IGBT Modules
1200V 75A

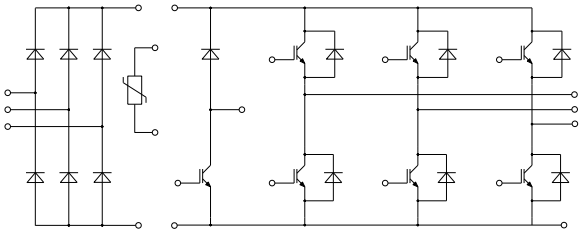
Features

- Low switching losses
- Low $V_{CE(sat)}$ with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- High short circuit capability(8us)
- Maximum junction temperature 175°C
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant (Note 1)("P" Suffix Designates RoHS Compliant. See Ordering Information)

Applications

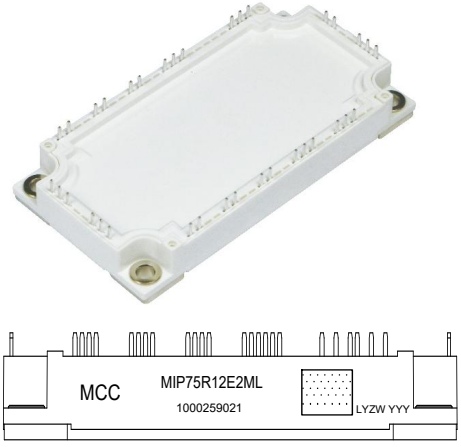
- Motor Drivers
- AC and DC Servo Drive Amplifier
- UPS (Uninterruptible Power Supplies)

Circuit Diagram



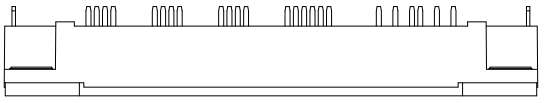
Note:

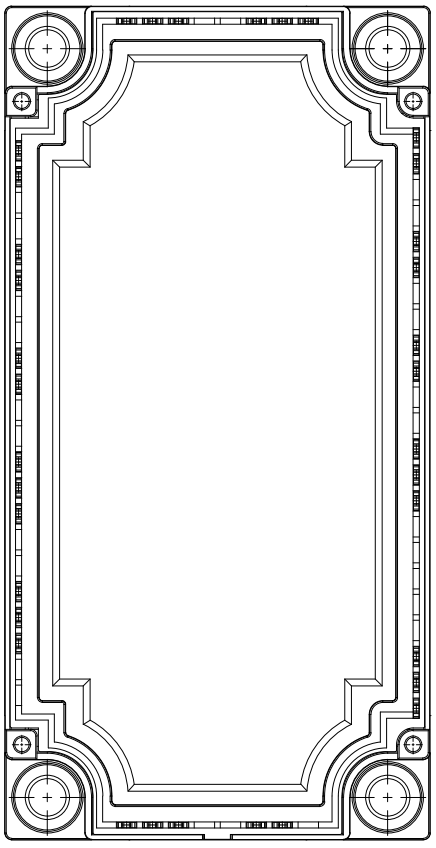
1. High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.



Marking Code Contents:
Logo: MCC
Product Number:MIP75R12E2ML
Trace Code: 10 Digits
2D Code format: Data Matrix

E2





● IGBT- Inverter

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Collector-Emitter Voltage	V_{CES}	V_{GE}=0V, I_C=1mA, T_{vj}=25°C	1200	V
Continuous Collector Current	I_C	T_C=100°C, T_{vjmax}=175°C	75	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	150	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25°C	±20	V
Total Power Dissipation	P_{tot}	T_C=25°C, T_{vjmax}=175°C	319	W

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=75A, T_J=25°C		1.60		V
		V_{GE}=15V, I_C=75A, T_J=125°C		1.85		
		V_{GE}=15V, I_C=75A, T_J=150°C		1.90		
G-E Threshold Voltage	$V_{GE(th)}$	I_C=2.8mA, V_{CE}=V_{GE}	5.0	5.9	6.5	V
C-E Leakage Current	I_{CES}	V_{CE}=1200V, V_{GE}=0V			1.0	mA
G-E Leakage Current	I_{GES}	V_{CE}=0V, V_{GE}=20V			400	nA
Internal Gate Resistance	R_g			2.73		Ω
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V,f=1MHz		9.9		nF
Reverse Transfer Capacitance	C_{res}			0.1		
Gate Charge	Q_g			0.79		μC
Turn-On Delay Time	$td_{(on)}$	V_{CC}=600V, I_C=75A, V_{GE}=±15V, R_G=5.6Ω, T_J=25°C		95		ns
Rise Time	t_r			31		
Turn-Off Delay Time	$td_{(off)}$			240		
Fall Time	t_f			255		
Turn-On Energy	E_{on}			3.4		mJ
Turn-Off Energy	E_{off}			5.8		
Turn-On Delay Time	$td_{(on)}$	V_{CC}=600V, I_C=75A, V_{GE}=±15V, R_G=5.6Ω, T_J=150°C		102		ns
Rise Time	t_r			36		
Turn-Off Delay Time	$td_{(off)}$			289		
Fall Time	t_f			423		
Turn-On Energy	E_{on}			5.7		mJ
Turn-Off Energy	E_{off}			8.4		
SC Data	I_{sc}	T_P≤8μs, V_{GE}=15V, V_{CC}=600V, V_{CEM}≤1200V, T_{Vj}=150°C		300		A

● Diode- Inverter

Maximum Ratings

Parameter	Symbol	Test Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	Tvj=25°C	1200	V
Continuous DC Forward Current	I_F		75	A
Repetitive Peak Forward Current	I_{FRM}	tp=1ms	150	A

