

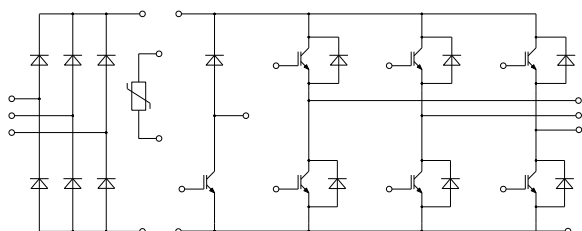
Features

- 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

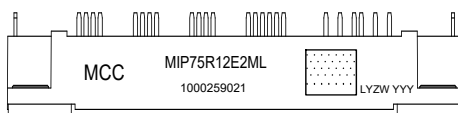
- Motor Drivers
- AC and DC Servo Drive Amplifier
- UPS (Uninterruptible Power Supplies)

Circuit Diagram



Note:

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



Marking Code Contents:

Logo: MCC

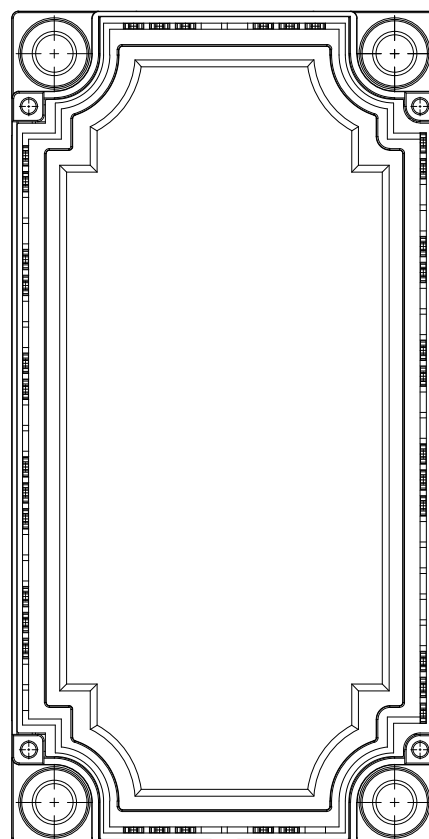
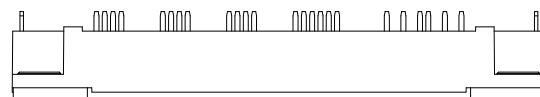
Product Number: MIP75R12E2ML

Trace Code: 10 Digits

2D Code format: Data Matrix

IGBT Modules 1200V 75A

E2



IGBT- Inverter

Maximum Ratings

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

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=75A, T_J=25^{\circ}C$		1.60		V
		$V_{GE}=15V, I_C=75A, T_J=125^{\circ}C$		1.85		
		$V_{GE}=15V, I_C=75A, T_J=150^{\circ}C$		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	$t_{d(on)}$	$V_{CC}=600V, I_C=75A, V_{GE}=\pm 15V, R_G=5.6\Omega, T_J=25^{\circ}C$		95		ns
Rise Time	t_r			31		
Turn-Off Delay Time	$t_{d(off)}$			240		
Fall Time	t_f			255		
Turn-On Energy	E_{on}	$V_{CC}=600V, I_C=75A, V_{GE}=\pm 15V, R_G=5.6\Omega, T_J=150^{\circ}C$		3.4		mJ
Turn-Off Energy	E_{off}			5.8		
Turn-On Delay Time	$t_{d(on)}$			102		ns
Rise Time	t_r			36		
Turn-Off Delay Time	$t_{d(off)}$			289		
Fall Time	t_f			423		
Turn-On Energy	E_{on}	$T_P \leq 8\mu s, V_{GE}=15V, V_{CC}=600V, V_{CEM} \leq 1200V, T_{vj}=150^{\circ}C$		5.7		mJ
Turn-Off Energy	E_{off}			8.4		
SC Data	I_{sc}	$T_P \leq 8\mu s, V_{GE}=15V, V_{CC}=600V, V_{CEM} \leq 1200V, T_{vj}=150^{\circ}C$		300		A

● Diode- Inverter

Maximum Ratings

Parameter	Symbol	Test Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}C$	1200	V
Continuous DC Forward Current	I_F		75	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	150	A

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	$I_F=75A, T_J=25^{\circ}C$		2.25	2.80	V
		$I_F=75A, T_J=125^{\circ}C$		1.90		
		$I_F=75A, T_J=150^{\circ}C$		1.80		
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=75A,$ $di_F/dt=-1800A/\mu s, T_J=25^{\circ}C$		43		A
Reverse Recovery Charge	Q_{rr}			2.99		μC
Reverse Recovery Energy	E_{rec}			0.97		mJ
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=75A,$ $di_F/dt=-1800A/\mu s, T_J=150^{\circ}C$		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}	$V_{GE}=0V, I_C=1mA, T_J=25^{\circ}C$	1200	V
Continuous Collector Current	I_C	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	50	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	100	A
Gate-Emitter Voltage	V_{GES}	$T_{Vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C, T_{vjmax}=175^{\circ}C$	250	W

