

## TBCG3-RN2 Comb Generator

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### 1 Introduction

The TBCG3-RN2 comb generator is primarily intended for testing radiated emission setups. It is a useful tool for validating the proper operation of the antenna and pre-amplifier, as well as the accurate set-up and configuration of the spectrum analyzer. It is well characterized in an anechoic chamber and the radiated emission plots can be used as a reference to compare an EUT in a non-ideal setup against the comb generator in the same location.

You can select between five fixed comb frequencies and an external comb frequency input with a range of 5 kHz to 200 MHz using a rotary switch. A switchable RF amplifier may increase the output signal by 20 decibels (dB).

The comb generator is supplied with two monopole antennas, a 30 cm monopole for frequencies below 300-500 MHz and a 10 cm monopole for frequencies above that.

The radiated comb spectrum is characterized from 5 MHz – 6 GHz.



*Picture 1: TBCG3-RN2 comb generator*

The TBCG3-RN2 has a 50 Ohm output with a female N-connector. The unit operates on six AA NiMH batteries and is supplied with an external charger.

The housing is machined from solid aluminium. The bottom lid is fitted with a 1/4" - 20 UNC thread that accepts regular tripod bolts.

## TBCG3-RN2 Comb Generator

### 2 Specification

Characterized frequency range: 5 MHz - 3 GHz

Comb spectrum flatness up to 1.5 GHz, amplifier off: typically 8 dB at the RF connector

Comb spectrum flatness up to 1.5 GHz, amplifier on: typically 12 dB at the RF connector

Output impedance: 50 Ohm

Output power: -5 dBm max. @ 100 MHz  $f_{comb}$ ; decreasing 6 dB with every  $f_{comb}/2$

Amplitude stability: < 0.2 dB; <0.1 dB after 15 minutes

Aging: < 0.5 dB over 12 months

Output connector: N type-female

Selectable, fixed comb frequencies: 100 MHz, 50 MHz, 25 MHz, 10 MHz, 5 MHz

Frequency stability: 50 ppm

External excitation input: 5 kHz – 200 MHz @ square input signal; 3.3 Vpp max

100 kHz – 200 MHz @ sinusoidal input signal; 3.3 Vpp max

External input impedance: 50 Ohm

Input connector: SMA-female

Indicators: Power On LED, Low Battery LED

Power supply: 6 x AA NiMH cells (e.g. Varta Mignon 2700, **not supplied**)

Charger: external; Ansmann ACS310

Antennas: 30 cm monopole for  $f < 300 \dots 500$  MHz; 10 cm monopole for  $f > 300 \dots 500$  MHz

Operation time: battery capacity / 96 mA (ampl. off) or 181 mA (ampl on)

Temperature range: -10°C to +45 °C; lower operating temperature dependent on battery type

Housing diameter: 180 mm

Housing height: 60 mm

Weight: 1250 g

**Warning: the TBCG3-RN2 radiates across a wide spectrum, significantly exceeding radiated emission limits specified in any CISPR standard. Use it only in a shielded environment to avoid interference with other electronic products.**

### 3 Characterization

The comb generator was tested in an anechoic chamber at 1 meter height and 3 meters from the antenna. The antenna was mounted at a fixed height of 1m.

The test plan, test report, and the associated CVS files contain the raw data (antenna voltage) and can be downloaded from the Tekbox website. Due to a restriction of the test tool, the amplitude axis of the charts in the test report is incorrectly labelled dB $\mu$ V/m. It is, in reality, dB $\mu$ V.

The data package also includes the data sheets and antenna factors for the measurement antennas involved. The processed raw data including conversion into electric field-strength are stored in the Excel file *TBCG3-RN2-summary.xlsx*.