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	I_F=75A, T_J=25°C		2.25	2.80	V
		I_F=75A, T_J=125°C		1.90		
		I_F=75A, T_J=150°C		1.80		
Reverse Recovery Current	I_{rr}	V_R=600V, I_F=75A, di_F/dt=-1800A/μs, T_J=25°C		43		A
Reverse Recovery Charge	Q_{rr}			2.99		μC
Reverse Recovery Energy	E_{rec}			0.97		mJ
Reverse Recovery Current	I_{rr}	V_R=600V, I_F=75A, di_F/dt=-1800A/μs, T_J=150°C		65		A
Reverse Recovery Charge	Q_{rr}			8.07		μC
Reverse Recovery Energy	E_{rec}			2.8		mJ

● IGBT- Brake-chopper

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Collector-Emitter Voltage	V_{CES}	V_{GE}=0V, I_C=1mA, T_J=25°C	1200	V
Continuous Collector Current	I_C	T_C=100°C, Tvjmax=175°C	50	A
Repetitive Peak Collector Current	I_{CRM}	t_p=1ms	100	A
Gate-Emitter Voltage	V_{GES}	T_{Vj}=25°C	±20	V
Total Power Dissipation	P_{tot}	T_C=25°C, Tvjmax=175°C	250	W

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=50A, T_J=25°C		1.75		V
		V_{GE}=15V, I_C=50A, T_J=125°C		1.90		
		V_{GE}=15V, I_C=50A, T_J=150°C		1.95		
G-E Threshold Voltage	$V_{GE(th)}$	I_C=1.7mA, V_{CE}=V_{GE}	5.0	5.7	6.5	V
C-E Leakage Current	I_{CES}	V_{CE}=1200V, V_{GE}=0V			1.0	mA
G-E Leakage Current	I_{GES}	V_{CE}=0V, V_{GE}=20V			400	nA
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V,f=1MHz		6.1		nF
Reverse Transfer Capacitance	C_{res}			0.08		
Gate Charge	Q_g			0.47		μC
Internal Gate Resistance	R_g			2.2		Ω
Turn-On Delay Time	$td_{(on)}$	V_{CC}=600V, I_C=50A, V_{GE}=±15V, R_G=5.8Ω, T_J=25°C		38		ns
Rise Time	t_r			61		
Turn-Off Delay Time	$td_{(off)}$			132		
Fall Time	t_f			269		
Turn-On Energy	E_{on}			3.4		mJ
Turn-Off Energy	E_{off}			3.3		
Turn-On Delay Time	$td_{(on)}$	V_{CC}=600V, I_C=50A, V_{GE}=±15V, R_G=5.8Ω, T_J=150°C		37		ns
Rise Time	t_r			58		
Turn-Off Delay Time	$td_{(off)}$			166		
Fall Time	t_f			435		
Turn-On Energy	E_{on}			5.0		mJ
Turn-Off Energy	E_{off}			5.1		
SC Data	I_{sc}	T_P≤8μs, V_{GE}=15V, V_{CC}=600V, V_{CEM}≤1200V, T_{Vj}=150°C		220		A

● Diode- Brake-chopper

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	Tvj=25°C	1200	V
Continuous DC Forward Current	I_F		25	A
Repetitive Peak Forward Current	I_{FRM}	tp=1ms	50	A

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	I_F=25A, T_{vj}=25°C		1.85	2.80	V
		I_F=25A, T_{vj}=125°C		1.65		
		I_F=25A, T_{vj}=150°C		1.60		
Reverse Recovery Current	I_{rr}	V_R=600V, I_F=25A, di_F/dt=-1600A/μs, T_{vj}=25°C		20		A
Reverse Recovery Charge	Q_{rr}			0.65		μC
Reverse Recovery Energy	E_{rec}			0.71		mJ
Reverse Recovery Current	I_{rr}	V_R=600V, I_F=25A, di_F/dt=-1600A/μs, T_{vj}=150°C		21		A
Reverse Recovery Charge	Q_{rr}			2.98		μC
Reverse Recovery Energy	E_{rec}			1.25		mJ

● Diode- Rectifier

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_J=25°C	1600	V
Average Output Current 50/60Hz, Sine Wave	$I_{F(AV)}$	T_C=100°C	75	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	T_C=100°C	115	A
Surge Forward Current	I_{FSM}	V_R=0V,tp=10ms,T_{vj}=25℃	780	A
		V_R=0V,tp=10ms,T_{vj}=150℃	650	
I^2t-value	I^2t	V_R=0V,tp=10ms,T_{vj}=25℃	3000	A^2S
		V_R=0V,tp=10ms,T_{vj}=150℃	2100	

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	I_F=75A, T_J=150°C		1.10		V
Reverse Current	I_R	V_R=1600V, T_J=150°C			2.0	mA

● NTC-Thermistor

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Rated Resistance	R_{25}			5.0		KΩ
Deviation of R100	R/R	R_{100}=493.3Ω, T_C=100°C	-5		5	%
Power Dissipation	P_{25}				20	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K

