



# STN7NF10

## N-CHANNEL 100V - 0.055 $\Omega$ - 5A SOT-223 LOW GATE CHARGE STripFET™ II POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STN7NF10	100 V	< 0.065 $\Omega$	5 A

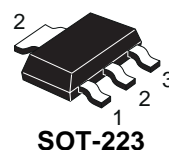
- TYPICAL R<sub>DS(on)</sub> = 0.055  $\Omega$
- APPLICATION ORIENTED CHARACTERIZATION

### DESCRIPTION

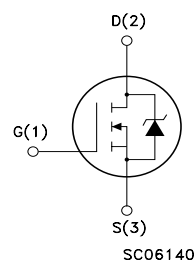
This Power MOSFET series realized with STMicroelectronics unique STripFET process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency isolated DC-DC converters for Telecom and Computer application. It is also intended for any application with low gate charge drive requirements.

### APPLICATIONS

- HIGH-EFFICIENCY DC-DC CONVERTERS
- UPS AND MOTOR CONTROL



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	100	V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 k $\Omega$ )	100	V
V <sub>GS</sub>	Gate- source Voltage	$\pm 20$	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	5	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	3.4	A
I <sub>DM</sub> (●)	Drain Current (pulsed)	20	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	3.3	W
	Derating Factor	0.026	W/°C
T <sub>stg</sub>	Storage Temperature	-55 to 150	°C
T <sub>j</sub>	Operating Junction Temperature		

(●) Pulse width limited by safe operating area

## STN7NF10

### THERMAL DATA

Rthj-PCB	Thermal Resistance Junction-PCB Max(*)	38	°C/W
Rthj-PCB	Thermal Resistance Junction-PCB Max(**)	100	°C/W
T <sub>l</sub>	Maximum Lead Temperature For Soldering Purpose (1.6 mm from case, for 10s)	260	°C

Note: (\*) When mounted on 1 in<sup>2</sup> FR-4 BOARD, 2 oz Cu, t<10s.

Note: (\*\*) When mounted on minimum footprint.

### ELECTRICAL CHARACTERISTICS (T<sub>CASE</sub> = 25 °C UNLESS OTHERWISE SPECIFIED)

#### OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source Breakdown Voltage	I <sub>D</sub> = 250 µA, 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, T <sub>C</sub> = 125 °C			1 10	µA µA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ±20V			±100	nA

#### ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA	2	3	4	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.5 A		0.055	0.065	Ω

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (1)	Forward Transconductance	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 1.5 A		12		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, f = 1 MHz, V <sub>GS</sub> = 0		870		pF
C <sub>oss</sub>	Output Capacitance			125		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			52		pF

**ELECTRICAL CHARACTERISTICS (CONTINUED)****SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 50\text{ V}$ , $I_D = 12\text{ A}$		58		ns
$t_r$	Rise Time	$R_G = 4.7\Omega$ , $V_{GS} = 10\text{ V}$ (see test circuit, Figure 3)		45		ns
$Q_g$	Total Gate Charge	$V_{DD} = 80\text{ V}$ , $I_D = 24\text{ A}$ ,		30	41	nC
$Q_{gs}$	Gate-Source Charge	$V_{GS} = 10\text{ V}$		6		nC
$Q_{gd}$	Gate-Drain Charge			10		nC

**SWITCHING OFF**

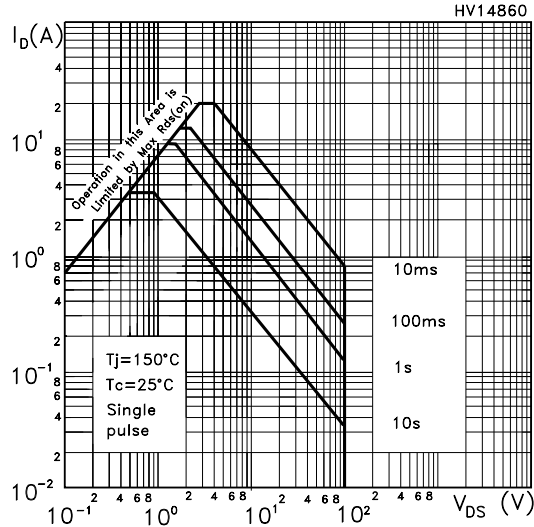
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 50\text{ V}$ , $I_D = 12\text{ A}$ ,		49		ns
$t_f$	Fall Time	$R_G = 4.7\Omega$ , $V_{GS} = 10\text{ V}$ (see test circuit, Figure 3)		17		ns