# TBCG3-RN2 Comb Generator

## 4 Spectrum plots, conducted output spectrum

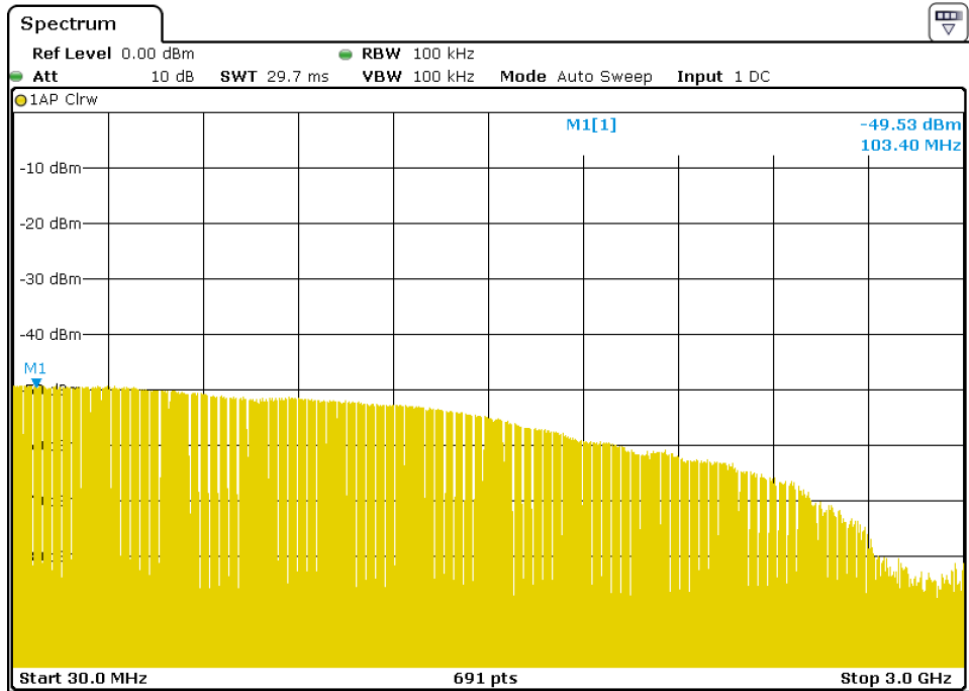


Figure 1 – 5 MHz comb frequency; amplifier off

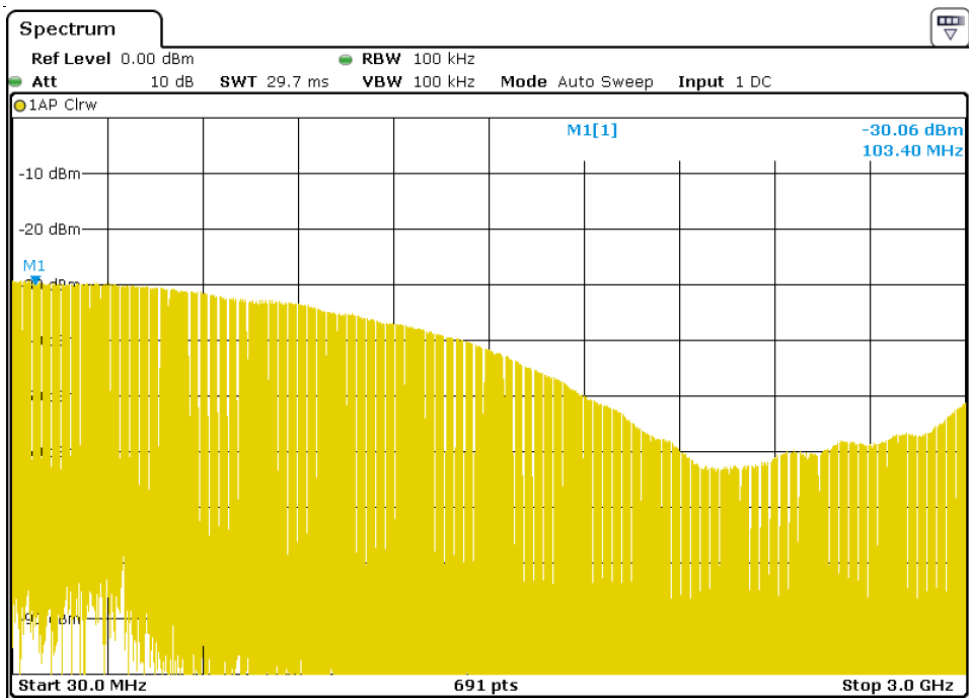


Figure 2 – 5 MHz comb frequency; amplifier on

