Silicon N-Channel Power MOSFET

CS10J65F A9-G

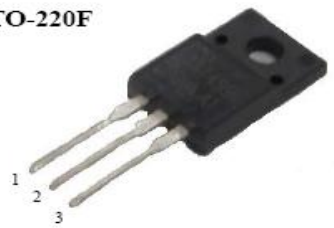
General Description：

CS10J65F A9-G, the silicon N-channel Enhanced MOSFETs, is obtained by the super junction technology which reduces the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency.

The package type is TO-220F, which accords with the RoHS standard.

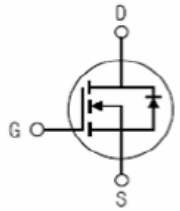
V_{DSS}	650	V
I_D	10	A
P_D(T_C=25℃)	30	W
$R_{DS(ON)max}$	0.62	Ω

TO-220F



1. Gate 2. Drain 3. Source

Inner Equivalent Principium Chart



Features：

- **Fast Switching**
- **Low Gate Charge**
- **Low Reverse transfer capacitances**
- **100% Single Pulse avalanche energy Test**
- **Halogen Free**

Applications：

- **Power switch circuit of adaptor and charger.**

Absolute（Tc= 25℃ unless otherwise specified）：

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	650	V
I_D	Continuous Drain Current	10	A
I_{DM}[a1]	Pulsed Drain Current	30	A
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}[a2]	Single Pulse Avalanche Energy	50	mJ
P_D	Power Dissipation	30	W
T_J，T_{stg}	Operating Junction and Storage Temperature Range	–55…+150	℃

Electrical Characteristics（Tc= 25℃ unless otherwise specified）:

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	650	--	--	V
I_{DSS}	Drain to Source Leakage Current	V_{DS} = 650V, V_{GS}= 0V, T_a = 25℃	--	--	1	μA
		V_{DS} =650V, V_{GS}= 0V, T_a = 125℃	--	--	100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} =+30V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS} =-30V	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=10V,I_D=3A	--	0.54	0.62	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2.5		4	V

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Trans conductance	V_{DS}=10V, I_D =3A	--	5.6	--	S
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 50V f = 1.0MHz	--	450	--	pF
C_{oss}	Output Capacitance		--	63	--	
C_{rss}	Reverse Transfer Capacitance		--	3.7	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D = 7 A V_{DD} = 300V R_G =25Ω	--	14	31	ns
tr	Rise Time		--	32	66	
$t_{d(OFF)}$	Turn-Off Delay Time		--	53	109	
t_f	Fall Time		--	15	32	
Q_g	Total Gate Charge	I_D = 7 A V_{DD} =480V V_{GS} = 10V	--	10	--	nC
Q_{gs}	Gate to Source Charge		--	2	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	3.7	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--		10	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--		20	A
V_{SD}	Diode Forward Voltage	I_S=7A,V_{GS}=0V	--	0.9	1.2	V
trr	Reverse Recovery Time	I_F=I_S I_F/dt=100A/us	--	400		ns
Qrr	Reverse Recovery Charge		--	1.5		uC

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	4.17	℃/W
$R_{\theta JA}$	Junction-to-Ambient	80	℃/W

[a1]: Repetitive rating; pulse width limited by maximum junction temperature
[a2]: L=10.0mH, Rg=25Ω, Vdd=50V, Start T_J=25℃

Characteristics Curve:

