Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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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

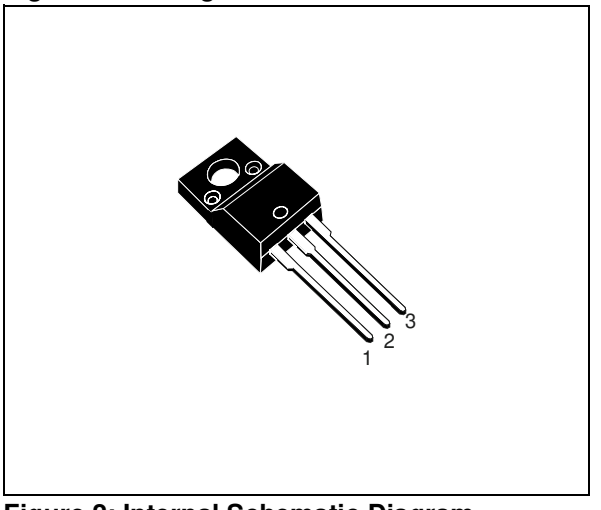

Figure 2: Internal Schematic Diagram

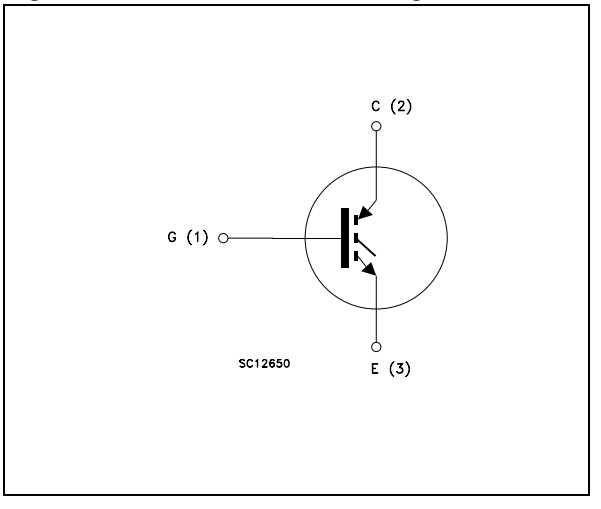

Table 2: Order Codes

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

Rev.3

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

Rthj-case	Thermal Resistance Junction-case Max	5	°C/W
Rthj-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 Tc=25°C Tc=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, Tj= 25°C V_{GE}=4.5 V, I_C= 7A, Tj= 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 V, I_C= 7 A		5		S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25V, f = 1 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} = 480V, I_C = 7 A, V_{GE} = 5V (see Figure 20)		16 2.5 8.5	22	nC nC nC
I_{CL}	Turn-Off SOA Minimum Current	V_{clamp} = 480 V , Tj = 125°C R_G = 1 KΩ, V_{GE}=5V	20			A
tscw	Short Circuit Withstand Time	V_{ce} = 0.5 $V_{BR(CES)}$, V_{GE}=5V, Tj = 125°C , R_G = 1KΩ		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 V, I_C = 7 A R_G=1KΩ , V_{GE} = 5 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 V, I_C = 7 A R_G=1KΩ V_{GE} = 5 V,Tj = 125°C		45 2.7		A/µs mJ

