UMW SP3232EEN

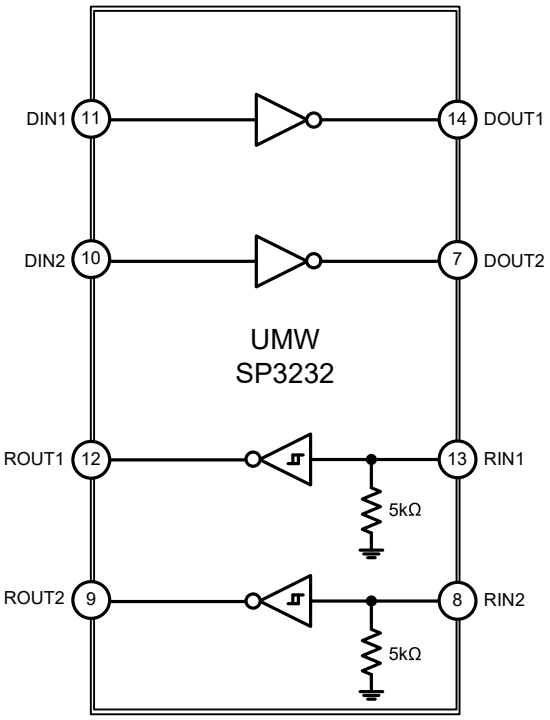
1.Description

The UMW SP3232EEN has two receivers and two drivers, and a dual charge-pump circuit. The device 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 3.0V to 5.5V supply. The device operates at data signaling rates up to 250kbit/s and a maximum of 30V/μs driver output slew rate.

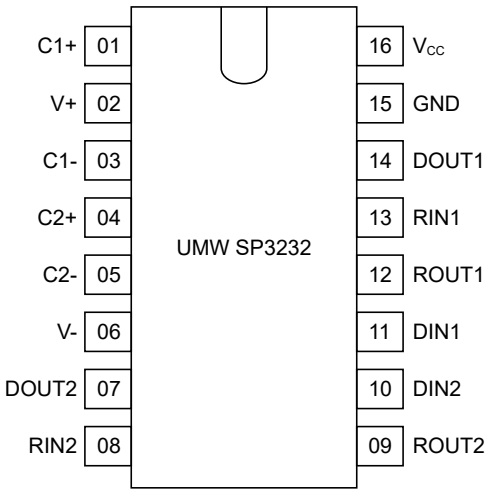
2.Features

- Exceeds ±8KV ESD Protection(HBM) for RS-232 I/O Pins
- Meets the Requirements of TIA/EIA-232-F and ITU V.28 Standards
- Operates With 3.0V to 5.5V V_{CC} Supply
- Operates Up To 250kbit/s Data Rate
- Two Drivers and Two Receivers
- External Capacitors 4×0.1μF
- Accepts 5.0V Logic Input With 3.3V Supply

3.Block Diagram



4.Pinning Information



SOP-16

Pin No	Symbol	Function
01	C1+	Positive Terminal of Voltage-Doubler Charge-Pump Capacitor
02	V+	+5.5V Generated by the Charge Pump
03	C1-	Negative Terminal of Voltage-Doubler Charge-Pump Capacitor
04	C2+	Positive Terminal ofInverting Charge-Pump Capacitor
05	C2-	Negative Terminal of Inverting Charge-Pump Capacitor
06	V-	-5.5V Generated by the Charge Pump
07	DOUT2	RS-232 Driver Outputs
08	RIN2	RS-232 Receiver inputs
09	ROUT2	TTL/CMOS Receiver Outputs
10	DIN2	TTL/CMOS Driver inputs
11	DIN1	TTL/CMOS Driver inputs
12	ROUT1	TTL/CMOS Receiver Outputs
13	RIN1	RS-232 Receiver Inputs
14	DOUT1	RS-232 Driver Outputs
15	GND	Ground
16	V_{CC}	+3.0V to +5.5V Supply Voltage

5.Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
Supply Voltage Range		V_{CC}	-0.3 ~ +6.0	V
Positive Output Supply Voltage Range (Note 2)		V+	-0.3 ~ +7.0	V
Negative Output Supply Voltage Range (Note 2)		V-	+0.3 ~ -7.0	V
Supply Voltage Difference (Note 2)		V+ - V-	+13	V
Input Voltage	Drivers	V_{IN}	-0.3 ~ +6.0	V
	Receivers		-25 ~ +25	V
Output Voltage	Drivers	V_{OUT}	-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}	-40 ~ + 85	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. All voltages are with respect to network GND.

