

LEGM50BH120L1S

IGBT Power Module

Features:

- $V_{CE}=1200V$ $I_C=50A$
- Low V_{CEsat}
- Maximum junction temperature 175°C
- Isolation Type Package

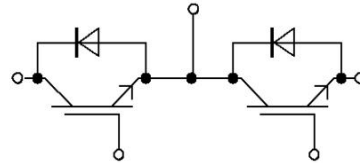
Applications:

- Welder
- Inductive heating

Package Type & Internal Circuit



L1



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	$T_C=100\text{ }^\circ\text{C}$	50	A
I_{CRM}	Peak Collector Current	$I_{CRM}=2I_C$	100	A
V_{GES}	Gate-Emitter Voltage	$T_{vj}=25\text{ }^\circ\text{C}$	± 20	V
P_{tot}	Total Power Dissipation	$T_C=25\text{ }^\circ\text{C}, T_{vjmax}=175\text{ }^\circ\text{C}$	270	W

Maximum Rated Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=50\text{ A}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$		1.80		V		
		$I_C=50\text{ A}, V_{GE}=15\text{ V}, T_{vj}=150\text{ }^\circ\text{C}$		2.20		V		
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=5.0\text{ mA}, V_{CE}=V_{GE}, T_{vj}=25\text{ }^\circ\text{C}$		5.9		V		
I_{CES}	Collector-Emitter Cut-off Current	$V_{CE}=1200\text{ V}, V_{GE}=0\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$			4.0	mA		
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$			450	nA		
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=50\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_{Gon}=15\text{ }\Omega$ $T_{vj}=25\text{ }^\circ\text{C}$		150		ns		
t_r	Rise Time, Inductive Load			100		ns		
$t_{d(off)}$	Turn-off Delay Time, Inductive Load				380		ns	
t_f	Fall Time, Inductive Load				60		ns	
E_{on}	Turn-on Energy Loss per Pulse				7.1		mJ	
E_{off}	Energy Loss per Pulse				3.9		mJ	
$t_{d(on)}$	Turn-on Delay Time, Inductive Load		$I_C=50\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_{Gon}=15\text{ }\Omega$ $T_{vj}=150\text{ }^\circ\text{C}$		130		ns	
t_r	Rise Time, Inductive Load					100		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load					440		ns
t_f	Fall Time, Inductive Load					130		ns
E_{on}	Turn-on Energy Loss per Pulse				7.7		mJ	
E_{off}	Energy Loss per Pulse				5.0		mJ	
R_{thJC}	Thermal resistance, junction to case	pro IGBT / per IGBT			0.55	K/W		
$T_{vj\ op}$	Temperature under switching conditions		-40		150	$^\circ\text{C}$		
I_{SC}	SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 600\text{ V}$ $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ $t_p \leq 10\text{ }\mu\text{s}, T_{vj} = 150\text{ }^\circ\text{C}$		250		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	$T_C=100\text{ }^{\circ}\text{C}$		50		A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ ms}$		100		A
I^2t	I^2t Value	$V_R=0\text{ V}$, $t_p=10\text{ ms}$, $T_{vj}=150\text{ }^{\circ}\text{C}$		550		A ² s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit		
V_F	Forward Voltage	$I_F=50\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		1.80		V		
		$I_F=50\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj}=150\text{ }^{\circ}\text{C}$		1.80		V		
t_{rr}	Reverse Recovery time	$I_F=50\text{ A}$, $V_R=600\text{ V}$ $-di/dt=500\text{ A/us}$ $T_{vj}=25\text{ }^{\circ}\text{C}$		330		ns		
Q_r	Recovered Charge			6.8		μC		
E_{rec}	Reverse Recovery Energy			1.9		mJ		
t_{rr}	Reverse Recovery time	$I_F=50\text{ A}$, $V_R=600\text{ V}$ $-di/dt=500\text{ A/us}$ $T_{vj}=150\text{ }^{\circ}\text{C}$		390		ns		
			Q_r	Recovered Charge		11.1		μC
			E_{rec}	Reverse Recovery Energy		8.2		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.83	K/W		
$T_{vj\text{ op}}$	Operating Junction Temperature		-40		150	$^{\circ}\text{C}$		

