

# ZXMN10A09K

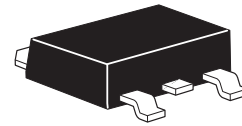
## 100V N-CHANNEL ENHANCEMENT MODE MOSFET IN DPAK

### SUMMARY

$V_{(BR)DSS}=100V$  ;  $R_{DS(on)}=0.085\Omega$ ;  $I_D=7.7A$

### 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.



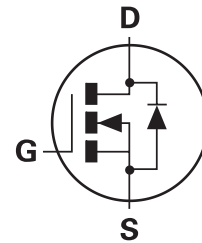
DPAK

### FEATURES

- Low on-resistance
- Fast switching speed
- Low gate drive
- D-Pak (TO-252) package

### APPLICATIONS

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



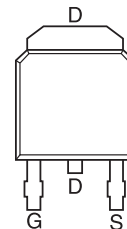
### ORDERING INFORMATION

| DEVICE       | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|--------------|-----------|------------|-------------------|
| ZXMN10A09KTC | 13"       | 16mm       | 2,500 units       |

### DEVICE MARKING

- ZXMN  
10A09K

PINOUT



TOP VIEW

# ZXMN10A09K

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                                                                                                                 | SYMBOL         | LIMIT           | UNIT                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|----------------------|
| Drain-source voltage                                                                                                                                      | $V_{DSS}$      | 100             | V                    |
| Gate-source voltage                                                                                                                                       | $V_{GS}$       | $\pm 20$        | V                    |
| Continuous drain current @ $V_{GS}=10V$ ; $T_A=25^{\circ}C^{(b)}$<br>@ $V_{GS}=10V$ ; $T_A=70^{\circ}C^{(b)}$<br>@ $V_{GS}=10V$ ; $T_A=25^{\circ}C^{(a)}$ | $I_D$          | 7.7<br>6.2<br>5 | A<br>A<br>A          |
| Pulsed drain current <sup>(c)</sup>                                                                                                                       | $I_{DM}$       | 27              | A                    |
| Continuous source current (body diode) <sup>(b)</sup>                                                                                                     | $I_S$          | 11              | A                    |
| Pulsed source current (body diode) <sup>(c)</sup>                                                                                                         | $I_{SM}$       | 27              | A                    |
| Power dissipation at $T_A=25^{\circ}C^{(a)}$<br>Linear derating factor                                                                                    | $P_D$          | 4.3<br>34.4     | W<br>mW/ $^{\circ}C$ |
| Power dissipation at $T_A=25^{\circ}C^{(b)}$<br>Linear derating factor                                                                                    | $P_D$          | 10.1<br>80.8    | W<br>mW/ $^{\circ}C$ |
| Power dissipation at $T_A=25^{\circ}C^{(d)}$<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.

