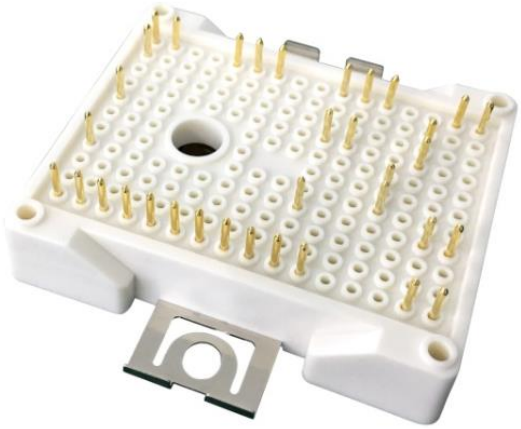
MG35P12P3

RoHS COMPLIANT



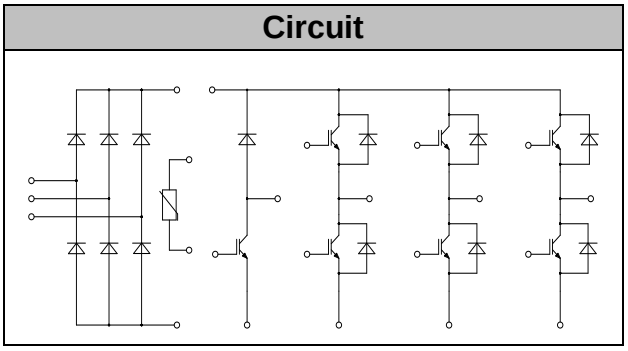
IGBT Modules

V_{CES}	1200V
I_C	35A

Applications

- Motor Drivers
- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)

Circuit



Features

- Low switching losses
- Low vce(sat) with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- High short circuit capability(10us)
- Isolated heatsink using DBC technology
- Maximum junction temperature 150℃
-

● 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}=125℃	35	A
Repetitive Peak Collector Current	I_{CRM}	tp=1ms	70	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation (IGBT-inverter)	P_{tot}	T_c=25℃ T_{vjmax}=150℃	250	W

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C =1.2mA,T_{vj}=25℃	5.8	6.4	7.0	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=35A,V_{GE}=15V, T_{vj}=25℃		1.95	2.40	V
		Ic=35A,V_{GE}=15V, T_{vj}=125℃		2.15		V
Gate Charge	Q_G			0.35		uC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE} =0V, f=1MHz, T_{vj}=25℃		2.30		nF
Reverse Transfer Capacitance	C_{res}			0.15		nF
Integrated gate resistor	Rg			3		Ω
Gate-Emitter leakage current	I_{GES}	V_{CE}=0 V, V_{GE}=20 V, T_{vj} = 25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C =35 A V_{CE} = 600 V V_{GE} = ±15V R_G = 51Ω T_{vj}=25℃		135		ns
Rise Time	t_r			109		ns
Turn-off Delay Time	$t_{d(off)}$			450		ns
Fall Time	t_f			17		ns
Energy Dissipation During Turn-on Time	E_{on}			1.62		mJ
Energy Dissipation During Turn-off Time	E_{off}			1.2		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C =35 A V_{CE} = 600 V V_{GE} = ±15V R_G = 51Ω T_{vj}=125℃		141		ns
Rise Time	t_r			115		ns
Turn-off Delay Time	$t_{d(off)}$			490		ns
Fall Time	t_f			19		ns
Energy Dissipation During Turn-on Time	E_{on}			2.4		mJ
Energy Dissipation During Turn-off Time	E_{off}			2.1		mJ
SC Data	I_{sc}	T_p≤10us,V_{GE}=15V,T_{vj}=125℃, V_{cc}=900V,V_{CEM}≤1200V		175		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		35	A
Repetitive Peak Forward Current	I_{FRM}	tp=1ms	70	A
I^2t-value	I^2t	V_R=0,t_p=10ms,T_{vj}=125℃	240	A^2s
		V_R=0,t_p=10ms,T_{vj}=125℃	220	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=35A,T_{vj}=25℃		1.65	2.15	V
		I_F=35A,T_{vj}=125℃		1.65		
Reverse Recovery Energy	E_{rec}	I_F =35 A V_R=600V -di_F/dt =900A/us T_{vj}=25℃		1.65		mJ
Recovered Charge	Q_{rr}			3.95		uC
Peak Reverse Recovery Current	I_{rr}			81.0		A
Reverse Recovery Energy	E_{rec}	I_F =35 A V_R=600V -di_F/dt =900A/us T_{vj}=125℃		1.50		mJ
Recovered Charge	Q_{rr}			6.80		uC
Peak Reverse Recovery Current	I_{rr}			85.0		A

