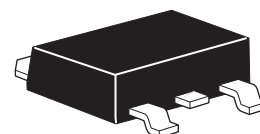


# ZXMP6A18K

## 60V P-channel enhancement mode MOSFET

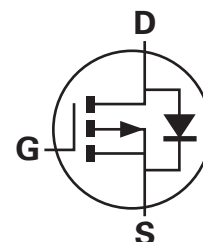
### Summary

$V_{(BR)DSS} = -60V$ ;  $R_{DS(on)} = 0.055$  ;  $I_D = -10.4A$



### Description

This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.



### Features

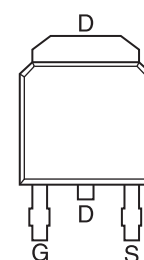
- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- DPAK package

### Applications

- Motor drive
- Disconnect switches

### Ordering information

| Device      | Reel size (inches) | Tape width | Quantity per reel |
|-------------|--------------------|------------|-------------------|
| ZXMP6A18KTC | 13                 | 16mm       | 2500 units        |



Pinout - Top view

### Device marking

ZXMP  
6A18

**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<br>@ $V_{GS}=10V$ ; $T_A=25^{\circ}C$ <sup>(b)</sup><br>@ $V_{GS}=10V$ ; $T_A=70^{\circ}C$ <sup>(b)</sup><br>@ $V_{GS}=10V$ ; $T_A=25^{\circ}C$ <sup>(a)</sup> | $I_D$          | -10.4<br>-8.3<br>-6.8 | A<br>A<br>A          |
| Pulsed drain current <sup>(c)</sup>                                                                                                                                                     | $I_{DM}$       | -37.5                 | A                    |
| Continuous source current (body diode) <sup>(b)</sup>                                                                                                                                   | $I_S$          | -11.5                 | A                    |
| Pulsed source current (body diode) <sup>(c)</sup>                                                                                                                                       | $I_{SM}$       | -37.5                 | A                    |
| Power dissipation at $T_A = 25^{\circ}C$ <sup>(a)</sup><br>Linear derating factor                                                                                                       | $P_D$          | 4.3<br>34.4           | W<br>mW/ $^{\circ}C$ |
| Power dissipation at $T_A = 25^{\circ}C$ <sup>(b)</sup><br>Linear derating factor                                                                                                       | $P_D$          | 10.1<br>80.8          | W<br>mW/ $^{\circ}C$ |
| Power dissipation at $T_A = 25^{\circ}C$ <sup>(d)</sup><br>Linear derating factor                                                                                                       | $P_D$          | 2.15<br>17.2          | W<br>mW/ $^{\circ}C$ |
| Operating and storage temperature range                                                                                                                                                 | $T_j: T_{stg}$ | -55 to +150           | $^{\circ}C$          |

**Thermal resistance**

| Parameter                          | Symbol          | Value | Unit          |
|------------------------------------|-----------------|-------|---------------|
| Junction to ambient <sup>(a)</sup> | $R_{\theta JA}$ | 29    | $^{\circ}C/W$ |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 12.3  | $^{\circ}C/W$ |
| Junction to ambient <sup>(d)</sup> | $R_{\theta JA}$ | 58    | $^{\circ}C/W$ |

