



# JCS5N50FTR

## 主要参数 MAIN CHARACTERISTICS

<b>Id</b>	<b>5 A</b>
<b>Vdss</b>	<b>500 V</b>
<b>Rdson-max</b> (@Vgs=10V)	<b>1.9Ω</b>
<b>Qg-typ</b>	<b>15 nC</b>

### 用途

- 高频开关电源
- 电子镇流器
- UPS 电源

### 产品特性

- 低栅极电荷
- 低  $C_{rss}$  (典型值 16pF)
- 开关速度快
- 产品全部经过雪崩测试
- 高抗 dv/dt 能力
- RoHS 产品

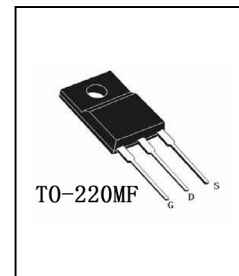
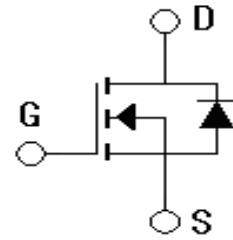
### APPLICATIONS

- High efficiency switch mode power supplies
- Electronic lamp ballasts based on half bridge
- UPS

### FEATURES

- Low gate charge
- Low  $C_{rss}$  (typical 16pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product

## 封装 Package



## 订货信息 ORDER MESSAGE

订货型号 Order codes	印记 Marking	封装 Package	无卤素 Halogen Free	包装 Packaging	器件重量 Device Weight
JCS5N50FTR-O-F-N-B	JCS5N50FTR	TO-220MF	否 NO	条管 Tube	2.20 g(typ)





## 绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

项 目 Parameter	符 号 Symbol	数 值 Value	单 位 Unit
		JCS5N50FTR	
最高漏极-源极直流电压 Drain-Source Voltage	V <sub>DSS</sub>	500	V
连续漏极电流 Drain Current -continuous	I <sub>D</sub> T=25℃ T=100℃	5*	A
		3.16*	A
最大脉冲漏极电流 (注1) Drain Current - pulse (note 1)	I <sub>DM</sub>	20*	A
最高栅源电压 Gate-Source Voltage	V <sub>GSS</sub>	±30	V
单脉冲雪崩能量 (注2) Single Pulsed Avalanche Energy (note 2)	E <sub>AS</sub>	305	mJ
雪崩电流 (注1) Avalanche Current (note 1)	I <sub>AR</sub>	5	A
重复雪崩能量 (注1) Repetitive Avalanche Current (note 1)	E <sub>AR</sub>	10.1	mJ
二极管反向恢复最大电压变化 速率 (注3) Peak Diode Recovery dv/dt (note 3)	dv/dt	4.5	V/ns
耗散功率 Power Dissipation	P <sub>D</sub> T <sub>C</sub> =25℃ -Derate above 25℃	41	W
		0.33	W/℃
最高结温及存储温度 Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55~+150	℃
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T <sub>L</sub>	300	℃

\*漏极电流由最高结温限制

\*Drain current limited by maximum junction temperature





## 电特性 ELECTRICAL CHARACTERISTICS

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单 位 Units
<b>关态特性 Off –Characteristics</b>						
漏—源击穿电压 Drain-Source Voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	500	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$ , referenced to $25^\circ C$	-	0.5	-	$V/^\circ C$
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=500V, V_{GS}=0V,$ $T_C=25^\circ C$	-	-	10	$\mu A$
		$V_{DS}=400V, T_C=125^\circ C$	-	-	100	$\mu A$
正向栅极体漏电流 Gate-body leakage current, forward	$I_{GSSF}$	$V_{DS}=0V, V_{GS}=30V$	-	-	100	nA
反向栅极体漏电流 Gate-body leakage current, reverse	$I_{GSSR}$	$V_{DS}=0V, V_{GS}=-30V$	-	-	-100	nA
<b>通态特性 On-Characteristics</b>						
阈值电压 Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D=250\mu A$	2.5	-	5.0	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.5A$	-	1.6	1.9	$\Omega$
正向跨导 Forward Transconductance	$g_{fs}$	$V_{DS}=40V, I_D=2.5A$ (note 4)	-	5.5	-	S
<b>动态特性 Dynamic Characteristics</b>						
输入电容 Input capacitance	$C_{iss}$	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$	-	492	633	pF
输出电容 Output capacitance	$C_{oss}$		-	83	110	pF
反向传输电容 Reverse transfer capacitance	$C_{rss}$		-	16	22	pF





