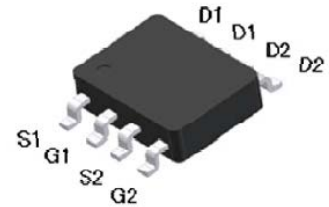
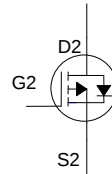
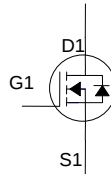


**N & P-Channel Logic Level Enhancement Mode Field Effect Transistor**

**Product Summary:**

|                            | N-CH | P-CH |
|----------------------------|------|------|
| BV <sub>DSS</sub>          | 40V  | -40V |
| R <sub>DS(on)</sub> (MAX.) | 28mΩ | 44mΩ |
| I <sub>D</sub>             | 7A   | -6A  |



Pb-Free Lead Plating & Halogen Free



**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>                   | N-CH       | P-CH | V    |
|                                                |                        |                                   | ±20        | ±20  |      |
| Continuous Drain Current                       | T <sub>A</sub> = 25 °C | I <sub>D</sub>                    | 7          | -6   | A    |
|                                                | T <sub>A</sub> = 70 °C |                                   | 6          | -5   |      |
| Pulsed Drain Current <sup>1</sup>              |                        | I <sub>DM</sub>                   | 28         | -24  |      |
| Power Dissipation                              | T <sub>A</sub> = 25 °C | P <sub>D</sub>                    | 2          |      | W    |
|                                                | T <sub>A</sub> = 70 °C |                                   | 1.3        |      |      |
| Operating Junction & Storage Temperature Range |                        | T <sub>j</sub> , T <sub>stg</sub> | -55 to 150 |      | °C   |

**THERMAL RESISTANCE RATINGS**

| THERMAL RESISTANCE  | SYMBOL           | TYPICAL | MAXIMUM | UNIT   |
|---------------------|------------------|---------|---------|--------|
| Junction-to-Case    | R <sub>θJC</sub> |         | 25      | °C / W |
| Junction-to-Ambient | R <sub>θJA</sub> |         | 62.5    |        |

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

<sup>2</sup>Duty cycle ≤ 1%

**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                | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$<br>$V_{GS} = 0V, I_D = -250\mu A$                                                     | N-CH   | 40   |      | V         |
|                                               |               |                                                                                                                     | P-CH   | -40  |      |           |
| Gate Threshold Voltage                        | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$<br>$V_{DS} = V_{GS}, I_D = -250\mu A$                                             | N-CH   | 1.0  | 1.5  | 3.0       |
|                                               |               |                                                                                                                     | P-CH   | -1.0 | -1.5 | -3.0      |
| Gate-Body Leakage                             | $I_{GSS}$     | $V_{DS} = 0V, V_{GS} = \pm 20V$<br>$V_{DS} = 0V, V_{GS} = \pm 20V$                                                  | N-CH   |      |      | $\pm 100$ |
|                                               |               |                                                                                                                     | P-CH   |      |      | $\pm 100$ |
| Zero Gate Voltage Drain Current               | $I_{DSS}$     | $V_{DS} = 32V, V_{GS} = 0V$<br>$V_{DS} = -32V, V_{GS} = 0V$                                                         | N-CH   |      |      | 1         |
|                                               |               |                                                                                                                     | P-CH   |      |      | -1        |
|                                               |               | $V_{DS} = 30V, V_{GS} = 0V, T_J = 125\text{ }^{\circ}C$<br>$V_{DS} = -30V, V_{GS} = 0V, T_J = 125\text{ }^{\circ}C$ | N-CH   |      |      | 25        |
|                                               |               |                                                                                                                     | P-CH   |      |      | -25       |
| On-State Drain Current <sup>1</sup>           | $I_{D(ON)}$   | $V_{DS} = 5V, V_{GS} = 10V$<br>$V_{DS} = -5V, V_{GS} = -10V$                                                        | N-CH   | 7    |      | A         |
|                                               |               |                                                                                                                     | P-CH   | -6   |      |           |
| Drain-Source On-State Resistance <sup>1</sup> | $R_{DS(ON)}$  | $V_{GS} = 10V, I_D = 7A$<br>$V_{GS} = -10V, I_D = -6A$                                                              | N-CH   |      | 25   | 28        |
|                                               |               |                                                                                                                     | P-CH   |      | 38   | 44        |
|                                               |               | $V_{GS} = 4.5V, I_D = 6A$<br>$V_{GS} = -4.5V, I_D = -5A$                                                            | N-CH   |      | 38   | 45        |
|                                               |               |                                                                                                                     | P-CH   |      | 55   | 70        |
| Forward Transconductance <sup>1</sup>         | $g_{fs}$      | $V_{DS} = 5V, I_D = 7A$<br>$V_{DS} = -5V, I_D = -6A$                                                                | N-CH   |      | 19   | S         |
|                                               |               |                                                                                                                     | P-CH   |      | 11   |           |
| DYNAMIC                                       |               |                                                                                                                     |        |      |      |           |
|                                               |               |                                                                                                                     |        |      |      |           |
| Input Capacitance                             | $C_{iss}$     | N-CH<br>$V_{GS} = 0V, V_{DS} = 20V, f = 1MHz$<br>P-CH<br>$V_{GS} = 0V, V_{DS} = -20V, f = 1MHz$                     | N-CH   |      | 527  | pF        |
| Output Capacitance                            | $C_{oss}$     |                                                                                                                     | P-CH   |      | 810  |           |
|                                               |               |                                                                                                                     | N-CH   |      | 81   |           |
| Reverse Transfer Capacitance                  | $C_{rss}$     |                                                                                                                     | P-CH   |      | 94   |           |
|                                               |               |                                                                                                                     | N-CH   |      | 59   |           |
|                                               |               |                                                                                                                     | P-CH   |      | 72   |           |