**SOURCE DRAIN DIODE**

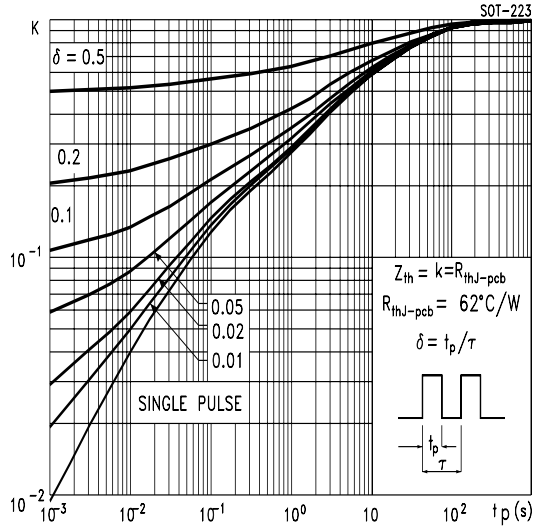
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				5	A
$I_{SDM(1)}$	Source-drain Current (pulsed)				20	A
$V_{SD(2)}$	Forward On Voltage	$I_{SD} = 5\text{ A}$ , $V_{GS} = 0$			1.3	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 5\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ ,		100		ns
$Q_{rr}$	Reverse Recovery Charge	$V_{DD} = 30\text{ V}$ , $T_j = 150^\circ\text{C}$		375		nC
$I_{RRM}$	Reverse Recovery Current	(see test circuit, Figure 5)		7.5		A

