



STGE50NB60HD

N-CHANNEL 50A - 600V ISOTOP PowerMESH™ IGBT

PRELIMINARY DATA

TYPE	V _{CES}	V _{CE(sat)}	I _C
STGE50NB60HD	600 V	< 2.8 V	50 A

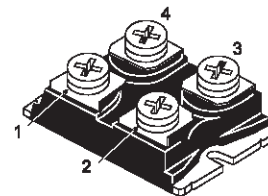
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V_{CESAT})
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- VERY HIGH FREQUENCY OPERATION
- OFF LOSSES INCLUDE TAIL CURRENT
- CO-PACKAGED WITH TURBOSWITCH™ ANTIPARALLEL DIODE

DESCRIPTION

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 "H" identifies a family optimized to achieve very low switching times for high frequency applications (<120kHz).

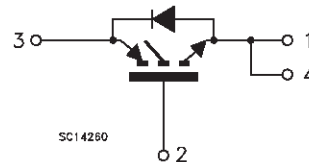
APPLICATIONS

- HIGH FREQUENCY MOTOR CONTROLS
- WELDING EQUIPMENTS
- SMPS AND PFC IN BOTH HARD SWITCH AND RESONANT TOPOLOGIES



ISOTOP

INTERNAL SCHEMATIC DIAGRAM



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	100	A
I _C	Collector Current (continuous) at T _c = 100 °C	50	A
I _{CM} (•)	Collector Current (pulsed)	400	A
P _{tot}	Total Dissipation at T _c = 25 °C	300	W
	Derating Factor	2.4	W/°C
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

(•) Pulse width limited by safe operating area

STGE50NB60HD

THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case	Max	0.416	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	30	°C/W
R _{thc-h}	Thermal Resistance Case-heatsink	Typ	0.1	°C/W

ELECTRICAL CHARACTERISTICS (T_j = 25 °C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{BR(CES)}	Collector-Emitter Breakdown Voltage	I _C = 250 μA V _{GE} = 0	600			V
I _{CES}	Collector cut-off (V _{GE} = 0)	V _{CE} = Max Rating T _j = 25 °C V _{CE} = Max Rating T _j = 125 °C			100 1000	μA μA
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 0)	V _{GE} = ± 20 V V _{CE} = 0			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GE(th)}	Gate Threshold Voltage	V _{CE} = V _{GE} I _C = 250 μA	3		5	V
V _{CE(SAT)}	Collector-Emitter Saturation Voltage	V _{GE} = 15 V I _C = 50 A V _{GE} = 15 V I _C = 50 A T _j = 125 °C		2.3 1.9	2.8	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{CE} = 25 V I _C = 50 A		22		S
C _{ies} C _{oes} C _{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{CE} = 25 V f = 1 MHz V _{GE} = 0		4500 450 90		pF pF pF
Q _G Q _{GE} Q _{GC}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V _{CE} = 480 V I _C = 50 A V _{GE} = 15 V		260 28 15		nC nC nC
I _{CL}	Latching Current	V _{clamp} = 480 V R _G = 10 Ω T _j = 150 °C	200			A

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{d(on)} t _r	Delay Time Rise Time	V _{CC} = 480 V I _C = 50 A V _{GE} = 15 V R _G = 10 Ω		20 70		ns ns
(di/dt) _{on}	Turn-on Current Slope	V _{CC} = 480 V I _C = 50 A R _G = 10 Ω V _{GE} = 15 V		350		A/μs
E _{on(○)}	Turn-on Switching Losses	T _j = 125 °C		950		μJ

ELECTRICAL CHARACTERISTICS (continued)**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-Over Time	$V_{CC} = 480 \text{ V}$ $I_C = 50 \text{ A}$		166		ns
$t_r(V_{off})$	Off Voltage Rise Time	$R_{GE} = 10 \ \Omega$ $V_{GE} = 15 \text{ V}$		48		ns
$t_d(off)$	Delay Time			326		ns
t_f	Fall Time			90		ns
$E_{off}(^{**})$	Turn-off Switching Loss			2.1		mJ
$E_{ts}(^{\circ})$	Total Switching Loss			3		mJ
t_c	Cross-Over Time	$V_{CC} = 480 \text{ V}$ $I_C = 50 \text{ A}$		270		ns
$t_r(V_{off})$	Off Voltage Rise Time	$R_{GE} = 10 \ \Omega$ $V_{GE} = 15 \text{ V}$		75		ns
$t_d(off)$	Delay Time	$T_j = 125 \text{ }^{\circ}\text{C}$		340		ns
t_f	Fall Time			200		ns
$E_{off}(^{**})$	Turn-off Switching Loss			2.9		mJ
$E_{ts}(^{\circ})$	Total Switching Loss			3.85		mJ