|                                                                         |                     |                                                                                                                                                                 |      |    |      |      |    |
|-------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|------|------|----|
| Total Gate Charge <sup>1,2</sup>                                        | Q <sub>g</sub>      | N-CH<br>V <sub>DS</sub> = 20V, V <sub>GS</sub> = 10V,<br>I <sub>D</sub> = 7A<br>P-CH<br>V <sub>DS</sub> = -20V, V <sub>GS</sub> = -10V,<br>I <sub>D</sub> = -6A | N-CH |    | 13.7 |      | nC |
| Gate-Source Charge <sup>1,2</sup>                                       | Q <sub>gs</sub>     |                                                                                                                                                                 | P-CH |    | 15   |      |    |
| Gate-Drain Charge <sup>1,2</sup>                                        | Q <sub>gd</sub>     |                                                                                                                                                                 | N-CH |    | 2.1  |      |    |
|                                                                         |                     |                                                                                                                                                                 | P-CH |    | 2.6  |      |    |
|                                                                         |                     |                                                                                                                                                                 | N-CH |    | 4.2  |      |    |
|                                                                         |                     |                                                                                                                                                                 | P-CH |    | 3.1  |      |    |
| Turn-On Delay Time <sup>1,2</sup>                                       | t <sub>d(on)</sub>  | N-CH<br>V <sub>DS</sub> = 10V,<br><br>I <sub>D</sub> = 1A, V <sub>GS</sub> = 10V, R <sub>GS</sub> = 6Ω                                                          | N-CH |    | 10   |      | nS |
|                                                                         |                     |                                                                                                                                                                 | P-CH |    | 12   |      |    |
| Rise Time <sup>1,2</sup>                                                | t <sub>r</sub>      |                                                                                                                                                                 | N-CH |    | 8.5  |      |    |
|                                                                         |                     |                                                                                                                                                                 | P-CH |    | 15   |      |    |
| Turn-Off Delay Time <sup>1,2</sup>                                      | t <sub>d(off)</sub> | P-CH                                                                                                                                                            |      |    |      |      |    |
|                                                                         |                     | N-CH                                                                                                                                                            |      | 13 |      |      |    |
|                                                                         |                     | V <sub>DS</sub> = -10V,<br><br>I <sub>D</sub> = -1A, V <sub>GS</sub> = -10V, R <sub>GS</sub> = 6Ω                                                               | P-CH |    | 25   |      |    |
| Fall Time <sup>1,2</sup>                                                | t <sub>f</sub>      | N-CH                                                                                                                                                            |      | 15 |      |      |    |
|                                                                         |                     | P-CH                                                                                                                                                            |      | 15 |      |      |    |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T <sub>c</sub> = 25 °C) |                     |                                                                                                                                                                 |      |    |      |      |    |
| Continuous Current                                                      | I <sub>S</sub>      |                                                                                                                                                                 | N-CH |    |      | 2.3  | A  |
|                                                                         |                     |                                                                                                                                                                 | P-CH |    |      | -2.3 |    |
| Pulsed Current <sup>3</sup>                                             | I <sub>SM</sub>     |                                                                                                                                                                 | N-CH |    |      | 9.2  |    |
|                                                                         |                     |                                                                                                                                                                 | P-CH |    |      | -9.2 |    |
| Forward Voltage <sup>1</sup>                                            | V <sub>SD</sub>     | I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0V                                                                                                          | N-CH |    |      | 1.3  | V  |
|                                                                         |                     |                                                                                                                                                                 | P-CH |    |      | -1.3 |    |

