

# CEPF630/CEBF630

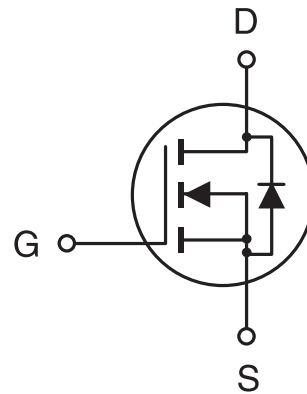
March 1998

## N-Channel Enhancement Mode Field Effect Transistor

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### FEATURES

- 200V , 10A ,  $R_{DS(ON)}=400m\Omega$  @VGS=10V.
- 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 ( $T_c=25^\circ\text{C}$ unless otherwise noted)

| Parameter   | Symbol         | Limit      | Unit                |
|---|----------------|------------|---------------------|
| Drain-Source Voltage  | $V_{DS}$       | 200        | V                   |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$   | V                   |
| Drain Current-Continuous<br>-Pulsed   | $I_D$          | 10         | A                   |
|   | $I_{DM}$       | 40         | A                   |
| Drain-Source Diode Forward Current  | $I_S$          | 10         | A                   |
| Maximum Power Dissipation @ $T_c=25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 75         | W                   |
|   |                | 0.6        | W/ $^\circ\text{C}$ |
| Operating and Storage Temperature Range   | $T_J, T_{STG}$ | -65 to 150 | $^\circ\text{C}$    |

### THERMAL CHARACTERISTICS

|   |                 |      |                    |
|---|-----------------|------|--------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 1.5  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5 | $^\circ\text{C/W}$ |

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## ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C unless otherwise noted)

| Parameter                                    | Symbol              | Condition   | Min | Typ | Max  | Unit |
|--|---------------------|---|-----|-----|------|------|
| <b>OFF CHARACTERISTICS</b>                   |                     |   |     |     |      |      |
| Drain-Source Breakdown Voltage               | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA  | 200 |     |      | V    |
| Zero Gate Voltage Drain Current              | I <sub>DSS</sub>    | V <sub>DS</sub> =160V, V <sub>GS</sub> =0V  |     |     | 25   | μA   |
| Gate-Body Leakage                            | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V  |     |     | ±100 | nA   |
| <b>ON CHARACTERISTICS<sup>a</sup></b>        |                     |   |     |     |      |      |
| Gate Threshold Voltage                       | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA  | 2   | 2.9 | 4    | V    |
| Drain-Source On-State Resistance             | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =5A  |     | 265 | 400  | mΩ   |
| On-State Drain Current                       | I <sub>D(ON)</sub>  | V <sub>GS</sub> =10V, V <sub>DS</sub> =10V  | 10  |     |      | A    |
| Forward Transconductance                     | g <sub>FS</sub>     | V <sub>DS</sub> =10V, I <sub>D</sub> =5A  | 3   | 6   |      | S    |
| <b>DYNAMIC CHARACTERISTICS<sup>b</sup></b>   |                     |   |     |     |      |      |
| Input Capacitance                            | C <sub>ISS</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V<br>f=1.0MHz   |     | 646 | 800  | pF   |
| Output Capacitance                           | C <sub>OSS</sub>    |   |     | 105 | 140  | pF   |
| Reverse Transfer Capacitance                 | C <sub>RSS</sub>    |   |     | 36  | 50   | pF   |
| <b>SWITCHING CHARACTERISTICS<sup>b</sup></b> |                     |   |     |     |      |      |
| Turn-On Delay Time                           | t <sub>D(ON)</sub>  | V <sub>DD</sub> =100V,<br>I <sub>D</sub> =5A,<br>V <sub>GS</sub> =10V,<br>R <sub>GEN</sub> =50Ω |     | 50  | 60   | ns   |
| Rise Time                                    | t <sub>r</sub>      |   |     | 80  | 120  | ns   |
| Turn-Off Delay Time                          | t <sub>D(OFF)</sub> |   |     | 55  | 80   | ns   |
| Fall Time                                    | t <sub>f</sub>      |   |     | 40  | 50   | ns   |
| Total Gate Charge                            | Q <sub>g</sub>      | V <sub>DS</sub> =160V, I <sub>D</sub> =5.9A,<br>V <sub>GS</sub> =10V                            |     | 25  | 60   | nC   |
| Gate-Source Charge                           | Q <sub>gs</sub>     |   |     | 5   |      | nC   |
| Gate-Drain Charge                            | Q <sub>gd</sub>     |   |     | 7   |      | nC   |

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| Parameter   | Symbol   | Condition                | Min | Typ | Max | Unit |
|---|----------|--------------------------|-----|-----|-----|------|
| <b>DRAIN-SOURCE DIODE CHARACTERISTICS<sup>a</sup></b> |          |                          |     |     |     |      |
| Diode Forward Voltage                                 | $V_{SD}$ | $V_{GS} = 0V, I_s = 10A$ |     | 0.9 | 1.5 | V    |

