

LEGM75BE120L5H

IGBT Power Module

Features:

- $V_{CE}=1200V$ $I_C=75A$
- Low $V_{CE(sat)}$
- V_{CEsat} with positive temperature coefficient
- Maximum junction temperature $150^{\circ}C$
- Isolation Type Package

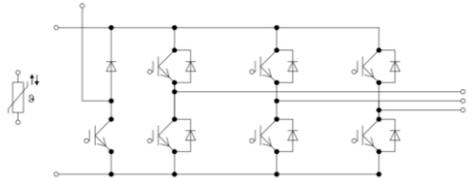
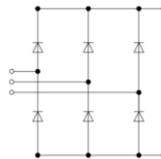
Applications:

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

Characteristics Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=75\text{ A}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$		1.78		V
		$I_C=75\text{ A}, V_{GE}=15\text{ V}, T_{vj}=125\text{ }^\circ\text{C}$		1.97		V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=5.0\text{ mA}, V_{CE}=V_{GE}, T_{vj}=25\text{ }^\circ\text{C}$		5.8		V
I_{CES}	Collector-Emitter Cut-off Current	$V_{CE}=1200\text{ V}, V_{GE}=0\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$			1.2	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$			410	nA
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=75\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=2\ \Omega$ $T_{vj}=25\text{ }^\circ\text{C}$		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			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		-40		125	$^\circ\text{C}$
I_{SC}	SC data	$V_{GE}\leq 15\text{ V}, V_{CC}=600\text{ V}$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$ $t_p\leq 10\ \mu\text{s}, T_{vj}=125\text{ }^\circ\text{C}$		400		A

Maximum Rated Values (Diode Inverter)

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

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 75\text{ A}$, $V_{CE} = 0\text{ V}$, $T_{vj} = 25\text{ }^{\circ}\text{C}$		1.79		V
		$I_F = 75\text{ A}$, $V_{CE} = 0\text{ V}$, $T_{vj} = 125\text{ }^{\circ}\text{C}$		1.96		V
t_{rr}	Reverse Recovery time	$I_F = 75\text{ A}$, $V_R = 600\text{ V}$ -di/dt = 2000 A/us $T_{vj} = 25\text{ }^{\circ}\text{C}$		100		ns
Q_r	Recovered Charge			15.6		uC
E_{rec}	Reverse Recovery Energy				0.5	
t_{rr}	Reverse Recovery time	$I_F = 75\text{ A}$, $V_R = 600\text{ V}$ -di/dt = 2000 A/us $T_{vj} = 125\text{ }^{\circ}\text{C}$		120		ns
Q_r	Recovered Charge			23.4		uC
E_{rec}	Reverse Recovery Energy				1.3	
R_{thJC}	Thermal resistance, junction to case	per Diode			0.65	K/W
$T_{vj\text{op}}$	Temperature under switching conditions		-40		125	$^{\circ}\text{C}$

Maximum Rated Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}= 25\text{ }^{\circ}\text{C}$		1800		V
I_{FRMSM}	Maximum RMS forward current per chip	$T_c= 80\text{ }^{\circ}\text{C}$		75		A
I_{RMSM}	Maximum RMS current at rectifier chip	$T_c= 80\text{ }^{\circ}\text{C}$		100		A
I_{FSM}	Surge forward current	$t_p= 10\text{ms}$ $T_{vj}= 25\text{ }^{\circ}\text{C}$		600		A
I^2t	I^2t -value			1800		A ² S
I_{FSM}	Surge forward current	$t_p= 10\text{ms}$ $T_{vj}= 125\text{ }^{\circ}\text{C}$		470		A
I^2t	I^2t -value			1100		A ² S

Characteristic Values (Diode Rectifier)

V_F	Forward voltage	$T_{vj}= 125\text{ }^{\circ}\text{C}$ $I_F= 75\text{ A}$		1.35		V
I_R	Reverse current	$T_{vj}= 125\text{ }^{\circ}\text{C}$ $V_R= 1800\text{ V}$		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	$T_{vj} = 25\text{ }^{\circ}\text{C}$		1200		V
I_C	Continuous Collector Current	$T_C = 100\text{ }^{\circ}\text{C}$, $T_{vj\text{ max}} = 150\text{ }^{\circ}\text{C}$		75		A
I_{CRM}	Peak Collector Current	$I_{CRM} = 2I_C$		150		A
V_{GES}	Gate-Emitter Voltage	$T_{vj} = 25\text{ }^{\circ}\text{C}$	-20		20	V