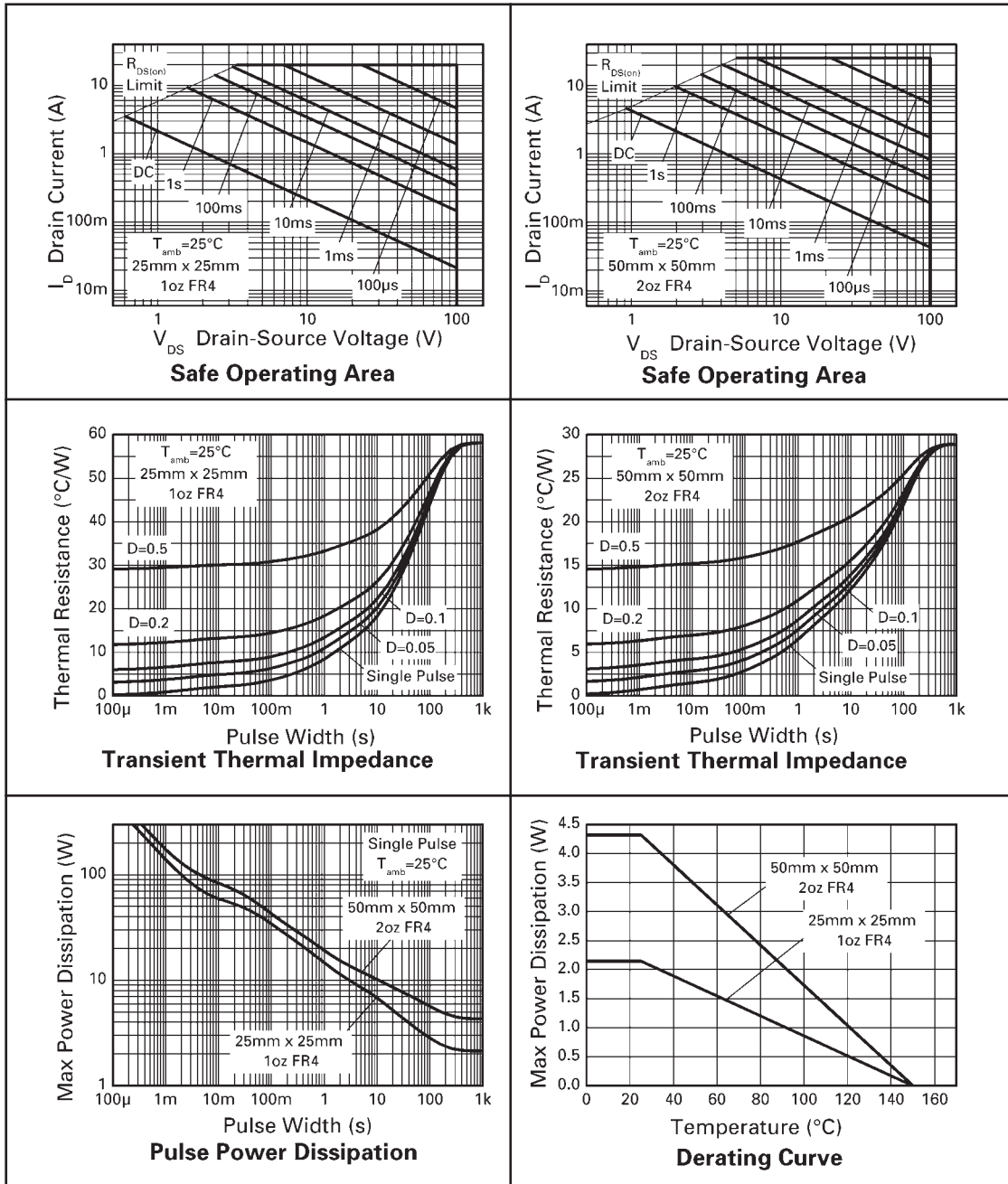
(b) For a device surface mounted on FR4 PCB measured at  $t \leq 10$  sec.

(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.

