



钜地半导体  
Tudi Semiconductor

## Product Specification

TUDI-MAX232A

+5V-Powered, Multichannel RS-232 Drivers/Receivers

网址 [www.sztdbdt.com](http://www.sztdbdt.com) Q

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- and sales

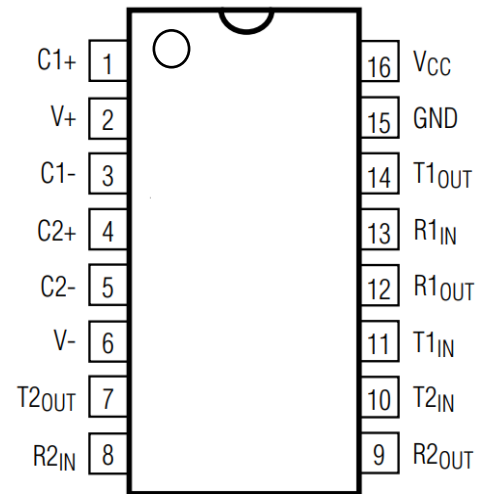


## Features

- Saves Board Space
- Integrated Charge Pump Circuitry
- Eliminates the Need for a Bipolar  $\pm 12V$  Supply
- Enables Single Supply Operation from +5V Supply
- Integrated Capacitors Saves Power for Reduced Power Requirements

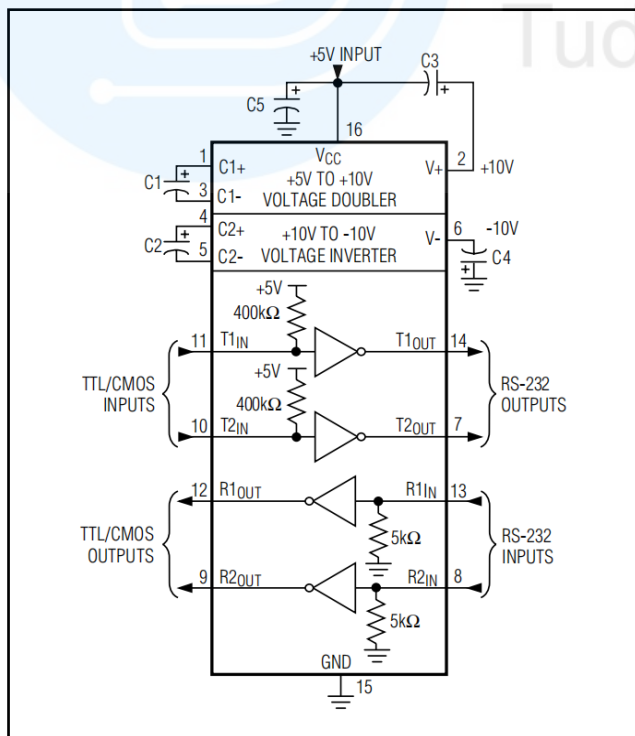
## Applications

- Interface Translation
- Multidrop RS-232 Networks
- Portable Diagnostics Equipment



## Description

The MAX22x family of line drivers/receivers is intended for all EIA/TIA-232E and V.28/V.24 communications interfaces, particularly applications where  $\pm 12V$  is not available. The MAX22x use no external components and are recommended for applications where printed circuit board space is critical. The MAX22x are offered in 3 different packages with temperatures from 0 to +70°C up to -40°C to +85°C. See ordering information table at the end of the data sheet for all package and temperature options.



Typical Operating Circuit



## Pin description

| Pin No | Symbol | Pin name                                                           |
|--------|--------|--------------------------------------------------------------------|
| 01     | C1+    | Output of external capacitance of positive voltage multiplier unit |
| 02     | V+     | Output of positive voltage of multiplier unit                      |
| 03     | C1-    | Output of external capacitance of positive voltage multiplier unit |
| 04     | C2+    | Output of external capacitance of negative voltage multiplier unit |
| 05     | C2-    | Output of external capacitance of negative voltage multiplier unit |
| 06     | V-     | Output of negative voltage of multiplier unit                      |
| 07     | T2oUT  | Output of transmitter data(levels RS-232)                          |
| 08     | R2IN   | Input of receiver data(levels RS-232)                              |
| 09     | R2oUT  | Output of receiver data(levels TTL/KMOS)                           |
| 10     | T2IN   | Input of transmitter data(levels TTL/KMOS)                         |
| 11     | T1n    | Input of transmitter data(levels TTL/KMOS)                         |
| 12     | R1oUT  | Output of receiver data(levels TTL/KMOS)                           |
| 13     | R1n    | Input of receiver data(levels RS-232)                              |
| 14     | T1oUT  | Output of transmitter data(levels RS-232)                          |
| 15     | GND    | Common output                                                      |
| 16     | Vcc    | Supply output of voltage source                                    |



