JHK100N120FA

Product Preview

1200V/100A FIELD-STOP TRENCH IGBT WITH DIODE

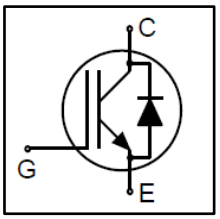
Features

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

Product Summary	
V_{CES}	1200V
I_C	100A (1)
$V_{CE(sat),typ}$	1.65V (T_J = 25°C)
Package	TO-264

Applications

- Inverters
- Frequency Converters
- Industrial Motor Drives
- Uninterrupted Power Supply



Ordering Information

Part Number	Marking	Package	Packing
JHK100N120FA	HK100N120FA	TO-264	Tube

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Collector-to-Emitter Voltage	V_{CES}	1200	V
Gate-to-Emitter Voltage	V_{GES}	±20	
DC Collector Current (T_c = 25°C, T_J = 150°C)	I_C	160 (2)	A
DC Collector Current (T_c = 100°C, T_J = 150°C)		103	
Pulsed Collector Current (pulse width limited by maximum T_J)	I_{CM}	300	
Diode Forward Current (T_c = 25°C, T_J = 150°C)	I_F	160 (2)	
Diode Forward Current (T_c = 100°C, T_J = 150°C)		100	
Diode Pulsed Current (pulse width limited by maximum T_J)	I_{FM}	300	
Short Circuit Withstand Time (V_{GE} = 15V, V_{CC} ≤ 600V, T_{J_start} ≤ 150°C)	t_{SC}	10	µs
Turn-off Safe Operating Area (V_{CE} ≤ 1200V, T_J ≤ 150°C)	-	300	A
Maximum Power Dissipation (T_c = 25°C, T_J = 150°C)	$P_{D(max)}$	696	W
Operating Junction Temperature	T_J	-40 to +150	°C
Storage Temperature	T_{stg}	-55 to +150	
Maximum Lead Temperature for Soldering (1/8" from case for 5 seconds)	T_{sld}	260	

Static Electrical Characteristics (3)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-to-Emitter Breakdown Voltage	BV_{CES}	V_{GE} = 0V, I_C = 250μA	1200	-	-	V
Collector-to-Emitter Leakage Current	I_{CES}	V_{CE} = 1200V, V_{GE} = 0V	-	-	10	μA
		V_{CE} = 1200V, V_{GE} = 0V, T_J =150°C	-	-	5	mA
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 = 1.5mA	5.5	6.5	7.5	V
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C = 100A	-	1.65	2.0	
		V_{GE} = 15V, I_C = 100A, T_J =150°C	-	2.2	-	
Diode Forward Voltage	V_F	V_{GE} = 0V, I_F = 100A	-	1.85	2.25	
		V_{GE} = 0V, I_F = 100A T_J =150°C	-	1.6	-	

Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$	-	-	25	°C/W
Junction-to-Case Thermal Resistance, IGBT	$R_{\theta JC}$	-	-	0.18	
Junction-to-Case Thermal Resistance, Diode		-	-	0.26	

Dynamic Electrical Characteristics (3)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Total Gate Charge	Q_g	V_{CC} = 600V, V_{GE} = 15V, I_C = 100A	-	478	-	nC
Input Capacitance	C_{iss}	V_{CE}= 25V, V_{GE} = 0V, f = 1MHz	-	9605	-	pF
Output Capacitance	C_{oss}		-	413	-	
Reverse Transfer Capacitance	C_{rss}		-	98	-	

Switching Characteristics, Inductive Load (3), (4)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Turn-on Delay time	$t_{d(ON)}$	V_{CC} = 600V, V_{GE} = 0/15V, R_G = 1Ω, I_C = 100A, L_{load} = 0.82mH, Energy losses include "tail" and diode reverse recovery.	-	62	-	ns
Rise Time	t_r		-	90	-	
Turn-off Delay time	$t_{d(OFF)}$		-	280	-	
Fall Time	t_f		-	119	-	
Turn-On Switching Loss	E_{on}		-	9.37	-	mJ
Turn-Off Switching Loss	E_{off}		-	5.07	-	
IGBT Total Switching Loss	E_{ts}		-	14.44	-	
Diode Reverse-Recovery Time	t_{rr}	V_R = 600V, I_F = 100A, dI_F/dt = 900A/μs	-	249	-	ns
Diode Reverse-Recovery Charge	Q_{rr}		-	5160	-	nC
Diode Peak Reverse-Recovery Current	I_{rrm}		-	37	-	A
Short Circuit Collector Current	$I_{C(SC)}$	V_{GE} = 15V, V_{CC} ≤ 600V, t_{SC} ≤ 10μs	-	350	-	A

(1) DC collector current, T_c = 102°C, T_J = 150°C.

