



## Compact Coverage Measurement System TS55-C3

For public GSM 900 / 1800 / 1900, GSM-R (railway), extended GSM

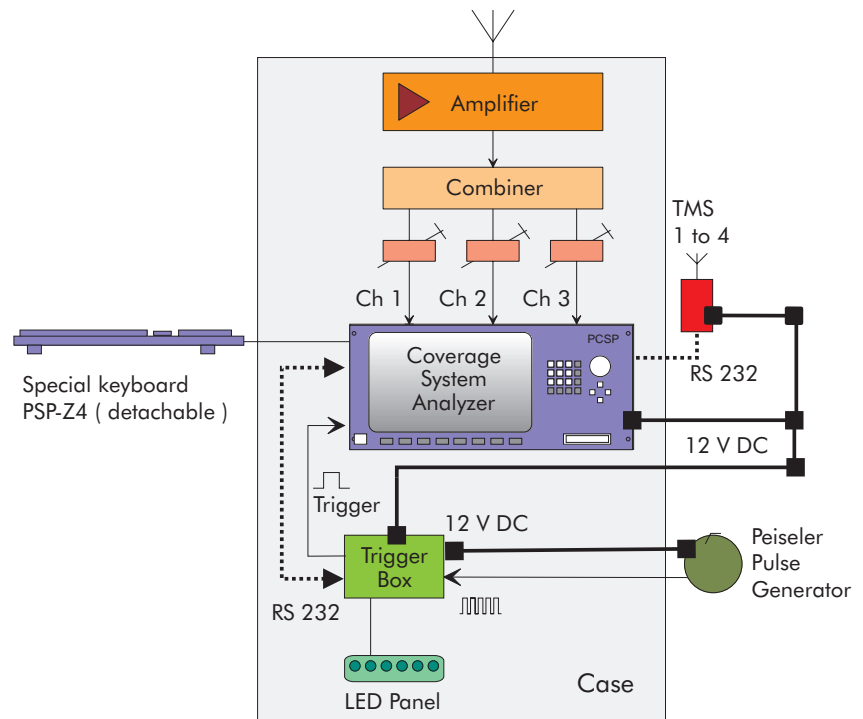
- Fast 3 ms measurements with accurate results (1 dB)
- Complete portable GSM measurement tool of compact design
- Powerful measurement software ROMES
- Extensions for navigation systems and GSM test mobiles
- 3 separate RF receiver channels for all GSM frequencies from 921 MHz to 1980 MHz
- Time- or distance-triggered measurements
- Stable case with front and rear cover for accessories
- External GPS receiver and up to 4 GSM test mobiles
- Economical solution for all GSM, field strength and signalling measurements
- Indoor and outdoor measurements
- Maximum flexibility; no fixed installation required

## General

Coverage Measurement System TS55-C3 is a highly compact solution for field-strength measurements designed for indoor and outdoor environments. The system is optimized for the mobile communication networks of GSM-R, E-GSM and public GSM (900/1800/1900).

The core function is provided by the Coverage Analyzer PCSP together with the integrated 3-channel receiver, accommodated on a single printed circuit board (TS55-RX). All hardware components such as TS55-RX, 4-COM-port interface board and trigger box are controlled by the Coverage Measurement Software ROMES.

All functions are integrated and wired in a robust aluminium transit case. This ensures reliable measurements.



Indoor coverage measurement system

## Functionality

Coverage Analyzer PCSP is the platform for the integration of the additional system components and their software control. Coverage Measurement Software ROMES is part of the system (see data sheet PD 0757.2415.22).

The receiver is equipped with three parallel RF sections for simultaneous measurements (measurement time for 1 to 3 frequencies: 3 ms). Thus three mobile communication frequencies can be measured at the same time.

The three test receivers are triggered by means of the trigger box. This unit is connected to a pulse generator either mechanically (Peiseler pulse generator) or electronically.

It is possible to run the RF measurements either time-triggered or distance-triggered. A LED panel informs about the status of the trigger box.