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=50A, T_J=25^{\circ}C$		1.75		V
		$V_{GE}=15V, I_C=50A, T_J=125^{\circ}C$		1.90		
		$V_{GE}=15V, I_C=50A, T_J=150^{\circ}C$		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	$t_{d(on)}$	$V_{CC}=600V, I_C=50A,$ $V_{GE}=\pm 15V, R_G=5.8\Omega,$ $T_J=25^{\circ}C$		38		ns
Rise Time	t_r			61		
Turn-Off Delay Time	$t_{d(off)}$			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	$t_{d(on)}$	$V_{CC}=600V, I_C=50A,$ $V_{GE}=\pm 15V, R_G=5.8\Omega,$ $T_J=150^{\circ}C$		37		ns
Rise Time	t_r			58		
Turn-Off Delay Time	$t_{d(off)}$			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}	$T_P \leq 8\mu s, V_{GE}=15V, V_{CC}=600V,$ $V_{CEM} \leq 1200V, T_{Vj}=150^{\circ}C$		220		A

● Diode- Brake-chopper

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}C$	1200	V
Continuous DC Forward Current	I_F		25	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	50	A

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	$I_F=25A, T_{vj}=25^{\circ}C$		1.85	2.80	V
		$I_F=25A, T_{vj}=125^{\circ}C$		1.65		
		$I_F=25A, T_{vj}=150^{\circ}C$		1.60		
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=25A, di_F/dt=-1600A/\mu s, T_{vj}=25^{\circ}C$		20		A
Reverse Recovery Charge	Q_{rr}			0.65		μC
Reverse Recovery Energy	E_{rec}			0.71		mJ
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=25A, di_F/dt=-1600A/\mu s, T_{vj}=150^{\circ}C$		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}	$T_J=25^{\circ}\text{C}$	1600	V
Average Output Current 50/60Hz, Sine Wave	$I_{F(AV)}$	$T_C=100^{\circ}\text{C}$	75	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	$T_C=100^{\circ}\text{C}$	115	A
Surge Forward Current	I_{FSM}	$V_R=0\text{V}, t_p=10\text{ms}, T_{vj}=25^{\circ}\text{C}$	780	A
		$V_R=0\text{V}, t_p=10\text{ms}, T_{vj}=150^{\circ}\text{C}$	650	
I^2t -value	I^2t	$V_R=0\text{V}, t_p=10\text{ms}, T_{vj}=25^{\circ}\text{C}$	3000	A^2S
		$V_R=0\text{V}, t_p=10\text{ms}, T_{vj}=150^{\circ}\text{C}$	2100	

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	$I_F=75\text{A}, T_J=150^{\circ}\text{C}$		1.10		V
Reverse Current	I_R	$V_R=1600\text{V}, T_J=150^{\circ}\text{C}$			2.0	mA

