LEGM75BE120L5H

IGBT Power Module

Features:

- V_{CE}=1200V I_C=75A
- Low $V_{CE(sat)}$
- V_{CEsat} with positive temperature coefficient
- Maximum junction temperature 175℃
- Isolation Type Package

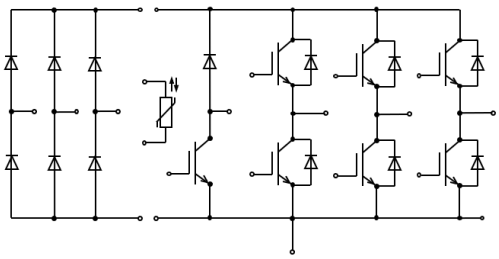
Applications:

- 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}=0V,I_C=1mA,T_{vj}=25℃	1200	V
I_C	Continuous Collector Current	T_C=100℃	75	A
I_{CRM}	Peak Collector Current	I_{CRM}=2I_C	150	A
V_{GES}	Gate-Emitter Voltage	T_{vj}=25℃	±30	V
P_{tot}	Total Power Dissipation	T_C=25℃,T_{vjmax}=150℃	350	W

Characteristics Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=75 A, V_{GE}=15 V, T_{vj}=25 ℃		1.83	2.3	V
		I_C=75 A, V_{GE}=15 V, T_{vj}=150 ℃		2.3		V
$V_{GE(th)}$	Gate Threshold Voltage	I_C=5.0 mA,V_{CE}=V_{GE},T_{vj}= 25 ℃	5.2	6.2	6.5	V
I_{CES}	Collector-Emitter Cut-off Current	V_{CE}=1200 V, V_{GE}=0 V, T_{vj}=25 ℃			20	μA
I_{GES}	Gate-Emitter Leakage Current	V_{CE}=0 V, V_{GE}=15 V, T_{vj}=25 ℃			200	nA
r_G	Integrated gate resister		-	3.1	-	Ω
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHZ	-	6.68	-	nF
C_{oes}	Output Capacitance		-	0.36	-	nF
C_{res}	Reverse Transfer Capacitance		-	220	-	pF
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C= 75 A,V_{CE}= 600 V V_{GE} =±15 V R_G = 2Ω T_{vj} = 25 ℃		66		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			2.3		mJ
E_{off}	Energy Loss per Pulse			6.4		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C = 75 A,V_{CE} = 600 V V_{GE} = ±15 V R_G = 2 Ω T_{vj}= 150 ℃		720		ns
t_r	Rise Time, Inductive Load			32		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			335		ns
t_f	Fall Time, Inductive Load			276		ns
E_{on}	Turn-on Energy Loss per Pulse			2.7		mJ
E_{off}	Energy Loss per Pulse			7.3		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.35	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		150	℃
I_{SC}	SC data	V_{GE} ≤15 V, V_{CC} = 900 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt t_P ≤ 10 μs, T_{vj} = 150 ℃		350		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 ℃		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, Tvj=150 ℃		1200		A^2s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=75 A, V_{CE}=0 V, T_{vj}=25 ℃		1.81	2.3	V
		I_F=75 A, V_{CE}=0 V, T_{vj}=150 ℃		1.95	2.5	V
t_{rr}	Reverse Recovery time	I_F= 75 A,V_R= 600 V -di/dt = 1200A/us T_{vj} = 25 ℃		200		ns
Q_r	Recovered Charge			4		uC
E_{rec}	Reverse Recovery Energy			1.3		mJ
t_{rr}	Reverse Recovery time	I_F= 75A,V_R= 600 V -di/dt = 1200A/us T_{vj} = 150 ℃		350		ns
Q_r	Recovered Charge			8		uC
E_{rec}	Reverse Recovery Energy			2.7		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.65	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		150	℃

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 ℃		75		A
I_{RMSM}	Maximum RMS current at rectifier chip	T_c=80 ℃		100		A
I_{FSM}	Surge forward current	t_p=10ms T_{vj}=25 ℃		600		A
I^2t	I^2t-value			1800		A^2S
I_{FSM}	Surge forward current	t_p=10ms T_{vj}= 150 ℃		470		A
I^2t	I^2t-value			1100		A^2S

Characteristic Values (Diode Rectifier)

