

TO-220-3L Plastic-Encapsulate MOSFETS

CJP10N65M1E N-Channel Power MOSFET

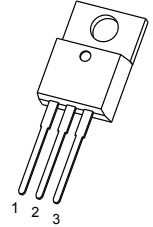
$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
650V	0.82Ω@10V	10A

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.

TO-220-3L

1. GATE
2. DRAIN
3. SOURCE



FEATURE

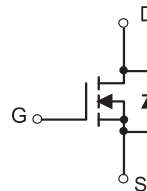
- High Current Rating
- Low Gate Charge
- Lower $R_{DS(on)}$
- Low Reverse Transfer Capacitance
- Fast Switching Capability
- Tighter V_{SD} Specifications
- Avalanche Energy Specified

MARKING



10N65M1E= Device code.
Solid dot = Green molding compound device,
if none, the normal device
XXXX = Code

EQUIVALENT CIRCUIT



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D ①	10	A
Pulsed Drain Current	I_{DM} ①②	40	A
Single Pulsed Avalanche Energy	E_{AS} ③	500	mJ
Power Dissipation	P_D ①	125	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	1.0	°C/W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	°C

MOSFET ELECTRICAL CHARACTERISTICS

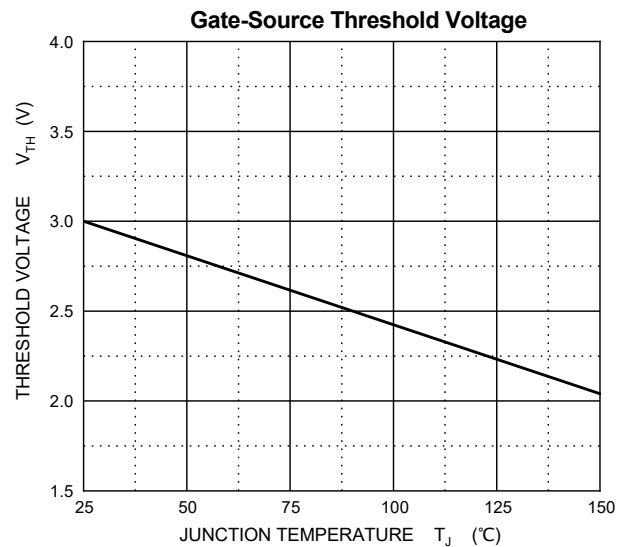
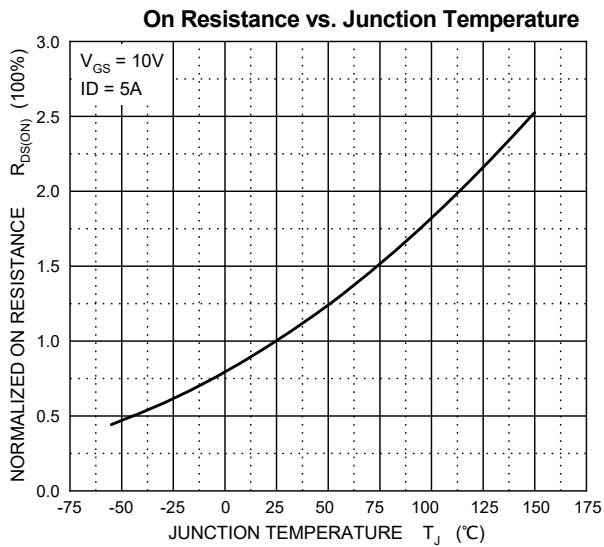
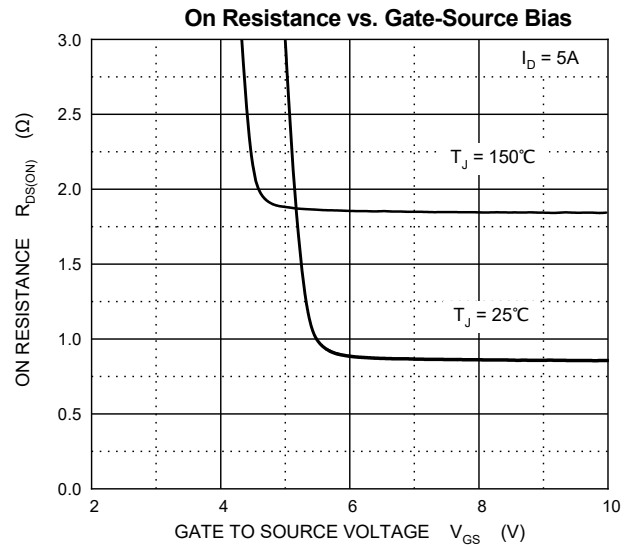
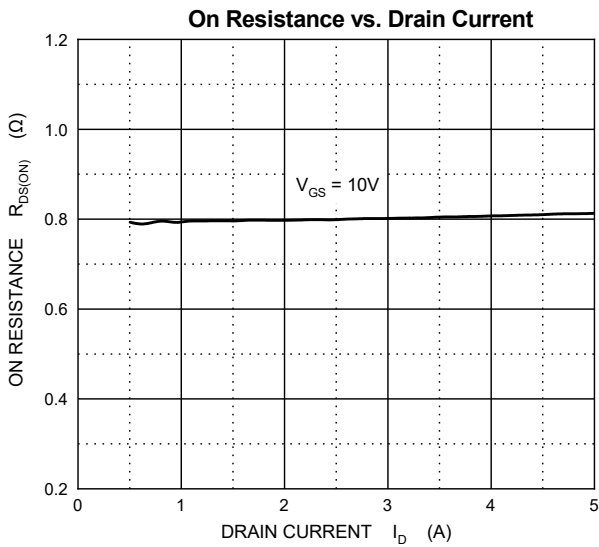
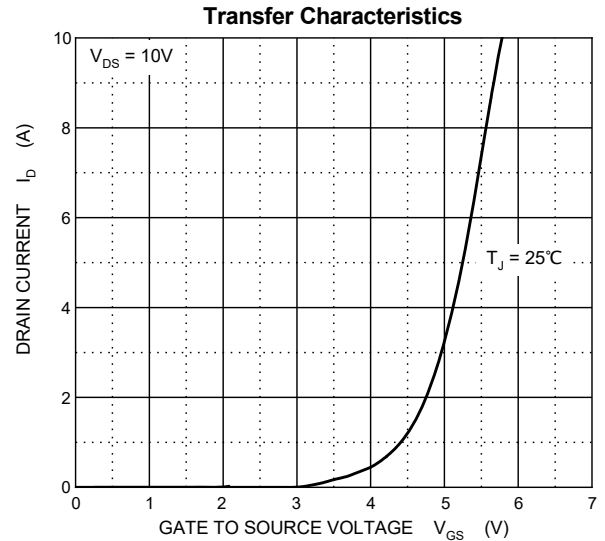
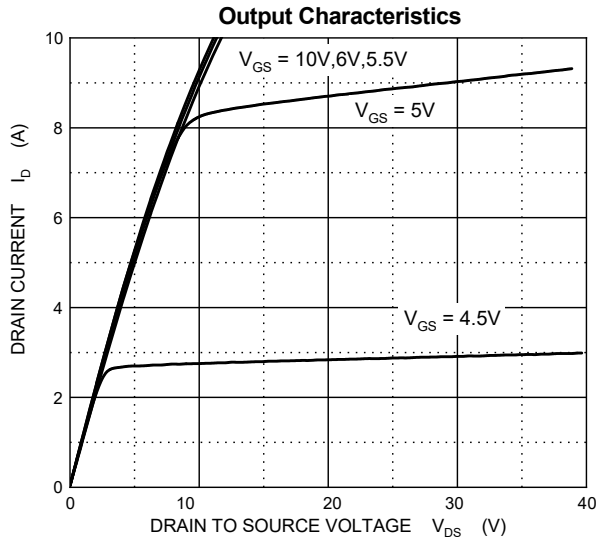
$T_J=25^{\circ}\text{C}$ unless otherwise specified

