



钜地半导体
Tudi Semiconductor

Product Specification

TUDI-ADM3202

Low Power, 3.3 V, RS-232 Line Drivers/Receivers

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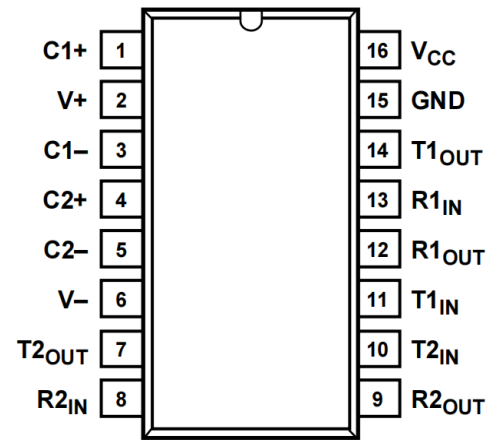
**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



FEATURES

- 460 kbps data rate
- Specified at 3.3 V
- Meets EIA-232E specifications
- 0.1 μ F charge pump capacitors
- Low power shutdown (ADM3222 and ADM1385) PDIP, SOIC_N, SOIC_W, SSOP, and TSSOP options
- Upgrade for MAX3222/MAX3232 and LTC1385
- ESD protection to IEC 1000-4-2 (801.2) on RS-232 pins (ADM3202 only)
- ± 8 kV: contact discharge
- ± 15 kV: air gap discharge



APPLICATIONS

- General-purpose RS-232 data
- Link Portable instruments
- Printers, palmtop computers, PDAs

GENERAL DESCRIPTION

The ADM3202/ADM3222/ADM1385 transceivers are high speed, 2-channel RS-232/V.28 interface devices that operate from a single 3.3 V power supply. Low power consumption and a shutdown facility (ADM3222/ADM1385) make them ideal for battery-powered portable instruments.

The ADM3202/ADM3222/ADM1385 parts conform to the EIA-232E and CCITT V.28 specifications and operate at data rates up to 460 kbps.

Four external 0.1 μ F charge pump capacitors are used for the voltage doubler/inverter, permitting operation from a single 3.3 V supply.

The ADM3222 contains additional enable and shutdown circuitry. The EN input can be used to three-state the receiver outputs. The SD input is used to power down the charge pump and transmitter outputs, reducing the quiescent current to less than 0.5 μ A. The receivers remain enabled during shutdown unless disabled using EN.

The ADM1385 contains a driver disable mode and a complete shutdown mode.

The ADM3202 is available in a 16-lead PDIP, SOIC_W, and SOIC_N, as well as a space-saving 16-lead TSSOP. The ADM3222 is available in 18-lead PDIP and SOIC_W and in 20-lead SSOP and TSSOP. The ADM1385 is available in a 20-lead SSOP, which is pin-compatible with the LTC1385 CG.



FUNCTIONAL BLOCK DIAGRAMS

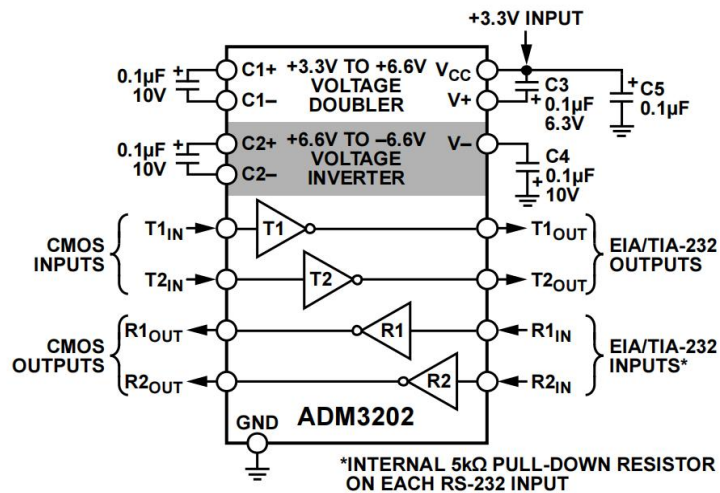


Figure 1.

