



STGF7NB60SL

N-CHANNEL 7A - 600V - TO-220FP

PowerMESH™ IGBT

Table 1: General Features

TYPE	V _{CES}	V _{CE(sat)} (Max) @25°C	I _C @100°C
STGF7NB60SL	600 V	< 1.6 V	7 A

- POLYSILICON GATE VOLTAGE DRIVEN
- LOW THRESHOLD VOLTAGE
- LOW ON-VOLTAGE DROP
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY

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 "S" identifies a family optimized achieve minimum on-voltage drop for low frequency applications (<1kHz).

APPLICATIONS

- LIGHT DIMMER
- STATIC RELAYS

Figure 1: Package

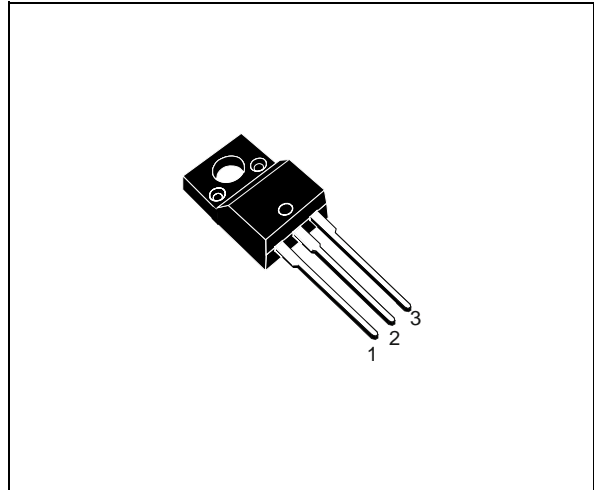


Figure 2: Internal Schematic Diagram

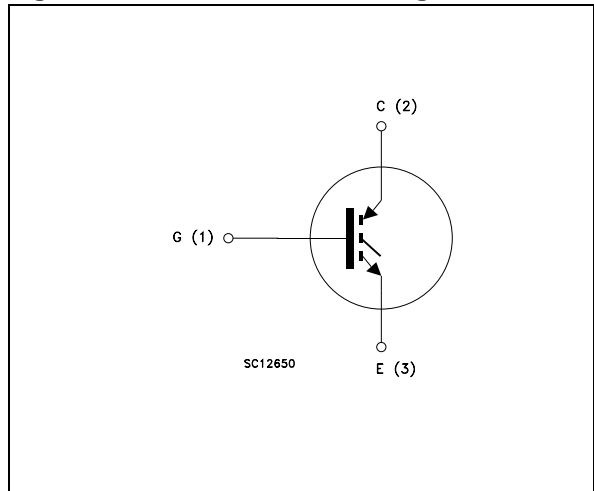


Table 2: Order Codes

SALES TYPE	MARKING	PACKAGE	PACKAGING
STGF7NB60SL	GF7NB60SL	TO-220FP	TUBE

Rev.3

STGF7NB60SL

Table 3: Absolute Maximum ratings

Symbol	Parameter	Value	Symbol
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	600	V
V _{ECR}	Reverse Battery Protection	20	V
V _{GE}	Gate-Emitter Voltage	± 20	V
I _C	Collector Current (continuous) at 25°C	15	A
I _C	Collector Current (continuous) at 100°C	7	A
I _{CM} (1)	Collector Current (pulsed)	20	A
P _{TOT}	Total Dissipation at T _C = 25°C	25	W
	Derating Factor	0.2	W/°C
V _{ISO}	Insulation Withstand Voltage A.C.	2500	V
T _{stg}	Storage Temperature	- 55 to 150	°C
T _j	Operating Junction Temperature		

(1)Pulse width limited by max. junction temperature.

