

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

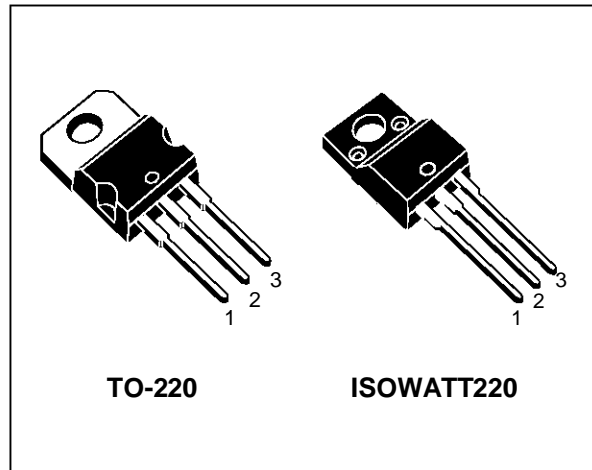
PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP2NA50	500 V	< 4 Ω	2.8 A
STP2NA50FI	500 V	< 4 Ω	2 A

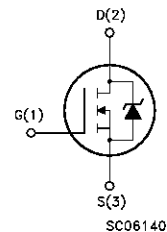
- TYPICAL R_{DS(on)} = 3.25 Ω
- ± 30V GATE TO SOURCE VOLTAGE RATING
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD

APPLICATIONS

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



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} = 20 KΩ)	500		V
V _{GS}	Gate-Source Voltage	± 30		V
I _D	Drain-Current (continuous) at T _c = 25°C	2.8	2	A
I _D	Drain-Current (continuous) at T _c = 100°C	1.8	1.25	A
I _{DM} (•)	Drain-Current (Pulsed)	11.2	11.2	A
P _{tot}	Total Dissipation at T _c = 25°C	75	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

STP2NA50/FI

THERMAL DATA

			TO220	ISOWATT220	
R _{thj-case}	Thermal Resistance Junction-case	Max	1.67	3.57	°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 _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 = 25 °C, I _D = I _{AR} , V _{DD} = 50 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 = 100 °C, pulse width limited by T _j max, δ < 1%)	1.8	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			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} I _D = 250 μA	2.25	3	3.75	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V I _D = 1.4 A V _{GS} = 10 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)} x R _{DS(on)max} V _{GS} = 10 V	2.8			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} x R _{DS(on)max} I _D = 1.4 A	0.8	2		S
C _{iss}	Input Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		300	400	pF
C _{oss}	Output Capacitance			55	70	pF
C _{rss}	Reverse Transfer Capacitance			15	20	pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 250\text{ V}$		7	10	ns
t_r	Rise Time	$I_D = 1.4\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		8	11	ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 400\text{ V}$ $I_D = 2.8\text{ A}$ $R_G = 47\ \Omega$ $V_{GS} = 10\text{ V}$		350		A/ μ s
Q_g	Total Gate Charge	$V_{DD} = 400\text{ V}$ $I_D = 2.8\text{ A}$ $V_{GS} = 10\text{ V}$		18	25	nC
Q_{gs}	Gate-Source Charge			5.5		nC
Q_{gd}	Gate-Drain Charge			7		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 400\text{ V}$		7	10	ns
t_f	Fall Time	$I_D = 2.8\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		7	10	ns
t_c	Cross-over Time			14	20	ns

