous Collector Current	I_C	T_c=100℃	300	A
Repetitive Peak Collector Current	I_{CRM}	tp=1ms	600	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_c=25℃ T_{vjmax}=175℃	1700	W

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, I_C=8mA,T_{vj}=25℃	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V,T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	Ic=300A,V_{GE}=15V, T_{vj}=25℃		1.85	2.20	V
		Ic=300A,V_{GE}=15V, T_{vj}=125℃		2.20		
		Ic=300A,V_{GE}=15V, T_{vj}=150℃		2.30		
Gate Charge	Q_G			2.6		uC
Internal Gate Resistor	R_{Gint}			2.5		Ω
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE} =0V, f=1MHz,T_{vj}=25℃		18.4		nF
Reverse Transfer Capacitance	C_{res}			0.9		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0 V, V_{GE}=20V,T_{vj} = 25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C=300 A, V_{CE}=600 V, V_{GE}=±15V, R_G=1.8Ω, T_{vj}=25℃		174		ns
Rise Time	t_r			38		ns
Turn-off Delay Time	$t_{d(off)}$			425		ns
Fall Time	t_f			104		ns
Energy Dissipation During Turn-on Time	E_{on}			17.4		mJ
Energy Dissipation During Turn-off Time	E_{off}			21.0		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=300 A, V_{CE}=600 V, V_{GE}=±15V, R_G=1.8Ω, T_{vj}=125℃		185		ns
Rise Time	t_r			42		ns
Turn-off Delay Time	$t_{d(off)}$			495		ns
Fall Time	t_f			170		ns
Energy Dissipation During Turn-on Time	E_{on}			26.5		mJ
Energy Dissipation During Turn-off Time	E_{off}			31.4		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C=300 A, V_{CE}=600 V, V_{GE}=±15V, R_G=1.8Ω, T_{vj}=150℃		191		ns
Rise Time	t_r			45		ns
Turn-off Delay Time	$t_{d(off)}$			437		ns
Fall Time	t_f			112		ns
Energy Dissipation During Turn-on Time	E_{on}			29.3		mJ
Energy Dissipation During Turn-off Time	E_{off}			33.5		mJ
SC Data	I_{sc}	T_p≤10us, V_{GE}=15V, T_{vj}=150℃, V_{cc}=900V, V_{CEM}≤1200V		1500		A

Diode

Absolute Maximum Ratings

	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_{vj}=25℃	1200	V
Continuous DC Forward Current	I_F		300	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	600	A
I^2t-value	I^2t	V_R=0,t_p=10ms,T_j=125℃	18200	A^2s
		V_R=0,t_p=10ms,T_j=150℃	17000	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=300A,T_{vj}=25℃		2.10		V
		I_F=300A,T_{vj}=125℃		2.15		
		I_F=300A,T_{vj}=150℃		2.17		
Recovered Charge	Q_{rr}	I_F=300 A V_R=600V -di$_F$/dt=6500A/us T_{vj}=25℃		34.0		uC
Peak Reverse Recovery Current	I_{rr}			375		A
Reverse Recovery Energy	E_{rec}			16.0		mJ
Recovered Charge	Q_{rr}	I_F=300 A V_R=600V -di$_F$/dt=6500A/us T_{vj}=125℃		54.0		uC
Peak Reverse Recovery Current	I_{rr}			410		A
Reverse Recovery Energy	E_{rec}			27.4		mJ
Recovered Charge	Q_{rr}	I_F=300 A V_R=600V -di$_F$/dt=6500A/us T_{vj}=150℃		58		uC
Peak Reverse Recovery Current	I_{rr}			416		A
Reverse Recovery Energy	E_{rec}			29.2		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		125	℃
Thermal Resistance Junction-to Case	$R_{\theta JC}$	per IGBT			0.09	K/W
		per Diode			0.12	
Thermal Resistance Case-to Sink	$R_{\theta CS}$	Conductive grease applied		0.035		K/W
Comparative Tracking Index	CTI			>400		
Module ElectrodesTorque	M_t	Recommended(M6)	3.0		5.0	N·m
Module-to-SinkTorque	M_s	Recommended(M6)	3.0		5.0	N·m
Weight of Module	G			315		g

