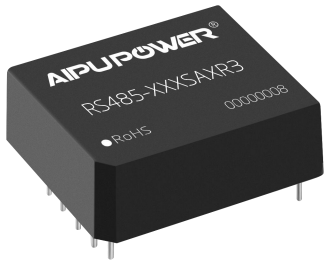
Isolated Transceiver Module
RS485-XXXSAXR3 Series

Typical Features

- ◆ Baud rate up to 500Kbps
- ◆ Integrated isolated power supply converter
- ◆ ESD Bus protection
- ◆ Isolated voltage 2500VDC
- ◆ Operating temperature from -40℃ to +85℃
- ◆ The bus supports 256 nodes max.



Application

RS485-XXXSAXR3 series of products are RS485 transceiver modules with integrated isolated power supply(built-in), the signal lines isolation, RS485 interface and bus protector. It can be an alternative to simplify the normal isolated RS485 circuit which includes a power supply module and a RS485 transceiver, its compact size is convenient for the application with RS485 function achieved in the consumer facility.

Product List

Certificate	Part No.	Input Voltage (VDC)		Output Voltage (VDC)		Baud rate (Kbps)	Nodes	Isolated output volt. terminal
		Nominal	Range	Nominal	Range			
-	RS485-3V3LSAR3	3.3	3.15-3.45	-	-	115.2	128	No
-	RS485-3V3LSAVR3			5	4.9-5.3	115.2	128	Yes
-	RS485-05LSAR3	5	4.75-5.25	-	-	115.2	256	No
-	RS485-05LSAVR3			5	4.9-5.3	115.2	256	Yes
-	RS485-3V3HSAR3	3.3	3.15-3.45	-	-	500	128	No
-	RS485-3V3HSAVR3			5	4.9-5.3	500	128	Yes
-	RS485-05HSAR3	5	4.75-5.25	-	-	500	256	No
-	RS485-05HSAVR3			5	4.9-5.3	500	256	Yes

Note 1: The part number letter V indicates the part with isolated voltage output terminal which should only work for the external pull-up & pull-down resistors, others are not recommended.

Note 2: Unless otherwise specified, all parameter values have been tested at the nominal input voltage, pure resistive rated load, and at room temperature 25°C.

Input Specifications

Item	Test Conditions		Min.	Typ.	Max.	Unit
Input inrush voltage (1sec.max)	3.3V input		-0.7	-	5	VDC
	5V input		-0.7	-	7	VDC
Input current	Static current	Power on, no communication	-	-	35	mA
	Sending current	Max rate, square wave communication	-	-	80	mA
TXD Logic level	High level	V_{IH}	$0.7V_{CC}$	V_{CC}	$1.1V_{CC}$	VDC
	Low level	V_{IL}	0	-	0.8	VDC

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RXD Logic level	High level		V_{OH}	V_{CC}-0.4	V_{CC}-0.2	-	VDC
	Low level		V_{OL}	0	0.2	0.4	VDC
TXD drive current			I_{TXD}	2	-	-	mA
RXD output current			I_{RXD}	-	-	10	mA
CON control current			I_{CON}	-	-	10	mA
Signal input	Series Interface		3.3V input	Compatible with +3.3V UART interface only			
			5V input	Compatible with +5V UART interface only			

Bus Interface

Item	Test Conditions	Min.	Typ.	Max.	Unit
Differential level	$V_{diff(d)}$, with no load	3	-	-	VDC
Differential input impedance	-7V≤V_{CM}≤+12V	96	-	-	KΩ
Output	RS485 Bus interface	Standard RS485 interface, 5.1KΩ pull-up & pull-down resistors built-in A & B Channels			
Bus interface protection		ESD protection			

Transmission Specifications

Item	Test Conditions		Min.	Typ.	Max.	Unit
Transmission rate	RS485-XXLSAXR3 Series		-	-	115.2	Kbps
	RS485-XXHSAXR3 Series		-	-	500	Kbps
Switching delay			-	-	100	uS
Number of nodes	256 nodes Max					
Transceiver control	Reversed comparing with the common RS485 transceiver control voltage level					
Data delay	TXD Send delay	T_T	-	180	-	nS
	RXD Receive delay	T_R	-	120	-	nS

Truth Table Characteristics

Transceiver Status	Control	Input	Output		
Sending status	CON	TXD	A	B	Line state
	0	1	1	0	Normal
	0	0	0	1	Normal
Receiving status	CON	V_A-V_B	RXD		
	1	≥+200mV	1		
	1	≤-200mV	0		
	1	-200mV<V_A-V_B<+200mV	Uncertain state		

