Features

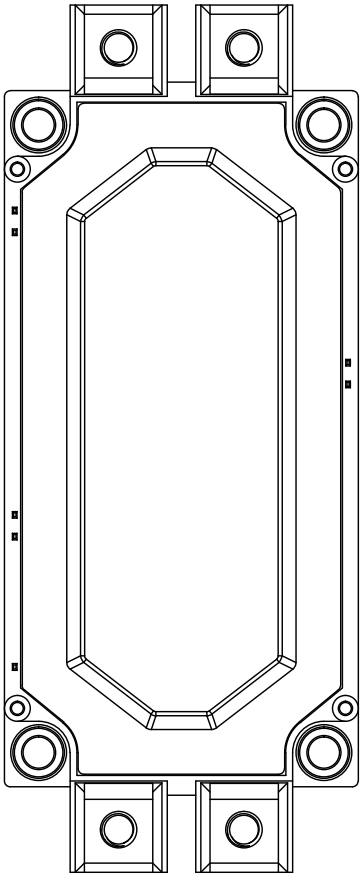
- Low Switching Losses
- Low $V_{ce(sat)}$ with Positive Temperature Coefficient
- Including Ultra Fast & Soft Recovery Anti-parallel FWD
- Low Inductance Package
- High Short Circuit Capability(10μs)
- Maximum Junction Temperature 175°C
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant (Note 1)("P" Suffix Designates RoHS Compliant. See Ordering Information)

IGBT Modules
1200V 600A

Applications

- High Frequency Switching Application
- Motion/sevo control
- UPS (Uninterruptible Power Supplies)
- Welding machine

E3

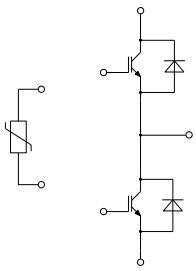


Parameter		Symbol	Rating	Unit
Collector-Emitter Voltage @V_{GE}=0V,I_C=1mA, T_{vj}=25ºC		V_{CES}	1200	V
Continuous Collector Current @T_C=100ºC		I_C	600	A
Repetitive Peak Collector Current @t_p=1ms		I_{CRM}	1200	A
Gate-Emitter peak Voltage@T_{vj}=25ºC		V_{GES}	±20	V
Total Power Dissipation	T_C=25°C	P_{tot}	3260	W
	T_{vjmax}=175°C			

Note:

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

Circuit Diagram



Electrical Characteristics of IGBT @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=13mA,T_{vj}=25°C	5.0	6.2	7.5	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25°C			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=600A,V_{GE}=15V, T_{vj}=25°C		1.50		V
		I_C=600A,V_{GE}=15V, T_{vj}=125°C		1.70		V
		I_C=600A,V_{GE}=15V, T_{vj}=175°C		1.80		V
Internal Gate Resistance	R_{Gint}			1.2		Ω
Gate Charge	Q_g			5.3		μC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1MHz , T_{vj}=25°C		44		nF
Reverse Transfer Capacitance	C_{res}			2.1		
Gate-Emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V, T_{vj}=25°C			500	nA
Turn-On Delay Time	$t_{d(on)}$	V_{CE}=600V, I_C=600A, V_{GE}=± 15V, R_{GON}=0.47Ω,R_{GOFF}=1.5Ω, L_S=30nH, T_{vj}=25°C		120		ns
Rise Time	t_r			60		
Turn-Off Delay Time	$t_{d(off)}$			575		
Fall Time	t_f			165		
Turn-On Energy	E_{on}			20		mJ
Turn-Off Energy	E_{off}			90		
Turn-On Delay Time	$t_{d(on)}$	V_{CE}=600V, I_C=600A, V_{GE}=± 15V, R_{GON}=0.47Ω,R_{GOFF}=1.5Ω, L_S=30nH, T_{vj}=125°C		145		ns
Rise Time	t_r			67		
Turn-Off Delay Time	$t_{d(off)}$			685		
Fall Time	t_f			290		
Turn-On Energy	E_{on}			50		mJ
Turn-Off Energy	E_{off}			94		
Turn-On Delay Time	$t_{d(on)}$	V_{CE}=600V, I_C=600A, V_{GE}=± 15V, R_{GON}=0.47Ω,R_{GOFF}=1.5Ω, L_S=30nH, T_{vj}=175°C		155		ns
Rise Time	t_r			70		
Turn-Off Delay Time	$t_{d(off)}$			735		
Fall Time	t_f			335		
Turn-On Energy	E_{on}			73		mJ
Turn-Off Energy	E_{off}			100		
SC Data	I_{SC}	T_p≤10μs,V_{GE}=15V,T_{vj}=175°C, V_{CC}=800V,V_{CEM}≤1200V		2000		A