6.Thermal Data

Parameter		Symbol	Ratings	Units
Junction to Ambient	SOP-16	θ_{JA}	105	°C/W

7.Recommended Operating Conditions (See Note & Table 1)

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Supply Voltage	V_{CC}	V_{CC}=3.3V		3	3.3	3.6	V
		V_{CC}=5V		4.5	5	5.5	V
Driver and Control High-level Input Voltage	V_{IH}	DIN	V_{CC}=3.3V	2			V
			V_{CC}=5.5V	2.4			V
Driver and Control Low-level Input Voltage	V_{IL}	DIN				0.8	V
Driver and Control input Voltage	V_{IN}	DIN				5.5	V
Receiver Input Voltage	V_{RIN}			-25		25	V
Operating Free-Air Temperature	T_A			-40		105	°C

Notes: Test conditions are C1~C4=0.1μF at V =3.3V±0.3V; C1=0.047μF, C2~C4=0.33μF at V_{CC}=5.0V±0.5V.

8.Electrical Characteristics

[(over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 3 & Table 1)]

Parameter	Symbol	Conditions	Min	Typ (Note 1)	Max	Units
Supply Current	I_{CC}	No load, V_{CC}=3.3V		1	3	mA
DRIVER SECTION						
High-Level Output Voltage	V_{OH}	DOUT at R_L=3kΩ to GND, DIN=GND	+5.0	+5.4		V
Low-Level Output Voltage	V_{OL}	DOUT at R_L=3kΩ to GND, DIN=V_{CC}	-5.0	-5.4		V
High-Level input Current	I_{OH}	V_I=V_{CC}		±0.01	±1	μA
Low-Level input Current	I_{OL}	V_I at GND		±0.01	±1	μA
Short-Circuit Output Current (Note 2)	I_{OS}	V_{CC}=3.6V, V_{OUT}=0V		±35	±60	mA
		V_{CC}=5.5V, V_{OUT}=0V		±35	±60	mA
Output Resistance	r_O	V_{CC}, V+ and V- =0V, V_{OUT}=±2.0V	300	10M		Ω
RECEIVER SECTION						
High-Level Output Voltage	V_{OH}	I_{OH}=-1.0mA	V_{CC}-0.6V	V_{CC}-0.1V		V
Low-Level Output Voltage	V_{OL}	I_{OH}=1.6mA			0.4	V
Positive-Going Iinput Threshold Voltage	V_{IT+}	V_{CC}=3.3V		1.5	2.4	V
		V_{CC}=5V		1.8	2.4	V
Negative-Going Input Threshold Voltage	V_{IT-}	V_{CC}=3.3V	0.6	1.2		V
		V_{CC}=5V	0.8	1.5		V
Input Hysteresis	V_{HYS}	V_{IT+}~V_{IT-}		0.3		V
Input Resistance	R_I	V_I=±3.0V~±25V	3	5	7	kΩ

Notes: 1. All typical values are at V_{CC}=3.3V or V_{CC}=5.0V, and T_A=25°C.

