STGW25H120F

High speed 25 A, 1200 V, trench gate field stop IGBT

Datasheet — preliminary data

Features

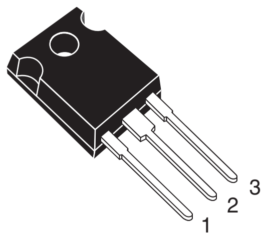
- Very high speed switching
- Tight parameters distribution
- Tail-less switching off
- Low thermal resistance

Applications

- Uninterruptible power supply
- Welding machines
- Photovoltaic inverters
- Power factor correction
- High switching frequency converters

Description

This device is an IGBT developed using an advanced proprietary trench gate and field stop structure. The device is part of the "H" series of IGBTs, which represent an optimum compromise between conduction and switching losses to maximize the efficiency of high switching frequency converters. Moreover, a slightly positive $V_{CE(sat)}$ temperature coefficient and very tight parameter distribution result in safer paralleling operation.



TO-247

Figure 1. Internal schematic diagram

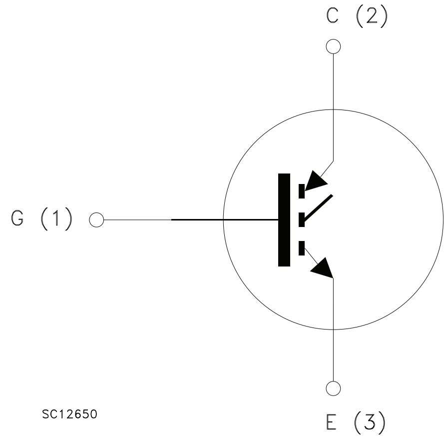


Table 1. Device summary

Order code	Marking	Package	Packaging
STGW25H120F	GW25H120F	TO-247	Tube

This is preliminary information on a new product now in development or undergoing evaluation. Details are subject to change without notice.

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{GE} = 0)	1200	V
I_C	Continuous collector current at T_C = 25 °C	50	A
I_C	Continuous collector current at T_C = 100 °C	25	A
I_{CP} (1)	Pulsed collector current	100	A
V_{GE}	Gate-emitter voltage	±20	V
P_{TOT}	Total dissipation at T_C = 25 °C	330	W
T_J	Operating junction temperature	– 55 to 150	°C

1. Pulse width limited by maximum junction temperature and turn-off within RBSOA

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case IGBT	0.38	°C/W
R_{thJA}	Thermal resistance junction-ambient	50	°C/W

2 Electrical characteristics

T_J = 25 °C unless otherwise specified.

Table 4. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-emitter breakdown voltage (V_{GE} = 0)	I_C = 1 mA	1200			V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_{GE} = 15 V, I_C = 25 A V_{GE} = 15 V, I_C = 25 A, T_J = 150 °C		2.15 2.25		V V
$V_{GE(th)}$	Gate threshold voltage	V_{CE} = V_{GE}, I_C = 1 mA		6		V
I_{CES}	Collector cut-off current (V_{GE} = 0)	V_{CE} = 1200 V V_{CE} = 1200 V, T_J = 150 °C			100 1	µA mA
I_{GES}	Gate-emitter leakage current (V_{CE} = 0)	V_{GE} = ± 20 V			250	nA

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{ies} C_{oes} C_{res}	Input capacitance Output capacitance Reverse transfer capacitance	V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0	-	4880 125 65	-	pF pF pF
Q_g Q_{ge} Q_{gc}	Total gate charge Gate-emitter charge Gate-collector charge	V_{CE} = 600 V, I_C = 25 A, V_{GE} = 15 V	-	144 36 64	-	nC nC nC

Table 6. Switching on/off (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r $(di/dt)_{on}$	Turn-on delay time Current rise time Turn-on current slope	V_{CC} = 600 V, I_C = 25 A R_G = 22 Ω, V_{GE} = 15 V *(see Figure 2)*	-	75 24 1100	-	ns ns A/µs
$t_{d(on)}$ t_r $(di/dt)_{on}$	Turn-on delay time Current rise time Turn-on current slope	V_{CC} = 600 V, I_C = 25 A R_G = 22 Ω, V_{GE} = 15 V, T_J = 150 °C *(see Figure 2)*	-	70 32 950	-	ns ns A/µs
$t_r(V_{off})$ $t_d(_{off})$ t_f	Off voltage rise time Turn-off delay time Current fall time	V_{CC} = 600 V, I_C = 25 A R_G = 22 Ω, V_{GE} = 15 V *(see Figure 2)*	-	50 285 46	-	ns ns ns
$t_r(V_{off})$ $t_d(_{off})$ t_f	Off voltage rise time Turn-off delay time Current fall time	V_{CC} = 600 V, I_C = 25 A R_G = 22 Ω, V_{GE} = 15 V, T_J = 150 °C *(see Figure 2)*	-	72 335 125	-	ns ns ns

