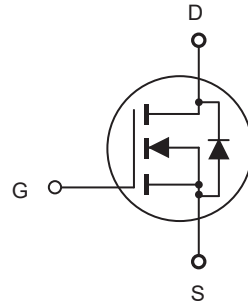


## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 120V, 84A,  $R_{DS(ON)} = 7m\Omega$  @  $V_{GS} = 10V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- Pb-free lead plating ; RoHS compliant.
- Halogen Free.
- TO-251 & TO-252 package.



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

| Parameter   | Symbol         | Limit      | Units               |
|---|----------------|------------|---------------------|
| Drain-Source Voltage  | $V_{DS}$       | 120        | V                   |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$   | V                   |
| Drain Current-Continuous @ $T_C = 25^\circ\text{C}$<br>@ $T_C = 100^\circ\text{C}$        | $I_D$          | 84         | A                   |
|   |                | 53         | A                   |
| Drain Current-Pulsed <sup>a</sup>   | $I_{DM}$       | 336        | A                   |
| Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$<br>- Derate above $25^\circ\text{C}$ | $P_D$          | 89         | W                   |
|   |                | 0.7        | W/ $^\circ\text{C}$ |
| Single Pulsed Avalanche Energy <sup>d</sup>   | $E_{AS}$       | 180.5      | mJ                  |
| Single Pulsed Avalanche Current <sup>d</sup>  | $I_{AS}$       | 19         | A                   |
| Operating and Store Temperature Range   | $T_J, T_{stg}$ | -55 to 150 | $^\circ\text{C}$    |

### Thermal Characteristics

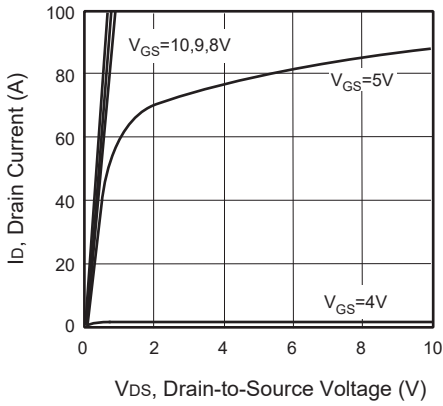
| Parameter                               | Symbol          | Limit | Units              |
|---|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 1.4   | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 50    | $^\circ\text{C/W}$ |



