

CDMSJ22013.8-650

**N-CHANNEL  
SUPER JUNCTION MOSFET  
13.8 AMP, 650 VOLT**



**TO-220FP CASE**

**Central**  
**Semiconductor**

[www.centrasemi.com](http://www.centrasemi.com)

**DESCRIPTION:**

The CENTRAL SEMICONDUCTOR CDMSJ22013.8-650 is a high current, 650 Volt N-Channel power MOSFET designed for high voltage, fast switching applications such as Power Factor Correction (PFC), and power chargers. This MOSFET combines high voltage capability with low  $r_{DS(ON)}$ , low threshold voltage and low gate charge.

**MARKING: CDMSJ**

**13.8-650**

**APPLICATIONS:**

- Power Factor Correction
- TV Power
- UPS
- PD Charger
- Adapter

**FEATURES:**

- High voltage capability ( $V_{DS}=650V$ )
- Low gate charge ( $Q_{GS}=6nC$ )
- Low  $r_{DS(ON)}$  ( $0.28\Omega$ )

**MAXIMUM RATINGS:** ( $T_C=25^\circ C$ )

	<b>SYMBOL</b>		<b>UNITS</b>
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	30	V
Continuous Drain Current	$I_D$	13.8	A
Continuous Drain Current ( $T_C=100^\circ C$ )	$I_D$	8.7	A
Pulsed Drain Current	$I_{DM}$	41.4	A
Forward Diode Current	$I_S$	13.8	A
Power Dissipation	$P_D$	35.7	W
Power Dissipation ( $T_C=100^\circ C$ )	$P_D$	14.3	W
Operating and Storage Junction Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ C$

**ELECTRICAL CHARACTERISTICS:** ( $T_J=25^\circ C$  unless otherwise noted)

<b>SYMBOL</b>	<b>TEST CONDITIONS</b>	<b>MIN</b>	<b>TYP</b>	<b>MAX</b>	<b>UNITS</b>
$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	650	710		V
$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3.2	4	V
$R_{DS(on)}$	$V_{GS}=10V, I_D=4.4A$ (Note 1)		248	280	m $\Omega$
$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$			1.0	$\mu A$
$I_{GSS}$	$V_{GS}=30V, V_{DS}=0V$			100	nA
$I_{GSSR}$	$V_{GS}=30V, V_{DS}=0V$			100	nA
gfs	$V_{DS}=20V, I_D=13.8A$		13		S
$Q_g$	$V_{DS}=520V, I_D=13.8A, V_{GS}=10V$		30		nC
$Q_{gs}$	$V_{DS}=520V, I_D=13.8A, V_{GS}=10V$		6		nC

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**ELECTRICAL CHARACTERISTICS - Continued:** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
$Q_{gd}$	$V_{DS}=520\text{V}$ , $I_D=13.8\text{A}$ , $V_{GS}=10\text{V}$		13		nC
$C_{iss}$	$V_{DS}=400\text{V}$ , $V_{GS}=0\text{V}$ , $f=250\text{kHz}$		1040		pF
$C_{oss}$	$V_{DS}=400\text{V}$ , $V_{GS}=0\text{V}$ , $f=250\text{kHz}$		38		pF
$C_{rss}$	$V_{DS}=400\text{V}$ , $V_{GS}=0\text{V}$ , $f=250\text{kHz}$		11		pF
$C_{o(er)}$	$V_{DS}=0\text{V}$ to $520\text{V}$ , $V_{GS}=0\text{V}$ , $f=250\text{kHz}$		48		pF
$t_{d(on)}$	$V_{DD}=325\text{V}$ , $I_D=13.8\text{A}$ , $V_{GS}=10\text{V}$ , $R_G=25\Omega$		43		ns
$t_r$	$V_{DD}=325\text{V}$ , $I_D=13.8\text{A}$ , $V_{GS}=10\text{V}$ , $R_G=25\Omega$		69		ns
$t_{d(off)}$	$V_{DD}=325\text{V}$ , $I_D=13.8\text{A}$ , $V_{GS}=10\text{V}$ , $R_G=25\Omega$		171		ns
$t_f$	$V_{DD}=325\text{V}$ , $I_D=13.8\text{A}$ , $V_{GS}=10\text{V}$ , $R_G=25\Omega$		66		ns
$R_g$	$f=1.0\text{MHz}$		21		$\Omega$
$V_{SD}$	$I_S=13.8\text{A}$ , $V_{GS}=0\text{V}$			1.4	V
$Q_{rr}$	$I_S=13.8\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$		5.4		$\mu\text{C}$
$t_{rr}$	$I_S=13.8\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$		344		ns

