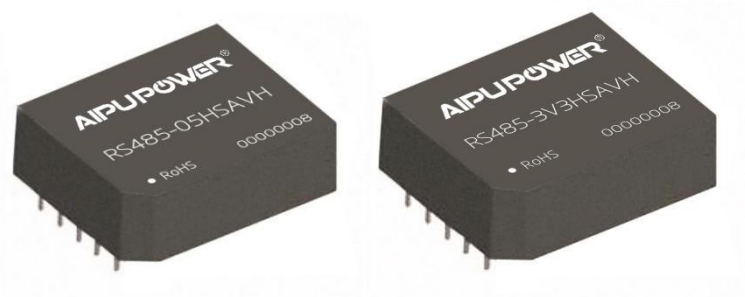
Typical Features

- ◆ Baud rate up to 500Kbps
- ◆ Integrated isolated power supply
- ◆ Bus protection
- ◆ Isolated voltage 3000VDC
- ◆ Operating temperature from -40℃ to +85℃
- ◆ The bus supports 256 nodes max.



Application

RS485-3V3HSAVH & RS485-05HSAVH 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 Range (VDC)	Output Voltage Range (VDC)
-	RS485-3V3HSAVH	3.15~3.45V	4.7~5.3V
-	RS485-05HSAVH	4.75~5.25V	4.7~5.3V

Input Specifications

Item		Conditions		Value
Power input	Static current	Power on, no communication	RS485-3V3HSAVH	≤40mA
			RS485-05HSAVH	≤50mA
	Sending current	500Kbps square wave communication	RS485-3V3HSAVH	≤50mA
			RS485-05HSAVH	≤60mA
Signal input	Series interface	RS485-3V3HSAVH		Compatible with +3.3V UART interface
		RS485-05HSAVH		Compatible with +5V UART interface
CON voltage level		Transmission is enabled at a high level		≥2.7V
		Reception is enabled at a low level		≤1.8V
CON switching delay		Transmission is enabled at a high level		≤200ns
		Reception is enabled at a low level		≤1us
TXD drive current		Normal communication		≥2mA
RXD output current		Normal communication		≤10mA

Bus Interface

Item	Conditions	Value
Output	RS485 Bus interface	Standard RS485 interface, 100KΩ pull-up & pull-down resistors built-in A & B bus (available to be adjusted according to the requirement)

A/B differential voltage	Output high level [1]	≥-20mV
	Output low level [0]	≤-200mV
	Uncertain state (abnormal)	>-200mV & <-20mV

Transmission Specifications

Transmission rate	500Kbps Max				
Number of nodes	256 nodes Max				
Transceiver control	Same as the common RS485 transceiver control voltage level				
Sending status	Control	Input	Output		
	CON	TXD	A	B	Line state
	1	1	1	0	Normal
	1	0	0	1	Normal
Receiving status	Control	Input	Output		
	CON	V_A-V_B	RXD level		
	0	≥-20mV	1		
	0	≤-200mV	0		

General Characteristics

Item	Test Conditions	Value
Electric isolation		Two-port isolation (Isolated between input & output)
Isolation voltage	Dielectric test 1 Min, leakage current ≤0.5mA, humidity ≤95%	3000VDC
Operating temperature		-40℃ to +85℃
Shortage temperature		-55℃ to +105℃
Relative humidity		10% - 90%
Case temperature rise		25°(Typ.)
Safety standard		IEC/EN62368
Safety class		CLASS III
Application environment		Dust, hard vibration, strong impact/shock and corrosive gas may damage the product

EMC Performances

Items			Test Standard	Performance/Class
EMC	EMI	CE	CISPR32/EN55032	CLASS A (with the recommended circuit 2-①)
		RE	CISPR32/EN55032	CLASS A (with the recommended circuit 2-①)
	EMS	ESD	IEC/EN61000-4-2	Contact ±4KV Perf. Criteria B
		EFT	IEC/EN61000-4-4	±2KV, Perf. Criteria B (between A & B, with the recommended circuit 2-②)
		Surge	IEC/EN61000-4-5	Line to line ±2KV, line to ground ±4KV Perf. Criteria B (between A & B, with the recommended circuit 2-②)

Recommended Circuits for the Application

1.Typical application

This RS485 transceiver module integrates 100KΩ pull-up & pull-down resistors, R6 & R7 are external pull-up & pull-down resistors which values should be selected based on the actual circuit conditions. The typical circuit diagram shown below. RS485-05HSAVH input voltage should be 5V, 3.3V is not available, RS485-3V3HSAVH input voltage should be 3.3V, 5V is not available.

