LEGM100BE120L5H

IGBT Power Module

Features:

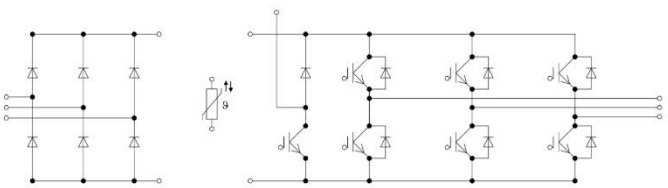
- V_{CE}=1200V I_C=100A
- Low $V_{CE(sat)}$
- V_{CEsat} with positive temperature coefficient
- Maximum junction temperature 150℃
- Isolation Type Package

Applications:

- The inverter
- Motor control and drives

Package Type & Internal Circuit

L5



Internal Circuit

Maximum Rated Values (IGBT Inverter)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	V_{EC}=0 V,I_C=1 mA,T_{vj}=25 ℃	1200	V
I_C	Continuous Collector Current	T_C=100 ℃	100	A
I_{CRM}	Peak Collector Current	I_{CRM}=2I_C	200	A
V_{GES}	Gate-Emitter Voltage	T_{vj}=25 ℃	±30	V
P_{tot}	Total Power Dissipation	T_C=25 ℃,T_{vjmax}=150 ℃	430	W

Characteristics Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=100A, V_{GE}=15 V, T_{vj}=25 ℃		1.60		V
		I_C=100A, V_{GE}=15 V, T_{vj}=125 ℃		1.75		V
$V_{GE(th)}$	Gate Threshold Voltage	I_C=5.0 mA,V_{CE}=V_{GE},T_{vj}= 25 ℃		5.8		V
I_{CES}	Collector-Emitter Cut-off Current	V_{CE}=1200 V, V_{GE}=0 V, T_{vj}=25 ℃			1.2	mA
I_{GES}	Gate-Emitter Leakage Current	V_{CE}=0 V, V_{GE}=15 V, T_{vj}=25 ℃			110	nA
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C=100 A,V_{CE}=600 V V_{GE}=±15 V R_{Gon}= 2Ω T_{vj}=25 ℃		120		ns
t_r	Rise Time, Inductive Load			40		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			330		ns
t_f	Fall Time, Inductive Load			100		ns
E_{on}	Turn-on Energy Loss per Pulse			3.7		mJ
E_{off}	Energy Loss per Pulse			8.3		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C=100 A,V_{CE}=600 V V_{GE}=±15 V R_{Gon}=2 Ω T_{vj}=125 ℃		130		ns
t_r	Rise Time, Inductive Load			45		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			400		ns
t_f	Fall Time, Inductive Load			260		ns
E_{on}	Turn-on Energy Loss per Pulse			4.5		mJ
E_{off}	Energy Loss per Pulse			12.2		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.29	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		125	℃
I_{SC}	SC data	V_{GE} ≤15 V, V_{CC} = 600 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt t_P ≤ 10 μs, T_{vj} = 125 ℃		450		A

Maximum Rated Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	T_{vj}= 25 ℃		1200		V
I_F	Continuous DC Forward Current	T_C=100 ℃		100		A
I_{FRM}	Repetitive Peak Forward Current	t_P=1 ms		200		A
I^2t	I^2t Value	V_R=0 V, t_P=10 ms, T_{vj}=125 ℃		1500		A^2s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=100 A, V_{CE}=0 V, T_{vj}=25 ℃		1.70		V
		I_F=100A, V_{CE}=0 V, T_{vj}=125 ℃		1.80		V
t_{rr}	Reverse Recovery time	I_F=100 A,V_R=600 V -di/dt=3000 A/us T_{vj}=25 ℃		160		ns
Q_r	Recovered Charge			8.3		uC
E_{rec}	Reverse Recovery Energy			3.5		mJ
t_{rr}	Reverse Recovery time	I_F=100A,V_R=600 V -di/dt=3000 A/us T_{vj}=125 ℃		170		ns
Q_r	Recovered Charge			16.9		uC
E_{rec}	Reverse Recovery Energy			9.0		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.52	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		125	℃

