



R140 1-PORT VECTOR NETWORK ANALYZER

LONG-TERM STABILITY OF REFLECTION MEASUREMENTS

ADDITIONAL ANALYSIS

(Upon customer request)

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All measurements described below were carried out using mechanical calibration kit with data-based definition of standards.

Serial number of device under test: 0050313.

Measurement steps:

11:30 Connection to RVNA software, VNA settings: RBW 100 Hz, number of points 401, system correction OFF, warm-up time 30 minutes.

12:00 Performing two 1-port calibrations consistently without pause and interruptions: *Cal 1* (T = 42.50 °C) and *Cal 2* (T = 42.50 °C), T – internal temperature of the device (temperature inside the housing).

After measurements, no standard connected at test port.

12:15 1-port calibration: *Cal 3* (T = 44.00 °C).

After measurements, no standard connected at test port.

12:30 1-port calibration: *Cal 4* (T = 46.30 °C).

After measurements, no standard connected at test port.

12:45 1-port calibration: *Cal 5* (T = 47.20 °C).

After measurements, matched load was connected to test port.

14:00 Performing two 1-port calibrations consistently: *Cal 6* (T = 48.30 °C) and *Cal 7* (T = 47.90 °C).

After measurements, matched load was connected to test port.

17:00 Performing two 1-port calibrations consistently: *Cal 8* (T = 48.50 °C) and *Cal 9* (T = 47.90 °C).

Analysis of measurement obtained:

I Effective parameters after 30 minute warming-up. Temperature 42.50 °C.

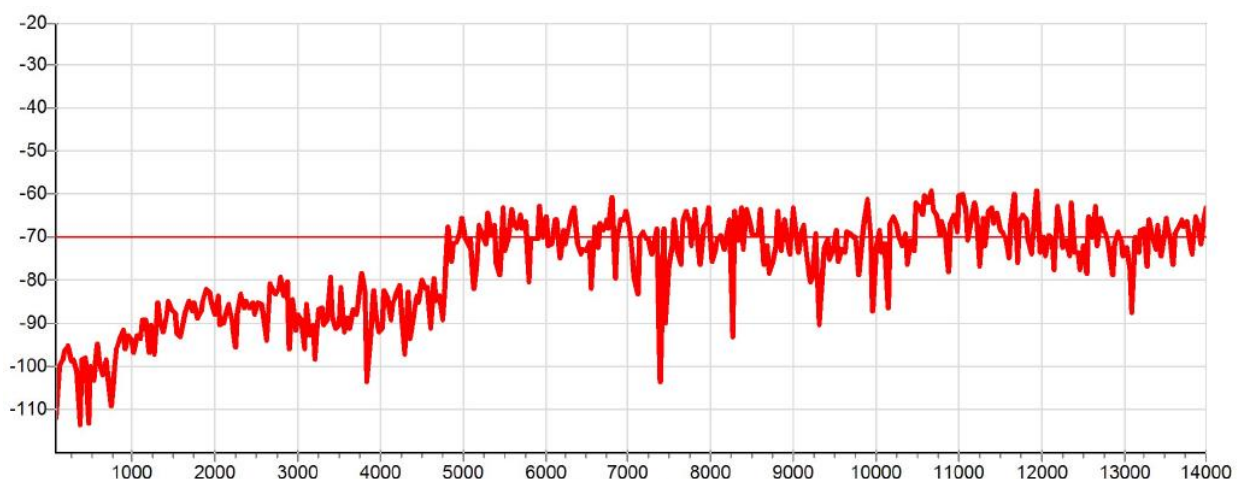


Figure 1 – Directivity (*Cal 1* and *Cal 2* comparison)