**NOTES:**

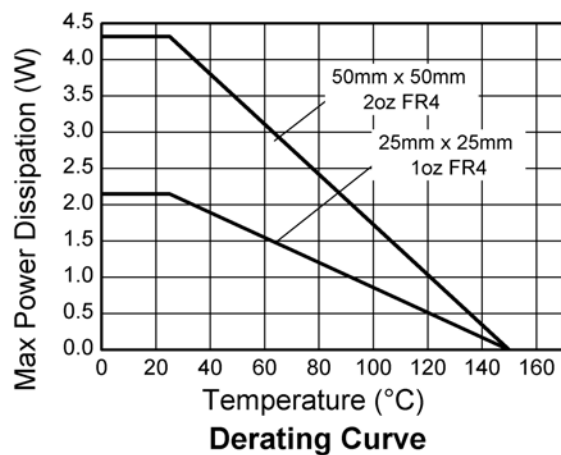
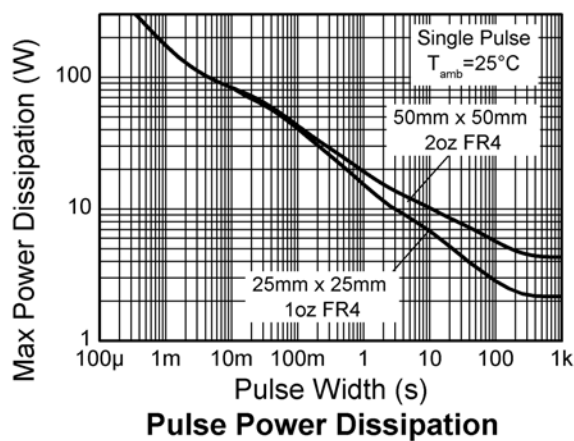
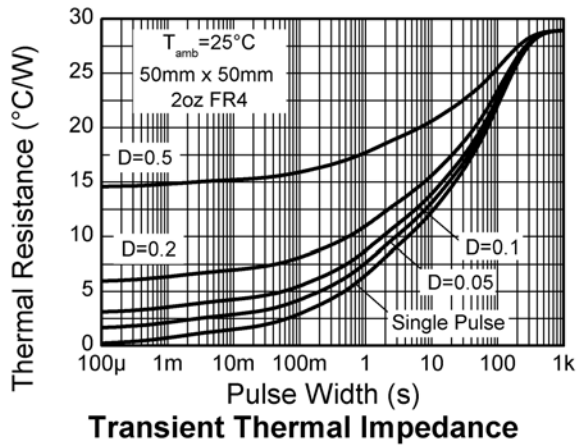
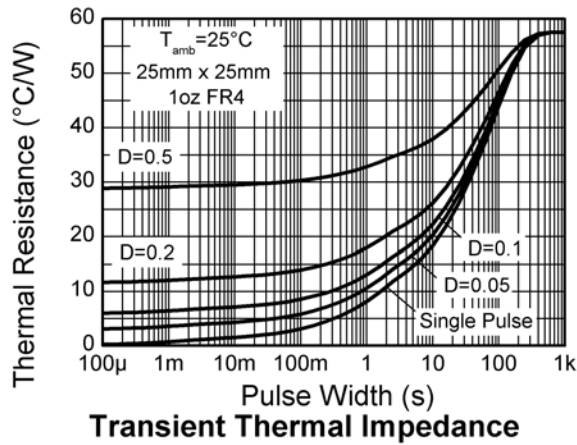
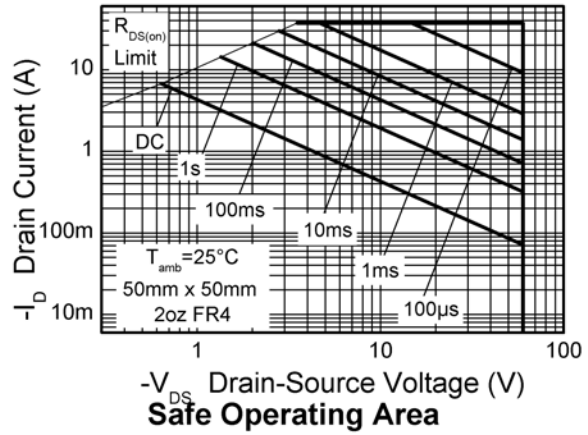
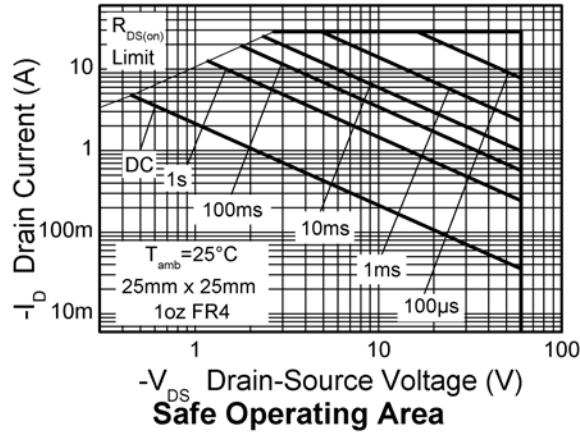
(a) For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.

(b) For a device surface mounted on FR4 PCB measured at  $t = 10$  sec.

(c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB,  $D=0.02$  pulse width=300 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.

