

STGE200NB60S

N-channel 150A - 600V - ISOTOP Low drop PowerMESH™ IGBT

General features

TYPE	V _{CES}	V _{CE(sat)} (typ.)	I _C	тс
STGE200NB60S	600V	1.2V 1.3V	150A 200A	100°C 25°C

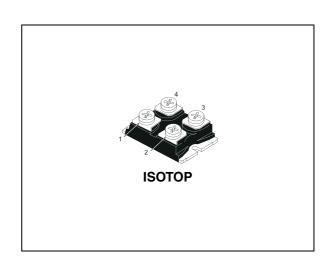
- High input impedance (voltage driven)
- Low on-voltage drop (Vcesat)
- Off losses include tail current
- Low gate charge
- High current capability



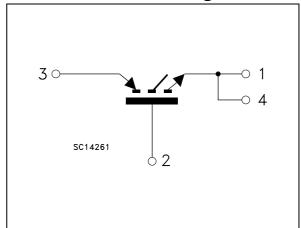
Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances. The suffix "S" identifies a family optimized to achieve very low VCE(sat) (@ max frequency of 1KHz).

Applications

- Low frequency motor controls
- Aluminum welding equipment



Internal schematic diagram



Order codes

Part number	Marking	Package	Packaging	
STGE200NB60S	GE200NB60S	ISOTOP	Tube	

Contents STGE200NB60S

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STGE200NB60S Electrical ratings

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{CES}	Collector-emitter voltage (V _{GS} = 0)	600	V
V _{GE}	Gate-emitter voltage	±20	V
I _C	Collector current (continuous) at T _C = 25°C	200	Α
I _C	Collector current (continuous) at T _C = 100°C	150	Α
I _{CM} ⁽¹⁾	Collector current (pulsed)	400	Α
P _{TOT}	Total dissipation at T _C = 25°C	600	W
	Derating factor	4.8	W/°C
V _{ISO}	Insulation winthstand voltage (DC) 25		V
T _{stg}	Storage temperature		°C
T _j	Operating junction temperature	– – 55 to 150	

^{1.} Pulse width limited by safe operating area

Table 2. Thermal resistance

Symbol	Parameter	Value	Unit
Rthj-case	Thermal resistance junction-case max	0.208	°C/W
Rthj-amb	Thermal resistance junction-ambient max	30	°C/W

Electrical characteristics STGE200NB60S

2 Electrical characteristics

(T_{CASE} =25°C unless otherwise specified)

Table 3. Static

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V _{BR(CES)}	Collector-emitter breakdown voltage	$I_C = 250 \mu A, V_{GE} = 0$	600			V
I _{CES}	Collector cut-off	V _{CE} = Max rating, @ 25°C			500	μΑ
·CES	$(V_{GE} = 0)$	V _{CE} = Max rating, @ 125°C			5	mA
I _{GES}	Gate-emitterleakage current (V _{CE} = 0)	$V_{GE} = \pm 20V, V_{CE} = 0$			±100	nA
V _{GE(th)}	Gate threshold voltage	$V_{CE} = V_{GE}, I_{C} = 250 \mu A$	3		5	٧
V	Collector-emitter saturation	$V_{GE} = 15V, I_{C} = 100A$		1.2	1.6	٧
V _{CE(sat)}	voltage	V _{GE} = 15V, I _C =150A,@100°C		1.2		V
9 _{fs}	Forward transconductance	$V_{CE} = 15V_{,} I_{C} = 100A$		80		S

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
C _{ies} C _{oes} C _{res}	Input capacitance Output capacitance Reverse transfer capacitance	$V_{CE} = 25V, f = 1MHz, V_{GE} = 0$		1560 0 1100 95		pF pF pF
Q _g Q _{ge} Q _{gc}	Total gate charge Gate-emitter charge Gate-collector charge	V _{CE} = 480V, I _C = 100A, V _{GE} = 15V		560 70 170		nC nC nC
I _{CL}	Latching current	$V_{clamp} = 480V$ Tj = 125°C , R _G = 10 Ω	300			Α

