

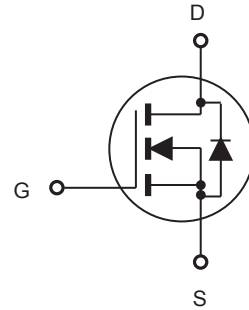


# CEP13N10L/CEB13N10L

## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 100V, 12.8A,  $R_{DS(ON)} = 175m\Omega @V_{GS} = 10V$ .  
 $R_{DS(ON)} = 185m\Omega @V_{GS} = 5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handing capability.
- Lead free product is acquired.
- TO-220 & TO-263 package.



### ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ C$ 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 @ $T_C = 25^\circ C$                                 | $I_D$          | 12.8       | A             |
| Drain Current-Continuous @ $T_C = 100^\circ C$                                |                | 9          | A             |
| Drain Current-Pulsed <sup>a</sup>   | $I_{DM}$       | 50         | A             |
| Maximum Power Dissipation @ $T_C = 25^\circ C$<br>- Derate above $25^\circ C$ | $P_D$          | 65         | W             |
|   |                | 0.43       | 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    | $R_{\theta JC}$ | 2.3   | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5  | $^\circ C/W$ |



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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  | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                | 100 |     |      | V         |
| Zero Gate Voltage Drain Current   | $I_{DSS}$    | $V_{DS} = 100V, V_{GS} = 0V$                                 |     |     | 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  | $V_{GS(th)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$                            | 1   |     | 3    | V         |
| Static Drain-Source On-Resistance   | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 6A$                                     |     | 140 | 175  | $m\Omega$ |
|   |              | $V_{GS} = 5V, I_D = 5A$                                      |     | 150 | 185  | $m\Omega$ |
| Forward Transconductance  | $g_{FS}$     | $V_{DS} = 10V, I_D = 6A$                                     |     | 5   |      | S         |
| <b>Dynamic Characteristics<sup>c</sup></b>  |              |  |     |     |      |           |
| Input Capacitance   | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{ MHz}$              |     | 450 |      | pF        |
| Output Capacitance  | $C_{oss}$    |  |     | 90  |      | pF        |
| Reverse Transfer Capacitance  | $C_{rss}$    |  |     | 25  |      | pF        |
| <b>Switching Characteristics<sup>c</sup></b>  |              |  |     |     |      |           |
| Turn-On Delay Time  | $t_{d(on)}$  | $V_{DD} = 80V, I_D = 11A, V_{GS} = 10V, R_{GEN} = 9.1\Omega$ |     | 8   | 16   | ns        |
| Turn-On Rise Time   | $t_r$        |  |     | 4   | 8    | ns        |
| Turn-Off Delay Time   | $t_{d(off)}$ |  |     | 30  | 60   | ns        |
| Turn-Off Fall Time  | $t_f$        |  |     | 3   | 6    | ns        |
| Total Gate Charge   | $Q_g$        | $V_{DS} = 80V, I_D = 11A, V_{GS} = 10V$                      |     | 12  | 24   | nC        |
| Gate-Source Charge  | $Q_{gs}$     |  |     | 1.3 |      | nC        |
| Gate-Drain Charge   | $Q_{gd}$     |  |     | 3   |      | nC        |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b>   |              |  |     |     |      |           |
| Drain-Source Diode Forward Current  | $I_S$        |  |     |     | 12.8 | A         |
| Drain-Source Diode Forward Voltage <sup>b</sup>   | $V_{SD}$     | $V_{GS} = 0V, I_S = 12.8A$                                   |     |     | 1.5  | 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. |              |  |     |     |      |           |



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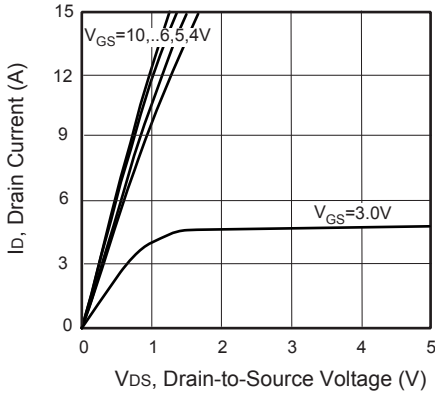


