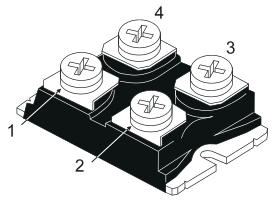
STGE50NB60HD

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



ISOTOP

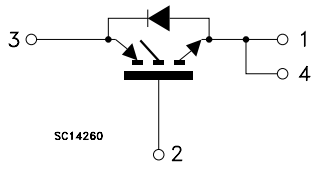
DESCRIPTION

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 perfomances. 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

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

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	0.416	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	30	°C/W
$R_{thc\text{-}h}$	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 = 10Ω		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}(ↄ)	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 V, I_C = 50 A		166		ns
$t_r(v_{off})$	Off Voltage Rise Time	R_{GE} = 10 Ω, V_{GE} = 15 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}(○)	Total Switching Loss			3		mJ
t_c	Cross-Over Time	V_{CC} = 480 V, I_C = 50 A		270		ns
$t_r(v_{off})$	Off Voltage Rise Time	R_{GE} = 10 Ω, V_{GE} = 15 V		75		ns
$t_{d(off)}$	Delay Time	T_j = 125 °C		340		ns
t_f	Fall Time			200		ns
E_{off}(**)	Turn-off Switching Loss			2.9		mJ
E_{ts}(○)	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 A				V
		I_f = 50 A, T_j = 125 °C		2		V
t_{rr}	Reverse Recovery Time	I_f = 50 A, V_R= 200 V		200		nS
Q_{rr}	Reverse Recovery Charge	dI/dt = 100 A/µS, T_j = 125 °C				nC
I_{rrm}	Reverse Recovery Current					A

(•) Pulse width limited by max. junction temperature

(○) 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

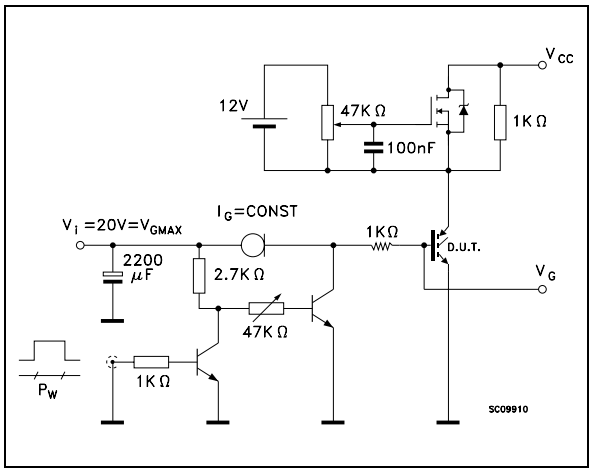


Fig. 2: Test Circuit For Inductive Load Switching

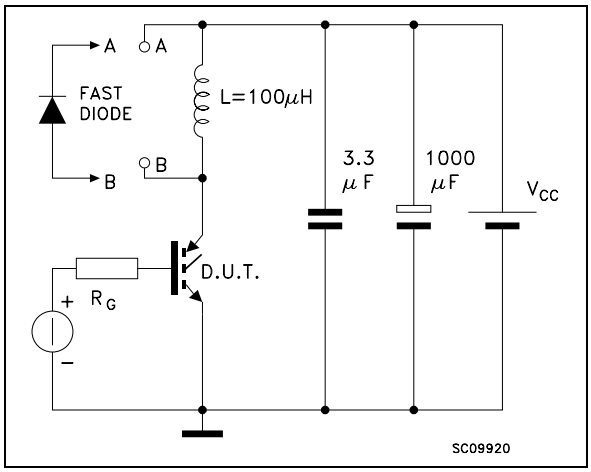
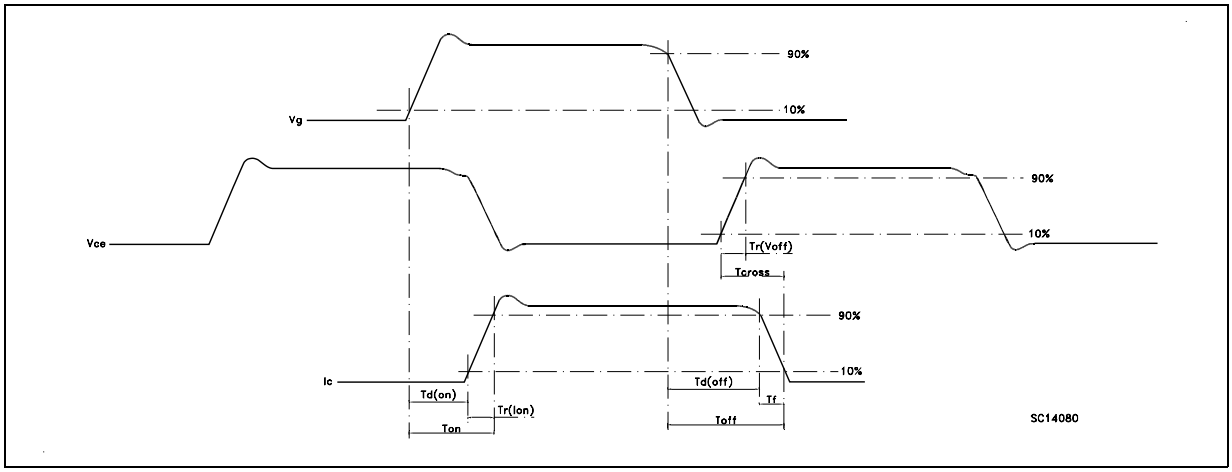


Fig. 3: Switching Waveforms



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