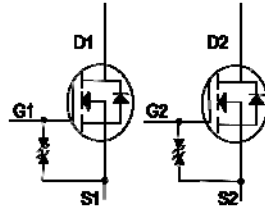


**Dual N-Channel Logic Level Enhancement Mode Field Effect Transistor**

**Product Summary:**

|                            |      |
|----------------------------|------|
| BV <sub>DSS</sub>          | 30V  |
| R <sub>DS(on)</sub> (MAX.) | 21mΩ |
| I <sub>D</sub>             | 9A   |



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

Pb-Free Lead Plating & Halogen Free

ESD Protection



**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C Unless Otherwise Noted)**

| PARAMETERS/TEST CONDITIONS                     |                                                     | SYMBOL                            | LIMITS     | UNIT |
|------------------------------------------------|-----------------------------------------------------|-----------------------------------|------------|------|
| Gate-Source Voltage                            |                                                     | V <sub>GS</sub>                   | ±20        | V    |
| Continuous Drain Current                       | T <sub>A</sub> = 25 °C                              | I <sub>D</sub>                    | 9          | A    |
|                                                | T <sub>A</sub> = 100 °C                             |                                   | 6.3        |      |
| Pulsed Drain Current <sup>1</sup>              |                                                     | I <sub>DM</sub>                   | 36         |      |
| Avalanche Current                              |                                                     | I <sub>AS</sub>                   | 10         |      |
| Avalanche Energy                               | L = 0.1mH, I <sub>D</sub> =10A, R <sub>G</sub> =25Ω | E <sub>AS</sub>                   | 5          | mJ   |
| Repetitive Avalanche Energy <sup>2</sup>       | L = 0.05mH                                          | E <sub>AR</sub>                   | 2.5        |      |
| Power Dissipation                              | T <sub>A</sub> = 25 °C                              | P <sub>D</sub>                    | 2.27       | W    |
|                                                | T <sub>A</sub> = 100 °C                             |                                   | 0.9        |      |
| Operating Junction & Storage Temperature Range |                                                     | T <sub>j</sub> , T <sub>stg</sub> | -55 to 150 | °C   |

100% UIS testing in condition of V<sub>D</sub>=15V, L=0.1mH, V<sub>G</sub>=10V, I<sub>L</sub>=7.5A, Rated V<sub>DS</sub>=30V N-CH

**THERMAL RESISTANCE RATINGS**

| THERMAL RESISTANCE               | SYMBOL           | TYPICAL | MAXIMUM | UNIT   |
|----------------------------------|------------------|---------|---------|--------|
| Junction-to-Case                 | R <sub>θJC</sub> |         | 7.5     | °C / W |
| Junction-to-Ambient <sup>3</sup> | R <sub>θJA</sub> |         | 55      |        |

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

<sup>2</sup>Duty cycle ≤ 1%

<sup>3</sup>55°C / W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.

