



## TO-220F Plastic-Encapsulate MOSFETS

### CJPF07N65M1 N-Channel Power MOSFET

$V_{(BR)DSS}$	$R_{DS(on)HMD}$	$I_D$
650V	1.0Ω@10V	7A

#### GENERAL DESCRIPTION

This advanced high voltage MOSFET is designed to stand high energy in the avalanche mode and switch efficiently. This new high energy device also offers a drain-to-source diode fast recovery time. Designed for high voltage, high speed switching applications such as power supplies, converters, power motor controls and bridge circuits.

#### FEATURES

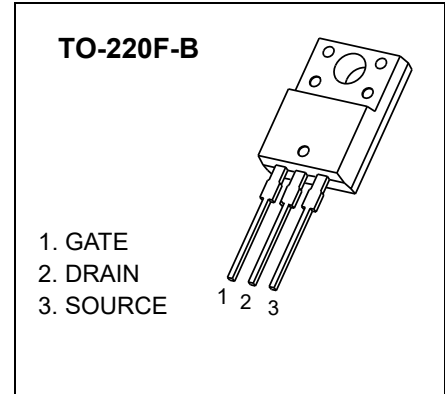
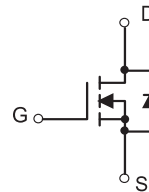
- High Current Rating
- Lower  $R_{DS(on)}$
- Lower Capacitance
- Lower Total Gate Charge
- Tighter  $V_{SD}$  Specifications
- Avalanche Energy Specified
- Fast Switching Capability

#### MARKING



07N65M1 = Device code.  
Solid dot = Green molding compound device,  
if none, the normal device.  
XXXX = Code.

#### EQUIVALENT CIRCUIT



#### ABSOLUTE MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	±30	V
Continuous Drain Current	$I_D$ <sup>①</sup>	7	A
Pulsed Drain Current	$I_{DM}$ <sup>②</sup>	28	A
Single Pulsed Avalanche Energy	$E_{AS}$ <sup>③</sup>	600	mJ
Maximum Power Dissipation	$P_D$ <sup>①</sup>	50	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance from Junction to Case	$R_{\theta JC}$ <sup>①</sup>	2.5	°C/W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150	°C

# MOSFET ELECTRICAL CHARACTERISTICS

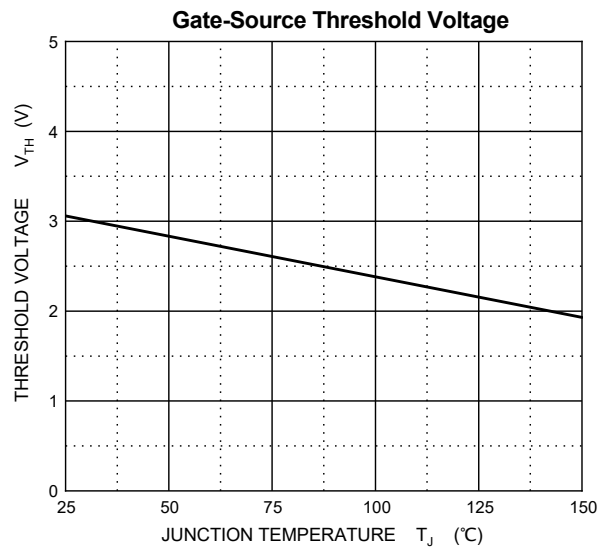
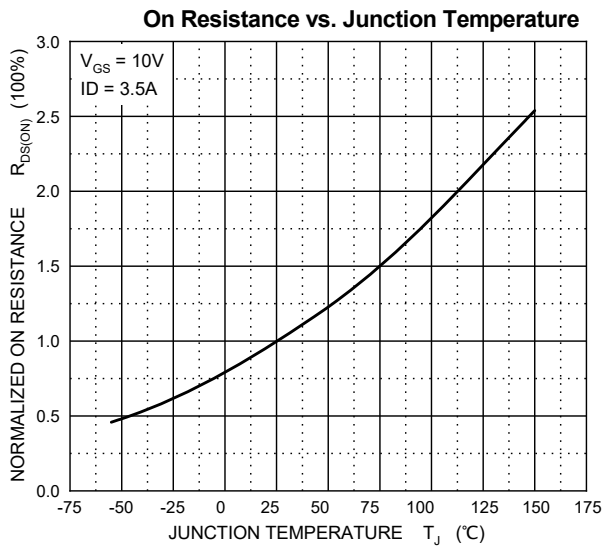
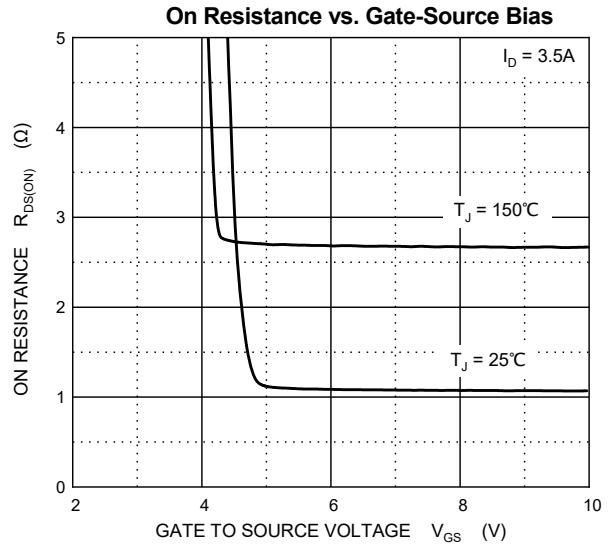
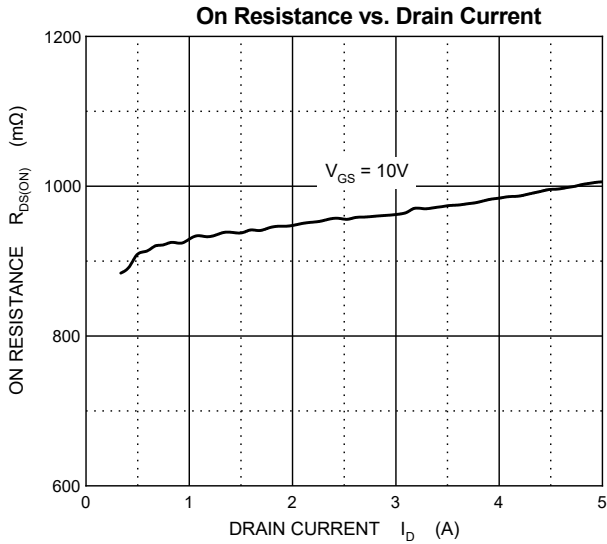
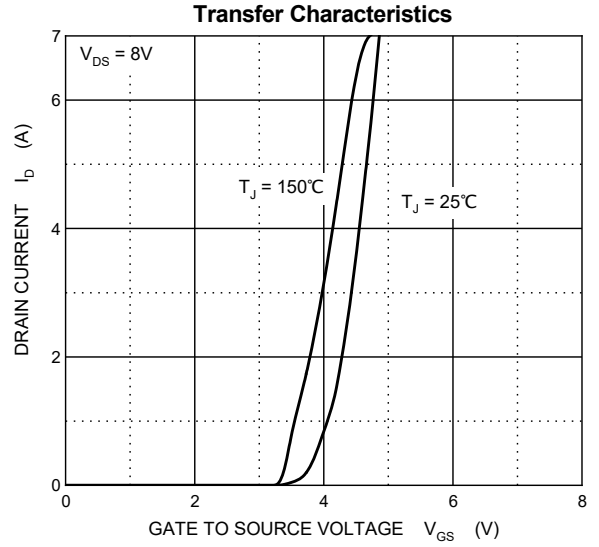
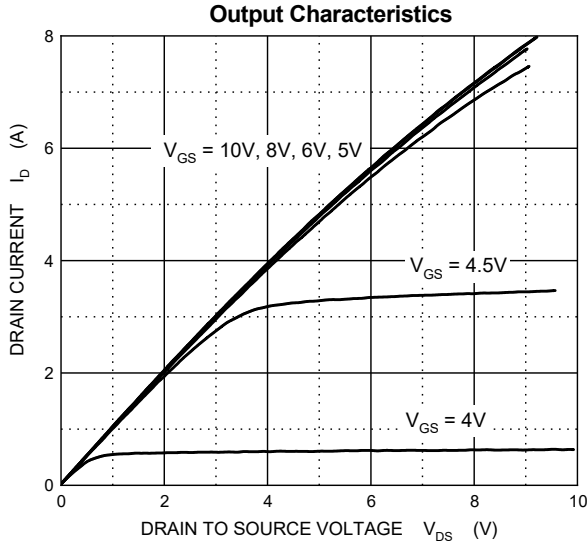
$T_J=25\text{ }^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
<b>Off characteristics</b>							
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 520V, V_{GS} = 0V$	$T_J = 25^\circ C$	-	-	1.0	$\mu A$
			$T_J = 125^\circ C$	-	-	100	
Gate-body leakage current	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	$\pm 100$	nA	
<b>On characteristics</b> <sup>④</sup>							
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	3.1	4.0	V	
Static drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 3.5A$	-	1.0	1.2	$\Omega$	
<b>Dynamic characteristics</b> <sup>⑤</sup>							
Input capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1MHz$	-	1060	-	$\mu F$	
Output capacitance	$C_{oss}$		-	99	-		
Reverse transfer capacitance	$C_{rss}$		-	8	-		
Gate resistance	$R_g$	$f = 1MHz$	-	4	-	$\Omega$	
<b>Switching characteristics</b> <sup>⑤</sup>							
Total gate charge	$Q_g$	$V_{GS} = 10V, V_{DS} = 520V, I_D = 7A$	-	25	-	nC	
Gate-source charge	$Q_{gs}$		-	5	-		
Gate-drain charge	$Q_{gd}$		-	10	-		
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 60V, V_{GS} = 10V, R_G = 25\Omega, I_D = 7A$	-	19	-	ns	
Turn-on rise time	$t_r$		-	61	-		
Turn-off delay time	$t_{d(off)}$		-	69	-		
Turn-off fall time	$t_f$		-	27	-		
<b>Drain-Source Diode Characteristics</b>							
Drain-source diode forward voltage	$V_{SD}$ <sup>④</sup>	$V_{GS} = 0V, I_S = 7A$	-	-	0.9	V	
Continuous drain-source diode forward current	$I_S$ <sup>①</sup>		-	-	7	A	
Pulsed drain-source diode forward current	$I_{SM}$ <sup>②</sup>		-	-	28	A	
Reverse recovery time	$t_{rr}$	$dI_F/dt = 100A/\mu s, I_S = 7A, V_{DD} = 30V$	-	348	-	ns	
Reverse recovery charge	$Q_{rr}$		-	2927	-	nC	

Notes:

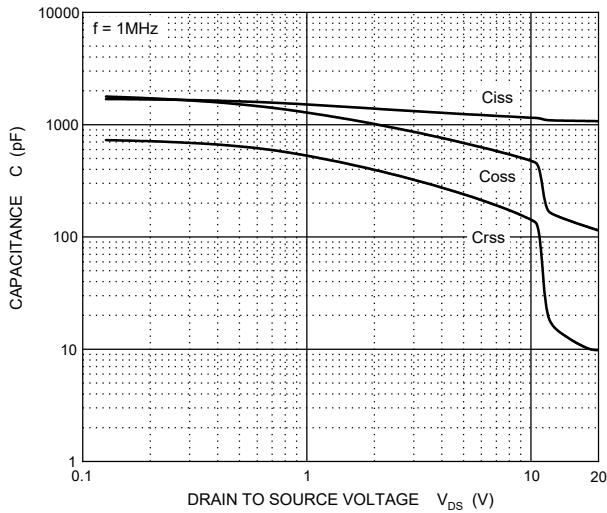
- $T_C = 25^\circ C$  Limited only by maximum temperature allowed.
- $P_W \leq 10\mu s$ , Duty cycle  $\leq 1\%$ .
- EAS condition:  $V_{DD} = 100V, V_{GS} = 10V, L = 10mH, R_g = 25\Omega$  Starting  $T_J = 25^\circ C$ .
- Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production.

# Typical Characteristics

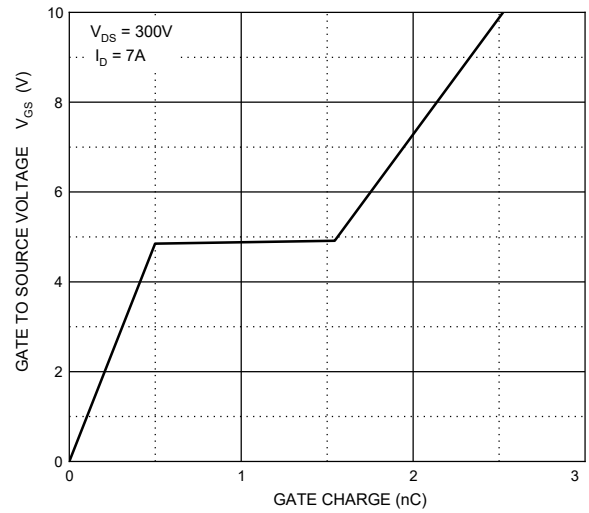


# Typical Characteristics

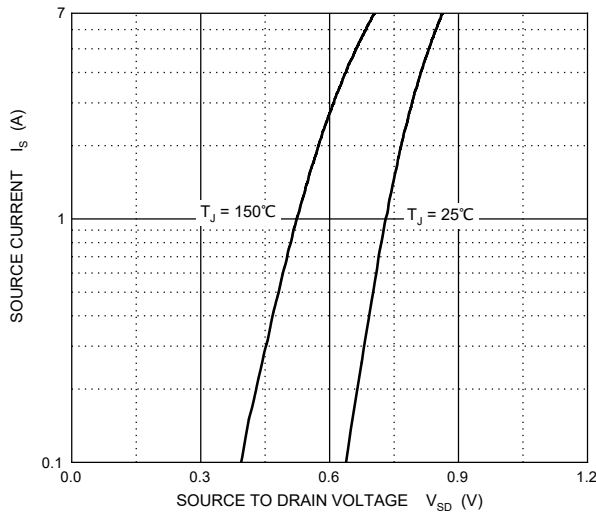
### Typical Capacitances



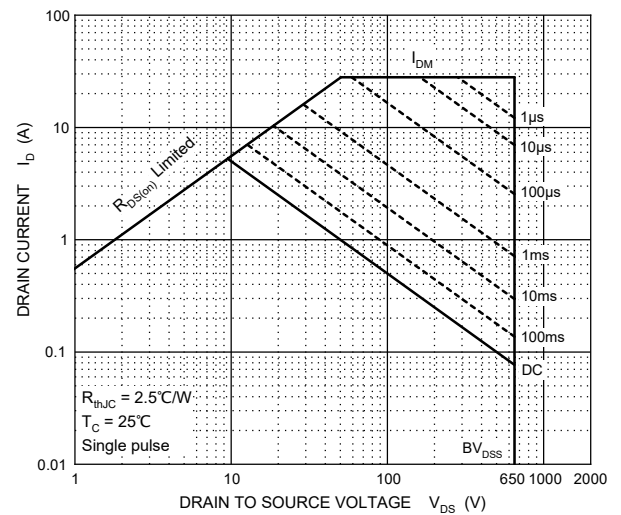
### Gate Charge



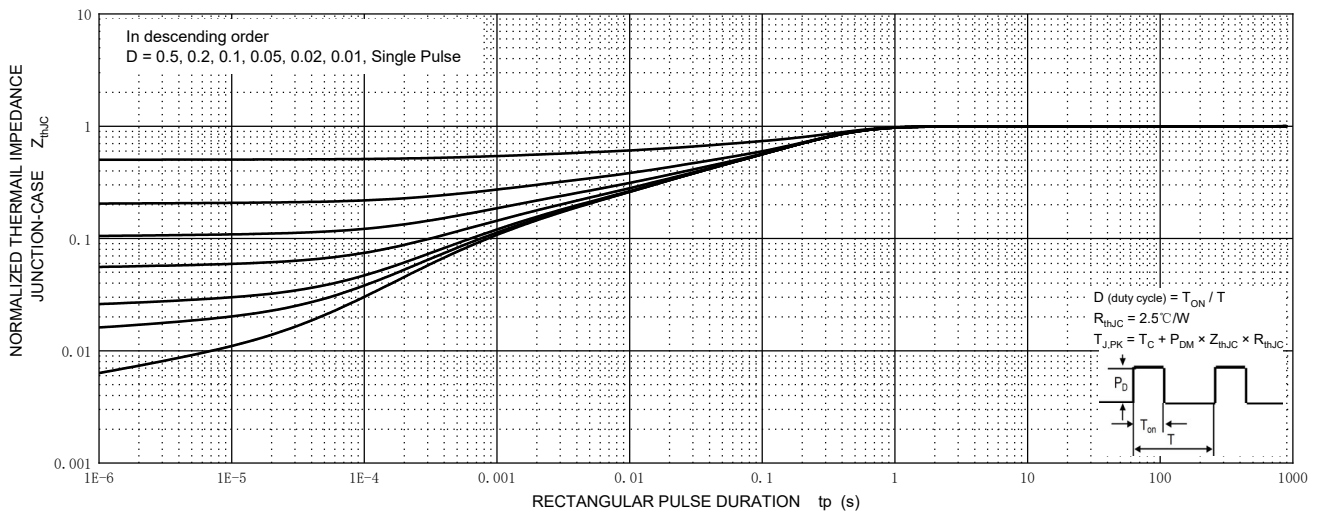
### Source-Drain Diode Forward Characteristics