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General Characteristics

Item	Test Conditions	Value
Isolation voltage	I/P-O/P, Test 60S, leakage current <1mA	≥2500VDC
Insulation resistance	@500VDC	≥1000MΩ
Operating temperature		-40℃ to +85℃
Shortage temperature		-55℃ to +105℃
Relative Humidity		10% - 90%
Case temperature rise	Ta=25°C	≤25°(Typ.)
Pin soldering temperature	1.5mm from the case, soldering time 10S	≤300°C
Safety standard		IEC/EN62368
Safety Class		CLASS III
Application Environment		Dust, hard vibration, strong impact/shock and corrosive gas may damage the product
Case material		Plastic case with flame class UL94-V0
Unit weight		4.3g (Typ.)
Cooling method		Nature air
Packing	Tube size (220mm×22mm×15mm)	12PCS/Tube
	Carton size (242mm×110mm×155mm)	288PCS (total 24 tubes)
Unit dimensions	20.02×17.02×7.00 mm	0.788×0.670×0.276 inch

EMC Performances

Items			Test Standard	Performance/Class
EMC	EMI	CE	CISPR32/EN55032	CLASS A (with the recommended circuit 2- ②)
		RE	CISPR32/EN55032	CLASS A (with the recommended circuit 2- ②)
	EMS	ESD	IEC/EN61000-4-2	Contact ±4KV Perf.Criteria B
		EFT	IEC/EN61000-4-4	Power port ±2KV, Perf.Criteria B (with the recommended circuit 2- ①)
				Signal port ±1KV, Perf.Criteria B (with the recommended circuit 2- ③)
		Surge	IEC/EN61000-4-5	Power port ±1KV(L - L) (with the recommended circuit 2- ①)
				Signal port ±0.25KV(L - L) / ±0.5KV(L - G) (with the recommended circuit 2- ③)
				Signal port ±0.5KV(L - L) / ±1KV(L - G) (with the recommended circuit 2- ③)
				Signal port ±1KV(L - L) / ±2KV(L - G) (with the recommended circuit 2- ③)
				Signal port ±2KV(L - L) / ±4KV(L - G) (with the recommended circuit 2- ③)
				Signal port ±4KV(L - L) / ±6KV(L - G) (with the recommended circuit 2- ③)

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Recommended Circuits for the Application

1.Typical application

This RS485 isolated transceiver module integrates 5.1KΩ pull-up & pull-down resistors built-in A & B Channels, the typical circuit diagram shown below. RS485-05XSAXR3 input voltage should be 5V, 3.3V is not available, RS485-3V3XSAXR3 input voltage should be 3.3V, 5V is not available.