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

| PARAMETER                                                               | SYMBOL             | TEST CONDITIONS                                               | LIMITS |     |          | UNIT       |
|-------------------------------------------------------------------------|--------------------|---------------------------------------------------------------|--------|-----|----------|------------|
|                                                                         |                    |                                                               | MIN    | TYP | MAX      |            |
| STATIC                                                                  |                    |                                                               |        |     |          |            |
| Drain-Source Breakdown Voltage                                          | $V_{(BR)DSS}$      | $V_{GS} = 0V, I_D = 250\mu A$                                 | 30     |     |          | V          |
| Gate Threshold Voltage                                                  | $V_{GS(th)}$       | $V_{DS} = V_{GS}, I_D = 250\mu A$                             | 1      | 1.5 | 3        |            |
| Gate-Body Leakage                                                       | $I_{GSS}$          | $V_{DS} = 0V, V_{GS} = \pm 20V$                               |        |     | $\pm 10$ | $\mu A$    |
| Zero Gate Voltage Drain Current                                         | $I_{DSS}$          | $V_{DS} = 24V, V_{GS} = 0V$                                   |        |     | 1        | $\mu A$    |
|                                                                         |                    | $V_{DS} = 20V, V_{GS} = 0V, T_J = 125\text{ }^{\circ}C$       |        |     | 25       |            |
| On-State Drain Current <sup>1</sup>                                     | $I_{D(ON)}$        | $V_{DS} = 10V, V_{GS} = 10V$                                  | 9      |     |          | A          |
| Drain-Source On-State Resistance <sup>1</sup>                           | $R_{DS(ON)}$       | $V_{GS} = 10V, I_D = 9A$                                      |        | 17  | 21       | m $\Omega$ |
|                                                                         |                    | $V_{GS} = 4.5V, I_D = 5A$                                     |        | 24  | 32       |            |
| Forward Transconductance <sup>1</sup>                                   | $g_{fs}$           | $V_{DS} = 5V, I_D = 9A$                                       |        | 16  |          | S          |
| DYNAMIC                                                                 |                    |                                                               |        |     |          |            |
| Input Capacitance                                                       | $C_{iss}$          | $V_{GS} = 0V, V_{DS} = 15V, f = 1MHz$                         |        | 530 |          | pF         |
| Output Capacitance                                                      | $C_{oss}$          |                                                               |        | 102 |          |            |
| Reverse Transfer Capacitance                                            | $C_{rss}$          |                                                               |        | 81  |          |            |
| Gate Resistance                                                         | $R_g$              | $V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz$                        |        | 2.0 |          | $\Omega$   |
| Total Gate Charge <sup>1,2</sup>                                        | $Q_g(V_{GS}=10V)$  | $V_{DS} = 15V, V_{GS} = 10V,$<br>$I_D = 9A$                   |        | 11  |          | nC         |
|                                                                         | $Q_g(V_{GS}=4.5V)$ |                                                               |        | 5.7 |          |            |
| Gate-Source Charge <sup>1,2</sup>                                       | $Q_{gs}$           |                                                               |        | 1.7 |          |            |
| Gate-Drain Charge <sup>1,2</sup>                                        | $Q_{gd}$           |                                                               |        | 3   |          |            |
| Turn-On Delay Time <sup>1,2</sup>                                       | $t_{d(on)}$        | $V_{DS} = 15V,$<br>$I_D = 1A, V_{GS} = 10V, R_{GS} = 6\Omega$ |        | 11  |          | nS         |
| Rise Time <sup>1,2</sup>                                                | $t_r$              |                                                               |        | 16  |          |            |
| Turn-Off Delay Time <sup>1,2</sup>                                      | $t_{d(off)}$       |                                                               |        | 36  |          |            |
| Fall Time <sup>1,2</sup>                                                | $t_f$              |                                                               |        | 20  |          |            |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T <sub>c</sub> = 25 °C) |                    |                                                               |        |     |          |            |
| Continuous Current                                                      | $I_S$              |                                                               |        |     | 2.3      | A          |
| Pulsed Current <sup>3</sup>                                             | $I_{SM}$           |                                                               |        |     | 9.2      |            |
| Forward Voltage <sup>1</sup>                                            | $V_{SD}$           | $I_F = I_S, V_{GS} = 0V$                                      |        |     | 1.2      | V          |
| Reverse Recovery Time                                                   | $t_{rr}$           | $I_F = I_S, di_F/dt = 100A / \mu S$                           |        | 45  |          | nS         |
| Peak Reverse Recovery Current                                           | $I_{RM(REC)}$      |                                                               |        | 28  |          | A          |
| Reverse Recovery Charge                                                 | $Q_{rr}$           |                                                               |        | 3   |          | nC         |

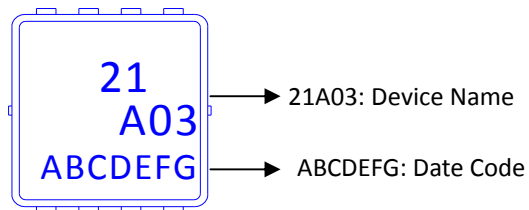
<sup>1</sup>Pulse test : Pulse Width  $\leq 300\mu$  sec, Duty Cycle  $\leq 2\%$ .

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

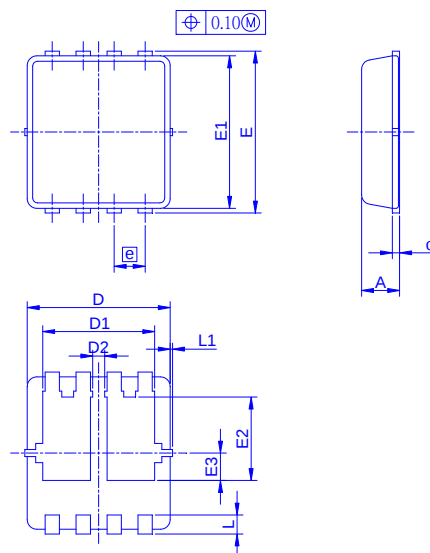
<sup>3</sup>Pulse width limited by maximum junction

temperature. **Ordering & Marking Information:**

Device Name: LB21N03BD for EDFN 3 x 3



## Outline Drawing



## Dimension in mm

| Dimension | A    | A1   | b    | c     | D    | D1   | D2    | E    | E1   | E2   | E3    | e    | L    | L1   | $\theta 1$ |
|-----------|------|------|------|-------|------|------|-------|------|------|------|-------|------|------|------|------------|
| Min.      | 0.70 | 0    | 0.24 | 0.10  | 2.95 | 2.25 |       | 3.15 | 2.95 | 1.65 |       |      | 0.30 | 0    | 0°         |
| Typ.      | 0.80 |      | 0.30 | 0.152 | 3.00 | 2.35 | 0.225 | 3.20 | 3.00 | 1.75 | 0.575 | 0.65 | 0.40 |      | 10°        |
| Max.      | 0.90 | 0.05 | 0.35 | 0.25  | 3.05 | 2.45 |       | 3.25 | 3.05 | 1.85 |       |      | 0.50 | 0.10 | 12°        |

## Recommended minimum pads

