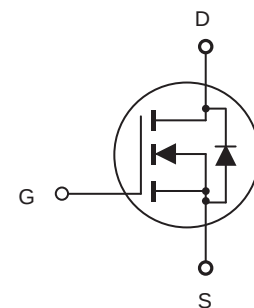
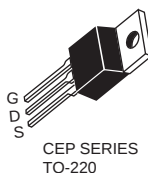
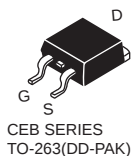


## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 30V, 40A,  $R_{DS(ON)} = 15m\Omega$  @  $V_{GS} = 10V$ .  
 $R_{DS(ON)} = 22m\Omega$  @  $V_{GS} = 4.5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handing capability.
- Lead free product is acquired.
- TO-220 & TO-263 package.



### ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ\text{C}$ unless otherwise noted

| Parameter                                                                                 | Symbol         | Limit      | Units               |
|-------------------------------------------------------------------------------------------|----------------|------------|---------------------|
| Drain-Source Voltage                                                                      | $V_{DS}$       | 30         | V                   |
| Gate-Source Voltage                                                                       | $V_{GS}$       | $\pm 20$   | V                   |
| Drain Current-Continuous                                                                  | $I_D$          | 40         | A                   |
| Drain Current-Pulsed <sup>a</sup>                                                         | $I_{DM}$       | 160        | A                   |
| Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$<br>- Derate above $25^\circ\text{C}$ | $P_D$          | 43         | W                   |
|                                                                                           |                | 0.29       | W/ $^\circ\text{C}$ |
| Operating and Store Temperature Range                                                     | $T_J, T_{stg}$ | -55 to 175 | $^\circ\text{C}$    |

### Thermal Characteristics

| Parameter                               | Symbol          | Limit | Units              |
|-----------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 3.5   | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5  | $^\circ\text{C/W}$ |



# CEP3120/CEB3120

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

| Parameter                                                                                                                                                                                                                                                                                                                                                        | Symbol       | Test Condition                                                    | Min | Typ  | Max  | Units      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------|-----|------|------|------------|
| Off Characteristics                                                                                                                                                                                                                                                                                                                                              |              |                                                                   |     |      |      |            |
| Drain-Source Breakdown Voltage                                                                                                                                                                                                                                                                                                                                   | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                     | 30  |      |      | V          |
| Zero Gate Voltage Drain Current                                                                                                                                                                                                                                                                                                                                  | $I_{DSS}$    | $V_{DS} = 30V, V_{GS} = 0V$                                       |     |      | 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         |
| On Characteristics <sup>c</sup>                                                                                                                                                                                                                                                                                                                                  |              |                                                                   |     |      |      |            |
| Gate Threshold Voltage                                                                                                                                                                                                                                                                                                                                           | $V_{GS(th)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$                                 | 1   |      | 3    | V          |
| Static Drain-Source                                                                                                                                                                                                                                                                                                                                              | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 40A$                                         |     | 11   | 15   | m $\Omega$ |
| On-Resistance                                                                                                                                                                                                                                                                                                                                                    |              | $V_{GS} = 4.5V, I_D = 32A$                                        |     | 17   | 22   | m $\Omega$ |
| Dynamic Characteristics <sup>d</sup>                                                                                                                                                                                                                                                                                                                             |              |                                                                   |     |      |      |            |
| Input Capacitance                                                                                                                                                                                                                                                                                                                                                | $C_{iss}$    | $V_{DS} = 15V, V_{GS} = 0V,$<br>$f = 1.0\text{ MHz}$              |     | 955  |      | pF         |
| Output Capacitance                                                                                                                                                                                                                                                                                                                                               | $C_{oss}$    |                                                                   |     | 155  |      | pF         |
| Reverse Transfer Capacitance                                                                                                                                                                                                                                                                                                                                     | $C_{rss}$    |                                                                   |     | 75   |      | pF         |
| Switching Characteristics <sup>d</sup>                                                                                                                                                                                                                                                                                                                           |              |                                                                   |     |      |      |            |
| Turn-On Delay Time                                                                                                                                                                                                                                                                                                                                               | $t_{d(on)}$  | $V_{DD} = 15V, I_D = 10A,$<br>$V_{GS} = 10V, R_{GEN} = 0.3\Omega$ |     | 13   | 26   | ns         |
| Turn-On Rise Time                                                                                                                                                                                                                                                                                                                                                | $t_r$        |                                                                   |     | 3.4  | 6.8  | ns         |
| Turn-Off Delay Time                                                                                                                                                                                                                                                                                                                                              | $t_{d(off)}$ |                                                                   |     | 30   | 60   | ns         |
| Turn-Off Fall Time                                                                                                                                                                                                                                                                                                                                               | $t_f$        |                                                                   |     | 6.8  | 13.6 | ns         |
| Total Gate Charge                                                                                                                                                                                                                                                                                                                                                | $Q_g$        | $V_{DS} = 15V, I_D = 40A,$<br>$V_{GS} = 10V$                      |     | 13.1 | 17.4 | nC         |
| Gate-Source Charge                                                                                                                                                                                                                                                                                                                                               | $Q_{gs}$     |                                                                   |     | 2.7  |      | nC         |
| Gate-Drain Charge                                                                                                                                                                                                                                                                                                                                                | $Q_{gd}$     |                                                                   |     | 1    |      | nC         |
| Drain-Source Diode Characteristics and Maximun Ratings                                                                                                                                                                                                                                                                                                           |              |                                                                   |     |      |      |            |
| Drain-Source Diode Forward Current <sup>b</sup>                                                                                                                                                                                                                                                                                                                  | $I_S$        |                                                                   |     |      | 40   | A          |
| Drain-Source Diode Forward Voltage <sup>c</sup>                                                                                                                                                                                                                                                                                                                  | $V_{SD}$     | $V_{GS} = 0V, I_S = 40A$                                          |     |      | 1.3  | V          |
| <div>Notes :</div> <div>a.Repetitive Rating : Pulse width limited by maximum junction temperature.</div> <div>b.Surface Mounted on FR4 Board, <math>t \leq 10\text{ sec.}</math></div> <div>c.Pulse Test : Pulse Width <math>\leq 300\mu s</math>, Duty Cycle <math>\leq 2\%</math>.</div> <div>d.Guaranteed by design, not subject to production testing.</div> |              |                                                                   |     |      |      |            |