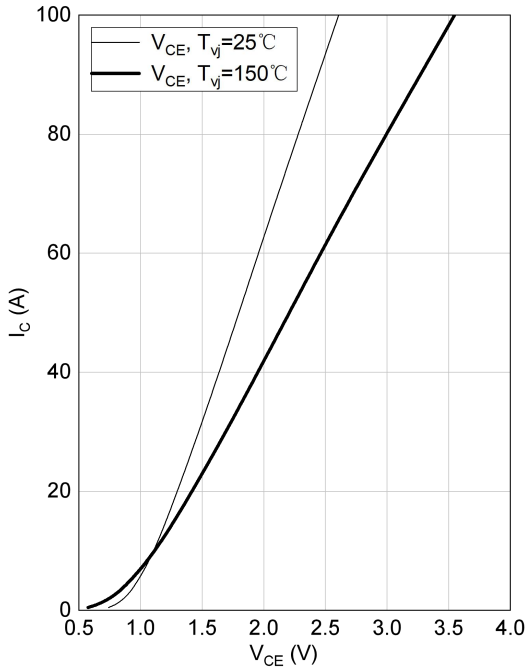
Module Characteristics

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		125	$^{\circ}\text{C}$
M_t	Module Electrodes Torque	Recommended(M5)	2.5		5.0	N·m
M_s	Module-to-Sink Torque	Recommended(M6)	3.0		6.0	N·m
G	Weight of Module			160		g

Output characteristic of IGBT, Inverter (typical)

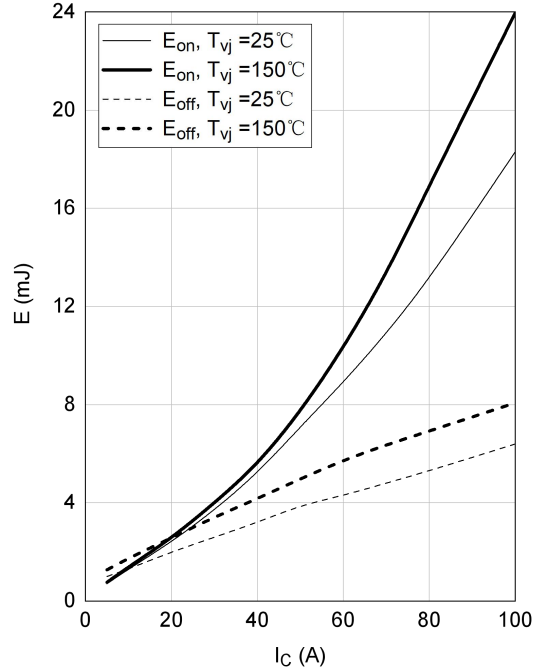
$$I_c = f(V_{CE})$$

$$V_{GE} = 15V$$


Switching losses of IGBT, Inverter (typical)

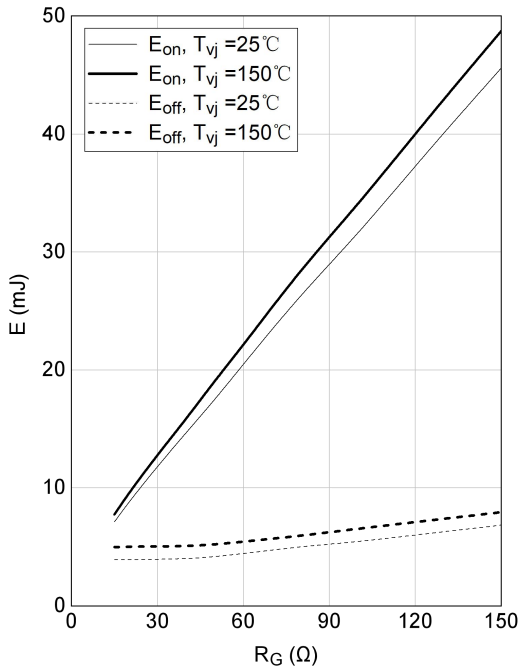
$$E_{on} = f(I_c), E_{off} = f(I_c)$$

$$V_{GE} = \pm 15V, R_{Gon} = 15\Omega, V_{CE} = 600V$$


Switching losses of IGBT, Inverter (typical)

