

JHH75N120HA

Product Preview

**1200V/75A HIGH SPEED FIELD-STOP TRENCH IGBT
WITH DIODE**

Features

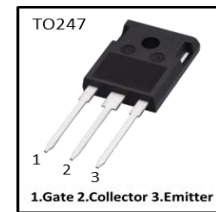
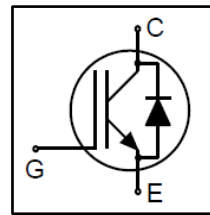
- High Speed Switching
- Low $V_{CE(sat)}$
- High Ruggedness



Product Summary	
V_{CES}	1200V
I_C	75A ⁽¹⁾
$V_{CE(sat),typ}$	1.75V ($T_J = 25^\circ\text{C}$)
Package	TO-247

Applications

- High Frequency Converters
- Uninterrupted Power Supply
- Solar Inverters
- Welding


Ordering Information

Part Number	Marking	Package	Packing
JHH75N120HA	HH75N120HA	TO-247	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 ($T_c = 25^\circ\text{C}$, $T_J = 175^\circ\text{C}$)	I_C	109	A
DC Collector Current ($T_c = 90^\circ\text{C}$, $T_J = 175^\circ\text{C}$)		75	
Pulsed Collector Current (pulse width limited by maximum T_J)	I_{CM}	225	
Diode Forward Current ($T_c = 25^\circ\text{C}$, $T_J = 175^\circ\text{C}$)	I_F	114	
Diode Forward Current ($T_c = 90^\circ\text{C}$, $T_J = 175^\circ\text{C}$)		75	
Diode Pulsed Current (pulse width limited by maximum T_J)	I_{FM}	225	
Turn-off Safe Operating Area ($V_{CE} \leq 1200\text{V}$, $T_J \leq 175^\circ\text{C}$)	-	225	A
Maximum Power Dissipation ($T_c = 25^\circ\text{C}$, $T_J = 175^\circ\text{C}$)	$P_{D(max)}$	441	W
Operating Junction Temperature	T_J	-40 to +175	°C
Storage Temperature	T_{stg}	-55 to +150	
Maximum Lead Temperature for Soldering (1/8" from case for 5 seconds)	T_{slid}	260	

Static Electrical Characteristics ⁽²⁾

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-to-Emitter Breakdown Voltage	BV_{CES}	$V_{GE} = 0V, I_C = 250\mu A$	1200	-	-	V
Collector-to-Emitter Leakage Current	I_{CES}	$V_{CE} = 1200V, V_{GE} = 0V$	-	-	10	μA
		$V_{CE} = 1200V, V_{GE} = 0V,$ $T_J = 150^\circ C$	-	-	5	mA
		$V_{CE} = 1200V, V_{GE} = 0V,$ $T_J = 175^\circ C$	-	-	20	mA
Gate-to-Emitter Leakage Current	I_{GES}	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	100	nA
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 1.5mA$	4.3	5.5	6.7	V
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE} = 15V, I_C = 75A$	-	1.75	2.1	
		$V_{GE} = 15V, I_C = 75A,$ $T_J = 150^\circ C$	-	2.55	-	
		$V_{GE} = 15V, I_C = 75A,$ $T_J = 175^\circ C$	-	2.8	-	
Diode Forward Voltage	V_F	$V_{GE} = 0V, I_F = 75A$	-	2	2.4	
		$V_{GE} = 0V, I_F = 75A$ $T_J = 150^\circ C$	-	1.8	-	
		$V_{GE} = 0V, I_F = 75A$ $T_J = 175^\circ C$	-	1.7	-	

Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$	-	-	40	$^\circ C/W$
Junction-to-Case Thermal Resistance, IGBT	$R_{\theta JC}$	-	-	0.34	
Junction-to-Case Thermal Resistance, Diode		-	-	0.54	

