

Super-Junction Power MOSFET

1. Product Information

Features

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

Pin Description

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

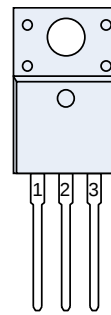
Applications

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

Quick reference

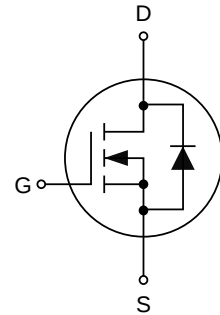
- $V_{DS} \geq 700\text{ V}$
- $I_D \leq 7\text{ A}$
- $R_{DS(ON)} \leq 650\text{ m}\Omega$ @ $V_{GS} = 10\text{ V}$ (Type: 560 m Ω)

Simplified Outline



Top View
TO-220F

Symbol



Package Marking and Ordering Information

Product Name	Marking	Package	Packaging	Quantity (pcs)
KJC70R650CF	KJC70R650CF	TO-220F	Tube	50

2. Absolute Maximum Ratings ($T_C=25^\circ\text{C}$ 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 ($T_C=25^\circ\text{C}$)	7	A
	Continuous Drain Current ($T_C=100^\circ\text{C}$)	5.6	A
I_{DM}	Pulsed Drain Current ^[1]	28	A
E_{AS}	Single Pulsed Avalanche Energy ^[2]	120	mJ
I_{AR}	Avalanche Current ^[1]	1.2	A
P_D	Power Dissipation ^[2]	31.25	W
	Power Dissipation, Derate above 25°C ^[2]	0.25	W/ $^\circ\text{C}$
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-Ambient	68	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-Case	4	$^\circ\text{C/W}$

3. Electrical Characteristics (T_J=25°C, 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	uA
		V _{DS} =560 V, T _C =125°C	-	10	-	uA
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 =3.5 A	-	560	650	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =100 V, V _{GS} =0 V, f=1 MHz	-	498	-	pF
C _{oss}	Output Capacitance		-	23	-	pF
C _{rss}	Reverse Transfer Capacitance		-	1.6	-	pF
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =400 V, I _D =3.5 A, V _{GS} =10V, R _G =25 Ω	-	12	-	ns
t _r	Turn-on Rise Time		-	22	-	ns
t _{d(off)}	Turn-off Delay Time		-	50	-	ns
t _f	Turn-off Fall Time		-	37	-	ns
Q _g	Total Gate Charge	V _{DS} =560 V, I _D =3.5 A, V _{GS} =10 V	-	13	-	nC
Q _{gs}	Gate-Source Charge		-	3	-	nC
Q _{gd}	Gate-Drain Charge		-	5	-	nC
Source-Drain Diode Characteristics						
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} =0V, I _F =3.5 A	-	0.85	-	V
I _S	Diode Continuous Forward Current		-	-	7	A
I _{SM}	Maximum Pulsed Body-Diode Forward Current		-	-	28	A
Q _{rr}	Reverse Recovery Time	V _R =400 V, I _F =3.5 A, di/dt=100 A/μs	-	200	-	uC
T _{rr}	Reverse Recovery Charge		-	1.3	-	ns

Notes:

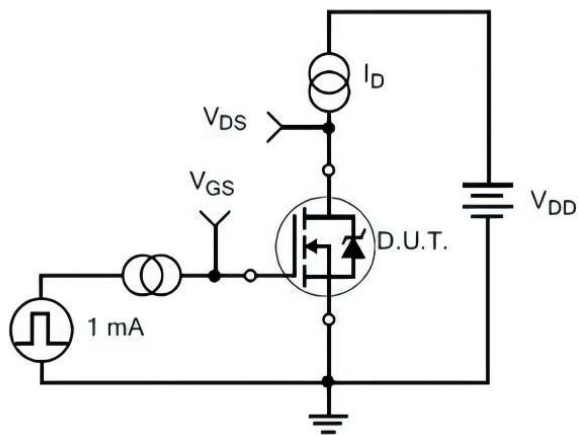
1. Limited by maximum junction temperature, maximum duty cycle is 0.75.

