

STGD7NB60S

N-CHANNEL 7A - 600V DPAK Power MESHTM IGBT

TYPE	V _{CES}	V _{CE(sat)}	Ic
STGD7NB60S	600 V	< 1.6 V	7 A

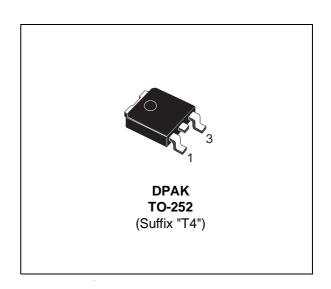
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP (Vcesat)
- HIGH CURRENT CAPABILITY
- OFF LOSSES INCLUDE TAIL CURRENT
- SURFACE-MOUNTING DPAK (TO-252) POWER PACKAGE IN TAPE & REEL (SUFFIX "T4")

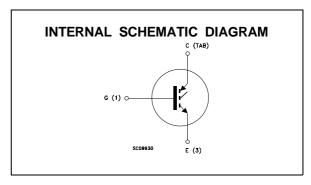
DESCRIPTION

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH $^{\rm TM}$ IGBTs, with outstanding perfomances. The suffix "S" identifies a family optimized to achieve minimum on-voltage drop for low frequency applications (<1kHz).

APPLICATIONS

- LIGHT DIMMER
- STATIC RELAYS
- MOTOR CONTROL





ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	600	V
V _{ECR}	Reverse Battery Protection	20	V
V_{GE}	Gate-Emitter Voltage	± 20	V
Ic	Collector Current (continuous) at T _c = 25 °C	15	Α
Ic	Collector Current (continuous) at T _c = 100 °C	7	Α
I _{CM} (•)	Collector Current (pulsed)	60	Α
P _{tot}	Total Dissipation at T _c = 25 °C	55	W
	Derating Factor	0.44	W/°C
T _{stg}	Storage Temperature	-65 to 150	°C
Tj	Max. Operating Junction Temperature	150	°C

^(•) Pulse width limited by safe operating area

November 1999 1/8

THERMAL DATA

R _{thj}	-case	Thermal	Resistance	Junction-case	Max	2.27	°C/W
R _{thi}	j-amb	Thermal	Resistance	Junction-ambient	Max	100	°C/W
Rtho	c-sink	Thermal	Resistance	Case-sink	Тур	1.5	°C/W

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

OFF

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
V _{BR(ECR)}	Emitter-Collector Breakdown Voltage	IC = 1 mA V _{GE} = 0	20			V
I _{CES}	Collector cut-off (V _{GE} = 0)	$V_{CE} = Max Rating$ $T_j = 25 ^{\circ}C$ $V_{CE} = Max Rating$ $T_j = 125 ^{\circ}C$			10 100	μA μA
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 0)	$V_{GE} = \pm 20 \text{ V}$ $V_{CE} = 0$			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
V _{GE(th)}	Gate Threshold Voltage	$V_{CE} = V_{GE}$ $I_C = 250 \mu A$	2.5		5	V
V _{CE(SAT)}	Saturation Voltage	$V_{GE} = 15 \text{ V}$ $I_{C} = 3 \text{ A}$ $V_{GE} = 15 \text{ V}$ $I_{C} = 7 \text{ A}$ $V_{GE} = 15 \text{ V}$ $I_{C} = 7 \text{ A}$ $T_{j} = 125 ^{\circ}\text{C}$		1 1.2 1.1	1.4 1.6	> >

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
g _{fs}	Forward Transconductance	V _{CE} =25 V I _C = 7 A	4			S
C _{ies} C _{oes} C _{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{CE} = 25 V f = 1 MHz V _{GE} = 0		610 65 12	780 85 15	pF pF pF
Q_G	Gate Charge	V _{CE} = 400 V I _C = 7 A V _{GE} = 15 \	'	33		nC
I _{CL}	Latching Current	$V_{clamp} = 480 \text{ V}$ $R_G=1k\Omega$ $T_i = 150 ^{\circ}\text{C}$	15			Α

