



# CEM8433

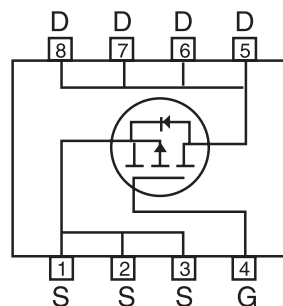
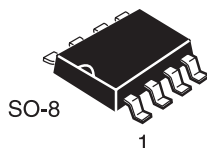
March 1998

## P-Channel Enhancement Mode Field Effect Transistor

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### FEATURES

- -20V , -5.2A ,  $R_{DS(ON)}=55m\Omega$  @  $V_{GS}=-4.5V$ .  
 $R_{DS(ON)}=95m\Omega$  @  $V_{GS}=-2.5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handing capability.
- Surface Mount Package.



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

| Parameter  | Symbol         | Limit      | Unit        |
|--|----------------|------------|-------------|
| Drain-Source Voltage   | $V_{DS}$       | -20        | V           |
| Gate-Source Voltage  | $V_{GS}$       | $\pm 8$    | V           |
| Drain Current-Continuous <sup>a</sup> @ $T_J=125^{\circ}C$<br>-Pulsed <sup>b</sup> | $I_D$          | $\pm 5.2$  | A           |
|  | $I_{DM}$       | $\pm 20$   | A           |
| Drain-Source Diode Forward Current <sup>a</sup>                                    | $I_S$          | -2.1       | A           |
| Maximum Power Dissipation <sup>a</sup>   | $P_D$          | 2.5        | W           |
| Operating Junction and Storage Temperature Range                                   | $T_J, T_{STG}$ | -55 to 150 | $^{\circ}C$ |

### THERMAL CHARACTERISTICS

|  |                 |    |               |
|--|-----------------|----|---------------|
| Thermal Resistance, Junction-to-Ambient <sup>a</sup> | $R_{\theta JA}$ | 50 | $^{\circ}C/W$ |
|--|-----------------|----|---------------|

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

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| Parameter                                    | Symbol              | Condition   | Min  | Typ <sup>c</sup> | Max  | Unit |
|--|---------------------|---|------|------------------|------|------|
| <b>OFF CHARACTERISTICS</b>                   |                     |   |      |                  |      |      |
| Drain-Source Breakdown Voltage               | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA   | -20  |                  |      | V    |
| Zero Gate Voltage Drain Current              | I <sub>DSS</sub>    | V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V  |      |                  | -1   | μA   |
| Gate-Body Leakage                            | I <sub>GSS</sub>    | V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V   |      |                  | ±100 | nA   |
| <b>ON CHARACTERISTICS<sup>b</sup></b>        |                     |   |      |                  |      |      |
| Gate Threshold Voltage                       | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                       | -0.4 | -0.8             | -1   | V    |
| Drain-Source On-State Resistance             | R <sub>DS(ON)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5.2A   |      | 49               | 55   | mΩ   |
|  |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.0A   |      | 91               | 95   | mΩ   |
| On-State Drain Current                       | I <sub>D(ON)</sub>  | V <sub>DS</sub> =-5V, V <sub>GS</sub> =-4.5V  | -10  |                  |      | A    |
| Forward Transconductance                     | g <sub>FS</sub>     | V <sub>DS</sub> =-10V, I <sub>D</sub> =-5.2A  |      | 9                |      | S    |
| <b>DYNAMIC CHARACTERISTICS<sup>c</sup></b>   |                     |   |      |                  |      |      |
| Input Capacitance                            | C <sub>ISS</sub>    | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V<br>f=1.0MHz  |      | 1420             | 2000 | pF   |
| Output Capacitance                           | C <sub>OSS</sub>    |   |      | 670              | 1000 | pF   |
| Reverse Transfer Capacitance                 | C <sub>RSS</sub>    |   |      | 210              | 600  | pF   |
| <b>SWITCHING CHARACTERISTICS<sup>c</sup></b> |                     |   |      |                  |      |      |
| Turn-On Delay Time                           | t <sub>D(ON)</sub>  | V <sub>D</sub> =-5V,<br>I <sub>D</sub> =-1A,<br>V <sub>GS</sub> =-4.5V,<br>R <sub>GEN</sub> =6Ω |      | 12               | 30   | ns   |
| Rise Time                                    | t <sub>r</sub>      |   |      | 45               | 60   | ns   |
| Turn-Off Delay Time                          | t <sub>D(OFF)</sub> |   |      | 70               | 150  | ns   |
| Fall Time                                    | t <sub>f</sub>      |   |      | 30               | 80   | ns   |
| Total Gate Charge                            | Q <sub>g</sub>      | V <sub>DS</sub> =-5V, I <sub>D</sub> =-5.2A,<br>V <sub>GS</sub> =-4.5V                          |      | 25               | 40   | nC   |
| Gate-Source Charge                           | Q <sub>gs</sub>     |   |      | 4                |      | nC   |
| Gate-Drain Charge                            | Q <sub>gd</sub>     |   |      | 8                |      | nC   |