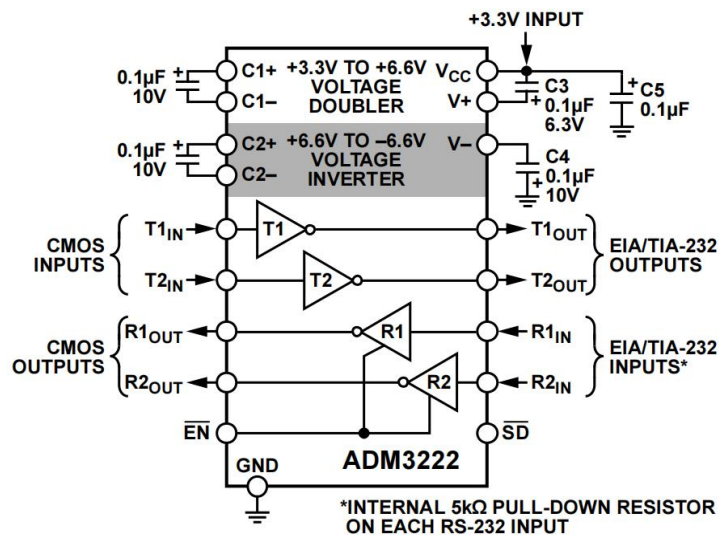


Figure 2.

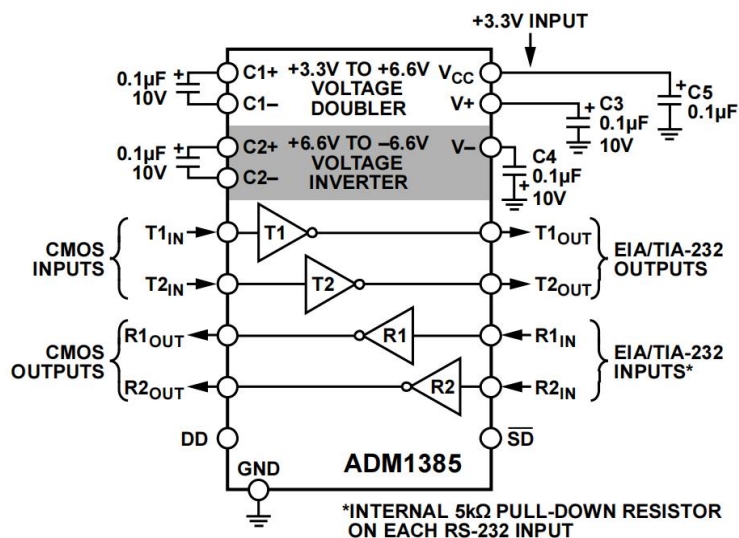


Figure 3.



SPECIFICATIONS

$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$, $C1$ to $C4 = 0.1 \mu\text{F}$. All specifications T_{MIN} to T_{MAX} , unless otherwise noted.

Table 1.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments	
DC CHARACTERISTICS						
Operating Voltage Range	3.0	3.3	5.5	V	No load R _L = 3 kΩ to GND	
V _{CC} Power Supply Current		1.3	3	mA		
		8	12	mA		
Shutdown Supply Current		0.01	0.5	μA		
LOGIC						
Input Logic Threshold Low, V _{INL}	2.0		0.8	V	T _{IN}	
Input Logic Threshold High, V _{INH}				V	T _{IN}	
CMOS Output Voltage Low, V _{OL}			0.4	V	I _{OUT} = 1.6 mA	
CMOS Output Voltage High, V _{OH}	V _{CC} – 0.6			V	I _{OUT} = –1 mA	
Logic Pull-Up Current		5	10	μA	T _{IN} = GND to V _{CC} ¹	
Output Leakage Current			±10	μA	Receivers disabled	
RS-232 RECEIVER						
EIA-232 Input Voltage Range	–30		+30	V		
EIA-232 Input Threshold Low	0.6	1.2		V		
EIA-232 Input Threshold High		1.6	2.4	V		
EIA-232 Input Hysteresis		0.4		V		
EIA-232 Input Resistance	3	5	7	kΩ		
RS-232 TRANSMITTER						
Output Voltage Swing (RS-232)	±5.0	±5.2		V	V _{CC} = 3.3 V, all transmitter outputs loaded with 3 kΩ to ground	
Output Voltage Swing (RS-562)	±3.7			V	V _{CC} = 3.0 V	
Transmitter Output Resistance	300			Ω	V _{CC} = 0 V, V _{OUT} = ±2 V	
RS-232 Output Short-Circuit Current		±15		mA	SD̄ = low, V _{OUT} = 12 V	
Output Leakage Current			±25	μA		
TIMING CHARACTERISTICS						
Maximum Data Rate	460			kbps	V _{CC} = 3.3 V, R _L = 3 kΩ to 7 kΩ, C _L = 50 pF to 1000 pF, one Tx switching	
Receiver Propagation Delay					R _L = 3 kΩ, C _L = 1000 pF	
TPHL		0.4	1	μs		
TPLH		0.4	1	μs		
Transmitter Propagation Delay		0.3	1.2	μs		
Receiver Output Enable Time		200		ns		
Receiver Output Disable Time		200		ns		
Transmitter Skew		30		ns		
Receiver Skew		300		ns		
Transition Region Slew Rate	5.5	10	30	V/μs		Measured from +3 V to –3 V or –3 V to +3 V, V _{CC} = +3.3 V; R _L = 3 kΩ, C _L = 1000 pF, T _A = 25°C

