

# LEGM450BH120L2H

## IGBT Power Module

### Features:

- $V_{CE}=1200V$   $I_C=450A$
- Low  $V_{CE(sat)}$
- $V_{CEsat}$  with positive temperature coefficient
- Maximum junction temperature 150°C
- Isolation Type Package

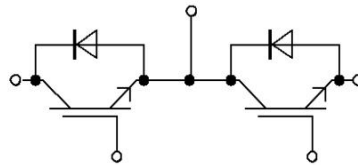
### Applications:

- The inverter
- Motor control and drives

### Package Type & Internal Circuit



L2



Internal Circuit

### Maximum Rated Values (IGBT Inverter)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CES}$	Collector-emitter voltage	$V_{EC}=0V, I_C=1mA, T_{vj}=25\text{ }^\circ\text{C}$	1200	V
$I_C$	Continuous Collector Current	$T_C=100\text{ }^\circ\text{C}$	450	A
$I_{CRM}$	Peak Collector Current	$I_{CRM}=2I_C$	900	A
$V_{GES}$	Gate-Emitter Voltage	$T_{vj}=25\text{ }^\circ\text{C}$	$\pm 30$	V
$P_{tot}$	Total Power Dissipation	$T_C=25\text{ }^\circ\text{C}, T_{vjmax}=150\text{ }^\circ\text{C}$	2000	W

**Maximum Rated Values (IGBT Inverter)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=450\text{ A}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$		1.90		V	
		$I_C=450\text{ A}, V_{GE}=15\text{ V}, T_{vj}=125\text{ }^\circ\text{C}$		2.20		V	
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=5.0\text{ mA}, V_{CE}=V_{GE}, T_{vj}=25\text{ }^\circ\text{C}$		5.7		V	
$I_{CES}$	Collector-Emitter Cut-off Current	$V_{CE}=1200\text{ V}, V_{GE}=0\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$			6.0	mA	
$I_{GES}$	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$			500	nA	
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=450\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_{Gon}=1\Omega$ $T_{vj}=25\text{ }^\circ\text{C}$		185		ns	
$t_r$	Rise Time, Inductive Load			111		ns	
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			478		ns	
$t_f$	Fall Time, Inductive Load			120		ns	
$E_{on}$	Turn-on Energy Loss per Pulse				25		mJ
$E_{off}$	Energy Loss per Pulse				43.8		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load		$I_C=450\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_{Gon}=1\Omega$ $T_{vj}=125\text{ }^\circ\text{C}$		202		ns
$t_r$	Rise Time, Inductive Load				125		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load				543		ns
$t_f$	Fall Time, Inductive Load				174		ns
$E_{on}$	Turn-on Energy Loss per Pulse				35.5		mJ
$E_{off}$	Energy Loss per Pulse				56.2		mJ
$R_{thJC}$	Thermal resistance, junction to case	per IGBT		0.058		K/W	
$T_{vj\ op}$	Temperature under switching conditions		-40		125	$^\circ\text{C}$	
$I_{sc}$	SC	$V_{GE}\leq 15\text{ V}, V_{CE}=600\text{ V},$ $t_p\leq 10\mu\text{s}, T_{vj}=125\text{ }^\circ\text{C},$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$		2100		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	$T_C=100\text{ }^{\circ}\text{C}$		450		A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1\text{ ms}$		900		A
$I^2t$	$I^2t$ Value	$V_R=0\text{ V}$ , $t_p=10\text{ ms}$ , $T_{vj}=125\text{ }^{\circ}\text{C}$		30000		$\text{A}^2\text{s}$

**Characteristic Values (Diode Inverter)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_F$	Forward Voltage	$I_F=450\text{ A}$ , $V_{CE}=0\text{ V}$ , $T_{vj}=25\text{ }^{\circ}\text{C}$		1.90		V
		$I_F=450\text{ A}$ , $V_{CE}=0\text{ V}$ , $T_{vj}=125\text{ }^{\circ}\text{C}$		2.05		V
$t_{rr}$	Reverse Recovery time	$I_F=450\text{ A}$ , $V_R=600\text{ V}$ $-di/dt=3750\text{ A/us}$ $T_{vj}=25\text{ }^{\circ}\text{C}$		212		ns
$Q_r$	Recovered Charge			36.3		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy			16.9		mJ
$t_{rr}$	Reverse Recovery time	$I_F=450\text{ A}$ , $V_R=600\text{ V}$ $-di/dt=3750\text{ A/us}$ $T_{vj}=125\text{ }^{\circ}\text{C}$		319		ns
			$Q_r$	Recovered Charge		56.6
$E_{rec}$	Reverse Recovery Energy			27.3		mJ
$R_{thJC}$	Thermal resistance, junction to case	per Diode			0.12	K/W
$T_{vj\text{ op}}$	Operating Junction Temperature		-40		125	$^{\circ}\text{C}$