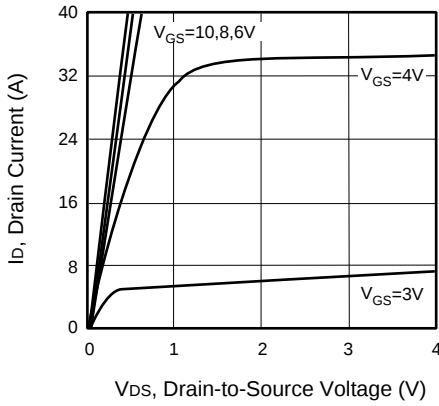


Figure 1. Output Characteristics

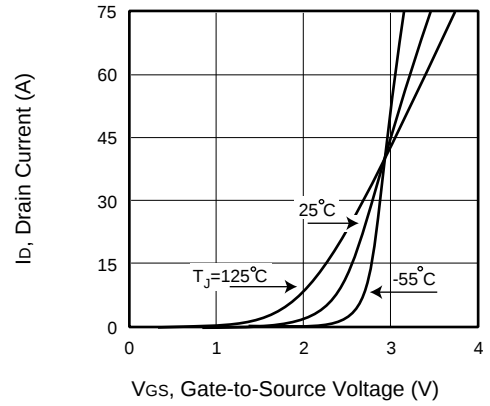


Figure 2. Transfer Characteristics

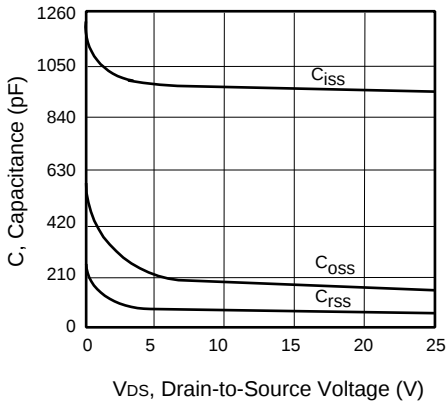


Figure 3. Capacitance

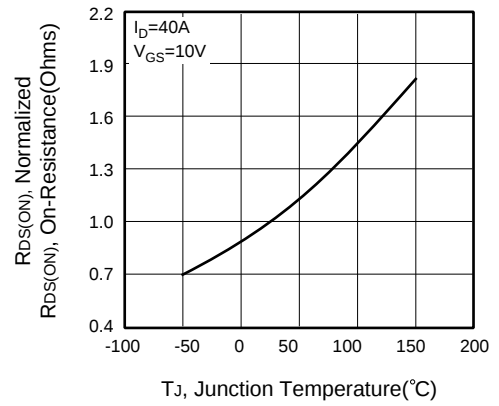


Figure 4. On-Resistance Variation with Temperature

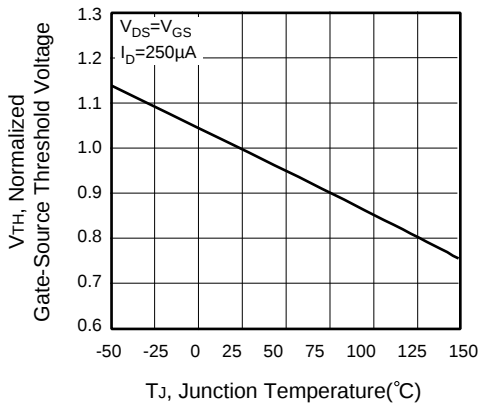


Figure 5. Gate Threshold Variation with Temperature

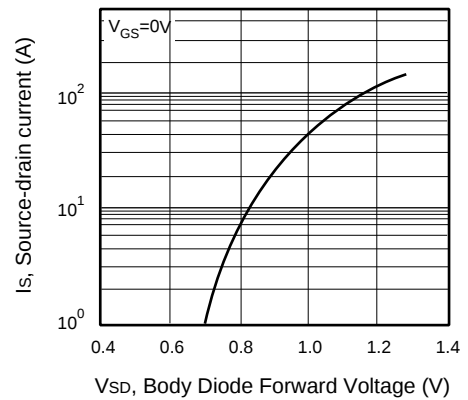