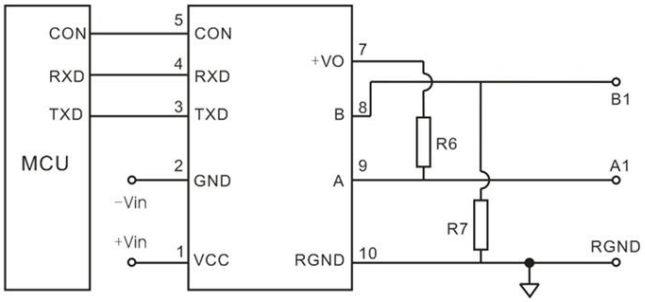


Figure - Circuit 1

2. Recommended EMC circuit diagram

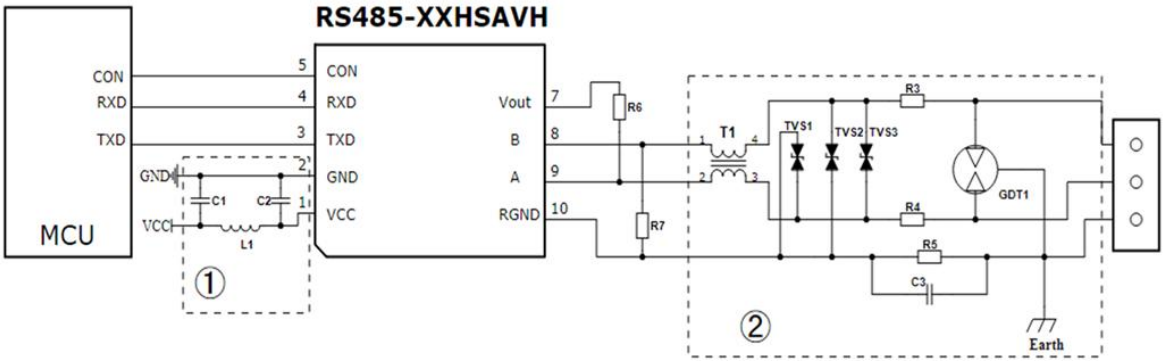
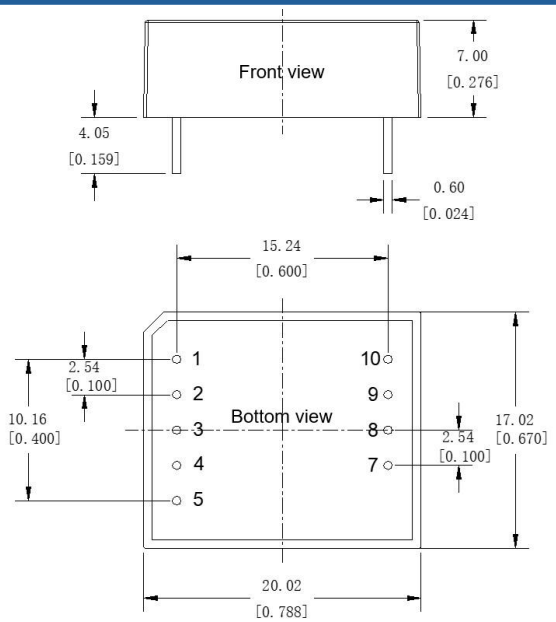


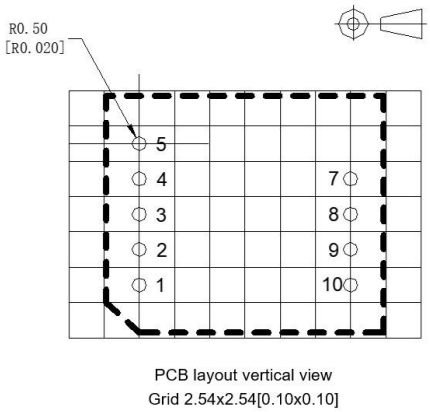
Figure - Circuit 2

Component No.	RS485-XXHSAVH
C1, C2	1uF/25V
L1	CD43/10uH
T1	ACM2520-301-2P
TVS1, TVS2	SMBJ6.5CA
TVS3	SMBJ12CA
R3, R4	Wire-wound resistor 2.7Ω/2W
R5	1MΩ
C3	1nF/2KV
R6, R7	TBD according to actual requirement
GDT1	3RL090M-5-S

Note: The product has built-in 100kΩ pull-up and pull-down resistors and ESD protection devices on internal A and B, so additional ESD protection device will be unnecessary in favorable environments. Refer to the circuit shown in Figure 1 which is available for typical application. However, in harsh application environments (such as high-voltage power systems, lightning areas, etc.), it is recommended to implement additional protective measures at A and B terminals. These may include TVS diodes, common-mode chokes, surge arresters, shielded twisted-pair cables, or single-point grounding to the same network. As shown in the recommended circuit in Figure 2, the provided parameter values are for reference only. The specific components and parameters in the circuit should be determined based on actual conditions.

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 No.	Function description	
1	+Vin	Positive input voltage
2	-Vin	Negative input voltage
3	TXD	Sending terminal
4	RXD	Receiving terminal
5	CON	Sending & receiving control terminal
7	+Vo	Positive output voltage
8	B	RS485H B terminal
9	A	RS485H A terminal
10	RGND	Isolated output GND

Application Notice

1. The product should be used as the specifications, hot-plug is not available, otherwise it could be permanently damaged.
2. RS485-05HSAVH is not available for 3.3V input, RS485-3V3HSAVH is not available for 5V input.
3. Pin 7 is only for the external pull-up resistor, leave it floating if unused. The built-in power supply is for internal use only, not for any external load.
4. According to the RS485 transmission standard, when the differential voltage between A & B falls within the range of -200 mV to -20 mV during communication, the receiver enters an indeterminate state. The RS485 network should be designed to avoid the communication failure. The user may decide whether to add a 120 Ω resistor between A & B based on the actual conditions (Adding this resistor helps to smooth the communication signal but also results in a slight decrease of A/B differential voltage) .
5. The product performance cannot be guaranteed if it works under over-load conditions.
6. 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).
7. All values or indicators on this datasheet have been tested based on Aipupower test specifications.
8. Aipupower can provide customization service.

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