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

| Parameter   | Symbol   | Condition                                | Min | Typ <sup>c</sup> | Max  | Unit |
|---|----------|--|-----|------------------|------|------|
| <b>DRAIN-SOURCE DIODE CHARACTERISTICS<sup>b</sup></b> |          |  |     |                  |      |      |
| Diode Forward Voltage                                 | $V_{SD}$ | $V_{GS} = 0\text{V}, I_S = -2.1\text{A}$ |     | -0.7             | -1.2 | V    |

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### Notes

- Surface Mounted on FR4 Board,  $t \leq 10\text{sec}$ .
- Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

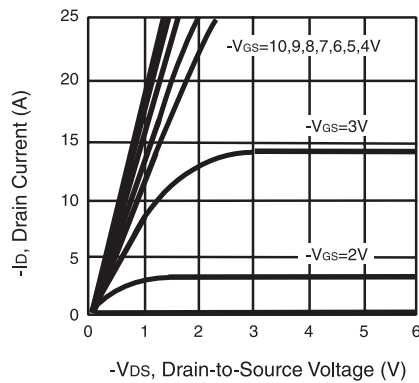


Figure 1. Output Characteristics

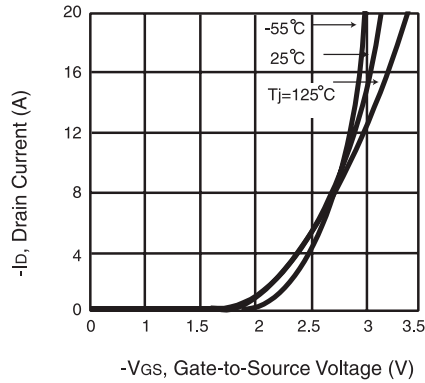


Figure 2. Transfer Characteristics

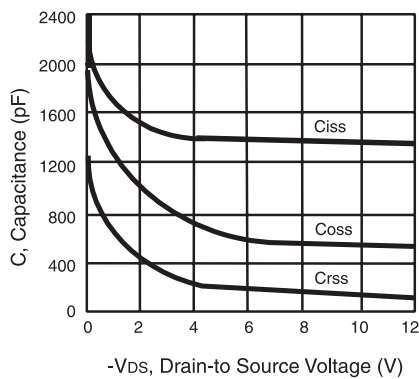


Figure 3. Capacitance

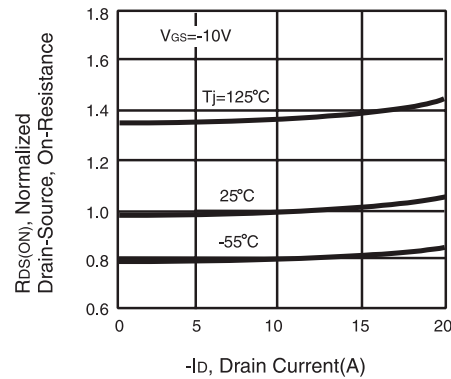
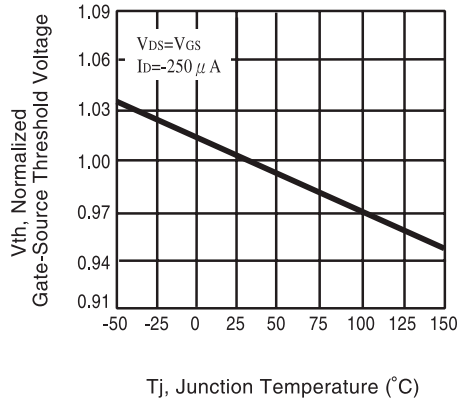


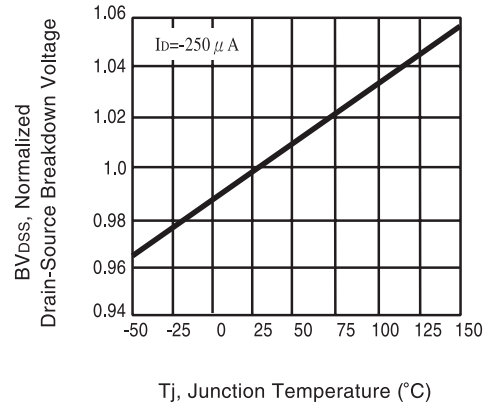
Figure 4. On-Resistance Variation with Drain Current and Temperature