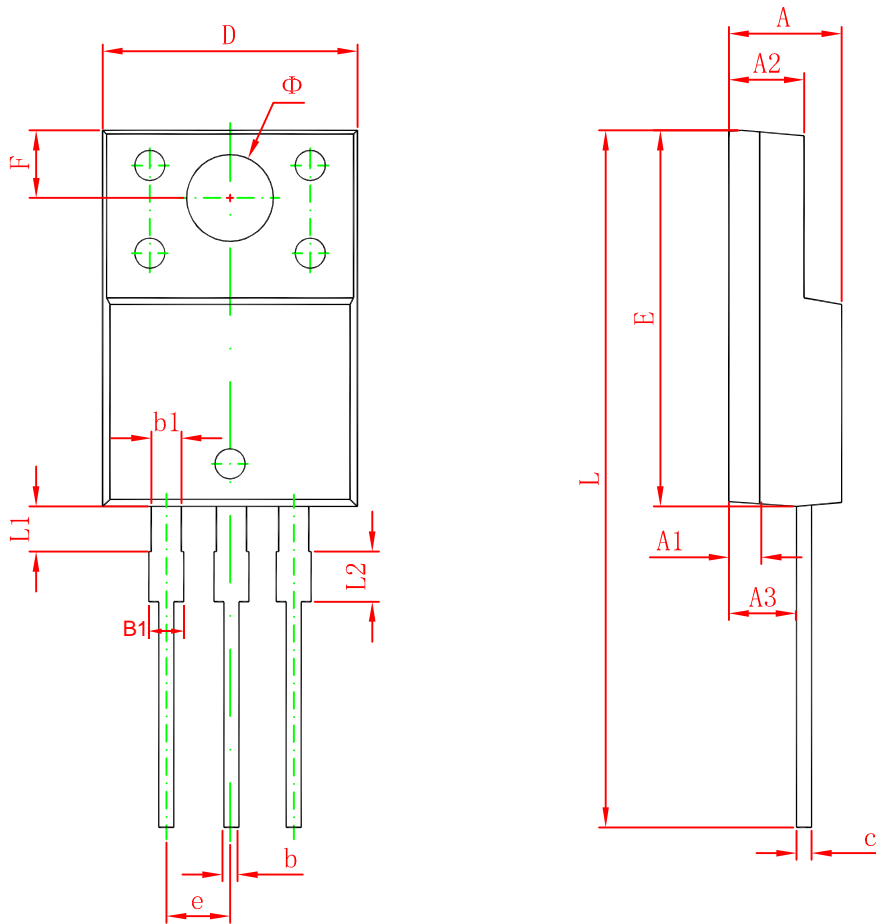
### Maximum Safe Operating Area



### Transient Thermal Impedance, Junction-Case



# TO-220F-B Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.200 REF.		0.047 REF.	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.710	0.910	0.028	0.036
b1	1.100	1.350	0.043	0.053
B1	1.150	1.400	0.045	0.055
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP.		0.100 TYP.	
F	2.700 REF.		0.106 REF.	
$\Phi$	3.300	3.700	0.130	0.146
L	28.000	28.400	1.102	1.118
L1	2.100	2.400	0.082	0.094
L2	1.300	1.700	0.051	0.066