

# LEGM200BH120L9H

## 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

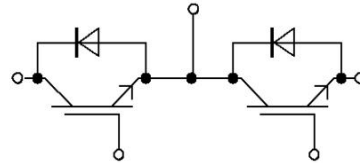
### Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

### Package Type & Internal Circuit



L9



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	$T_{vj}=25^\circ C$	$\pm 30$	V
$P_{tot}$	Total Power Dissipation	$T_C=25^\circ C, T_{vjmax}=175^\circ C$	1150	W

**Maximum Rated Values (IGBT Inverter)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=200\text{ A}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$		1.80	2.3	V	
		$I_C=200\text{ A}, V_{GE}=15\text{ V}, T_{vj}=150\text{ }^\circ\text{C}$		2.00	2.5	V	
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=5.0\text{ mA}, V_{CE}=V_{GE}, T_{vj}=25\text{ }^\circ\text{C}$	5.2	6.2	6.5	V	
$I_{CES}$	Collector-Emitter Cut-off Current	$V_{CE}=1200\text{ V}, V_{GE}=0\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$			20	$\mu\text{A}$	
$I_{GES}$	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$			200	nA	
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=200\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=2\ \Omega$ $T_{vj}=25\text{ }^\circ\text{C}$		106		ns	
$t_r$	Rise Time, Inductive Load			41		ns	
$t_{d(off)}$	Turn-off Delay Time, Inductive Load				328		ns
$t_f$	Fall Time, Inductive Load				236		ns
$E_{on}$	Turn-on Energy Loss per Pulse				5.6		mJ
$E_{off}$	Energy Loss per Pulse				17.1		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=200\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=2\ \Omega$ $T_{vj}=150\text{ }^\circ\text{C}$		122		ns	
$t_r$	Rise Time, Inductive Load				43		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load				423		ns
$t_f$	Fall Time, Inductive Load				370		ns
$E_{on}$	Turn-on Energy Loss per Pulse				9.8		mJ
$E_{off}$	Energy Loss per Pulse				32.2		mJ
$R_{thJC}$	Thermal resistance, junction to case	per IGBT			0.13	K/W	
$T_{vj\ op}$	Temperature under switching conditions		-40		150	$^\circ\text{C}$	
$I_{sc}$	SC	$V_{GE}\leq 15\text{ V}, V_{CE}=600\text{ V},$ $t_p\leq 10\mu\text{s}, T_{vj}=150\text{ }^\circ\text{C},$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$		800		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	$V_R = 0\text{ V}$ , $t_p = 10\text{ ms}$ , $T_{vj} = 150\text{ }^{\circ}\text{C}$		7500		$\text{A}^2\text{s}$

**Characteristic Values (Diode Inverter)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_F$	Forward Voltage	$I_F = 200\text{ A}$ , $V_{CE} = 0\text{ V}$ , $T_{vj} = 25\text{ }^{\circ}\text{C}$		1.65	2.15	V
		$I_F = 200\text{ A}$ , $V_{CE} = 0\text{ V}$ , $T_{vj} = 150\text{ }^{\circ}\text{C}$		1.7		V
$t_{rr}$	Reverse Recovery time	$I_F = 200\text{ A}$ , $V_R = 600\text{ V}$ $-di/dt = 1200\text{ A/us}$		200		ns
$Q_r$	Recovered Charge			15		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy		$T_{vj} = 25\text{ }^{\circ}\text{C}$		4.5	
$t_{rr}$	Reverse Recovery time	$I_F = 200\text{ A}$ , $V_R = 600\text{ V}$ $-di/dt = 1200\text{ A/us}$		350		ns
			$Q_r$	Recovered Charge		30.9
$E_{rec}$	Reverse Recovery Energy		$T_{vj} = 150\text{ }^{\circ}\text{C}$		12.1	
$R_{thJC}$	Thermal resistance, junction to case	per Diode			0.19	K/W
$T_{vj\text{ op}}$	Operating Junction Temperature		-40		150	$^{\circ}\text{C}$

