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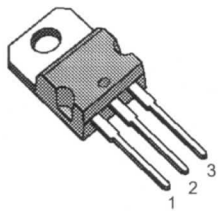
STP5NA80
STP5NA80FI

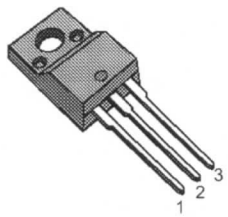
N - CHANNEL ENHANCEMENT MODE FAST POWER MOS TRANSISTOR

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP5NA80	800 V	< 2.4 Ω	4.7 A
STP5NA80FI	800 V	< 2.4 Ω	2.8 A

- TYPICAL $R_{DS(on)}$ = 1.8 Ω
- ± 30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW INTRINSIC CAPACITANCES
- GATE GHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD



TO-220



ISOWATT220

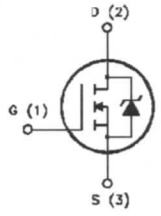
DESCRIPTION

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

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP5NA80	STP5NA80FI	
V_{DS}	Drain-source Voltage (V_{GS} = 0)	800		V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	800		V
V_{GS}	Gate-source Voltage	± 30		V
I_D	Drain Current (continuous) at T_c = 25 °C	4.7	2.8	A
I_D	Drain Current (continuous) at T_c = 100 °C	3	1.8	A
I_{DM}(•)	Drain Current (pulsed)	19	19	A
P_{tot}	Total Dissipation at T_c = 25 °C	125	45	W
	Derating Factor	1	0.36	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	
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1	2.78	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5		°C/W
$R_{thc\text{-}sink}$	Thermal Resistance Case-sink	Typ	0.5		°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, $\delta < 1\%$)	4.7	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, $I_D = I_{AR}$, V_{DD} = 50 V)	110	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_j max, $\delta < 1\%$)	4.5	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (T_c = 100 °C, pulse width limited by T_j max, $\delta < 1\%$)	3	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	800			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
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V I_D = 2.5 A		1.8	2.4	Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ V_{GS} = 10 V	4.7			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 = 2.5 A	2.7	5.2		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0		1250 140 35	1700 190 50	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} = 400 V I_D = 2.5 A R_G = 47 Ω V_{GS} = 10 V (see test circuit, figure 3)		40 100	55 135	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{DD} = 640 V I_D = 5 A R_G = 47 Ω V_{GS} = 10 V (see test circuit, figure 5)		180		A/µs
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 640 V I_D = 5 A V_{GS} = 10 V		55 8 24	75	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 V I_D = 5 A R_G = 47 Ω V_{GS} = 10 V (see test circuit, figure 5)		75 25 110	100 35 150	ns ns ns

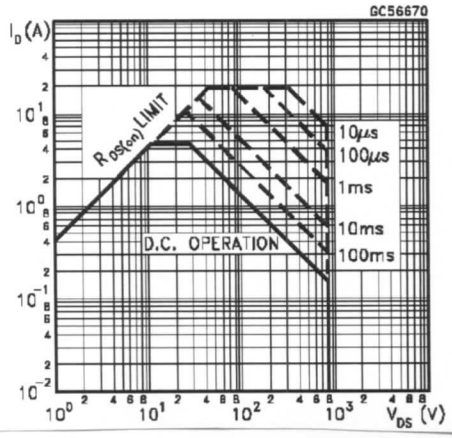
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(•)	Source-drain Current Source-drain Current (pulsed)				4.7 19	A A
V_{SD} (*)	Forward On Voltage	I_{SD} = 4.7 A V_{GS} = 0			1.6	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 5 A di/dt = 100 A/µs V_{DD} = 100 V T_j = 150 °C (see test circuit, figure 5)		800 15.2 38		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