Table 7. Switching energy (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Eon (1) E_{off} (2) E_{ts}	Turn-on switching losses Turn-off switching losses Total switching losses	V_{CC} = 600 V, I_C = 25 A R_G = 22 Ω, V_{GE} = 15 V *(see Figure 2)*	-	1.48 0.78 2.26	-	mJ mJ mJ
Eon (1) E_{off} (2) E_{ts}	Turn-on switching losses Turn-off switching losses Total switching losses	V_{CC} = 600 V, I_C = 25 A R_G = 22 Ω, V_{GE} = 15 V T_J = 150 °C *(see Figure 2)*	-	2.5 1.36 3.86	-	mJ mJ mJ

1. Energy losses include reverse recovery of the diode
2. Turn-off losses include also the tail of the collector current

3 Test circuits

Figure 2. Test circuit for inductive load switching

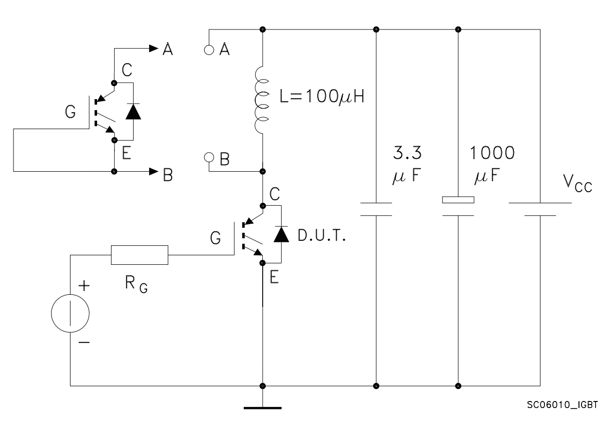


Figure 3. Gate charge test circuit

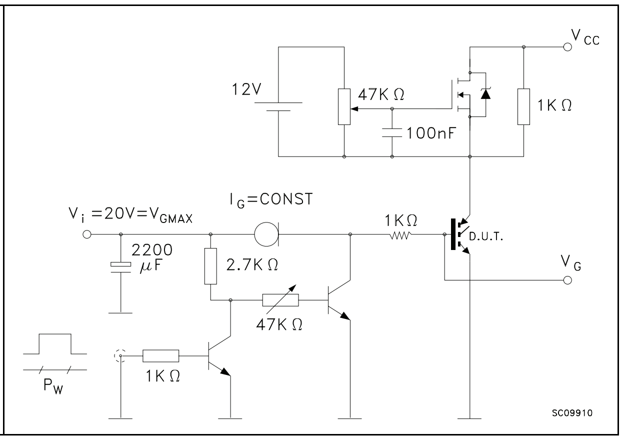


Figure 4. Switching waveform

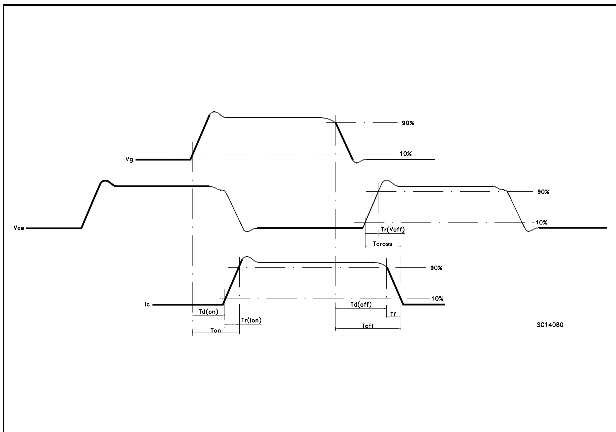
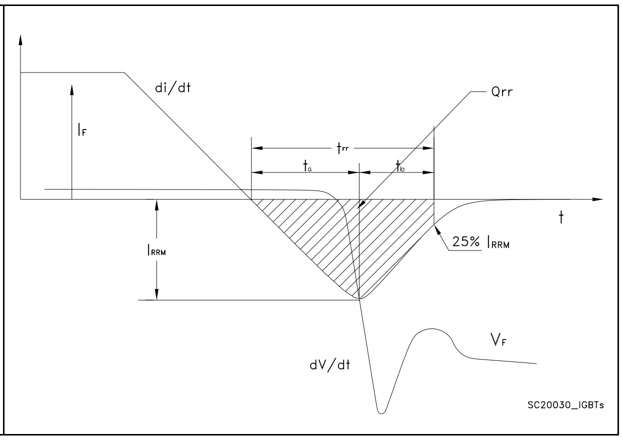


