

LEGM150CH120L1H

IGBT Power Module

Features

- $V_{CE}=1200V$ $I_C=150A$
- Low $V_{CE(sat)}$
- V_{CEsat} with positive temperature coefficient
- Maximum junction temperature $175^{\circ}C$
- Isolation Type Package

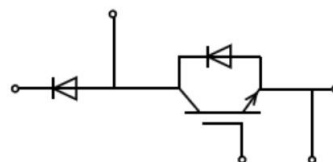
Applications

- The inverter
- Motor control and drives

Package Type & Internal Circuit



L1



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	$T_C=100^{\circ}C$	150	A
I_{CRM}	Peak Collector Current	$I_{CRM}=2I_C$	300	A
V_{GES}	Gate-Emitter Voltage	$T_{vj}=25^{\circ}C$	± 20	V
P_{tot}	Total Power Dissipation	$T_C=25^{\circ}C, T_{vjmax}=175^{\circ}C$	1050	W

Characteristics Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=150\text{ A}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^{\circ}\text{C}$		1.75	2.3	V
		$I_C=150\text{ A}, V_{GE}=15\text{ V}, T_{vj}=150\text{ }^{\circ}\text{C}$		2.0		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	$V_{CE}=1200\text{ V}, V_{GE}=0\text{ V}, T_{vj}=25\text{ }^{\circ}\text{C}$			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}, V_{GE}=15\text{ V}, T_{vj}=25\text{ }^{\circ}\text{C}$			400	nA
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=150\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_{Gon}=1\text{ }\Omega$ $T_{vj}=25\text{ }^{\circ}\text{C}$		120		ns
t_r	Rise Time, Inductive Load			55		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			370		ns
t_f	Fall Time, Inductive Load			105		ns
E_{on}	Turn-on Energy Loss per Pulse			3.1		mJ
E_{off}	Energy Loss per Pulse			12.4		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=150\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_{Gon}=1\text{ }\Omega$ $T_{vj}=150\text{ }^{\circ}\text{C}$		140		ns
t_r	Rise Time, Inductive Load			60		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			400		ns
t_f	Fall Time, Inductive Load			115		ns
E_{on}	Turn-on Energy Loss per Pulse			3.8		mJ
E_{off}	Energy Loss per Pulse			15		mJ
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.17	K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		150	$^{\circ}\text{C}$
I_{SC}	SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 900\text{ V}$ $V_{CEmax} = V_{CES} - I_{SCE} \cdot di/dt$ $t_p \leq 10\text{ }\mu\text{s}, T_{vj} = 150\text{ }^{\circ}\text{C}$		650		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	$T_C=100\text{ }^{\circ}\text{C}$		150		A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ ms}$		300		A
I^2t	I^2t Value	$V_R=0\text{ V}$, $t_p=10\text{ ms}$, $T_{vj}=150\text{ }^{\circ}\text{C}$		4500		A^2s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=150\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		1.75		V
		$I_F=150\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj}=150\text{ }^{\circ}\text{C}$		1.85		V
t_{rr}	Reverse Recovery time	$I_F=150\text{ A}$, $V_R=600\text{ V}$ $-di/dt=3500\text{ A/us}$ $T_{vj}=25\text{ }^{\circ}\text{C}$		160		ns
Q_r	Recovered Charge			14.7		μC
E_{rec}	Reverse Recovery Energy			7.4		mJ
t_{rr}	Reverse Recovery time	$I_F=150\text{ A}$, $V_R=600\text{ V}$ $-di/dt=3500\text{ A/us}$ $T_{vj}=150\text{ }^{\circ}\text{C}$		190		ns
Q_r	Recovered Charge			21.8		μC
E_{rec}	Reverse Recovery Energy			11.3		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.28	K/W
$T_{vj\text{ op}}$	Operating Junction Temperature		-40		150	$^{\circ}\text{C}$