Characteristic Values (IGBT Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 50\text{ A}$, $V_{GE} = 15\text{ V}$, $T_{vj} = 25\text{ }^{\circ}\text{C}$		1.54		V	
		$I_C = 50\text{ A}$, $V_{GE} = 15\text{ V}$, $T_{vj} = 125\text{ }^{\circ}\text{C}$		1.65		V	
$V_{GE(th)}$	Gate Threshold Voltage	$I_C = 5.0\text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25\text{ }^{\circ}\text{C}$		5.8		V	
I_{CES}	Collector-Emitter Cut-off Current	$V_{CE} = 1200\text{ V}$, $V_{GE} = 0\text{ V}$, $T_{vj} = 25\text{ }^{\circ}\text{C}$			1.2	mA	
I_{GES}	Gate-Emitter Leakage Current	$V_{CE} = 0\text{ V}$, $V_{GE} = 15\text{ V}$, $T_{vj} = 25\text{ }^{\circ}\text{C}$			410	nA	
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C = 50\text{ A}$, $V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_G = 2\ \Omega$ $T_{vj} = 25\text{ }^{\circ}\text{C}$		100		ns	
t_r	Rise Time, Inductive Load			23		ns	
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			290		ns	
t_f	Fall Time, Inductive Load			180		ns	
E_{on}	Turn-on Energy Loss per Pulse				1.5		mJ
E_{off}	Energy Loss per Pulse				3.5		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load		$I_C = 50\text{ A}$, $V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_G = 2\ \Omega$ $T_{vj} = 125\text{ }^{\circ}\text{C}$		110		ns
t_r	Rise Time, Inductive Load				25		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load				360		ns
t_f	Fall Time, Inductive Load				160		ns
E_{on}	Turn-on Energy Loss per Pulse				1.7		mJ
E_{off}	Energy Loss per Pulse				5.8		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT				0.35	K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		125	$^{\circ}\text{C}$	

Maximum Rated Values (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	$T_{vj}= 25\text{ }^{\circ}\text{C}$		1200		V
I_F	Continuous DC Forward Current	$T_C= 100\text{ }^{\circ}\text{C}$		50		A
I_{FRM}	Repetitive Peak Forward Current	$t_p= 1\text{ ms}$		100		A
I^2t	I^2t Value	$V_R= 0\text{ V}, t_p=10\text{ ms}, T_{vj}= 125\text{ }^{\circ}\text{C}$		1200		A^2s

Characteristics (Diode Brake-Chopper)