Maximum Rated Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25 ℃		1800		V
I_{FRMSM}	Maximum RMS forward current per chip	T_c=80 ℃		100		A
I_{RMSM}	Maximum RMS current at rectifier chip	T_c=80 ℃		150		A
I_{FSM}	Surge forward current	t_p=10ms T_{vj}=25 ℃		1150		A
I^2t	I^2t-value			6600		A^2S
I_{FSM}	Surge forward current	t_p=10ms T_{vj}=125 ℃		880		A
I^2t	I^2t-value			3850		A^2S

Characteristic Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward voltage	T_{vj}=125 ℃ I_F=100 A		1.30		V
I_R	Reverse current	T_{vj}=125 ℃ V_R=1800 V		1.1		mA
R_{thjc}	Thermal resistance junction to case	per diode			0.47	K/W
T_{vjop}	Temperature under switching conditions		-40		125	℃

Maximum Rated Values (IGBT Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{CES}	Collector-emitter voltage	T_{vj}=25℃		1200		V
I_C	Continuous Collector Current	T_C = 100℃, $T_{vj\ max}$ = 175℃		75		A
I_{CRM}	Peak Collector Current	I_{CRM}=2I_C		150		A
V_{GES}	Gate-Emitter Voltage	T_{vj}=25℃	-20		20	V

Characteristic Values (IGBT Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=75A, V_{GE}=15 V, T_{vj}=25 ℃		1.65		V
		I_C=75A, V_{GE}=15 V, T_{vj}=125 ℃		1.80		V
$V_{GE(th)}$	Gate Threshold Voltage	I_C=5.0 mA,V_{CE}=V_{GE},T_{vj}= 25 ℃		5.8		V
I_{CES}	Collector-Emitter Cut-off Current	V_{CE}=1200 V, V_{GE}=0 V, T_{vj}=25 ℃			1.2	mA
I_{GES}	Gate-Emitter Leakage Current	V_{CE}=0 V, V_{GE}=15 V, T_{vj}=25 ℃			410	nA
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C= 75 A,V_{CE}= 600 V V_{GE} =±15 V R_{Gon} = 2Ω T_{vj} = 25 ℃		110		ns
t_r	Rise Time, Inductive Load			35		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			270		ns
t_f	Fall Time, Inductive Load			170		ns
E_{on}	Turn-on Energy Loss per Pulse			1.9		mJ
E_{off}	Energy Loss per Pulse			4.8		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C = 75 A,V_{CE} = 600 V V_{GE} = ±15 V R_{Gon} = 2Ω T_{vj}= 125 ℃		110		ns
t_r	Rise Time, Inductive Load			40		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			320		ns
t_f	Fall Time, Inductive Load			280		ns
E_{on}	Turn-on Energy Loss per Pulse			2.4		mJ
E_{off}	Energy Loss per Pulse			7.5		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.35	K/W
$T_{vj\ op}$	Temperature under switching conditions	I_C=75 A, V_{GE}=15 V, T_{vj}=25 ℃	-40		125	℃

Maximum Rated Values (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	T_{vj}= 25 ℃		1200		V
I_F	Continuous DC Forward Current	T_C=100 ℃		75		A
I_{FRM}	Repetitive Peak Forward Current	t_P=1 ms		150		A
I^2t	I^2t Value	V_R=0 V, t_P=10 ms, T_{vj}=125 ℃		1200		A^2s

Characteristics (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=75 A, V_{CE}=0 V, T_{vj}=25 ℃		1.65		V
		I_F=75 A, V_{CE}=0 V, T_{vj}=125 ℃		1.75		V
t_{rr}	Reverse Recovery time	I_F= 75 A,V_R= 600 V -di/dt = 2000A/us T_{vj} = 25 ℃		100		ns
Q_r	Recovered Charge			15.6		uC
E_{rec}	Reverse Recovery Energy			0.5		mJ
t_{rr}	Reverse Recovery time	I_F= 75A,V_R= 600 V -di/dt = 2000A/us T_{vj} = 125 ℃		120		ns
Q_r	Recovered Charge			23.4		uC
E_{rec}	Reverse Recovery Energy			1.3		mJ
R_{thJC}	Thermal resistance, junction to case	pro Diode / per Diode			0.64	K/W
$T_{vj\ op}$	Temperature under switching conditions	I_F=75 A, V_{CE}=0 V, T_{vj}=25 ℃	-40		125	℃