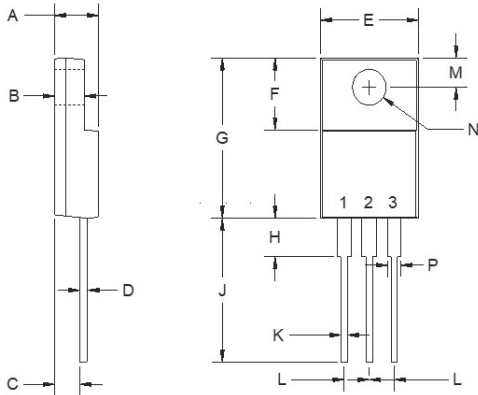
Note 1: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

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**TO-220FP CASE - MECHANICAL OUTLINE**



R5

SYMBOL	DIMENSIONS			
	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.165	0.202	4.20	5.12
B	0.090	0.130	2.30	3.30
C	0.098	0.122	2.50	3.10
D	-	0.031	-	0.80
E	0.382	0.418	9.70	10.63
F	0.238	0.276	6.06	7.00
G	0.583	0.640	14.80	16.25
H	-	0.177	-	4.50
J	0.503	0.543	12.78	13.80
K	0.020	0.035	0.50	0.90
L	0.100		2.54	
M	0.100	0.140	2.55	3.55
N (DIA)	0.116	0.134	2.95	3.40
P	0.039	0.058	1.00	1.47

TO-220FP (REV: R5)

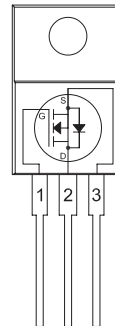
**LEAD CODE:**

- 1) Gate
- 2) Drain
- 3) Source

**MARKING CODE: CDMSJ**

**13.8-650**

**PIN CONFIGURATION**



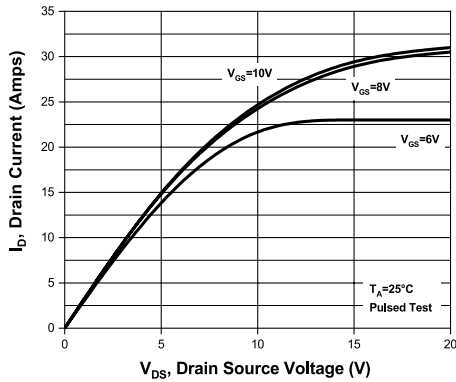
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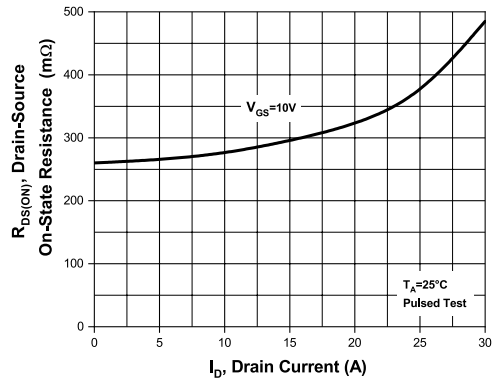


