# LEGM150TD120L5H

## IGBT Power Module

### Features

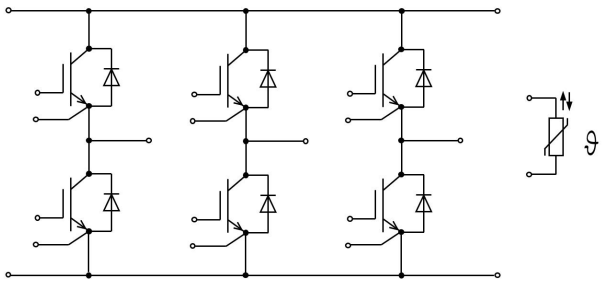
- $V_{CE}$=1200V $I_C$=150A
- Low $V_{CE(sat)}$
- $V_{CEsat}$ with positive temperature coefficient
- Maximum junction temperature 150℃
- Isolation Type Package

### Applications

- The inverter
- Motor control and drives

### Package Type & Internal Circuit

L5



Internal Circuit

### Maximum Rated Values (IGBT Inverter)

| 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 | $I_{CRM}$=2$I_C$ | 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 Inverter)

| 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<br>$V_{GE}$=±15 V<br>$R_{Gon}$=1 Ω<br>$T_{vj}$=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<br>$V_{GE}$=±15 V<br>$R_{Gon}$=1 Ω<br>$T_{vj}$=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<br>$V_{CEmax}$ = $V_{CES}$ -$L_{sCE}$ ·di/dt<br>$t_P$ ≤ 10 μs, $T_{vj}$ = 125 ℃ | | 900 | | 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 ℃ | | 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 Inverter)

| 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<br>-di/dt=3500 A/us<br>$T_{vj}$=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<br>-di/dt=3500 A/us<br>$T_{vj}$=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 | ℃ |

## 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 |

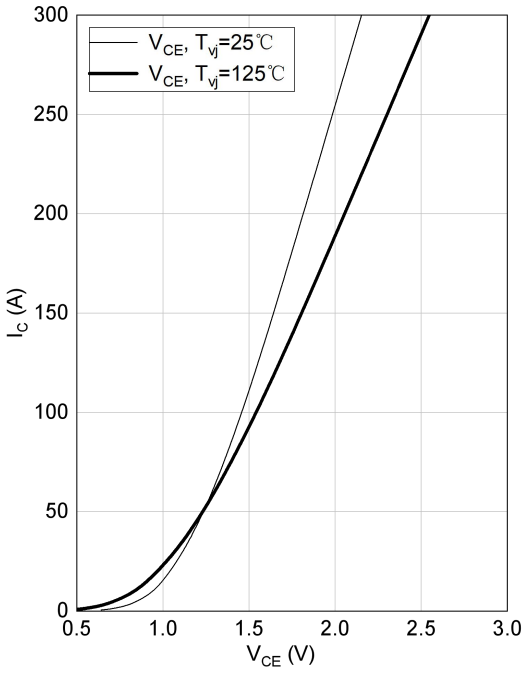
## Module Characteristics

| 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 | | | 300 | | g |

Output characteristic of IGBT,Inverter (typical)

$I_c = f(V_{CE})$

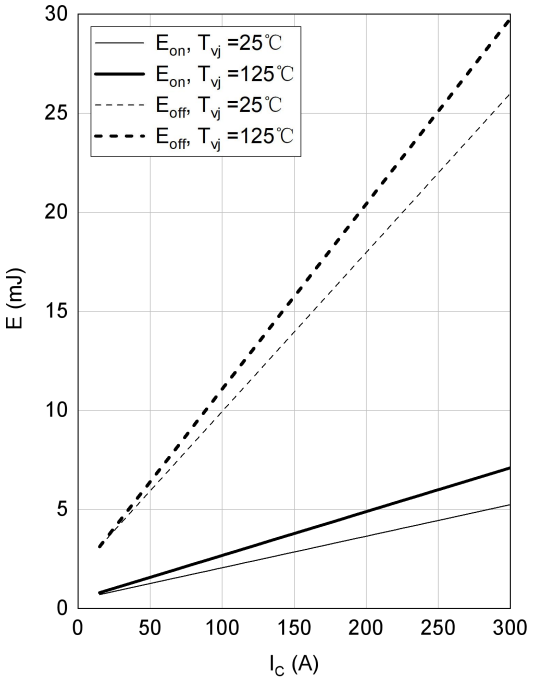
$V_{GE} = 15V$




Switching losses of IGBT,Inverter (typical)