NTC-Thermistor (Characteristic Values)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated resistance	T_c=25 ℃		5		KΩ
ΔR/R	Deviation of R100	T_c=100 ℃	-5		5	%
P_{25}	Power dissipation	T_c=25 ℃		20		mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298,15K))]$		3380		K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298,15K))]$		3450		K

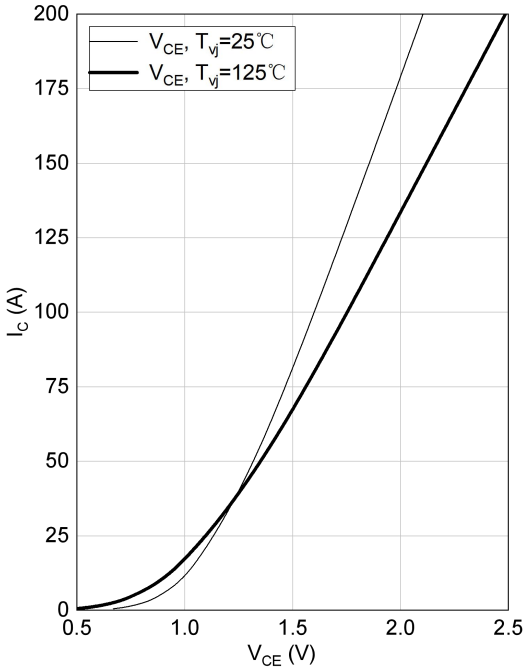
Module Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{isol}	Isolation voltage	t=1min,f=50Hz	2500			V
T_{stg}	Storage Temperature		-40		125	℃
M_s	Module-to-Sink Torque	Recommended(M5)	3.0		6.0	N·m
G	Weight of Module			300		g

Output characteristic of IGBT,Inverter (typical)

$I_c = f(V_{CE})$

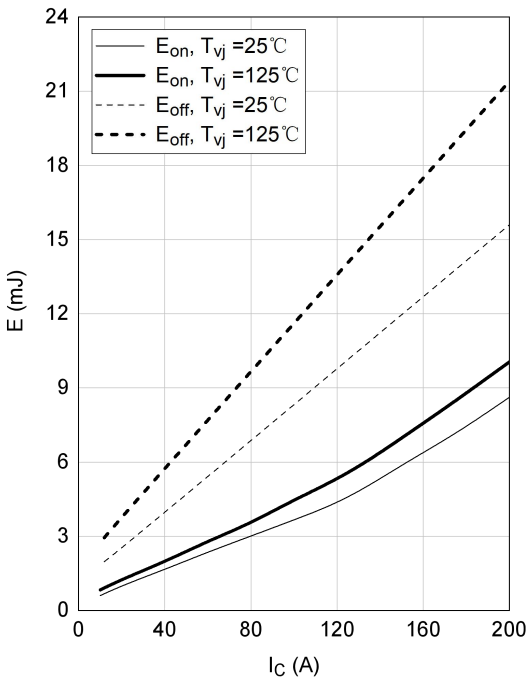
$V_{GE} = 15V$



Switching losses of IGBT,Inverter (typical)

