JHB10N60EE/JHP10N60EE

Product Preview

600V 10A FIELD-STOP TRENCH IGBT WITH DIODE

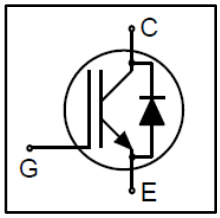
Features

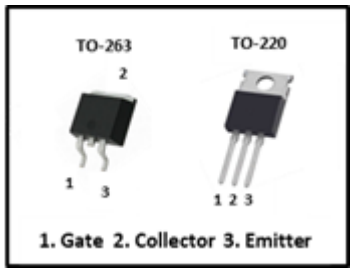
- Low $V_{CE(sat)}$
- Fast Switching
- High Ruggedness
- Short-Circuit Rated

Product Summary	
V_{CES}	600V
I_C	10A[(1)]
$V_{CE(sat),typ.}$	1.45V (T_J = 25°C)
Package	JHB10N60EE: TO-263 JHP10N60EE: TO-220

Applications

- Motor Control
- Servo
- Home Appliances
- General Purpose Inverters





Ordering Information

Part Number	Marking	Package	Packing
JHB10N60EE	HB10N60EE	TO-263	Tube
JHB10N60EE_R	HB10N60EE	TO-263	Tape and reel
JHP10N60EE	HP10N60EE	TO-220	Tube

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Collector-to-Emitter Voltage	V_{CES}	600	V
Gate-to-Emitter Voltage	V_{GES}	±20	
DC Collector Current (T_c = 100°C, T_J = 150°C)	I_C	13.7	A
Pulsed Collector Current (pulse width limited by max T_J)	I_{CM}	40	
Diode Forward Current (T_c = 100°C, T_J = 150°C)	I_F	20	
Diode Pulsed Current (pulse width limited by max T_J)	I_{FM}	40	
Maximum Power Dissipation (T_c = 25°C, T_J = 150°C)	$P_{D(max)}$	83	W
Operating Junction Temperature	T_J	-40 to +150	°C
Storage Temperature	T_{stg}	-40 to +150	

Static Electrical Characteristics (2)

Parameter	Symbol	Test Conditions	Min	Typ.	Max	Unit
Collector-to-Emitter Breakdown Voltage	BV_{CES}	V_{GE} = 0V, I_C = 250μA	600	-	-	V
Collector-to-Emitter Leakage Current	I_{CES}	V_{CE} = 600V, V_{GE} = 0V	-	-	10	μA
		V_{CE} = 600V, V_{GE} = 0V T_J = 150°C	-	-	250	
Gate-to-Emitter Leakage Current	I_{GES}	V_{CE} = 0V, V_{GE} = ±20V	-	-	100	nA
Gate Threshold Voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 250μA	5.2	6.2	7.2	V
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C = 10A	-	1.45	1.8	V
		V_{GE} = 15V, I_C = 10A, T_J =150°C	-	1.7	-	
Diode Forward Voltage	V_F	V_{GE} = 0V, I_F = 10A	-	1.5	2.0	V
		V_{GE} = 0V, I_F = 10A T_J =150°C	-	1.2	-	

Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Junction-to-Ambient Thermal Resistance (TO-263, TO-220)	$R_{\theta JA}$	-	-	62	°C/W
Junction-to-Case Thermal Resistance (TO-263, TO-220), IGBT	$R_{\theta JC}$	-	-	1.5	
Junction-to-Case Thermal Resistance (TO-263, TO-220), Diode		-	-	1.4	

Dynamic Electrical Characteristics (2)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Total Gate Charge	Q_g	V_{CC} = 400V, V_{GE} = 15V, I_C = 10A	-	21	-	nC
Input Capacitance	C_{iss}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	-	570	-	pF
Output Capacitance	C_{oss}		-	56	-	
Reverse Transfer Capacitance	C_{rss}		-	12	-	