result close to 60 dB

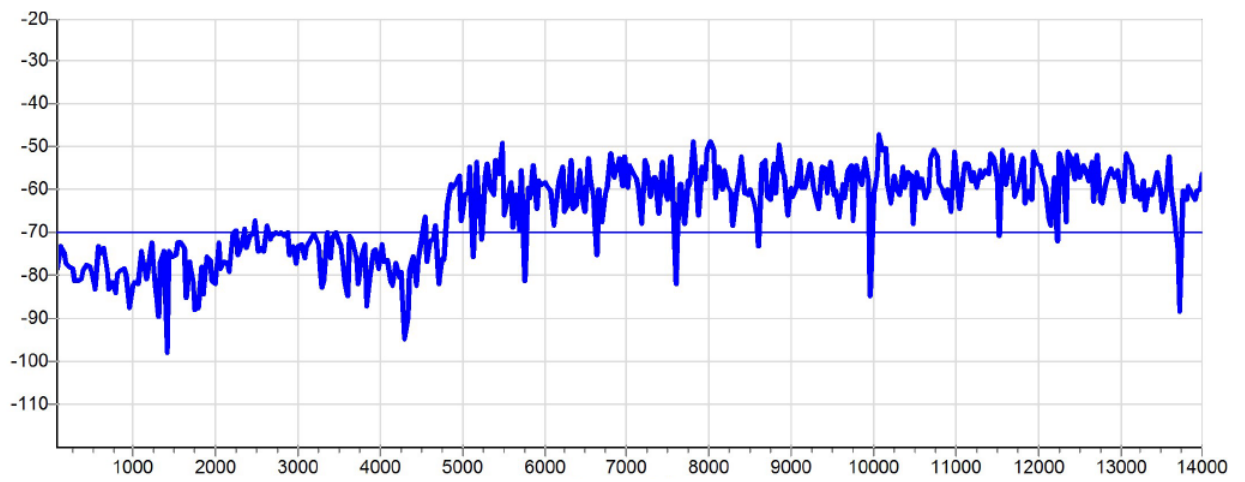


Figure 2 – Source match (*Cal 1* and *Cal 2* comparison)
 result close to 50 dB

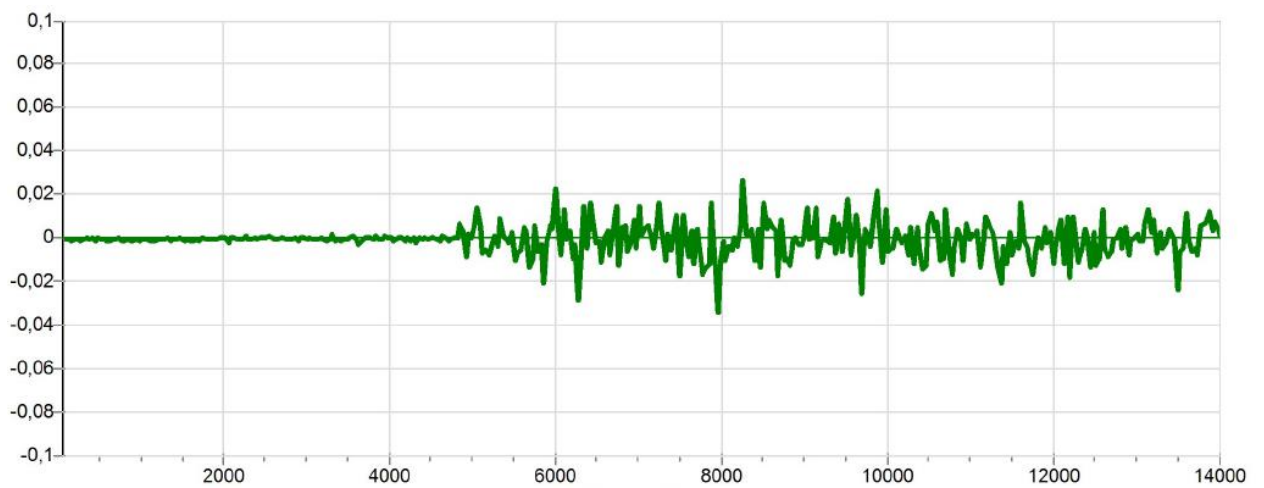


Figure 3 – Reflection tracking (*Cal 1* and *Cal 2* comparison)
 result is approximately equal ± 0.03 dB

II Effective parameters stability over time and due to changing internal temperature.