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$

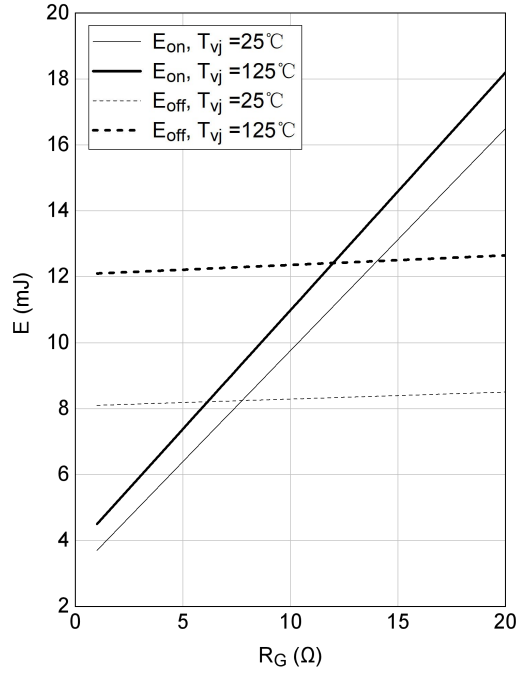
$V_{GE} = 15V$, $R_G = 2\Omega$, $V_{CE} = 600V$



Switching losses of IGBT,Inverter (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$

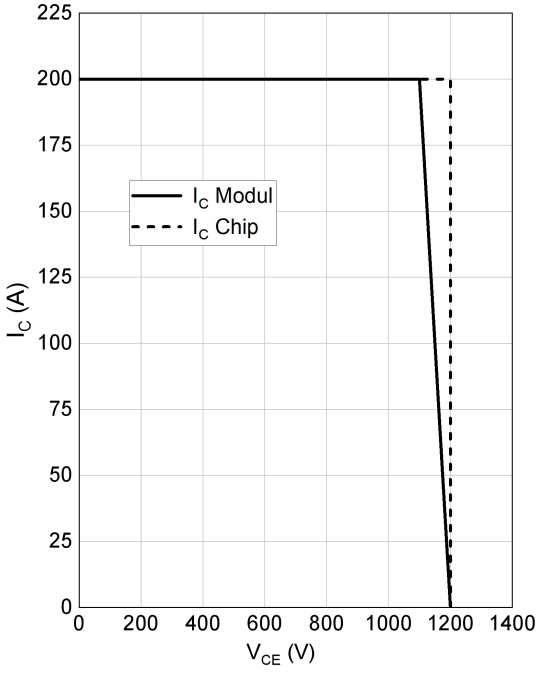
$V_{GE} = \pm 15V$, $I_C = 100A$, $V_{CE} = 600V$



RBSOA IGBT,Inverter (typical)

$I_C = f(V_{CE})$

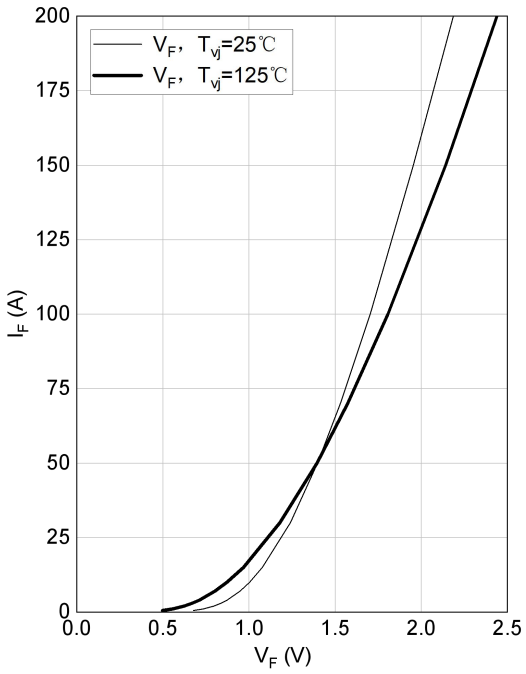
$V_{GE} = 15V$, $R_{Goff} = 2\Omega$, $T_{vj} = 125$ ℃



forward characteristic of Diode,Inverter (typical)

