



THE DATASHEET OF STS5PF20V





STS5PF20V

P-CHANNEL 20V - 0.065Ω - 5A SO-8
2.5V-DRIVE STripFET™ II POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STS5PF20V	20 V	< 0.080 Ω (@4.5V) < 0.10 Ω (@2.5V)	5 A

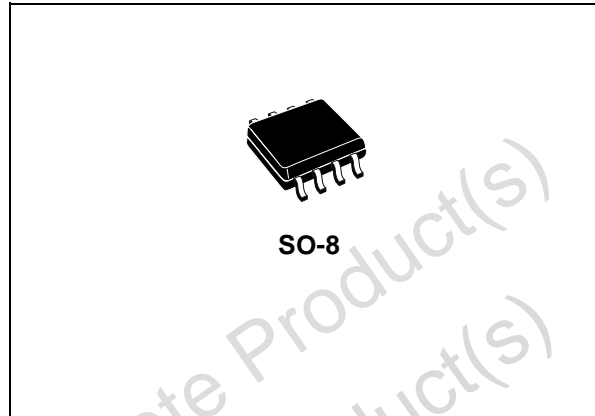
- TYPICAL R_{DS(on)} = 0.065Ω (@4.5V)
- TYPICAL R_{DS(on)} = 0.085Ω (@2.5V)
- ULTRA LOW THRESHOLD GATE DRIVE (2.5V)
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY

DESCRIPTION

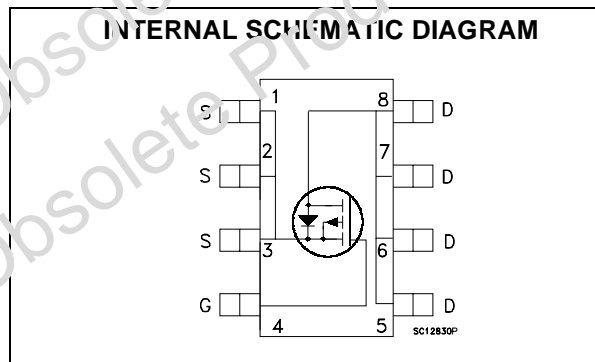
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely extremely low on-resistance when driven at 2.5V.

APPLICATIONS

- POWER MANAGEMENT IN CELLULAR PHONES
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT



SO-8



ORDER CODES

PART NUMBER	MARKING	PACKAGE	PACKAGING
STS5PF20V	S5PF20V	SO-8	TAPE & REEL

STS5PF20V

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	± 8	V
I_D	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	5	A
I_D	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	3.1	A
$I_{DM} (\bullet)$	Drain Current (pulsed)	20	A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	2.5	W

(\bullet) Pulse width limited by safe operating area

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

THERMAL DATA

$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	50	$^\circ\text{C}/\text{W}$
T_j	Max. Operating Junction Temperature	-55 to 150	$^\circ\text{C}$
T_{stg}	Storage Temperature	-55 to 150	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	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 ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$, $T_C = 125^\circ\text{C}$			1 10	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 8\text{V}$			± 100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	0.45			V
$R_{D(on)}$	Static Drain-source On Resistance	$V_{GS} = 4.5\text{V}$, $I_D = 2.5\text{ A}$ $V_{GS} = 2.5\text{V}$, $I_D = 2.5\text{ A}$		0.065 0.085	0.080 0.10	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (1)$	Forward Transconductance	$V_{DS} = 15\text{ V}$, $I_D = 2.5\text{ A}$		6.6		S
C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		412		pF
C_{oss}	Output Capacitance			179		pF
C_{rss}	Reverse Transfer Capacitance			42.5		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 10\text{ V}$, $I_D = 2.5\text{ A}$		11		ns
t_r	Rise Time	$R_G = 4.7\Omega$, $V_{GS} = 2.5\text{ V}$ (see test circuit, Figure 1)		47		ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 10\text{ V}$, $I_D = 5\text{ A}$, $V_{GS} = 2.5\text{ V}$ (see test circuit, Figure 2)		4.5 0.73 1.75	6	nC nC nC