Electrical Characteristics of Diode @ 25°C (Unless Otherwise Specified)

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_{vj}=25°C	1200	V
Continuous DC Forward Current	I_F		600	A
Repetitive Peak Forward Current	I_{FRM}	t_p=1ms	1200	A
I^2t-value	I^2t	V_R=0,tp=10ms, T_{vj}=150°C	37500	A^2S

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V_F	I_F=600A, T_{vj}=25℃		1.85	2.30	V
		I_F=600A, T_{vj}=125℃		1.95		V
		I_F=600A, T_{vj}=175℃		2.00		V
Recovered Charge	Q_{rr}	I_F=600A, V_R=600V, -diF/dt=5700A/μs, Ls=30nH,T_{vj}=25°C		53		μC
Peak Reverse Recovery Current	I_{rr}			485		A
Reverse Recovery Time	t_{rr}			155		ns
Reverse Recovery Energy	E_{rec}			27		mJ
Recovered Charge	Q_{rr}	I_F=600A, V_R=600V, -diF/dt=5700A/μs, Ls=30nH,T_{vj}=125°C		75		μC
Peak Reverse Recovery Current	I_{rr}			570		A
Reverse Recovery Time	t_{rr}			700		ns
Reverse Recovery Energy	E_{rec}			43		mJ
Recovered Charge	Q_{rr}	I_F=600A, V_R=600V, -diF/dt=5700A/μs, Ls=30nH,T_{vj}=175°C		133		μC
Peak Reverse Recovery Current	I_{rr}			585		A
Reverse Recovery Time	t_{rr}			840		ns
Reverse Recovery Energy	E_{rec}			55		mJ

NTC-Thermistor Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Rated Resistance	R_{25}			5		kΩ
R100	R100	T_C=100℃	468		518	Ω
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K
B-value	$B_{25/100}$	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$		3433		K

Module Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Isolation voltage	V_{isol}	t=1min,f=50Hz	3400			V
Maximum Junction Temperature	T_{jmax}				175	°C
Operating Junction Temperature	$T_{vj\ op}$		-40		175	°C
Storage Temperature	T_{stg}		-40		125	°C
Stray-inductance-module	L_{SCE}			20		nH
Module lead resistance, Terminals-chip	$R_{CC'+EE'}$	T_C=25℃, per switch		0.90		mΩ
		T_C=125℃, per switch		1.25		mΩ
		T_C=175℃, per switch		1.40		mΩ
Thermal Resistance Junction to Case	$R_{\theta JC(IGBT)}$	per switch			0.046	K/W
	$R_{\theta JC(Diode)}$	per switch			0.077	K/W
Thermal Resistance Case to Sink	$R_{\theta CS(IGBT)}$	IGBT per switch		0.030		K/W
	$R_{\theta CS(Diode)}$	Diode per switch		0.036		K/W
Comparative Tracking Index	CTI		200			
Module Electrodes Torque	M_t	Recommended(M6)	3.0		6.0	N·m
Module to Sink Torque	M_s	Recommended(M5)	3.0		6.0	N·m
Weight of Module	G			350		g