(2) Limited by bonding wire

(3) T_J = 25°C unless otherwise specified

(4) 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

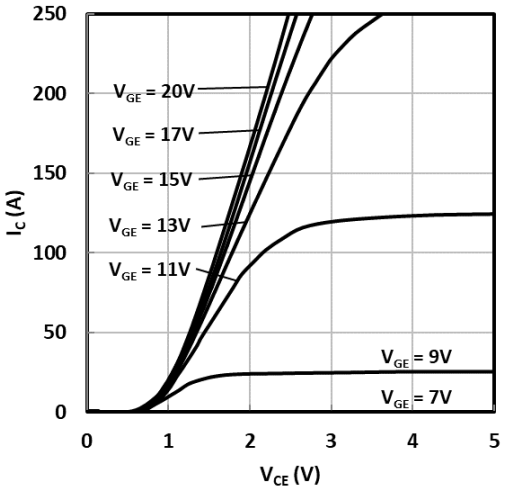


Fig. 1 Typical output characteristics

(T_J = 25 °C, t_p = 250 µs)

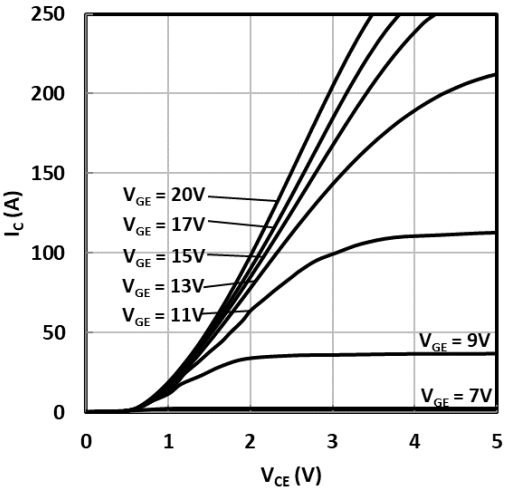


Fig. 2 Typical output characteristics

(T_J = 150 °C, t_p = 250 µs)

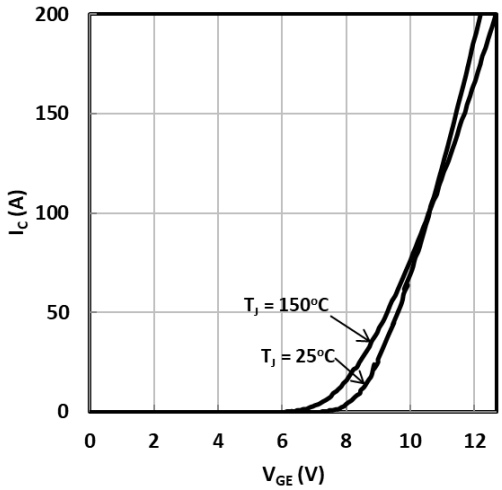


Fig. 3 Typical transfer characteristics

(V_{CE} = 20 V, t_p = 250 µs)

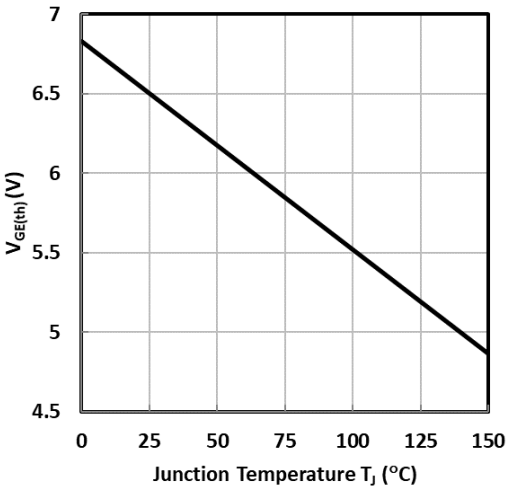


Fig. 4 Typical gate threshold voltage as a function of junction temperature

(V_{CE} = V_{GE} , I_C = 1.5mA)

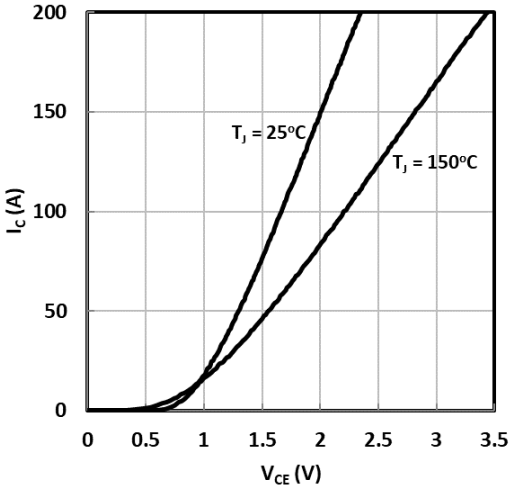


Fig. 5 Typical saturation voltage characteristics

(V_{GE} = 15 V, t_p = 250 µs)

