LEGM25BF120L4HZ

IGBT Power Module

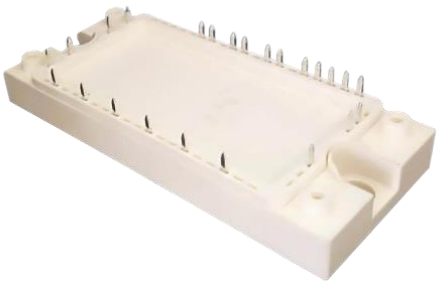
Features:

- V_{CE}=1200V I_C=25A
- 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



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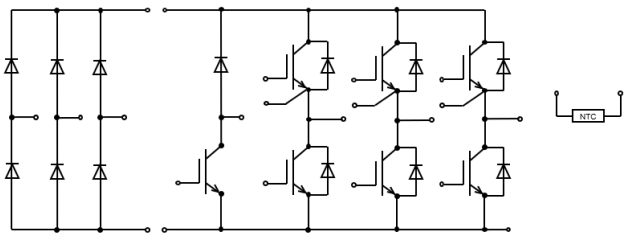


Internal Circuit

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℃	25	A
I_{CRM}	Peak Collector Current	I_{CRM}=2I_C	50	A
V_{GES}	Gate-Emitter Voltage	T_{vj}=25℃	±30	V
P_{tot}	Total Power Dissipation	T_C=25℃,T_{vjmax}=150℃	87	W

Maximum Rated Values (IGBT Inverter)

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 ℃	1.7	1.85	2.5	V
		I_C=25 A, V_{GE}=15 V, T_{vj}=125 ℃		2.53	2.7	V
$V_{GE(th)}$	Gate Threshold Voltage	I_C=5.0 mA,V_{CE}=V_{GE},T_{vj}= 25 ℃	5.2	6.0	6.5	V
I_{CES}	Collector-Emitter Cut-off Current	V_{CE}=1200 V, V_{GE}=0 V, T_{vj}=25 ℃			20	uA
I_{GES}	Gate-Emitter Leakage Current	V_{CE}=0 V, V_{GE}=15 V, T_{vj}=25 ℃			200	nA
C_{ies}	Input capacitance	f = 1 MHz, T_{vj}= 25°C, V_{CE} = 25 V, V_{GE}= 0 V		2.15		nF
C_{res}	Reverse transfer capacitance			72.3		pF
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C=25 A,V_{CE}=600 V, V_{GE}=±15 V, R_G=20Ω, T_{vj}=25 ℃		138		ns
t_r	Rise Time, Inductive Load			94		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			220		ns
t_f	Fall Time, Inductive Load			152		ns
E_{on}	Turn-on Energy Loss per Pulse			3.53		mJ
E_{off}	Turn-off Energy Loss per Pulse			1.23		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C=25 A,V_{CE}=600 V, V_{GE}=±15 V, R_G=20Ω, T_{vj}=125 ℃		116		ns
t_r	Rise Time, Inductive Load			114		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			264		ns
t_f	Fall Time, Inductive Load			244		ns
E_{on}	Turn-on Energy Loss per Pulse			4.41		mJ
E_{off}	Turn-off Energy Loss per Pulse			1.81		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			1.45	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		125	°C
I_{sc}	SC	V_{GE}≤15V, V_{CE}=600V, tp≤10μS, T_{vj}=125℃, VCE_{max}=V_{CES}-L_{sCE} ·di/dt		100		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			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}=125 ℃		220		A^2s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=25 A, V_{CE}=0 V,T_{vj}= 25 ℃		1.85	2.5	V
		I_F=25 A, V_{CE}=0 V,T_{vj}=125 ℃		1.85	2.5	V
t_{rr}	Reverse Recovery time	I_F=25 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=25A,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		125	℃