Table 9: Switching Off

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

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

Figure 3: Output Characteristics

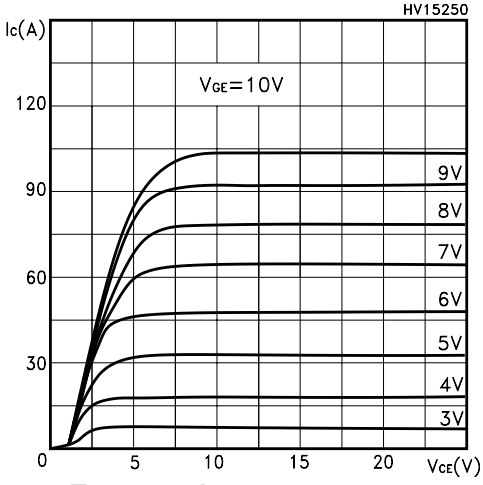

Figure 4: Transconductance

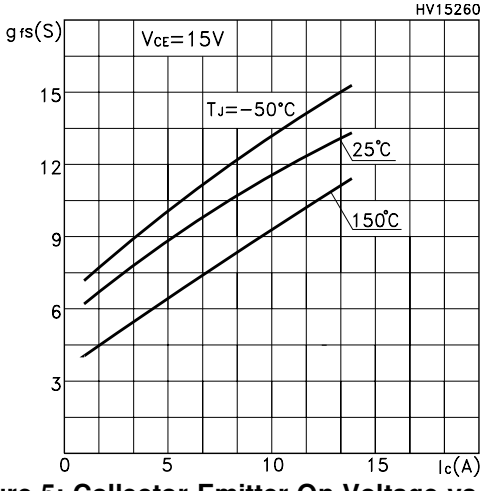

Figure 5: Collector-Emitter On Voltage vs Collector Current

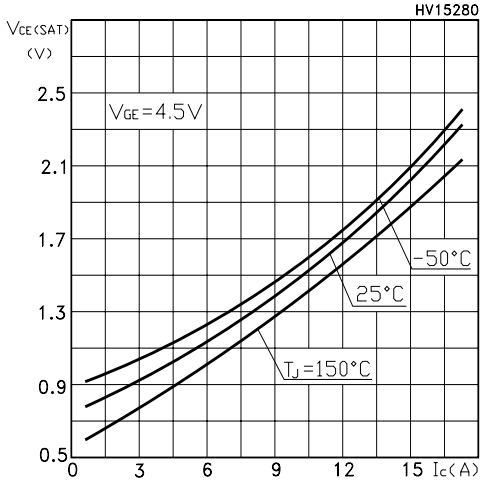

Figure 6: Transfer Characteristics

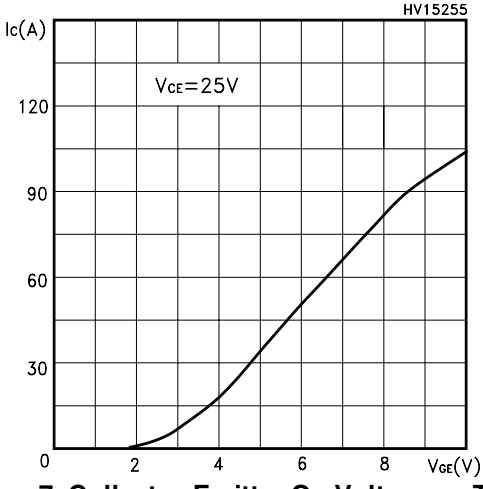

