

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)
- PWM Motor Controls
- LED Lighting
- Adapter

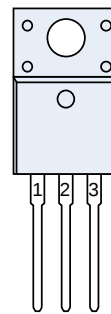
Quick reference

- $V_{DS} \geq 650\text{ V}$
- $I_D \leq 25\text{ A}$
- $R_{DS(ON)} \leq 130\text{ m}\Omega @ V_{GS} = 10\text{ V}$ (Type: 110 m Ω)

Pin Description

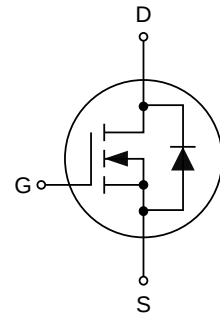
Pin	Description
1	Gate(G)
2	Drain(D)
3	Source(S)

Simplified Outline



Top View
TO-220F

Symbol



Package Marking and Ordering Information

Product Name	Marking	Package	Packaging	Quantity (pcs)
KJC65R130CF	KJC65R130F	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	650	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Continuous Drain Current ($T_C=25^\circ\text{C}$) ^[1]	25	A
	Continuous Drain Current ($T_C=100^\circ\text{C}$) ^[1]	14	A
I_{DM}	Pulsed Drain Current ^[1]	100	A
E_{AS}	Single Pulsed Avalanche Energy ^[2]	720	mJ
P_D	Power Dissipation	47	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-Ambient	66	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction- Case	2.65	$^\circ\text{C/W}$

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	650	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =650 V, V _{GS} =0 V	-	-	1	uA
		V _{DS} =520 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	3.5	4.5	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10 V, I _D =12.5 A	-	110	130	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =100 V, V _{GS} =0 V, F=1 MHz	-	2095	-	pF
C _{oss}	Output Capacitance		-	90	-	pF
C _{rss}	Reverse Transfer Capacitance		-	1.6	-	pF
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =325 V, I _D =25 A, R _G =25 Ω, V _{GS} =10V	-	43	-	ns
t _r	Turn-on Rise Time		-	55	-	ns
t _{d(off)}	Turn-off Delay Time		-	185	-	ns
t _f	Turn-off Fall Time		-	42	-	ns
Q _g	Total Gate Charge	V _{DS} =325 V, I _D =25 A, V _{GS} =10 V	-	49	-	nC
Q _{gs}	Gate-Source Charge		-	11	-	nC
Q _{gd}	Gate-Drain Charge		-	19	-	nC
Source-Drain Diode Characteristics						
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} =0V, I _F =25 A	-	-	1.4	V
I _S	Diode Continuous Forward Current		-	-	25	A
I _{SM}	Maximum Pulsed Body-Diode Forward Current		-	-	100	A
Q _{rr}	Reverse Recovery Time	V _{GS} =0 V, I _F =25 A, di/dt=100 A/μs	-	316	-	uC
T _{rr}	Reverse Recovery Charge		-	5.1	-	ns

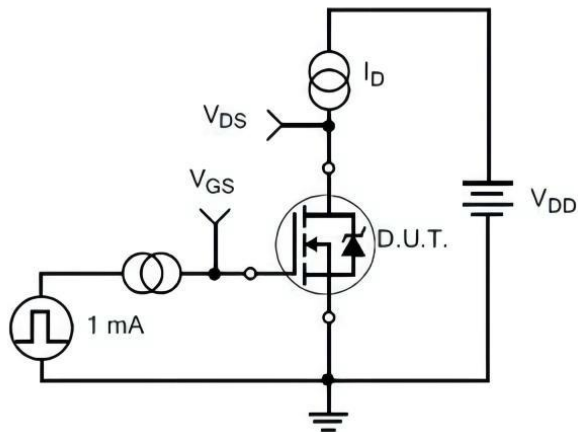
Notes:

- Limited by maximum junction temperature.
- T_J=25°C, V_{DD}=50 V, V_G=10 V, R_G=25Ω.