COLLECTOR-EMITTER DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_f	Forward Current				50	A
I_{fm}	Forward Current pulsed				400	A
V_f	Forward On-Voltage	$I_f = 50 \text{ A}$				V
		$I_f = 50 \text{ A}$ $T_j = 125 \text{ }^{\circ}\text{C}$		2		V
t_{rr}	Reverse Recovery Time	$I_f = 50 \text{ A}$ $V_R = 200 \text{ V}$		200		nS
Q_{rr}	Reverse Recovery Charge	$dI/dt = 100 \text{ A}/\mu\text{S}$ $T_j = 125 \text{ }^{\circ}\text{C}$				nC
I_{rrm}	Reverse Recovery Current					A

(●) Pulse width limited by max. junction temperature

($\circ$) Include recovery losses on the STTA2006 freewheeling diode

(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

(**) Losses Include Also The Tail (Jedec Standardization)

Fig. 1: Gate Charge test Circuit

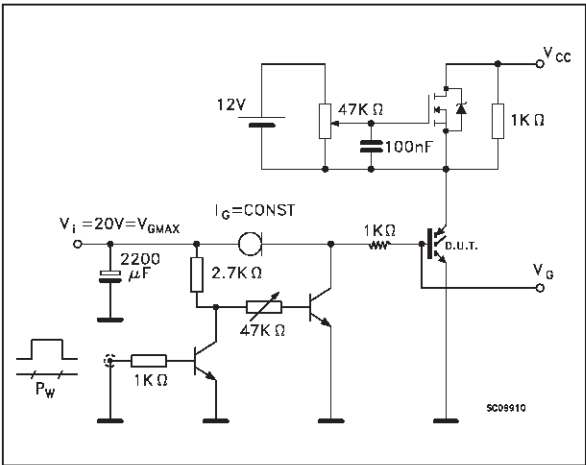


Fig. 2: Test Circuit For Inductive Load Switching

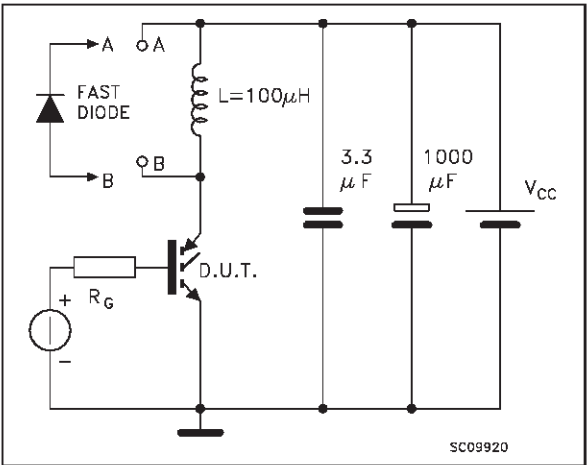
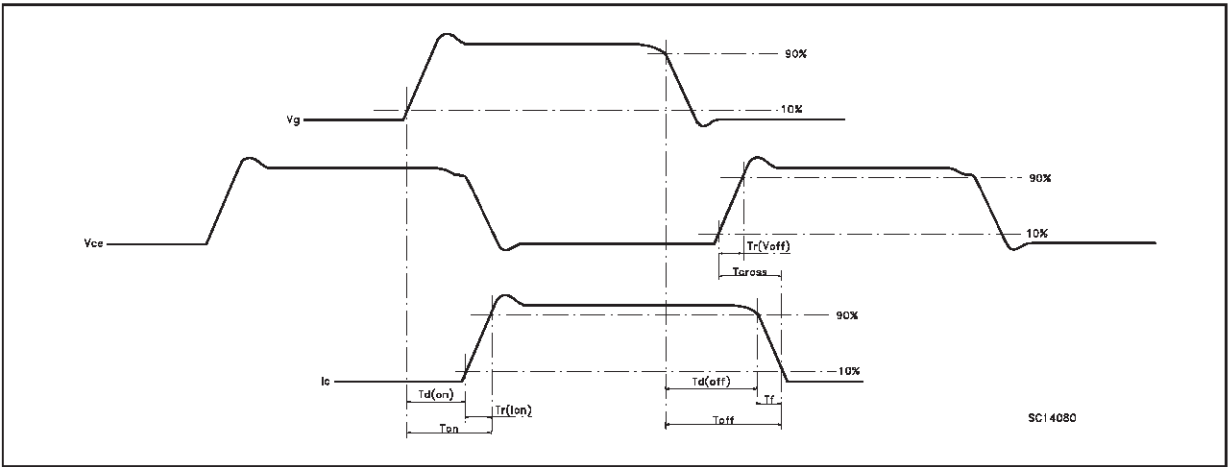
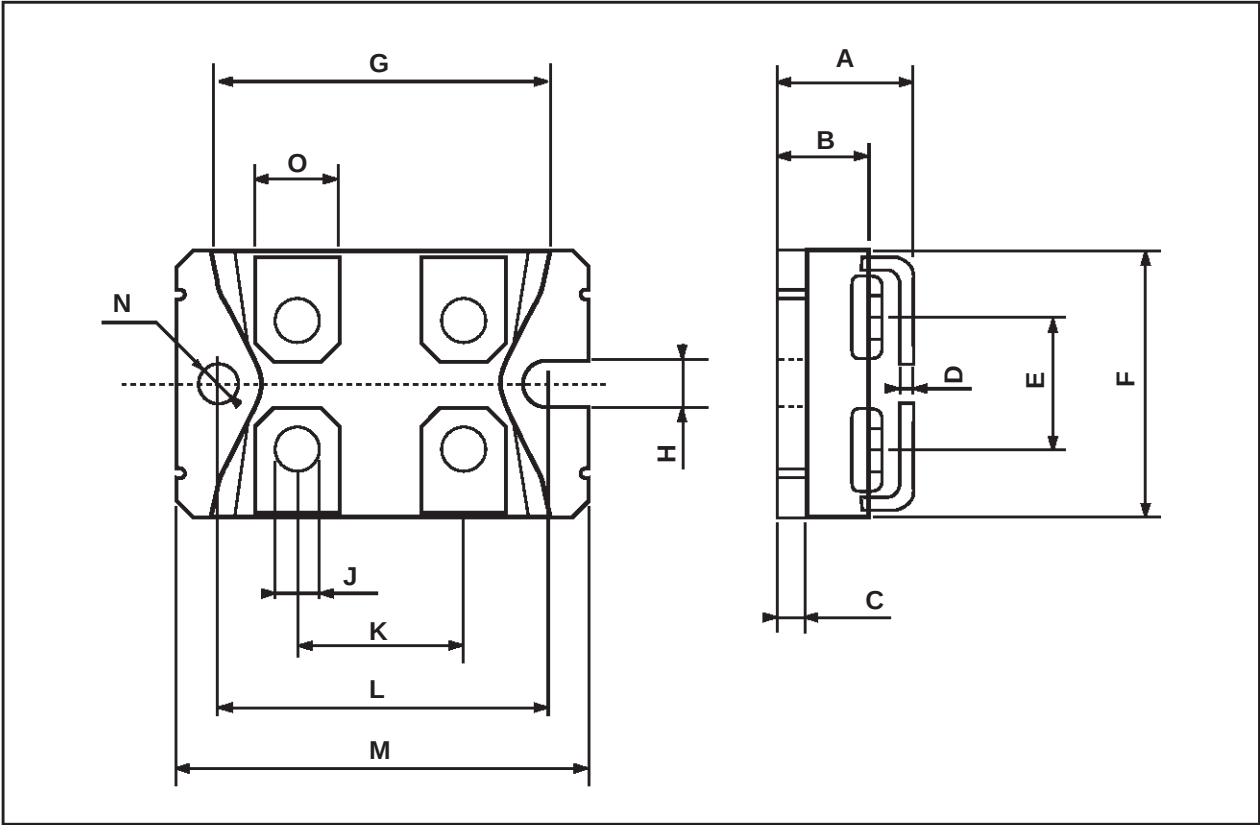


Fig. 3: Switching Waveforms



ISOTOP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.8		12.2	0.466		0.480
B	8.9		9.1	0.350		0.358
C	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
H	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
M	37.8		38.2	1.488		1.503
N	4			0.157		
O	7.8		8.2	0.307		0.322



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