



STS4PF20V

P-CHANNEL 20V - 0.090 Ω - 4A SO-8 2.7V-DRIVE STripFET™ II POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STS4PF20V	20 V	< 0.11 Ω (@ 4.5 V) < 0.135 Ω (@ 2.7 V)	4 A

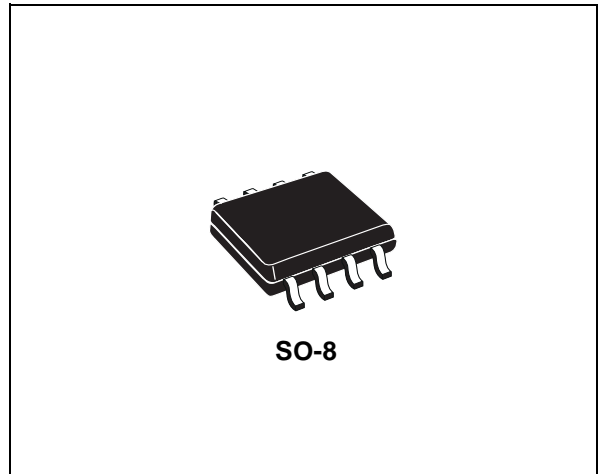
- TYPICAL R_{DS(on)} = 0.090 Ω @ 4.5 V
- TYPICAL R_{DS(on)} = 0.100 Ω @ 2.7 V
- ULTRA LOW THRESHOLD GATE DRIVE (2.7 V)
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY

DESCRIPTION

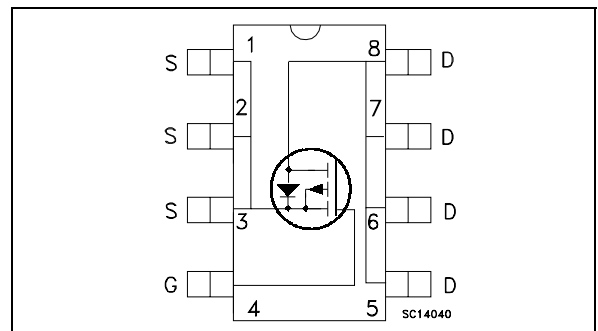
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

APPLICATIONS

- MOBILE PHONE APPLICATIONS
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT



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 kΩ)	20	V
V _{GS}	Gate- source Voltage	± 12	V
I _D	Drain Current (continuous) at T _C = 25°C	4	A
I _D	Drain Current (continuous) at T _C = 100°C	2.5	A
I _{DM} (●)	Drain Current (pulsed)	16	A
P _{tot}	Total Dissipation at T _C = 25°C	2.5	W

(●) Pulse width limited by safe operating area.

Note: For the P-CHANNEL MOSFET actual polarity of voltages and current has to be reversed

STS4PF20V

THERMAL DATA

Rthj-amb T _j T _{stg}	(*)Thermal Resistance Junction-ambient Maximum Operating Junction Temperature storage temperature	Max	50 150 -55 to 150	°C/W °C °C
------------------------------------------------	---------------------------------------------------------------------------------------------------------	-----	-------------------------	------------------

(*) When Mounted on 1 inch² FR-4 board, 2 oz of Cu and t ≤ 10 sec.

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

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA, 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°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.	Typ.	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 I _D = 2 A V _{GS} = 2.7 V I _D = 2 A		0.090 0.100	0.110 0.135	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} =15V I _D =2 A		7.5		S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 15V, f = 1 MHz, V _{GS} = 0		500 140 30		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON(*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{DD} = 10\text{ V}$ $I_D = 2\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 1)		38 39		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 10\text{ V}$ $I_D = 4\text{ A}$ $V_{GS} = 4.5\text{ V}$ (see test circuit, Figure 2)		6.2 1 1.4		nC nC nC

SWITCHING OFF(*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 10\text{ V}$ $I_D = 2\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 1)		54 12		ns ns
$t_r(V_{off})$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{clamp} = 16\text{ V}$ $I_D = 4\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ (Inductive Load, Figure 3)		46 11 15		ns ns ns