# TBCG3-RN2 Comb Generator

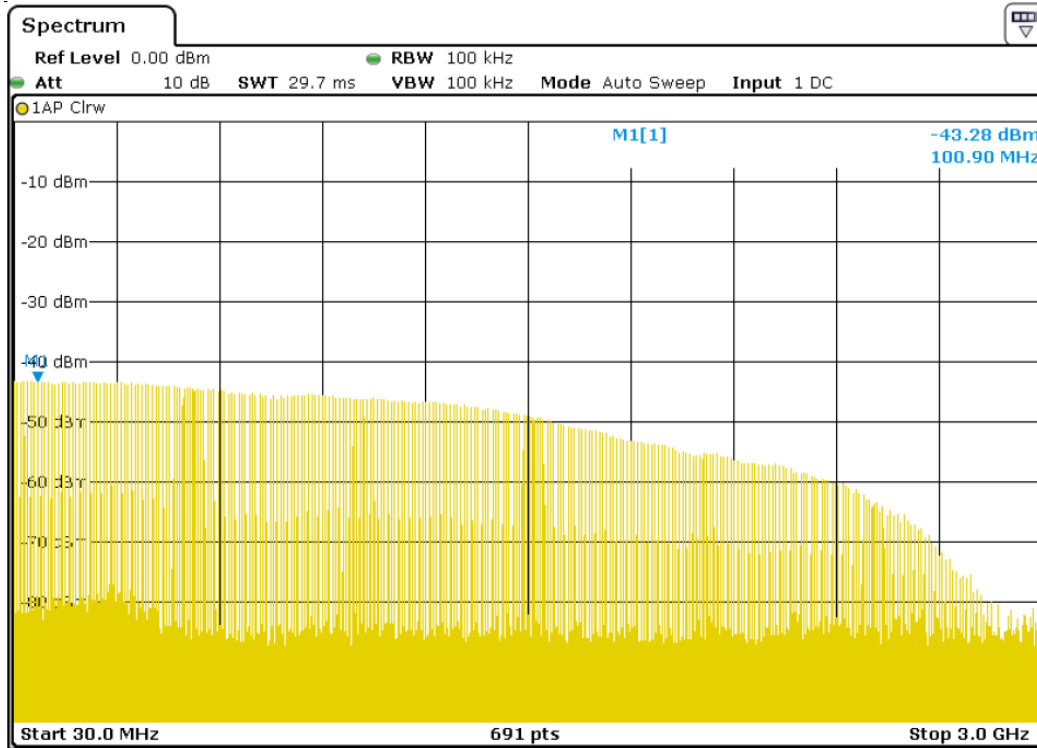


Figure 3 – 10 MHz comb frequency; amplifier off

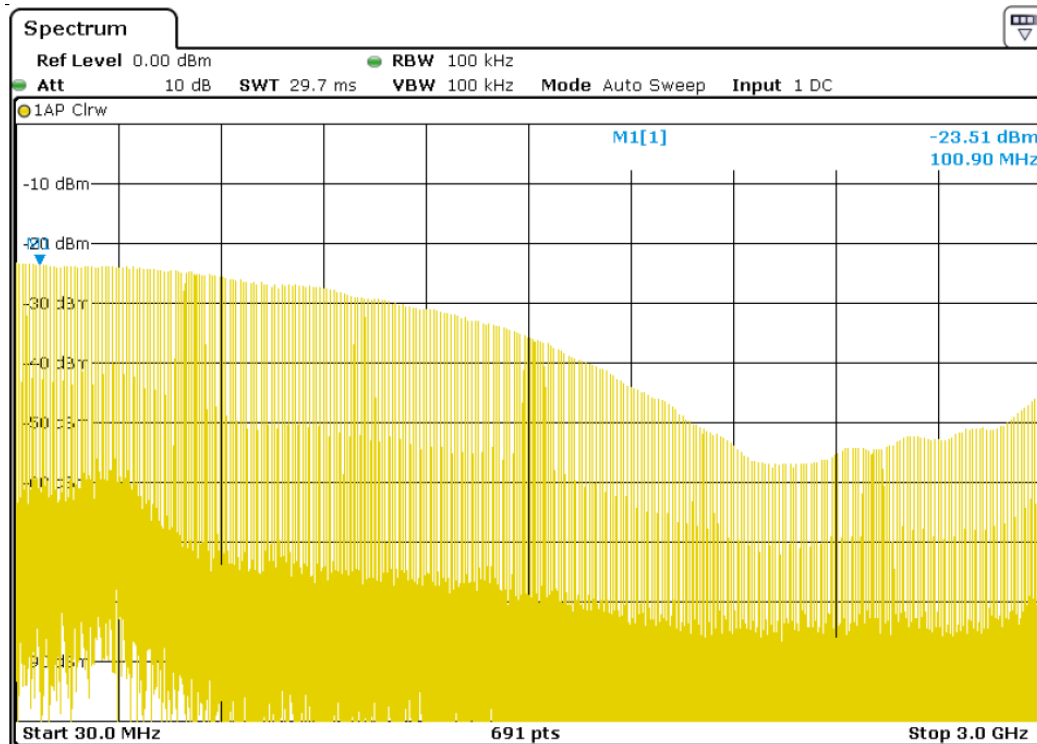


Figure 4 – 10 MHz comb frequency; amplifier on

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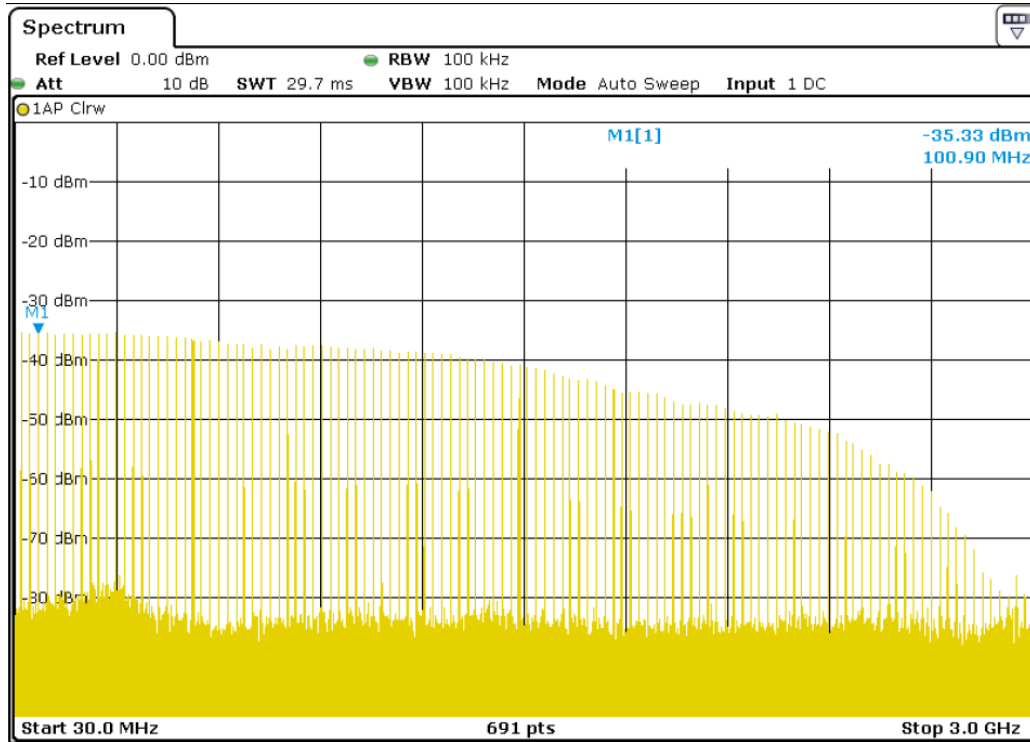