Table 4: Thermal Data

R _{thj-case}	Thermal Resistance Junction-case Max	5	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient Max	62.5	°C/W

ELECTRICAL CHARACTERISTICS (T_{CASE} =25°C UNLESS OTHERWISE SPECIFIED)

Table 5: Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{BR(CES)}	Collectro-Emitter Breakdown Voltage	I _C = 250 μA, V _{GE} = 0	600			V
V _{BR(ECS)}	Emitter-Collector Breakdown Voltage	I _C = 1mA, V _{GE} = 0	20			V
I _{CES}	Collector-Emitter Leakage Current (V _{CE} = 0)	V _{GE} = Max Rating T _C =25°C T _C =125°C			10 100	μA μA
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 0)	V _{GE} = ± 20 V , V _{CE} = 0			±100	nA

Table 6: On

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GE(th)}	Gate Threshold Voltage	V _{CE} = V _{GE} , I _C = 250 μA	1.2		2.4	V
V _{CE(SAT)}	Collector-Emitter Saturation Voltage	V _{GE} =4.5 V, I _C = 7A, T _j = 25°C V _{GE} =4.5 V, I _C = 7A, T _j = 125°C		1.2 1.1	1.6	V V

ELECTRICAL CHARACTERISTICS (CONTINUED)

Table 7: Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	$V_{CE} = 15 \text{ V}, I_C = 7 \text{ A}$		5		S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{CE} = 25 \text{ V}, f = 1 \text{ MHz}, V_{GE} = 0$		800 60 10		pF pF pF
Q_g Q_{ge} Q_{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	$V_{CE} = 480 \text{ V}, I_C = 7 \text{ A},$ $V_{GE} = 5 \text{ V}$ (see Figure 20)		16 2.5 8.5	22	nC nC nC
I_{CL}	Turn-Off SOA Minimum Current	$V_{clamp} = 480 \text{ V}, T_j = 125^\circ\text{C}$ $R_G = 1 \text{ K}\Omega, V_{GE} = 5 \text{ V}$	20			A
tscw	Short Circuit Withstand Time	$V_{ce} = 0.5 V_{BR(CES)}, V_{GE} = 5 \text{ V},$ $T_j = 125^\circ\text{C}, R_G = 1 \text{ K}\Omega$		14		μs

Table 8: Switching On

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Current Rise Time	$V_{CC} = 480 \text{ V}, I_C = 7 \text{ A}, R_G = 1 \text{ K}\Omega,$ $V_{GE} = 5 \text{ V}$ (see Figure 18)		1.1 0.25		μs μs
$(di/dt)_{on}$ E_{on}	Turn-on Current Slope Turn-on Switching Losses	$V_{CC} = 480 \text{ V}, I_C = 7 \text{ A}, R_G = 1 \text{ K}\Omega$ $V_{GE} = 5 \text{ V}, T_j = 125^\circ\text{C}$		45 2.7		A/ μs mJ

Table 9: Switching Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c $t_r(V_{off})$ $t_{d(off)}$ t_f $E_{off(**)}$	Cross-over Time Off Voltage Rise Time Delay Time Current Fall Time Turn-off Switching Loss	$V_{CC} = 480 \text{ V}, I_C = 7 \text{ A},$ $R_{GE} = 1 \text{ K}\Omega, V_{GE} = 5 \text{ V}$ (see Figure 18)		2.7 1.6 5.2 1.1 4.1		μs μs μs μs mJ
t_c $t_r(V_{off})$ $t_{d(off)}$ t_f $E_{off(**)}$	Cross-over Time Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss	$V_{CC} = 480 \text{ V}, I_C = 7 \text{ A},$ $R_{GE} = 1 \text{ K}\Omega, V_{GE} = 5 \text{ V}$ $T_j = 125^\circ\text{C}$ (see Figure 18)		4.4 2.4 6.4 1.7 7.1		μs μs μs μs mJ

