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8/06—Rev. C to Rev. D

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9/05—Rev. B to Rev. C

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12/01—Rev. A to Rev. B

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SPECIFICATIONS

$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$, $C1$ to $C4 = 0.1 \text{ }\mu\text{F}$. 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	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
Transition Region Slew Rate	5.5	10	30	V/μs	

¹ ADM1385: Input leakage current typically $-10 \text{ }\mu\text{A}$ 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 $^{\circ}\text{C}$)	450 mW
Thermal Impedance, θ_{JA}	
N-16/N-18 (2-Layer Test Board)	117 $^{\circ}\text{C/W}$
RW-16/RW-18 (4-Layer Test Board)	56 $^{\circ}\text{C/W}$
R-16 (4-Layer Test Board)	81 $^{\circ}\text{C/W}$
RU-16 (4-Layer Test Board)	113 $^{\circ}\text{C/W}$
RU-20 (4-Layer Test Board)	110 $^{\circ}\text{C/W}$
RS-20 (4-Layer Test Board)	83 $^{\circ}\text{C/W}$
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.

ESD CAUTION



ESD (electrostatic discharge) sensitive device.

Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATIONS AND FUNCTION DESCRIPTIONS

PIN CONFIGURATIONS (N, R, RU, AND RW PACKAGES)

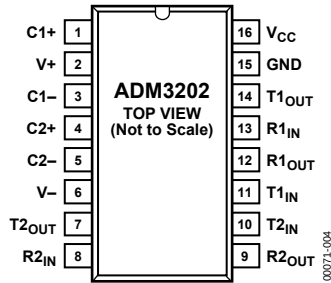


Figure 4. N, R, RU, and RW Packages Pin Configuration

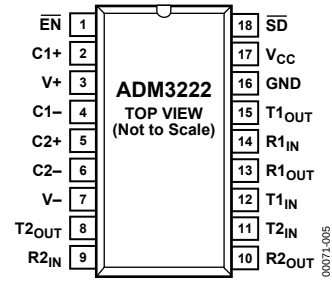


Figure 5. N and RW Packages Pin Configuration

PIN CONFIGURATIONS (RS AND RU PACKAGES)

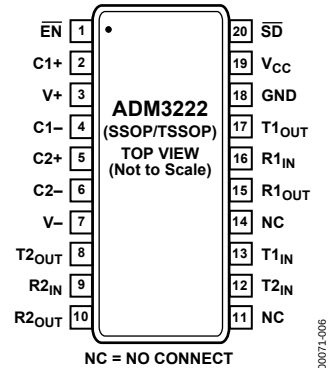


Figure 6. RS and RU Packages Pin Configuration

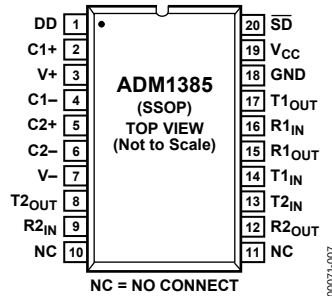


Figure 7. RS Package Pin Configuration

Table 3. Pin Function Descriptions

Mnemonic	Description
V _{CC}	Power Supply Input (3.3 V ± 0.3 V).
V ₊	Internally Generated Positive Supply (+6 V nominal).
V ₋	Internally Generated Negative Supply (-6 V nominal).
GND	Ground Pin. Must be connected to 0 V.
C1+, C1-	External Capacitor 1 is connected between these pins. A 0.1 μF capacitor is recommended but larger capacitors up to 47 μF can be used.
C2+, C2-	External Capacitor 2 is connected between these pins. A 0.1 μF capacitor is recommended but larger capacitors up to 47 μF can be used.
T _{XIN}	Transmitter (Driver) Inputs. These inputs accept TTL/CMOS levels.
T _{XOUT}	Transmitter (Driver) Outputs. These are RS-232 signal levels (typically ±9 V).
R _{XIN}	Receiver Inputs. These inputs accept RS-232 signal levels. An internal 5 kΩ pull-down resistor to GND is connected on each input.
R _{XOUT}	Receiver Outputs. These are CMOS output logic levels.
EN	(ADM3222 only) Receiver Enable. Active low. When low, the receiver outputs are enabled. When high, they are three-stated.
SD	(ADM3222 only) Shutdown Control. Active low. When low, the charge pump is shut down and the transmitter outputs are disabled.
SD	(ADM1385 only) Shutdown Control. When low, the charge pump is shut down and all transmitters and receivers are disabled.
DD	(ADM1385 only) Driver Disable. When low, the charge pump is turned off and the transmitters are disabled. The receivers remain active.
NC	No Connect.