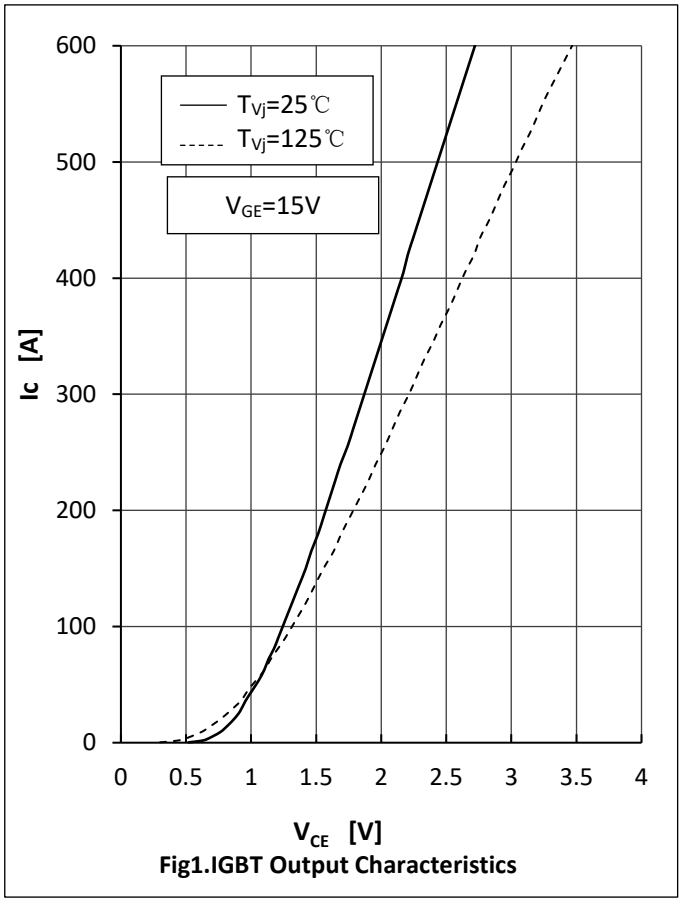


Fig1.IGBT Output Characteristics

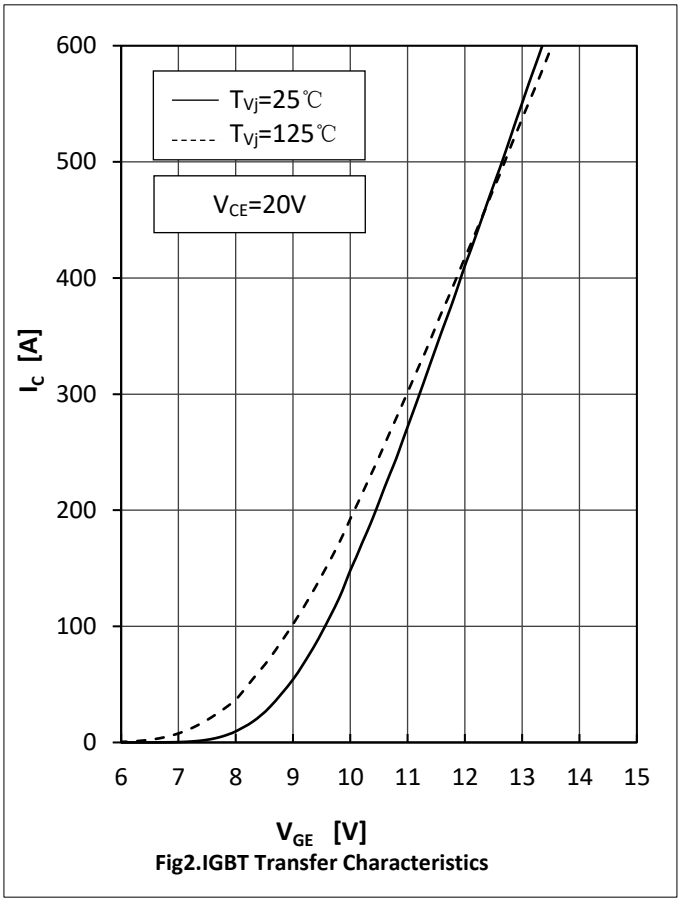


Fig2.IGBT Transfer Characteristics

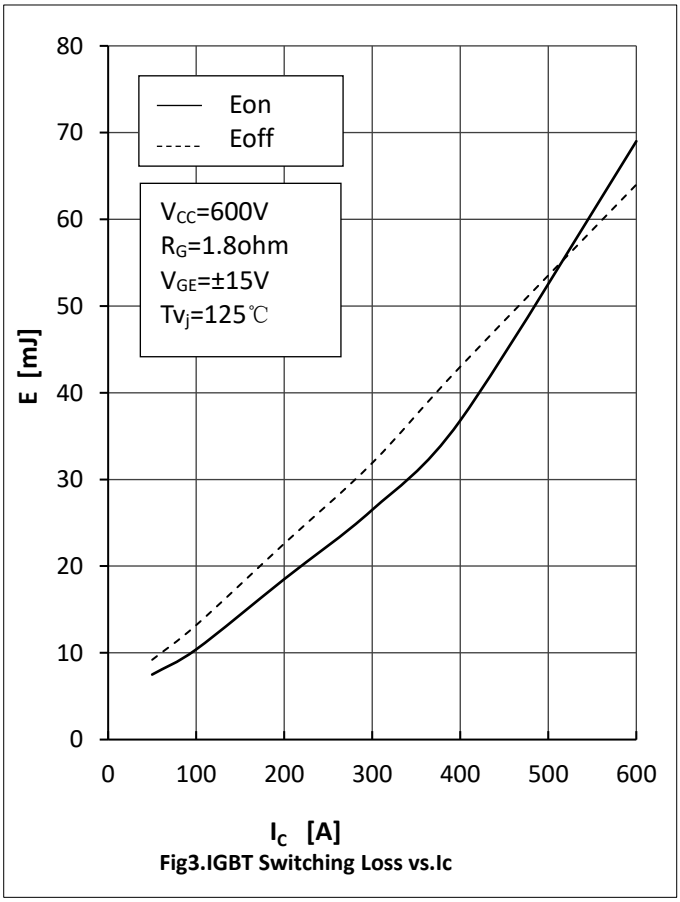