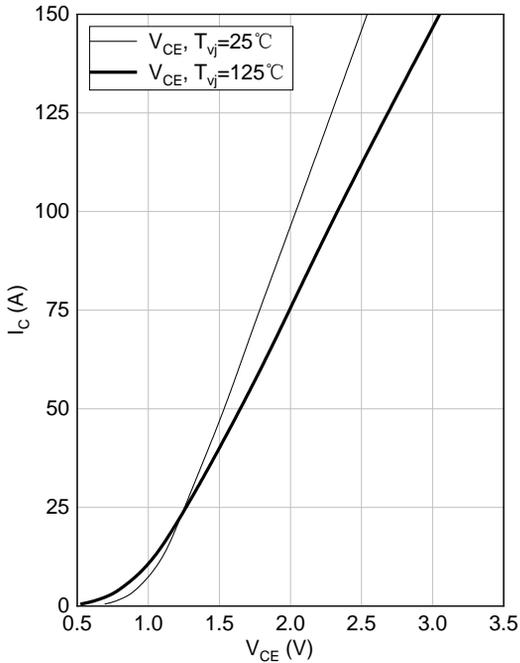
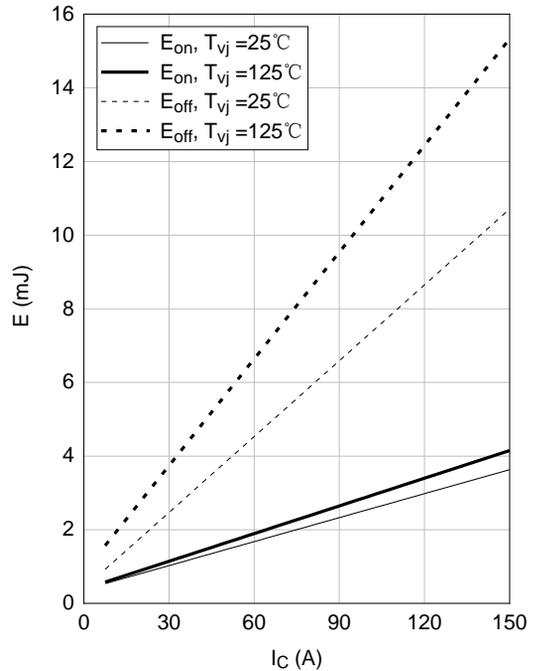
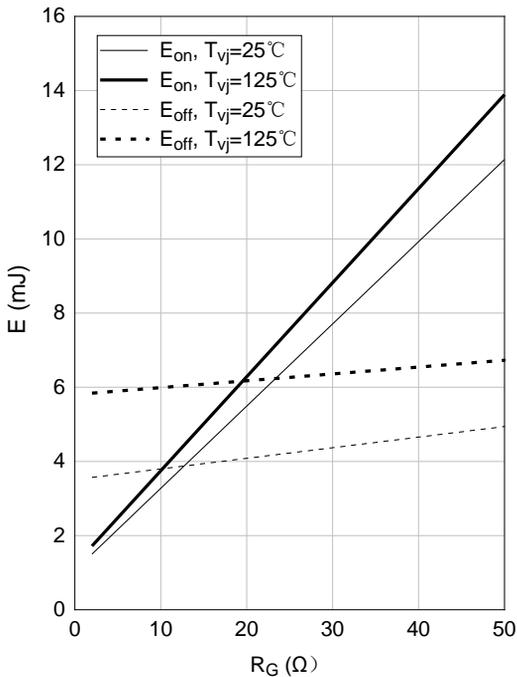
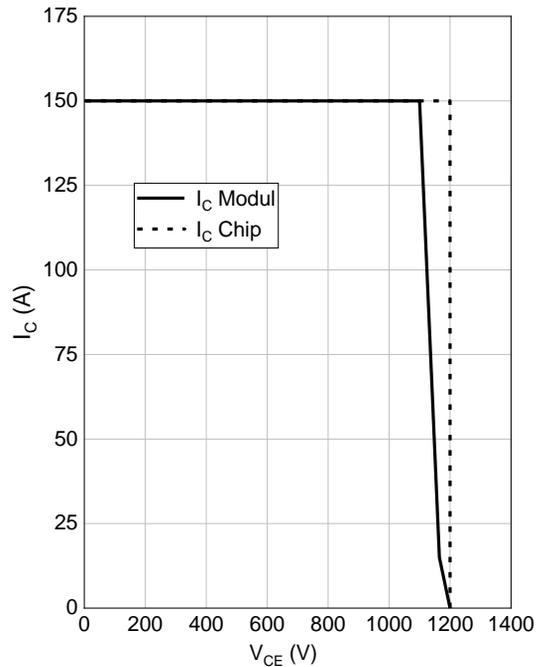
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit		
V_F	Forward Voltage	$I_F= 50\text{ A}, V_{CE}=0\text{ V}, T_{vj}= 25\text{ }^{\circ}\text{C}$		1.6 3		V		
		$I_F= 50\text{ A}, V_{CE}=0\text{ V}, T_{vj}= 125\text{ }^{\circ}\text{C}$		1.6 4		V		
t_{rr}	Reverse Recovery time	$I_F= 50\text{ A}, V_R= 600\text{ V}$ -di/dt= 2000 A/us $T_{vj}= 25\text{ }^{\circ}\text{C}$		90		ns		
Q_r	Recovered Charge			9.5		μC		
E_{rec}	Reverse Recovery Energy			1.2		mJ		
t_{rr}	Reverse Recovery time	$I_F= 50\text{ A}, V_R= 600\text{ V}$ -di/dt= 2000 A/us $T_{vj}=125\text{ }^{\circ}\text{C}$		110		ns		
			Q_r	Recovered Charge		15. 9		μC
					E_{rec}	Reverse Recovery Energy		1.4
R_{thJC}	Thermal resistance, junction to case	pro Diode / per Diode			0.6 4	K/W		
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		125	$^{\circ}\text{C}$		

NTC-Thermistor (Characteristic Values)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R ₂₅	Rated resistance	T _c = 25 °C		5		KΩ
ΔR/R	Deviation of R100	T _c = 100 °C	-5		5	%
P ₂₅	Power dissipation	T _c = 25 °C			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

