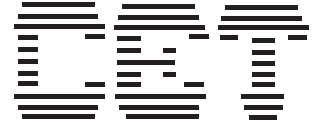
# CEPF640/CEBF640



March 1998

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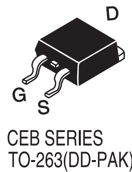
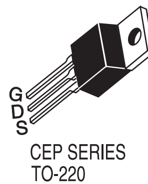
## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

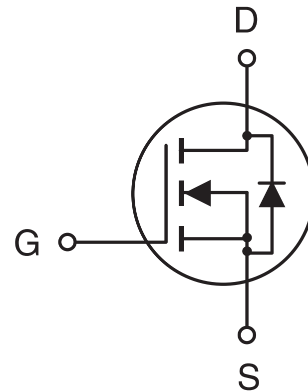
- 200V , 18A , $R_{DS(ON)}$=180mΩ @$V_{GS}$=10V
- Super high dense cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability.
- TO-220 & TO-263 package.




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 | $V_{DS}$ | 200 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 18 | A |
| -Pulsed | $I_{DM}$ | 72 | A |
| Drain-Source Diode Forward Current | $I_S$ | 18 | A |
| Maximum Power Dissipation @Tc=25°C | $P_D$ | 125 | W |
| Derate above 25°C | | 1.0 | W/°C |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to 150 | °C |

### THERMAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.0 | °C/W |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5 | °C/W |

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

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250µA | 200 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=160V, $V_{GS}$=0V | | | 25 | µA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=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, $I_D$ = 9A | | | 180 | mΩ |
| On-State Drain Current | $I_{D(ON)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 10V | 18 | | | A |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 10V, $I_D$ = 9A | | 10.8 | | S |
| **DYNAMIC CHARACTERISTICS**[b] | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$ =25V, $V_{GS}$ = 0V<br>f =1.0MHz | | 1250 | 1700 | pF |
| Output Capacitance | $C_{OSS}$ | | | 188 | 250 | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 60 | 80 | pF |
| **SWITCHING CHARACTERISTICS**[b] | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}$ = 100V,<br>$I_D$ = 11A,<br>$V_{GS}$ = 10V,<br>$R_{GEN}$ = 9.1Ω | | 15 | 30 | ns |
| Rise Time | $t_r$ | | | 70 | 105 | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 55 | 85 | ns |
| Fall Time | $t_f$ | | | 55 | 70 | ns |
| Total Gate Charge | $Q_g$ | $V_{DS}$ =160V, $I_D$ = 18A,<br>$V_{GS}$ =10V | | 65 | 80 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 12 | | nC |
| Gate-Drain Charge | $Q_{gd}$ | | | 37 | | nC |

# CEPF640/CEBF640

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

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **DRAIN-SOURCE DIODE CHARACTERISTICS** [a] | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0V, Is = 18A | | | 1.5 | V |

