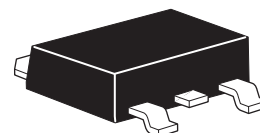


# ZXMP6A16K

## 60V DPAK P-channel enhancement mode MOSFET

### Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
|---------------|---------------------------|-----------|
| -60           | 0.085 @ $V_{GS} = -10V$   | 8.2       |
|               | 0.125 @ $V_{GS} = -4.5V$  | 6.75      |



### Description

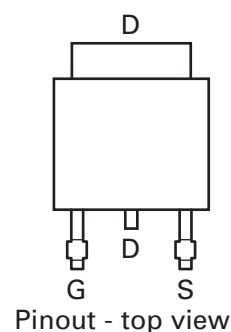
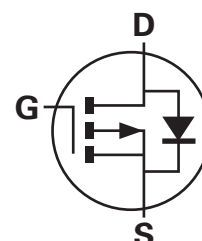
This new generation trench MOSFET from Zetex features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high efficiency power management applications.

### Features

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- DPAK package

### Applications

- DC-DC converters
- Power management functions
- Disconnect switches
- Motor control



### Ordering information

| Device      | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|--------------------|-----------------|-------------------|
| ZXMP6A16KTC | 13                 | 16              | 2500              |

### Device marking

ZXMP  
6A16

# ZXMP6A16K

## Absolute maximum ratings

| Parameter                                                                                                                                                                   | Symbol         | Limit             | Unit                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------|----------------------|
| Drain-source voltage                                                                                                                                                        | $V_{DSS}$      | -60               | V                    |
| Gate-source voltage                                                                                                                                                         | $V_{GS}$       | $\pm 20$          | V                    |
| Continuous drain current @ $V_{GS} = 10V$ ; $T_{amb}=25^{\circ}C^{(b)}$<br>@ $V_{GS} = 10V$ ; $T_{amb}=70^{\circ}C^{(b)}$<br>@ $V_{GS} = 10V$ ; $T_{amb}=25^{\circ}C^{(a)}$ | $I_D$          | 8.2<br>6.5<br>5.4 | A                    |
| Pulsed drain current <sup>(c)</sup>                                                                                                                                         | $I_{DM}$       | 27.2              | A                    |
| Continuous source current (body diode) <sup>(b)</sup>                                                                                                                       | $I_S$          | 10                | A                    |
| Pulsed source current (body diode) <sup>(c)</sup>                                                                                                                           | $I_{SM}$       | 27.2              | A                    |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$<br>Linear derating factor                                                                                                | $P_D$          | 4.24<br>33.9      | W<br>mW/ $^{\circ}C$ |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$<br>Linear derating factor                                                                                                | $P_D$          | 9.76<br>78        | W<br>mW/ $^{\circ}C$ |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(d)}$<br>Linear derating factor                                                                                                | $P_D$          | 2.11<br>16.8      | W<br>mW/ $^{\circ}C$ |
| Operating and storage temperature range                                                                                                                                     | $T_j, T_{stg}$ | -55 to +150       | $^{\circ}C$          |