TYPICAL PERFORMANCE CHARACTERISTICS

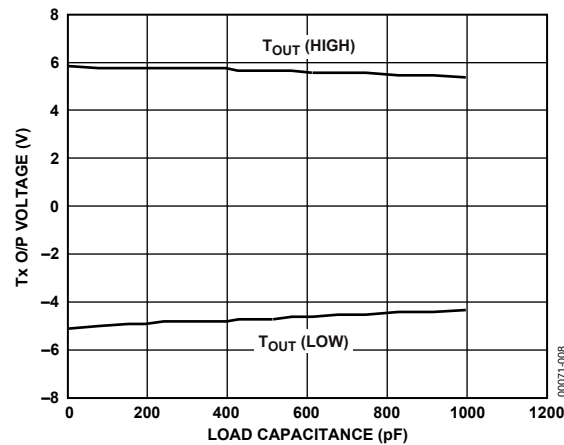


Figure 8. Transmitter Output Voltage High/Low vs. Load Capacitance @ 460 kbps

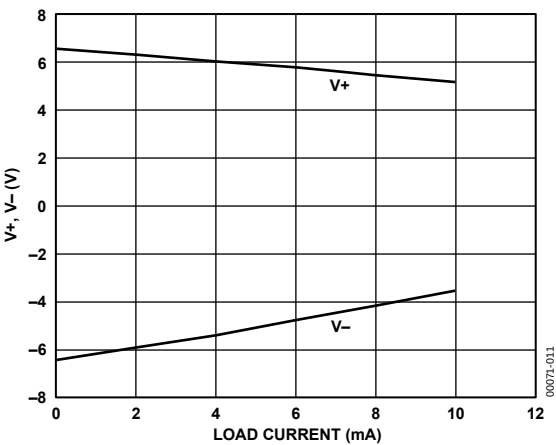


Figure 11. Charge Pump V+, V- vs. Load Current

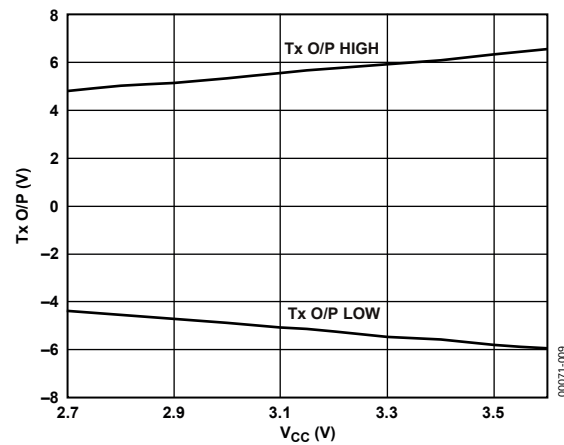


Figure 9. Transmitter Output Voltage vs. V_{CC}

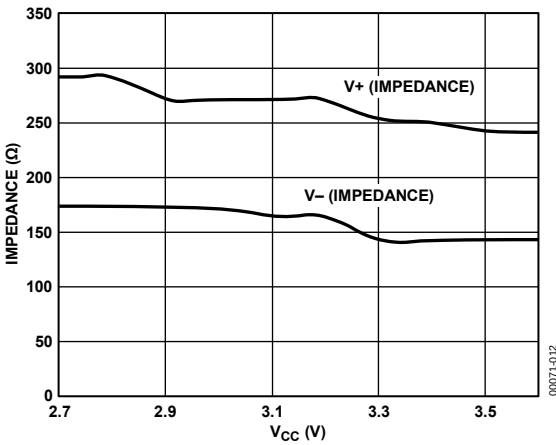


Figure 12. Charge Pump Impedance vs. V_{CC}

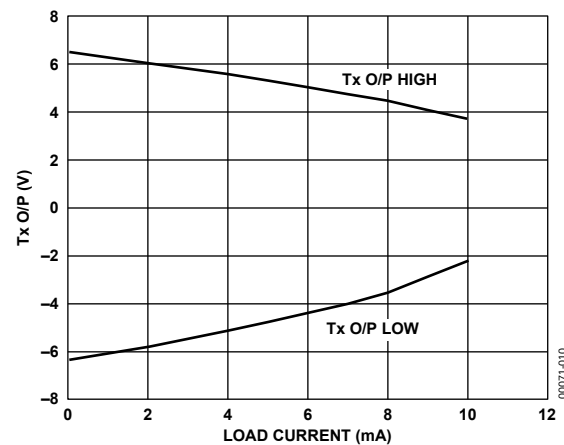


Figure 10. Transmitter Output Voltage Low/High vs. Load Current

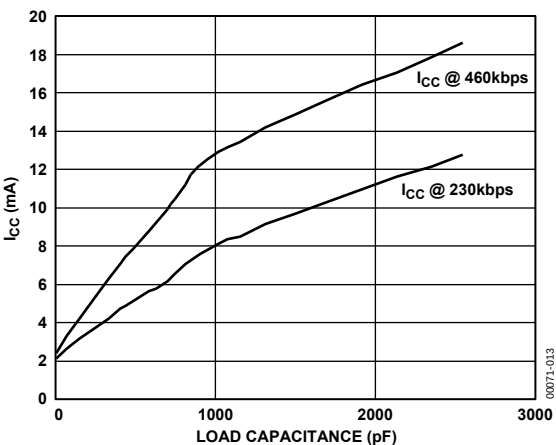


Figure 13. Power Supply Current vs. Load Capacitance

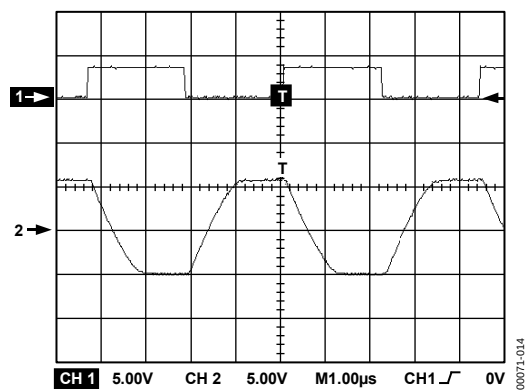


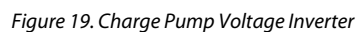
