# CED3120/CEU3120

## N-Channel Enhancement Mode Field Effect Transistor

## FEATURES

■ 30V, 36A , $R_{DS(ON)}$ = 15mΩ @$V_{GS}$ = 10V.

$R_{DS(ON)}$ = 22mΩ @$V_{GS}$ = 4.5V.

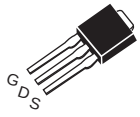
■ Super high dense cell design for extremely low $R_{DS(ON)}$.

■ High power and current handing capability.

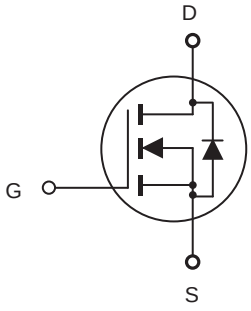
■ Lead free product is acquired.

■ TO-251 & TO-252 package.


CEU SERIES
TO-252(D-PAK)




CED SERIES
TO-251(I-PAK)




## ABSOLUTE MAXIMUM RATINGS $T_C$ = 25°C unless otherwise noted

| Parameter | Symbol | Limit | Units |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 36 | A |
| Drain Current-Pulsed [a] | $I_{DM}$ | 144 | A |
| Maximum Power Dissipation @ $T_C$ = 25°C | $P_D$ | 33 | W |
| - Derate above 25°C | | 0.26 | W/°C |
| Operating and Store Temperature Range | $T_J$,$T_{stg}$ | -55 to 150 | °C |

## Thermal Characteristics

| Parameter | Symbol | Limit | Units |
|---|---|---|---|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 3.8 | °C/W |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 50 | °C/W |

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

| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 30 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 30V, $V_{GS}$ = 0V | | | 1 | μA |
| 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 |
| **On Characteristics** [c] | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = 250μA | 1 | | 3 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 36A | | 12 | 15 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ =29A | | 17 | 22 | mΩ |
| **Dynamic Characteristics** [d] | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 15V, $V_{GS}$ = 0V, f = 1.0 MHz | | 960 | | pF |
| Output Capacitance | $C_{oss}$ | | | 160 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 80 | | pF |
| **Switching Characteristics** [d] | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 15V, $I_D$ = 10A, $V_{GS}$ = 10V, $R_{GEN}$ = 0.3Ω | | 14 | 28 | ns |
| Turn-On Rise Time | $t_r$ | | | 3.3 | 6.6 | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 31 | 62 | ns |
| Turn-Off Fall Time | $t_f$ | | | 7 | 14 | ns |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 15V, $I_D$ = 36A, $V_{GS}$ = 10V | | 13.3 | 17.7 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 2.7 | | nC |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.1 | | nC |
| **Drain-Source Diode Characteristics and Maximun Ratings** | | | | | | |
| Drain-Source Diode Forward Current [b] | $I_S$ | | | | 36 | A |
| Drain-Source Diode Forward Voltage [c] | $V_{SD}$ | $V_{GS}$ = 0V, $I_S$ = 36A | | | 1.3 | V |

**Notes :**
a.Repetitive Rating : Pulse width limited by maximum junction temperature.
b.Surface Mounted on FR4 Board, t ≤ 10 sec.
c.Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
d.Guaranteed by design, not subject to production testing.