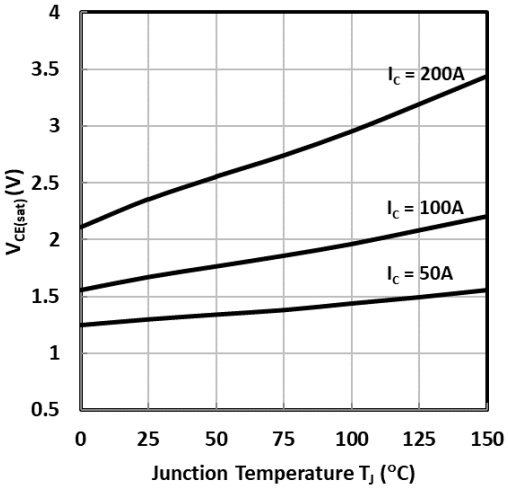


Fig. 6 Typical saturation voltage as a function of junction temperature

(V_{GE} = 15 V, t_p = 250 µs)

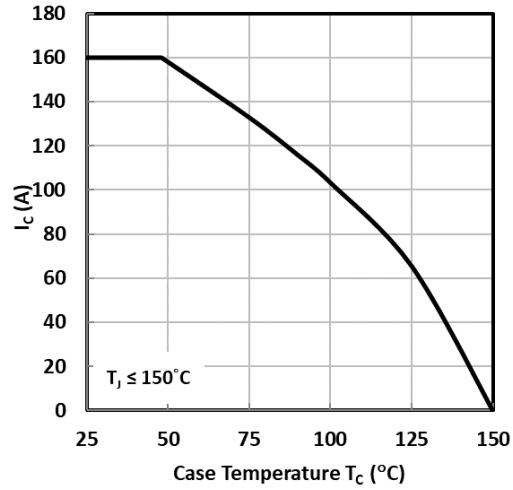


Fig. 7 Maximum DC collector current as a function of case temperature

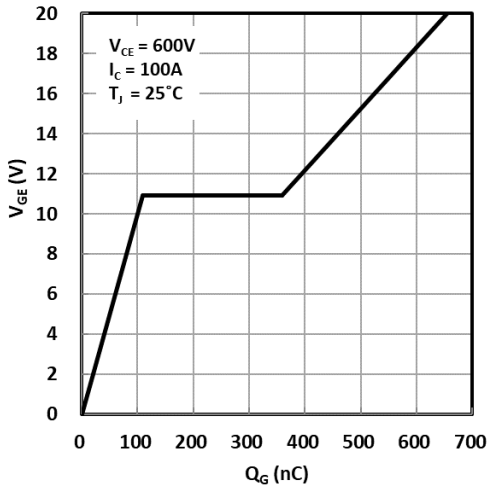


Fig. 8 Typical gate charge characteristics

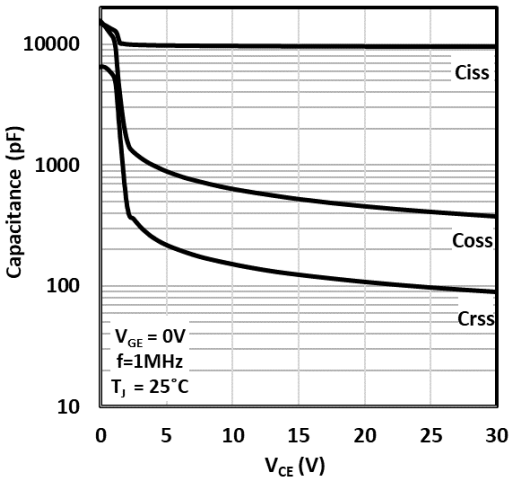


Fig. 9 Typical capacitance as a function of collector-to-emitter voltage

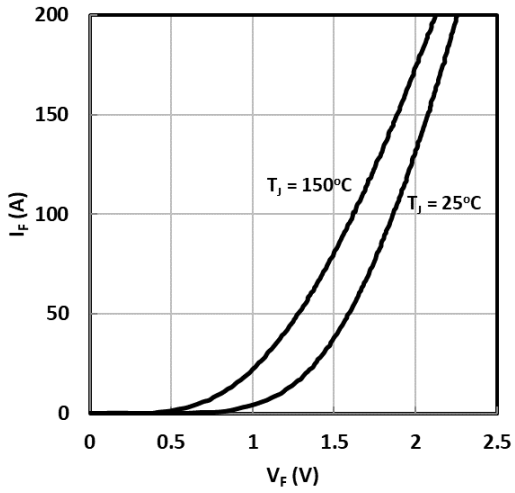


Fig. 10 Typical diode forward current as a function of forward voltage

(V_{GE} = 0 V, t_p = 250 µs)