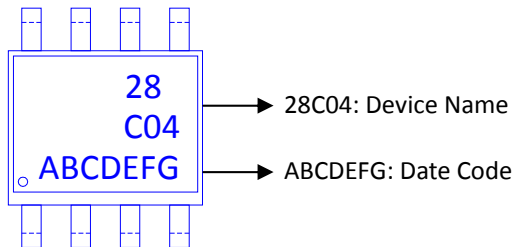
<sup>1</sup>Pulse test : Pulse Width  $\leq 300 \mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

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

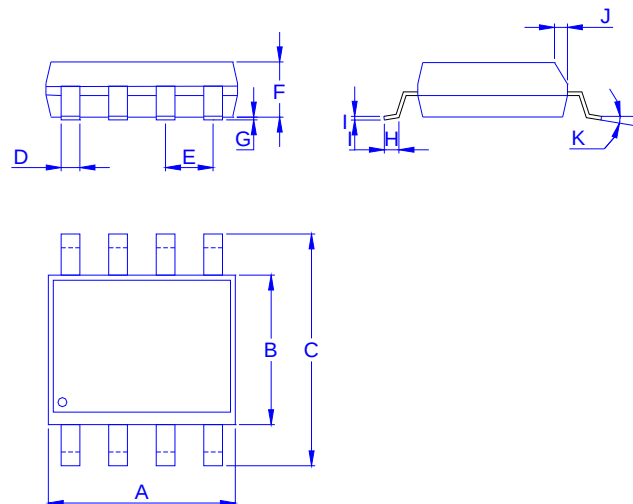
<sup>3</sup>Pulse width limited by maximum junction temperature.

