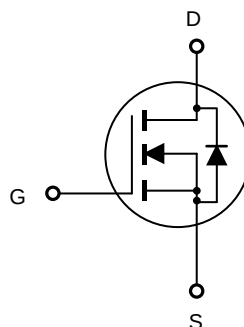


## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 100V, 13.3A,  $R_{DS(ON)} = 120m\Omega$  @  $V_{GS} = 10V$ .
- 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                                                                      | $V_{DS}$       | 100        | V                   |
| Gate-Source Voltage                                                                       | $V_{GS}$       | $\pm 20$   | V                   |
| Drain Current-Continuous                                                                  | $I_D$          | 13.3       | A                   |
| Drain Current-Pulsed <sup>a</sup>                                                         | $I_{DM}$       | 53         | A                   |
| Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$<br>- Derate above $25^\circ\text{C}$ | $P_D$          | 43         | W                   |
|                                                                                           |                | 0.34       | W/ $^\circ\text{C}$ |
| Operating and Store Temperature Range                                                     | $T_J, T_{stg}$ | -55 to 175 | $^\circ\text{C}$    |

### Thermal Characteristics

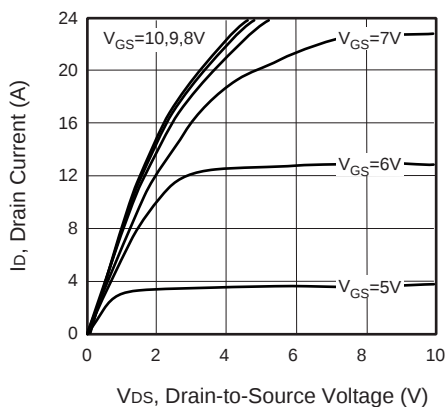
| Parameter                               | Symbol          | Limit | Units              |
|-----------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 3.5   | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 50    | $^\circ\text{C/W}$ |