● IGBT-brake-chopper

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}=125℃	15	A
Repetitive Peak Collector Current	I_{CRM}	tp=1ms	30	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25℃	±20	V
Total Power Dissipation	P_{tot}	T_c=25℃,T_{vjmax}=150℃	119	W

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C =0.5mA,T_{vj}=25℃	5.8	6.4	7.0	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=15A,V_{GE}=15V, T_{vj}=25℃		1.85	2.25	V
		Ic=15A,V_{GE}=15V, T_{vj}=125℃		2.15		
Gate Charge	Q_G			0.12		uC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE} =0V, f=1MHz, T_{vj}=25℃		0.890		nF
Reverse Transfer Capacitance	C_{res}			0.030		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0 V, V_{GE}=20 V, T_{vj} = 25℃			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C =15 A V_{CE} = 600 V V_{GE} = ±15V R_G = 39Ω T_{vj}=25℃		55		ns
Rise Time	t_r			59		ns
Turn-off Delay Time	$t_{d(off)}$			195		ns
Fall Time	t_f			145		ns
Energy Dissipation During Turn-on Time	E_{on}			1.25		mJ
Energy Dissipation During Turn-off Time	E_{off}			0.83		mJ

Turn-on Delay Time	$t_{d(on)}$	I_C =15 A V_{CE} = 600 V V_{GE} = ±15V R_G = 39Ω T_{vj}=125℃		55		ns
Rise Time	t_r			65		ns
Turn-off Delay Time	$t_{d(off)}$			275		ns
Fall Time	t_f			190		ns
Energy Dissipation During Turn-on Time	E_{on}			1.75		mJ
Energy Dissipation During Turn-off Time	E_{off}			1.20		mJ
SC Data	I_{sc}	T_p≤10us, V_{GE}=15V, T_{vj}=125℃, V_{cc}=900V, V_{CEM}≤1200V		55		A

● Diode-Brake-Chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_j=25℃	1200	V
Continuous DC Forward Current	I_F		15	A
Repetitive Peak Forward Current	I_{FRM}	tp=1ms	30	A
I^2t-value	I^2t	V_R=0, t_p=10ms, T_j=105℃	40.0	A^2s
		V_R=0, t_p=10ms, T_j=125℃	34.0	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=15A, T_{vj}=25℃		1.75	2.25	V
		I_F=15A, T_{vj}=125℃		1.75		
Recovered Charge	Q_{rr}	I_F =15 A V_R=600V -di_F/dt =575A/us T_{vj}=25℃		1.30		uC
Peak Reverse Recovery Current	I_{rr}			18.8		A
Reverse Recovery Energy	E_{rec}			0.54		mJ
Recovered Charge	Q_{rr}	I_F =15 A V_R=600V -di_F/dt =575A/us T_{vj}=125℃		2.40		uC
Peak Reverse Recovery Current	I_{rr}			19.4		A
Reverse Recovery Energy	E_{rec}			0.86		mJ

● Diode-Rectifier

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_j=25℃	1600	V
Average output Current 50/60Hz, sine wave	$I_{F(AV)}$	T_c=100℃	35	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	T_c=100℃	60	A
Surge Forward Current	I_{FSM}	V_R=0,t_p=10ms,T_j=45℃	320	A
I^2t-value	I^2t	V_R=0,t_p=10ms,T_j=45℃	510	A^2s

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	I_F=35A,T_j=125℃		1.02		V
Reverse Current	I_R	T_j=125,V_R=1600V			2	mA

● 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}			20.0		mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\ K))]$		3375		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	2500			V
Maximum Junction Temperature	T_{jmax}				150	℃
Operating Junction Temperature	$T_{vj\,op}$		-40		125	℃
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		0.45	0.50	K/W
		per Diode-inverter		0.80	0.90	
		per IGBT-brake-copper		0.95	1.05	
		per Diode-chopper		1.75	1.90	
		per Diode-rectifier		1.05	1.25	
Thermal Resistance Case-to Sink	$R_{\theta CS}$	per IGBT-inverter		0.45		K/W
		per Diode-inverter		0.85		
		per IGBT-brake-copper		1.00		
		per Diode-chopper		1.86		
		per Diode-rectifier		1.11		
		per Module		0.037		
Mounting Force Per Clamp	F		30		80	N
Weight of Module	G			45		g