● NTC-Thermistor

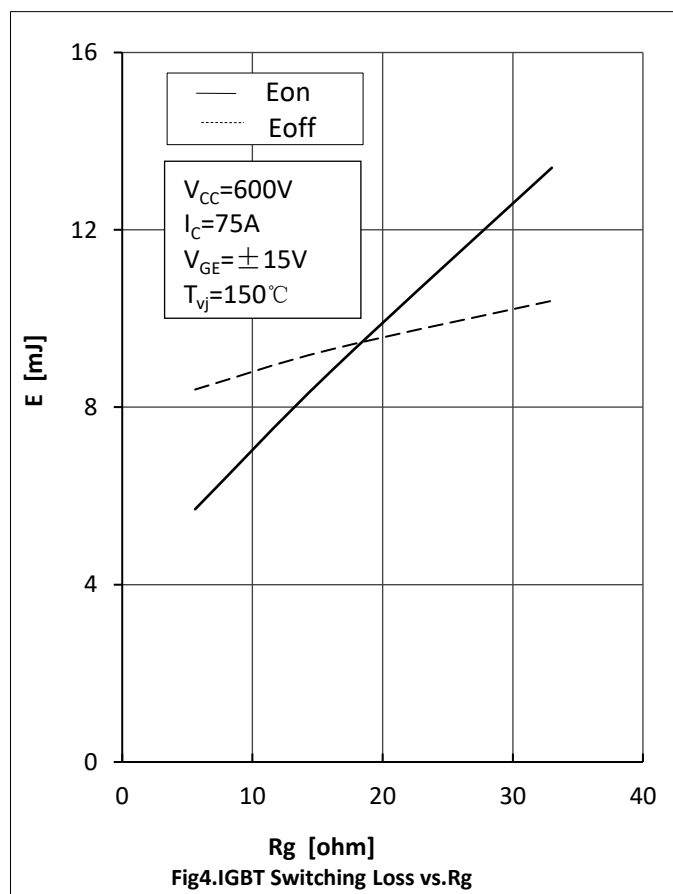
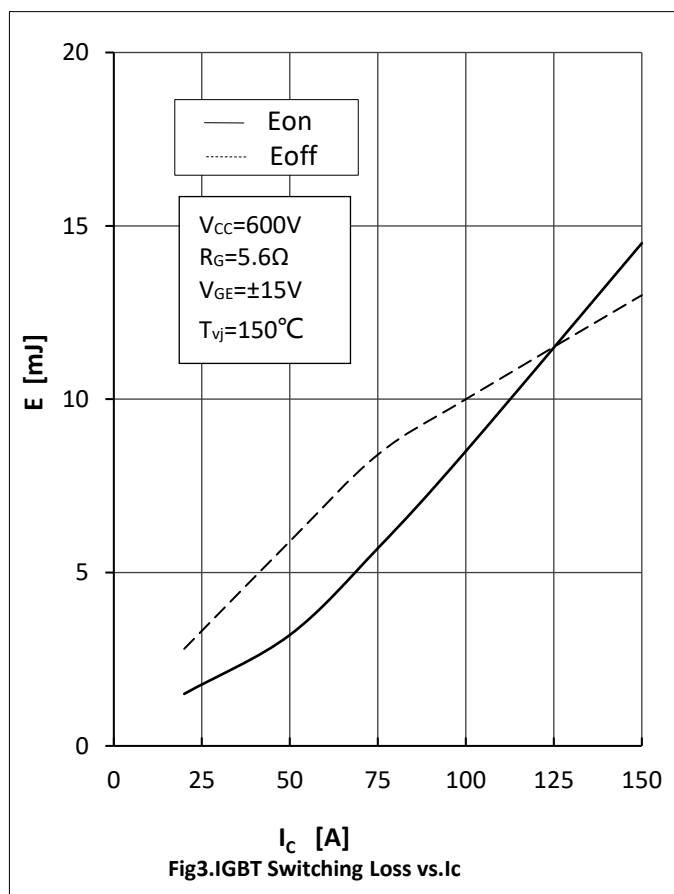