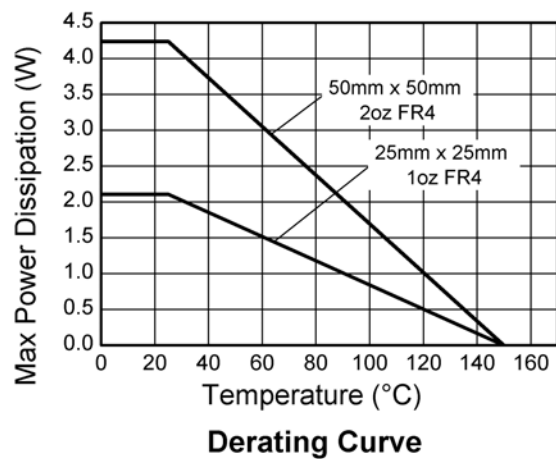
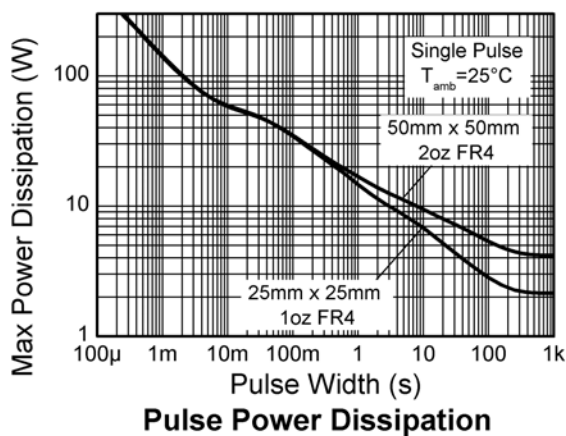
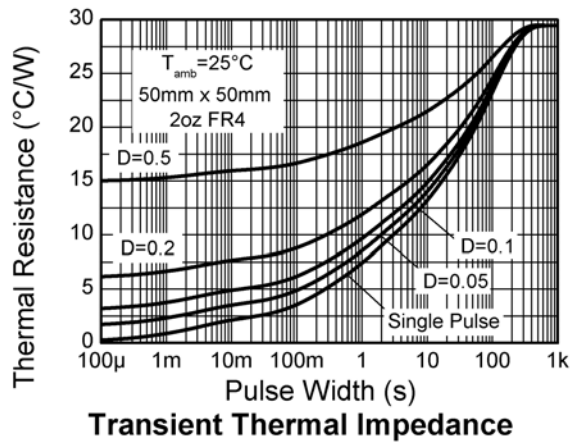
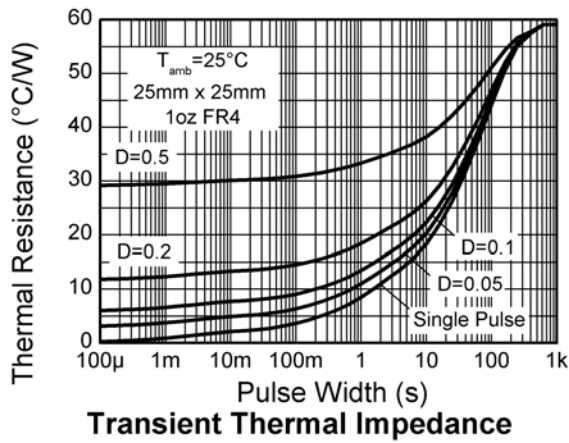
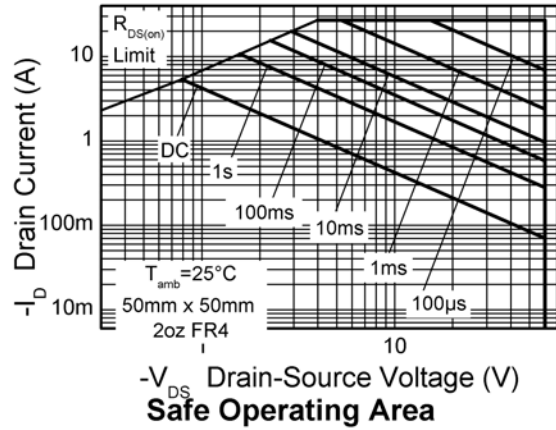
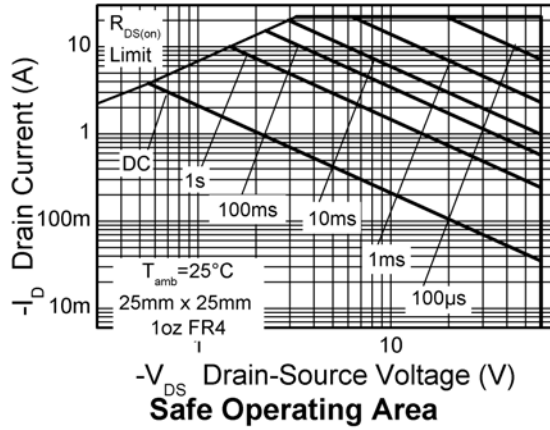
## Thermal resistance

| Parameter                          | Symbol          | Limit | Unit          |
|------------------------------------|-----------------|-------|---------------|
| Junction to ambient <sup>(a)</sup> | $R_{\theta JA}$ | 29.45 | $^{\circ}C/W$ |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 12.8  | $^{\circ}C/W$ |
| Junction to ambient <sup>(d)</sup> | $R_{\theta JA}$ | 59.1  | $^{\circ}C/W$ |

### NOTES:

- (a) For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
- (b) For a device surface mounted on FR4 PCB measured at  $t \leq 10$  sec.
- (c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB,  $D=0.02$  pulse width=300 $\mu s$  - pulse width limited by maximum junction temperature.
- (d) For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

