

N - CHANNEL ENHANCEMENT MODE FAST POWER MOS TRANSISTOR

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP3NA50	500 V	< 3 Ω	3.3 A
STP3NA50FI	500 V	< 3 Ω	2.3 A

- TYPICAL R_{DS(on)} = 2.4 Ω
- ± 30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD

DESCRIPTION

This series of POWER MOSFETS represents the most advanced high voltage technology. The optimized cell layout coupled with a new proprietary edge termination concur to give the device low R_{DS(on)} and gate charge, unequalled ruggedness and superior switching performance.

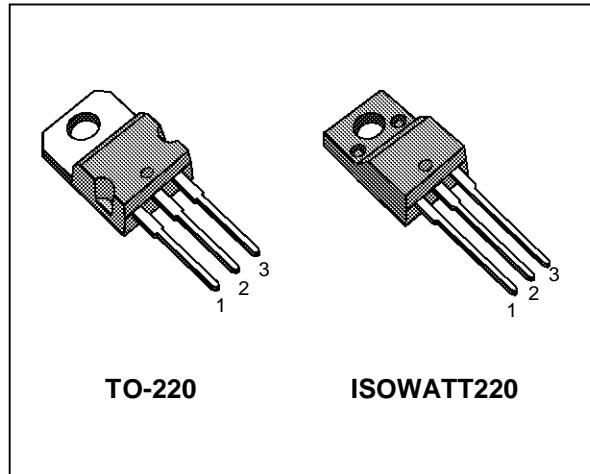
APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES AND MOTOR DRIVE

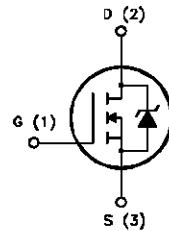
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP3NA50	STP3NA50FI	
V _{DS}	Drain-source Voltage (V _{GS} = 0)	500	500	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	500	500	V
V _{GS}	Gate-source Voltage	± 30	± 30	V
I _D	Drain Current (continuous) at T _c = 25 °C	3.3	2.3	A
I _D	Drain Current (continuous) at T _c = 100 °C	2.1	1.5	A
I _{DM(•)}	Drain Current (pulsed)	13.2	13.2	A
P _{tot}	Total Dissipation at T _c = 25 °C	80	40	W
	Derating Factor	0.64	0.32	W/°C
V _{ISO}	Insulation Withstand Voltage (DC)	—	2000	V
T _{stg}	Storage Temperature	-65 to 150		°C
T _j	Max. Operating Junction Temperature	150		°C

(•) Pulse width limited by safe operating area



INTERNAL SCHEMATIC DIAGRAM



STP3NA50/FI

THERMAL DATA

			TO-220	ISOWATT220	
R _{thj-case}	Thermal Resistance Junction-case	Max	1.56	3.12	°C/W
R _{thj-amb} R _{thc-sink} T ₁	Thermal Resistance Junction-ambient Thermal Resistance Case-sink Maximum Lead Temperature For Soldering Purpose	Max Typ	62.5 0.5 300		°C/W °C/W °C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max, δ < 1%)	3.3	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	55	mJ
E _{AR}	Repetitive Avalanche Energy (pulse width limited by T _j max, δ < 1%)	2.2	mJ
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (T _c = 100 °C, pulse width limited by T _j max, δ < 1%)	2.1	A

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	500			V
I _{dss}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating x 0.8 T _c = 125 °C			25 250	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 30 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	2.25	3	3.75	V
R _{D(on)}	Static Drain-source On Resistance	V _{GS} = 10V I _D = 1.5 A		2.4	3	Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} x R _{D(on)max} V _{GS} = 10 V	3.3			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} x R _{D(on)max} I _D = 1.5 A	1.2	2.2		S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		370 62 20	485 81 27	pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	$V_{DD} = 250 \text{ V}$ $I_D = 1.5 \text{ A}$ $R_G = 18 \Omega$ $V_{GS} = 10 \text{ V}$ (see test circuit, figure 3)		14 23	20 30	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 400 \text{ V}$ $I_D = 3 \text{ A}$ $R_G = 18 \Omega$ $V_{GS} = 10 \text{ V}$ (see test circuit, figure 5)		340		$\text{A}/\mu\text{s}$
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 400 \text{ V}$ $I_D = 3 \text{ A}$ $V_{GS} = 10 \text{ V}$		21 6 9	28	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 400 \text{ V}$ $I_D = 3 \text{ A}$ $R_G = 18 \Omega$ $V_{GS} = 10 \text{ V}$ (see test circuit, figure 5)		13 11 26	18 16 35	ns ns ns

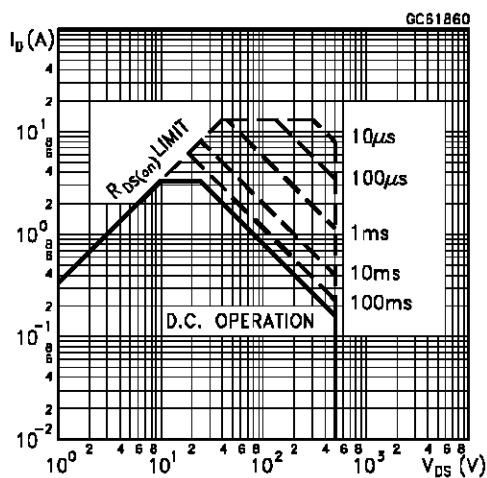
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				3.3 13.2	A A
$V_{SD} (\ast)$	Forward On Voltage	$I_{SD} = 3.3 \text{ A}$ $V_{GS} = 0$			1.6	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 3 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 100 \text{ V}$ $T_j = 150 \text{ }^\circ\text{C}$ (see test circuit, figure 5)		350 4.2 24		ns μC A

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

(*) Pulse width limited by safe operating area

Safe Operating Areas for TO-220



Safe Operating Areas for ISOWATT220