### Notes

- a. Pulse Test: Pulse Width  $\leq 300 \mu s$ , Duty Cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

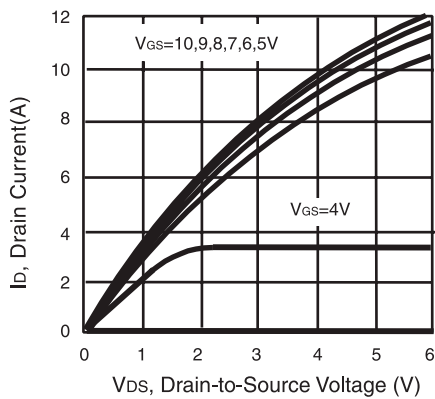


Figure 1. Output Characteristics

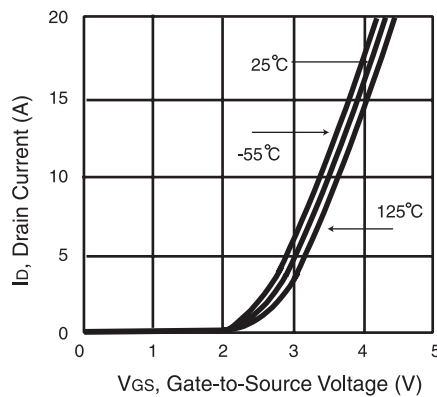


Figure 2. Transfer Characteristics

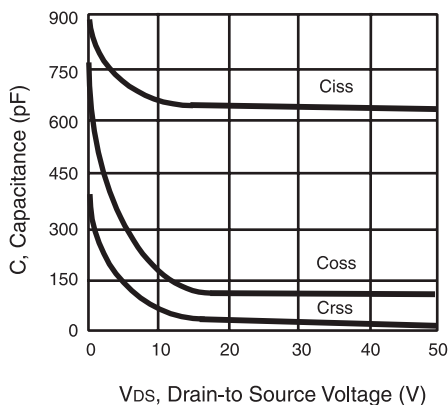


Figure 3. Capacitance

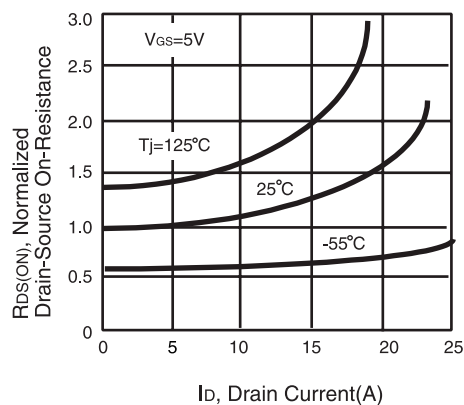
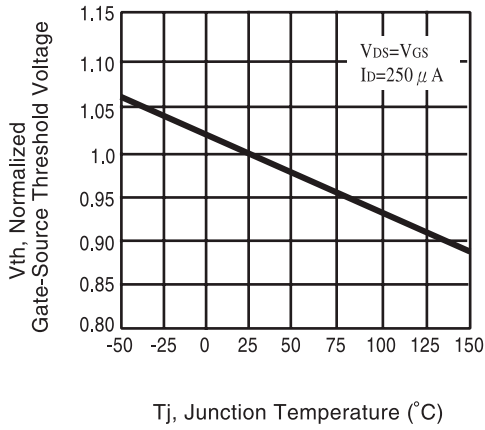


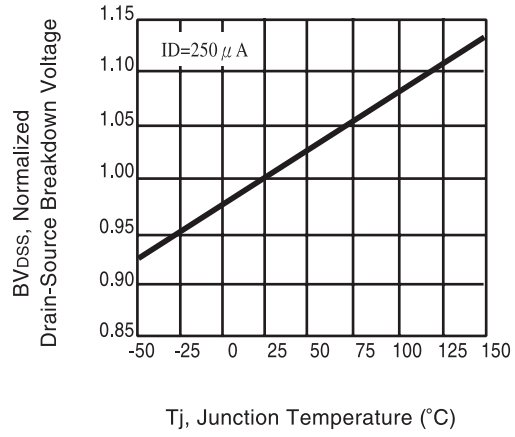
Figure 4. On-Resistance Variation with Drain Current and Temperature

