Jan.2021

LEGM150CL120L1H

IGBT Power Module

Features

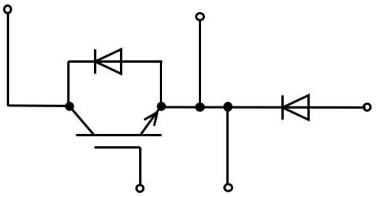
- V_{CE}=1200V I_C=150A
- Low $V_{CE(sat)}$
- V_{CEsat} with positive temperature coefficient
- Maximum junction temperature 150℃
- Isolation Type Package

Applications

- The inverter
- Motor control and drives

Package Type & Internal Circuit

L1



Internal Circuit

Maximum Rated Values (IGBT Brake-Chopper)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Maximum Power Dissipation	V_{EC}=0 V,I_C=1 mA,T_{vj}=25 ℃	1200	V
I_C	Continuous Collector Current	T_C=100 ℃	150	A
I_{CRM}	Peak Collector Current	I_{CRM}=2I_C	300	A
V_{GES}	Gate-Emitter Voltage	T_{vj}=25 ℃	±20	V
P_{tot}	Total Power Dissipation	T_C=25℃,T_{vjmax}=150℃	730	W

Maximum Rated Values（IGBT Brake-Chopper）

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=150 A, V_{GE}=15 V, T_{vj}=25 ℃		1.65		V
		I_C=150 A, V_{GE}=15 V, T_{vj}=125 ℃		1.80		V
$V_{GE(th)}$	Gate Threshold Voltage	I_C=5.0 mA,V_{CE}=V_{GE},T_{vj}= 25 ℃		5.8		V
I_{CES}	Collector-Emitter Cut-off Current	V_{CE}=1200 V, V_{GE}=0 V, T_{vj}=25 ℃			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{CE}=0 V, V_{GE}=15 V, T_{vj}=25 ℃			400	nA
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C=150 A,V_{CE}=600 V V_{GE}=±15 V R_{Gon}=1 Ω T_{vj}=25 ℃		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 A,V_{CE}=600 V V_{GE}=±15 V R_{Gon}=1 Ω T_{vj}=125 ℃		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
$T_{vj\ op}$	Temperature under switching conditions		-40		125	℃
I_{SC}	SC data	V_{GE} ≤15 V, V_{CC} = 600 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt t_P ≤ 10 μs, T_{vj} = 125 ℃		900		A

Maximum Rated Values (Diode Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	T_{vj}= 25 ℃		1200		V
I_F	Continuous DC Forward Current	T_C=100 ℃		150		A
I_{FRM}	Repetitive Peak Forward Current	t_P=1 ms		300		A
I^2t	I^2t Value	V_R=0 V, t_P=10 ms, T_{vj}=125 ℃		4500		A^2s

Characteristic Values (Diode Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=150 A, V_{CE}=0 V, T_{vj}=25 ℃		1.75		V
		I_F=150 A, V_{CE}=0 V, T_{vj}=125 ℃		1.85		V
t_{rr}	Reverse Recovery time	I_F=150 A,V_R=600 V -di/dt=3500 A/us T_{vj}=25 ℃		160		ns
Q_r	Recovered Charge			14.7		uC
E_{rec}	Reverse Recovery Energy			7.4		mJ
t_{rr}	Reverse Recovery time	I_F=150 A,V_R=600 V -di/dt=3500 A/us T_{vj}=125 ℃		190		ns
Q_r	Recovered Charge			21.8		uC
E_{rec}	Reverse Recovery Energy			11.3		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.28	K/W
$T_{vj\ op}$	Operating Junction Temperature		-40		125	℃

Maximum Rated Values (Diode Reverse)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	T_{vj}= 25 ℃		1200		V
I_F	Continuous DC Forward Current	T_C=100 ℃		150		A
I_{FRM}	Repetitive Peak Forward Current	t_P=1 ms		300		A
I^2t	I^2t Value	V_R=0 V, t_P=10 ms, T_{vj}=125 ℃		4500		A^2s