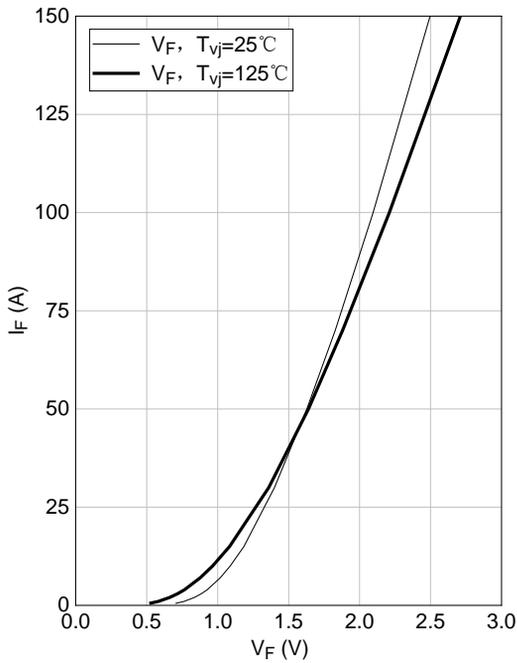
Module Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{isol}	Isolation voltage	t=1 min,f= 50Hz	2500			V
T _{stg}	Storage Temperature		-40		125	°C
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)
 $I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$

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

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

RBSOA IGBT, Inverter (typical)
 $I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}, R_G = 50\ \Omega, T_{vj} = 125^\circ\text{C}$


Forward characteristic of Diode, Inverter (typical)

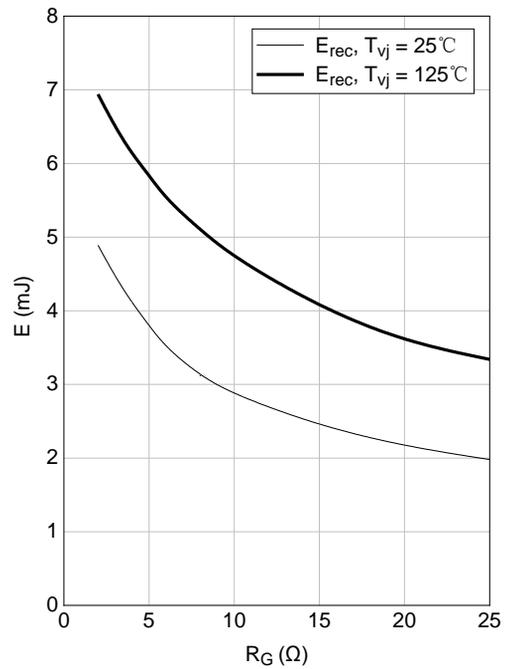
$$I_F = f(V_F)$$



Switching losses Diode, Inverter (typical)

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

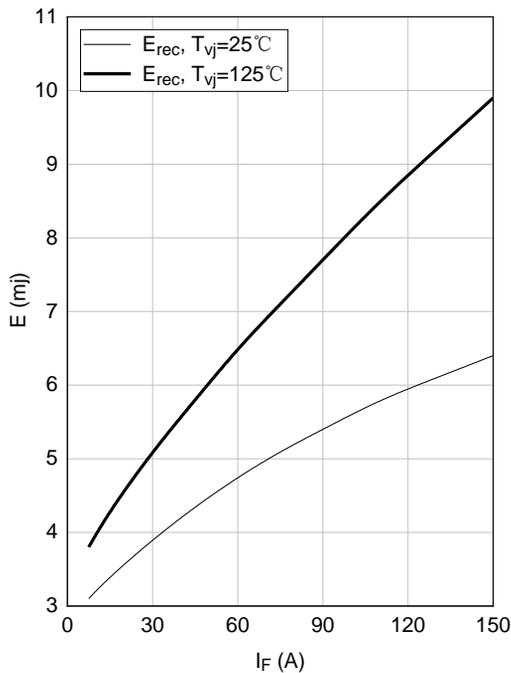
$$I_F = 75 \text{ A}, V_{CE} = 600 \text{ V}$$



Switching losses Diode, Inverter (typical)