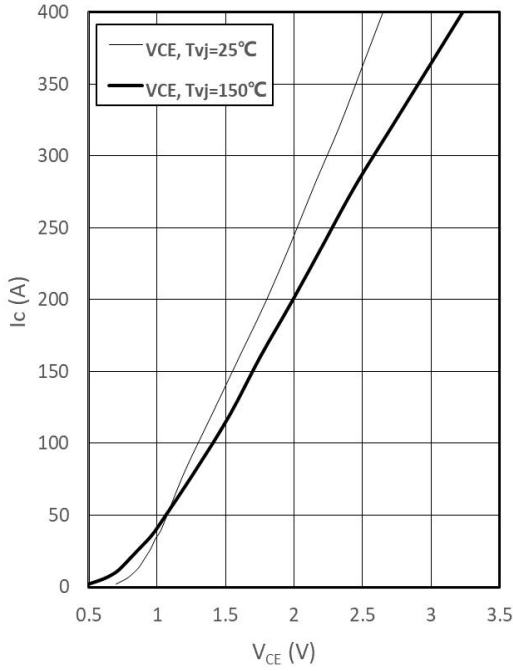
**Module Characteristics**

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		150	$^{\circ}\text{C}$
$M_t$	Module Electrodes Torque	Recommended(M6)	2.5		5.0	N·m
$M_s$	Module-to-Sink Torque	Recommended(M6)	3.0		6.0	N·m
G	Weight of Module			300		g

