



# YJG20N06A

## N-Channel Enhancement Mode Field Effect Transistor

### Product Summary

|                                    |        |
|------------------------------------|--------|
| $V_{DS}$                           | 60V    |
| $I_D$                              | 20A    |
| $R_{DS(ON)}$ ( at $V_{GS}= 10V$ )  | 43mohm |
| $R_{DS(ON)}$ ( at $V_{GS}= 4.5V$ ) | 47mohm |
| 100% EAS Tested                    |        |
| 100% $V_{DS}$ Tested               |        |

### General Description

Trench Power MV MOSFET technology  
Excellent package for heat dissipation  
High density cell design for Low  $R_{DS(ON)}$   
Moisture Sensitivity Level 1  
Epoxy Meets UL 94 V-0 Flammability Rating  
Halogen Free

### Applications

DC-DC Converters  
Power management functions  
Backlighting

### Absolute Maximum Ratings ( $T_A=25$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|-----------|--------|-------|------|
|-----------|--------|-------|------|

Drain-source Voltage

$V_{DS}$



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## Electrical Characteristics (T<sub>J</sub>=25 unless otherwise noted)

| Parameter                             | Symbol              | Conditions   | Min | Typ  | Max   | Units |
|---------------------------------------|---------------------|--|-----|------|-------|-------|
| <b>Static Parameter</b>               |                     |  |     |      |       |       |
| Drain-Source Breakdown Voltage        | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA  | 60  |      |       | V     |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>    | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V  |     |      | 1     | μA    |
| Gate-Body Leakage Current             | I <sub>GSS</sub>    | V <sub>GS</sub> = ± 20V, V <sub>DS</sub> =0V   |     |      | ± 100 | nA    |
| Gate Threshold Voltage                | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA  | 1.0 | 1.5  | 2.5   | V     |
| Static Drain-Source On-Resistance     | R <sub>DS(on)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> =20A   |     | 34   | 43    | m     |
|                                       |                     | V <sub>GS</sub> = 4.5V, I <sub>D</sub> =10A  |     | 36   | 47    |       |
| Diode Forward Voltage                 | V <sub>SD</sub>     | I <sub>S</sub> =10A, V <sub>GS</sub> =0V   |     | 0.8  | 1.2   | V     |
| Maximum Body-Diode Continuous Current | I <sub>S</sub>      |  |     |      | 20    | A     |
| <b>Dynamic Parameters</b>             |                     |  |     |      |       |       |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHZ  |     | 1018 |       | pF    |
| Output Capacitance                    | C <sub>oss</sub>    |  |     | 70   |       |       |
| Reverse Transfer Capacitance          | C <sub>rss</sub>    |  |     | 62   |       |       |
| <b>Switching Parameters</b>           |                     |  |     |      |       |       |
| Total Gate Charge                     | Q <sub>g</sub>      | V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, I <sub>D</sub> =10A  |     | 26   |       | nC    |
| Gate-Source Charge                    | Q <sub>gs</sub>     |  |     | 5.4  |       |       |
| Gate-Drain Charge                     | Q <sub>gd</sub>     |  |     | 6.5  |       |       |
| Reverse Recovery Charge               | Q <sub>rr</sub>     | I <sub>F</sub> =20A, di/dt=500A/us   |     | 11.7 |       | ns    |
| Reverse Recovery Time                 | t <sub>rr</sub>     |  |     | 23   |       |       |
| Turn-on Delay Time                    | t <sub>D(on)</sub>  | V <sub>GS</sub> =10V, V <sub>DD</sub> =30V, I <sub>D</sub> =2A, R <sub>L</sub> =1<br>R <sub>GEN</sub> =3 |     | 10   |       | ns    |
| Turn-on Rise Time                     | t <sub>r</sub>      |  |     | 20   |       |       |
| Turn-off Delay Time                   | t <sub>D(off)</sub> |  |     | 29   |       |       |
| Turn-off fall Time                    | t <sub>f</sub>      |  |     | 22   |       |       |

A. Pulse Test: Pulse Width 300us, Duty cycle 2%.

B. R<sub>JA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>JC</sub> is guaranteed by design, while R<sub>JA</sub> is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.



