

# LEGM600BH120L6H

## IGBT Power Module

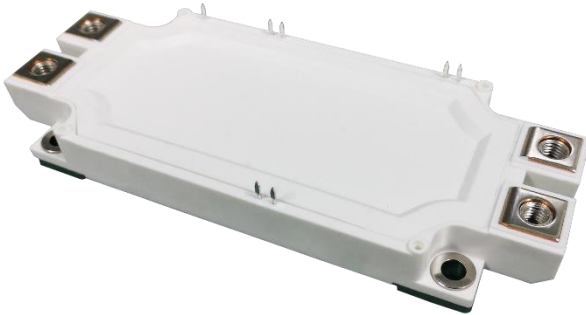
### Features:

- $V_{CE}=1200V$   $I_C=600A$
- Low  $V_{CE(sat)}$
- $V_{CEsat}$  with positive temperature coefficient
- Maximum junction temperature 175°C
- Isolation Type Package

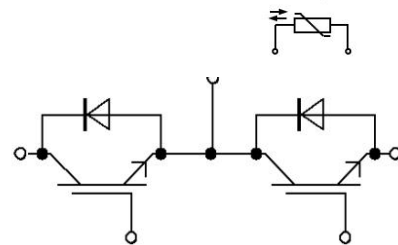
### Applications:

- Uninterruptible Power Supplies (UPS)
- Power converter and inverter for wind turbines
- Solutions for photovoltaic energy systems

### Package Type & Internal Circuit



L6



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	$T_C=100\text{ }^\circ\text{C}$	600	A
$I_{CRM}$	Peak Collector Current	$I_{CRM}=2I_C$	1200	A
$V_{GES}$	Gate-Emitter Voltage	$T_{vj}=25\text{ }^\circ\text{C}$	$\pm 30$	V
$P_{tot}$	Total Power Dissipation	$T_C=25^\circ\text{C}, T_{vjmax}=150\text{ }^\circ\text{C}$	2800	W

**Maximum Rated Values (IGBT Inverter)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> =600 A, V <sub>GE</sub> =15 V, T <sub>vj</sub> =25 °C		1.8	2.3	V	
		I <sub>C</sub> =600 A, V <sub>GE</sub> =15 V, T <sub>vj</sub> =150 °C		2.0	2.5	V	
V <sub>GE(th)</sub>	Gate Threshold Voltage	I <sub>C</sub> =8.0 mA, V <sub>CE</sub> =V <sub>GE</sub> , T <sub>vj</sub> = 25 °C	5.2	6.2	6.5	V	
I <sub>CES</sub>	Collector-Emitter Cut-off Current	V <sub>CE</sub> =1200 V, V <sub>GE</sub> =0 V, T <sub>vj</sub> =25 °C			20	μA	
I <sub>GES</sub>	Gate-Emitter Leakage Current	V <sub>CE</sub> =0 V, V <sub>GE</sub> =15 V, T <sub>vj</sub> =25 °C			200	nA	
t <sub>d(on)</sub>	Turn-on Delay Time, Inductive Load	I <sub>C</sub> =600 A, V <sub>CE</sub> =600 V V <sub>GE</sub> =±15 V R <sub>G</sub> =0.7Ω T <sub>vj</sub> =25 °C		106		ns	
t <sub>r</sub>	Rise Time, Inductive Load			61		ns	
t <sub>d(off)</sub>	Turn-off Delay Time, Inductive Load			410		ns	
t <sub>f</sub>	Fall Time, Inductive Load			151		ns	
E <sub>on</sub>	Turn-on Energy Loss per Pulse				24.3		mJ
E <sub>off</sub>	Energy Loss per Pulse				55.1		mJ
t <sub>d(on)</sub>	Turn-on Delay Time, Inductive Load		I <sub>C</sub> =600 A, V <sub>CE</sub> =600 V V <sub>GE</sub> =±15 V R <sub>G</sub> =0.7Ω T <sub>vj</sub> =150 °C		122		ns
t <sub>r</sub>	Rise Time, Inductive Load				64		ns
t <sub>d(off)</sub>	Turn-off Delay Time, Inductive Load				461		ns
t <sub>f</sub>	Fall Time, Inductive Load				330		ns
E <sub>on</sub>	Turn-on Energy Loss per Pulse				30.3		mJ
E <sub>off</sub>	Energy Loss per Pulse				62.1		mJ
R <sub>thJC</sub>	Thermal resistance, junction to case	per IGBT			0.048	K/W	
T <sub>vj op</sub>	Temperature under switching conditions		-40		150	°C	
I <sub>SC</sub>	SC data	V <sub>GE</sub> ≤15 V, V <sub>CC</sub> = 900 V V <sub>CEmax</sub> = V <sub>CES</sub> -L <sub>sCE</sub> ·di/dt t <sub>p</sub> ≤ 10 μs, T <sub>vj</sub> = 150 °C		2500		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	$T_C=100\text{ }^{\circ}\text{C}$		600		A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1\text{ ms}$		1200		A
$I^2t$	$I^2t$ Value	$V_R=0\text{ V}$ , $t_p=10\text{ ms}$ , $T_{vj}=125\text{ }^{\circ}\text{C}$		48000		$\text{A}^2\text{s}$