Curve Characteristics

Fig1.IGBT Output Characteristics

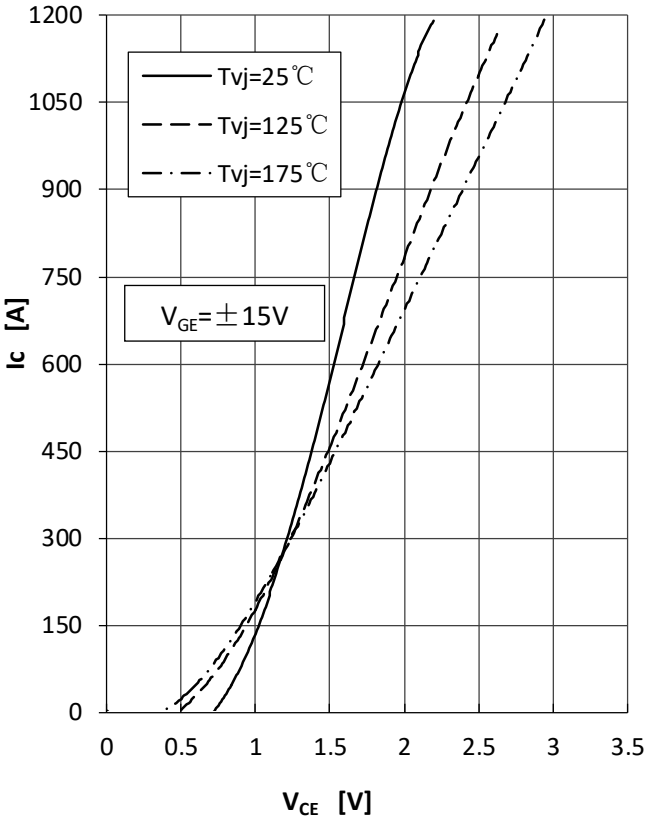


Fig2.IGBT Transfer Characteristics