Figure 5 – 25 MHz comb frequency; amplifier off

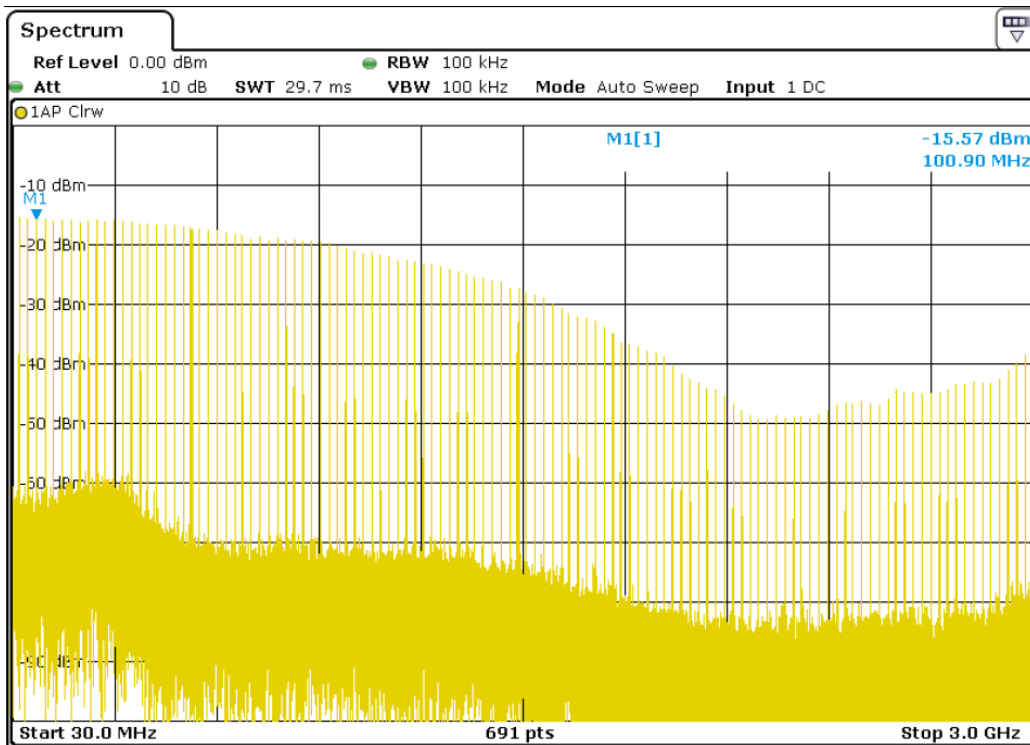


Figure 6 – 25 MHz comb frequency; amplifier on

# TBCG3-RN2 Comb Generator

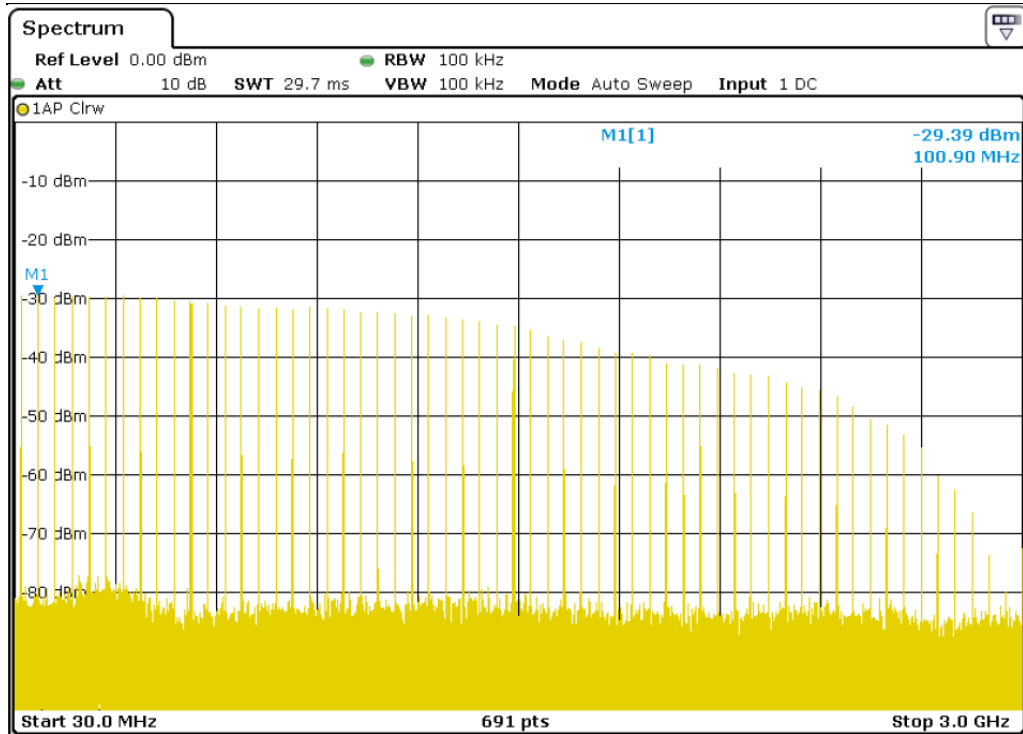


Figure 7 – 50 MHz comb frequency; amplifier off

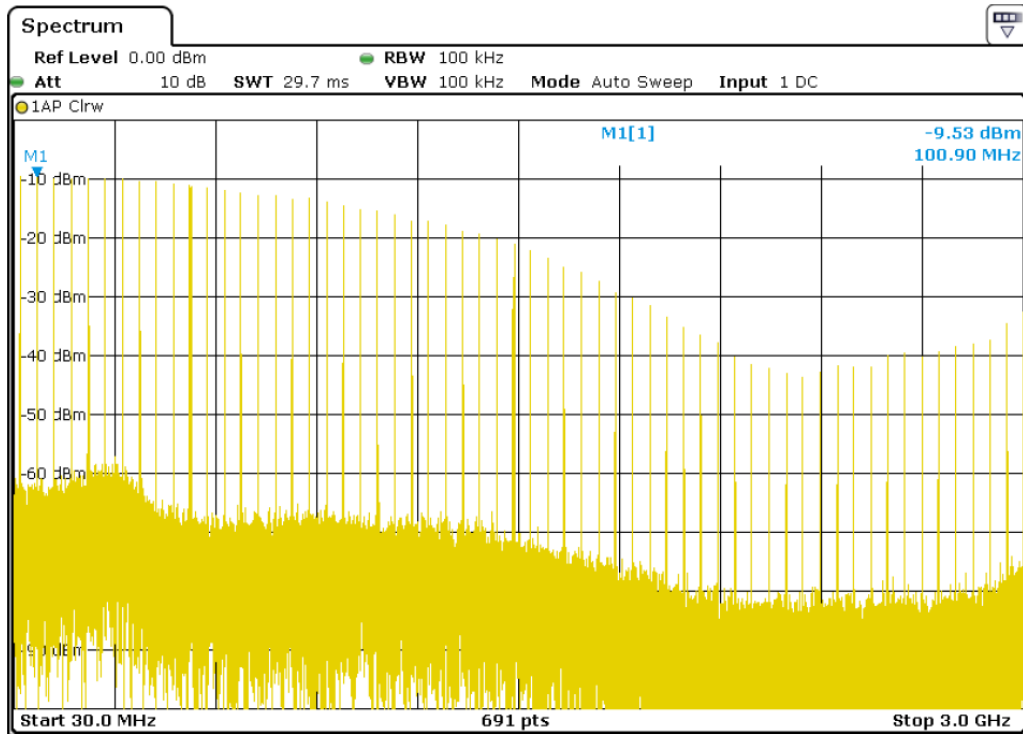


Figure 8 – 50 MHz comb frequency; amplifier on

# TBCG3-RN2 Comb Generator

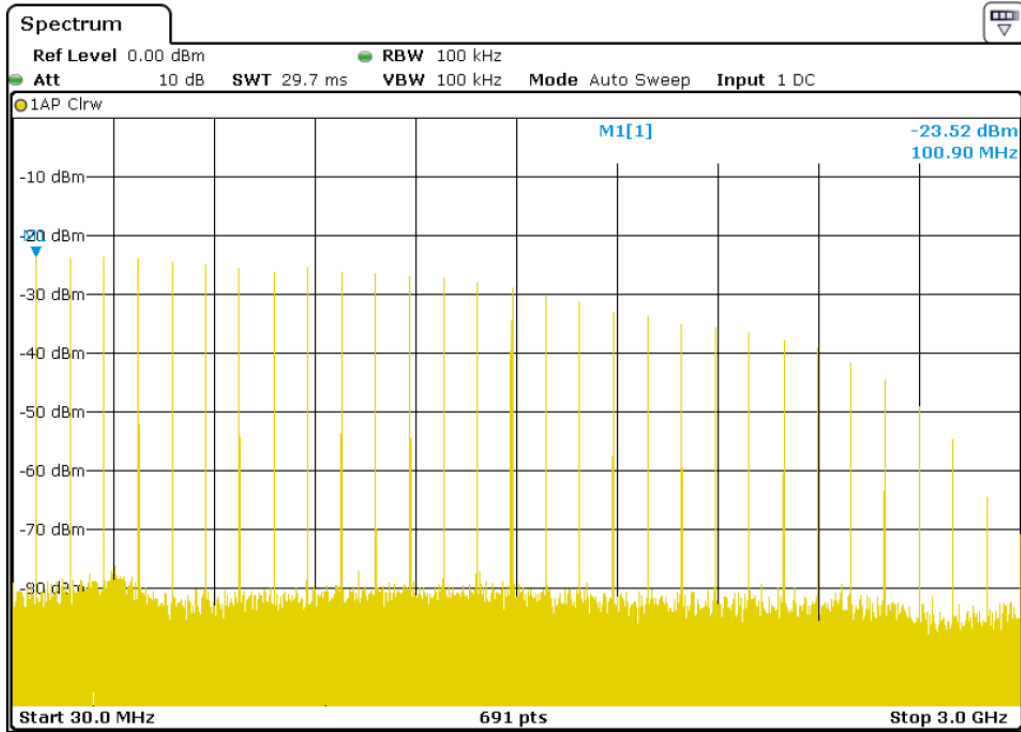


Figure 9 – 100 MHz comb frequency; amplifier off

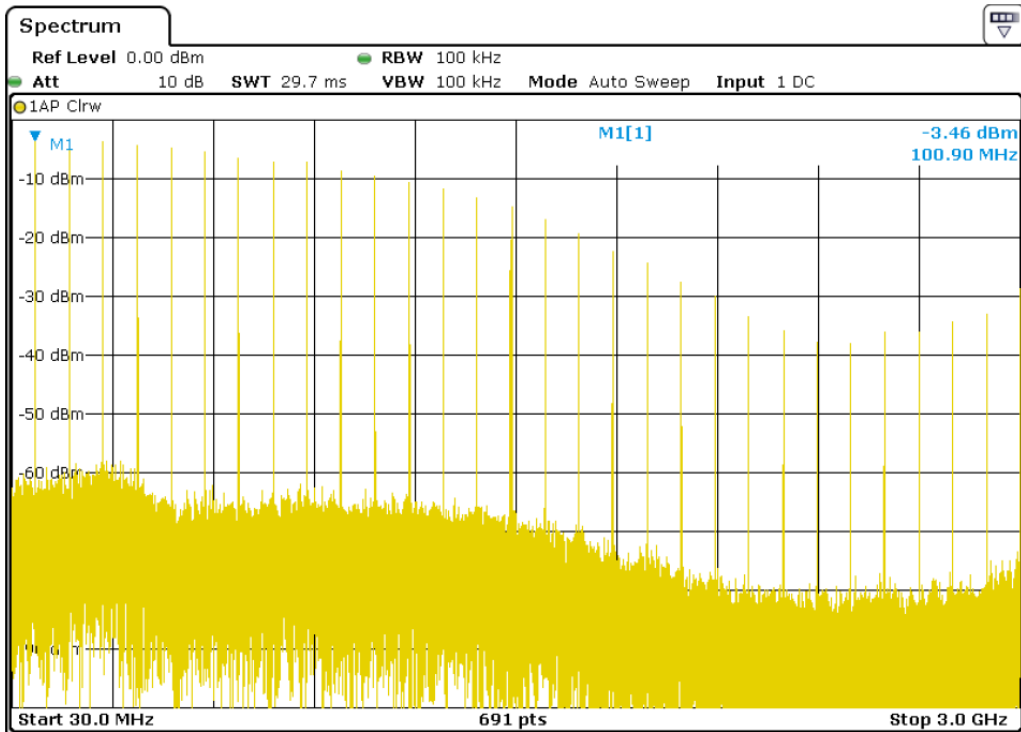


Figure 10 – 100 MHz comb frequency; amplifier on

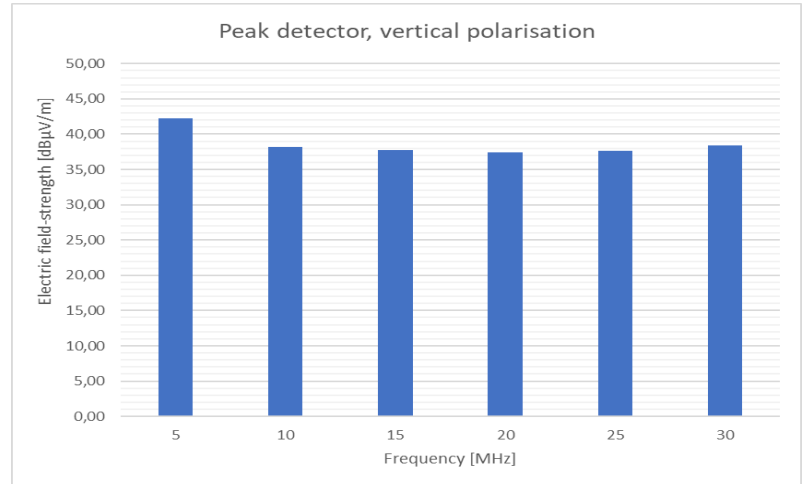
## TBCG3-RN2 Comb Generator

### 5 Spectrum plots, radiated spectrum

#### 5.1 5 MHz comb frequency, 30 cm antenna, amplifier off, 5 MHz – 30 MHz

| Frequency [MHz] | AVG VERT [dB $\mu$ V/m] | PK VERT [dB $\mu$ V/m] |
|-----------------|-------------------------|------------------------|
| 5               | 41,90                   | 42,22                  |
| 10              | 37,79                   | 38,24                  |
