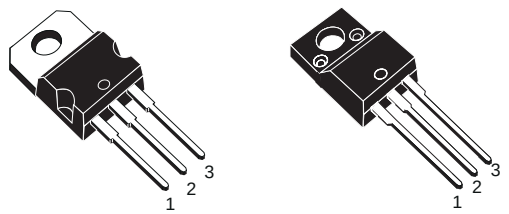
STP16NS25
STP16NS25FP

N-CHANNEL 250V - 0.23Ω - 16A TO-220 / TO-220FP
MESH OVERLAY™ MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP16NS25	250 V	< 0.28 Ω	16 A
STP16NS25FP	250 V	< 0.28 Ω	16 A

- TYPICAL R_{DS}(on) = 0.23 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED

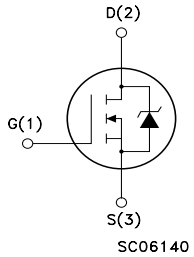


TO-220 **TO-220FP**

DESCRIPTION

Using the latest high voltage MESH OVERLAY™ process, STMicroelectronics has designed an advanced family of power MOSFETs with outstanding performance. The new patented STrip layout coupled with the Company's proprietary edge termination structure, makes it suitable in coverters for lighting applications.

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITH MODE POWER SUPPLIES (SMPS)
- DC-DC CONVERTERS FOR TELECOM, INDUSTRIAL, AND LIGHTING EQUIPMENT
- IDEAL FOR MONITOR's B+ FUNCTION

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP16NS25	STP16NS25FP	
V_{DS}	Drain-source Voltage (V_{GS} = 0)	250		V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	250		V
V_{GS}	Gate- source Voltage	± 20		V
I_D	Drain Current (continuos) at T_C = 25°C	16	16(*)	A
I_D	Drain Current (continuos) at T_C = 100°C	11	11(*)	A
I_{DM} (•)	Drain Current (pulsed)	64	64(*)	A
P_{TOT}	Total Dissipation at T_C = 25°C	140	40	W
	Derating Factor	1	0.33	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	5		V/ns
V_{ISO}	Insulation Withstand Voltage (DC)	-	2500	V
T_{stg}	Storage Temperature	–65 to 150		°C
T_j	Max. Operating Junction Temperature			

(•)Pulse width limited by safe operating area

(1) I_{SD}≤ 16A, di/dt≤300 A/µs, V_{DD}≤ $V_{(BR)DSS}$, Tj≤T_{jMAX}

THERMAL DATA

		TO-220	TO-220FP	°C/W
Rthj-case	Thermal Resistance Junction-case Max	0.9	3	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5		°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)	16	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, I_D = I_{AR}, V_{DD} = 50 V)	600	mJ

ELECTRICAL CHARACTERISTICS (TCASE = 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	250			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} = ± 20 V			±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 = 8 A		0.23	0.28	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	V_{DS} > $I_{D(on)}$ x $R_{DS(on)max}$, I_D = 8 A		15		S
C_{iss}	Input Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		1270		pF
C_{oss}	Output Capacitance			190		pF
C_{rss}	Reverse Transfer Capacitance			74		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{DD} = 125 V, I_D = 8 A R_G = 4.7Ω V_{GS} = 10 V (see test circuit, Figure 3)		14.5		ns
t_r	Rise Time			26		ns
Q_g	Total Gate Charge	V_{DD} = 200V, I_D = 16 A, V_{GS} = 10V		59	83	nC
Q_{gs}	Gate-Source Charge			7.9		nC
Q_{gd}	Gate-Drain Charge			22.3		nC

SWITCHING OFF

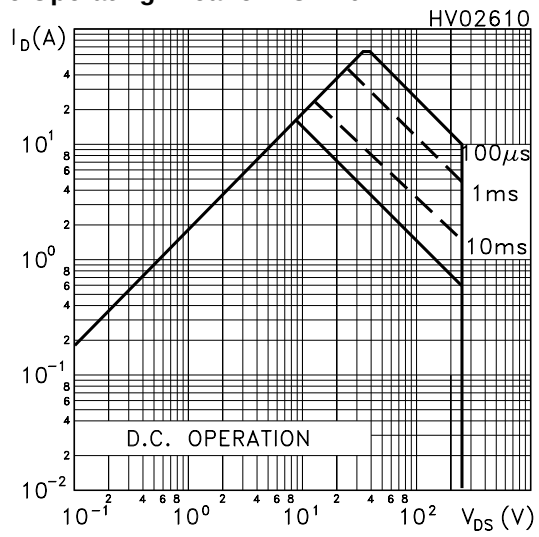
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(Voff)}$ t_f	Turn-off- Delay Time Fall Time	V_{DD} = 125V, I_D = 8 A, R_G = 4.7Ω, V_{GS} = 10V (see test circuit, Figure 3)		72 32		ns ns
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	V_{clamp} = 200V, I_D = 16 A, R_G = 4.7Ω, V_{GS} = 10V (see test circuit, Figure 5)		24 28 56		ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				16	A
I_{SDM} (2)	Source-drain Current (pulsed)				64	A
V_{SD} (1)	Forward On Voltage	I_{SD} = 16 A, V_{GS} = 0			1.5	V
t_{rr}	Reverse Recovery Time	I_{SD} = 16 A, di/dt = 100A/µs V_{DD} = 30V, T_j = 150°C (see test circuit, Figure 5)		270		ns
Q_{rr}	Reverse Recovery Charge			1.5		µC
I_{RRM}	Reverse Recovery Current			11.4		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