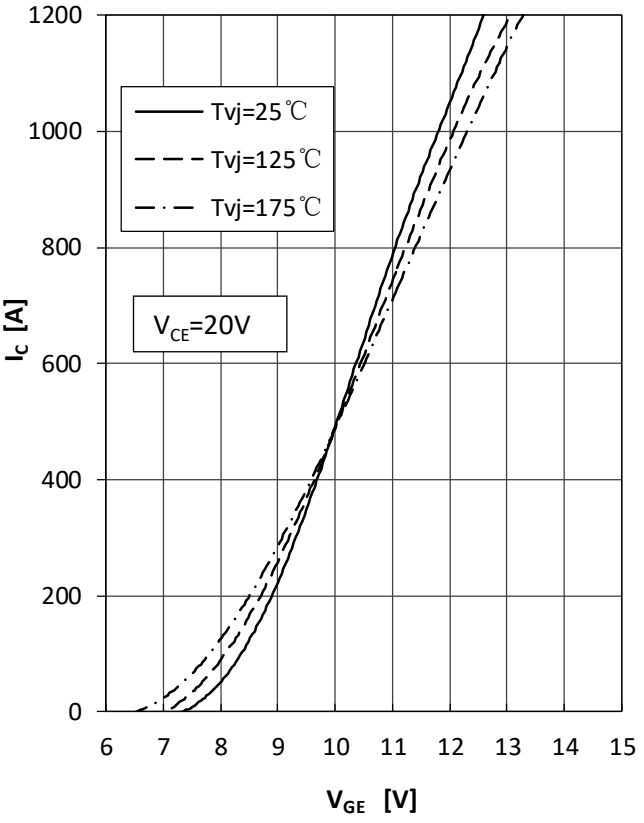


Fig3.IGBT Switching Loss vs.Ic

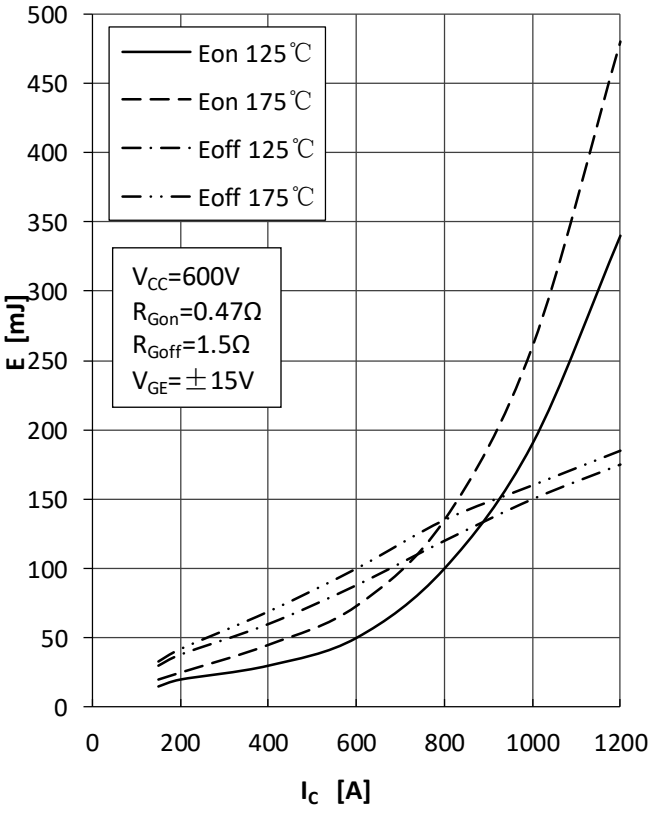
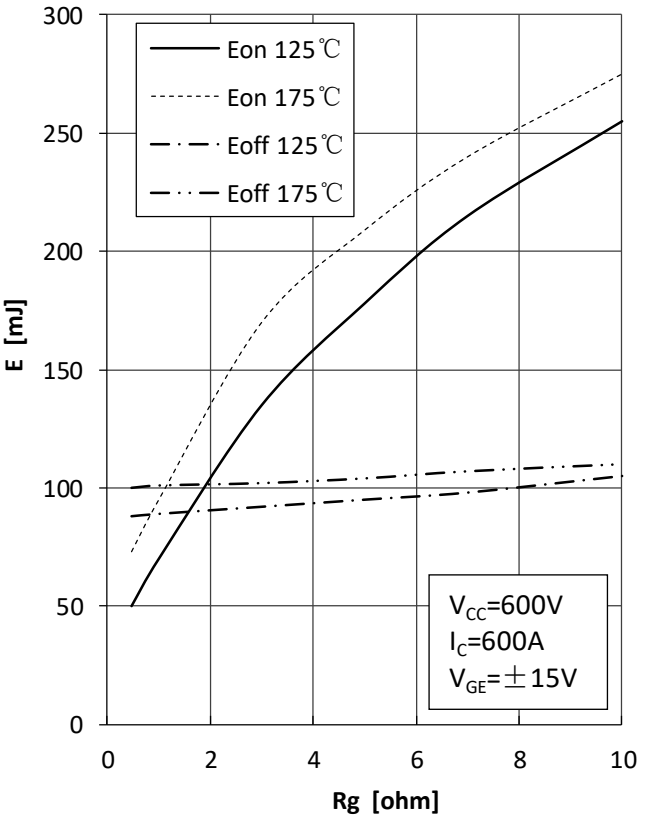