For indoor measurement applications the Coverage Analyzer PCSP with the trigger box and a mechanical pulse generator can be fixed on a suitable trolley. The system is powered from an external 12 V battery. When required, external monitoring of the battery's voltage and current is possible. Only one antenna is connected to the system, an internal RF splitter/amplifier ensures high isolation.

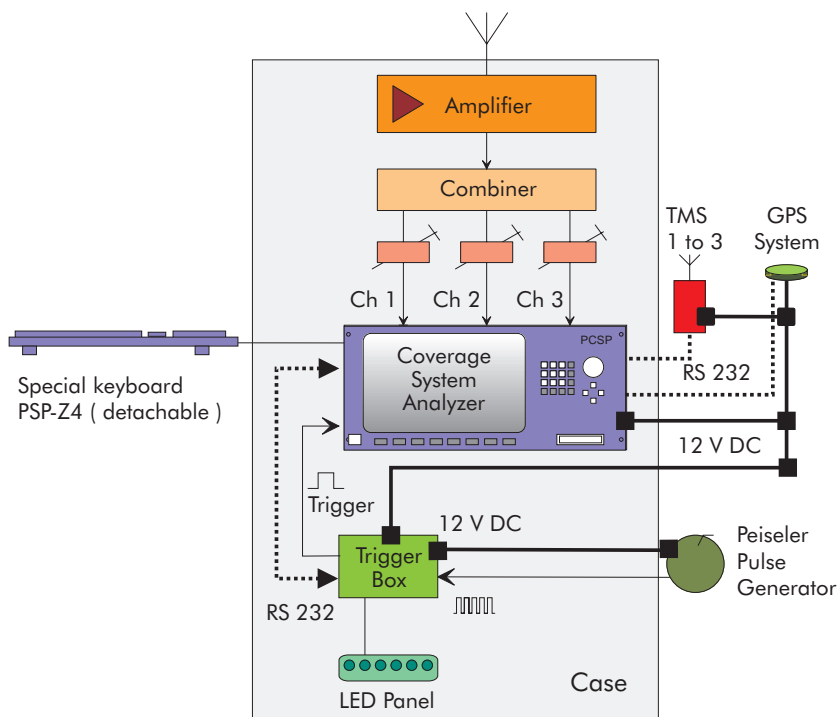
## Extension of the basic model (options)

### Localization

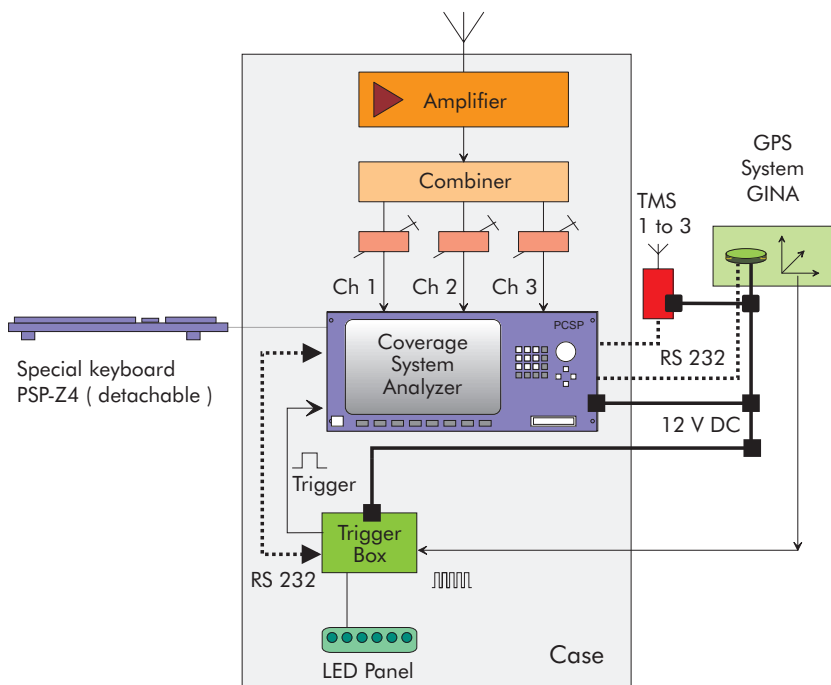
For outdoor measurements, which require additional navigation/localization information, the indoor measurement system can be extended by means of a GPS navigation system. A very compact GPS receiver (eg Garmin Mouse) is connected to the Coverage Analyzer PCSP via a RS232 serial interface. Control of the GPS receiver and read-out of positioning information is performed by the ROMES software; the NMEA protocol is supported. For users requiring a dead reckoning feature for GPS operation the Coverage Measurement System TS55-C3 can be equipped with the Rohde&Schwarz GPS Inertial Navigation System TS-GINA. This navigation system provides a 12-channel GPS receiver combined with an inertial navigation module. This configuration does not require any further connection to the vehicle (eg Peiseler pulse generator) and thus provides maximum flexibility.

