



## STT5NF20V

N-channel 20 V, 0.030  $\Omega$ , 5 A SOT23-6L  
2.5 V drive STripFET™ II Power MOSFET

Preliminary data

### Features

Type	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STT5NF20V	20 V	< 0.035 $\Omega$ @ 4.5 V	5 A
		< 0.045 $\Omega$ @ 2.5 V	

### Applications

- Switching

### 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.

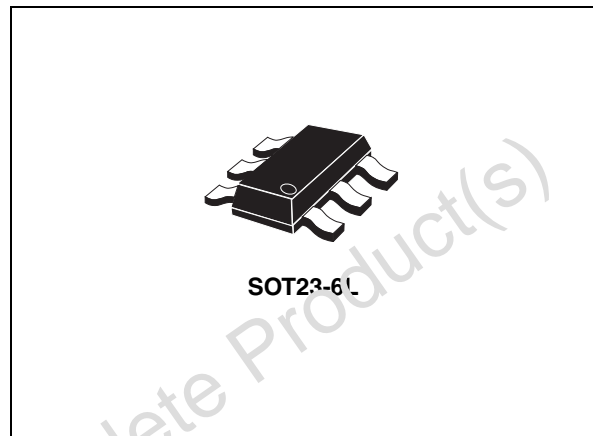


Figure 1. Internal schematic diagram

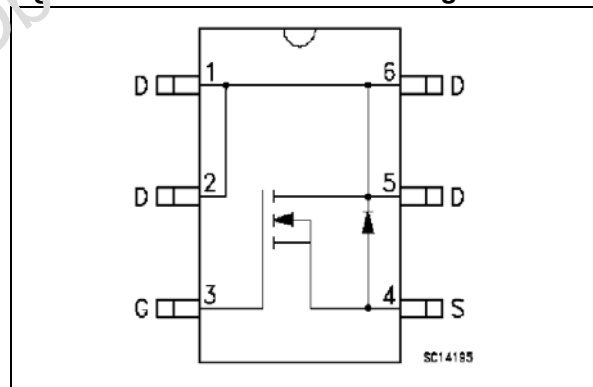


Table 1. Device summary

Order code	Marking	Package	Packing
STT5NF20V	STT2	SOT23-6L	Tape and reel

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage ( $V_{GS} = 0$ )	20	V
$V_{GS}$	Gate-source voltage	$\pm 12$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	5	A
$I_D$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	3	A
$I_{DM}^{(1)}$	Drain current (pulsed)	20	A
$P_{TOT}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	1.6	W
$T_{stg}$	Storage temperature	-55 to 150	$^\circ\text{C}$
$T_j$	Max. operating junction temperature	150	$^\circ\text{C}$

1. Pulse width limited by safe operating area

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{thj-amb}$	Thermal resistance junction-case max	78	$^\circ\text{C/W}$

## 2 Electrical characteristics

( $T_{CASE} = 25\text{ °C}$  unless otherwise specified)

**Table 4. Static**

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 ( $V_{GS} = 0$ )	$V_{DS} = \text{max rating}$ $V_{DS} = \text{max rating}$ , $T_C = 125\text{ °C}$			1 10	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 12\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$	0.6			V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 4.5\text{ V}$ , $I_D = 2.5\text{ A}$		0.030	0.035	$\Omega$
		$V_{GS} = 2.5\text{ V}$ , $I_D = 2.5\text{ A}$		0.037	0.045	$\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 15\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0$		460		pF
$C_{oss}$	Output capacitance		-	200		pF
$C_{rss}$	Reverse transfer capacitance				50	
$Q_g$	Total gate charge	$V_{DD} = 16\text{ V}$ , $I_D = 5\text{ A}$		8.5	11.5	nC
$Q_{gs}$	Gate-source charge	$V_{GS} = 4.5\text{ V}$	-	1.8		nC
$Q_{gd}$	Gate-drain charge	<a href="#">Figure 3</a>		2.4		nC

**Table 6. Switching on/off (inductive load)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 10\text{ V}$ , $I_D = 2.5\text{ A}$ , $R_G = 4.7\ \Omega$ , $V_{GS} = 4.5\text{ V}$ <i>Figure 2</i>	-	7	-	ns
$t_r$	Rise time			33		ns
$t_{d(off)}$	Turn-off delay time	<i>Figure 2</i>	-	27	-	ns
$t_f$	Fall time			10		ns