### Recommended Operating Conditions

| Symbol | Parameter                                | Rate |     | Unit |
|--------|------------------------------------------|------|-----|------|
|        |                                          | min  | max |      |
| Vcc    | Supply voltage                           | 4.5  | 5.5 | V    |
| V+     | Transmitter output high voltage          | 5.0  | -   |      |
| V-     | Transmitter output low voltage           | -5.0 | -   |      |
| VTIN   | Transmitter input voltage                | 0    | Vcc |      |
| VRIN   | Receiver input voltage                   | -30  | 30  |      |
| Isc    | Transmitter short circuit output current | -    | ±60 | mA   |
| Ta     | Ambient temperature                      | -40  | 85  | C    |

### Maximum conditions

| Symbol | Parameter                                   | Rate    |              | Unit |
|--------|---------------------------------------------|---------|--------------|------|
|        |                                             | min     | max          |      |
| Vcc    | Supply voltage                              | -0.3    | 6.0          | V    |
| V+     | Transmitter high output voltage             | Vcc-0.3 | 14           |      |
| V-     | Transmitter low output voltage              | -0.3    | -14          |      |
| VTIN   | Transmitter input voltage                   | -0.3    | V++0.3       |      |
| VRIN   | Receiver input voltage                      | -30     | 30           |      |
| Pp     | Dissipated powerDIP-package                 | -       |              | mW   |
| Isc    | Output current of transmitter short circuit | -       | Continuously | mA   |
| Ta     | Ambient temperature                         | -60     | 150          | C    |





| Receiver electrical parameters    |                                   |                                                                  |      |       |               |       |         |
|-----------------------------------|-----------------------------------|------------------------------------------------------------------|------|-------|---------------|-------|---------|
| Symbol                            | Parameter                         | Test conditions                                                  | Rate |       |               |       | Unit    |
|                                   |                                   |                                                                  | 25°C |       | -40°C to 85°C |       |         |
|                                   |                                   |                                                                  | min  | max   | min           | max   |         |
| Vh                                | Hysteresis voltage                | Vcc=5.0V                                                         | 0.2  | 0.9   | 0.2           | 1.0   | V       |
| Von                               | On(operation)voltage              | $V_o \leq 0.1V_{IoL}$<br>$\leq 20 \text{ }\mu\text{A}$           |      | 2.4   |               | 2.3   |         |
| Voff                              | Off(dropout)voltage               | $V_o \geq V_{cc} - 0.1V_{IoH}$<br>$\leq -20 \text{ }\mu\text{A}$ | 0.8  |       | 0.9           |       |         |
| VoL                               | Output low voltage                | IoL=3.2 mA<br>Vcc=4.5V                                           | -    | 0.3   |               | 0.4   |         |
| VoH                               | Output high voltage               | IoH=-1.0 mA<br>Vcc=4.5V                                          | 3.6  |       | 3.5           | -     |         |
| RI                                | Input resistance                  | Vcc=5.0V                                                         | 3.0  | 7.0   | 3.0           | 7.0   | kOhm    |
| Transmitter electrical parameters |                                   |                                                                  |      |       |               |       |         |
| Symbol                            | Parameter                         | Test conditions                                                  | Rate |       |               |       | Unit    |
|                                   |                                   |                                                                  | 25°C |       | -40°C to 85°C |       |         |
|                                   |                                   |                                                                  | min  | max   | min           | max   |         |
| VoL                               | Output low voltage                | Vcc=4.5V<br>VH=2.0V                                              | -    | -5.2  |               | -5.0  | V       |
| VoH                               | Output high voltage               | Vcc=4.5V<br>VL=0.8V                                              | 5.2  |       | 5.0           | -     |         |
| I                                 | Input low current                 | Vcc=5.5V Vπ=0V                                                   | -    | -1.0  |               | -10.0 | uA      |
| IH                                | Input high current                | Vcc=5.5V<br>VH=Vcc                                               |      | 1.0   |               | 10.0  |         |
| SR                                | Speed of output frontchange       | Vcc=5.0V CL=50<br>-1000 pF                                       | 3.0  | 30    | 2.7           | 27    | V/uS    |
| Ro                                | Output resistance                 | Vcc=V+=V-=0V<br>Vo=±2V                                           | 350  | -     | 300           | -     | Ohm     |
| Isc                               | Short circuit outputcurrent       | Vcc=5.5V<br>Vo=0V                                                |      | -5050 |               | -6060 | mA kbps |
| ST                                | Speed of information transmission | Vcc=4.5V<br>CL=1000 pF                                           | 140  |       | 120           | -     |         |