**Characteristic Values (Diode Inverter)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_F$	Forward Voltage	$I_F=600\text{ A}$ , $V_{CE}=0\text{ V}$ , $T_{vj}=25\text{ }^{\circ}\text{C}$		2.5	2.7	V
		$I_F=600\text{ A}$ , $V_{CE}=0\text{ V}$ , $T_{vj}=150\text{ }^{\circ}\text{C}$		2.5		V
$t_{rr}$	Reverse Recovery time	$I_F=600\text{ A}$ , $V_R=600\text{ V}$ $-di/dt=1350\text{ A/us}$ $T_{vj}=25\text{ }^{\circ}\text{C}$		220		ns
$Q_r$	Recovered Charge			29.5		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy			11.5		mJ
$t_{rr}$	Reverse Recovery time	$I_F=600\text{ A}$ , $V_R=600\text{ V}$ $-di/dt=1350\text{ A/us}$ $T_{vj}=150\text{ }^{\circ}\text{C}$		380		ns
			$Q_r$	Recovered Charge		86
$E_{rec}$	Reverse Recovery Energy			39		mJ
$R_{thJC}$	Thermal resistance, junction to case	per Diode			0.078	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	$t=1\text{ min}$ , $f=50\text{ Hz}$	4000			V
$T_{stg}$	Storage Temperature		-40		150	$^{\circ}\text{C}$
$M_t$	Module Electrodes Torque	Recommended(M6)	3.0		6.0	$\text{N}\cdot\text{m}$
		Recommended(M4)	1.1		2.0	
$M_s$	Module-to-Sink Torque	Recommended(M6)	3.0		6.0	$\text{N}\cdot\text{m}$
G	Weight of Module			350		g

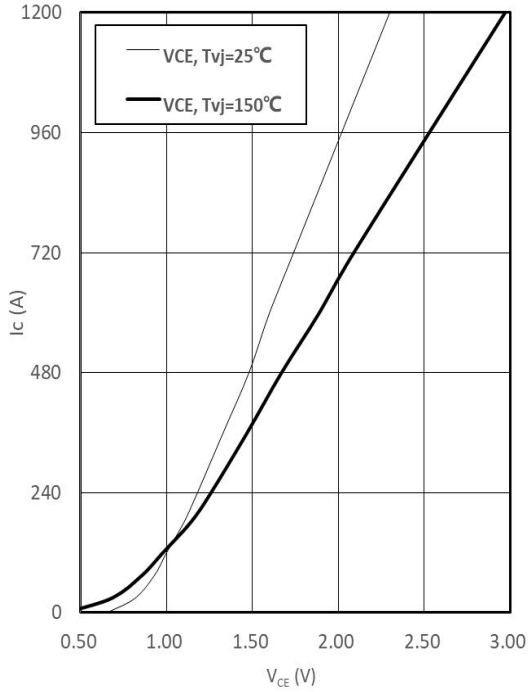
**NTC-Thermistor (Characteristic Values)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>25</sub>	Rated resistance	T <sub>c</sub> =25 °C		5		KΩ
ΔR/R	Deviation of R100	T <sub>c</sub> =100 °C	-5		5	%
P <sub>25</sub>	Power dissipation	T <sub>c</sub> =25 °C			20	mW
B <sub>25/50</sub>	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298,15K))]$		3380		K
B <sub>25/100</sub>	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298,15K))]$		3450		K