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## TYPICAL CHARACTERISTICS



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## 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> | 100  |      |       | V    | I <sub>D</sub> = 250μA, V <sub>GS</sub> =0V                                               |
| Zero gate voltage drain current                        | I <sub>DSS</sub>     |      |      | 1     | μA   | V <sub>DS</sub> = 100V, 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>  | 2.0  |      | 4.0   | V    | I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>                                   |
| Static drain-source on-state resistance <sup>(1)</sup> | R <sub>DS(on)</sub>  |      |      | 0.085 | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.6A                                              |
|                                                        |                      |      |      | 0.100 | Ω    | V <sub>GS</sub> = 6V, I <sub>D</sub> = 4.2A                                               |
| Forward transconductance <sup>(1)</sup> <sup>(3)</sup> | g <sub>fs</sub>      |      | 10.7 |       | S    | V <sub>DS</sub> = 15V, I <sub>D</sub> = 4.6A                                              |
| DYNAMIC <sup>(3)</sup>                                 |                      |      |      |       |      |                                                                                           |
| Input capacitance                                      | C <sub>iss</sub>     |      | 1313 |       | pF   | V <sub>DS</sub> = 50V, 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>(2)</sup> <sup>(3)</sup>                |                      |      |      |       |      |                                                                                           |
| Turn-on-delay time                                     | t <sub>d(on)</sub>   |      | 6.8  |       | ns   | V <sub>DD</sub> = 50V, I <sub>D</sub> = 1A<br>R <sub>G</sub> ≅6.0Ω, V <sub>GS</sub> = 10V |
| Rise time                                              | t <sub>r</sub>       |      | 5.3  |       | ns   |                                                                                           |
| Turn-off delay time                                    | t <sub>d(off)</sub>  |      | 27.5 |       | ns   |                                                                                           |
| Fall time                                              | t <sub>f</sub>       |      | 12.3 |       | ns   |                                                                                           |
| Total gate charge                                      | Q <sub>g</sub>       |      | 17.2 |       | nC   | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 6V<br>I <sub>D</sub> = 4.6A                      |
| Total gate charge                                      | Q <sub>g</sub>       |      | 26   |       | nC   | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 4.6A                     |
| Gate-source charge                                     | Q <sub>gs</sub>      |      | 5.6  |       | nC   |                                                                                           |
| Gate drain charge                                      | Q <sub>gd</sub>      |      | 7.6  |       | nC   |                                                                                           |
| SOURCE-DRAIN DIODE                                     |                      |      |      |       |      |                                                                                           |
| Diode forward voltage <sup>(1)</sup>                   | V <sub>SD</sub>      |      | 0.85 | 0.95  | V    | T <sub>j</sub> =25°C, I <sub>F</sub> = 4.7A,<br>V <sub>GS</sub> =0V                       |
| Reverse recovery time <sup>(3)</sup>                   | t <sub>rr</sub>      |      | 40   |       | ns   | T <sub>j</sub> =25°C, I <sub>S</sub> = 3A,<br>di/dt=100A/μs                               |
| Reverse recovery charge <sup>(3)</sup>                 | Q <sub>rr</sub>      |      | 62   |       | nC   |                                                                                           |

### NOTES

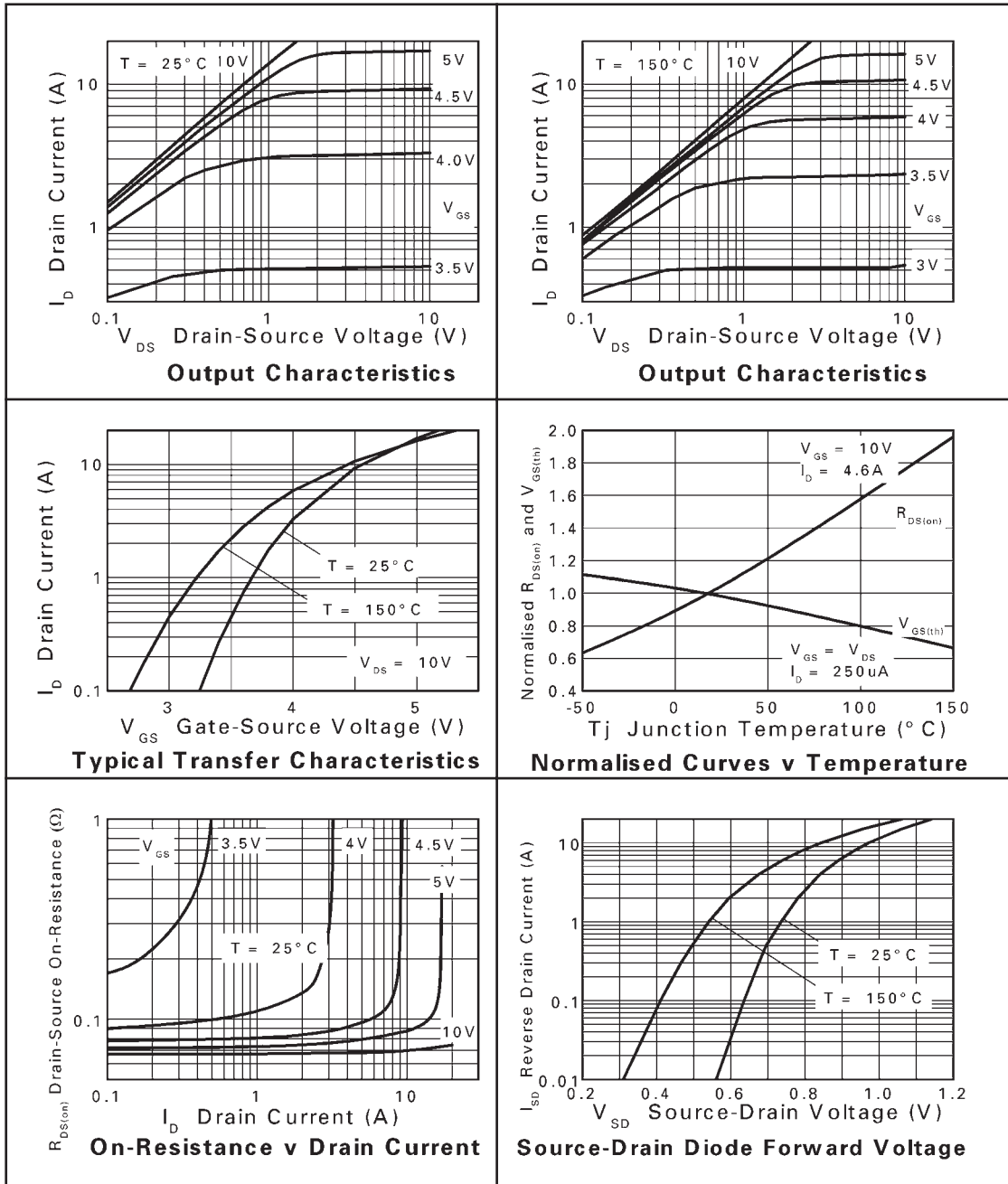
(1) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