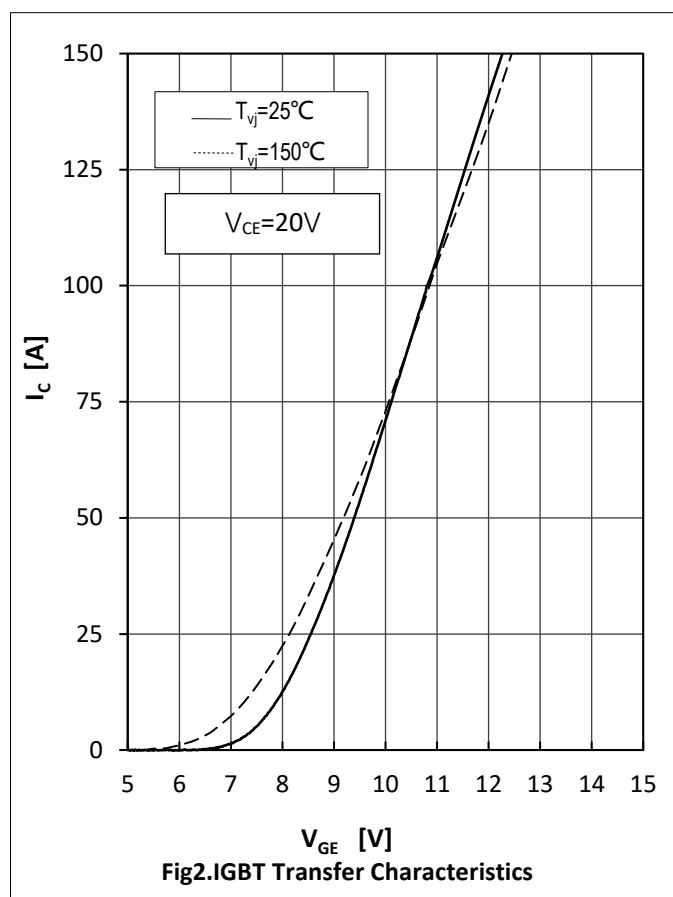
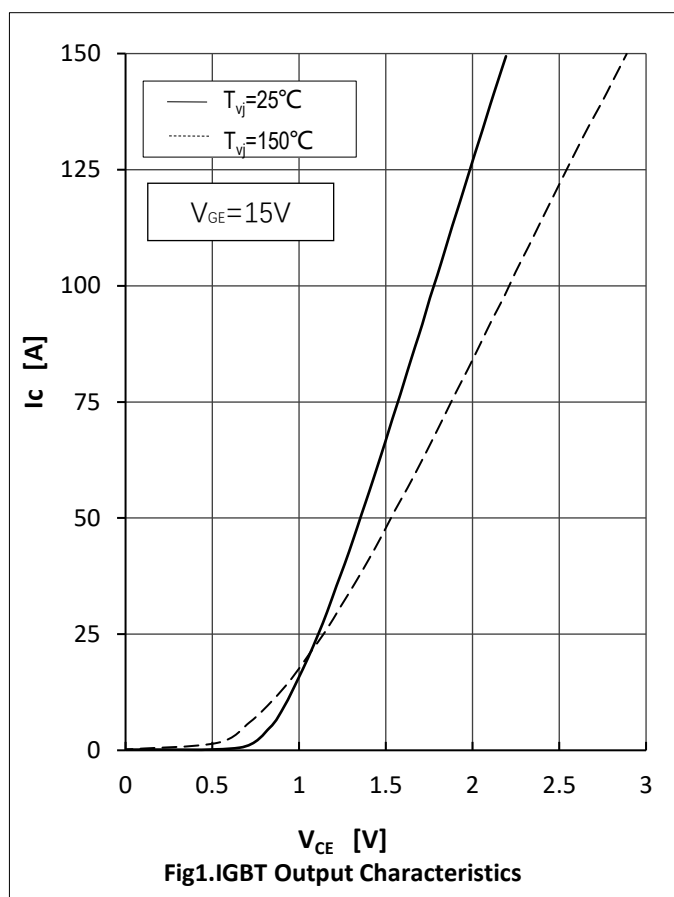
Electrical Characteristics