Dynamic Electrical Characteristics ⁽²⁾

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Total Gate Charge	Q_g	$V_{CC} = 600V,$ $V_{GE} = 15V,$ $I_C = 75A$	-	242	-	nC
Input Capacitance	C_{iss}	$V_{CE} = 25V,$ $V_{GE} = 0V,$ $f = 1MHz$	-	5195	-	pF
Output Capacitance	C_{oss}		-	183	-	
Reverse Transfer Capacitance	C_{rss}		-	51	-	

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Turn-on Delay time	$t_{d(ON)}$	$V_{CC} = 600V,$ $V_{GE} = 0/15V,$ $R_G = 10\Omega,$ $I_C = 75A,$ $L_{load} = 0.82mH,$ Energy losses include "tail" and diode reverse recovery.	-	56	-	ns
Rise Time	t_r		-	78	-	
Turn-off Delay time	$t_{d(OFF)}$		-	239	-	
Fall Time	t_f		-	57	-	
Turn-On Switching Loss	E_{on}		-	4.5	-	mJ
Turn-Off Switching Loss	E_{off}		-	2.2	-	
IGBT Total Switching Loss	E_{ts}		-	6.7	-	
Diode Reverse-Recovery Time	t_{rr}	$V_R = 600V,$ $I_F = 75A,$ $di_F/dt = 770A/\mu s$	-	197	-	ns
Diode Reverse-Recovery Charge	Q_{rr}		-	2780	-	nC
Diode Peak Reverse-Recovery Current	I_{rrm}		-	26	-	A

(1) DC collector current, $T_c = 90C$, $T_J = 175^\circ C$.

(2) $T_J = 25^\circ C$ unless otherwise specified

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

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

Typical Electrical Characteristics

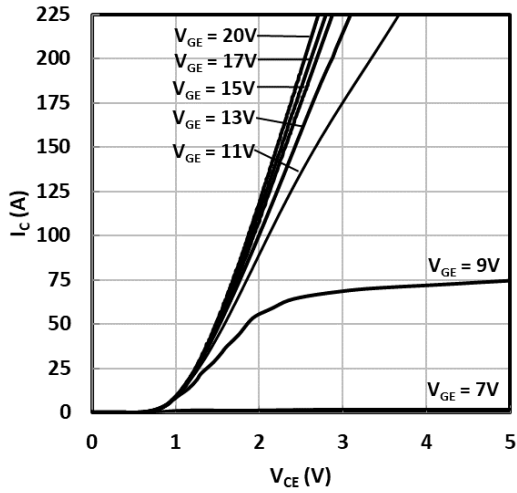


Fig. 1 Typical output characteristics
($T_J = 25\text{ }^\circ\text{C}$, $t_p = 250\text{ }\mu\text{s}$)

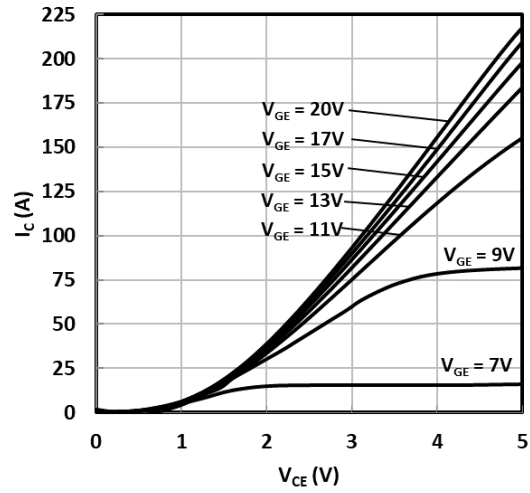


Fig. 2 Typical output characteristics
($T_J = 175\text{ }^\circ\text{C}$, $t_p = 250\text{ }\mu\text{s}$)

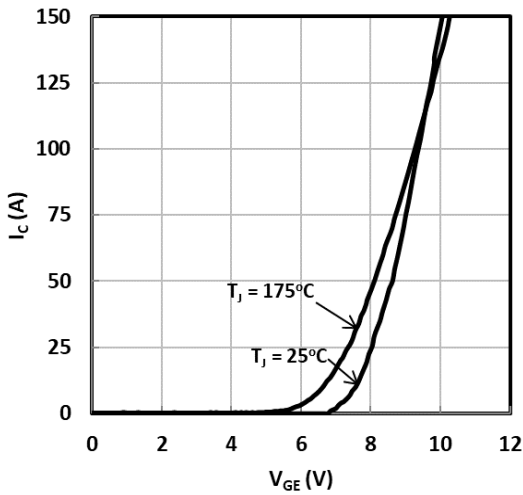


Fig. 3 Typical transfer characteristics
($V_{CE} = 20\text{ V}$, $t_p = 250\text{ }\mu\text{s}$)