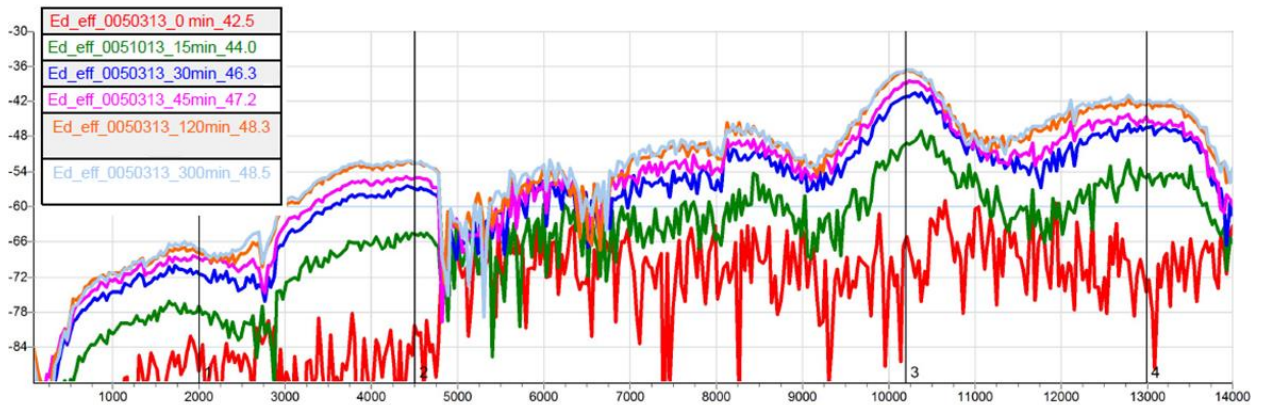


Figure 4 – Directivity (*Cal 2, 3, 4, 5, 6 and 8* comparison)
worst case 36 dB (50 dB up to 4.8 GHz)

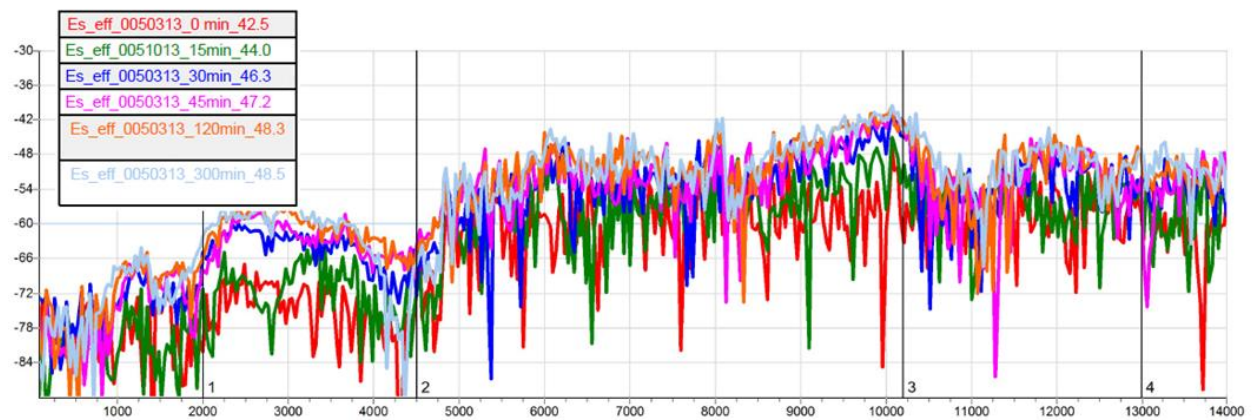


Figure 5 – Source match (*Cal 2, 3, 4, 5, 6 and 8* comparison)
worst case 40 dB (55 dB up to 4.8 GHz)