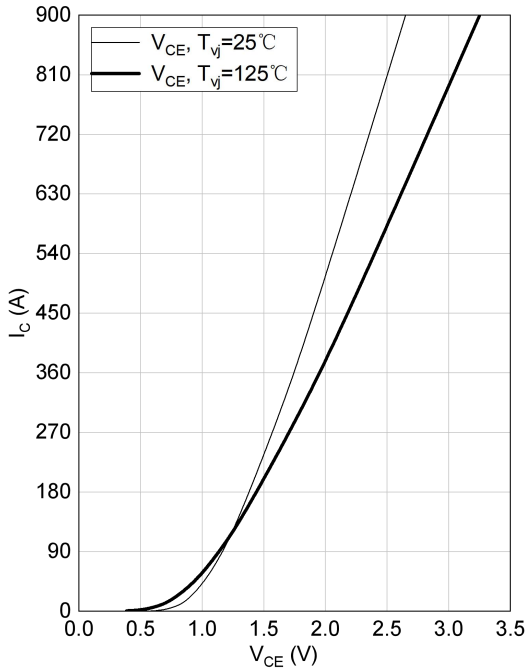
**Module Characteristics**

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		125	$^{\circ}\text{C}$
$M_t$	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)**

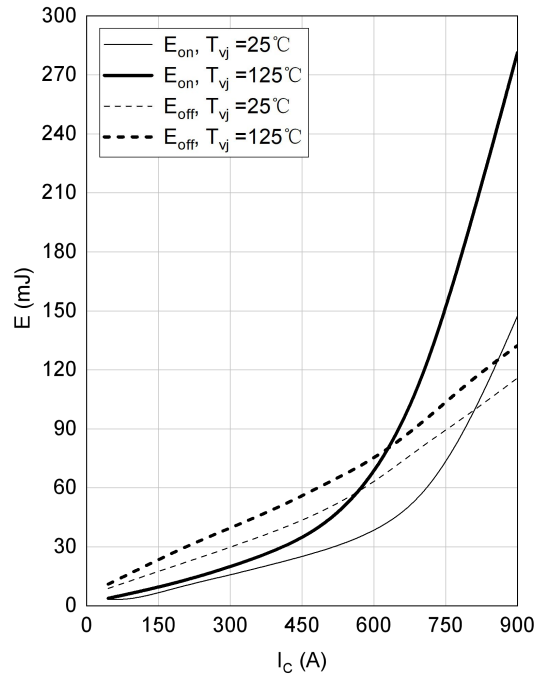
$$I_c = f(V_{CE})$$

$$V_{GE} = 15V$$


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

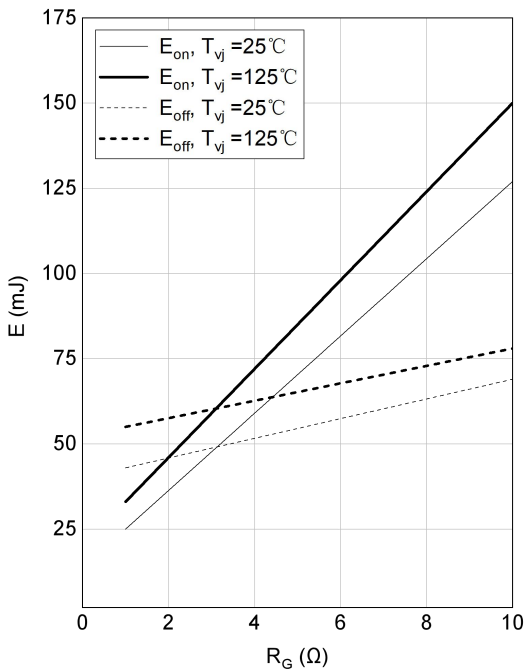
$$E_{on} = f(I_c), E_{off} = f(I_c)$$

$$V_{GE} = \pm 15V, R_G = 1\Omega, V_{CE} = 600V$$