Figure 7: Collector-Emitter On Voltage vs Temperature

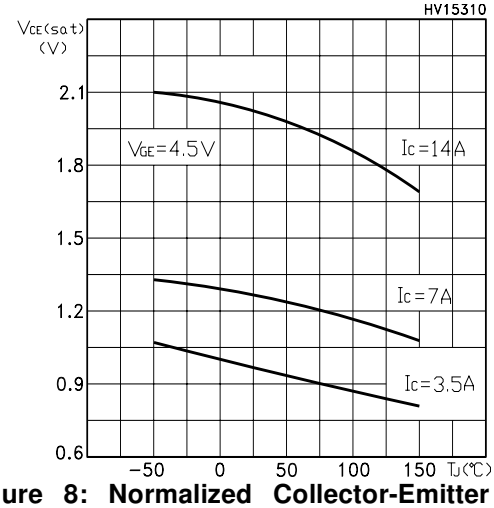

Figure 8: Normalized Collector-Emitter On Voltage vs Temperature

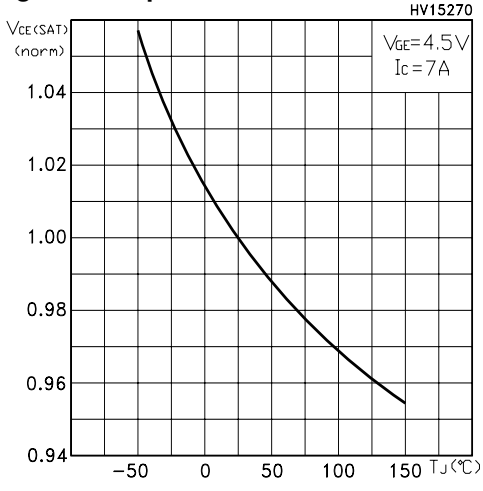

Figure 9: Gate Thereshold vs Temperature

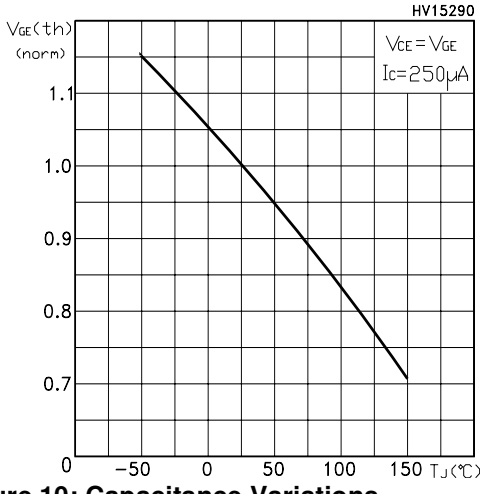

Figure 10: Capacitance Variations

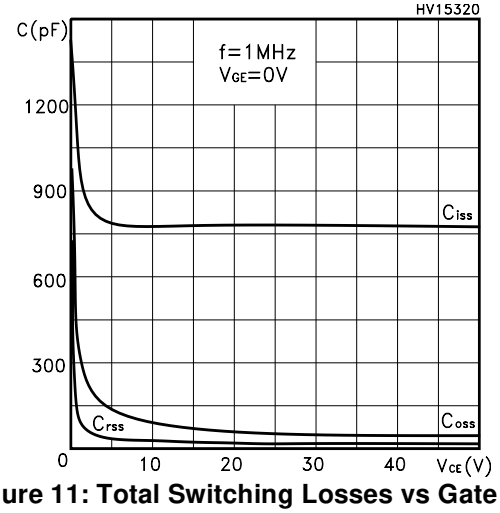

Figure 11: Total Switching Losses vs Gate Resistance