## Typical Performance Characteristics

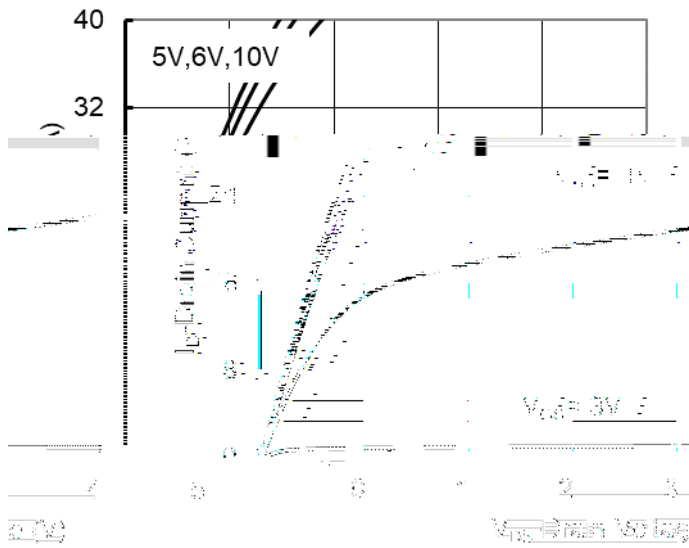


Figure 1. Output Characteristics

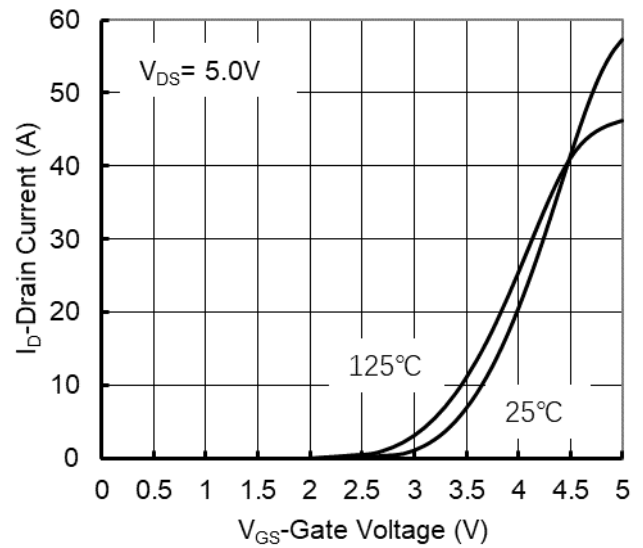


Figure 2. Transfer Characteristics

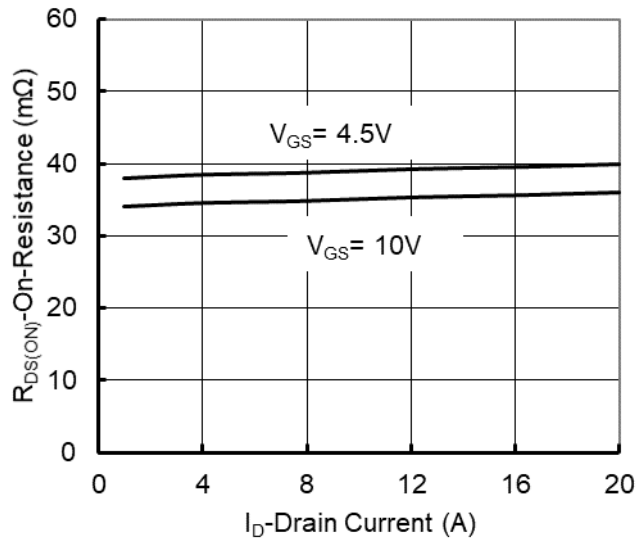


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