● Module Characteristics(T_C=25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Isolation Voltage	V_{isol}	t=1min, f=50Hz	2500			V
Maximum Junction Temperature	T_{jmax}				175	°C
Operating Junction Temperature	$T_{vj\ op}$		-40		150	°C
Storage Temperature	T_{stg}		-40		125	°C
Stray-Inductance-Module	L_{SCE}			60		nH
Comparative Tracking Index	CTI		200			
Module Lead Resistance, Terminals-Chip	$R_{CC'+EE}$	T_C=25°C, per Switch		4.0		mΩ
	$R_{AA'+CC}$			3.0		
Thermal Resistance Junction to Case	$R_{\theta JC}$	per IGBT-inverter			0.47	K/W
		per Diode-inverter			0.67	
		per IGBT-brake-copper			0.60	
		per Diode-chopper			1.20	
		per Diode-rectifier			0.60	
Thermal Resistance Junction to Sink	$R_{\theta CS}$	per Module		0.009		K/W
Module-to-Sink Torque	Ms		3.0		6.0	N·m
Weight of Module	G			300		g

Curve Characteristics

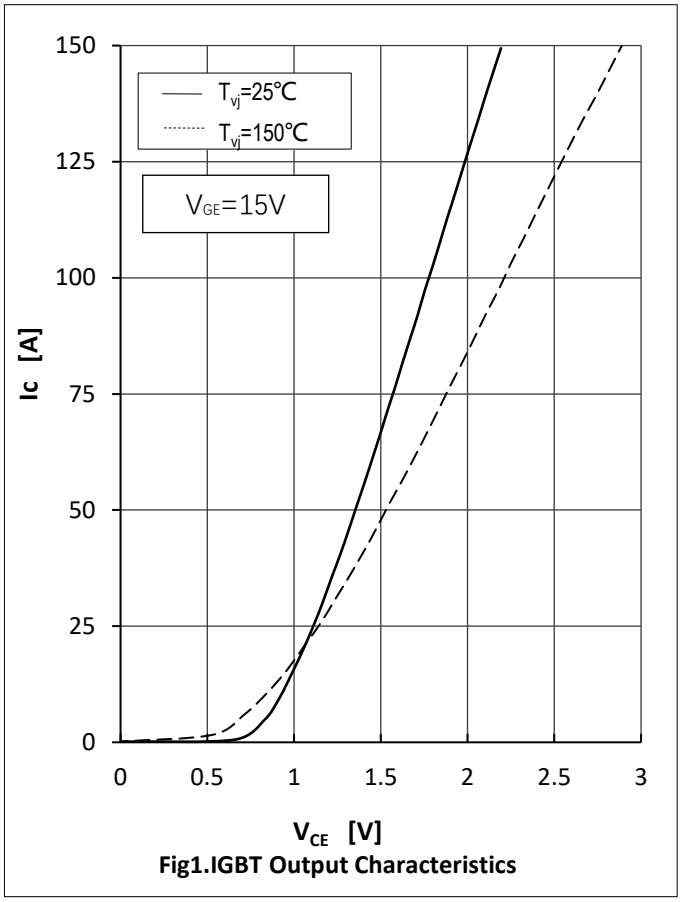


Fig1.IGBT Output Characteristics

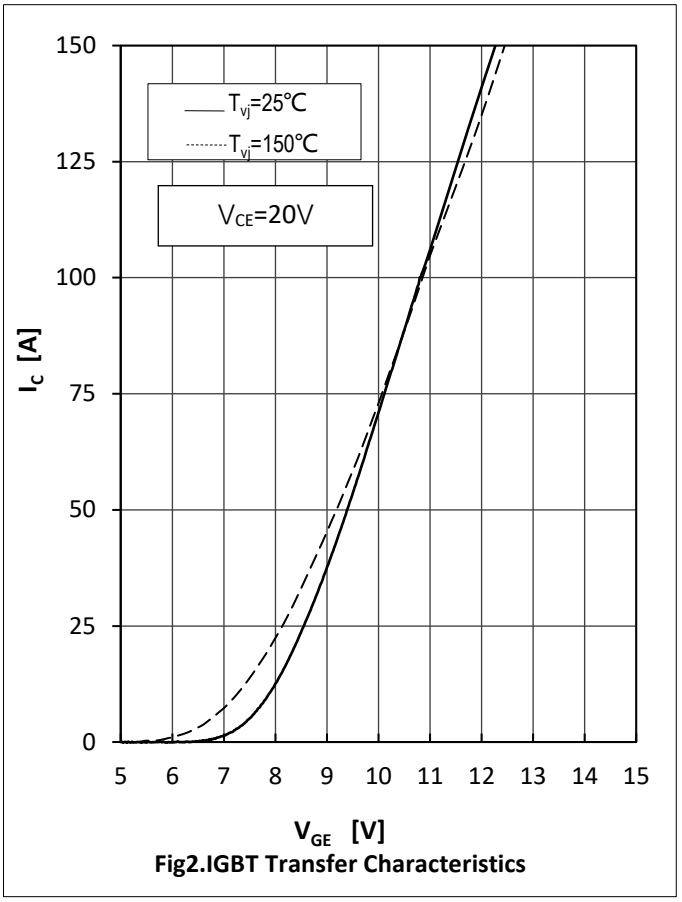


Fig2.IGBT Transfer Characteristics

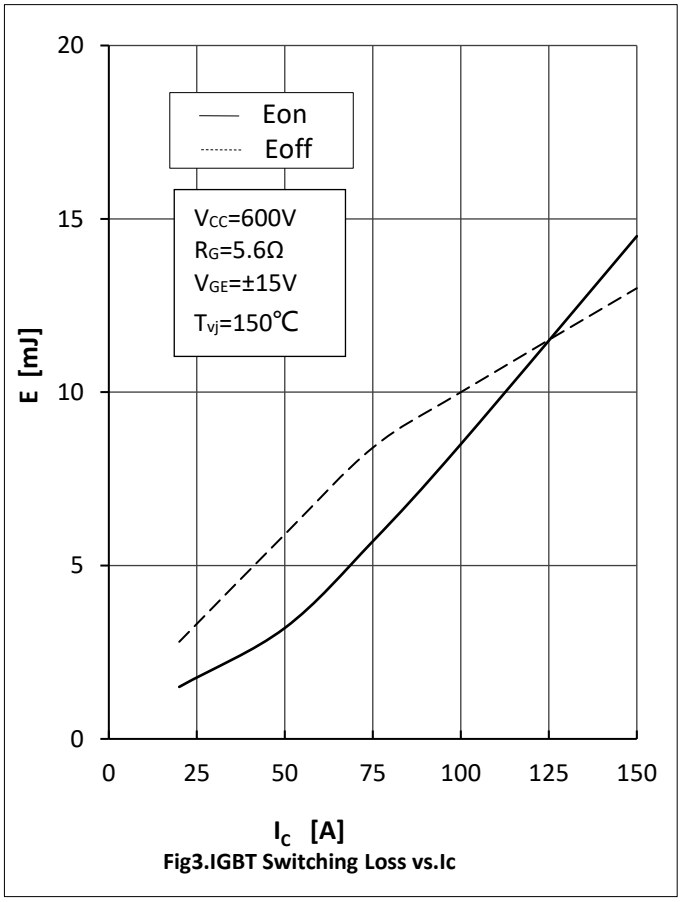


Fig3.IGBT Switching Loss vs.Ic

