MG40HF12LEC1

RoHS COMPLIANT

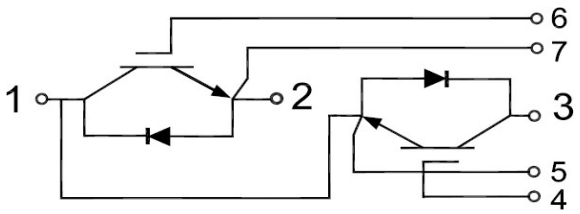
IGBT Modules

VCES	1200V
IC	40A

Applications

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

Circuit



Features

- High speed IGBT in NPT technology
- Low switching losses
- High short circuit capability(10us)
- Including ultra fast & soft recovery anti-parallel FWD
- Low inductance
- Maximum junction temperature 150℃

● 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=80℃	40	A
Repetitive Peak Collector Current	I_{CRM}	tp=1ms	80	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_c=25℃ T_{vjmax}=150℃	312	W

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, I_C =1.6mA,T_{vj}=25℃	5.0	5.8	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	$V_{CE(sat)}$	Ic=40A,V_{GE}=15V, T_{vj}=25℃		2.0	3.5	V
		Ic=40A,V_{GE}=15V, T_{vj}=125℃		2.3		
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE} =0V, f=1MHz,T_{vj}=25℃		3.5		nF
Reverse Transfer Capacitance	C_{res}			0.2		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 =40 A V_{CE} = 600 V V_{GE} = ±15V R_{GON} = 10Ω R_{GOFF} = 5.1Ω Ls=35nH Ld=320uH T_{vj}=25℃		21		ns
Rise Time	t_r			42		ns
Turn-off Delay Time	$t_{d(off)}$			192		ns
Fall Time	t_f			28		ns
Energy Dissipation During Turn-on Time	E_{on}			3.7		mJ
Energy Dissipation During Turn-off Time	E_{off}			1.5		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C =40 A V_{CE} = 600 V V_{GE} = ±15V R_{GON} = 10Ω R_{GOFF} = 5.1Ω Ls=35nH Ld=320uH T_{vj}=125℃		28		ns
Rise Time	t_r			45		ns
Turn-off Delay Time	$t_{d(off)}$			250		ns
Fall Time	t_f			30		ns
Energy Dissipation During Turn-on Time	E_{on}			5.1		mJ
Energy Dissipation During Turn-off Time	E_{off}			2.2		mJ
SC Data	I_{sc}	T_p≤10us,V_{GE}=15V,T_{vj}=125℃, V_{cc}=600V,V_{CEM}≤1200V		240		A

Diode

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		40	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	80	A

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=40A,T_{vj}=25℃		1.85	2.10	V
		I_F=40A,T_{vj}=125℃		1.80		
Recovered Charge	Q_{rr}	I_F =40 A V_R=600V -di$_F$/dt =900A/us T_{vj}=25℃		2.85		uC
Peak Reverse Recovery Current	I_{rr}			45		A
Reverse Recovery Energy	E_{rec}			0.80		mJ
Recovered Charge	Q_{rr}	I_F =40 A V_R=600V -di$_F$/dt =900A/us T_{vj}=125℃		5.16		uC
Peak Reverse Recovery Current	I_{rr}			50		A
Reverse Recovery Energy	E_{rec}			1.55		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}				150	℃
Operating Junction Temperature	$T_{vj\ op}$		-40		125	℃
Storage Temperature	T_{stg}		-40		125	℃
Thermal Resistance Junction-to Case	$R_{\theta JC}$	per IGBT			0.40	K/W
		per Diode			0.78	
Thermal Resistance Case-to Sink	$R_{\theta CS}$	Conductive grease applied		0.05		K/W
Module ElectrodesTorque	M_t	Recommended(M5)	2.5		5.0	N·m
Module-to-SinkTorque	M_s	Recommended(M6)	3.0		5.0	N·m
Weight of Module	G			150		g