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

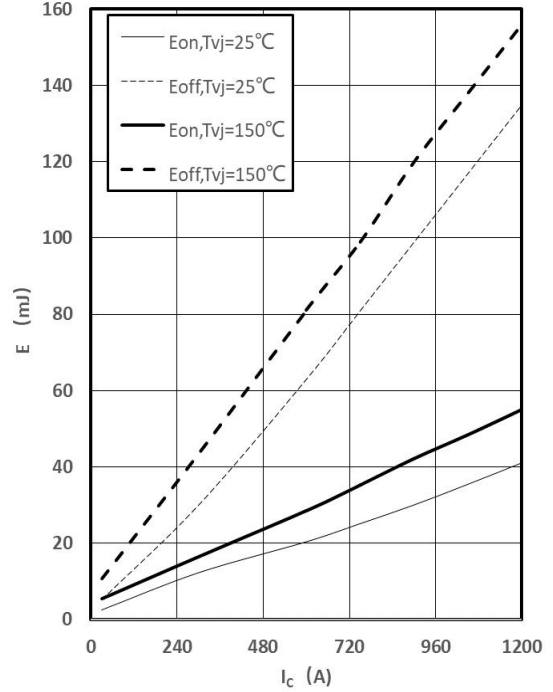
$$I_c = f(V_{CE})$$

$$V_{GE} = 15V$$


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

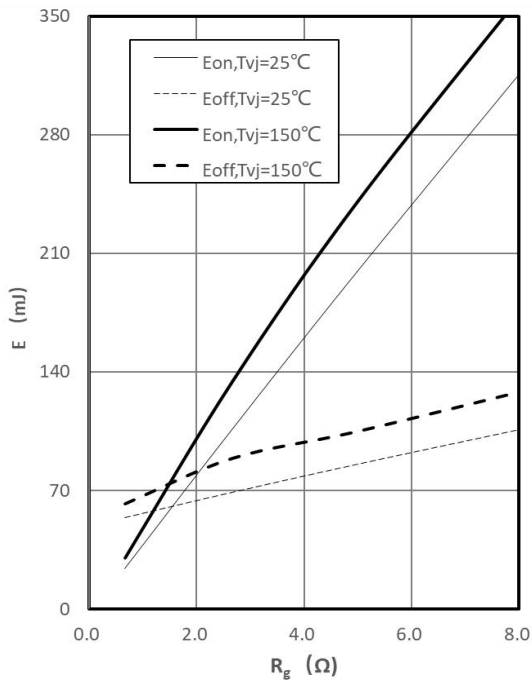
$$E_{on} = f(I_c), E_{off} = f(I_c)$$

$$V_{GE} = \pm 15V, R_G = 0.7\Omega, V_{CE} = 600V$$


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

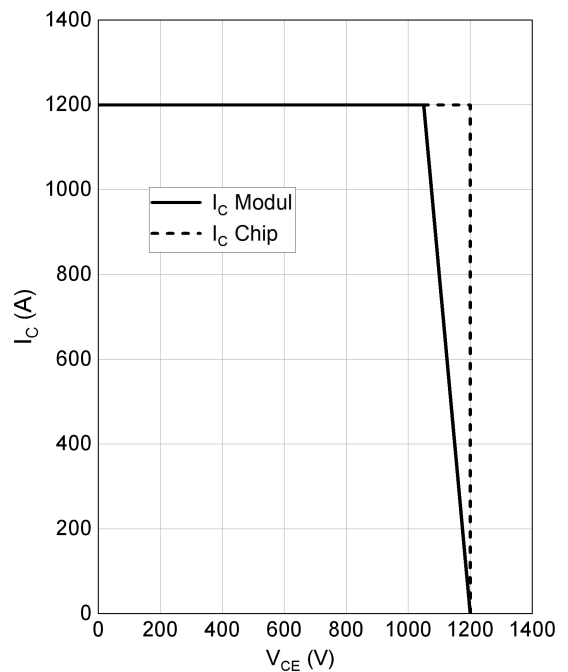
$$E_{on} = f(R_G), E_{off} = f(R_G)$$

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