Table 5. Switching on/off (inductive load)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
t _{d(on)}	Delay time Current rise time	$I_C = 100A$, $V_{CC} = 480V$ $V_{GF} = 15V$, $R_G = 3\Omega$		64 112		ns ns
(di/dt) _{on}	Turn-on current slope	Tj = 25°C (see Figure 17)		1840		A/µs
t _{d(on)} t _r (di/dt) _{on}	Dealy time Current rise time Turn-on current slope	$I_{C} = 100A$, $V_{CC} = 480V$ $V_{GE} = 15V$, $R_{G} = 3\Omega$ $T_{J} = 125^{\circ}C$ (see Figure 17)		56 114 1800		ns ns A/µs
$\begin{array}{c} t_{\text{C}} \\ t_{\text{f}}(\text{V}_{\text{off}}) \\ t_{\text{d}}(_{\text{off}}) \\ t_{\text{f}} \end{array}$	Cross-over time Off voltage rise time Delay time Current fall time	I_C = 100A , V_{CC} = 480V V_{GE} = 15V , R_G = 3 Ω T_j = 25°C (see Figure 17)		2.98 1.7 2.4 1.23		μs μs μs μs
t _c t _r (V _{off}) t _d (_{off}) t _f	Cross-over time Off voltage rise time Delay time Current fall time	I_C = 100A , V_{CC} = 480V V_{GE} = 15V , R_G = 3 Ω Tj = 125°C (see Figure 17)		4.52 2.6 2.8 1.8		μs μs μs μs

Table 6. Switching energy (inductive load)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
Eon ⁽¹⁾	Turn-on switching losses	$V_{CC} = 480V, I_{C} = 100A$		11.7		mJ
E _{off} (2)	Turn-off switching loss	$R_G = 3\Omega$, $V_{GE} = 15V$, $Tj = 25$ °C		59		mJ
E _{ts}	Total switching loss	(see Figure 17)		70.7		mJ
Eon (1)	Turn-on switching losses	$V_{CC} = 480V, I_{C} = 100A$		12		mJ
E _{off} (2)	Turn-off switching loss	$R_G = 3\Omega$, $V_{GE} = 15V$,		92		mJ
E _{ts}	Total switching loss	Tj= 125°C (see Figure 17)		104		mJ

^{1.} Eon is the turn-on losses when a typical diode is used in the test circuit in *Figure 17*

^{2.} Turn-off losses include also the tail of the collector current.

Electrical characteristics STGE200NB60S

2.1 Electrical characteristics (curves)

Figure 1. Output characteristics

Figure 2. Transfer characteristics

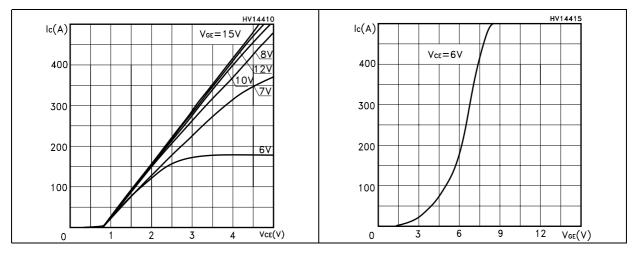


Figure 3. Transconductance

Figure 4. Collector-emitter on voltage vs temperature

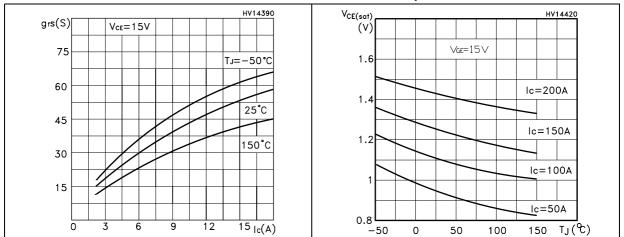
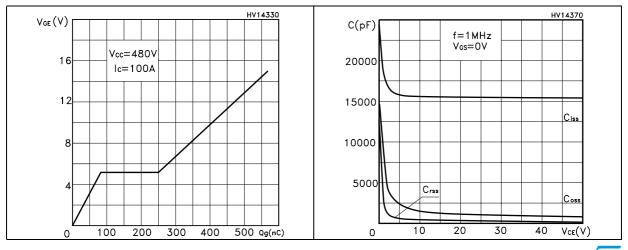


Figure 5. Gate charge vs gate-source voltage Figure 6. Capacitance variations



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0

50

100

vs temperature HV14350 HV14440 V_{GE(th)} (norm) VCE(sat) 1.6 1.1 T_-50℃ Ic=250μA 1.4 25°0 1.0 1.2 150℃ 0.9 0.8 0.8 0.7 0.6

Collector-emitter on voltage vs Figure 7. Normalized gate threshold voltage Figure 8. collector current

Figure 9. Normalized breakdown voltage vs Figure 10. Switching losses vs temperature temperature

