

# JCS4N65F

## 主要参数 MAIN CHARACTERISTICS

$I_D$	4.0 A
$V_{DSS}$	650 V
$R_{dson} (V_{GS}=10V)$	2.8 $\Omega$
$Q_g$	27nC

### 用途

- 高频开关电源
- 电子镇流器
- LED 电源

### 产品特性

- 低栅极电荷
- 低  $C_{RSS}$  (典型值 14pF)
- 开关速度快
- 产品全部经过雪崩测试
- 高抗  $dv/dt$  能力
- RoHS 产品

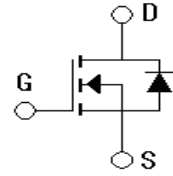
### APPLICATIONS

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

### FEATURES

- Low gate charge
- Low  $C_{RSS}$  (typical 14pF)
- 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
有卤-条管 Halogen-Tube	无卤-条管 Halogen-Free-Tube	有卤-编带 Halogen-Reel	无卤-编带 Halogen-Free-Reel		
JCS4N65F-F-B	JCS4N65F-F-BR	N/A	N/A	JCS4N65F	TO-220MF



## 绝对最大额定值 ABSOLUTE RATINGS (Tc=25°C)

项 目 Parameter	符 号 Symbol	数 值 Value	单 位 Unit
		JCS4N65F	
最高漏极-源极直流电压 Drain-Source Voltage	$V_{DSS}$	650	V
连续漏极电流 Drain Current -continuous	$I_D$ T=25°C T=100°C	4.0*	A
		2.5*	A
最大脉冲漏极电流 (注1) Drain Current - pulse (note 1)	$I_{DM}$	16*	A
最高栅源电压 Gate-Source Voltage	$V_{GSS}$	±30	V
单脉冲雪崩能量 (注2) Single Pulsed Avalanche Energy (note 2)	$E_{AS}$	240	mJ
雪崩电流 (注1) Avalanche Current (note 1)	$I_{AR}$	4.0	A
重复雪崩能量 (注1) Repetitive Avalanche Current (note 1)	$E_{AR}$	10.0	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	5.5	V/ns
耗散功率 Power Dissipation	$P_D$ T <sub>C</sub> =25°C -Derate above 25°C	33	W
		0.26	W/°C
最高结温及存储温度 Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55~+150	°C
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T <sub>L</sub>	300	°C

\*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	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	650	-	-	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 $25^\circ C$	-	0.65	-	V/ $^\circ C$
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V,$ $T_C=25^\circ C$	-	-	10	$\mu A$
		$V_{DS}=500V, T_C=125^\circ C$	-	-	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	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2A$	-	2.1	2.8	$\Omega$
正向跨导 Forward Transconductance	$g_{fs}$	$V_{DS} = 40V, I_D=2A$ (note 4)	-	4.7	-	S
<b>动态特性 Dynamic Characteristics</b>						
输入电容 Input capacitance	$C_{iss}$	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$	-	710	920	pF
输出电容 Output capacitance	$C_{oss}$		-	65	85	pF
反向传输电容 Reverse transfer capacitance	$C_{rss}$		-	14	19	pF

**电特性 ELECTRICAL CHARACTERISTICS**

开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{DD}=325V, I_D=4A, R_G=25\Omega$ (note 4, 5)	-	20	50	ns
上升时间 Turn-On rise time	$t_r$		-	55	120	ns
延迟时间 Turn-Off delay time	$t_{d(off)}$		-	70	150	ns
下降时间 Turn-Off Fall time	$t_f$		-	55	120	ns
栅极电荷总量 Total Gate Charge	$Q_g$	$V_{DS}=520V,$ $I_D=4A$ $V_{GS}=10V$ (note 4, 5)	-	27	30	nC
栅-源电荷 Gate-Source charge	$Q_{gs}$		-	3.6	-	nC
栅-漏电荷 Gate-Drain charge	$Q_{gd}$		-	13.1	-	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		$I_S$	-	-	4	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		$I_{SM}$	-	-	16	A
正向压降 Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V,$ $I_S=4.0A$	-	-	1.4	V
反向恢复时间 Reverse recovery time	$t_{rr}$	$V_{GS}=0V, I_S=4.0A$ $di/dt=100A/\mu s$ (note 4)	-	330	-	ns
反向恢复电荷 Reverse recovery charge	$Q_{rr}$		-	2.67	-	$\mu C$

**热特性 THERMAL CHARACTERISTIC**

项 目 Parameter	符 号 Symbol	最大 Max	单位 Unit
		JCS4N65FB	
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	3.79	$^{\circ}C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	62.5	$^{\circ}C/W$

