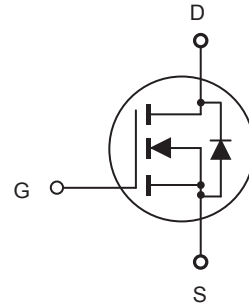


## N-Channel Enhancement Mode Field Effect Transistor

PRELIMINARY

### FEATURES

- 80V, 30A,  $R_{DS(ON)} = 30m\Omega$  @  $V_{GS} = 10V$ .  
 $R_{DS(ON)} = 38m\Omega$  @  $V_{GS} = 4.5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- Lead-free plating ; RoHS compliant.
- TO-251 & TO-252 package.



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

| Parameter   | Symbol         | Limit      | Units         |
|---|----------------|------------|---------------|
| Drain-Source Voltage  | $V_{DS}$       | 80         | V             |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$   | V             |
| Drain Current-Continuous @ $T_C = 25^\circ C$<br>@ $T_C = 100^\circ C$        | $I_D$          | 30         | A             |
|   |                | 19.5       | A             |
| Drain Current-Pulsed <sup>a</sup>   | $I_{DM}$       | 120        | A             |
| Maximum Power Dissipation @ $T_C = 25^\circ C$<br>- Derate above $25^\circ C$ | $P_D$          | 57.7       | W             |
|   |                | 0.38       | W/ $^\circ C$ |
| Single Pulsed Avalanche Energy <sup>e</sup>                                   | $E_{AS}$       | 100        | mJ            |
| Single Pulsed Avalanche Current <sup>e</sup>                                  | $I_{AS}$       | 20         | A             |
| Operating and Store Temperature Range   | $T_J, T_{stg}$ | -55 to 150 | $^\circ C$    |

### Thermal Characteristics

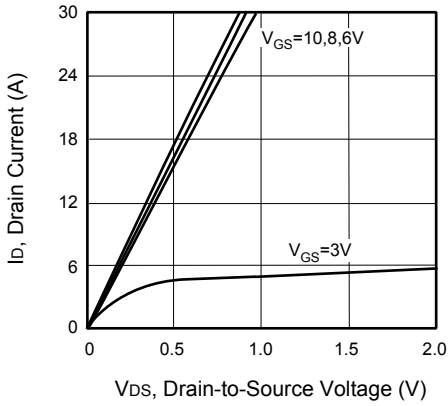
| Parameter                               | Symbol          | Limit | Units        |
|---|-----------------|-------|--------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 2.2   | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 50    | $^\circ C/W$ |