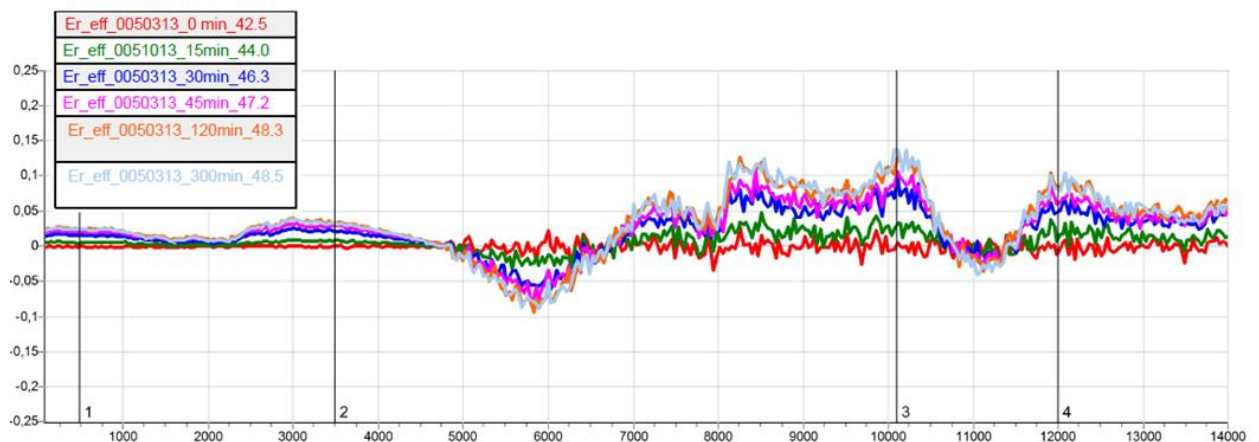


Figure 6 – Reflection tracking (*Cal 2, 3, 4, 5, 6 and 8* comparison)
worst case 0.15 dB (0.04 dB up to 4.8 GHz)

III Effective parameters stability for 3 hours. The measurements were carried out at the same internal temperature of the device that was close to 48.5 °C.

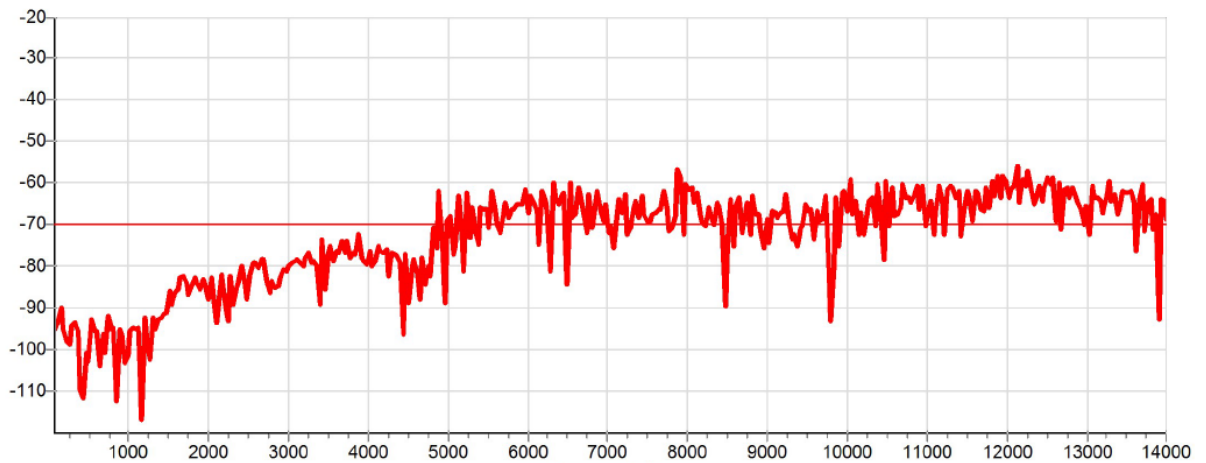


Figure 7 – Directivity (*Cal 6* and *Cal 8* comparison)
better than 55 dB over entire frequency range