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

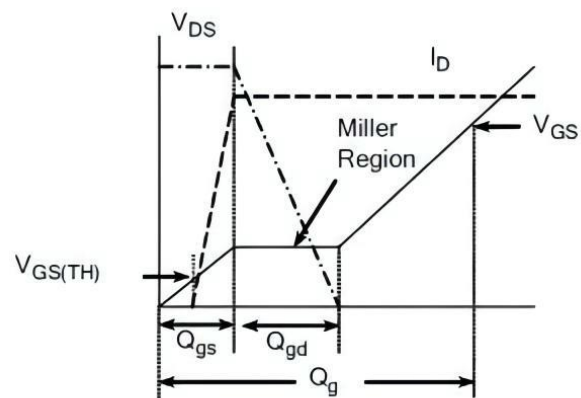
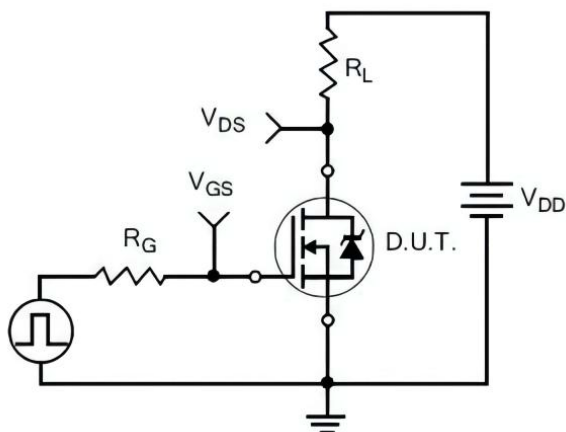


Table 2. Resistive Switching Test Circuit and Waveforms

Resistive Switching Test Circuit



Resistive Switching Waveforms

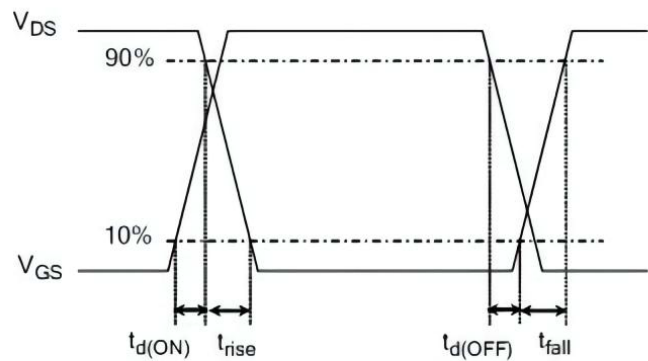
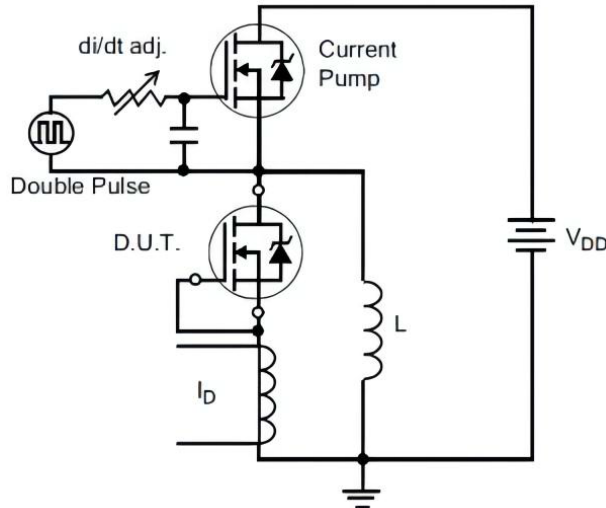