### Dynamic parameters

| Symbol           | Parameter                        | Test conditions        | Rate |      |               |      | Unit |
|------------------|----------------------------------|------------------------|------|------|---------------|------|------|
|                  |                                  |                        | 25°C |      | -40°C to 85°C |      |      |
|                  |                                  |                        | min  | max  | min           | max  |      |
| tPHLR<br>(tPLHR) | Signal propagation<br>delay time | Vcc=4.5V<br>CL=150 pF  |      | 9.7  | -             | 10   | us   |
| tPHLT<br>(tPLHT) | Signal propagation<br>delay time | Vcc=4.5V<br>CL=2500 pF |      | 5.0* |               | 6.0* |      |

### Capacitance

| Symbol | Parameter           | Test conditions | Rate |     |               |     | Unit |
|--------|---------------------|-----------------|------|-----|---------------|-----|------|
|        |                     |                 | 25°C |     | -40°C to 85°C |     |      |
|        |                     |                 | min  | max | min           | max |      |
| CIN    | Input capacitance   | 5.0             | 9.0  |     |               |     | pF   |
| CpD    | Dynamic capacitance |                 | 90   |     |               |     |      |

### Static parameters

| Symbol          | Parameter                  | Test conditions                          | Rate |      |               |     | Unit |
|-----------------|----------------------------|------------------------------------------|------|------|---------------|-----|------|
|                 |                            |                                          | 25°C |      | -40°C to 85°C |     |      |
|                 |                            |                                          | min  | max  | min           | max |      |
| I <sub>cc</sub> | Consumption current static | V <sub>cc</sub> =5.0V V <sub>π</sub> =0V |      | 10.0 |               | 14  | mA   |



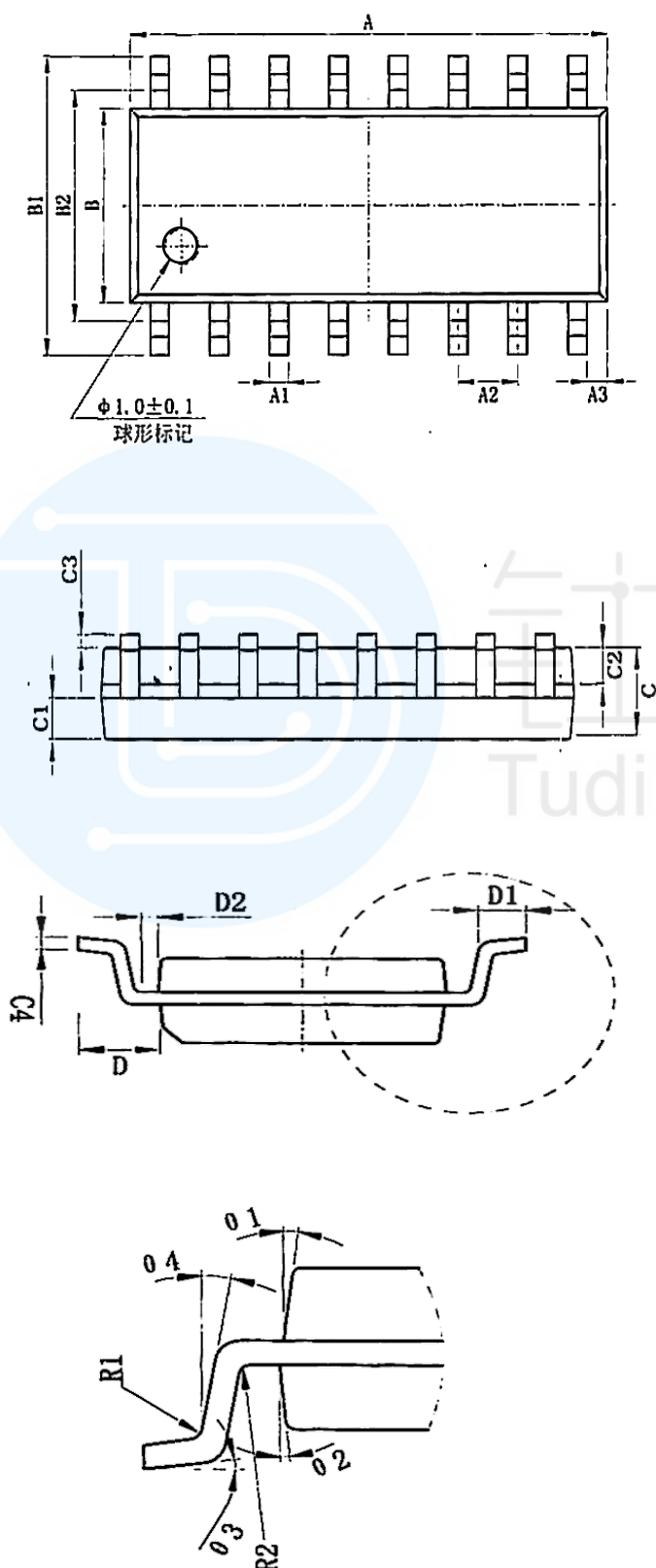
| Truth table |                                                |   |   |
|-------------|------------------------------------------------|---|---|
| Inputs      | RIn,TIN                                        | H | L |
| Outputs     | RovT,TovT                                      | L | H |
| H-vol-L     | Note:<br>Itage high level;<br>ow voltage level |   |   |