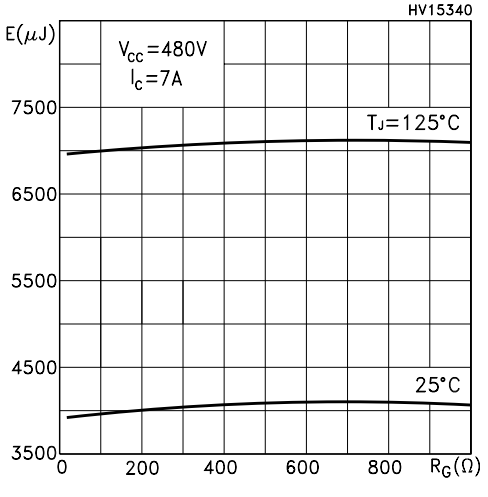

Figure 12: Normalized Breakdown Voltage vs Temperature

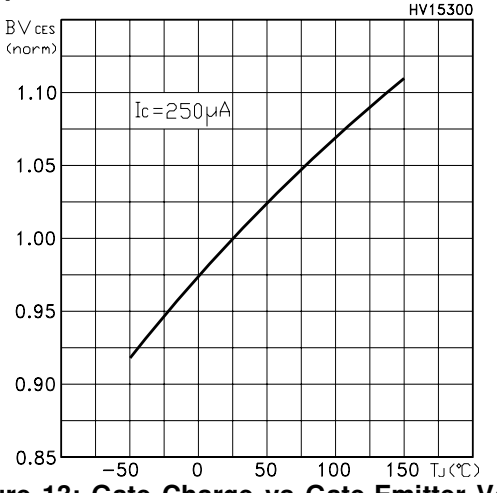

Figure 13: Gate Charge vs Gate-Emitter Voltage

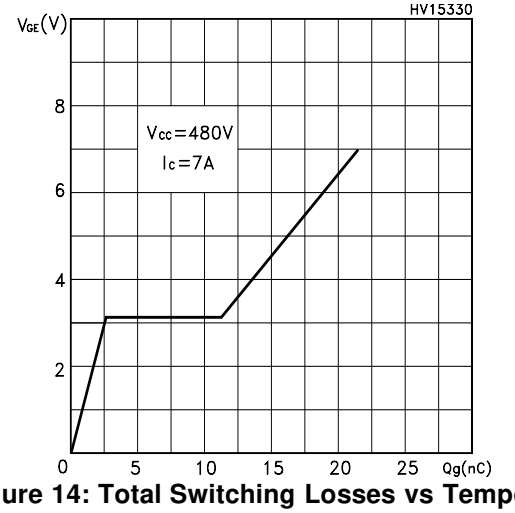

Figure 14: Total Switching Losses vs Temperature

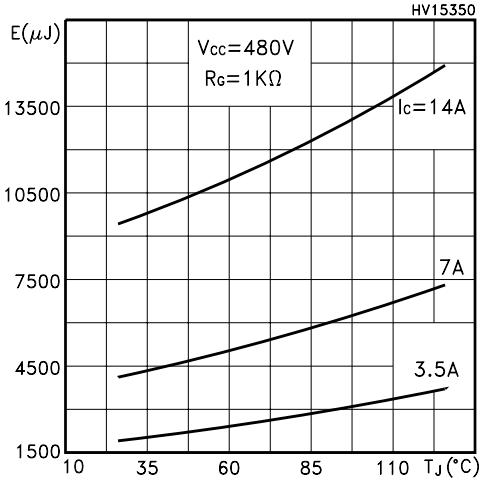

Figure 15: Total Switching Losses vs Collector Current

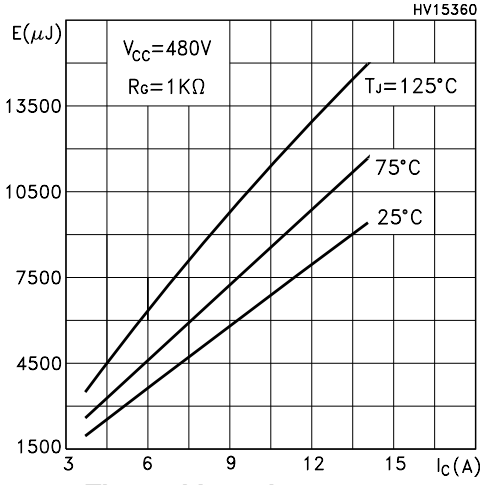

Figure 16: Thermal Impedance