2. Short-circuit 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.

3. Test conditions are C1~C4=0.1μF at V_{CC}=3.3V±0.3V; C1=0.047μF, C2~C4=0.33μF at V_{CC}=5.0V±0.5V.

4. Pulse skew is defined as |tPLH-tPHL| of each channel of the same device.

9.Switching Characteristics

[over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 3 and Table 1)]

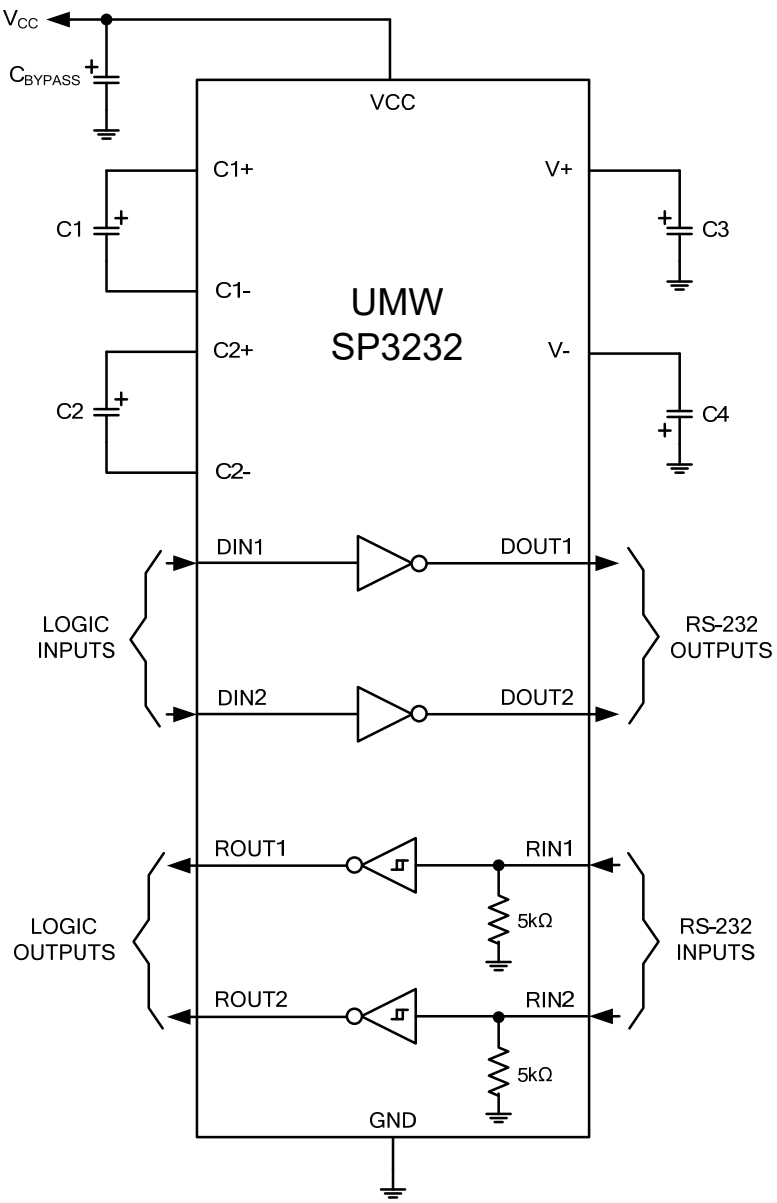
Parameter	Symbol	Conditions	Min	Typ (Note 1)	Max	Units
Maximum data rate		R_L=3kΩ, C_L=1000pF, One Driver Switching	120	235		kbps
Driver propagation delay	t_{PHL}	R_L=3kΩ, C_L=1000pF		1		μs
Driver propagation delay	t_{PLH}	R_L=3kΩ, C_L=1000pF		1		μs
Receiver propagation delay	t_{PHL}	Receiver input to receiver output, C_L=150pF		0.3		μs
Receiver propagation delay	t_{PLH}	Receiver input to receiver output, C_L=150pF		0.3		μs
Receiver output enable time				200		ns
Receiver output disable time		$\|t_{PHL}-t_{PLH}\|$, T_{AMB}=25°C		200		ns
Driver skew		$\|t_{PHL}-t_{PLH}\|$		100	500	ns
Receiver skew		V_{CC}=3.3V, R_L=3kΩ, C_L=1000pF		200	1000	ns
Transition-region slew rate		T_{AMB}=25°C, measurements taken from -3.0V to 3.0V or 3.0V to -3.0V			30	V/μs

Notes: 1. All typical values are at V_{CC}=3.3V or V_{CC}=5.0V, and T_A=25°C.