Figure 14. 460 kbps Data Transmission

GENERAL DESCRIPTION

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.

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

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



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

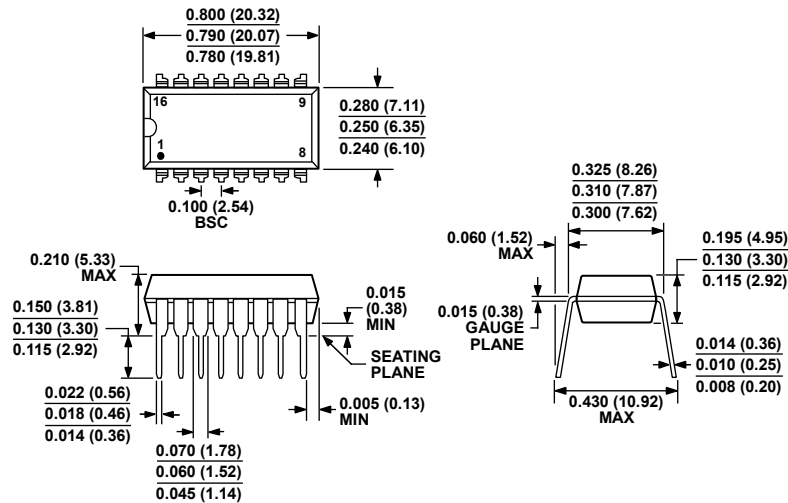
The receivers are inverting level-shifters that accept RS-232 input levels and translate them into 3 V logic output levels. The inputs have internal 5 k Ω , pull-down resistors to ground and are protected against overvoltages up to ± 30 V. Unconnected inputs are pulled to 0 V by the internal 5 k Ω , 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.

