

STGW30NC120HD

N-CHANNEL 30A - 1200V - TO-247 VERY FAST PowerMESH™ IGBT

TARGET SPECIFICATION

General features

Туре	V _{CES}	V _{CE(sat)} (Max) @ 25°C	I _C
STGW30NC120HD	1200V	< 2.8V	30A

- LOW ON-LOSSES
- LOW ON-VOLTAGE DROP (V_{cesat})
- HIGH CURRENT CAPABILITY
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW GATE CHARGE
- VERY HIGH FREQUENCY OPERATION
- LATCH CURRENT FREE OPERATION

Description

Using the latest high voltage technology based on its patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, with outstanding performances. The suffix "H" identifies a family optimized for high frequency application in order to achieve very high switching performances (reduced tfall) mantaining a low voltage drop.

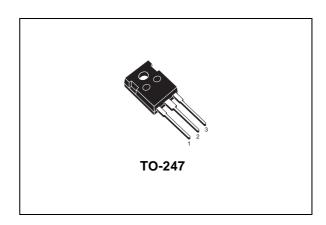
Applications

- HIGH FREQUENCY MOTOR CONTROL
- U.P.S
- WELDING EQUIPMENT
- INDUCTION HEATING

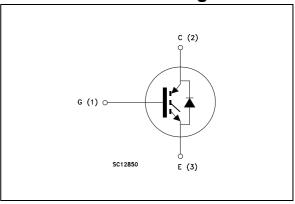
Order codes

November 2005

Sales Type	Marking	Package	Packaging
STGW30NC120HD	GW30NC120HD	TO-247	TUBE



Internal schematic diagram



Rev 1 1/9 1 Electrical ratings STGW30NC120HD

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	1200	V
I _C Note 2	Collector Current (continuous) at 25°C	60	Α
I _C Note 2	Collector Current (continuous) at 100°C	30	Α
I _{CM} Note 1	Collector Current (pulsed)	120	Α
V _{GE}	Gate-Emitter Voltage	± 20	V
P _{TOT}	Total Dissipation at T _C =25°C	200	
I _f	Diode RMS Forward Current at T _C =25°C	200	
T _j	Operating Junction Temperature	55 to 150	
T _{stg}	Storage Temperature	- 55 to 150	

Table 2. Thermal resistance

		Min.	Тур.	Max.	Unit
Rthj-case	Thermal Resistance Junction-case			0.625	°C/W
Rthj-amb	Thermal Resistance Junction-ambient			50	°C/W

STGW30NC120HD 2 Electrical characteristics

2 Electrical characteristics

 $(T_{CASE} = 25 \, ^{\circ}C \text{ unless otherwise specified})$

Table 3. Static

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
V _{BR(CES)}	Collectro-Emitter Breakdown Voltage	$I_C = 250 \mu A, V_{GE} = 0$	1200			V
V _{CE(SAT)}	Collector-Emitter Saturation Voltage	V _{GE} = 15V, I _C = 20A, Tj= 25°C V _{GE} = 15V, I _C = 20A, Tj= 125°C		2.4 2	2.9	V V
V _{GE(th)}	Gate Threshold Voltage	$V_{CE} = V_{GE}, I_{C} = 250 \mu A$	5		7	V
I _{CES}	Collector-Emitter Leakage Current (V _{CE} = 0)	V _{GE} =Max Rating,Tc=25°C V _{GE} =Max Rating, Tc=125°C			10 100	μA μA
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 0)	V _{GE} =± 20V , V _{CE} = 0			± 100	nA
9 _{fs}	Forward Transconductance	$V_{CE} = 25V_{,} I_{C} = 25A$		TBD		S

Table 4. Dynamic

Symbol	Parameter	Test Conditions		Тур.	Max.	Unit
C _{ies} C _{oes} C _{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{CE} = 25V, f = 1 \text{ MHz}, V_{GE} = 0$		TBD TBD TBD		pF pF pF
Qg Qge Qgc	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	$V_{CE} = 960V, I_{C} = 20A, V_{GE} = 15V$		TBD TBD TBD	TBD	nC nC nC

2 Electrical characteristics STGW30NC120HD

Table 5. Switching on/off (inductive load)

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
t _{d(on)} t _r (di/dt) _{on}	Turn-on Delay Time Current Rise Time Turn-on Current Slope	V_{CC} = 960V, I_{C} = 20A R_{G} = 10 Ω , V_{GE} = 15V, T_{J} = 25°C (see Figure 3)		TBD 62 TBD		ns ns A/µs
t _{d(on)} t _r (di/dt) _{on}	Turn-on Delay Time Current Rise Time Turn-on Current Slope	$V_{CC} = 960V, I_{C} = 20A$ $R_{G} = 10\Omega, V_{GE} = 15V, Tj = 125^{\circ}C$ (see Figure 3)		TBD TBD TBD		ns ns A/µs
$t_{\rm r}({ m V}_{ m off}) \ t_{ m d}({ m o}_{ m off}) \ t_{ m f}$	Off Voltage Rise Time Turn-off Delay Time Current Fall Time	V_{CC} = 960V, I_{C} = 20A R_{G} = 10 Ω , V_{GE} = 15V, T_{J} = 25°C (see Figure 3)		TBD TBD TBD		ns ns ns
$t_{r}(V_{off})$ $t_{d}(_{off})$ t_{f}	Cross-over Time Off Voltage Rise Time Turn-off Delay Time Current Fall Time	$V_{CC} = 960V, I_{C} = 20A$ $R_{G} = 10\Omega, V_{GE} = 15V, T_{j} = 125^{\circ}C$ (see Figure 3)		TBD TBD TBD		ns ns ns