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

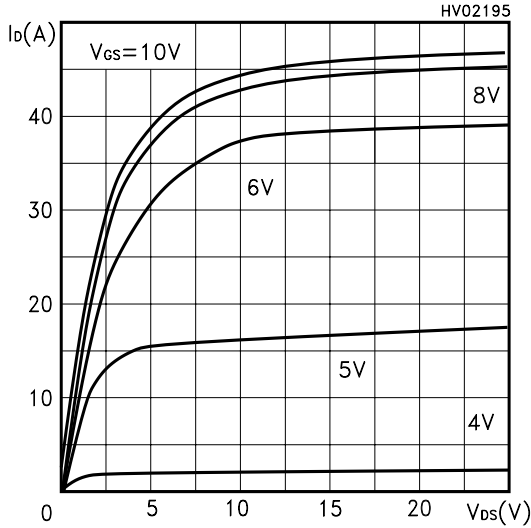
Safe Operating Area



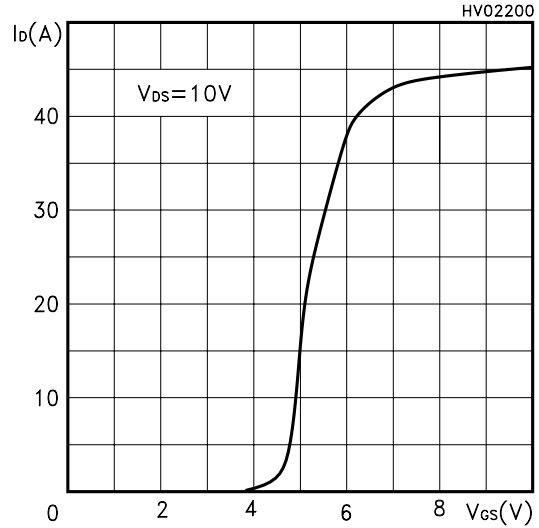
Thermal Impedance



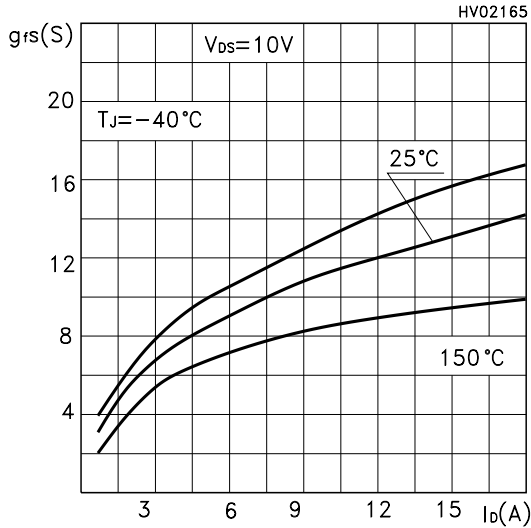
Output Characteristics



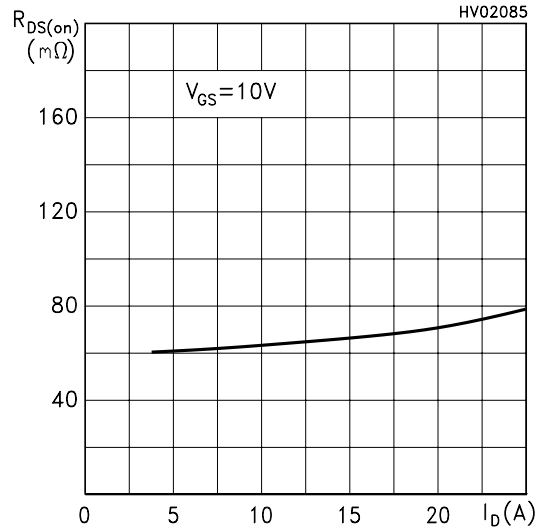
Transfer Characteristics



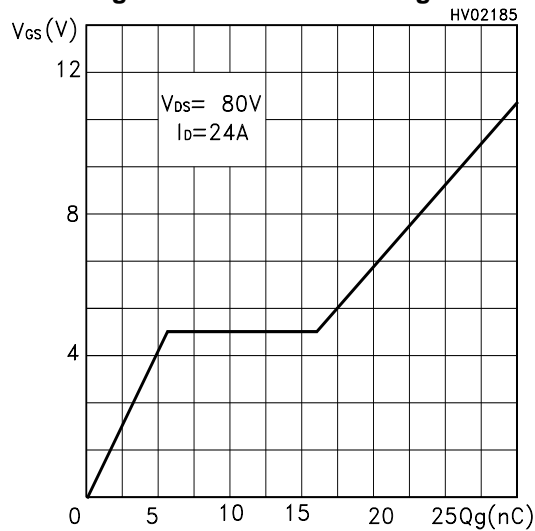
Transconductance



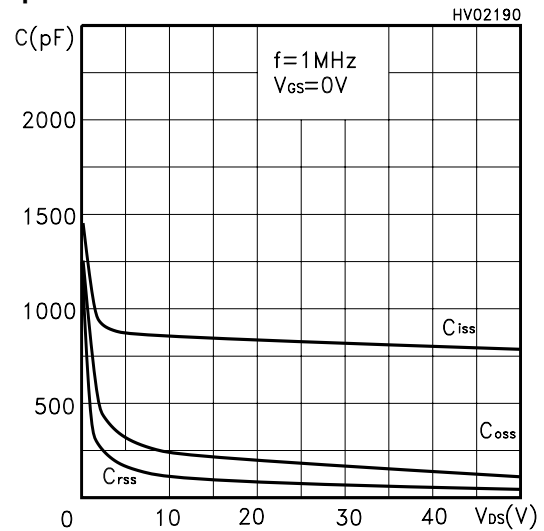
Static Drain-source On Resistance