| 15              | 37,26                   | 37,80                  |
| 20              | 36,85                   | 37,39                  |
| 25              | 37,00                   | 37,58                  |
| 30              | 37,73                   | 38,39                  |

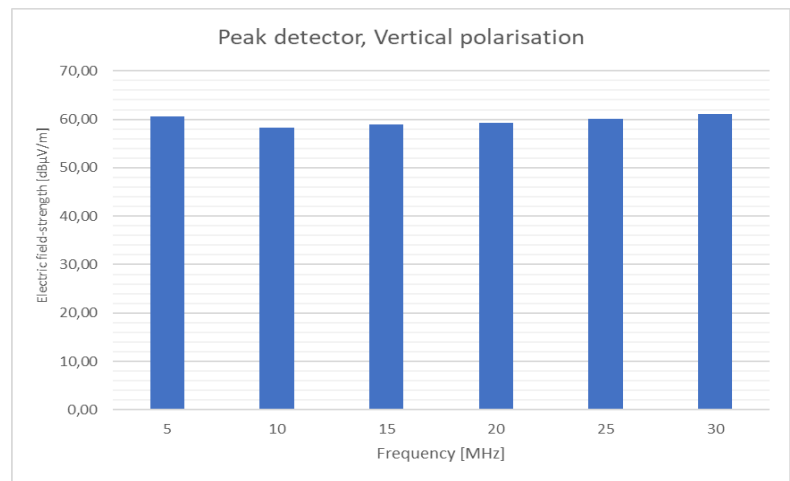
Measured with monopole antenna  
3m distance, 1 meter height



#### 5.2 5 MHz comb frequency, 30 cm antenna, amplifier on, 5 MHz – 30 MHz

| Frequency [MHz] | AVG VERT [dB $\mu$ V/m] | PK VERT [dB $\mu$ V/m] |
|-----------------|-------------------------|------------------------|
| 5               | 60,46203465             | 60,52186436            |
| 10              | 58,18131657             | 58,25656147            |
| 15              | 58,9213401              | 58,9933921             |
| 20              | 59,24687763             | 59,31687351            |
| 25              | 59,94397008             | 60,01258504            |
| 30              | 60,97456223             | 61,04570252            |