### GSM signalling

For the collection of signalling data up to four (three if GPS receiver is connected) test mobiles can be connected to the system via RS232 interfaces. Control is effected by the ROMES software extension for GSM signalling (TS95K50).



Outdoor coverage measurement system with standard GPS receiver



Outdoor coverage measurement system with GPS System GINA  
(GINA = GPS + inertial navigation system)

## Mechanical design

Coverage Analyzer PCSP is extended by an additional connector panel on its left. The two parts fit into a robust 19" transit case, with removable covers at front and rear. All external components such as Peiseler pulse generator, GSM antenna, test mobiles and GPS navigation system are connected via suitable connectors. The system provides 4 serial ports (RS 232) at the front panel.

The coverage measurement system is powered from an external 12 V DC source; a cable for its connection to the cigarette lighter of a car is provided.

The GSM test mobiles (optional) are powered from their own batteries. Tracing of the air interface is via the built-in antennas. 12 V supply and external antennas for the GSM test mobiles are available as options.

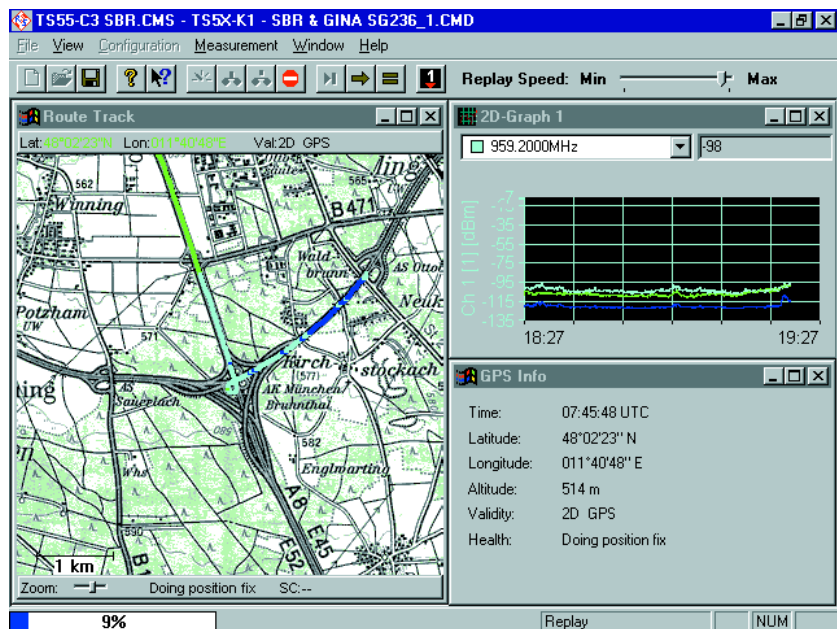


Complete system including rear and front covers for accessories, navigation system (TS-GINA), GSM test mobile