## Ordering & Marking Information:

Device Name: LB28C04H for SOP-8



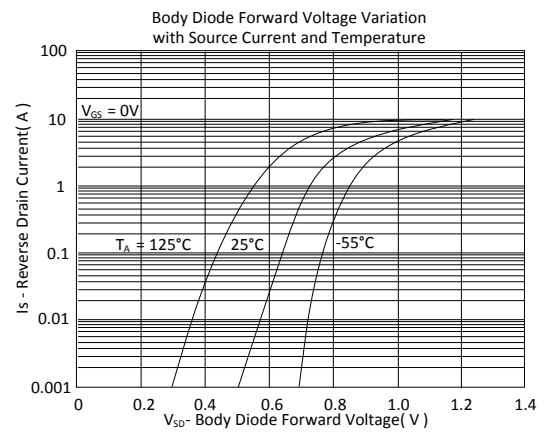
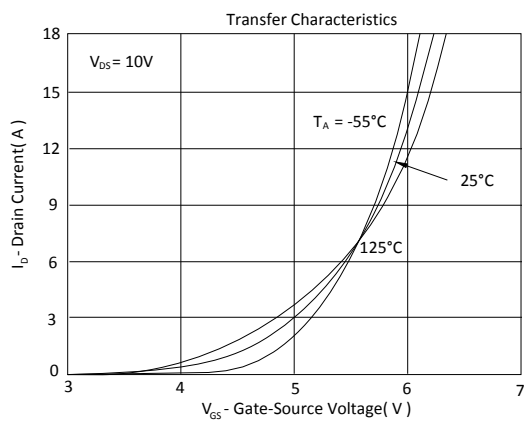
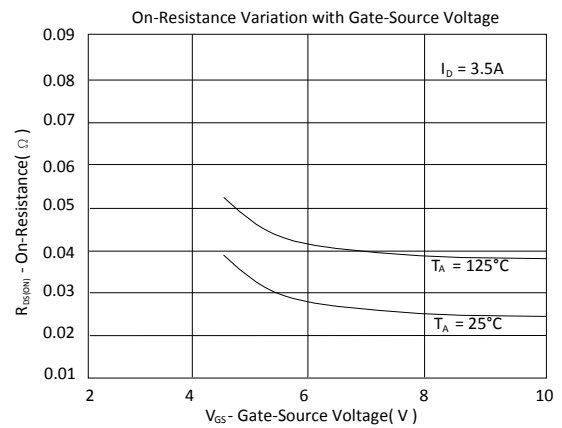
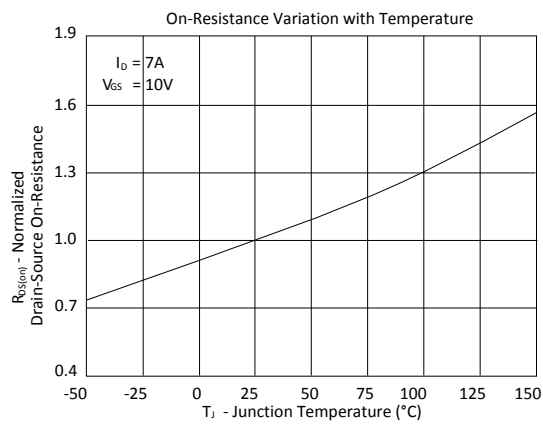
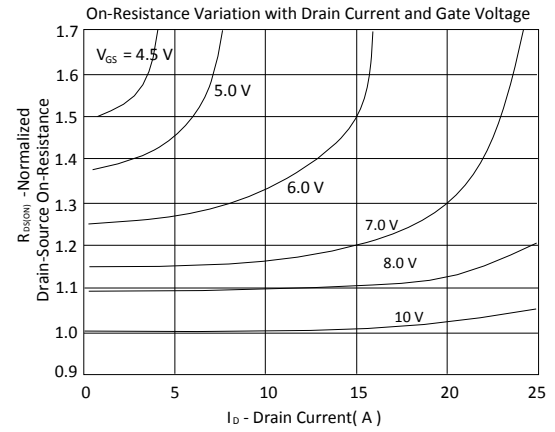
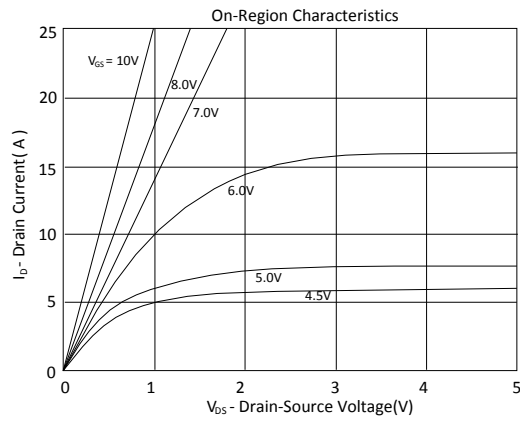
## Outline Drawing

