

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(10 μ s)
- 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

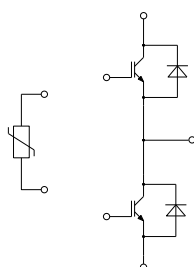
- High Frequency Switching Application
- AC and DC Servo Drive Amplifier
- UPS (Uninterruptible Power Supplies)

Parameter		Symbol	Rating	Unit
Collector-Emitter Voltage@ $V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$		V_{CES}	1200	V
Continuous Collector Current @ $T_C=100^{\circ}C$		I_C	450	A
Repetitive Peak Collector Current @ $t_p=1ms$		I_{CRM}	900	A
Gate-Emitter Voltage@ $T_{vj}=25^{\circ}C$		V_{GE}	± 20	V
Isolation Voltage @ $f=50Hz, t=1min$		V_{isol}	2500(Min)	V
Weight of Module		G	345	g
Module Electrodes Torque:M5		M_t	3~5	N*m
Module-to-Sink Torque :M6		M_S	3~5	N*m
Total Power Dissipation	$T_C=25^{\circ}C$	P_{tot}	2340	W
	$T_{vjmax}=175^{\circ}C$			

Note:

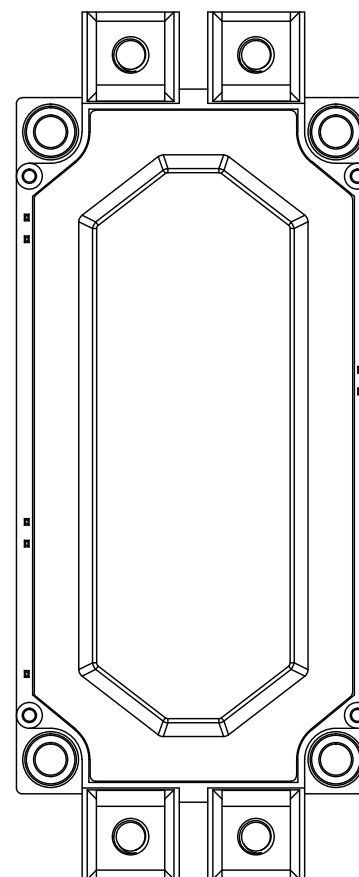
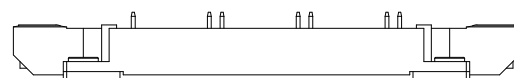
1. High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.

Circuit Diagram



IGBT Modules 1200V 450A

E3



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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, $I_C=12mA$, $T_{vj}=25^{\circ}C$	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V$, $V_{GE}=0V$, $T_{vj}=25^{\circ}C$			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=450A$, $V_{GE}=15V$, $T_{vj}=25^{\circ}C$		1.85	2.20	V
		$I_C=450A$, $V_{GE}=15V$, $T_{vj}=125^{\circ}C$		2.15		V
		$I_C=450A$, $V_{GE}=15V$, $T_{vj}=150^{\circ}C$		2.25		V
Internal Gate Resistance	R_{Gint}			1.67		Ω
Gate Charge	Q_g			3.50		μC
Input Capacitance	C_{ies}	$V_{CE}=25V$, $V_{GE}=0V$, $f=1MHz$, $T_{vj}=25^{\circ}C$		25		nF
Reverse Transfer Capacitance	C_{res}			1.1		
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V$, $V_{GE}=20V$, $T_{vj}=25^{\circ}C$			400	nA
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V$, $I_C=450A$, $V_{GE}=\pm 15V$, $R_{GON}=1.3\Omega$, $R_{GOFF}=1.3\Omega$, $T_{vj}=25^{\circ}C$		228		ns
Rise Time	t_r			96		
Turn-Off Delay Time	$t_{d(off)}$			361		
Fall Time	t_f			154		
Turn-On Energy	E_{on}			52.1		mJ
Turn-Off Energy	E_{off}			38.2		
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V$, $I_C=450A$, $V_{GE}=\pm 15V$, $R_{GON}=1.3\Omega$, $R_{GOFF}=1.3\Omega$, $T_{vj}=125^{\circ}C$		236		ns
Rise Time	t_r			106		
Turn-Off Delay Time	$t_{d(off)}$			412		
Fall Time	t_f			244		
Turn-On Energy	E_{on}			72.1		mJ
Turn-Off Energy	E_{off}			49.1		
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V$, $I_C=450A$, $V_{GE}=\pm 15V$, $R_{GON}=1.3\Omega$, $R_{GOFF}=1.3\Omega$, $T_{vj}=150^{\circ}C$		245		ns
Rise Time	t_r			116		
Turn-Off Delay Time	$t_{d(off)}$			436		
Fall Time	t_f			265		
Turn-On Energy	E_{on}			84.6		mJ
Turn-Off Energy	E_{off}			57.9		
SC Data	I_{SC}	$T_p \leq 10\mu s$, $V_{GE}=15V$, $T_{vj}=150^{\circ}C$, $V_{CC}=900V$, $V_{CEM} \leq 1200V$		2250		A

