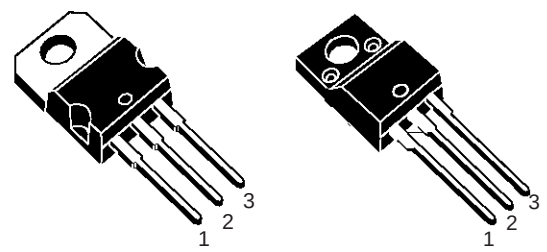
STP75NE75
STP75NE75FP

N - CHANNEL 75V - 0.01Ω - 75A TO-220/TO-220FP STripFET™ POWER MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP75NE75	75 V	< 0.013 Ω	75 A
STP75NE75FP	75 V	< 0.013 Ω	40 A

- TYPICAL $R_{DS(on)}$ = 0.01 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION



TO-220 TO-220FP

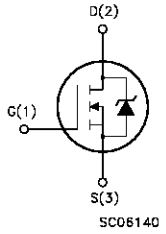
DESCRIPTION

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

- SOLENOID AND RELAY DRIVERS
- DC MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC CONVERTERS
- AUTOMOTIVE ENVIRONMENT

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP75NE75	STP75NE75FP	
V_{DS}	Drain-source Voltage (V_{GS} = 0)	75		V
V_{DGR}	Drain- gate Voltage (R_{GS} = 20 kΩ)	75		V
V_{GS}	Gate-source Voltage	± 20		V
I_D	Drain Current (continuous) at T_c = 25 °C	75	40	A
I_D	Drain Current (continuous) at T_c = 100 °C	53	28	A
I_{DM}(•)	Drain Current (pulsed)	300	160	A
P_{tot}	Total Dissipation at T_c = 25 °C	160	50	W
	Derating Factor	1.06	0.37	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} ≤75 A, di/dt ≤ 300 A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_j ≤ T_{JMAX}

THERMAL DATA

			TO-220	TO-220FP	
$R_{thj-case}$	Thermal Resistance Junction-case	Max	0.94	2.7	$^oC/W$
$R_{thj-amb}$ $R_{thc-sink}$ T_l	Thermal Resistance Junction-ambient Thermal Resistance Case-sink Maximum Lead Temperature For Soldering Purpose	Max Typ	62.5 0.5 300		$^oC/W$ $^oC/W$ ^oC

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	75	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 ^oC, $I_D = I_{AR}$, V_{DD} = 30V)	200	mJ

ELECTRICAL CHARACTERISTICS (T_{case} = 25 ^oC 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	75			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating V_{DS} = Max Rating T_c = 125 ^oC			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} = 10V I_D = 37.5 A		0.01	0.013	Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ V_{GS} = 10 V	75			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 =37.5 A		40		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0		5300 850 310		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} = 40 V I_D = 40 A R_G = 4.7 Ω V_{GS} = 10 V (Resistive Load, see fig. 3)		32 130		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 60 V I_D = 75 A V_{GS} = 10 V		150 30 62	200	nC nC nC

SWITCHING OFF

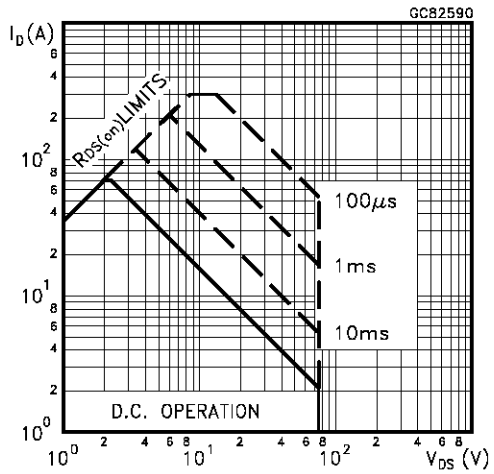
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	V_{DD} = 40 V I_D = 40 A R_G = 4.7 Ω V_{GS} = 10 V (Resistive Load, see fig. 3)		150 45		ns ns
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	V_{clamp} = 60 V I_D = 75 A R_G = 4.7 Ω V_{GS} = 4.5 V (Inductive Load, see fig. 5)		35 60 100		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)				43 170	A A
V_{SD} (*)	Forward On Voltage	I_{SD} = 75 A V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 75 A di/dt = 100 A/µs V_{DD} = 30 V T_j = 150 °C (see test circuit, fig. 5)		130 0.6 9		ns µC A

(*) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %
(•) Pulse width limited by safe operating area

Safe Operating Area for TO-220



Safe Operating Area for TO-220FP