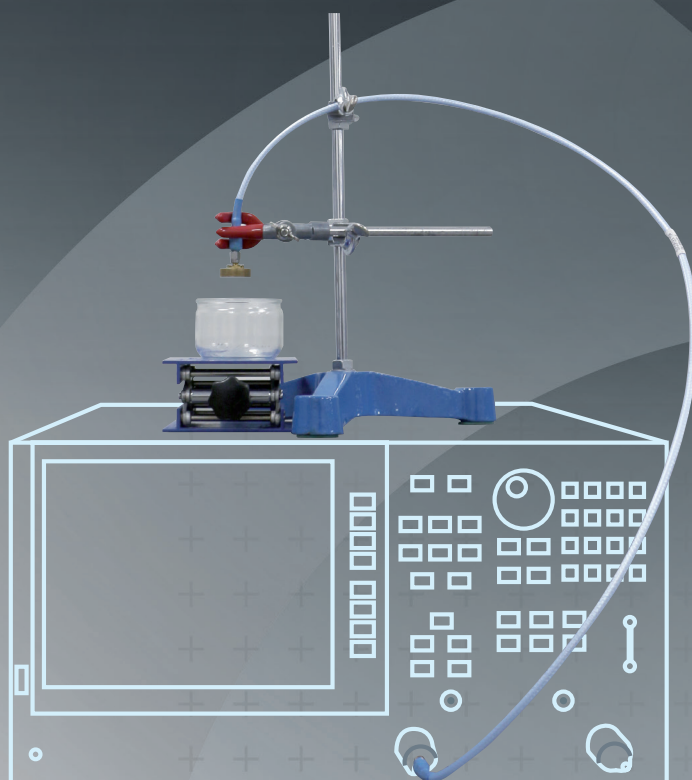


# + LimeSAR



LimeSAR kit has been developed by MVG to measure material dielectric properties (complex permittivity and conductivity).

LimeSAR can be use independently or can be integrated to OpenSAR SW, to update automatically the measured values for further SAR measurements.

Applied to SAR context, LimeSAR allows ensuring that properties of the liquid remain compliant to the applicable standards over time.

## MAIN FEATURES

### Product category

- Liquid measurement kit

### Function

- Measure the dielectric properties of materials (example: SAR liquids)

### User profile

- SAR bench users, University, Biology Lab.

### Related standard

- IEC/IEEE 62209-1528; FCC related KDBs; IEC 62209-1/ IEC 62209-2; EN 50361:2001; EN 50383

### Related software

- OpenSAR and Caliprobe

### Related equipment

- SAR liquids, tissue simulating liquids or gels

### Included equipment

- Measurement probe, RF cable, 3 samples bottles, 1 elevator, 1 stand tripod

### Additional required equipment

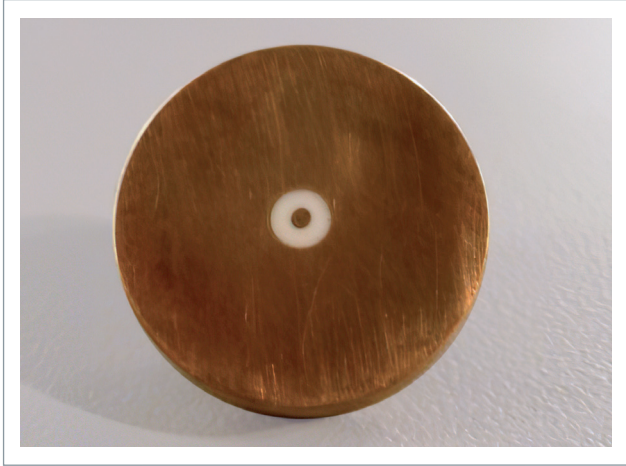
- Vector Network Analyzer, SMA female calibration kit



- LimeSAR can be used with any Network Analyzer available on the market.
- LimeSAR probe can measure the entire frequency band from 150 MHz up to 7.5 GHz.

# + LimeSAR is compliant with the applicable standards

## 1 THE PROBE



- The contact probe is open-ended coaxial transmission line sections.
- It measures the reflection coefficient with respect to the open-circuit end, using a network analyzer.
- It is wide band (150 MHz – 7.5 GHz).



### PROBE CALIBRATION

- Calibration of the VNA in Short-Open-Load (less sensitive to phase error during liquid measurements)
- Calibration according to 2 standards: air and deionized water
- No short circuit is used

## 2 THE SOFTWARE

Frequency (MHz)	Epsilon'	Epsilon''	Sigma (S/m)	IEC/IEEE Standard (Head Liquid) (x100%)
150.00	50.07	84.77	0.71	Epsilon: -4.27 % Epsilon: -2.95 %
500.00	46.12	28.89	0.81	Epsilon: -5.67 % Epsilon: -7.31 %
850.00	44.90	19.64	0.93	Epsilon: -8.13 % Epsilon: -11.22 %
1200.00	44.27	15.68	1.05	Epsilon: -9.09 % Epsilon: -4.96 %
1550.00	43.66	14.94	1.29	Epsilon: -9.26 % Epsilon: -2.24 %
1900.00	42.60	13.75	1.45	Epsilon: -6.51 % Epsilon: -3.63 %
2250.00	42.77	13.91	1.74	Epsilon: -8.97 % Epsilon: -7.02 %
2600.00	41.78	13.98	2.02	Epsilon: -7.14 % Epsilon: -3.01 %
2950.00	41.68	13.62	2.23	Epsilon: -3.69 % Epsilon: -4.81 %
3300.00	41.15	14.12	2.59	Epsilon: -7.80 % Epsilon: -4.95 %
3650.00	39.83	14.52	2.95	Epsilon: -5.52 % Epsilon: -3.94 %
4000.00	38.13	15.28	3.39	Epsilon: -1.95 % Epsilon: -1.02 %
4350.00	37.26	15.66	3.79	Epsilon: -0.76 % Epsilon: -0.04 %
4700.00	36.43	15.89	4.15	Epsilon: -0.35 % Epsilon: -0.14 %
5050.00	35.60	16.19	4.54	Epsilon: -1.53 % Epsilon: -0.90 %
5400.00	34.66	16.43	4.93	Epsilon: -3.17 % Epsilon: -1.43 %
5750.00	33.71	16.69	5.32	Epsilon: -4.64 % Epsilon: -2.11 %
6100.00	32.86	16.97	5.75	Epsilon: -6.56 % Epsilon: -2.75 %
6450.00	32.40	17.16	6.15	Epsilon: -6.25 % Epsilon: -2.08 %
6800.00	32.00	17.59	6.64	Epsilon: -6.26 % Epsilon: -3.53 %
7150.00	31.71	18.26	7.25	Epsilon: -6.95 % Epsilon: -6.22 %
7500.00	31.64	18.66	7.90	Epsilon: -6.99 %

WATER TEMPERATURE  
20.00°C

- It includes information on calibration and parameters of the VNA for the applicable frequency band
- It calculates the measurement value in function of the frequency
- It updates automatically the values in the OpenSAR SW or exports the values in a text file
- It gives directly the deviation from the target value in order to quickly verify that the liquid properties are within the acceptable range (IEC, IEEE, FCC.....)

