

## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 700V, 3.5A,  $R_{DS(ON)} = 3.3\Omega$  @  $V_{GS} = 10V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- Lead free product is acquired.
- TO-251 & TO-252 package.



### ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ\text{C}$ unless otherwise noted

| Parameter   | Symbol         | Limit      | Units               |
|---|----------------|------------|---------------------|
| Drain-Source Voltage  | $V_{DS}$       | 700        | V                   |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 30$   | V                   |
| Drain Current-Continuous  | $I_D$          | 3.5        | A                   |
| Drain Current-Pulsed <sup>a</sup>   | $I_{DM}$       | 14         | A                   |
| Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$<br>- Derate above $25^\circ\text{C}$ | $P_D$          | 56         | W                   |
|   |                | 0.45       | W/ $^\circ\text{C}$ |
| Single Pulsed Avalanche Energy <sup>e</sup>   | $E_{AS}$       | 43         | mJ                  |
| Single Pulsed Avalanche Current <sup>e</sup>  | $I_{AS}$       | 3.5        | A                   |
| Operating and Store Temperature Range   | $T_J, T_{stg}$ | -55 to 150 | $^\circ\text{C}$    |

### Thermal Characteristics

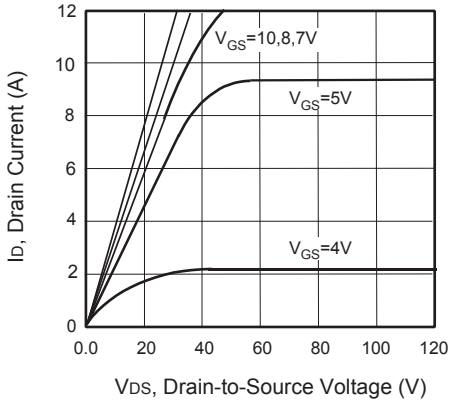
| Parameter                               | Symbol          | Limit | Units              |
|---|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 2.2   | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 50    | $^\circ\text{C/W}$ |



