



DESCRIPTION

The A3232 consists of two drivers, two receivers, and a dual charge-pump circuit with $\pm 12\text{kV}$ IEC 61000-4-2 Contact Discharge ESD protection.

The A3232 meets the requirements of TIA/EIA-232-F and provides the electrical interface between an asynchronous communication controller and the serial-port connector.

The charge pump and four small external capacitors allow operation from a single 3V to 5.5V supply. The A3232 operates at data signaling rates up to 250 kbps.

The A3232 is available in SOP16 and TSSOP16 package.

ORDERING INFORMATION

Package Type	Part Number	
SOP16 SPQ: 2,500pcs/Reel	M16	A3232M16R
		A3232M16VR
TSSOP16 SPQ: 2,500pcs/Reel	TMX16	A3232TMX16R
		A3232TMX16VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

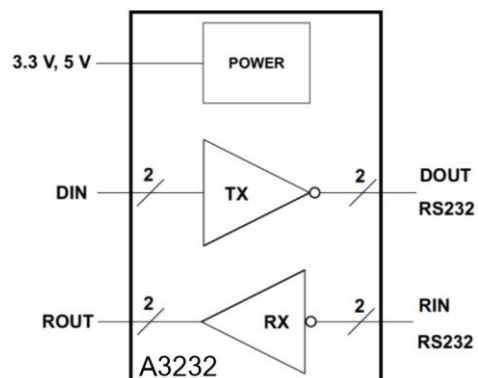
FEATURES

- RS-232 Bus-terminal ESD protection Exceeds
- $\pm 12\text{kV}$ (IEC61000-4-2, Contact Discharge)
- $\pm 15\text{kV}$ (IEC61000-4-2, Air-Gap Discharge)
- Meets the Requirements of TIA/EIA-232-F standard
- Operates with 3V to 5.5V VCC Supply
- Operates up to 250kbps
- Two Drivers and Two Receivers
- External Capacitors: $4 \times 0.1 \mu\text{F}$
- Accepts 5V Logic Input With 3.3V Supply
- Operation Temperature: $-40^\circ\text{C} \sim +125^\circ\text{C}$

APPLICATION

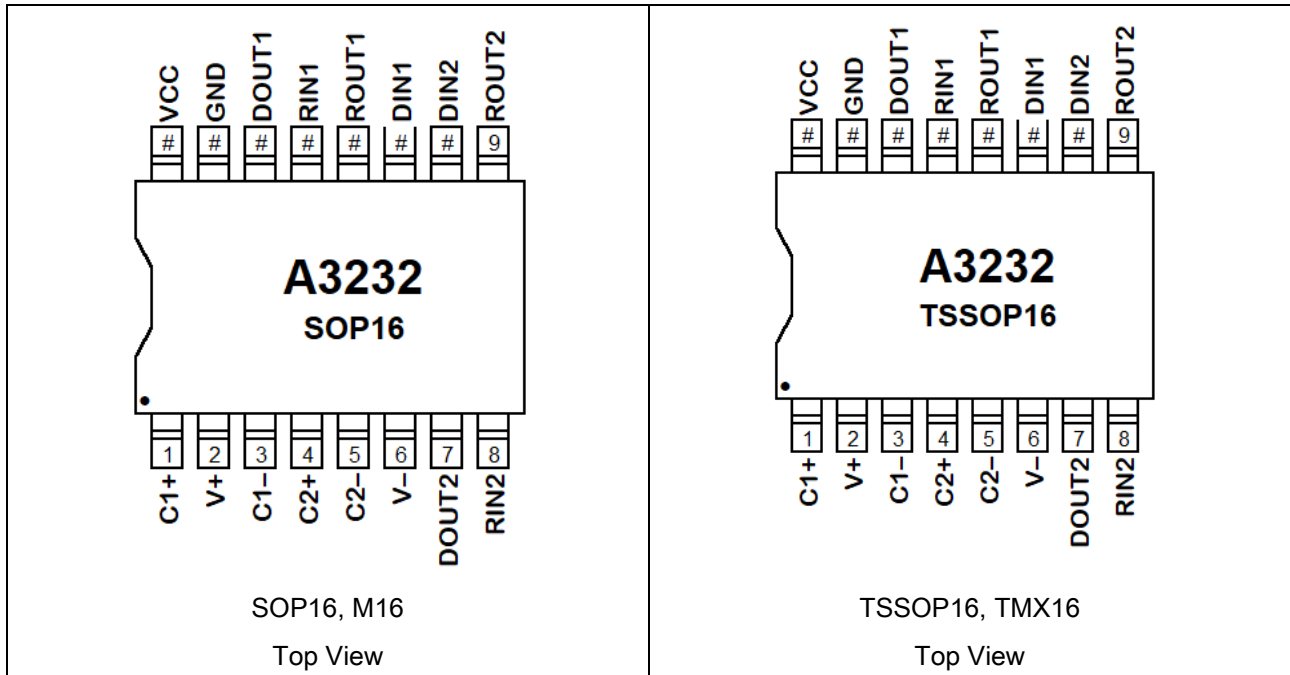
- Industrial PCs
- Wired Networking
- Data Center and Enterprise Networking
- Battery-Powered Systems
- PDAs, Hand-held Equipment
- Notebooks, Laptops, Palmtop PCs
- Printers