SWITCHING ON

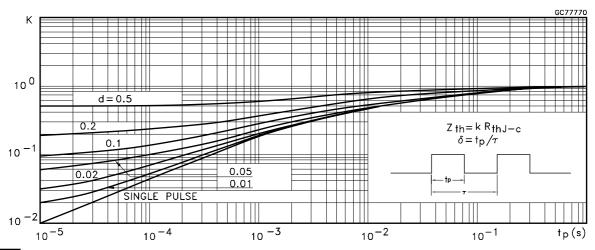
Symbol	Parameter	Test Cond	Min.	Тур.	Max.	Unit	
t _{d(on)} t _r	Delay Time Rise Time	V _{CC} = 480 V V _{GE} = 15 V	$I_C = 7 A$ $R_G = 1 K\Omega$		0.7 0.46		μs μs
(di/dt) _{on}	Turn-on Current Slope	$V_{CC} = 480 \text{ V}$ $R_G = 1 \text{ K}\Omega$	$I_C = 7 A$ $V_{GE} = 15 V$		8		A/μs
Eon	Turn-on Switching Losses	T _j = 125 °C			0.4		mJ

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING OFF

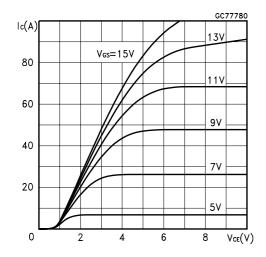
Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
t_{c} $t_{r}(v_{off})$ t_{f} $E_{off}(**)$	Cross-Over Time Off Voltage Rise Time Fall Time Turn-off Switching Loss	$V_{CC} = 480 \text{ V}$ $I_{C} = 7 \text{ A}$ $V_{GE} = 100 \Omega$ $V_{GE} = 15 \text{ V}$		2.2 1.2 1.2 3.5		μs μs μs mJ
$\begin{array}{c} t_{c} \\ t_{r}(v_{off}) \\ t_{f} \\ E_{off}(^{**}) \end{array}$	Cross-Over Time Off Voltage Rise Time Fall Time Turn-off Switching Loss	$V_{CC} = 480 \text{ V}$ $I_{C} = 7 \text{ A}$ $R_{GE} = 100 \Omega$ $V_{GE} = 15 \text{ V}$ $T_{j} = 125 ^{\circ}\text{C}$		3.8 1.2 1.9 5.3		μs μs μs mJ

Thermal Impedance

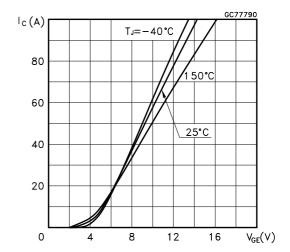


^(*) Pulse width limited by safe operating area
(*) Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %
(**)Losses Include Also The Tail (Jedec Standardization)

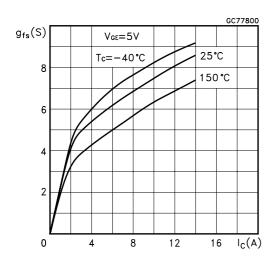
Output Characteristics



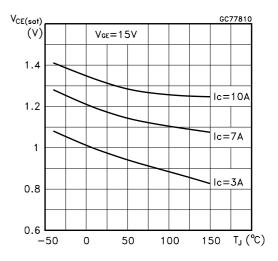
Transfer Characteristics



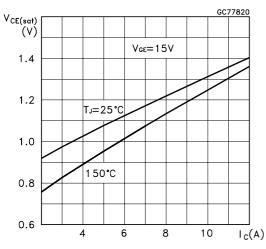
Transconductance



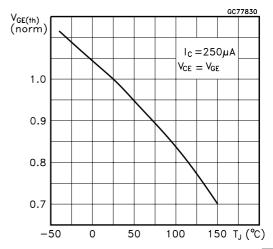
Collector-Emitter On Voltage vs Temperature



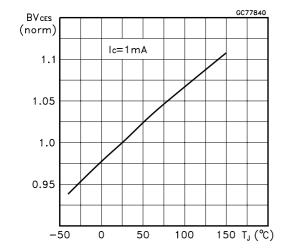
Collector-Emitter On Voltage vs Collector Current



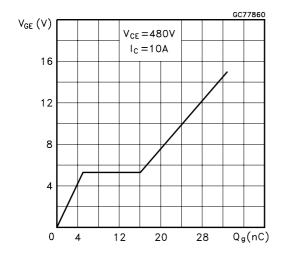
Gate Threshold vs Temperature



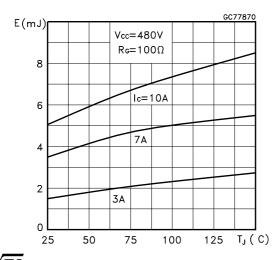
Normalized Breakdown Voltage vs Temperature