Characteristic Values (Diode Reverse)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=150 A, V_{CE}=0 V, T_{vj}=25 ℃		1.75		V
		I_F=150 A, V_{CE}=0 V, T_{vj}=125 ℃		1.85		V
t_{rr}	Reverse Recovery time	I_F=150 A,V_R=600 V -di/dt=3500 A/us T_{vj}=25 ℃		160		ns
Q_r	Recovered Charge			14.7		uC
E_{rec}	Reverse Recovery Energy			7.4		mJ
t_{rr}	Reverse Recovery time	I_F=150 A,V_R=600 V -di/dt=3500 A/us T_{vj}=125 ℃		190		ns
Q_r	Recovered Charge			21.8		uC
E_{rec}	Reverse Recovery Energy			11.3		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.28	K/W
$T_{vj\ op}$	Operating Junction Temperature		-40		125	℃

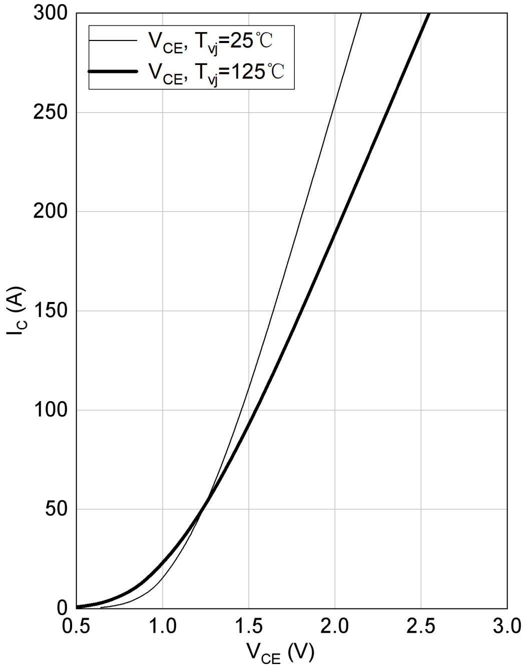
Module Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{isol}	Isolation voltage	t=1 min,f=50 Hz	2500			V
T_{stg}	Storage Temperature		-40		125	℃
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			160		g

Output characteristic of IGBT, Brake-Chopper (typical)

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

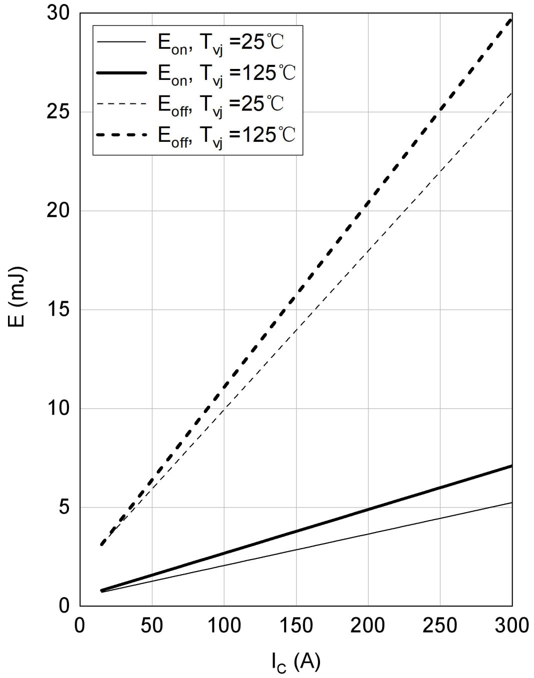
$V_{GE} = 15V$



Switching losses of IGBT, Brake-Chopper (typical)

$E_{on} = f\ (I_C),\ E_{off} = f\ (I_C)$

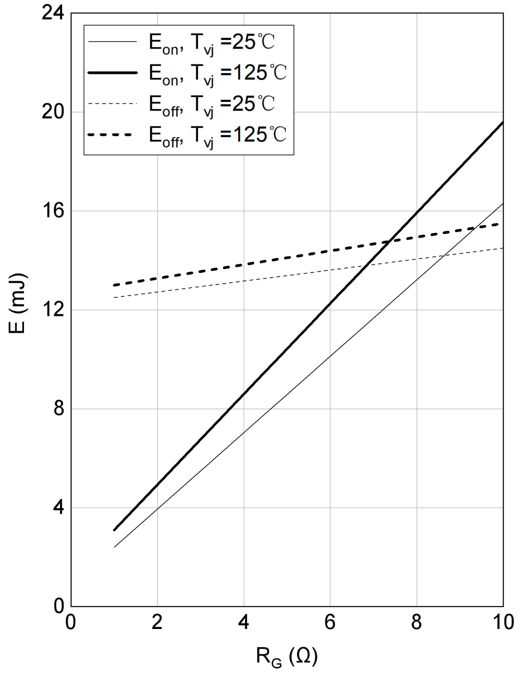
$V_{GE} = \pm 15V,\ R_G = 1\Omega,\ V_{CE} = 600V$



