

STT5NF20V

N-CHANNEL 20V - 0.030 Ω - 5A SOT23-6L 2.7V-DRIVE STripFETTM II POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	ID
STT5NF20V	20 V	< 0.040 Ω (@ 4.5 V) < 0.045 Ω (@ 2.7 V)	5 A

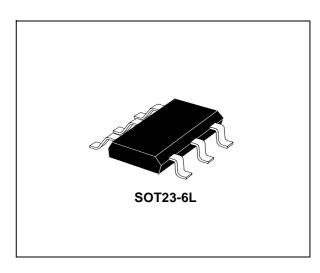
- TYPICAL $R_{DS}(on) = 0.030 \Omega @ 4.5 V$
- TYPICAL $R_{DS}(on) = 0.037 \Omega @ 2.7 V$
- ULTRA LOW THRESHOLD GATE DRIVE (2.7 V)
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY

DESCRIPTION

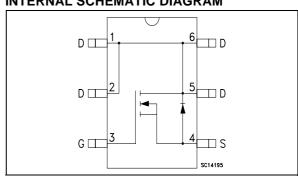
This Power MOSFET is the latest development of STMicroelectronis unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low onresistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- DC MOTOR DRIVE
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT
- POWER MANAGEMENT IN PORTABLE/DESKTOP PCs



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	20	V
V_{DGR}	Drain-gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)	20	V
V _{GS}	Gate- source Voltage	± 12	V
I _D	Drain Current (continuous) at T _C = 25°C	5	А
I _D	Drain Current (continuous) at T _C = 100°C	3	А
I _{DM} (•)	Drain Current (pulsed)	20	А
P _{tot}	Total Dissipation at T _C = 25°C	1.6	W

^(•) Pulse width limited by safe operating area.

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THERMAL DATA

Rthj-a	mb Thermal Resistance Junction-ambient	Max	78	°C/W
Tj	Max. Operating Junction Temperature		-55 to 150	°C
T _{st}	Storage Temperature		-55 to 150	°C

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

OFF

Symbol	Parameter	Parameter Test Conditions		Тур.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	$I_D = 250 \ \mu\text{A}, \ V_{GS} = 0$	20			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	$V_{DS} = Max Rating$ $V_{DS} = Max Rating T_C = 125^{\circ}C$			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 12V			±100	nA

ON (*)

Symbol	Parameter	Test Conditions		Min.	Тур.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}$	I _D = 250 μA	0.6			V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 4.5 V V _{GS} = 2.7 V	I _D = 2.5 A I _D = 2.5 A		0.030 0.037	0.040 0.045	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
g _{fs} (*)	Forward Transconductance	$V_{DS}=15 \text{ V}$ $I_{D}=2.5 \text{ A}$		9.5		S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 15V f = 1 MHz, V _{GS} = 0		460 200 50		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
t _{d(on)} t _r	Turn-on Delay Time Rise Time	$\begin{aligned} V_{DD} &= 10 \text{ V} & I_D &= 2.5 \text{ A} \\ R_G &= 4.7 \ \Omega & V_{GS} &= 4.5 \text{ V} \\ \text{(Resistive Load, Figure 1)} \end{aligned}$		7 33		ns ns
Q _g Q _{gs} Q _{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V _{DD} = 16V I _D = 5A V _{GS} =4.5V (see test circuit, Figure 2)		8.5 1.8 2.4	11.5	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
$t_{d(off)} \ t_{f}$	Turn-off Delay Time Fall Time	$\begin{array}{ccc} V_{DD} = 10 \text{ V} & I_D = 2.5 \text{ A} \\ R_G = 4.7\Omega, & V_{GS} = 4.5 \text{ V} \\ \text{(Resistive Load, Figure 1)} \end{array}$		27 10		ns ns
t _{d(Voff)} t _f t _c	Off-voltage Rise Time Fall Time Cross-over Time	$\begin{split} &V_{clamp} = 16 \text{ V} & I_D = 5 \text{ A} \\ &R_G = 4.7\Omega, &V_{GS} = 4.5 \text{ V} \\ &(\text{Inductive Load, Figure 3}) \end{split}$		26 11 21		ns ns ns

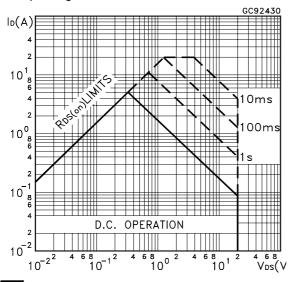
SOURCE DRAIN DIODE

Symbol	Parameter	Test C	Test Conditions		Тур.	Max.	Unit
I _{SD} I _{SDM} (•)	Source-drain Current Source-drain Current (pulsed)					5 20	A A
V _{SD} (*)	Forward On Voltage	I _{SD} = 5 A	V _{GS} = 0			1.2	V
t _{rr} Q _{rr} I _{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 5 A$ $V_{DD} = 10 V$ (see test circu	di/dt = $100A/\mu s$ $T_j = 150$ °C it, Figure 3)		26 13 1		ns nC A

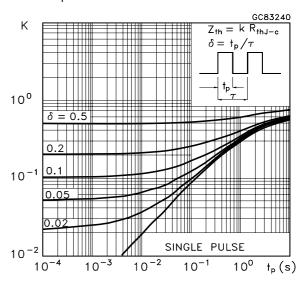
^(*)Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.

