LEGM35BE120E2H

IGBT Power Module

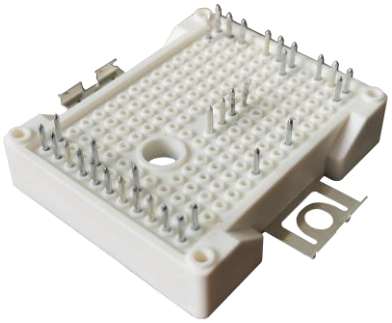
Features:

- V_{CE}=1200V I_C=35A
- Low $V_{CE(sat)}$
- V_{CEsat} with positive temperature coefficient
- Maximum junction temperature 175℃
- Isolation Type Package

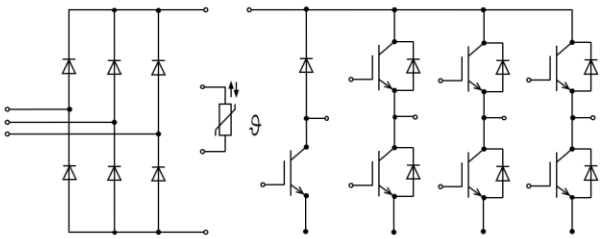
Applications:

- The inverter
- Motor control and drives

Package Type & Internal Circuit



E2



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 ℃	35	A
I_{CRM}	Peak Collector Current	I_{CRM}= 2 I_C	70	A
V_{GES}	Gate-Emitter Voltage	T_{vj}= 25 ℃	±30	V
P_{tot}	Total Power Dissipation	T_C= 25 ℃,T_{vjmax}= 175 ℃	200	W

Characteristics Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=35 A, V_{GE}=15 V, T_{vj}=25 ℃		2.00		V
		I_C=35 A, V_{GE}=15 V, T_{vj}=150 ℃		2.50		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= 35 A,V_{CE}= 600 V V_{GE}= ±15 V R_G= 15 Ω T_{vj}= 25 ℃		170		ns
t_r	Rise Time, Inductive Load			160		ns
$t_{d(off)}$	Turn-on Delay Time, Inductive Load			310		ns
t_f	Fall Time, Inductive Load			100		ns
E_{on}	Turn-on Energy Loss per Pulse			4.6		mJ
E_{off}	Energy Loss per Pulse			2.2		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C= 35 A,V_{CE}= 600 V V_{GE}= ±15 V R_G= 15 Ω T_{vj}= 150 ℃		210		ns
t_r	Rise Time, Inductive Load			180		ns
$t_{d(off)}$	Turn-on Delay Time, Inductive Load			350		ns
t_f	Fall Time, Inductive Load			180		ns
E_{on}	Turn-on Energy Loss per Pulse			4.9		mJ
E_{off}	Energy Loss per Pulse			3.0		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.75	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		150	℃
I_{sc}	SC	V_{GE} ≤ 15 V, V_{CE}= 600 V, t_p≤ 10 μs, T_{vj}= 150 ℃, V_{CEmax}=V_{CES}-L_{sCE} ·di/dt		170		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 ℃		35		A
I_{FRM}	Repetitive Peak Forward Current	t_P= 1 ms		70		A
I^2t	I^2t Value	V_R=0 V, t_P= 10 ms, T_{vj}= 150 ℃		220		A^2s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F= 35 A, V_{CE}= 0 V,T_{vj}= 25 ℃		2.38		V
		I_F= 35 A, V_{CE}= 0 V,T_{vj}=150 ℃		2.7		V
t_{rr}	Reverse Recovery time	I_F = 35 A, V_R = 600 V -di/dt = 100A/us T_{vj} = 25 ℃		140		ns
Q_r	Recovered Charge			1.1		uC
E_{rec}	Reverse Recovery Energy			6.7		mJ
t_{rr}	Reverse Recovery time	I_F= 35 A,V_R= 600 V -di/dt = 100 A/us T_{vj} = 150 ℃		290		ns
Q_r	Recovered Charge			2.5		uC
E_{rec}	Reverse Recovery Energy			0.5		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			1.03	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		150	℃