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

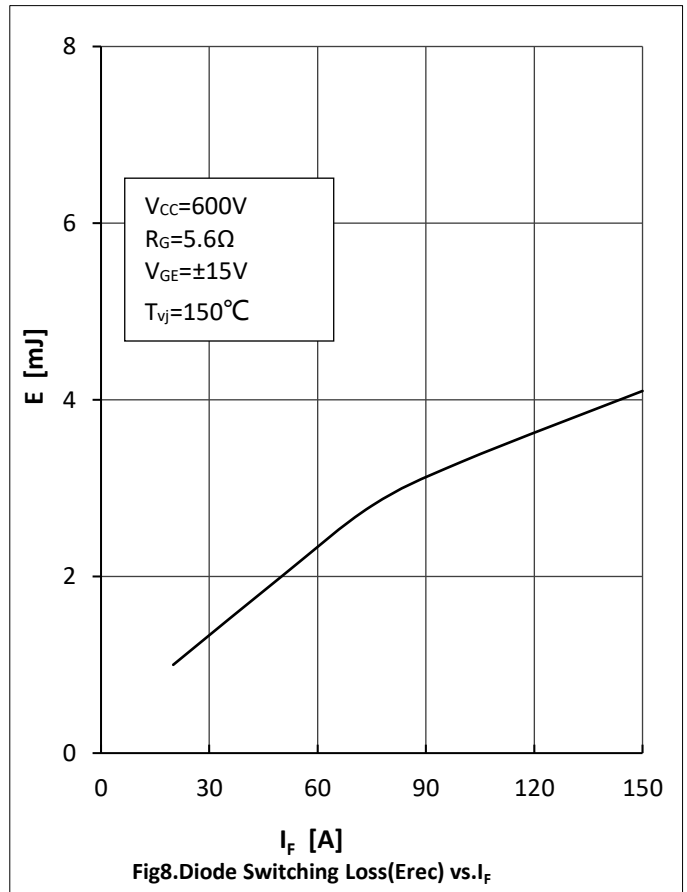
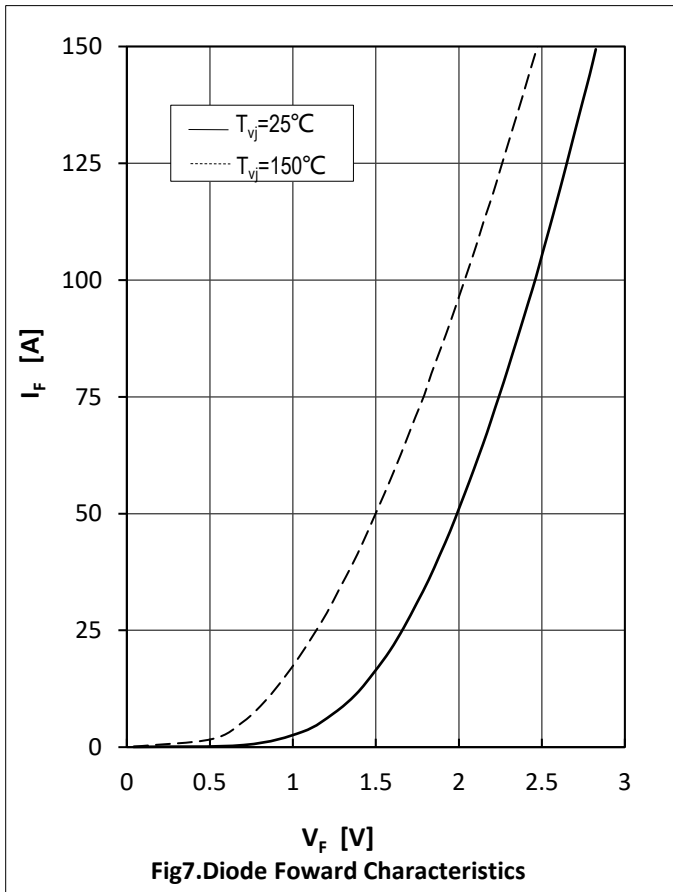