Switching losses of IGBT, Brake-Chopper (typical)

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

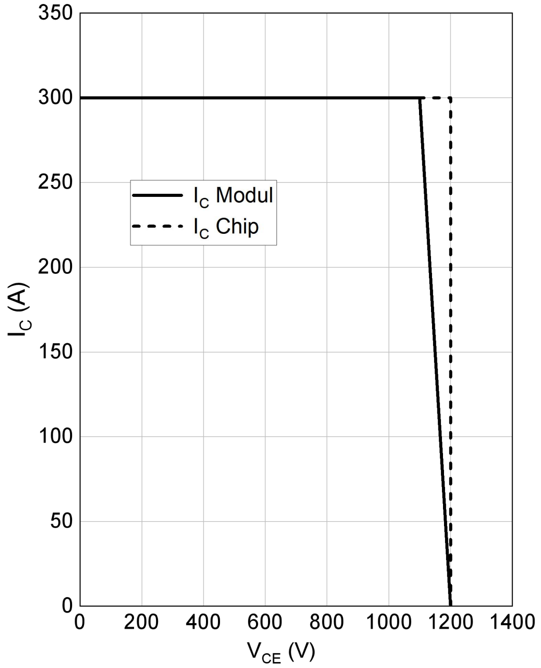
$V_{GE} = \pm 15V,\ I_C = 150A,\ V_{CE} = 600V$



RBSOA IGBT, Brake-Chopper (typical)

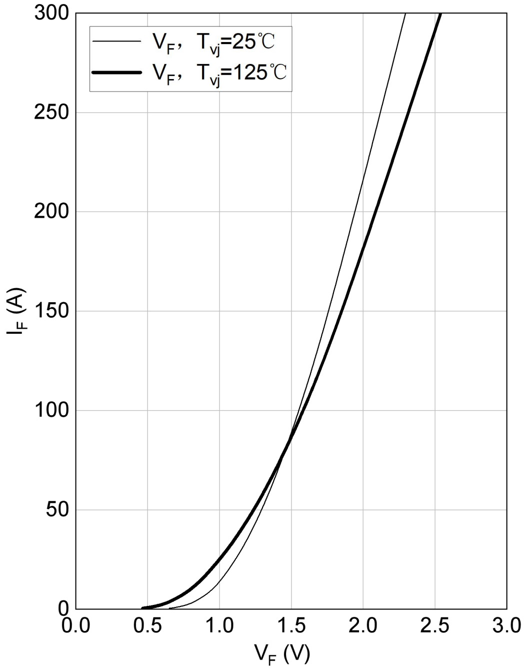
$I_C = f\ (V_{CE})$

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



Forward characteristic of Diode, Chopper (typical)

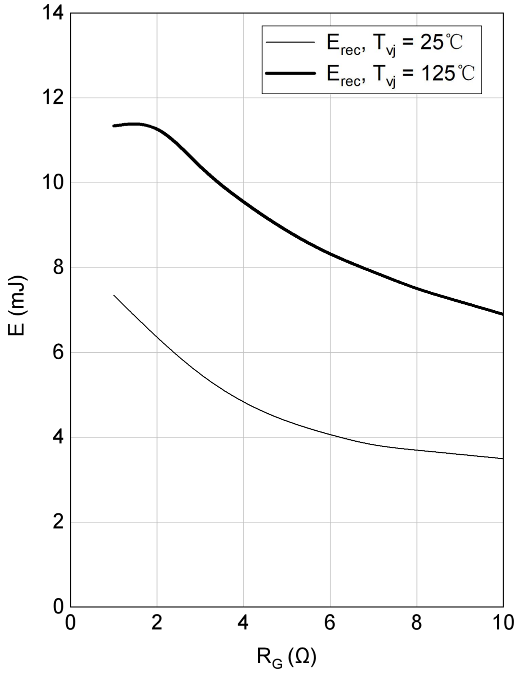
IF = f(VF)



Switching losses of Diode, Chopper (typical)