**Output characteristic of IGBT, Inverter (typical)**

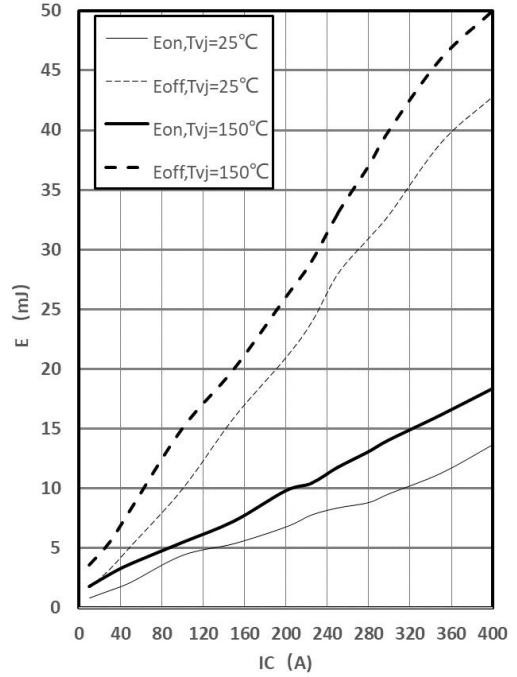
$$I_c = f(V_{CE})$$

$$V_{GE} = 15V$$


**Switching losses of IGBT, Inverter (typical)**

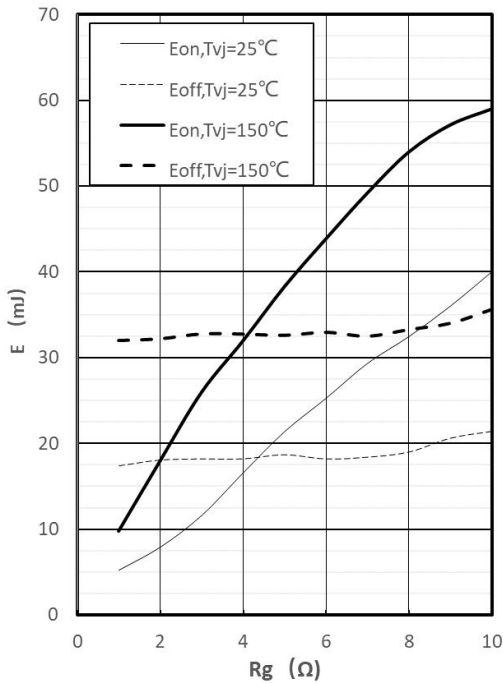
$$E_{on} = f(I_c), E_{off} = f(I_c)$$

$$V_{GE} = \pm 15V, R_G = 2\Omega, V_{CE} = 600V$$


**Switching losses of IGBT, Inverter (typical)**

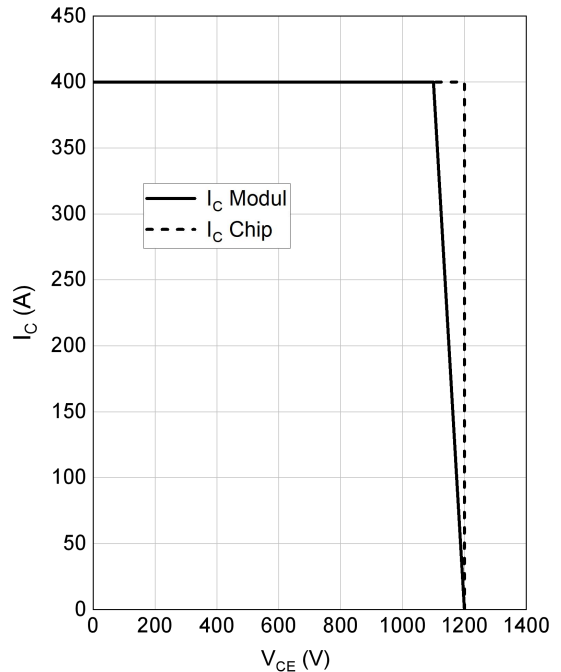
$$E_{on} = f(R_G), E_{off} = f(R_G)$$

$$V_{GE} = \pm 15V, I_c = 200A, V_{CE} = 600V$$


**RBSOA IGBT, Inverter (typical)**

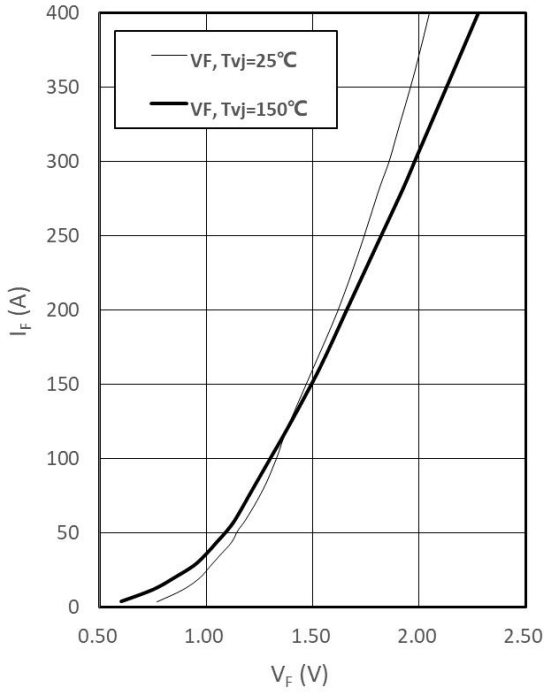
$$I_c = f(V_{CE})$$

$$V_{GE} = \pm 15V, R_{Goff} = 1\Omega, T_{vj} = 125^\circ\text{C}$$



Forward characteristic of Diode, Inverter (typical)

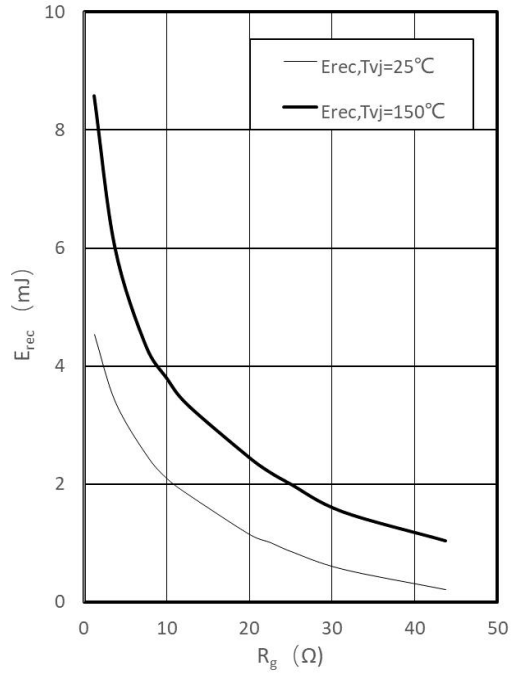
$$I_F = f(V_F)$$



Switching losses of Diode, Inverter (typical)

