July.2022

LEGM50TD120L4HZ

IGBT Power Module

Features:

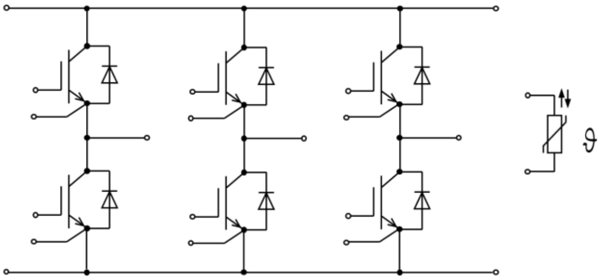
- V_{CE}=1200V I_C=50A
- Low $V_{CE(sat)}$
- V_{CEsat} with positive temperature coefficient
- Maximum junction temperature 150℃
- Isolation Type Package

Applications:

- The inverter
- Motor control and drives

Package Type & Internal Circuit

L4



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℃	1200	V
I_C	Continuous Collector Current	T_C=100℃	50	A
I_{CRM}	Peak Collector Current	I_{CRM}=2I_C	100	A
V_{GES}	Gate-Emitter Voltage	T_{vj}=25℃	±20	V
P_{tot}	Total Power Dissipation	T_C=25℃,T_{vjmax}=150℃	270	W

Characteristics Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=50 A, V_{GE}=15 V, T_{vj}=25 ℃		1.80	2.25	V
		I_C=50 A, V_{GE}=15 V, T_{vj}=125 ℃		2.05	2.7	V
$V_{GE(th)}$	Gate Threshold Voltage	I_C=2 mA,V_{CE}=V_{GE},T_{vj}= 25 ℃	5	6	6.5	V
I_{CES}	Collector-Emitter Cut-off Current	V_{CE}=1200 V, V_{GE}=0 V, T_{vj}=25 ℃			4.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{CE}=0 V, V_{GE}=15 V, T_{vj}=25 ℃			450	nA
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHZ	-	5.19	-	nF
C_{oes}	Output Capacitance		-	225	-	pF
C_{res}	Reverse Transfer Capacitance		-	189	-	pF
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C=50 A,V_{CE}=600 V V_{GE}=±15 V R_{Gon}=15 Ω T_{vj}=25 ℃		76		ns
t_r	Rise Time, Inductive Load			62		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			278		ns
t_f	Fall Time, Inductive Load			196		ns
E_{on}	Turn-on Energy Loss per Pulse			5.2		mJ
E_{off}	Energy Loss per Pulse			3.1		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	I_C=50 A,V_{CE}=600 V V_{GE}=±15 V R_{Gon}=15 Ω T_{vj}=125 ℃		80		ns
t_r	Rise Time, Inductive Load			64		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			326		ns
t_f	Fall Time, Inductive Load			284		ns
E_{on}	Turn-on Energy Loss per Pulse			5.4		mJ
E_{off}	Energy Loss per Pulse			4.5		mJ
R_{thJC}	Thermal resistance, junction to case	pro IGBT / per IGBT			0.47	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		125	°C
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 ℃		250		A

Maximum Rated Values (Diode Inverter)

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 ℃		50		A
I_{FRM}	Repetitive Peak Forward Current	t_P=1 ms		100		A
I^2t	I^2t Value	V_R=0 V, t_P=10 ms, T_{vj}=125 ℃		550		A^2s

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=50 A, V_{CE}=0 V, T_{vj}=25 ℃		1.9	2.2	V
		I_F=50 A, V_{CE}=0 V, T_{vj}=125 ℃		1.8	2.1	V
t_{rr}	Reverse Recovery time	I_F=50 A,V_R=600 V -di/dt=3000 A/us T_{vj}=25 ℃		43		ns
Q_r	Recovered Charge			2.10		uC
E_{rec}	Reverse Recovery Energy			0.43		mJ
t_{rr}	Reverse Recovery time	I_F=50A,V_R=600 V -di/dt=3000 A/us T_{vj}=125 ℃		45		ns
Q_r	Recovered Charge			1.86		uC
E_{rec}	Reverse Recovery Energy			0.47		mJ
R_{thJC}	Thermal resistance, junction to case	per Diode			0.85	K/W
$T_{vj\ op}$	Operating Junction Temperature		-40		125	℃

NTC-Thermistor (Characteristic Values)