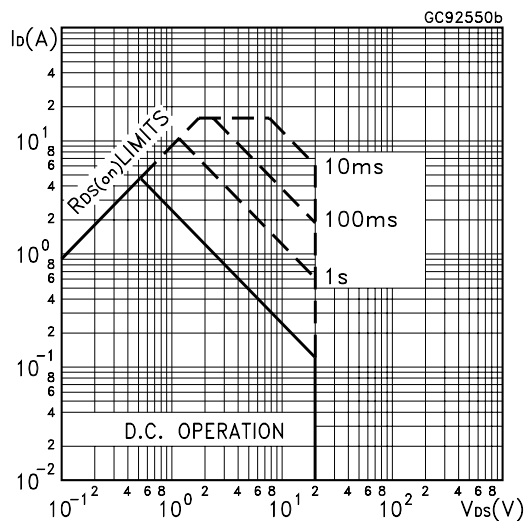
SOURCE DRAIN DIODE(*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM} (\bullet)$	Source-drain Current Source-drain Current (pulsed)				4 16	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 4\text{ A}$ $V_{GS} = 0$			1.2	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 4\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 15\text{ V}$ $T_j = 150^\circ\text{C}$ (Inductive Load, Figure 3)		20 13 1.3		ns nC A

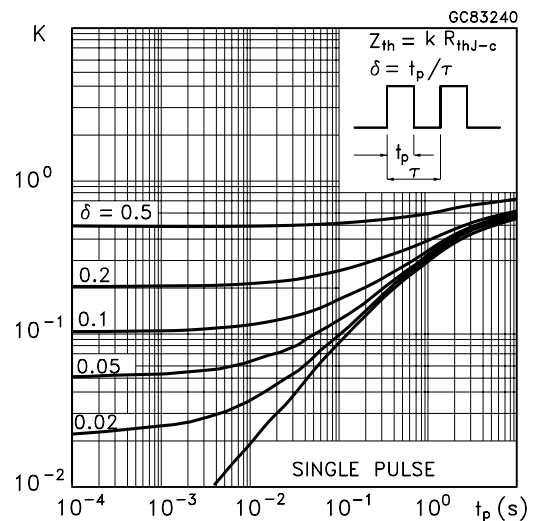
(*)Pulse width $\leq 300\ \mu\text{s}$, duty cycle 1.5 %.