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

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1200	V
Continuous DC Forward Current	I_F		450	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1\text{ms}$	900	A
I^2t -value	I^2t	$V_R=0, t_p=10\text{ms}, T_{vj}=125^{\circ}\text{C}$	32000	A^2S
		$V_R=0, t_p=10\text{ms}, T_{vj}=150^{\circ}\text{C}$	30000	

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V_F	$I_F=450\text{A}, T_{vj}=25^{\circ}\text{C}$		1.90		V
		$I_F=450\text{A}, T_{vj}=125^{\circ}\text{C}$		1.80		V
		$I_F=450\text{A}, T_{vj}=150^{\circ}\text{C}$		1.75		V
Recovered Charge	Q_{rr}	$I_F=450\text{A}, V_R=600\text{V},$ $-di_F/dt=4600\text{A}/\mu\text{s}, T_{vj}=25^{\circ}\text{C}$		26.8		μC
Peak Reverse Recovery Current	I_{rr}			155		A
Reverse Recovery Energy	E_{rec}			7.9		mJ
Recovered Charge	Q_{rr}	$I_F=450\text{A}, V_R=600\text{V},$ $-di_F/dt=4600\text{A}/\mu\text{s}, T_{vj}=125^{\circ}\text{C}$		75.4		μC
Peak Reverse Recovery Current	I_{rr}			258		A
Reverse Recovery Energy	E_{rec}			24.9		mJ
Recovered Charge	Q_{rr}	$I_F=450\text{A}, V_R=600\text{V},$ $-di_F/dt=4600\text{A}/\mu\text{s}, T_{vj}=150^{\circ}\text{C}$		82.5		μC
Peak Reverse Recovery Current	I_{rr}			320		A
Reverse Recovery Energy	E_{rec}			36.3		mJ

NTC-Thermistor Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Rated Resistance	R_{25}			5		k Ω
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Isolation voltage	V_{isol}	$t=1min, f=50Hz$	2500			V
Maximum Junction Temperature	T_{jmax}				175	$^{\circ}C$
Operating Junction Temperature	$T_{vj op}$		-40		150	$^{\circ}C$
Storage Temperature	T_{stg}		-40		125	$^{\circ}C$
Thermal Resistance Junction to Case	$R_{\theta JC}$	per IGBT			0.065	K/W
		per Diode			0.13	
Thermal Resistance Case-to Sink	$R_{\theta CS}$	Conductive grease applied		0.009		K/W