Fig4.IGBT Switching Loss vs.Rg



Curve Characteristics

Fig5.RBSOA

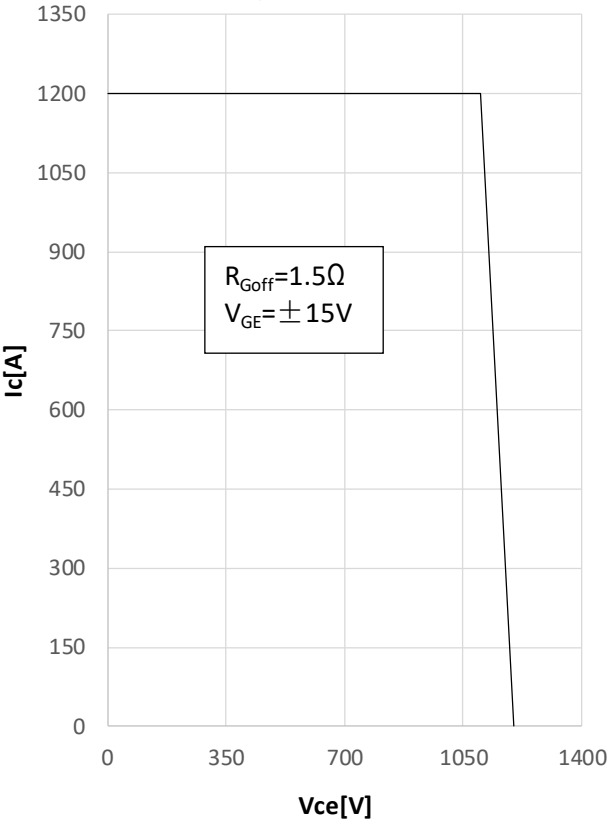


Fig 6. IGBT Transient Thermal Impedance

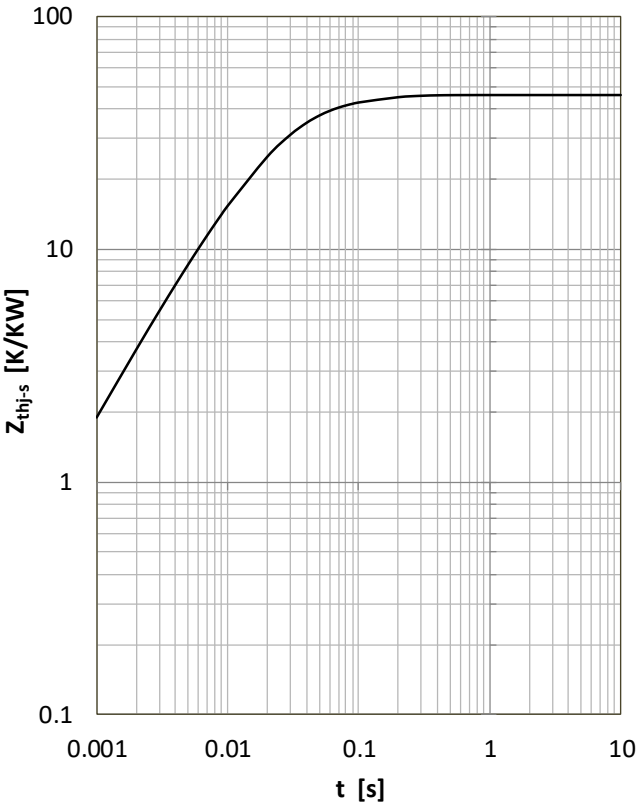