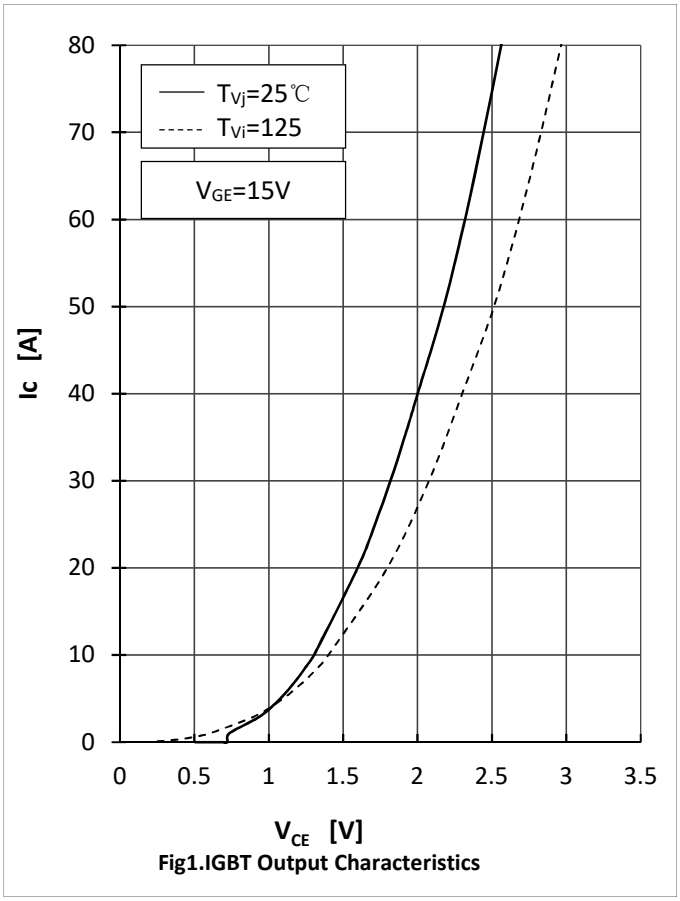


Fig1.IGBT Output Characteristics

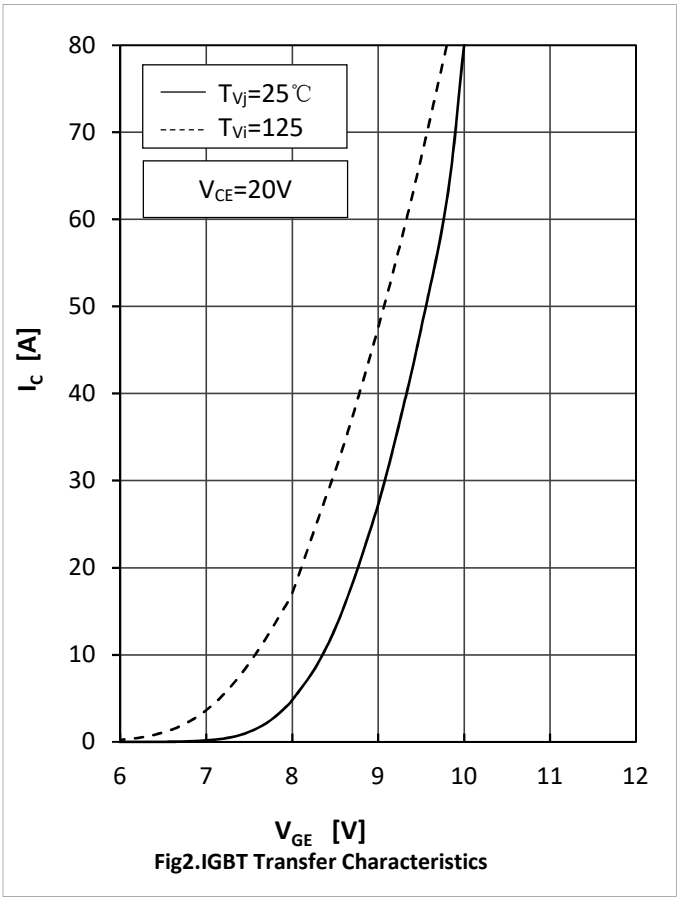


Fig2.IGBT Transfer Characteristics