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

Figure 3: Output Characteristics

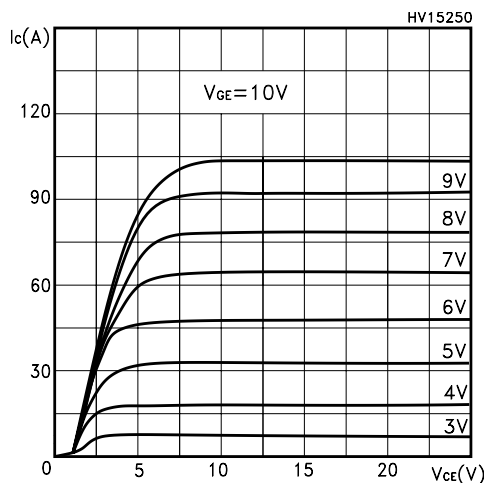


Figure 4: Transconductance

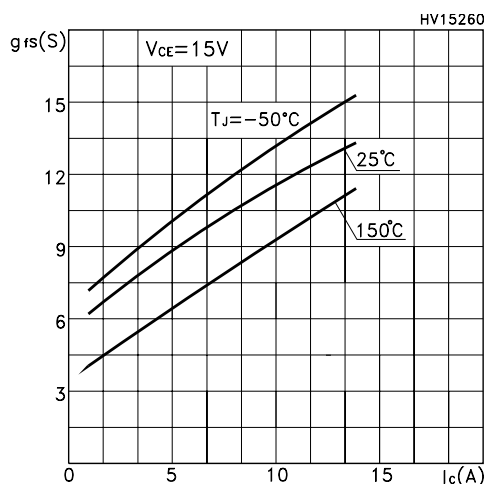


Figure 5: Collector-Emitter On Voltage vs Collector Current

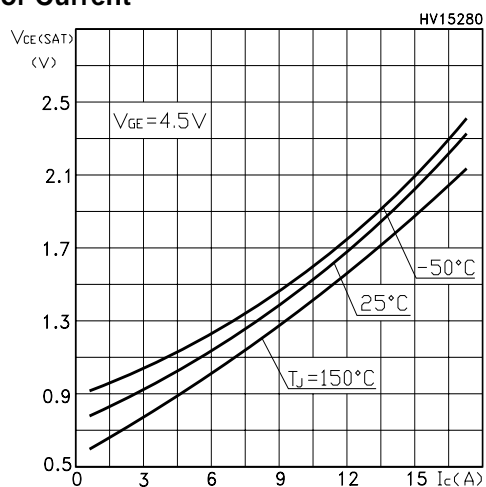


Figure 6: Transfer Characteristics

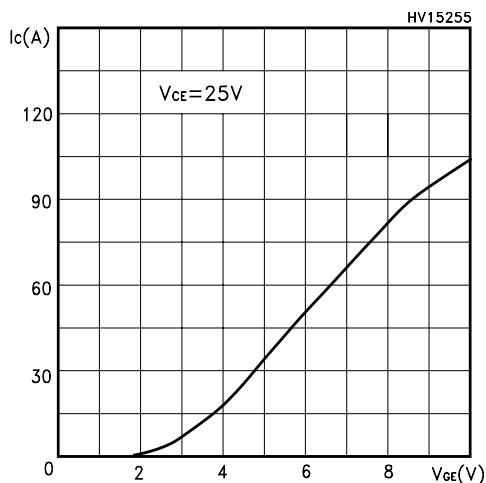


Figure 7: Collector-Emitter On Voltage vs Temperature

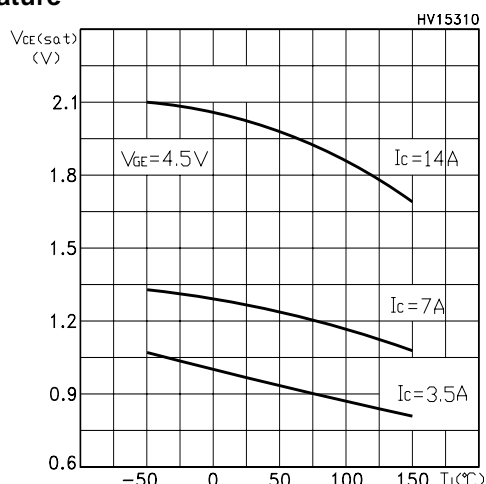