(\bullet)Pulse width limited by T_{JMAX}

Safe Operating Area

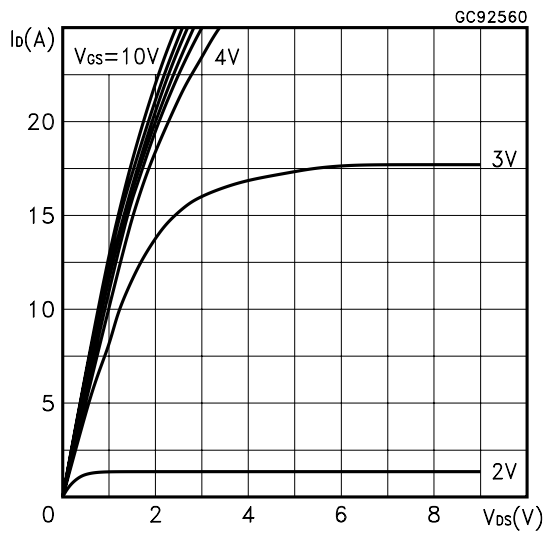


Thermal Impedance

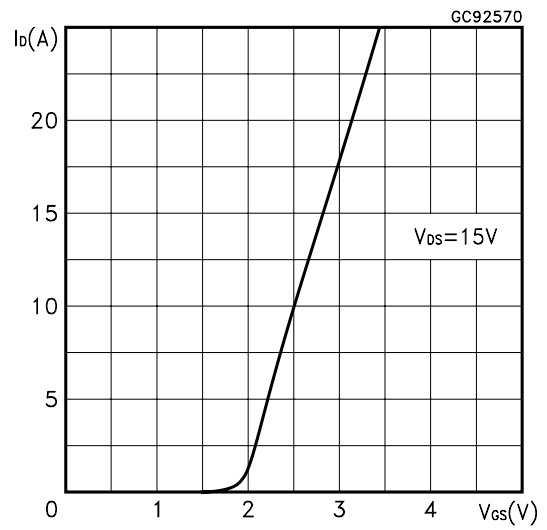


STS4PF20V

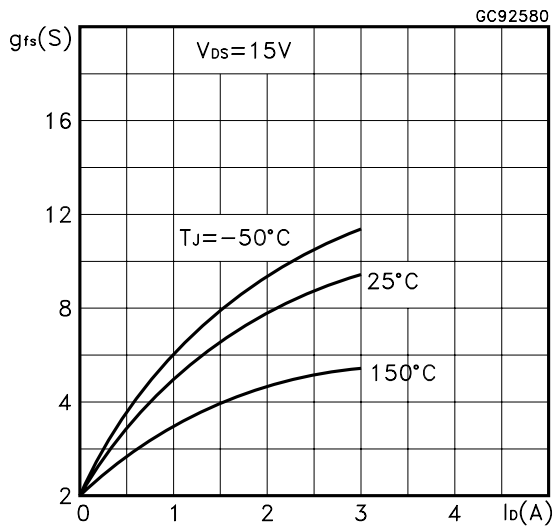
Output Characteristics



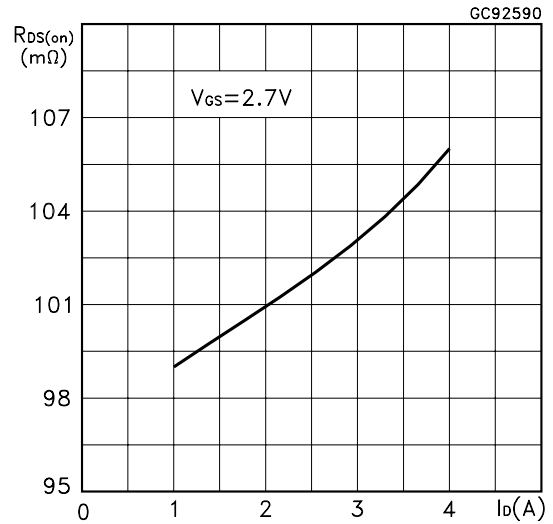
Transfer Characteristics



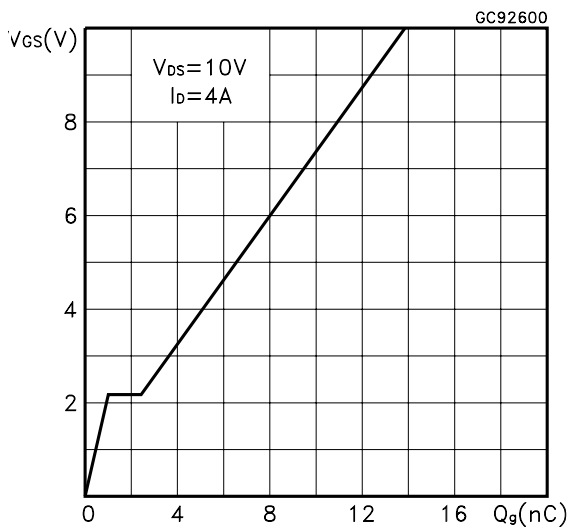
