

LEGM25BE120E1H7

IGBT Power Module

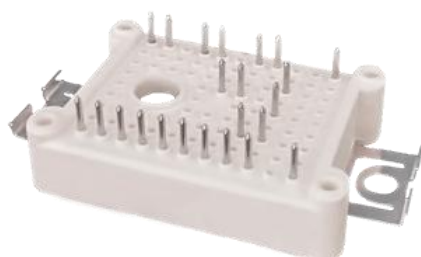
Features:

- $V_{CE}=1200V$ $I_C=25A$
- Low $V_{CE(sat)}$
- TRENCHSTOP™ IGBT7
- V_{CEsat} with positive temperature coefficient
- Overload operation up to 175°C
- Isolation Type Package

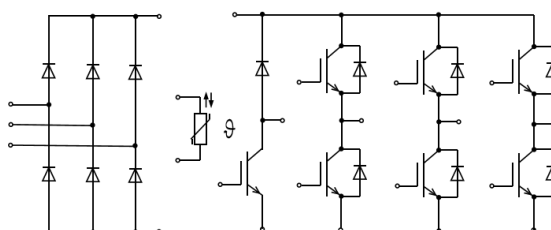
Applications:

- The inverter
- Motor control and drives

Package Type & Internal Circuit



E1



Internal Circuit

Maximum Rated Values (IGBT Inverter)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	$V_{EC}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	1200	V
I_C	Continuous Collector Current	$T_C=100^{\circ}C$	25	A
I_{CRM}	Peak Collector Current	$I_{CRM}=2I_C$	50	A
V_{GES}	Gate-Emitter Voltage	$T_{vj}=25^{\circ}C$	± 20	V

Maximum Rated Values (IGBT Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=25\text{ A}$, $V_{GE}=15\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		1.87		V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=0.8\text{ mA}$, $V_{CE}=V_{GE}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		5.74		V
Q_G	Gate charge	$V_{GE}=\pm 15\text{ V}$, $V_{CC}=600\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$		0.395		μC
$R_{g(int)}$	Internal gate resistor	$T_{vj}=25\text{ }^{\circ}\text{C}$		0.0		Ω
C_{ies}	Input capacitance	$f = 1\text{ MHz}$, $T_{vj}=25\text{ }^{\circ}\text{C}$, $V_{CE}=25\text{ V}$, $V_{GE}=0\text{ V}$		4.77		nF
C_{res}	Reverse transfer capacitance			0.017		nF
I_{CES}	Collector-Emitter Cut-off Current	$V_{CE}=1200\text{ V}$, $V_{GE}=0\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$			0.0056	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}$, $V_{GE}=15\text{ V}$, $T_{vj}=25\text{ }^{\circ}\text{C}$			100	nA
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=25\text{ A}$, $V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=6.2\Omega$ $T_{vj}=25\text{ }^{\circ}\text{C}$		0.037		μs
t_r	Rise Time, Inductive Load			0.02		μs
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			0.186		μs
t_f	Fall Time, Inductive Load			0.173		μs
E_{on}	Turn-on Energy Loss per Pulse			1.55		mJ
E_{off}	Turn-off Energy Loss per Pulse			1.58		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=25\text{ A}$, $V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=6.2\Omega$ $T_{vj}=175\text{ }^{\circ}\text{C}$		0.04		μs
t_r	Rise Time, Inductive Load			0.025		μs
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			0.334		μs
t_f	Fall Time, Inductive Load			0.285		μs
E_{on}	Turn-on Energy Loss per Pulse			2.45		mJ
E_{off}	Turn-off Energy Loss per Pulse			3.05		mJ
R_{thJH}	Junction-radiator thermal resistance	per IGBT		1.36		K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		175	$^{\circ}\text{C}$

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			25		A
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{ ms}$		50		A

Characteristic Values (Diode Inverter)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 25\text{ A}$, $V_{CE} = 0\text{ V}$, $T_{vj} = 25\text{ }^{\circ}\text{C}$		2.1		V
I_{rr}	Peak reverse recovery current	$I_F = 25\text{ A}$, $V_R = 600\text{ V}$ $-di/dt = 950\text{ A/us}$ $T_{vj} = 25\text{ }^{\circ}\text{C}$		24.2		A
Q_r	Recovered Charge			2.25		μC
E_{rec}	Reverse Recovery Energy			0.65		mJ
I_{rr}	Peak reverse recovery current	$I_F = 25\text{ A}$, $V_R = 600\text{ V}$ $-di/dt = 950\text{ A/us}$ $T_{vj} = 175\text{ }^{\circ}\text{C}$		37.6		A
Q_r	Recovered Charge			4.95		μC
E_{rec}	Reverse Recovery Energy			1.89		mJ
R_{thJH}	Junction-radiator thermal resistance	per Diode		1.96		K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		175	$^{\circ}\text{C}$