### TYPICAL ELECTRICAL CHARACTERISTICS

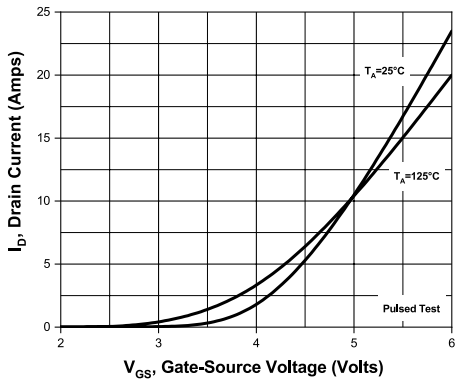
Typical Output Characteristics



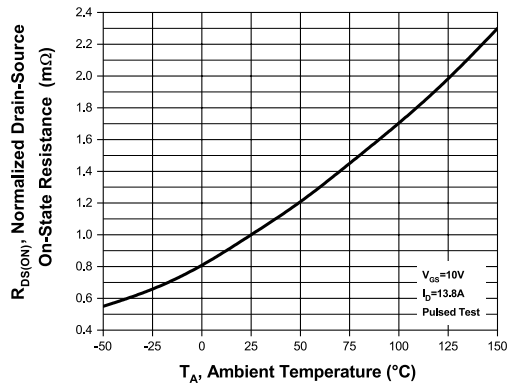
Drain Source On Resistance



Transfer Characteristics



Drain Source Temperature Coefficient

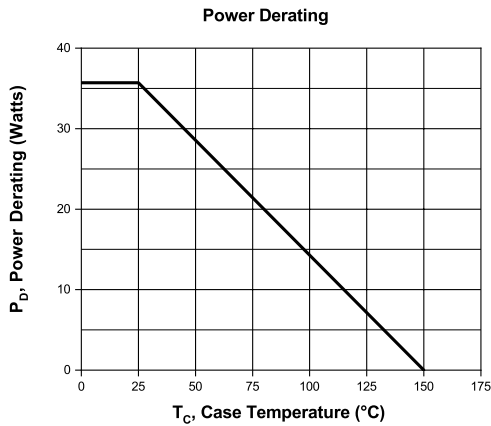
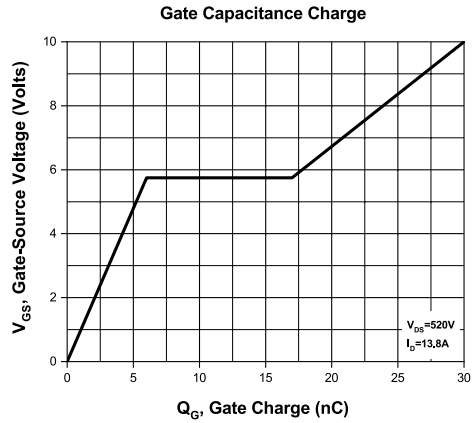
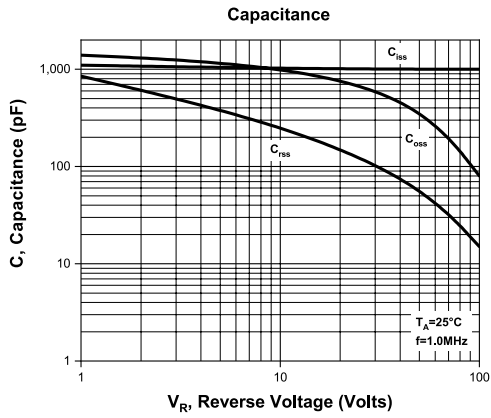


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### TYPICAL ELECTRICAL CHARACTERISTICS



## OUTSTANDING SUPPORT AND SUPERIOR SERVICES



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### PRODUCT SUPPORT

Central's operations team provides the highest level of support to insure product is delivered on-time.

- Supply management (Customer portals)
- Inventory bonding
- Consolidated shipping options
- Custom bar coding for shipments
- Custom product packing

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### DESIGNER SUPPORT/SERVICES

Central's applications engineering team is ready to discuss your design challenges. Just ask.

- Free quick ship samples (2<sup>nd</sup> day air)
- Online technical data and parametric search
- SPICE models
- Custom electrical curves
- Environmental regulation compliance
- Customer specific screening
- Up-screening capabilities
- Special wafer diffusions
- PbSn plating options
- Package details
- Application notes
- Application and design sample kits
- Custom product and package development

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### REQUESTING PRODUCT PLATING

1. If requesting Tin/Lead plated devices, add the suffix "TIN/LEAD" to the part number when ordering (example: 2N2222A TIN/LEAD).
2. If requesting Lead (Pb) Free plated devices, add the suffix "PBFREE" to the part number when ordering (example: 2N2222A PBFREE).

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### CONTACT US

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