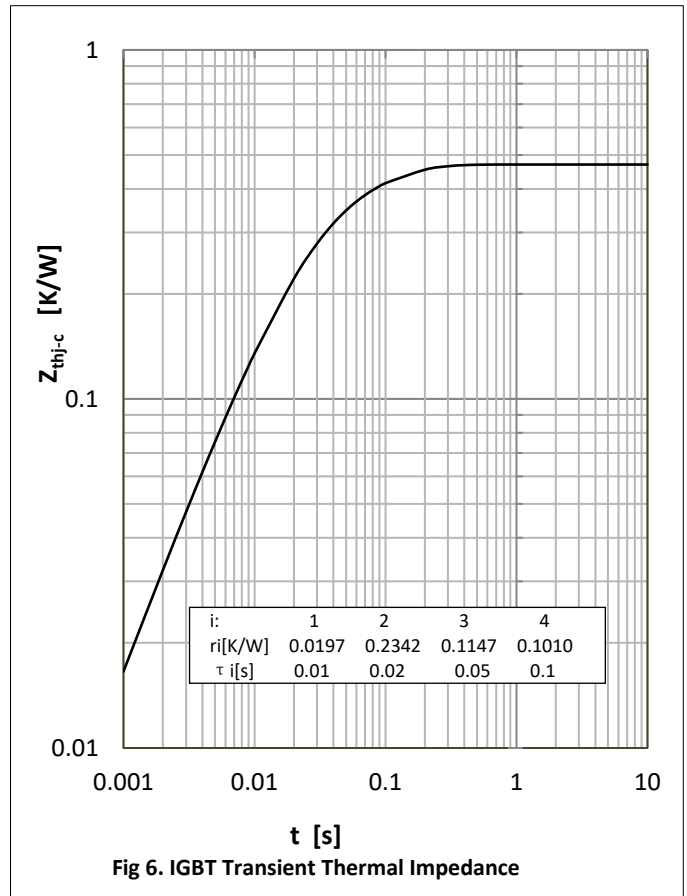
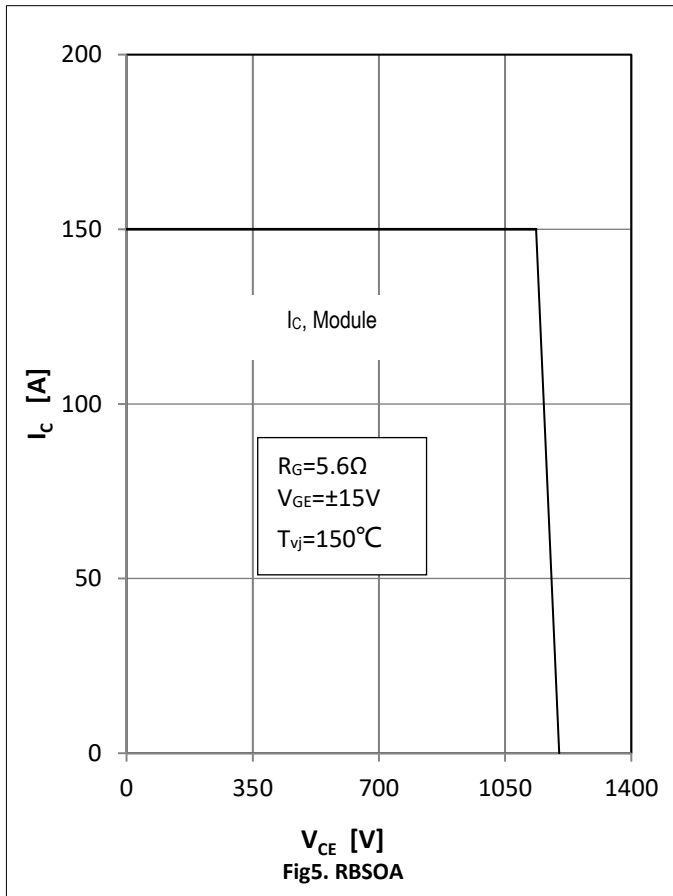
● Module Characteristics($T_C=25^{\circ}\text{C}$ unless otherwise specified)