Maximum Rated Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}=25\text{ }^{\circ}\text{C}$		1600		V
I_{FRMSM}	Maximum RMS forward current per chip	$T_c=100\text{ }^{\circ}\text{C}$		25		A
I_{RMSM}	Maximum RMS current at rectifier chip	$T_c=100\text{ }^{\circ}\text{C}$		25		A
I_{FSM}	Surge forward current	$t_p=10\text{ms}$ $T_{vj}=25\text{ }^{\circ}\text{C}$		300		A
I^2t	I^2t -value			450		A ² S
I_{FSM}	Surge forward current	$t_p=10\text{ms}$ $T_{vj}=150\text{ }^{\circ}\text{C}$		245		A
I^2t	I^2t -value			300		A ² S

Characteristic Values (Diode Rectifier)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward voltage	$T_{vj}=150\text{ }^{\circ}\text{C}$ $I_F=10\text{A}$		0.8		V
I_R	Reverse current	$T_{vj}=150\text{ }^{\circ}\text{C}$ $V_R=1600\text{V}$		1.0		mA
R_{thJH}	Junction-radiator thermal resistance	per diode		1.5		K/W
T_{vjop}	Temperature under switching conditions		-40		150	$^{\circ}\text{C}$

Maximum Rated Values (IGBT Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{CES}	Collector-emitter voltage	$T_{vj}=25^{\circ}\text{C}$		1200		V
I_C	Continuous Collector Current	$T_C = 100^{\circ}\text{C}, T_{vj\max} = 150^{\circ}\text{C}$		25		A
I_{CRM}	Peak Collector Current	$I_{CRM}=2I_C$		50		A
V_{GES}	Gate-Emitter Voltage	$T_{vj}=25^{\circ}\text{C}$	-20		20	V

Characteristic Values (IGBT Brake-Chopper)

Symbol 0	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=25\text{ A}, V_{GE}=15\text{ V}, T_{vj}=25^{\circ}\text{C}$		1.87		V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=0.8\text{ mA}, V_{CE}=V_{GE}, T_{vj}=25^{\circ}\text{C}$		5.74		V
Q_G	Gate charge	$V_{GE}=\pm 15\text{ V}, V_{CC}=600\text{ V}, T_{vj}=25^{\circ}\text{C}$		0.395		μC
$R_{g(int)}$	Internal gate resistor	$T_{vj}=25^{\circ}\text{C}$		0.0		Ω
C_{ies}	Input capacitance	$f = 1\text{ MHz}, T_{vj}=25^{\circ}\text{C},$ $V_{CE}=25\text{ V}, V_{GE}=0\text{ V}$		4.77		nF
C_{res}	Reverse transfer capacitance			0.017		nF
I_{CES}	Collector-Emitter Cut-off Current	$V_{CE}=1200\text{ V}, V_{GE}=0\text{ V}, T_{vj}=25^{\circ}\text{C}$			0.0056	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0\text{ V}, V_{GE}=15\text{ V}, T_{vj}=25^{\circ}\text{C}$			100	nA
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=25\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=6.2\Omega$ $T_{vj}=25^{\circ}\text{C}$		0.037		μs
t_r	Rise Time, Inductive Load			0.020		μs
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			0.186		μs
t_f	Fall Time, Inductive Load			0.173		μs
E_{on}	Turn-on Energy Loss per Pulse			1.55		mJ
E_{off}	Turn-off Energy Loss per Pulse			1.58		mJ
$t_{d(on)}$	Turn-on Delay Time, Inductive Load	$I_C=25\text{ A}, V_{CE}=600\text{ V}$ $V_{GE}=\pm 15\text{ V}$ $R_G=6.2\Omega$ $T_{vj}=175^{\circ}\text{C}$		0.04		μs
t_r	Rise Time, Inductive Load			0.025		μs
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			0.334		μs
t_f	Fall Time, Inductive Load			0.285		μs
E_{on}	Turn-on Energy Loss per Pulse			2.45		mJ
E_{off}	Turn-off Energy Loss per Pulse			3.05		mJ

Characteristic Values (IGBT Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{SC}	Short Circuit Data	$V_{GE} \leq 15\text{ V}$, $V_{CC} = 800\text{ V}$, $V_{CEmax}=V_{CES}-L_{sCE} \cdot di/dt$ $t_p \leq 7\text{ }\mu\text{s}$, $T_{vj}=175\text{ }^\circ\text{C}$		75		A
R_{thJH}	Junction-radiator thermal resistance	per IGBT		1.36		K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		175	$^\circ\text{C}$

Maximum Rated Values (Diode Brake-Chopper)

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			25		A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ ms}$		50		A

Characteristics (Diode Brake-Chopper)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=25\text{ A}$, $V_{CE}=0\text{ V}$, $T_{vj} = 25\text{ }^\circ\text{C}$		2.1		V
I_{rr}	Peak reverse recovery current	$I_F=25\text{ A}$, $V_R=600\text{ V}$ $-di/dt=950\text{ A}/\mu\text{s}$ $T_{vj}=25\text{ }^\circ\text{C}$		24.2		A
Q_r	Recovered Charge			2.25		μC
E_{rec}	Reverse Recovery Energy			0.65		mJ
I_{rr}	Peak reverse recovery current	$I_F=25\text{ A}$, $V_R=600\text{ V}$ $-di/dt=950\text{ A}/\mu\text{s}$ $T_{vj}=175\text{ }^\circ\text{C}$		37.6		A
Q_r	Recovered Charge			4.95		μC
E_{rec}	Reverse Recovery Energy			1.89		mJ
R_{thJH}	Junction-radiator thermal resistance	per Diode		1.96		K/W
$T_{vj\text{ op}}$	Temperature under switching conditions		-40		175	$^\circ\text{C}$