## 电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	$t_d(\text{on})$	$V_{DD}=250V, I_D=5A, R_G=25\Omega$ (note 4, 5)	-	6	20	ns
上升时间 Turn-On rise time	$t_r$		-	55	120	ns
延迟时间 Turn-Off delay time	$t_d(\text{off})$		-	25	60	ns
下降时间 Turn-Off Fall time	$t_f$		-	35	80	ns
栅极电荷总量 Total Gate Charge	$Q_g$	$V_{DS}=400V,$ $I_D=5A$ $V_{GS}=10V$ (note 4, 5)	-	15	20	nC
栅-源电荷 Gate-Source charge	$Q_{gs}$		-	3.5	-	nC
栅-漏电荷 Gate-Drain charge	$Q_{gd}$		-	6	-	nC
漏-源二极管特性及最大额定值 Drain-Source Diode Characteristics and Maximum Ratings						
正向最大连续电流 Maximum Continuous Drain -Source Diode Forward Current		$I_S$	-	-	5	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		$I_{SM}$	-	-	20	A
正向压降 Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V,$ $I_S=5A$	-	-	1.5	V
反向恢复时间 Reverse recovery time	$t_{rr}$	$V_{GS}=0V, I_S=5A$ $di_f/dt=100A/\mu s$ (note 4)	-	74	-	ns
反向恢复电荷 Reverse recovery charge	$Q_{rr}$		-	0.04	-	$\mu C$
单脉冲短路耐量 Single Pulsed Short Energy	Pulse Width	$DC=325V, V_{GS}=15V$	-	-	44	$\mu s$

## 热特性 THERMAL CHARACTERISTIC

项 目 Parameter	符 号 Symbol	最大 Max	单 位 Unit
		JCS5N50FTR	
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	3.08	$^{\circ}C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	62.5	$^{\circ}C/W$

注释:

- 1: 脉冲宽度由最高结温限制
- 2:  $L=22mH, I_{AS}=5A, V_{DD}=50V, R_G=25\Omega$ , 起始结温  
 $T_J=25^{\circ}C$
- 3:  $I_{SD} \leq 5A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , 起始结温  
 $T_J=25^{\circ}C$
- 4: 脉冲测试: 脉冲宽度 $\leq 300\mu s$ , 占空比 $\leq 2\%$
- 5: 基本与工作温度无关

Notes:

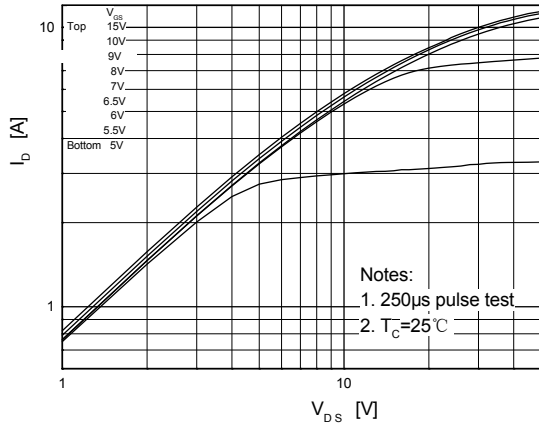
- 1: Pulse width limited by maximum junction temperature
- 2:  $L=22mH, I_{AS}=5A, V_{DD}=50V, R_G=25\Omega$ , Starting  
 $T_J=25^{\circ}C$
- 3:  $I_{SD} \leq 5A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  
 $T_J=25^{\circ}C$
- 4: Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycles  $\leq 2\%$
- 5: Essentially independent of operating temperature