Figure 5. Diode recovery time waveform



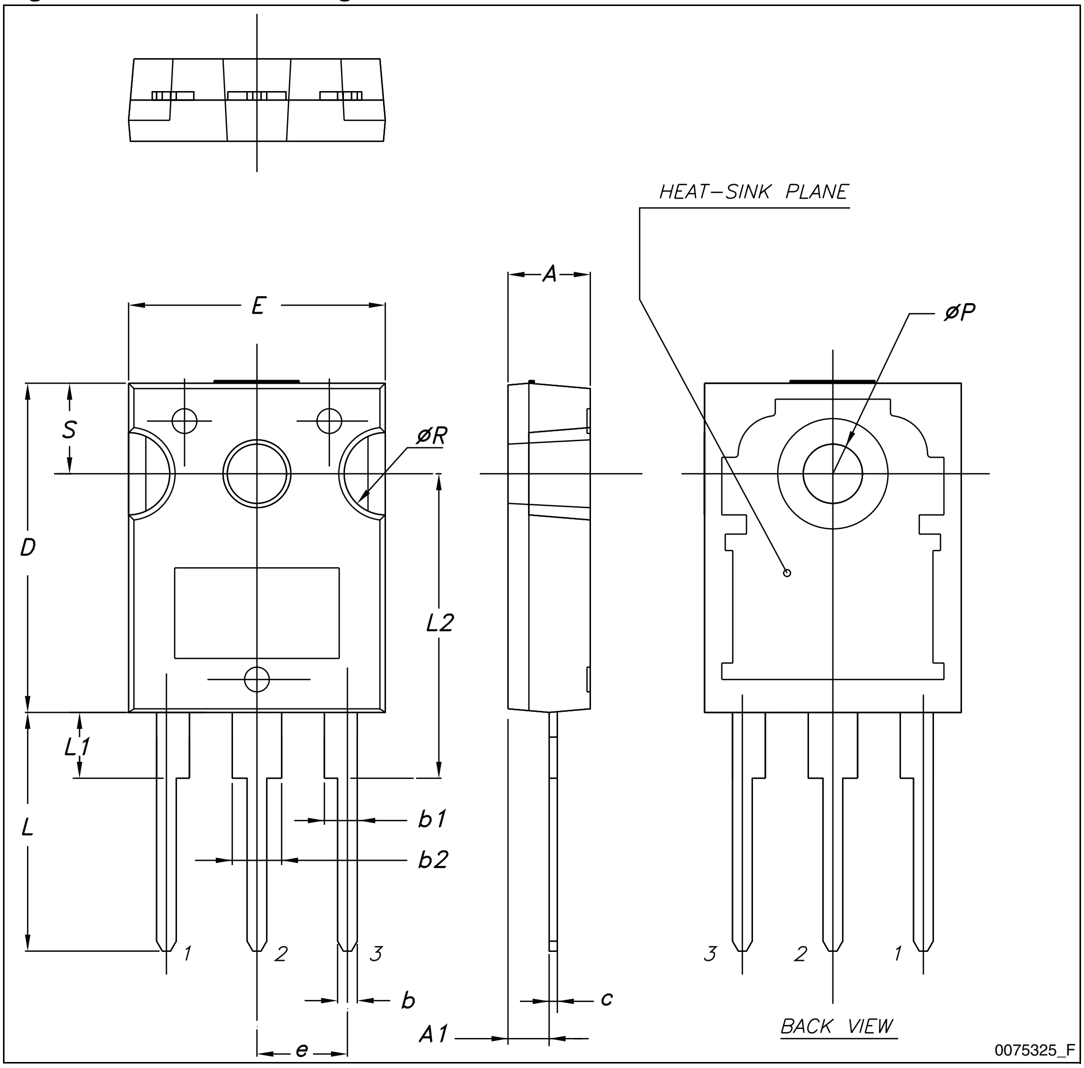
4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 8. TO-247 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.85		5.15
A1	2.20		2.60
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e		5.45	
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
∅P	3.55		3.65
∅R	4.50		5.50
S		5.50	

Figure 6. TO-247 drawing



5 Revision history

Table 9. Document revision history

Date	Revision	Changes
24-Jul-2012	1	Initial release.