Switching Characteristics, Inductive Load (2), (3)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(ON)}$	V_{CC} = 400V, V_{GE} = 0/15V, R_G = 10Ω, I_C = 10A, L_{load} = 0.82mH (Energy losses include "tail" and FRD reverse recovery)	-	15	-	ns
Rise Time	t_r		-	13	-	
Turn-off delay time	$t_{d(OFF)}$		-	70	-	
Fall Time	t_f		-	95	-	
Turn-On Switching Loss	E_{on}		-	0.17	-	mJ
Turn-Off Switching Loss	E_{off}		-	0.16	-	
Total Switching Loss	E_{ts}		-	0.33	-	
Short Circuit Capability	t_{SC}	V_{GE} = 15V, V_{CC} ≤ 400V, V_P ≤ 600V	5	-	-	μs
Short Circuit Collector Current	$I_{C(SC)}$		-	65	-	A

(1) T_c = 115°C, T_J = 150°C.

(2) T_J = 25°C unless otherwise specified.

(3) t_r: from 10% of Ic to 90% of Ic; t_f: from 90% of Ic to 10% of Ic;

E_{on}: from 10% of V_{GE} to 10% of V_{CE}; E_{off}: from 90% of V_{GE} to 10% of Ic.

Typical Electrical Characteristics

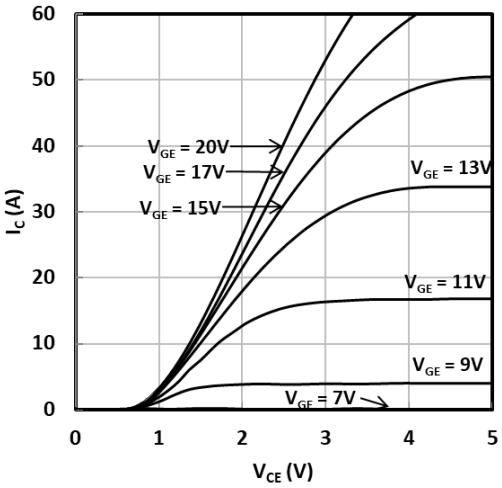


Fig. 1 Typical output characteristics

(T_J = 25 °C, t_p = 250 µs)

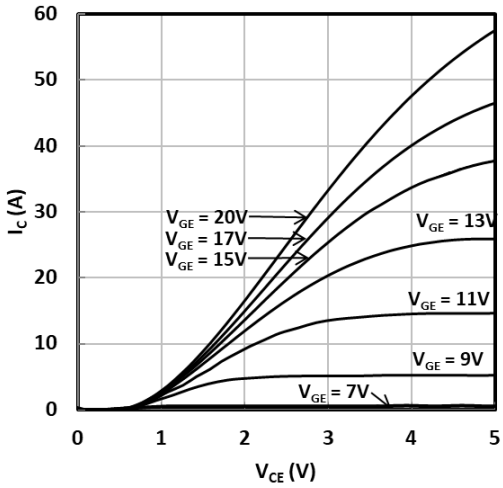


Fig. 2 Typical output characteristics

(T_J = 150 °C, t_p = 250 µs)

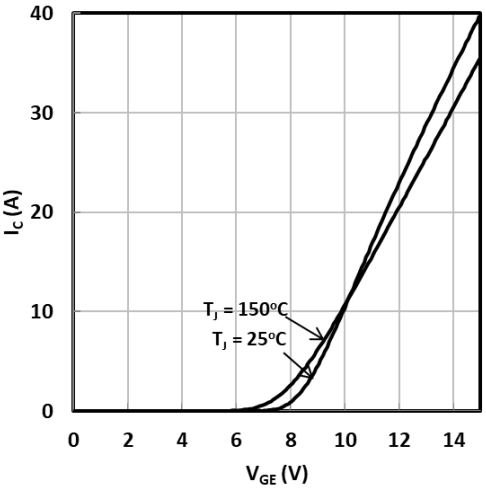


Fig. 3 Typical transfer characteristics

(V_{CE} = 20 V, t_p = 250 µs)

