

# Troubleshooting Power in Automotive Electronics Applications

## R&S® Scope Rider – the portable automotive oscilloscope

### Challenge

Troubleshooting automotive applications brings a wide range of challenges. Testing electric drives requires floating measurements at voltages up to 700 VDC or higher. Debugging communications between different modules requires triggering on and decoding of serial protocols such as CAN/LIN, CAN-FD and SENT. And tests are often performed in a mobile setting where battery operation is important.

### Solution

The R&S® Scope Rider is the only portable, battery-operated handheld oscilloscope that offers up to 500 MHz bandwidth, isolated channels with 1000 V (RMS) maximum isolation rating and laboratory-class performance. Trigger & decode functionality for popular automotive protocols, advanced analysis functionality such as harmonic and spectrum analysis as well as a high-resolution frequency counter make it an excellent choice for troubleshooting automotive designs.

Your benefit	Features
High bandwidth and superior performance	<ul style="list-style-type: none"> <li>■ 60 MHz to 500 MHz bandwidth with channel isolation for up to 1000 V (RMS)</li> <li>■ Excellent sensitivity: 2 mV/div to 100 V/div</li> <li>■ 10-bit A/D converter</li> <li>■ Advanced triggering capabilities</li> <li>■ 33 automatic measurement functions</li> </ul>
Serial trigger & decode for automotive and general purpose protocols	<ul style="list-style-type: none"> <li>■ I<sup>2</sup>C/SPI, UART, CAN/LIN, CAN-FD, SENT support</li> <li>■ Symbolic labels</li> <li>■ Dedicated decode table for easier analysis</li> </ul>
Advanced analysis functions	<ul style="list-style-type: none"> <li>■ Spectrum analyzer</li> <li>■ Harmonic analyzer</li> <li>■ Frequency counter</li> <li>■ Logic analyzer</li> <li>■ Data logger</li> </ul>



### 500 MHz bandwidth with 1000 V (RMS) channel isolation

Isolated Inputs for up to 1000 V (RMS) floating voltage measurements eliminates the need for differential high-voltage probes.

### Mixed signal capability with 8 digital inputs

The R&S®RTH-B1 mixed signal option allows digital control signals to be captured while analyzing analog input signals.

### Automotive protocol support

CAN, CAN-FD, LIN and SENT serial protocol trigger & decode with label support for debugging automotive buses.

### Easy protocol analysis with protocol decode table

#	Frame Start	Type	bit	ID [hex]	DLC	Values 8 bit [hex]	CRC [hex]	State
1	500 ms	Data	11	064	3	D0 E7 20	35CE	Ok
2	498 ms	Data	29	01A54321	5	07 24 4E 7C CC	5AA0	Ok
3	496 ms	Remote	11	1E5	2		2C0E	Ok
4	495 ms	Data	11	1E5	2	2B B4	45DB	Ok
5	493 ms	Data	29	0630A0CD	4	18 46 51 B1	7324	Ok
6	491 ms	Remote	29	03B1C002	4		4E15	Ok
7	489 ms	Data	11	DA2	4	70 61 C3 CB	0599	CRC, Frm Error
8	488 ms	Error						Error Frame
9	487 ms	Data	29	01234ABC	8	B5 C1 46 AE A7 29 1E 7F	62B6	Ok
10	484 ms	Ovid						Ovid Frame

Protocol table for easier troubleshooting of communications errors.

## Ordering information

Popular options/accessories	
<b>Bundles</b>	
<b>Power electronics bundle</b> - History/segmented memory - Advanced triggering - Harmonics analysis	<b>R&amp;S®RTH-PAKWR</b> - R&S®RTH-K15 - R&S®RTH-K19 - R&S®RTH-K34
<b>Automotive bundle</b> - CAN/LIN serial trigger & decode - CAN-FD serial trigger & decode - SENT serial trigger & decode	<b>R&amp;S®RTH-PAKAUTO</b> - R&S®RTH-K3 - R&S®RTH-K9 - R&S®RTH-K10
<b>Hardware options</b>	
Mixed signal, 250 MHz, 8 digital channels	R&S®RTH-B1
<b>Software options</b>	
I²C/SPI serial trigger & decode	R&S®RTH-K1
UART/RS-232/422/485 serial trigger & decode	R&S®RTH-K2
CAN/LIN serial trigger & decode	R&S®RTH-K3
CAN-FD serial trigger & decode	R&S®RTH-K9
SENT serial trigger & decode	R&S®RTH-K10
History/segmented memory	R&S®RTH-K15
Advanced triggering	R&S®RTH-K19
Harmonics analysis	R&S®RTH-K34
Wireless LAN	R&S®RTH-K200 R&S®RTH-K200US
Web interface remote control	R&S®RTH-K201
<b>Passive probes</b>	
500 MHz, 10:1, isolated, 300 V CAT III, compact lab probe	R&S®RT-ZI10C/-2/-4
500 MHz, 100:1, isolated, 600 V CAT IV, 1000 V CAT III (3540 V CAT 0)	R&S®RT-ZI11
<b>Current probes</b>	
20 kHz, 2000 A, AC/DC	R&S®RT-ZC02
100 kHz, 30 A, AC/DC	R&S®RT-ZC03
<b>Accessories</b>	
Accessory extension set for R&S®RT-ZI10/ R&S®RT-ZI11	R&S®RT-ZA21
Soft carrying bag	R&S®HA-Z220
Hard shell protective carrying case	R&S®RTH-Z4
Car adapter	R&S®HA-Z302
Battery charger for lithium-ion battery	R&S®HA-Z303
Replacement lithium-ion battery pack	R&S®HA-Z306