



TT&C SCOE (TCR TESTER)

TELEMETRY, TRACKING & CONTROL-SPECIFIC
CHECK-OUT EQUIPMENT



TERMA[®]
ALLIES IN INNOVATION

The TT&C SCOE can be ordered with additional features, for example supporting an X- or Ka-Band Downlink input to the measurement equipment only or to a high data rate modem, or with a Service Module Simulator Part (Power, Discrete TM/TC, CAN-Bus for TC and TM, etc.) for a standalone Transponder / Integrated Communication Unit Test Bench.

RF Harness

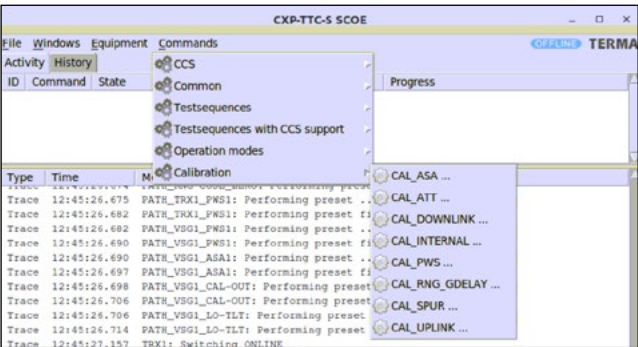
The RFTS comes with proven high-performance microwave coaxial cable assemblies, ruggedized for use outside a thermal vacuum chamber and good amplitude and phase stability vs. flexure and temperature, as well as superior shielding.

Typical Measurement Uncertainties

Measurement type	Uncertainties (2σ)
TC Operation: active interface is provided with uplink power setting, frequency sweeping, measurement of PM modulation index	No test Uplink power ±0.3dB (down to -130dBm)
TM Operation: the TM path is switched to the Modem receiver which is switched to the TM mode as configured for demodulation	No test
Frequency accuracy and stability	with Spectrum Analyzer in Counter Mode: resolution is 0.1Hz, Accuracy given by OCXO With R&S FSV3-B4 (OCXO) < ±1x10 ⁻⁷ per year < ±1x10 ⁻⁹ per day < ±5x10 ⁻⁸ initial calibration
Absolute power level/stability	Uplink down to -130dBm: <±0.3dB Downlink: <±0.2dB with PWS Stability: ±0.05dB
Power spectrum and spurious	±0.05 dB
Modulation index TC and TM	≤ 2% (referred to MI of 1.0rad), i.e. ≤0.02 rad
Uplink TC execution threshold	≤ ±0.3dB
Uplink carrier acquisition threshold and lock maintenance	≤ ±0.3dB
Receiver AGC verification	≤ ±0.3dB
ESA Ranging tone-code delay and group delay response vs. frequency (100kHz to 1.5MHz)	≤ ±3ns
Ranging Channel Amplitude Response vs. frequency and 3dB bandwidth	≤ ±0.3dB
SSB phase noise	±0.2 deg rms repeatability, accuracy given by residual noise of spectrum analyzer
Measurement of in- and out-band-spurious (unwanted emissions)	≤ 1 dB (can be calibrated over signal source frequency range, for higher frequencies a loss vs. frequency table can be stored)

Some example GUIs:

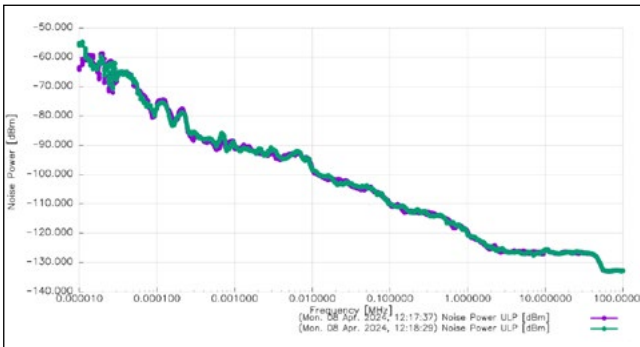
Calibration Overview



Software Components

In addition to the remote-control functionality via the CCS and GUI control, the SW package provides the "internal logic" functionality of self-test, calibration, measurement and status/measurement reports. The following illustration shows a chart of historical measurement results obtained via web access. The data can be exported in pdf, csv, and jpg format. The RF device and path state can be traced and controlled by the interactive synoptic display.

Phase noise measurement (comparison)



Terma SPECTRA TT&C SDR Modem is fully integrated into the RF SCOE.

[Learn more about Terma SPECTRA](#)

The headquarter for RF/TTC Test System Business is at Terma Technologies GmbH in Austria.





Operating in the aerospace, defense, and security sector, Terma supports customers and partners all over the world. Our dedicated and talented global workforce develops and manufactures mission-critical products and solutions that meet rigorous customer requirements.

At Terma, we believe in the premise that creating customer value is not just about strong engineering and manufacturing skills. It is also about being able to apply these skills in the context of our customers' specific needs. Only through close collaboration and dialog can we deliver a level of partnership and integration unmatched in the industry.

Our business activities, products, and systems include: command and control systems; radar systems; self-protection systems for ships and aircraft; space technology; and advanced aerostructures for the aircraft industry.

Terma has decades of hands-on know-how in supporting and maintaining mission-critical systems in some of the world's most hostile areas. Terma Support & Services offers through-life support of all our products to maximize operational availability, enhance platform lifetime, and ensure the best possible cost of ownership.

Headquartered in Aarhus, Denmark, Terma has subsidiaries and operations across Europe, in the Middle East, in Asia Pacific as well as a wholly-owned U.S. subsidiary, Terma Inc., with offices in Washington D.C., Georgia, and Texas.