# CEP06N5/CEB06N5

Oct. 2002

## N-Channel Logic Level Enhancement Mode Field Effect Transistor

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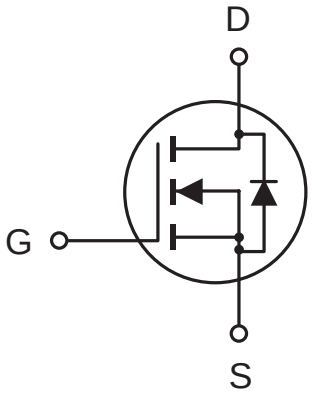
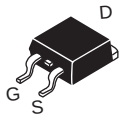
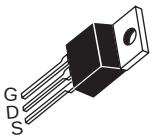
## FEATURES

- 500V , 6.6A , $R_{DS(ON)}$=1Ω @$V_{GS}$=10V.
- Super high dense cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability.
- TO-220 & TO-263 package.




CEB SERIES
TO-263(DD-PAK)




CEP SERIES
TO-220

## ABSOLUTE MAXIMUM RATINGS (Tc=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 500 | V |
| Gate-Source Voltage | $V_{GS}$ | ±30 | V |
| Drain Current-Continuous | $I_D$ | 6.6 | A |
| -Pulsed | $I_{DM}$ | 20 | A |
| Drain-Source Diode Forward Current | $I_S$ | 6.6 | A |
| Maximum Power Dissipation @Tc=25°C | $P_D$ | 104 | W |
| Derate above 25°C | | 0.83 | W/°C |
| Operating and Storage Temperautre Range | $T_J$, $T_{STG}$ | -55 to 150 | °C |

## THERMAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.2 | °C/W |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5 | °C/W |

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## ELECTRICAL CHARACTERISTICS ($T_C$=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **DRAIN-SOURCE AVALANCHE RATING**[a] | | | | | | |
| Single Pulse Drain-Source Avalanche Energy | $E_{AS}$ | $V_{DD}$=50V, L=24mH $R_G$=25Ω | | 500 | | mJ |
| Maximum Drain-Source Avalanche Current | $I_{AS}$ | | | 6 | | A |
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0V,$I_D$ = 250μA | 500 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 500V, $V_{GS}$ = 0V | | | 25 | μA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{GS}$ = ±30V, $V_{DS}$ = 0V | | | ±100 | nA |
| **ON CHARACTERISTICS**[a] | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 2 | | 4 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$ =10V, $I_D$ = 4A | | 0.85 | 1.0 | Ω |
| On-State Drain Current | $I_{D(ON)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 10V | 6 | | | A |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 50V, $I_D$ = 4A | | 4 | | S |
| **SWITCHING CHARACTERISTICS**[b] | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}$ =250V, $I_D$ = 6A, $V_{GS}$ = 10V $R_{GEN}$=18Ω | | 23 | 45 | ns |
| Rise Time | $t_r$ | | | 35 | 70 | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 162 | 240 | ns |
| Fall Time | $t_f$ | | | 44 | 90 | ns |
| Total Gate Charge | $Q_g$ | $V_{DS}$ =400V, $I_D$ = 6A, $V_{GS}$ =10V | | 54 | 65 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 9 | | nC |
| Gate-Drain Charge | $Q_{gd}$ | | | 27 | | nC |

## ELECTRICAL CHARACTERISTICS ($T_C$=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **DYNAMIC CHARACTERISTICS** [b] | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$ =25V, $V_{GS}$ = 0V<br>f =1.0MHz | | 823 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 110 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 64 | | pF |
| **DRAIN-SOURCE DIODE CHARACTERISTICS** [a] | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0V, Is =6A | | | 1.5 | V |

Notes

a.Pulse Test:Pulse Width≤300 μs, Duty Cycle ≤ 2%.
b.Guaranteed by design, not subject to production testing.