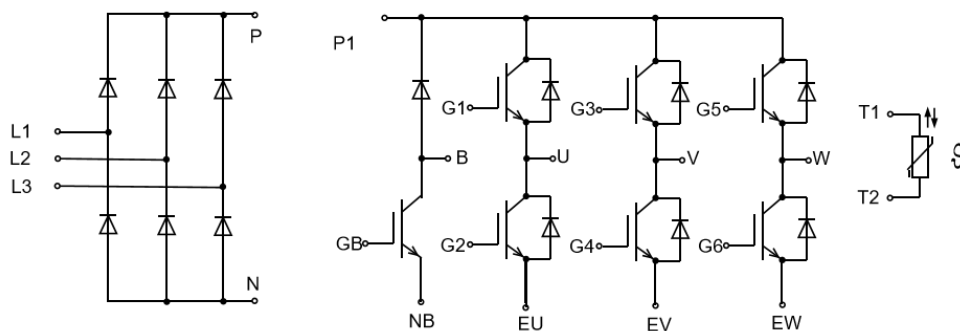
NTC-Thermistor (Characteristic Values)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated resistance	$T_c=25\text{ }^{\circ}\text{C}$		5		K Ω
$\Delta R/R$	Deviation of R100	$T_c=100\text{ }^{\circ}\text{C}$	-5		5	%
P_{25}	Power dissipation	$T_c=25\text{ }^{\circ}\text{C}$		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

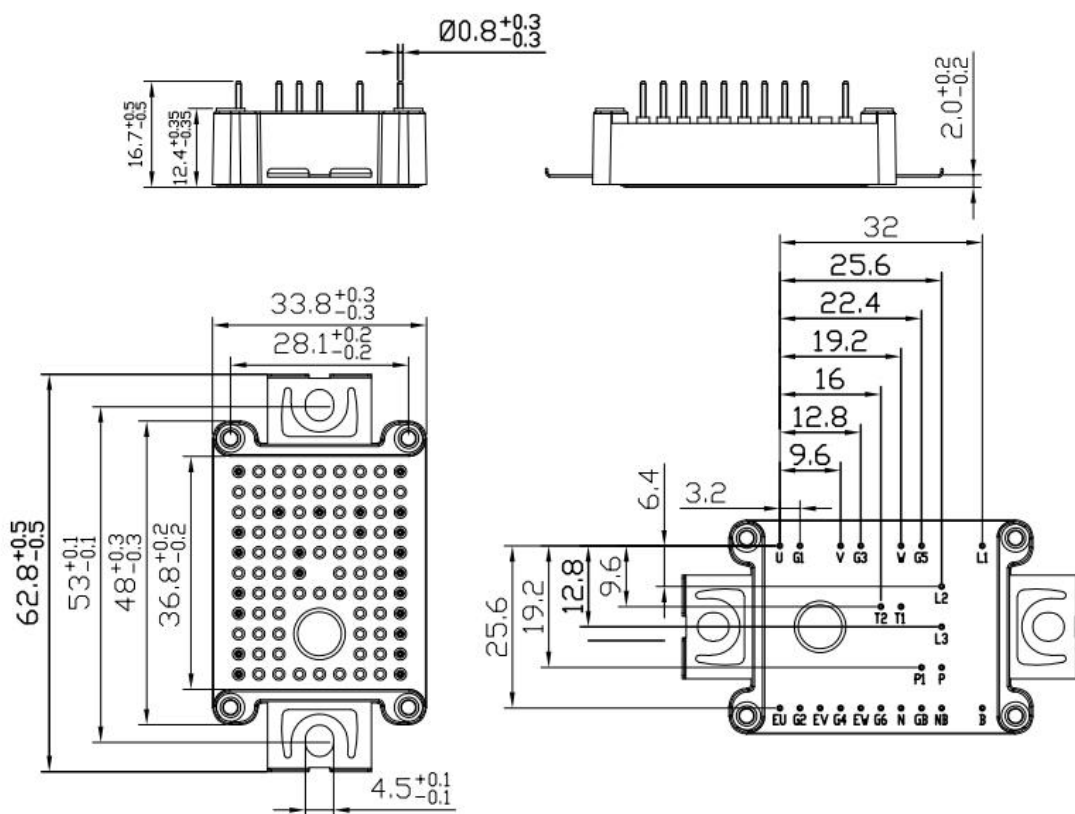
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{isol}	Isolation voltage	$t=1\text{ min}, f=50\text{ Hz}$	2500			V
T_{stg}	Storage Temperature		-40		125	$^{\circ}\text{C}$
F	Mounting Force per Clamp		20		50	N
G	Weight of Module			25		g

Circuit Diagram



Package Dimensions

(Dimensions in Millimeters)



DISCLAIMER

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE
TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE