



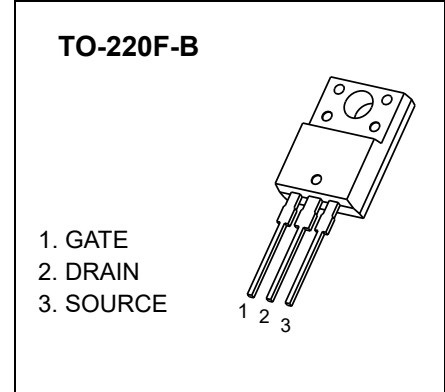
TO-220F-B Plastic-Encapsulate MOSFETS

CJPF12N65M1 N-Channel Power MOSFET

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
650V	0.67Ω@10V	12A

GENERAL DESCRIPTION

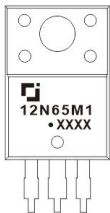
This advanced high voltage MOSFET is designed to stand high energy in the avalanche mode and switch efficiently. This new high energy device also offers a drain-to-source diode fast recovery time. Designed for high voltage, high speed switching applications such as power supplies, converters, power motor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



FEATURE

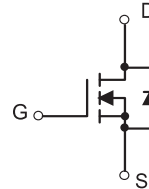
- High Current Rating
- Lower $R_{DS(on)}$
- Lower Capacitance
- Lower Total Gate Charge
- Tighter V_{SD} Specifications
- Avalanche Energy Specified
- Fast Switching Capability

MARKING



12N65M1= Device code.
Solid dot = Green molding compound device,
if none, the normal device
XXXX=Code

EQUIVALENT CIRCUIT



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 ①	12	A
Pulsed Drain Current	I_{DM} ②	48	A
Single Pulsed Avalanche Energy	E_{AS} ③	400	mJ
Power Dissipation	P_D ①	74	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$ ⑥	62.5	°C/W
Thermal Resistance from Junction to Case	$R_{\theta JC}$ ①	1.7	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 ~+150	°C

MOSFET ELECTRICAL CHARACTERISTICS

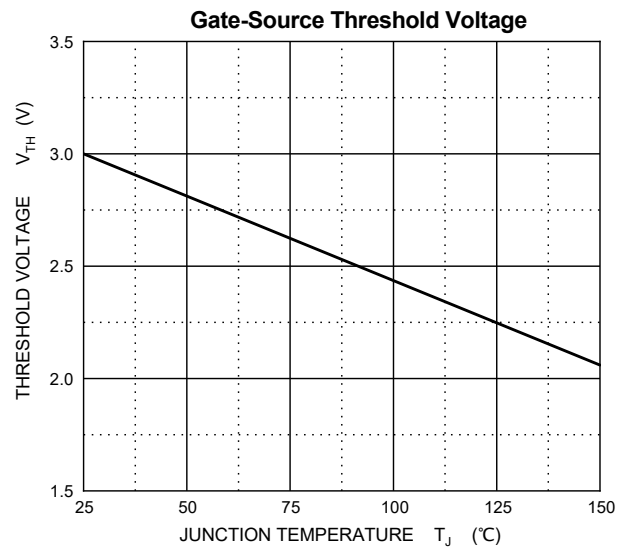
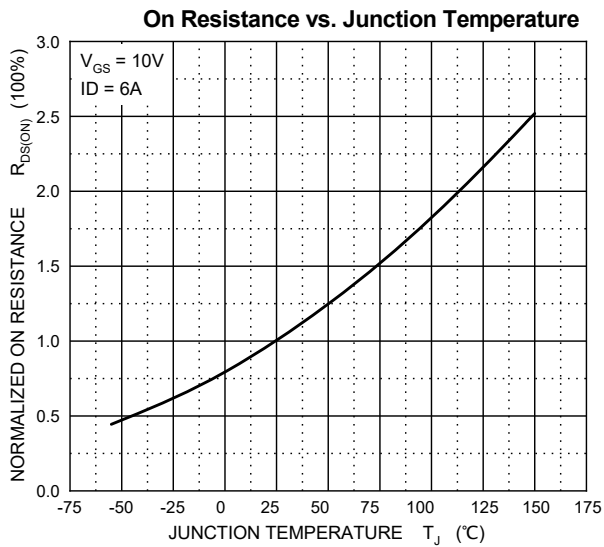
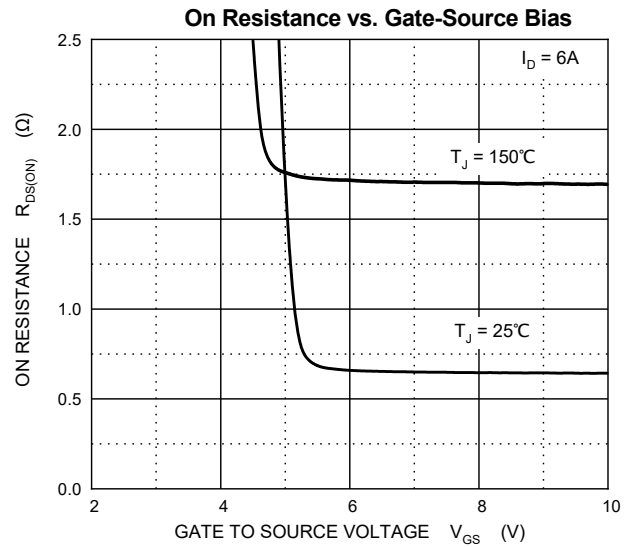
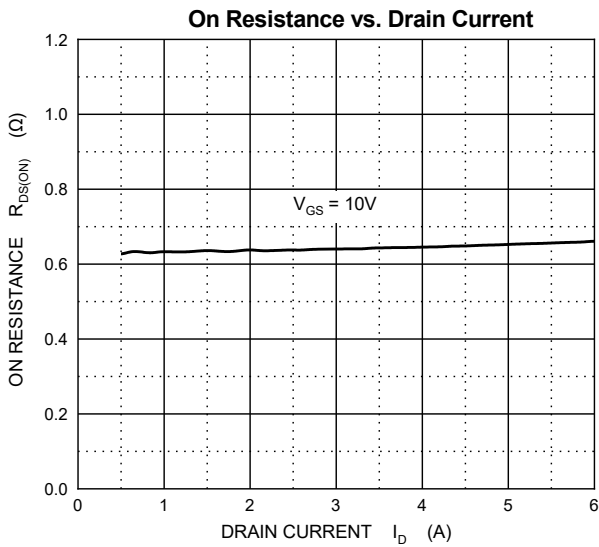
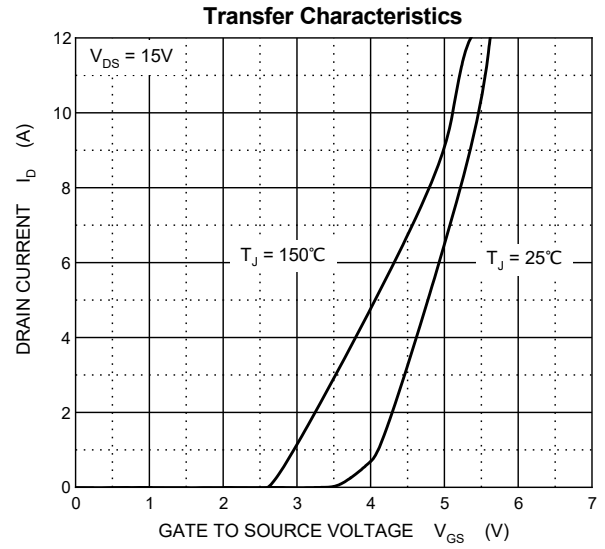
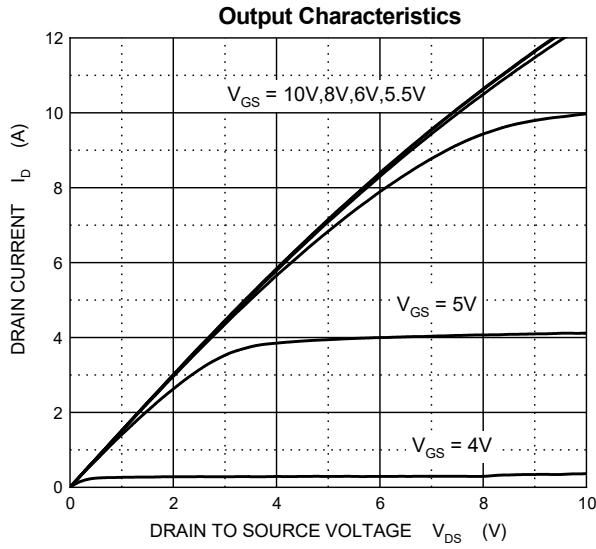
$T_J=25\text{ }^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			1.0	μA
Gate-body leakage current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 30V$			± 100	nA
On characteristics ^④						
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	3.0	4.0	V
Static drain-source on-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 6A$		0.67	0.8	Ω
Dynamic characteristics ^⑤						
Input capacitance	C_{iss}	$V_{DS} = 50V, V_{GS} = 0V, f = 100kHz$		1930		pF
Output capacitance	C_{oss}			104		
Reverse transfer capacitance	C_{rss}			4.8		
Switching characteristics ^⑤						
Total gate charge	Q_g	$V_{DS} = 50V, V_{GS} = 10V, I_D = 12A$		30		nC
Gate-source charge	Q_{gs}			10.3		
Gate-drain charge	Q_{gd}			6.4		
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 24V, V_{GS} = 10V, R_G = 10\Omega, I_D = 12A$		17		ns
Turn-on rise time	t_r			5		
Turn-off delay time	$t_{d(off)}$			38		
Turn-off fall time	t_f			20		
Drain-Source Diode Characteristics						
Drain-source diode forward voltage	V_{SD} ^④	$V_{GS} = 0V, I_S = 12A$			1.2	V
Maximum continuous drain-source diode forward current	I_S ^①				12	A
Maximum pulsed drain-source diode forward current	I_{SM} ^②				48	A

Notes :

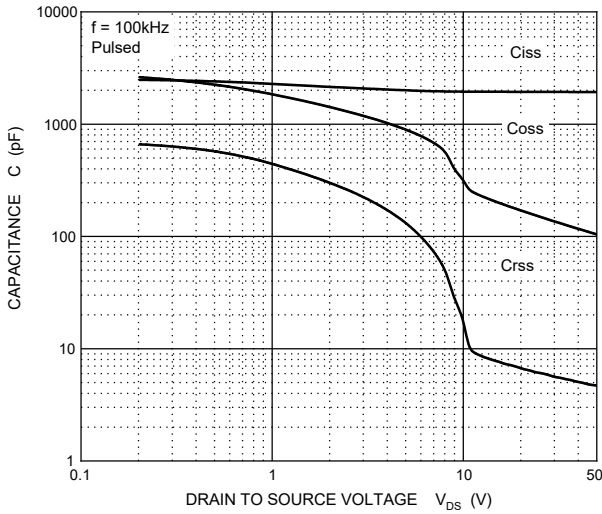
- $T_C=25\text{ }^\circ\text{C}$ Limited only by maximum temperature allowed.
- $P_W \leq 10\mu s$, Duty cycle $\leq 1\%$.
- EAS condition: $V_{DD}=50V, V_{GS}=10V, L=10mH, R_g=25\Omega$ Starting $T_J = 25\text{ }^\circ\text{C}$.
- Pulse Test : Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production.
- The value of $R\theta_{JA}$ is measured with the device in a still air environment with $T_a=25\text{ }^\circ\text{C}$.

Typical Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise specified)

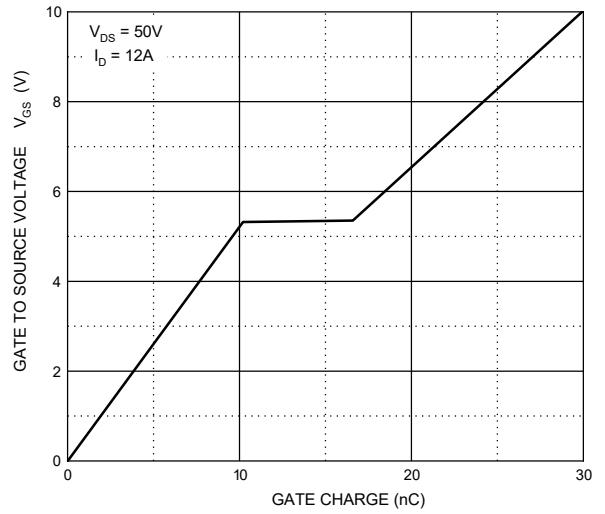


Typical Characteristics (T_J = 25°C, unless otherwise specified)

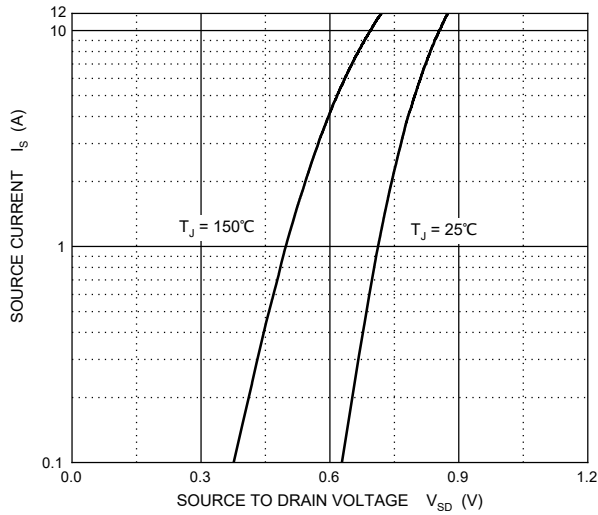
Typical Capacitances



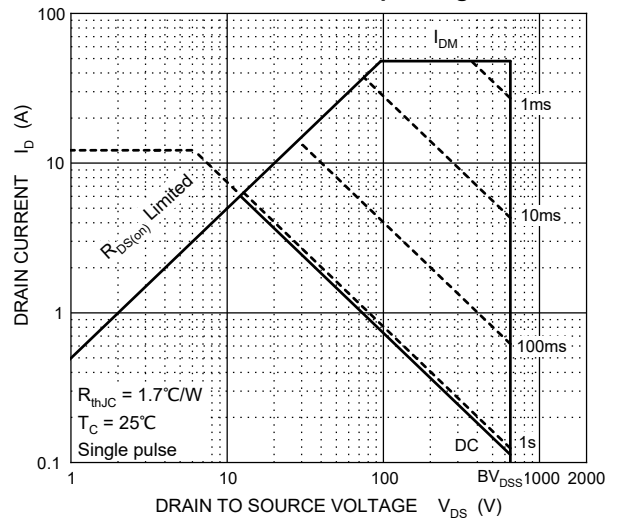