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

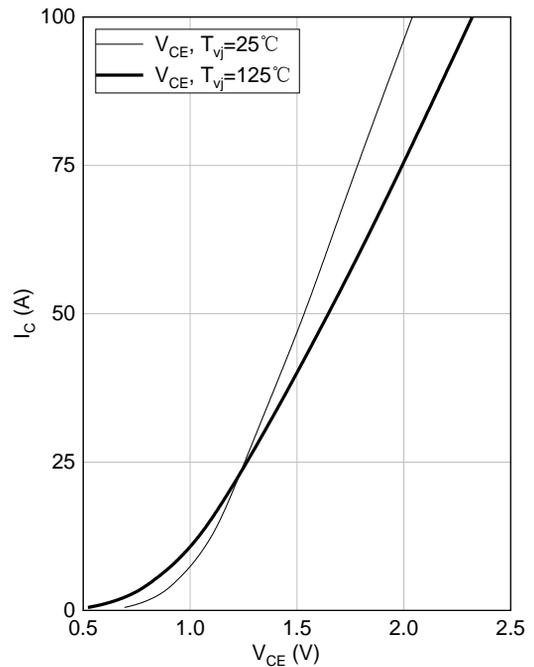
$$R_{Gon} = 2\Omega, V_{CE} = 600 \text{ V}$$



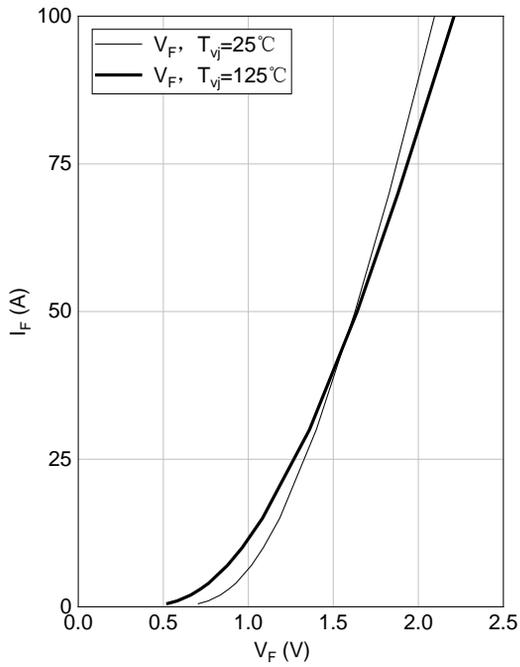
Output characteristic IGBT, Brake-Chopper (typical)

$$I_C = f(V_{CE})$$

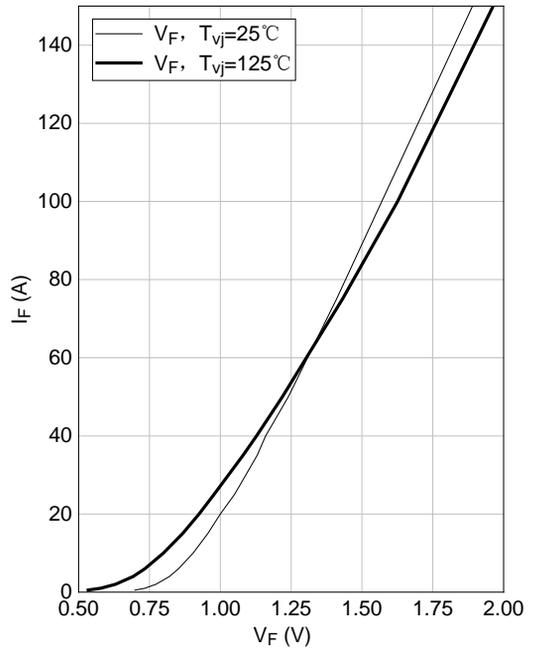
$$V_{GE} = 15 \text{ V}$$



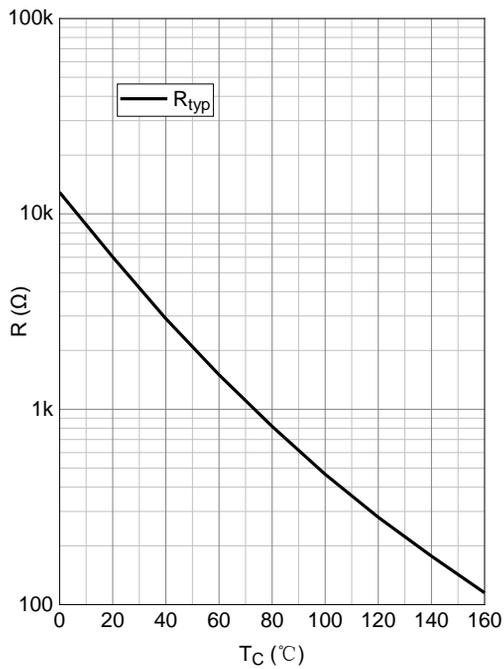
Forward characteristic of Diode, Brake-Chopper (typical)
 $I_F = f(V_F)$