Table 3. Diode Recovery Test Circuit and Waveforms

Diode Recovery Test Circuit



Diode Recovery Waveforms

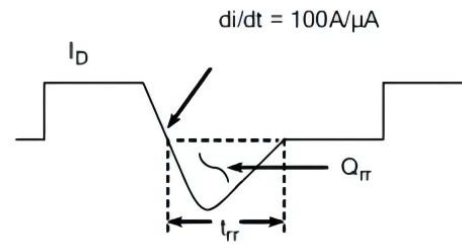
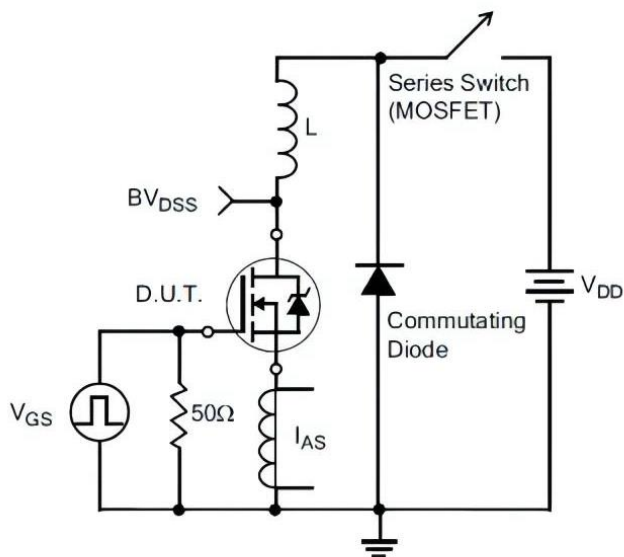
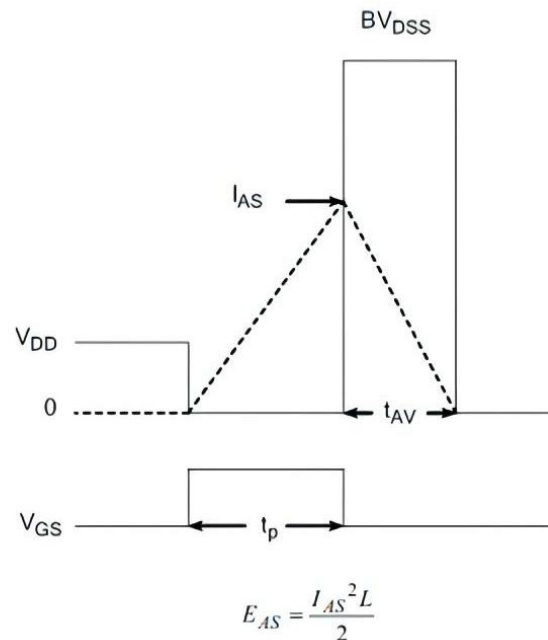