## Characteristics



# ZXMP6A18K

## Electrical characteristics (at $T_A = 25^\circ\text{C}$ 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>  |      |       | 0.055<br>0.080 | Ω    | V <sub>GS</sub> =-10V, I <sub>D</sub> =-3.5A<br>V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2.9A |
| Forward transconductance <sup>(*)</sup> (‡)            | g <sub>fs</sub>      |      | 8.7   |                | S    | V <sub>DS</sub> =-15V,I <sub>D</sub> =-3.5A                                                   |
| Dynamic <sup>(‡)</sup>                                 |                      |      |       |                |      |                                                                                               |
| Input capacitance                                      | C <sub>iss</sub>     |      | 1580  |                | pF   | V <sub>DS</sub> =-30 V, V <sub>GS</sub> =0V,<br>f=1MHz                                        |
| Output capacitance                                     | C <sub>oss</sub>     |      | 160   |                | pF   |                                                                                               |
| Reverse transfer capacitance                           | C <sub>rss</sub>     |      | 140   |                | pF   |                                                                                               |
| Switching <sup>(†)</sup> (‡)                           |                      |      |       |                |      |                                                                                               |
| Turn-on delay time                                     | t <sub>d(on)</sub>   |      | 4.6   |                | ns   | V <sub>DD</sub> =-30V, I <sub>D</sub> =-1A<br>R <sub>G</sub> =6.0W,V <sub>GS</sub> =-10V      |
| Rise time                                              | t <sub>r</sub>       |      | 5.8   |                | ns   |                                                                                               |
| Turn-off delay time                                    | t <sub>d(off)</sub>  |      | 55    |                | ns   |                                                                                               |
| Fall time                                              | t <sub>f</sub>       |      | 23    |                | ns   |                                                                                               |
| Gate charge                                            | Q <sub>g</sub>       |      | 23    |                | nC   | V <sub>DS</sub> =-30V,V <sub>GS</sub> =-5V,<br>I <sub>D</sub> =-3.5A                          |
| Total gate charge                                      | Q <sub>g</sub>       |      | 44    |                | nC   | V <sub>DS</sub> =-30V,V <sub>GS</sub> =-10V,<br>I <sub>D</sub> =-3.5A                         |
| Gate-source charge                                     | Q <sub>gs</sub>      |      | 3.9   |                | nC   |                                                                                               |
| Gate-drain charge                                      | Q <sub>gd</sub>      |      | 9.8   |                | 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> =-4.2A,<br>V <sub>GS</sub> =0V                           |
| Reverse recovery time <sup>(‡)</sup>                   | t <sub>rr</sub>      |      | 37    |                | ns   | T <sub>J</sub> =25°C, I <sub>F</sub> =-2.1A,<br>di/dt= 100A/μs                                |
| Reverse recovery charge <sup>(‡)</sup>                 | Q <sub>rr</sub>      |      | 56    |                | nC   |                                                                                               |

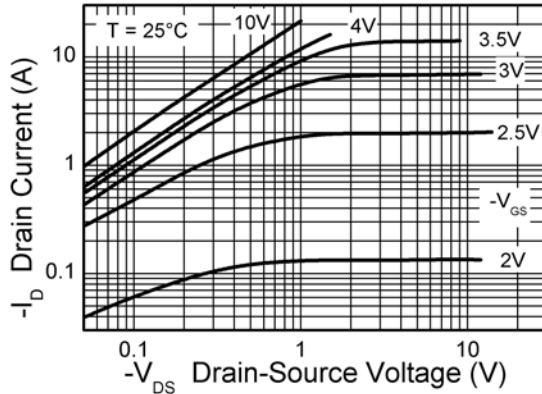
### NOTES:

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

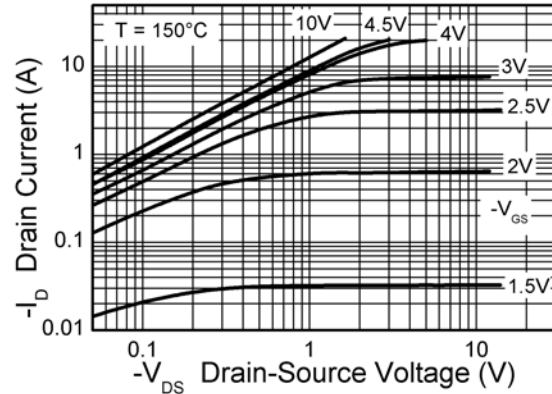
(†) Switching characteristics are independent of operating junction temperature.