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	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 5A$		0.82	1	Ω
Dynamic characteristics ^⑤						
Input capacitance	C_{iss}	$V_{DS} = 50V, V_{GS} = 0V, f = 1MHz$		1340		pF
Output capacitance	C_{oss}			81		
Reverse transfer capacitance	C_{rss}			10		
Switching characteristics ^⑤						
Total gate charge	Q_g	$V_{DS} = 50V, V_{GS} = 10V, I_D = 10A$		30.2		nC
Gate-source charge	Q_{gs}			10.4		
Gate-drain charge	Q_{gd}			6.3		
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 20V, V_{GS} = 10V,$ $R_G = 10\Omega, I_D = 10A$		14.8		ns
Turn-on rise time	t_r			3.9		
Turn-off delay time	$t_{d(off)}$			37.1		
Turn-off fall time	t_f			22.9		
Drain-Source Diode Characteristics						
Drain-source diode forward voltage	V_{SD} ^④	$V_{GS} = 0V, I_S = 10A$			1.2	V
Maximum continuous drain-source diode forward current	I_S ^①				10	A
Maximum pulsed drain-source diode forward current	I_{SM} ^{①②}				40	A

Notes :

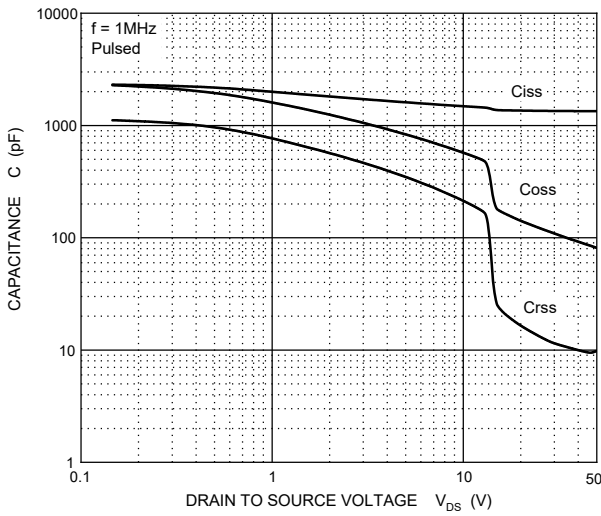
- $T_C=25^{\circ}\text{C}$ Limited only by maximum temperature allowed.
- $P_W \leq 10\mu s$, Duty cycle $\leq 1\%$.
- EAS condition: $V_{DD}=50V, V_{GS}=10V, L=10mH, R_G=25\Omega$ Starting $T_J = 25^{\circ}\text{C}$.
- Pulse Test : Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- Guaranteed by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

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

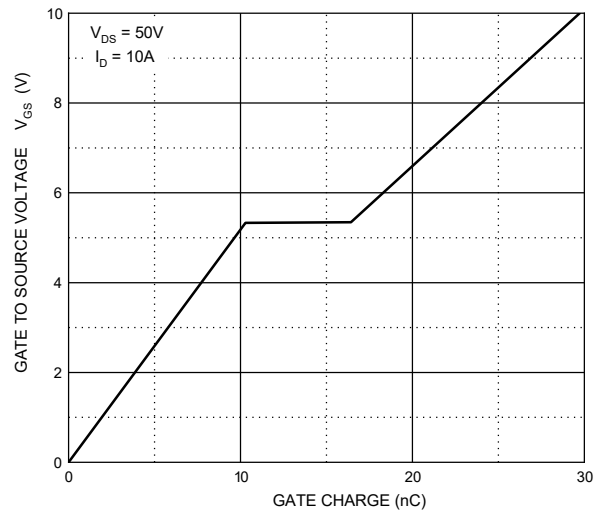


Typical Characteristics (T_J = 25°C, unless otherwise specified)