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

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

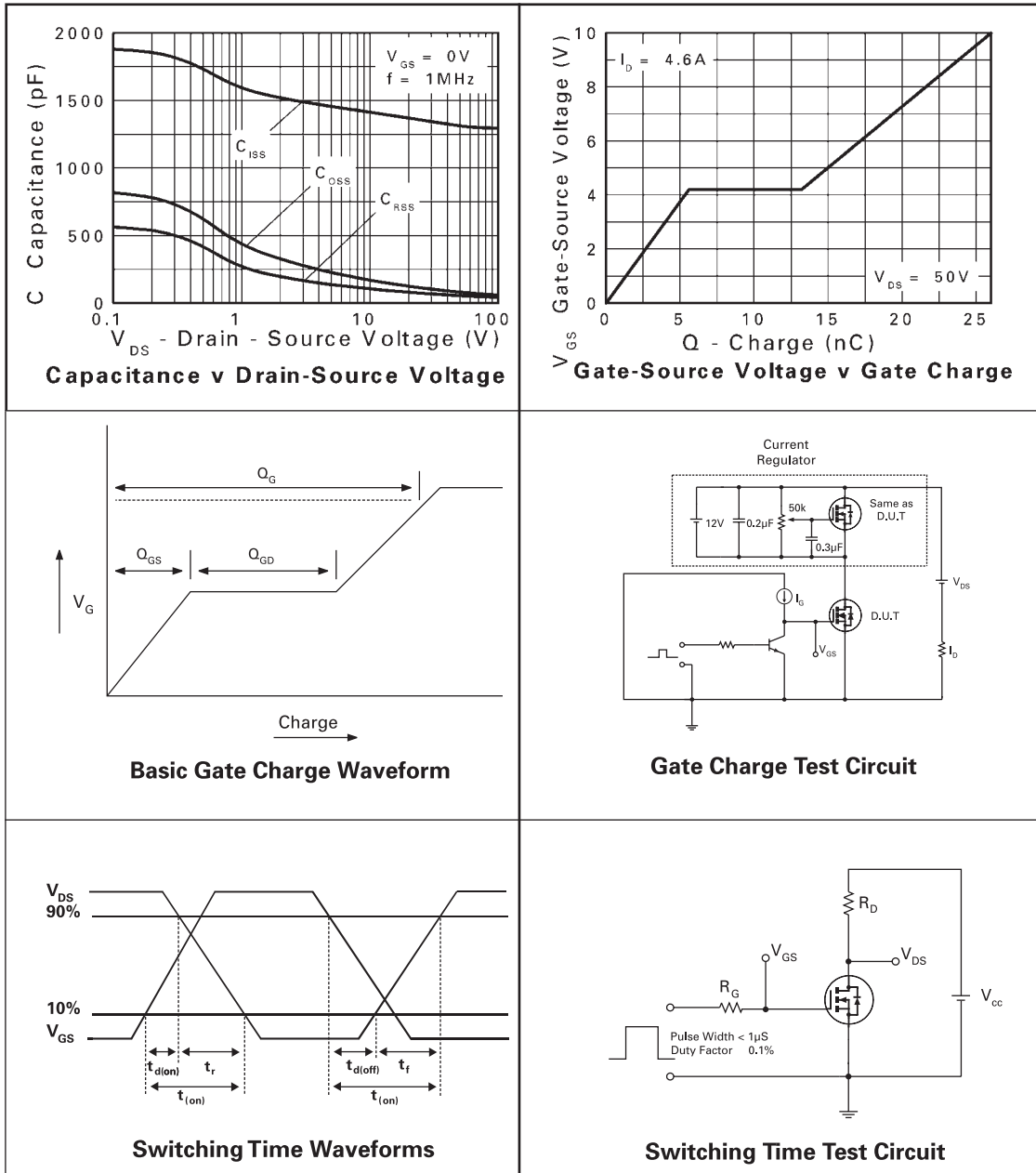
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## TYPICAL CHARACTERISTICS