Fig3.IGBT Switching Loss vs.Ic

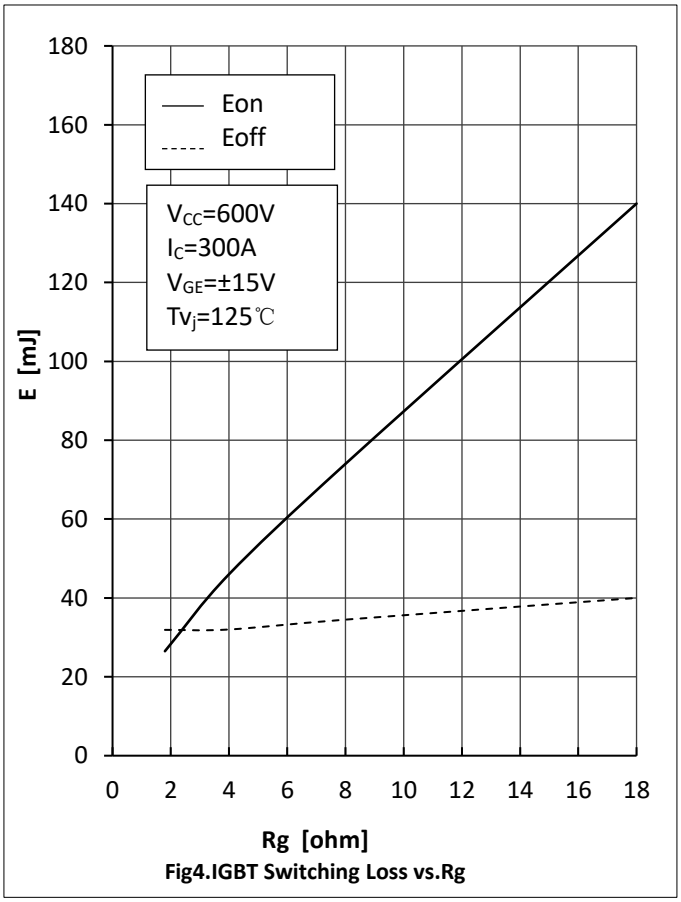


Fig4.IGBT Switching Loss vs.Rg

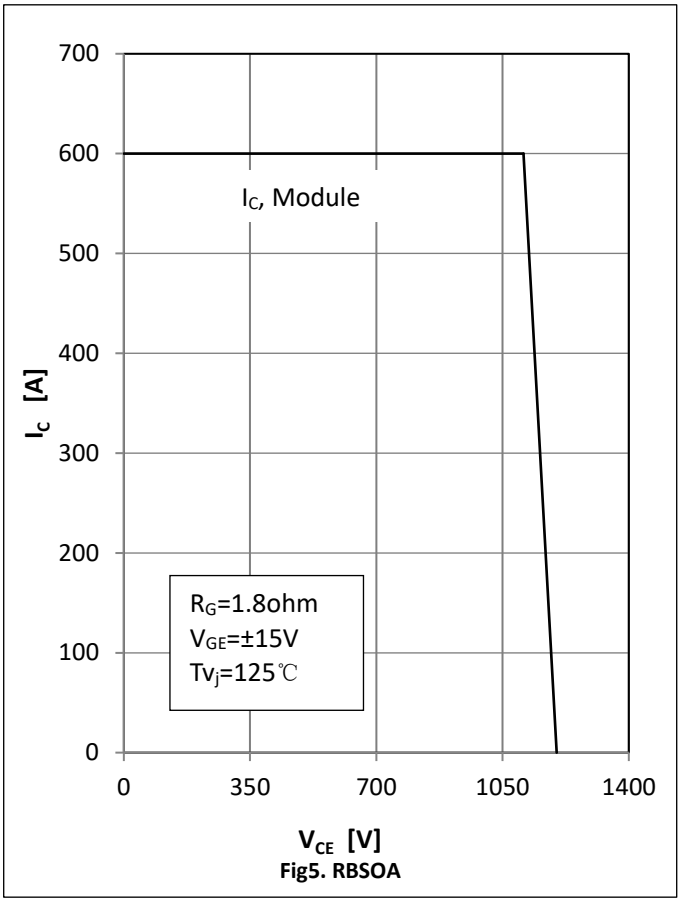


Fig5. RBSOA