BLOCK DIAGRAM





PIN DESCRIPTION



Pin #	Symbol	I/O	Function
1	C1+	-	Positive lead of C1 capacitor
2	V+	O	Positive charge pump output for storage capacitor only
3	C1-	-	Negative lead of C1 capacitor
4	C2+	-	Positive lead of C2 capacitor
5	C2-	-	Negative lead of C2 capacitor
6	V-	O	Negative charge pump output for storage capacitor only
7	DOUT2	O	RS232 Driver Output
8	RIN2	I	RS232 Receiver Input
9	ROUT2	O	TTL/CMOS Receiver Output
10	DIN2	I	TTL/CMOS Driver Input
11	DIN1	I	TTL/CMOS Driver Input
12	ROUT1	O	TTL/CMOS Receiver Output
13	RIN1	I	RS232 Receiver Input
14	DOUT1	O	RS232 Driver Output
15	GND	-	Ground
16	VCC	-	Supply Voltage



ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Min.	Max.	Units
Supply voltage		V_{CC}	-0.3	6	V
Positive output supply voltage		V+	-0.3	7	V
Negative output supply voltage		V-	0.3	-7	V
Supply voltage difference		$V+ - V-$		13	V
Input voltage	Drivers	V_I	-0.3	6	V
	Receivers		-25	25	V
Output voltage	Drivers	V_O	-13.2	13.2	V
	Receivers		-0.3	$V_{CC} + 0.3$	V
Operating virtual junction temperature		T_J		150	°C
Storage temperature		T_{STG}	-65	150	°C

Stress beyond above listed "Absolute Maximum Ratings" may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

C1–C4 = 0.1µF at $V_{CC} = 3.3V \pm 0.3V$; C1 = 0.047µF, C2–C4 = 0.33µF at $V_{CC} = 5V \pm 0.5V$

Parameter		Symbol	Min.	Max.	Units	
Supply voltage	$V_{CC} = 3.3 V$		3	3.6	V	
	$V_{CC} = 5 V$		4.5	5.5		
Driver high-level input voltage	DIN	V_{IH}	$V_{CC} = 3.3 V$	2	5.5	V
			$V_{CC} = 5 V$	2.4	5.5	
Driver low-level input		DIN	V_{IL}	0	0.8	V
Receiver input voltage		RIN	V_I	-2.5	25	V
Operating free-air temperature		T_A		-40	125	°C