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 ℃		25		A
I_{CRM}	Peak Collector Current	I_{CRM}= 2I_C		50		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=25 A, V_{GE}=15 V, T_{vj}=25 ℃		2.01		V
		I_C=25 A, V_{GE}=15 V, T_{vj}=150 ℃		2.53		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= 25 A,V_{CE}= 600 V V_{GE}= ±15 V R_G= 20 Ω T_{vj}= 25 ℃		170		ns
t_r	Rise Time, Inductive Load			160		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			170		ns
t_f	Fall Time, Inductive Load			150		ns
E_{on}	Turn-on Energy Loss per Pulse			3.7		mJ
E_{off}	Energy Loss per Pulse			1.4		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C= 25 A,V_{CE}= 600 V V_{GE}= ±15 V R_G= 20 Ω T_{vj}= 150 ℃		130		ns
t_r	Rise Time, Inductive Load			180		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			250		ns
t_f	Fall Time, Inductive Load			180		ns
E_{on}	Turn-on Energy Loss per Pulse			3.9		mJ
E_{off}	Energy Loss per Pulse			1.8		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.89	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 ℃		70		A
I_{RMSM}	Maximum RMS current at rectifier chip	T_c= 80 ℃		70		A
I_{FSM}	Surge forward current	t_p= 10ms T_{vj}= 25 ℃		420		A
I^2t	I^2t-value	t_p= 10ms T_{vj}= 150 ℃		880		A^2S
I_{FSM}	Surge forward current	t_p= 10ms T_{vj}= 25 ℃		360		A
I^2t	I^2t-value	t_p= 10ms T_{vj}= 150 ℃		600		A^2S

Characteristic Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward voltage	T_c= 25 ℃		0.9		V
I_R	Reverse current	T_{vj}= 150 ℃ V_R= 1800 V		1.1		mA
R_{thjc}	Thermal resistance junction to case	T_c= 25 ℃		0.76		K/W
T_{vjop}	Temperature under switching conditions	per diode	-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 ℃		25		A
I_{FRM}	Repetitive Peak Forward Current	t_P=1 ms		50		A
I^2t	I^2t Value	V_R=0 V, t_P=10 ms, T_{vj}=150 ℃		100		A^2s

Characteristics (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	T_{vj}= 25 ℃		2.03		V
		T_{vj}= 150 ℃		2.05		V
t_{rr}	Reverse Recovery time	I_F = 25 A,V_R = 600 V -di/dt = 250 A/us T_{vj} = 25 ℃		220		ns
Q_r	Recovered Charge			0.8		uC
E_{rec}	Reverse Recovery Energy			0.2		mJ
t_{rr}	Reverse Recovery time	I_F = 25 A,V_R= 600 V -di/dt= 250 A/us T_{vj}= 150 ℃		340		ns
Q_r	Recovered Charge			1.6		uC
E_{rec}	Reverse Recovery Energy			0.5		mJ
R_{thJC}	Thermal resistance, junction to case	I_F= 25 A, V_{CE}= 0 V, T_{vj}= 25 ℃			1.24	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		150	°C

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

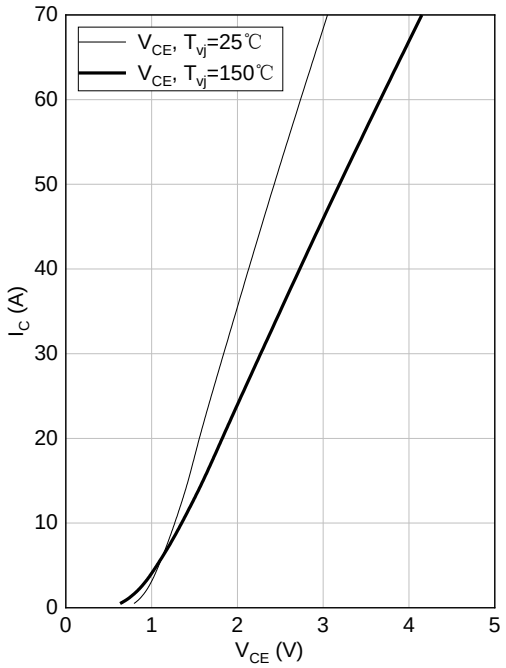
Module Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{isol}	Isolation voltage	t= 1 min,f= 50 Hz	2500			V
T_{stg}	Storage Temperature		-40		150	℃
F	Mountig Force per Clamp		40		80	N
G	Weight of Module			40		g

Output characteristic of IGBT,Inverter (typical)