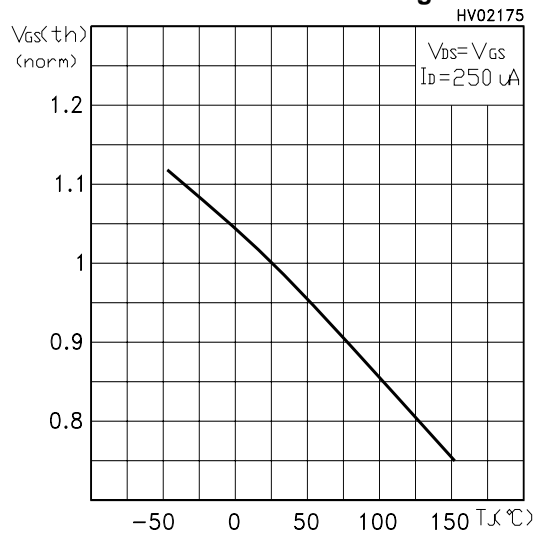
### Gate Charge vs Gate-source Voltage



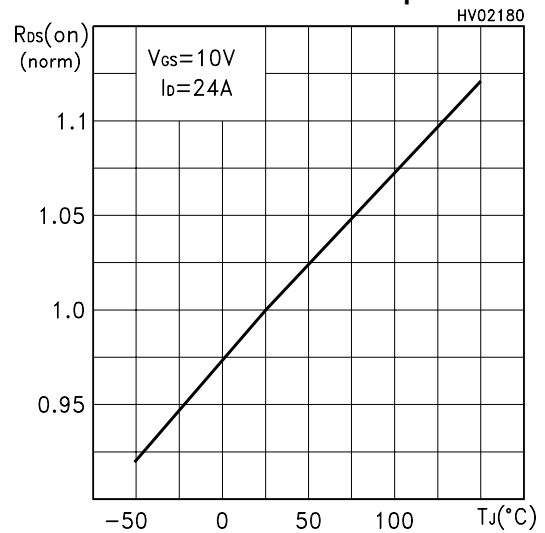
### Capacitance Variations



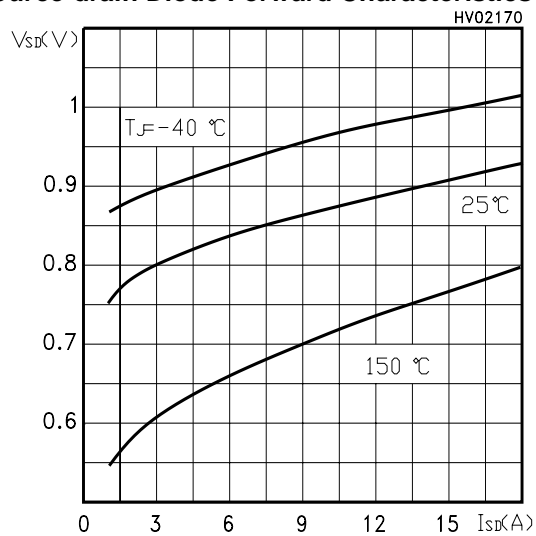
### Normalized Gate Threshold Voltage vs Temp.



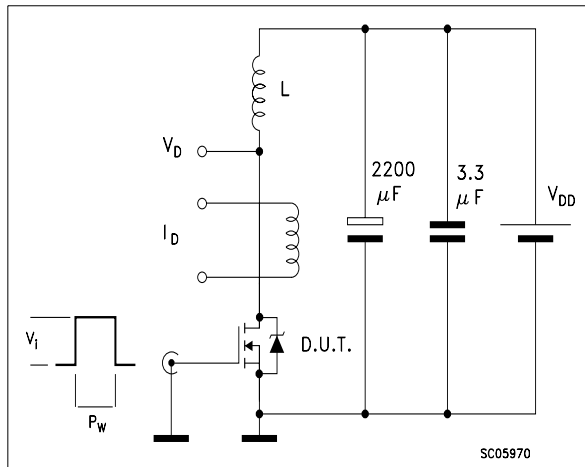
### Normalized On Resistance vs Temperature



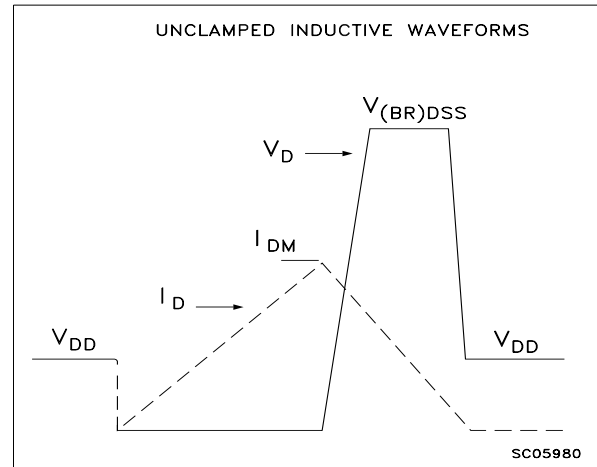
### Source-drain Diode Forward Characteristics