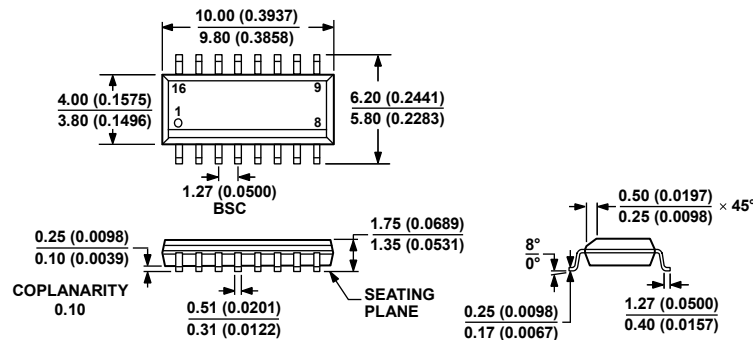
OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MS-001-AB
CONTROLLING DIMENSIONS ARE IN INCHES; MILLIMETER DIMENSIONS (IN PARENTHESES) ARE ROUNDED-OFF INCH EQUIVALENTS FOR REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN. CORNER LEADS MAY BE CONFIGURED AS WHOLE OR HALF LEADS.

Figure 20. 16-Lead Plastic Dual In-Line Package [PDIP]
Narrow Body
(N-16)

Dimensions shown in inches and (millimeters)



COMPLIANT TO JEDEC STANDARDS MS-012-AC
CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS (IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.

Figure 21. 16-Lead Standard Small Outline Package [SOIC_N]
Narrow Body
(R-16)

Dimensions shown in millimeters and (inches)

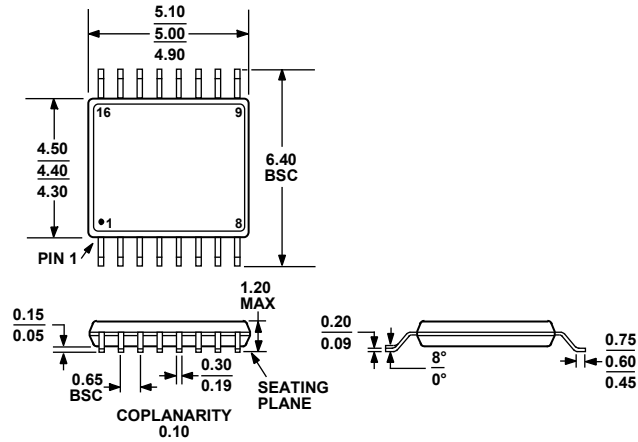


Figure 22. 16-Lead Thin Shrink Small Outline Package [TSSOP]
(RU-16)
Dimensions shown in millimeters

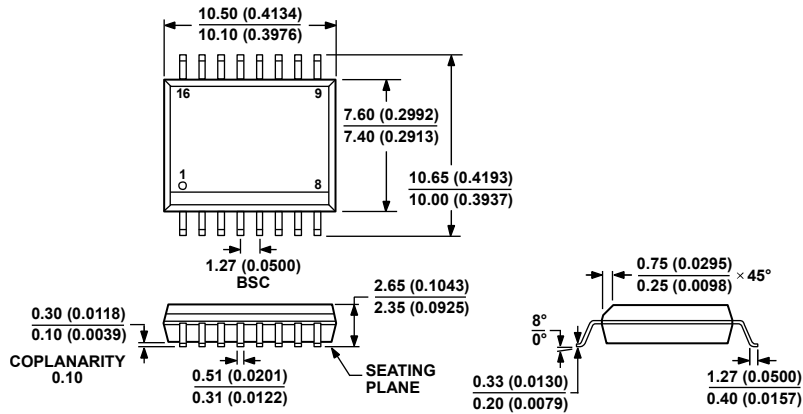
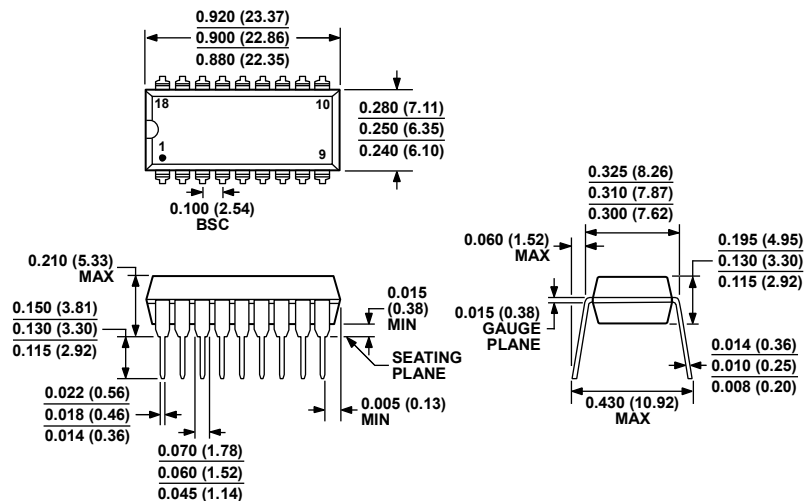