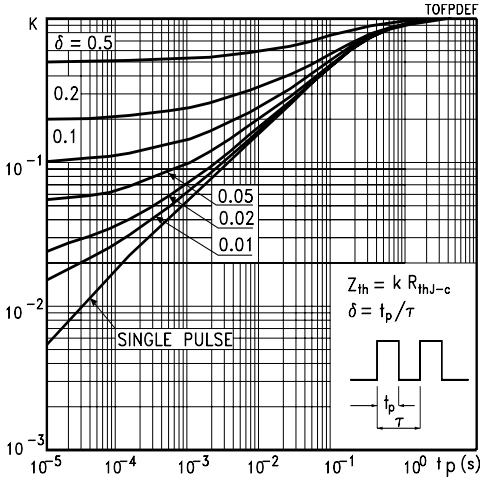

Figure 17: Turn-Off SOA

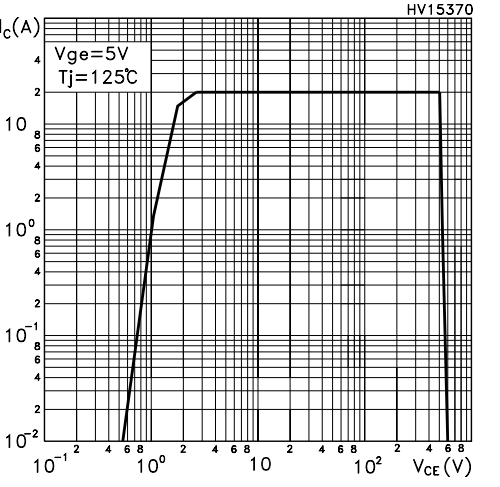

Figure 18: Test Circuit for Inductive Load Switching

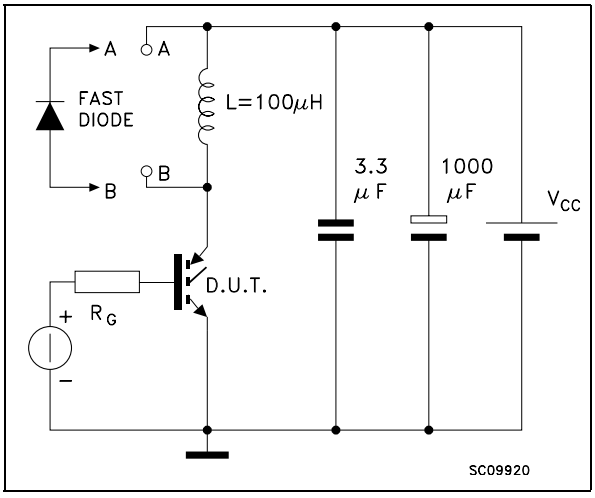

Figure 19: Switching Waveforms

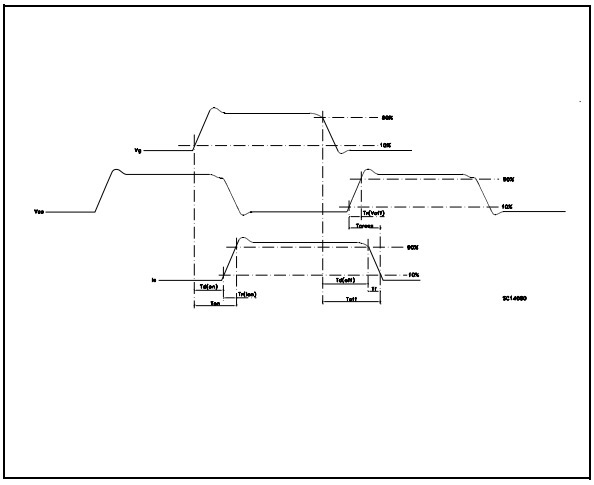

Figure 20: Gate Charge Test Circuit

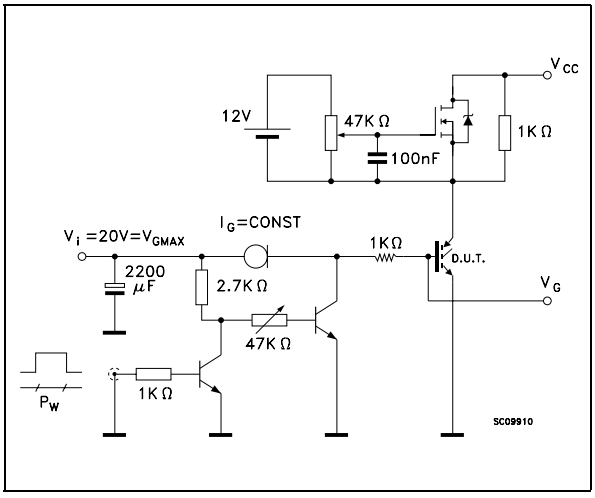

Table 10: Revision History

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