Curve Characteristics

Fig1.IGBT Output Characteristics

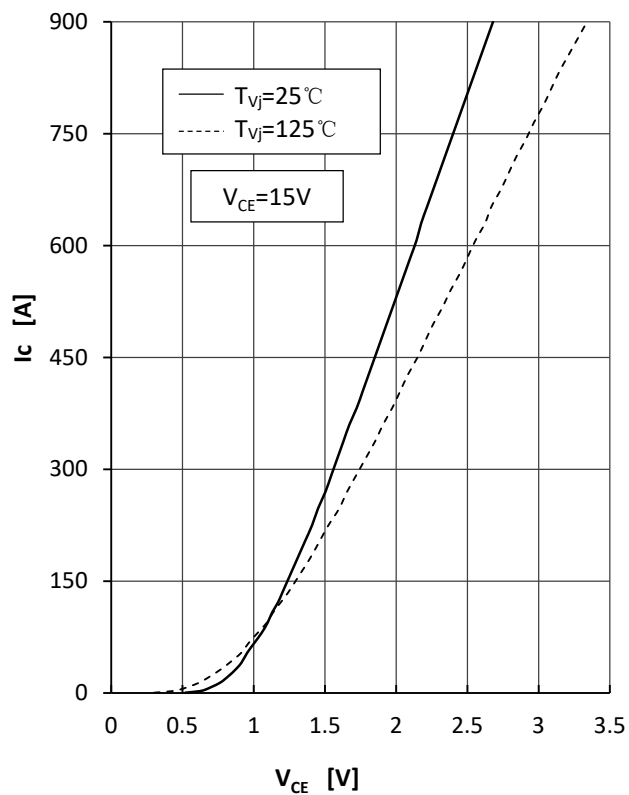


Fig2.IGBT Transfer Characteristics