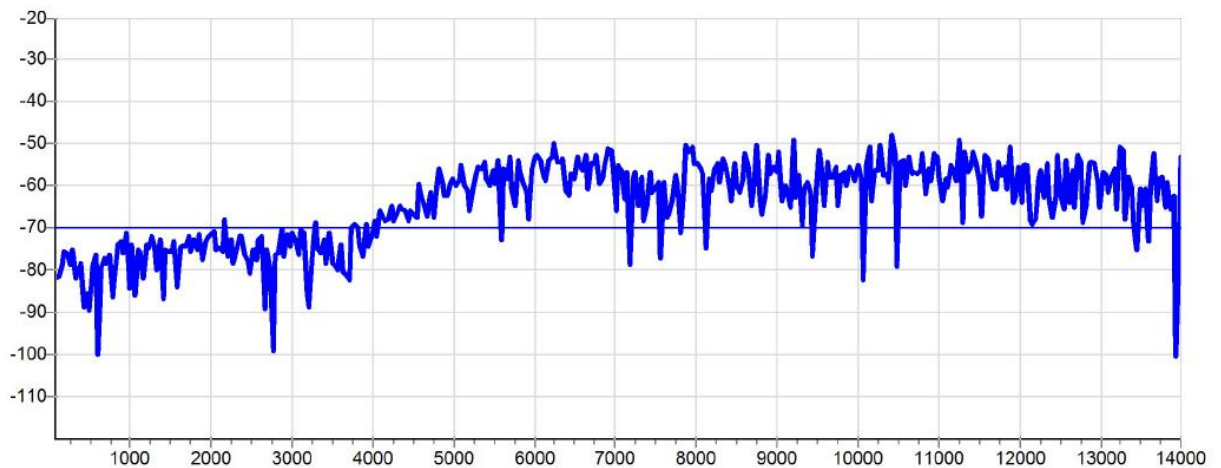


Figure 8 – Source match (*Cal 6* and *Cal 8* comparison)
better than 48 dB

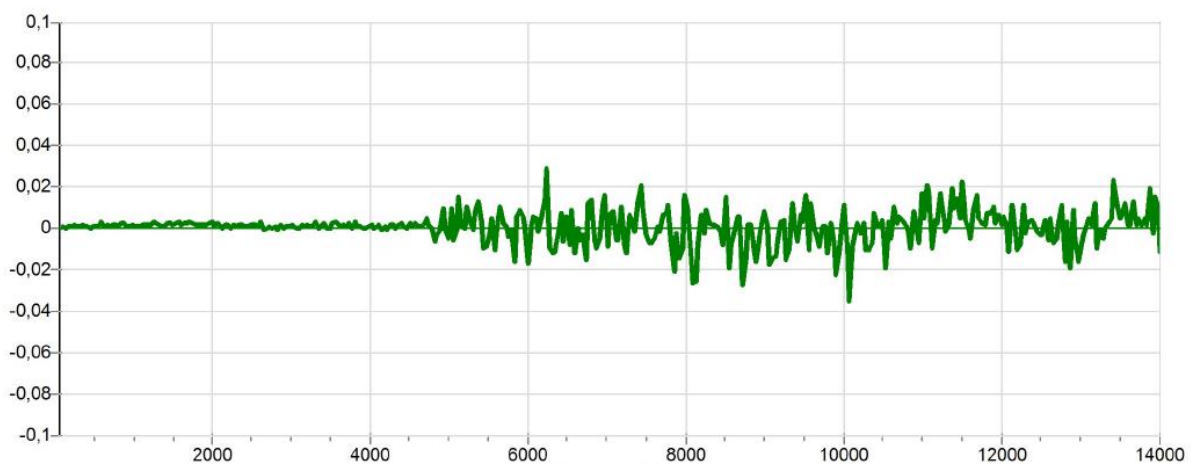


Figure 9 – Reflection tracking (*Cal 6* and *Cal 8* comparison)
approximately ± 0.03 dB

IV Effective directivity stability when internal temperature changes by 1 °C and 2 °C.



Figure 10 – Directivity (Cal 4, 5 and 6 comparison)

“red” – temperature changes by 1 °C (46.30 °C - 47.20 °C), time frame 15 min
“green” - temperature changes by 2 °C (46.30 °C - 48.30 °C), time frame 90 min

Conclusion:

Device demonstrates good parameters stability (directivity 50 dB, source match 48 dB, reflection tracking ± 0.05 dB) over entire frequency range in case if changing internal temperature less than 1 °C.