Figure 6. Body Diode Forward Voltage Variation with Source Current

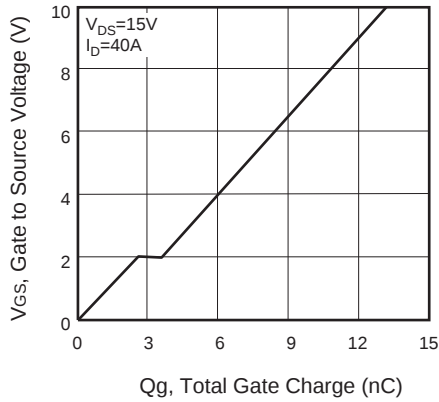


Figure 7. Gate Charge

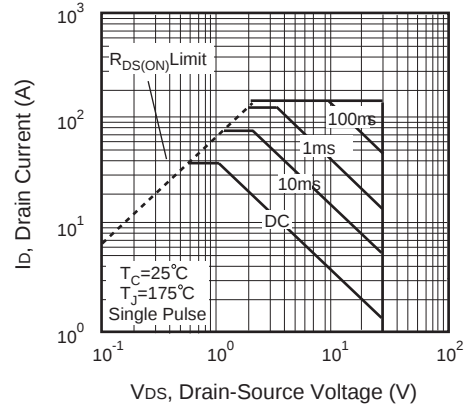


Figure 8. Maximum Safe Operating Area

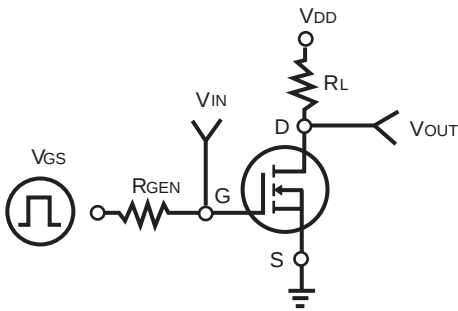


Figure 9. Switching Test Circuit

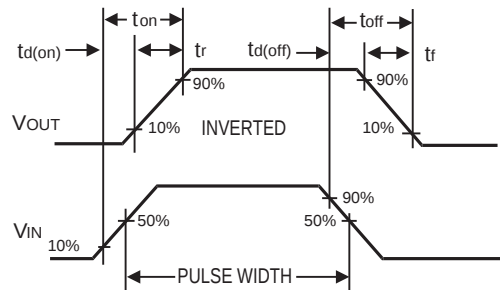


Figure 10. Switching Waveforms

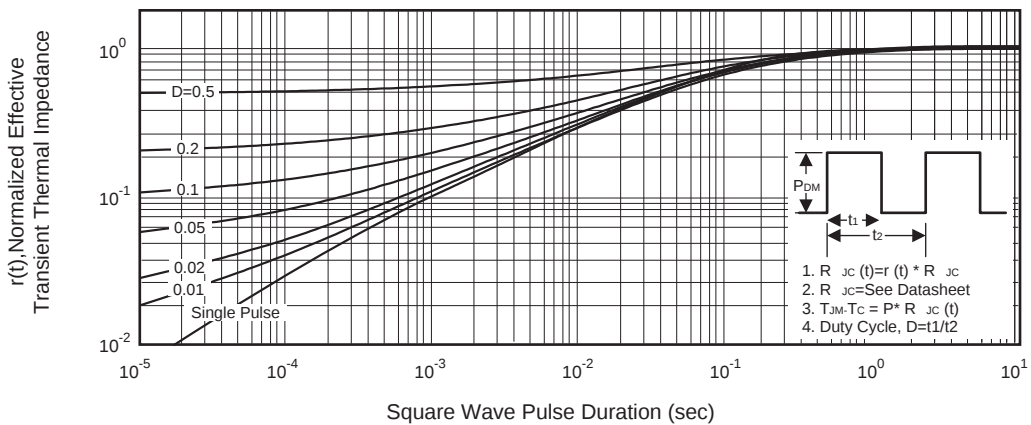


Figure 11. Normalized Thermal Transient Impedance Curve