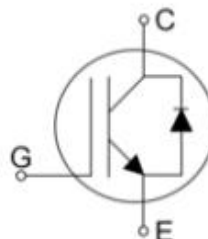


LEGP40N120AHF

IGBT Discrete

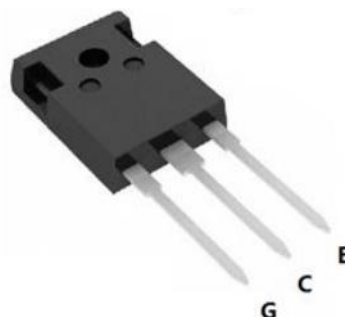
Features:

- 1200V/40A Trench Field Stop IGBT
- High breakdown voltage up to 1200V for improved reliability
- Trench-Stop Technology offering :
 - Low $V_{CE(sat)}$
 - Very tight parameter distribution
 - Short circuit withstand time – 10 μ s
 - High ruggedness, temperature stable
 - Easy parallel switching capability due to positive temperature coefficient in $V_{CE(sat)}$
- Enhanced avalanche capability



Applications:

- UPS
- Frequency converter
- PTC heater
- Climate compressor
- Solar inverter



Type	V_{CE}	I_C	$V_{CE(sat)}$ @ $I_C=40A$	Marking	Package
LEGP40N120AHF	1200V	40A	1.85 V	GP40N120AHF	TO-247-3L

Maximum Rated Values

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage		1200	V
I_C	Continuous Collector Current	$T_C=25^{\circ}\text{C}$	80	A
		$T_C=100^{\circ}\text{C}$	40	A
I_F	Diode Forward current	$T_C=25^{\circ}\text{C}$	80	A
		$T_C=100^{\circ}\text{C}$	40	A
V_{GE}	Gate-Emitter Voltage		± 20	V
V_{GE}	Transient Gate-Emitter Voltage		± 30	V
I_{Cplus}	Pulsed collector current		160	A
I_{Fplus}	Diode Pulsed Current		160	A
T_{sc}	Short Circuit Withstand Time	Short Circuit Withstand Time	10	us
P_{tot}	Total Power Dissipation	$T_C=25^{\circ}\text{C}$	428	W
T_{vj}	Operating Junction Temperature	Operating Junction Temperature	$-40\dots+175$	$^{\circ}\text{C}$
T_{stg}	Storage Temperature	Storage Temperature	$-55\dots+150$	$^{\circ}\text{C}$
	Soldering temperature	wave soldering 1.6mm (0.063in.) from case for 10s	260	$^{\circ}\text{C}$
M	Mounting torque	M3 screw Maximum of mounting processes: 3	0.6	Nm

Thermal Resistance

Symbol	Parameter	Ratings	Unit
$R_{\theta(j-c)}$	IGBT thermal resistance, junction - case	0.35	K/W
$R_{\theta(j-c)}$	Diode thermal resistance, junction - case	0.60	K/W
$R_{\theta(j-a)}$	Thermal resistance, junction - ambient	40	K/W