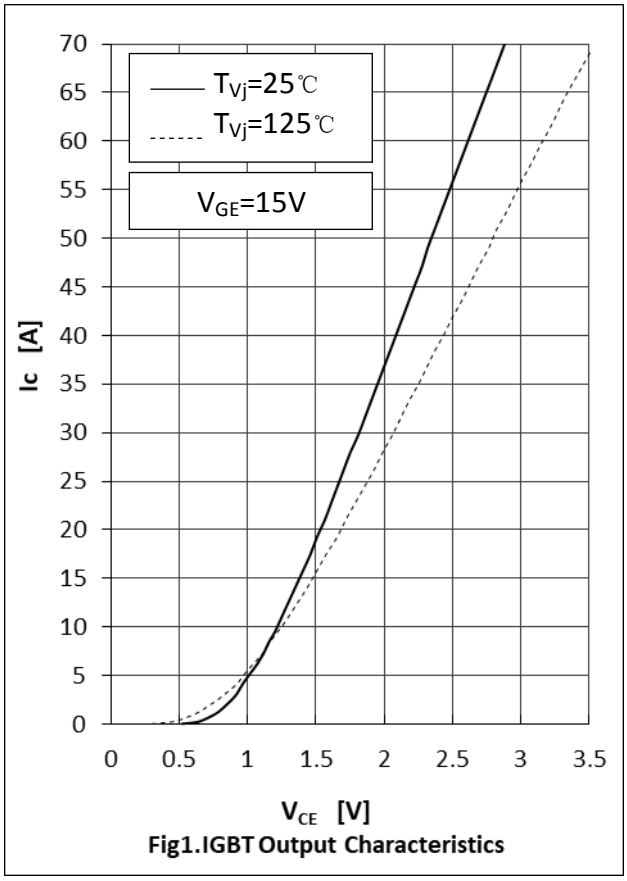


Fig1.IGBT Output Characteristics

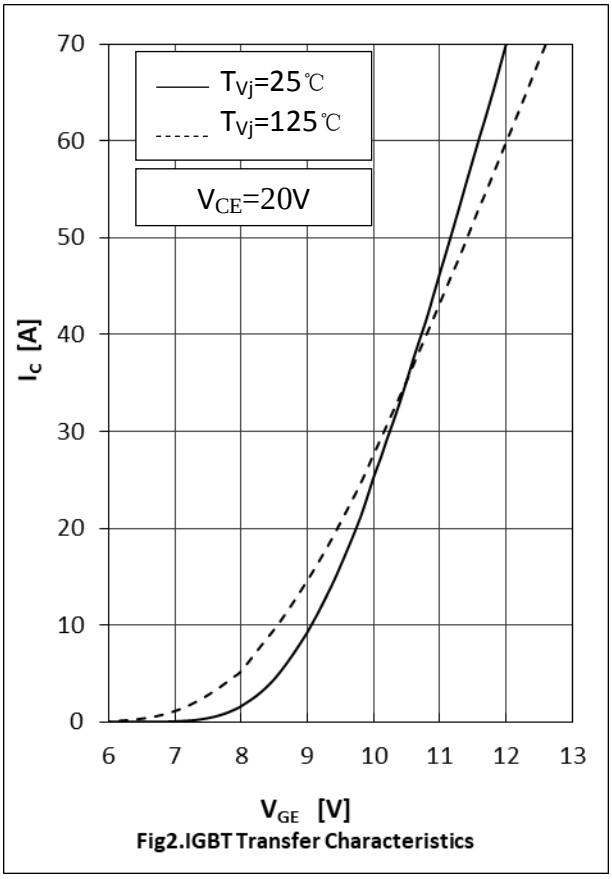


Fig2.IGBT Transfer Characteristics

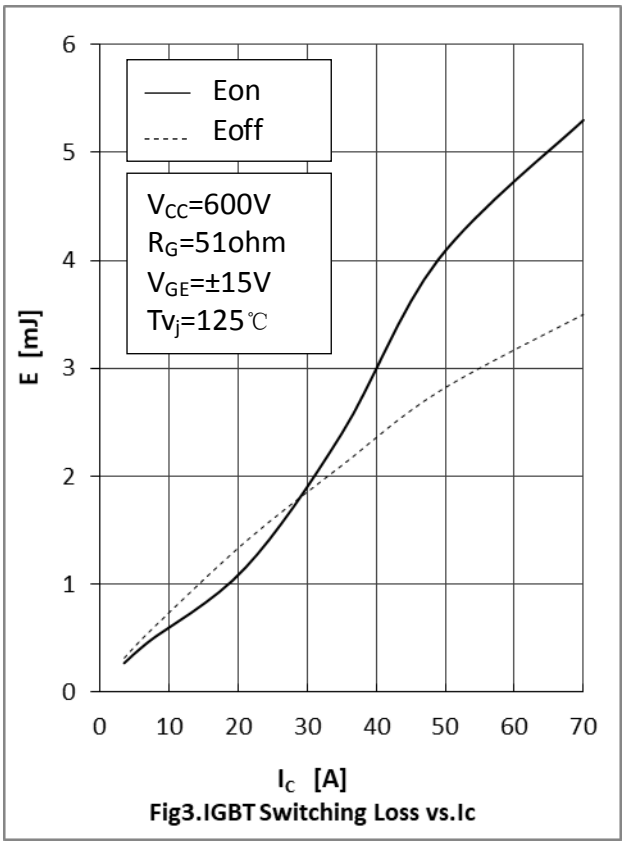


Fig3.IGBT Switching Loss vs.Ic

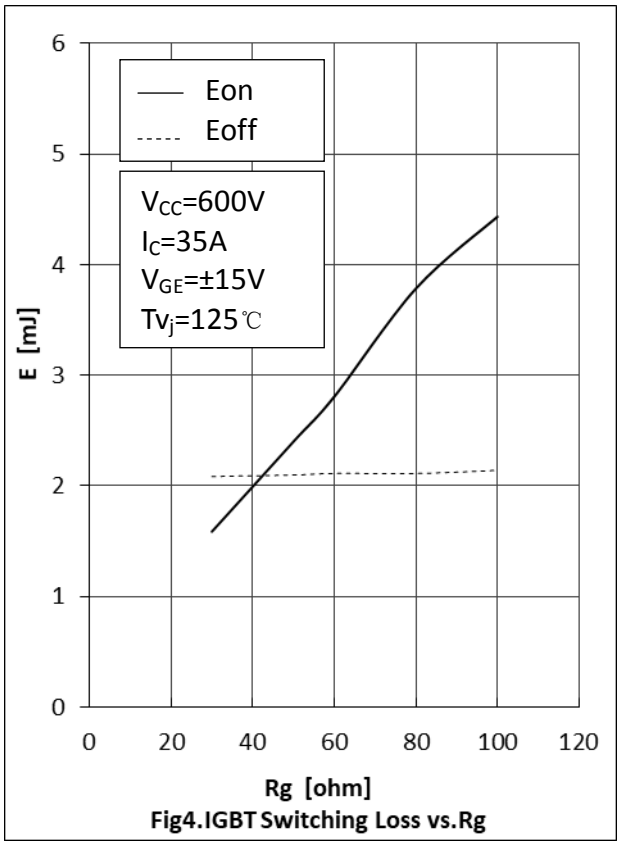


Fig4.IGBT Switching Loss vs.Rg

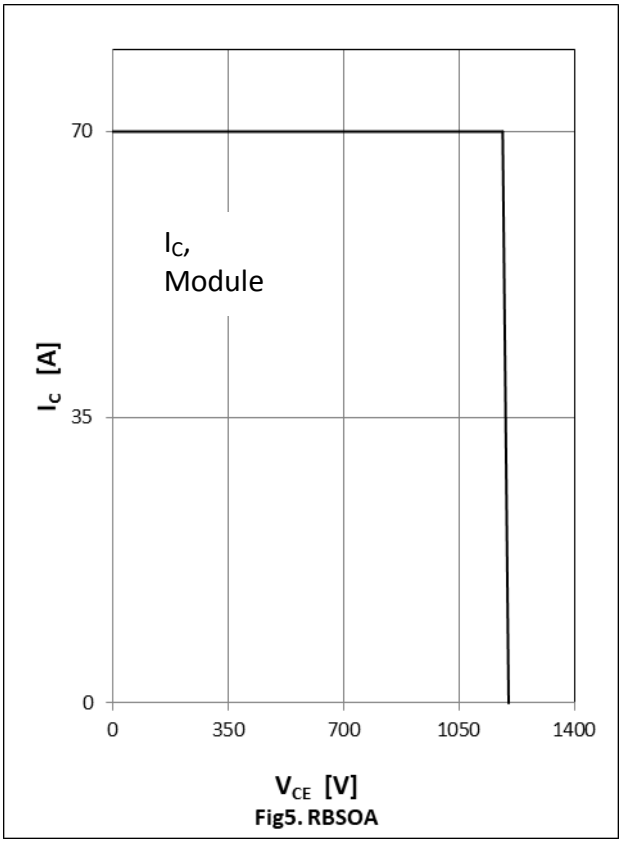


Fig5. RBSOA

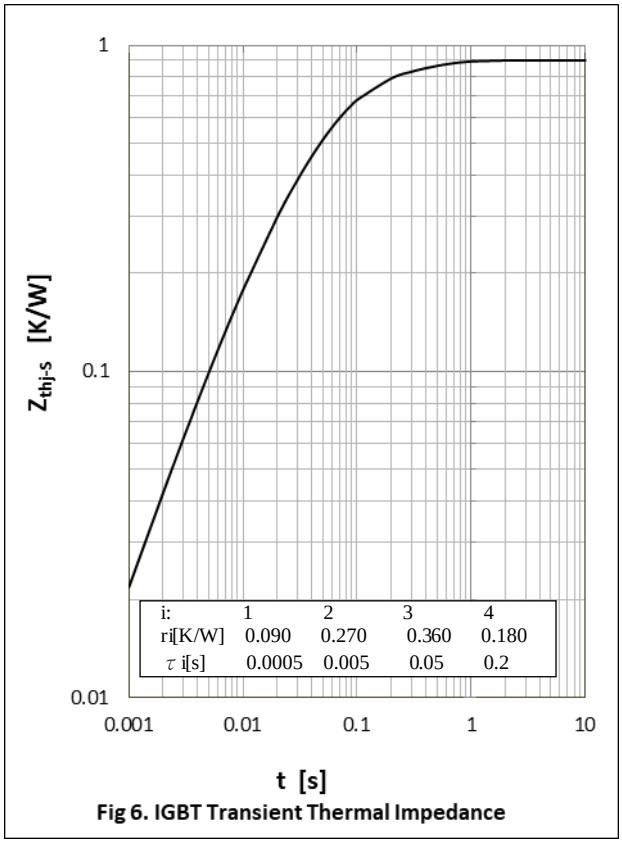