Fig7.Diode Foward Characteristics

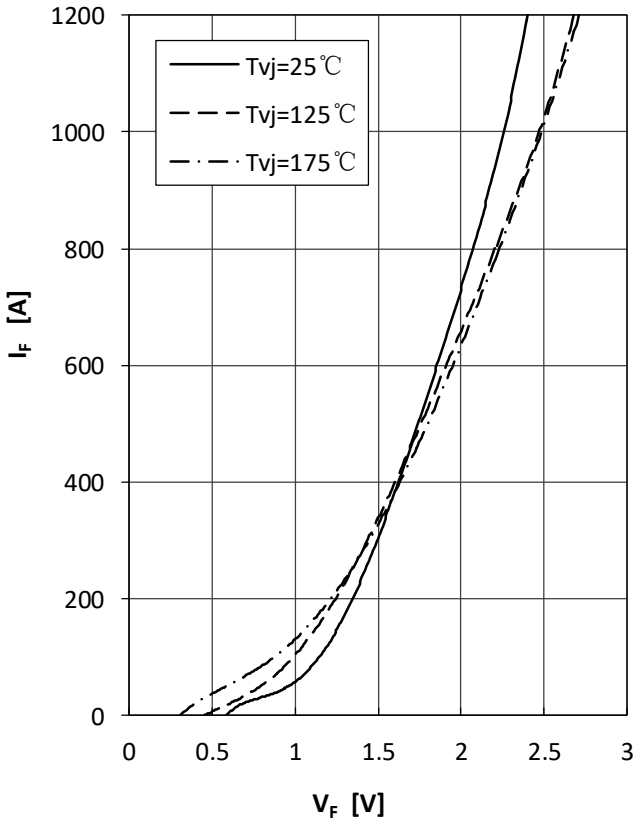
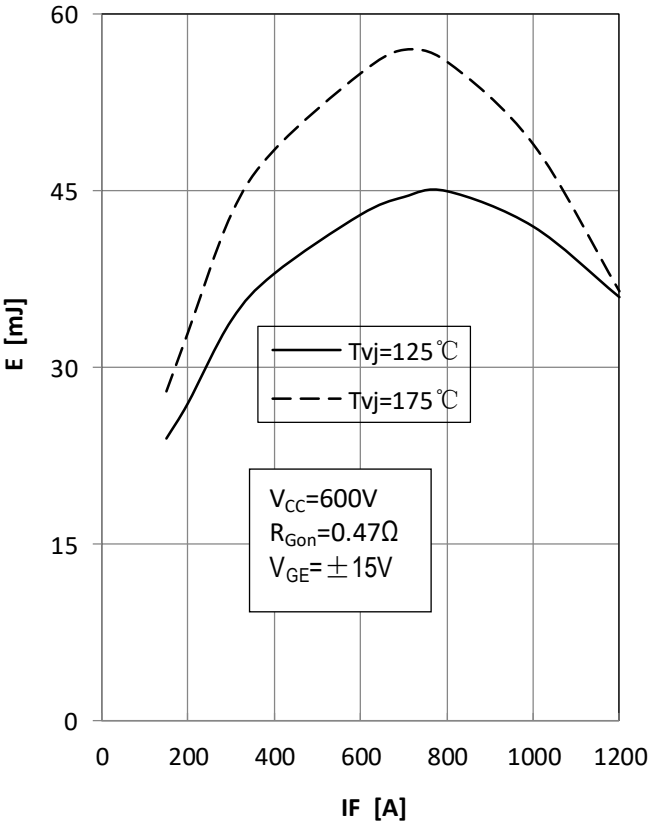
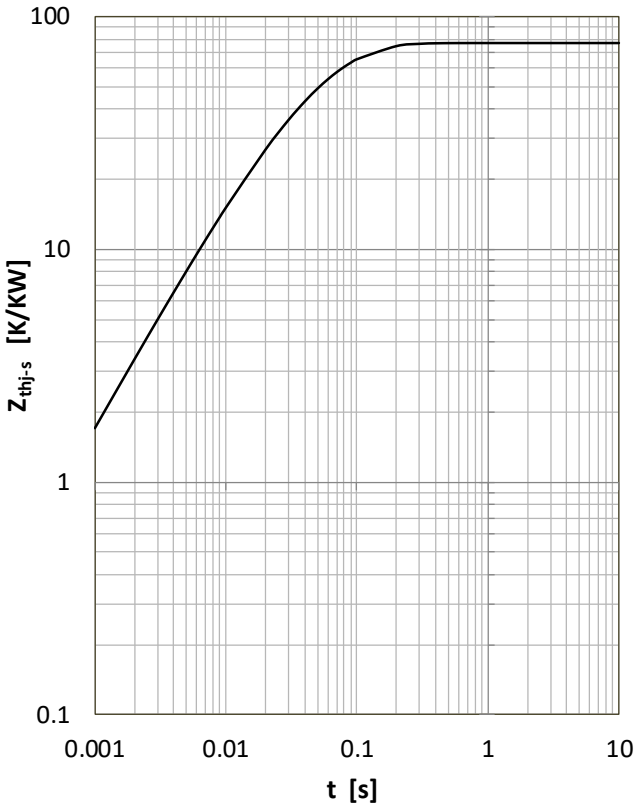