(•)Pulse width limited by safe operating area.

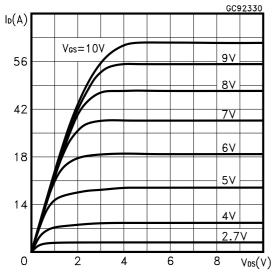
Safe Operating Area



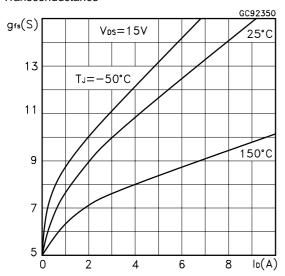
Thermal Impedance



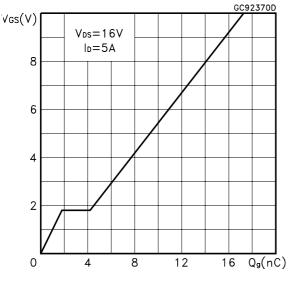
Output Characteristics



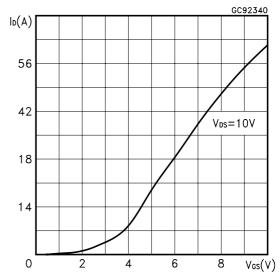
Transconductance



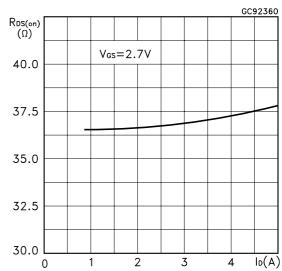
Gate Charge vs Gate-source Voltage



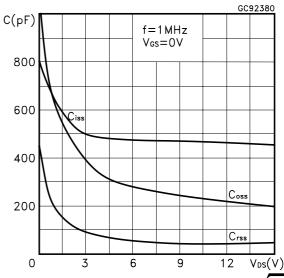
Transfer Characteristics



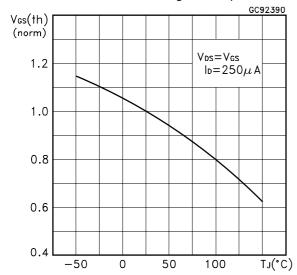
Static Drain-source On Resistance



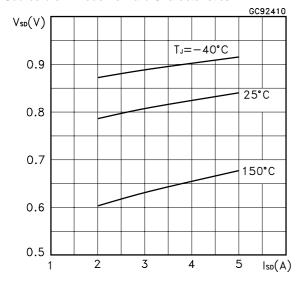
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Source-drain Diode Forward Characteristics



Normalized on Resistance vs Temperature

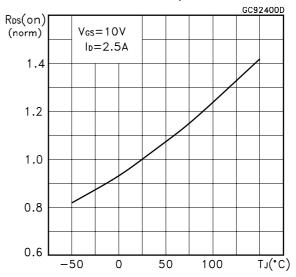


Fig. 1: Switching Times Test Circuits For Resistive Load

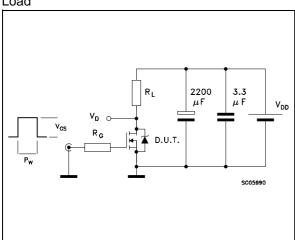


Fig. 2: Gate Charge test Circuit

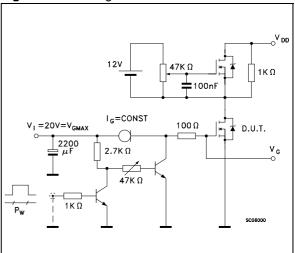
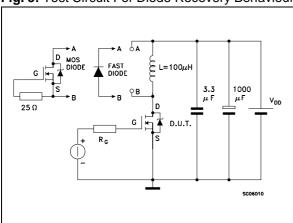
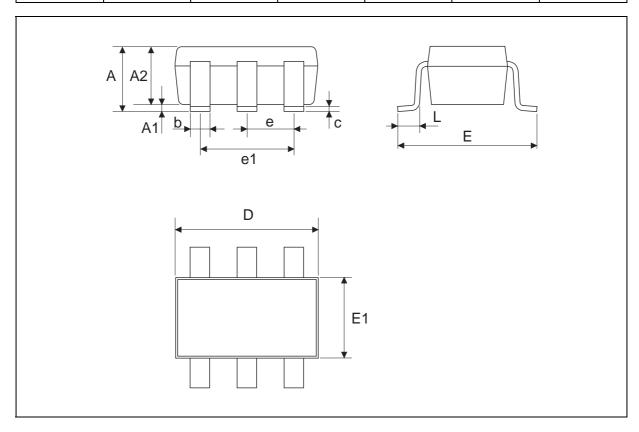


Fig. 3: Test Circuit For Diode Recovery Behaviour



SOT23-6L MECHANICAL DATA

DIM.	mm			mils		
2	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
А	0.90		1.45	0.035		0.057
A1	0.00		0.15	0.000		0.006
A2	0.90		1.30	0.035		0.051
b	0.25		0.50	0.010		0.020
С	0.09		0.20	0.004		0.008
D	2.80		3.10	0.110		0.122
E	2.60		3.00	0.102		0.118
E1	1.50		1.75	0.059		0.069
L	0.35		0.55	0.014		0.022
е		0.95			0.037	
e1		1.90			0.075	



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