



# CED6086/CEU6086

## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 60V, 50A,  $R_{DS(ON)} = 8.7m\Omega$  @  $V_{GS} = 10V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handing capability.
- Lead free product is acquired.
- TO-251 & TO-252 package.



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

| Parameter   | Symbol         | Limit      | Units         |
|---|----------------|------------|---------------|
| Drain-Source Voltage  | $V_{DS}$       | 60         | V             |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$   | V             |
| Drain Current-Continuous  | $I_D$          | 50         | A             |
| Drain Current-Pulsed <sup>a</sup>   | $I_{DM}$       | 200        | A             |
| Maximum Power Dissipation @ $T_C = 25^\circ C$<br>- Derate above $25^\circ C$ | $P_D$          | 50         | W             |
|   |                | 0.33       | W/ $^\circ C$ |
| Operating and Store Temperature Range   | $T_J, T_{stg}$ | -55 to 175 | $^\circ C$    |

### Thermal Characteristics

| Parameter                               | Symbol          | Limit | Units        |
|---|-----------------|-------|--------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 3     | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 50    | $^\circ C/W$ |



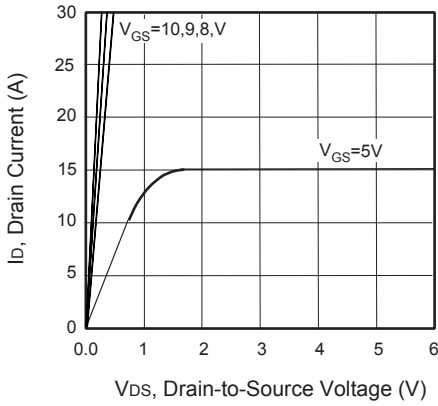
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## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

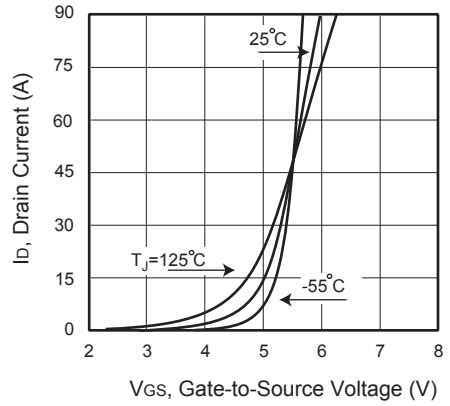
| Parameter  | Symbol       | Test Condition  | Min | Typ  | Max  | Units     |
|--|--------------|---|-----|------|------|-----------|
| <b>Off Characteristics</b>   |              |   |     |      |      |           |
| Drain-Source Breakdown Voltage   | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                     | 60  |      |      | V         |
| Zero Gate Voltage Drain Current  | $I_{DSS}$    | $V_{DS} = 60V, V_{GS} = 0V$                                       |     |      | 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  | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 24A$   |     | 6.7  | 8.7  | $m\Omega$ |
| <b>Dynamic Characteristics<sup>c</sup></b>   |              |   |     |      |      |           |
| Input Capacitance  | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V,$<br>$f = 1.0\text{ MHz}$              |     | 2420 |      | pF        |
| Output Capacitance   | $C_{oss}$    |   |     | 235  |      | pF        |
| Reverse Transfer Capacitance   | $C_{rss}$    |   |     | 150  |      | pF        |
| <b>Switching Characteristics<sup>c</sup></b>   |              |   |     |      |      |           |
| Turn-On Delay Time   | $t_{d(on)}$  | $V_{DD} = 30V, I_D = 20A,$<br>$V_{GS} = 10V, R_{GEN} = 4.7\Omega$ |     | 13   | 26   | ns        |
| Turn-On Rise Time  | $t_r$        |   |     | 4    | 8    | ns        |
| Turn-Off Delay Time  | $t_{d(off)}$ |   |     | 45   | 90   | ns        |
| Turn-Off Fall Time   | $t_f$        |   |     | 6    | 12   | ns        |
| Total Gate Charge  | $Q_g$        | $V_{DS} = 48V, I_D = 20A,$<br>$V_{GS} = 10V$                      |     | 50   | 65   | nC        |
| Gate-Source Charge   | $Q_{gs}$     |   |     | 8    |      | nC        |
| Gate-Drain Charge  | $Q_{gd}$     |   |     | 16   |      | nC        |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b>  |              |   |     |      |      |           |
| Drain-Source Diode Forward Current   | $I_S$        |   |     |      | 40   | A         |
| Drain-Source Diode Forward Voltage <sup>b</sup>  | $V_{SD}$     | $V_{GS} = 0V, I_S = 40A$  |     |      | 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 = 0.1mH, $I_{AS} = 42A$ , $V_{DD} = 24V$ , $R_G = 25\Omega$ , Starting $T_J = 25\text{ C}$ |              |   |     |      |      |           |