$I_F = f(V_F)$

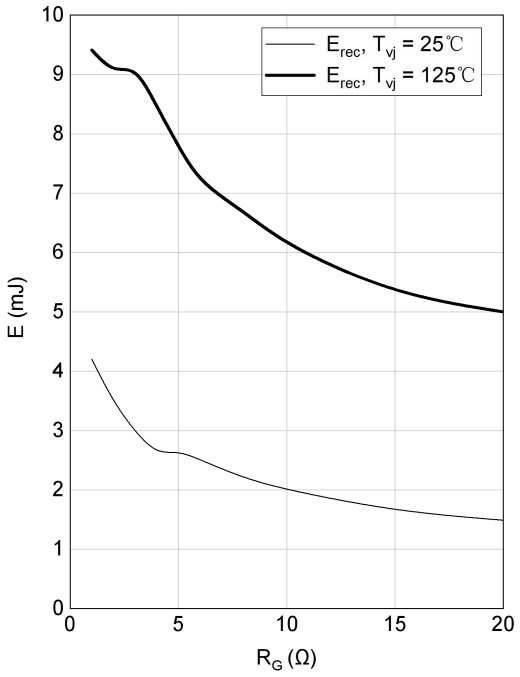
$V_{GE} = \pm 15V$



switching losses of Diode, Inverter (typical)

$E_{rec} = f(R_G)$,

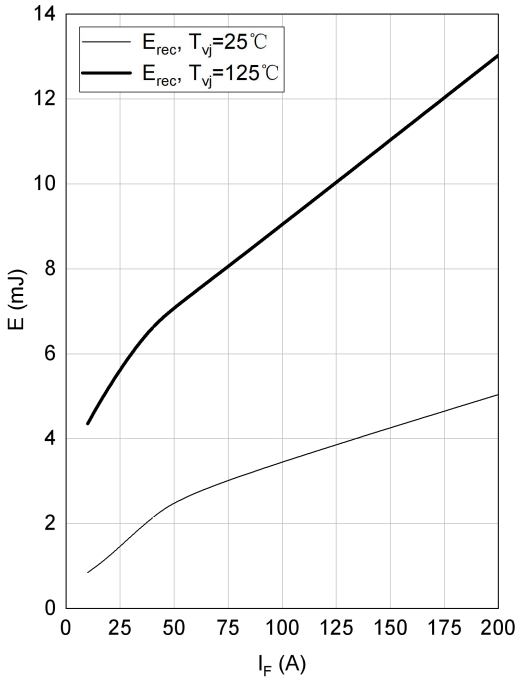
I_F =100A，V_{CE} = 600V



switching losess of Diode, Inverter (typical)

