KJC70R380CF

Super-Junction Power MOSFET

1. Product Information

Features

- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Fast Switching Capability
- Lead Free Product is Acquired

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

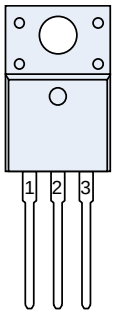
Quick reference

- V_{DS} ≧ 700 V
- I_D ≦11 A
- $R_{DS(ON)}$ ≦ 380 mΩ @ V_{GS} = 10 V (Type: 340 mΩ)

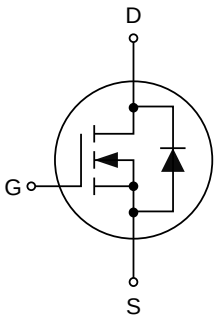
Pin Description

Pin	Description
1	Gate(G)
2	Drain(D)
3	Source(S)

Simplified Outline	Symbol



Top View
TO-220F



Package Marking and Ordering Information

Product Name	Marking	Package	Packaging	Quantity (pcs)
KJC70R380CF	KJC70R380CF	TO-220F	Tube	50

2. Absolute Maximum Ratings (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	700	V
V_{GS}	Gate-Source Voltage	±30	V
I_D	Continuous Drain Current (T_C=25℃)	11	A
	Continuous Drain Current (T_C=100℃)	7.8	A
I_{DM}	Pulsed Drain Current [1]	44	A
E_{AS}	Single Pulsed Avalanche Energy [2]	180	mJ
I_{AR}	Avalanche Current [1]	5	A
P_D	Power Dissipation [2]	33	W
	Power Dissipation, Derate above 25℃ [2]	0.264	W/℃
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance, Junction-Ambient	62	℃/W
$R_{\theta JC}$	Thermal Resistance, Junction-Case	3.8	℃/W

3. Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Type	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0 V, I_D=250 μA	700	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=700 V, V_{GS}=0 V	-	-	1	μA
		V_{DS}=560 V, T_C=125℃	-	10	-	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±30 V, V_{DS}=0 V	-	-	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250 μA	2.5	-	4.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10 V, I_D=5.5 A	-	340	380	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=100 V, V_{GS}=0 V, f=1 MHz	-	890	-	pF
C_{oss}	Output Capacitance		-	36.5	-	pF
C_{rss}	Reverse Transfer Capacitance		-	1.6	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=400 V, I_D=5.5 A, V_{GS}=10V, R_G=25 Ω	-	15.5	-	ns
t_r	Turn-on Rise Time		-	32	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	74	-	ns
t_f	Turn-off Fall Time		-	39	-	ns
Q_g	Total Gate Charge	V_{DS}=560 V, I_D=5.5 A, V_{GS}=10 V	-	19	-	nC
Q_{gs}	Gate-Source Charge		-	3	-	nC
Q_{gd}	Gate-Drain Charge		-	8.3	-	nC
Source-Drain Diode Characteristics						
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS}=0V, I_F=5.5 A	-	0.85	-	V
I_S	Diode Continuous Forward Current		-	-	11	A
I_{SM}	Maximum Pulsed Body-Diode Forward Current		-	-	44	A
T_{rr}	Reverse Recovery Time	V_R=400 V, I_F=5.5 A, di/dt=100 A/μs	-	311	-	ns
Q_{rr}	Reverse Recovery Charge		-	2.8	-	μC

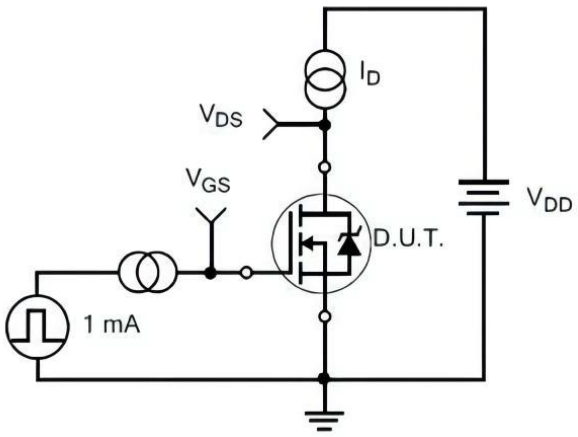
Notes:

1. Limited by maximum junction temperature, maximum duty cycle is 0.75.
2. T_J=25℃, V_{DD}=50 V, V_G=10 V, L=0.25 mH, R_G=25 Ω.