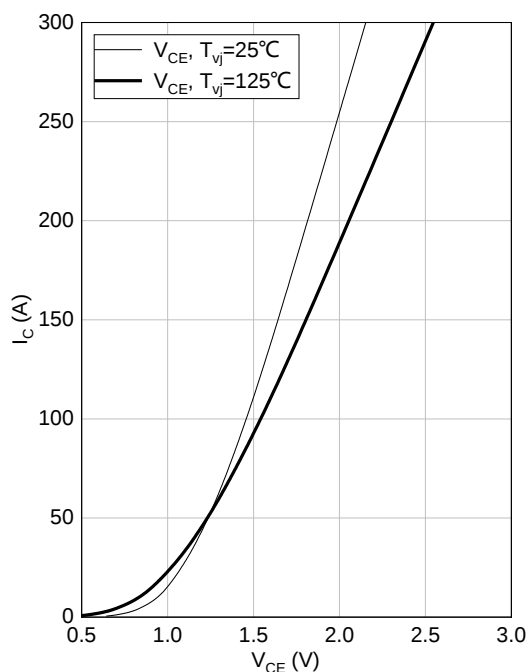
Module Characteristics

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(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)

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

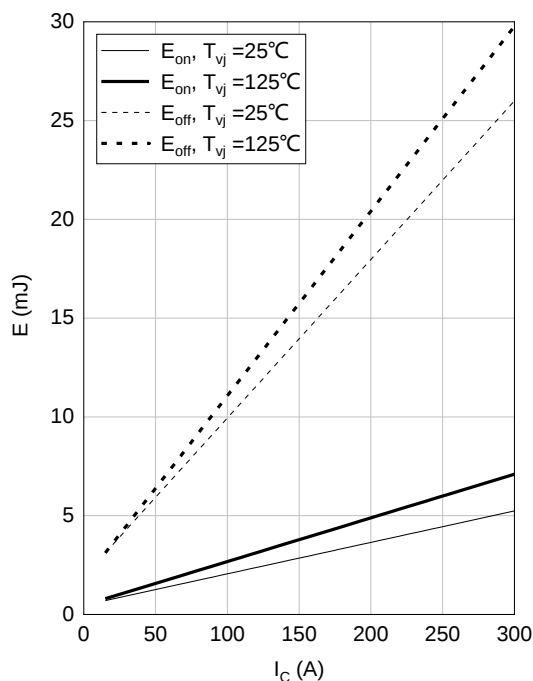
$$V_{GE} = 15V$$



Switching losses of IGBT, Inverter (typical)

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

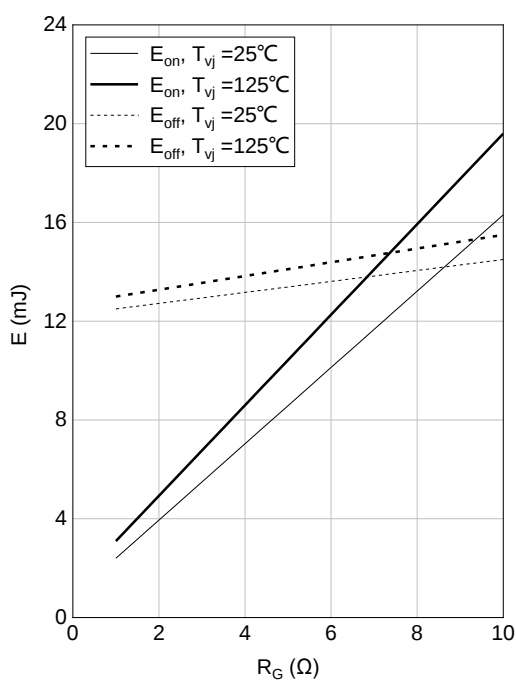
$$V_{GE} = \pm 15V, R_G = 1\Omega, V_{CE} = 600V$$



Switching losses of IGBT, Inverter (typical)

