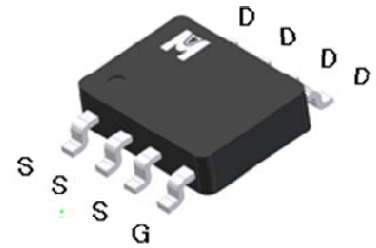
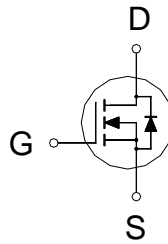


N-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

|                     |               |
|---------------------|---------------|
| $BV_{DSS}$          | 30V           |
| $R_{DS(on)}$ (MAX.) | 9.5m $\Omega$ |
| $I_D$               | 14A           |



UIS, R<sub>g</sub> 100% Tested

Pb-Free Lead Plating & Halogen Free



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25\text{ }^\circ\text{C}$  Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS                     |  | SYMBOL           | LIMITS     | UNIT             |
|--|--|------------------|------------|------------------|
| Gate-Source Voltage                            |  | $V_{GS}$         | $\pm 20$   | V                |
| Continuous Drain Current                       | $T_C = 25\text{ }^\circ\text{C}$                     | $I_D$            | 14         | A                |
|  | $T_C = 100\text{ }^\circ\text{C}$                    |                  | 11         |                  |
| Pulsed Drain Current <sup>1</sup>              |  | $I_{DM}$         | 50         |                  |
| Avalanche Current                              |  | $I_{AS}$         | 14         |                  |
| Avalanche Energy                               | $L = 0.1\text{mH}, I_D = 14\text{A}, R_G = 25\Omega$ | $E_{AS}$         | 9.8        | mJ               |
| Repetitive Avalanche Energy <sup>2</sup>       | $L = 0.05\text{mH}$                                  | $E_{AR}$         | 4.9        |                  |
| Power Dissipation                              | $T_A = 25\text{ }^\circ\text{C}$                     | $P_D$            | 2.5        | W                |
|  | $T_A = 100\text{ }^\circ\text{C}$                    |                  | 1          |                  |
| Operating Junction & Storage Temperature Range |  | $T_{j}, T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

100% UIS testing in condition of  $V_D = 15\text{V}, L = 0.1\text{mH}, V_G = 10\text{V}, I_L = 14\text{A}$ , Rated  $V_{DS} = 30\text{V}$  N-CH

THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE               | SYMBOL          | TYPICAL | MAXIMUM | UNIT                        |
|----------------------------------|-----------------|---------|---------|-----------------------------|
| Junction-to-Case                 | $R_{\theta JC}$ |         | 25      | $^\circ\text{C} / \text{W}$ |
| Junction-to-Ambient <sup>3</sup> | $R_{\theta JA}$ |         | 50      |                             |

<sup>1</sup>Pulse width limited by maximum junction temperature.

<sup>2</sup>Duty cycle  $\leq 1\%$

<sup>3</sup>50 $^\circ\text{C} / \text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, Unless Otherwise Noted)