V_F	Forward voltage	T_{vj}= 125 ℃ I_F= 75 A		1.35		V
I_R	Reverse current	Tvj=150 ℃ V_R= 1800 V		1.3		mA
R_{thjc}	Thermal resistance junction to case	per diode		0.65		K/W

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℃, $T_{vj\ max}$ = 150℃		50		A
I_{CRM}	Peak Collector Current	I_{CRM}=2I_C		100		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=50 A, V_{GE}=15 V, T_{vj}=25 ℃		1.9	2.3	V
		I_C=50 A, V_{GE}=15 V, Tvj=150 ℃		2.3	2.7	V
$V_{GE(th)}$	Gate Threshold Voltage	I_C=5.0 mA,V_{CE}=V_{GE},T_{vj}= 25 ℃	5	6.0	6.5	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= 50 A,V_{CE}= 600 V V_{GE}=±15 V R_G= 15Ω T_{vj}= 25 ℃		42		ns
t_r	Rise Time, Inductive Load			42		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			230		ns
t_f	Fall Time, Inductive Load			128		ns
E_{on}	Turn-on Energy Loss per Pulse			4.2		mJ
E_{off}	Energy Loss per Pulse			1.8		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C= 50 A,V_{CE}= 600 V V_{GE}=±15 V R_G= 15Ω T_{vj}= 150 ℃		48		ns
t_r	Rise Time, Inductive Load			45		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			260		ns
t_f	Fall Time, Inductive Load			248		ns
E_{on}	Turn-on Energy Loss per Pulse			8.23		mJ
E_{off}	Energy Loss per Pulse			4.9		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.55	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		150	℃

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 ℃		30		A
I_{FRM}	Repetitive Peak Forward Current	t_P=1 ms		60		A
I^2t	I^2t Value	V_R=0 V, t_P=10 ms, Tvj=150 ℃		550		A^2s

Characteristics (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=30 A, V_{CE}=0 V,T_{vj}= 25 ℃		1.9	2.3	V
		I_F=30 A, V_{CE}=0 V,T_{vj}=125 ℃		1.9		V
t_{rr}	Reverse Recovery time	I_F=30 A,V_R=600 V -di/dt=100A/us T_{vj}=25 ℃, V_{GE}=-15V		170		ns
Q_r	Recovered Charge			0.98		uC
E_{rec}	Reverse Recovery Energy			0.35		mJ
t_{rr}	Reverse Recovery time	I_F=30A,V_R=600 V -di/dt=100A/us T_{vj}=125 ℃ V_{GE}=-15V		205		ns
Q_r	Recovered Charge			1.09		uC
E_{rec}	Reverse Recovery Energy			0.36		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			1.0	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		150	℃

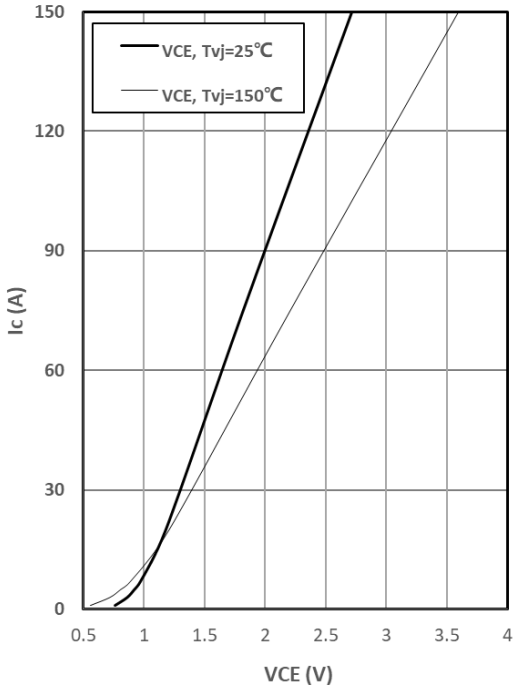
NTC-Thermistor (Characteristic Values)