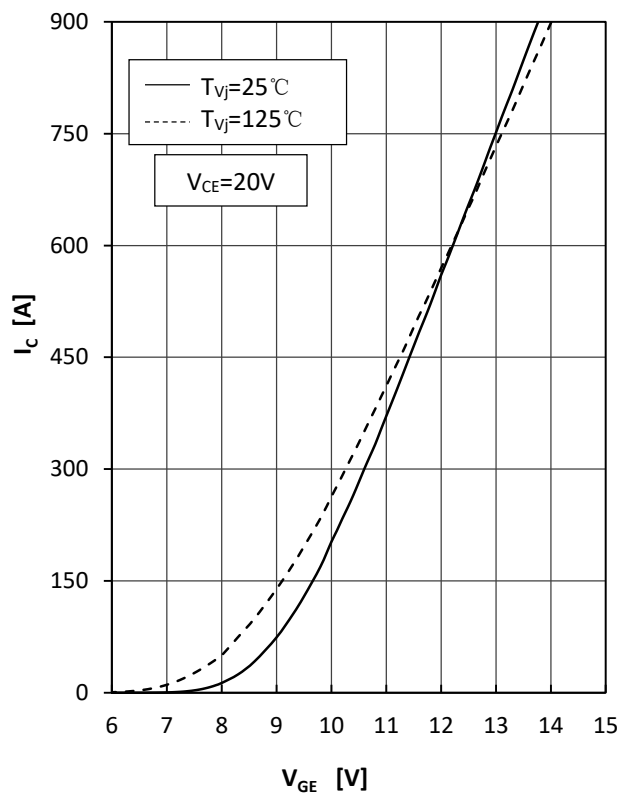


Fig3.IGBT Switching Loss vs.Ic

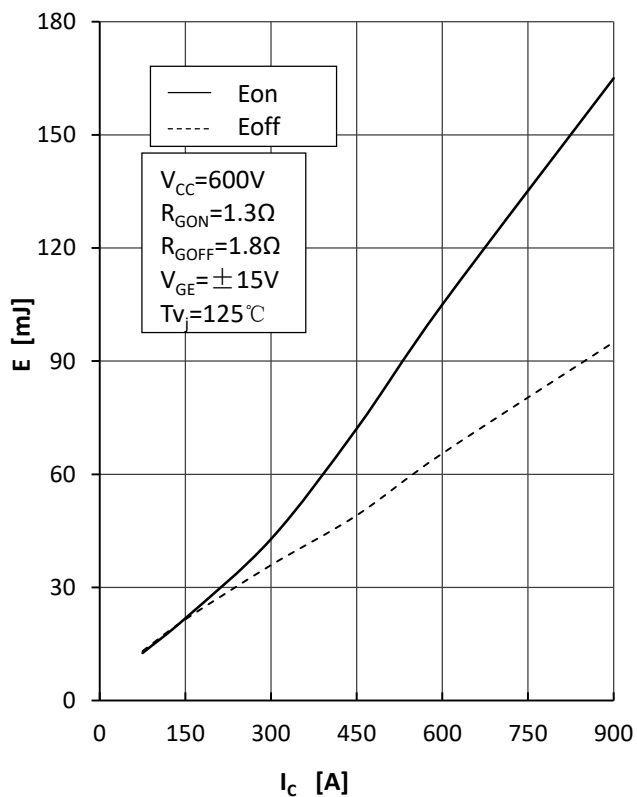
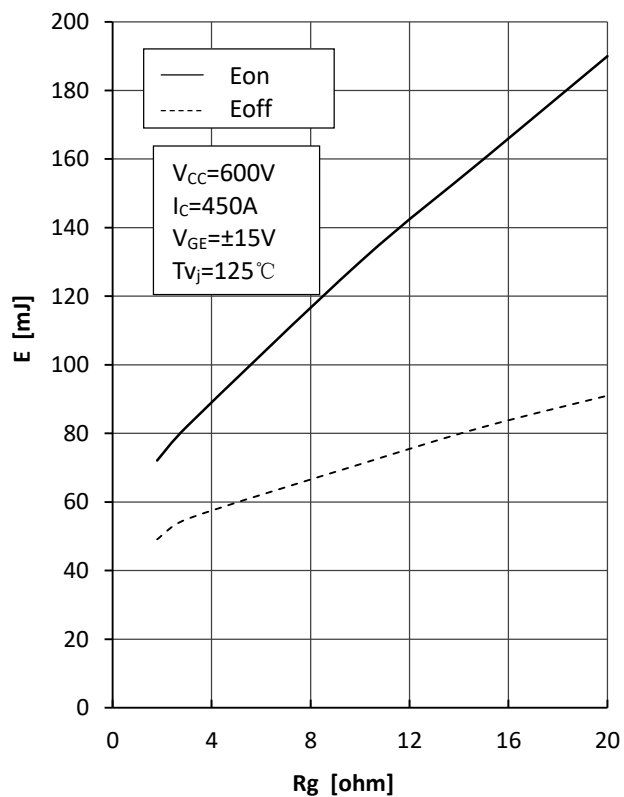


