SGS-THOMSON MICROELECTRONICS

STP2NA50
STP2NA50FI

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

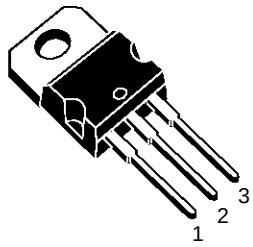
PRELIMINARY DATA

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP2NA50	500 V	<4 Ω	2.8 A
STP2NA50FI	500 V	< 4 Ω	2A

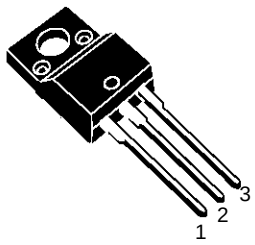
- TYPICAL $R_{DS(on)}$ = 3.25 Ω
- ± 30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD

APPLICATIONS

- MEDIUM CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- CONSUMER AND INDUSTRIAL LIGHTING

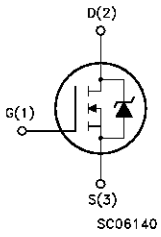


TO-220



ISOWATT220

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP2NA50	STP2NA50FI	
V_{DS}	Drain-Source Voltage (V_{gs} = 0)	500		V
V_{DGR}	Drain-Gate Voltage (R_{gs} =2 0 KΩ)	500		V
V_{GS}	Gate-Source Voltage	± 30		V
I_D	Drain-Current (continuous) at T_c =2 5°C2	.8	2	A
I_D	Drain-Current (continuous) at T_c =1 00°C1	.8	1.25	A
I_{DM}(•)	Drain-Current (Pulsed)	11.2	11.2	A
P_{tot}	Total Dissipation at T_c =2 5°C7	5	35	W
	Derating Factor	0.6	0.28	W/°C
V_{ISO}	Insulation Withstand Voltage (DC)	-	4000	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	
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.67	3.57	°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, δ <1 %)	2.8	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j =2 5 °C, I_D =I $_{AR}$,V $_{DD}$ =5 0 V)	42	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_j max, δ <1 %)	1.6	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (T_c =1 00 °C, pulse width limited by T_j max, δ <1 %)	1.8	A

ELECTRICAL CHARACTERISTICS (T_{case} =2 5 °C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D = 250 µAV $_{GS}$ = 0	500			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} =0) V_{DS} =M axR ating V_{DS} =M axR ating x0 .8 T_c = 125 °C				250 1000	µA µA
I_{GSS}	Gate-Source Leakage Current (V_{DS} =0)	V_{GS} = ± 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 µA2	.25	3	3.75	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} =1 0 V I_D =1 .4 A V_{GS} =1 0 V I_D =1 .4 A T_c = 100 °C		3.25	4 8	Ω Ω
$I_{D(on)}$	On State Drain Current	V_{DS} >I $_{D(on)}$ xR $_{DS(on)\,max}$ V_{GS} =1 0 V	2.8			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (∗)F	orward Transconductance	V_{DS} >I $_{D(on)}$ xR $_{DS(on)\,max}$ I_D =1 .4 A	0.8	2		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25V f = 1M Hz V_{GS} = 0		300 55 15	400 70 20	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} =2 50 V I_D =1 .4 A R_G =4 .7 Ω V_{GS} =1 0 V		7 8	10 11	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{DD} =4 00 V I_D =2 .8 A R_G =4 7 Ω V_{GS} =1 0 V		350		A/µs
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} =4 00 V I_D =2.8 A V_{GS} =1 0 V		18 5.5 7	25	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} =4 00 V I_D =2 .8 A R_G =4 .7 Ω V_{GS} =1 0 V		7 7 14	10 10 20	ns ns ns

SOURCE DRAIN DIODE

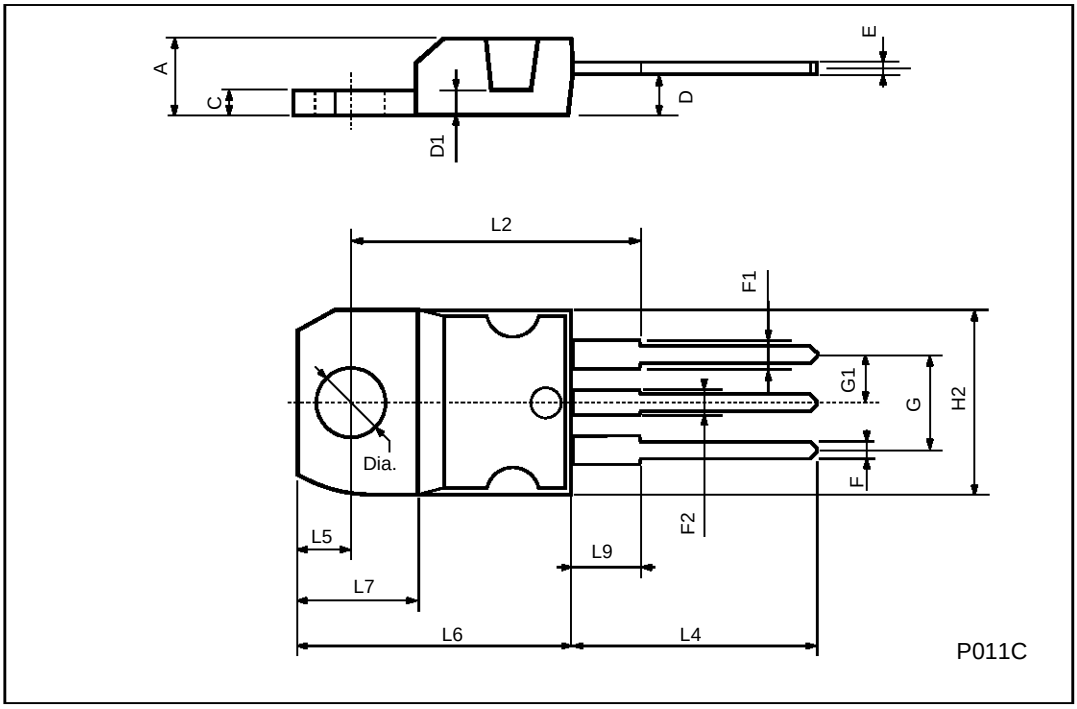
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (•)	Source-drain Current Source-drain Current (pulsed)				2.8 11.2	A A
V_{SD} (∗)F	orward On Voltage	I_{SD} =2 .8 A V_{GS} =0			1.6	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} =2 .8 A di/dt =1 00 A/µs V_{DD} =1 00 V T_j =1 50 °C		380 4.4 23		ns µC A

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

(•) Pulse width limited by safe operating area

TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



ISOWATT220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.4		0.7	0.015		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126