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

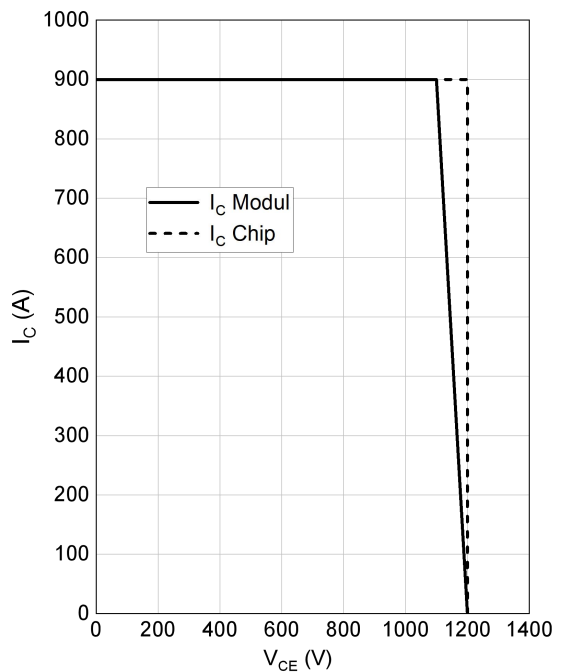
$$E_{on} = f(R_G), E_{off} = f(R_G)$$

$$V_{GE} = \pm 15V, I_c = 450A, V_{CE} = 600V$$


**RBSOA IGBT, Inverter (typical)**

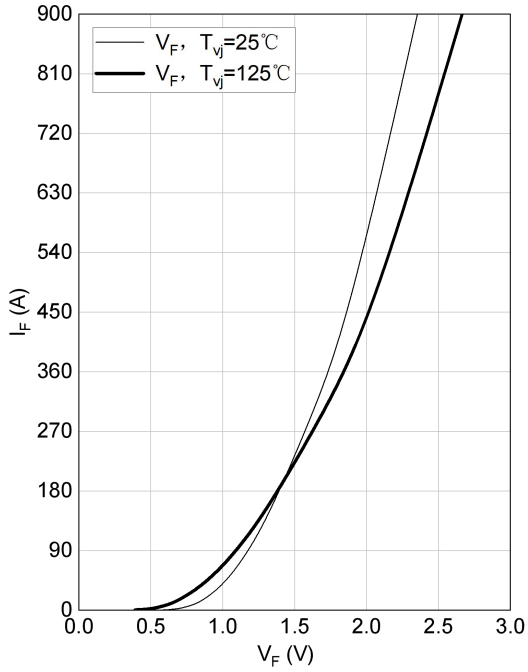
$$I_c = f(V_{CE})$$

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



Forward characteristic of Diode, Inverter (typical)

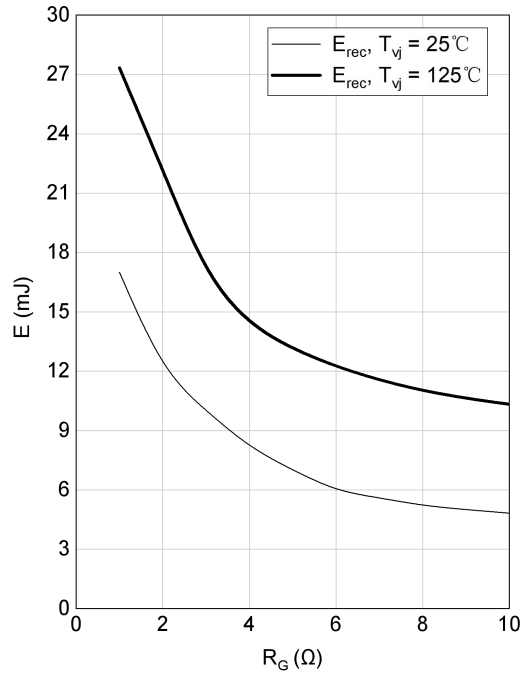
$$I_F = f(V_F)$$



Switching losses of Diode, Inverter (typical)