$E_{rec} = f(I_F)$,

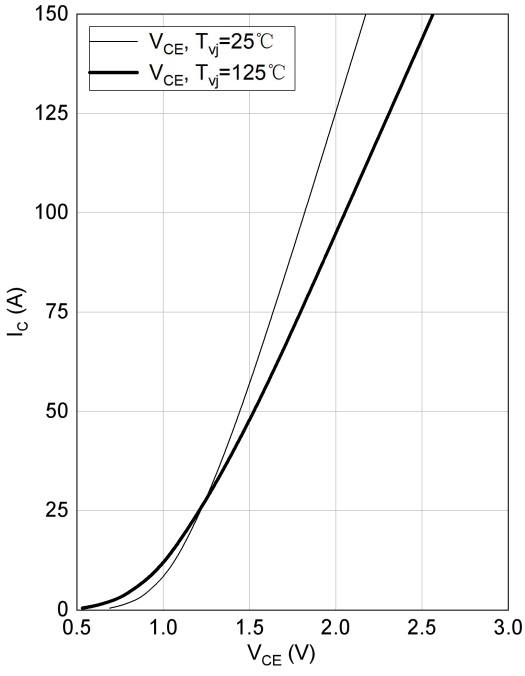
$R_{Gon} = 2\Omega$，V_{CE} = 600V



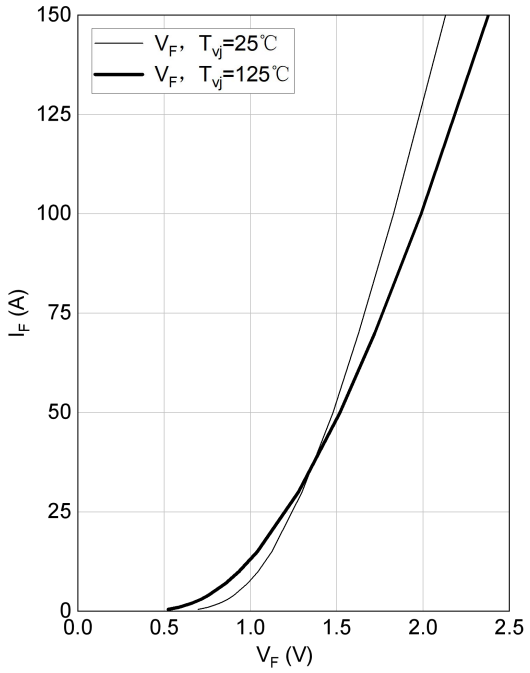
output characteristic IGBT,Brake-Chopper (typical)

$I_C = f(V_{CE})$

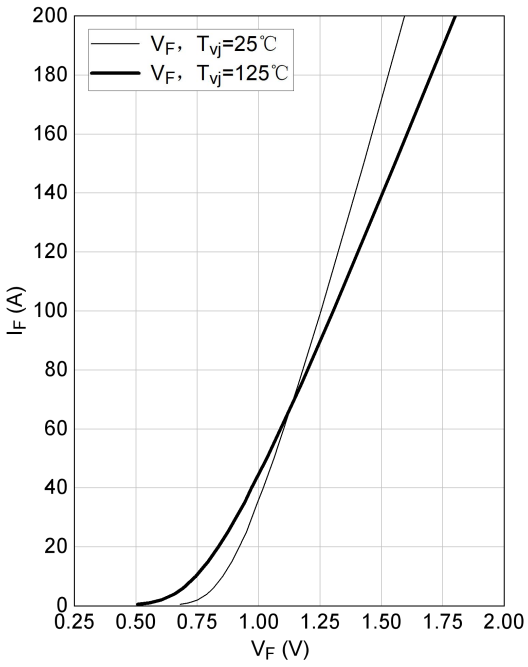
V_{GE} = 15 V



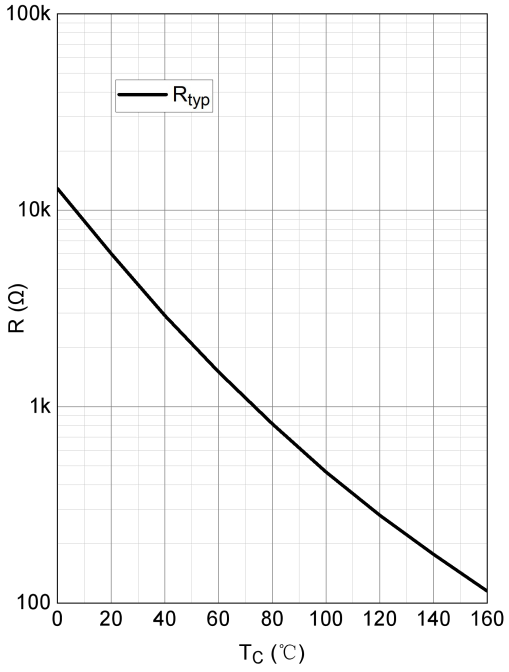
Forward characteristic of Diode,Brake-Chopper (typical)
$I_F = f(V_F)$



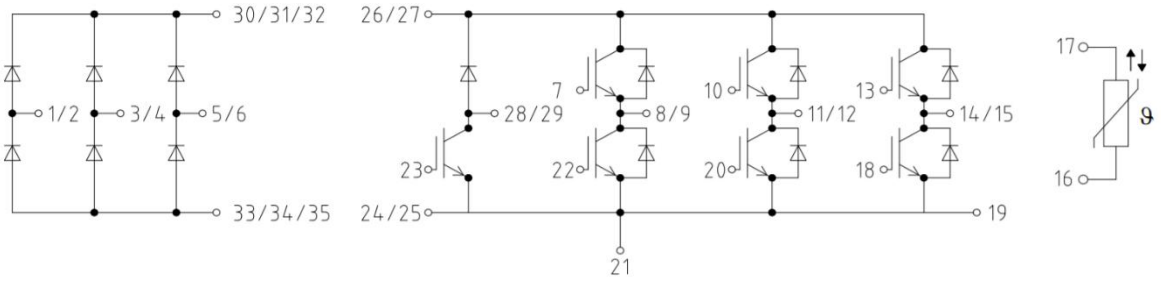
Forward characteristic of Diode, Rectifier(typical)
$I_F = f(V_F)$