Figure 8: Normalized Collector-Emitter On Voltage vs Temperature

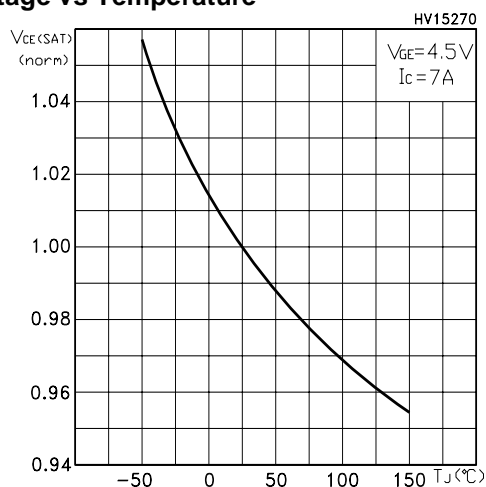


Figure 9: Gate Threshhold vs Temperature

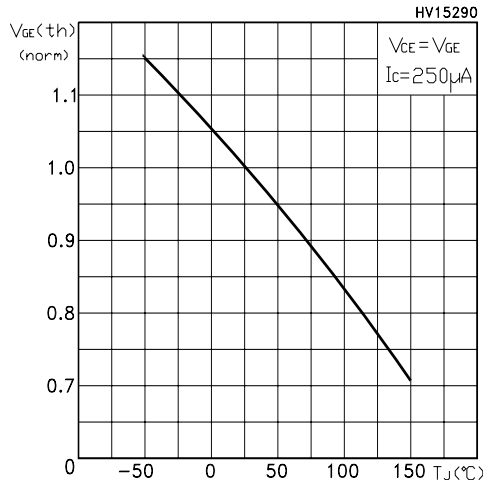


Figure 10: Capacitance Variations

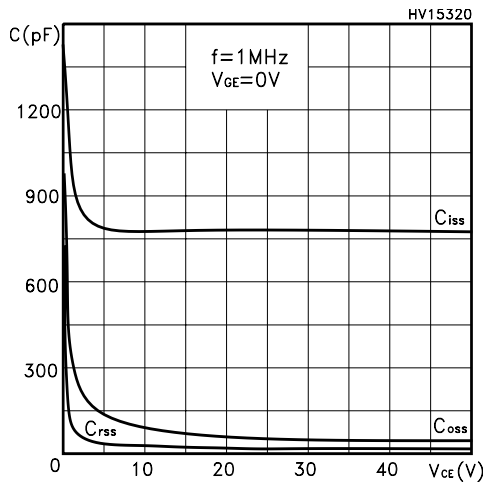


Figure 11: Total Switching Losses vs Gate Resistance

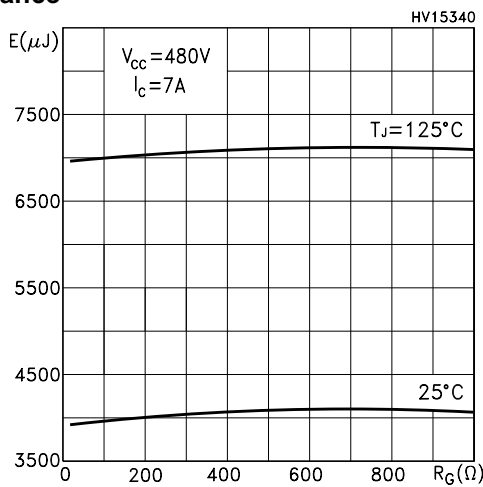


Figure 12: Normalized Breakdown Voltage vs Temperature

