

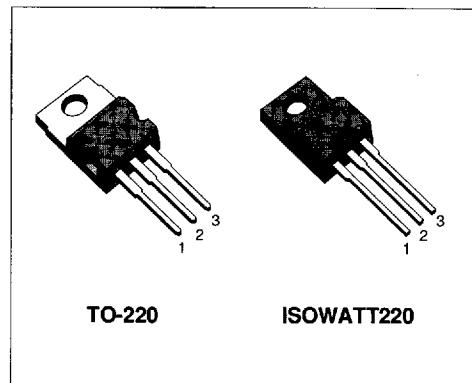
N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

TYPE	V _{DSS}	R _{D(on)}	I _D
STP3N90	900 V	< 4.5 Ω	3.2 A
STP3N90FI	900 V	< 4.5 Ω	1.9 A

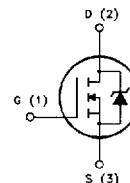
- TYPICAL R_{D(on)} = 3.9 Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW INPUT CAPACITANCE
- LOW GATE CHARGE
- APPLICATION ORIENTED CHARACTERIZATION

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- CONSUMER AND INDUSTRIAL LIGHTING
- DC-AC INVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLY (UPS)



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP3N90	STP3N90FI	
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	± 20		V
I _D	Drain Current (continuous) at T _c = 25 °C	3.2	1.9	A
I _D	Drain Current (continuous) at T _c = 100 °C	2	1.2	A
I _{DM(•)}	Drain Current (pulsed)	13	13	A
P _{tot}	Total Dissipation at T _c = 25 °C	100	40	W
	Derating Factor	0.8	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

			TO-220	ISOWATT220	
R _{thj-case}	Thermal Resistance Junction-case	Max	1.25	3.12	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max		62.5	°C/W
R _{thc-sink}	Thermal Resistance Case-sink	Typ		0.5	°C/W
T _j	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, δ < 1%)	3.2	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	160	mJ
E _{AR}	Repetitive Avalanche Energy (pulse width limited by T _j max, δ < 1%)	4.2	mJ
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (T _c = 100 °C, pulse width limited by T _j max, δ < 1%)	2	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	900			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating × 0.8 T _c = 125 °C			250 1000	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 _{D(S(on))}	Static Drain-source On Resistance	V _{GS} = 10 V I _D = 1.7 A V _{GS} = 10 V I _D = 1.7 A T _c = 100 °C		3.9	4.5 9	Ω Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{D(S(on))max} V _{GS} = 10 V	3.2			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{D(S(on))max} I _D = 1.7 A	1	3.5		S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		650 82 28	850 105 40	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	$V_{DD} = 30 \text{ V}$ $I_D = 2.1 \text{ A}$ $R_G = 50 \Omega$ $V_{GS} = 10 \text{ V}$ (see test circuit, figure 3)			50 110	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 640 \text{ V}$ $I_D = 3 \text{ A}$ $R_G = 50 \Omega$ $V_{GS} = 10 \text{ V}$ (see test circuit, figure 5)		170		A/ μs
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 400 \text{ V}$ $I_D = 3 \text{ A}$ $V_{GS} = 10 \text{ V}$		42 6 17	55	nC nC nC

SWITCHING OFF

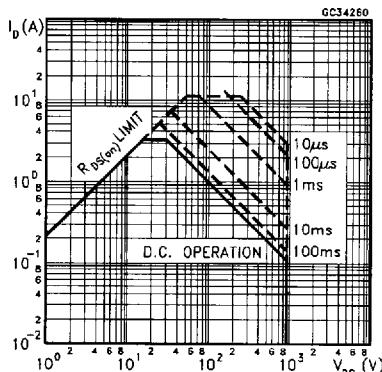
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 640 \text{ V}$ $I_D = 3 \text{ A}$ $R_G = 50 \Omega$ $V_{GS} = 10 \text{ V}$ (see test circuit, figure 5)		95 20 120	120 25 165	ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM(\bullet)}$	Source-drain Current Source-drain Current (pulsed)				3.2 13	A A
$V_{SD} (\bullet)$	Forward On Voltage	$I_{SD} = 3.2 \text{ A}$ $V_{GS} = 0$			2	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 3 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 80 \text{ V}$ $T_j = 150^\circ \text{C}$ (see test circuit, figure 5)		700		ns
Q_{rr}	Reverse Recovery Charge			8.8		μC
I_{RRM}	Reverse Recovery Current			25		A

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

(*) Pulse width limited by safe operating area

Safe Operating Areas For TO220**Safe Operating Areas For ISOWATT220**