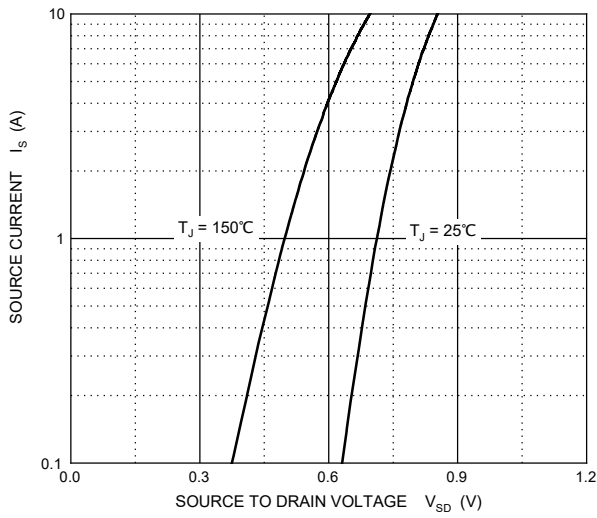
Typical Capacitances



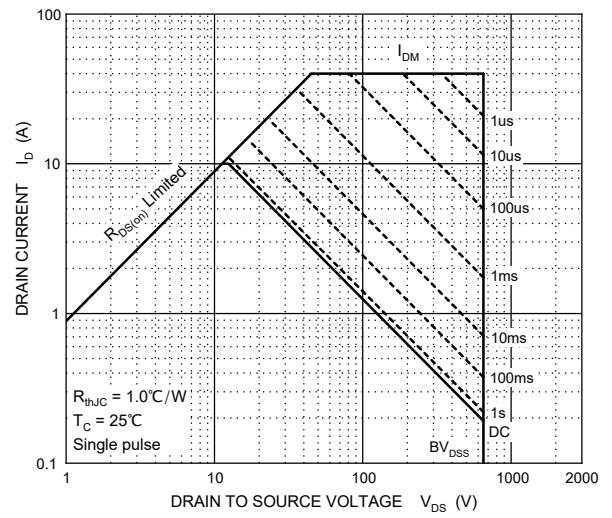
Gate Charge



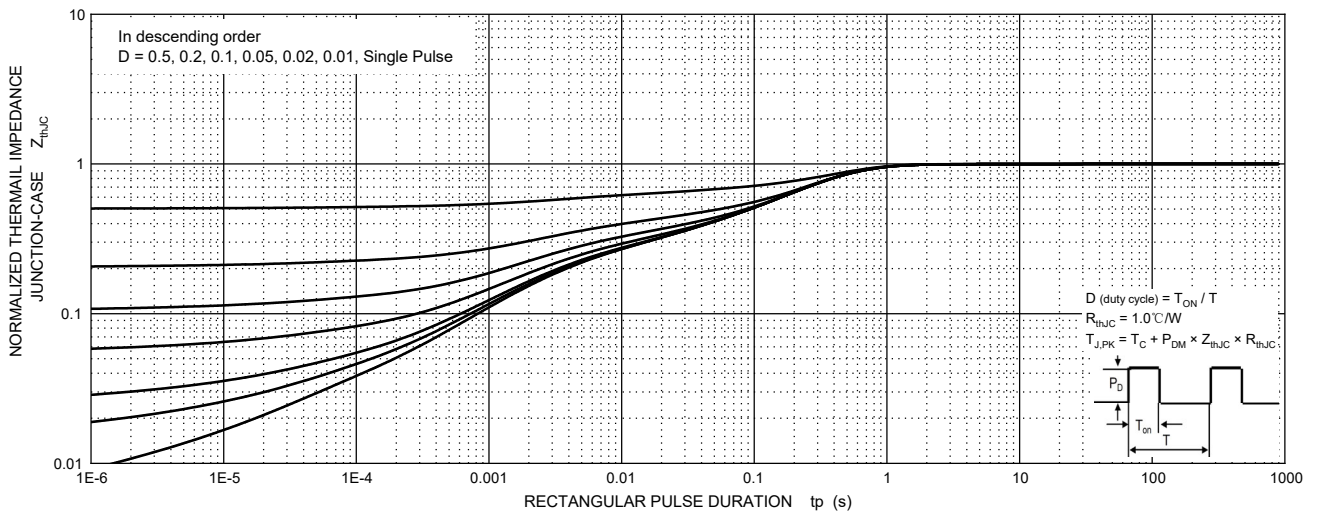
Source-Drain Diode Forward Characteristics