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

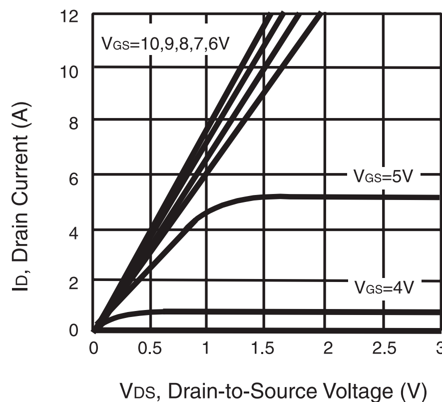


**Figure 1. Output Characteristics**

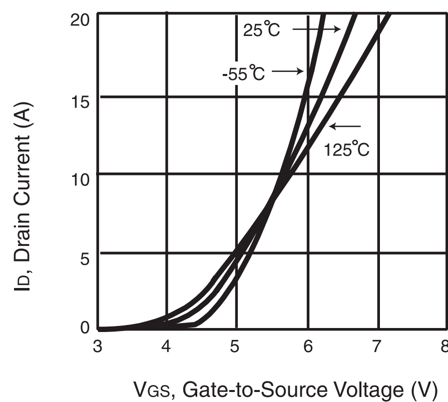


**Figure 2. Transfer Characteristics**

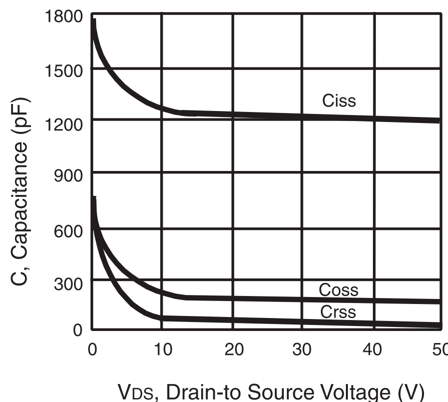


**Figure 3. Capacitance**

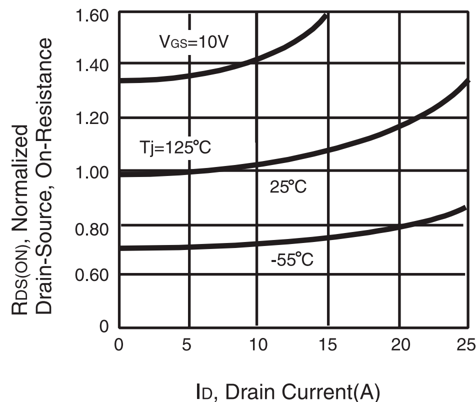


**Figure 4. On-Resistance Variation with Drain Current and Temperature**

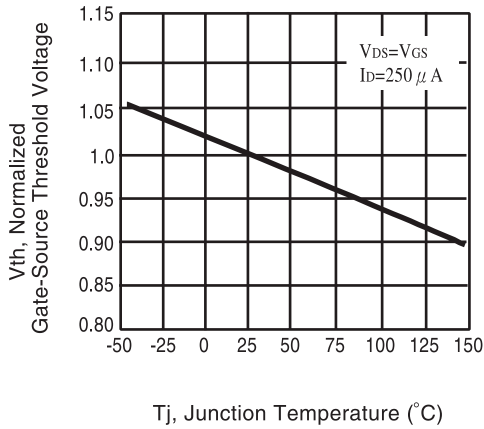


**Figure 5. Gate Threshold Variation with Temperature**

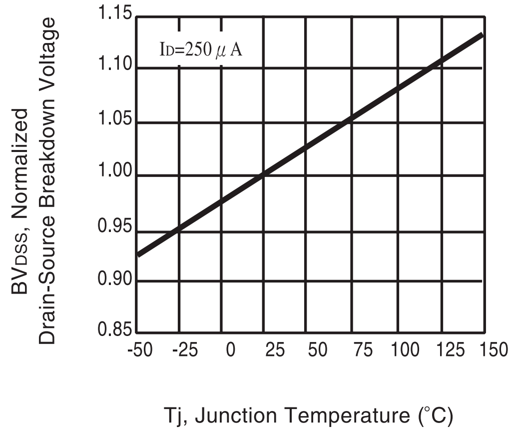


**Figure 6. Breakdown Voltage Variation with Temperature**

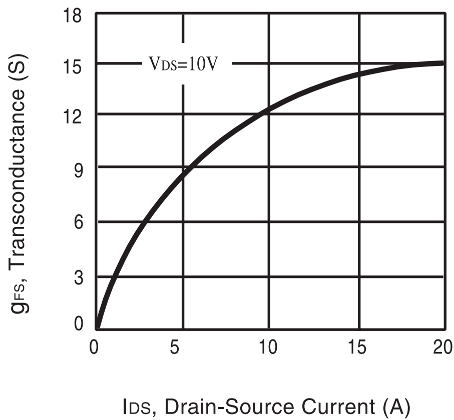


