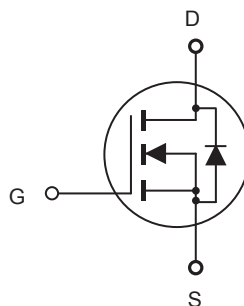


## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 100V, 25A,  $R_{DS(ON)} = 53m\Omega$  @  $V_{GS} = 10V$ .
- 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                                                                  | $I_D$          | 25         | A                   |
| Drain Current-Pulsed <sup>a</sup>                                                         | $I_{DM}$       | 100        | A                   |
| Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$<br>- Derate above $25^\circ\text{C}$ | $P_D$          | 56         | W                   |
|                                                                                           |                | 0.45       | W/ $^\circ\text{C}$ |
| Operating and Store Temperature Range                                                     | $T_J, T_{stg}$ | -55 to 175 | $^\circ\text{C}$    |

### Thermal Characteristics

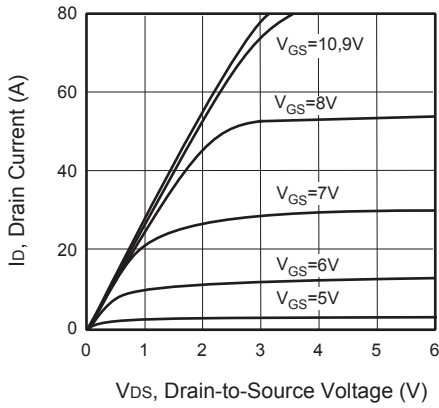
| Parameter                               | Symbol          | Limit | Units              |
|-----------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 2.2   | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient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