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

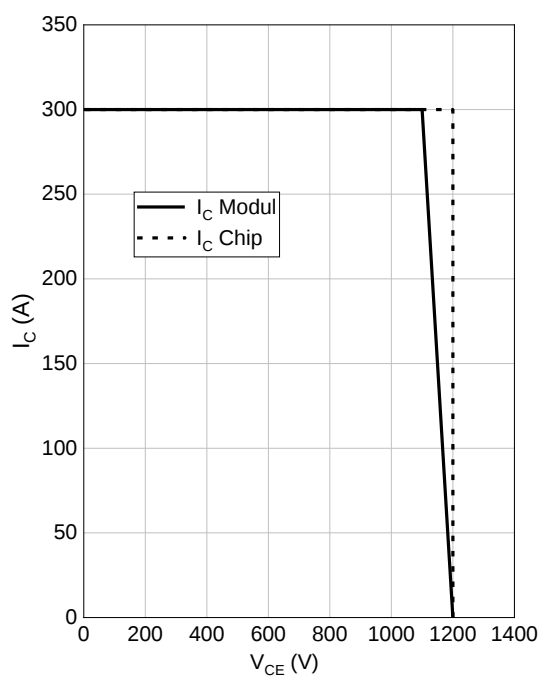
$$V_{GE} = \pm 15V, I_c = 150A, V_{CE} = 600V$$



RBSOA IGBT, Inverter (typical)

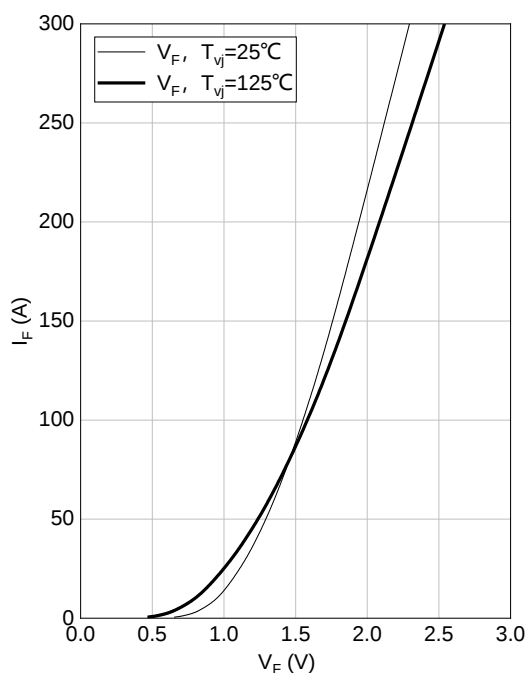
$$I_c = f(V_{CE})$$

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



Forward characteristic of Diode, Inverter (typical)

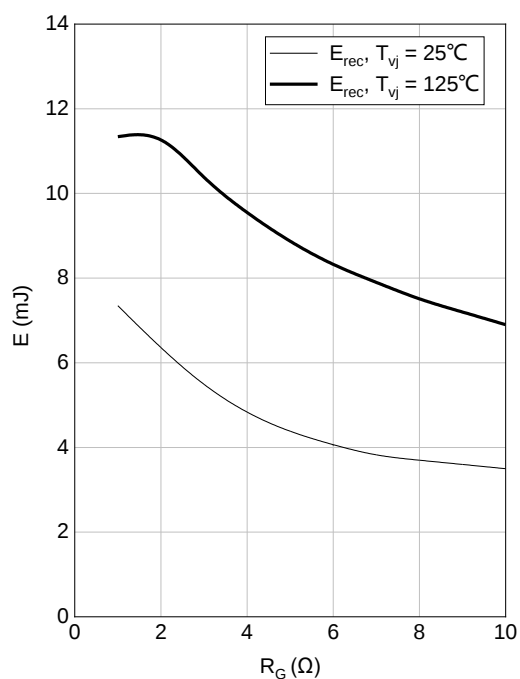
$$I_F = f(V_F)$$



Switching losses of Diode, Inverter (typical)