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

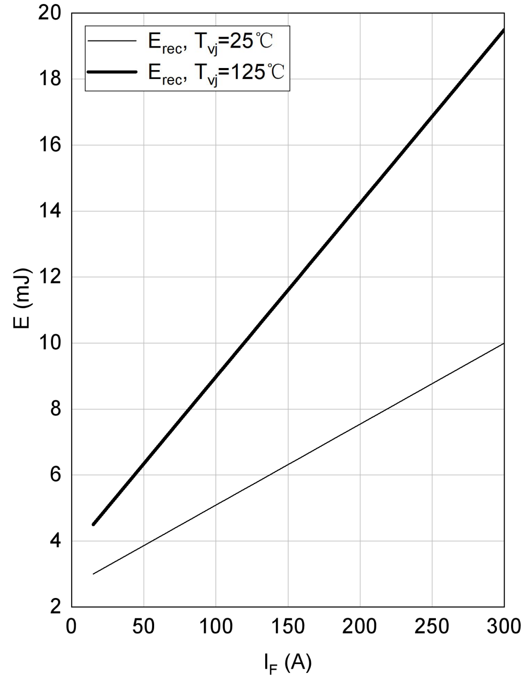
$I_F = 150A$，$V_{CE} = 600V$



Switching losess of Diode, Chopper (typical)

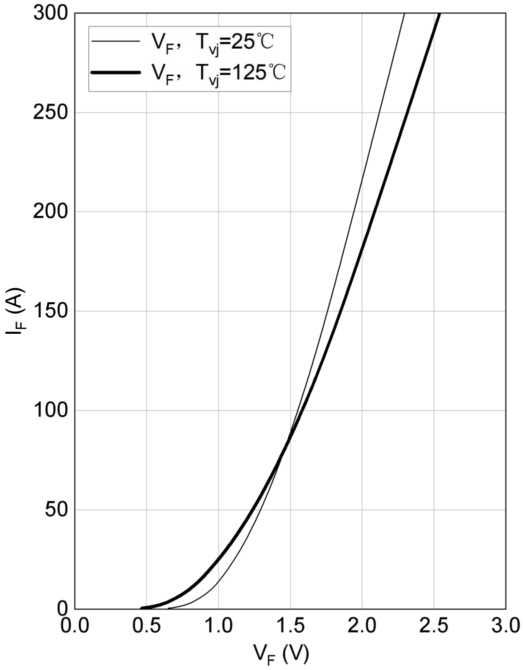
$E_{rec} = f(I_F)$,

$R_G = 1\Omega$，$V_{CE} = 600V$

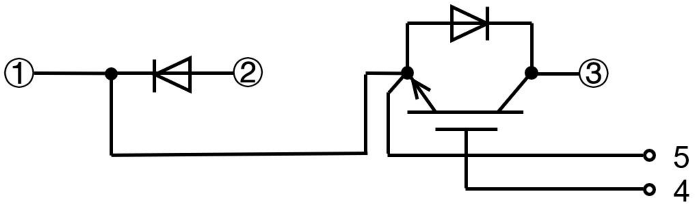


Forward characteristic of Diode, Reverse (typical)

IF = f(VF)

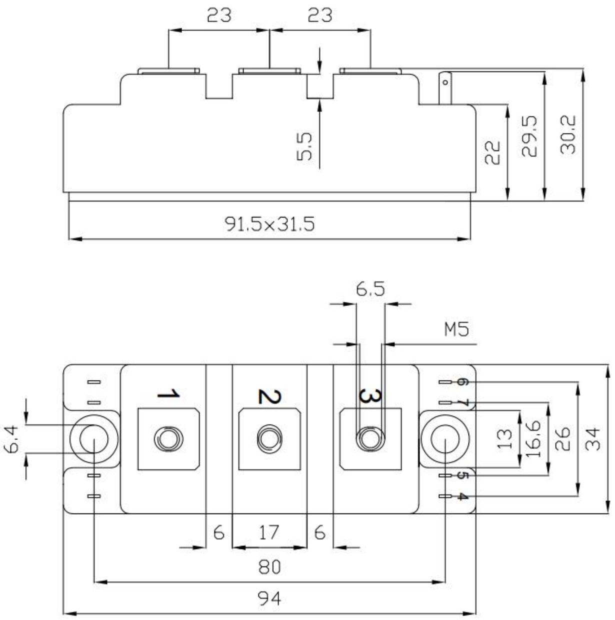


Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



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