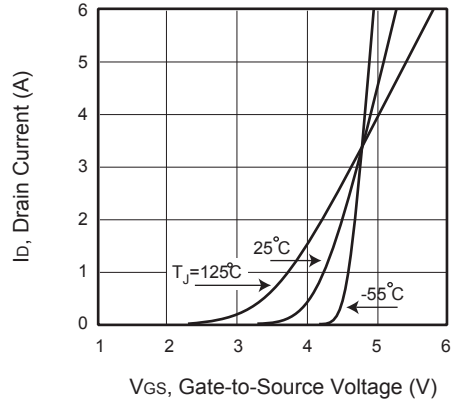
# CED04N7G/CEU04N7G

## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

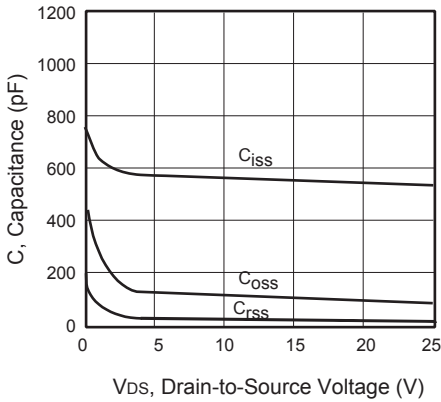
| Parameter   | Symbol       | Test Condition  | Min | Typ  | Max  | Units    |
|---|--------------|---|-----|------|------|----------|
| <b>Off Characteristics</b>  |              |   |     |      |      |          |
| Drain-Source Breakdown Voltage  | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                               | 700 |      |      | V        |
| Zero Gate Voltage Drain Current   | $I_{DSS}$    | $V_{DS} = 700V, V_{GS} = 0V$                                |     |      | 25   | $\mu A$  |
| Gate Body Leakage Current, Forward  | $I_{GSSF}$   | $V_{GS} = 30V, V_{DS} = 0V$                                 |     |      | 100  | nA       |
| Gate Body Leakage Current, Reverse  | $I_{GSSR}$   | $V_{GS} = -30V, V_{DS} = 0V$                                |     |      | -100 | nA       |
| <b>On Characteristics<sup>b</sup></b>   |              |   |     |      |      |          |
| Gate Threshold Voltage  | $V_{GS(th)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$                           | 2   |      | 4    | V        |
| Static Drain-Source On-Resistance   | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 1.8A$                                  |     | 2.5  | 3.3  | $\Omega$ |
| <b>Dynamic Characteristics<sup>c</sup></b>  |              |   |     |      |      |          |
| Input Capacitance   | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{ MHz}$             |     | 595  |      | pF       |
| Output Capacitance  | $C_{oss}$    |   |     | 80   |      | pF       |
| Reverse Transfer Capacitance  | $C_{rss}$    |   |     | 20   |      | pF       |
| <b>Switching Characteristics<sup>c</sup></b>  |              |   |     |      |      |          |
| Turn-On Delay Time  | $t_{d(on)}$  | $V_{DD} = 300V, I_D = 4A, V_{GS} = 10V, R_{GEN} = 25\Omega$ |     | 18   | 36   | ns       |
| Turn-On Rise Time   | $t_r$        |   |     | 17   | 34   | ns       |
| Turn-Off Delay Time   | $t_{d(off)}$ |   |     | 40.5 | 81   | ns       |
| Turn-Off Fall Time  | $t_f$        |   |     | 19   | 38   | ns       |
| Total Gate Charge   | $Q_g$        | $V_{DS} = 480V, I_D = 4A, V_{GS} = 10V$                     |     | 14   | 18.2 | nC       |
| Gate-Source Charge  | $Q_{gs}$     |   |     | 3    |      | nC       |
| Gate-Drain Charge   | $Q_{gd}$     |   |     | 6    |      | nC       |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b>   |              |   |     |      |      |          |
| Drain-Source Diode Forward Current  | $I_S$        |   |     |      | 3.5  | A        |
| Drain-Source Diode Forward Voltage <sup>b</sup>   | $V_{SD}$     | $V_{GS} = 0V, I_S = 3.5A$                                   |     |      | 1.5  | V        |
| <b>Notes :</b> □<br>a.Repetitive Rating : Pulse width limited by maximum junction temperature.□<br>b.Device Mounted on FR4 Board, $t < 10\text{ sec.}$ □<br>c.Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ .□<br>d.Guaranteed by design, not subject to production testing.□<br>e.L = 7mH, $I_{AS} = 3.5A, V_{DD} = 50V, R_G = 25\Omega$ , Starting $T_J = 25\text{ C}$ □ |              |   |     |      |      |          |