4. Test Circuits and Waveforms (T_J=25℃)

Table 1. Gate Charge Test Circuit and Waveforms

Gate Charge Test Circuit



Gate Charge Waveforms

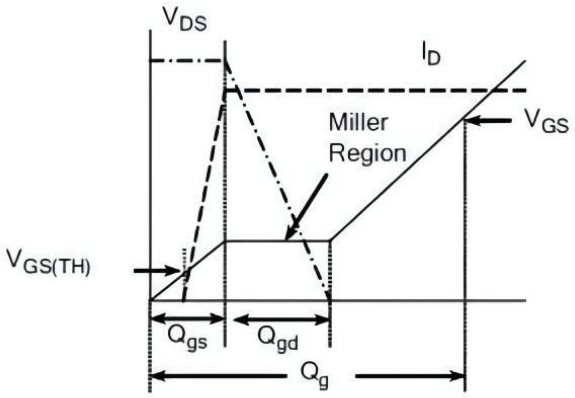
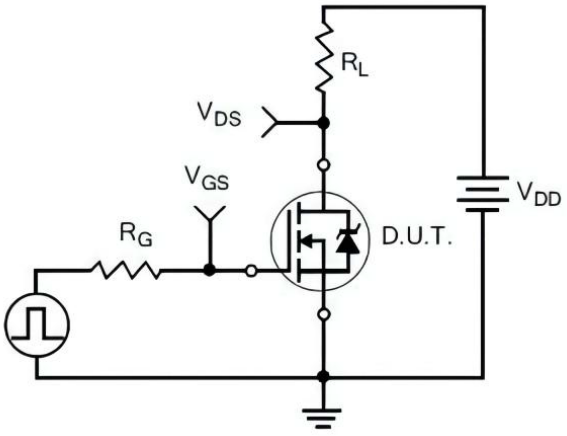


Table 2. Resistive Switching Test Circuit and Waveforms

Resistive Switching Test Circuit



Resistive Switching Waveforms

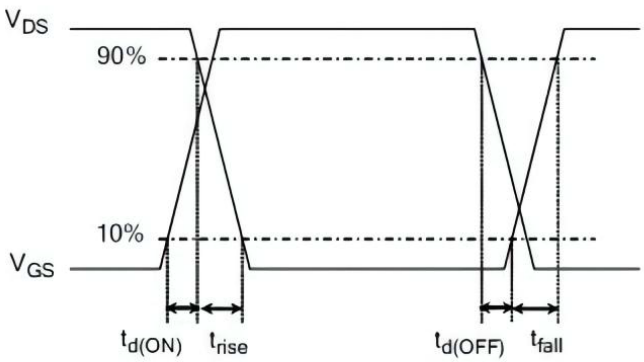
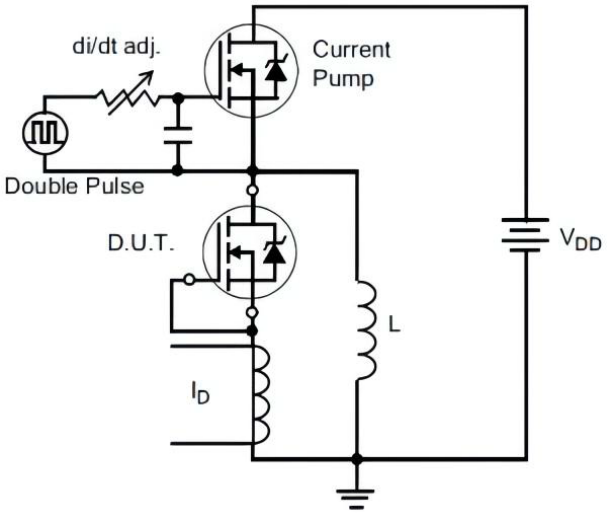