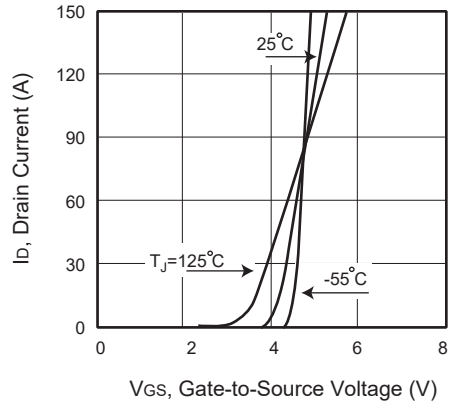
# CED100N12/CEU100N12

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

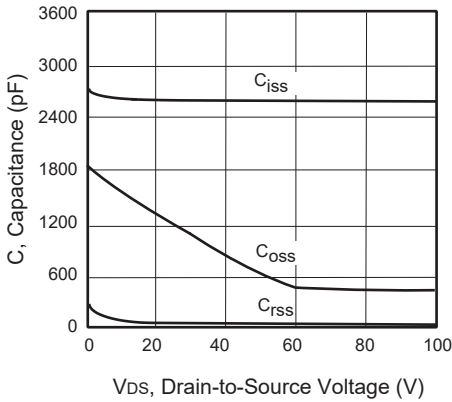
| Parameter   | Symbol       | Test Condition  | Min | Typ  | Max  | Units     |
|---|--------------|---|-----|------|------|-----------|
| <b>Off Characteristics</b>  |              |   |     |      |      |           |
| Drain-Source Breakdown Voltage  | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                               | 120 |      |      | V         |
| Zero Gate Voltage Drain Current   | $I_{DSS}$    | $V_{DS} = 120V, V_{GS} = 0V$                                |     |      | 1    | $\mu A$   |
| Gate Body Leakage Current, Forward  | $I_{GSSF}$   | $V_{GS} = 20V, V_{DS} = 0V$                                 |     |      | 100  | nA        |
| Gate Body Leakage Current, Reverse  | $I_{GSSR}$   | $V_{GS} = -20V, V_{DS} = 0V$                                |     |      | -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   | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 20A$                                   |     | 6    | 7    | $m\Omega$ |
| <b>Dynamic Characteristics<sup>c</sup></b>  |              |   |     |      |      |           |
| Input Capacitance   | $C_{iss}$    | $V_{DS} = 60V, V_{GS} = 0V, f = 1.0\text{ MHz}$             |     | 2590 |      | pF        |
| Output Capacitance  | $C_{oss}$    |   |     | 420  |      | pF        |
| Reverse Transfer Capacitance  | $C_{rss}$    |   |     | 15   |      | pF        |
| <b>Switching Characteristics<sup>c</sup></b>  |              |   |     |      |      |           |
| Turn-On Delay Time  | $t_{d(on)}$  | $V_{DD} = 60V, I_D = 20A, V_{GS} = 10V, R_{GEN} = 10\Omega$ |     | 36   |      | ns        |
| Turn-On Rise Time   | $t_r$        |   |     | 17   |      | ns        |
| Turn-Off Delay Time   | $t_{d(off)}$ |   |     | 65   |      | ns        |
| Turn-Off Fall Time  | $t_f$        |   |     | 23   |      | ns        |
| Total Gate Charge   | $Q_g$        | $V_{DS} = 60V, I_D = 20A, V_{GS} = 10V$                     |     | 45   |      | nC        |
| Gate-Source Charge  | $Q_{gs}$     |   |     | 13   |      | nC        |
| Gate-Drain Charge   | $Q_{gd}$     |   |     | 10   |      | nC        |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b>   |              |   |     |      |      |           |
| Drain-Source Diode Forward Current  | $I_S$        |   |     |      | 74   | A         |
| Drain-Source Diode Forward Voltage <sup>b</sup>   | $V_{SD}$     | $V_{GS} = 0V, I_S = 20A$                                    |     |      | 1.2  | V         |
| <b>Notes :</b><br>a. Repetitive Rating : Pulse width limited by maximum junction temperature.<br>b. Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ .<br>c. Guaranteed by design, not subject to production testing.<br>d. L = 1mH, $I_{AS} = 19A, V_{DD} = 50V, R_G = 25\Omega$ , Starting $T_J = 25^\circ\text{C}$ . |              |   |     |      |      |           |