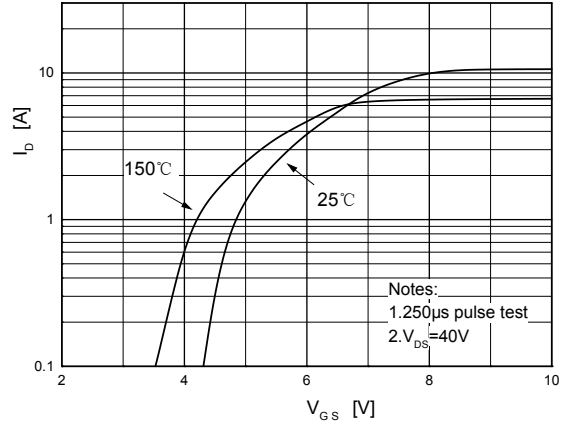


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

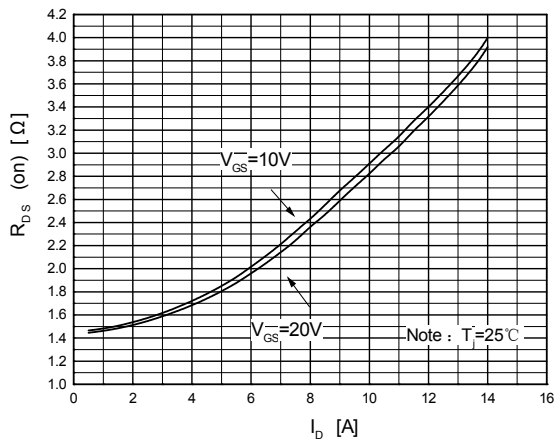
**On-Region Characteristics**



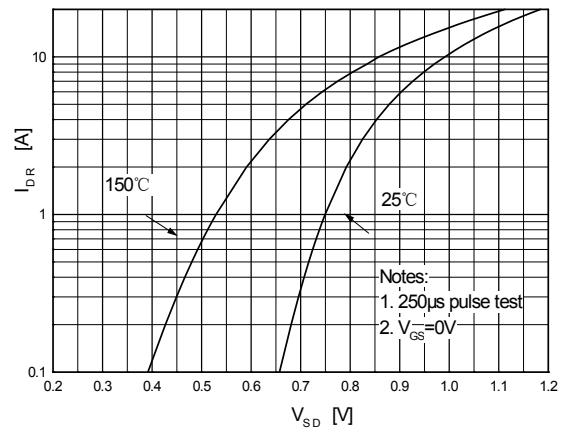
**Transfer Characteristics**



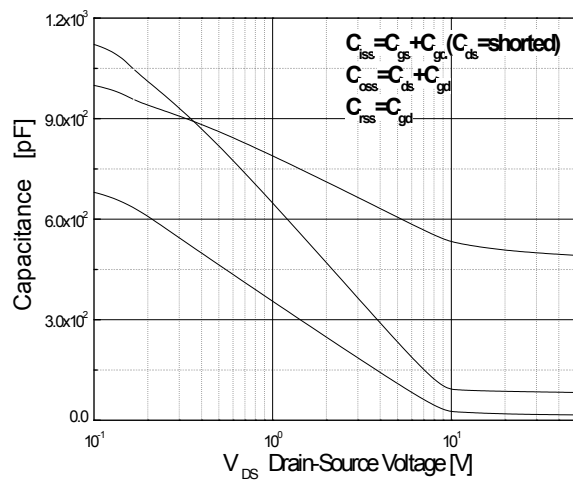
**On-Resistance Variation vs. Drain Current and Gate Voltage**



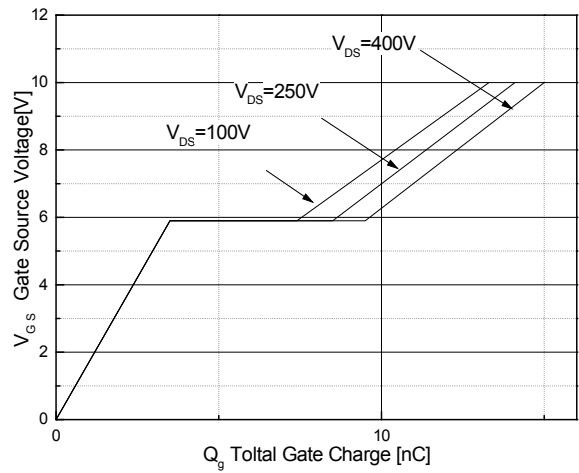
**Body Diode Forward Voltage Variation vs. Source Current and Temperature**



