

LEGM300BH120L9H

IGBT Power Module

Features

- $V_{CE}=1200V$ $I_C=300A$
- Low $V_{CE(sat)}$
- V_{CEsat} with positive temperature coefficient
- Maximum junction temperature 175°C
- Isolation Type Package

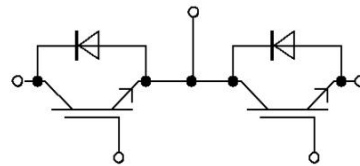
Applications

- The inverter
- Motor control and drives

Package Type & Internal Circuit



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	$T_C=100^\circ C$	300	A
I_{CRM}	Peak Collector Current	$I_{CRM}=2I_C$	600	A
V_{GES}	Gate-Emitter Voltage	$T_{vj}=25^\circ C$	± 30	V
P_{tot}	Total Power Dissipation	$T_C=25^\circ C, T_{vjmax}=150^\circ C$	1300	W

Maximum Rated Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=300\text{ A}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^\circ\text{C}$		1.83	2.3	V	
		$I_C=300\text{ A}, V_{GE}=15\text{ V}, T_{vj}=150\text{ }^\circ\text{C}$		2.0	2.5	V	
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=3\text{ mA}, V_{CE}=V_{GE}, T_{vj}=25\text{ }^\circ\text{C}$	5.8	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	μA	
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	$I_C=300\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=0.5\ \Omega$ $T_{vj}=25\text{ }^\circ\text{C}$		66		ns	
t_r	Rise Time, Inductive Load			35		ns	
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			270		ns	
t_f	Fall Time, Inductive Load			170		ns	
E_{on}	Turn-on Energy Loss per Pulse			9.2		mJ	
E_{off}	Energy Loss per Pulse			25.2		mJ	
$t_{d(on)}$	Turn-on Delay Time, Inductive Load		$I_C=300\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=0.5\ \Omega$ $T_{vj}=150\text{ }^\circ\text{C}$		720		ns
t_r	Rise Time, Inductive Load				32		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load				335		ns
t_f	Fall Time, Inductive Load			276		ns	
E_{on}	Turn-on Energy Loss per Pulse			17.9		mJ	
E_{off}	Energy Loss per Pulse			56.5		mJ	
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.091	K/W	
$T_{vj\ op}$	Temperature under switching conditions		-40		150	$^\circ\text{C}$	
I_{sc}	SC	$V_{GE}\leq 15\text{ V}, V_{CE}=900\text{ V},$ $t_p\leq 10\ \mu\text{s}, T_{vj}=150\text{ }^\circ\text{C},$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$		1500		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	$T_C=100\text{ }^{\circ}\text{C}$		300		A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ ms}$		600		A
I^2t	I^2t Value	$V_R=0\text{ V}$, $t_p=10\text{ ms}$, $T_{vj}=150\text{ }^{\circ}\text{C}$		18000		A^2s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=300\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		1.81	2.3	V
		$I_F=300\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj}=150\text{ }^{\circ}\text{C}$		2.00	2.5	V
t_{rr}	Reverse Recovery time	$I_F=300\text{ A}$, $V_R=600\text{ V}$ $-di/dt=2800\text{ A/us}$		200		ns
Q_r	Recovered Charge			16.5		μC
E_{rec}	Reverse Recovery Energy		$T_{vj}=25\text{ }^{\circ}\text{C}$		5.2	
t_{rr}	Reverse Recovery time	$I_F=300\text{ A}$, $V_R=600\text{ V}$ $-di/dt=2800\text{ A/us}$ $T_{vj}=150\text{ }^{\circ}\text{C}$		350		ns
			Q_r	Recovered Charge		42
E_{rec}	Reverse Recovery Energy				10.8	
R_{thJC}	Thermal resistance, junction to case	per Diode			0.143	K/W
$T_{vj\text{ op}}$	Operating Junction Temperature		-40		150	$^{\circ}\text{C}$