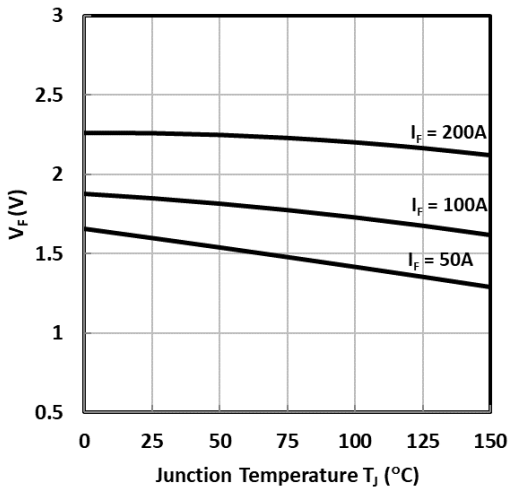
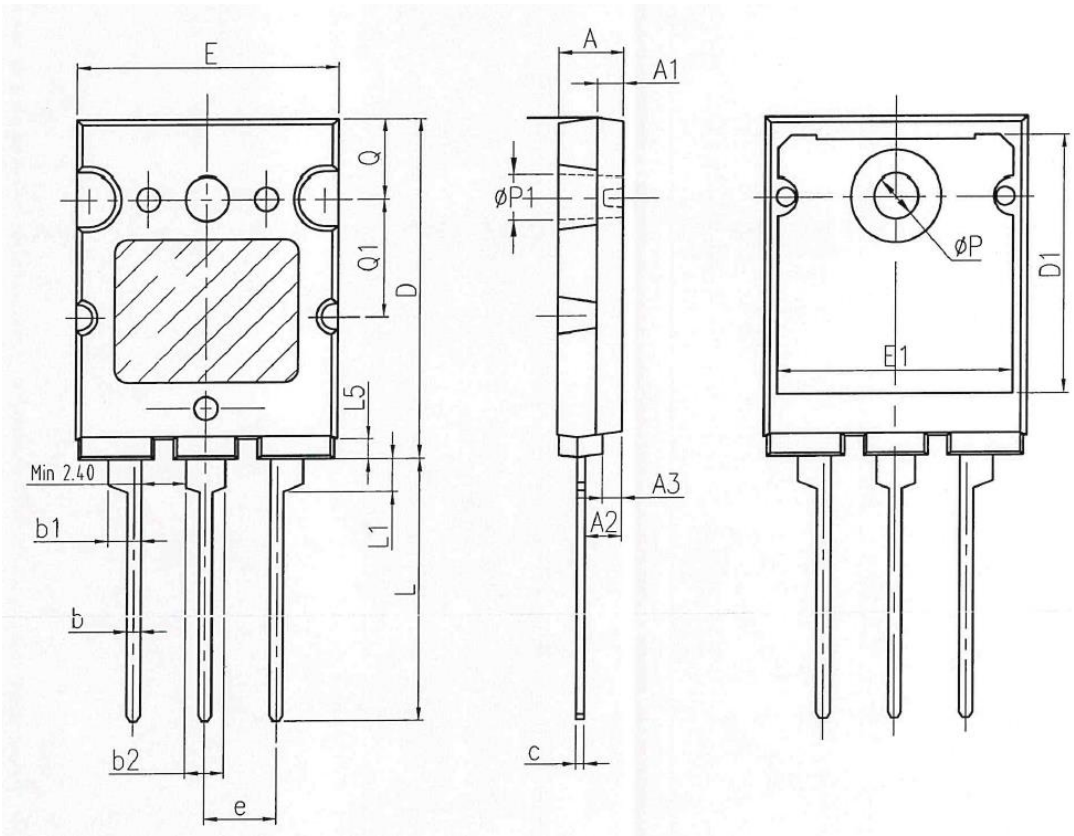


Fig. 11 Typical diode forward voltage as a function of junction temperature

Package Drawing



SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1		2.00 REF	
A2	2.50	2.80	3.10
A3		1.50 REF	
b	0.90	1.00	1.25
b1	2.30	2.50	2.75
b2	2.80	3.00	3.20
c	0.50	0.60	0.85
D	25.70	26.00	26.30
D1	19.00	-	-
E	19.50	20.00	20.50
E1	16.00	-	-
e		5.45 TYP	
L	19.50	20.00	20.50
L1	2.20	2.50	2.70
L5		1.35 REF	
ΦP	3.00	3.20	3.40
ΦP1	3.20	3.40	3.60
Q	5.80	6.00	6.20
Q1	8.80	9.00	9.20

TO-264

Revision history of JHK100N120FA Specification

Version	Change Items	Effective Date
1.00	Initial Release	10-Aug-21

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