Maximum Rated Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25 ℃		1600		V
I_{FRMSM}	Maximum RMS forward current per chip	T_c=80 ℃		50		A
I_{RMSM}	Maximum RMS current at rectifier chip	T_c=80 ℃		50		A
I_{FSM}	Surge forward current	t_p=10ms T_{vj}=25 ℃		300		A
I^2t	I^2t-value			450		A^2S
I_{FSM}	Surge forward current	t_p=10ms T_{vj}=125 ℃		230		A
I^2t	I^2t-value			310		A^2S

Characteristic Values (Diode Rectifier)

V_F	Forward voltage	T_{vj}=125 ℃ I_F=25A		1.1		V
I_R	Reverse current	T_{vj}=125 ℃ V_R=1600V		1.1		mA
R_{thjc}	Thermal resistance junction to case	per diode			1.1	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℃, $T_{vj\,max}$ = 150℃		15		A
I_{CRM}	Peak Collector Current	I_{CRM}=2I_C		30		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=15 A, V_{GE}=15 V, T_{vj}=25 ℃		1.85	2.5	V
		I_C=15 A, V_{GE}=15 V, T_{vj}=125 ℃		2.0	2.7	V
$V_{GE(th)}$	Gate Threshold Voltage	I_C=5.0 mA,V_{CE}=V_{GE},T_{vj}= 25 ℃	5.0	6.0	6.5	V
I_{CES}	Collector-Emitter Cut-off Current	V_{CE}=1200 V, V_{GE}=0 V, T_{vj}=25 ℃			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{CE}=0 V, V_{GE}=15 V, T_{vj}=25 ℃			410	nA
C_{ies}	Input capacitance	f = 1 MHz, T_{vj}= 25℃, V_{CE} = 25 V, V_{GE}= 0 V		1.29		nF
C_{res}	Reverse transfer capacitance			41		pF
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C=15 A,V_{CE}=600 V V_{GE}=±15 V R_G=35Ω T_{vj}=25 ℃		94		ns
t_r	Rise Time, Inductive Load			52		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			243		ns
t_f	Fall Time, Inductive Load			190		ns
E_{on}	Turn-on Energy Loss per Pulse			1.95		mJ
E_{off}	Turn-off Energy Loss per Pulse			0.81		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C=15 A,V_{CE}=600 V V_{GE}=±15 V R_G=35Ω Tvj=125 ℃		85		ns
t_r	Rise Time, Inductive Load			114		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			202		ns
t_f	Fall Time, Inductive Load			312		ns
E_{on}	Turn-on Energy Loss per Pulse			2.1		mJ
E_{off}	Turn-off Energy Loss per Pulse			1.2		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			1.15	K/W
$T_{vj\,op}$	Temperature under switching conditions		-40		125	℃
I_{sc}	SC	V_{GE}≤15V, V_{CE}=600V, t_p≤10μs, T_{vj}=125℃, V_{CEmax}=V_{CES}-L_{sCE} ·di/dt		60		A

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 ℃		15		A
I_{FRM}	Repetitive Peak Forward Current	t_P=1 ms		30		A
I^2t	I^2t Value	V_R=0 V, t_P=10 ms, T_{vj}=150 ℃		15		A^2s

Characteristics (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=15 A, V_{CE}=0 V, T_{vj}=25 ℃		1.9	2.5	V
		I_F=15 A, V_{CE}=0 V, T_{vj}=125 ℃		1.90	2.5	V
t_{rr}	Reverse Recovery time	I_F=15 A,V_R=600 V -di/dt=300A/us T_{vj}=25 ℃		220		ns
Q_r	Recovered Charge			0.8		μC
E_{rec}	Reverse Recovery Energy			0.2		mJ
t_{rr}	Reverse Recovery time	I_F=15A,V_R=600 V -di/dt=300A/us T_{vj}=125 ℃		370		ns
Q_r	Recovered Charge			1.4		μC
E_{rec}	Reverse Recovery Energy			0.4		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			1.45	K/W
$T_{vj\ op}$	Temperature under switching conditions		-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