Transconductance



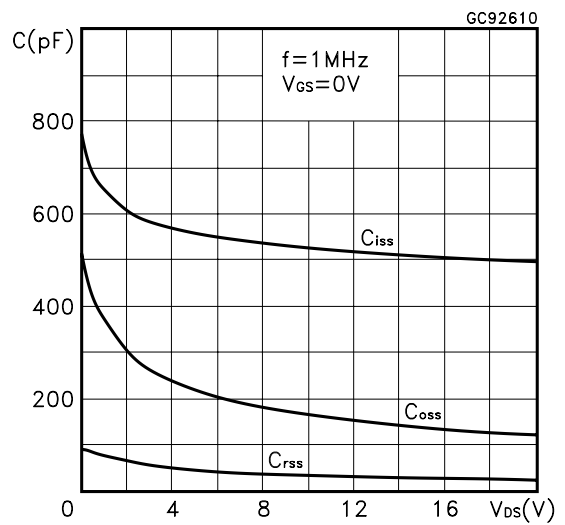
Static Drain-source On Resistance



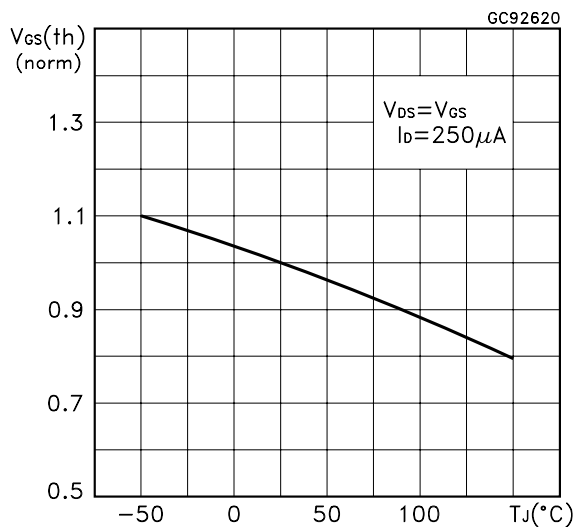
Gate Charge vs Gate-source Voltage



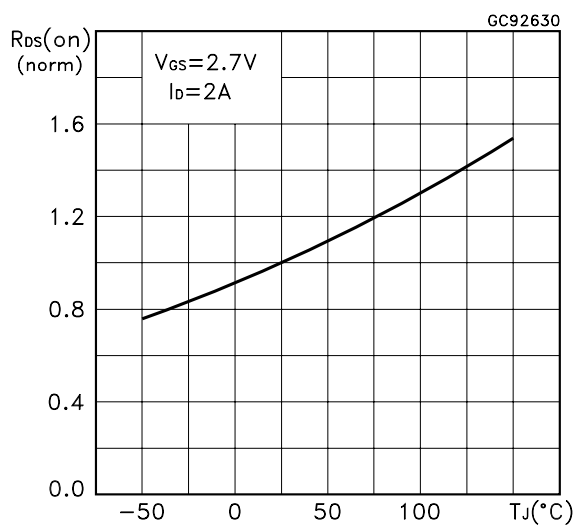
Capacitance Variations



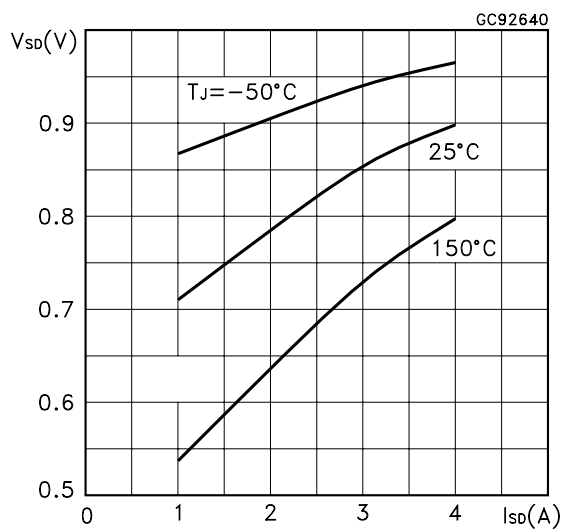
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature