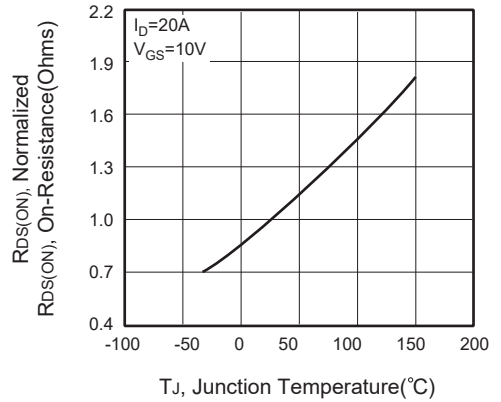
**Figure 1. Output Characteristics**



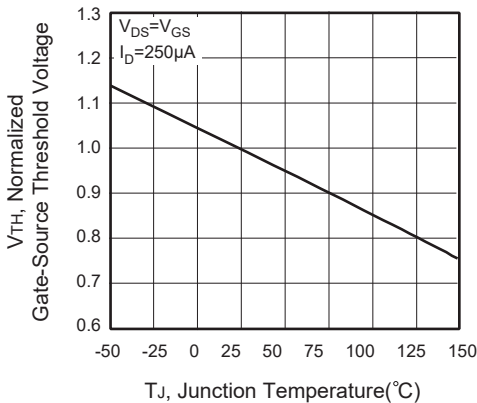
**Figure 2. Transfer Characteristics**



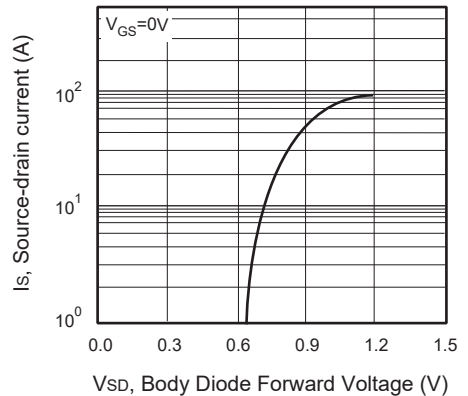
**Figure 3. Capacitance**



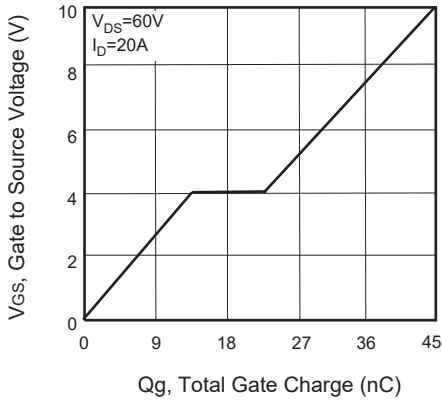
**Figure 4. On-Resistance Variation with Temperature**



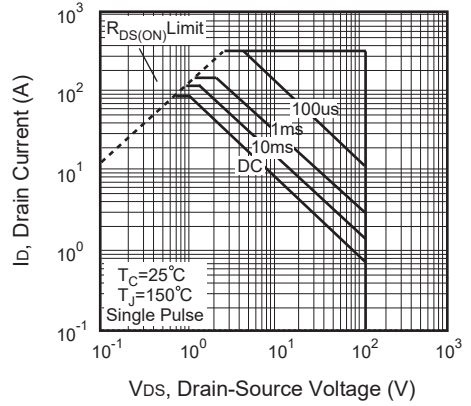
**Figure 5. Gate Threshold Variation with Temperature**



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



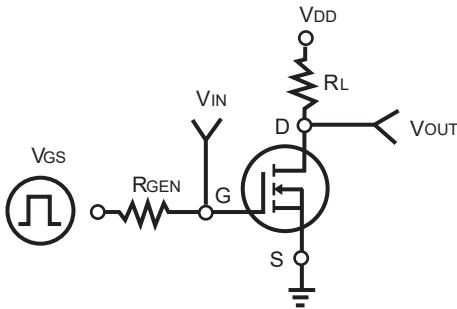
**Figure 7. Gate Charge**



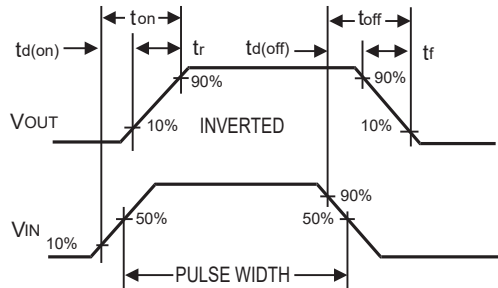
**Figure 8. Maximum Safe Operating Area**



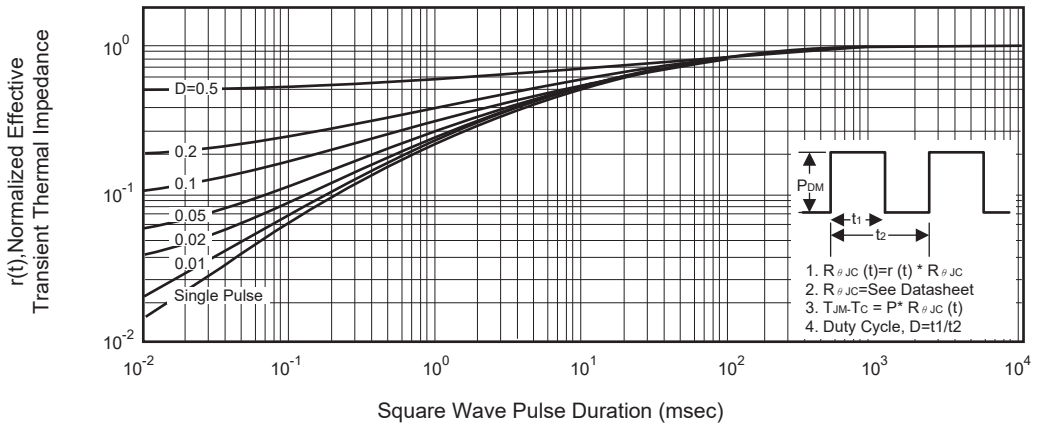
**Figure 9. Breakdown Voltage Variation VS Temperature**



**Figure 10. Switching Test Circuit**



**Figure 11. Switching Waveforms**



**Figure 12. Normalized Thermal Transient Impedance Curve**