ELECTRICAL CHARACTERISTICS

C1–C4 = 0.1μF at V_{CC} = 3.3V±0.3V; C1 = 0.047μF, C2–C4 = 0.33μF at V_{CC} = 5V±0.5V, T_A = +25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply current	I _{CC}	No load, V _{CC} = 3.3 V or 5 V		1.5		mA
Driver						
High-level output voltage	V _{OH}	D _{OUT} at R _L = 3 kΩ to GND, DIN = GND	5	5.4		V
Low-level output voltage	V _{OL}	D _{OUT} at R _L = 3 kΩ to GND, DIN = V _{CC}	-5	-5.4		V
High-level input current	I _{IH}	V _I = V _{CC}		±0.01	±1	μA
Low-level input current	I _{IL}	V _I at GND		±0.01	±1	μA
Short-circuit output current	I _{OS}	V _{CC} = 3.6 V, V _O = 0 V		±30	±60	mA
		V _{CC} = 5.5 V, V _O = 0 V				
Output resistance	r _O	V _{CC} , V ₊ , V ₋ = 0 V, V _O = ±2 V	300	10M		Ω
Receiver						
High-level output voltage	V _{OH}	I _{OH} = -1 mA	V _{CC} -0.6	V _{CC} -0.1		V
Low-level output voltage	V _{OL}	I _{OL} = 1.6 mA			0.4	
Positive-going input threshold voltage	V _{IT+}	V _{CC} = 3.3 V		1.5	2.4	V
		V _{CC} = 5 V		2.0	2.4	
Negative-going input threshold voltage	V _{IT-}	V _{CC} = 3.3 V	0.6	1.1		V
		V _{CC} = 5 V	0.8	1.5		
Input hysteresis (V _{IT+} - V _{IT-})	V _{hys}			0.4		V
Input resistance	r _i	V _I = ±3 V to ±25 V	3	5	7	kΩ
Switching						
Maximum data rate		R _L = 3 kΩ, C _L = 1000 pF, One D _{OUT} switching	250			kbps
Driver pulse skew	tsk(p)	R _L = 3 kΩ to 7 kΩ, C _L = 150pF to 2500 pF, see Fig2.		100		ns
Driver slew rate, transition region	SR(tr)	R _L = 3 kΩ to 7 kΩ V _{CC} = 3.3 V	C _L = 150 pF to 1000 pF	6	30	V/μs
			C _L = 150 pF to 2500 pF	4	30	
Receiver propagation delay time, low-to high-level output	t _{PLH}	C _L = 150 pF see Fig 3.		150		ns
Receiver propagation delay time, high- to low-level output	t _{PHL}			150		ns
Receiver pulse skew	tsk(p)			60		ns

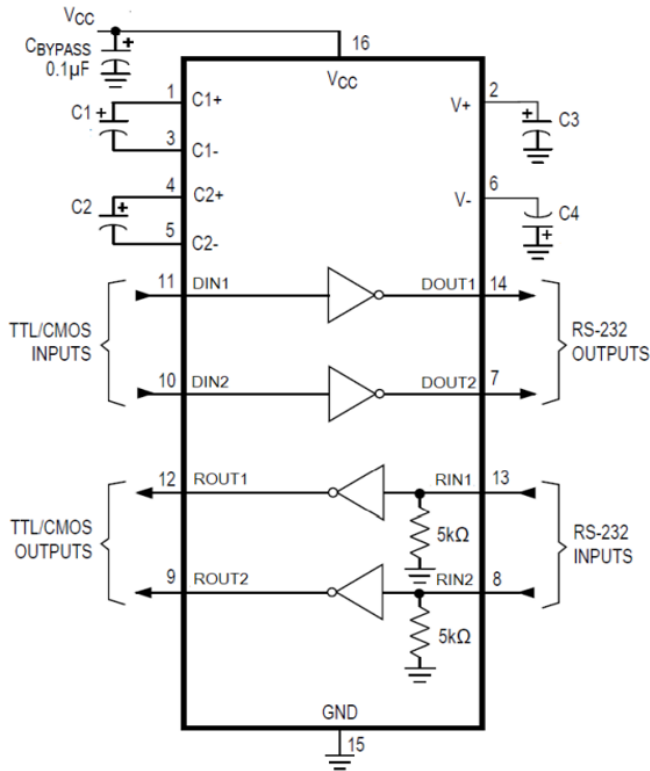
* Short-Circuits durations should be controlled to prevent exceeding the device absolute power dissipation ratings, and not more than one output should be shorted at a time

** Pulse skew is defined as |t_{PLH} - t_{PHL}| of each channel of the same device.



TYPICAL APPLICATION

Fig.1 Typical Operating Circuit



Vcc	C1	C2, C3, C4
3.3V±0.3V	0.1 μF	0.1 μF
5V±0.5V	0.047 μF	0.33 μF
3V to 5.5V	0.1 μF	0.47 μF

Non Polarized ceramic capacitors are acceptable. If polarized tantalum or electrolytic capacitors are used, then should be connected as shown.