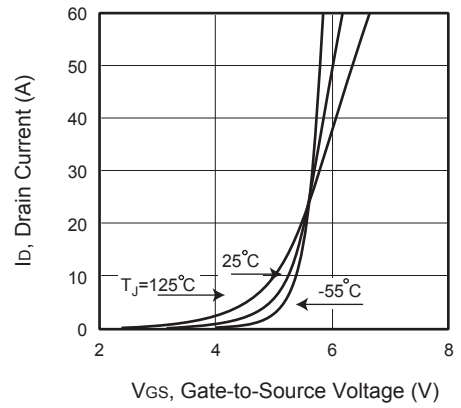
# CED540N/CEU540N

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

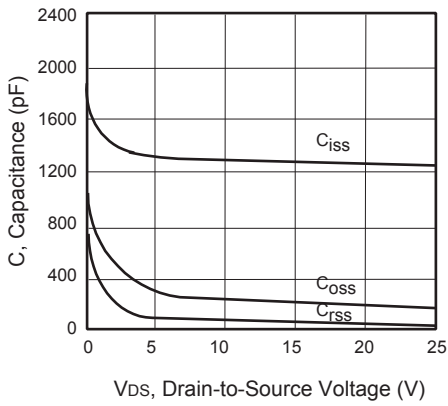
| Parameter                                                                                                                                                                                                                                                                                                                                                          | 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                                                                                                                                                                                                                                                                                                                                    | $I_{DSS}$    | $V_{DS} = 100V, V_{GS} = 0V$                                      |     |      | 25   | $\mu A$    |
| 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                                                                                                                                                                                                                                                                                                                                  | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 18A$                                         |     | 45   | 53   | m $\Omega$ |
| Forward Transconductance                                                                                                                                                                                                                                                                                                                                           | $g_{FS}$     | $V_{DS} = 25V, I_D = 18A$                                         |     | 14   |      | S          |
| Dynamic Characteristics <sup>c</sup>                                                                                                                                                                                                                                                                                                                               |              |                                                                   |     |      |      |            |
| Input Capacitance                                                                                                                                                                                                                                                                                                                                                  | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V,$<br>$f = 1.0\text{ MHz}$              |     | 1275 |      | pF         |
| Output Capacitance                                                                                                                                                                                                                                                                                                                                                 | $C_{oss}$    |                                                                   |     | 200  |      | pF         |
| Reverse Transfer Capacitance                                                                                                                                                                                                                                                                                                                                       | $C_{rss}$    |                                                                   |     | 25   |      | pF         |
| Switching Characteristics <sup>c</sup>                                                                                                                                                                                                                                                                                                                             |              |                                                                   |     |      |      |            |
| Turn-On Delay Time                                                                                                                                                                                                                                                                                                                                                 | $t_{d(on)}$  | $V_{DD} = 50V, I_D = 18A,$<br>$V_{GS} = 10V, R_{GEN} = 5.1\Omega$ |     | 17   | 34   | ns         |
| Turn-On Rise Time                                                                                                                                                                                                                                                                                                                                                  | $t_r$        |                                                                   |     | 10   | 20   | ns         |
| Turn-Off Delay Time                                                                                                                                                                                                                                                                                                                                                | $t_{d(off)}$ |                                                                   |     | 40   | 80   | ns         |
| Turn-Off Fall Time                                                                                                                                                                                                                                                                                                                                                 | $t_f$        |                                                                   |     | 4    | 8    | ns         |
| Total Gate Charge                                                                                                                                                                                                                                                                                                                                                  | $Q_g$        | $V_{DS} = 80V, I_D = 18A,$<br>$V_{GS} = 10V$                      |     | 28   | 56   | nC         |
| Gate-Source Charge                                                                                                                                                                                                                                                                                                                                                 | $Q_{gs}$     |                                                                   |     | 6    |      | nC         |
| Gate-Drain Charge                                                                                                                                                                                                                                                                                                                                                  | $Q_{gd}$     |                                                                   |     | 8    |      | nC         |
| Drain-Source Diode Characteristics and Maximun Ratings                                                                                                                                                                                                                                                                                                             |              |                                                                   |     |      |      |            |
| Drain-Source Diode Forward Current                                                                                                                                                                                                                                                                                                                                 | $I_S$        |                                                                   |     |      | 25   | A          |
| Drain-Source Diode Forward Voltage <sup>b</sup>                                                                                                                                                                                                                                                                                                                    | $V_{SD}$     | $V_{GS} = 0V, I_S = 18A$                                          |     |      | 1.3  | V          |
| Notes :<br><sup>a</sup> Repetitive Rating : Pulse width limited by maximum junction temperature.<br><sup>b</sup> Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ .<br><sup>c</sup> Guaranteed by design, not subject to production testing.<br><sup>d</sup> L = 1.9mH, $I_{AS} = 15A, V_{DD} = 50V, R_G = 25\Omega$ , Starting $T_J = 25^\circ C$ |              |                                                                   |     |      |      |            |