$I_c = f(V_{CE})$

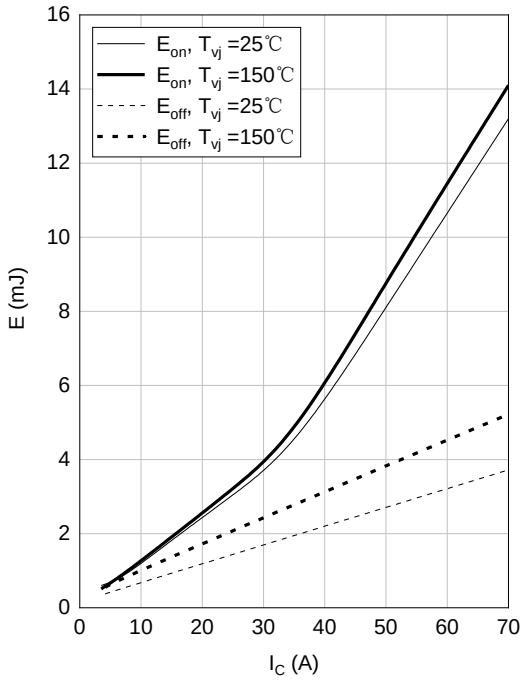
$V_{GE} = 15$ V



Switching time of IGBT,Inverter (typical)

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

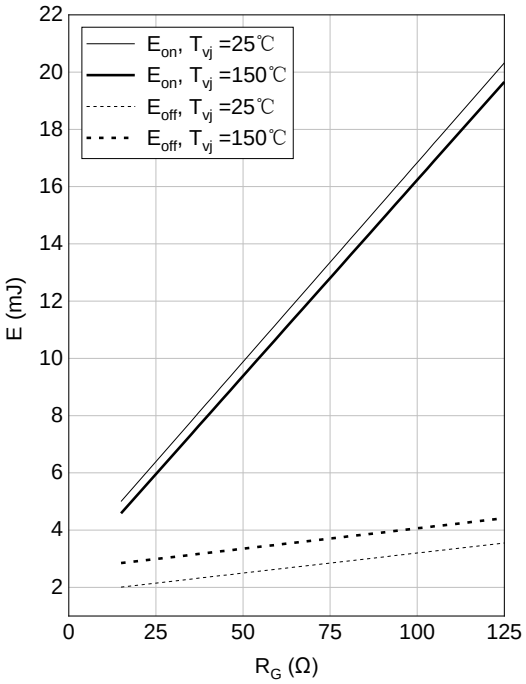
$V_{GE} = \pm 15$ V, $R_G = 15\ \Omega$, $V_{CE} = 600$ V



Switching losess of IGBT,Inverter (typical)

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

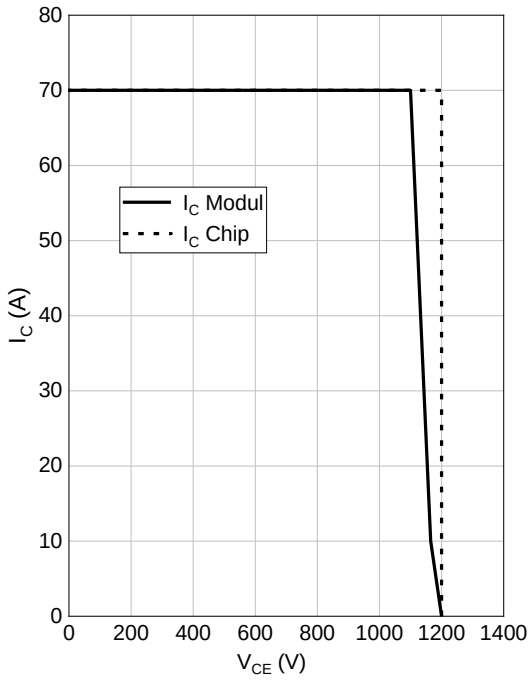
$V_{GE} = \pm 15$ V, $I_C = 35$ A, $V_{CE} = 600$ V



RBSOA IGBT,Inverter (typical)

