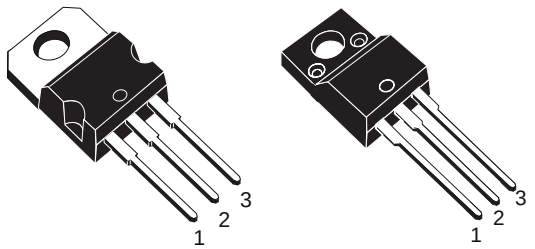
STP14NF12
STP14NF12FP

N-CHANNEL 120V - 0.16Ω - 14A TO-220/TO-220FP
LOW GATE CHARGE STripFET™ POWER MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP14NF12	120 V	< 0.18 Ω	14 A
STP14NF12FP	120 V	< 0.18 Ω	14 A

- TYPICAL R_{DS}(on) = 0.16Ω
- EXCEPTIONAL dv/dt CAPABILITY
- APPLICATION ORIENTED CHARACTERIZATION

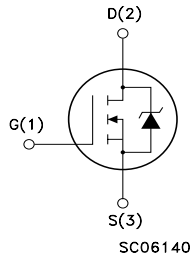


TO-220 **TO-220FP**

DESCRIPTION

This Power MOSFET series realized with STMicroelectronics unique STripFET process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency isolated DC-DC converters for Telecom and Computer application. It is also intended for any application with low gate charge drive requirements

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- HIGH-EFFICIENCY DC-DC CONVERTERS
- UPS AND MOTOR CONTROL

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP14NF12	STP14NF12FP	
V_{DS}	Drain-source Voltage (V_{GS} = 0)	120		V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	120		V
V_{GS}	Gate- source Voltage	±20		V
I_D	Drain Current (continuous) at T_C = 25°C	14	8.5	A
I_D	Drain Current (continuous) at T_C = 100°C	9	6	A
I_{DM} (●)	Drain Current (pulsed)	56	34	A
P_{TOT}	Total Dissipation at T_C = 25°C	60	25	W
	Derating Factor	0.4	0.17	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	9		V/ns
E_{AS} (2)	Single Pulse Avalanche Energy	60		mJ
V_{ISO}	Insulation Withstand Voltage (DC)	-	2500	V
T_j	Operating Junction Temperature	-55 to 175		°C
T_{stg}	Storage Temperature			

(●) Pulse width limited by safe operating area

(1) I_{SD} ≤14A, di/dt ≤300A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_j ≤ $T_{JMAX.}$
(2) Starting T_j = 25°C, I_D = 14A, V_{DD} = 50V

THERMAL DATA

		TO-220	TO-220FP	
Rthj-case	Thermal Resistance Junction-case Max	2.5	6	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5		°C/W
T_l	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	120			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating			1	µA
		V_{DS} = Max Rating, T_C = 125 °C			10	µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ±20V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250µA	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V, I_D = 7 A		0.16	0.18	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	V_{DS} = 15V , I_D = 7 A		4		S
C_{iss}	Input Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		460		pF
C_{oss}	Output Capacitance			70		pF
C_{rss}	Reverse Transfer Capacitance			30		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} = 50 V, I_D = 7 A R_G = 4.7Ω V_{GS} = 10V (Resistive Load, see Figure 3)		16 25		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 80 V, I_D = 14 A, V_{GS} = 10V		15.5 3.7 4.7	21	nC nC nC

SWITCHING OFF

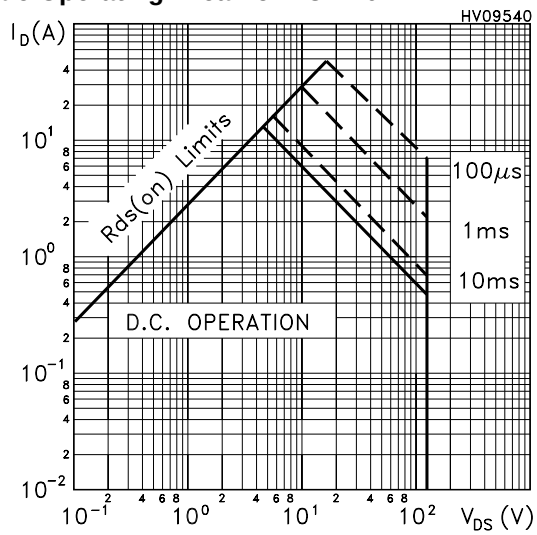
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off-Delay Time Fall Time	V_{DD} = 50 V, I_D = 7 A, R_G = 4.7Ω, V_{GS} = 10V (Resistive Load, see Figure 3)		32 8		ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				14	A
I_{SDM} (2)	Source-drain Current (pulsed)				56	A
V_{SD} (1)	Forward On Voltage	I_{SD} = 14 A, V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 14 A, di/dt = 100A/µs, V_{DD} = 50 V, T_j = 150°C (see test circuit, Figure 5)		92 230 5		ns nC A

Note: 1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
2. Pulse width limited by safe operating area.

Safe Operating Area For TO-220



Safe Operating Area For TO-220FP