



Preliminary

Features

- Meet EIA/TIA-232-F standards from a +3.0V to 5.5V power supply
- Guaranteed data rate 500kbps under loading
- Two transmitters and Two Receivers design for AZRS3232ESO Transceiver
- Latch-up free
- External Capacitor : 4 x 0.1 μF
- Accepts 5V Logic Input under 3.3V supply
- System Level ESD Specifications:
 $\pm 15\text{kV}$ IEC 61000-4-2 Air Discharge
 $\pm 8\text{ kV}$ IEC 61000-4-2 Contact Discharge

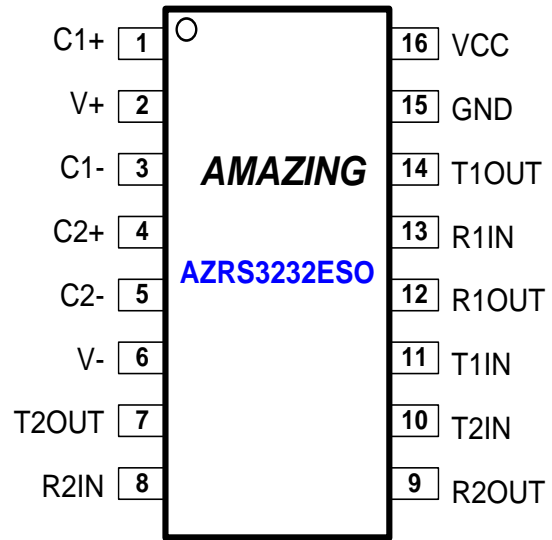
Applications

- Portable Computers
- Battery-Powered RS232 Systems
- PADs and POS terminal
- Routers and HUBs
- Peripherals and Printers
- Industrial Controlled Machine

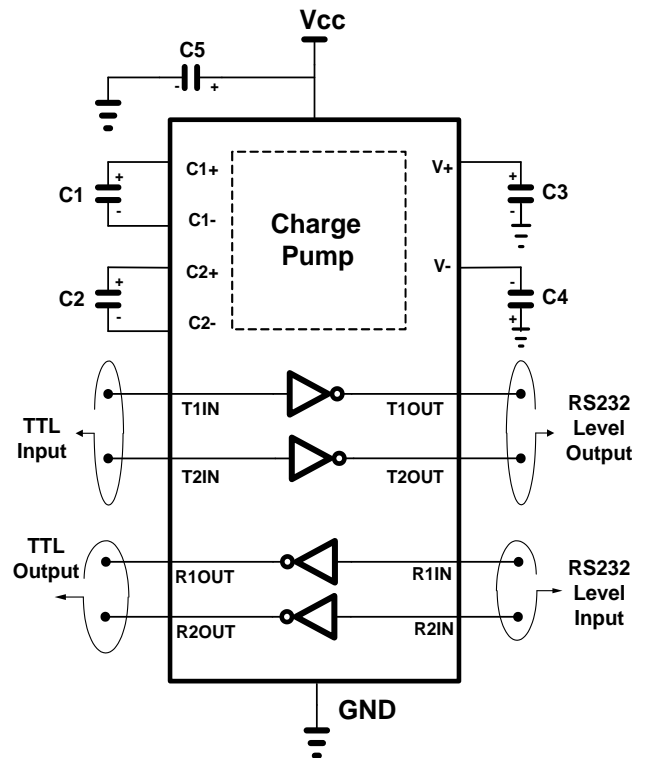
Description

AZRS3232ESO is an RS-232 transceiver that meets the EIA/TIA-232-F standards under supply power +3.0V to +5.5V. AZRS3232ESO is a 2-transmitter and 2-receiver device with a high-efficient charge pump circuit embedded. This high-efficient charge pump circuit with 0.1 μF external capacitors provides the bipolar output to the transmitters. AZRS3232ESO operates with ultra low power consumption under guaranteed data rate of 500kbps. AZRS3232ESO is ideal transceiver IC for portable application such as notebook or PDA.

AZRS3232ESO is also a high reliable device with both latch-up free and enhanced ESD protection. All the outputs of transmitters and the inputs of receivers can meet the specifications of IEC 61000-4-2 contact 8kV, and air 15kV.



Pin Configuration for AZRS3232ESO



Functional Block of AZRS3232ESO



Preliminary

SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS			
PARAMETER	PARAMETER	RATING	UNITS
Power Supply Vcc	Vcc	-0.3 to +6.0	V
Charge Pump Positive Output V+	V+	-0.3 to +7.0	V
Charge Pump Negative Output V-	V-	+0.3 to -7.0	V
V+, V- Supply voltage difference	V+ - V-	13	V
Receiver Input	RxIN	± 25	V
Transmitter Input	TxIN	-0.3 to (V _{CC} +0.3)	V
Receiver Output	RxOUT	-0.3 to (V _{CC} +0.3)	V
Transmitter Output	TxOUT	± 13.2	V
Operating Temperature	T _{OP}	-40 to +85	°C
Storage Temperature	T _{STO}	-65 to +150	°C

ELECTRICAL CHARACTERISTICS

Unless otherwise noted, the following specifications apply for Vcc=+3.0V to +5.5V with T_{AMB}=T_{MIN} to T_{MAX}, C1 to C4=0.1 μ F. Typical values apply at Vcc=+3.3V and T_{AMB}=25°C.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
DC CHARACTERISTIC					
Supply Current	No Load		0.3	1	mA
LOGIC INPUTS					
Negative-going input threshold voltage	Vcc=3.3V	0.8	1.2		V
	Vcc=5.0V (TxIN)	0.8	1.5		
Positive-going input threshold voltage	Vcc=3.3V		1.5	2.0	V
	Vcc=5.0V (TxIN)		1.8	2.4	
Input Hysteresis			0.3		
Input Leakage Current	TxIN		± 0.01	± 1	μ A
TRANSMITTER OUTPUTS					
Output Voltage Swing	3k Ω load to ground at all transmitter outputs, T _{AMB} =+25°C	± 5.0	± 5.4		V
Output Resistance	V _{CC} =V+=V-=0V, T _{OUT} =+2V	300	10M		Ω
Output Short-Circuit Current	V _{CC} =3.3V or 5.0V, V _{OUT} =0V		± 35	± 60	mA



Preliminary

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Leakage Current	$V_{OUT}=\pm 12V$, $V_{CC}=4.5V$ to $5.5V$ or $3.0V$ to $3.6V$, $V_{CC}=0V$.		±0.1	±25	μA
RECEIVER INPUTS and OUTPUTS					
Input Voltage Range		-25		25	V
Positive-going input threshold voltage	$V_{CC} = 3.3V$		1.5	2.4	
	$V_{CC} = 5.0V$		1.8	2.4	
Negative-going input threshold voltage	$V_{CC} = 3.3V$	0.6	1.2		V
	$V_{CC} = 5.0V$	0.8	1.5		
Input Hysteresis			0.3		
High-level output voltage	$I_{OH} = -1mA$	V_{CC} -0.6	$V_{CC} -$ 0.1		V
Low-level output voltage	$I_{OL}=1.6mA$			0.4	V
Input Resistance		3	5	7	kΩ
TIMING CHARACTERISTICS					
TRANSMITTER					
Maximum Data Rate	$R_L=3K\Omega$, $C_L=1000pF$, one transmitter switching		500		Kbps
Transmitter Skew	$ t_{PHL} - t_{PLH} $, $R_L=3\sim 7K\Omega$, $C_L=150pF\sim 2500pF$		300		ns
Transition-Region Slew Rate	$R_L=3\sim 7K\Omega$, $C_L=150pF\sim 2500pF$, One Transmitter Switching, transition from -3.0V to +3.0V or +3.0V to -3.0V	4		30	V / μs
Receiver					
Receiver Propagation Delay	t_{RPHL} , RxIN to RxOUT, $C_L=150pF$		300		ns
	t_{RPLH} , RxIN to RxOUT, $C_L=150pF$		300		
Receiver Skew	$ t_{RPHL} - t_{RPLH} $		300		ns



Preliminary

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
ESD Protection					
Pin Name (Pin Number)	Test Condition				
RxIN(8,13) TxOUT(7,14)	IEC61000-4-2 Contact		8		kV
	IEC61000-4-2 Air		15		kV

PIN FUNCTION DESCRIPTION

Pin Number	Mnemonic	Description
1	C1+	Positive terminal of the first switch capacitor
2	V+	Positive voltage of charge pump output
3	C1-	Negative terminal of the first switch capacitor
4	C2+	Positive terminal of the second switch capacitor
5	C2-	Negative terminal of the second switch capacitor
6	V-	Negative voltage of charge pump output
7	T2OUT	Second transmitter output
8	R2IN	Second Receiver input
9	R2OUT	Second Receiver output
10	T2IN	Second Transmitter input
11	T1IN	First Transmitter input
12	R1OUT	First receiver output
13	R1IN	First receiver input
14	T1OUT	First transmitter output
15	GND	Ground of the device
16	VCC	+3.0V to 5.5V Supply voltage



Detail DESCRIPTION

AZRS3232ESO is a RS-232 transceiver that meets the EIA/TIA-232 and V.28/V.24 communication protocols. AZRS3232ESO is a 2-transmitter /2-receiver device with a high-efficient charge pump circuit embedded. The design of high efficient charge pump circuit is Amazing's property that can generate RS-232 voltage levels from +3.0V to +5.5V power supply. This high-efficient charge pump circuit with $0.1\mu\text{F}$ capacitors provides the bipolar output to transmitters, and makes the transmitters deliver the RS-232 output voltage levels. The design of transmitter is also the property of Amazing. Under normal operation and with fully loaded, AZRS3232ESO can operate for guaranteed data rate of 500kbps with ultra low power consumption. Therefore, AZRS3232ESO is ideal for portable application such as notebook or PDA.

AZRS3232ESO is also a high reliable device with both latch-up free and high ESD immunity. The high robust ESD devices embedded in AZRS3232ESO are also the properties of Amazing. All the outputs of transmitter and the inputs of receiver meet the specification of IEC 61000-4-2 Air 15kV and Contact 8kV.

Bipolar Charge Pump Circuit

High efficient charge pump circuit in AZRS3232ESO is a four-capacitance structure with input of the single power supply. Bipolar voltage output of AZRS3232ESO can be pumped to above $\pm 5.0\text{V}$ under the +3.0V to +5.5V supply power range. Because a negative feedback regulator is embedded, the output voltage is fixed at a small range in supply power voltage. Moreover, the charge pump can operate under 2-phase or 4-phase mode by loading condition. When AZRS3232ESO is powered on, the bipolar output will be pumped to the steady output with low ripple voltage.

Transmitter

The design of the transmitter is an inverted translator that converts TTL/CMOS-logic voltage level to EIA/TIA-232 voltage level. The

transmitters of AZRS3232ESO guarantee a 500kbps data rate under the loading of $3\text{k}\Omega$ resistance in parallel with 1000pF capacitance. The slew-rate controller in the transmitter can limit the transition of output voltage below $30\text{V}/\mu\text{s}$ to meet the RS-232 standard. When the transmitters are active, the input signals of transmitters will be transported to the outputs of transmitters in inverting level. The transmitters will not be damaged when their output nodes are short to GND. When the supply voltage is shorted to ground(0V) , the transmitters are disabled and the outputs of transmitters stay at high impedance state, which permits the output of transmitters to be forced to $\pm 12\text{V}$ with maximum leakage current of $0.1\mu\text{A}$. The inputs of transmitters do not have any pull-up resistors for input leakage consideration. Therefore, the status of unused inputs of transmitters should be defined.