SOURCE DRAIN DIODE

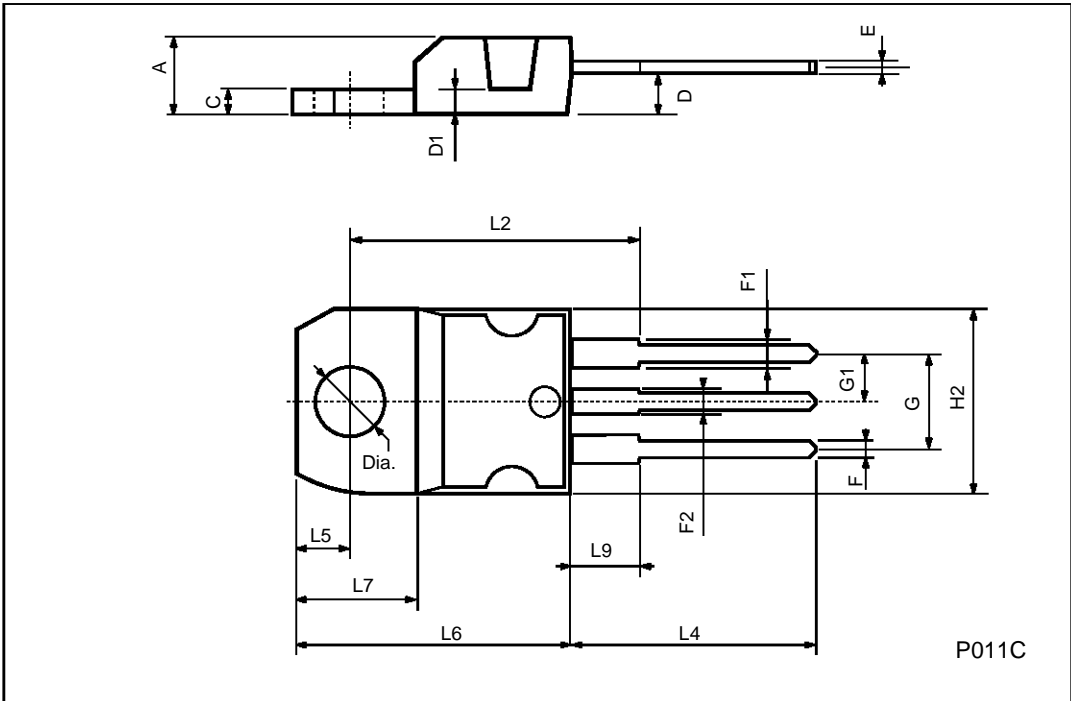
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				2.8	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				11.2	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 2.8\text{ A}$ $V_{GS} = 0$			1.6	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 2.8\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 100\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$		380		ns
Q_{rr}	Reverse Recovery Charge			4.4		μ C
I_{RRM}	Reverse Recovery Current			23		A

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

(\bullet) Pulse width limited by safe operating area

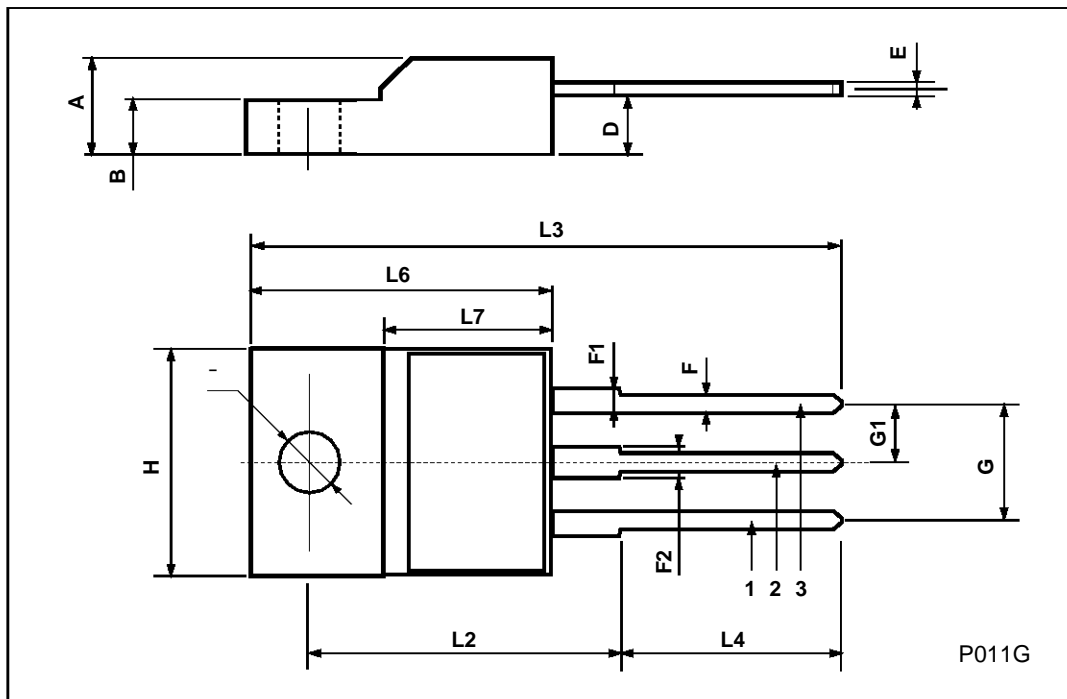
TO-220 MECHANICAL DATA

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
∅	3		3.2	0.118		0.126



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