

## General Description

The 5N50 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

- 100% avalanche tested
- Low Gate Charge
- Fast switching
- Improved dv/dt capability
- RoHS Compliant

## Product Summary

BVDSS	RDSON	ID
500V	1.4Ω	5A

## Applications

- Charger
- Adaptor
- Power Supply
- Ballast

## TO-220/220F Pin Configuration



## Absolute Maximum Ratings

T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	CMP5N50/CMF5N50		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)	5	5*	A
		2.9	2.9*	A
I <sub>DM</sub>	Drain Current - Pulsed (Note 1)	20	20*	A
V <sub>GSS</sub>	Gate-Source Voltage	±30		V
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)	250		mJ
I <sub>AR</sub>	Avalanche Current (Note 1)	5		A
E <sub>AR</sub>	Repetitive Avalanche Energy	7.2		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> = 25°C) - Derate above 25°C	73	38	W
		0.58	0.3	W/°C
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

\* Drain current limited by maximum junction temperature

## Thermal Characteristics

Symbol	Parameter	CMP5N50/CMF5N50		Units
R <sub>θC</sub>	Thermal Resistance, Junction-to-Case Max.	1.71	3.31	°C/W
R <sub>θCS</sub>	Thermal Resistance, Case-to-Sink Typ.	---		°C/W
R <sub>θA</sub>	Thermal Resistance, Junction-to-Ambient Max.	62.5		°C/W

## Electrical Characteristic

$T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	500	--	--	V
$BV_{DSS}$ $T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$	--	0.5	--	$\text{V}/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
		$V_{DS} = 400\text{ V}, V_T = 125^\circ\text{C}$	--	--	10	
$I_{GSSF}$	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	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$	--	1.1	1.4	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 2.5\text{ A}$ (Note 4)	--	5.2	--	S

## Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	500	--	pF
$C_{oss}$	Output Capacitance		--	75	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	10	--	pF

## Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 250\text{ V}, I_D = 5\text{ A}$ $R_G = 25$	--	18	--	ns	
$t_r$	Turn-On Rise Time		--	48	--	ns	
$t_{d(off)}$	Turn-Off Delay Time		(Note 4,5)	--	55	--	ns
$t_f$	Turn-Off Fall Time		--	50	--	ns	
$Q_g$	Total Gate Charge	$V_{DS} = 400\text{ V}, I_D = 5\text{ A}$ $V_{GS} = 10\text{ V}$	--	16	--	nC	
$Q_{gs}$	Gate-Source Charge		--	3.5	--	nC	
$Q_{gd}$	Gate-Drain Charge		(Note 4,5)	--	6.8	--	nC

## Drain-Source Diode Characteristics and Maximum Ratings

$I_S$	Maximum Continuous Drain-Source Diode Forward Current	--	--	5	A	
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current	--	--	20	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	$V_{GS} = 0\text{ V}, I_S = 5\text{ A}$	--	370	--	ns
$Q_{rr}$	Reverse Recovery Charge	$di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	1.7	--	$\mu\text{C}$

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L = 21.5\text{ mH}, I_{AS} = 5\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 5\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$
4. Pulse Test: Pulse width  $\leq 300\ \mu\text{s}$ , Duty cycle  $\leq 2\%$
5. Essentially independent of operating temperature

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Typical Characteristics