Characteristics Values of the IGBT

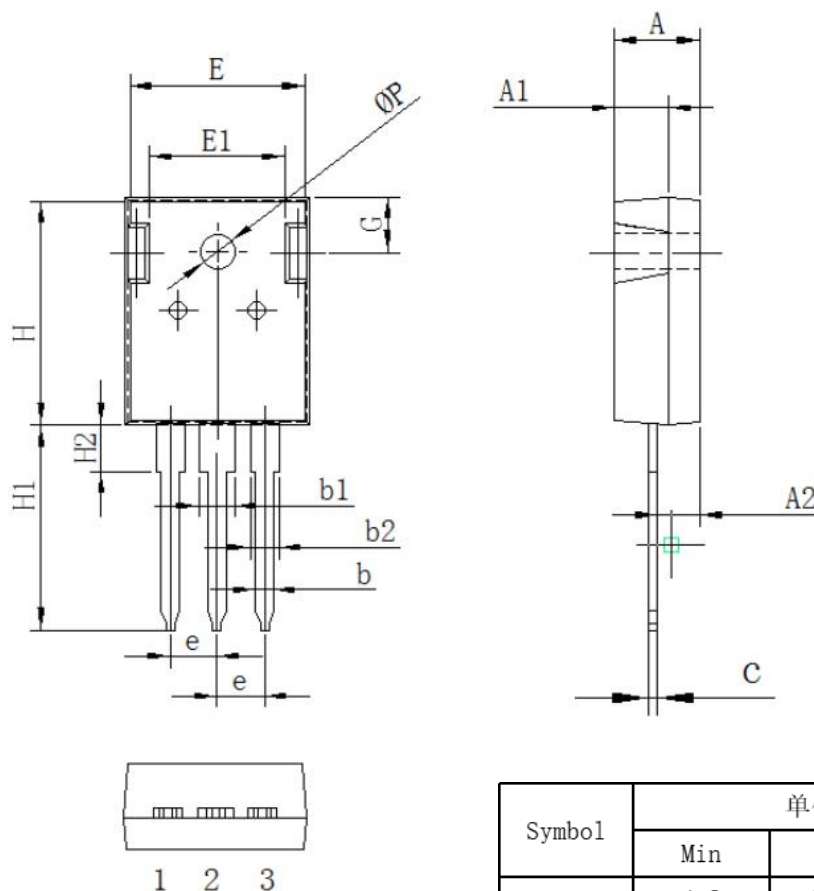
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	1200			V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=40 A, V_{GE}=15 V, T_{vj}=25^\circ C$		1.85	2.2	V
		$I_C=40 A, V_{GE}=15 V, T_{vj}=150^\circ C$		2.35		V
		$I_C=40 A, V_{GE}=15 V, T_{vj}=175^\circ C$		2.45		V
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=1.5 mA, V_{CE}=V_{GE}$	5.0	5.8	6.5	V
I_{CES}	Collector-Emitter Cut-off Current	$V_{CE}=1200V, V_{GE}=0 V, T_{vj}=25^\circ C$			0.1	mA
		$V_{CE}=1200V, V_{GE}=0 V, T_{vj}=175^\circ C$			4.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{CE}=0 V, V_{GE}=20 V, T_{vj}=25^\circ C$			250	nA
g_{FS}	Transconductance	$V_{CE}=20V, I_C=40A$		20		S
C_{ies}	Input Capacitance	$f = 1MHz, T_{vj}= 25^\circ C,$ $V_{CE}= 25 V, V_{GE}= 0 V$		3149		pF
C_{oes}	Output Capacitance			183		pF
C_{res}	Reverse Transfer Capacitance			103		pF
Q_G	Gate charge	$V_{CC}=600V, I_C=40A, V_{GE}=15V$		240		nC
$t_{d(on)}$	Turn-on Delay Time	$I_C=40 A, V_{CE}=600 V$ $V_{GE}=\pm 15 V$ $R_G=10\Omega$ $T_{vj}=25^\circ C$		186		ns
t_r	Rise Time, Inductive Load			38		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			234		ns
t_f	Fall Time, Inductive Load			159		ns
E_{on}	Turn-on Energy Loss per Pulse			1.6		mJ
E_{off}	Turn-off Energy Loss			3.0		mJ
$t_{d(on)}$	Turn-on Delay Time	$I_C=40 A, V_{CE}=600 V$ $V_{GE}=\pm 15 V$ $R_G=10\Omega$ $T_{vj}=175^\circ C$		187		ns
t_r	Rise Time, Inductive Load			39		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			318		ns
t_f	Fall Time, Inductive Load			290		ns
E_{on}	Turn-on Energy Loss per Pulse			3.4		mJ
E_{off}	Turn-off Energy Loss			4.8		mJ
I_{SC}	Short circuit collector current	$V_{GE}=15V, V_{CC}\leq 600V,$ $t_{SC}\leq 10\mu s, T_j=175^\circ C$		160		A

Characteristics Values of the Diode

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=40\text{ A}, T_{vj}=25\text{ }^{\circ}\text{C}$		2.2		V
		$I_F=40\text{ A}, T_{vj}=150\text{ }^{\circ}\text{C}$		1.8		V
		$I_F=40\text{ A}, T_{vj}=175\text{ }^{\circ}\text{C}$		1.6		V
t_{rr}	Reverse Recovery time	$I_F=40\text{ A}, V_R=600\text{ V}$ $-di/dt=500\text{ A/us}$ $T_{vj}=25\text{ }^{\circ}\text{C}$		255		ns
Q_r	Recovered Charge			2.0		μC
I_{rrm}	Diode peak reverse recovery current			18		A
t_{rr}	Reverse Recovery time	$I_F=40\text{ A}, V_R=600\text{ V}$ $-di/dt=500\text{ A/us}$ $T_{vj}=175\text{ }^{\circ}\text{C}$		526		ns
Q_r	Recovered Charge			9.0		μC
I_{rrm}	Diode peak reverse recovery current			37		A

Package Dimensions

TO-247



Symbol	单位 mm		
	Min	Nom	Max
A	4.8	5.00	5.20
A1	3.3	3.5	3.7
A2	2.20	2.40	2.60
b	1.00	1.2	1.40
b1	2.90	3.10	3.30
b2	1.90	2.10	2.30
c	0.50	0.60	0.70
e	5.25	5.45	5.65
E	15.2	15.7	16.2
E1	10.2	10.7	11.2
H	20.8	21	21.2
H1	19.5	20.0	20.5
H2	4.00	4.20	4.40
G	5.60	5.80	600
ΦP	3.30	3.50	3.70

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2. Operating conditions may differ from simulation assumptions in several aspects like level of DC-link voltage, applied gate-voltage and gate-resistor, case and junction temperatures as well as the power circuit stray-inductance. Therefore, deviations of parameters and assumptions used for the simulation and the real application may exist.
3. Although Leading Energy is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors. Therefore, in order to prevent personal injury or fire arising from failure, please take necessary safety measures. Leading Energy shall have no responsibility for any damages arising out of the use of our products beyond the rating specified by Leading Energy.
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