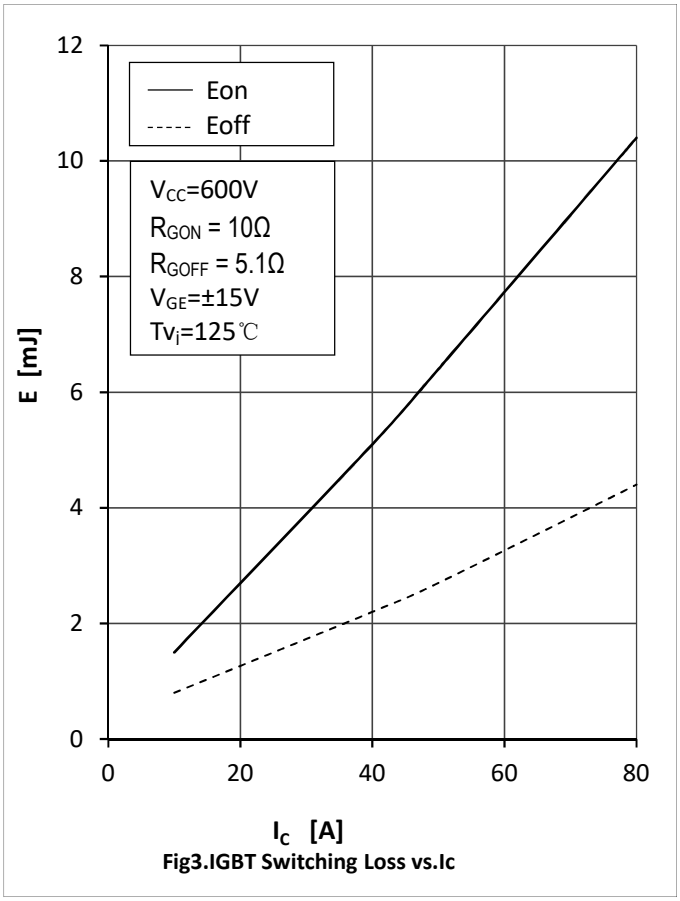


Fig3.IGBT Switching Loss vs.Ic

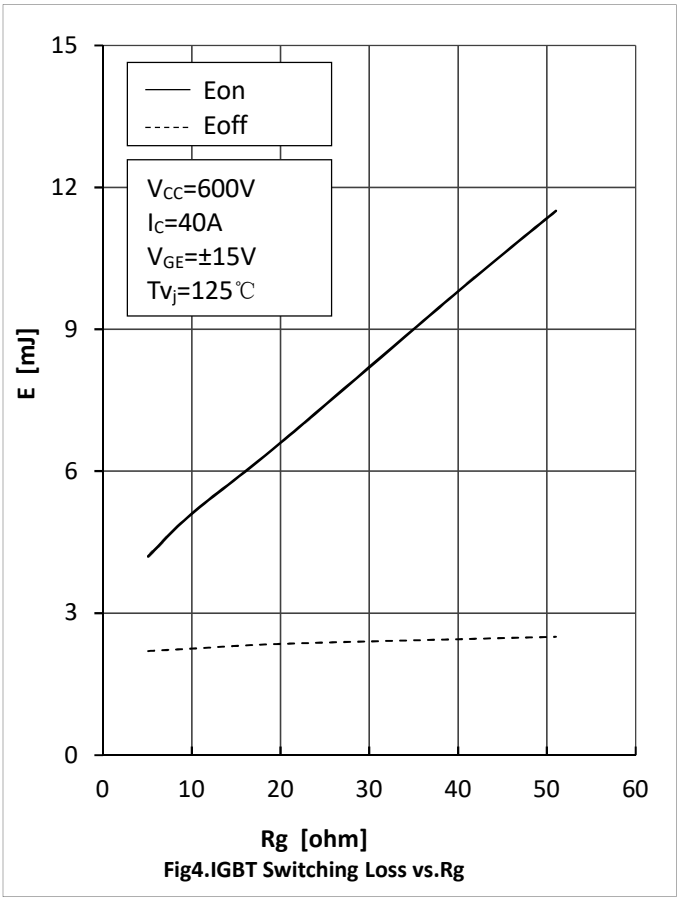


Fig4.IGBT Switching Loss vs.Rg

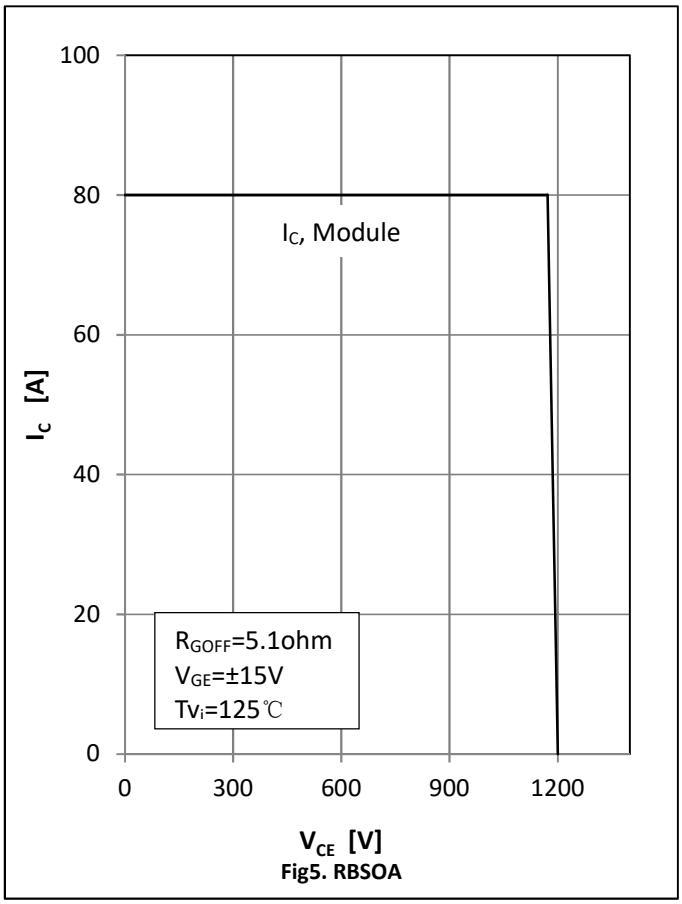