Fig8.Diode Switching Loss(Erec) vs.IF

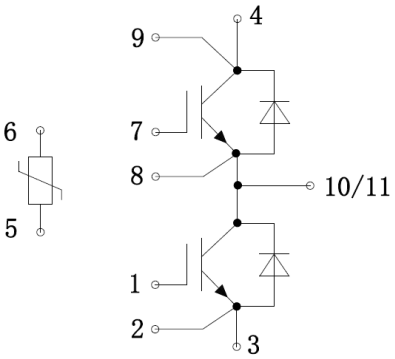


Curve Characteristics

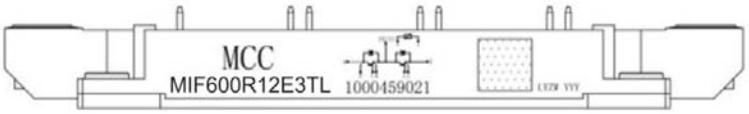
Fig9.Diode Transient Thermal Impedance



Circuit Diagram



Module Marking

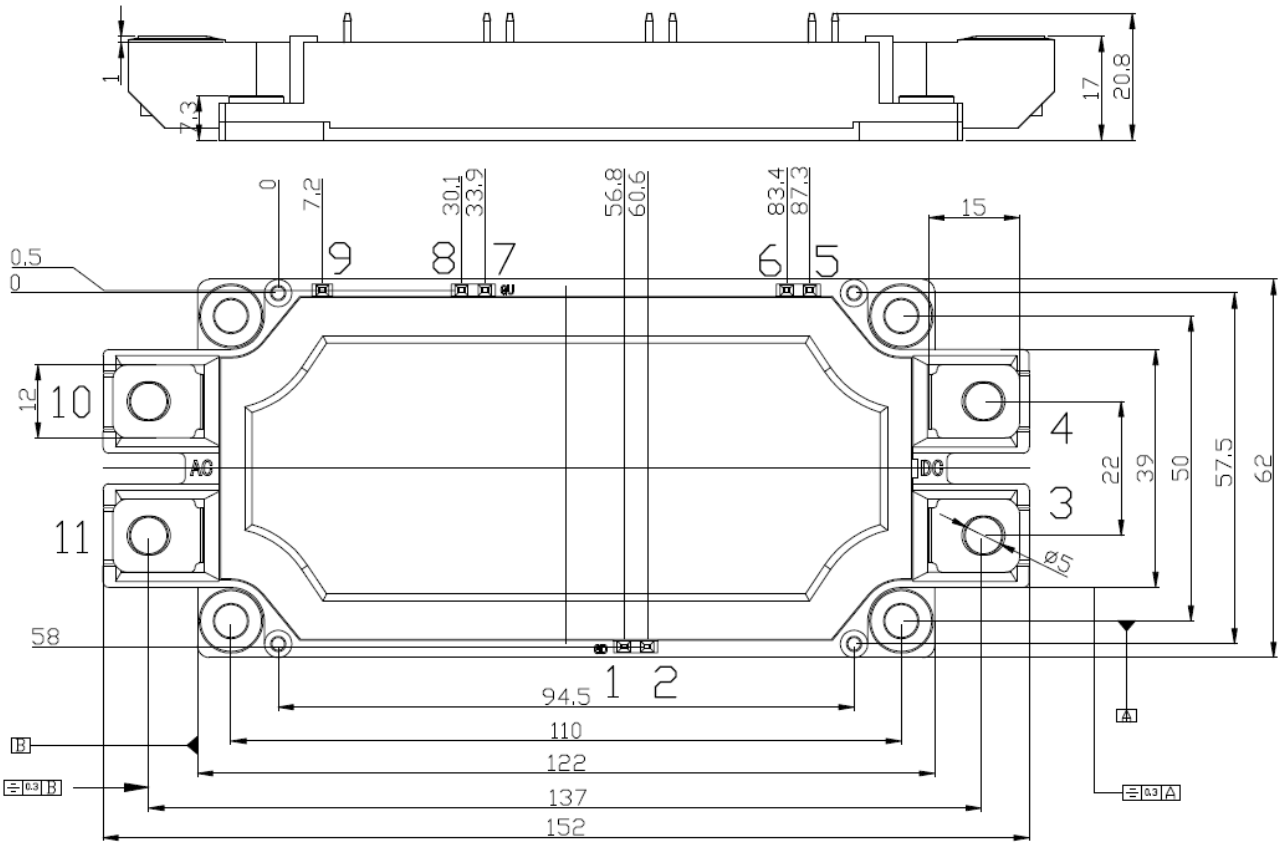


Marking Code Contents:
Logo: MCC
Product Number:MIF600R12E3TL
Trace Code: 10 Digits
Circuit Diagram
2D Code format: Data Matrix

Package Dimensions

Dimensions in mm

E3



Ordering Information

Device	Packing
Part Number-BP	Bulk: 4pcs/Box ; 24pcs/Ctn