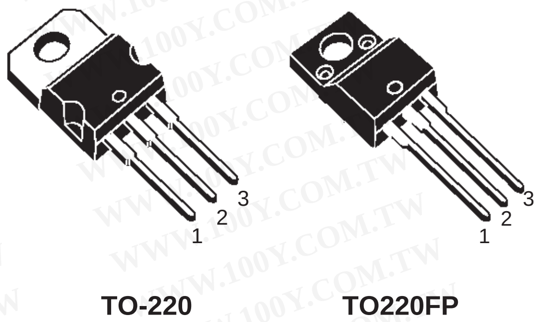
STP20NE06L
STP20NE06LFP

N - CHANNEL 60V - 0.07 Ω - 20 A - TO-220/TO-220FP
STripFET™ POWER MOSFET

PRELIMINARY DATA

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP20NE06L STP20NE06LFP	60 V 60 V	< 0.085 Ω < 0.085 Ω	20 A 13 A

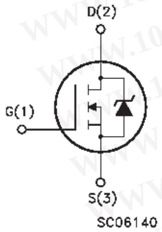
- TYPICAL $R_{DS(on)}$ = 0.07 Ω
- EXCEPTIONAL dV/dt CAPABILTY
- 100% AVALANCHE TESTED
- LOW GATE CHARGE 100 °C
- HIGH dV/dt CAPABILITY
- APPLICATION ORIENTED CHARACTERIZATION



DESCRIPTION

This Power Mosfet is the latest development of SGS-THOMSON unique "Single Feature Size" process whereby a single body is implanted on a strip layout structure. 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.

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- DC MOTOR CONTROL
- DC-DC & DC-AC CONVERTERS
- SYNCHRONOUS RECTIFICATION

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP20NE06L	STP20NE06LFP	
V_{DS}	Drain-source Voltage (V_{GS} = 0)	60		V
V_{DGR}	Drain- gate Voltage (R_{GS} = 20 kΩ)	60		V
V_{GS}	Gate-source Voltage	± 20		V
I_D	Drain Current (continuous) at T_c = 25 °C	20	13	A
I_D	Drain Current (continuous) at T_c = 100 °C	14	9	A
I_{DM}(•)	Drain Current (pulsed)	80	80	A
P_{tot}	Total Dissipation at T_c = 25 °C	70	30	W
	Derating Factor	0.47	0.2	W/°C
V_{ISO}	Insulation Withstand Voltage (DC)	—	2000	V
dV/dt	Peak Diode Recovery voltage slope	7		V/ns
T_{stg}	Storage Temperature	-65 to 175		°C
T_j	Max. Operating Junction Temperature	175		°C

(•) Pulse width limited by safe operating area

(1) $I_{SD} \leq 20$ A, di/dt ≤ 300 A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{JMAX}$

THERMAL DATA

		TO-220	TO-220FP	
$R_{thj-case}$	Thermal Resistance Junction-case Max	2.14	5	^{o}C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	62.5		^{o}C/W
$R_{thc-sink}$	Thermal Resistance Case-sink Typ	0.5		^{o}C/W
T_l	Maximum Lead Temperature For Soldering Purpose	300		^{o}C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	20	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 ^{o}C, $I_D = I_{AR}$, V_{DD} = 35 V)	80	mJ

ELECTRICAL CHARACTERISTICS (T_{case} = 25 ^{o}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	60			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating V_{DS} = Max Rating T_c = 125 ^{o}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	1	1.8	2.5	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 5 V I_D = 10 A V_{GS} = 10 V I_D = 10 A		0.07 0.06	0.085 0.07	Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ V_{GS} = 10 V	20			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (∗)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ I_D =10 A	5	9		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0		800 125 50	1100 170 70	pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	V_{DD} = 30 V I_D = 10 A		20	30	ns
t_r	Rise Time	R_G =4.7 Ω V_{GS} = 5 V		45	60	ns
Q_g	Total Gate Charge	V_{DD} = 48 V I_D = 20 A V_{GS} = 5 V		14	20	nC
Q_{gs}	Gate-Source Charge			8		nC
Q_{gd}	Gate-Drain Charge			4		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	V_{DD} = 48 V I_D = 20 A		10	14	ns
t_f	Fall Time	R_G =4.7 Ω V_{GS} = 5 V		25	34	ns
t_c	Cross-over Time			42	60	ns