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

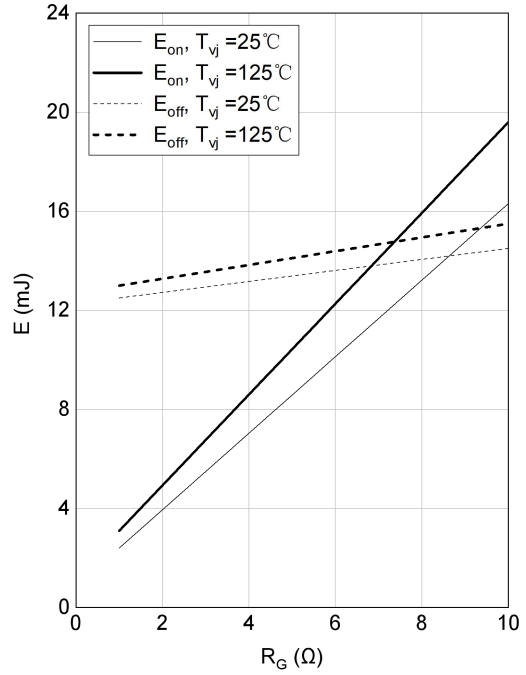
$V_{GE} = \pm 15V$, $R_G = 1\Omega$, $V_{CE} = 600V$




Switching losses of IGBT,Inverter (typical)

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

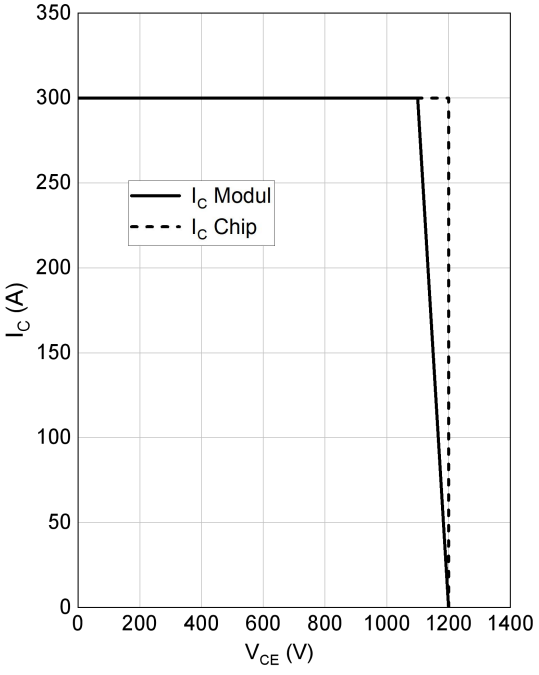
$V_{GE} = \pm 15V$, $I_C = 150A$, $V_{CE} = 600V$




RBSOA IGBT,Inverter (typical)

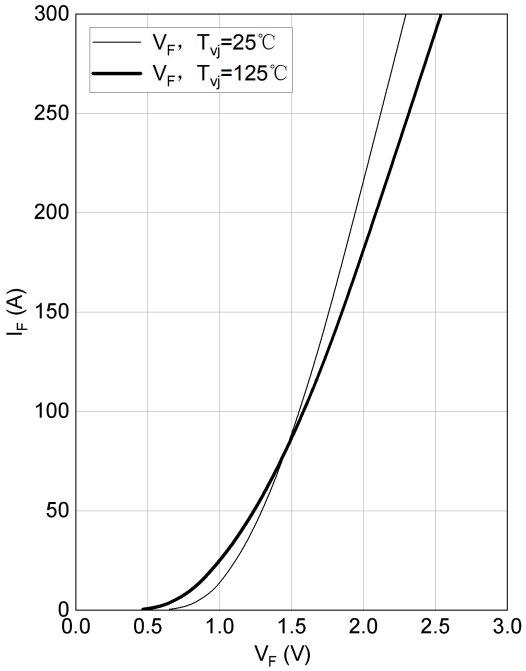
$I_C = f(V_{CE})$

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



Forward characteristic of Diode,Inverter (typical)