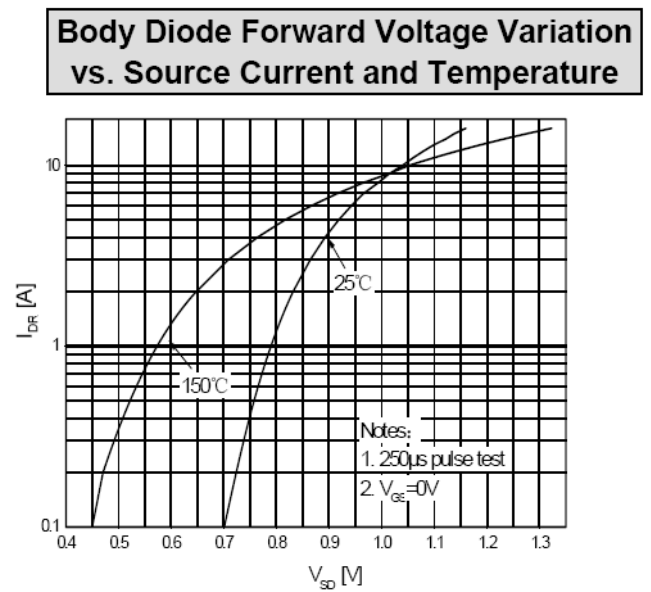
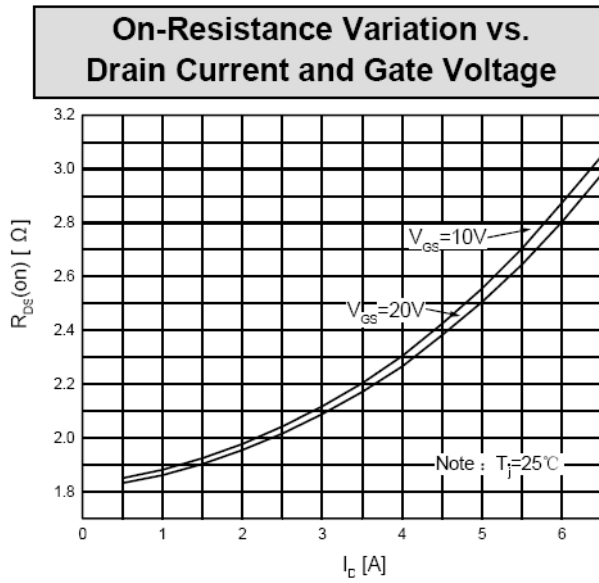
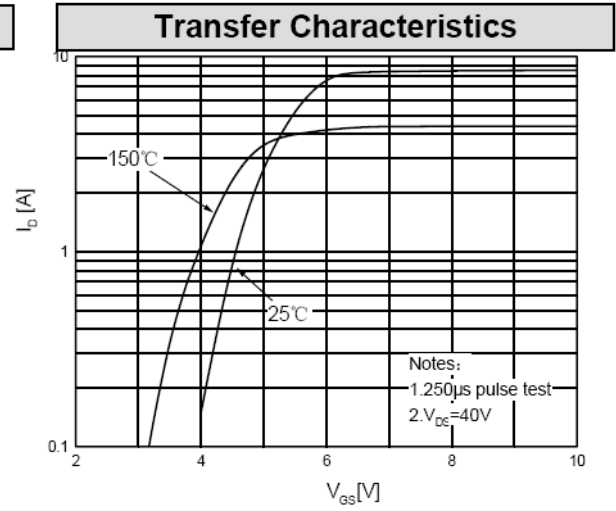
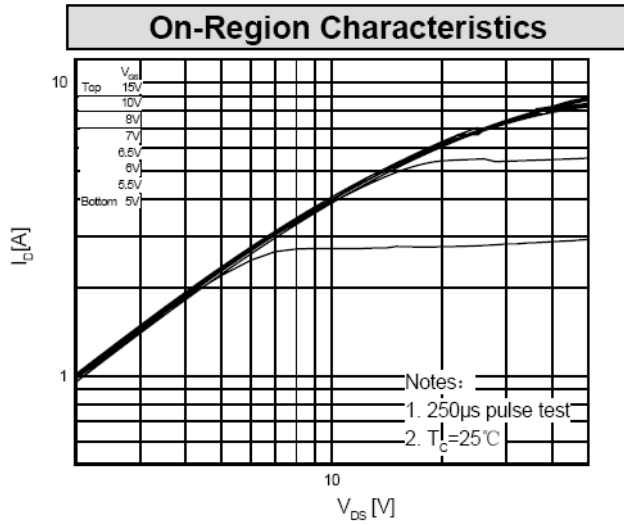
注释:

- 1: 脉冲宽度由最高结温限制
- 2:  $L=25mH, I_{AS}=4.0A, V_{DD}=50V, R_G=25\Omega$ , 起始结温  $T_J=25^{\circ}C$
- 3:  $I_{SD} \leq 4.0A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , 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

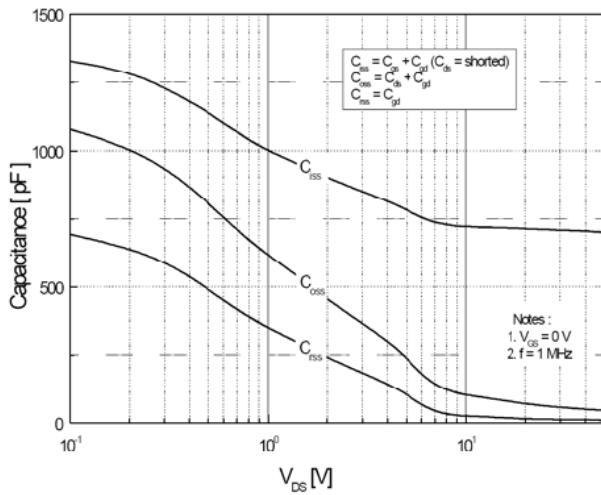
Notes:

- 1: Pulse width limited by maximum junction temperature
- 2:  $L=25mH, I_{AS}=4.0A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_J=25^{\circ}C$
- 3:  $I_{SD} \leq 4.0A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^{\circ}C$
- 4: Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$
- 5: Essentially independent of operating temperature

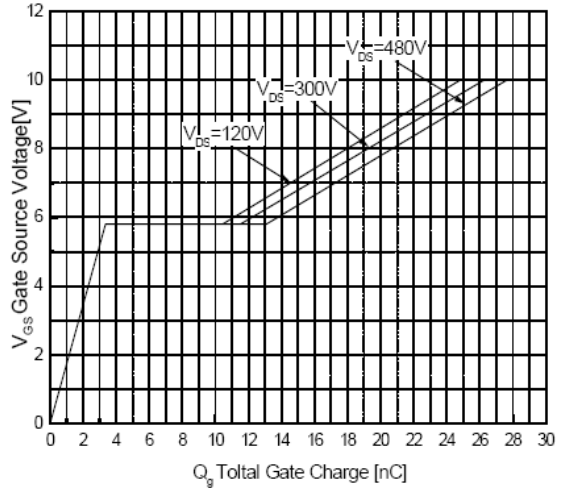
特征曲线 ELECTRICAL CHARACTERISTICS (curves)



**Capacitance Characteristics**

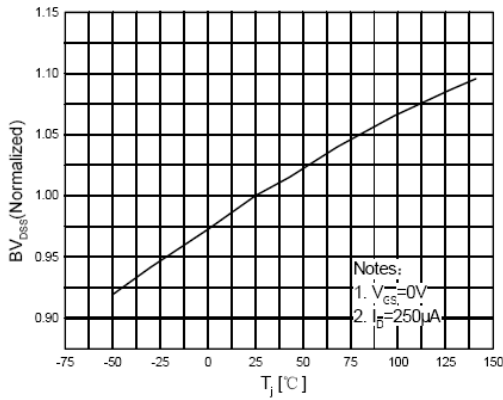


**Gate Charge Characteristics**

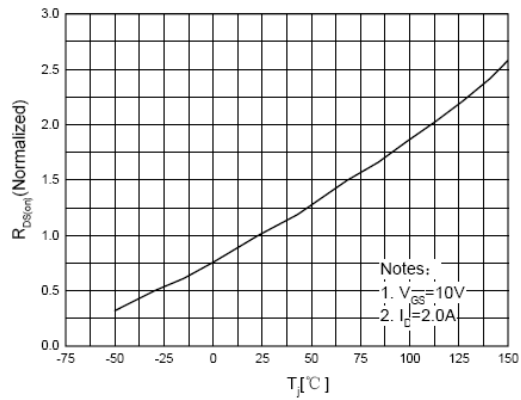


**特征曲线 ELECTRICAL CHARACTERISTICS (curves)**

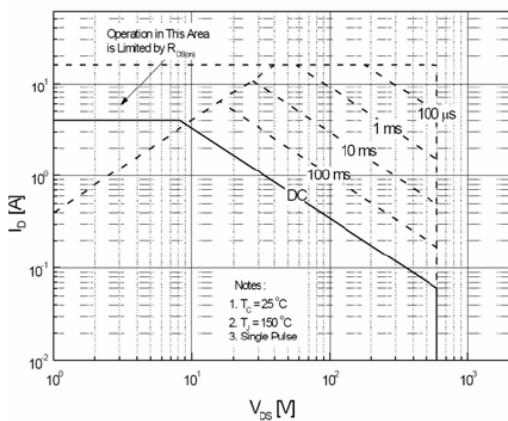
**Breakdown Voltage Variation vs. Temperature**