Table 3. Diode Recovery Test Circuit and Waveforms

Diode Recovery Test Circuit



Diode Recovery Waveforms

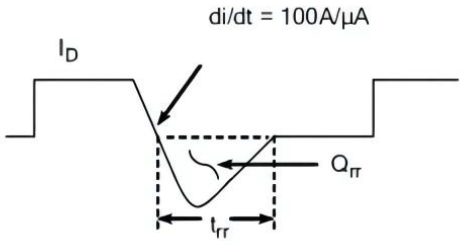
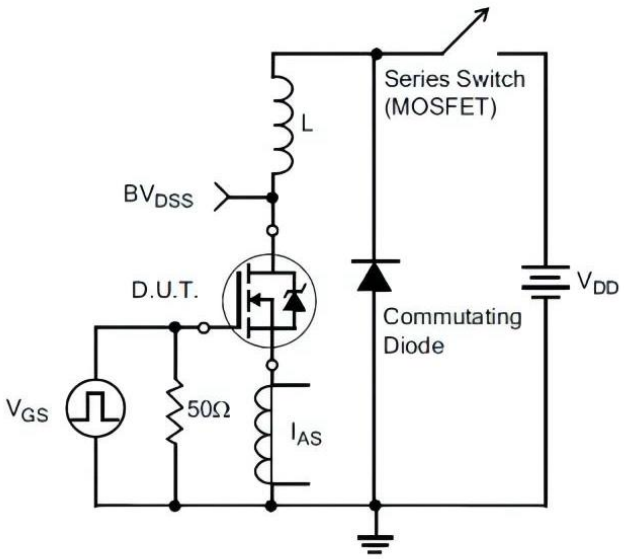
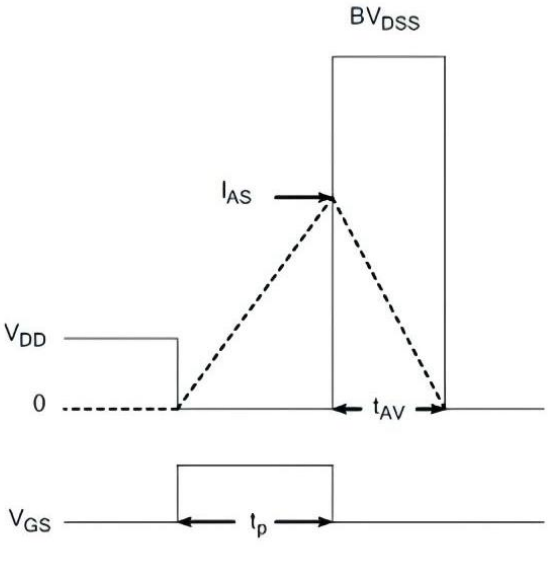