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

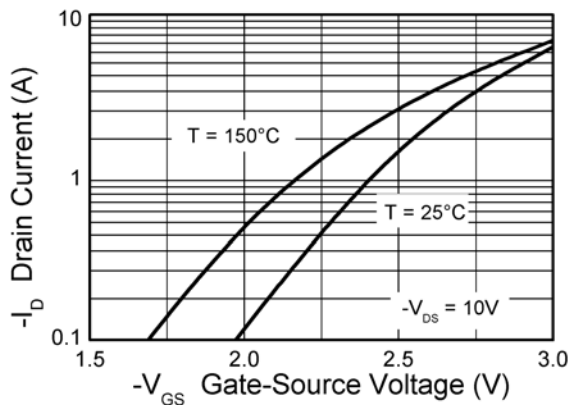
## Typical characteristics



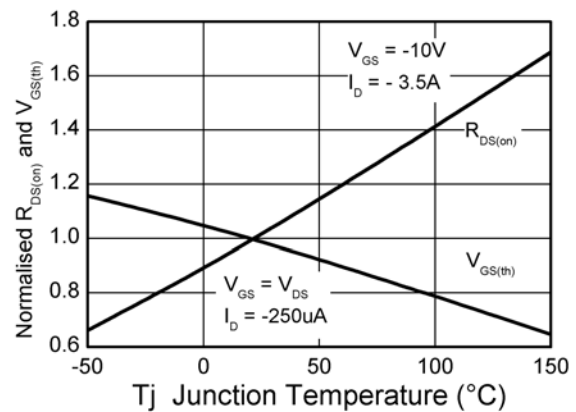
Output Characteristics



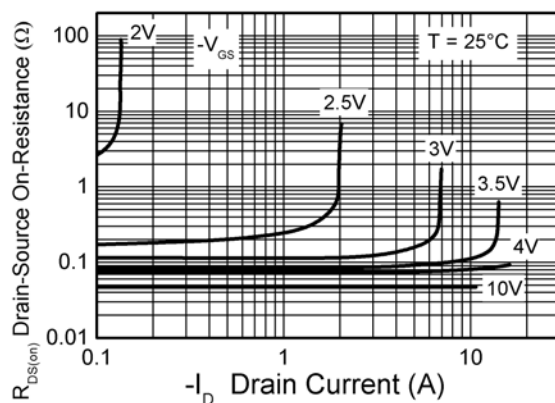
Output Characteristics



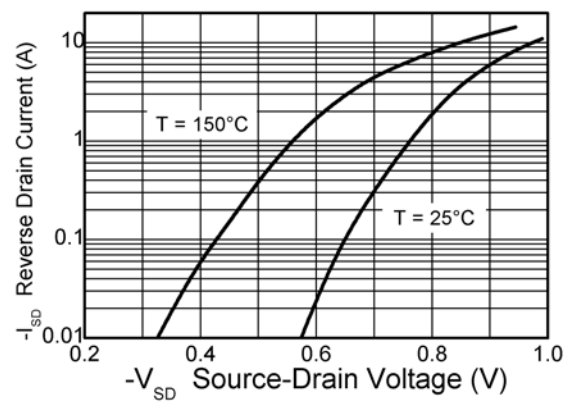
Typical Transfer Characteristics



Normalised Curves v Temperature

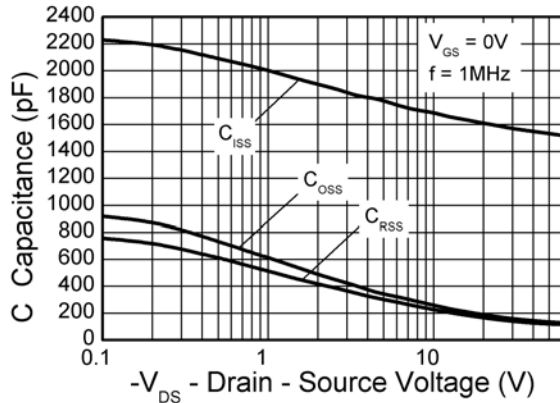


On-Resistance v Drain Current

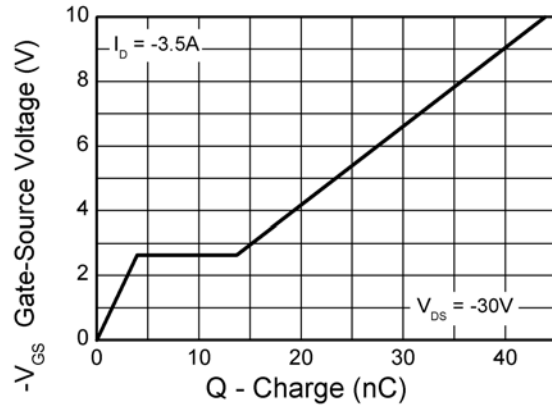


Source-Drain Diode Forward Voltage

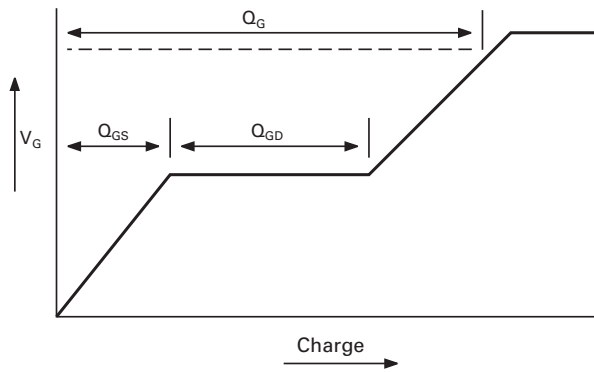
## Typical Characteristics



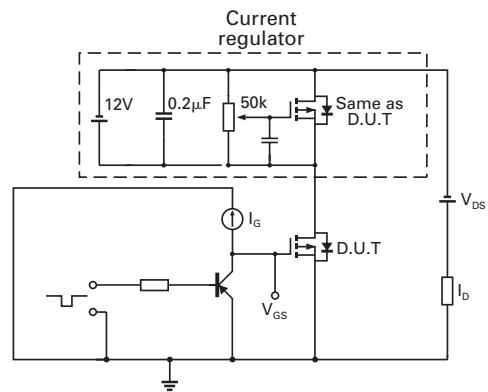