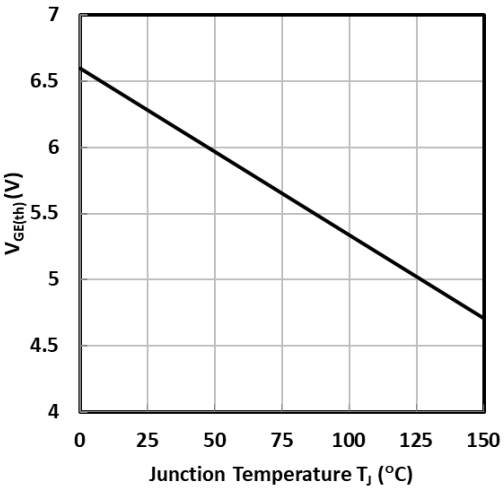


Fig. 4 Typical gate threshold voltage as a function of junction temperature

(V_{CE} = V_{GE} , I_C = 250 µA)

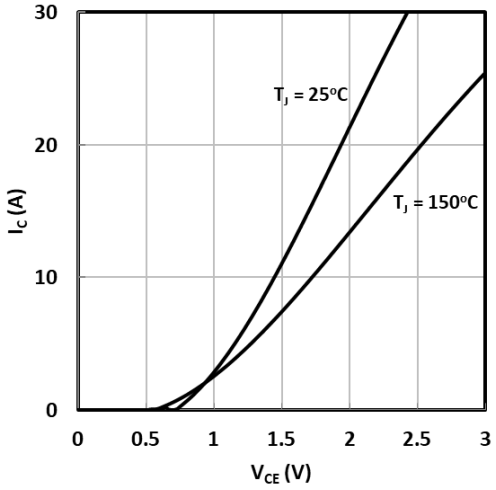


Fig. 5 Typical saturation voltage characteristics

(V_{GE} = 15 V, t_p = 250 µs)

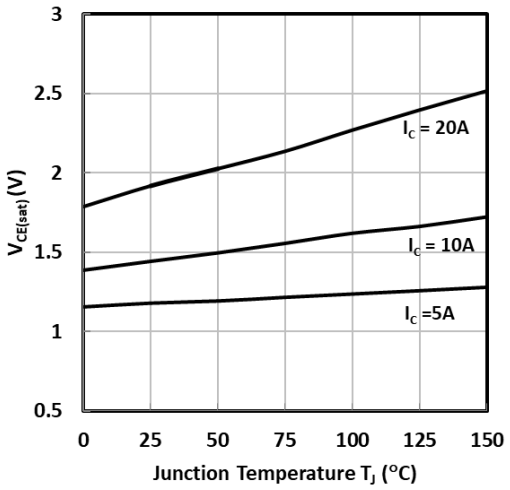


Fig. 6 Typical saturation voltage as a function of junction temperature

(V_{GE} = 15 V, t_p = 250 µs)

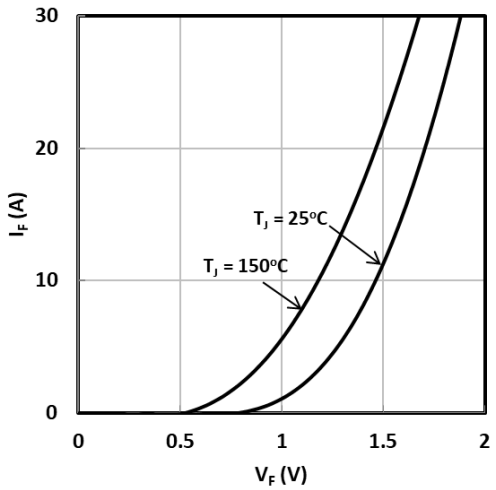


Fig. 7 Typical diode forward current as a function of forward voltage

(V_{GE} = 0 V, t_p = 250 µs)