SWITCHING OFF

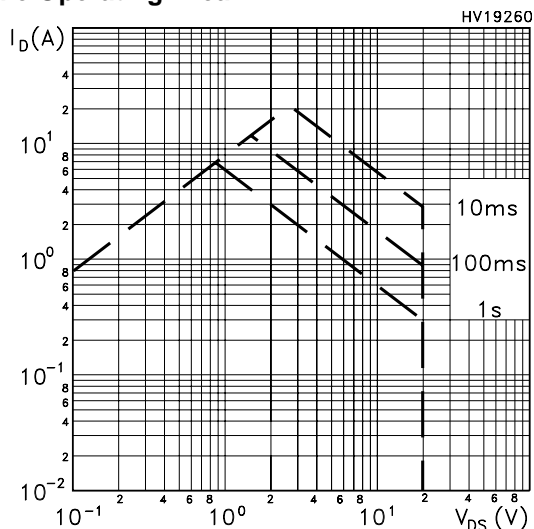
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 10\text{ V}$, $I_D = 2.5\text{ A}$,		39		ns
t_f	Fall Time	$R_G = 4.7\Omega$, $V_{GS} = 2.5\text{ V}$ (see test circuit, Figure 1)		20		ns

SOURCE DRAIN DIODE

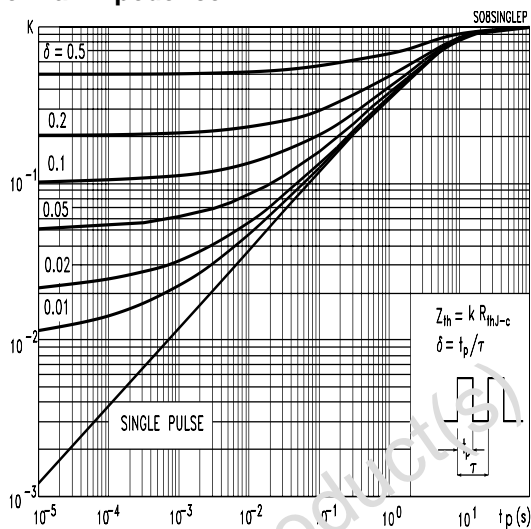
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				5	A
I_{SDM}	Source-drain Current (pulsed)				20	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 5\text{ A}$, $V_{GS} = 0$			1.2	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 5\text{ A}$, $di/dt = 100\text{ V}/\mu\text{s}$, $V_{DD} = 16\text{ V}$, $T_J = 150^\circ\text{C}$ (see test circuit, Figure 3)		32 12.8 0.8		ns nC A