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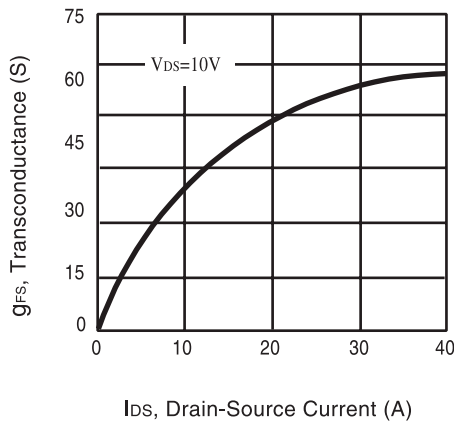
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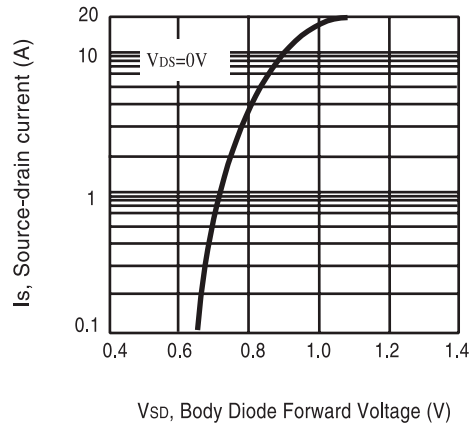
**Figure 5. Gate Threshold Variation with Temperature**



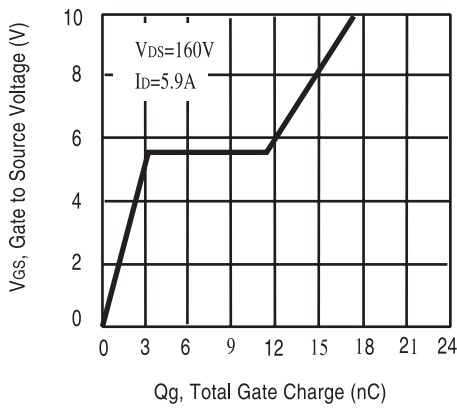
**Figure 6. Breakdown Voltage Variation with Temperature**



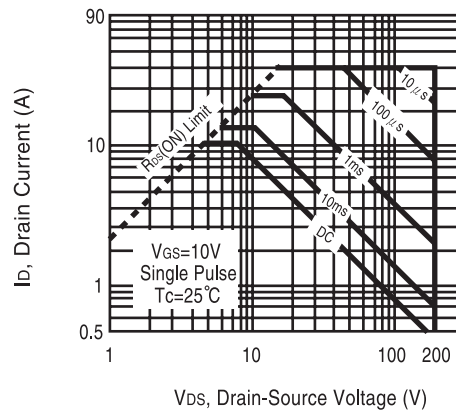
**Figure 7. Transconductance Variation with Drain Current**



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



**Figure 9. Gate Charge**



**Figure 10. Maximum Safe Operating Area**

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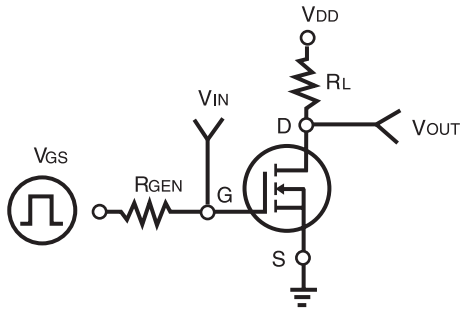


Figure 11. Switching Test Circuit

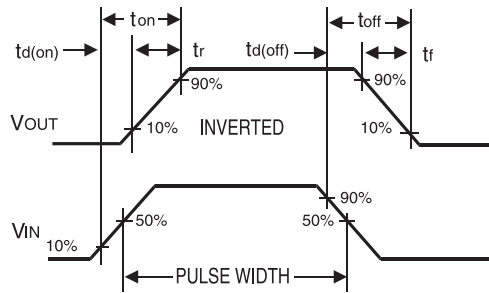


Figure 12. Switching Waveforms

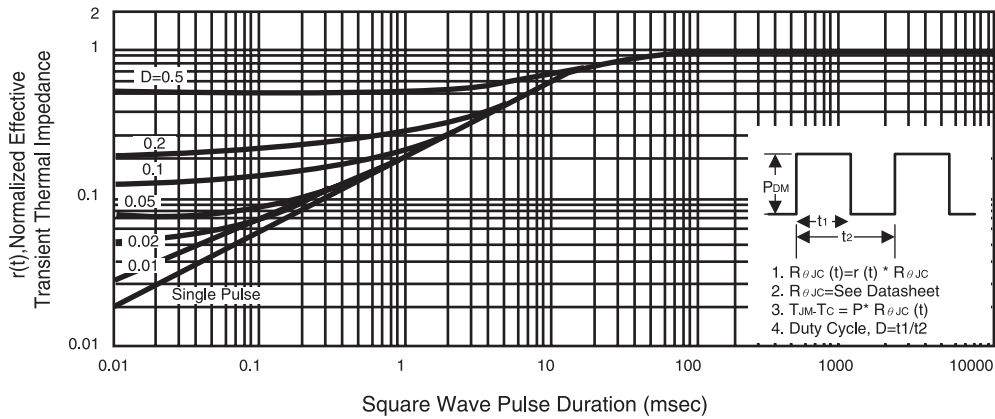


Figure 13. Normalized Thermal Transient Impedance Curve