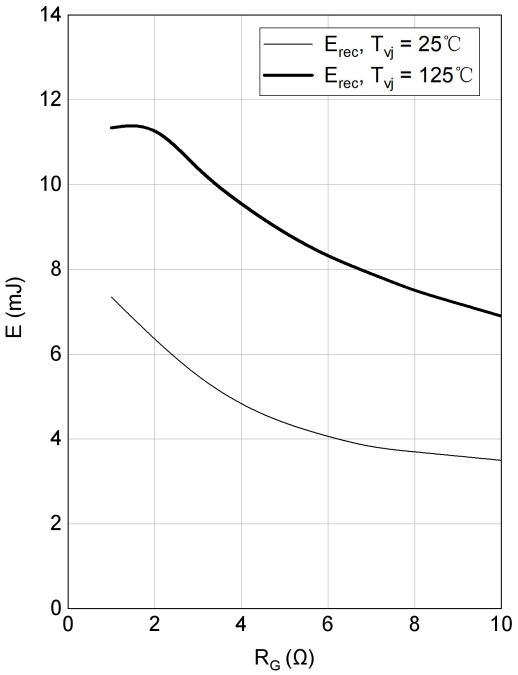
$I_F = f(V_F)$




Switching losses of Diode, Inverter (typical)

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

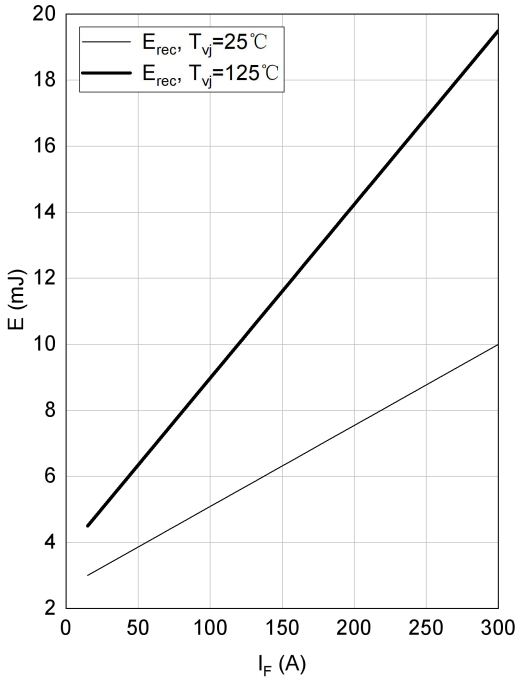
$I_F$ = 150A，$V_{CE}$ = 600V




Switching losess of Diode, Inverter (typical)