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

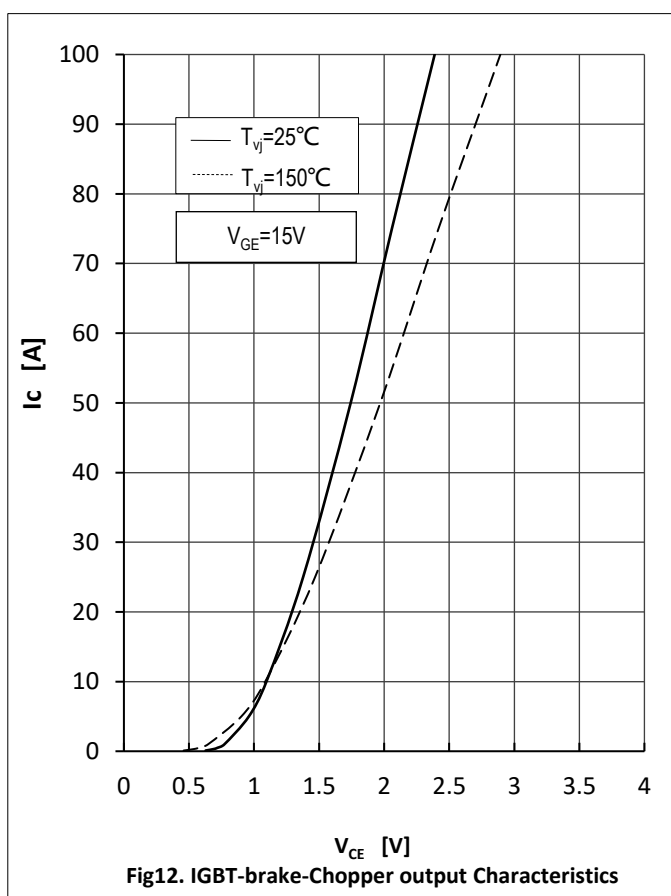
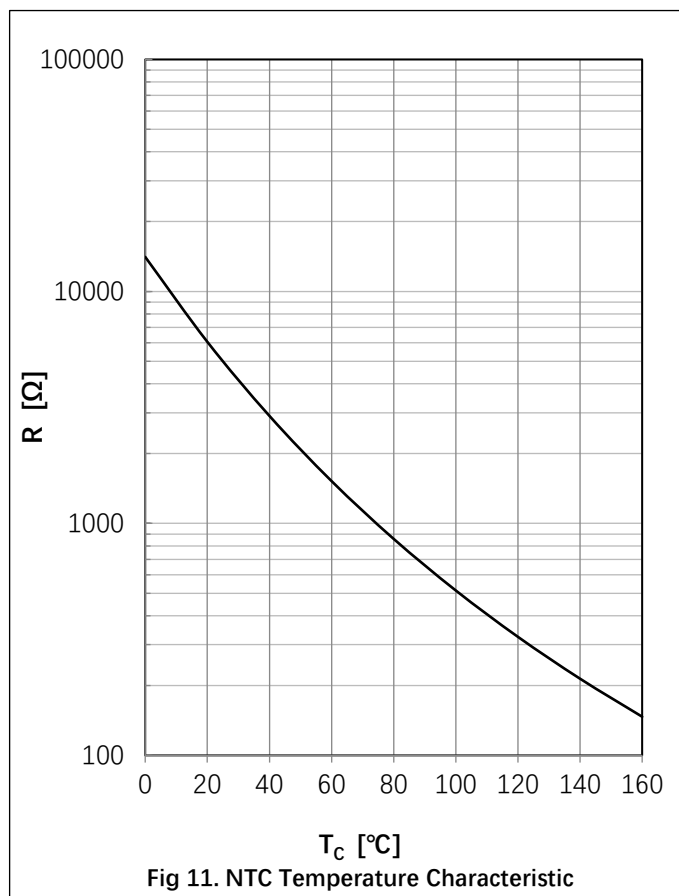
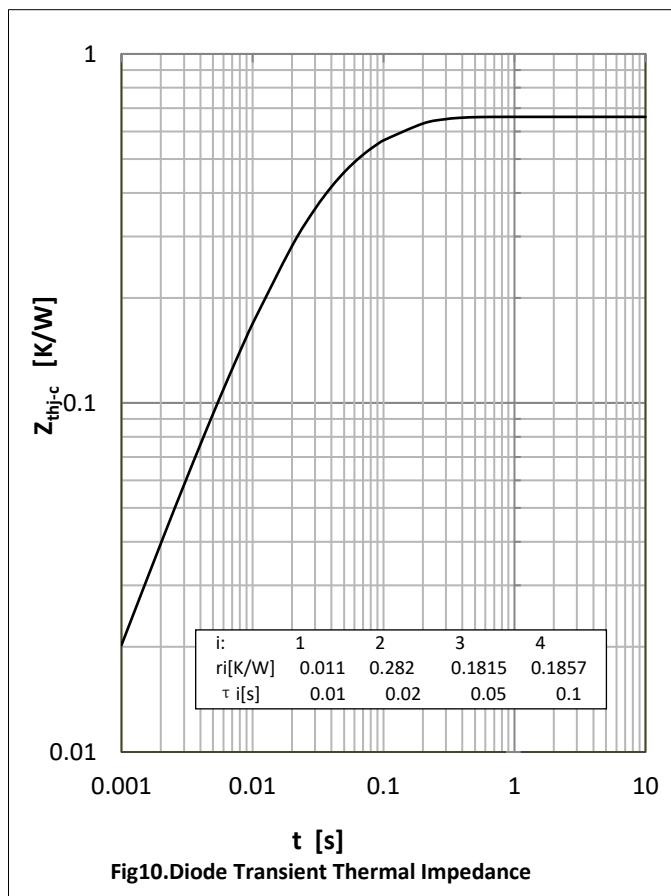
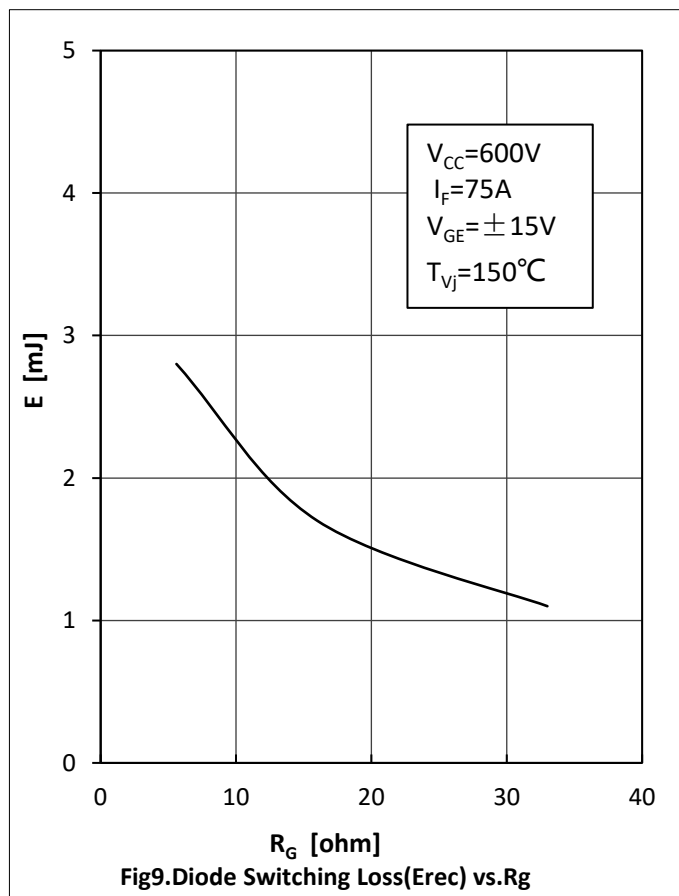
Curve Characteristics