| PARAMETER   | SYMBOL                                 | TEST CONDITIONS   | LIMITS   |      |      | UNIT |
|---|--|---|--|------|------|------|
|   |  |   | MIN  | TYP  | MAX  |      |
| <b>STATIC</b>   |  |   |  |      |      |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub>                   | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                          | 30   |      |      | V    |
| Gate Threshold Voltage  | V <sub>GS(th)</sub>                    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA            | 1  | 1.7  | 3    |      |
| Gate-Body Leakage   | I <sub>GSS</sub>                       | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V                          |  |      | ±100 | nA   |
| Zero Gate Voltage Drain Current   | I <sub>DSS</sub>                       | V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V                           |  |      | 1    | μA   |
|   |  | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125 °C  |  |      | 25   |      |
| On-State Drain Current <sup>1</sup>   | I <sub>D(ON)</sub>                     | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 10V                          | 50   |      |      | A    |
| Drain-Source On-State Resistance <sup>1</sup>                                 | R <sub>DS(ON)</sub>                    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 14A                           |  | 8    | 9.5  | mΩ   |
|   |  | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 11A                          |  | 12   | 14.5 |      |
| Forward Transconductance <sup>1</sup>   | g <sub>fs</sub>                        | V <sub>DS</sub> = 5V, I <sub>D</sub> = 14A                            |  | 20   |      | S    |
| <b>DYNAMIC</b>  |  |   |  |      |      |      |
| Input Capacitance   | C <sub>iss</sub>                       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V, f = 1MHz                 |  | 828  |      | pF   |
| Output Capacitance  | C <sub>oss</sub>                       |   |  | 196  |      |      |
| Reverse Transfer Capacitance  | C <sub>rss</sub>                       |   |  | 174  |      |      |
| Gate Resistance   | R <sub>g</sub>                         | V <sub>GS</sub> = 15mV, V <sub>DS</sub> = 0V, f = 1MHz                |  | 1.7  |      | Ω    |
| Total Gate Charge <sup>1,2</sup>  | Q <sub>g</sub> (V <sub>GS</sub> =10V)  | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V,<br>I <sub>D</sub> = 14A |  | 17.6 |      | nC   |
|   | Q <sub>g</sub> (V <sub>GS</sub> =4.5V) |   |  | 12   |      |      |
| Gate-Source Charge <sup>1,2</sup>   | Q <sub>gs</sub>                        |   |  | 2.8  |      |      |
| Gate-Drain Charge <sup>1,2</sup>  | Q <sub>gd</sub>                        |   |  | 7.4  |      |      |
| Turn-On Delay Time <sup>1,2</sup>   | t <sub>d(on)</sub>                     |   | V <sub>DS</sub> = 15V,<br>I <sub>D</sub> = 1A, V <sub>GS</sub> = 10V, R <sub>GS</sub> = 2.7Ω |      | 8    |      |
| Rise Time <sup>1,2</sup>  | t <sub>r</sub>                         |   |  | 15   |      |      |
| Turn-Off Delay Time <sup>1,2</sup>  | t <sub>d(off)</sub>                    |   |  | 20   |      |      |
| Fall Time <sup>1,2</sup>  | t <sub>f</sub>                         |   |  | 20   |      |      |
| <b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T<sub>C</sub> = 25 °C)</b> |  |   |  |      |      |      |
| Continuous Current  | I <sub>S</sub>                         |   |  |      | 5    | A    |
| Pulsed Current <sup>3</sup>   | I <sub>SM</sub>                        |   |  |      | 20   |      |
| Forward Voltage <sup>1</sup>  | V <sub>SD</sub>                        | I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0V                |  |      | 1.3  | V    |
| Reverse Recovery Time   | t <sub>rr</sub>                        | I <sub>F</sub> = I <sub>S</sub> , dI <sub>F</sub> /dt = 100A / μS     |  | 22   |      | nS   |
| Peak Reverse Recovery Current   | I <sub>RM(REC)</sub>                   |   |  | 50   |      | A    |
| Reverse Recovery Charge   | Q <sub>rr</sub>                        |   |  | 12   |      | nC   |

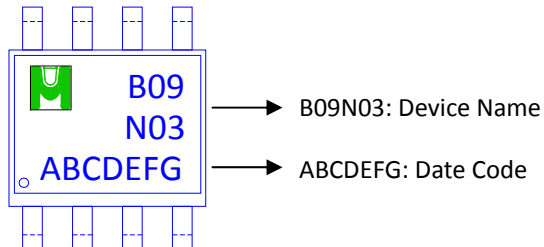
<sup>1</sup>Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

<sup>2</sup>Independent of operating temperature.

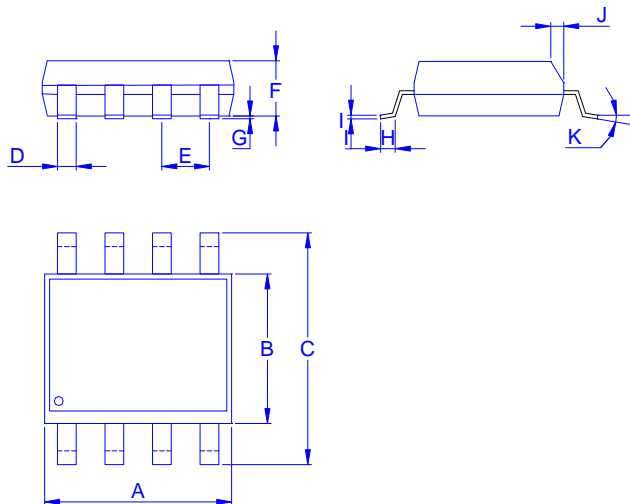
<sup>3</sup>Pulse width limited by maximum junction temperature.

**Ordering & Marking Information:**

Device Name: EMB09N03G for SOP-8



**Outline Drawing**



Dimension in mm

| Dimension | A    | B    | C    | D    | E    | F    | G    | H    | I    | J    | K  |
|-----------|------|------|------|------|------|------|------|------|------|------|----|
| Min.      | 4.70 | 3.70 | 5.80 | 0.33 |      | 1.20 | 0.08 | 0.40 | 0.19 | 0.25 | 0° |
| Typ.      |      |      |      |      | 1.27 |      |      |      |      |      |    |
| Max.      | 5.10 | 4.10 | 6.20 | 0.51 |      | 1.62 | 0.28 | 0.83 | 0.26 | 0.50 | 8° |



TYPICAL CHARACTERISTICS