2. T_J=25°C, V_{DD}=50 V, V_G=10 V, L=0.3 mH, R_G=25 Ω.

4. Test Circuits and Waveforms ($T_J=25^\circ\text{C}$)

Table 1. Gate Charge Test Circuit and Waveforms

Gate Charge Test Circuit



Gate Charge Waveforms

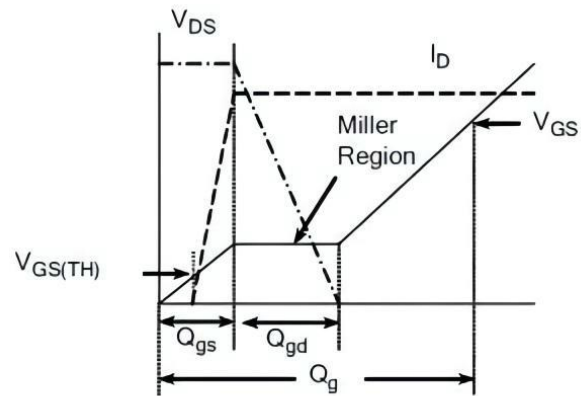
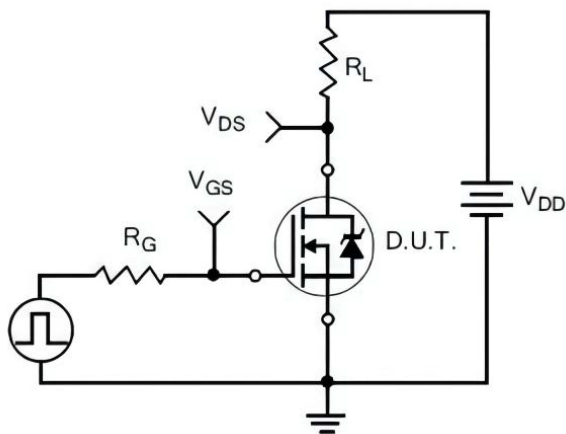


Table 2. Resistive Switching Test Circuit and Waveforms

Resistive Switching Test Circuit



Resistive Switching Waveforms

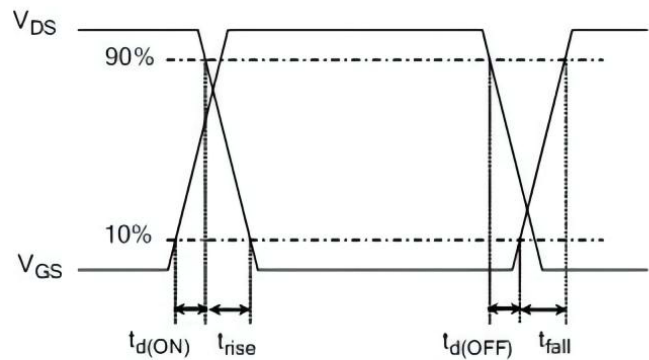
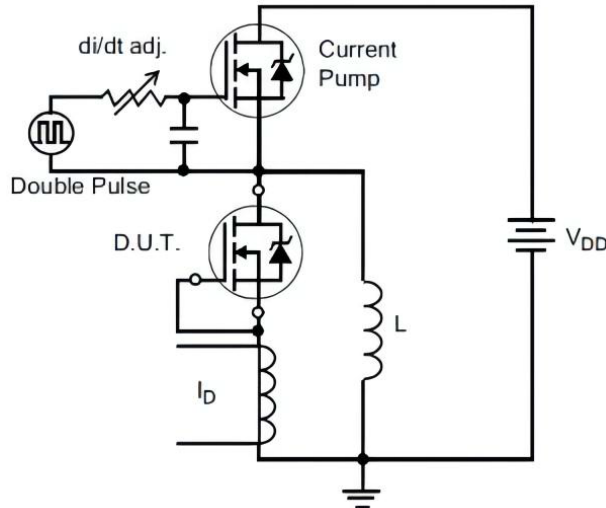