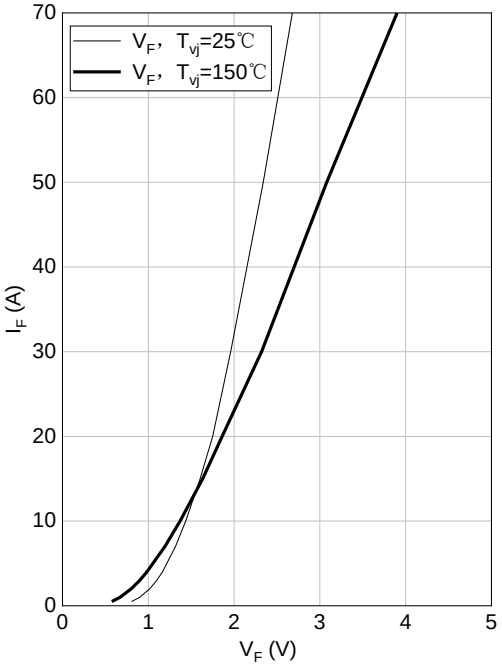
$I_C = f(V_{CE})$

$V_{GE} = \pm 15$ V, $R_G = 15\ \Omega$, $T_{vj} = 150$ ℃



Forward characteristic of Diode,Inverter (typical)

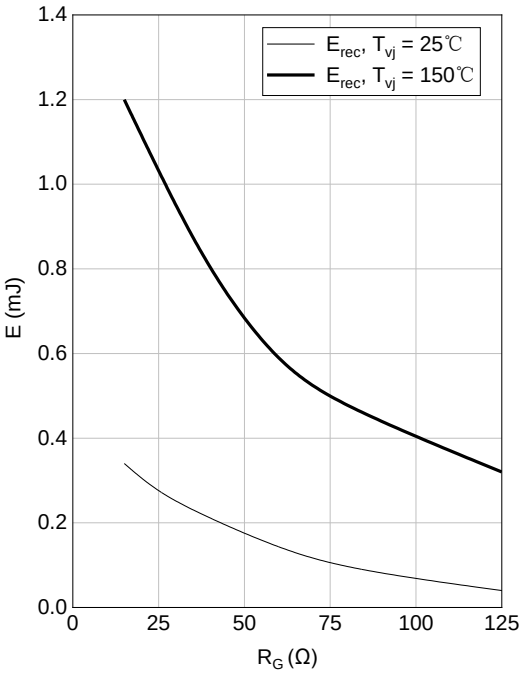
$I_F = f(V_F)$



Switching losses of Diode, Inverter (typical)

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

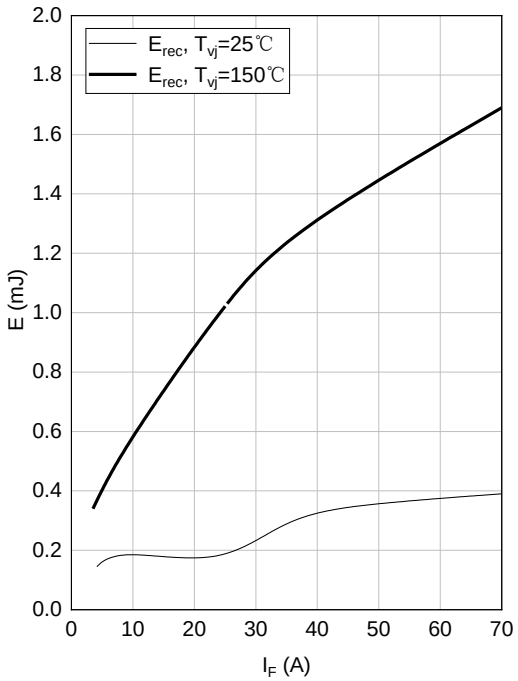
I_F = 35 A, V_{CE} = 600 V



Switching losses of Diode, Inverter (typical)

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

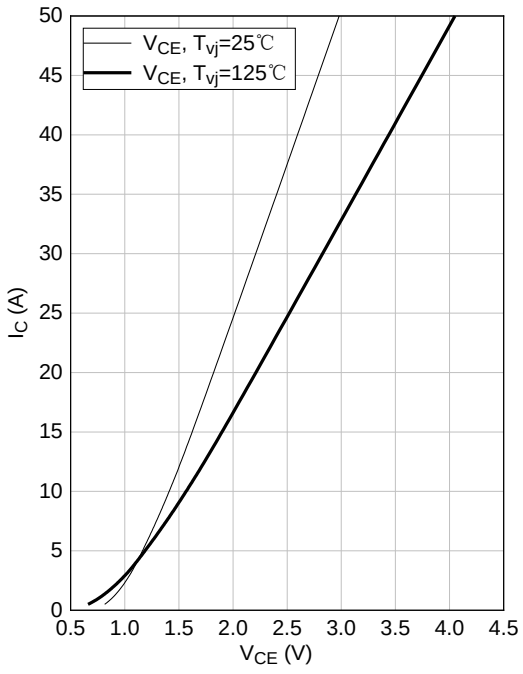
R_G = 15 Ω, V_{CE} = 600 V



Output characteristic of IGBT,Brake-Chopper, (typical)

