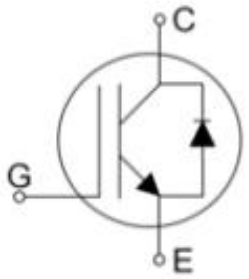
Nov.2025

LEGP40N65AH

IGBT Discrete

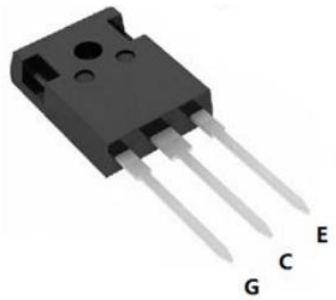
Features:

- 650V/40A Trench Field Stop IGBT
- High breakdown voltage up to 650V for improved reliability
- Trench-Stop Technology offering :
  - Low $V_{CE(sat)}$
  - High speed switching
  - Low switching losses
  - High ruggedness, temperature stable
  - Easy parallel switching capability due to positive temperature coefficient in $V_{CE(sat)}$
- Converter with high switching frequency



Applications:

- Soft switching applications
- Air conditioning
- Motor drive inverter



Type	V_{CE}	I_C	$V_{CE(sat)}$ @I_C=40A	Marking	Package
LEGP40N65AH	650V	40A	1.6 V	GP40N65AH	TO-247-3L

Maximum Rated Values

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	T_{vj}=25℃	650	V
I_C	Continuous Collector Current	T_C=25℃	80	A
		T_C=100℃	40	A
I_F	Diode Forward current	T_C=25℃	40	A
		T_C=100℃	20	A
V_{GE}	Gate-Emitter Voltage		±20	V
V_{GE}	Transient Gate-Emitter Voltage		±30	V
I_{CRM}	Pulsed Collector Current		160	A
I_{Fplus}	Diode Pulsed Current		80	A
T_{sc}	Short Circuit Withstand Time	V_{GE}= 15V, V_{CE}= 400V	5	μs
P_{tot}	Total Power Dissipation	T_C=25℃		W
T_{vj}	Operating Junction Temperature	Operating Junction Temperature	-40...+175	℃
T_{stg}	Storage Temperature	Storage Temperature	-55...+150	℃
	Soldering temperature	wave soldering 1.6mm (0.063in.) from case for 10s	260	℃

Thermal Resistance

Symbol	Parameter	Ratings	Unit
$R_{θ(j-c)}$	IGBT thermal resistance, junction - case	0.6	K/W
$R_{θ(j-a)}$	Thermal resistance, junction - ambient	40	K/W