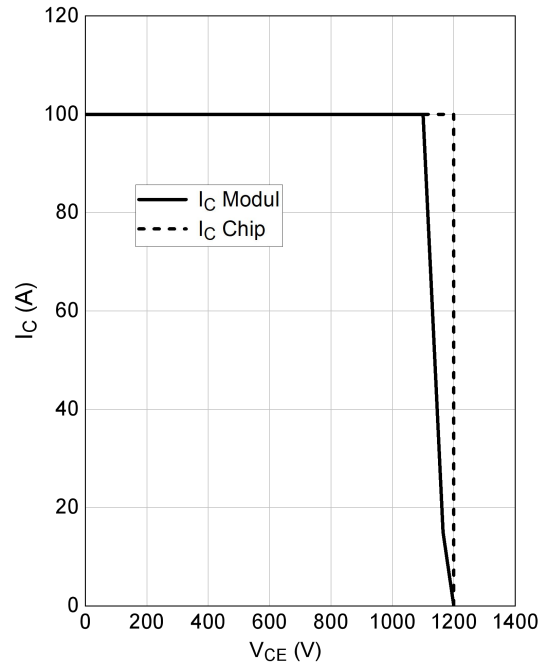
$$E_{on} = f(R_G), E_{off} = f(R_G)$$

$$V_{GE} = \pm 15V, I_c = 50A, V_{CE} = 600V$$


RBSOA IGBT, Inverter (typical)

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

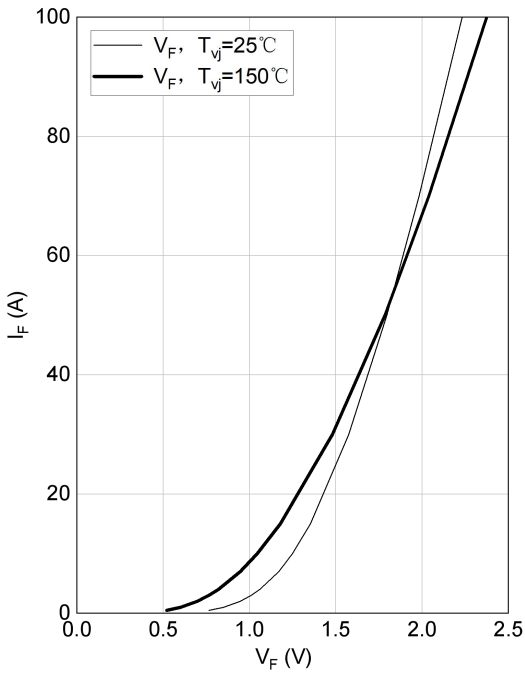
$$V_{GE} = \pm 15V, R_{Goff} = 15\Omega, T_{vj} = 150^\circ C$$



Forward characteristic of Diode, Inverter (typical)

$$I_F = f(V_F)$$

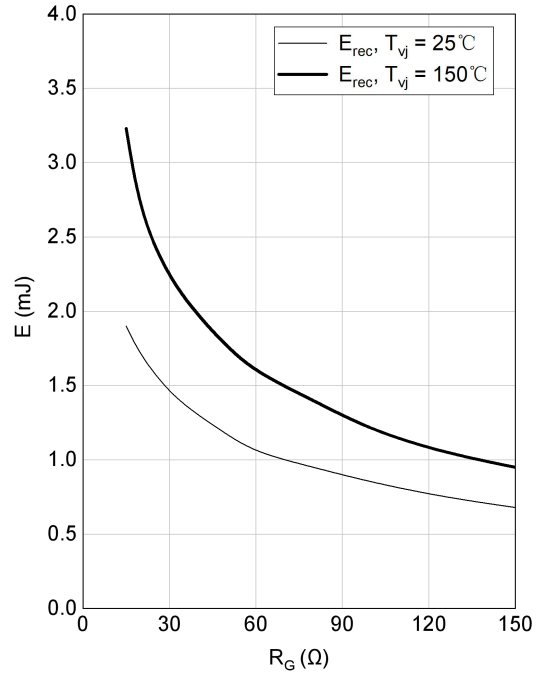
$$V_{GE} = \pm 15V$$



Switching losses of Diode, Inverter (typical)