**Capacitance Characteristics**



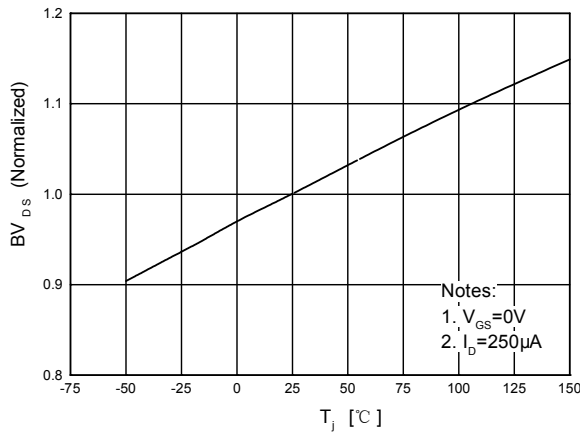
**Gate Charge Characteristics**



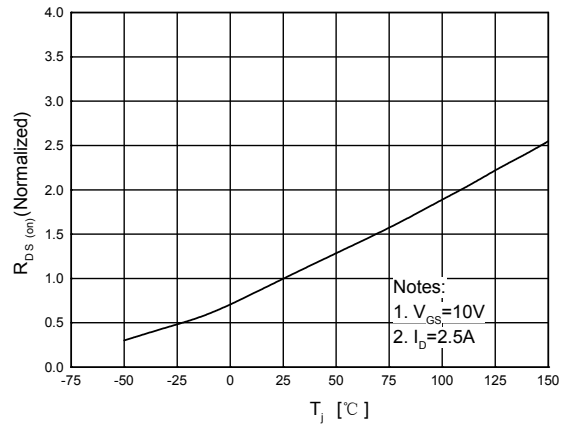


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

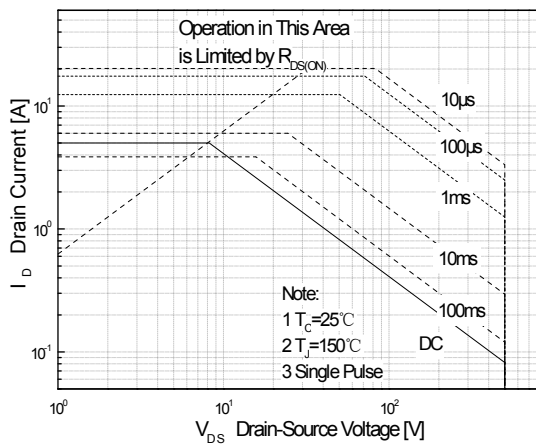
Breakdown Voltage Variation vs. Temperature