**RBSOA IGBT, Inverter (typical)**

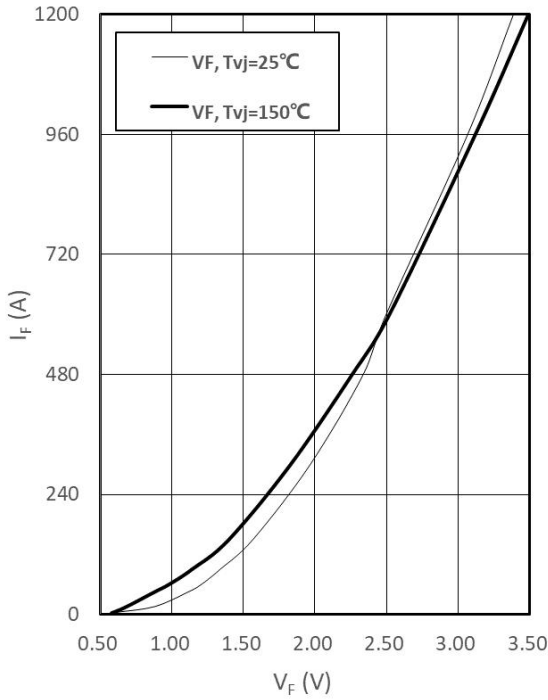
$$I_c = f(V_{CE})$$

$$V_{GE} = \pm 15V, R_{Goff} = 0.7\Omega, T_{vj} = 150^\circ C$$



forward characteristic of Diode, Inverter (typical)

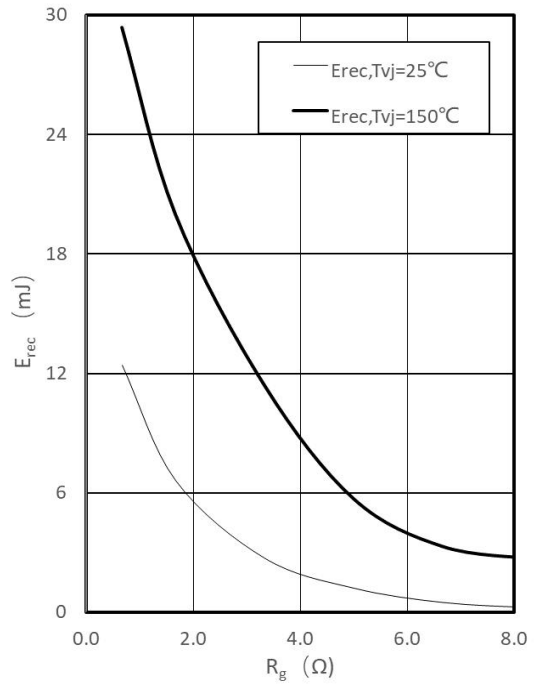
$$I_F = f(V_F)$$



switching losses of Diode, Inverter (typical)

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

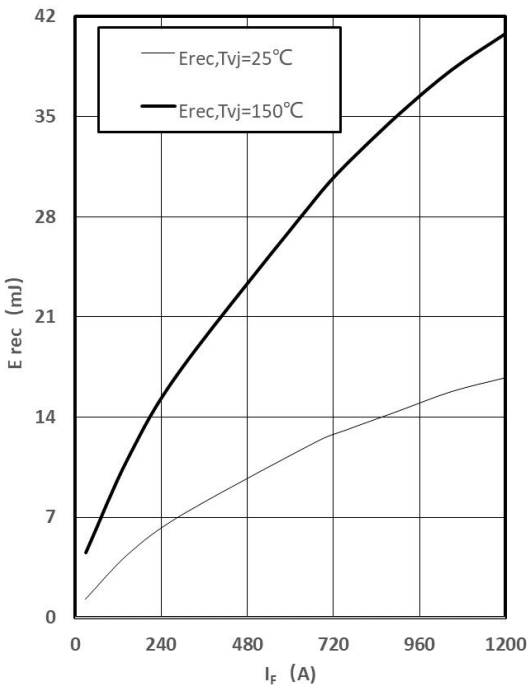
$I_F = 600\text{A}$ ,  $V_{CE} = 600\text{V}$



switching loss of Diode, Inverter (typical)