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

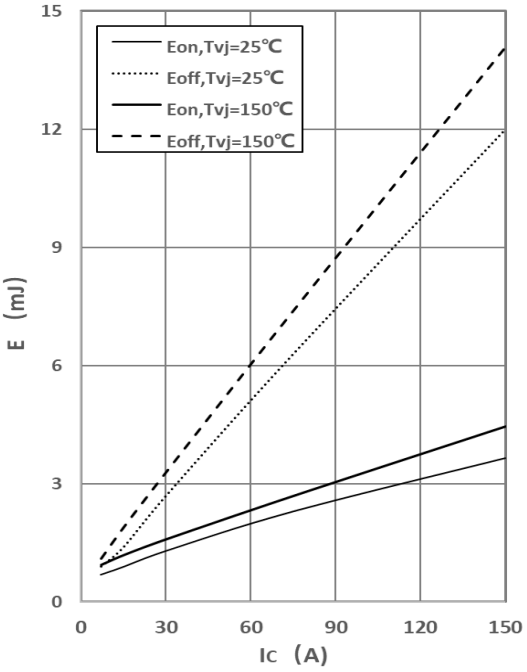
Module Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{isol}	Isolation voltage	t=1min,f=50Hz	2500			V
T_{stg}	Storage Temperature		-40		150	℃
M_s	Module-to-Sink Torque	Recommended(M5)	3.0		6.0	N·m
G	Weight of Module			300		g

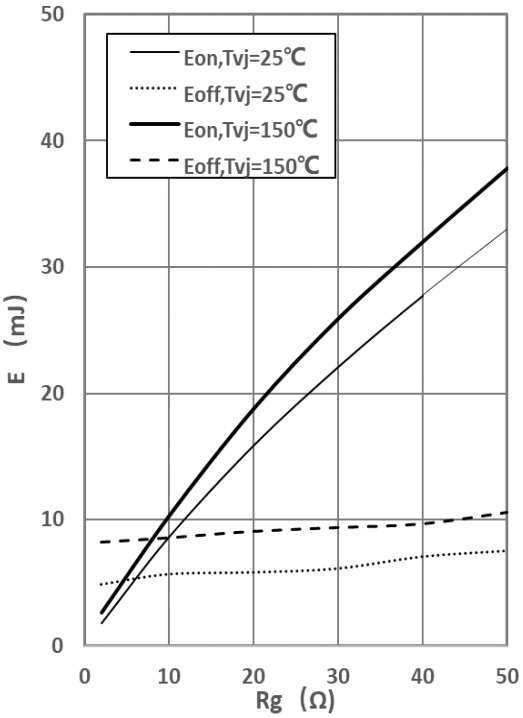
Output characteristic of IGBT,Inverter(typical)
$I_C = f(V_{CE})$
V_{GE} = 15V



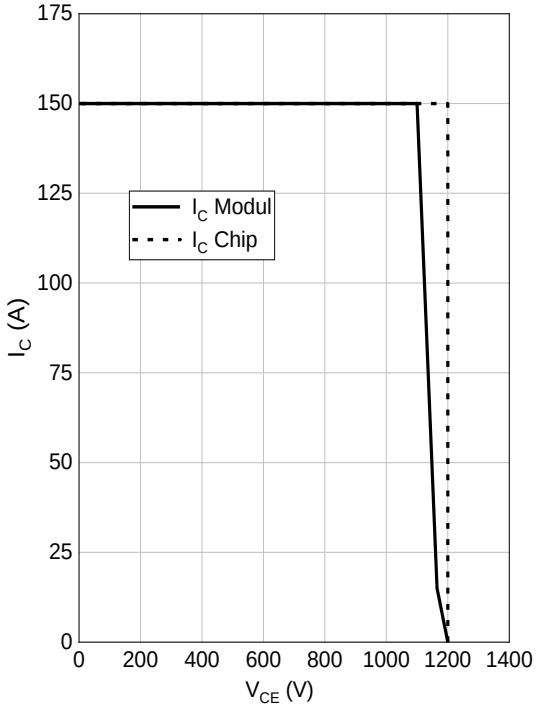
Switching losses IGBT,Inverter(typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE}= ±15V, R_G = 2Ω, V_{CE} = 600V



Switching losses IGBT,Inverter(typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15V, I_C = 75A , V_{CE} = 600V