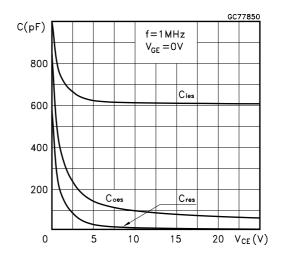
Gate Charge vs Gate-Emitter Voltage



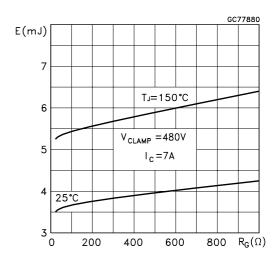
Off Losses vs Temperature



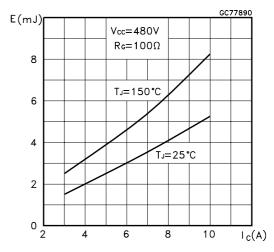
Capacitance Variations



Off Losses vs Gate Resistance



Off Losses vs Collector Current



A7/

Switching Off Safe Operatin Area

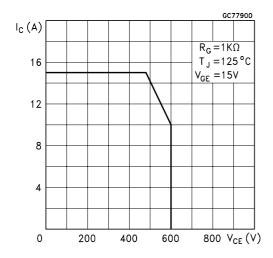


Fig. 1: Gate Charge test Circuit

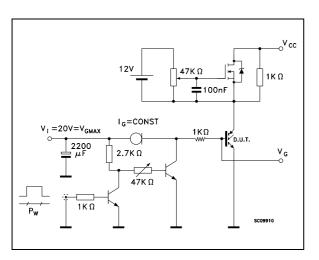


Fig. 2: Test Circuit For Inductive Load Switching

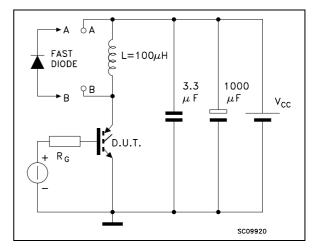
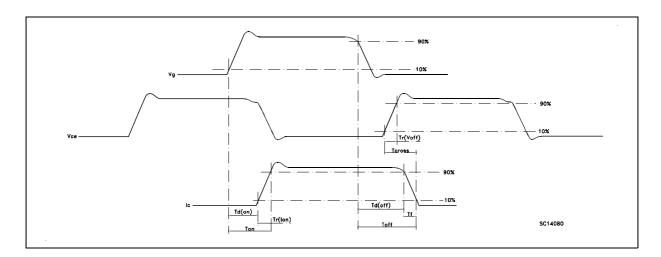
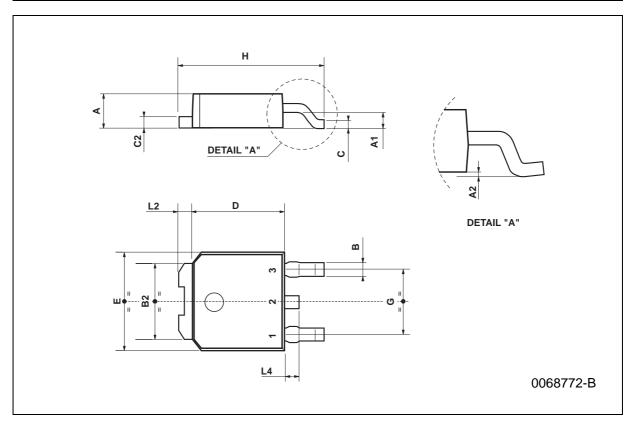


Fig. 3: Switching Waveforms



TO-252 (DPAK) MECHANICAL DATA

DIM.		mm			inch		
Diwi.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Α	2.2		2.4	0.086		0.094	
A1	0.9		1.1	0.035		0.043	
A2	0.03		0.23	0.001		0.009	
В	0.64		0.9	0.025		0.035	
B2	5.2		5.4	0.204		0.212	
С	0.45		0.6	0.017		0.023	
C2	0.48		0.6	0.019		0.023	
D	6		6.2	0.236		0.244	
Е	6.4		6.6	0.252		0.260	
G	4.4		4.6	0.173		0.181	
Н	9.35		10.1	0.368		0.397	
L2		0.8			0.031		
L4	0.6		1	0.023		0.039	



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