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

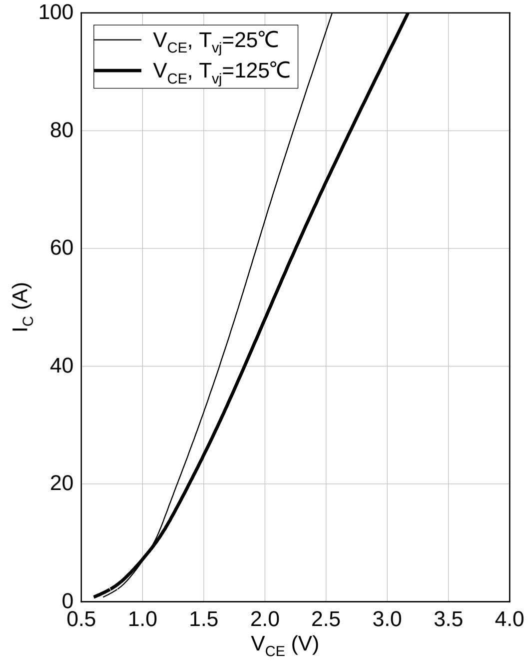
Module Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{isol}	Isolation voltage	t=1min,f=50Hz	2500			V
T_{stg}	Storage Temperature		-40		125	℃
M_s	Module-to-Sink Torque	Recommended(M5)	3.0		6.0	N·m
G	Weight of Module			180		g

Output characteristic of IGBT,Inverter (typical)

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

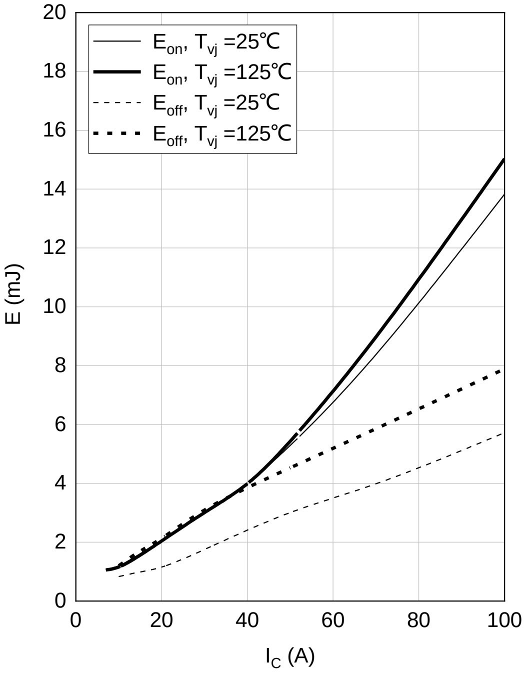
$V_{GE} = 15V$



Switching losses of IGBT,Inverter (typical)

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

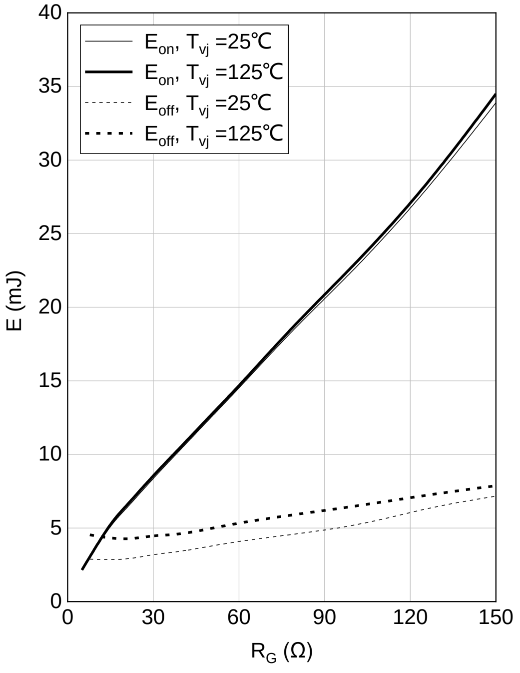
$V_{GE} = \pm 15V$, $R_{Gon} = 15\Omega$, $V_{CE} = 600V$



Switching losses of IGBT,Inverter (typical)

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

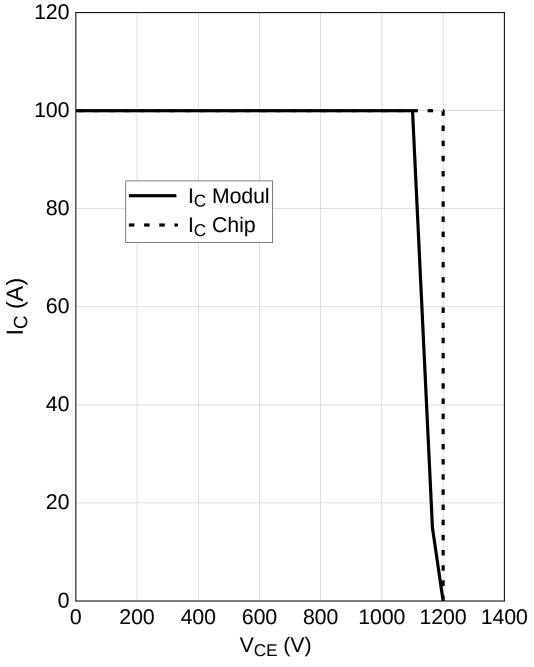
$V_{GE} = \pm 15V$, $I_C = 50A$, $V_{CE} = 600V$