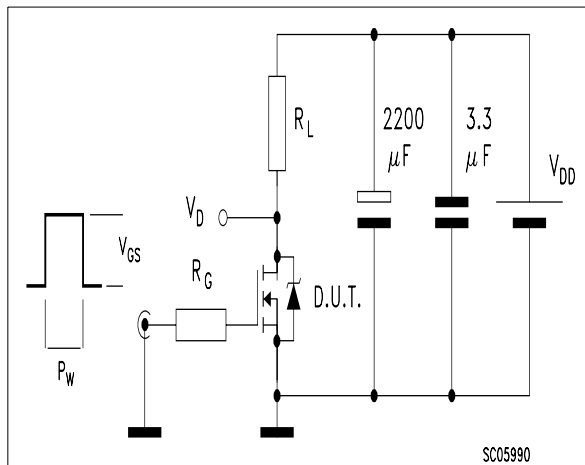
**Fig. 1: Unclamped Inductive Load Test Circuit**



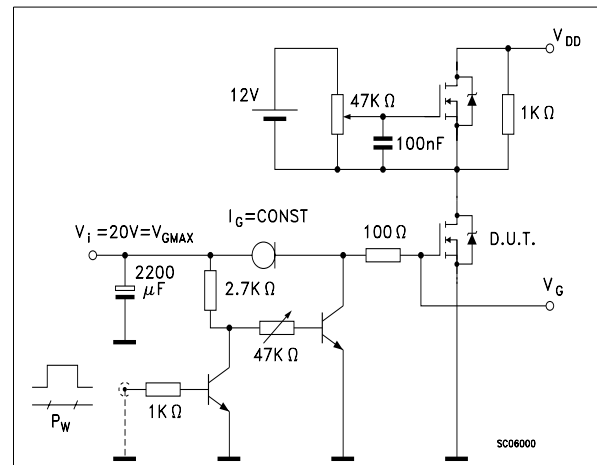
**Fig. 2: Unclamped Inductive Waveform**



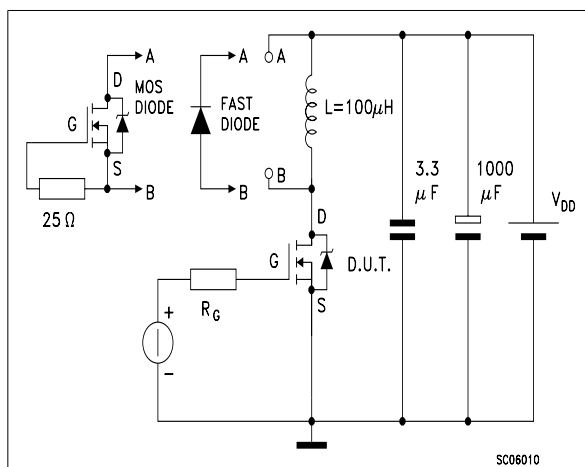
**Fig. 3: Switching Times Test Circuit For Resistive Load**



**Fig. 4: Gate Charge test Circuit**

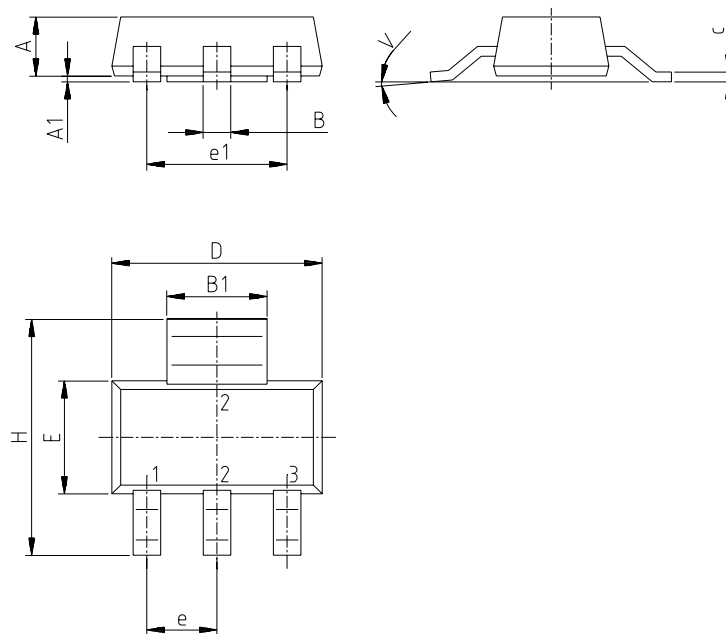


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



## SOT-223 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.80			0.071
B	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
c	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
e		2.30			0.090	
e1		4.60			0.181	
E	3.30	3.50	3.70	0.130	0.138	0.146
H	6.70	7.00	7.30	0.264	0.276	0.287
V			10°			10°
A1		0.02				



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