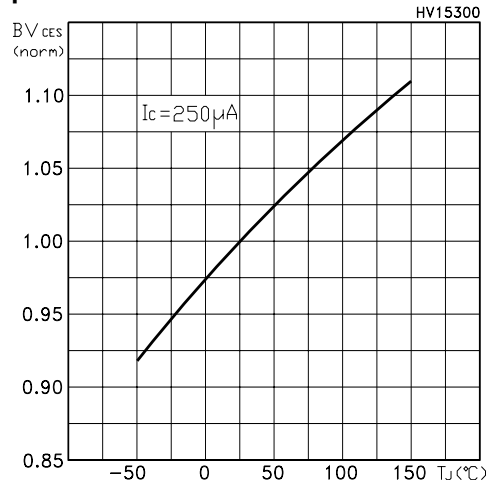


Figure 13: Gate Charge vs Gate-Emitter Voltage

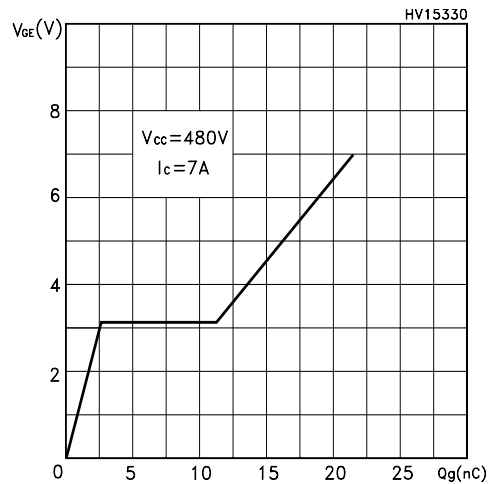


Figure 14: Total Switching Losses vs Temperature

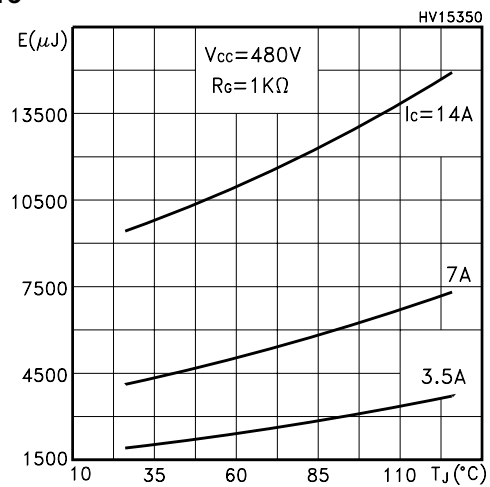


Figure 15: Total Switching Losses vs Collector Current

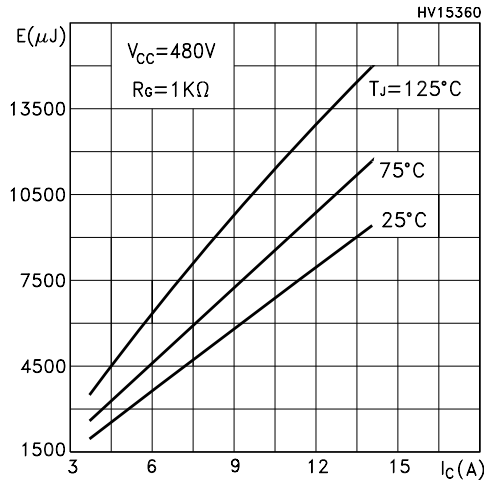


Figure 16: Thermal Impedance

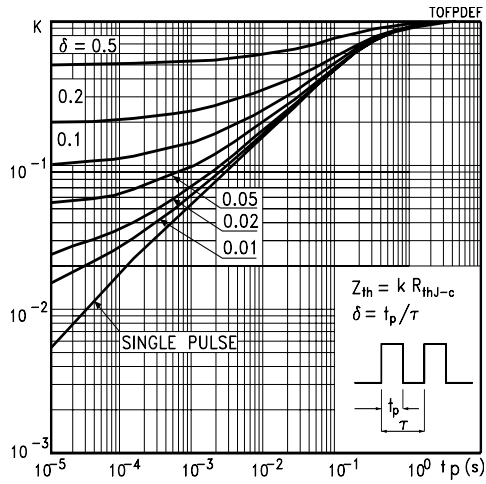


Figure 17: Turn-Off SOA

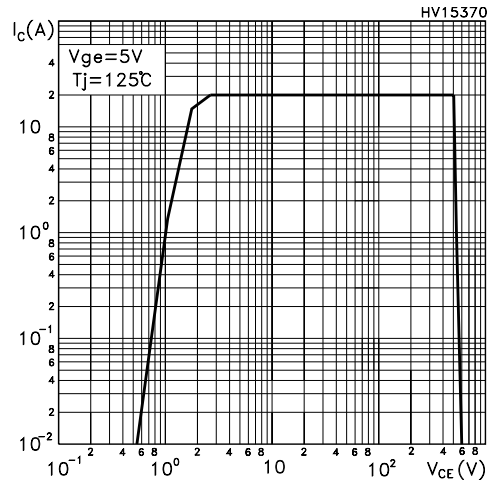