RBSOA IGBT,Inverter (typical)

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

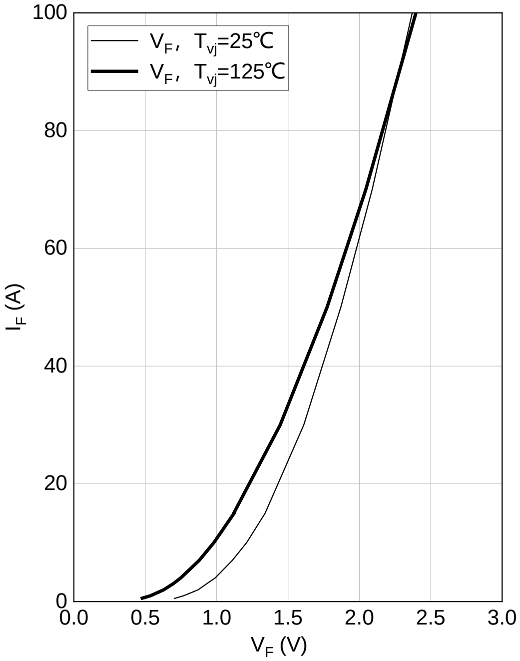
$V_{GE} = \pm 15V$, $R_{Goff} = 15\Omega$, T_{vj} =150 ℃



Forward characteristic of Diode,Inverter (typical)

$I_F = f(V_F)$

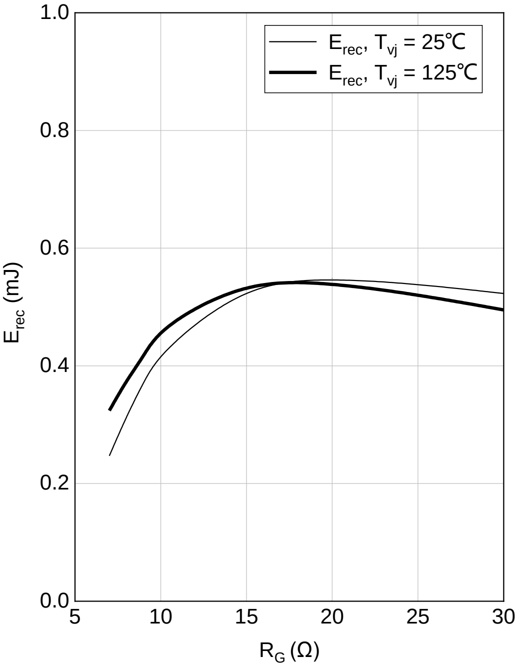
$V_{GE} = \pm 15V$



Switching losses of Diode, Inverter (typical)

Erec = f (R_G),

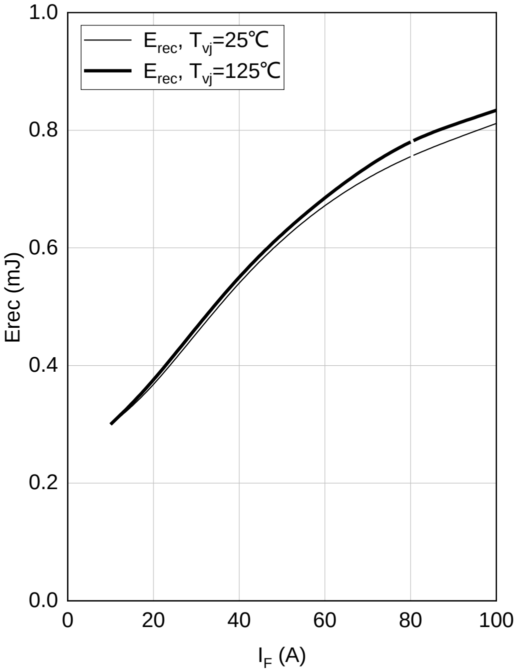
I_F = 50 A, V_{CE} = 600 V



switching losses of Diode, Inverter (typical)

