

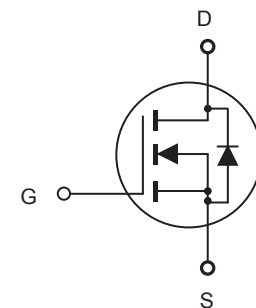
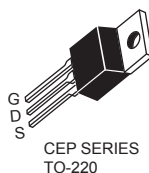
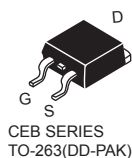


# CEP45N10/CEB45N10

## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 100V, 44A,  $R_{DS(ON)} = 39m\Omega$  @  $V_{GS} = 10V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- Lead free product is acquired.
- TO-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                                                           | $V_{GS}$       | $\pm 25$   | V             |
| Drain Current-Continuous                                                      | $I_D$          | 44         | A             |
| Drain Current-Pulsed <sup>a</sup>                                             | $I_{DM}$       | 176        | A             |
| Maximum Power Dissipation @ $T_C = 25^\circ C$<br>- Derate above $25^\circ C$ | $P_D$          | 136        | W             |
|                                                                               |                | 0.91       | W/ $^\circ C$ |
| Single Pulsed Avalanche Energy <sup>d</sup>                                   | $E_{AS}$       | 397        | mJ            |
| Single Pulsed Avalanche Current <sup>d</sup>                                  | $I_{AS}$       | 43.5       | A             |
| 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    | $R_{\theta JC}$ | 1.1   | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5  | $^\circ C/W$ |



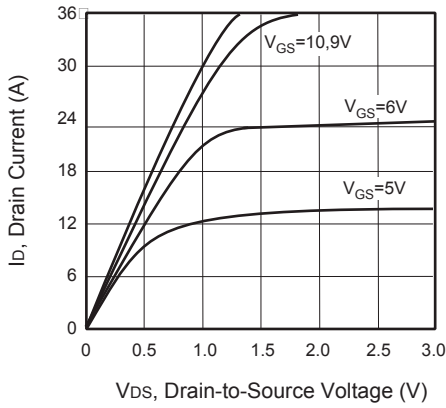
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## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