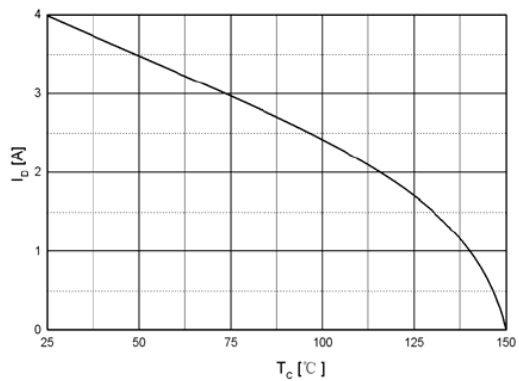
**On-Resistance Variation vs. Temperature**



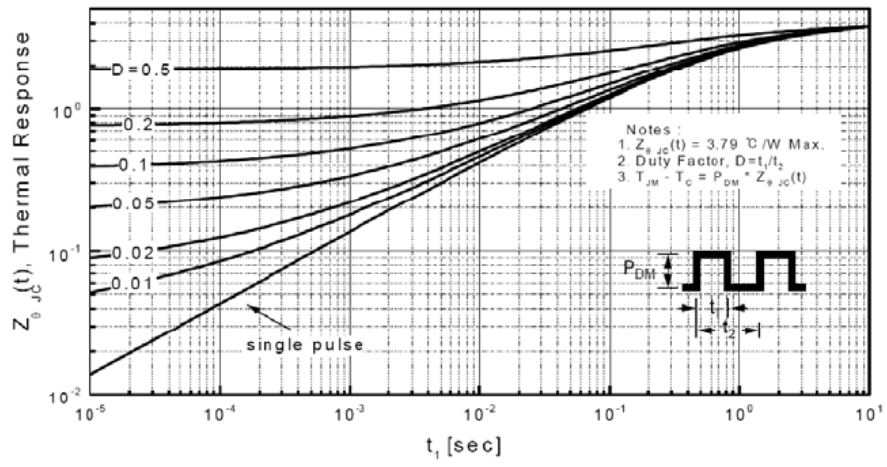
**Maximum Safe Operating Area For JCS4N65F**



**Maximum Drain Current vs. Case Temperature**



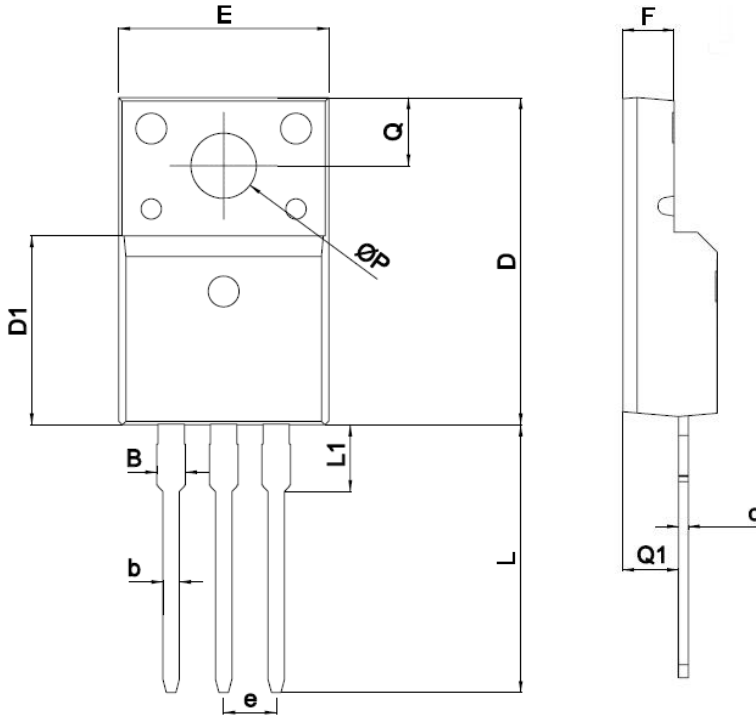
**Transient Thermal Response Curve  
For JCS4N65F**



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
c	0.45	0.60
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
$\Phi P$	3.08	3.28