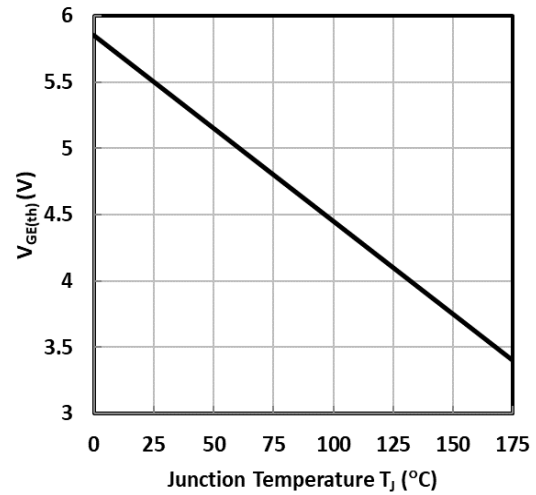


Fig. 4 Typical gate threshold voltage as a function of junction temperature
($V_{CE} = V_{GE}$, $I_C = 1.5\text{ mA}$)

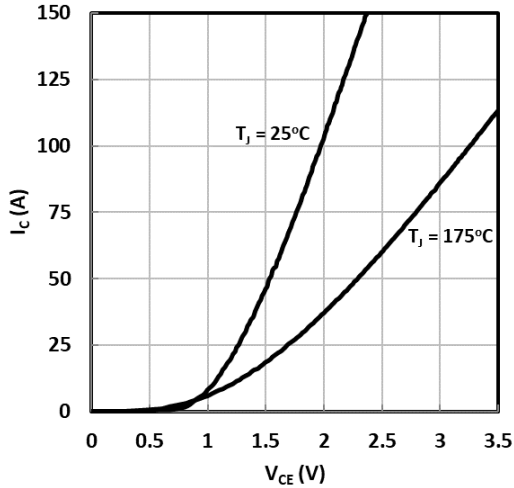


Fig. 5 Typical saturation voltage characteristics
($V_{GE} = 15\text{ V}$, $t_p = 250\ \mu\text{s}$)

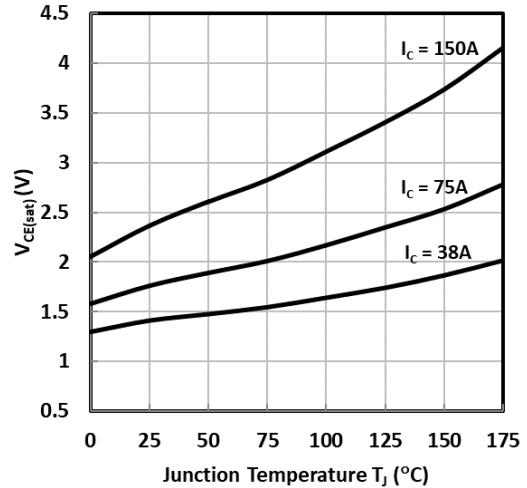


Fig. 6 Typical saturation voltage as a function of junction temperature
($V_{GE} = 15\text{ V}$, $t_p = 250\ \mu\text{s}$)