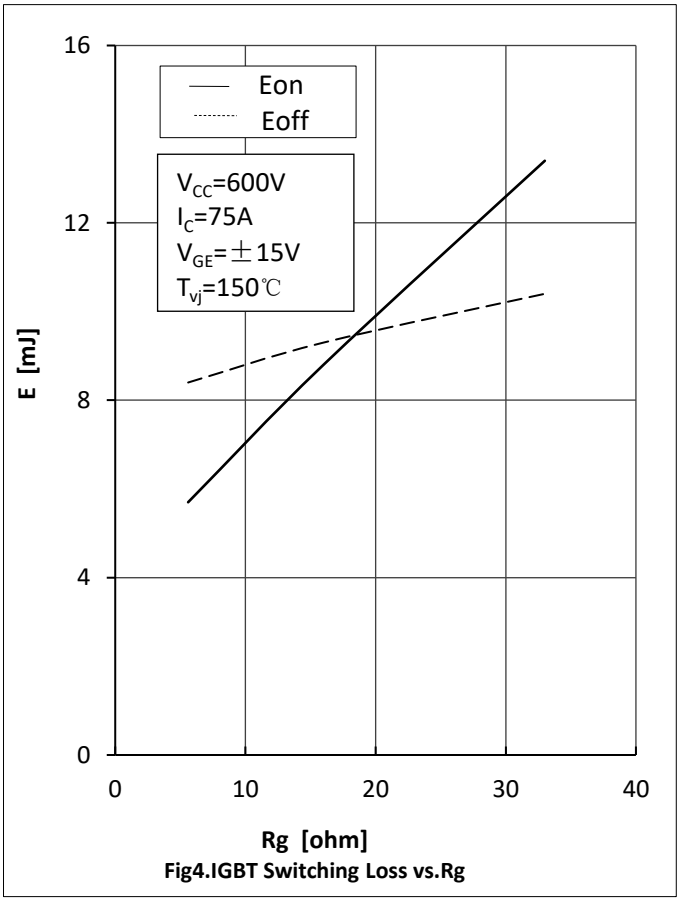


Fig4.IGBT Switching Loss vs.Rg

Curve Characteristics

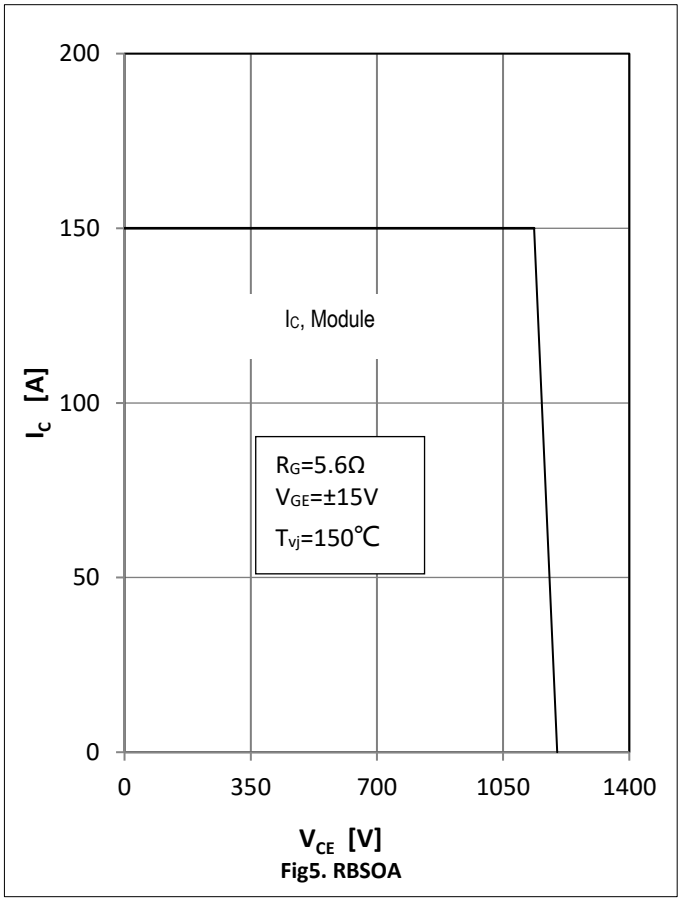


Fig5. RBSOA

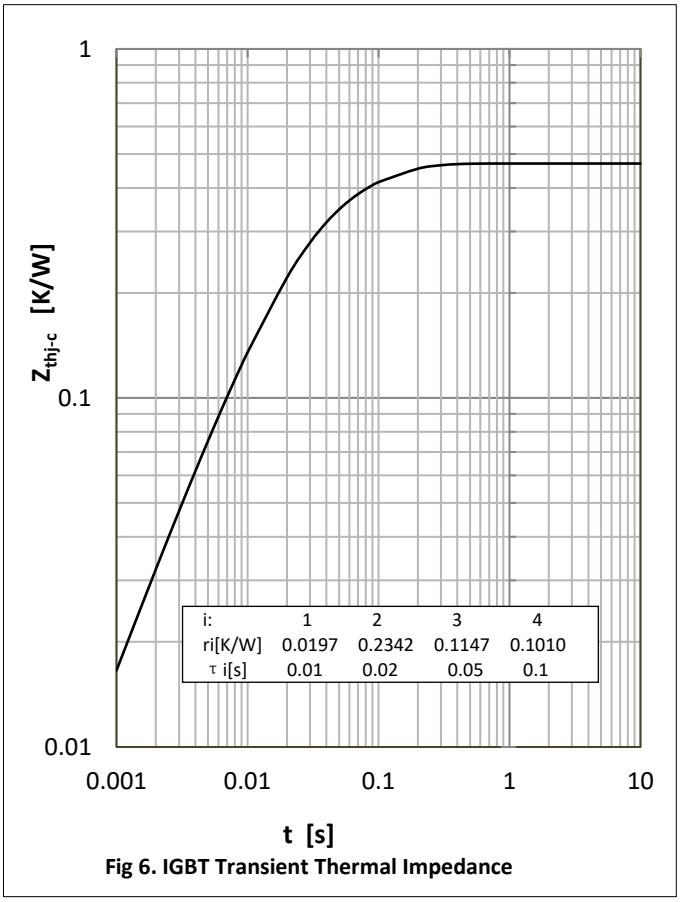


Fig 6. IGBT Transient Thermal Impedance

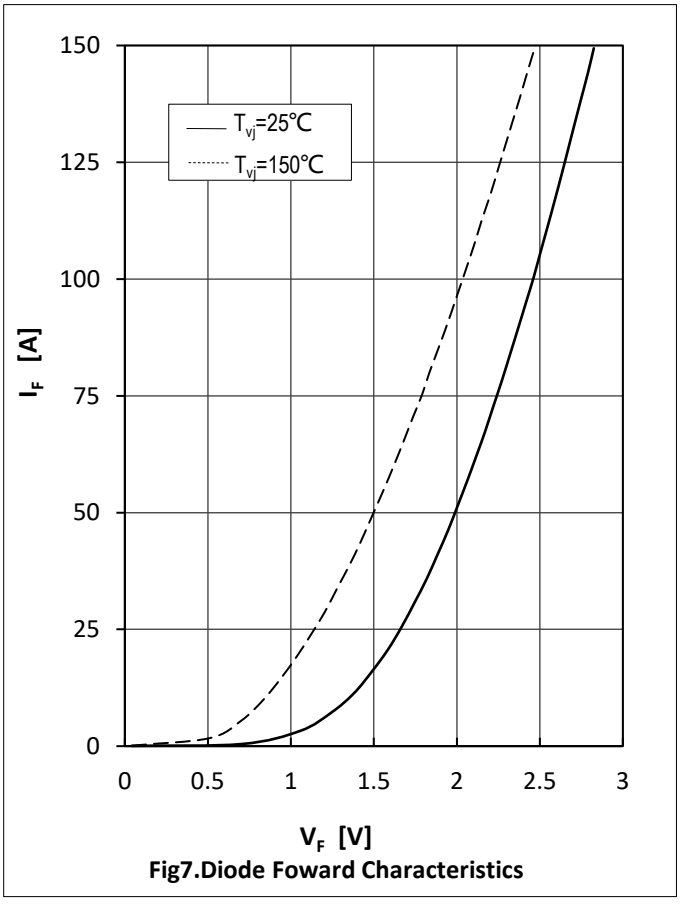


Fig7.Diode Foward Characteristics

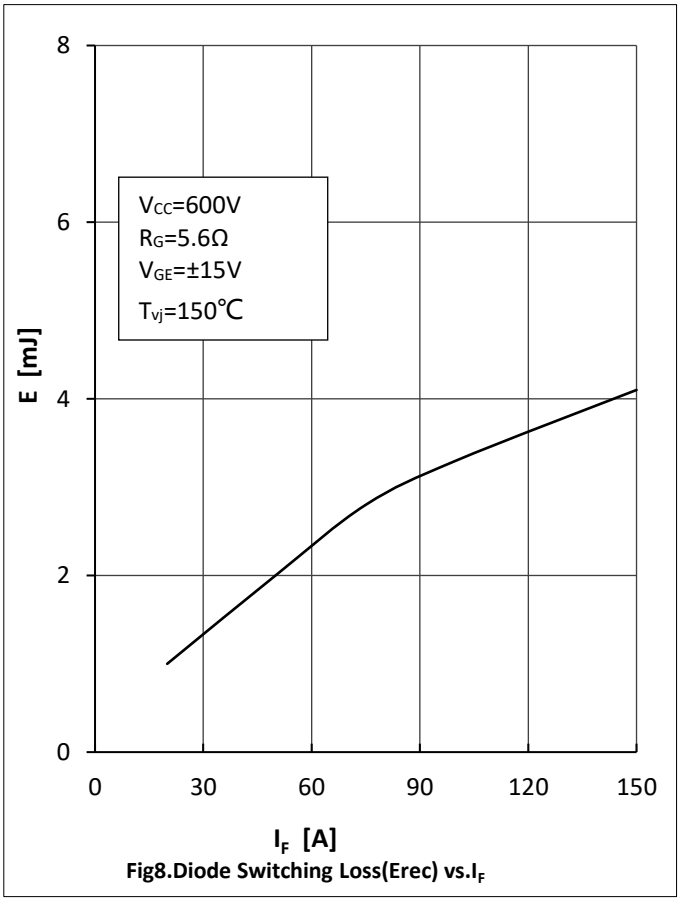


Fig8.Diode Switching Loss(Erec) vs.I_F