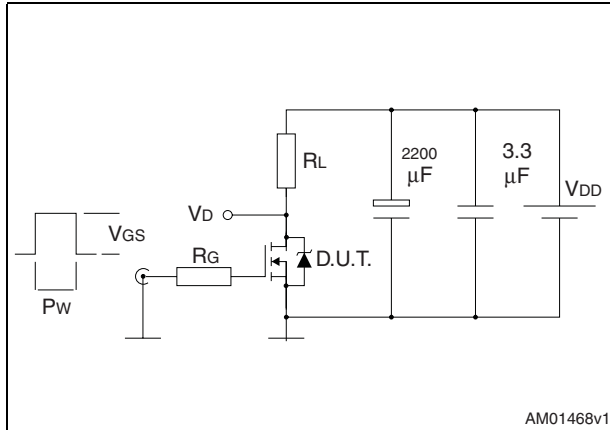
**Table 7. Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		5	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)			20	A	
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 5\text{ A}$ , $V_{GS} = 0$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 5\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 10\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$ <i>Figure 4</i>	-	26		ns
$Q_{rr}$	Reverse recovery charge			13		nC
$I_{RRM}$	Reverse recovery current			1		A

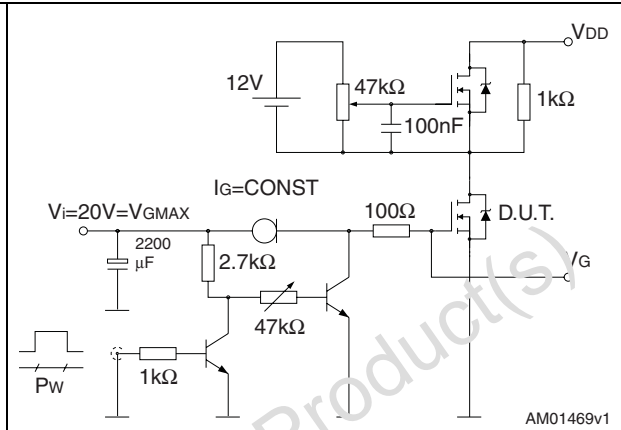
1. Pulse width limited by safe operating area
2. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

### 3 Test circuits

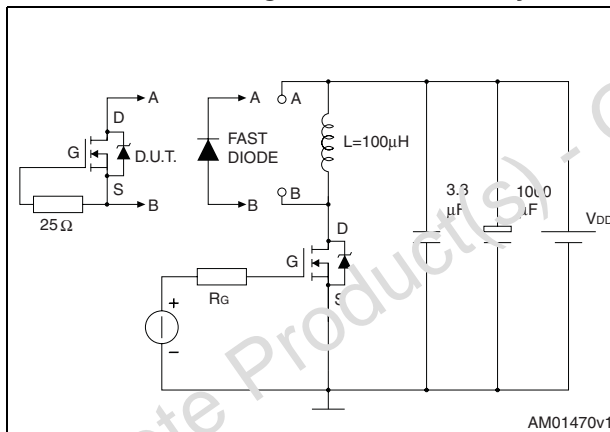
**Figure 2. Switching times test circuit for resistive load**



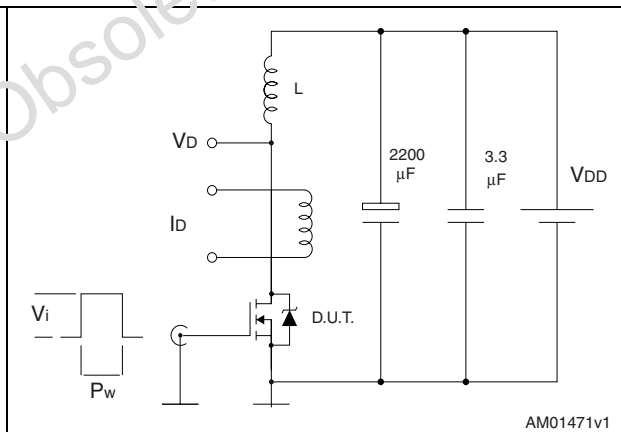
**Figure 3. Gate charge test circuit**



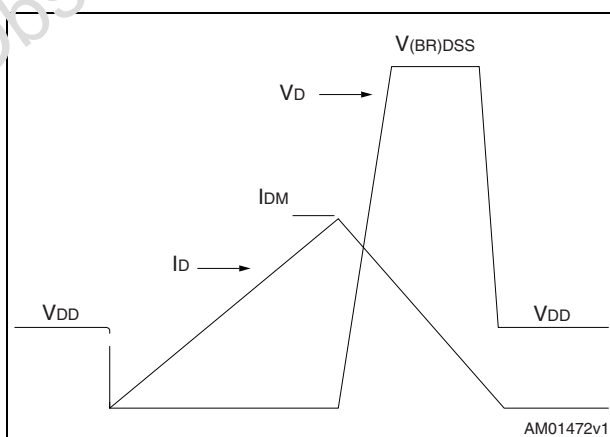
**Figure 4. Test circuit for inductive load switching and diode recovery times**



