

LEGM200BE120L5H7

IGBT Power Module

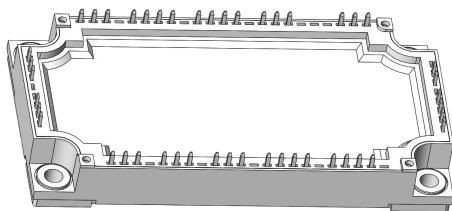
Features

- $V_{CE}=1200V$ $I_C=200A$
- Low $V_{CE(sat)}$
- V_{CEsat} with positive temperature coefficient
- Maximum junction temperature 175°C
- Isolation Type Package

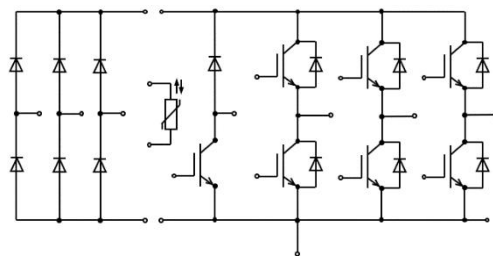
Applications

- 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}	Maximum Power Dissipation	$V_{EC}=0V, I_C=1mA, T_{vj}=25^\circ C$	1200	V
I_C	Continuous Collector Current	$T_C=100^\circ C$	200	A
I_{CRM}	Peak Collector Current	$I_{CRM}=2I_C$	400	A
V_{GES}	Gate-Emitter Voltage	$T_{vj}=25^\circ C$	± 20	V

Maximum Rated Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=200\text{ A}$, $V_{GE}=15\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		1.6	1.83	V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=3.0\text{ mA}$, $V_{CE}=V_{GE}$, $T_{vj}=25\text{ }^{\circ}\text{C}$	5.1	5.7	6.3	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	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}$, $V_{GE}=15\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$			100	nA
R_G	Gate resistance	$I_C = 150\text{mA}$		1.1		Ω
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=200\text{ A}$, $V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=2.7\text{ }\Omega$ $T_{vj}=25\text{ }^{\circ}\text{C}$		203		ns
t_r	Rise Time, Inductive Load			94		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			351		ns
t_f	Fall Time, Inductive Load			103		ns
E_{on}	Turn-on Energy Loss per Pulse			25.1		mJ
E_{off}	Energy Loss per Pulse			12.9		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=200\text{ A}$, $V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=2.7\text{ }\Omega$ $T_{vj}=175\text{ }^{\circ}\text{C}$		239		ns
t_r	Rise Time, Inductive Load			99		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			433		ns
t_f	Fall Time, Inductive Load			262		ns
E_{on}	Turn-on Energy Loss per Pulse			45.9		mJ
E_{off}	Energy Loss per Pulse			23.8		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.231	K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		175	$^{\circ}\text{C}$
I_{SC}	SC data	$V_{GE} \leq 15\text{ V}$, $V_{CC} = 800\text{ V}$ $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ $t_p \leq 10\text{ }\mu\text{s}$, $T_{vj} = 150\text{ }^{\circ}\text{C}$		640		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	$T_C = 100\text{ }^{\circ}\text{C}$		200		A
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{ ms}$		400		A
I^2t	I^2t Value	$V_R = 0\text{ V}$, $t_p = 10\text{ ms}$, $T_{vj} = 175\text{ }^{\circ}\text{C}$		3050		A^2s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 200\text{ A}$, $V_{CE} = 0\text{ V}$, $T_{vj} = 25\text{ }^{\circ}\text{C}$		1.45	1.58	V
I_{rr}	Reverse Recovery Current	$I_F = 200\text{ A}$, $V_R = 600\text{ V}$ $-di/dt = 2050\text{ A/us}$ $T_{vj} = 25\text{ }^{\circ}\text{C}$		80		A
Q_r	Recovered Charge			15.7		μC
E_{rec}	Reverse Recovery Energy			4.85		mJ
I_{rr}	Reverse Recovery Current	$I_F = 200\text{ A}$, $V_R = 600\text{ V}$ $-di/dt = 2050\text{ A/us}$ $T_{vj} = 175\text{ }^{\circ}\text{C}$		118		A
Q_r	Recovered Charge			35.6		μC
E_{rec}	Reverse Recovery Energy			12.2		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.376	K/W
$T_{vj\text{ op}}$	Operating Junction Temperature		-40		175	$^{\circ}\text{C}$