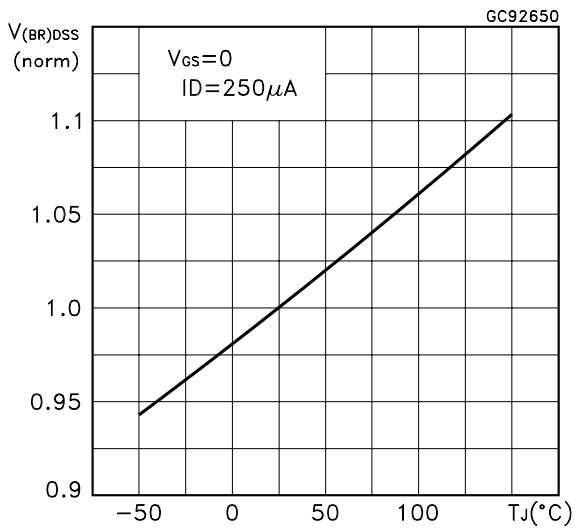


Fig. 1: Switching Times Test Circuits For Resistive Load

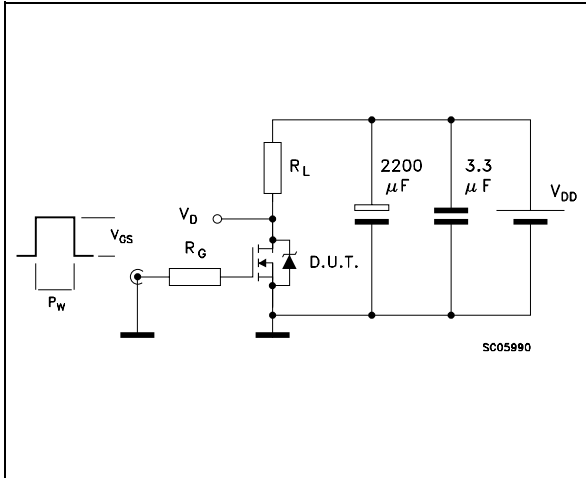


Fig. 2: Gate Charge test Circuit

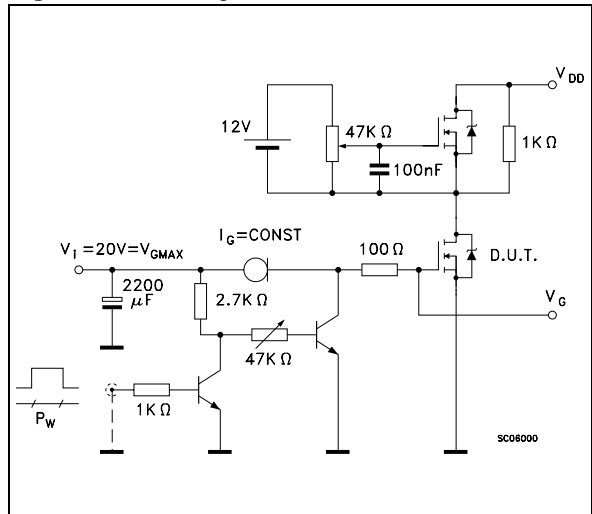
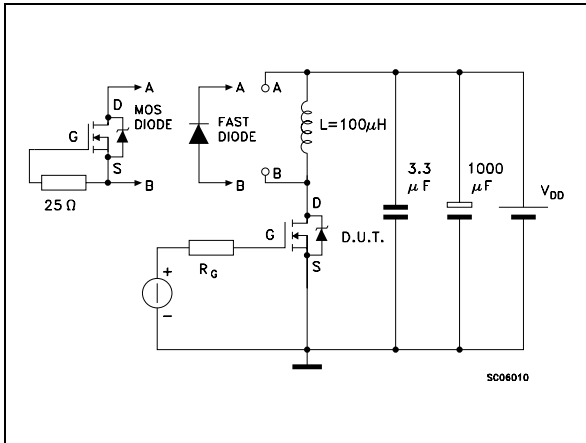


Fig. 3: Test Circuit For Diode Recovery Behaviour



SO-8 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45 (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8 (max.)					



0016023

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is registered trademark of STMicroelectronics
© 2002 STMicroelectronics - All Rights Reserved

All other names are the property of their respective owners.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco -
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>