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

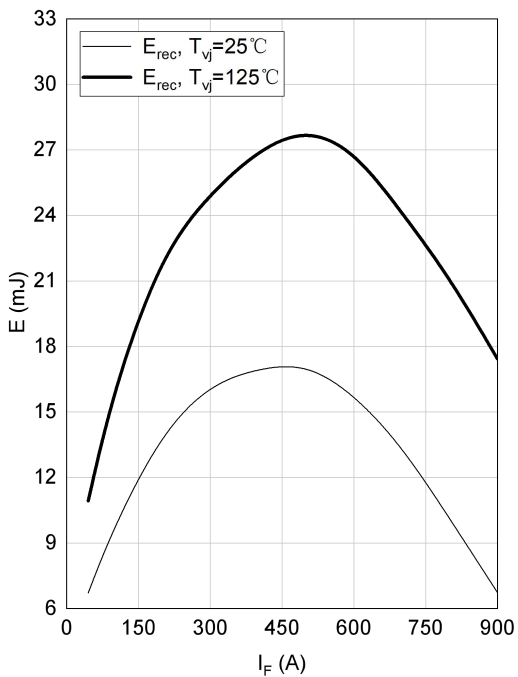
$$I_F = 450\text{A}, V_{CE} = 600\text{V}$$



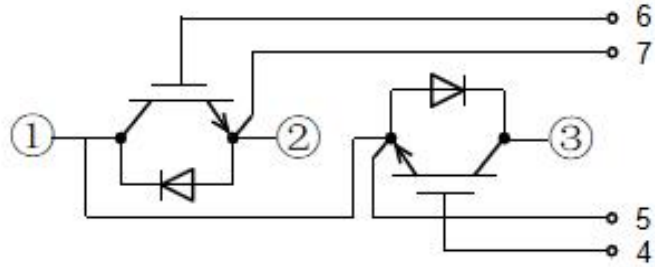
Switching losses of Diode, Inverter (typical)

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

$$R_{Gon} = 1\Omega, V_{CE} = 600\text{V}$$

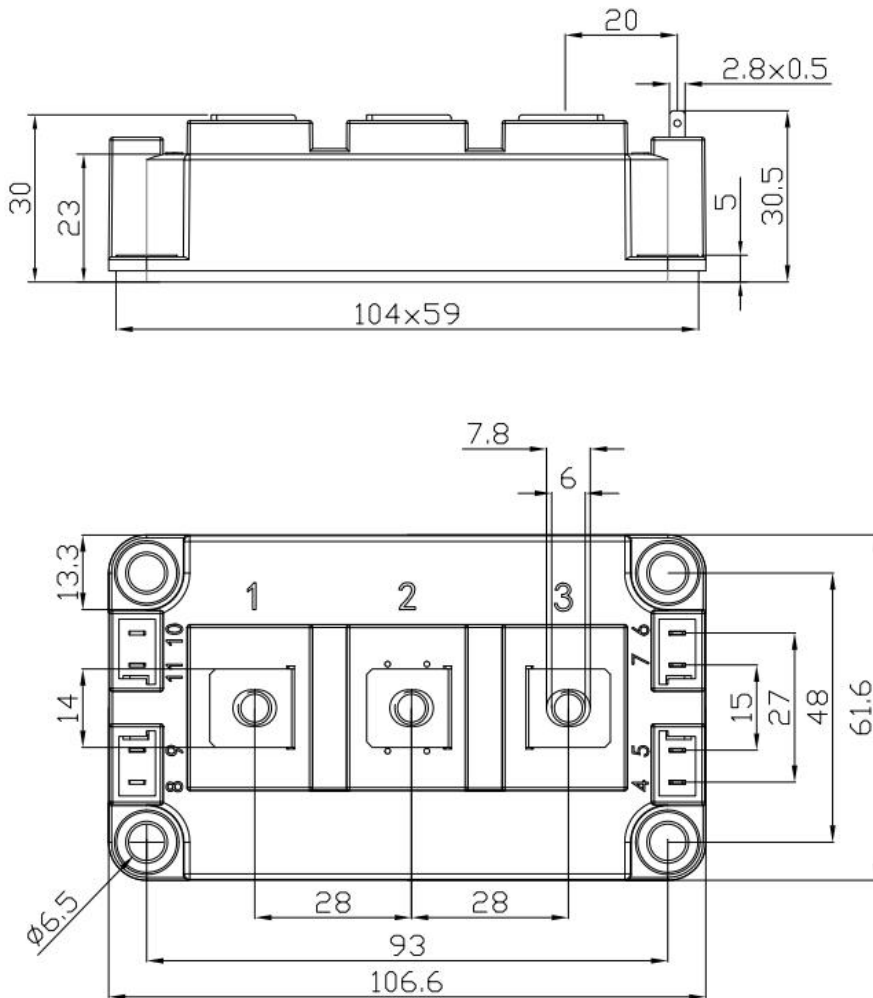


**Circuit Diagram**



**Package Dimensions**

(Dimensions in Millimeters)



**DISCLAIMER**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.