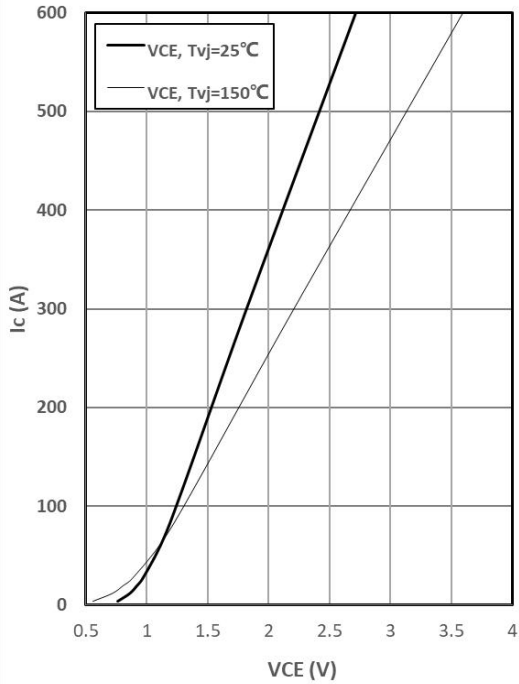
Module Characteristics

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)

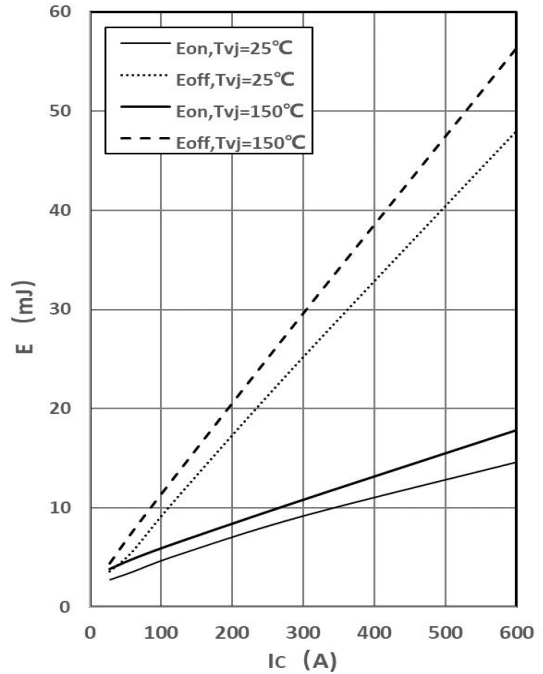
$$I_c = f(V_{CE})$$

$$V_{GE} = 15V$$


Switching losses of IGBT, Inverter (typical)

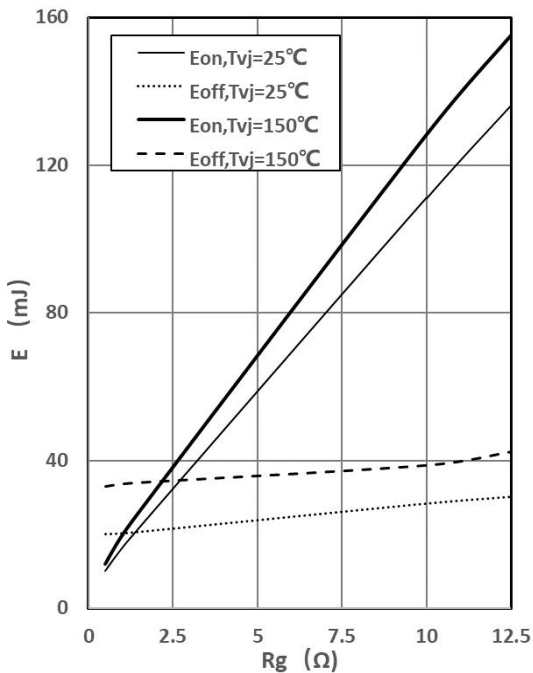
$$E_{on} = f(I_c), E_{off} = f(I_c)$$

$$V_{GE} = \pm 15V, R_G = 0.5\Omega, V_{CE} = 600V$$


Switching losses of IGBT, Inverter (typical)

