

### General Description

The 6N50 have been fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications.

### Features

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

### Product Summary

BVDSS	RDSON	ID
500V	1.3Ω	6A

### Applications

- Power Supply
- Uninterruptible Power Supply

### TO-252/251 Pin Configuration



### Absolute Maximum Ratings TC = 25°C unless otherwise noted

Symbol	Parameter	TSD6N50M/TSU6N50M	Units
V <sub>DSS</sub>	Drain-Source Voltage	500	V
I <sub>D</sub>	Drain Current - Continuous (T <sub>C</sub> = 25°C) - Continuous (T <sub>C</sub> = 100°C)	6	A
		3.8	A
I <sub>DM</sub>	Drain Current - Pulsed (Note 1)	18	A
V <sub>GSS</sub>	Gate-Source Voltage	±30	V
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)	285	mJ
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> = 25°C)	90	W
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C
T <sub>L</sub>	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

### Thermal Characteristics

Symbol	Parameter	TSD6N50M/TSU6N50M	Units
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case Max.	1.4	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient Max.	83	°C/W

**Electrical Characteristic** ( $T_c=25^{\circ}\text{C}$  unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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**Off Characteristics**

$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	500	--	--	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

**On Characteristics**

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0	--	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 2.75\text{A}$	--	--	1.3	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 5\text{A}$	--	8	--	S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	1450	--	pF
$C_{oss}$	Output Capacitance		--	95	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	10	--	pF

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 250\text{ V}, I_D = 6\text{A},$ $R_G = 25\ \Omega$	--	5	--	ns
$t_r$	Turn-On Rise Time		--	55	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	25	--	ns
$t_f$	Turn-Off Fall Time		--	55	--	ns
$Q_g$	Total Gate Charge	$V_{DS} = 400\text{ V}, I_D = 6\text{A},$ $V_{GS} = 10\text{ V}$	--	13	30	nC
$Q_{gs}$	Gate-Source Charge		--	4	--	nC
$Q_{gd}$	Gate-Drain Charge		--	6	--	nC

**Drain-Source Diode Characteristics and Maximum Ratings**

$I_S$	Maximum Continuous Drain-Source Diode Forward Current	--	--	6	A	
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current	--	--	18	A	
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 5\text{A}$	--	--	1.4	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 6\text{A},$ $di_F / dt = 100\text{ A}/\mu\text{s}$	--	275	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	1.7	--	$\mu\text{C}$

**Notes:**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $L = 5\text{ mH}, I_{AS} = 10.5\text{A}, V_{DD} = 10\text{V},$  Starting  $T_J = 25^{\circ}\text{C}$

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