## Thermal characteristics



# ZXMP6A16K

## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| Parameter                                              | Symbol               | Min. | Typ.  | Max.  | Unit | Conditions                                                                                   |
|--------------------------------------------------------|----------------------|------|-------|-------|------|----------------------------------------------------------------------------------------------|
| Static                                                 |                      |      |       |       |      |                                                                                              |
| Drain-source breakdown voltage                         | V <sub>(BR)DSS</sub> | -60  |       |       | V    | I <sub>D</sub> = -250μA, V <sub>GS</sub> =0V                                                 |
| Zero gate voltage drain current                        | I <sub>DSS</sub>     |      |       | -1.0  | μA   | V <sub>DS</sub> = -60V, V <sub>GS</sub> =0V                                                  |
| Gate-body leakage                                      | I <sub>GSS</sub>     |      |       | 100   | nA   | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                   |
| Gate-source threshold voltage                          | V <sub>GS(th)</sub>  | -1.0 |       |       | V    | I <sub>D</sub> = -250μA, V <sub>DS</sub> =V <sub>GS</sub>                                    |
| Static drain-source on-state resistance <sup>(*)</sup> | R <sub>DS(on)</sub>  |      |       | 0.085 | Ω    | V <sub>GS</sub> = -10V, I <sub>D</sub> = -2.9A                                               |
|                                                        |                      |      |       | 0.125 | Ω    | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2.4A                                              |
| Forward transconductance <sup>(*)</sup> (‡)            | g <sub>fs</sub>      |      | 7.2   |       | S    | V <sub>DS</sub> = -15V, I <sub>D</sub> = -2.9A                                               |
| Dynamic <sup>(‡)</sup>                                 |                      |      |       |       |      |                                                                                              |
| Input capacitance                                      | C <sub>iss</sub>     |      | 1021  |       | pF   | V <sub>DS</sub> = -30V, V <sub>GS</sub> =0V<br>f=1MHz                                        |
| Output capacitance                                     | C <sub>oss</sub>     |      | 83    |       | pF   |                                                                                              |
| Reverse transfer capacitance                           | C <sub>rss</sub>     |      | 56    |       | pF   |                                                                                              |
| Switching <sup>(†)</sup> (‡)                           |                      |      |       |       |      |                                                                                              |
| Turn-on-delay time                                     | t <sub>d(on)</sub>   |      | 3.5   |       | ns   | V <sub>DD</sub> = -30V, I <sub>D</sub> = -1A<br>R <sub>G</sub> ≅6.0Ω, V <sub>GS</sub> = -10V |
| Rise time                                              | t <sub>r</sub>       |      | 4.1   |       | ns   |                                                                                              |
| Turn-off delay time                                    | t <sub>d(off)</sub>  |      | 35    |       | ns   |                                                                                              |
| Fall time                                              | t <sub>f</sub>       |      | 10    |       | ns   |                                                                                              |
| Gate charge                                            | Q <sub>g</sub>       |      | 12.1  |       | nC   | V <sub>DS</sub> = -30V, V <sub>GS</sub> = -5V<br>I <sub>D</sub> = -2.9A                      |
| Total gate charge                                      | Q <sub>g</sub>       |      | 24.2  |       | nC   | V <sub>DS</sub> = -30V, V <sub>GS</sub> = -10V<br>I <sub>D</sub> = -2.9A                     |
| Gate-source charge                                     | Q <sub>gs</sub>      |      | 2.5   |       | nC   |                                                                                              |
| Gate drain charge                                      | Q <sub>gd</sub>      |      | 3.7   |       | nC   |                                                                                              |
| Source-drain diode                                     |                      |      |       |       |      |                                                                                              |
| Diode forward voltage <sup>(*)</sup>                   | V <sub>SD</sub>      |      | -0.85 | -0.95 | V    | T <sub>J</sub> =25°C, I <sub>S</sub> = -3.4A,<br>V <sub>GS</sub> =0V                         |
| Reverse recovery time <sup>(‡)</sup>                   | t <sub>rr</sub>      |      | 29.2  |       | ns   | T <sub>J</sub> =25°C, I <sub>S</sub> = -2A,<br>di/dt=100A/μs                                 |
| Reverse recovery charge <sup>(‡)</sup>                 | Q <sub>rr</sub>      |      | 39.6  |       | nC   |                                                                                              |

