

**N-CHANNEL 30V - 0.0034 Ω - 80A TO-220
STripFET™ POWER MOSFET**
PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP80NF03L-04	30 V	< 0.004 Ω	80 A

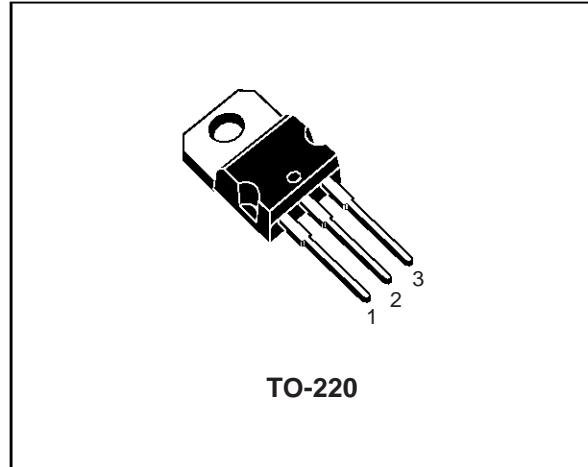
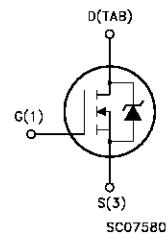
- TYPICAL R_{DS(on)} = 0.0034 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- LOW GATE CHARGE 100 °C
- APPLICATION ORIENTED CHARACTERIZATION

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

- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC & DC-AC CONVERTERS
- AUTOMOTIVE ENVIRONMENT (INJECTION, ABS, AIR-BAG, LAMPDRIVERS, Etc.)


INTERNAL SCHEMATIC DIAGRAM

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	30	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	30	V
V _{GS}	Gate-source Voltage	± 20	V
I _{D(••)}	Drain Current (continuous) at T _c = 25 °C	80	A
I _D	Drain Current (continuous) at T _c = 100 °C	56	A
I _{DM(•)}	Drain Current (pulsed)	320	A
P _{tot}	Total Dissipation at T _c = 25 °C	210	W
	Derating Factor	1.43	W/°C
E _A (1)	Single Pulse Avalanche Energy	2	J
T _{stg}	Storage Temperature	-65 to 175	°C
T _j	Max. Operating Junction Temperature	175	°C

(•) Pulse width limited by safe operating area

(••) Current limited by package

(1) starting T_j = 25 °C, I_D = 40A, V_{DD} = 15V

STP80NF03L-04

THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case	Max	0.7	°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 _I	Maximum Lead Temperature For Soldering Purpose		300	°C

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	30			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating T _c = 125 °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	1.7	2.5	V
R _{D(on)}	Static Drain-source On Resistance	V _{GS} = 10V I _D = 40 A V _{GS} = 4.5V I _D = 40 A		0.0034 0.0042	0.004 0.0055	Ω Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{D(on)max} V _{GS} = 10 V	80			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{D(on)max} I _D = 15 A		50		S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		7000 1700 600		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{DD} = 15 \text{ V}$ $I_D = 40 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 4.5 \text{ V}$ (Resistive Load, see fig. 3)		50 275		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 24 \text{ V}$ $I_D = 80 \text{ A}$ $V_{GS} = 4.5 \text{ V}$		120 37 58	160	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 15 \text{ V}$ $I_D = 40 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 4.5 \text{ V}$ (Resistive Load, see fig. 3)		230 190		ns ns
$t_{r(V_{off})}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{clamp} = 24 \text{ V}$ $I_D = 80 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 4.5 \text{ V}$ (Inductive Load, see fig. 5)		175 280 470		ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				80 320	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 80 \text{ A}$ $V_{GS} = 0$			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 80 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 20 \text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, fig. 5)		88 0.176 4.4		ns μC A

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

(*) Pulse width limited by safe operating area