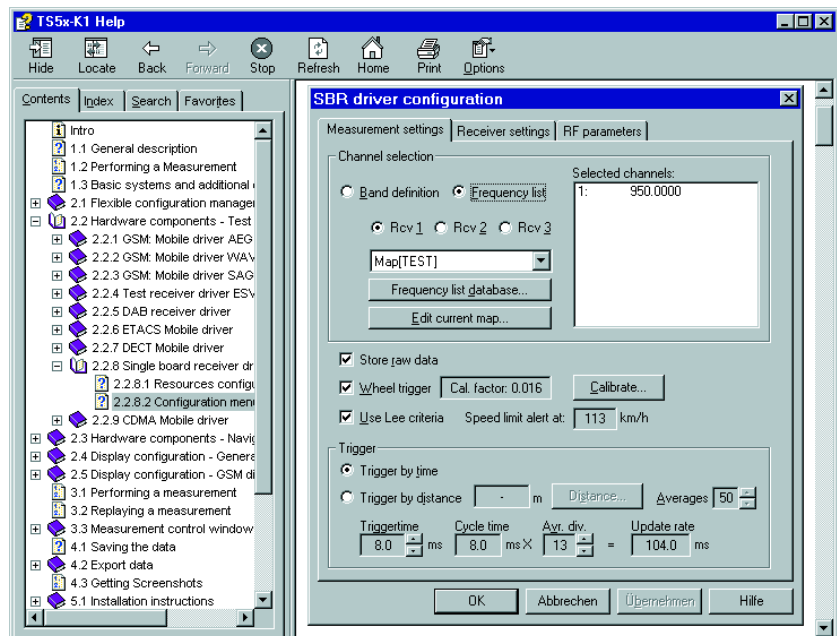
## Software

Coverage Measurement Software ROMES, a Windows application, controls all system parts such as receiver, GPS system and test mobiles and configures the entire system. The software driver for the 3-channel receiver allows the setting of three frequencies, raw data and/or average data according to Lee criteria, time- or distance-triggering. A calibration function is also included.

The software driver for the GSM test mobiles can be set for normal measurements, CAMP mode or scanning mode.



Typical online graphics for Measurement Software ROMES (here: Route Track, 2D-Graph, GPS Info); Replay mode



Measurement Software ROMES: software driver for 3-channel receiver, combined with on-line help



## Specifications

### General data

Power consumption	12 V / 4 A (without options)
Weight of PCSP	approx. 14 kg (including all options and transit case)

### RF input impedance

Impedance	50 $\Omega$ , N female connector
VSWR	< 1.5
Dimensions in mm (W x H x D)	580 x 220 x 500 (including transit case)
Coverage Analyzer PCSP	see data sheet PSP7

### 3-Channel Receiver TS55-RX

#### RF channels

The receiver consists of three separate RF channels, which operate in parallel. Each channel uses its own synthesizer for the generation of the intermediate frequency. This allows simultaneous reception of three frequencies.

#### Frequency ranges

921 MHz to 960 MHz  
1805 MHz to 1880 MHz  
1905 MHz to 1980 MHz

Each receiver can be configured independently to one of these frequency ranges.

#### Frequency selection

Frequency setting  
Measurement time

100 kHz  
3 ms for 1 to 3 frequencies

#### Selectivity

-110 dBm at S/N ratio of 2 dB  
(IF bandwidth approx. 100 kHz)

A GSM signal with an RF level of -110 dBm can be detected reliably from the noise level.

#### Dynamic range

80 dB  
(70 dB with a linearity departure of  $\pm 3$  dB)

For the measurement of higher RF input levels selectable attenuators can be switched into each channel.

### Maximum RF input level

Continuous 10 dBm  
Pulse 0.1 mWs (within 10  $\mu$ s)

### IF bandwidth

100 kHz

### Output signal

IF 10.7 MHz (-1 V to +1 V)

### Amplification

Aging < 1 dB / year  
< 5 dB / 10 years

### Temperature drift

+/- 2 dB in temperature range  
0 °C to +55 °C

### Intermodulation

70 dB  
(with -30 dB RF input level at two inputs)

### Image frequency rejection

$\geq 70$  dB

### Environment requirements

RF receiver module as fully screened PCB. It fulfils the Rohde&Schwarz in-house requirements for equipment class B according to internal specification No. 149 (IEC, MIL-STD, EN...).

## Ordering information

Coverage Measurement System TS55-C3 1113.2491.02

Basic system configuration comprising

- Coverage Analyzer PCSP
- Transit case with installation
- TS55-RX 3-channel receiver
- GPS Garmin
- Coverage Measurement Software ROMES

Certified Quality System  
**ISO 9001**  
DQS REG. NO 1954-04



# ROHDE & SCHWARZ