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

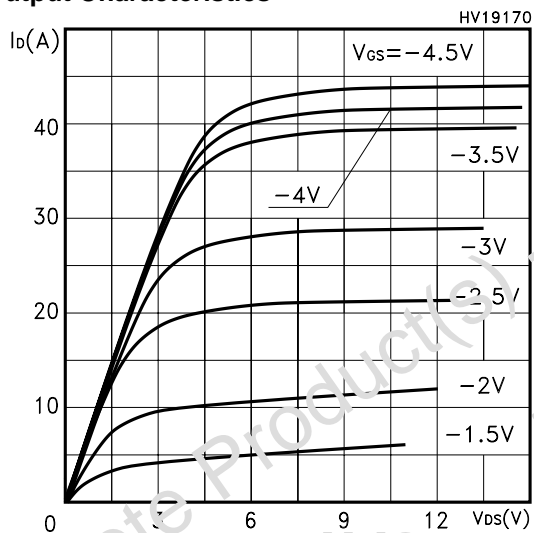
Safe Operating Area



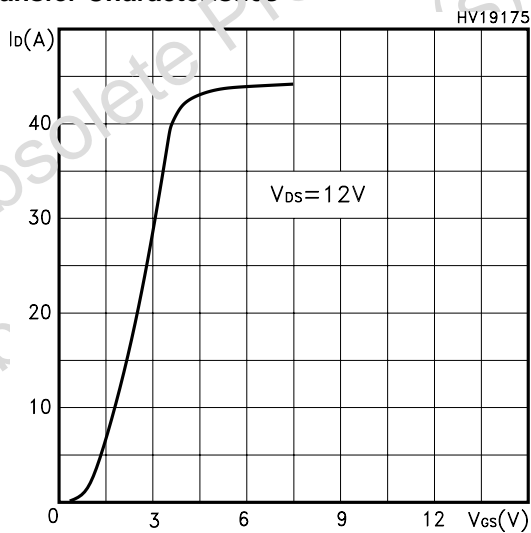
Thermal Impedance



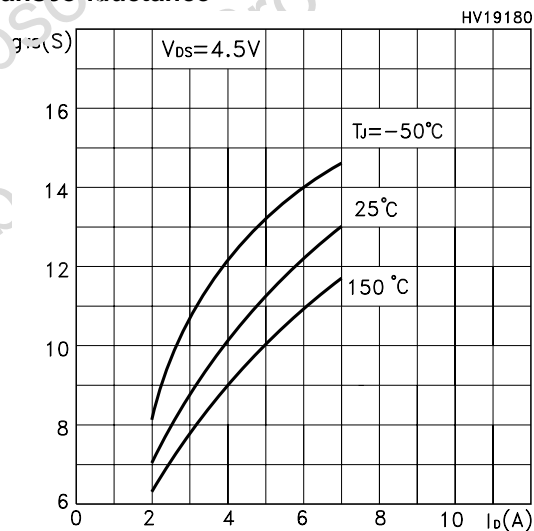
Output Characteristics



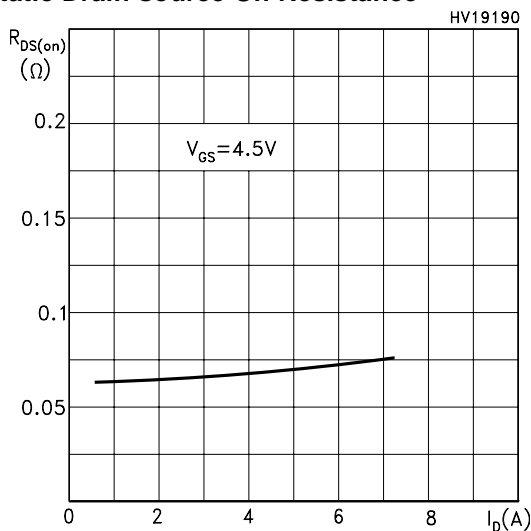
Transfer Characteristics