Fig 6. IGBT Transient Thermal Impedance

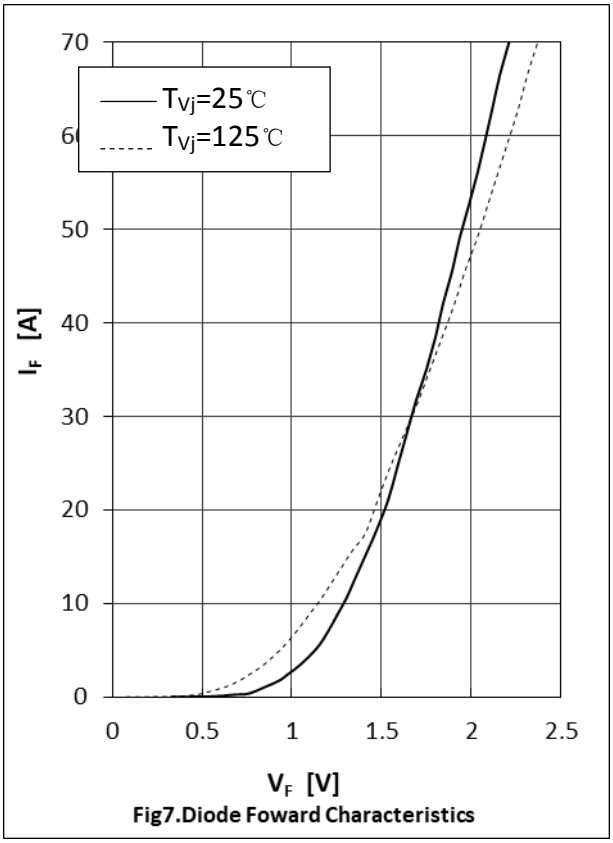


Fig7.Diode Foward Characteristics

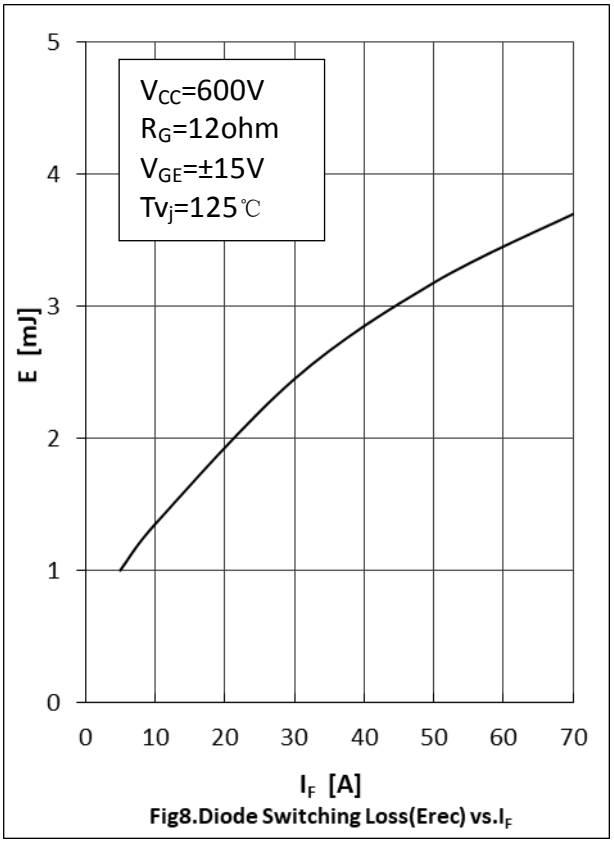


Fig8.Diode Switching Loss(Erec) vs.I_F