Curve Characteristics

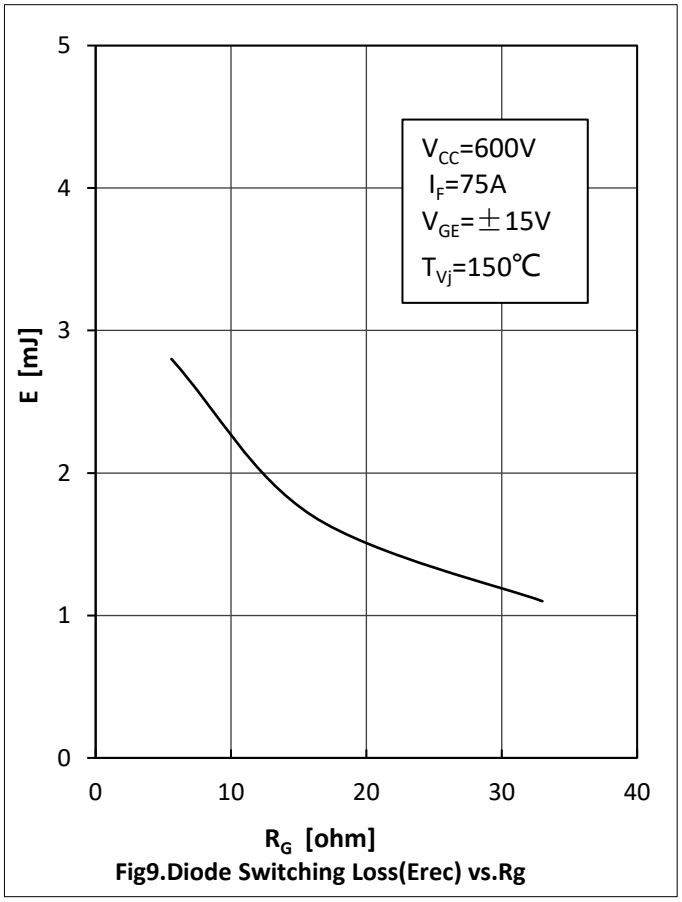


Fig9.Diode Switching Loss(Erec) vs.Rg

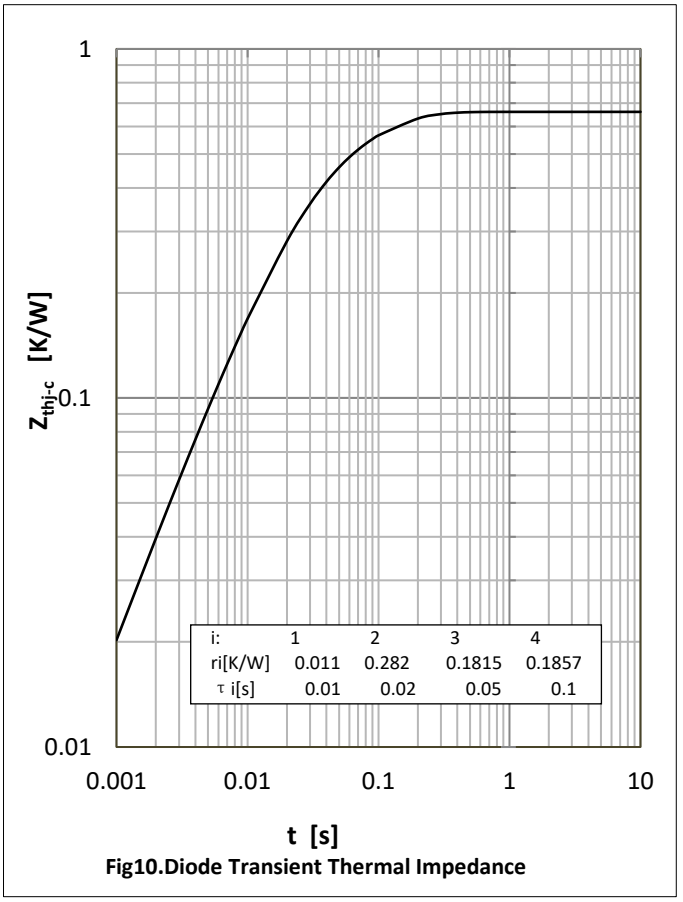


Fig10.Diode Transient Thermal Impedance

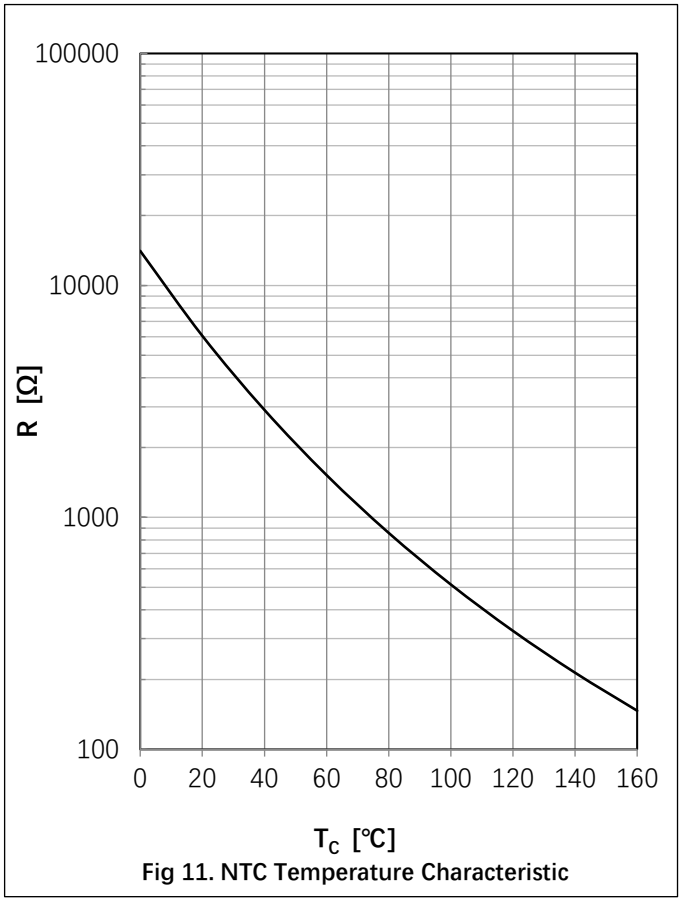


Fig 11. NTC Temperature Characteristic

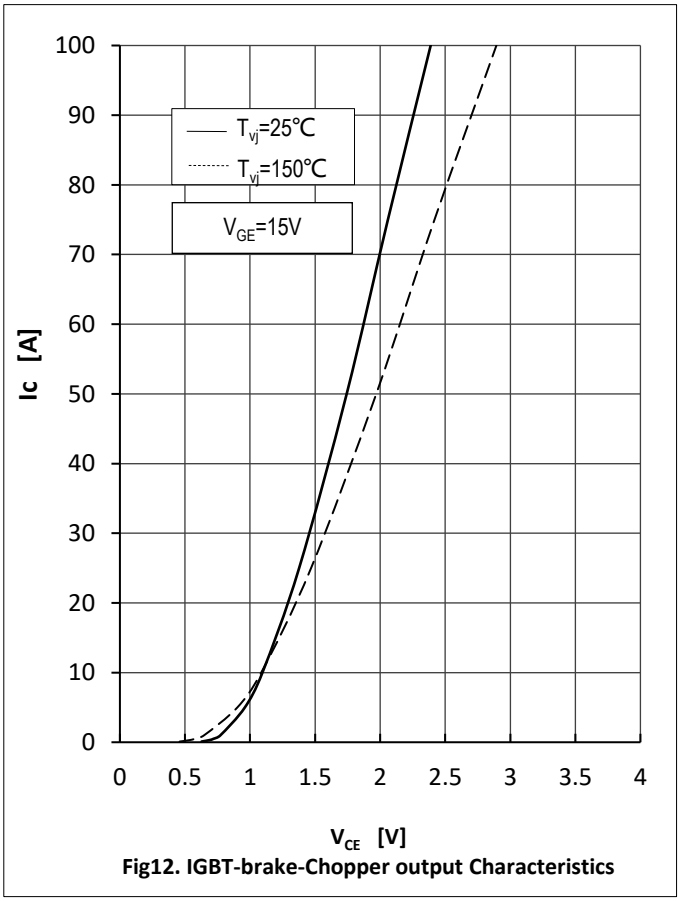


Fig12. IGBT-brake-Chopper output Characteristics