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	$T_C = 100^{\circ}\text{C}$, $T_{vj\text{ max}} = 175^{\circ}\text{C}$		150		A
I_{CRM}	Peak Collector Current	$I_{CRM}=2I_C$		300		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	$I_C=150\text{ A}$, $V_{GE}=15\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		1.5	1.7	V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=3.0\text{ mA}$, $V_{CE}=V_{GE}$, $T_{vj}=25\text{ }^{\circ}\text{C}$	5.4	5.8	6.2	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	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}$, $V_{GE}=15\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$			100	nA
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=150\text{ A}$, $V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=6\text{ }\Omega$ $T_{vj}=25\text{ }^{\circ}\text{C}$		197		ns
t_r	Rise Time, Inductive Load			85		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			419		ns
t_f	Fall Time, Inductive Load			113		ns
E_{on}	Turn-on Energy Loss per Pulse			12.2		mJ
E_{off}	Energy Loss per Pulse			10.5		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=150\text{ A}$, $V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=6\text{ }\Omega$ $T_{vj}=175\text{ }^{\circ}\text{C}$		215		ns
t_r	Rise Time, Inductive Load			93		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			521		ns
t_f	Fall Time, Inductive Load			272		ns
E_{on}	Turn-on Energy Loss per Pulse			23.1		mJ
E_{off}	Energy Loss per Pulse			20.1		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.29	K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		175	$^{\circ}\text{C}$
I_{SC}	SC data	$V_{GE} \leq 15\text{ V}$, $V_{CC} = 800\text{ V}$, $V_{CEmax} = V_{CES}$ $-L_{sCE} \cdot di/dt$, $t_p \leq 8\text{ }\mu\text{s}$, $T_{vj} = 150\text{ }^{\circ}\text{C}$		480		A

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			75		A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ ms}$		150		A
I^2t	I^2t Value	$V_R=0\text{ V}$, $t_p=10\text{ ms}$, $T_{vj}=175\text{ }^{\circ}\text{C}$		370		A ² s

Characteristics (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=75\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		1.7		V
I_{rr}	Reverse Recovery Current	$I_F=75\text{ A}$, $V_R=600\text{ V}$ $-di/dt=1050\text{ A/us}$ $T_{vj}=25\text{ }^{\circ}\text{C}$, $V_{GE}=-15\text{ V}$		52		ns
Q_r	Recovered Charge			6.62		uC
E_{rec}	Reverse Recovery Energy			1.62		mJ
I_{rr}	Reverse Recovery Current	$I_F=75\text{ A}$, $V_R=600\text{ V}$ $-di/dt=1050\text{ A/us}$ $T_{vj}=175\text{ }^{\circ}\text{C}$ $V_{GE}=-15\text{ V}$		80		ns
Q_r	Recovered Charge			19		uC
E_{rec}	Reverse Recovery Energy			4.65		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.728	K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		175	$^{\circ}\text{C}$

Maximum Rated Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}=25\text{ }^{\circ}\text{C}$		1600		V
$I_{F(AV)}$	Maximum RMS forward current per chip	$T_c=80\text{ }^{\circ}\text{C}$		110		A
I_{RMSM}	Maximum RMS current at rectifier chip	$T_c=80\text{ }^{\circ}\text{C}$		110		A
I_{FSM}	Surge forward current	$t_p=10\text{ms}$ $T_{vj}=25\text{ }^{\circ}\text{C}$		1320		A
I^2t	I^2t -value	$t_p=10\text{ms}$ $T_{vj}=25\text{ }^{\circ}\text{C}$		8712		A ² S

Characteristic Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward voltage	$T_c=25\text{ }^{\circ}\text{C}$			1.2	V
I_R	Reverse current	$T_{vj}=150\text{ }^{\circ}\text{C}$, $V_R=1600\text{V}$		2	10	mA
R_{thjc}	Thermal resistance junction to case	$T_c=25\text{ }^{\circ}\text{C}$			0.86	K/W
T_{vjop}	Temperature under switching conditions		-40		150	$^{\circ}\text{C}$

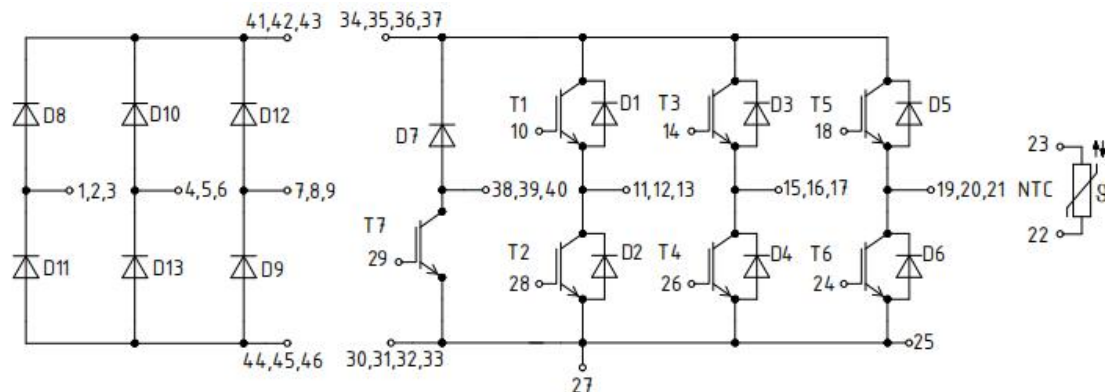
NTC-Thermistor (Characteristic Values)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated resistance	$T_c=25\text{ }^{\circ}\text{C}$		5		K Ω
$\Delta R/R$	Deviation of R100	$T_c=100\text{ }^{\circ}\text{C}$	-5		5	%
P_{25}	Power dissipation	$T_c=25\text{ }^{\circ}\text{C}$			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