Fig.2 Driver Pulse Skew

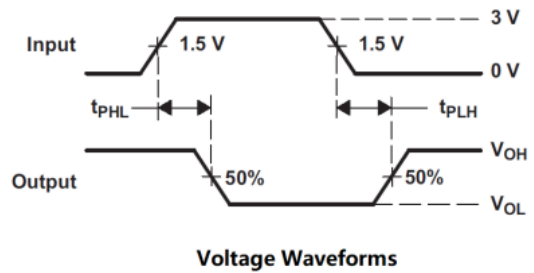
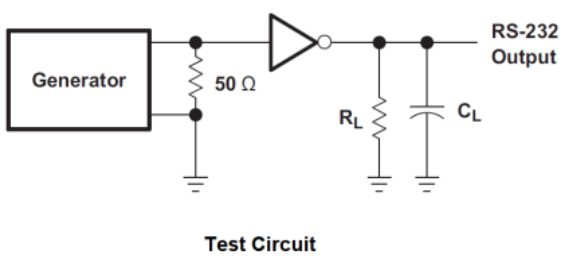
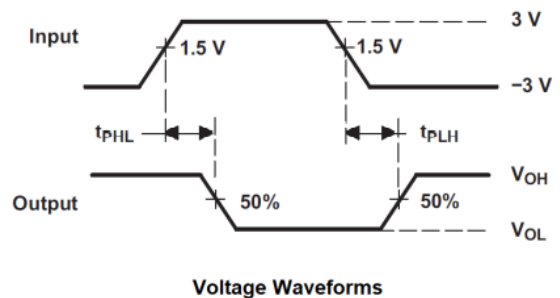
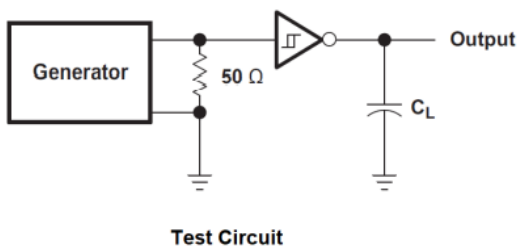


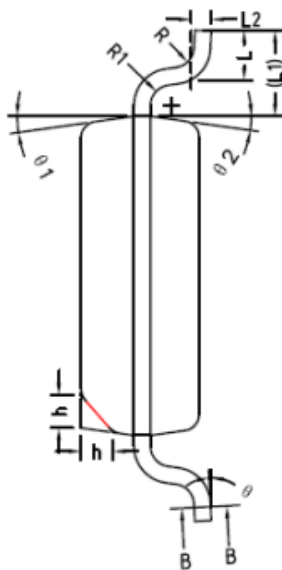
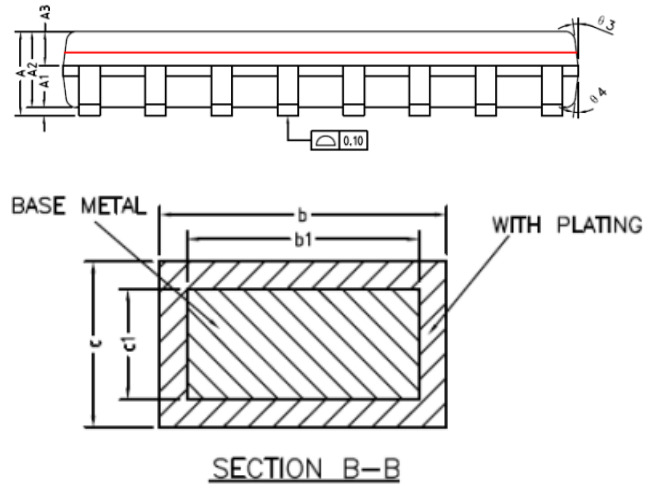
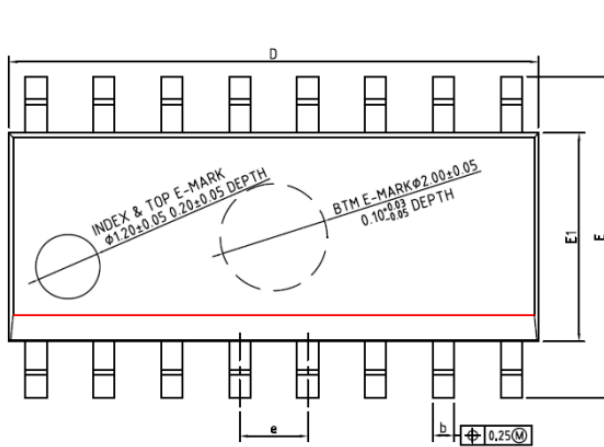
Fig.3 Receiver Propagation Delay Times