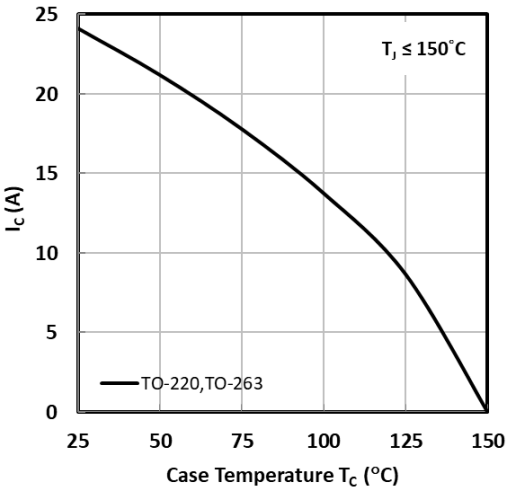


Fig. 8 Maximum DC collector current as a function of case temperature

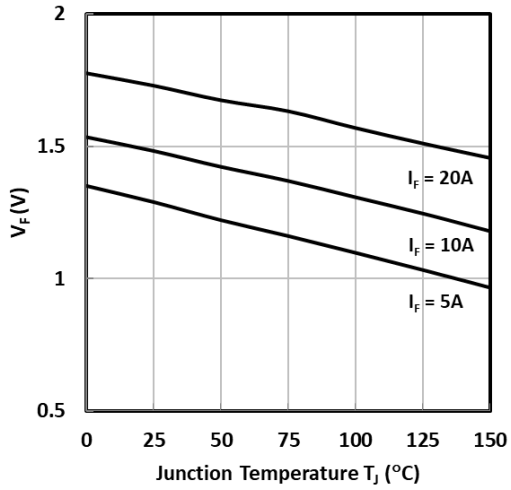


Fig. 9 Typical diode forward voltage as a function of junction temperature

(V_{GE} = 0 V, t_p = 250 µs)

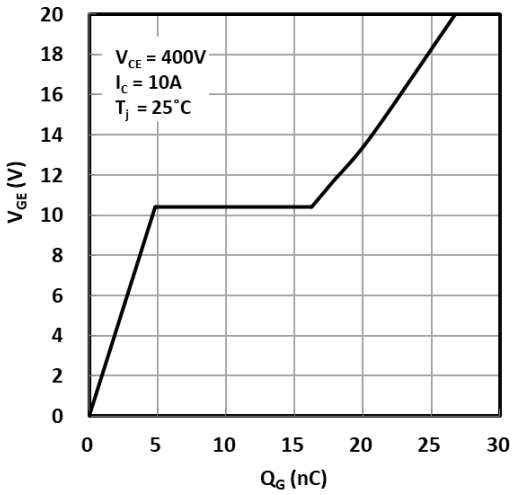


Fig. 10 Typical gate charge characteristics

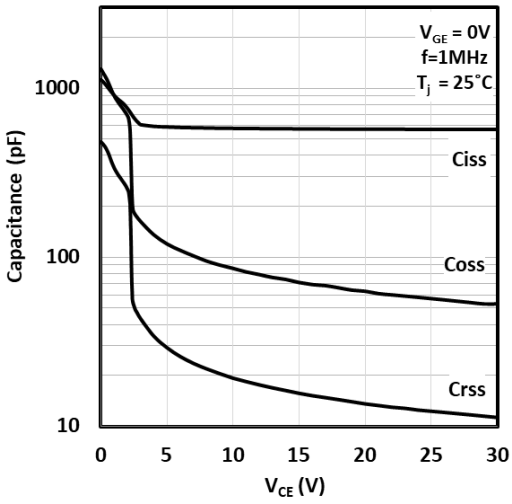
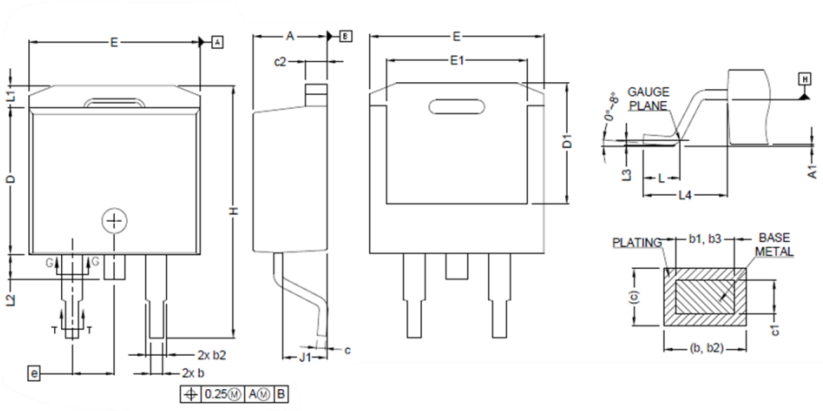