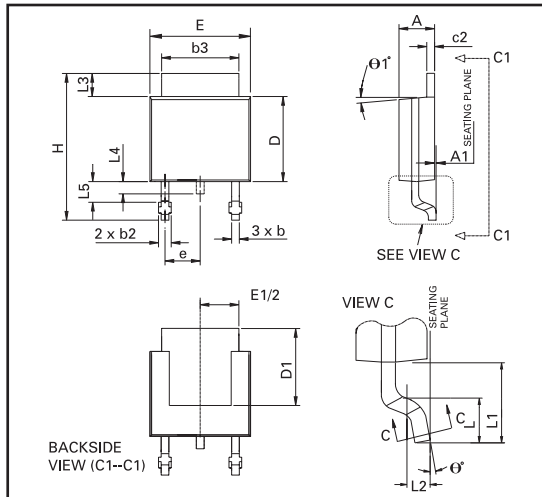
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## TYPICAL CHARACTERISTICS



# ZXMN10A09K

## PACKAGE OUTLINE



Controlling dimensions are in millimeters. Approximate conversions are given in inches

## PACKAGE DIMENSIONS

| DIM | Millimeters |       | Inches |       | DIM              | Millimeters |       | Inches    |       |
|-----|-------------|-------|--------|-------|------------------|-------------|-------|-----------|-------|
|     | Min         | Max   | Min    | Max   |                  | Min         | Max   | Min       | Max   |
| A   | 2.18        | 2.38  | 0.086  | 0.094 | e                | 2.30 BSC    |       | 0.090 BSC |       |
| A1  | —           | 0.127 | —      | 0.005 | H                | 9.40        | 10.41 | 0.370     | 0.410 |
| b   | 0.635       | 0.89  | 0.025  | 0.035 | L                | 1.40        | 1.78  | 0.055     | 0.070 |
| b2  | 0.762       | 1.114 | 0.030  | 0.045 | L1               | 2.74 REF    |       | 0.108 REF |       |
| b3  | 5.20        | 5.46  | 0.205  | 0.215 | L2               | 0.051 BSC   |       | 0.020 BSC |       |
| c   | 0.457       | 0.609 | 0.018  | 0.024 | L3               | 0.89        | 1.27  | 0.035     | 0.050 |
| c2  | 0.457       | 0.584 | 0.018  | 0.023 | L4               | 0.635       | 1.01  | 0.025     | 0.040 |
| D   | 5.97        | 6.22  | 0.235  | 0.245 | L5               | 1.14        | 1.52  | 0.045     | 0.060 |
| D1  | 5.20        | —     | 0.205  | —     | $\theta 1^\circ$ | 0°          | 10°   | 0°        | 10°   |
| E   | 6.35        | 6.73  | 0.250  | 0.265 | $\theta^\circ$   | 0°          | 15°   | 0°        | 15°   |
| E1  | 4.32        | —     | 0.170  | —     | —                | —           | —     | —         | —     |

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