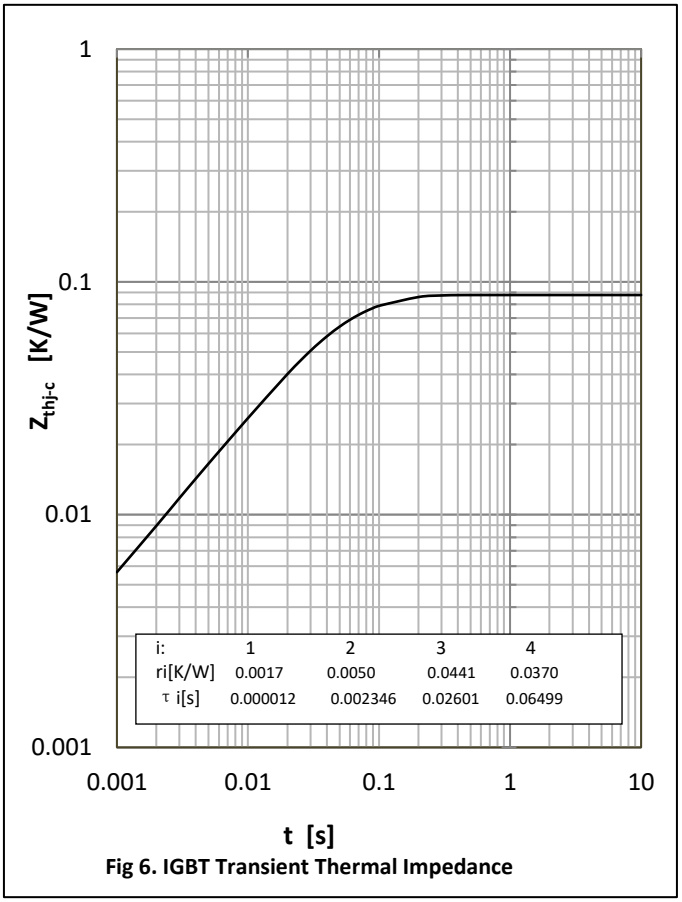


Fig 6. IGBT Transient Thermal Impedance

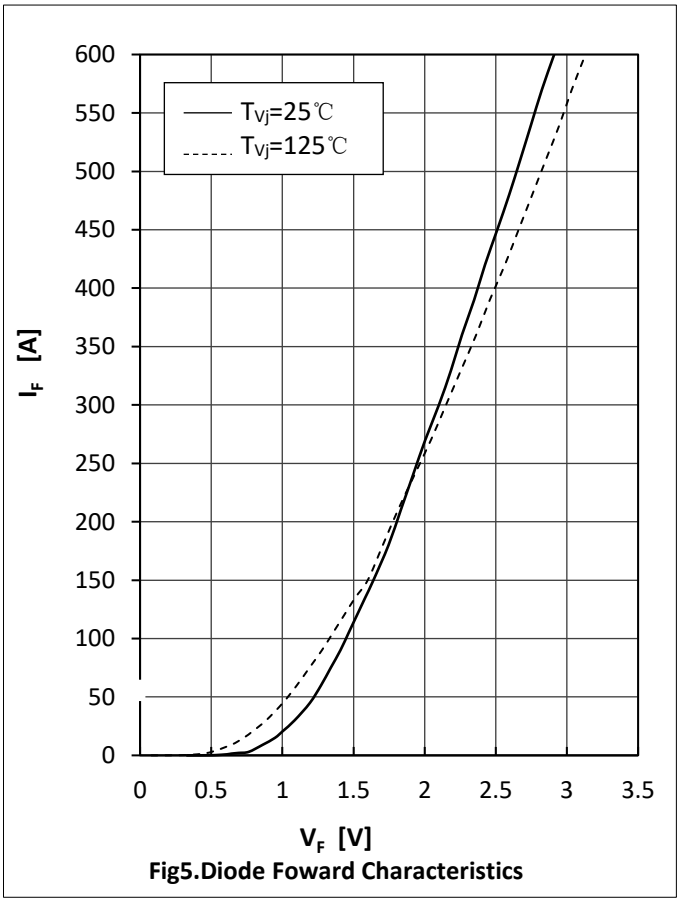


Fig5.Diode Foward Characteristics