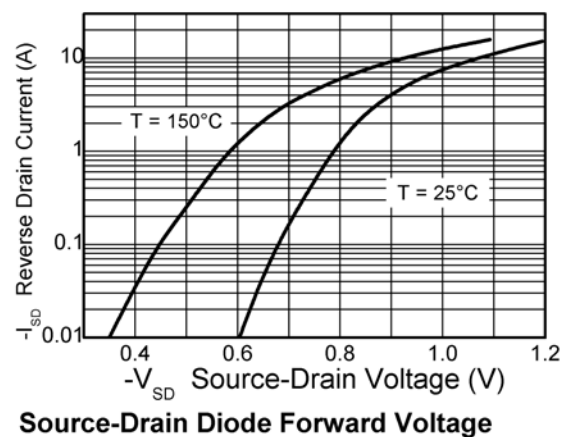
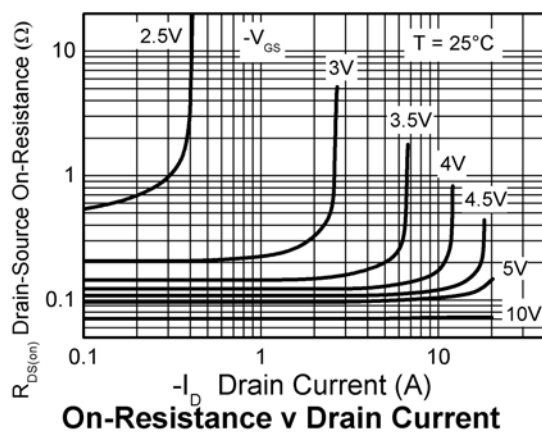
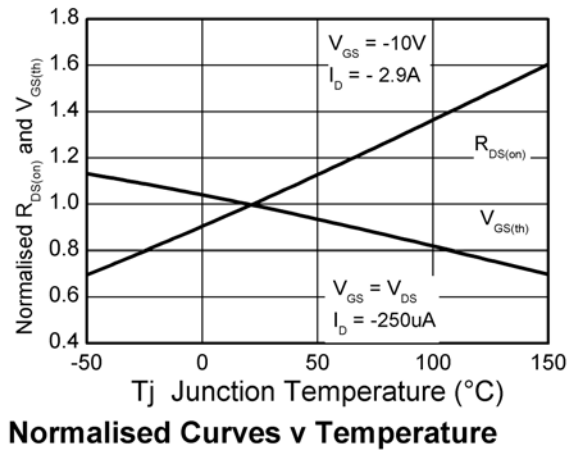
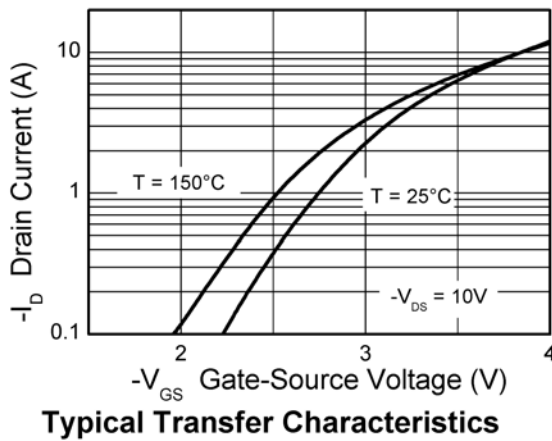
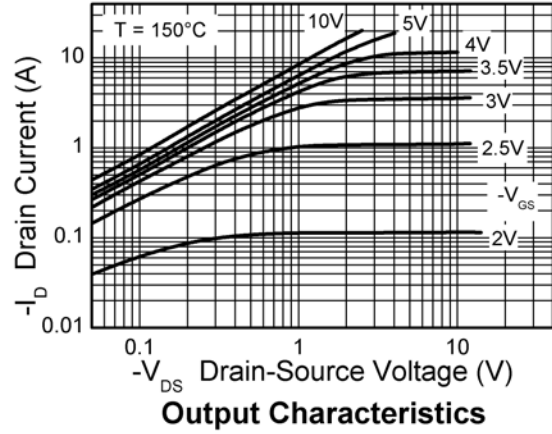
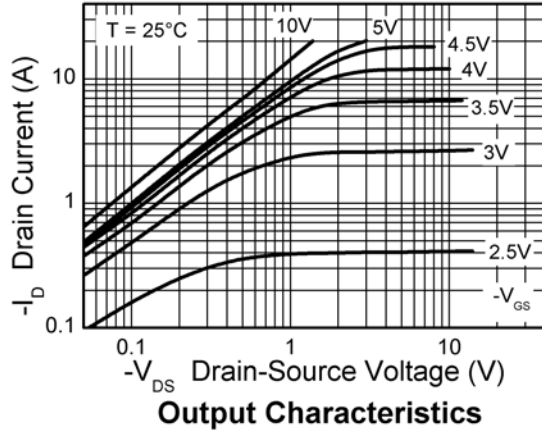
### NOTES:

(\*) Measured under pulsed conditions. Pulse width =  $300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

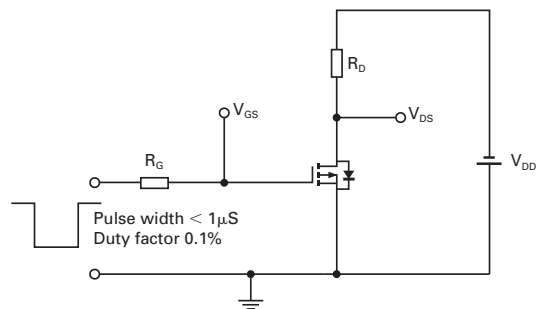
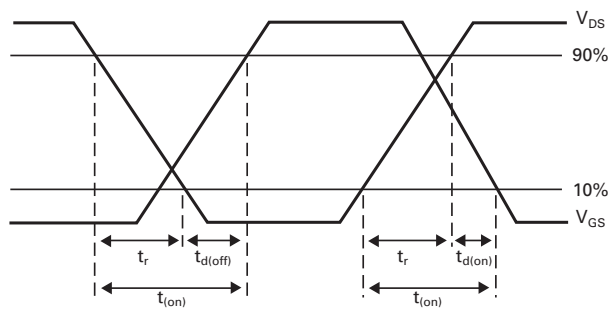
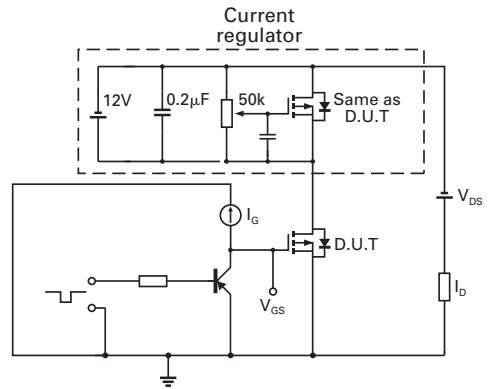
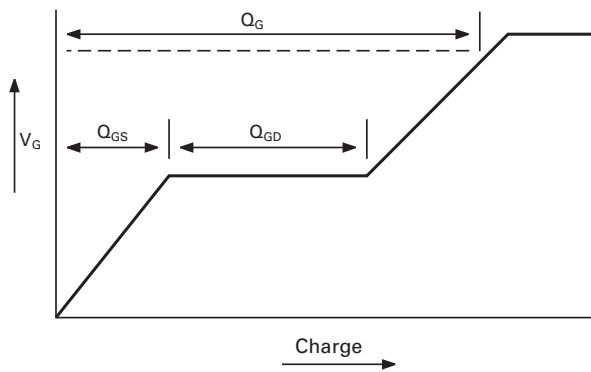
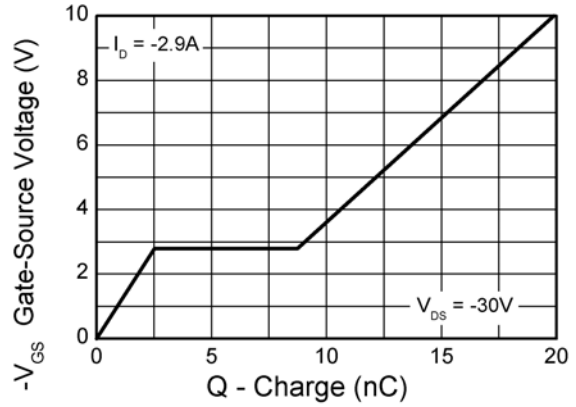
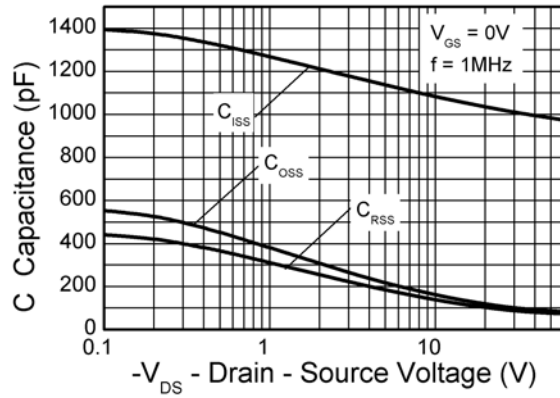
(†) Switching characteristics are independent of operating junction temperature.