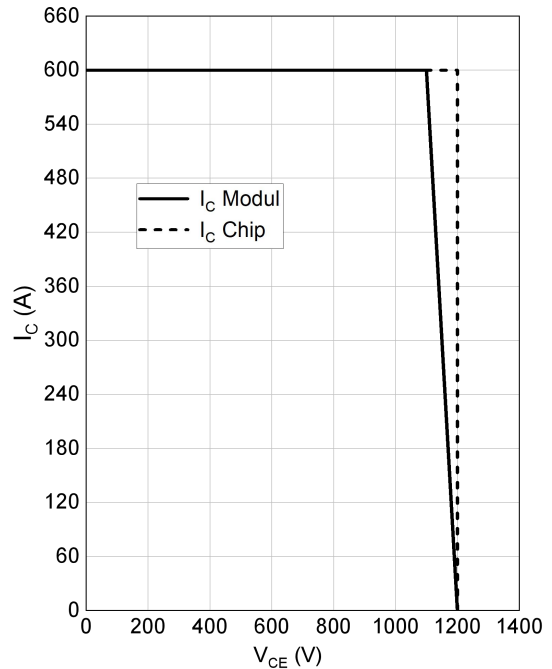
$$E_{on} = f(R_G), E_{off} = f(R_G)$$

$$V_{GE} = \pm 15V, I_c = 300A, V_{CE} = 600V$$


RBSOA IGBT, Inverter (typical)

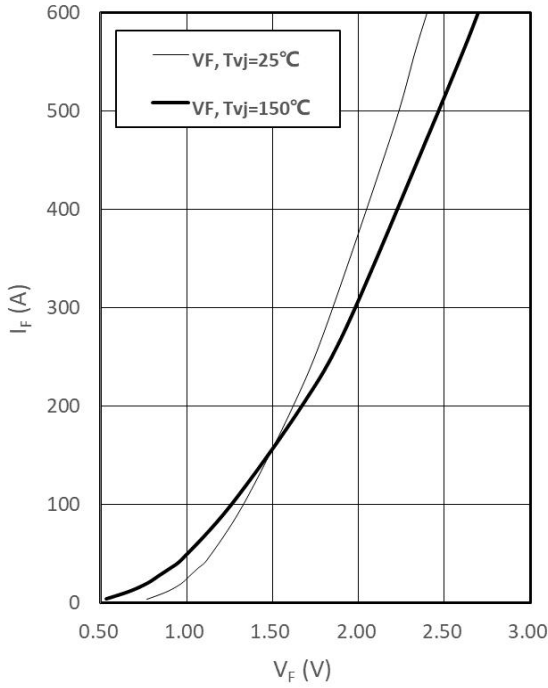
$$I_c = f(V_{CE})$$

$$V_{GE} = \pm 15V, R_G = 0.5\Omega, T_{vj} = 150^\circ C$$



Forward characteristic of Diode, Inverter (typical)

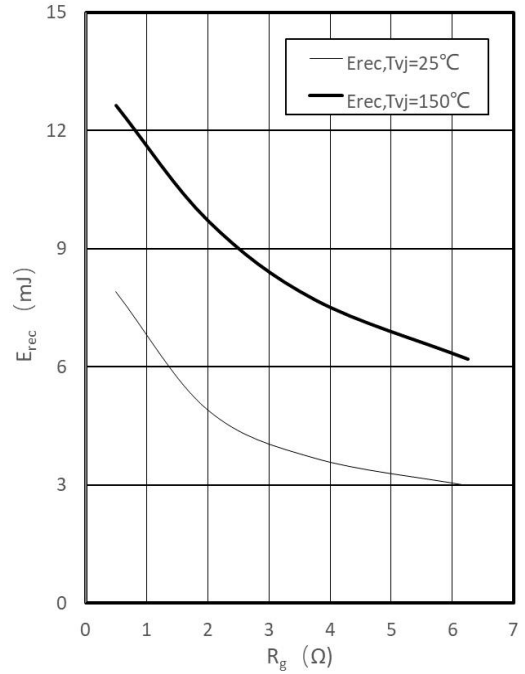
$$I_F = f(V_F)$$



Switching losses of Diode, Inverter (typical)