## Order information

| Order Number    | Package | Package Quantity      | Marking<br>On The park | Temperature    |
|-----------------|---------|-----------------------|------------------------|----------------|
| MAX232ACSE-TUDI | SOP16   | Tape,Reel,2500        | MAX232ACSE             | 0°C to 70°C    |
| MAX232ACUE-TUDI | TSSOP16 | Tape,Reel,2500        | MAX232ACUE             |                |
| MAX232ACPE-TUDI | DIP16   | Tube,25,A box of 1000 | MAX232ACPE             |                |
| MAX232ACWE-TUDI | SMD16   | Tape,Reel,1000        | MAX232ACWE             |                |
| MAX232AESE-TUDI | SOP16   | Tape,Reel,2500        | MAX232AESE             | - 40°C to 85°C |
| MAX232AEUE-TUDI | TSSOP16 | Tape,Reel,2500        | MAX232AEUE             |                |
| MAX232AEPE-TUDI | DIP16   | Tube,25,A box of 1000 | MAX232AEPE             |                |
| MAX232AEWE-TUDI | SMD16   | Tape,Reel,1000        | MAX232AEWE             |                |

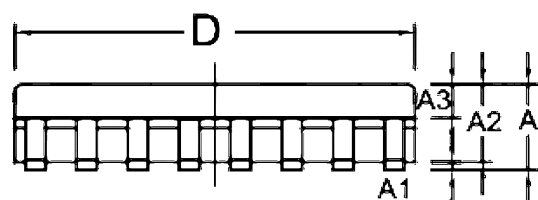
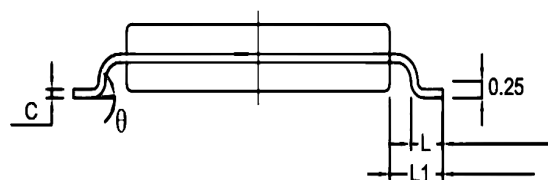
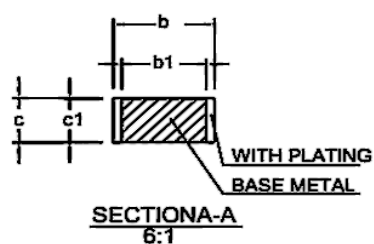
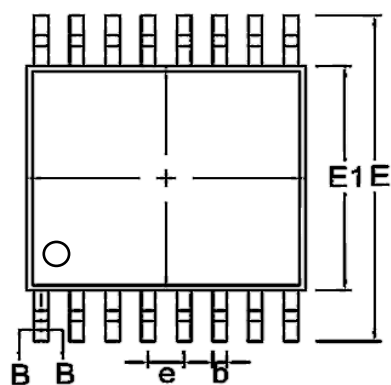