Gate Charge



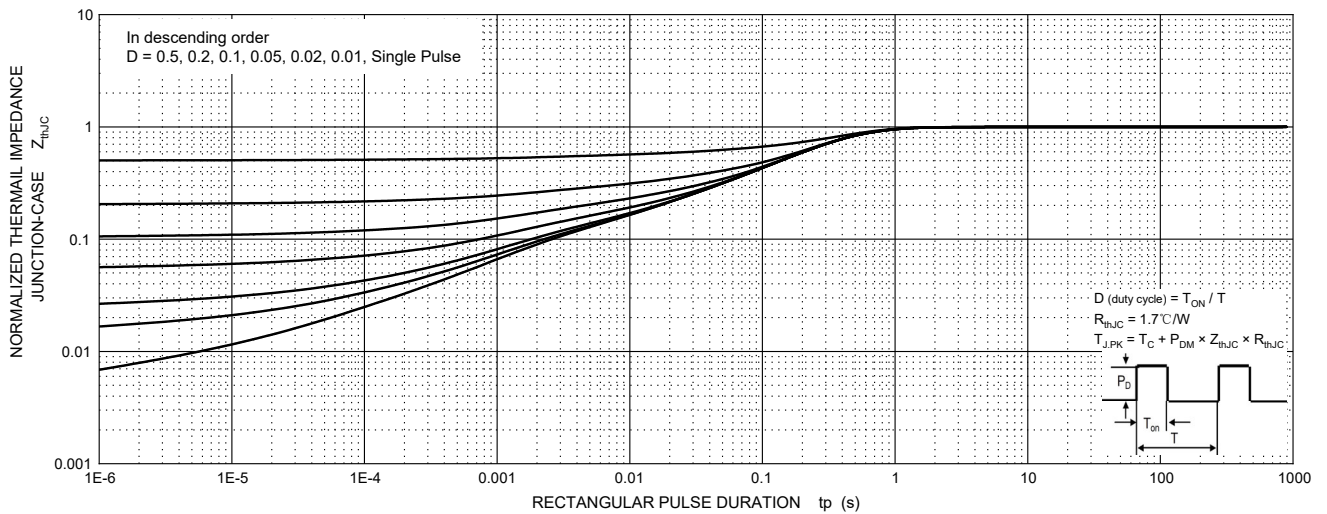
Source-Drain Diode Forward Characteristics



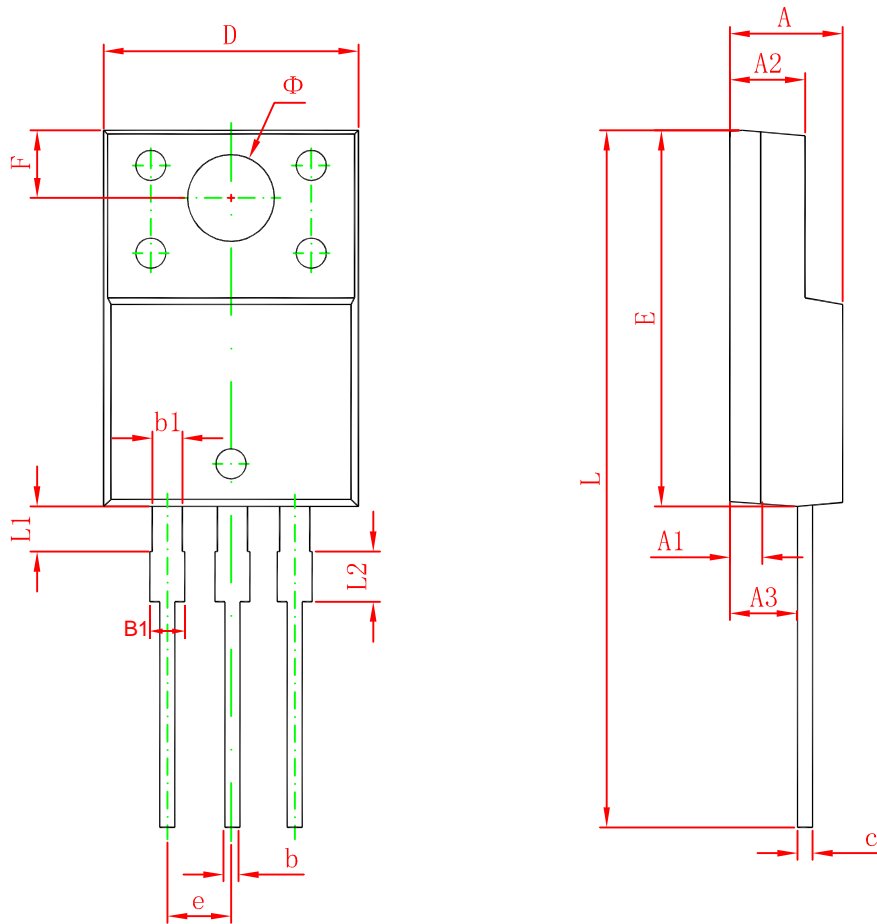
Maximum Safe Operating Area



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.	
Φ	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