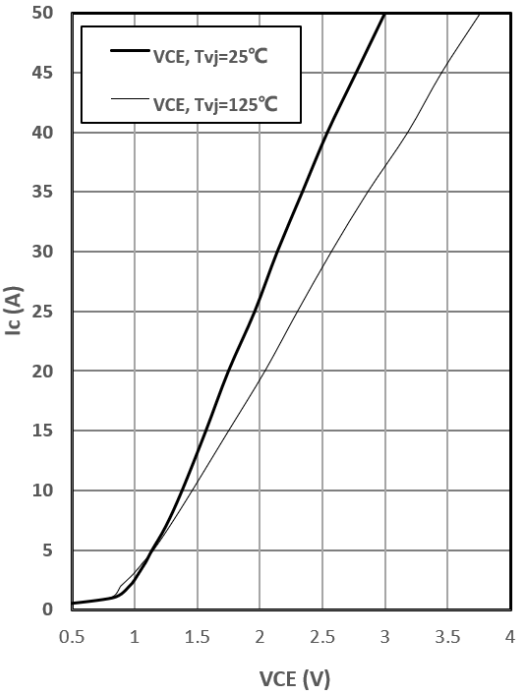
Module Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{isol}	Isolation voltage	t=1min,f=50Hz	2500			V
T_{stg}	Storage Temperature		-40		150	℃
M_s	Module-to-Sink Torque	Recommended(M5)	3.0		6.0	N·m
G	Weight of Module			180		g

Output characteristic of IGBT,Inverter (typical)

$I_c = f(V_{CE})$

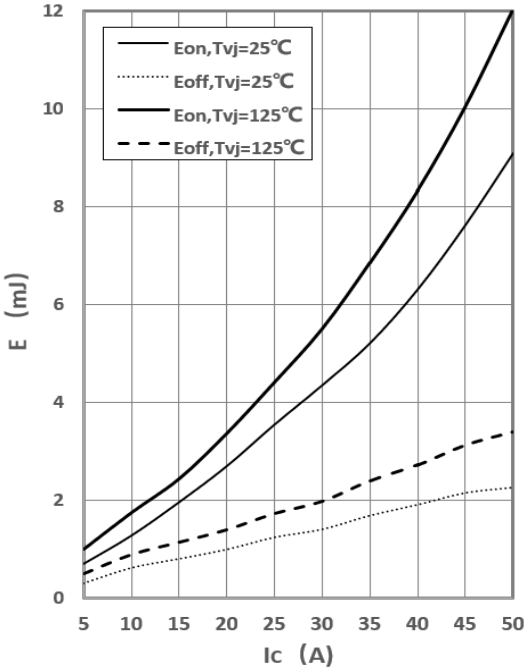
$V_{GE} = 15V$



Switching losses of IGBT,Inverter (typical)

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

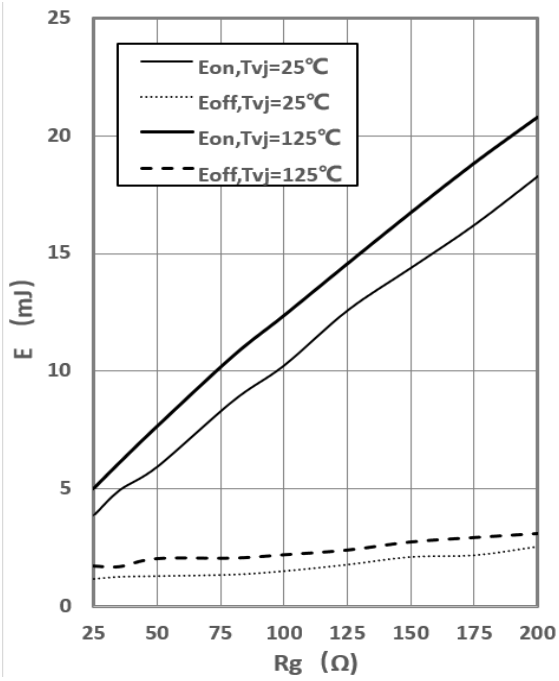
$V_{GE} = \pm 15V$, $R_G = 20\Omega$, $V_{CE} = 600V$