Figure 23. 16-Lead Standard Small Outline Package [SOIC_W]
Wide Body
(RW-16)
Dimensions shown in millimeters and (inches)

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COMPLIANT TO JEDEC STANDARDS MS-001

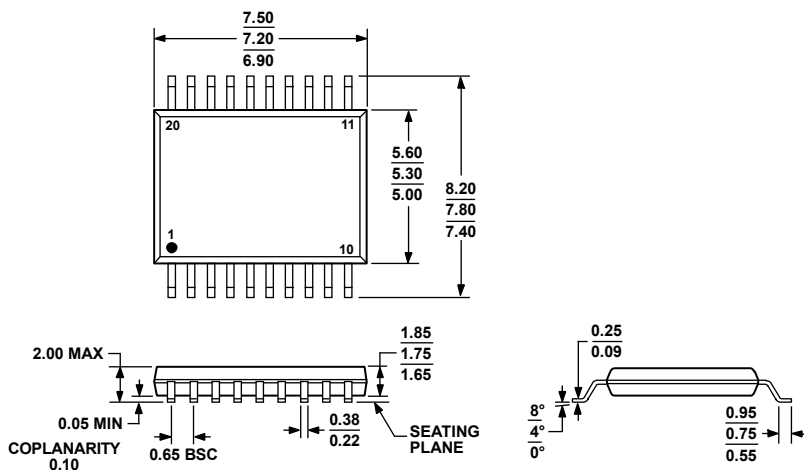
CONTROLLING DIMENSIONS ARE IN INCHES; MILLIMETER DIMENSIONS (IN PARENTHESES) ARE ROUNDED-OFF INCH EQUIVALENTS FOR REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN. CORNER LEADS MAY BE CONFIGURED AS WHOLE OR HALF LEADS.

Figure 24. 18-Lead Plastic Dual In-Line Package [PDIP]

Narrow Body

(N-18)

Dimensions shown in inches and (millimeters)

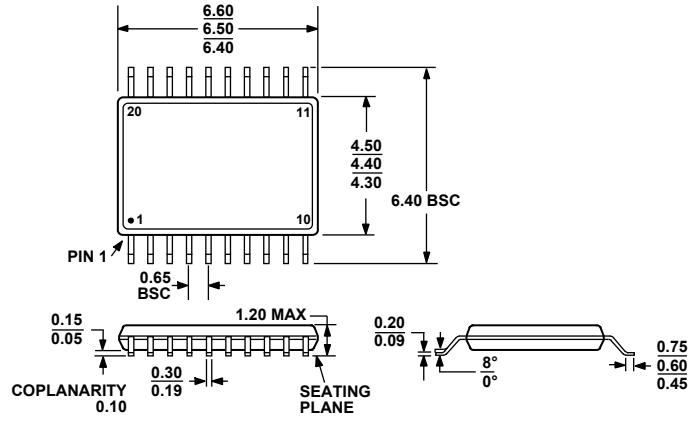


COMPLIANT TO JEDEC STANDARDS MO-150-AE

Figure 25. 20-Lead Shrink Small Outline Package [SSOP]

(RS-20)

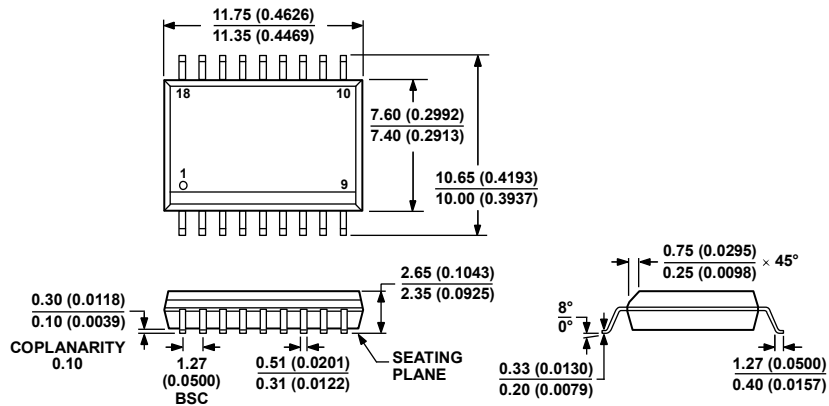
Dimensions shown in millimeters



COMPLIANT TO JEDEC STANDARDS MO-153-AC

Figure 26. 20-Lead Thin Shrink Small Outline Package [TSSOP]
(RU-20)

Dimensions shown in millimeters



COMPLIANT TO JEDEC STANDARDS MS-013-AB
CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS
(IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR
REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.