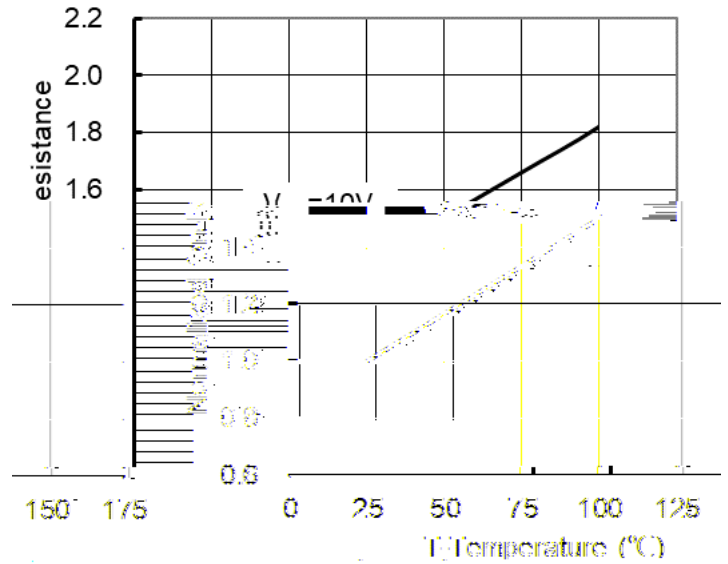


Figure 4. On-Resistance vs. Junction Temperature

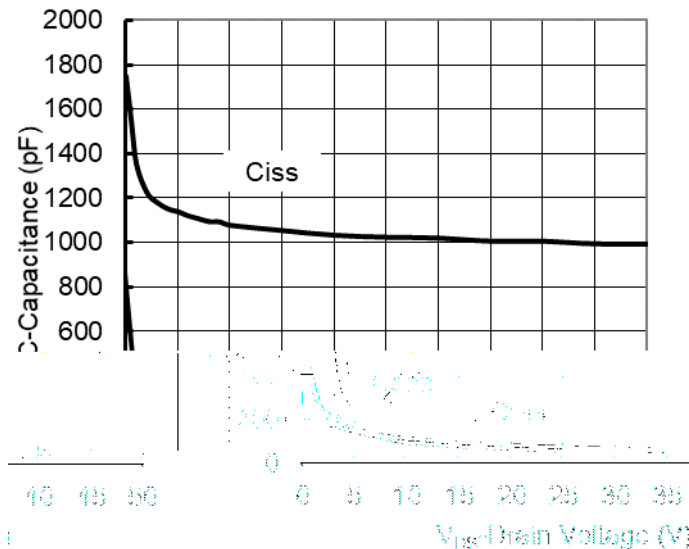


Figure 5. Capacitance Characteristics

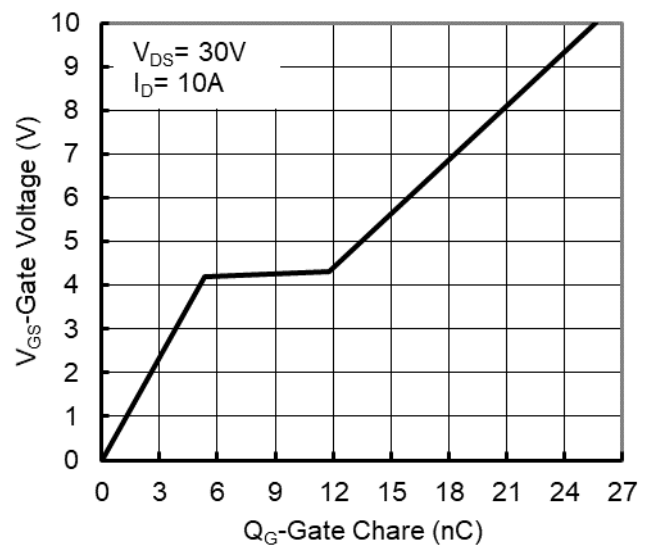


Figure 6. Gate Charge

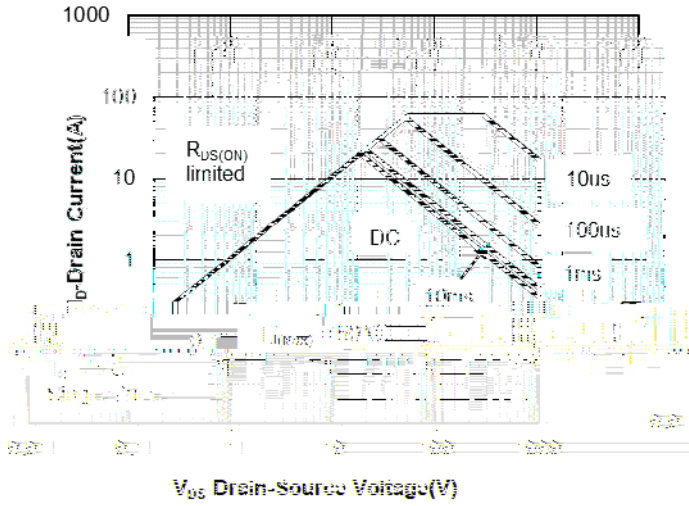