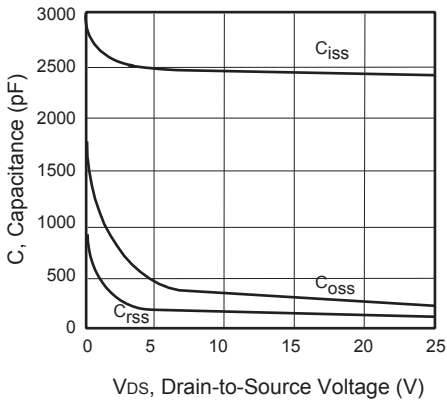
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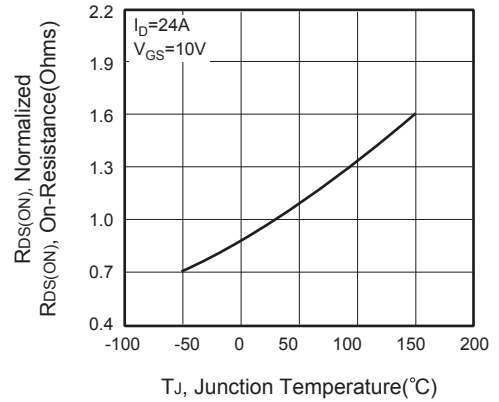
**Figure 1. Output Characteristics**



**Figure 2. Transfer Characteristics**



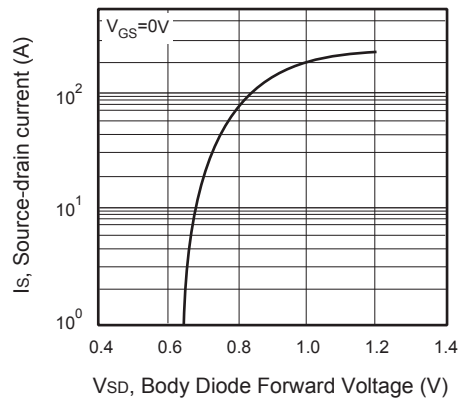
**Figure 3. Capacitance**



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



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



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



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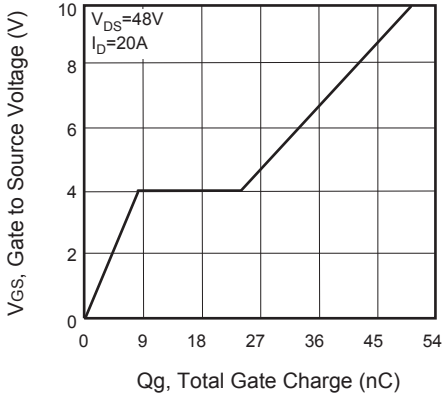


Figure 7. Gate Charge

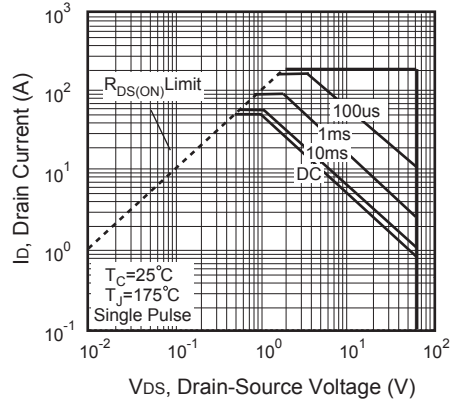


Figure 8. Maximum Safe Operating Area



Figure 9. Switching Test Circuit

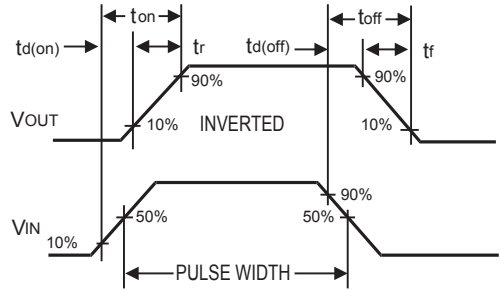


Figure 10. Switching Waveforms

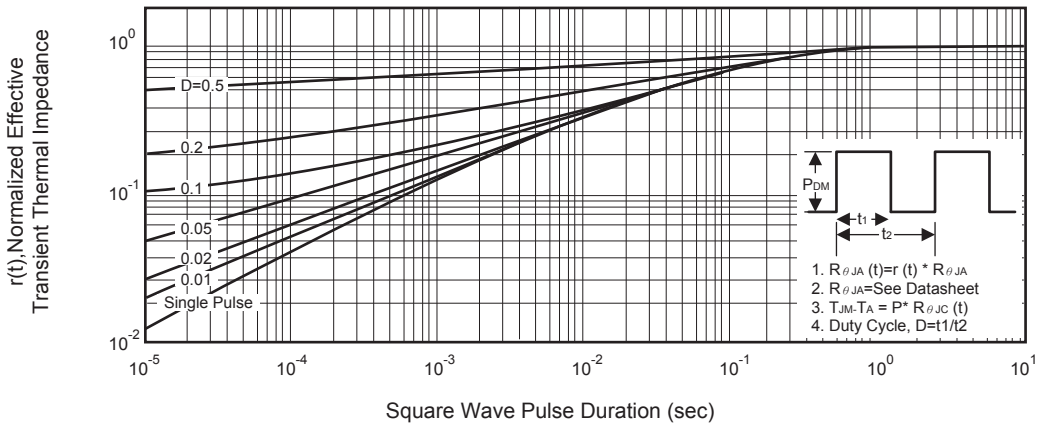


Figure 11. Normalized Thermal Transient Impedance Curve