Table 4. Unclamped inductive Switching (UIS) Test Circuit and Waveforms

Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

5. Electrical Characteristics

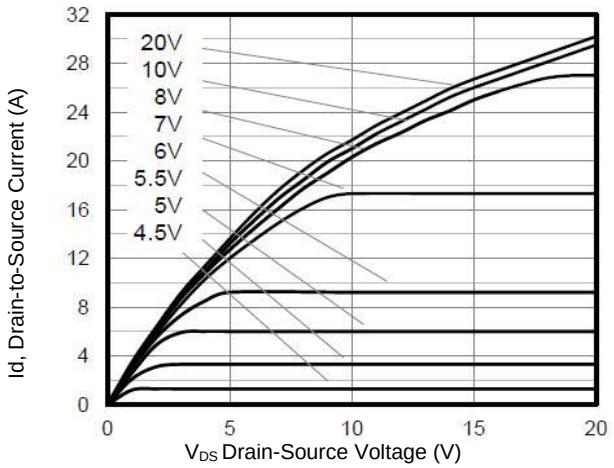


Figure 1. Typical Output Characteristics

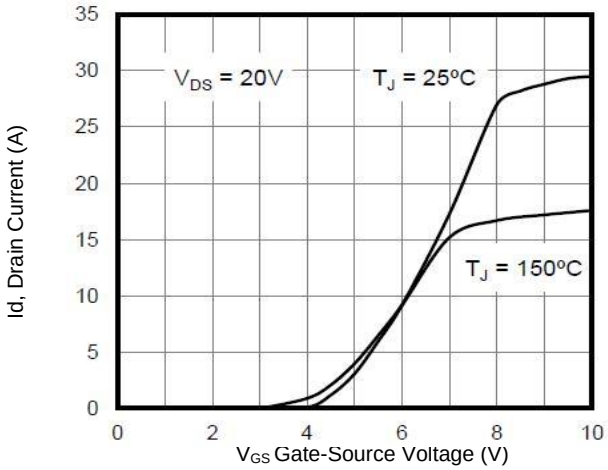


Figure 2. Typical Transfer Characteristics

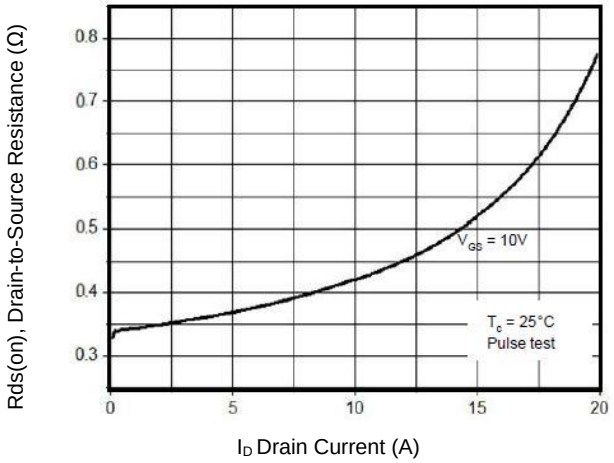


Figure 3. On-Resistance versus Drain Current

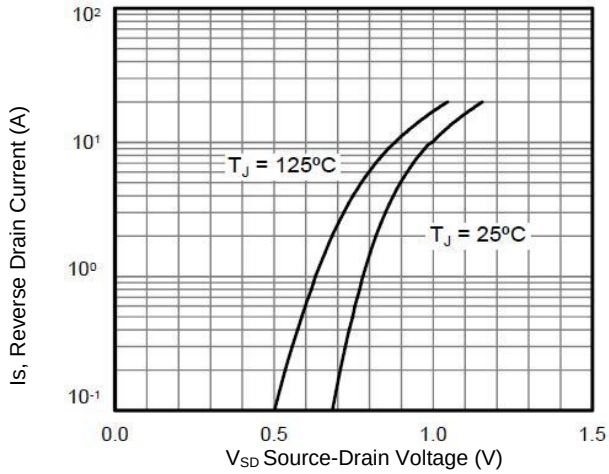


Figure 4. Diode forward voltage versus Current

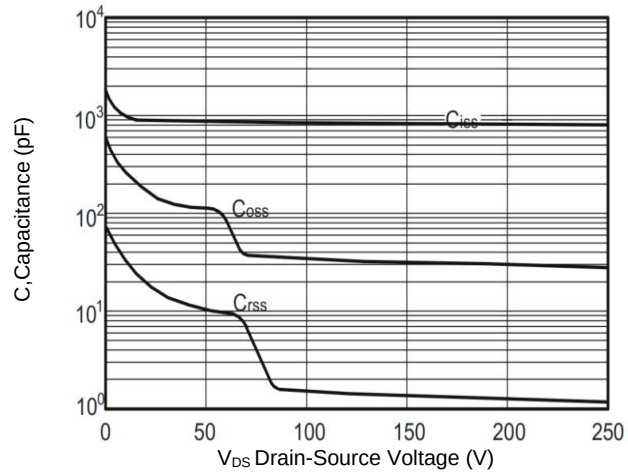


Figure 5. Typical Capacitance versus V_{DS}

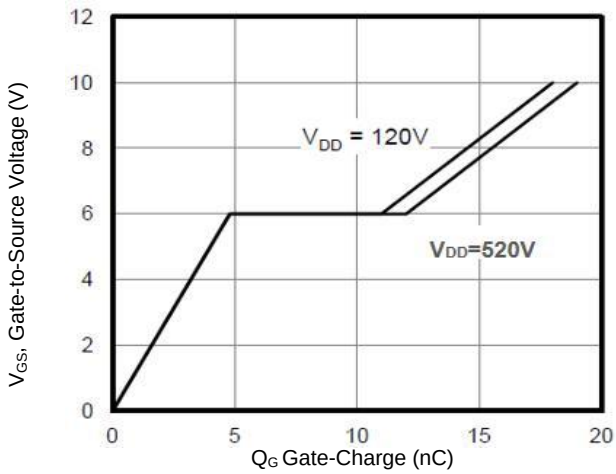


Figure 6. Typical Gate Charge versus V_{GS}

5. Electrical Characteristics (cont.)