Figure 1. Output Characteristics

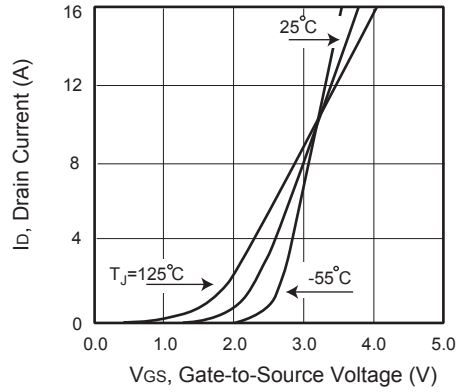


Figure 2. Transfer Characteristics

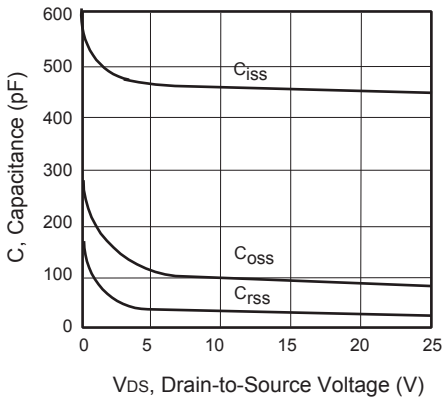


Figure 3. Capacitance

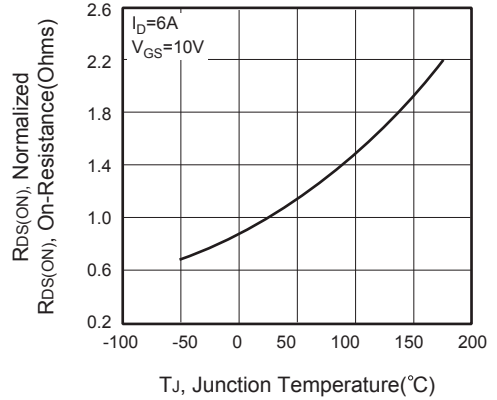


Figure 4. On-Resistance Variation with Temperature



Figure 5. Gate Threshold Variation with Temperature

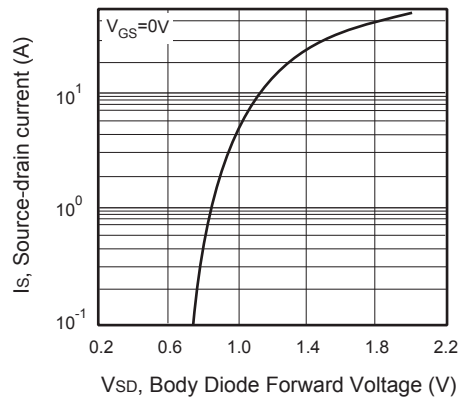


Figure 6. Body Diode Forward Voltage Variation with Source Current



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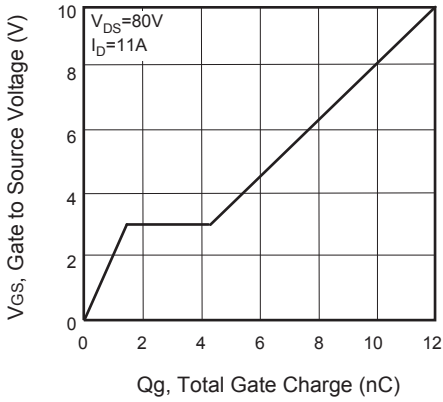


Figure 7. Gate Charge

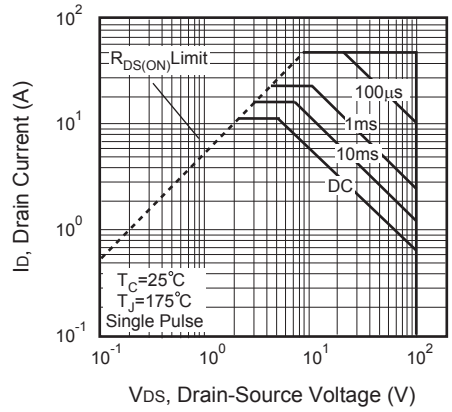


Figure 8. Maximum Safe Operating Area



Figure 9. Switching Test Circuit



Figure 10. Switching Waveforms

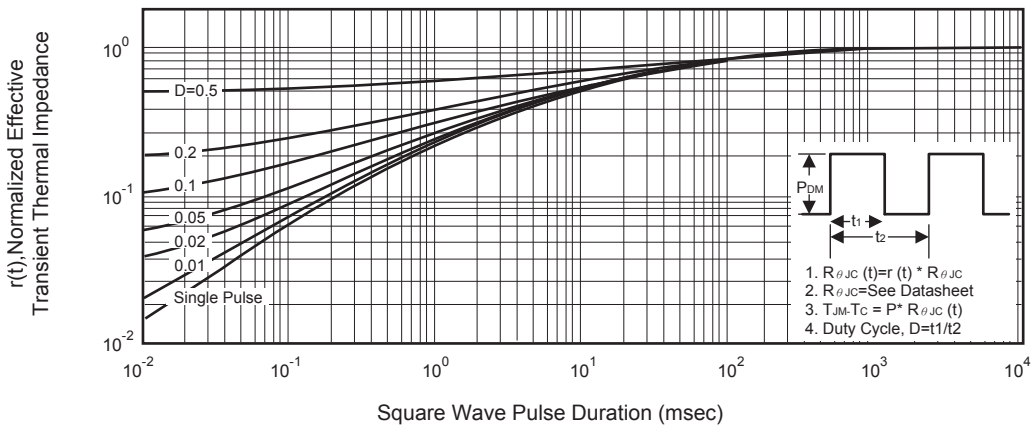


Figure 11. Normalized Thermal Transient Impedance Curve