Table 6. Switching energy (inductive load)

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Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Eon Note 3 E _{off} Note 4 E _{ts}	Turn-on Switching Losses Turn-off Switching Losses Total Switching Losses	V_{CC} = 960V, I_{C} = 20A R_{G} = 10 Ω , V_{GE} = 15V, T_{J} = 25°C (see Figure 3)		TBD TBD TBD		μJ μJ μJ
Eon Note 3 E _{off} Note 4 E _{ts}	Turn-on Switching Losses Turn-off Switching Losses Total Switching Losses	V_{CC} = 960V, I_{C} = 20A R_{G} = 10 Ω , V_{GE} = 15V, T_{J} = 125°C (see Figure 3)		TBD TBD TBD		μJ μJ μJ

Table 7. Collector-emitter diode

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
V _f	Farward On Valtage	If = 12A		2.4	2.9	V
٧f	Forward On-Voltage	If = 12A, Tj = 125 °C		1.4		V
t _{rr}	Reverse Recovery Time	If = 12A, V _R = 27V,		TBD		ns
Q_{rr}	Reverse Recovery Charge	T _j = 125 °C, di/dt = 100A/μs		TBD		nC
I _{rrm}	Reverse Recovery Current	(see Figure 4)		TBD		Α

⁽¹⁾Pulse width limited by max junction temperature

(2) Calculated according to the iterative formula:

$$I_{C}(T_{C}) = \frac{T_{JMAX} - T_{C}}{R_{THJ-C} \times V_{CESAT(MAX)}(T_{C}, I_{C})}$$

577

⁽³⁾ Eon is the turn-on losses when a typical diode is used in the test circuit in figure 2. If the IGBT is offered in a package with a co-pack diode, the co-pack diode is used as external diode. IGBTs & Diode are at the same temperature (25°C and 125°C)

⁽⁴⁾ Turn-off losses include also the tail of the collector current

STGW30NC120HD 3 Test Circuits

3 Test Circuits

Figure 1. Test Circuit for Inductive Load Switching

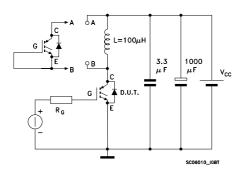


Figure 2. Gate Charge Test Circuit

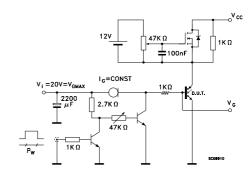
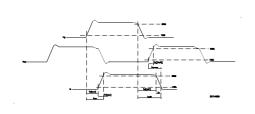
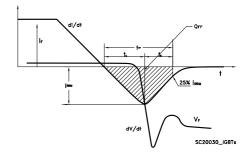


Figure 3. Switching Waveform

Figure 4. Diode Recovery Time Waveform



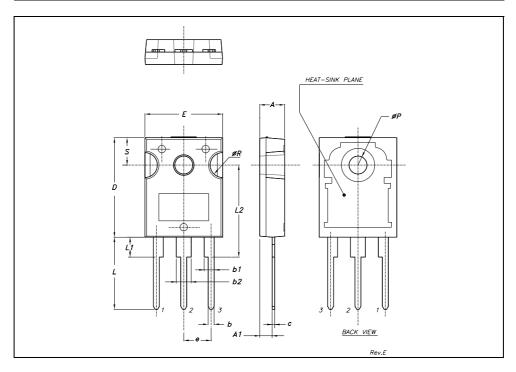


4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

TO-247 MECHANICAL DATA

DIM		mm.			inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
Α	4.85		5.15	0.19		0.20
A1	2.20		2.60	0.086		0.102
b	1.0		1.40	0.039		0.055
b1	2.0		2.40	0.079		0.094
b2	3.0		3.40	0.118		0.134
С	0.40		0.80	0.015		0.03
D	19.85		20.15	0.781		0.793
Е	15.45		15.75	0.608		0.620
е		5.45			0.214	
L	14.20		14.80	0.560		0.582
L1	3.70		4.30	0.14		0.17
L2		18.50			0.728	
øΡ	3.55		3.65	0.140		0.143
øR	4.50		5.50	0.177		0.216
S		5.50			0.216	



5 Revision History STGW30NC120HD

5 Revision History

Date	Revision	Changes
14-Nov-2005	1	Initial release.

STGW30NC120HD 5 Revision History

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