

# STN2NF10

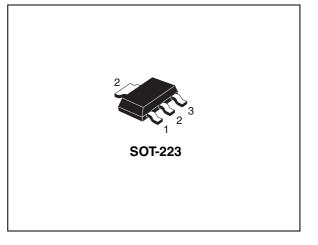
## N-channel 100V - 0.23Ω - 2.4A - SOT-223 STripFET™ II Power MOSFET

### Features

Туре	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STN2NF10	100V	< 0.26Ω	2.4A

### Description

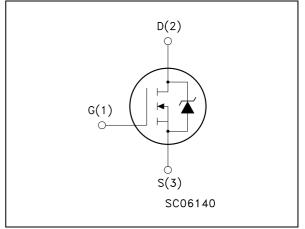
This Power MOSFET is the latest development of STMicroelectronics unique "single feature size" strip-based process. The resulting transistor shows extremely high packing density for low onresistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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



### Application

- Switching application
  - DC-DC converters

### Internal schematic diagram



### Order code

Part number	Marking	Package	Packaging	
STN2NF10	N2NF10	SOT-223	Tape & reel	

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#### 1

# **Electrical ratings**

Table 1.	Absolute	maximum	ratings
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Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source voltage (V <sub>GS</sub> =0)	100	V
V <sub>GS</sub>	Gate-source voltage	± 20	V
I <sub>D</sub>	Drain current (continuous) at $T_C = 25^{\circ}C$	2.4	А
۱ <sub>D</sub>	Drain current (continuous) at $T_C = 100^{\circ}C$	1.5	А
I <sub>DM</sub> <sup>(1)</sup>	Drain current (pulsed)	17	А
	Derating factor	0.026	W/°C
P <sub>TOT</sub> <sup>(2)</sup>	Total dissipation at $T_{C} = 25^{\circ}C$	3.3	W
E <sub>AS</sub> <sup>(3)</sup>	Single pulse avalanche energy	200	mJ
dv/dt (4)	Peak diode recovery voltage slope	30	V/ns
T <sub>j</sub> T <sub>stg</sub>	Operating junction temperature Storage temperature	-55 to 150	°C

1. Pulse width limited by safe operating area

2. This value is rated according to Rthj-amb, t  $\leq$  10sec

3.  $I_{AS}$  = 2.4A,  $V_{DD}$  = 30V, Rg=4.7 $\Omega$ , starting Tj = 25°C

4.  $I_{SD} \leq 6A$ , di/dt  $\leq 500A/\mu s$ ,  $V_{DD}$ = 80%  $V_{(BR)DSS}$ 

#### Table 2. Thermal data

Symbol Parameter		Value	Unit
Rthj-amb <sup>(1)</sup>	Thermal resistance junction-amb	38	°C/W
Rthj-amb <sup>(2)</sup>	Thermal resistance junction-amb	62.5	°C/W

1. When mounted on 1inch<sup>2</sup> FR-4 board, 2 oz. Cu, (t < 10sec)

2. When mounted on 1inch<sup>2</sup> FR-4 board, 2 oz. Cu, (t >10sec)



## 2 Electrical characteristics

(T<sub>CASE</sub>=25°C unless otherwise specified)

	On/on states					
Symbol	Parameter Test conditions		Min.	Тур.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source breakdown voltage	I <sub>D</sub> = 250μΑ, V <sub>GS</sub> = 0	100			V
I <sub>DSS</sub>	Zero gate voltage drain current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = Max rating, V <sub>DS</sub> = Max rating,Tc=125°C V <sub>DS</sub> = 30V, Tc=125°C			1 10 1	μΑ μΑ μΑ
I <sub>GSS</sub>	Gate body leakage current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ±20V			±100	nA
V <sub>GS(th)</sub>	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250 \mu A$	2		4	V
R <sub>DS(on)</sub>	Static drain-source on resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.2A		0.23	0.26	Ω

#### Table 3. On/off states

#### Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
9 <sub>fs</sub>	Forward transconductance	V <sub>DS</sub> =15V, I <sub>D</sub> =1.2A		2.5		S
C <sub>iss</sub> C <sub>oss</sub> C <sub>rss</sub>	Input capacitance Output capacitance Reverse transfer capacitance	V <sub>DS</sub> =25V, f=1MHz, V <sub>GS</sub> =0		280 45 20		pF pF pF
Q <sub>g</sub> Q <sub>gs</sub> Q <sub>gd</sub>	Total gate charge Gate-source charge Gate-drain charge	$V_{DD}$ =80V, $I_D$ = 6A $V_{GS}$ =10V (see Figure 15)		10 2.5 4	14	nC nC nC