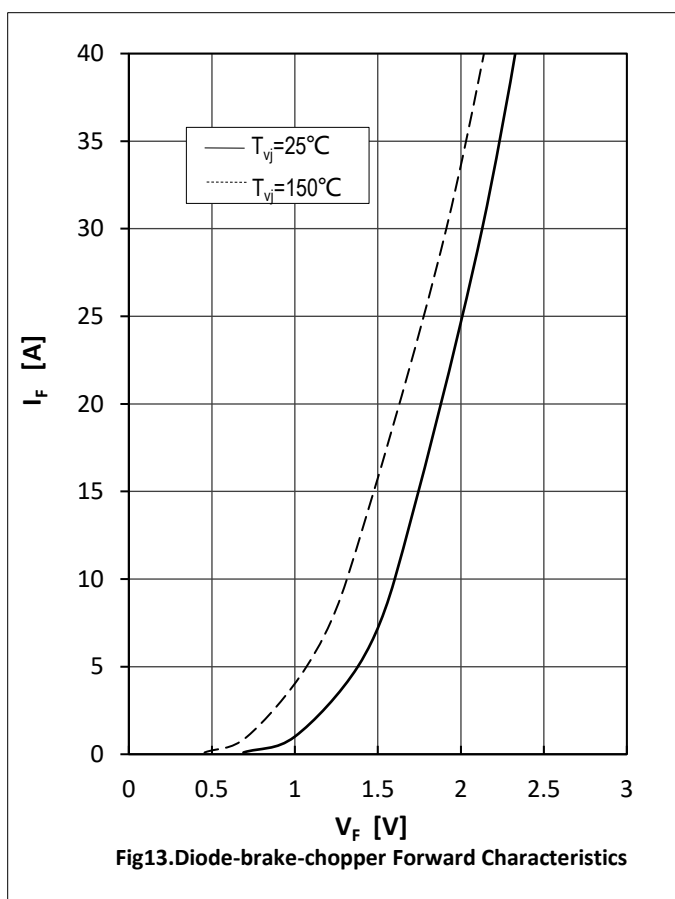
Curve Characteristics



Curve Characteristics

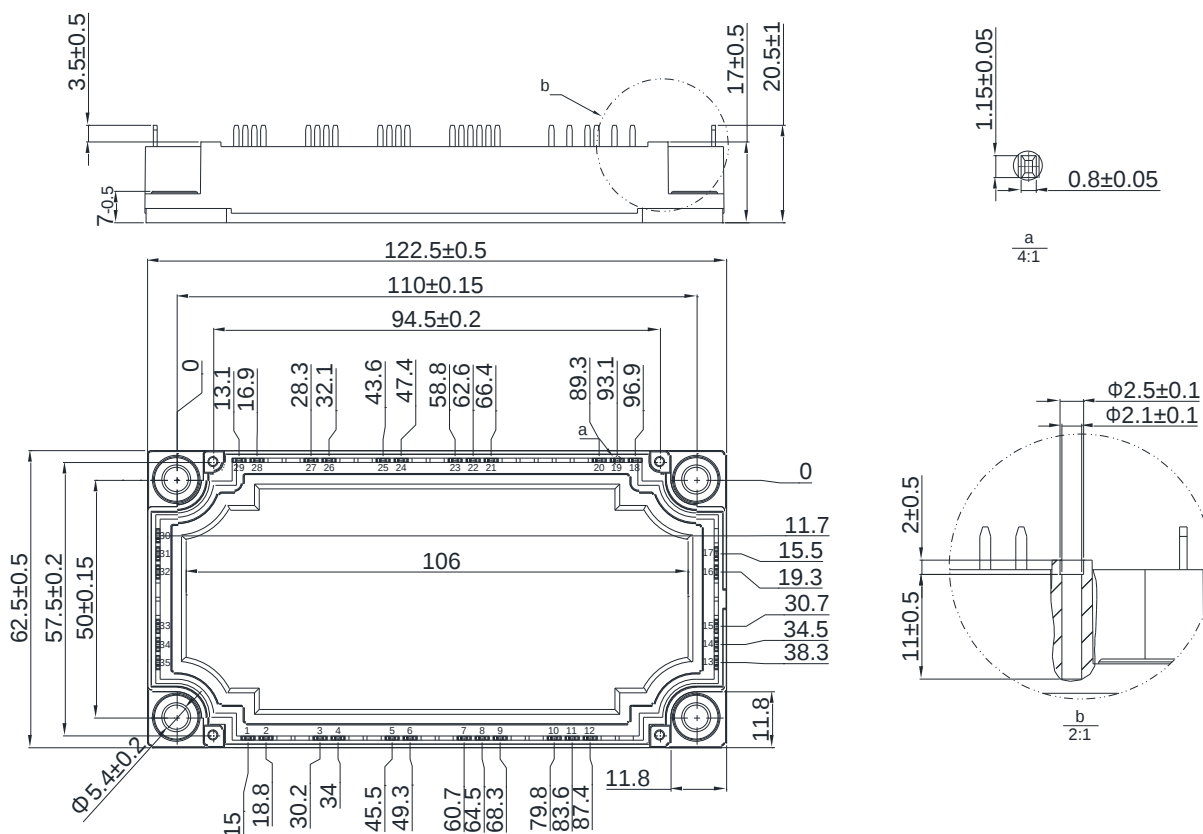


Curve Characteristics



Dimensions in mm

E2



Ordering Information

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

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