Figure 7. Safe Operation Area

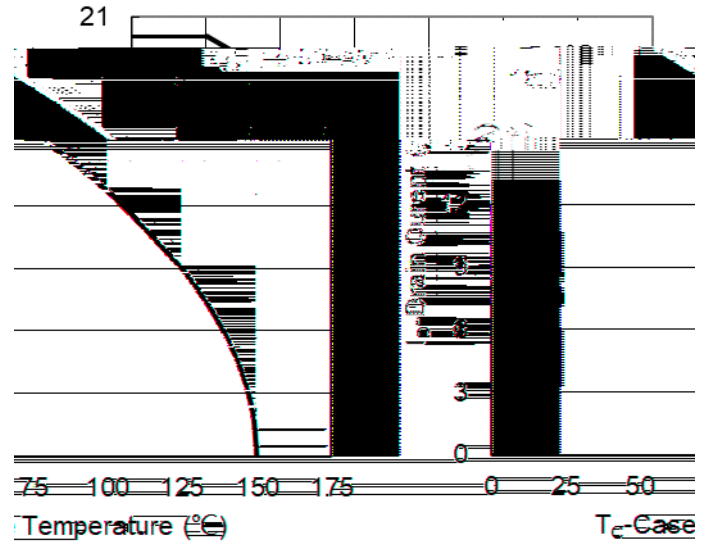


Figure 8. Maximum Continuous Drain Current vs Case Temperature

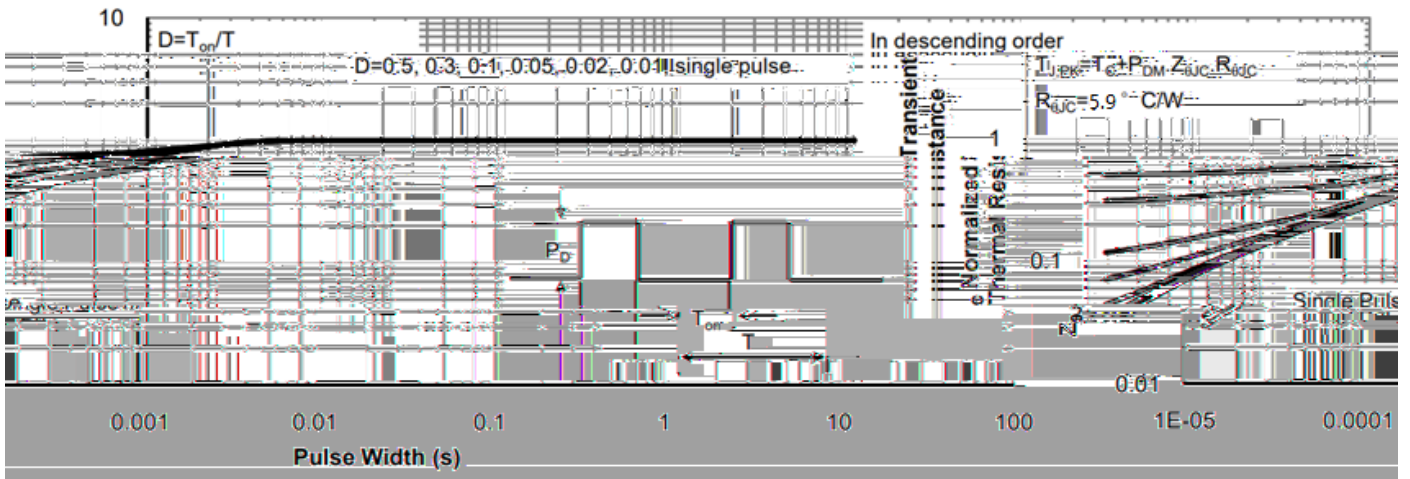
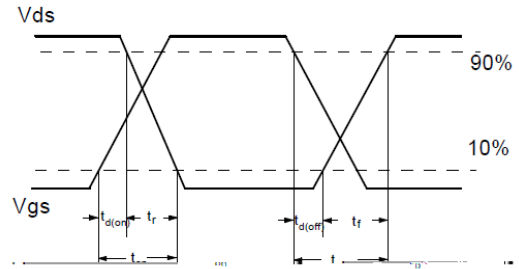
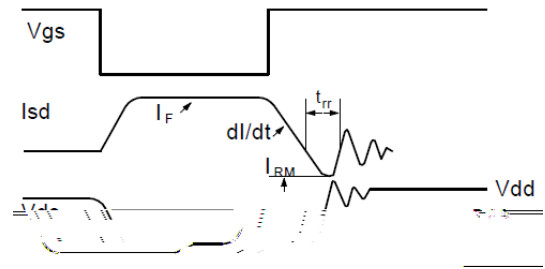
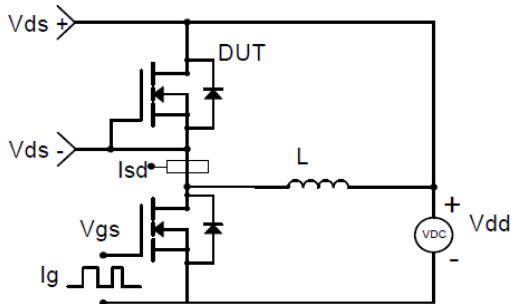