PACKAGE INFORMATION

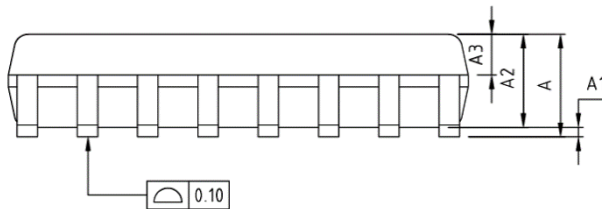
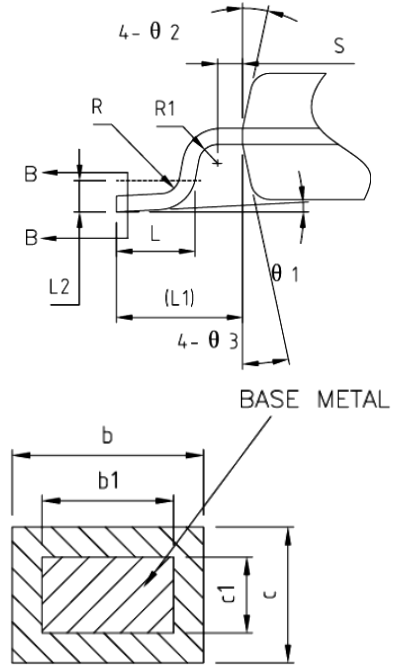
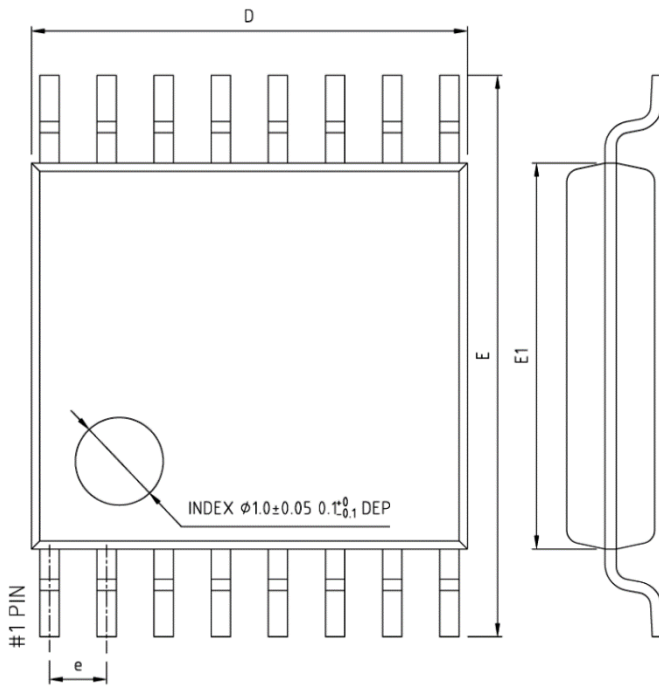
Dimension in SOP16 (Unit: mm)



Symbol	Min.	Max.
A	-	1.750
A1	0.100	0.250
A2	1.350	1.550
A3	0.550	0.750
b	0.360	0.510
b1	0.350	0.450
c	0.180	0.250
c1	0.170	0.230
D	9.800	10.00
E	5.800	6.200
E1	3.800	4.000
e	1.220	1.320
L	0.450	0.800
L1	1.040 REF	
L2	0.250 BSC	
R	0.070	-
R1	0.070	-
h	0.300	0.500
θ	0°	8°
$\theta 1$	6°	10°
$\theta 2$	6°	10°
$\theta 3$	5°	9°
$\theta 4$	5°	9°



Dimension in TSSOP16 (Unit: mm)



SECTION B-B

Symbol	Min.	Max.
A	-	1.200
A1	0.050	0.150
A2	0.900	1.050
A3	0.340	0.540
b	0.200	0.280
b1	0.200	0.240
c	0.100	0.190
c1	0.100	0.150
D	4.860	5.060
E	6.200	6.600
E1	4.300	4.500
e	0.650 BSC	
L	0.450	0.750
L1	1.000 REF	
L2	0.250 BSC	
R	0.090	-
R1	0.090	-
S	0.200	-
θ1	0°	8°
θ2	10°	14°
θ3	10°	14°



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