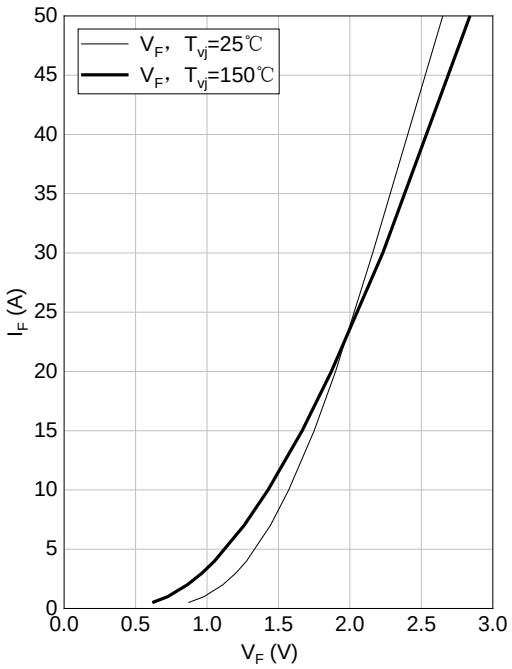
$I_c = f(V_{CE})$

V_{GE} = 15 V



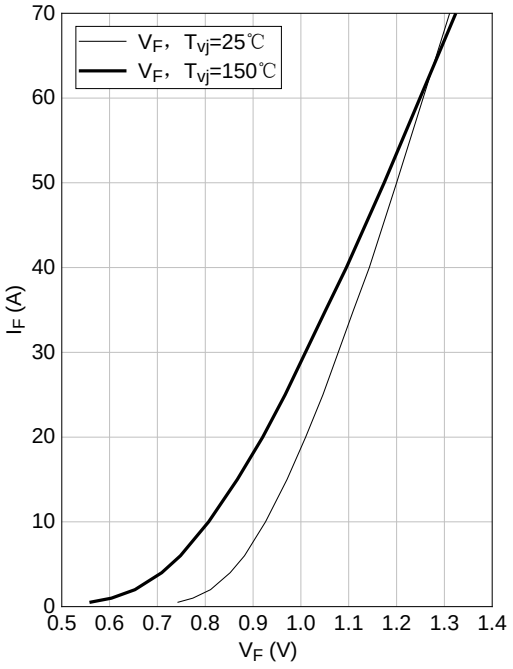
Forward characteristic of Diode,Brake-Chopper (typical)

$I_F = f(V_F)$



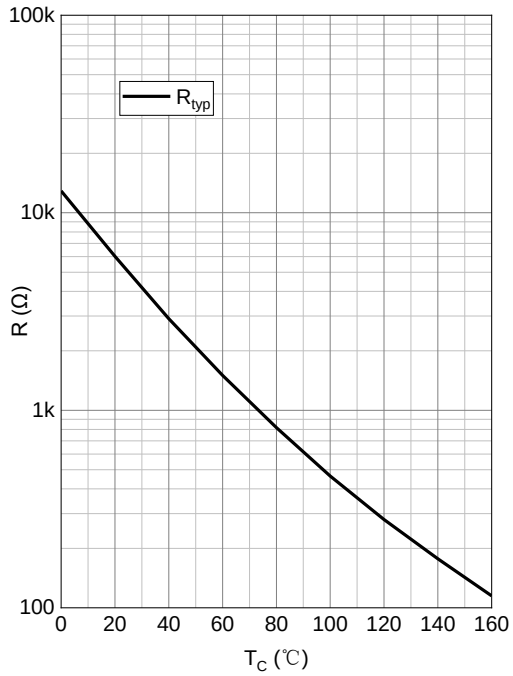
Forward characteristic of Diode, Rectifier(typical)

