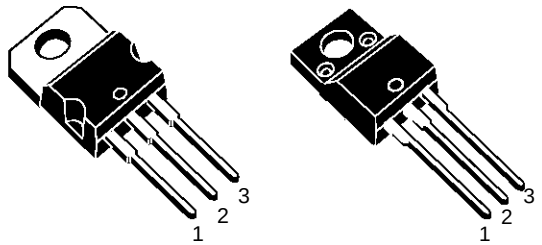
STP3NA90
STP3NA90FI

N - CHANNEL ENHANCEMENT MODE FAST POWER MOS TRANSISTOR

PRELIMINARY DATA

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP3NA90	900 V	< 5.3 Ω	3 A
STP3NA90FI	900 V	< 5.3 Ω	1.9 A

- TYPICAL $R_{DS(on)}$ = 4.4 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

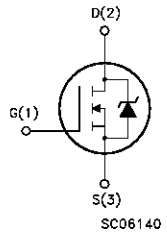


TO-220 **ISOWATT220**

APPLICATIONS

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

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP3NA90	STP3NA90FI	
V_{DS}	Drain-Source Voltage (V_{gs} = 0)	900		V
V_{DGR}	Drain-Gate Voltage (R_{gs} = 20 KΩ)	900		V
V_{GS}	Gate-Source Voltage	± 30		V
I_D	Drain-Current (continuous) at T_c = 25°C	3	1.9	A
I_D	Drain-Current (continuous) at T_c = 100°C	2	1.2	A
I_{DM}(•)	Drain-Current (Pulsed)	12	12	A
P_{tot}	Total Dissipation at T_c = 25°C	100	40	W
	Derating Factor	1.25	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

THERMAL DATA

			TO220	ISOWATT220	
$R_{thj-case}$	Thermal Resistance Junction-case	Max	0.8	3.12	$^oC/W$
$R_{thj-amb}$ $R_{thc-sink}$ 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, $\delta < 1\%$)	3	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_j = 25\ ^oC$, $I_D = I_{AR}$, $V_{DD} = 50$ V)	45	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_j max, $\delta < 1\%$)	2	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive ($T_c = 100\ ^oC$, pulse width limited by T_j max, $\delta < 1\%$)	2	A

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	$I_D = 250\ \mu A$ $V_{GS} = 0$	900			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	V_{DS} = Max Rating V_{DS} = Max Rating x 0.8 $T_c = 125\ ^oC$			250 1000	µA µA
I_{GSS}	Gate-Source Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 30$ V			±100	mA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $_{ID} = 250\ \mu A$	2.25	3	3.75	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10$ V $I_D = 1.5$ A $V_{GS} = 10$ V $I_D = 1.5$ A $T_c = 100^oC$		4.4	5.3 10.6	Ω Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10$ V	3			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 1.5$ A	1.5	2.8		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25$ V f = 1 MHz $V_{GS} = 0$		690 80 20	900 105 30	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} = 450 V I_D = 1.5 A R_G = 4.7 Ω V_{GS} = 10 V		10 10	15 15	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{DD} = 720 V I_D = 3 A R_G = 47 Ω V_{GS} = 10 V		360		A/µs
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 720 V I_D =3 A V_{GS} = 10 V		35 6 14	50	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} = 720 V I_D = 3 A R_G = 4.7 Ω V_{GS} = 10 V		11 8 19	10 13 26	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)				3 12	A A
V_{SD} (∗)	Forward On Voltage	I_{SD} = 3 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 A di/dt = 100 A/µs V_{DD} = 100 V T_j = 150 °C		950 14.2 30		ns µC A

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

(•) Pulse width limited by safe operating area