



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

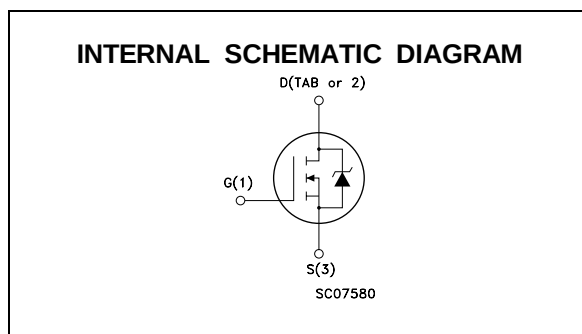
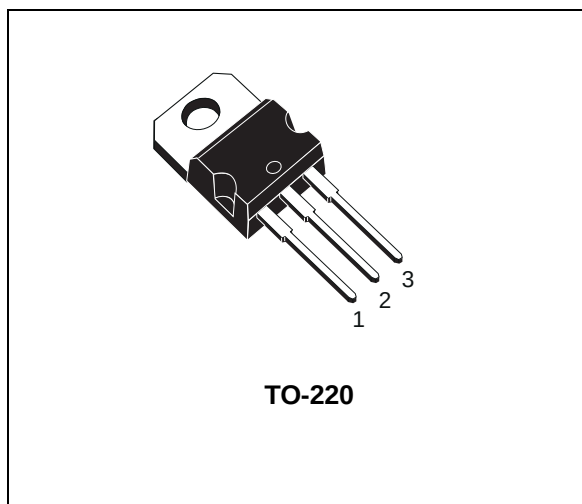
- TYPICAL R_{DS(on)} = 0.3 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- AVALANCHE RUGGED TECHNOLOGY
- 100 % AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION

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



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 k Ω)	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} $\leq$ 7 A, di/dt $\leq$ 200 A/ μ s, V_{DD} $\leq$ V_{(BR)DSS}, T_j $\leq$ T_{JMAX}

STP7NE10

THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case	Max	3.33	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	100	°C/W
R _{thc-sink}	Thermal Resistance Case-sink	Typ	1.5	°C/W
T _I	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)} × 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)} × 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
$t_{d(on)}$	Turn-on Time	$V_{DD} = 50\text{ V}$		6.5		ns
t_r	Rise Time	$I_D = 3.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 5\text{ V}$		15		ns
Q_g	Total Gate Charge	$V_{DD} = 80\text{ V}$ $I_D = 5\text{ A}$ $V_{GS} = 5\text{ V}$		14	18	nC
Q_{gs}	Gate-Source Charge			6		nC
Q_{gd}	Gate-Drain Charge			4		nC

SWITCHING OFF

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

SOURCE DRAIN DIODE

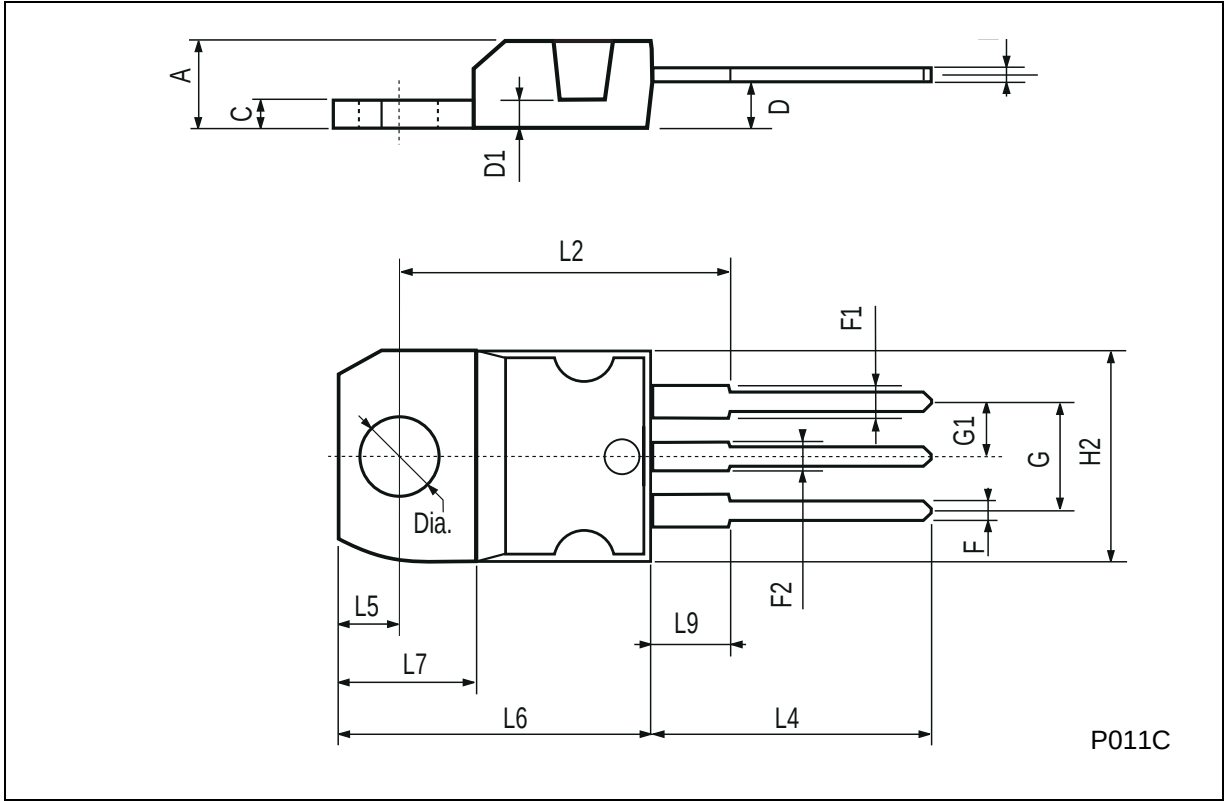
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				7	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				28	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 8\text{ A}$ $V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 5\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$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

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

(\bullet) 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 </tr <tr><td>L9</td><td>3.5</td><td></td><td>3.93</td><td>0.137</td><td></td><td>0.154</td></tr> <tr><td>DIA.</td><td>3.75</td><td></td><td>3.85</td><td>0.147</td><td></td><td>0.151</td></tr>	L9	3.5		3.93	0.137		0.154	DIA.	3.75		3.85	0.147		0.151
L9	3.5		3.93	0.137		0.154														
DIA.	3.75		3.85	0.147		0.151														



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