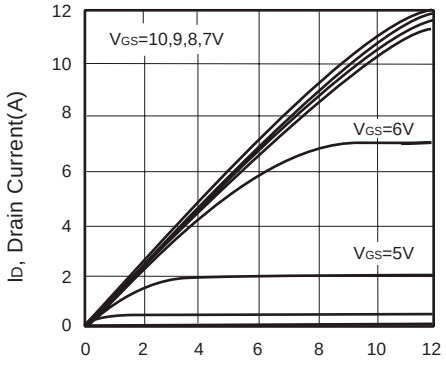


**Figure 1. Output Characteristics**

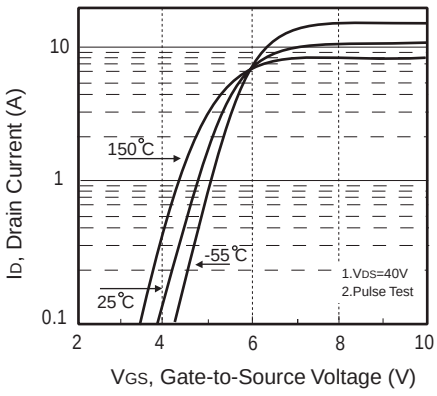


**Figure 2. Transfer Characteristics**

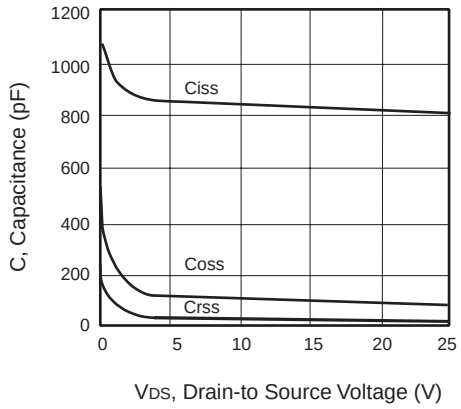


**Figure 3. Capacitance**

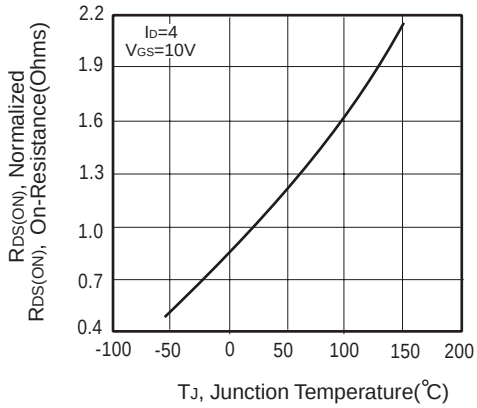


**Figure 4. On-Resistance Variation with Temperature**

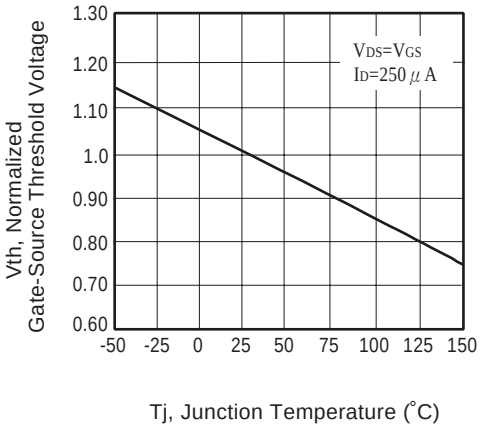


**Figure 5. Gate Threshold Variation with Temperature**

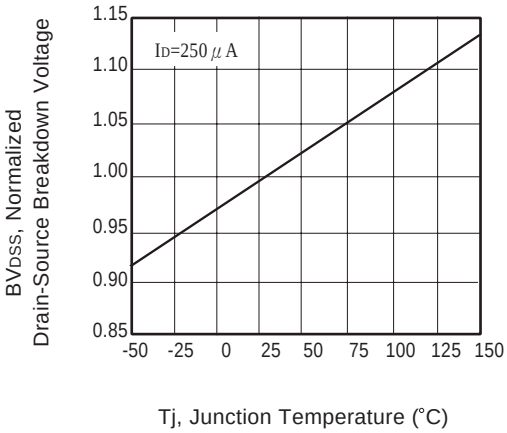


**Figure 6. Breakdown Voltage Variation with Temperature**

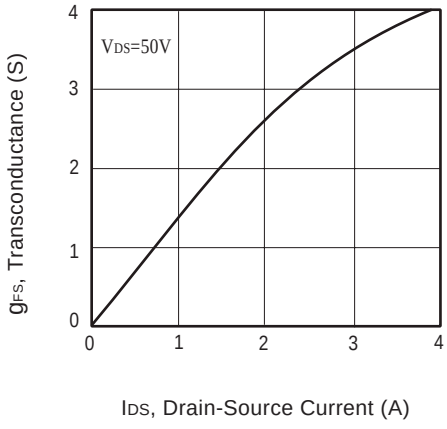


