

## 500V N-Channel MOSFET

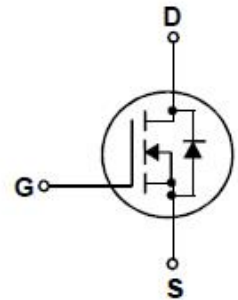
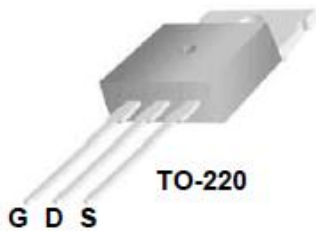
### General Description

This Power MOSFET is produced using advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

### Features

- 24A, 500V,  $R_{DS(on)typ.} = 0.19\Omega @ V_{GS} = 10V$
- Low gate charge(40nC)
- High ruggedness
- Fast switching
- Improved dv/dt capability



## Absolute Maximum Ratings T<sub>c</sub> = 25 °C unless otherwise noted

Symbol	Parameter	JFPC24N50C	JFFM24N50C	Units
V <sub>DSS</sub>	Drain – Source Voltage	500		V
I <sub>D</sub>	Drain Current	Continuous ( T <sub>c</sub> = 25 °C )	24	24*
		Continuous ( T <sub>c</sub> = 100 °C )	15	15*
I <sub>DM</sub>	Drain Current - Pulsed ( Note 1 )	80		A
V <sub>GSS</sub>	Gate – Source Voltage	±30		V
E <sub>AS</sub>	Single Pulsed Avalanche Energy ( Note 2 )	500		mJ
I <sub>AR</sub>	Avalanche Current ( Note 1 )	24		A
E <sub>AR</sub>	Repetitive Avalanche Energy ( Note 1 )	22		mJ
dv/dt	Peak Diode Recovery dv/dt ( Note 3 )	50		V/ns
P <sub>D</sub>	Power Dissipation ( T <sub>c</sub> = 25 °C )	295	50	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	250		°C

\*Drain current limited by maximum junction temperature.

## Thermal characteristics

Symbol	Parameter	JFPC24N50C	JFFM24N50C	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.42	2.5	$^{\circ}\text{C}/\text{W}$
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink Typ.	0.46	---	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	62.5	$^{\circ}\text{C}/\text{W}$

## Electrical Characteristics $T_c = 25^{\circ}\text{C}$ 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
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^{\circ}\text{C}$	--	0.7	--	$\text{V}/^{\circ}\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	--	--	10	$\mu\text{A}$
		$V_{DS} = 400\text{ V}, T_c = 125^{\circ}\text{C}$	--	--	100	$\mu\text{A}$
$I_{GSSF}$	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
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance	$V_{GS} = 10\text{ V}, I_D = 12\text{ A}$	--	0.19	0.3	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 12\text{ A}$ (Note 4)	--	19.0	--	S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	--	2410	--	pF
$C_{oss}$	Output Capacitance		--	1300	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	90	--	pF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 250\text{ V}, I_D = 12.0\text{ A}, R_G = 6\ \Omega, V_{GS} = 10\text{ V}$ (Note 4,5)	--	65	--	ns
$t_r$	Turn-On Rise Time		--	140	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	215	--	ns
$t_f$	Turn-Off Fall Time		--	85	--	ns
$Q_g$	Total Gate Charge	$V_{DS} = 250\text{ V}, I_D = 12.0\text{ A}, V_{GS} = 10\text{ V}$ (Note 4,5)	--	60	--	nC
$Q_{gs}$	Gate-Source Charge		--	18	--	nC
$Q_{gd}$	Gate-Drain Charge		--	30	--	nC
<b>Drain – Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain-Source Diode Forward Current		--	--	24	A
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current		--	--	80	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 24.0\text{ A}$	--	--	1.4	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 24.0\text{ A}$	--	410	--	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	2.5	--	$\mu\text{C}$

### Notes:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature
2.  $L = 2.0\text{ mH}, I_{AS} = 24\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$ , Starting  $T_J = 25^{\circ}\text{C}$
3.  $I_{SD} \leq 24.0\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^{\circ}\text{C}$
4. Pulsed Test: Pulsed width  $\leq 250\ \mu\text{s}$ , Duty cycle  $\leq 2\%$
5. Essentially independent of operating temperature