Receiver

The design of the receiver of AZRS3232ESO is an inverted translator that converts EIA/TIA-232 voltage level input to TTL/CMOS-logic voltage level output. The input resistance of receiver is about $5\text{k}\Omega$ to meet the standard of RS232. The receiver guarantees a 500kbps data rate under the loading of a 150pF .

Application Information

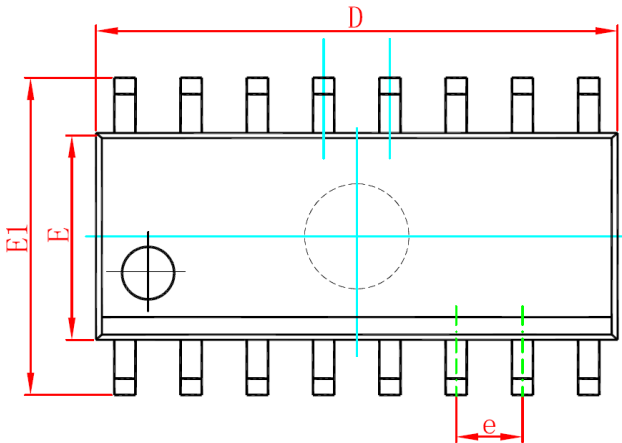
To generate the high efficient bipolar charge pump, the four capacitors (C1 ~ C4) must be placed as closer to RS232 transceiver as possible. The trace of the PCB layout is suggested to be shorter than 1cm from the pinout of the charge pump to the dedicated capacitor. Moreover, the capacitor of power supply (C5) should be placed as closed as the transceiver as possible.



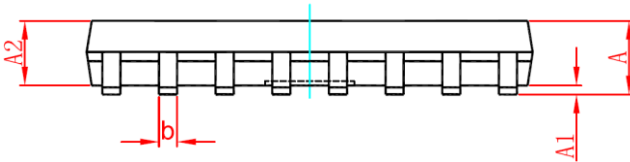
Preliminary

Mechanical Details

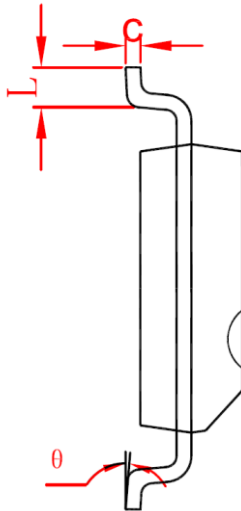
SOP-16(150)
PACKAGE DIAGRAMS
TOP VIEW



SIDE VIEW



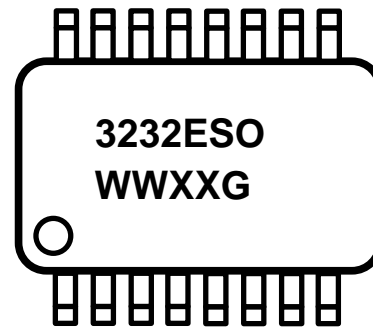
END VIEW1



PACKAGE DIMENSIONS

Symbol	Dimensions In Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	—	1.75	—	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.55	0.049	0.061
b	0.31	0.51	0.012	0.020
c	0.10	0.26	0.004	0.010
D	9.70	10.20	0.382	0.402
E	3.70	4.10	0.146	0.161
E1	5.80	6.20	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.40	1.27	0.016	0.050
θ	0	8	0	8

Marking Code



3232ESO = Device Code

WW = Date Code ; Control Code = XX

G = Green Part Indication

Part Number	Marking Code
AZRS3232ESO	3232ESO
(Green part)	WWXXG



Preliminary

Ordering Information

PN#	Material	Package	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZRS3232ESO.RDG	Green	SOP-16L(150)	T/R	13 inch	2,500/reel	1 reel =2,500/box	5 box = 12,500/carton

Revision History

Revision	Modification Description
Revision 2016/06/24	Preliminary Release