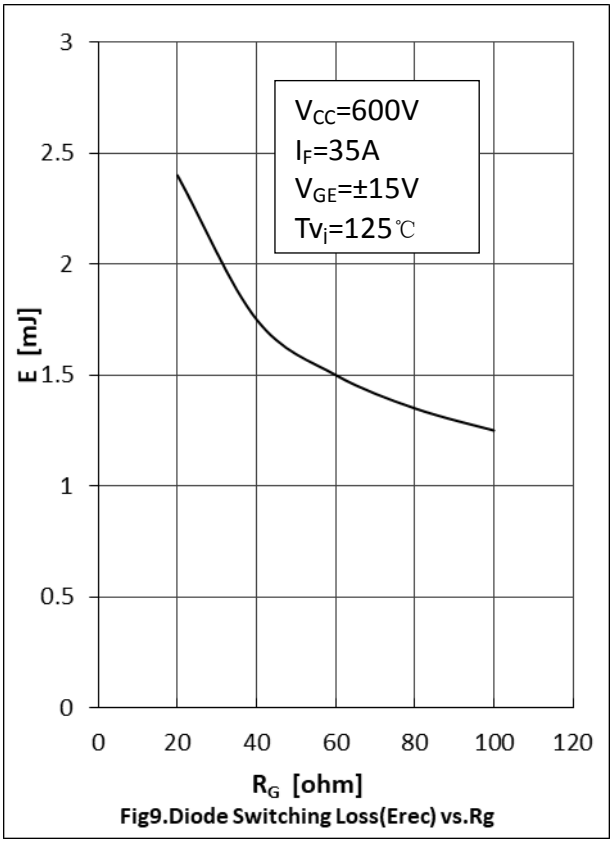


Fig9.Diode Switching Loss(Erec) vs.Rg

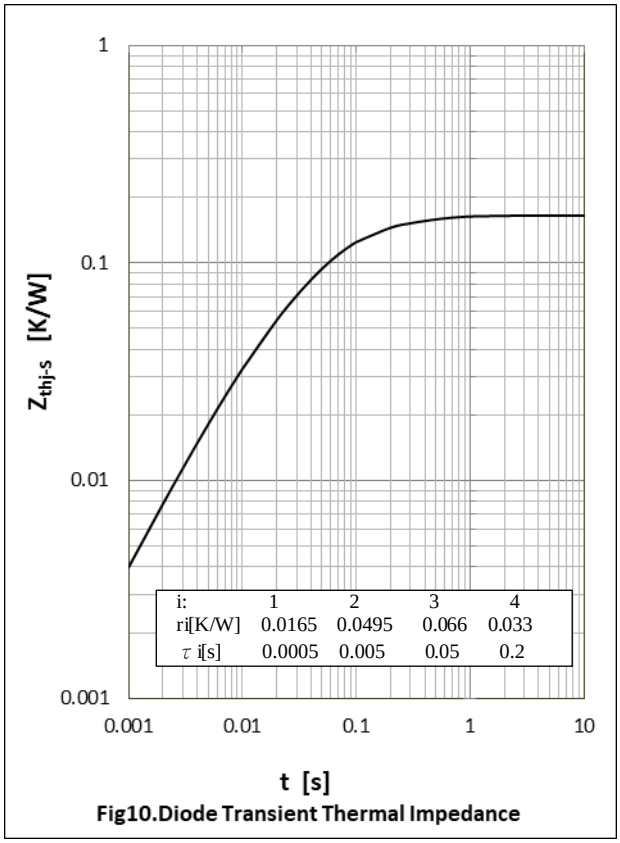


Fig10.Diode Transient Thermal Impedance