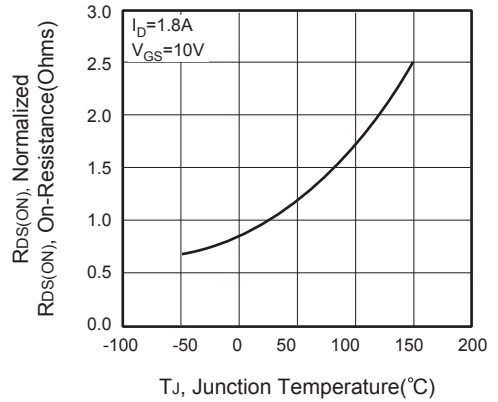
**Figure 1. Output Characteristics**



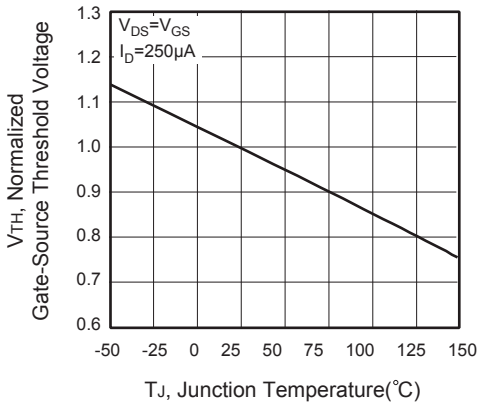
**Figure 2. Transfer Characteristics**



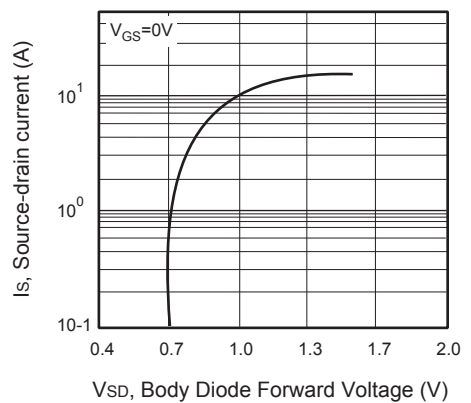
**Figure 3. Capacitance**



**Figure 4. On-Resistance Variation with Temperature**



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



**Figure 6. Body Diode Forward Voltage Variation with Source Current**

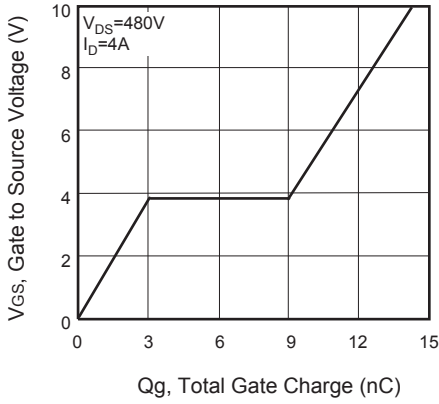


Figure 7. Gate Charge

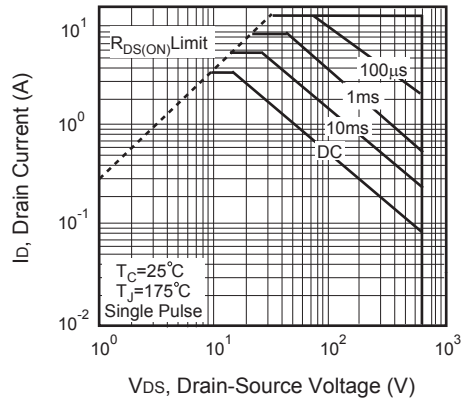


Figure 8. Maximum Safe Operating Area



Figure 9. Switching Test Circuit



Figure 10. Switching Waveforms

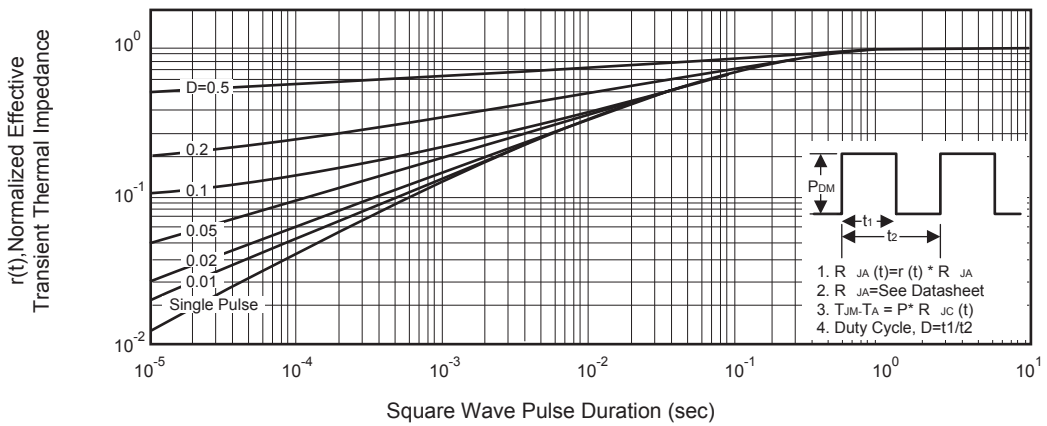


Figure 11. Normalized Thermal Transient Impedance Curve