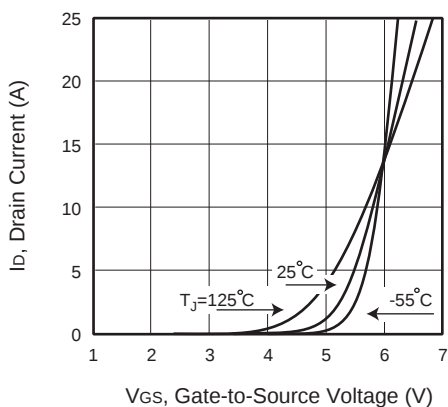
# CED16N10/CEU16N10

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

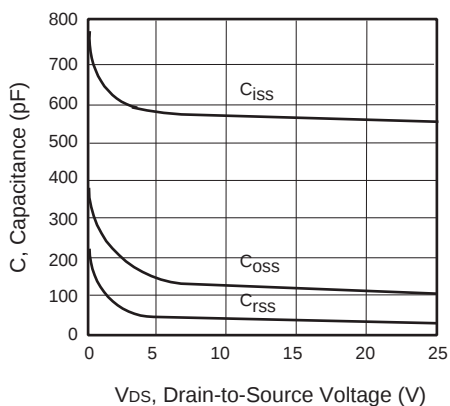
| Parameter                                                                                                 | Symbol       | Test Condition                                                     | Min | Typ | Max  | Units      |
|-----------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------|-----|-----|------|------------|
| Off Characteristics                                                                                       |              |                                                                    |     |     |      |            |
| Drain-Source Breakdown Voltage                                                                            | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                      | 100 |     |      | V          |
| Zero Gate Voltage Drain Current                                                                           | $I_{DSS}$    | $V_{DS} = 100, V_{GS} = 0V$                                        |     |     | 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         |
| On Characteristics <sup>b</sup>                                                                           |              |                                                                    |     |     |      |            |
| Gate Threshold Voltage                                                                                    | $V_{GS(th)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$                                  | 2   |     | 4    | V          |
| Static Drain-Source On-Resistance                                                                         | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 6.5A$                                         |     | 100 | 120  | m $\Omega$ |
| Forward Transconductance                                                                                  | $g_{FS}$     | $V_{DS} = 10V, I_D = 6.5A$                                         |     | 5   |      | S          |
| Dynamic Characteristics <sup>c</sup>                                                                      |              |                                                                    |     |     |      |            |
| Input Capacitance                                                                                         | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V,$<br>$f = 1.0\text{ MHz}$               |     | 530 |      | pF         |
| Output Capacitance                                                                                        | $C_{oss}$    |                                                                    |     | 100 |      | pF         |
| Reverse Transfer Capacitance                                                                              | $C_{rss}$    |                                                                    |     | 22  |      | pF         |
| Switching Characteristics <sup>c</sup>                                                                    |              |                                                                    |     |     |      |            |
| Turn-On Delay Time                                                                                        | $t_{d(on)}$  | $V_{DD} = 50V, I_D = 13.3A,$<br>$V_{GS} = 10V, R_{GEN} = 25\Omega$ |     | 15  | 40   | ns         |
| Turn-On Rise Time                                                                                         | $t_r$        |                                                                    |     | 2.9 | 7    | ns         |
| Turn-Off Delay Time                                                                                       | $t_{d(off)}$ |                                                                    |     | 32  | 70   | ns         |
| Turn-Off Fall Time                                                                                        | $t_f$        |                                                                    |     | 7   | 15   | ns         |
| Total Gate Charge                                                                                         | $Q_g$        | $V_{DS} = 80V, I_D = 13.3A,$<br>$V_{GS} = 10V$                     |     | 12  | 16   | nC         |
| Gate-Source Charge                                                                                        | $Q_{gs}$     |                                                                    |     | 3   |      | nC         |
| Gate-Drain Charge                                                                                         | $Q_{gd}$     |                                                                    |     | 4.1 |      | nC         |
| Drain-Source Diode Characteristics and Maximun Ratings                                                    |              |                                                                    |     |     |      |            |
| Drain-Source Diode Forward Current                                                                        | $I_S$        |                                                                    |     |     | 13.3 | A          |
| Drain-Source Diode Forward Voltage <sup>b</sup>                                                           | $V_{SD}$     | $V_{GS} = 0V, I_S = 13.3A$                                         |     |     | 1.5  | V          |
| Notes :                                                                                                   |              |                                                                    |     |     |      |            |
| a.Repetitive Rating : Pulse width limited by maximum junction temperature                                 |              |                                                                    |     |     |      |            |
| b.Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ .                                      |              |                                                                    |     |     |      |            |
| c.Guaranteed by design, not subject to production testing.                                                |              |                                                                    |     |     |      |            |
| d. L=0.5mH, I <sub>AS</sub> =13.3A, VDD=25V, R <sub>G</sub> =25 $\Omega$ , Starting T <sub>J</sub> =25 °C |              |                                                                    |     |     |      |            |



