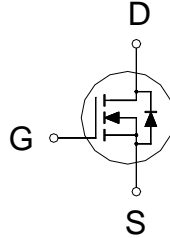


N-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

| | |
|----------------------------|--------|
| BV _{DSS} | 40V |
| R _{DS(on)} (MAX.) | 12.8mΩ |
| I _D | 18A |



UIS, R_g 100% Tested

Pb-Free Lead Plating & Halogen Free



ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS | | SYMBOL | LIMITS | UNIT |
|--|---|-----------------------------------|------------|------|
| Gate-Source Voltage | | V _{GS} | ±20 | V |
| Continuous Drain Current | T _C = 25 °C | I _D | 18 | A |
| | T _C = 100 °C | | 13 | |
| Pulsed Drain Current ¹ | | I _{DM} | 72 | |
| Avalanche Current | | I _{AS} | 12 | |
| Avalanche Energy | L = 0.1mH, I _D =12A, R _G =25Ω | E _{AS} | 7.2 | mJ |
| Repetitive Avalanche Energy ² | L = 0.05mH | E _{AR} | 3.6 | |
| Power Dissipation | T _C = 25 °C | P _D | 21 | W |
| | T _C = 100 °C | | 8.3 | |
| Power Dissipation | T _A = 25 °C | P _D | 2.5 | W |
| | T _A = 100 °C | | 1 | |
| Operating Junction & Storage Temperature Range | | T _J , T _{stg} | -55 to 150 | °C |

THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE | SYMBOL | TYPICAL | MAXIMUM | UNIT |
|----------------------------------|------------------|---------|---------|--------|
| Junction-to-Case | R _{θJC} | | 6 | °C / W |
| Junction-to-Ambient ³ | R _{θJA} | | 50 | |

¹Pulse width limited by maximum junction temperature.

²Duty cycle ≤ 1%

³50°C / W when mounted on a 1 in² pad of 2 oz copper.



ELECTRICAL CHARACTERISTICS ($T_c = 25\text{ }^\circ\text{C}$, Unless Otherwise Noted)

| PARAMETER | SYMBOL | TEST CONDITIONS | LIMITS | | | UNIT |
|---|---------------|--|--------|------|-----------|-----------|
| | | | MIN | TYP | MAX | |
| STATIC | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$ | 40 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1.5 | 2.0 | 3.0 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0V, V_{GS} = \pm 20V$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 32V, V_{GS} = 0V$ | | | 1 | μA |
| | | $V_{DS} = 30V, V_{GS} = 0V, T_J = 125\text{ }^\circ\text{C}$ | | | 10 | |
| On-State Drain Current ¹ | $I_{D(ON)}$ | $V_{DS} = 5V, V_{GS} = 10V$ | 18 | | | A |
| Drain-Source On-State Resistance ¹ | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 12A$ | | 10.8 | 12.8 | $m\Omega$ |
| | | $V_{GS} = 4.5V, I_D = 7A$ | | 20 | 25 | |
| Forward Transconductance ¹ | g_{fs} | $V_{DS} = 5V, I_D = 12A$ | | 25 | | S |
| DYNAMIC | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0V, V_{DS} = 20V, f = 1MHz$ | | 1090 | | pF |
| Output Capacitance | C_{oss} | | | 133 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 106 | | |
| Gate Resistance | R_g | $V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz$ | | 2.0 | | Ω |
| Total Gate Charge ^{1,2} | Q_g | $V_{DS} = 20V, V_{GS} = 10V, I_D = 12A$ | | 24 | | nC |
| Gate-Source Charge ^{1,2} | Q_{gs} | | | 3 | | |
| Gate-Drain Charge ^{1,2} | Q_{gd} | | | 6.6 | | |
| Turn-On Delay Time ^{1,2} | $t_{d(on)}$ | $V_{DS} = 20V, I_D = 1A, V_{GS} = 10V, R_{GS} = 6\Omega$ | | 3 | | nS |
| Rise Time ^{1,2} | t_r | | | 11 | | |
| Turn-Off Delay Time ^{1,2} | $t_{d(off)}$ | | | 16 | | |
| Fall Time ^{1,2} | t_f | | | 6 | | |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_c = 25\text{ }^\circ\text{C}$) | | | | | | |
| Continuous Current | I_S | | | | 2.5 | A |
| Pulsed Current ³ | I_{SM} | | | | 10 | |
| Forward Voltage ¹ | V_{SD} | $I_F = I_S, V_{GS} = 0V$ | | | 1.2 | V |
| Reverse Recovery Time | t_{rr} | $I_F = I_S, di_F/dt = 100A / \mu S$ | | 18 | | nS |
| Reverse Recovery Charge | Q_{rr} | | | | 10 | |

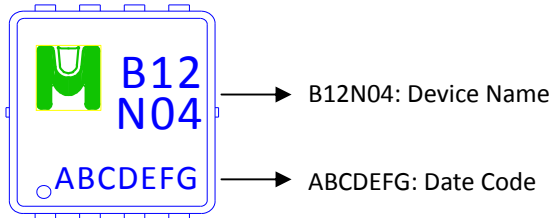
¹Pulse test : Pulse Width $\leq 300\text{ }\mu\text{sec}$, Duty Cycle $\leq 2\%$.

²Independent of operating temperature.

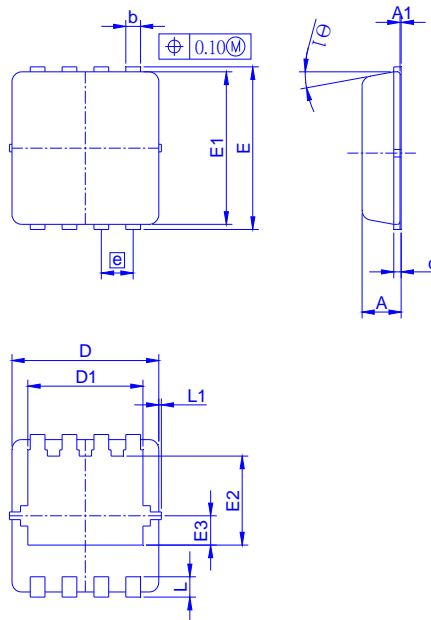
³Pulse width limited by maximum junction temperature.

Ordering & Marking Information:

Device Name: EMB12N04V for EDFN 3 x 3



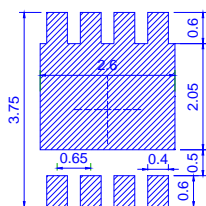
Outline Drawing



Dimension in mm

| Dimension | A | A1 | b | c | D | D1 | E | E1 | E2 | E3 | e | L | L1 | θ1 |
|-----------|------|------|------|-------|------|------|------|------|------|-------|------|------|------|-----|
| Min. | 0.70 | 0 | 0.24 | 0.10 | 2.95 | 2.25 | 3.15 | 2.95 | 1.65 | | | 0.30 | | 0° |
| Typ. | 0.80 | | 0.30 | 0.152 | 3.00 | 2.35 | 3.20 | 3.00 | 1.75 | 0.575 | 0.65 | 0.40 | 0.13 | 10° |
| Max. | 0.90 | 0.05 | 0.37 | 0.25 | 3.15 | 2.45 | 3.40 | 3.15 | 1.96 | | | 0.50 | | 12° |

Recommended minimum pads





TYPICAL CHARACTERISTICS