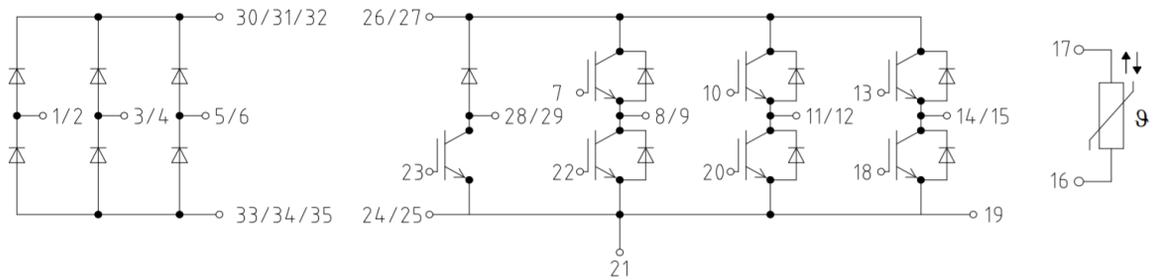
Forward characteristic of Diode, Rectifier (typical)
 $I_F = f(V_F)$



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

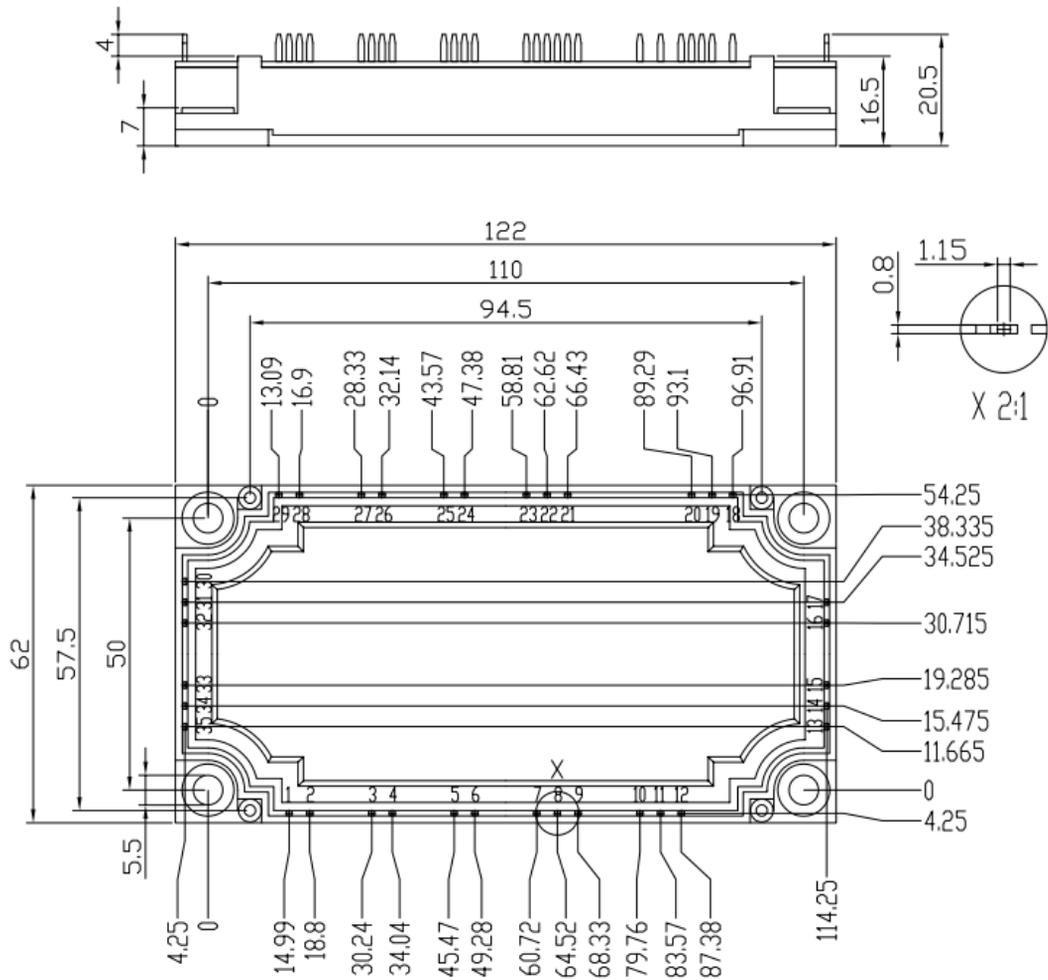


Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



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