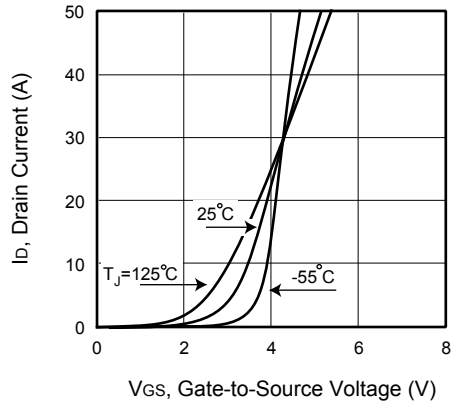
# CED30N08/CEU30N08

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

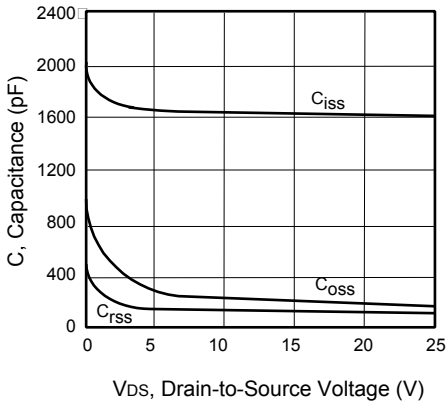
| Parameter  | Symbol       | Test Condition  | Min | Typ  | Max  | Units     |
|--|--------------|---|-----|------|------|-----------|
| <b>Off Characteristics</b>   |              |   |     |      |      |           |
| Drain-Source Breakdown Voltage   | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                   | 80  |      |      | V         |
| Zero Gate Voltage Drain Current  | $I_{DSS}$    | $V_{DS} = 80V, V_{GS} = 0V$                                     |     |      | 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>c</sup></b>   |              |   |     |      |      |           |
| Gate Threshold Voltage   | $V_{GS(th)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$                               | 1   |      | 3    | V         |
| Static Drain-Source  | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 30A$                                       |     | 22   | 30   | $m\Omega$ |
| On-Resistance  |              | $V_{GS} = 4.5V, I_D = 15A$                                      |     | 27   | 38   | $m\Omega$ |
| <b>Dynamic Characteristics <sup>d</sup></b>  |              |   |     |      |      |           |
| Input Capacitance  | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V,$<br>$f = 1.0\text{ MHz}$            |     | 1600 |      | pF        |
| Output Capacitance   | $C_{oss}$    |   |     | 185  |      | pF        |
| Reverse Transfer Capacitance   | $C_{rss}$    |   |     | 100  |      | pF        |
| <b>Switching Characteristics <sup>d</sup></b>  |              |   |     |      |      |           |
| Turn-On Delay Time   | $t_{d(on)}$  | $V_{DD} = 50V, I_D = 15A,$<br>$V_{GS} = 10V, R_{GEN} = 6\Omega$ |     | 16   |      | ns        |
| Turn-On Rise Time  | $t_r$        |   |     | 7    |      | ns        |
| Turn-Off Delay Time  | $t_{d(off)}$ |   |     | 45   |      | ns        |
| Turn-Off Fall Time   | $t_f$        |   |     | 8    |      | ns        |
| Total Gate Charge  | $Q_g$        | $V_{DS} = 50V, I_D = 15A,$<br>$V_{GS} = 10V$                    |     | 37   |      | nC        |
| Gate-Source Charge   | $Q_{gs}$     |   |     | 6    |      | nC        |
| Gate-Drain Charge  | $Q_{gd}$     |   |     | 9    |      | nC        |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b>  |              |   |     |      |      |           |
| Drain-Source Diode Forward Current <sup>b</sup>  | $I_S$        |   |     |      | 30   | A         |
| Drain-Source Diode Forward Voltage <sup>c</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.Surface Mounted on FR4 Board, $t \leq 10\text{ sec.}$ □<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 = 0.5mH, $I_{AS} = 20A$ , $V_{DD} = 25V$ , $R_G = 25\Omega$ , Starting $T_J = 25\text{ C}$ |              |   |     |      |      |           |