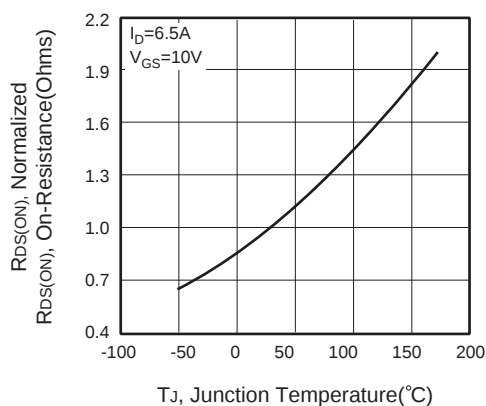
**Figure 1. Output Characteristics**



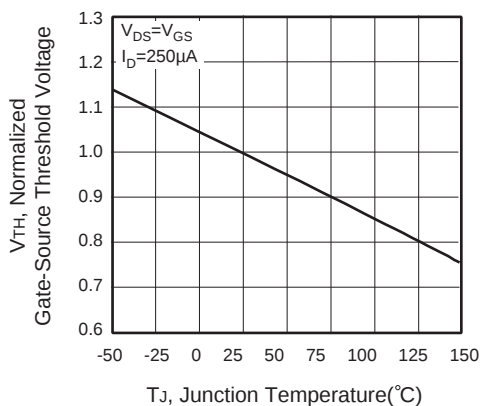
**Figure 2. Transfer Characteristics**



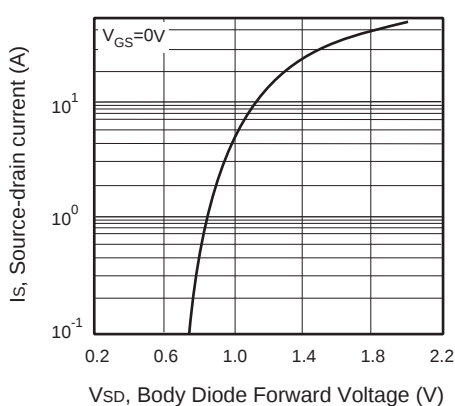
**Figure 3. Capacitance**



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



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



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

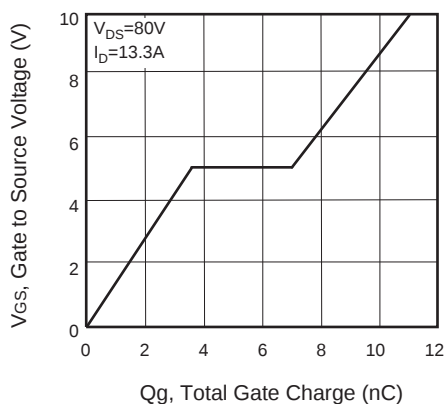


Figure 7. Gate Charge

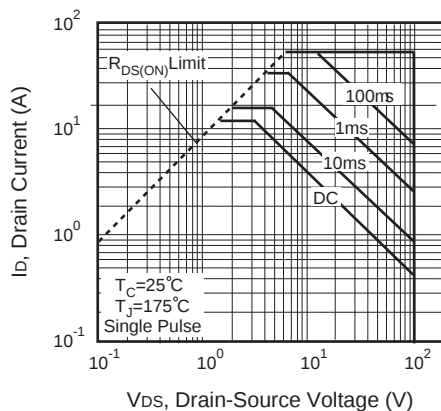


Figure 8. Maximum Safe Operating Area

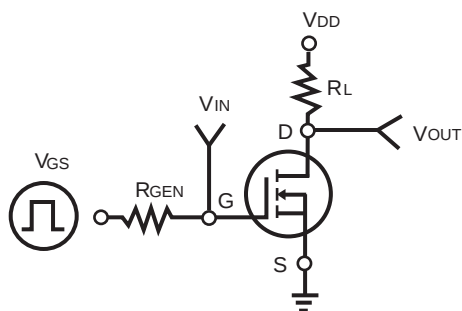


Figure 9. Switching Test Circuit

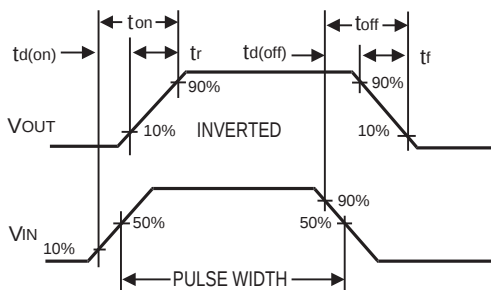


Figure 10. Switching Waveforms

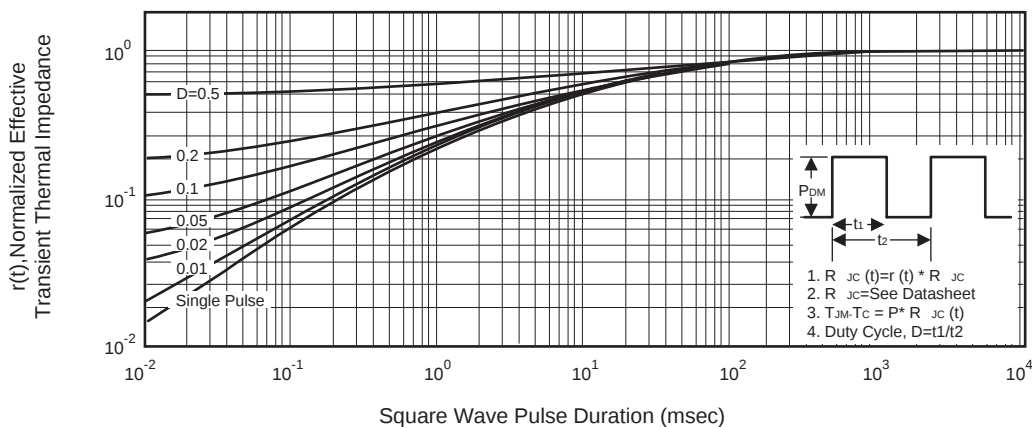


Figure 11. Normalized Thermal Transient Impedance Curve