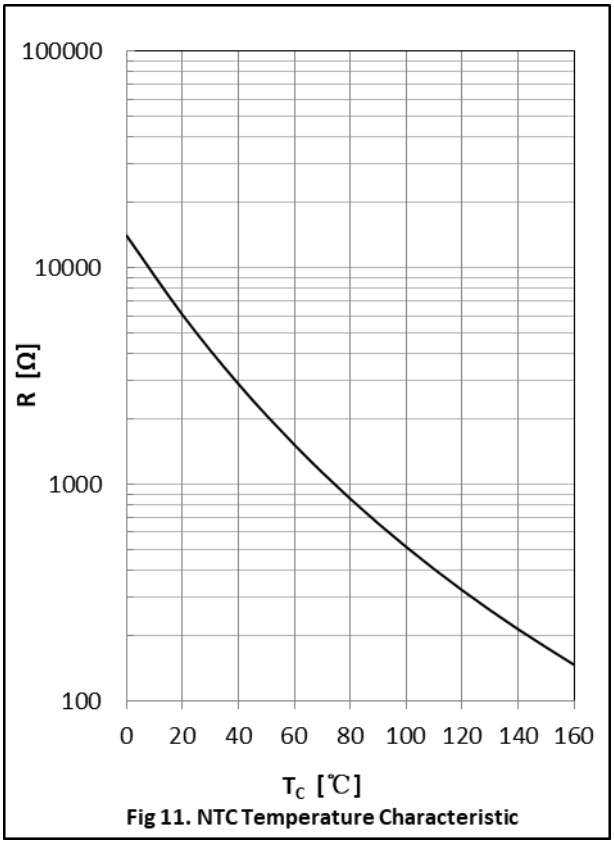
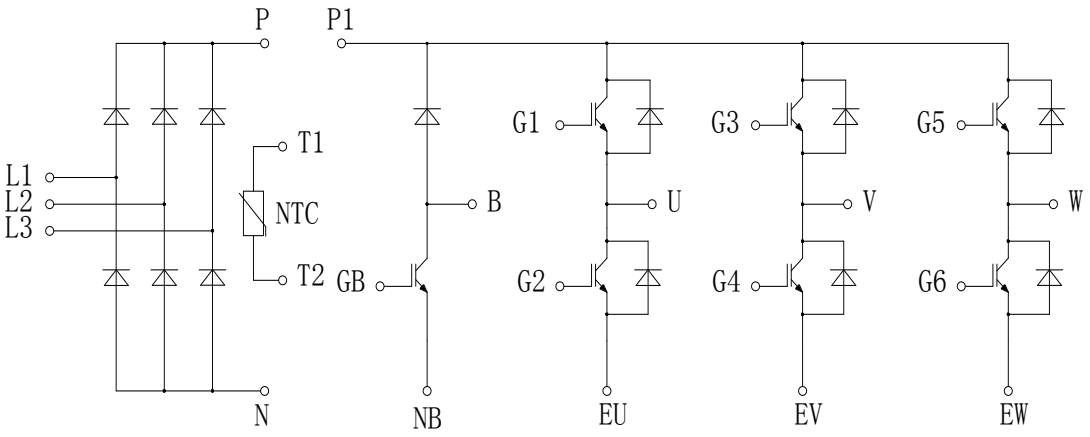


Fig 11. NTC Temperature Characteristic

Circuit Diagram



Package Outline Information

CASE: P3

Dimensions in Millimeters