



# CEP61A3/CEB61A3

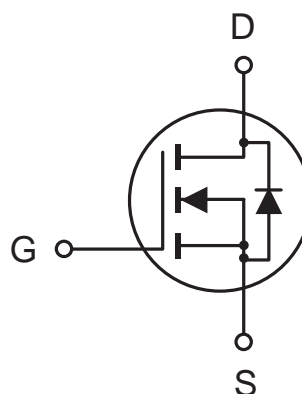
Jan. 2003

## N-Channel Logic Level Enhancement Mode Field Effect Transistor

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### FEATURES

- 30V , 60A ,  $R_{DS(ON)}=12m\Omega$  @  $V_{GS}=10V$ .  
 $R_{DS(ON)}=19m\Omega$  @  $V_{GS}=4.5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- TO-220 & TO-263 package.



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

| Parameter   | Symbol         | Limit      | Unit           |
|---|----------------|------------|----------------|
| Drain-Source Voltage  | $V_{DS}$       | 30         | V              |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$   | V              |
| Drain Current-Continuous<br>-Pulsed   | $I_D$          | 60         | A              |
|   | $I_{DM}$       | 180        | A              |
| Drain-Source Diode Forward Current  | $I_S$          | 60         | A              |
| Maximum Power Dissipation @ $T_c=25^{\circ}C$<br>Derate above $25^{\circ}C$ | $P_D$          | 75         | W              |
|   |                | 0.5        | W/ $^{\circ}C$ |
| Operating and Storage Temperature Range                                     | $T_J, T_{STG}$ | -65 to 175 | $^{\circ}C$    |

### THERMAL CHARACTERISTICS

|   |                 |      |               |
|---|-----------------|------|---------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 2    | $^{\circ}C/W$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5 | $^{\circ}C/W$ |

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## ELECTRICAL CHARACTERISTICS (Tc=25°C unless otherwise noted)

| Parameter                              | Symbol              | Condition   | Min | Typ <sup>c</sup> | Max  | Unit |
|--|---------------------|---|-----|------------------|------|------|
| OFF CHARACTERISTICS                    |                     |   |     |                  |      |      |
| Drain-Source Breakdown Voltage         | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA   | 30  |                  |      | V    |
| Zero Gate Voltage Drain Current        | I <sub>DSS</sub>    | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V   |     |                  | 1    | μA   |
| Gate-Body Leakage                      | I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V  |     |                  | ±100 | nA   |
| ON CHARACTERISTICS <sup>a</sup>        |                     |   |     |                  |      |      |
| Gate Threshold Voltage                 | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> 250μA  | 1   |                  | 3    | V    |
| Drain-Source On-State Resistance       | R <sub>DS(ON)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 26A   |     | 10               | 12   | mΩ   |
|  |                     | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 21A  |     | 15               | 19   | mΩ   |
| On-State Drain Current                 | I <sub>D(ON)</sub>  | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 10V  | 60  |                  |      | A    |
| Forward Transconductance               | g <sub>FS</sub>     | V <sub>DS</sub> = 10V, I <sub>D</sub> = 26A   |     | 34               |      | S    |
| DYNAMIC CHARACTERISTICS <sup>b</sup>   |                     |   |     |                  |      |      |
| Input Capacitance                      | C <sub>ISS</sub>    | V <sub>DS</sub> =15V, V <sub>GS</sub> = 0V<br>f =1.0MHz   |     | 1200             |      | pF   |
| Output Capacitance                     | C <sub>OSS</sub>    |   |     | 480              |      | pF   |
| Reverse Transfer Capacitance           | C <sub>RSS</sub>    |   |     | 130              |      | pF   |
| SWITCHING CHARACTERISTICS <sup>b</sup> |                     |   |     |                  |      |      |
| Turn-On Delay Time                     | t <sub>D(ON)</sub>  | V <sub>DD</sub> = 15V,<br>I <sub>D</sub> = 48A,<br>V <sub>GS</sub> = 10V<br>R <sub>GEN</sub> =24Ω |     | 16               | 30   | ns   |
| Rise Time                              | t <sub>r</sub>      |   |     | 28               | 50   | ns   |
| Turn-Off Delay Time                    | t <sub>D(OFF)</sub> |   |     | 40               | 90   | ns   |
| Fall Time                              | t <sub>f</sub>      |   |     | 73               | 130  | ns   |
| Total Gate Charge                      | Q <sub>g</sub>      | V <sub>DS</sub> = 15V,I <sub>D</sub> = 48A<br>V <sub>GS</sub> = 5V                                |     | 19               | 23   | nC   |
| Gate-Source Charge                     | Q <sub>gs</sub>     |   |     | 5                |      | nC   |
| Gate-Drain Charge                      | Q <sub>gd</sub>     |   |     | 9                |      | nC   |

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## ELECTRICAL CHARACTERISTICS ( $T_c=25^{\circ}\text{C}$ unless otherwise noted)

