

## N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

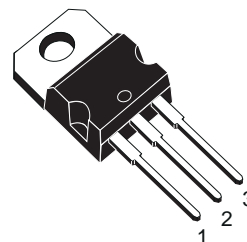
PRELIMINARY DATA

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STP53N08	80 V	< 0.024 Ω	53 A

- TYPICAL R<sub>DS(on)</sub> = 0.018 Ω
- AVALANCE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- 175 °C OPERATING TEMPERATURE
- APPLICATION ORIENTED CHARACTERIZATION

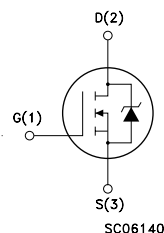
### APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- REGULATORS
- DC-DC & DC-AC CONVERTERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- AUTOMOTIVE ENVIRONMENT (INJECTION, ABS, AIR-BAG, LAMPDRIVERS, Etc.)



TO-220

### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	80	V
V <sub>DGR</sub>	Drain- gate Voltage (R <sub>GS</sub> = 20 kΩ)	80	V
V <sub>GS</sub>	Gate-source Voltage	± 20	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 25 °C	53	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 100 °C	37	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	212	A
P <sub>tot</sub>	Total Dissipation at T <sub>c</sub> = 25 °C	150	W
	Derating Factor	1	W/°C
T <sub>stg</sub>	Storage Temperature	-65 to 175	°C
T <sub>j</sub>	Max. Operating Junction Temperature	175	°C

(•) Pulse width limited by safe operating area

## THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case	Max	1	$^{\circ}C/W$
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	62.5	$^{\circ}C/W$
$R_{thj-amb}$	Thermal Resistance Case-sink	Typ	0.5	$^{\circ}C/W$
$T_l$	Maximum Lead Temperature For Soldering Purpose		300	$^{\circ}C$

## AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
$I_{AR}$	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by $T_j$ max, $\delta < 1\%$ )	53	A
$E_{AS}$	Single Pulse Avalanche Energy (starting $T_j = 25^{\circ}C$ , $I_D = I_{AR}$ , $V_{DD} = 25 V$ )	600	mJ
$E_{AR}$	Repetitive Avalanche Energy (pulse width limited by $T_j$ max, $\delta < 1\%$ )	150	mJ
$I_{AR}$	Avalanche Current, Repetitive or Not-Repetitive ( $T_c = 100^{\circ}C$ , pulse width limited by $T_j$ max, $\delta < 1\%$ )	37	A

ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

## OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250 \mu A$ $V_{GS} = 0$	80			V
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating} \times 0.8$ $T_c = 125^{\circ}C$			250 1000	$\mu A$ $\mu A$
$I_{GSS}$	Gate-body Leakage Current ( $V_{DS} = 0$ )	$V_{GS} = \pm 20 V$			$\pm 100$	nA

## ON (\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250 \mu A$	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10 V$ $I_D = 26.5 A$ $V_{GS} = 10 V$ $I_D = 26.5 A$ $T_c = 100^{\circ}C$		0.018	0.024 0.048	$\Omega$ $\Omega$
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10 V$	53			A

## DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (*)$	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 26.5 A$	20	38		S
$C_{iss}$	Input Capacitance	$V_{DS} = 25 V$ $f = 1 MHz$ $V_{GS} = 0$		4200	5500	pF
$C_{oss}$	Output Capacitance			700	900	pF
$C_{rss}$	Reverse Transfer Capacitance			160	210	pF

**ELECTRICAL CHARACTERISTICS** (continued)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Turn-on Time Rise Time	$V_{DD} = 40\text{ V}$ $R_G = 4.7\ \Omega$	$I_D = 26.5\text{ A}$ $V_{GS} = 10\text{ V}$	30 90	45 130	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 64\text{ V}$ $R_G = 47\ \Omega$	$I_D = 53\text{ A}$ $V_{GS} = 10\text{ V}$	380		A/ $\mu$ s
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 10\text{ V}$ $I_D = 53\text{ A}$ $V_{GS} = 64\text{ V}$		120 20 45	170	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	$V_{DD} = 64\text{ V}$ $R_G = 4.7\ \Omega$	$I_D = 53\text{ A}$ $V_{GS} = 10\text{ V}$	35 45 80	50 65 115	ns ns ns

**SOURCE DRAIN DIODE**

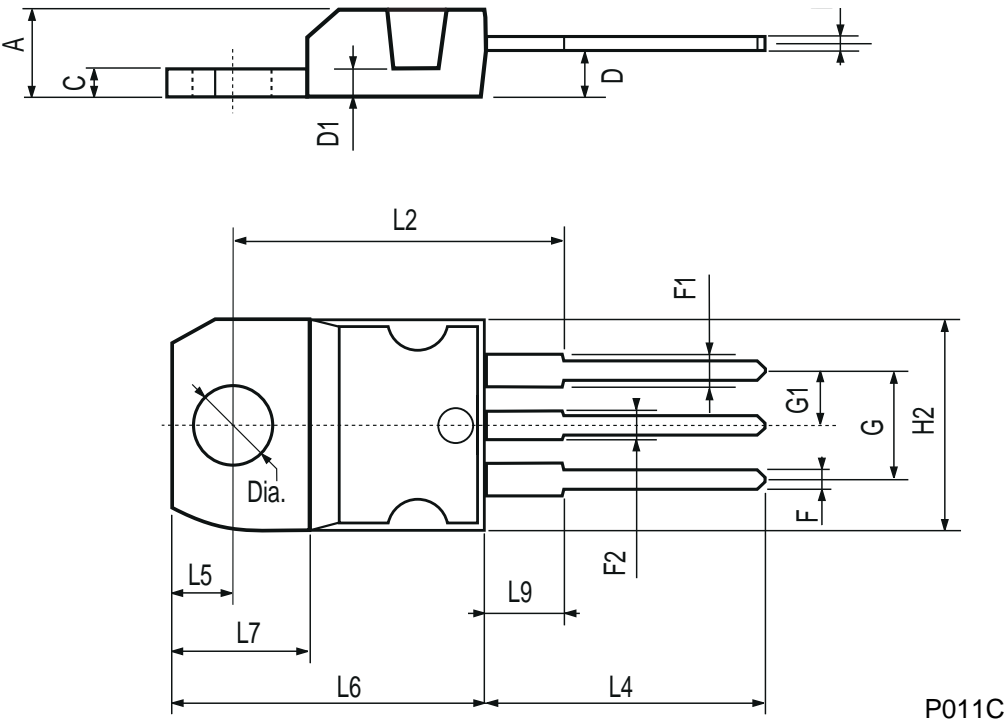
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				53 212	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 60\text{ A}$ $V_{GS} = 0$			1.5	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 53\text{ A}$ $V_{DD} = 25\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$ $T_J = 150\text{ }^\circ\text{C}$		180 1 11		ns $\mu$ C A

(\*) Pulsed: Pulse duration = 300  $\mu$ 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 </tr <tr><td>L9</td><td>3.5</td><td></td><td>3.93</td><td>0.137</td><td></td><td>0.154</td></tr> <tr><td>DIA.</td><td>3.75</td><td></td><td>3.85</td><td>0.147</td><td></td><td>0.151</td></tr>	L9	3.5		3.93	0.137		0.154	DIA.	3.75		3.85	0.147		0.151
L9	3.5		3.93	0.137		0.154														
DIA.	3.75		3.85	0.147		0.151														



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