Fig4.IGBT Switching Loss vs.Rg



Curve Characteristics

Fig5.RBSOA

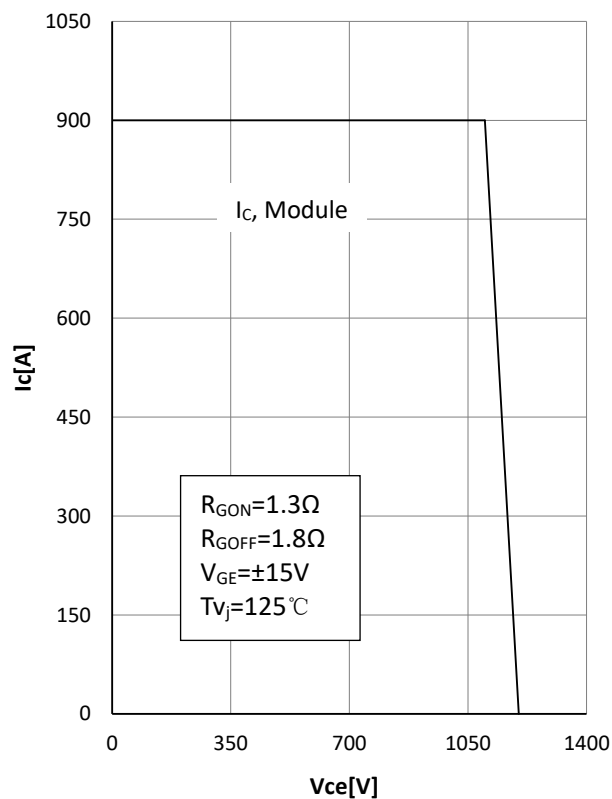


Fig 6. IGBT Transient Thermal Impedance