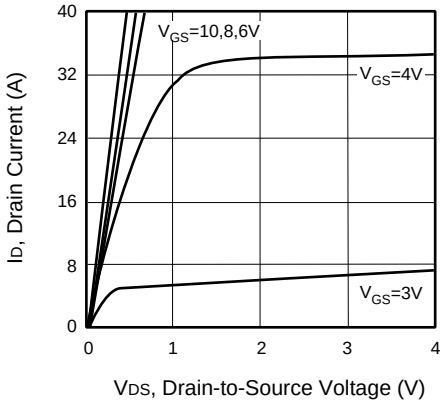



**Figure 1. Output Characteristics**

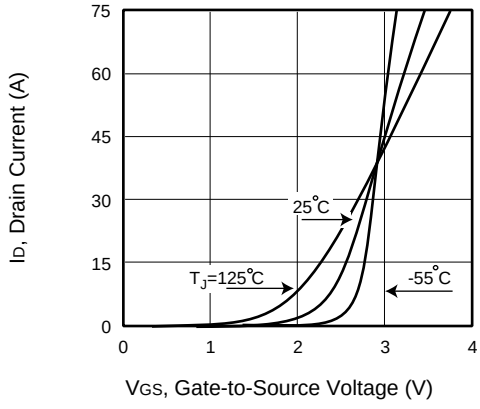



**Figure 2. Transfer Characteristics**

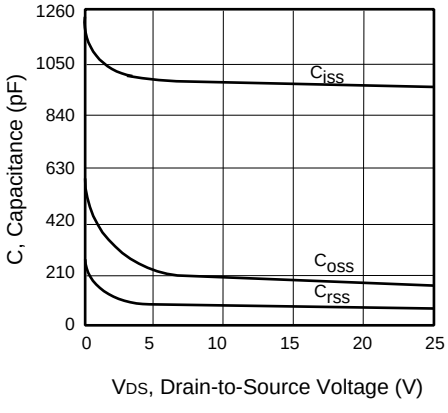



**Figure 3. Capacitance**

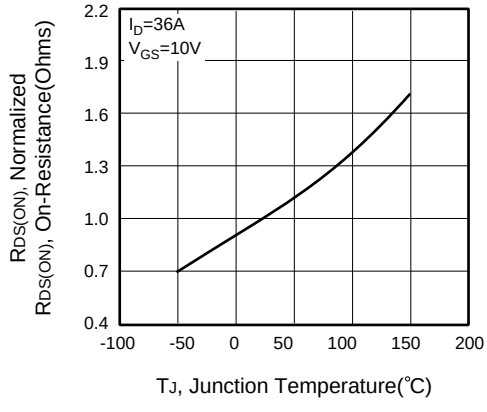



**Figure 4. On-Resistance Variation with Temperature**

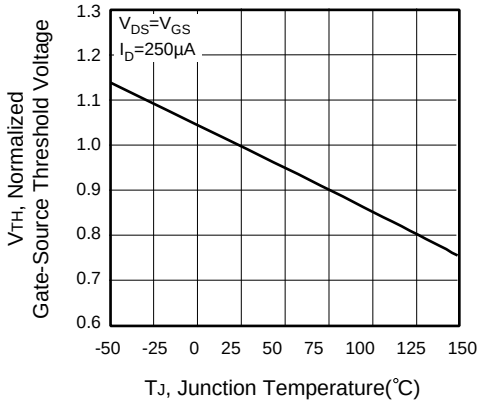



**Figure 5. Gate Threshold Variation with Temperature**

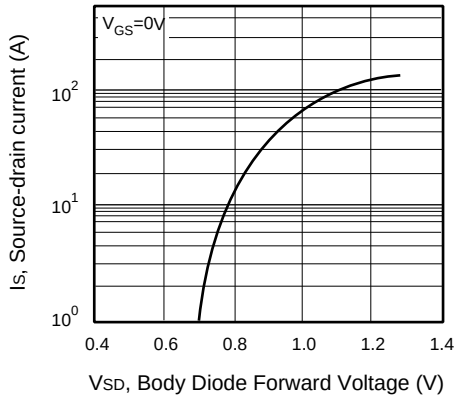



**Figure 6. Body Diode Forward Voltage Variation with Source Current**

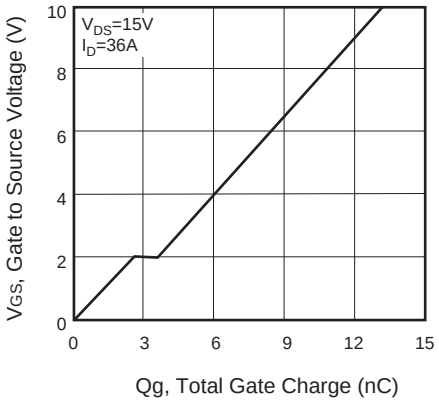



**Figure 7. Gate Charge**

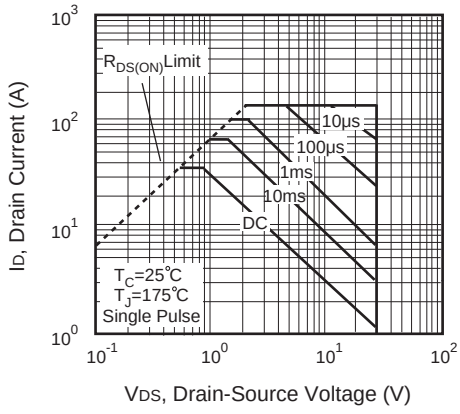



**Figure 8. Maximum Safe Operating Area**

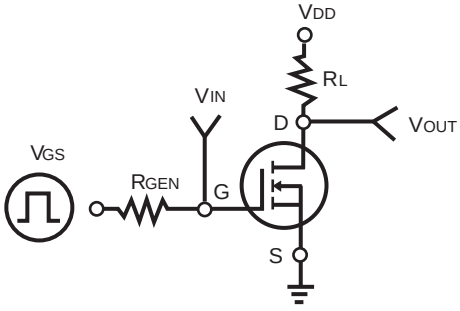



**Figure 9. Switching Test Circuit**

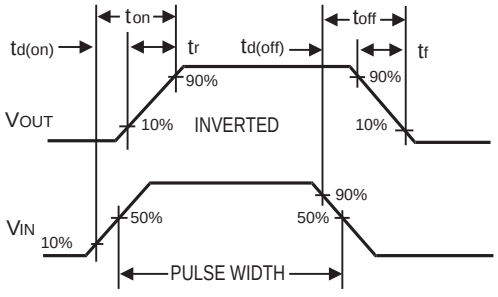



**Figure 10. Switching Waveforms**

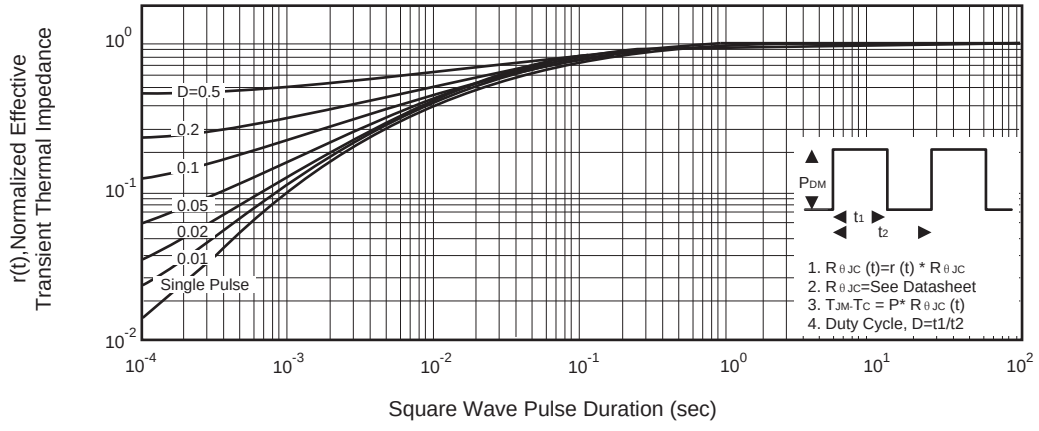



**Figure 11. Normalized Thermal Transient Impedance Curve**