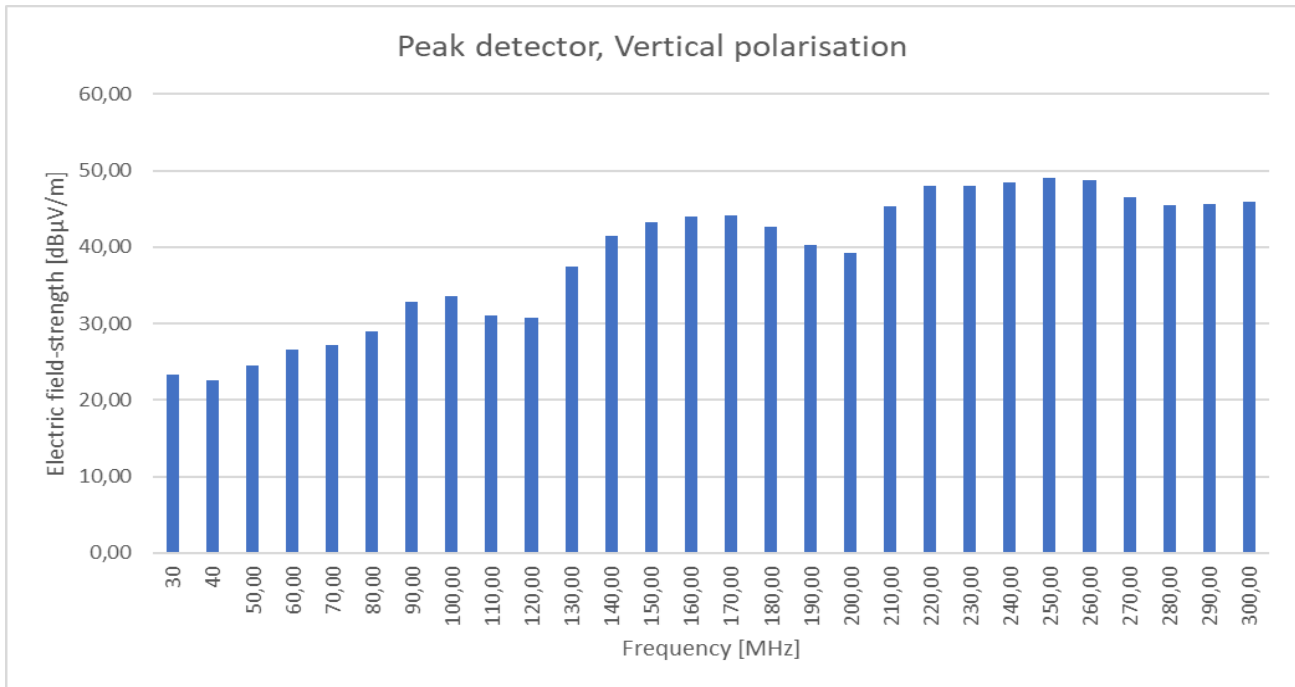
Measured with monopole antenna  
3m distance, 1 meter height





## TBCG3-RN2 Comb Generator

### 5.3 10 MHz comb frequency, 10 cm antenna, amplifier off, 30 MHz – 300 MHz

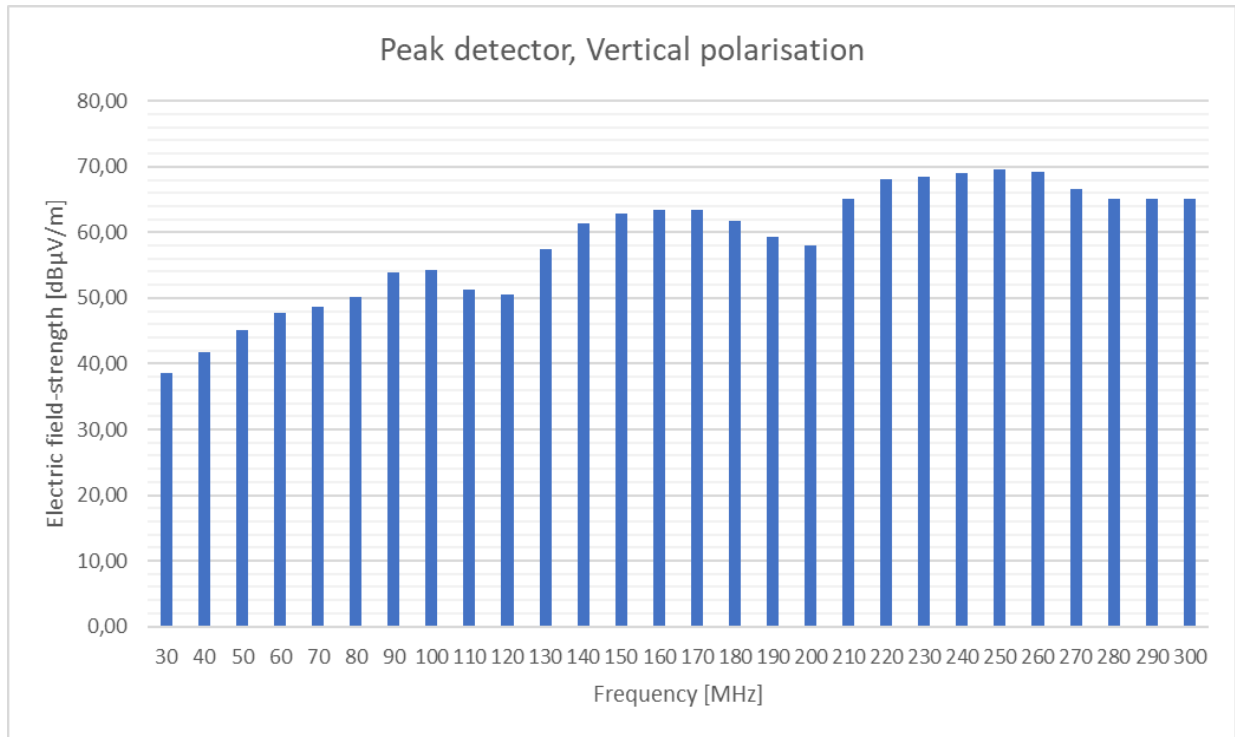


Measured with biconical antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] | Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|
| 30              | 0,33             | 20,47           | 13,48             | 23,27            | 170             | 21,69            | 25,61           | 43,70             | 44,10            |
| 40              | -5,46            | 13,92           | 18,17             | 22,60            | 180             | 17,09            | 22,80           | 42,17             | 42,68            |
| 50              | -7,46            | 11,10           | 22,36             | 24,48            | 190             | 16,09            | 22,81           | 39,52             | 40,22            |
| 60              | -7,19            | 9,37            | 25,38             | 26,57            | 200             | 12,93            | 21,44           | 38,53             | 39,29            |
| 70              | -11,57           | 6,86            | 26,42             | 27,23            | 210             | 7,11             | 19,65           | 44,87             | 45,28            |
| 80              | -10,14           | 7,00            | 28,22             | 28,95            | 220             | 19,81            | 24,83           | 47,61             | 47,95            |
| 90              | -5,78            | 9,42            | 32,24             | 32,81            | 230             | 24,22            | 27,78           | 47,68             | 48,02            |
| 100             | 0,68             | 12,57           | 32,95             | 33,61            | 240             | 21,47            | 26,09           | 48,02             | 48,38            |
| 110             | -0,49            | 13,34           | 30,10             | 31,10            | 250             | 21,44            | 26,68           | 48,75             | 49,08            |
| 120             | 1,25             | 14,37           | 29,59             | 30,76            | 260             | 23,68            | 27,77           | 48,34             | 48,68            |
| 130             | 0,92             | 16,20           | 36,91             | 37,51            | 270             | 21,14            | 26,24           | 46,07             | 46,46            |
| 140             | 8,92             | 18,28           | 41,04             | 41,46            | 280             | 27,21            | 30,67           | 44,88             | 45,41            |
| 150             | 15,07            | 21,42           | 42,85             | 43,26            | 290             | 21,44            | 26,95           | 45,02             | 45,56            |
| 160             | 19,59            | 24,12           | 43,66             | 44,05            | 300             | 16,28            | 25,51           | 45,24             | 45,90            |