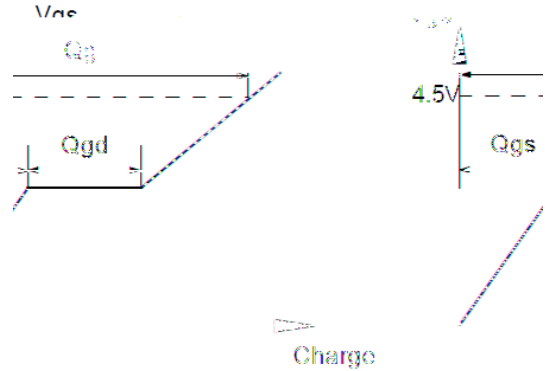
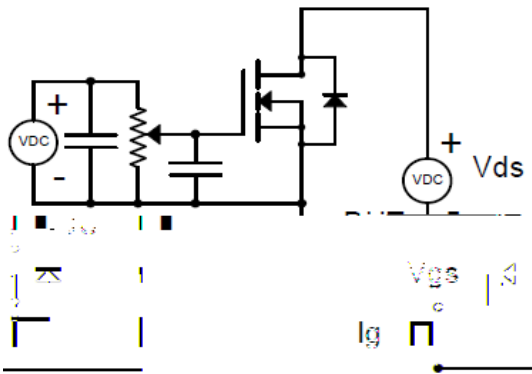
Figure 9. Normalized Maximum Transient Thermal Impedance



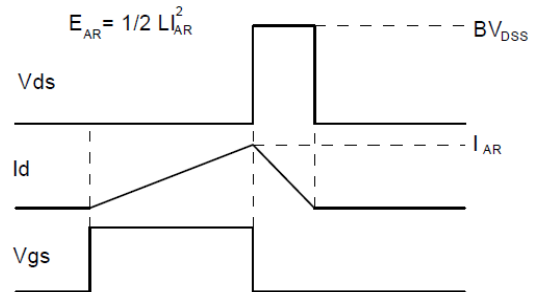
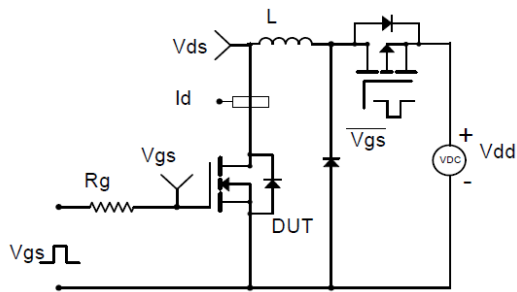
**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**