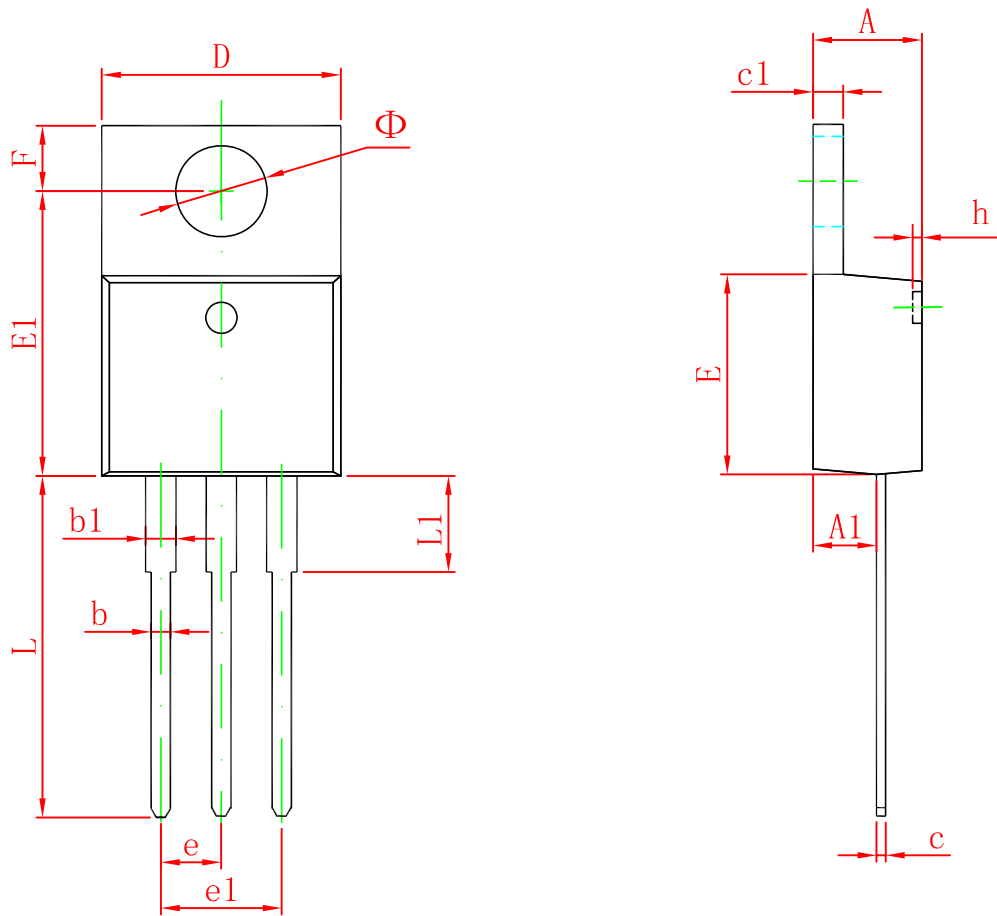
Maximum Safe Operating Area



Transient Thermal Impedance, Junction-Case



TO-220-3L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540 TYP		0.100 TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
Φ	3.735	3.935	0.147	0.155