Table 3. Diode Recovery Test Circuit and Waveforms

Diode Recovery Test Circuit



Diode Recovery Waveforms

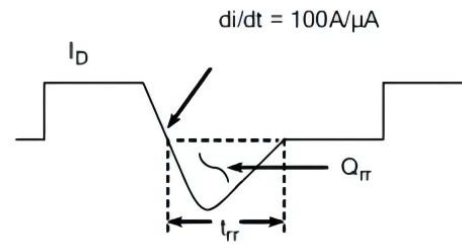
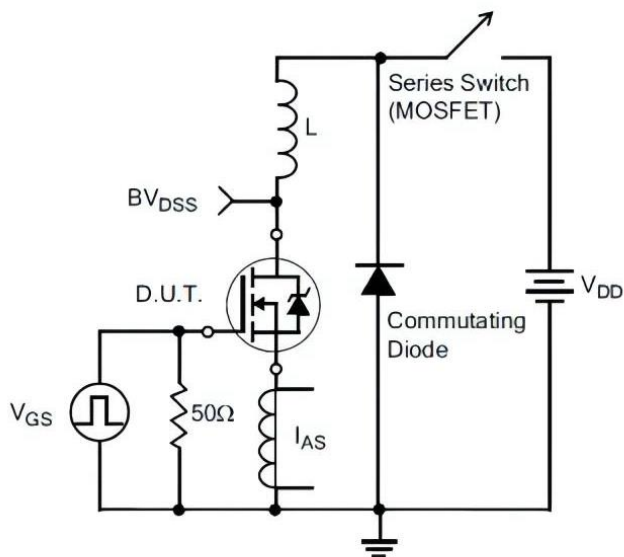
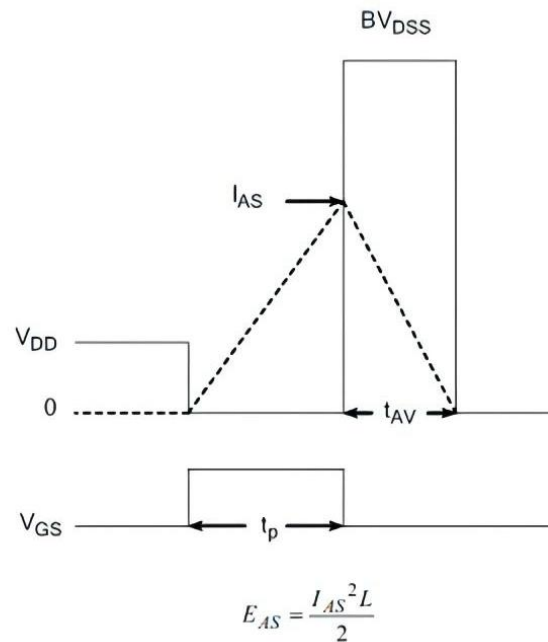