**Gate Charge Test Circuit & Waveform**

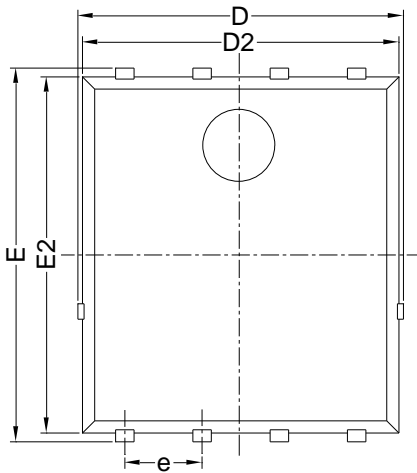


**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**

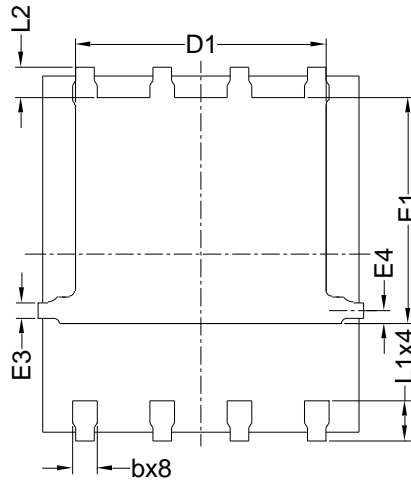


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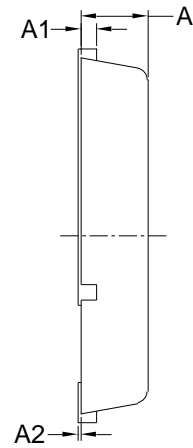
## PDFN5060-8L-B-1.1MM Package Information



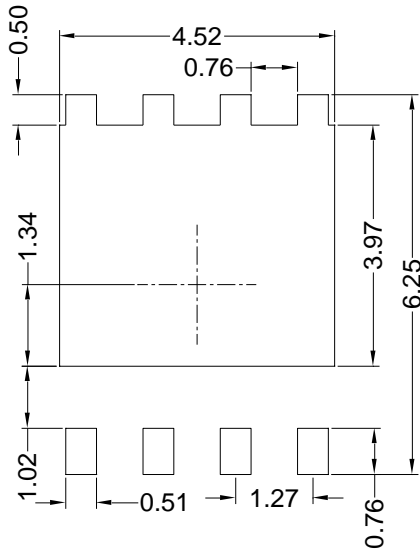
Top View



Bottom View



Side View



Suggested Solder Pad Layout  
Top View

| SYMBOL | MILLIMETER |      |      |
|--------|------------|------|------|
|        | MIN        | NOM  | MAX  |
| D      | 5.15       | 5.35 | 5.55 |
| E      | 5.95       | 6.15 | 6.35 |
| A      | 1.00       | 1.10 | 1.20 |
| A1     | 0.254 BSC  |      |      |
| A2     |            |      | 0.10 |
| D1     | 3.92       | 4.12 | 4.32 |
| E1     | 3.52       | 3.72 | 3.92 |
| D2     | 5.00       | 5.20 | 5.40 |
| E2     | 5.66       | 5.86 | 6.06 |
| E3     | 0.254 REF  |      |      |
| E4     | 0.21 REF   |      |      |
| L1     | 0.56       | 0.66 | 0.76 |
| L2     | 0.50 BSC   |      |      |
| b      | 0.31       | 0.41 | 0.51 |
| e      | 1.27 BSC   |      |      |

Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.10$ mm.
3. The pad layout is for reference purposes only.



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