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

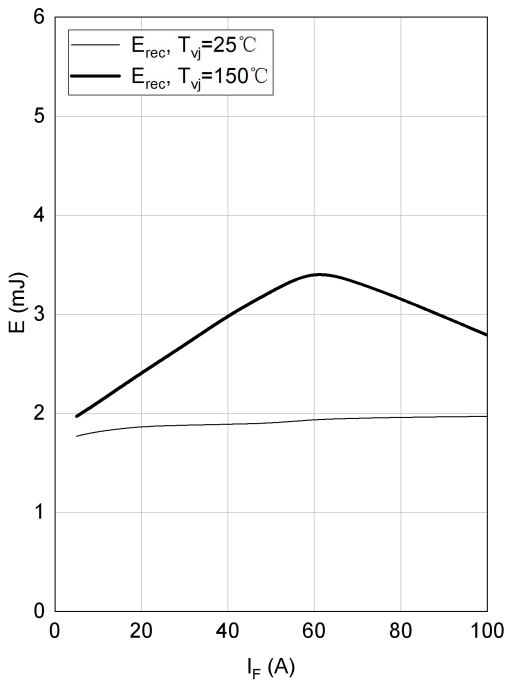
$$I_F = 50 A, V_{CE} = 600 V$$



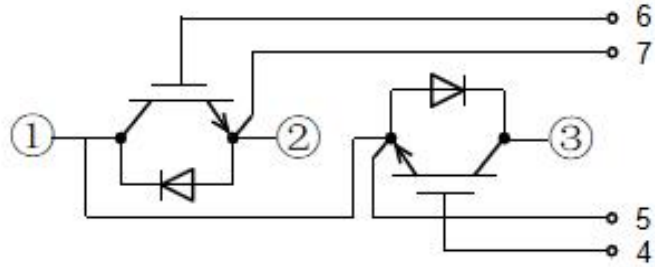
switching losses of Diode, Inverter (typical)

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

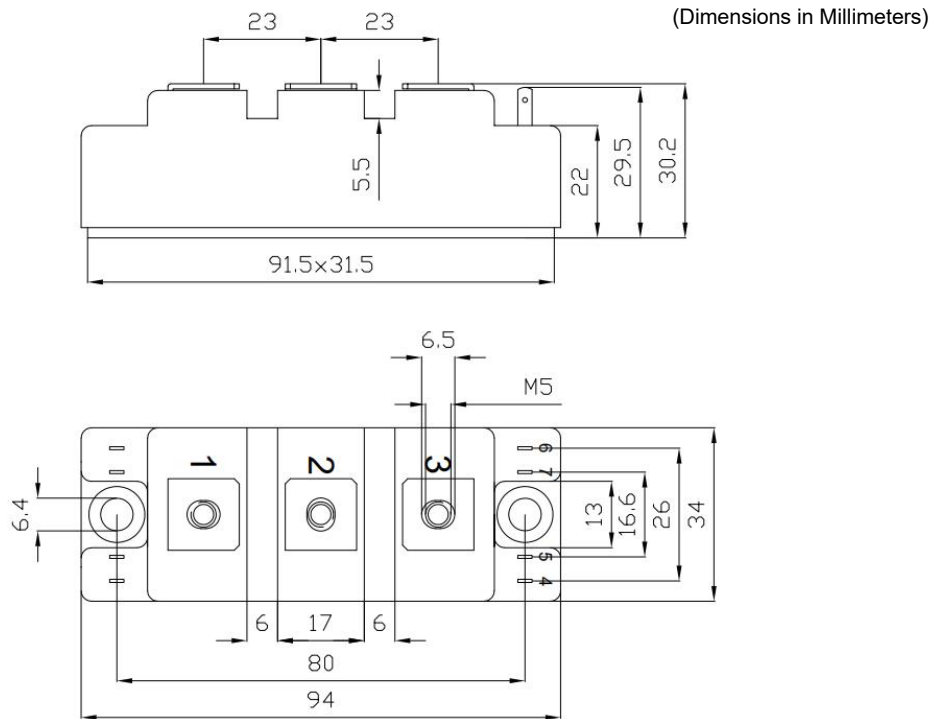
$$R_{Gon} = 15 \Omega, V_{CE} = 600V$$



Circuit Diagram



Package Dimensions



DISCLAIMER

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