**Figure 7. Transconductance Variation with Drain Current**

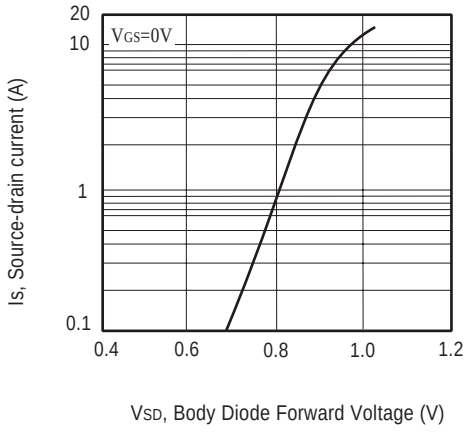


**Figure 8. Body Diode Forward Voltage Variation with Source Current**

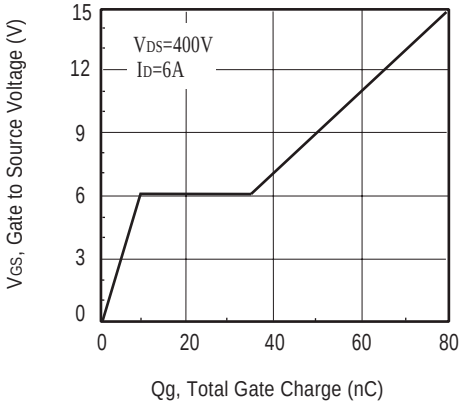


**Figure 9. Gate Charge**

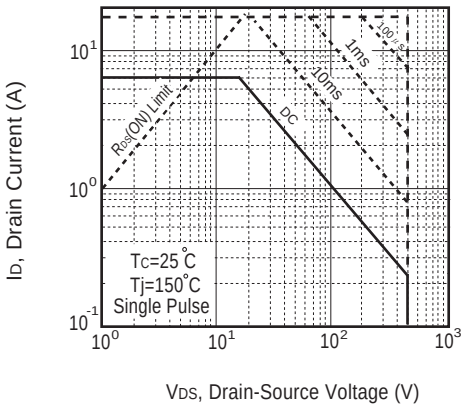


**Figure 10. Maximum Safe Operating Area**

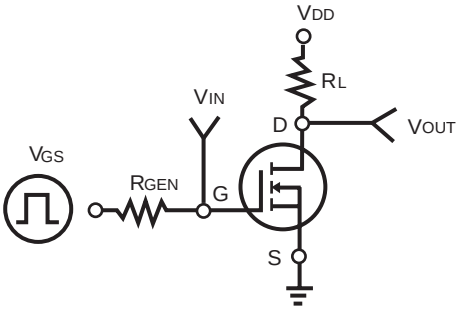


**Figure 11. Switching Test Circuit**

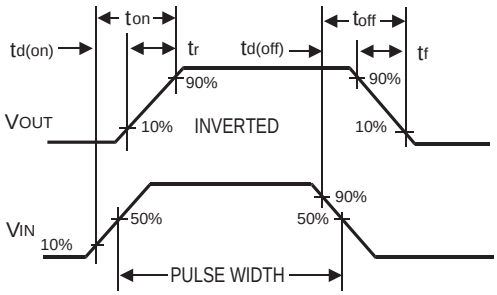


**Figure 12. Switching Waveforms**

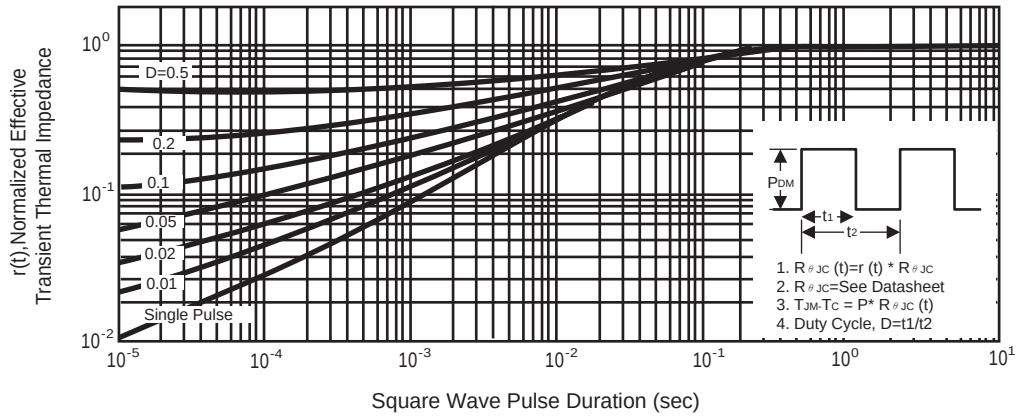


**Figure 13. Normalized Thermal Transient Impedance Curve**