Table 4. Unclamped inductive Switching (UIS) Test Circuit and Waveforms

Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



5. Electrical Characteristics

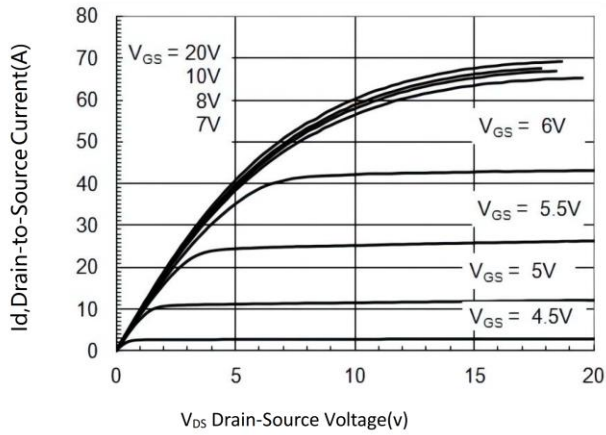


Figure1. Typical Output Characteristics

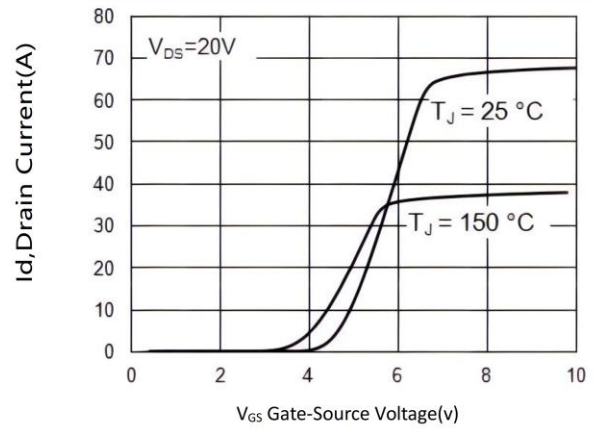


Figure2. Typical Transfer Characteristics

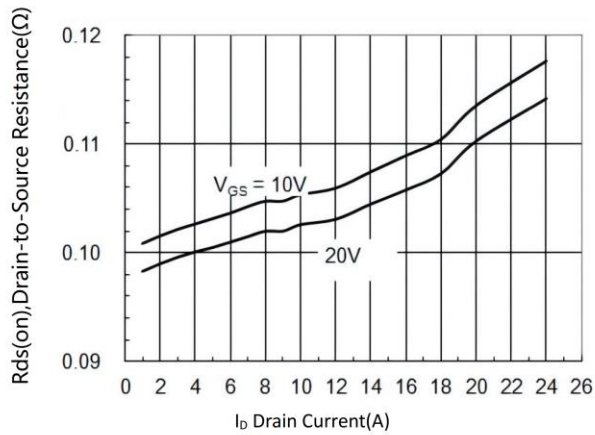


Figure3. On-Resistance versus Drain Current

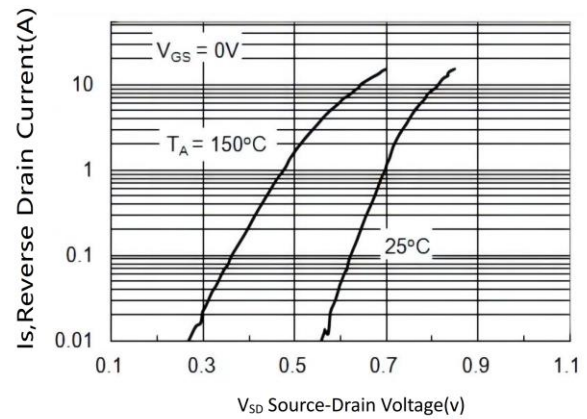


Figure4. Diode forward voltage versus Current

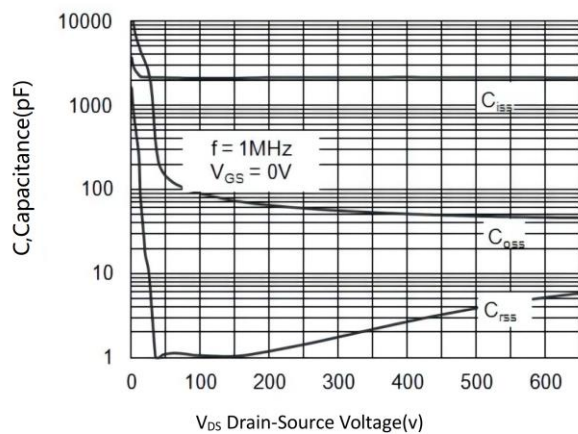


Figure5. Typical Capacitance versus V_{DS}