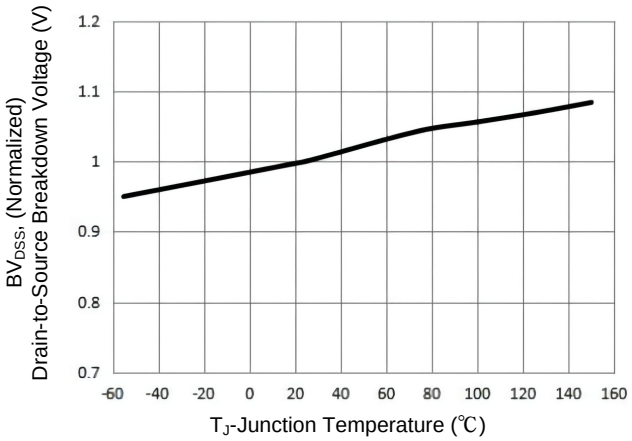


Figure 7. BV_{DSS} Variation with Temperature

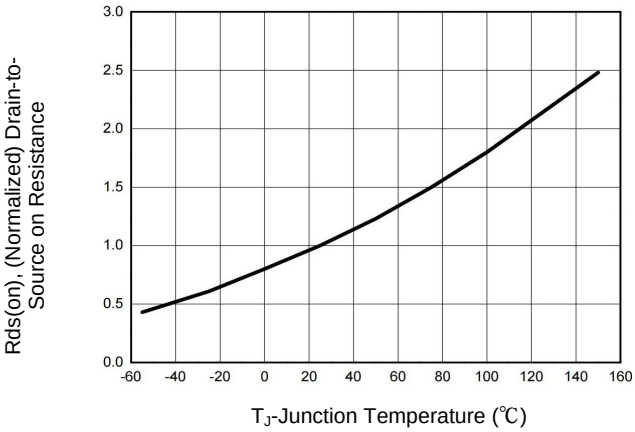


Figure 8. On-Resistance Variation with Temperature

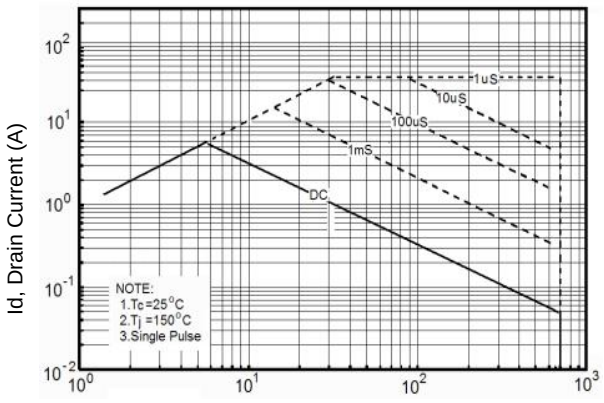


Figure 9. Maximum Safe Operating Area

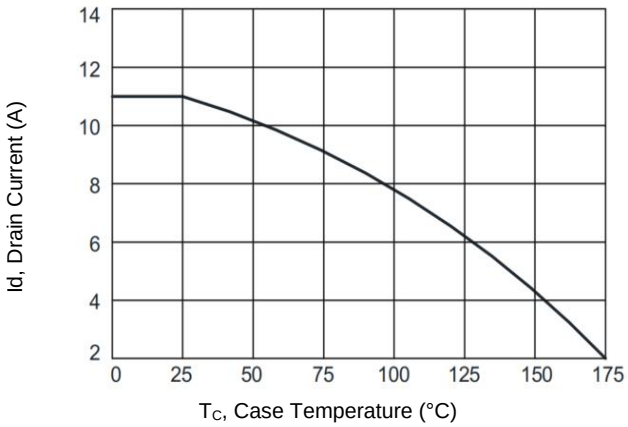
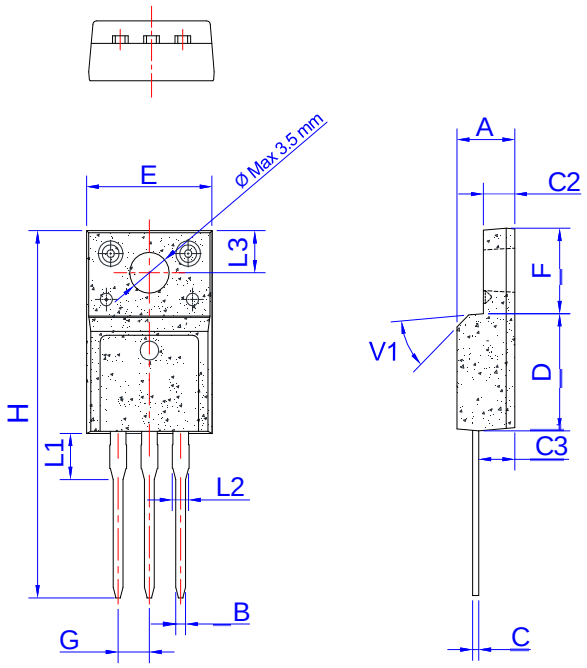


Figure 10. Maximum Continuous Drain Current versus Case Temperature

6. Package Mechanical Data

- **TO-220F Package**



Symbol	Dimensions in Millimeters		
	MIN.	NOM.	MAX
A	4.50		4.90
B	0.74	0.80	0.83
C	0.47		0.65
C2	2.45		2.75
C3	2.60		3.00
D	8.80		9.30
E	9.80		10.4
F	6.40		6.80
G		2.54	
H	28.0		29.8
L1		3.63	
L2	1.14		1.70
L3		3.30	
V1		45°	