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| Parameter  | Symbol   | Condition                              | Min | Typ | Max | Unit |
|--|----------|--|-----|-----|-----|------|
| <b>DRAIN-SOURCE DIODE CHARACTERISTICS <sup>a</sup></b> |          |  |     |     |     |      |
| Diode Forward Voltage                                  | $V_{SD}$ | $V_{GS} = 0\text{V}, I_S = 26\text{A}$ |     | 0.9 | 1.3 | V    |

### Notes

a. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

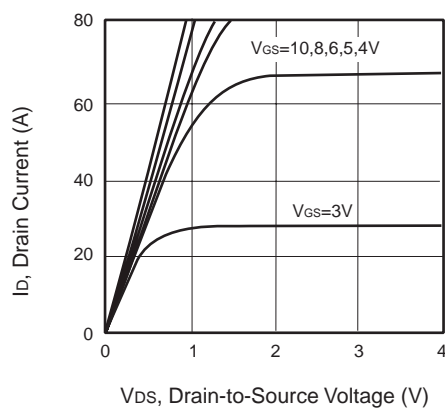


Figure 1. Output Characteristics

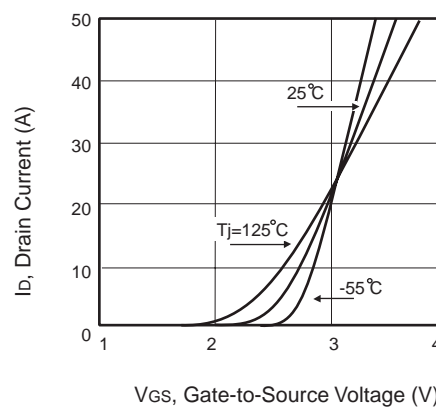


Figure 2. Transfer Characteristics

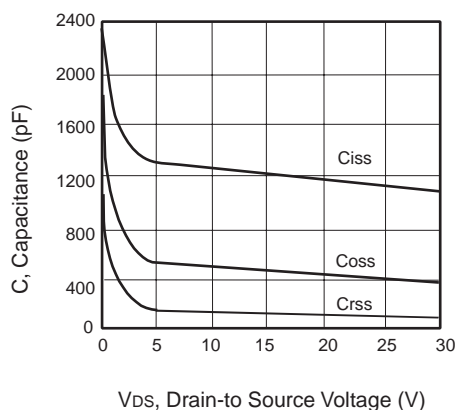


Figure 3. Capacitance

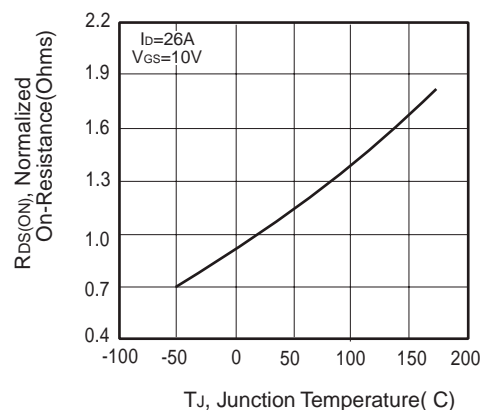
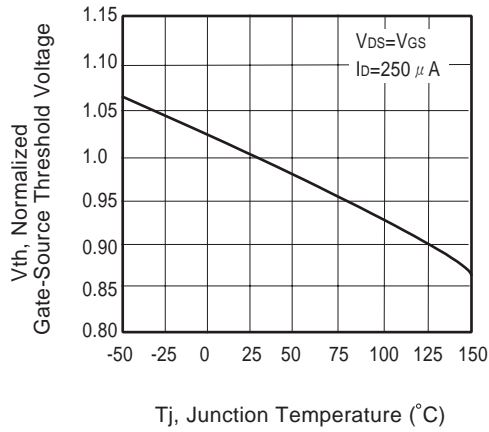


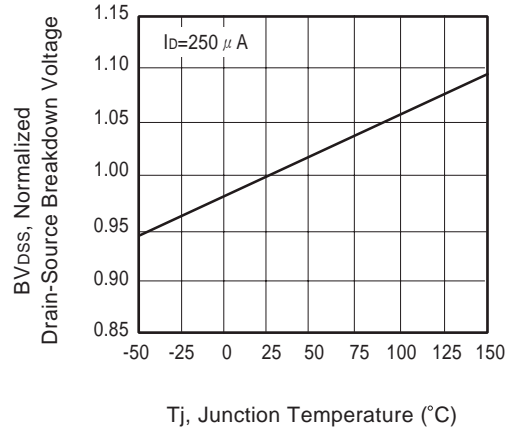
Figure 4. On-Resistance Variation with Temperature