Figure 18: Test Circuit for Inductive Load Switching

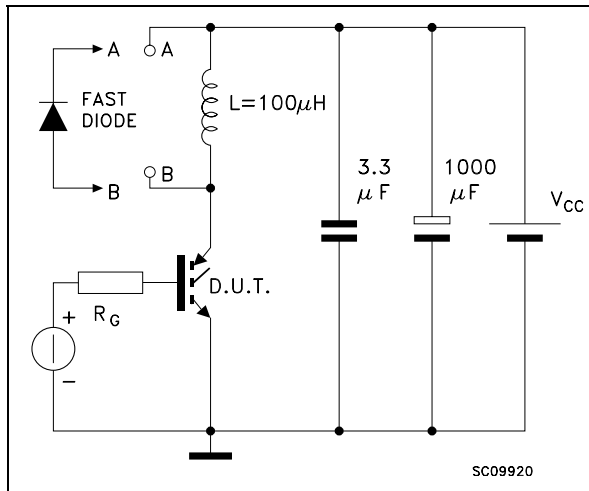


Figure 19: Switching Waveforms

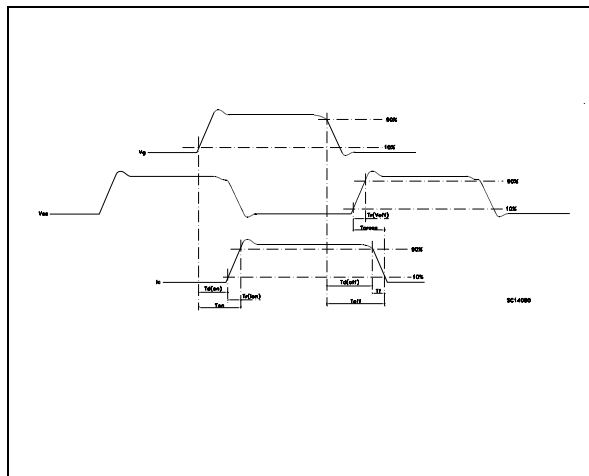
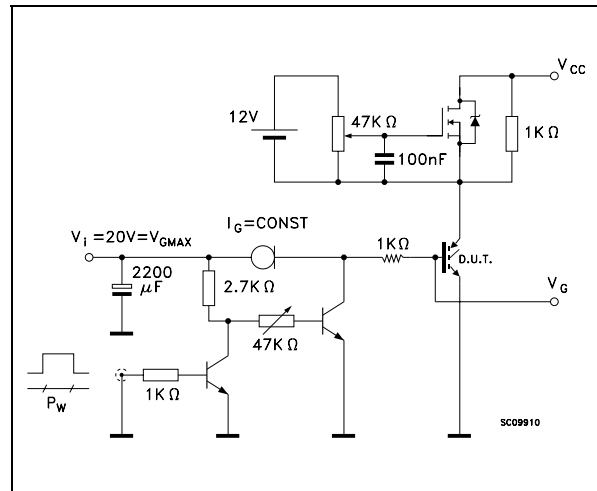


Figure 20: Gate Charge Test Circuit



STGF7NB60SL

Table 10: Revision History

Date	Revision	Description of Changes
04-June-2004	2	Stylesheet update. No content change
02-Sep-2004	3	Datasheet updated, see table1

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