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Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
t <sub>d(on)</sub> t <sub>r</sub>	Turn-on delay time Rise time	$V_{DD}$ =50V, $I_D$ = 2.4A $V_{GS}$ =10V, $R_G$ =4.7 $\Omega$ (see Figure 14)		6 10		ns ns
t <sub>d(off)</sub> t <sub>f</sub>	Turn-off delay time Fall time	$V_{DD}=50V, I_D = 2.4A$ $V_{GS}=10V, R_G=4.7\Omega$ (see Figure 14)		20 3		ns ns

Table 5. Switching times

#### Table 6.Source drain diode

Symbol	Parameter	Test conditions	Min.	Тур.	Max	Unit
I <sub>SD</sub> I <sub>SDM</sub> <sup>(1)</sup>	Source-drain current Source-drain current (pulsed)				2.4 17	A A
V <sub>SD</sub> <sup>(2)</sup>	Forward on voltage	I <sub>SD</sub> = 2.4A, V <sub>GS</sub> =0			1.2	V
t <sub>rr</sub> Q <sub>rr</sub> I <sub>RRM</sub>	Reverse recovery time Reverse recovery charge Reverse recovery current	I <sub>SD</sub> = 6A, V <sub>DD</sub> =10V di/dt=100A/µs,Tj=150°C ( <i>see Figure 19</i> )		70 175 5		ns nC A

1. Pulse width limited by safe operating area

2. Pulsed: pulse duration = 300µs, duty cycle 1.5%



### 2.1 Electrical characteristics (curves)

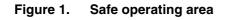
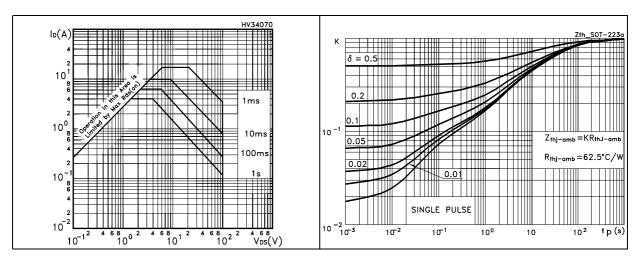
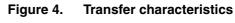
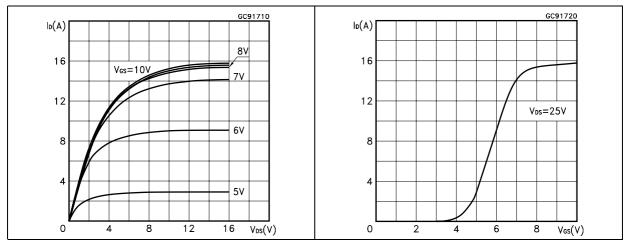


Figure 2. Thermal impedance

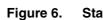












Static drain-source on resistance

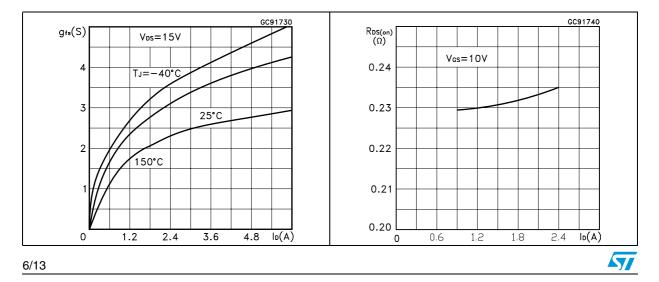


Figure 7. Gate charge vs. gate-source voltage

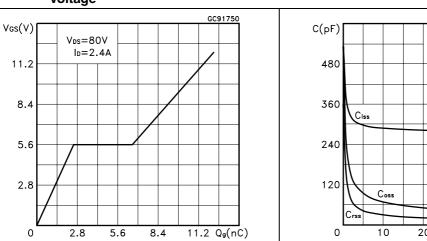


Figure 9. Normalized gate threshold voltage Figure 10. vs. temperature

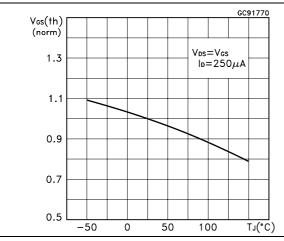


Figure 11. Source-drain diode forward characteristics

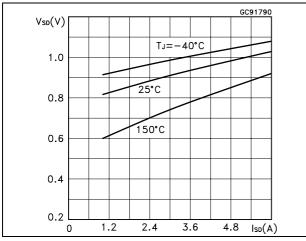
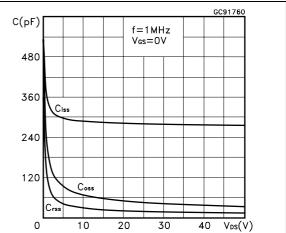