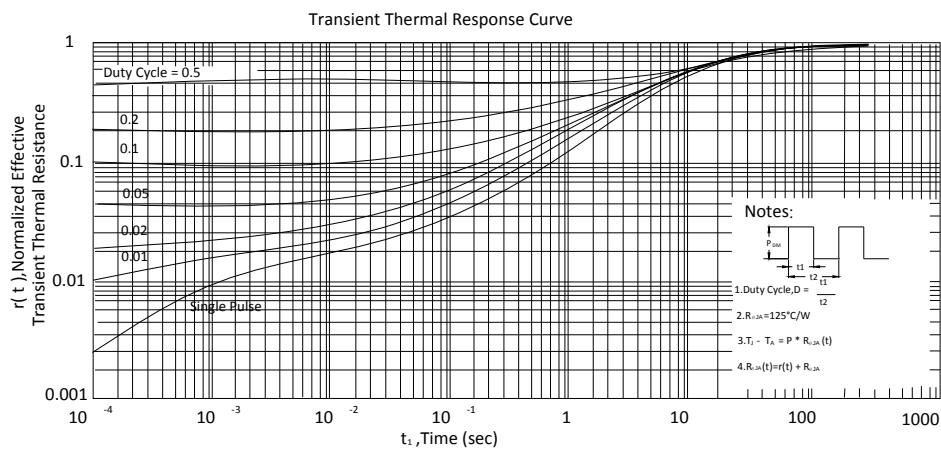
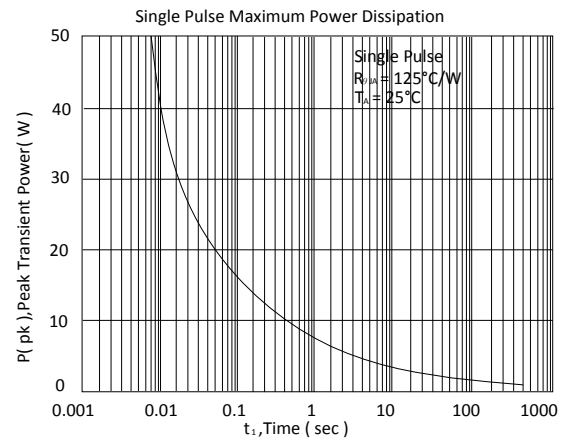
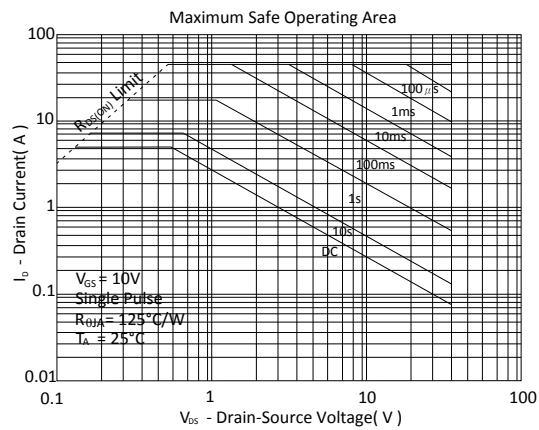
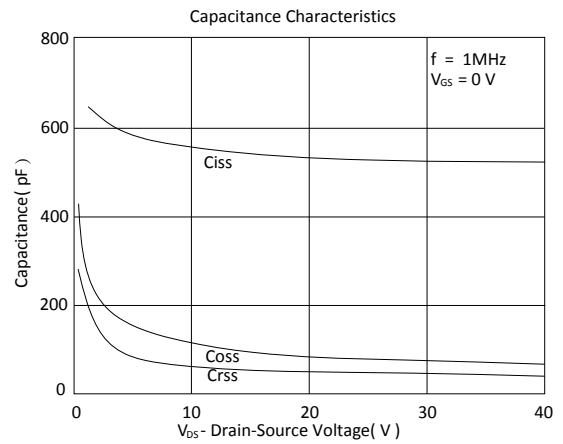
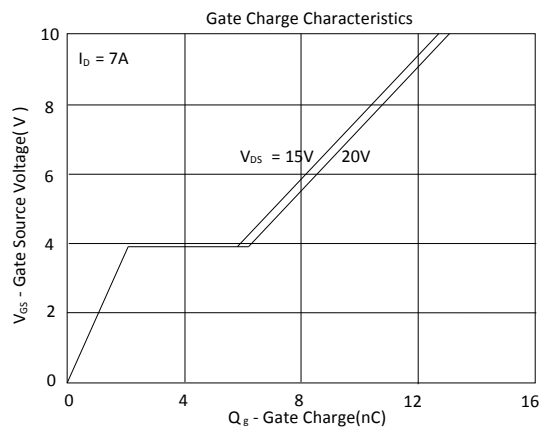


Dimension in mm

| 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° |

## N-Channel





P-Channel