Switching losses of IGBT,Inverter (typical)

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

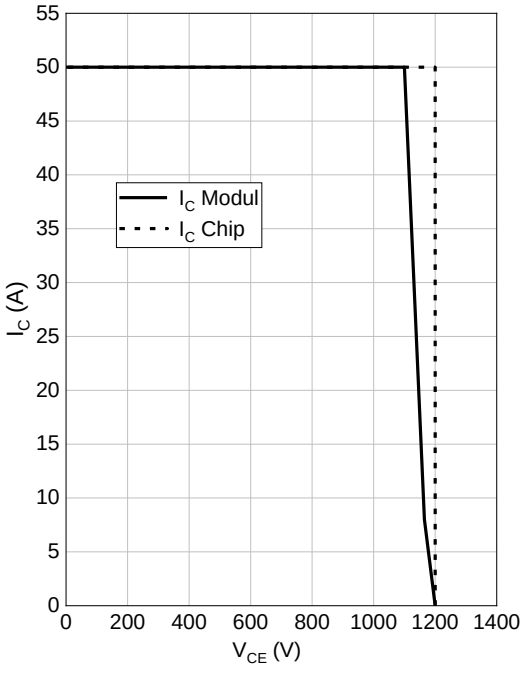
$V_{GE} = \pm 15V$, $I_C = 25A$, $V_{CE} = 600V$



RBSOA IGBT,Inverter (typical)

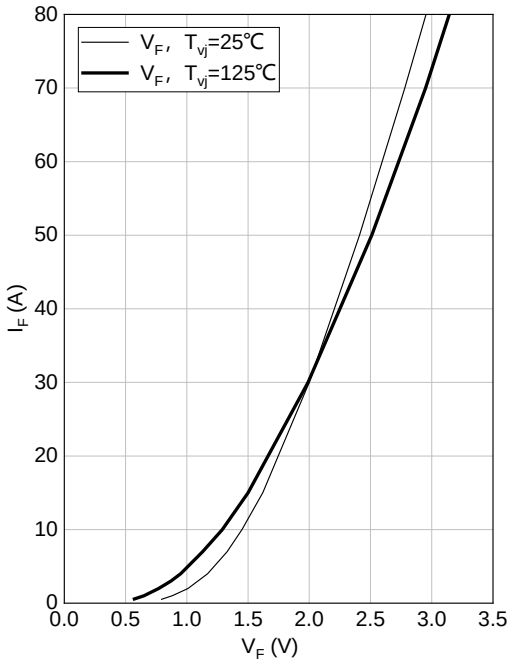
$I_C = f(V_{CE})$

$V_{GE} = \pm 15V$, $R_{Goff} = 20\Omega$, $T_{vj} = 125$ ℃



Forward characteristic of Diode,Inverter (typical)

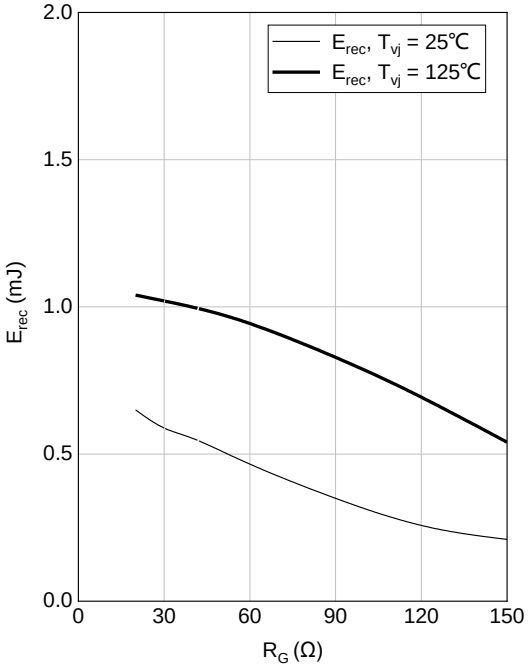
$I_F = f(V_F)$



Switching losses of Diode, Inverter (typical)