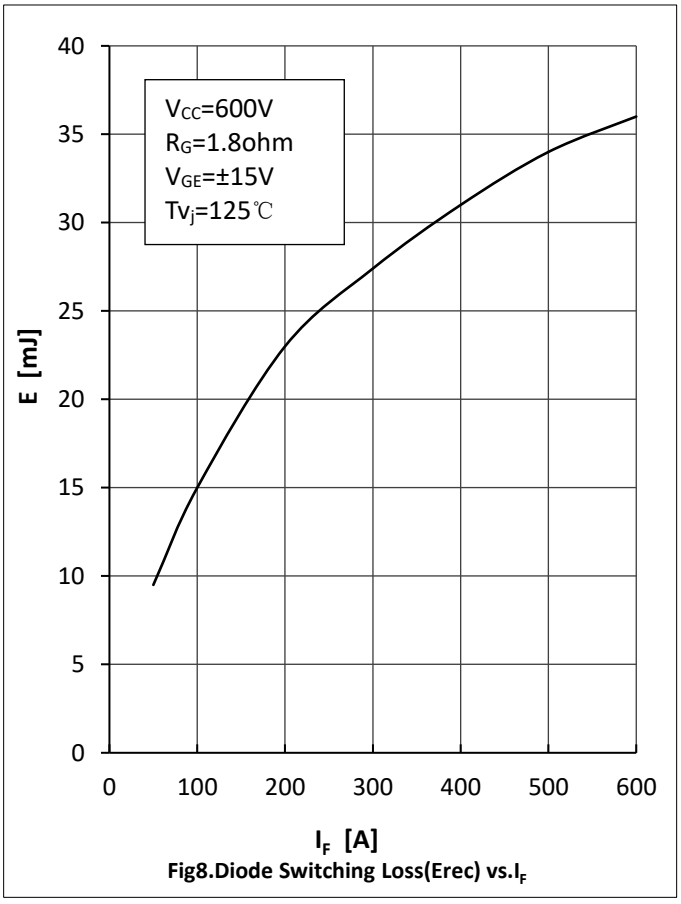


Fig8.Diode Switching Loss(Erec) vs.I_F

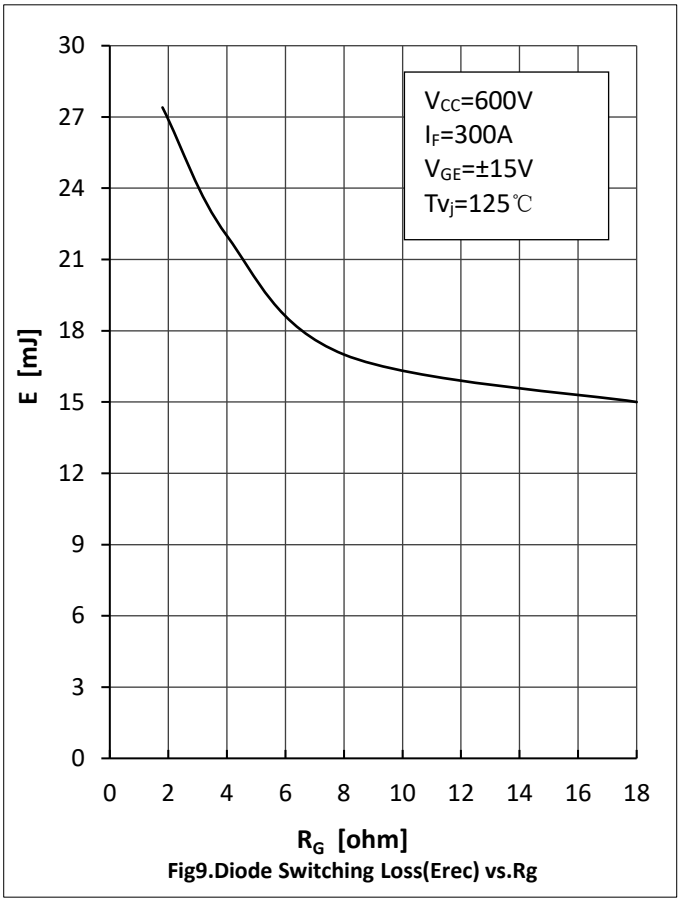


Fig9.Diode Switching Loss(Erec) vs.Rg

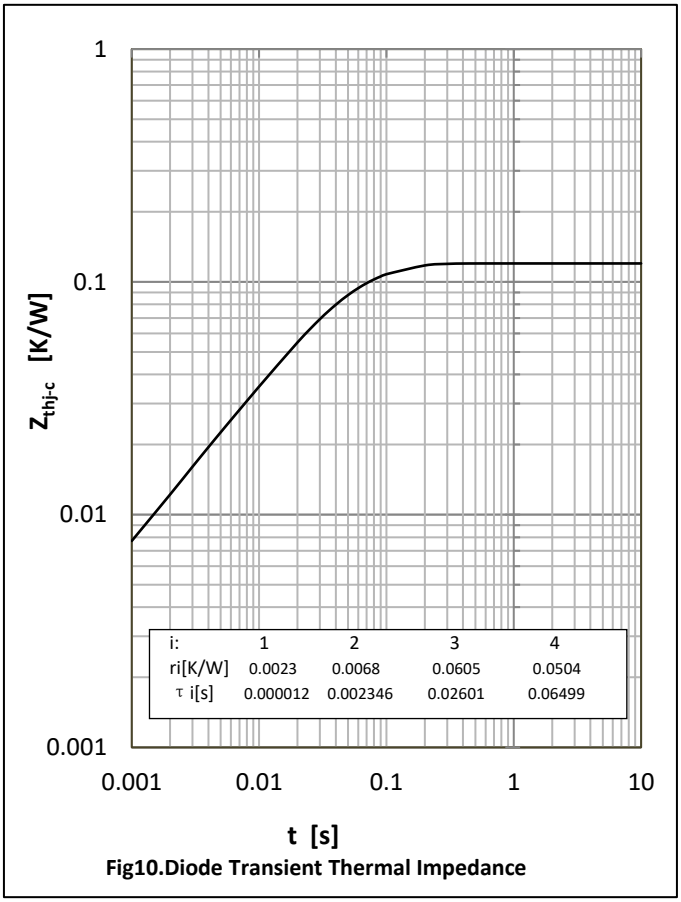
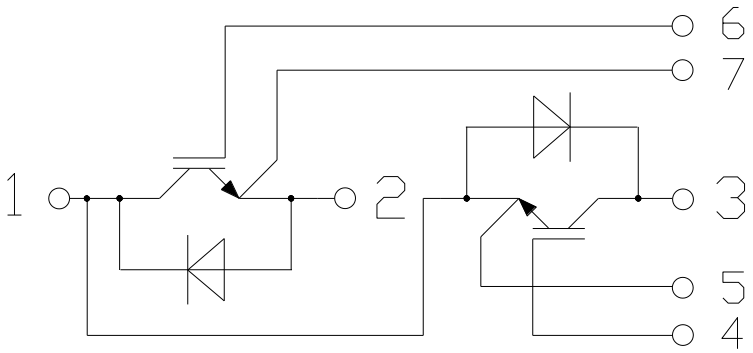


Fig10.Diode Transient Thermal Impedance

- **Circuit Diagram**



- **Package Outline Information**

Dimensions in Millimeters