Curve Characteristics

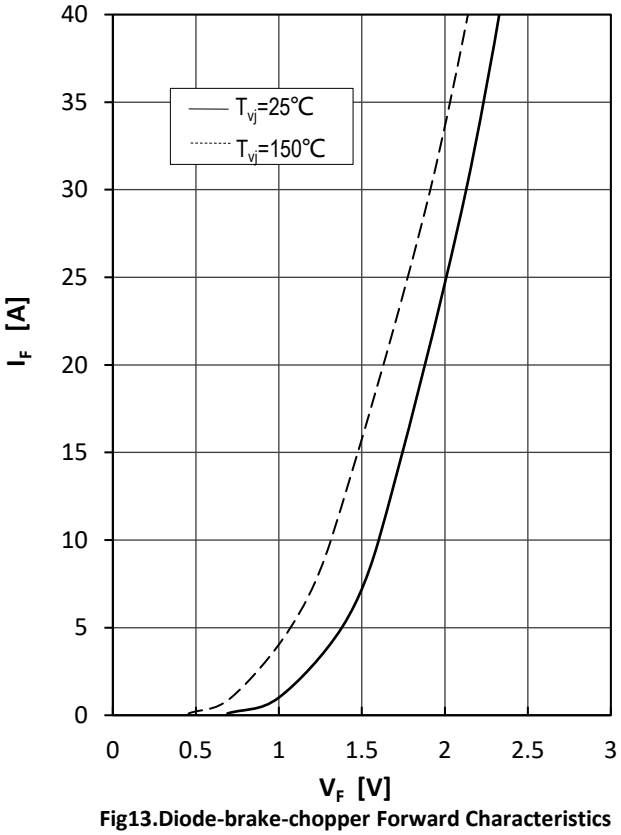
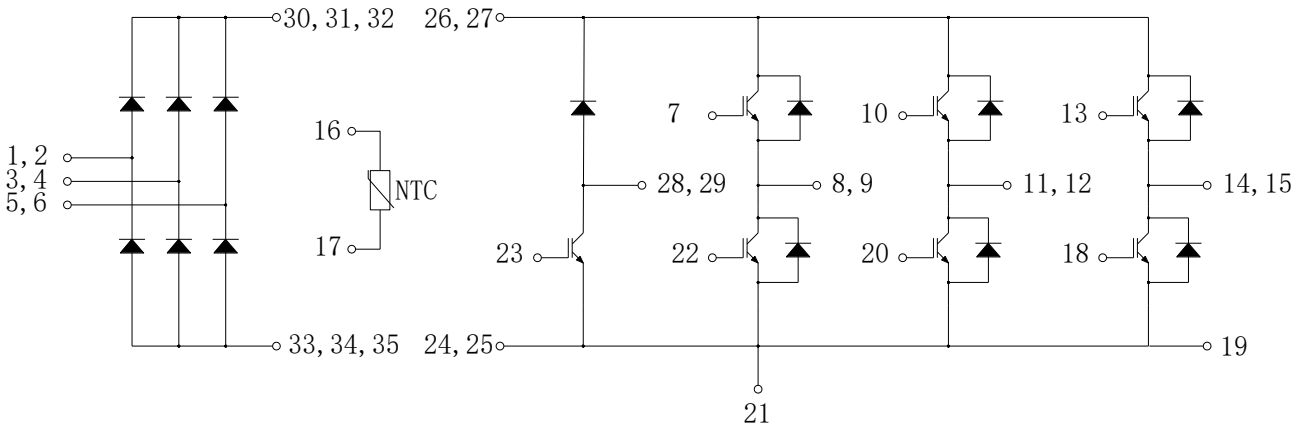


Fig13.Diode-brake-chopper Forward Characteristics

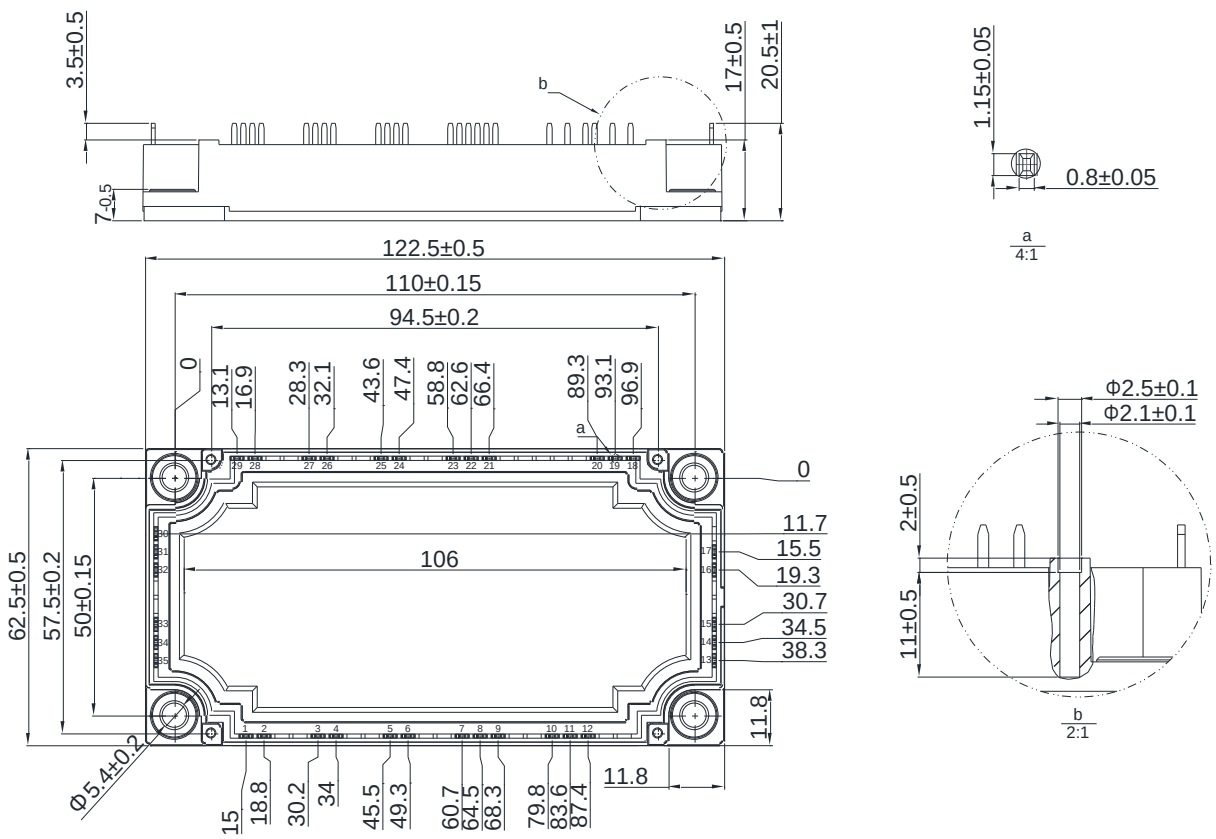
Circuit Diagram



Package Dimensions

Dimensions in mm

E2



Ordering Information

Device	Packing
Part Number-BP	Bulk: 6pcs/Box ; 36pcs/Ctn