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

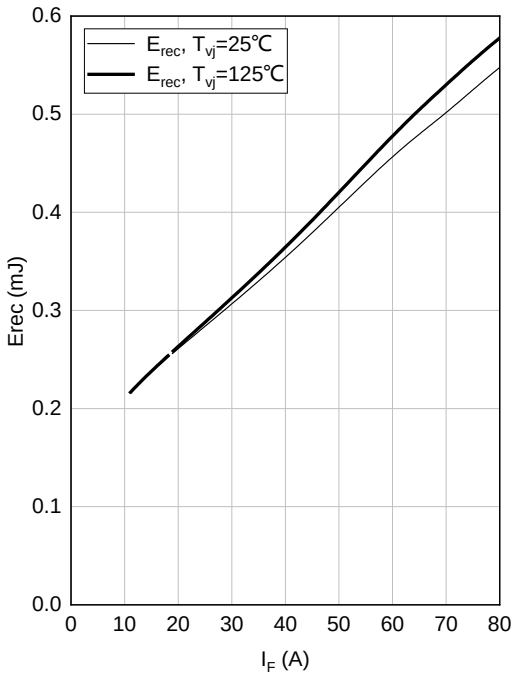
I_F = 25A，V_{CE} = 600V



Switching losses of Diode, Inverter (typical)