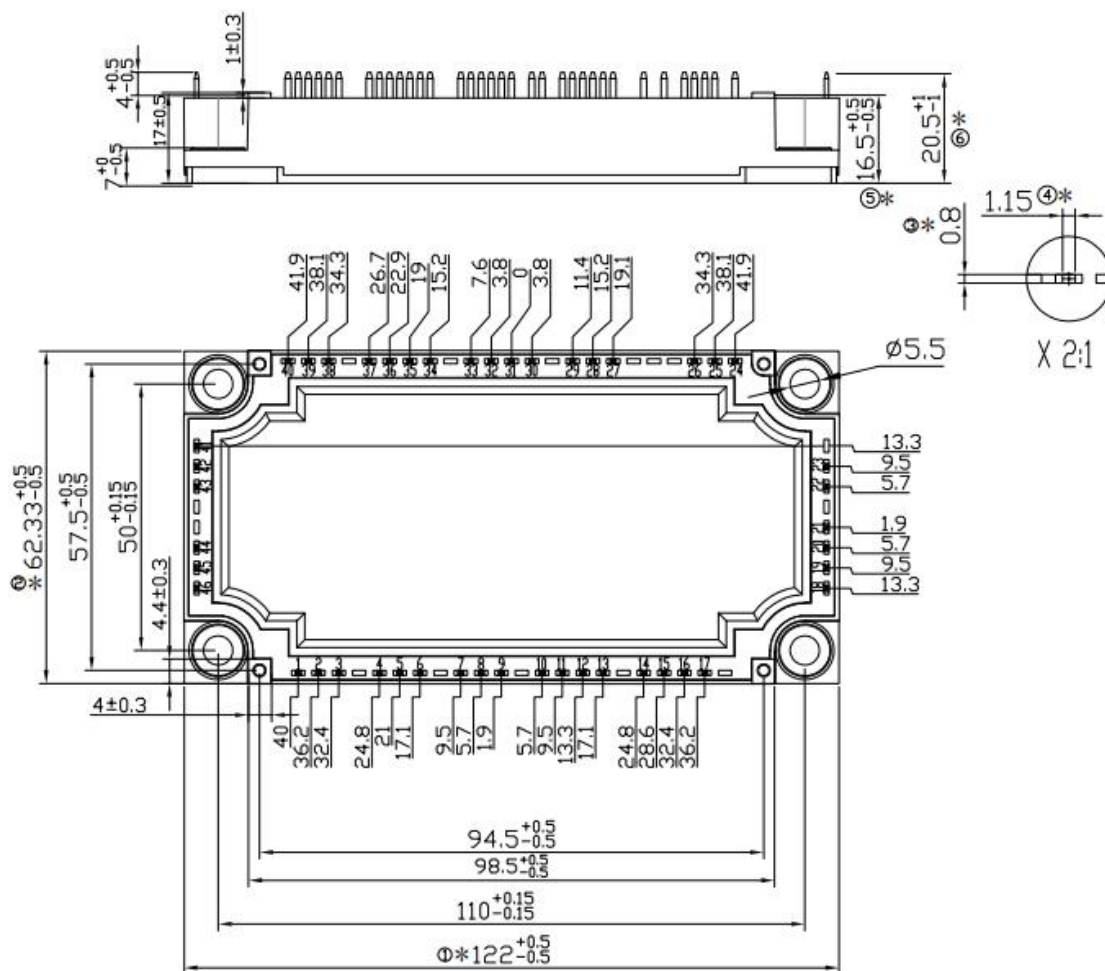
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{isol}	Isolation voltage	$t=1\text{min}, f=50\text{Hz}$	2500			V
T_{stg}	Storage Temperature		-40		125	$^{\circ}\text{C}$
M_s	Module-to-Sink Torque	Recommended(M5)	3.0		6.0	N·m
G	Weight of Module			300		g

Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



DISCLAIMER

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