Fig5. RBSOA

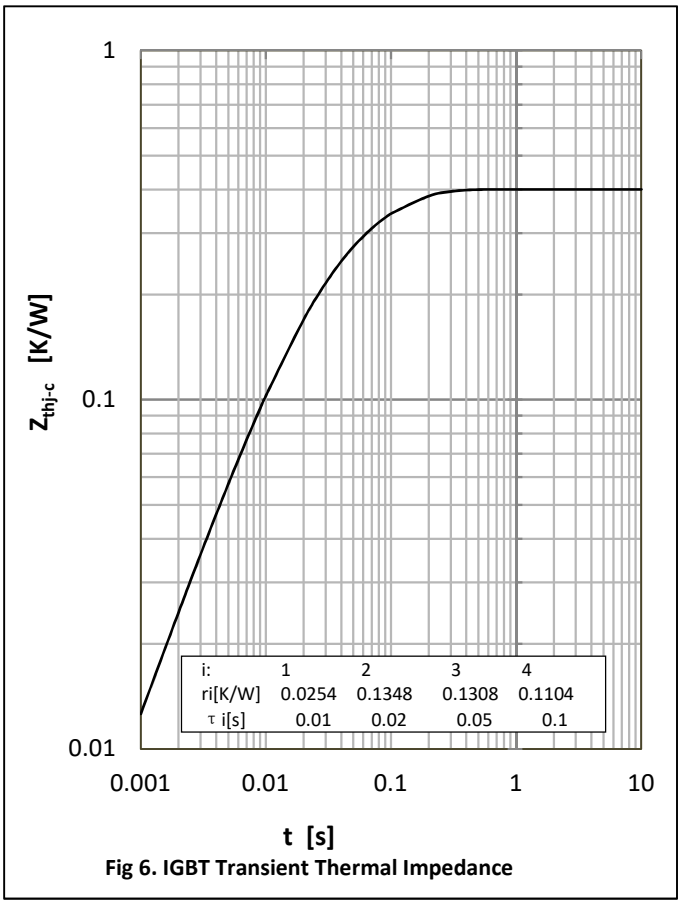


Fig 6. IGBT Transient Thermal Impedance

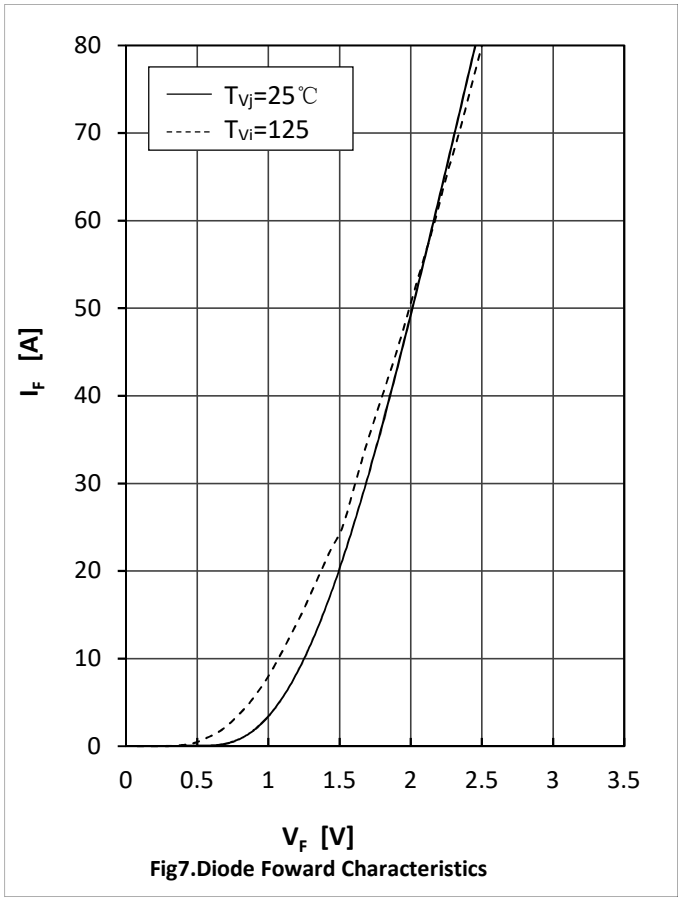


Fig7.Diode Foward Characteristics