Figure 1. Output Characteristics

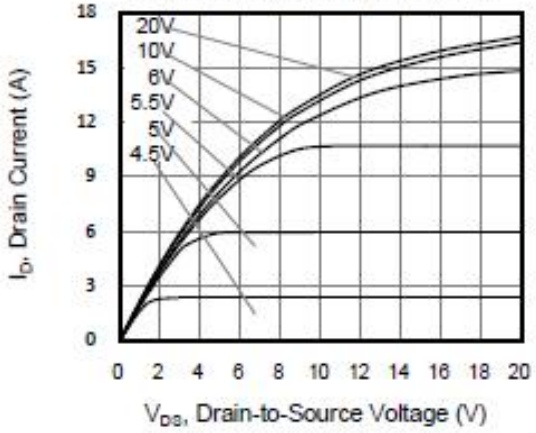


Figure 2. Transfer Characteristics

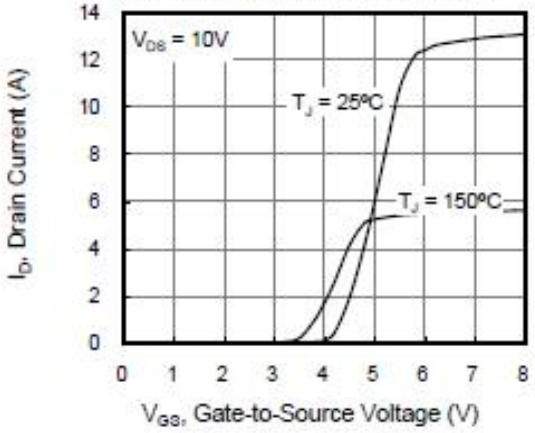


Figure 3. On-Resistance vs. Drain Current

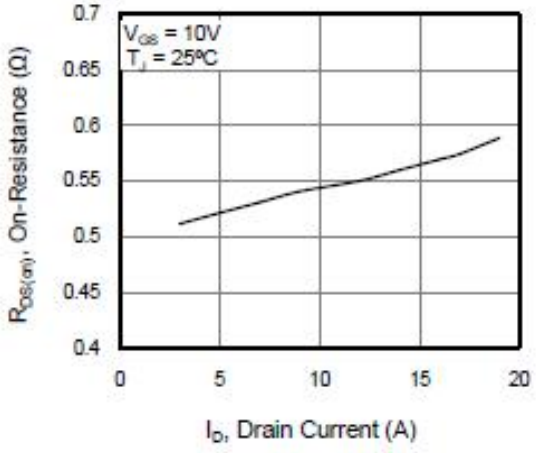


Figure 4. Capacitance

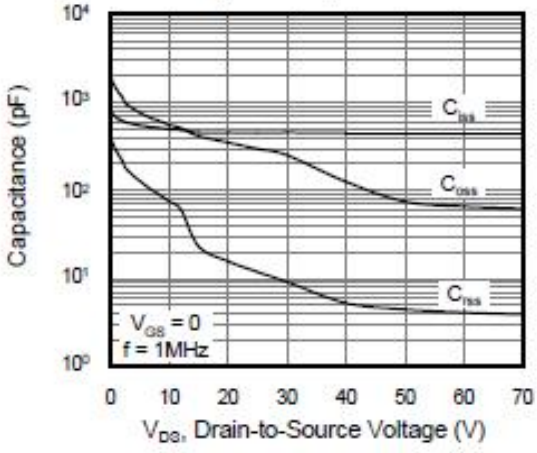


Figure 5. Gate Charge

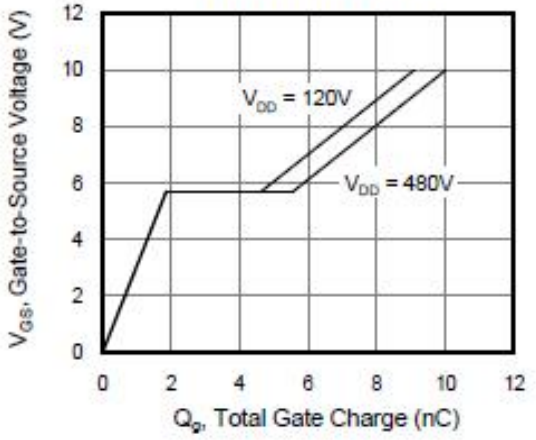


Figure 6. Body Diode Forward Voltage