Table 4. Unclamped inductive Switching (UIS) Test Circuit and Waveforms

Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



5. Electrical Characteristics

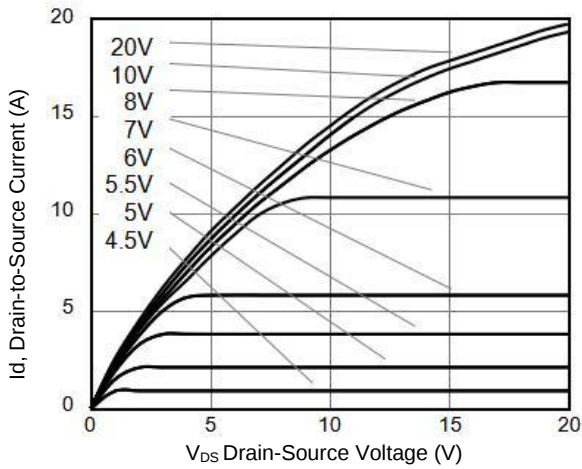


Figure 1. Typical Output Characteristics

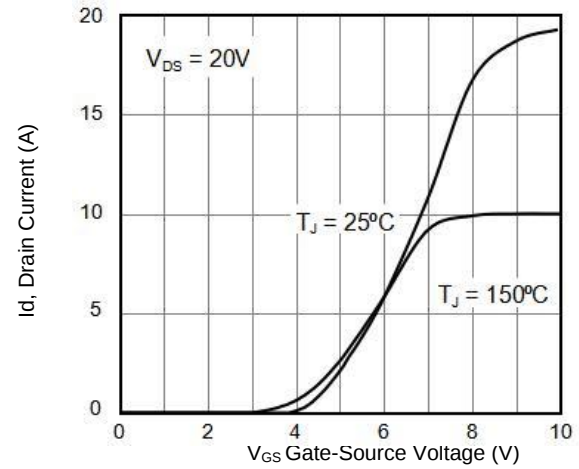


Figure 2. Typical Transfer Characteristics

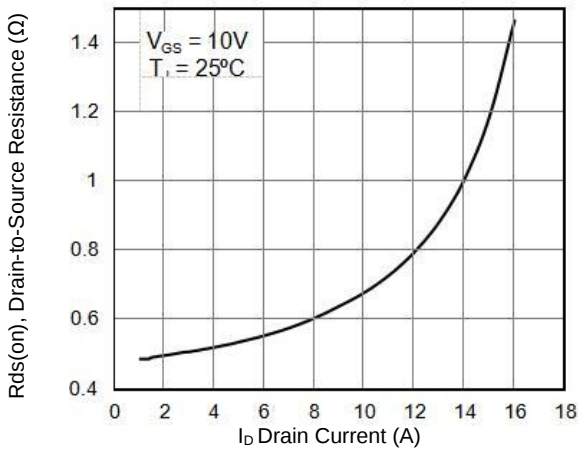


Figure 3. On-Resistance versus Drain Current

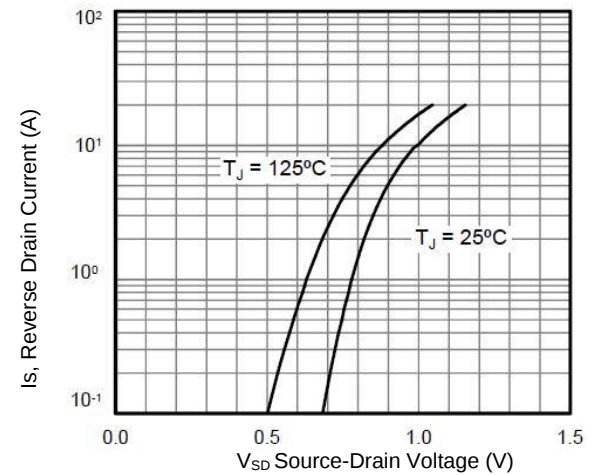


Figure 4. Diode forward voltage versus Current

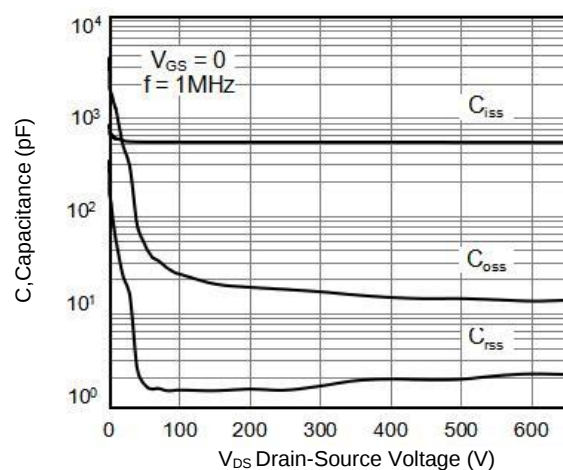


Figure 5. Typical Capacitance versus V_{DS}