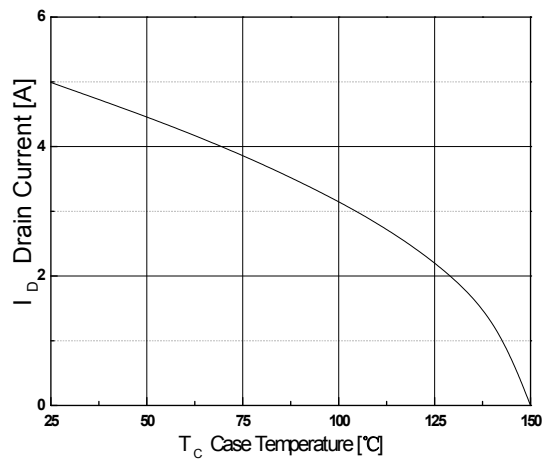
On-Resistance Variation vs. Temperature



Maximum Safe Operating Area For JCS7N50FTR

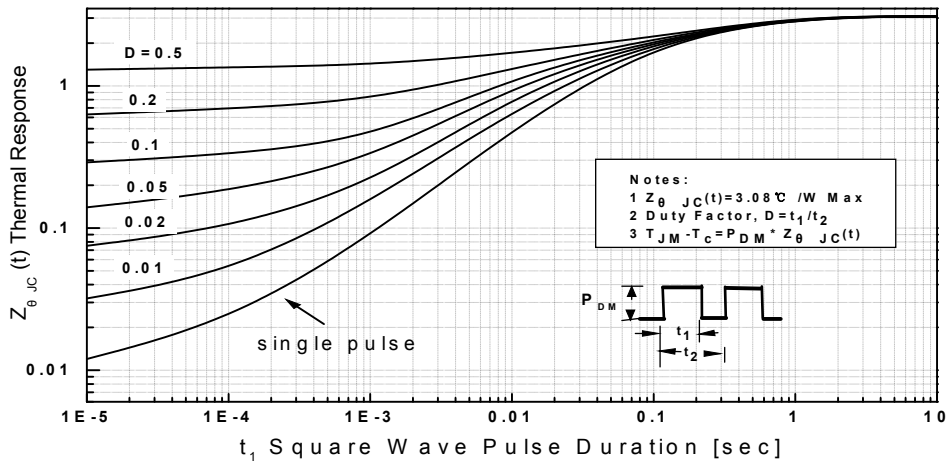


Maximum Drain Current vs. Case Temperature





Transient Thermal Response Curve  
For JCS5N50FTR

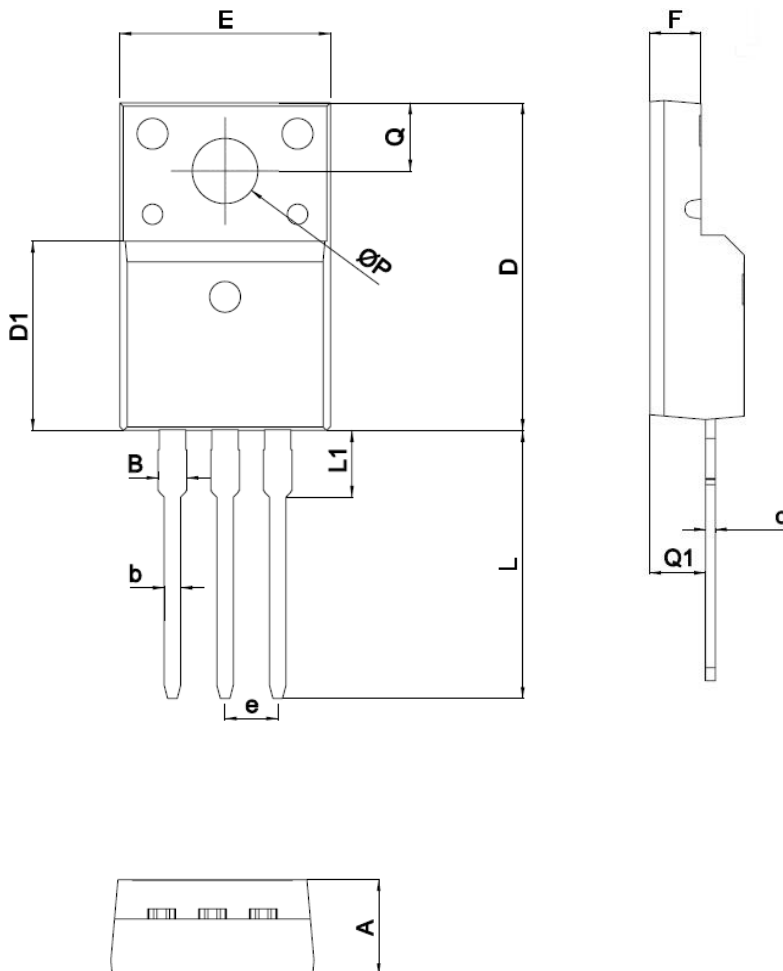




## 外形尺寸 PACKAGE MECHANICAL DATA

TO-220MF

单位 Unit: mm



SYMBOL	mm	
	MIN	MAX
A	4.5	4.9
B		1.47
b	0.7	0.9
D	15.67	16.07
D1	9.04	9.20
e	2.54TYPE	
E	9.96	10.36
F	2.34	2.74
L	12.58	13.38
L1	3.13	3.33
Q	3.2	3.4
Q1	2.56	2.96
ΦP	3.08	3.28





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