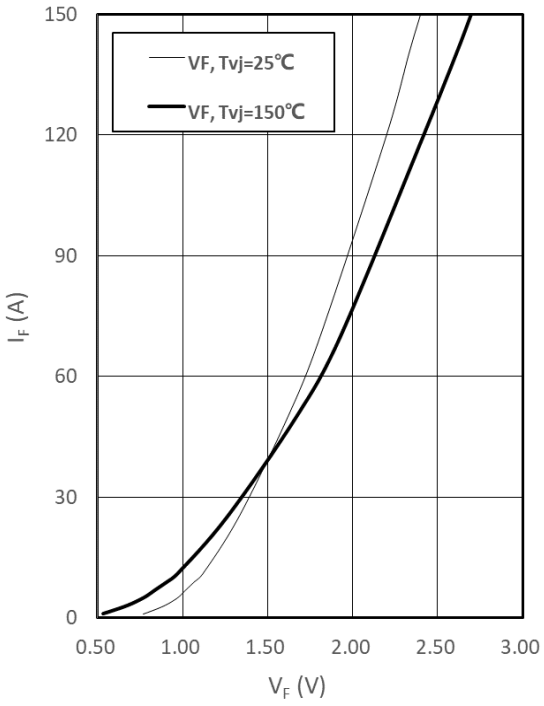


RBSOA IGBT,Inverter (typical)
$I_C = f(V_{CE})$
V_{GE} = ±15V, R_{Goff} = 2Ω, T_{vj} =150 ℃



Forward characteristic of Diode, Inverter (typical)