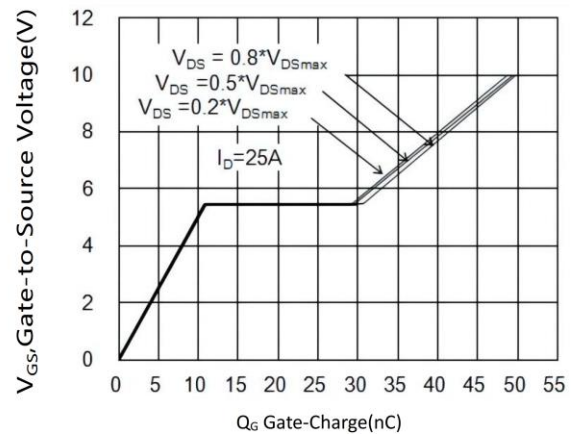


Figure6. Typical Gate Charge versus V_{GS}

5. Electrical Characteristics (cont.)

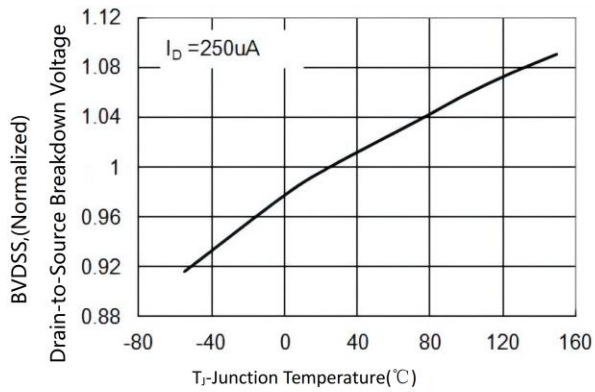


Figure7. BV_{DSS} Variation with Temperature

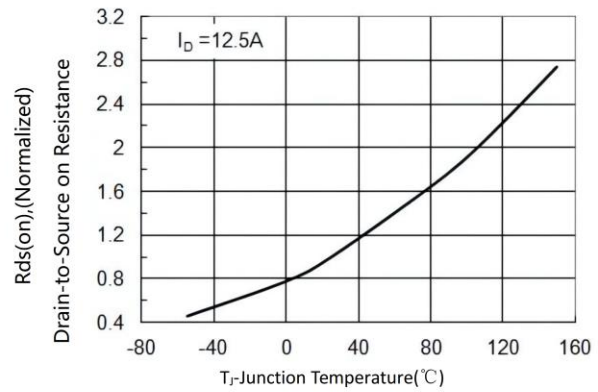


Figure8. On-Resistance Variation with Temperature

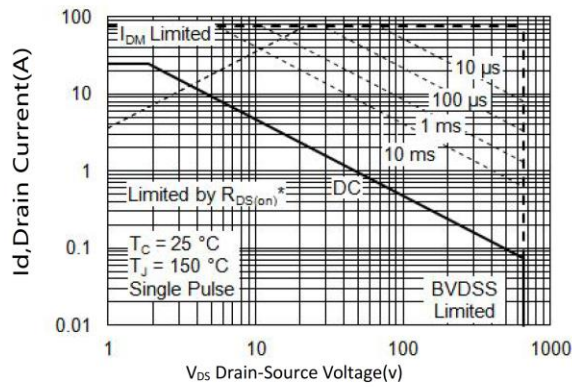


Figure9. Maximum Safe Operating Area

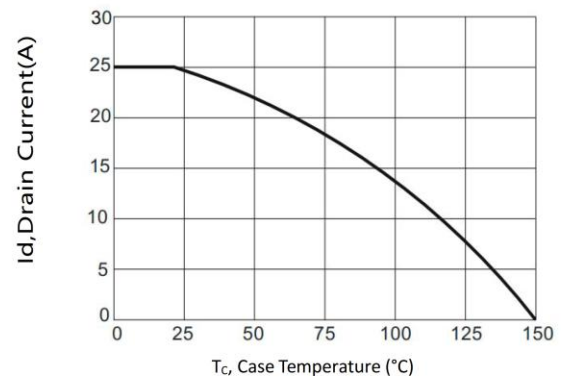
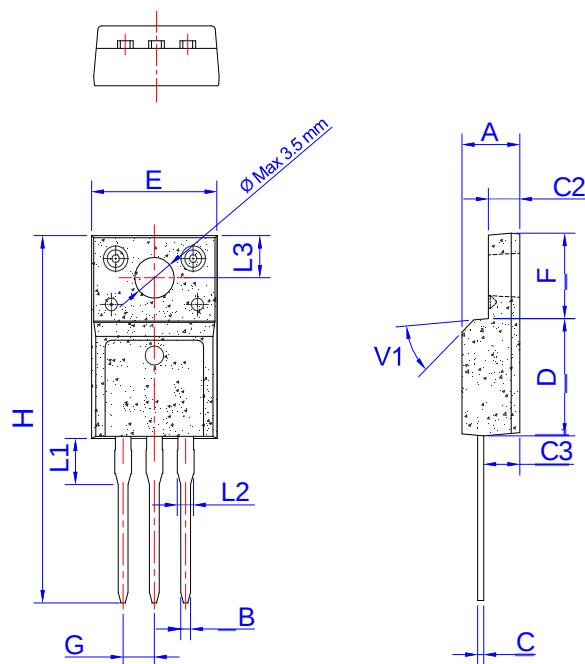


Figure10. Maximum Continuous Drain Current versus Case Temperature

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°	