## Package SOP16



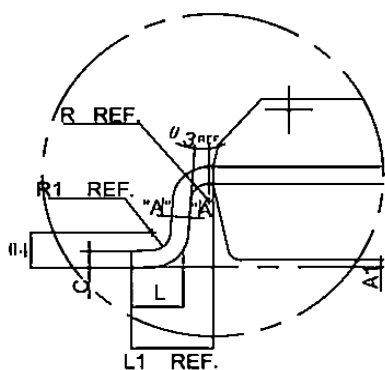
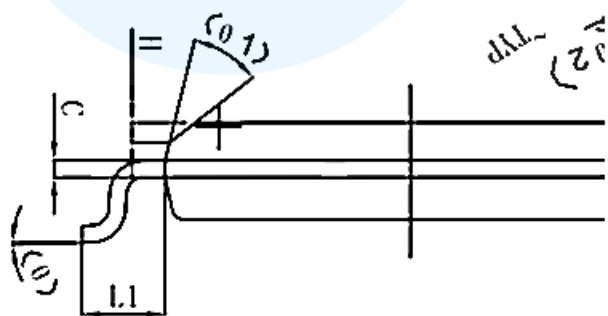
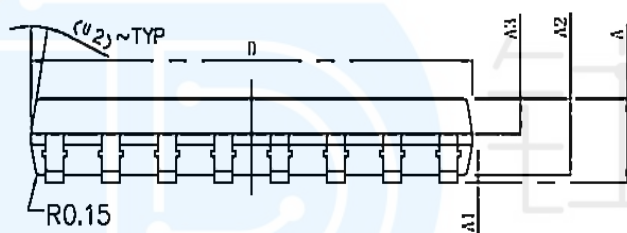
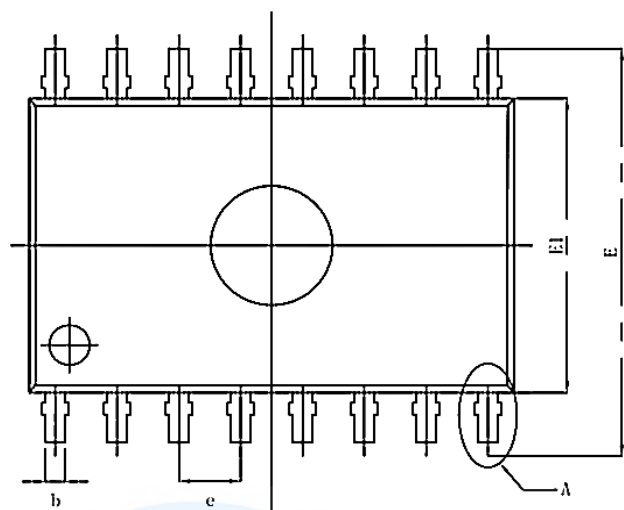
| SIZE<br>SYMBOL | MIN./mm    | MAX./mm |
|----------------|------------|---------|
| A              | 9.80       | 10.00   |
| A1             | 0.356      | 0.456   |
| A2             | 1.27TYP    |         |
| A3             | 0.302TYP   |         |
| B              | 3.85       | 3.95    |
| B1             | 5.84       | 6.24    |
| B2             | 5.00 TYP   |         |
| C              | 1.40       | 1.60    |
| C1             | 0.61       | 0.71    |
| C2             | 0.54       | 0.64    |
| C3             | 0.05       | 0.25    |
| C4             | 0.203      | 0.233   |
| D              | 1.05 TYP   |         |
| D1             | 0.40       | 0.70    |
| D2             | 0.15       | 0.25    |
| R1             | 0.20TYP    |         |
| R2             | 0.20TYP    |         |
| 01             | 8°~12°TYP4 |         |
| 02             | 8°~12°TYP4 |         |
| 03             | 0°~8°      |         |
| 04             | 4°~12°     |         |