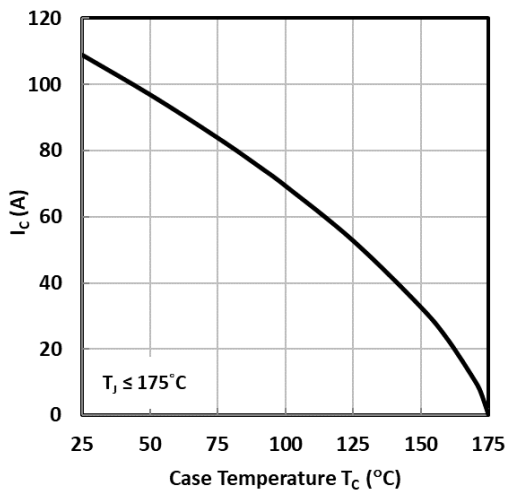


Fig. 7 Maximum DC collector current as a function of case temperature

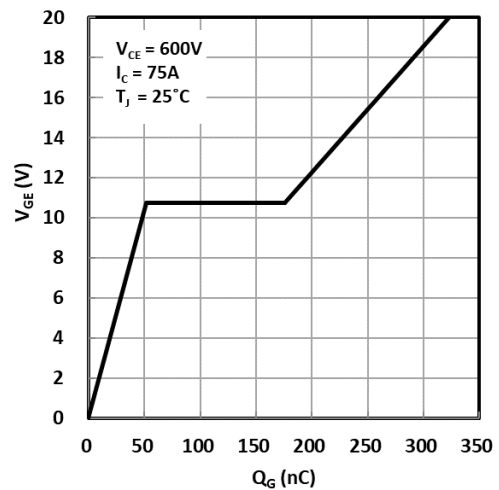


Fig. 8 Typical gate charge characteristics

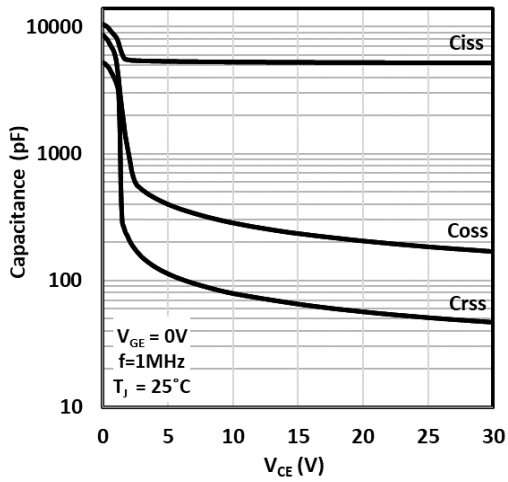


Fig. 9 Typical capacitance as a function of collector-to-emitter voltage

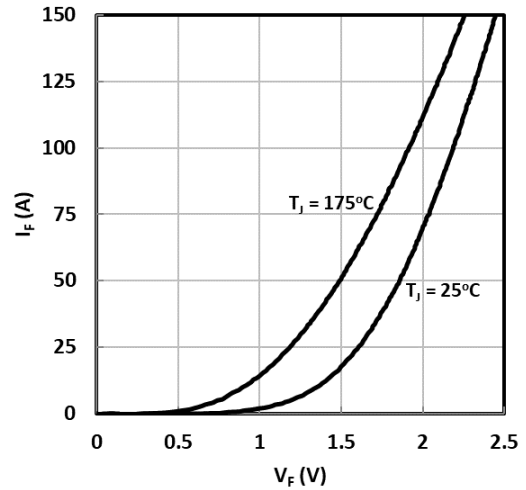


Fig. 10 Typical diode forward current as a function of forward voltage
($V_{GE} = 0V$, $t_p = 250 \mu s$)