40

80

120

160

200 Ic(A)

150 T_J (℃)

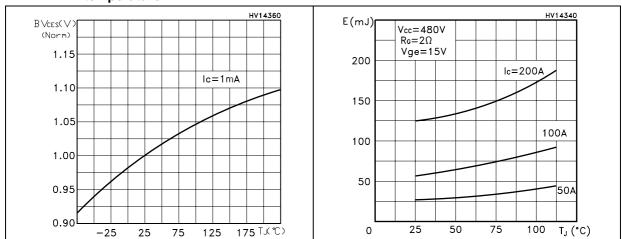
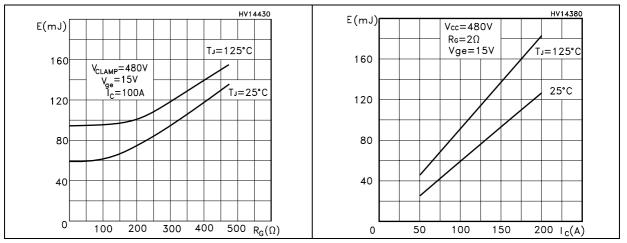


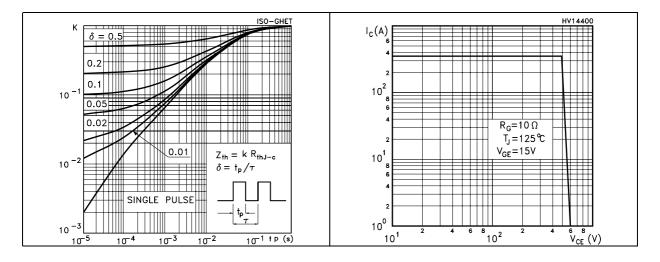
Figure 11. Switching losses vs gate resistance Figure 12. Switching losses vs collector current



Electrical characteristics STGE200NB60S

Figure 13. Thermal impedance

Figure 14. Turn-off SOA



STGE200NB60S Test circuit

3 Test circuit

Figure 15. Test circuit for inductive load switching

Figure 16. Gate charge test circuit

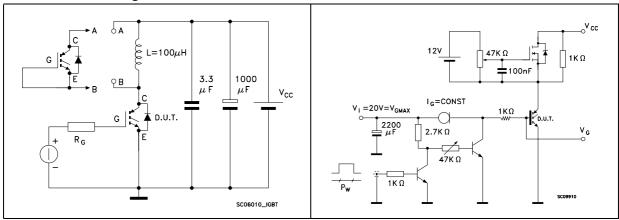
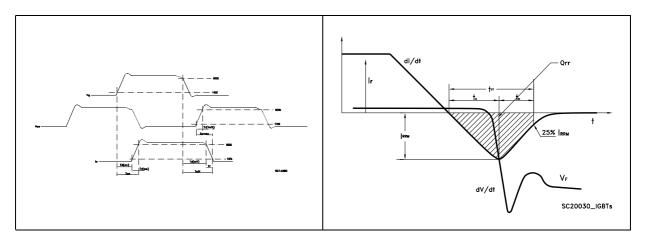


Figure 17. Switching waveform

Figure 18. Diode recovery time waveform



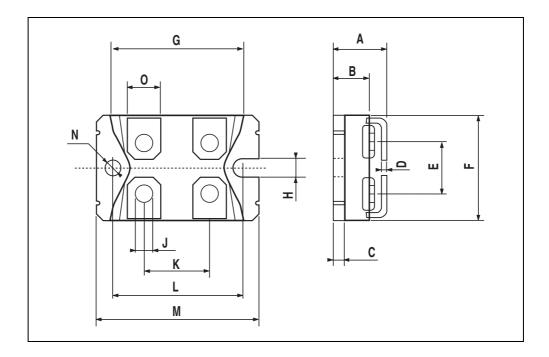
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4 Package mechanical data

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

ISOTOP MECHANICAL DATA

DIM.		mm			inch	
Dilvi.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
Α	11.8		12.2	0.466		0.480
В	8.9		9.1	0.350		0.358
С	1.95		2.05	0.076		0.080
D	0.75		0.85	0.029		0.033
E	12.6		12.8	0.496		0.503
F	25.15		25.5	0.990		1.003
G	31.5		31.7	1.240		1.248
Н	4			0.157		
J	4.1		4.3	0.161		0.169
K	14.9		15.1	0.586		0.594
L	30.1		30.3	1.185		1.193
М	37.8		38.2	1.488		1.503
N	4			0.157		
0	7.8		8.2	0.307		0.322



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Revision history STGE200NB60S

5 Revision history

Table 7. Revision history

Date	Revision	Changes		
28-Feb-2005	6	Complete version		
26-Jul-2006	7	New template		
03-Nov-2006	8	New value inserted on Table 1.: Absolute maximum ratings		

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