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

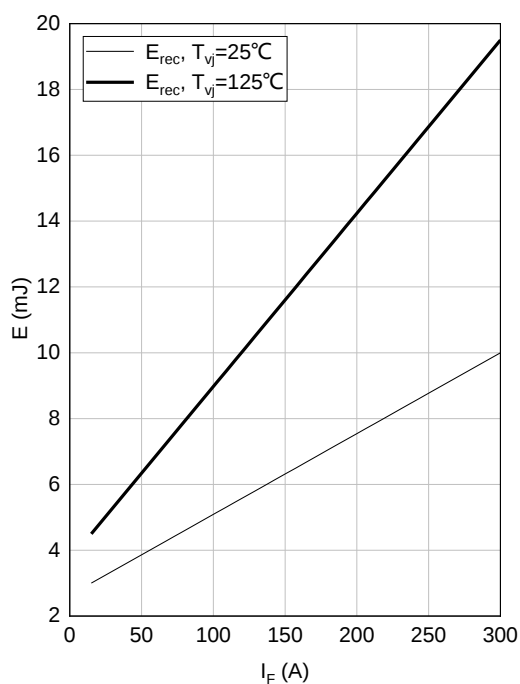
$$I_F = 200A, V_{CE} = 600V$$



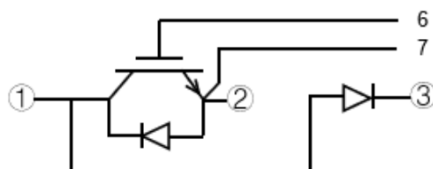
Switching losses of Diode, Inverter (typical)

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

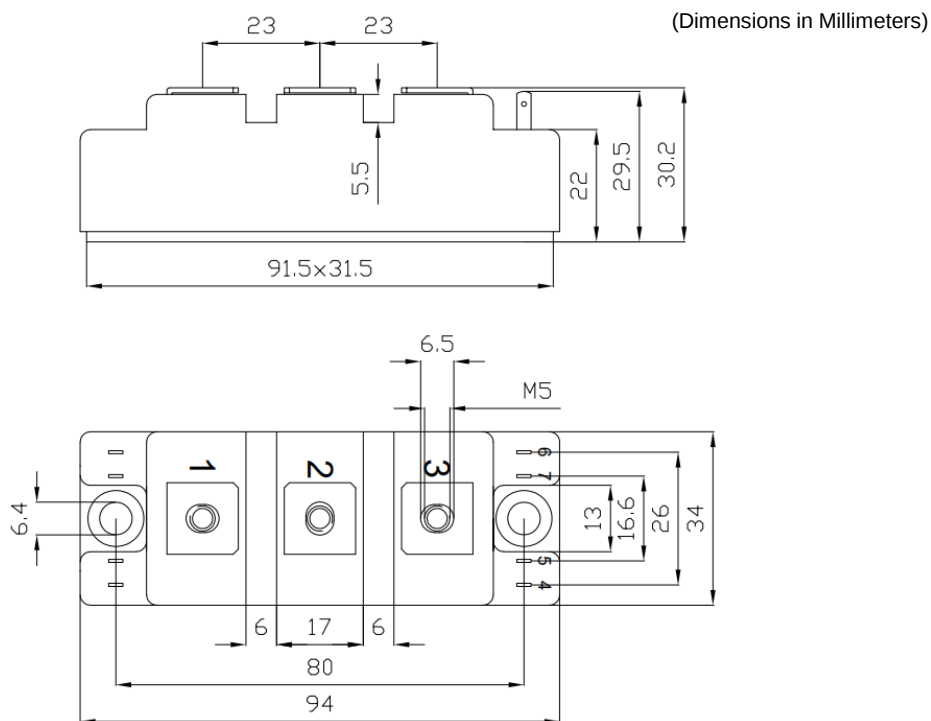
$$R_G = 1\Omega, V_{CE} = 600V$$



Circuit Diagram



Package Dimensions



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