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### 5.4 10 MHz comb frequency, 10 cm antenna, amplifier on, 30 MHz – 300 MHz

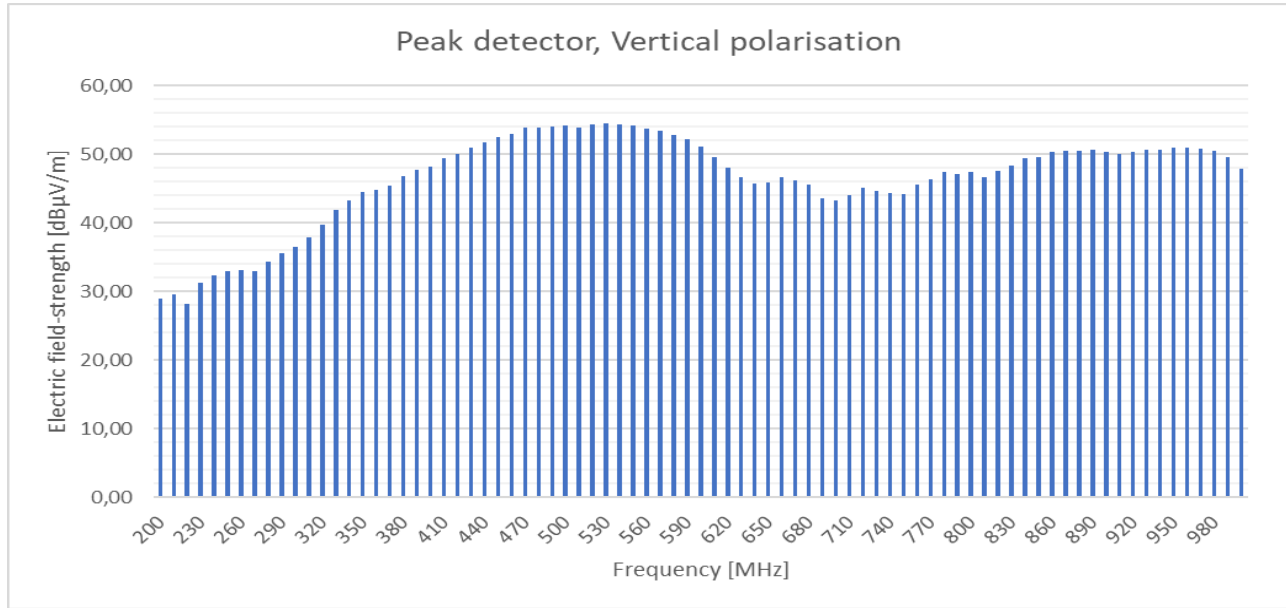


Measured with biconical antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] | Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|
| 30              | 2,67             | 20,77           | 37,44             | 38,56            | 170             | 41,61            | 42,06           | 63,22             | 63,37            |
| 40              | 1,00             | 15,92           | 41,31             | 41,74            | 180             | 37,14            | 37,96           | 61,58             | 61,73            |
| 50              | 8,90             | 15,84           | 44,96             | 45,19            | 190             | 36,39            | 37,31           | 59,11             | 59,27            |
| 60              | 15,38            | 18,63           | 47,64             | 47,81            | 200             | 34,00            | 35,18           | 57,82             | 57,99            |
| 70              | 7,97             | 13,16           | 48,44             | 48,59            | 210             | 29,50            | 31,61           | 64,90             | 65,06            |
| 80              | 10,82            | 15,15           | 50,05             | 50,19            | 220             | 40,89            | 41,53           | 67,86             | 68,02            |
| 90              | 17,16            | 20,17           | 53,73             | 53,87            | 230             | 45,20            | 45,61           | 68,25             | 68,42            |
| 100             | 23,33            | 25,18           | 54,10             | 54,24            | 240             | 42,79            | 43,36           | 68,86             | 69,03            |
| 110             | 21,68            | 24,05           | 51,08             | 51,23            | 250             | 42,71            | 43,35           | 69,47             | 69,66            |
| 120             | 21,70            | 24,28           | 50,31             | 50,48            | 260             | 44,83            | 45,33           | 68,96             | 69,14            |
| 130             | 23,14            | 25,77           | 57,34             | 57,49            | 270             | 42,54            | 43,13           | 66,42             | 66,60            |
| 140             | 30,51            | 31,86           | 61,14             | 61,29            | 280             | 47,69            | 48,09           | 64,98             | 65,15            |
| 150             | 35,59            | 36,42           | 62,70             | 62,84            | 290             | 42,05            | 42,83           | 64,84             | 65,05            |
| 160             | 39,81            | 40,38           | 63,38             | 63,52            | 300             | 37,53            | 38,97           | 64,87             | 65,08            |