2. Short-circuit 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.

3. Test conditions are C1~C4=0.1μF at V_{CC}=3.3V±0.3V; C1=0.047μF, C2~C4=0.33μF at V_{CC}=5.0V±0.5V.

4. Pulse skew is defined as |tPLH-tPHL| of each channel of the same device.



Notes: 1.C3 can be connected to V_{CC} or GND.

2.Resistor values shown are nominal.

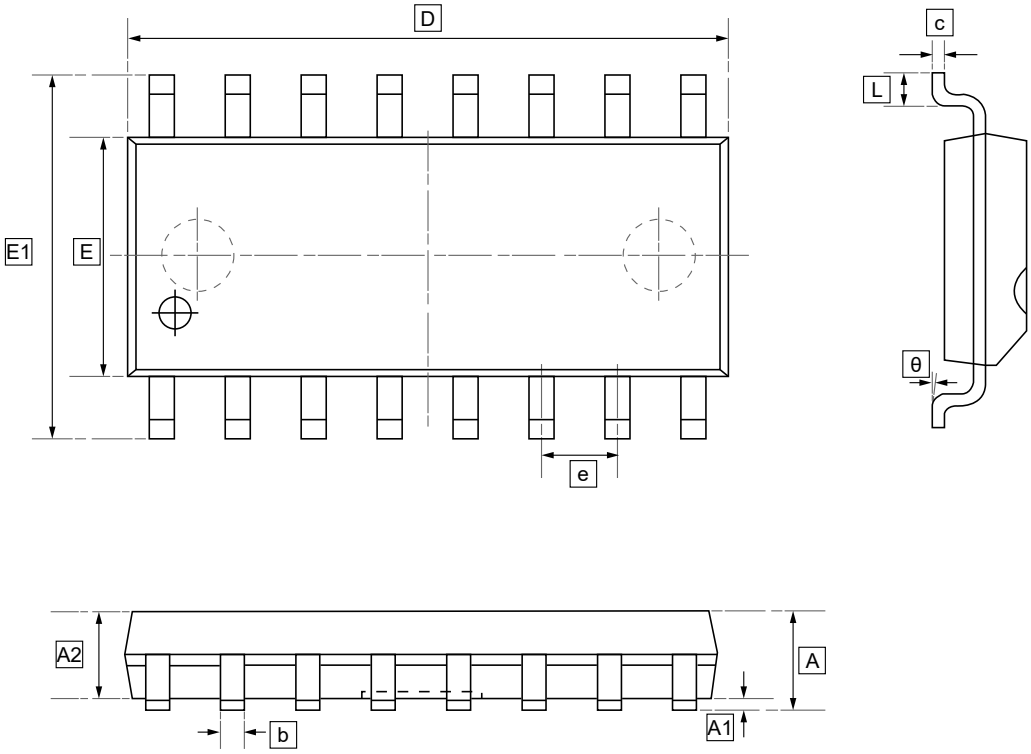
3.NC: No internal connection.

4. Nonpolarized ceramic capacitors are acceptable. If polarized tantalum or electrolytic capacitors are used. they should be connected as shown.

V_{CC}(V)	C1(μF)	C2, C3, C4 (μF)	C_{BYPASS}(μF)
3.0~3.6	0.22	0.22	0.22
3.15~3.6	0.1	0.1	0.1
4.5~5.5	0.047	0.33	0.047
3.0~5.5	0.22	1	0.22

Table1. Typical Operating Circuit and Capacitor Values

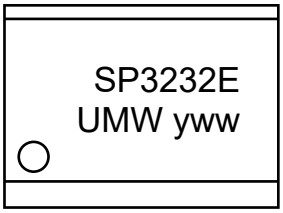
10.SOP-16 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0	1.350	0.330	0.170	9.800	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	10.200	4.000	6.200	BSC	1.270	8°

11.Ordering information



yww: Batch Code

Order Code	Package	Base QTY	Delivery Mode
UMW SP3232EEN	SOP-16	2500	Tape and reel

12.Disclaimer

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