¹ ADM1385: Input leakage current typically $-10 \mu\text{A}$ when $T_{IN} = \text{GND}$.



ABSOLUTE MAXIMUM RATINGS

$T_A = 25^{\circ}\text{C}$, unless otherwise noted.

Table 2.

Parameter	Rating
V_{CC}	$-0.3\text{ V to }+6\text{ V}$
V_+	$(V_{CC} - 0.3\text{ V})\text{ to }+14\text{ V}$
V_-	$+0.3\text{ V to }-14\text{ V}$
Input Voltages	
T_{IN}	$-0.3\text{ V to } (V_+, +0.3\text{ V})$
R_{IN}	$\pm 30\text{ V}$
Output Voltages	
T_{OUT}	$\pm 15\text{ V}$
R_{OUT}	$-0.3\text{ V to } (V_{CC} + 0.3\text{ V})$
Short-Circuit Duration	
T_{OUT}	Continuous
Power Dissipation (Derates 6 mW/ $^{\circ}\text{C}$ above 50°C)	450 mW
Thermal Impedance, θ_{JA}	
N-16/N-18 (2-Layer Test Board)	117°C/W
RW-16/RW-18 (4-Layer Test Board)	56°C/W
R-16 (4-Layer Test Board)	81°C/W
RU-16 (4-Layer Test Board)	113°C/W
RU-20 (4-Layer Test Board)	110°C/W
RS-20 (4-Layer Test Board)	83°C/W
Operating Temperature Range	
Industrial (A Version)	$-40^{\circ}\text{C to }+85^{\circ}\text{C}$
Storage Temperature Range	$-65^{\circ}\text{C to }+150^{\circ}\text{C}$
Lead Temperature (Soldering, 10 sec)	JEDEC industry standard J-STD-020

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



GENERAL DESCRIPTION

The ADM3202/ADM3222/ADM1385 are RS-232 line drivers/receivers. Step-up voltage converters coupled with level-shifting transmitters and receivers allow RS-232 levels to be developed while operating from a single 3.3 V supply.

CMOS technology is used to keep the power dissipation to an absolute minimum, allowing maximum battery life in portable applications.

The ADM3202/ADM3222/ADM1385 are modifications, enhancements, and improvements of the AD230 to AD241 family and derivatives. They are essentially plug-in compatible and do not have any materially different applications.

CIRCUIT DESCRIPTION

The internal circuitry consists of these main sections:

- A charge pump voltage converter
- 3.3 V logic to EIA-232 transmitters
- EIA-232 to 5 V logic receivers

Charge Pump DC to DC Voltage Converter

The charge pump voltage converter consists of a 200 kHz oscillator and a switching matrix. The converter generates a ± 6.6 V supply from the input 3.3 V level. This is done in two stages by using a switched capacitor technique as illustrated in Figure 18 and Figure 19. First, the 3.3 V input supply is doubled to 6.6 V by using Capacitor C1 as the charge storage element. The +6.6 V level is then inverted to generate -6.6 V using C2 as the storage element. C3 is shown connected between V+ and V_{CC} but is equally effective if connected between V+ and GND.