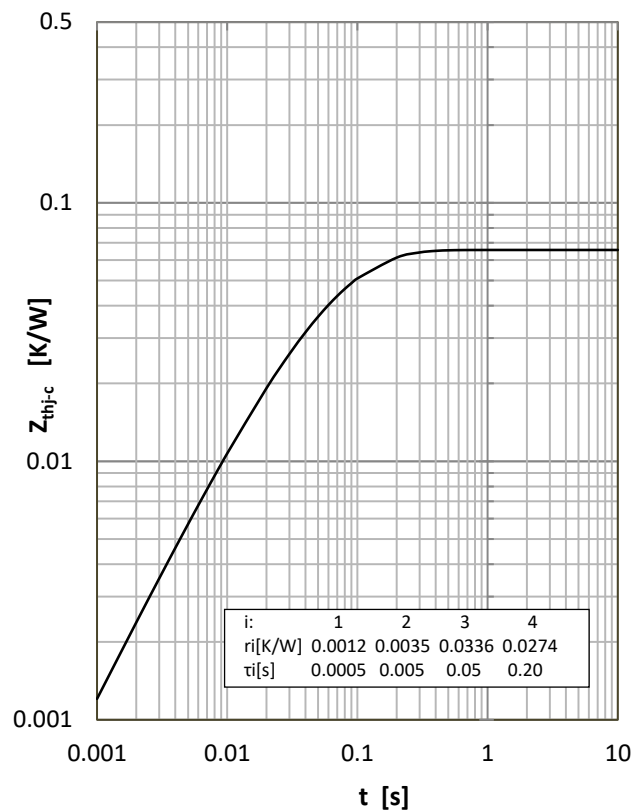


Fig7.Diode Foward Characteristics

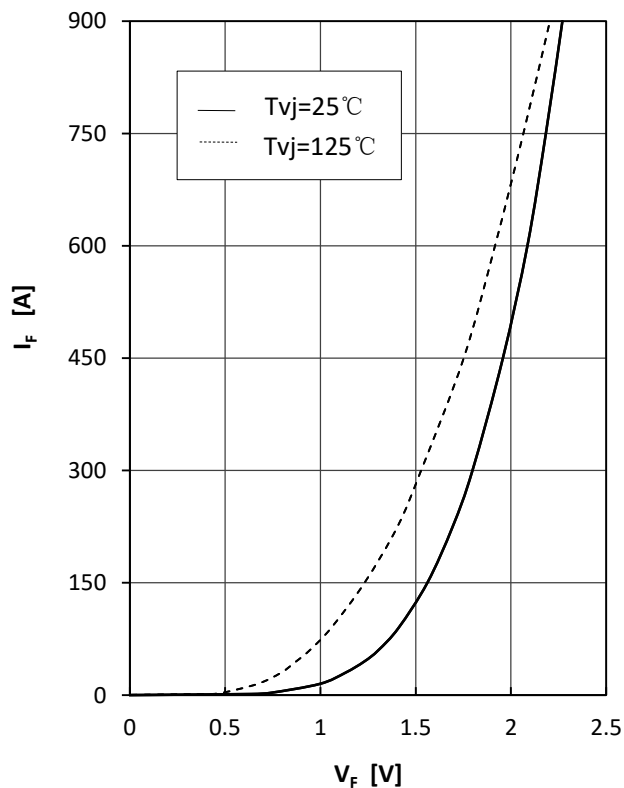
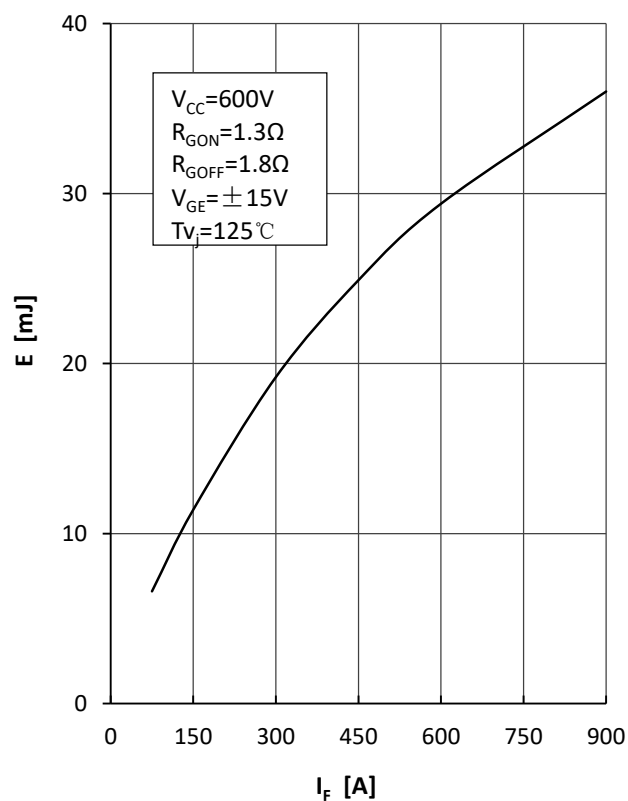