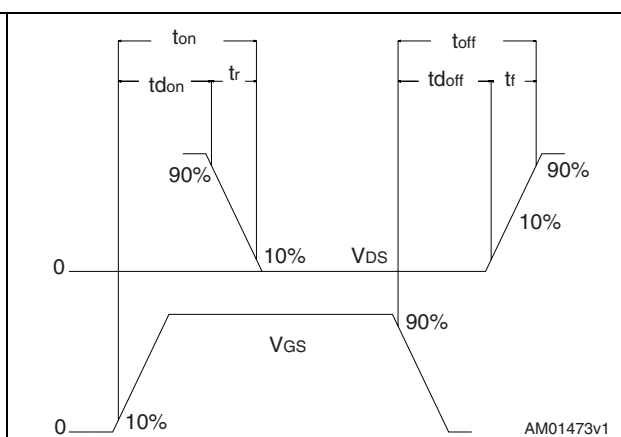
**Figure 5. Unclamped inductive load test circuit**



**Figure 6. Unclamped inductive waveform**



**Figure 7. Switching time waveform**



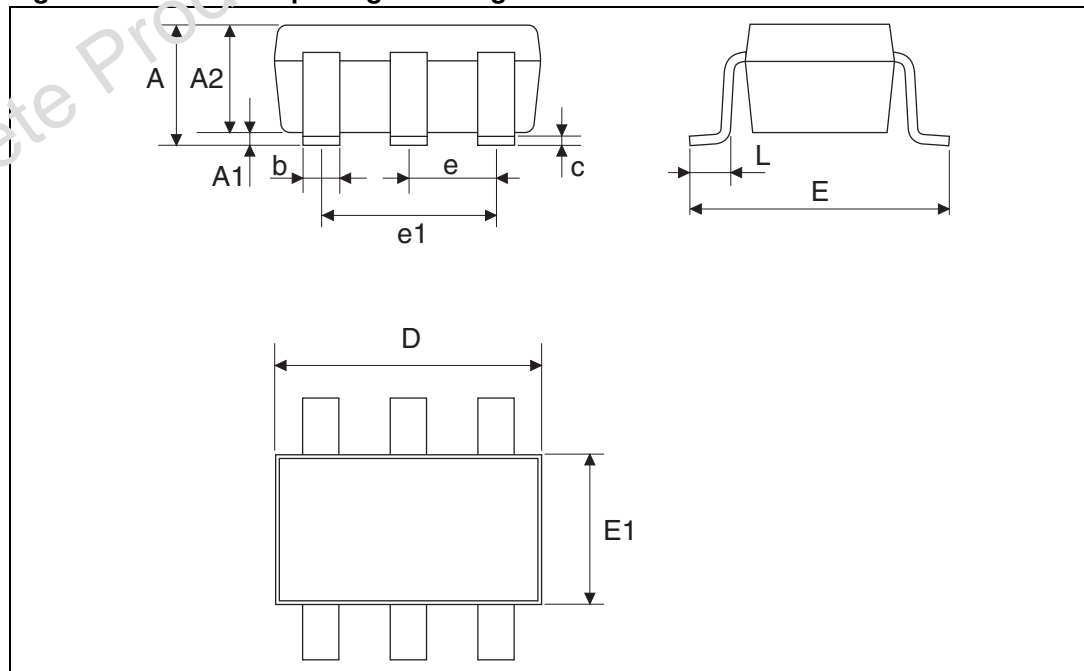
## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

**Table 8. SOT23-6L package mechanical data**

Dim.	mm			mils		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.25	0.035		0.049
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
C	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
e		0.95			0.037	
e1		1.90			0.075	

**Figure 8. SOT23-6L package drawing**



## 5 Revision history

Table 9. Document revision history

Date	Revision	Changes
21-Jun-2004	3	
11-Sep-2009	4	Updated mechanical data

Obsolete Product(s) - Obsolete Product(s)

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