Capacitors C3 and C4 are used to reduce the output ripple. Their values are not critical and can be increased, if desired. Capacitor C3 is shown connected between V+ and V_{CC}. It is also acceptable to connect this capacitor between V+ and GND.

If desired, larger capacitors (up to 10 μ F) can be used for Capacitors C1 to C4.

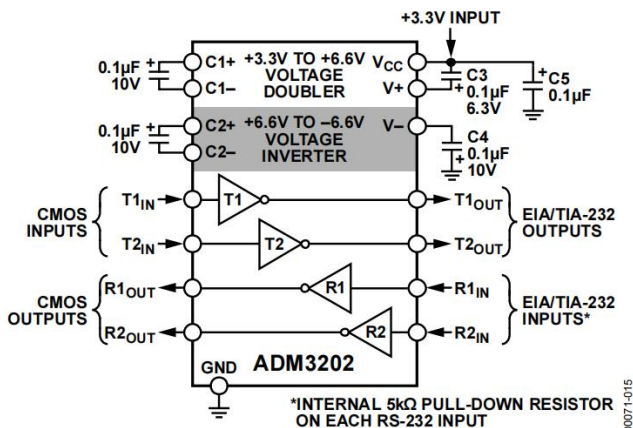


Figure 15. ADM3202 Typical Operating Circuit

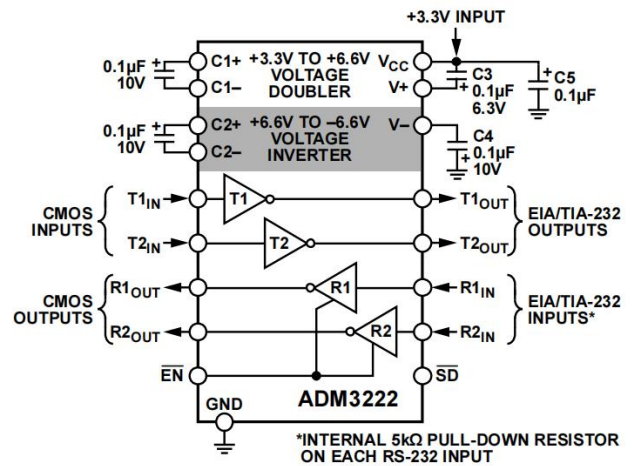


Figure 16. ADM3222 Typical Operating Circuit

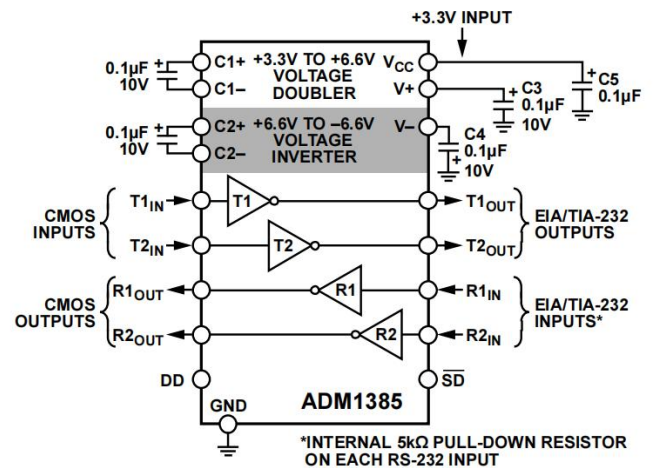


Figure 17. ADM1385 Typical Operating Circuit

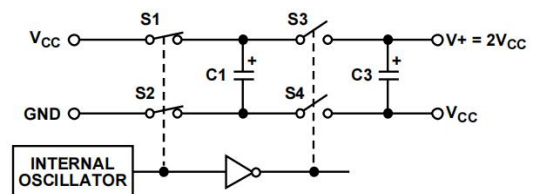


Figure 18. Charge Pump Voltage Doubler

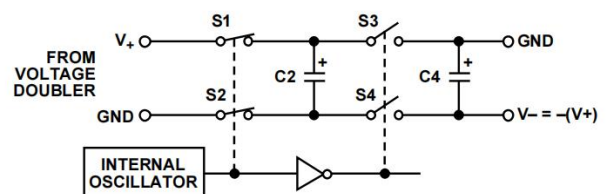


Figure 19. Charge Pump Voltage Inverter



Transmitter (Driver) Section

The drivers convert 3.3 V logic input levels into RS-232 output levels. With $V_{CC} = 3.3$ V and driving an RS-232 load, the output voltage swing is typically ± 6 V.