Fig8.Diode Switching Loss(Erec) vs. If



Curve Characteristics

Fig9.Diode Switching Loss(Erec) vs.Rg

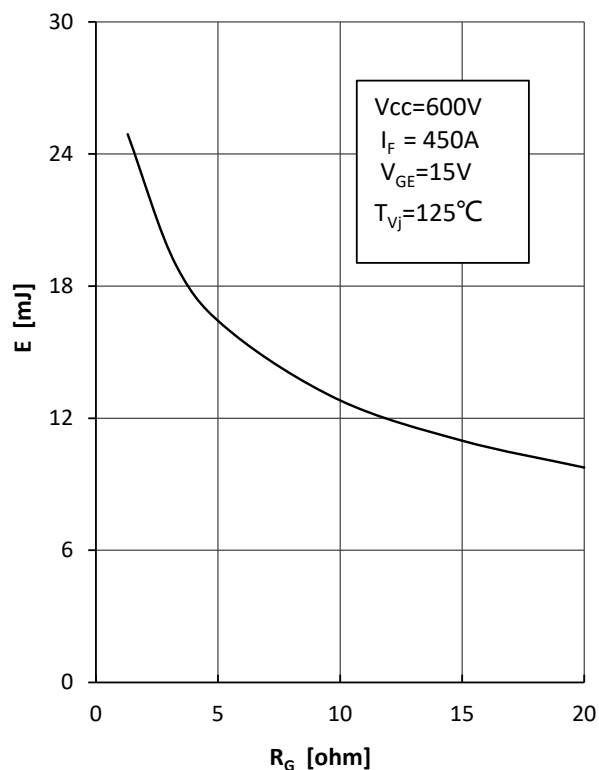


Fig10.Diode Transient Thermal Impedance

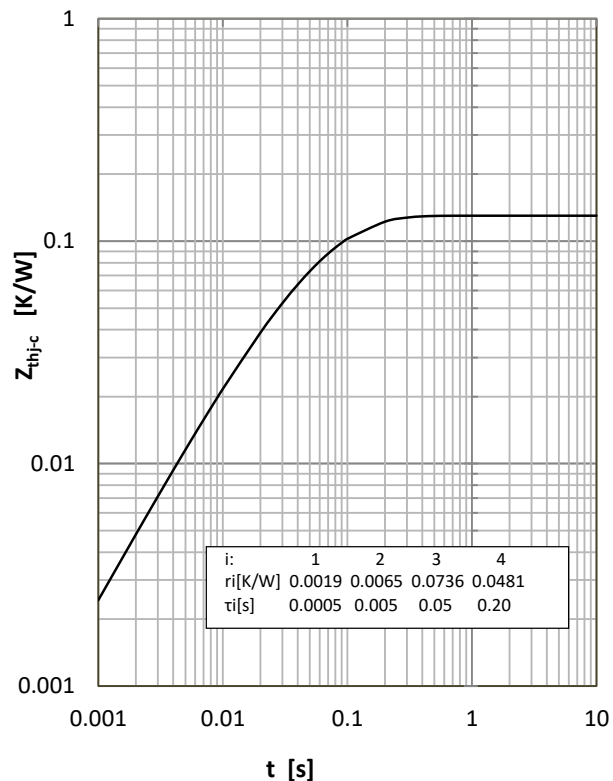
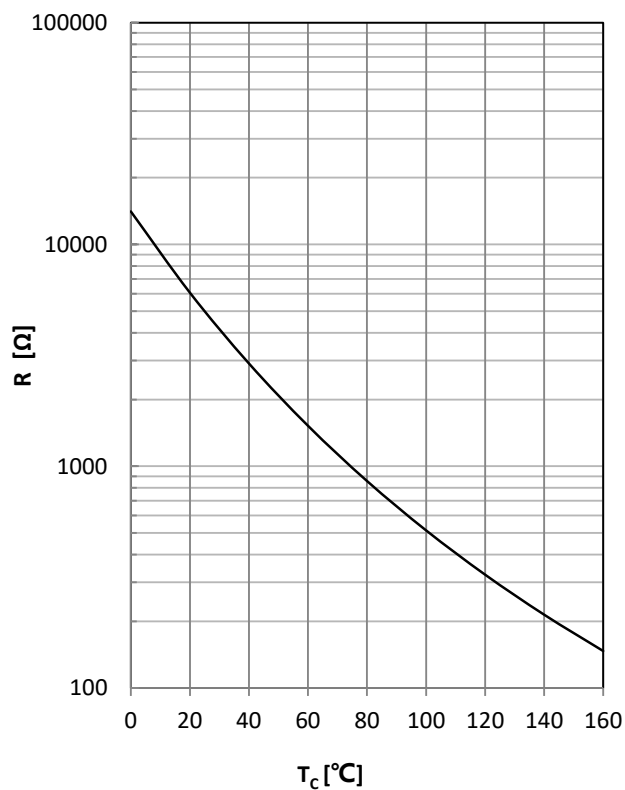
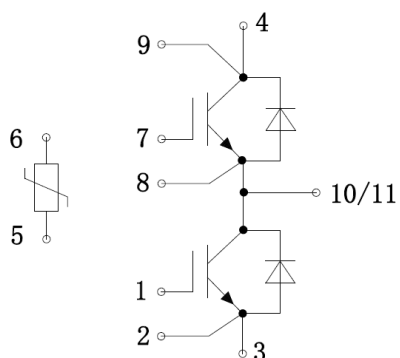