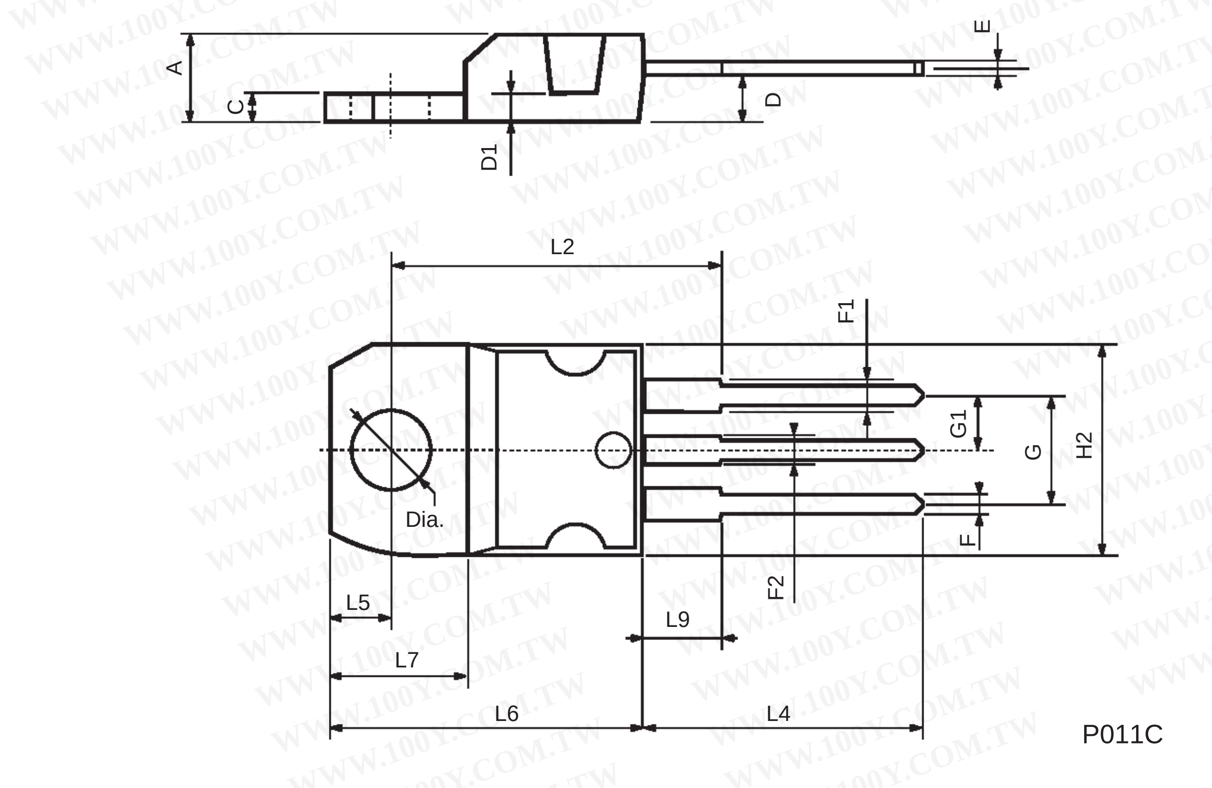
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				20	A
I_{SDM}(•)	Source-drain Current (pulsed)				80	A
V_{SD} (∗)	Forward On Voltage	I_{SD} =20 A V_{GS} = 0			1.5	V
t_{rr}	Reverse Recovery Time	I_{SD} = 20 A di/dt = 100 A/µs V_{DD} = 30 V T_j = 150 °C		65		ns
Q_{rr}	Reverse Recovery Charge			130		µC
I_{RRM}	Reverse Recovery Current			4		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



TO-220FP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126