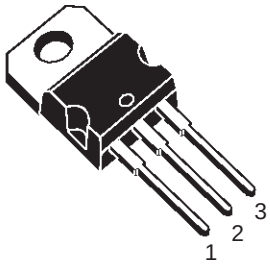
STP7NE10

N - CHANNEL 100V - 0.3 Ω - 7A - TO-220
STripFET™ POWER MOSFET

PRELIMINARY DATA

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP7NE10	100 V	< 0.4 Ω	7 A

- TYPICAL $R_{DS(on)}$ = 0.3 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- AVALANCHE RUGGED TECHNOLOGY
- 100 % AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION



TO-220

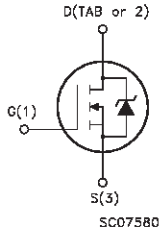
DESCRIPTION

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

- DC MOTOR CONTROL (DISK DRIVES,etc.)
- DC-DC & DC-AC CONVERTERS
- SYNCHRONOUS RECTIFICATION

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	100	V
V_{DGR}	Drain- gate Voltage (R_{GS} = 20 kΩ)	100	V
V_{GS}	Gate-source Voltage	± 20	V
I_D	Drain Current (continuous) at T_c = 25 °C	7	A
I_D	Drain Current (continuous) at T_c = 100 °C	4.9	A
I_{DM}(•)	Drain Current (pulsed)	28	A
P_{tot}	Total Dissipation at T_c = 25 °C	45	W
	Derating Factor	0.3	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	6	V/ns
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	175	°C

(•) Pulse width limited by safe operating area

(1) I_{SD} ≤7 A, di/dt ≤ 200 A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_j ≤ T_{JMAX}

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	3.33	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	100	°C/W
$R_{thc\text{-}sink}$	Thermal Resistance Case-sink	Typ	1.5	°C/W
T_l	Maximum Lead Temperature For Soldering Purpose		275	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	7	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, $I_D = I_{AR}$, V_{DD} = 30 V)	40	mJ

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	100			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating V_{DS} = Max Rating T_c = 100 °C			1 10	µA µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ± 20 V			± 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	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10 V I_D = 3.5 A		0.32	0.4	Ω
$I_{D(on)}$	On State Drain Current	V_{DS} > $I_{D(on)}$ x $R_{DS(on)max}$ V_{GS} = 10 V	7			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	V_{DS} > $I_{D(on)}$ x $R_{DS(on)max}$ I_D =2.5 A		2.5		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0		305 45 21		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	V_{DD} = 50 V I_D = 3.5 A R_G = 4.7 Ω V_{GS} = 5 V		6.5 15		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 80 V I_D = 5 A V_{GS} = 5 V		14 6 4	18	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(Voff)}$ t_f	Turn-off Delay Time Fall Time	V_{DD} = 50 V I_D = 3.5A R_G = 4.7 Ω V_{GS} = 10 V		25 7		ns ns
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	V_{DD}=80V I_D=7A R_G = 4.7 Ω V_{GS} = 10 V		7 8 16		ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(•)	Source-drain Current Source-drain Current (pulsed)				7 28	A A
V_{SD} (*)	Forward On Voltage	I_{SD} = 8 A V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 5 A di/dt = 100 A/µs V_{DD} = 50 V T_j = 150 °C		75 210 5.5		ns µC A

(*) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

(•) Pulse width limited by safe operating area

TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151