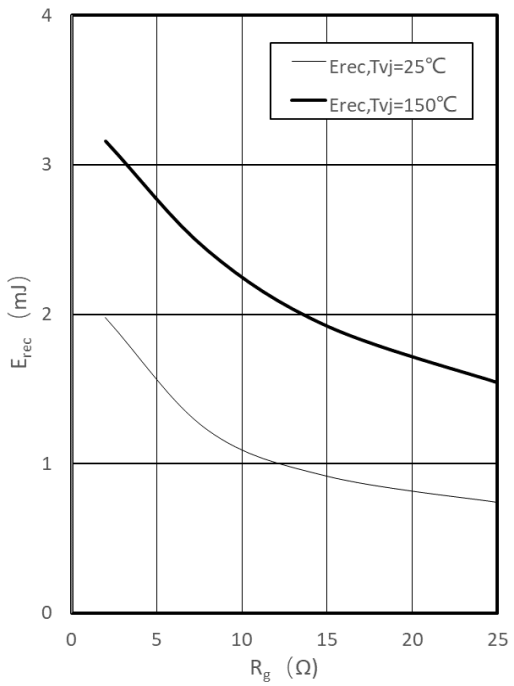
$I_F = f(V_F)$



Switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

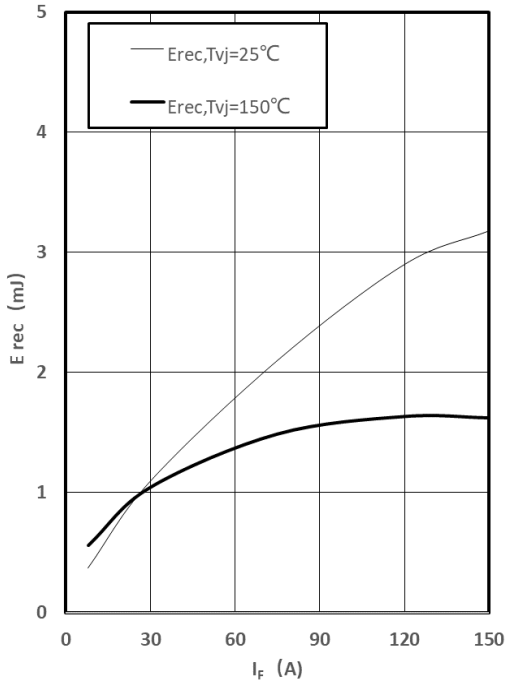
$I_F = 75$ A, $V_{CE} = 600$ V



Switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

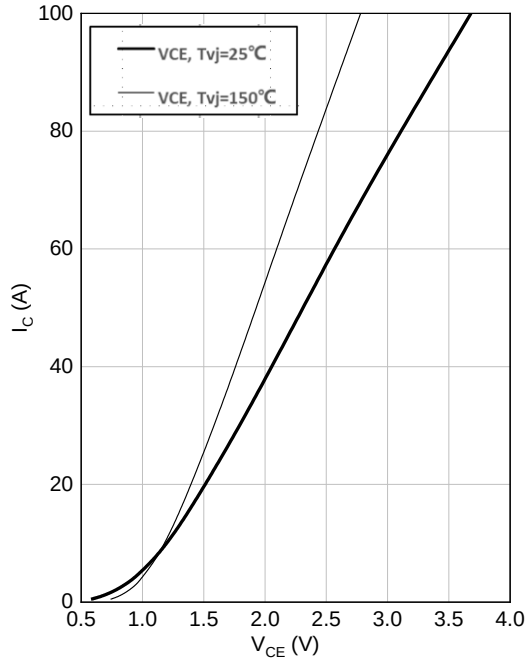
$R_{Gon} = 2\Omega$, $V_{CE} = 600$ V



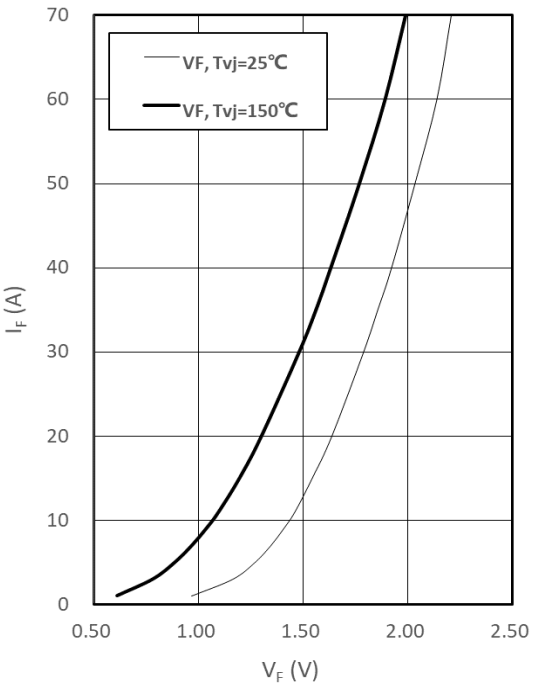
Output characteristic IGBT,Brake-Chopper (typical)

$I_C = f(V_{CE})$

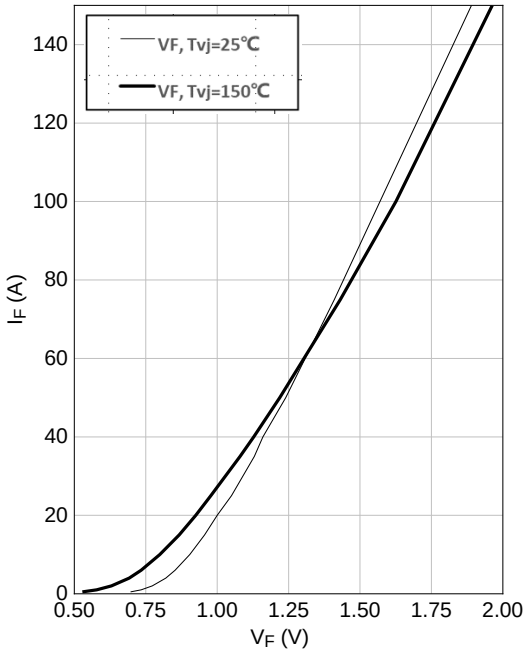
$V_{GE} = 15$ V



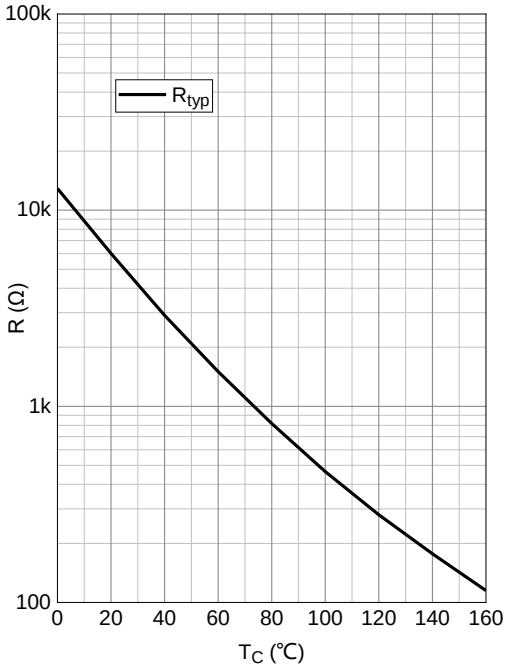
Forward characteristic of Diode,Brake-Chopper (typical)
$I_F = f(V_F)$



