

N - CHANNEL ENHANCEMENT MODE FAST POWER MOS TRANSISTOR

PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP4NA100	1000 V	<3.5 Ω	4.2 A

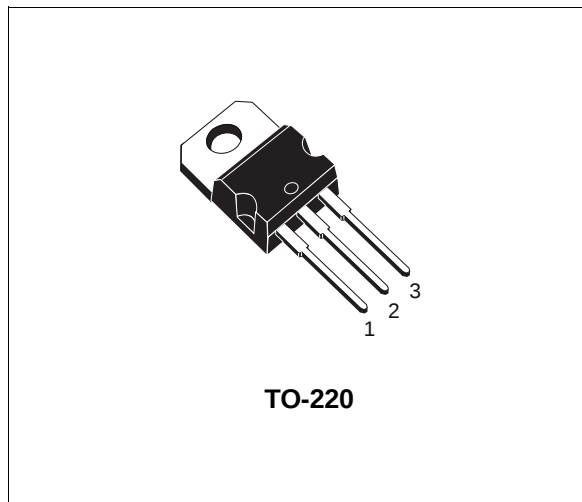
- TYPICAL R_{DS(on)} = 2.9 Ω
- ± 30 V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD

DESCRIPTION

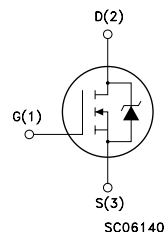
This series of POWER MOSFETS represents the most advanced high voltage technology. The optimized cell layout coupled with a new proprietary edge termination concur to give the device low R_{DS(on)} and gate charge, unequalled ruggedness and superior switching performance.

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES AND MOTOR DRIVE



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	1000	V
V _{DGR}	Drain- gate Voltage (R _{GS} = 20 k Ω)	1000	V
V _{GS}	Gate-source Voltage	± 30	V
I _D	Drain Current (continuous) at T _c = 25 °C	4.2	A
I _D	Drain Current (continuous) at T _c = 100 °C	2.6	A
I _{DM} (•)	Drain Current (pulsed)	16.8	A
P _{tot}	Total Dissipation at T _c = 25 °C	125	W
	Derating Factor	1	W/°C
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

(•) Pulse width limited by safe operating area

STP4NA100

THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case	Max	1	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	62.5	°C/W
R _{thc-sink}	Thermal Resistance Case-sink	Typ	0.5	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose		300	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max, δ < 1%)	4.2	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	160	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	1000			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating T _c = 100 °C			50 250	µA µA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 30 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	2.25	3	3.75	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10V I _D = 2.1 A		3	3.5	Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{DS(on)max} V _{GS} = 10 V				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 = 2.1 A	2	5.5		S
C _{iss}	Input Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		1650		pF
C _{oss}	Output Capacitance			127		pF
C _{rss}	Reverse Transfer Capacitance			31		pF

ELECTRICAL CHARACTERISTICS (continued)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 500\text{ V}$ $I_D = 2.1\text{ A}$		14		ns
t_r	Rise Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		12		ns
Q_g	Total Gate Charge	$V_{DD} = 800\text{ V}$ $I_D = 4.2\text{ A}$ $V_{GS} = 10\text{ V}$		59		nC
Q_{gs}	Gate-Source Charge			9.4		nC
Q_{gd}	Gate-Drain Charge			26.5		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 800\text{ V}$ $I_D = 4.2\text{ A}$		94		ns
t_f	Fall Time	$R_G = 47\ \Omega$ $V_{GS} = 10\text{ V}$		30		ns
t_c	Cross-over Time	(see test circuit, figure 5)		142		ns

SOURCE DRAIN DIODE

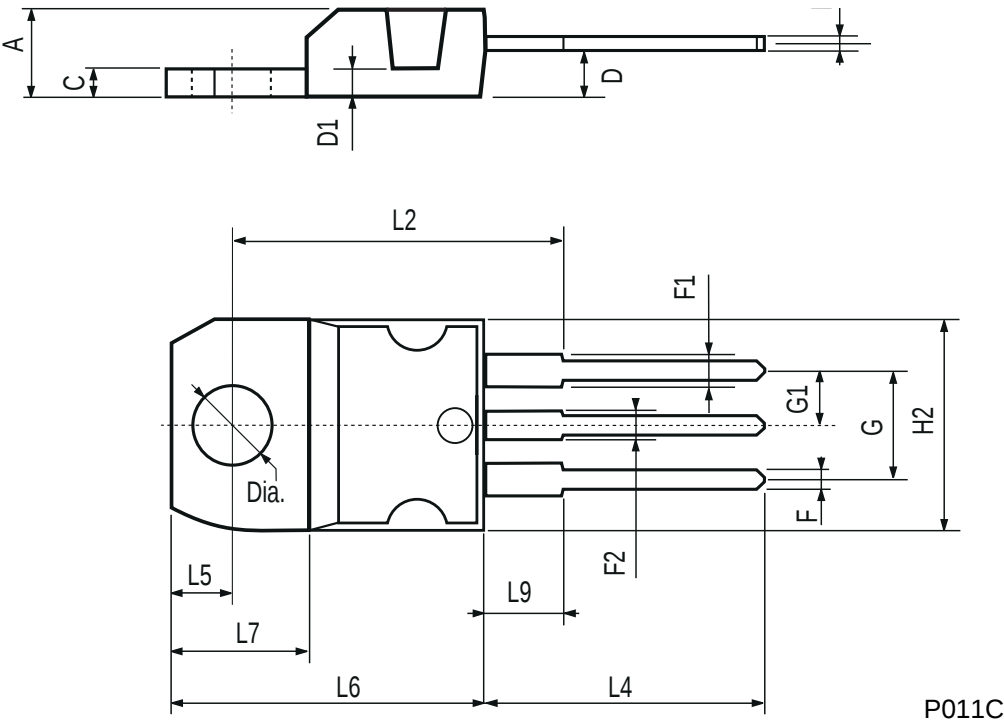
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				4.2	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				16.8	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 4.2\text{ A}$ $V_{GS} = 0$			1.6	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 4.2\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 100\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ (see circuit, figure 5)		1000		ns
Q_{rr}	Reverse Recovery Charge			14		μC
I_{RRM}	Reverse Recovery Current			28		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
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



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