## Package TSSOP16



| SIZE<br>SYMBOL | MIN./mm | TYP./mm | MAX./mm |
|----------------|---------|---------|---------|
| A              | --      | --      | 1.20    |
| A1             | 0.05    |         | 0.15    |
| A2             | 0.90    | 1.00    | 1.05    |
| b              | 0.20    | --      | 0.30    |
| b1             | 0.19    | 0.22    | 0.25    |
| C              | 0.110   | 0.127   | 0.145   |
| cl             | 0.12    | 0.13    | 0.14    |
| D              | 4.86    | 4.96    | 5.06    |
| E              | 6.20    | 6.40    | 6.60    |
| E1             | 4.30    | 4.40    | 4.50    |
| e              | 0.65BSC |         |         |
| L              | 0.45    | 0.60    | 0.75    |
| L1             | 1.00BSC |         |         |
|                | 0°      | --      | 8°      |

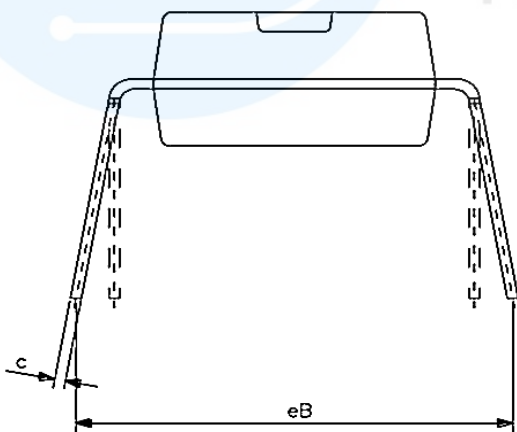
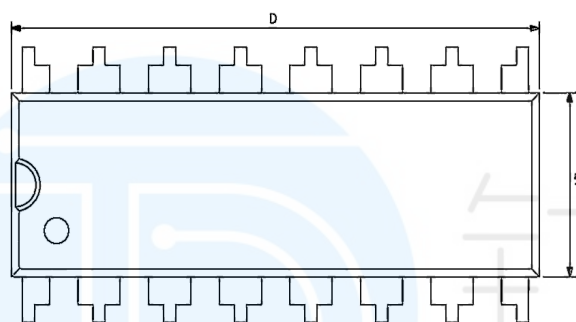
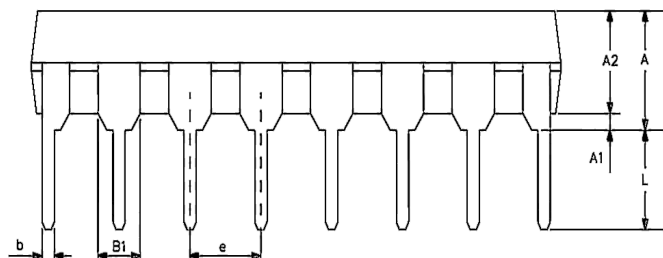
## Package SMD16



| SIZE<br>SYMBOL | MIN./mm | MAX./mm |
|----------------|---------|---------|
| A              | —       | 2.65    |
| A1             | 0.10    | 0.30    |
| A2             | 2.25    | 2.35    |
| A3             | 0.97    | 1.07    |
| D              | 10.10   | 10.50   |
| E              | 10.26   | 10.60   |
| E1             | 7.30    | 7.70    |
| e              | 1.27BSC |         |
| L              | 0.55    | 0.85    |
| L1             | 1.4BSC  |         |
| H              | 0.345   | 0.365   |
| R              | 0.20TYP |         |
| R1             | 0.30TYP |         |
| $\theta$       | 0°      | 8°      |
| $\theta 1$     | 45° TYP |         |
| $\theta 2$     | 12° TYP |         |
| $\theta 3$     | 0°      | 8°      |
| $\theta 4$     | 0°      | 10°     |



## Package DIP16



| SIZE<br>SYMBOL | MIN./mm | MAX./mm |
|----------------|---------|---------|
| A2             | 3.20    | 3.60    |
| A1             | 0.51    | —       |
| A              | 3.60    | 5.33    |
| L              | 3.00    | 3.60    |
| b              | 0.36    | 0.56    |
| B1             | 1.52    |         |
| D              | 18.80   | 19.94   |
| E1             | 6.20    | 6.60    |
| e              | 2.54    |         |
| C              | 0.20    | 0.36    |
| eB             | 7.62    | 9.30    |
| R              | 0.20TYP |         |
| R1             | 0.30TYP |         |
| θ              | 0°      | 8°      |
| θ1             | 45°TYP  |         |
| 02             | 12°TYP  |         |
| 03             | 0°      | 8°      |
| 04             | 0°      | 10°     |



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