Capacitance v Drain-Source Voltage



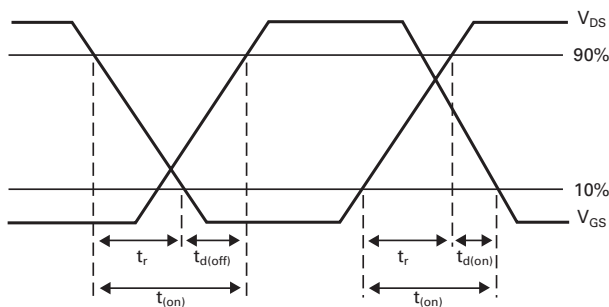
Gate-Source Voltage v Gate Charge



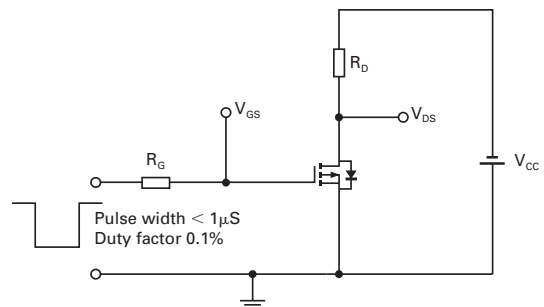
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



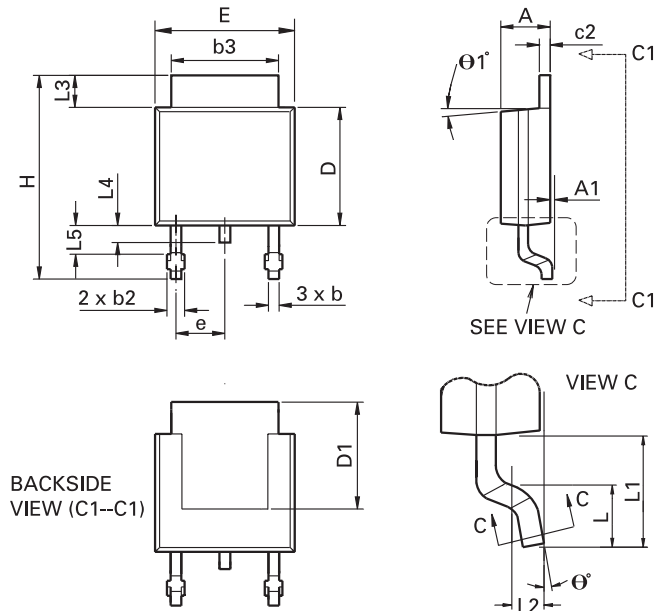
Switching time test circuit

# **ZXMP6A18K**

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# ZXMP6A18K

## 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        | -     | Θ1° | 0°        | 10°   | 0°          | 10°   |
| E   | 0.250  | 0.265 | 6.35        | 6.73  | Θ°  | 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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