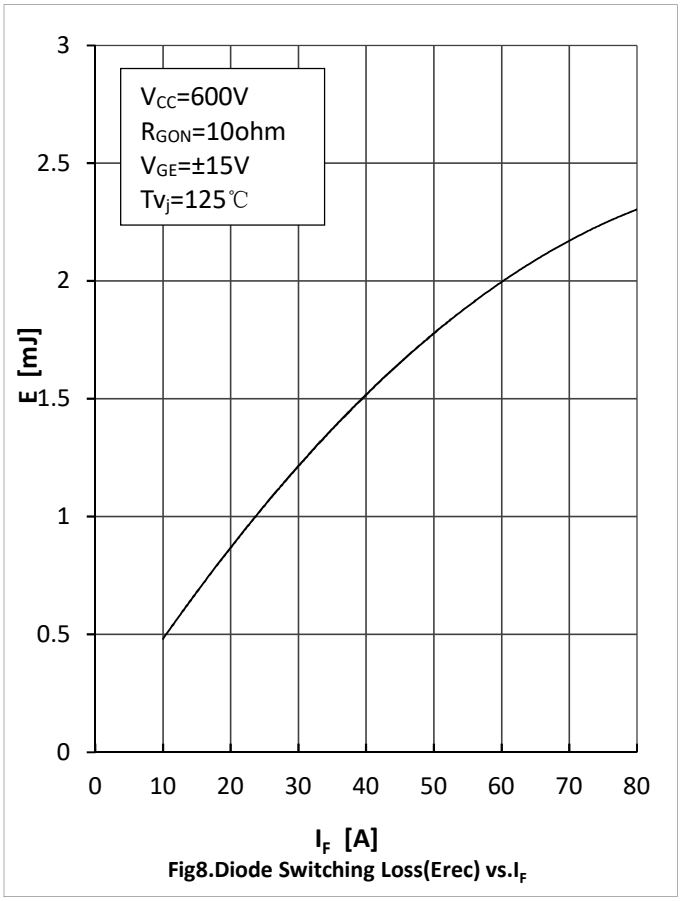


Fig8.Diode Switching Loss(Erec) vs.I_F

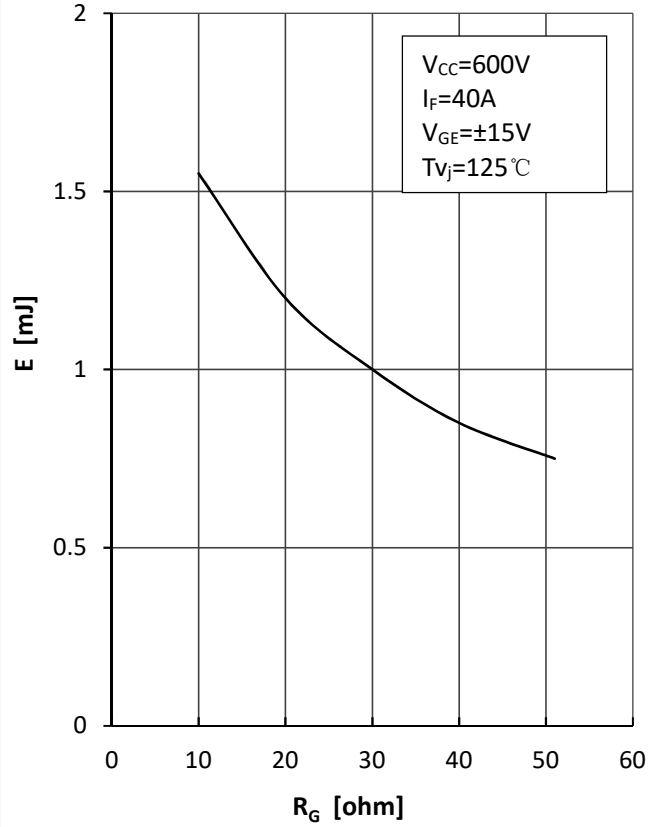


Fig9.Diode Switching Loss(Erec) vs.Rg

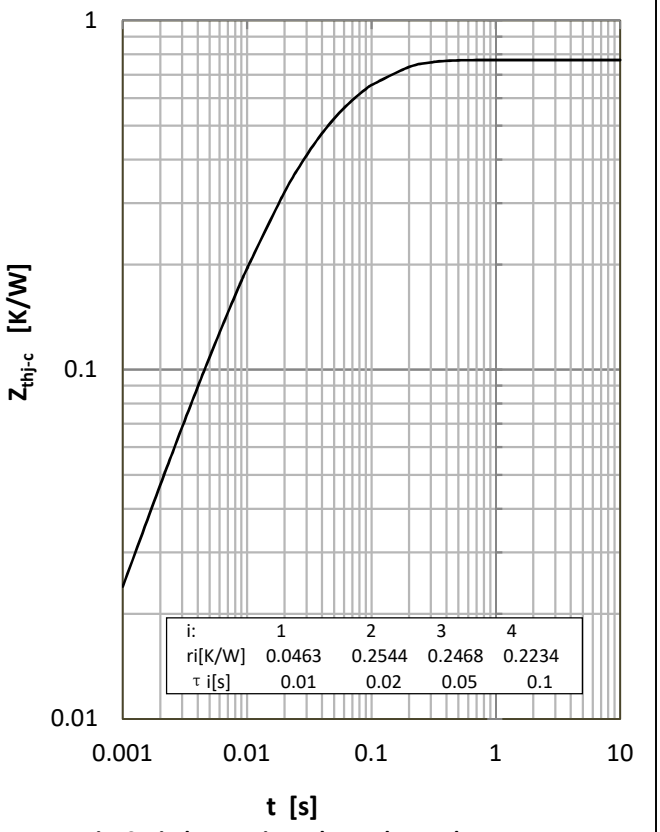
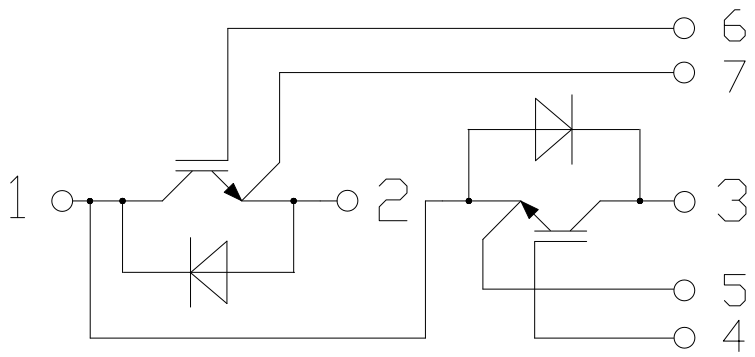


Fig10.Diode Transient Thermal Impedance

Circuit Diagram



Package Outline Information

Dimensions in Millimeters