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

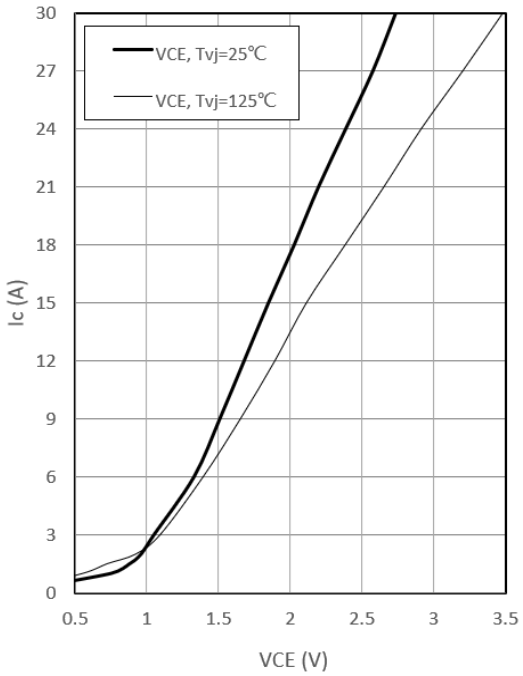
R_G =20 Ω，V_{CE} = 600V



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

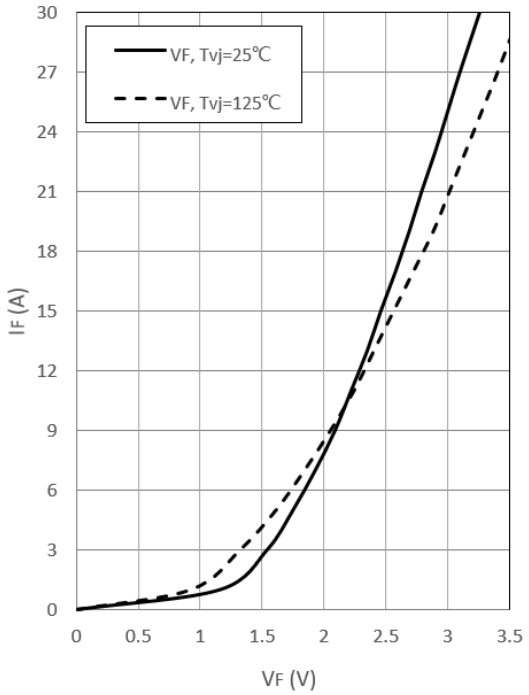
$I_c = f(V_{CE})$

V_{GE} = 15V



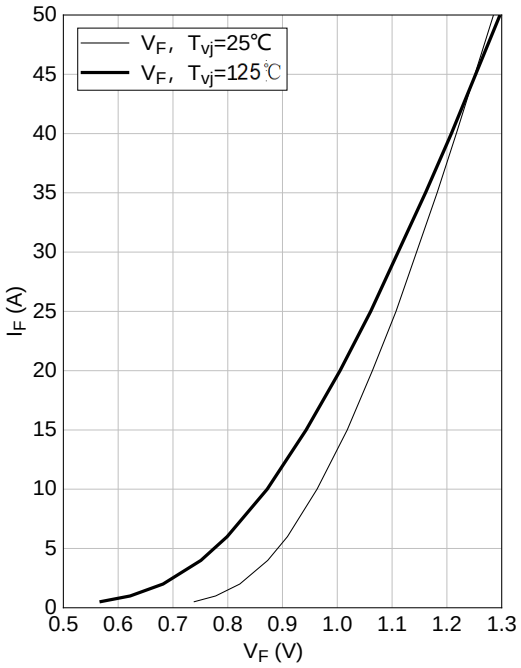
Forward characteristic of Diode,Brake-Chopper (typical)

$I_F = f(V_F)$



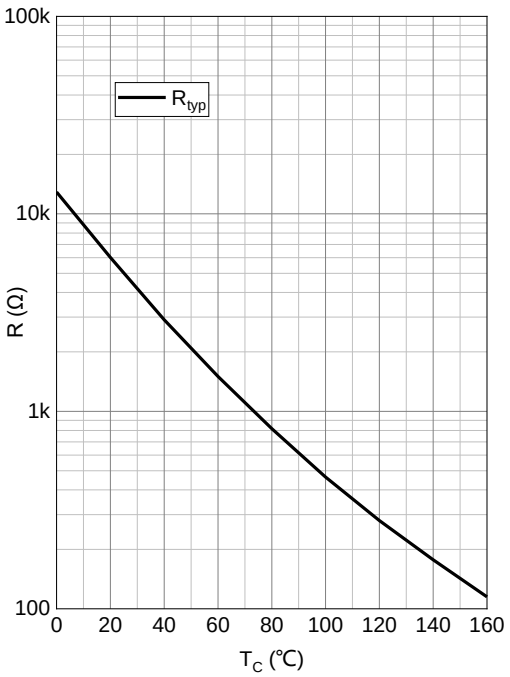
Forward characteristic of Diode, Rectifier(typical)

$I_F = f(V_F)$

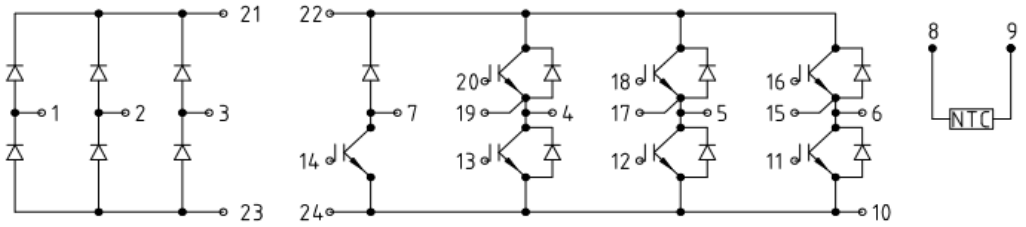


NTC-thermistor-temperature characteristic (typical)