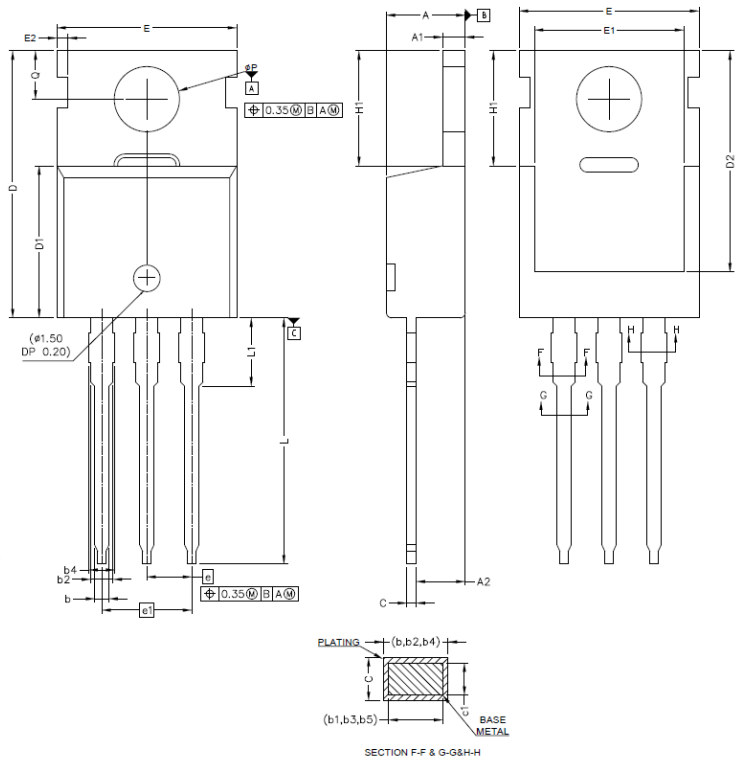
Fig. 11 Typical capacitance as a function of collector-to-emitter voltage

Package Drawing



SYMBOL	MIN.	MAX.
A	4.36	4.56
A1	0	0.25
b	0.70	0.90
b1	0.51	0.89
b2	1.20	1.46
b3	1.17	1.37
c	0.38	0.694
c1	0.38	0.534
c2	1.19	1.34
D	8.60	9.00
D1	6.9	7.5
E	10.15	10.55
E1	8.1	8.7
e	2.54 BSC	
H	15.0	15.6
L	1.9	2.5
L1	-	1.65
L2	-	1.78
L3	0.25 TYP	
L4	4.78	5.28
J1	2.56	2.96

TO-263



SYMBOL	MIN	MAX
A	4.25	4.65
A1	1.20	1.34
A2	2.56	2.92
b	0.71	0.97
b1	0.38	0.91
b2	1.14	1.78
b3	1.14	1.73
b4	1.14	1.78
b5	1.14	1.73
c	0.46	0.61
c1	0.36	0.56
D	14.32	15.86
D1	8.39	8.79
D2	12.20	12.80
E	9.96	10.36
E1	8.14	8.74
E2	0.59	0.69
e	2.54 BSC	
e1	5.08 BSC	
H1	6.30	6.70
L	13.40	14.40
L1	3.65	4.05
ØP	3.60	3.80
Q	2.54	2.94

TO-220

Revision history of JHB10N60EE/JHP10N60EE Specification

Version	Change Items	Effective Date
1.00	Initial Release.	22-Jun-20
1.01	Thermal specification updates.	24-Jun-20

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