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

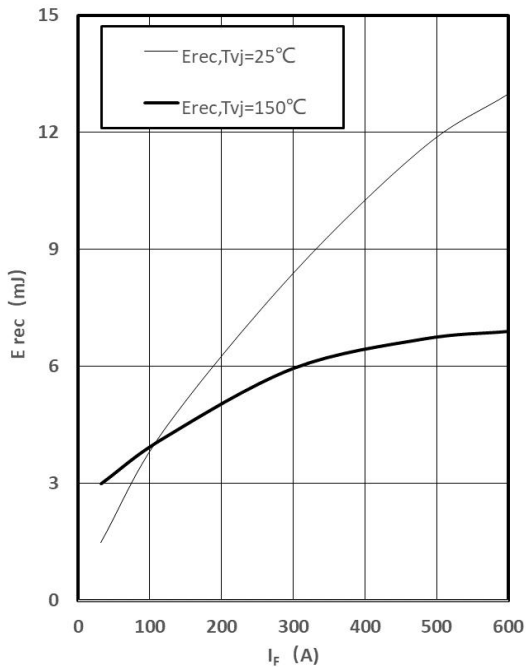
$$I_F = 300\text{A}, V_{CE} = 600\text{V}$$



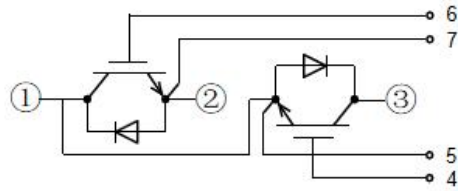
Switching losses of Diode, Inverter (typical)

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

$$R_G = 0.5 \Omega, V_{CE} = 600\text{V}$$

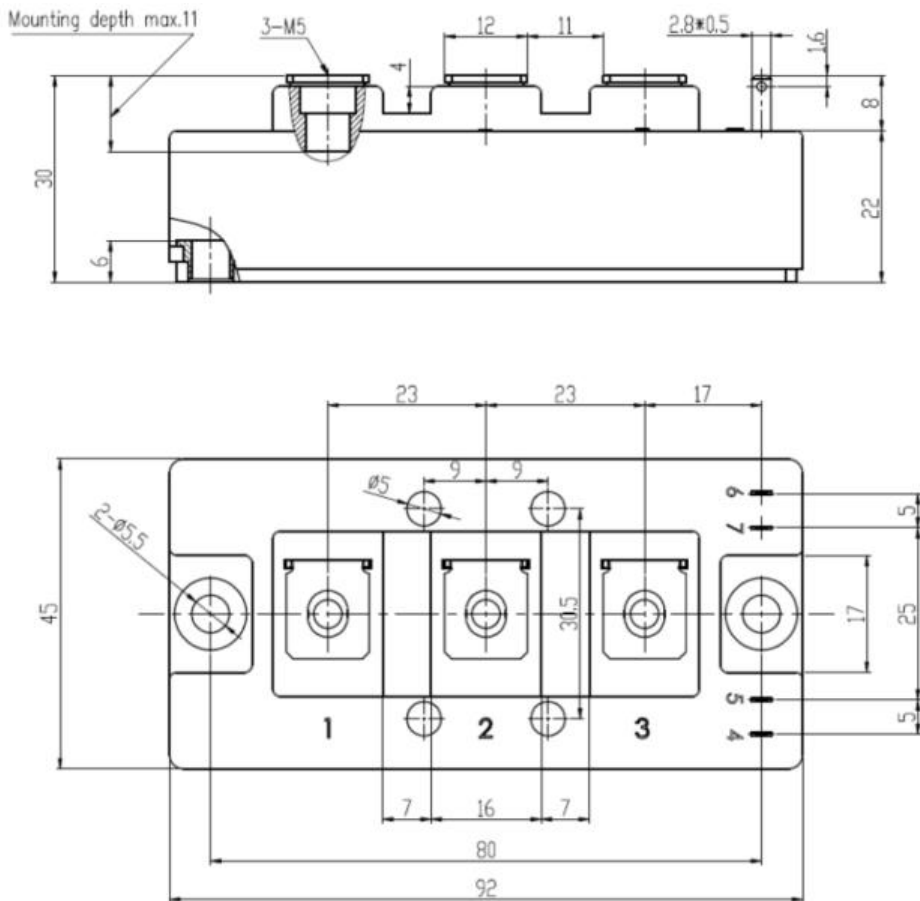


Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



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