$I_F = f(V_F)$

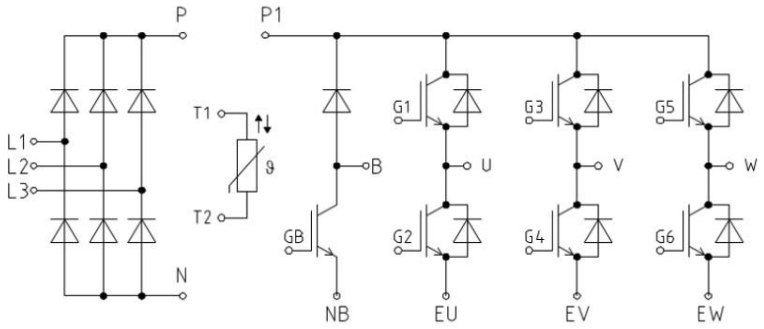


NTC-thermistor-temperature characteristic (typical)

$R = f(T_{NTC})$,

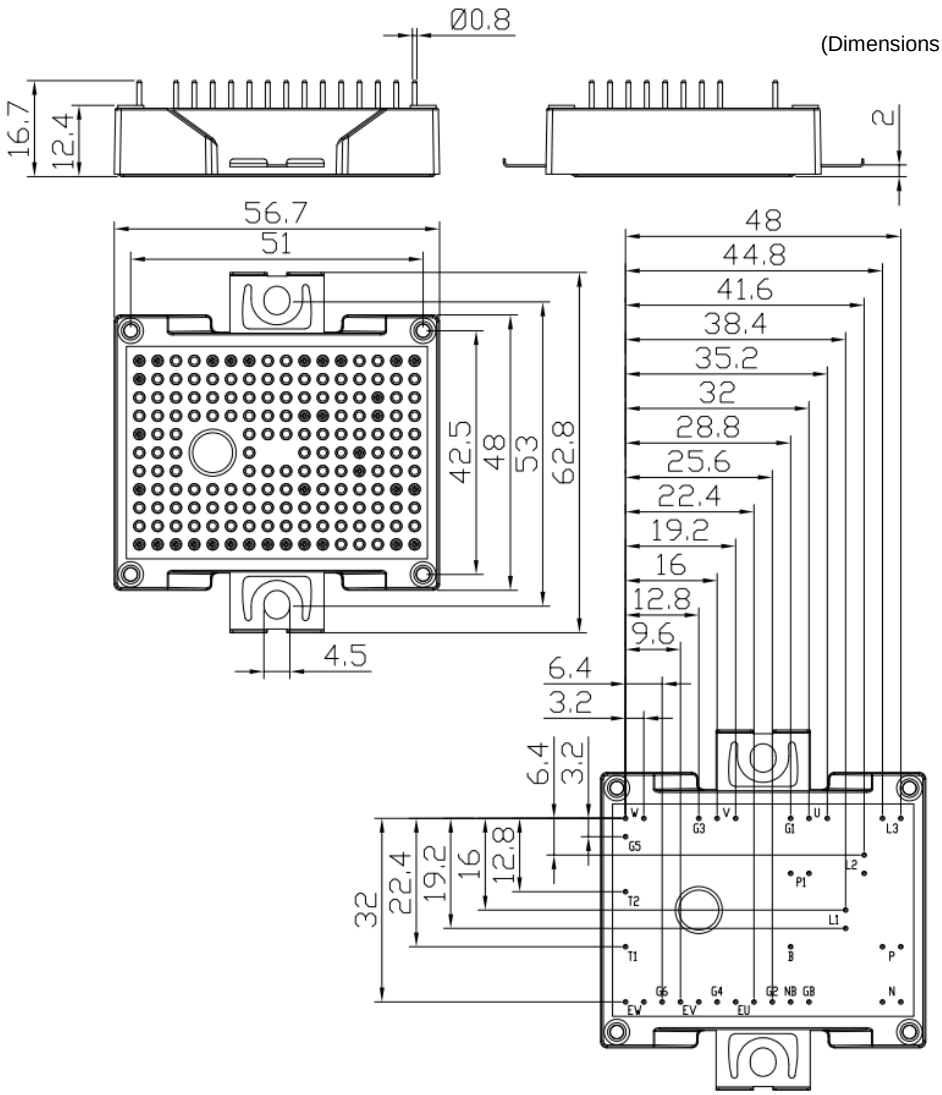


Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



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