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

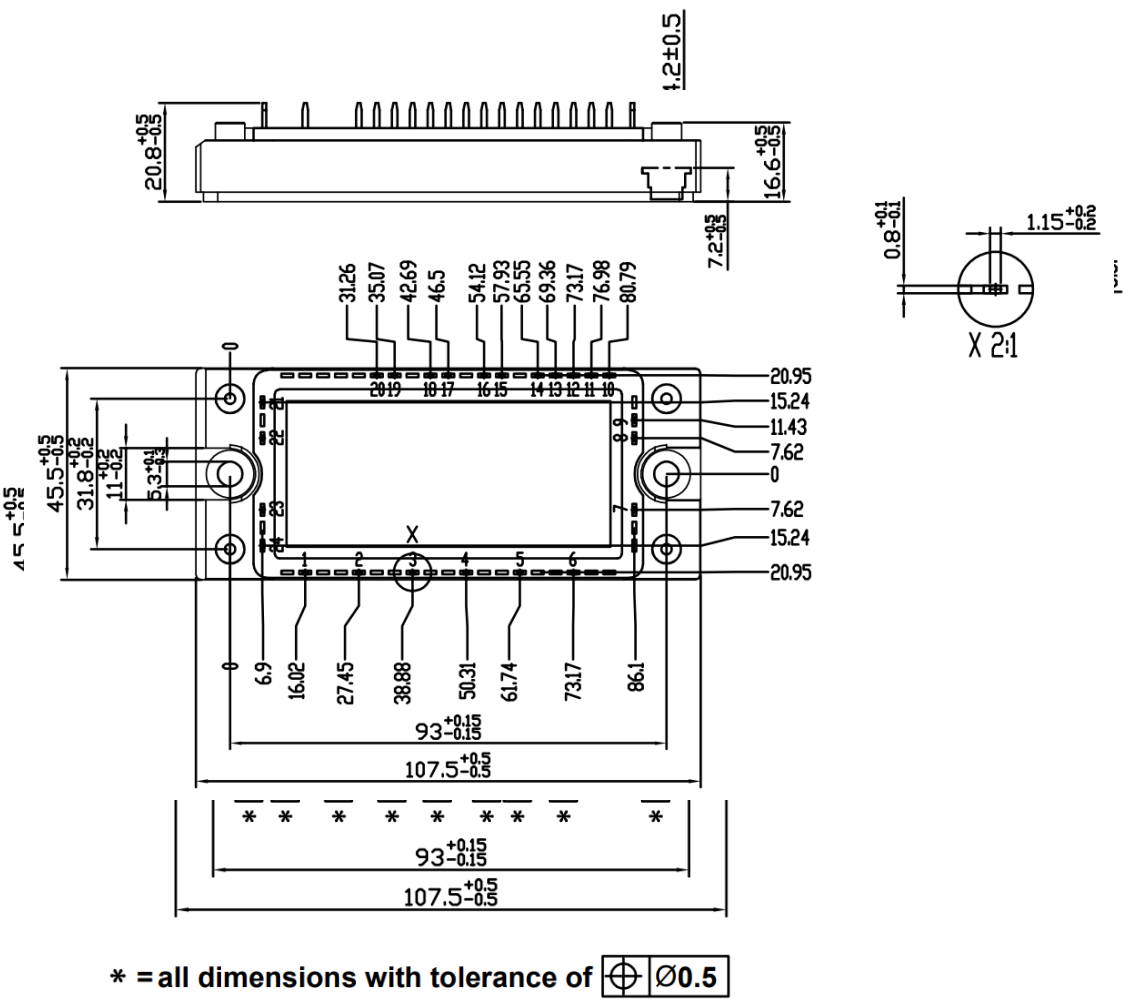


Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



* = all dimensions with tolerance of ⌖ Ø0.5

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