(‡) For design aid only, not subject to production testing.

## Typical characteristics

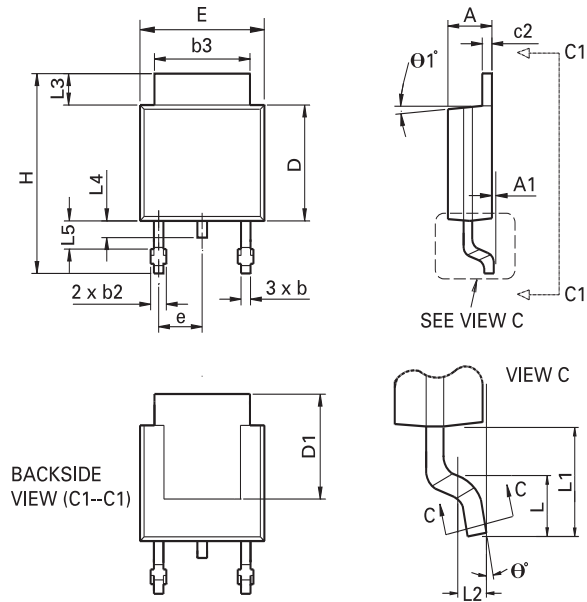


## Typical characteristics



# ZXMP6A16K

## Package outline - DPAK



| DIM | Inches |       | Millimeters |       | DIM     | Inches    |       | Millimeters |       |
|-----|--------|-------|-------------|-------|---------|-----------|-------|-------------|-------|
|     | Min    | Max   | Min         | Max   |         | Min       | Max   | Min         | Max   |
| A   | 0.086  | 0.094 | 2.18        | 2.39  | e       | 0.090 BSC |       | 2.29 BSC    |       |
| A1  | -      | 0.005 | -           | 0.127 | H       | 0.370     | 0.410 | 9.40        | 10.41 |
| b   | 0.020  | 0.035 | 0.508       | 0.89  | L       | 0.055     | 0.070 | 1.40        | 1.78  |
| b2  | 0.030  | 0.045 | 0.762       | 1.14  | L1      | 0.108 REF |       | 2.74 REF    |       |
| b3  | 0.205  | 0.215 | 5.21        | 5.46  | L2      | 0.020 BSC |       | 0.508 BSC   |       |
| c   | 0.018  | 0.024 | 0.457       | 0.61  | L3      | 0.035     | 0.065 | 0.89        | 1.65  |
| c2  | 0.018  | 0.023 | 0.457       | 0.584 | L4      | 0.025     | 0.040 | 0.635       | 1.016 |
| D   | 0.213  | 0.245 | 5.41        | 6.22  | L5      | 0.045     | 0.060 | 1.14        | 1.52  |
| D1  | 0.205  | -     | 5.21        | -     | theta1° | 0°        | 10°   | 0°          | 10°   |
| E   | 0.250  | 0.265 | 6.35        | 6.73  | theta°  | 0°        | 15°   | 0°          | 15°   |
| E1  | 0.170  | -     | 4.32        | -     | -       | -         | -     | -           | -     |

**Note:** Controlling dimensions are in inches. Approximate dimensions are provided in millimeters

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### Product status key:

|                                   |                                                                                |
|-----------------------------------|--------------------------------------------------------------------------------|
| "Preview"                         | Future device intended for production at some point. Samples may be available  |
| "Active"                          | Product status recommended for new designs                                     |
| "Last time buy (LTB)"             | Device will be discontinued and last time buy period and delivery is in effect |
| "Not recommended for new designs" | Device is still in production to support existing designs and production       |
| "Obsolete"                        | Production has been discontinued                                               |

### Datasheet status key:

|                       |                                                                                                                                                                                                             |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| "Provisional version" | This term denotes a pre-release datasheet. It provides a clear indication of anticipated performance. However, changes to the test conditions and specifications may occur, at any time and without notice. |
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