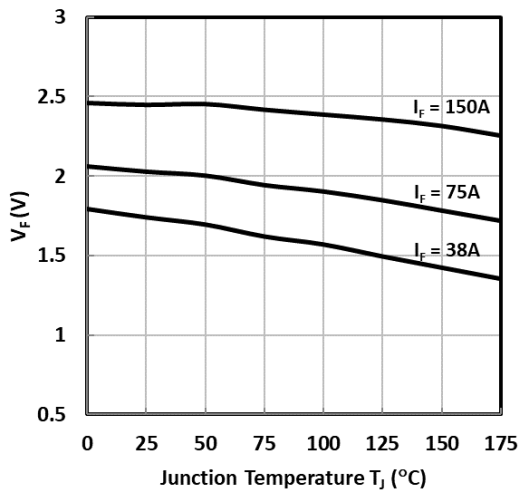
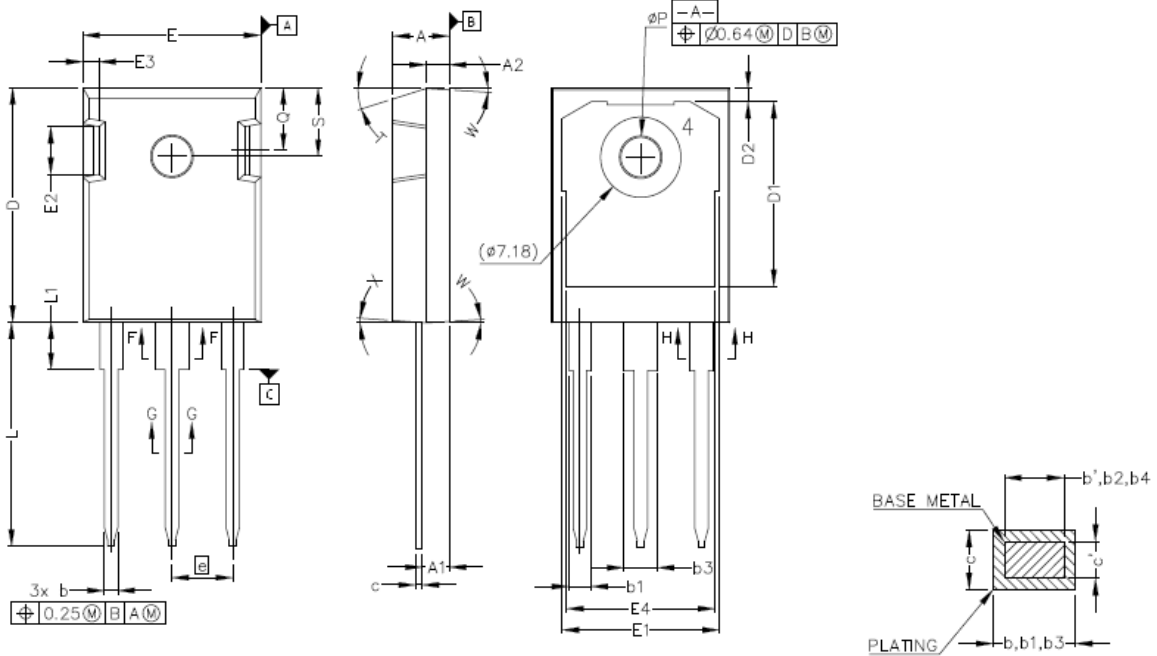


Fig. 11 Typical diode forward voltage as a function of junction temperature
($V_{GE} = 0V$, $t_p = 250 \mu s$)

Package Drawing



SYM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	.190	.205
A1	2.29	2.54	.090	.100
A2	1.91	2.16	.075	.085
b'	1.07	1.28	.042	.050
b	1.07	1.33	.042	.052
b1	1.91	2.41	.075	.095
b2	1.91	2.16	.075	.085
b3	2.87	3.38	.113	.133
b4	2.87	3.13	.113	.123
c'	0.55	0.65	.022	.026
c	0.55	0.68	.022	.027
D	20.80	21.10	.819	.831
D1	16.25	17.65	.640	.695
D2	0.95	1.25	.037	.049
E	15.75	16.13	.620	.635
E1	13.10	14.15	.516	.557
E2	3.68	5.10	.145	.201
E3	1.00	1.90	.039	.075
E4	12.38	13.43	.487	.529
e	5.44 BSC		.214 BSC	
N	3		3	
L	19.81	20.32	.780	.800
L1	4.10	4.40	.161	.173
φP	3.51	3.65	.138	.144
Q	5.49	6.00	.216	.236
S	6.04	6.30	.238	.248
T	17.5° REF.			
W	3.5° REF.			
X	4° REF.			

TO-247

Revision history of JHH75N120HA Specification

Version	Change Items	Effective Date
1.00	Initial Release	Jun-21

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