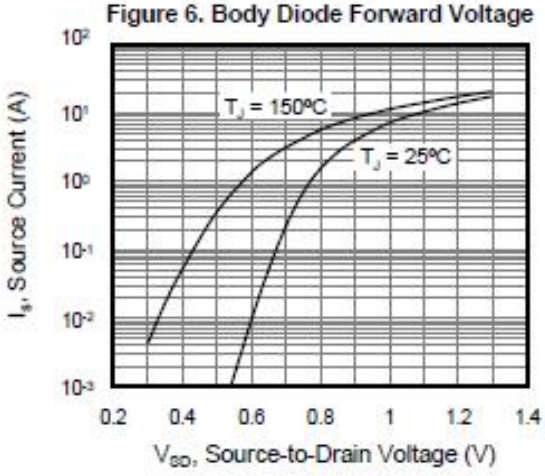


Figure 7. On-Resistance vs. Junction Temperature

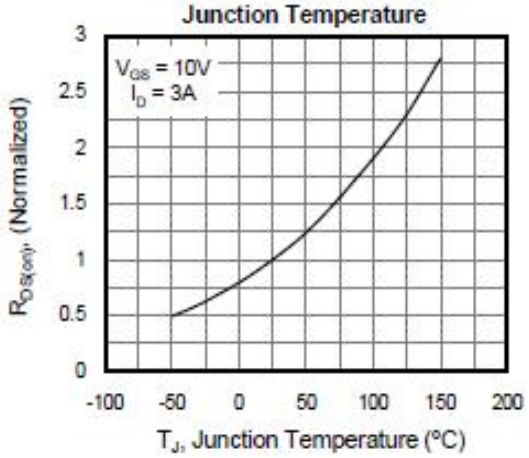
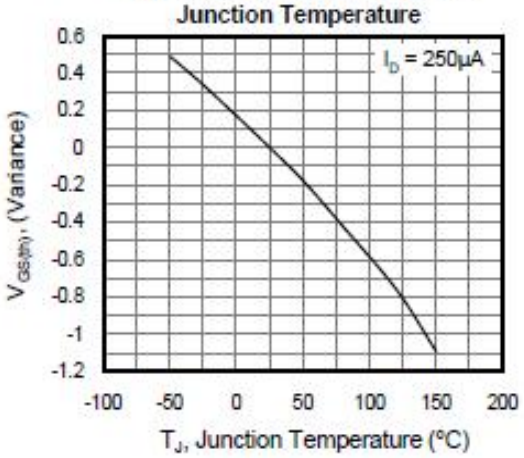
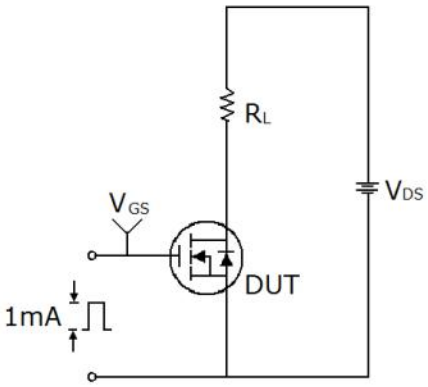


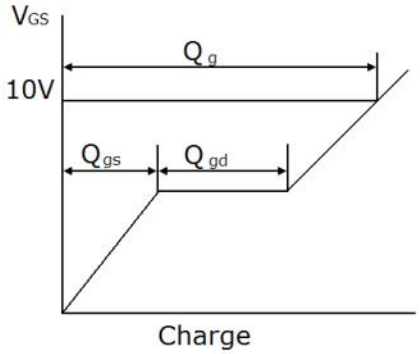
Figure 8. Threshold Voltage vs. Junction Temperature



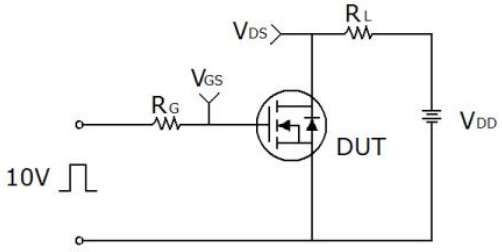
Test Circuit and Waveform:

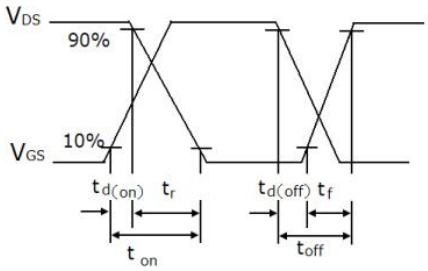
1）Gate charge test circuit & Waveform



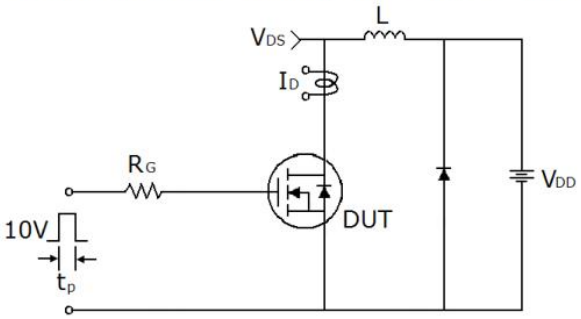


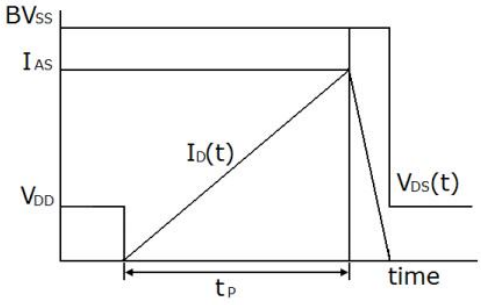
2）Switch Time Test Circuit:



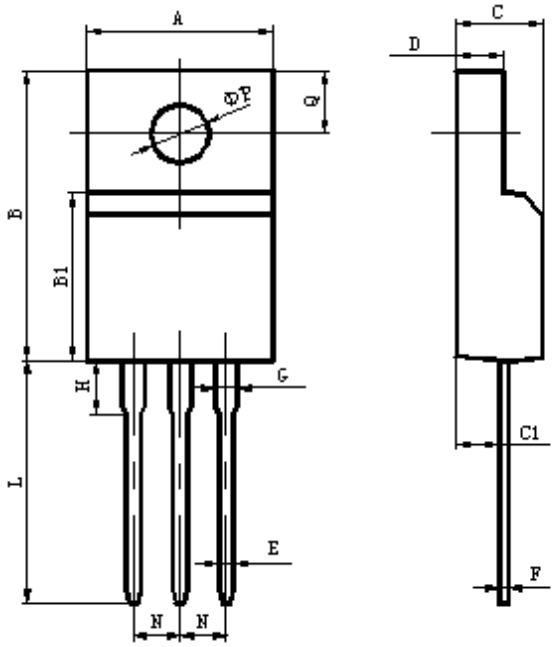


3）Unclamped Inductive Switching Test Circuit & Waveforms





Package Information:



Items	Values(mm)	
	MIN	MAX
A	9.60	10.4
B	15.4	16.2
B1	8.90	9.50
C	4.30	4.90
C1	2.10	3.00
D	2.40	3.00
E	0.60	1.00
F	0.30	0.60
G	1.12	1.42
H	3.40	3.80
	2.40	2.90
L	12.0	14.0
	6.30	7.70
N	2.34	2.74
Q	3.15	3.55
ϕ P	2.90	3.30

TO-220F Package

The name and content of poisonous and harmful material in products

Part's Name	Hazardous Substance									
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE	DIBP	DEHP	DBP	BBP
Limit	≤0.1%	≤0.1%	≤ 0.01%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%
Lead Frame	○	○	○	○	○	○	○	○	○	○
Molding	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
Wire Bonding	○	○	○	○	○	○	○	○	○	○
Solder	×	○	○	○	○	○	○	○	○	○
Note	○: means the hazardous material is under the criterion of SJ/T11363-2006. ×: means the hazardous material exceeds the criterion of SJ/T11363-2006. The plumbum element of solder exist in products presently, but within the allowed range of Eurogroup's RoHS.									

Warnings

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. It is suggested to be used under 80 percent of the maximum ratings of the device.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. VDMOSFET is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. This publication is made by Huajing Microelectronics and subject to regular change without notice.

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