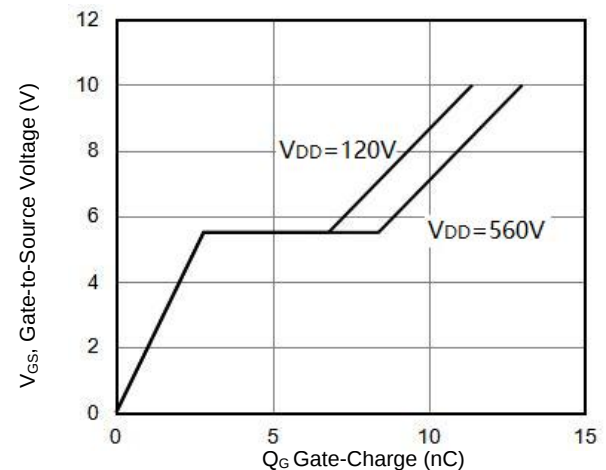


Figure 6. Typical Gate Charge versus V_{GS}

5. Electrical Characteristics (cont.)

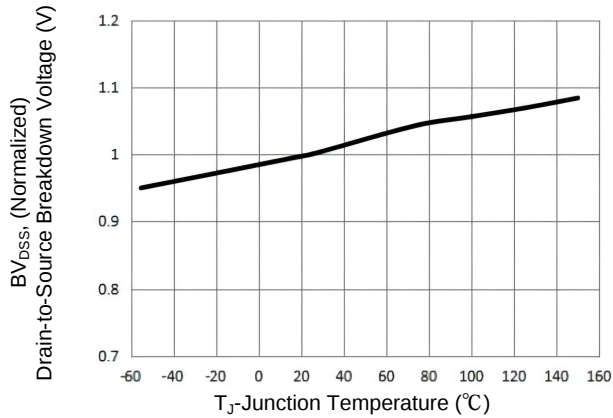


Figure 7. BV_{DSS} Variation with Temperature

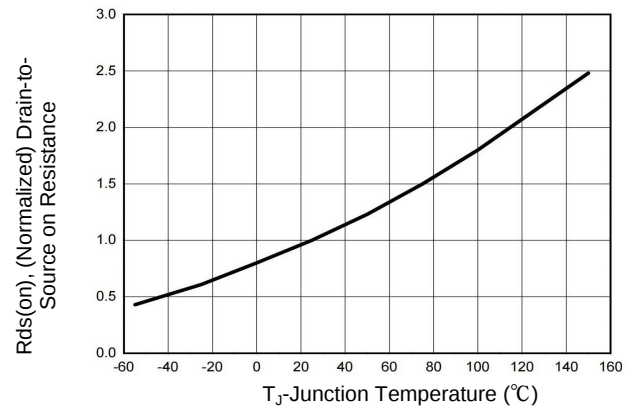


Figure 8. On-Resistance Variation with Temperature

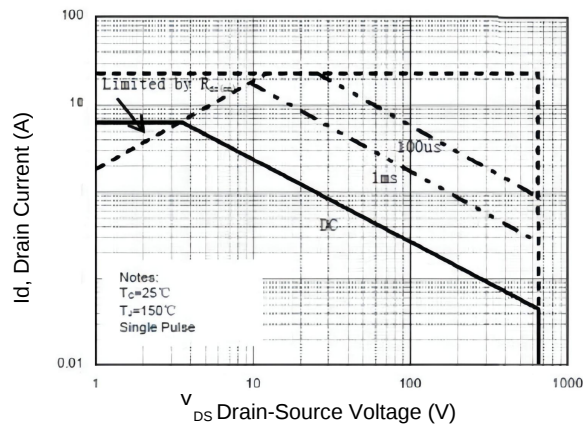


Figure 9. Maximum Safe Operating Area

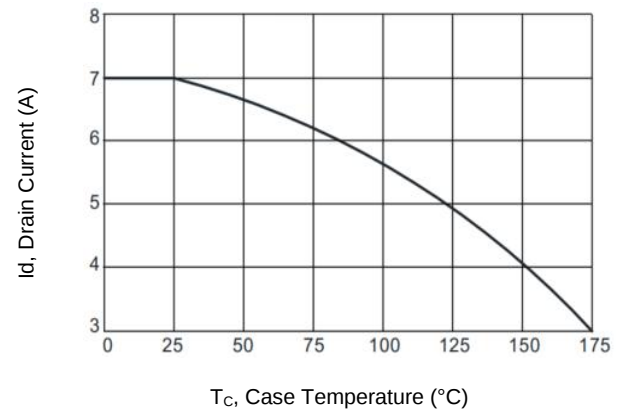
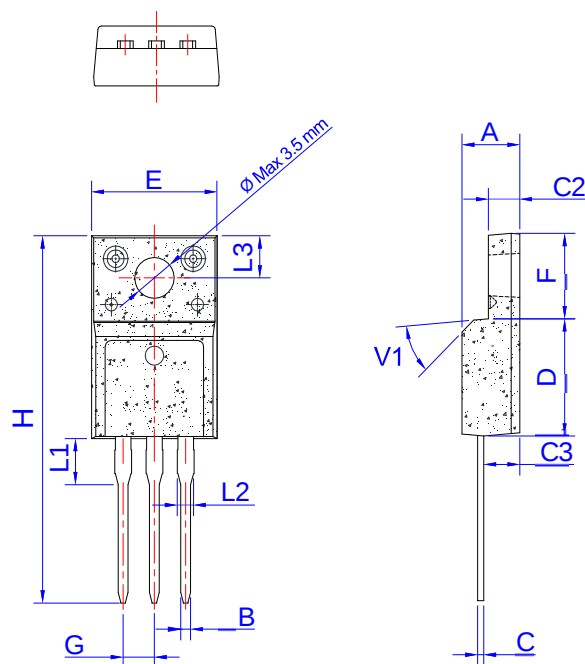


Figure 10. Maximum Continuous Drain Current versus Case Temperature

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°	