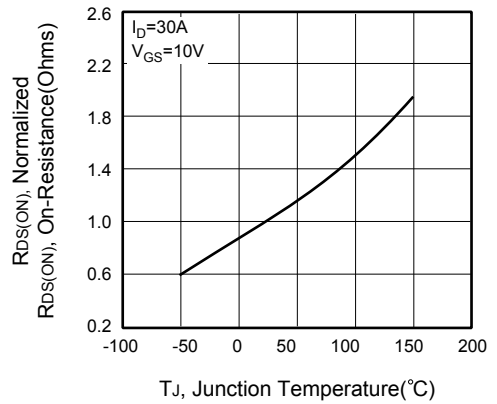
**Figure 1. Output Characteristics**



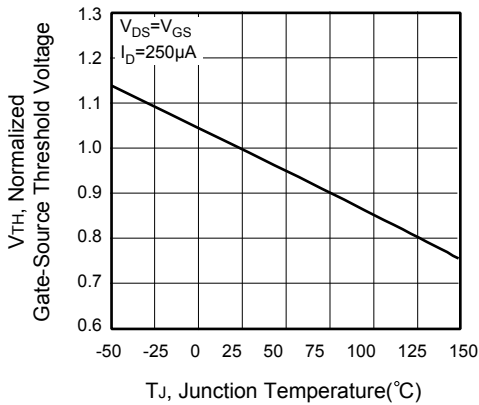
**Figure 2. Transfer Characteristics**



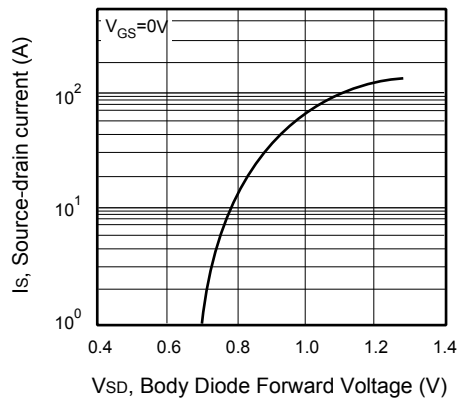
**Figure 3. Capacitance**



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



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



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

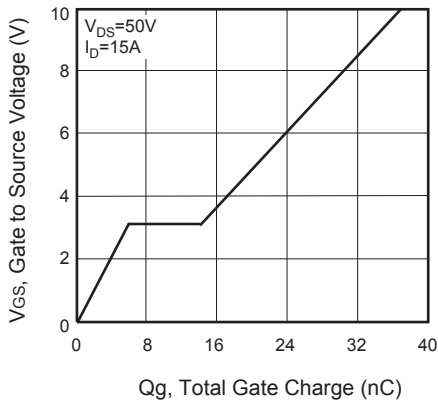


Figure 7. Gate Charge

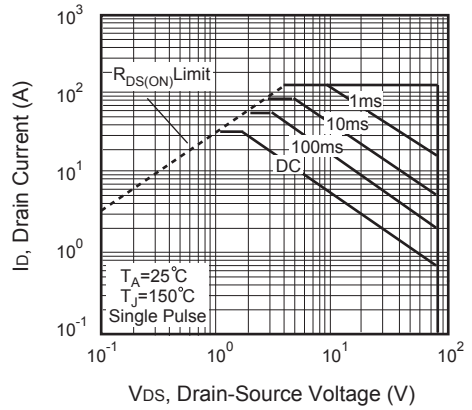


Figure 8. Maximum Safe Operating Area

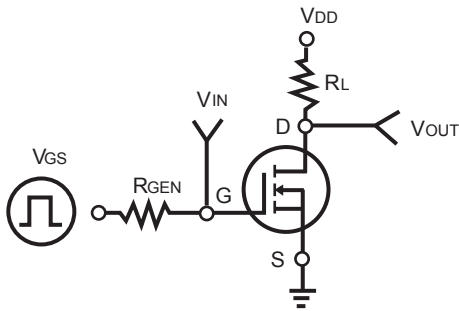


Figure 9. Switching Test Circuit

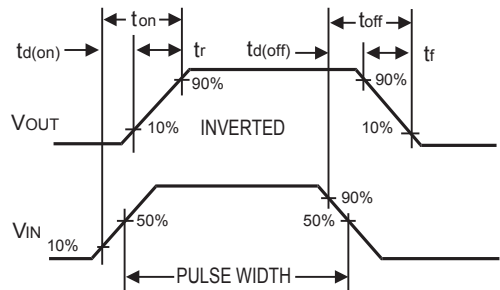


Figure 10. Switching Waveforms

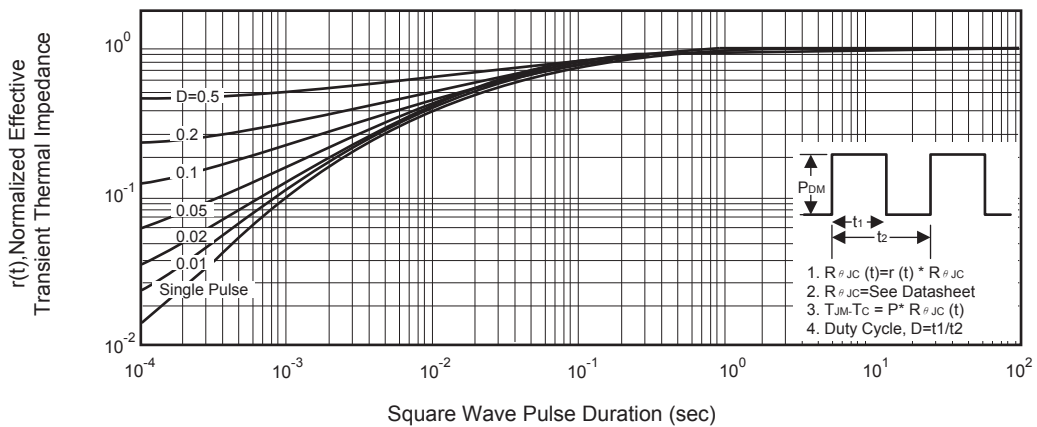


Figure 11. Normalized Thermal Transient Impedance Curve