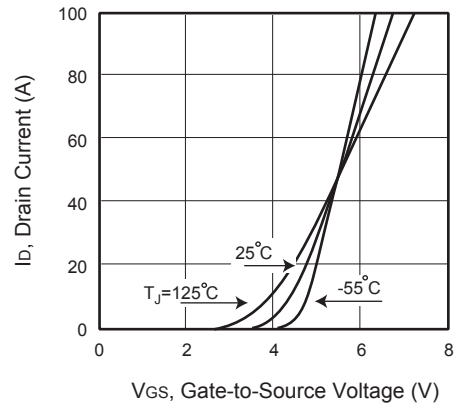
| Parameter                                                                                                                                                                                                                                                                                                                                                                         | Symbol       | Test Condition                                             | Min | Typ  | Max  | Units      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------|-----|------|------|------------|
| Off Characteristics                                                                                                                                                                                                                                                                                                                                                               |              |                                                            |     |      |      |            |
| Drain-Source Breakdown Voltage                                                                                                                                                                                                                                                                                                                                                    | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                              | 100 |      |      | V          |
| Zero Gate Voltage Drain Current                                                                                                                                                                                                                                                                                                                                                   | $I_{DSS}$    | $V_{DS} = 100V, V_{GS} = 0V$                               |     |      | 1    | $\mu A$    |
| Gate Body Leakage Current, Forward                                                                                                                                                                                                                                                                                                                                                | $I_{GSSF}$   | $V_{GS} = 25V, V_{DS} = 0V$                                |     |      | 100  | nA         |
| Gate Body Leakage Current, Reverse                                                                                                                                                                                                                                                                                                                                                | $I_{GSSR}$   | $V_{GS} = -25V, V_{DS} = 0V$                               |     |      | -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                                                                                                                                                                                                                                                                                                                                                 | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 21.8A$                                |     | 30   | 39   | m $\Omega$ |
| Dynamic Characteristics <sup>c</sup>                                                                                                                                                                                                                                                                                                                                              |              |                                                            |     |      |      |            |
| Input Capacitance                                                                                                                                                                                                                                                                                                                                                                 | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{ MHz}$            |     | 1955 |      | pF         |
| Output Capacitance                                                                                                                                                                                                                                                                                                                                                                | $C_{oss}$    |                                                            |     | 300  |      | pF         |
| Reverse Transfer Capacitance                                                                                                                                                                                                                                                                                                                                                      | $C_{rss}$    |                                                            |     | 35   |      | pF         |
| Switching Characteristics <sup>c</sup>                                                                                                                                                                                                                                                                                                                                            |              |                                                            |     |      |      |            |
| Turn-On Delay Time                                                                                                                                                                                                                                                                                                                                                                | $t_{d(on)}$  | $V_{DD} = 50V, I_D = 5A, V_{GS} = 10V, R_{GEN} = 25\Omega$ |     | 27   | 54   | ns         |
| Turn-On Rise Time                                                                                                                                                                                                                                                                                                                                                                 | $t_r$        |                                                            |     | 19   | 38   | ns         |
| Turn-Off Delay Time                                                                                                                                                                                                                                                                                                                                                               | $t_{d(off)}$ |                                                            |     | 185  | 370  | ns         |
| Turn-Off Fall Time                                                                                                                                                                                                                                                                                                                                                                | $t_f$        |                                                            |     | 35   | 70   | ns         |
| Total Gate Charge                                                                                                                                                                                                                                                                                                                                                                 | $Q_g$        | $V_{DS} = 80V, I_D = 37A, V_{GS} = 10V$                    |     | 49   | 65   | nC         |
| Gate-Source Charge                                                                                                                                                                                                                                                                                                                                                                | $Q_{gs}$     |                                                            |     | 10   |      | nC         |
| Gate-Drain Charge                                                                                                                                                                                                                                                                                                                                                                 | $Q_{gd}$     |                                                            |     | 16   |      | nC         |
| Drain-Source Diode Characteristics and Maximum Ratings                                                                                                                                                                                                                                                                                                                            |              |                                                            |     |      |      |            |
| Drain-Source Diode Forward Current                                                                                                                                                                                                                                                                                                                                                | $I_S$        |                                                            |     |      | 44   | A          |
| Drain-Source Diode Forward Voltage <sup>b</sup>                                                                                                                                                                                                                                                                                                                                   | $V_{SD}$     | $V_{GS} = 0V, I_S = 40A$                                   |     |      | 1.5  | V          |
| <div>Notes :<br/>a.Repetitive Rating : Pulse width limited by maximum junction temperature<br/>b.Pulse Test : Pulse Width <math>\leq 300\mu s</math>, Duty Cycle <math>\leq 2\%</math>.<br/>c.Guaranteed by design, not subject to production testing.<br/>d.L = 0.42mH, <math>I_{AS} = 43.5A, V_{DD} = 25V, R_G = 25\Omega</math>, Starting <math>T_J = 25\text{ C}</math></div> |              |                                                            |     |      |      |            |



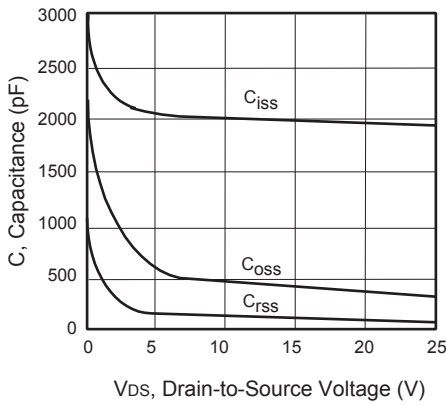
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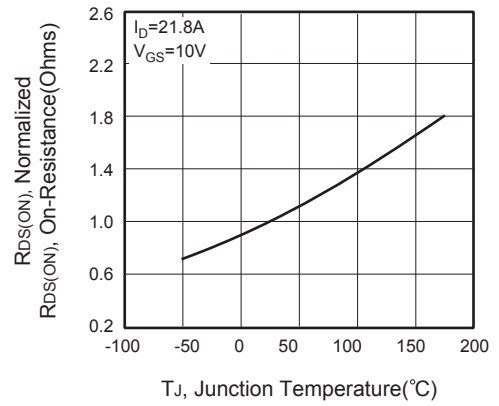
**Figure 1. Output Characteristics**