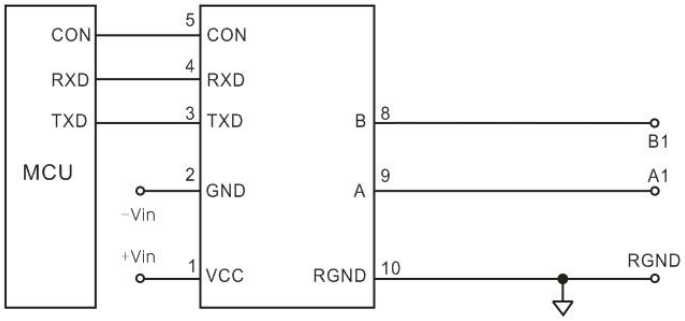

Figure – Circuit 1

2. Recommended EMC circuit diagram

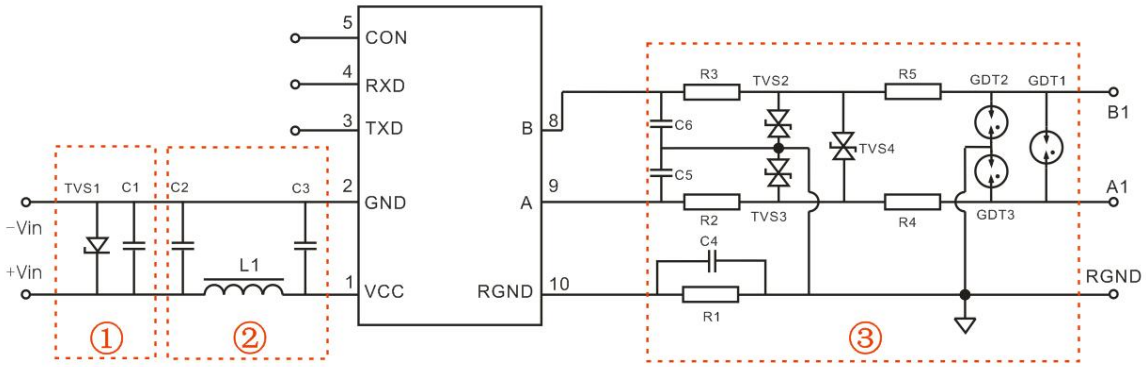

Figure – Circuit 2

Component No.	RS485-3V3XSAXR3		RS485-05XSAXR3		
C1	220uF/10V (Electrolytic capacitor)				
TVS1	SMCJ5.0A		SMCJ6.5A		
C2, C3	1uF/50V				
L1	10uH				
C5, C6	100pF/100V				
C4	1nF/2KW				
R1	1MΩ				
TVS2, TVS3, TVS4	SMBJ15CA				
R4, R5	-		Wire-wound resistor 10Ω/2W		
R2, R3	Wire-wound resistor 10Ω/1W	Wire-wound resistor 10Ω/2W	-		
GDT1, GDT2, GDT3	-		G30-A90X	S30-A90X	S50-A90X
Note 1: GDT1/GDT2/GDT3 can be replaced by one Three-terminal gas discharge tube, for example B3D090L-C. Note 2: "-" means no component is used.					

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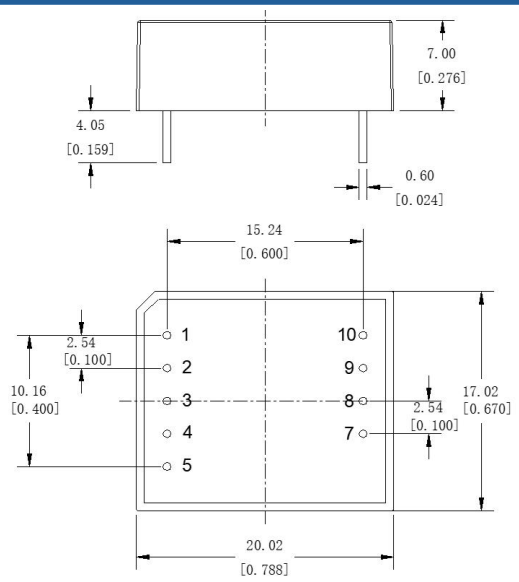
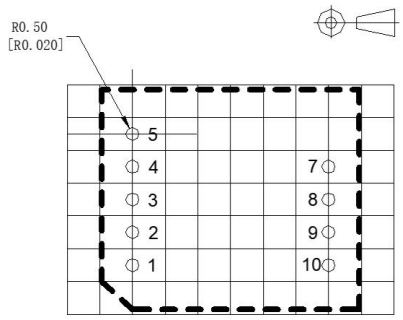
Mechanical Dimensions





PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

Unit: mm[inch]
Pin diameter tolerance: ±0.10[±0.004]
General tolerance: ±0.25[±0.010]

Pin-out Function Description

	RS485-XXXSAR3 series	RS485-XXXSAVR3 series	
Pin No.	Function mark	Function mark	Function description
1	+Vin	+Vin	Positive input voltage
2	-Vin	-Vin	Negative input voltage
3	TXD	TXD	Sending terminal
4	RXD	RXD	Receiving terminal
5	CON	CON	Control terminal
6	-	-	-
7	-	+Vo	Positive isolated output voltage
8	B	B	RS485 B terminal
9	A	A	RS485 A terminal
10	RGND	RGND	Isolated output GND

Note: "-" means No Pin.

Application Notice

1. The product should be used as the specifications, hot plugging is not available, otherwise it could be permanently damaged.
2. RS485-05XSAXR3 is not available for 3.3V, RS485-3V3XSAXR3 is not available for 5V.
3. The product performance on this datasheet cannot be guaranteed if it works under the over-load condition.
4. Unless otherwise specified, all values or indicators on this datasheet are tested at Ta=25℃, humidity<75%RH, nominal input voltage and rated load (pure resistance load).
5. All values or indicators on this datasheet had been tested based on Aipupower test specifications.
6. The specifications are specially for the parts listed on this datasheet, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.
7. Aipupower can provide customization service.

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