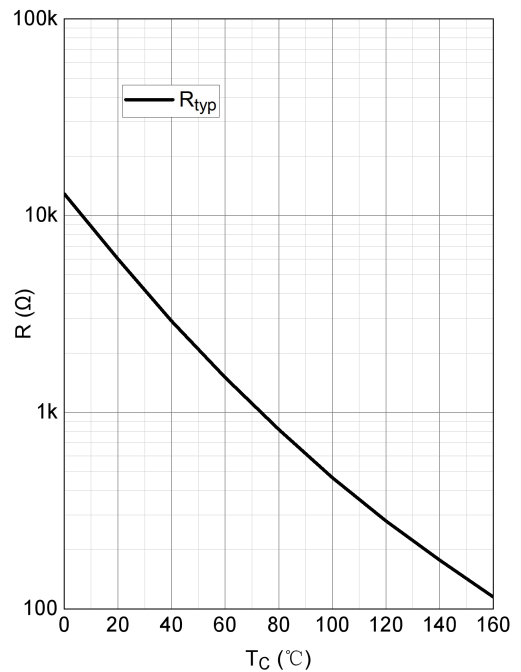
$$E_{rec} = f(I_F)$$

$R_{Gon} = 0.7\Omega$ ,  $V_{CE} = 600\text{V}$

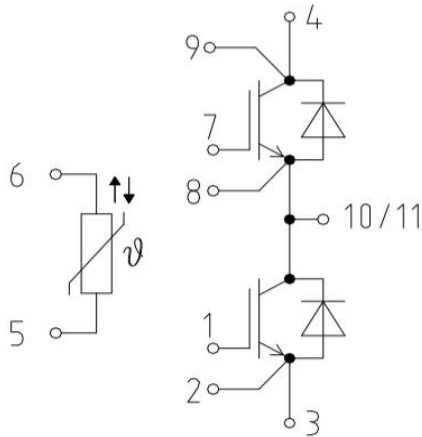


NTC-Thermistor-temperature characteristic (typical)

$$R = f(T)$$

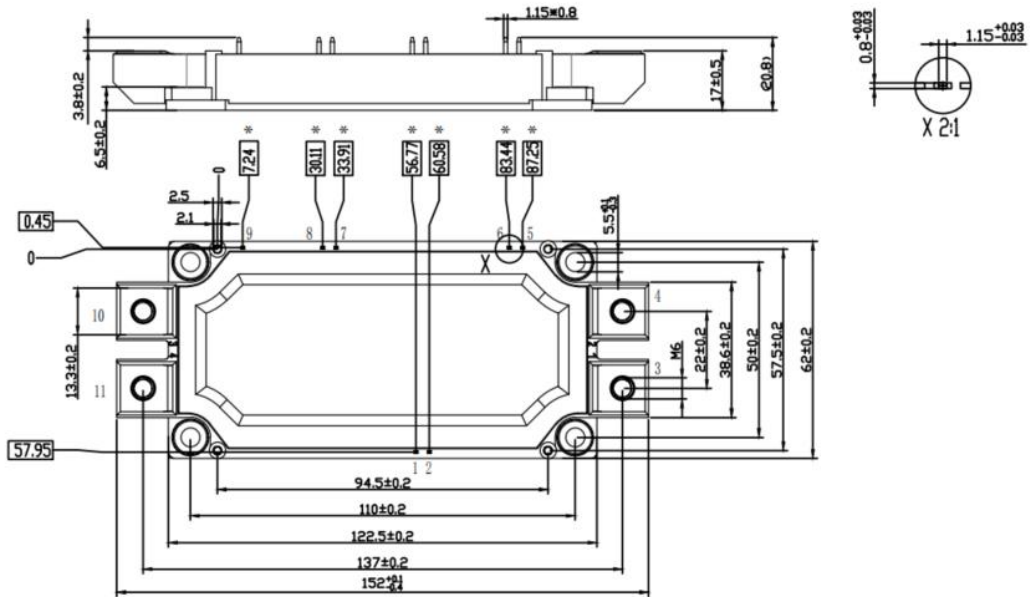


**Circuit Diagram**



**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