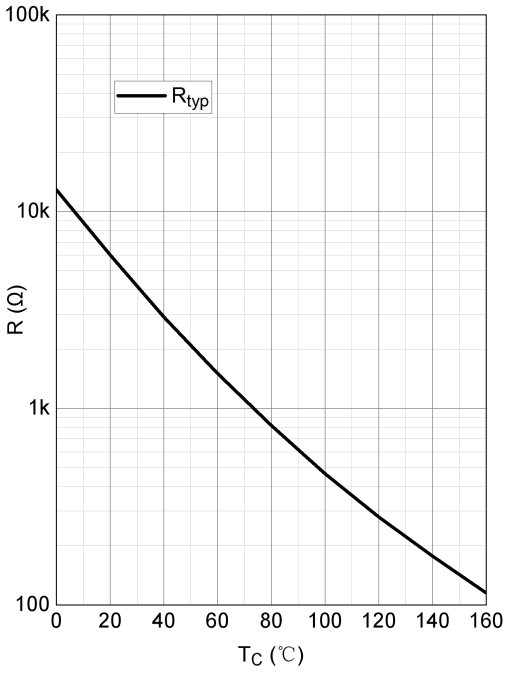
$E_{rec} = f(I_F)$,

$R_G$ = 1Ω，$V_{CE}$ = 600V

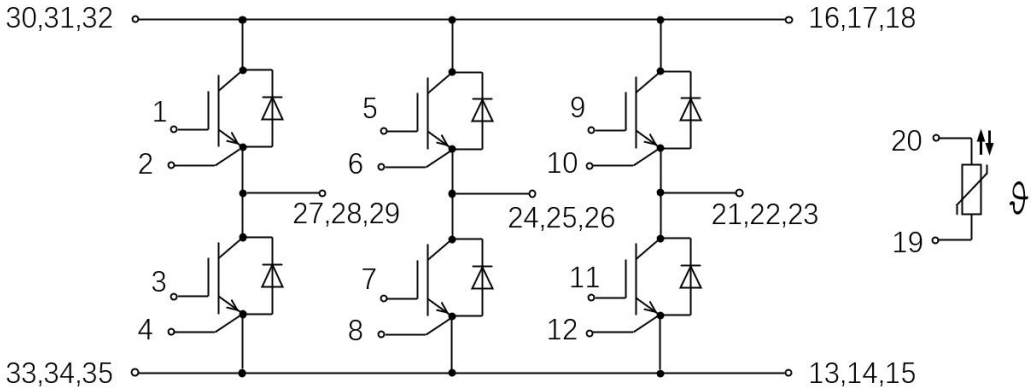



NTC-Thermistor-temperature characteristic (typical)

R = f (T)

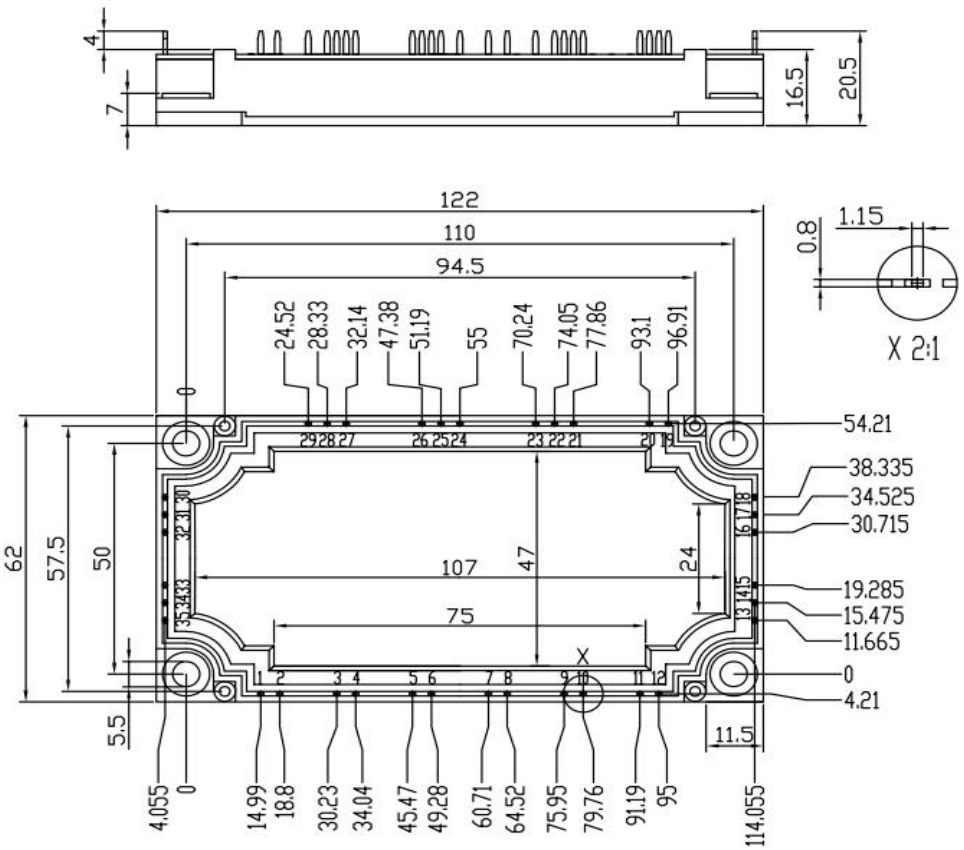


## Circuit Diagram




## Package Dimensions

(Dimensions in Millimeters)



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