Figure 27. 18-Lead Standard Small Outline Package [SOIC_W]
Wide Body
(RW-18)

Dimensions shown in millimeters and (inches)

060706-A

ADM3202/ADM3222/ADM1385

ORDERING GUIDE

Model ¹	Temperature Range	Package Description	Package Option
ADM3202AN	–40°C to +85°C	16-Lead Plastic Dual In-Line Package [PDIP]	N-16
ADM3202ANZ	–40°C to +85°C	16-Lead Plastic Dual In-Line Package [PDIP]	N-16
ADM3202ARN	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_N]	R-16
ADM3202ARN-REEL	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_N]	R-16
ADM3202ARN-REEL7	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_N]	R-16
ADM3202ARNZ	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_N]	R-16
ADM3202ARNZ-REEL	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_N]	R-16
ADM3202ARNZ-REEL7	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_N]	R-16
ADM3202ARU	–40°C to +85°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADM3202ARU-REEL	–40°C to +85°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADM3202ARU-REEL7	–40°C to +85°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADM3202ARUZ	–40°C to +85°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADM3202ARUZ-REEL	–40°C to +85°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADM3202ARUZ-REEL7	–40°C to +85°C	16-Lead Thin Shrink Small Outline Package [TSSOP]	RU-16
ADM3202ARW	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_W]	RW-16
ADM3202ARW-REEL7	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_W]	RW-16
ADM3202ARWZ	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_W]	RW-16
ADM3202ARWZ-REEL	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_W]	RW-16
ADM3202ARWZ-REEL7	–40°C to +85°C	16-Lead Standard Small Outline Package [SOIC_W]	RW-16
ADM3222AN	–40°C to +85°C	18-Lead Plastic Dual In-Line Package [PDIP]	N-18
ADM3222ANZ	–40°C to +85°C	18-Lead Plastic Dual In-Line Package [PDIP]	N-18
ADM3222ARS	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20
ADM3222ARS-REEL	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20
ADM3222ARS-REEL7	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20
ADM3222ARSZ	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20
ADM3222ARSZ-REEL	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20
ADM3222ARSZ-REEL7	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20
ADM3222ARU	–40°C to +85°C	20-Lead Thin Shrink Small Outline Package [TSSOP]	RU-20
ADM3222ARU-REEL	–40°C to +85°C	20-Lead Thin Shrink Small Outline Package [TSSOP]	RU-20
ADM3222ARU-REEL7	–40°C to +85°C	20-Lead Thin Shrink Small Outline Package [TSSOP]	RU-20
ADM3222ARUZ	–40°C to +85°C	20-Lead Thin Shrink Small Outline Package [TSSOP]	RU-20
ADM3222ARUZ-REEL	–40°C to +85°C	20-Lead Thin Shrink Small Outline Package [TSSOP]	RU-20
ADM3222ARUZ-REEL7	–40°C to +85°C	20-Lead Thin Shrink Small Outline Package [TSSOP]	RU-20
ADM3222ARW	–40°C to +85°C	18-Lead Standard Small Outline Package [SOIC_W]	RW-18
ADM3222ARW-REEL	–40°C to +85°C	18-Lead Standard Small Outline Package [SOIC_W]	RW-18
ADM3222ARWZ	–40°C to +85°C	18-Lead Standard Small Outline Package [SOIC_W]	RW-18
ADM3222ARWZ-REEL	–40°C to +85°C	18-Lead Standard Small Outline Package [SOIC_W]	RW-18
ADM3222ARWZ-REEL7	–40°C to +85°C	18-Lead Standard Small Outline Package [SOIC_W]	RW-18
ADM1385ARS	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20
ADM1385ARSZ	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20
ADM1385ARSZ-REEL	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20
ADM1385ARSZ-REEL7	–40°C to +85°C	20-Lead Shrink Small Outline Package [SSOP]	RS-20

¹ Z = RoHS Compliant Part.

NOTES

NOTES