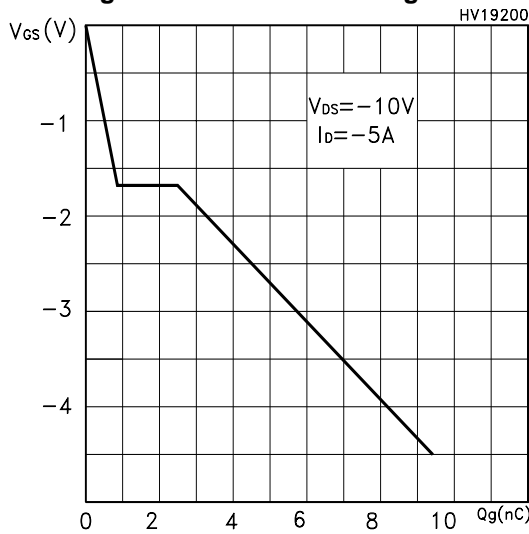
Transconductance



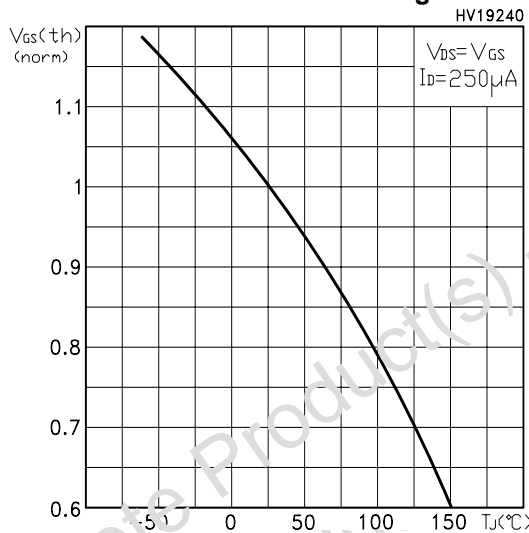
Static Drain-source On Resistance



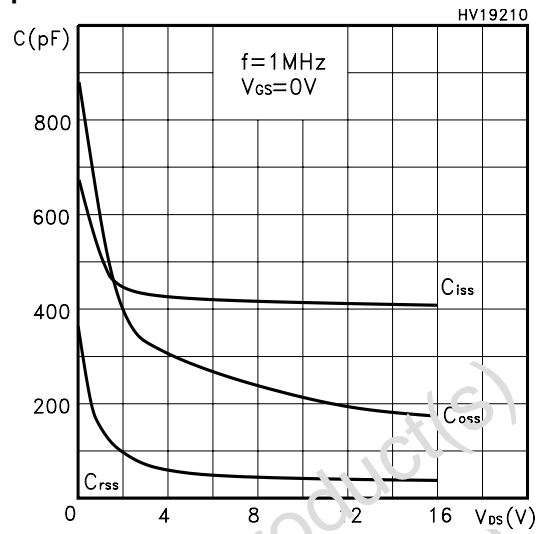
Gate Charge vs Gate-source Voltage



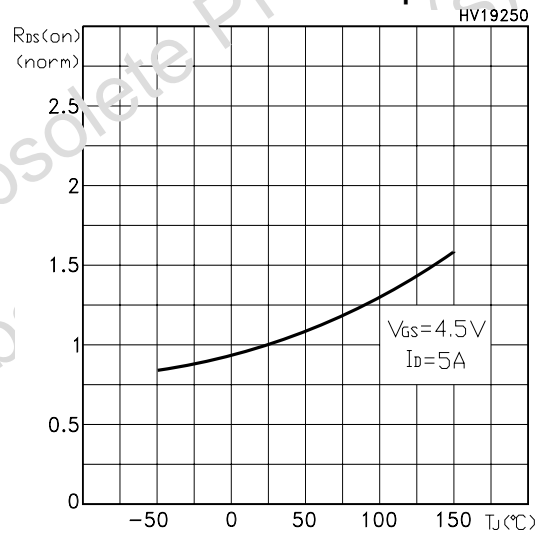
Normalized Gate Threshold Voltage vs Temp.