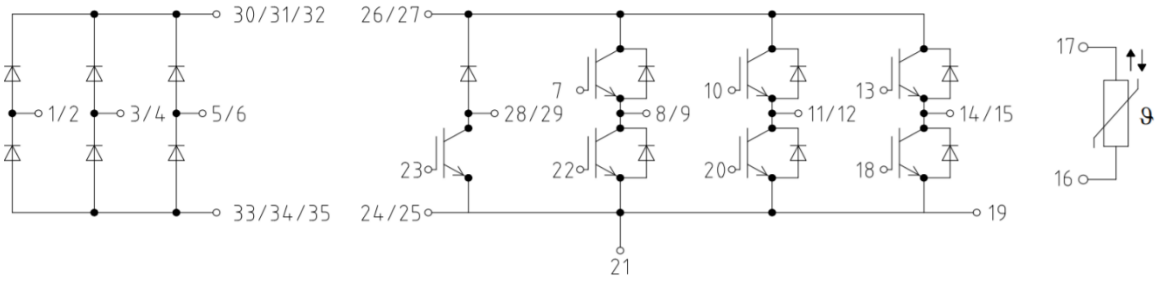
Forward characteristic of Diode, Rectifier(typical)
$I_F = f(V_F)$



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

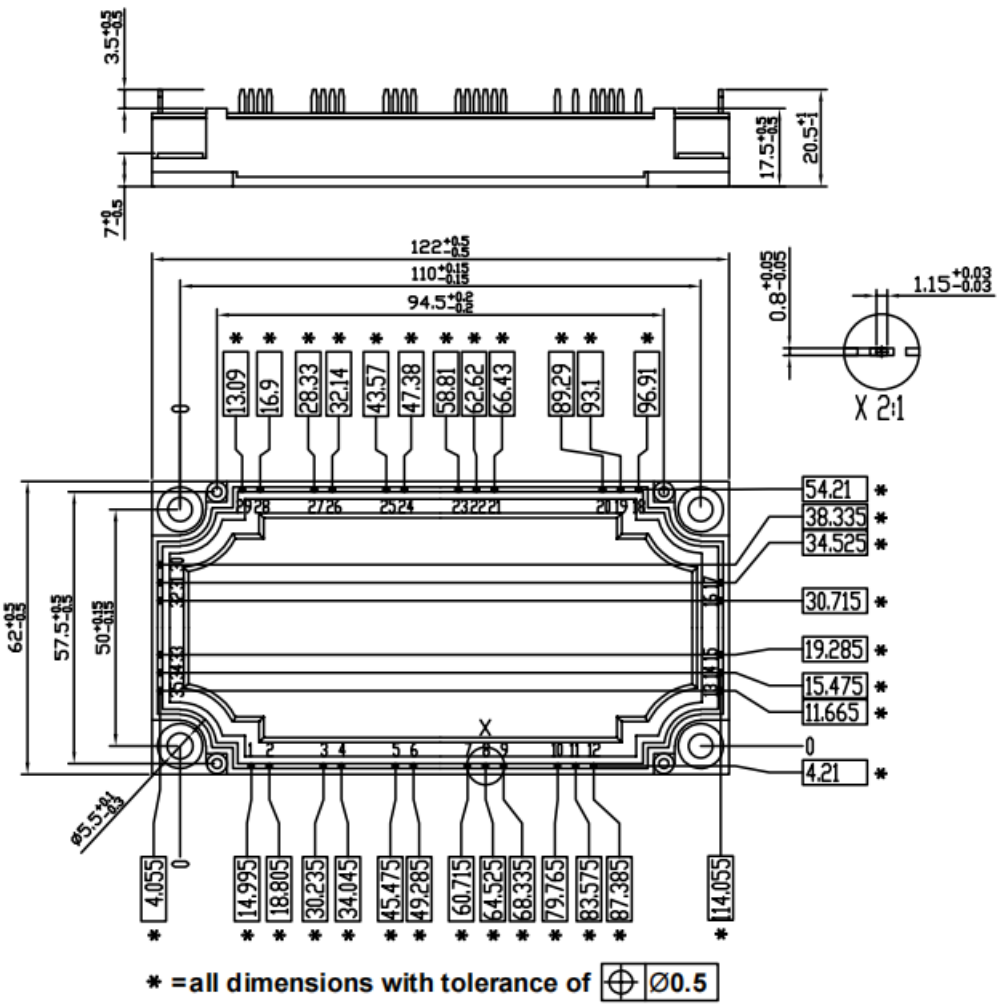


Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



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