Receiver Section

The receivers are inverting level-shifters that accept RS-232 input levels and translate them into 3 V logic output levels. The inputs have internal 5 k Ω , pull-down resistors to ground and are protected against overvoltages up to ± 30 V. Unconnected inputs are pulled to 0 V by the internal 5 k Ω , pull-down resistor. This results in a Logic 1 output level for unconnected inputs or for inputs connected to GND.

The receivers have Schmitt-trigger inputs with a hysteresis level of 0.4 V. This ensures error-free reception for both noisy inputs and for inputs with slow transition times.

HIGH BAUD RATE

The ADM3202/ADM3222 feature high slew rates permitting data transmission at rates well in excess of the EIA/RS-232E specifications. RS-232 voltage levels are maintained at data rates up to 460 kbps even under worst-case loading conditions. This allows high speed data links between two terminals and is suitable for the new generation ISDN modem standards that require data rates of 230 kbps. The slew rate is internally controlled to less than 30 V/ μ s to minimize EMI interference.

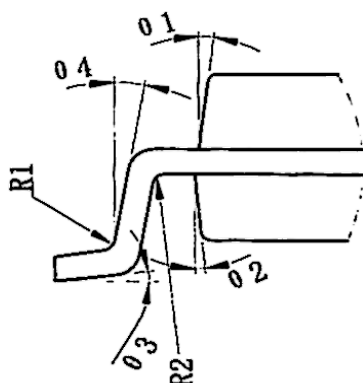
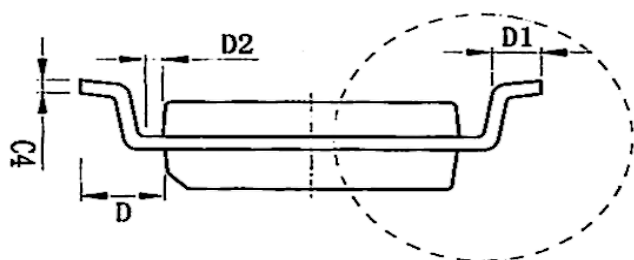
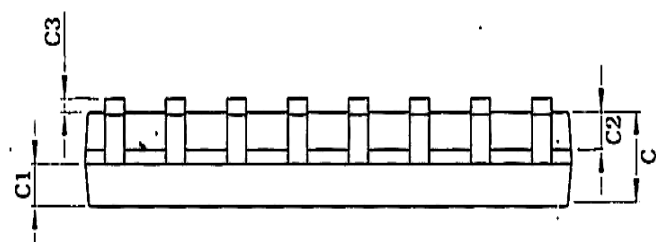
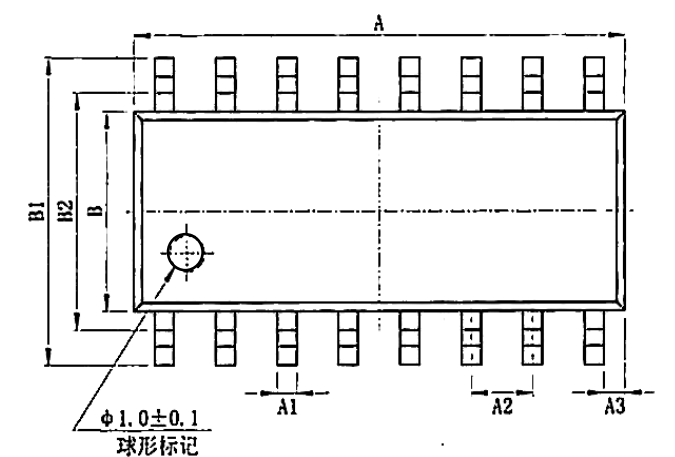


Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
ADM3202ANZ-TUDI	DIP16	Tube,25,A box of 1000	ADM3202ANZ	-40°C to +85°C
ADM3202ARNZ-REEL-TUDI	SOP16	Tape,Reel,2500	ADM3202ARNZ-REEL	
ADM3202ARUZ-REEL-TUDI	TSSOP16	Tape,Reel,2500	ADM3202ARUZ-REEL	