Capacitance Variations



Normalized On Resistance vs Temperature



Source-Drain Diode Forward Characteristics

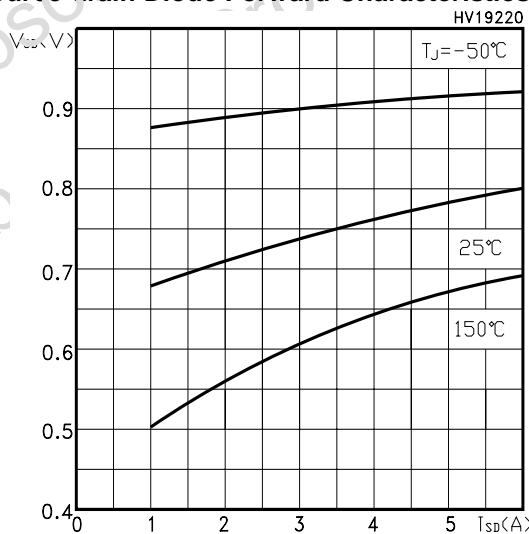


Fig. 1: Switching Times Test Circuit For Resistive Load

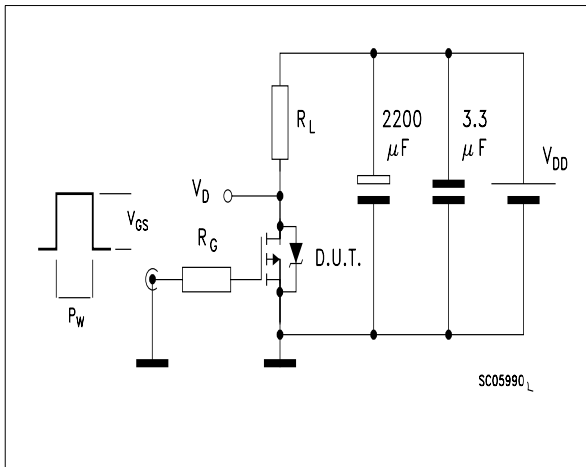


Fig. 2: Gate Charge test Circuit

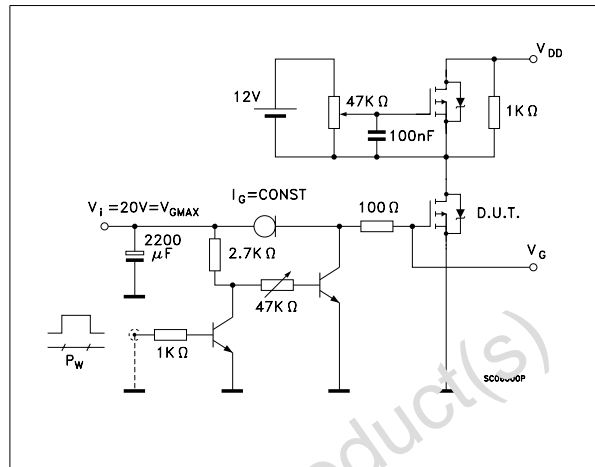
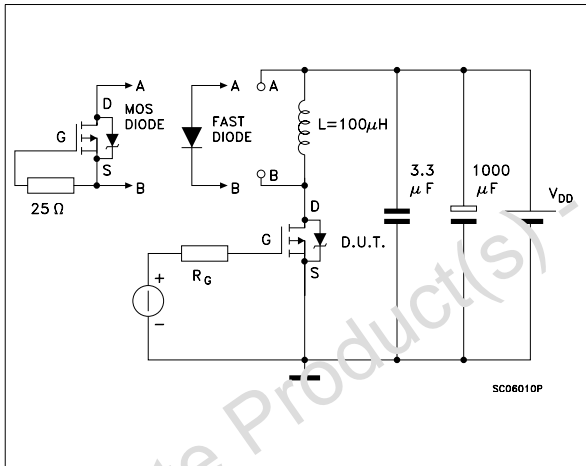
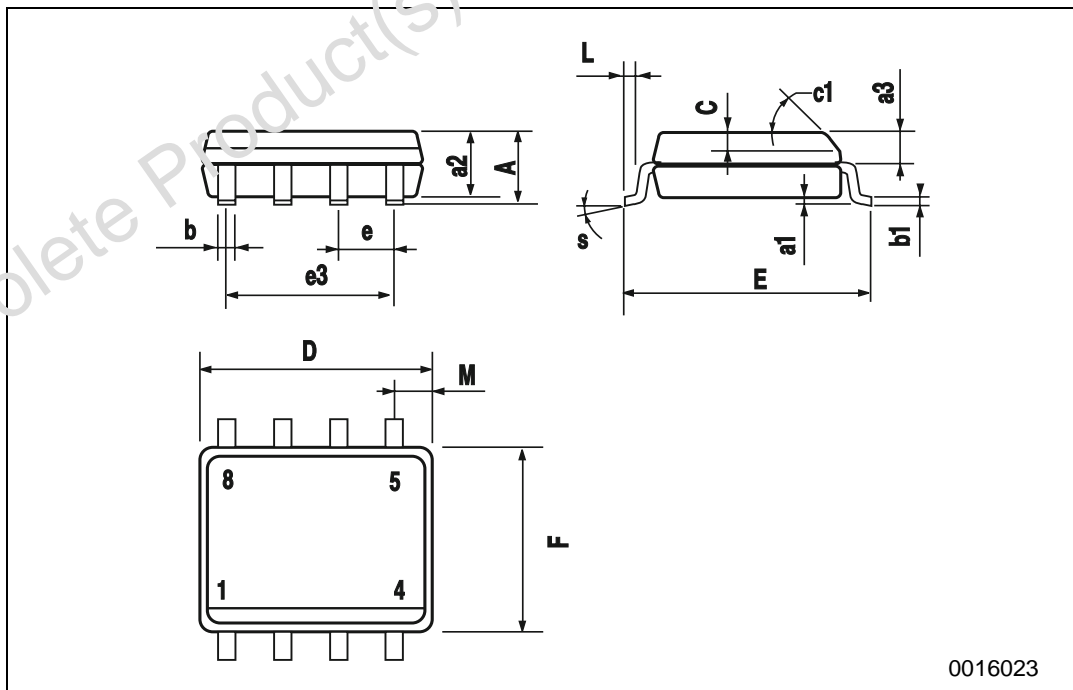


Fig. 3: Test Circuit For Diode Recovery Behaviour



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		0.019
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.)					



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