Figure 8. Capacitance variations



igure 10. Normalized on resistance vs. temperature

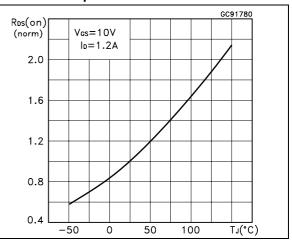
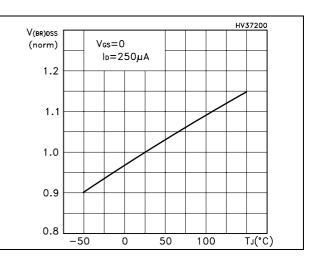


Figure 12. Normalized  $BV_{DSS}$  vs. temperature



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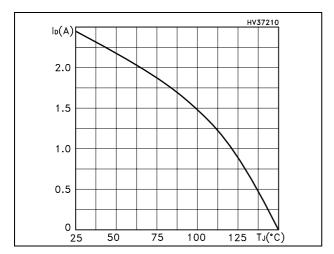


Figure 13. Max drain current vs. temperature

## 3 Test circuit

Figure 14. Switching times test circuit for resistive load

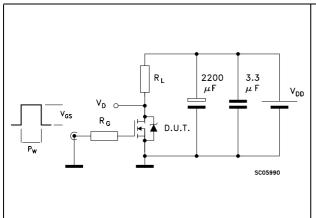
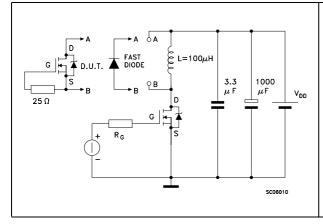
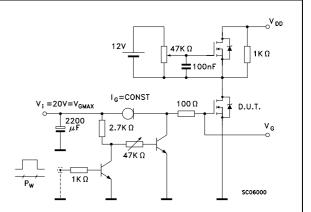


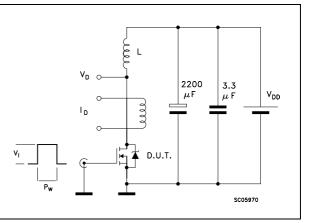
Figure 16. Test circuit for inductive load switching and diode recovery times

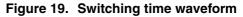












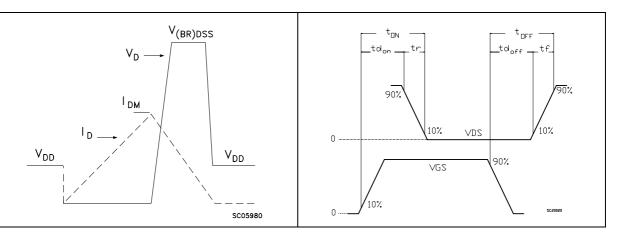


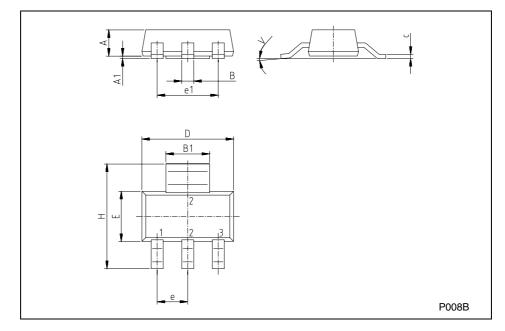
Figure 15. Gate charge test circuit

## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: *www.st.com* 



	SOT-223 MECHANICAL DATA						
DIM.		mm			inch		
2	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
А			1.80			0.071	
В	0.60	0.70	0.80	0.024	0.027	0.031	
B1	2.90	3.00	3.10	0.114	0.118	0.122	
С	0.24	0.26	0.32	0.009	0.010	0.013	
D	6.30	6.50	6.70	0.248	0.256	0.264	
е		2.30			0.090		
e1		4.60			0.181		
Е	3.30	3.50	3.70	0.130	0.138	0.146	
Н	6.70	7.00	7.30	0.264	0.276	0.287	
V			10 <sup>°</sup>			10 <sup>o</sup>	
A1		0.02					





# 5 Revision history

Date	Revision	Changes
14-Sep-2006	4	The document has been reformatted
29-Mar-2007	5	Figure 1 has been updated
04-Apr-2007	6	New test condition for I <sub>DSS</sub> on <i>Table 3</i>



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