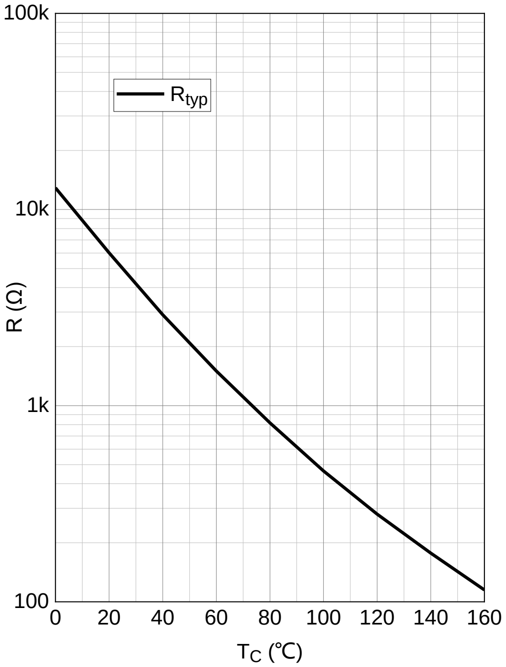
Erec = f(I_F),

R_{Gon} = 15 Ω, V_{CE} = 600V

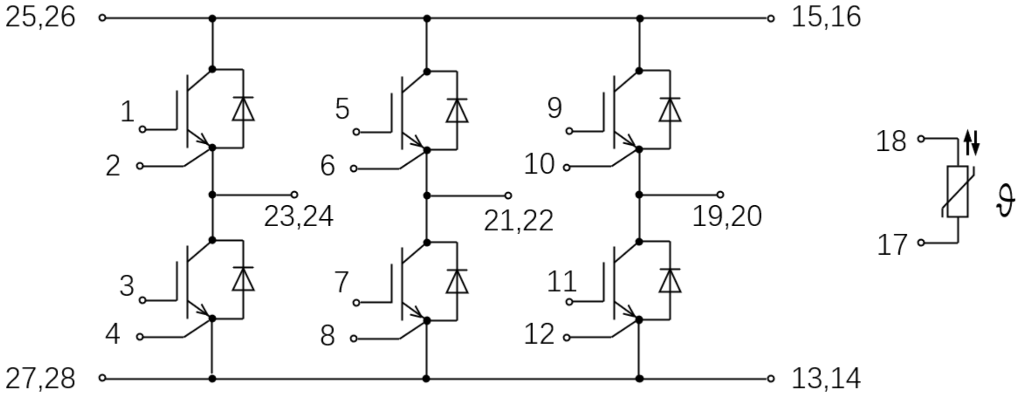


NTC-Thermistor-temperature characteristic (typical)

R = f (T)

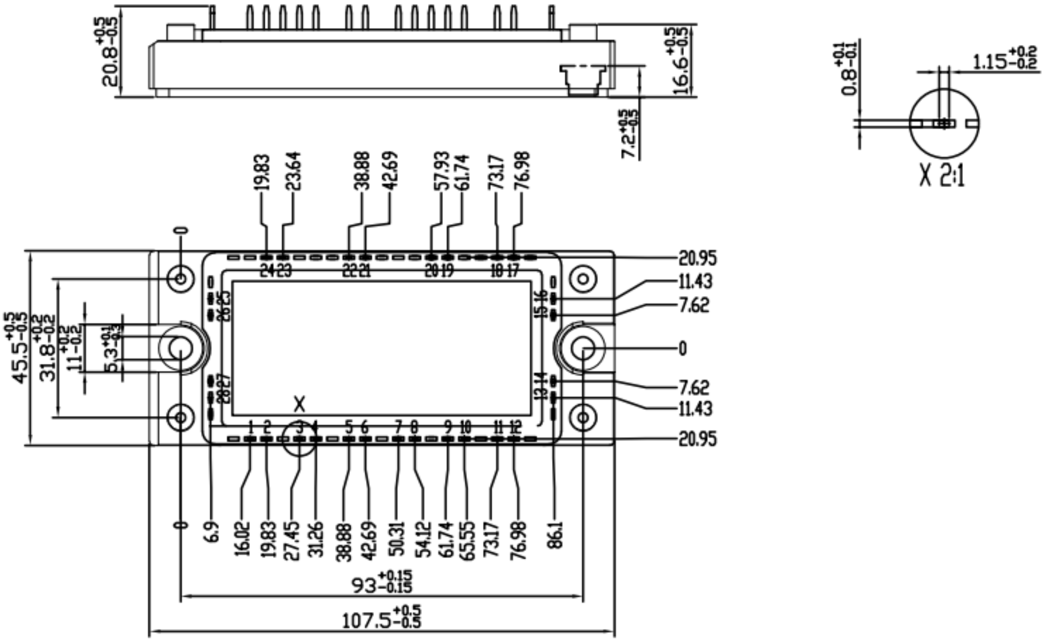


Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



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