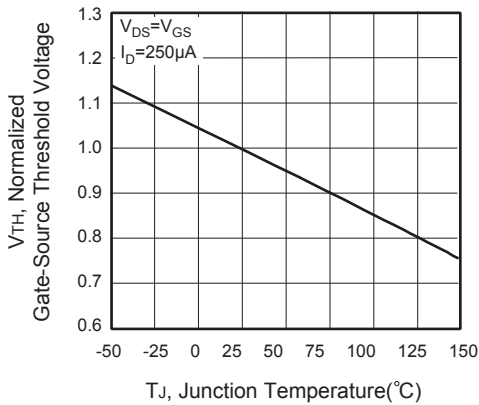
**Figure 2. Transfer Characteristics**



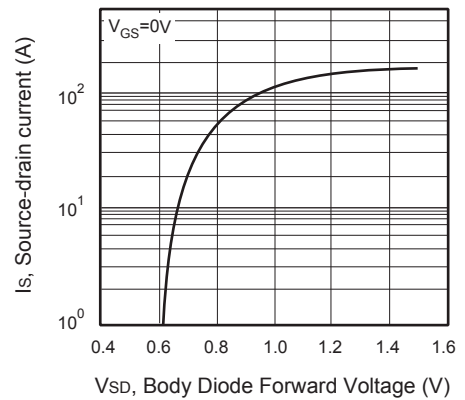
**Figure 3. Capacitance**



**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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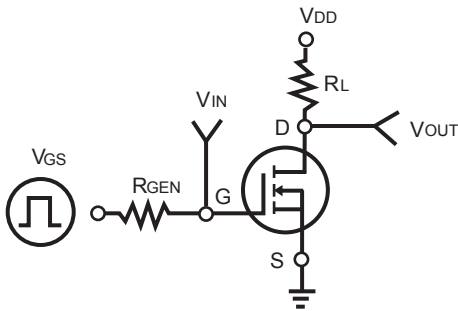
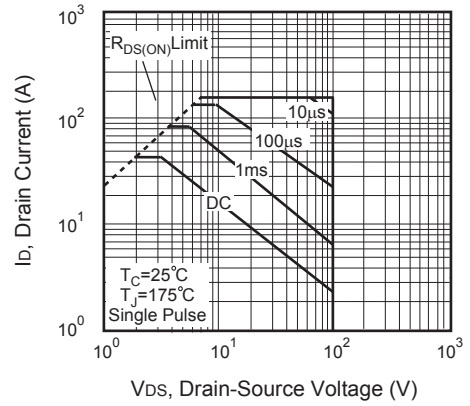
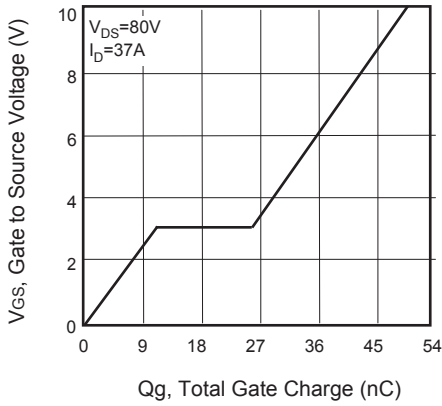


Figure 9. Switching Test Circuit

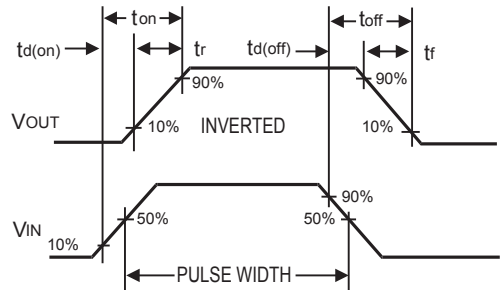


Figure 10. Switching Waveforms