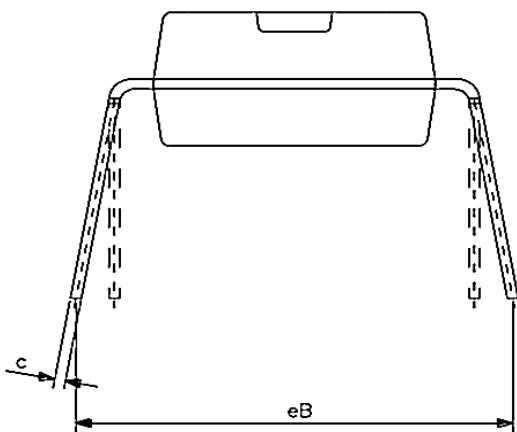
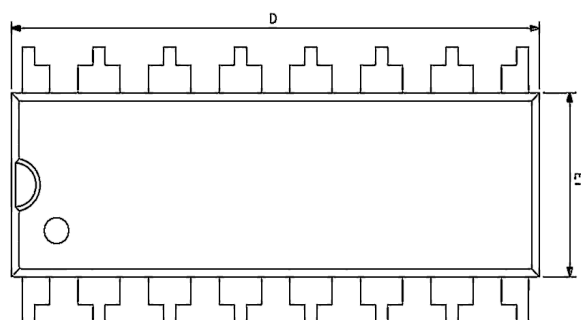
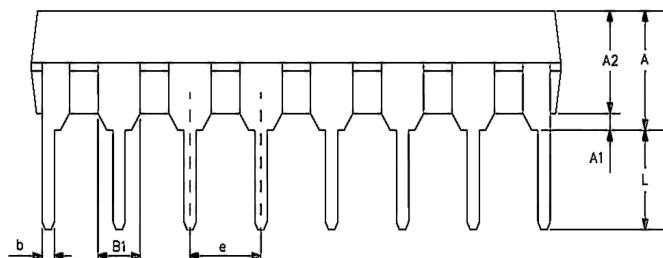
Package SOP16



SIZE 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	
O1	8°~12°TYP4	
O2	8°~12°TYP4	
O3	0°~8°	
O4	4°~12°	

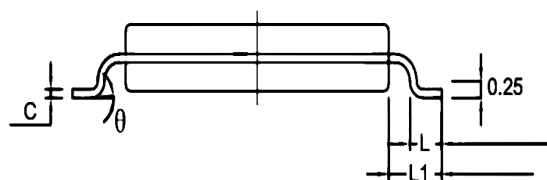
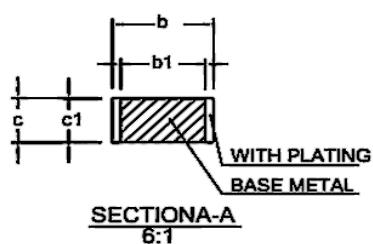
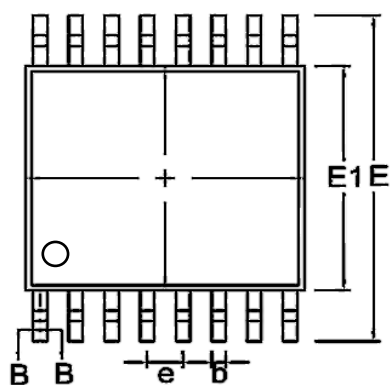


Package DIP16

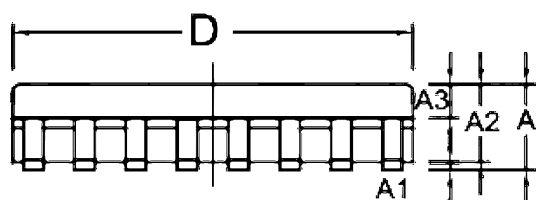


SIZE SYMBOL	MIN./mm	MAX./mm
A2	3.20	3.60
A1	0.51	—
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
C	0.20	0.36
eB	7.62	9.30
R	0.20TYP	
R1	0.30TYP	
θ	0°	8°
$\theta 1$	45°TYP	
02	12°TYP	
03	0°	8°
04	0°	10°

Package TSSOP16



SIZE 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°





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