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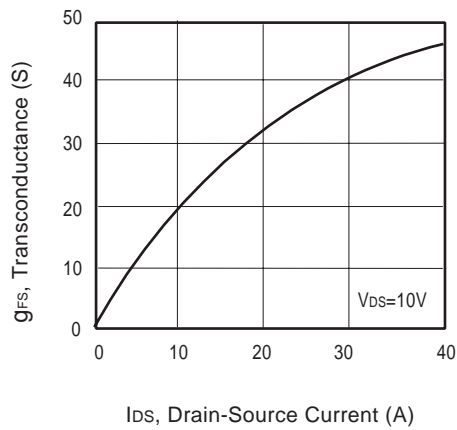
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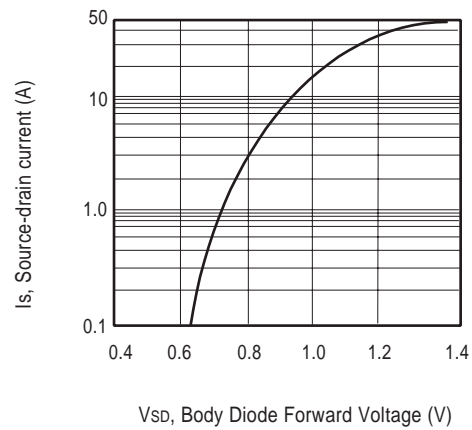
**Figure 5. Gate Threshold Variation with Temperature**



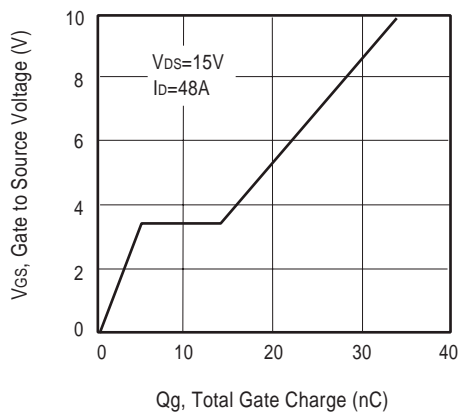
**Figure 6. Breakdown Voltage Variation with Temperature**



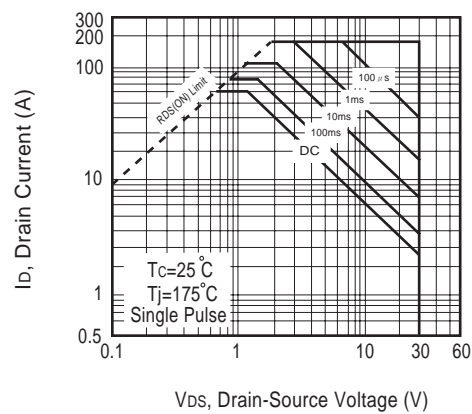
**Figure 7. Transconductance Variation with Drain Current**



**Figure 8. Body Diode Forward Voltage Variation with Source Current**



**Figure 9. Gate Charge**



**Figure 10. Maximum Safe Operating Area**

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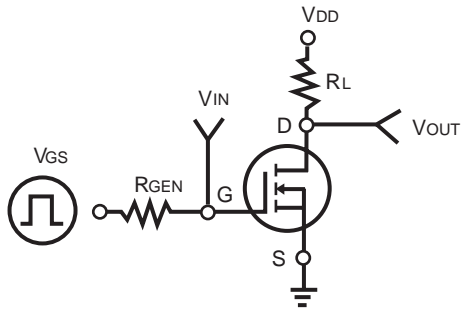


Figure 11. Switching Test Circuit

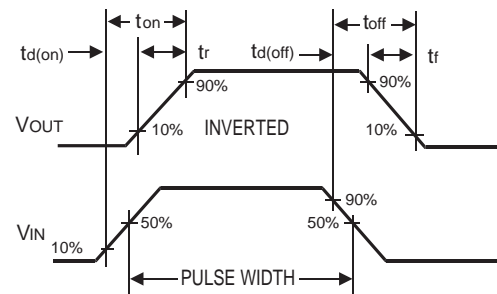


Figure 12. Switching Waveforms

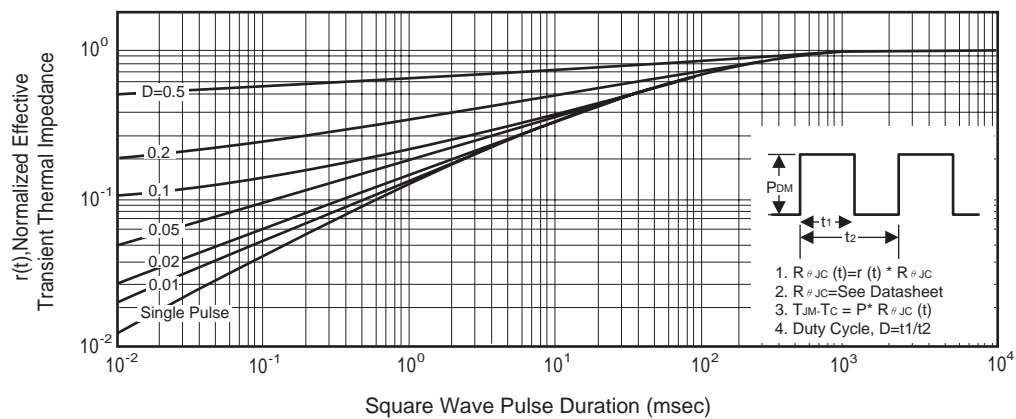


Figure 13. Normalized Thermal Transient Impedance Curve