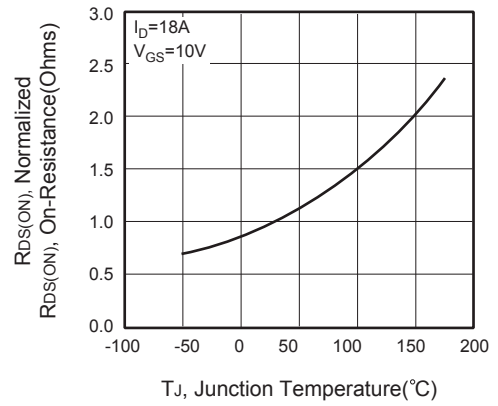
**Figure 1. Output Characteristics**



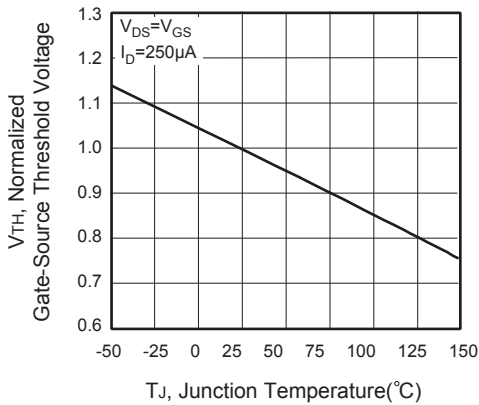
**Figure 2. Transfer Characteristics**



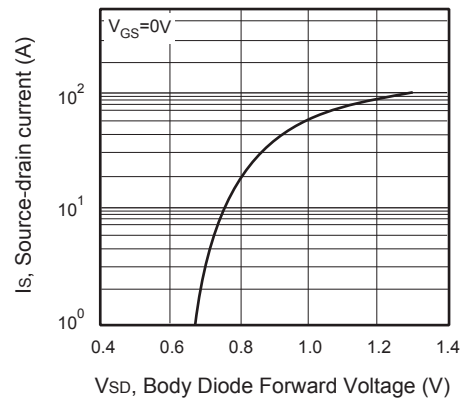
**Figure 3. Capacitance**



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



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



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



# CED540N/CEU540N

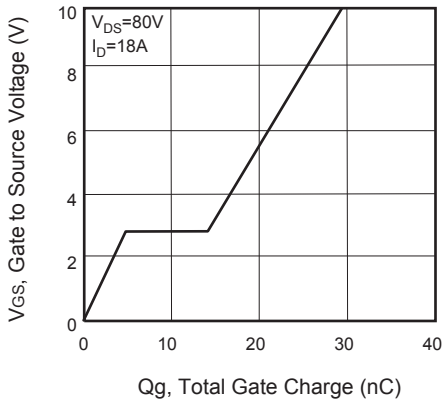


Figure 7. Gate Charge

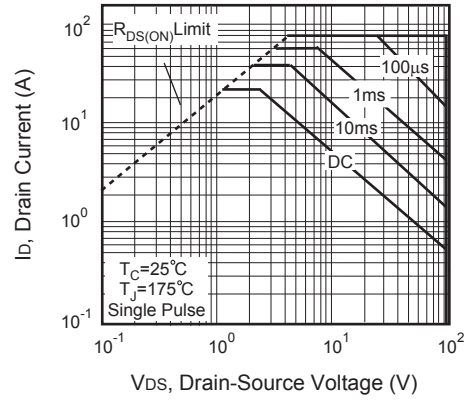


Figure 8. Maximum Safe Operating Area

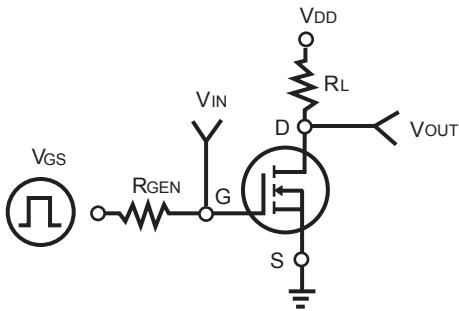


Figure 9. Switching Test Circuit



Figure 10. Switching Waveforms

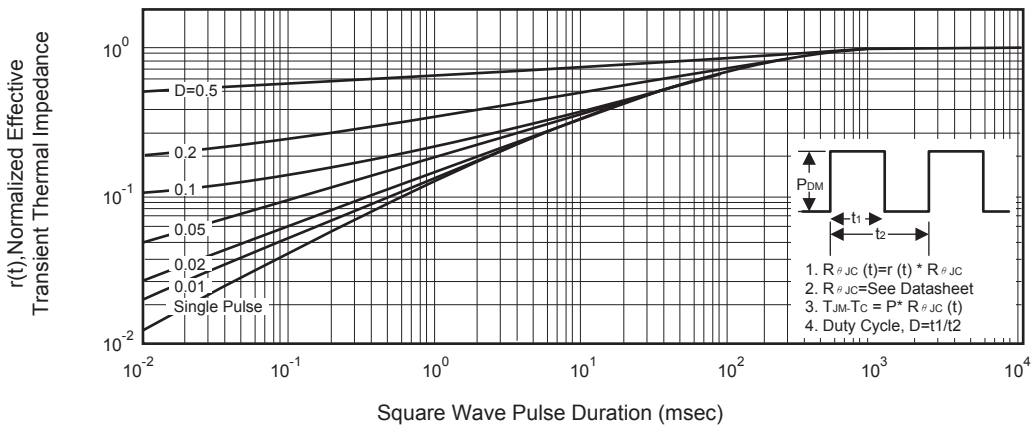


Figure 11. Normalized Thermal Transient Impedance Curve