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

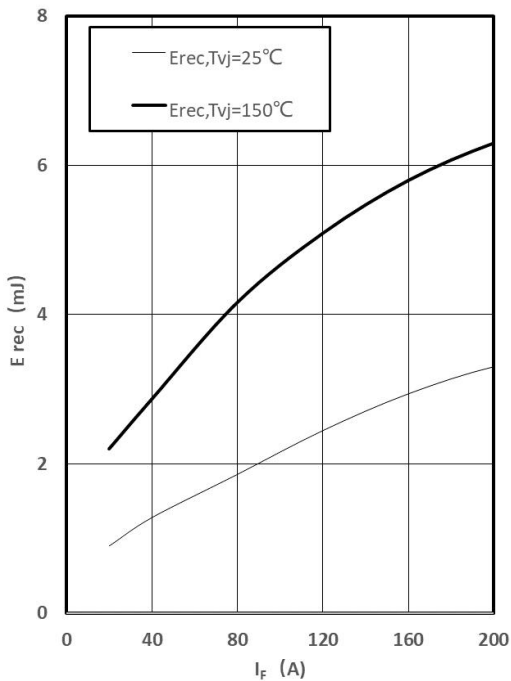
$$I_F = 200\text{A}, V_{CE} = 600\text{V}$$



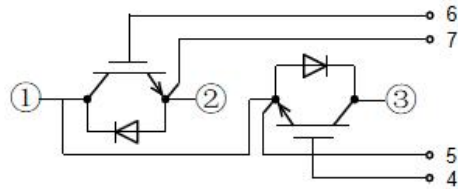
Switching losses of Diode, Inverter (typical)

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

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

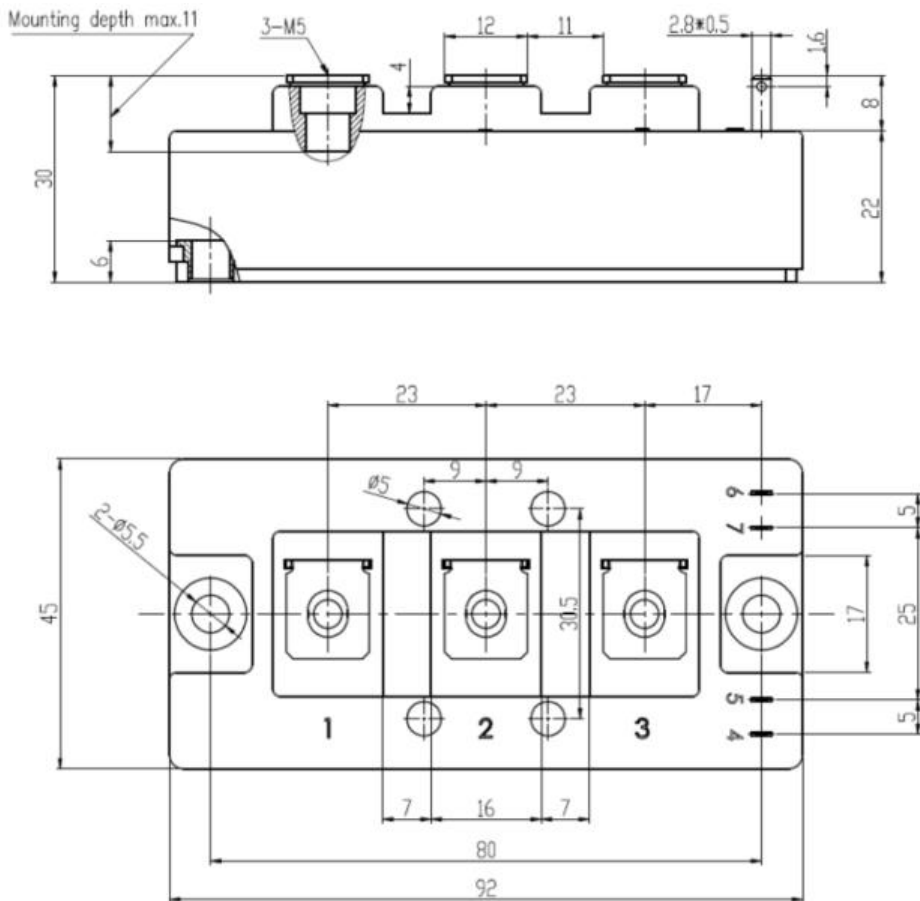


### Circuit Diagram



### Package Dimensions

(Dimensions in Millimeters)



**DISCLAIMER**

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