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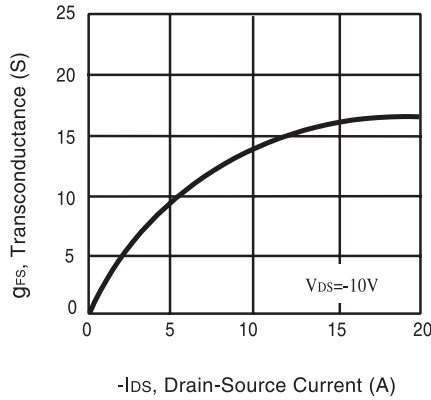
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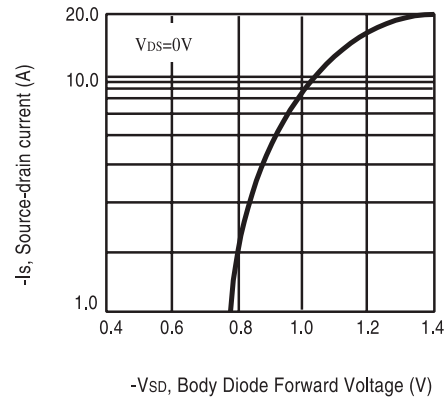
**Figure 5. Gate Threshold Variation with Temperature**



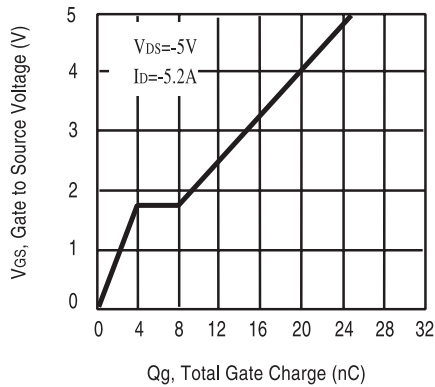
**Figure 6. Breakdown Voltage Variation with Temperature**



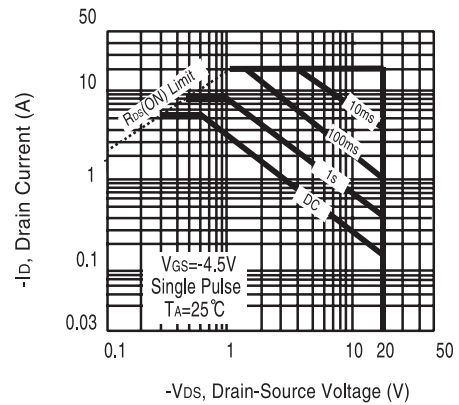
**Figure 7. Transconductance Variation with Drain Current**



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



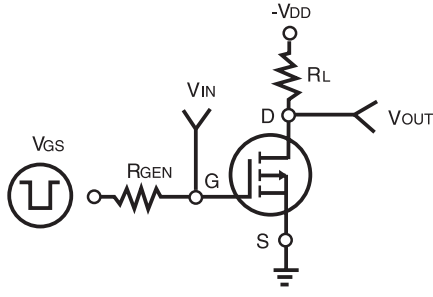
**Figure 9. Gate Charge**



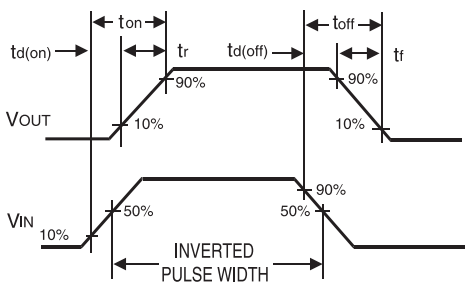
**Figure 10. Maximum Safe Operating Area**

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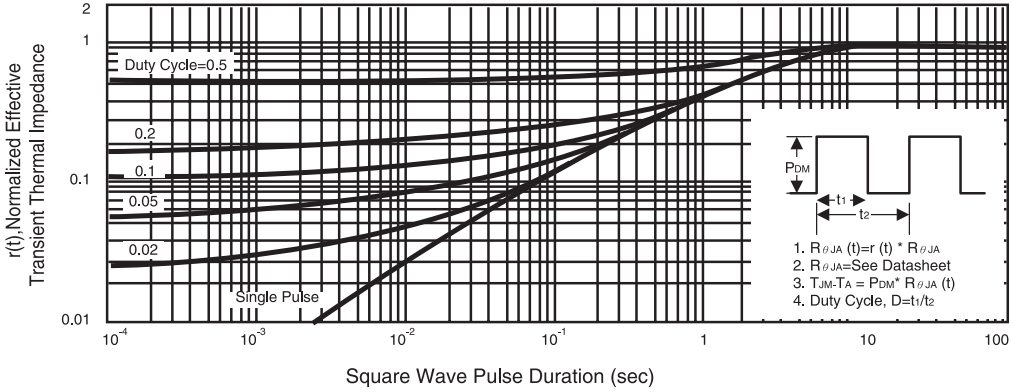
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**Figure 11. Switching Test Circuit**



**Figure 12. Switching Waveforms**



**Figure 13. Normalized Thermal Transient Impedance Curve**