**Figure 7. Transconductance Variation with Drain Current**

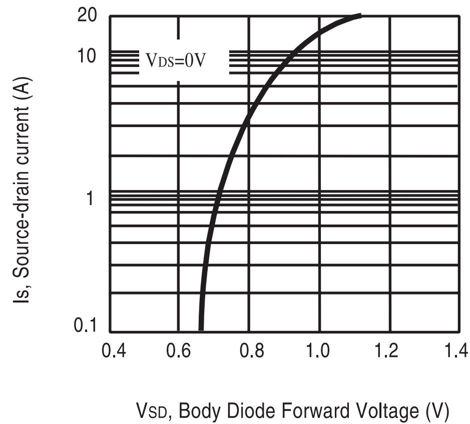


**Figure 8. Body Diode Forward Voltage Variation with Source Current**

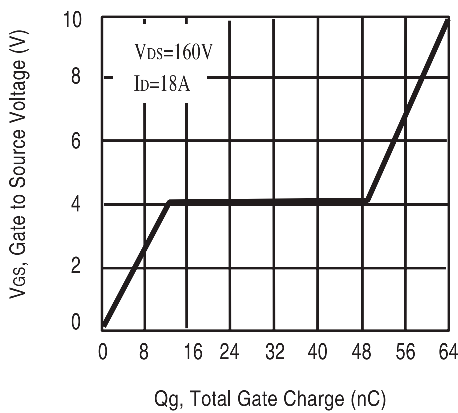


**Figure 9. Gate Charge**

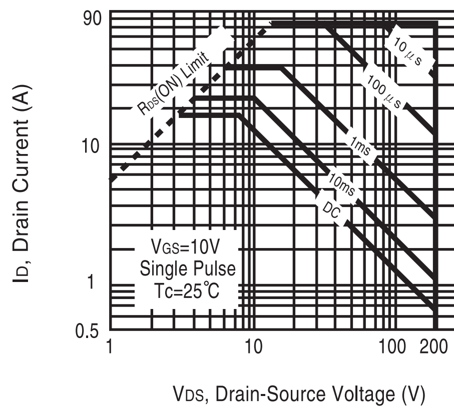


**Figure 10. Maximum Safe Operating Area**

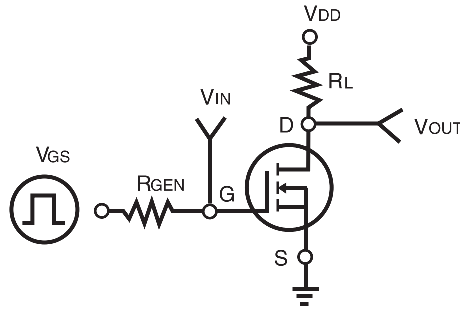


Figure 11. Switching Test Circuit

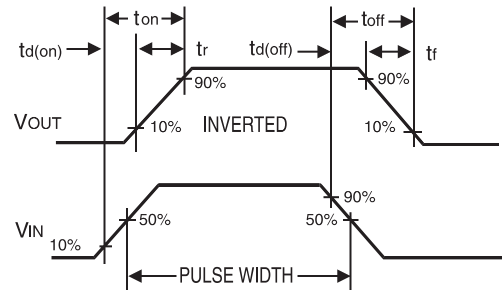


Figure 12. Switching Waveforms

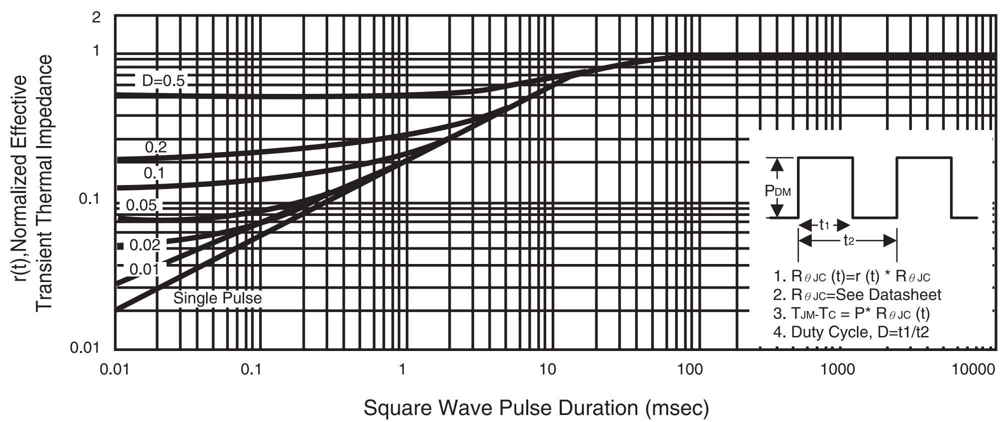


Figure 13. Normalized Thermal Transient Impedance Curve