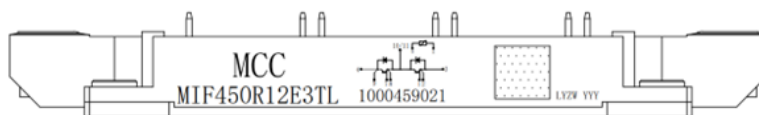
Fig 11. NTC Temperature Characteristic



Circuit Diagram



Module Marking

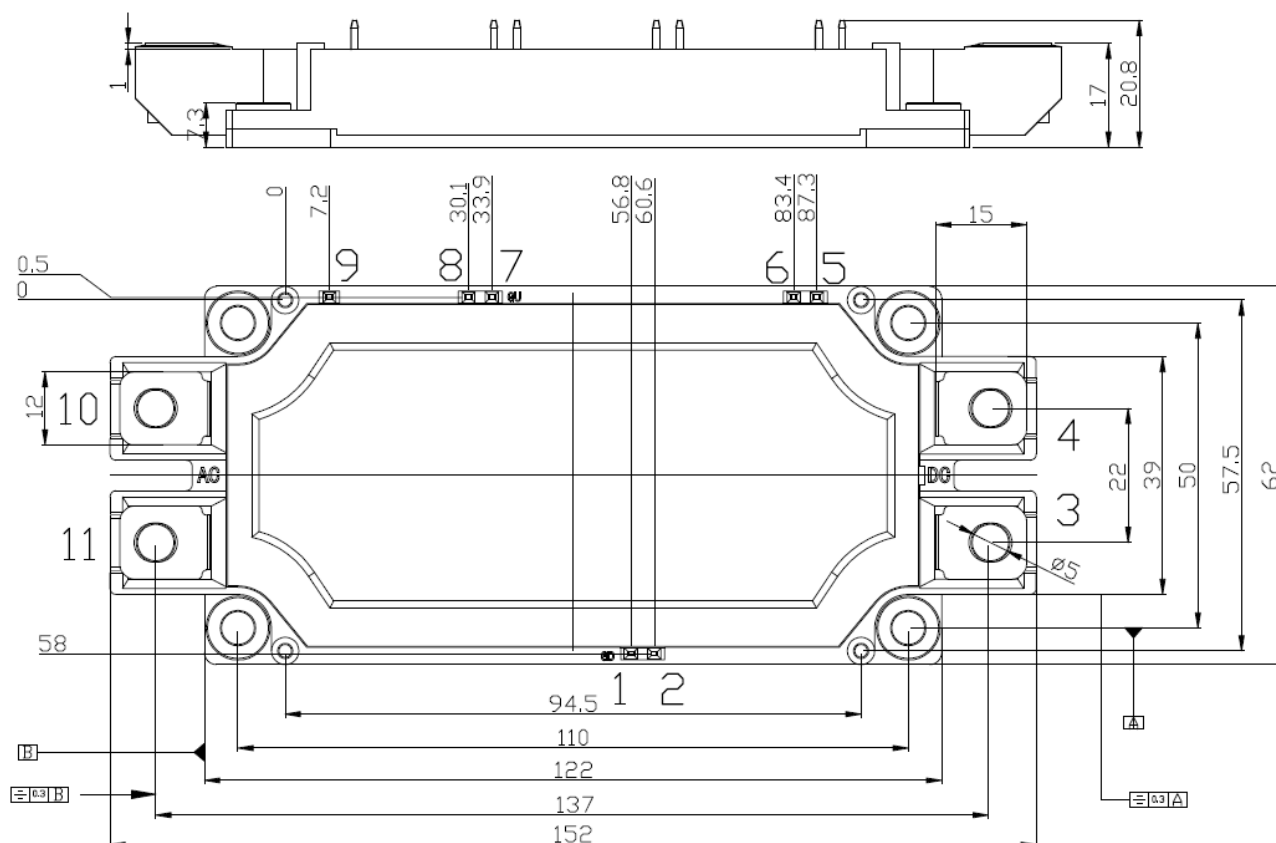


Marking Code Contents:
Logo: MCC
Product Number: MIF450R12E3TL
Trace Code: 10 Digits
Circuit Diagram
2D Code format: Data Matrix

Package Dimensions

Dimensions in mm

E3



Ordering Information

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

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