Characteristics Values of the IGBT

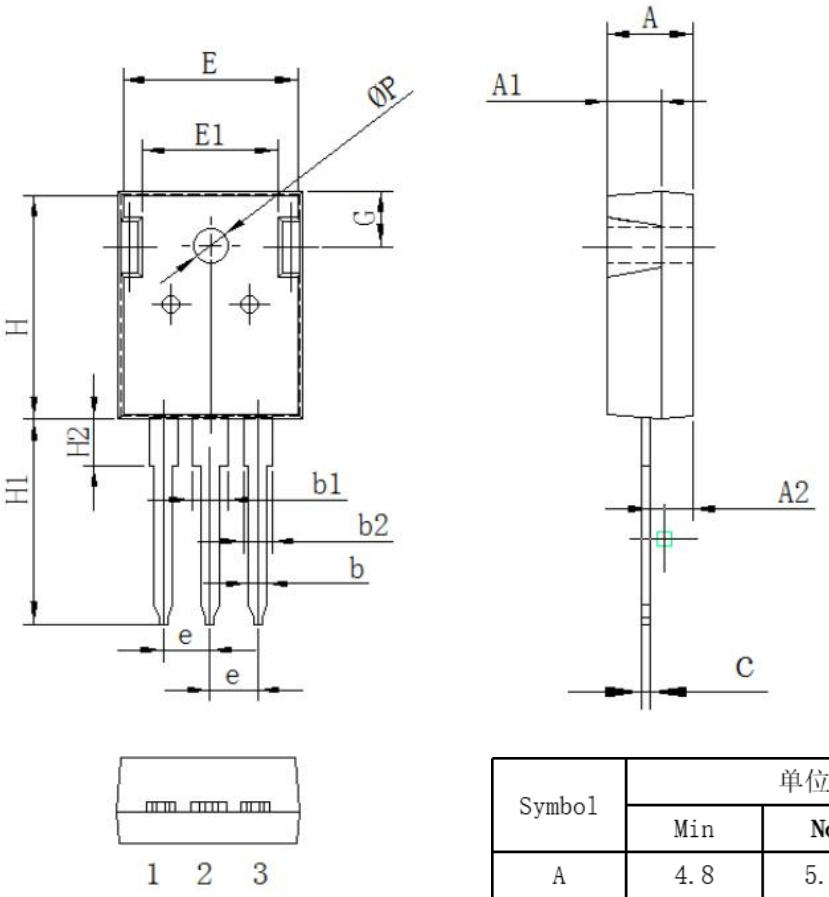
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 0.25mA	650			V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=40 A, V_{GE}=15 V, T_{vj}=25 ℃		1.6	2.1	V
		I_C=40 A, V_{GE}=15 V, T_{vj}=175 ℃		2.1		V
$V_{GE(th)}$	Gate Threshold Voltage	I_C= 0.8 mA,V_{CE}=V_{GE}	5.0	5.7	6.2	V
I_{CES}	Collector-Emitter Cut-off Current	V_{CE}=650V, V_{GE}=0 V, T_{vj}=25 ℃			0.1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{CE}=0 V, V_{GE}=20 V, T_{vj}=25 ℃			250	nA
C_{iss}	Input capacitance	f = 1MHz, T_{vj}= 25℃, V_{CE}= 25 V, V_{GE}= 0 V		2996		pF
C_{oss}	Output capacitance			119		pF
C_{rss}	Reverse transfer capacitance			23.4		pF
$t_{d(on)}$	Turn-on Delay Time	I_C=40 A,V_{CE}=400 V, V_{GE}=±15 V, R_G=10 Ω, T_{vj}=25 ℃		77		ns
t_r	Rise Time, Inductive Load			46		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			161		ns
t_f	Fall Time, Inductive Load			44		ns
E_{on}	Turn-on Energy Loss per Pulse			0.60		mJ
E_{off}	Turn-off Energy Loss			0.87		mJ
$t_{d(on)}$	Turn-on Delay Time	I_C=40 A,V_{CE}=400 V, V_{GE}=±15 V, R_G=10 Ω, T_{vj}=175 ℃		79		ns
t_r	Rise Time, Inductive Load			54		ns
$t_{d(off)}$	Turn-off Delay Time, Inductive Load			171		ns
t_f	Fall Time, Inductive Load			70		ns
E_{on}	Turn-on Energy Loss per Pulse			1.31		mJ
E_{off}	Turn-off Energy Loss			1.08		mJ

Characteristics Values of the Diode

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=20 A,T_{vj}=25 ℃		1.54		V
		I_F=20 A,T_{vj}=150 ℃		1.15		V
I_{rr}	Reverse Recovery Current	I_C=40 A,V_{CE}=400 V di/dt=800A/μs, T_{vj}=25 ℃		14.9		A
Q_r	Recovered Charge			575		nC
t_{rr}	Reverse Recovery Energy			60		ns
I_{rr}	Reverse Recovery Current	I_C=40 A,V_{CE}=400 V di/dt=606A/μs, T_{vj}=175 ℃		24.5		A
Q_r	Recovered Charge			1859		nC
t_{rr}	Reverse Recovery Energy			112		ns

Package Dimensions

TO-247-3L



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

DISCLAIMER

1. This product datasheet is subject to change without prior notice. Leading Energy reserves the right to modify products for performance enhancement or other purposes.
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.
4. Due to the technical requirements, our product may contain dangerous substances. For further information, please contact the relevant sales representative.
5. This product datasheet is for reference only and is not part of the contract. The technical agreement signed by both parties shall prevail.