NTC-Thermistor-temperature characteristic (typical)
R = f (T)

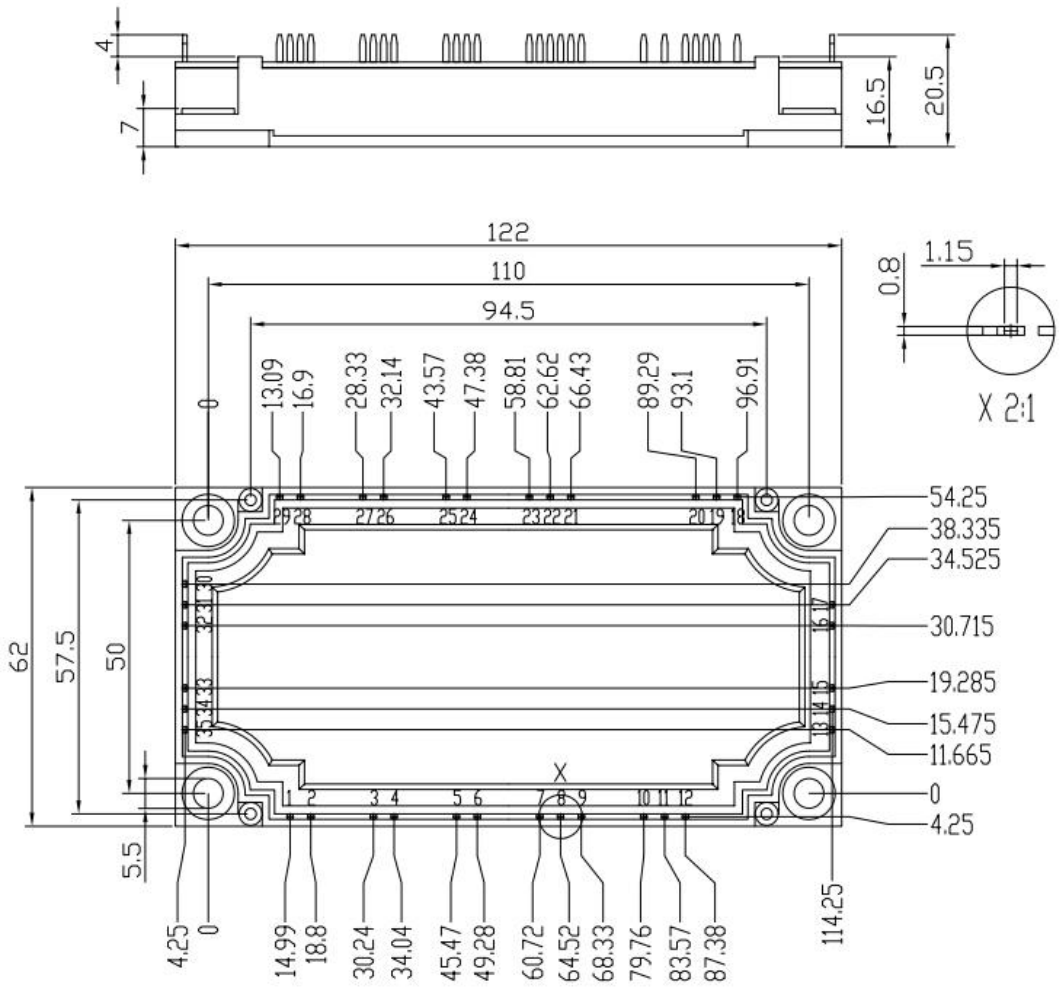


Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



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