## TBCG3-RN2 Comb Generator

### 5.5 10 MHz comb frequency, 10 cm antenna, amplifier off, 200 MHz – 1 GHz

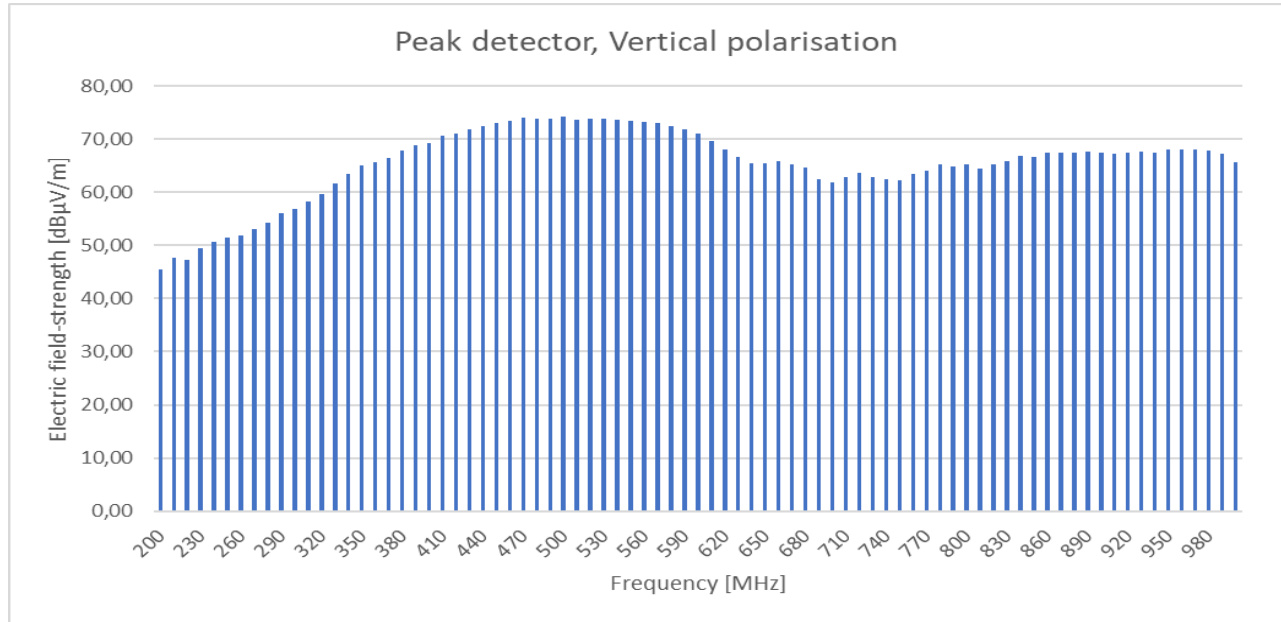


Measured with logarithmic periodic antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] | Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|
| 200             | 5,05             | 16,57           | 27,39             | 28,96            | 610             | 18,78            | 26,12           | 49,16             | 49,51            |
| 210             | 8,84             | 17,40           | 28,29             | 29,65            | 620             | 16,49            | 25,29           | 47,68             | 48,11            |
| 220             | 5,75             | 16,40           | 26,51             | 28,22            | 630             | 10,72            | 23,09           | 46,18             | 46,68            |
| 230             | -3,34            | 13,65           | 30,02             | 31,26            | 640             | 20,49            | 27,69           | 45,16             | 45,75            |
| 240             | 0,04             | 14,36           | 31,26             | 32,28            | 650             | 19,98            | 27,09           | 45,41             | 45,94            |
| 250             | -0,17            | 14,41           | 31,91             | 32,92            | 660             | 10,26            | 23,54           | 46,08             | 46,63            |
| 260             | 5,15             | 16,59           | 32,10             | 33,14            | 670             | 11,02            | 23,87           | 45,55             | 46,19            |
| 270             | 7,58             | 17,24           | 31,89             | 32,92            | 680             | 20,13            | 27,40           | 44,96             | 45,56            |
| 280             | 6,93             | 17,71           | 33,27             | 34,29            | 690             | 18,84            | 27,20           | 42,79             | 43,56            |
| 290             | 15,81            | 21,48           | 34,72             | 35,65            | 700             | 21,15            | 27,83           | 42,39             | 43,25            |
| 300             | 13,16            | 20,26           | 35,61             | 36,50            | 710             | 23,19            | 29,02           | 43,31             | 44,10            |
| 310             | 13,80            | 20,70           | 37,10             | 37,89            | 720             | 18,54            | 26,82           | 44,34             | 45,05            |
| 320             | 12,96            | 21,21           | 39,14             | 39,71            | 730             | 7,62             | 24,17           | 43,85             | 44,66            |
| 330             | 9,46             | 19,76           | 41,37             | 41,86            | 740             | 22,35            | 28,52           | 43,60             | 44,37            |
| 340             | 9,43             | 19,49           | 42,75             | 43,20            | 750             | 21,50            | 27,81           | 43,53             | 44,26            |
| 350             | 20,24            | 24,60           | 44,08             | 44,50            | 760             | 19,17            | 27,67           | 45,02             | 45,64            |
| 360             | 18,03            | 23,71           | 44,42             | 44,81            | 770             | 17,65            | 26,82           | 45,81             | 46,40            |
| 370             | 9,99             | 20,23           | 45,14             | 45,50            | 780             | 19,61            | 27,41           | 46,85             | 47,41            |
| 380             | 18,65            | 23,88           | 46,40             | 46,78            | 790             | 19,69            | 27,41           | 46,54             | 47,09            |
| 390             | 22,45            | 26,33           | 47,46             | 47,77            | 800             | 23,88            | 29,75           | 46,90             | 47,50            |
| 400             | 21,83            | 25,89           | 47,87             | 48,18            | 810             | 24,22            | 29,71           | 46,02             | 46,62            |
| 410             | 16,40            | 22,90           | 49,22             | 49,48            | 820             | 22,94            | 29,10           | 46,98             | 47,56            |
| 420             | 18,96            | 24,54           | 49,73             | 50,01            | 830             | 24,98            | 30,39           | 47,90             | 48,43            |
| 430             | 21,26            | 25,98           | 50,65             | 50,89            | 840             | 27,16            | 31,85           | 48,96             | 49,43            |
| 440             | 19,20            | 25,06           | 51,50             | 51,75            | 850             | 27,59            | 32,10           | 49,16             | 49,64            |
| 450             | 11,15            | 22,03           | 52,25             | 52,45            | 860             | 26,97            | 31,53           | 49,89             | 50,34            |
| 460             | 10,62            | 21,57           | 52,73             | 52,92            | 870             | 25,84            | 30,88           | 50,05             | 50,49            |
| 470             | 22,89            | 27,33           | 53,67             | 53,84            | 880             | 24,26            | 30,63           | 50,01             | 50,45            |
| 480             | 25,27            | 28,98           | 53,74             | 53,93            | 890             | 24,63            | 30,60           | 50,20             | 50,66            |
| 490             | 23,35            | 27,77           | 53,82             | 54,00            | 900             | 23,83            | 30,13           | 49,86             | 50,31            |
| 500             | 29,53            | 31,97           | 54,02             | 54,20            | 910             | 15,80            | 27,12           | 49,51             | 50,04            |
| 510             | 31,66            | 33,53           | 53,65             | 53,81            | 920             | 24,29            | 30,65           | 49,86             | 50,33            |
| 520             | 31,20            | 33,26           | 54,23             | 54,40            | 930             | 28,74            | 32,96           | 50,14             | 50,62            |
| 530             | 25,81            | 29,52           | 54,40             | 54,57            | 940             | 28,51            | 32,80           | 50,15             | 50,61            |
| 540             | 22,55            | 27,41           | 54,15             | 54,33            | 950             | 27,54            | 32,65           | 50,56             | 50,99            |
| 550             | 14,54            | 23,57           | 53,94             | 54,13            | 960             | 28,48            | 33,06           | 50,58             | 51,02            |
| 560             | 21,51            | 27,54           | 53,59             | 53,79            | 970             | 26,24            | 31,84           | 50,43             | 50,88            |
| 570             | 25,87            | 29,80           | 53,18             | 53,39            | 980             | 25,50            | 31,18           | 50,02             | 50,54            |
| 580             | 23,03            | 28,41           | 52,60             | 52,83            | 990             | 26,18            | 31,57           | 49,06             | 49,60            |
| 590             | 23,33            | 28,47           | 51,87             | 52,15            | 1000            | 20,72            | 29,52           | 47,11             | 47,83            |
| 600             | 24,01            | 29,13           | 50,85             | 51,15            |                 |                  |                 |                   |                  |

## TBCG3-RN2 Comb Generator

### 5.6 10 MHz comb frequency, 10 cm antenna, amplifier on, 200 MHz – 1 GHz

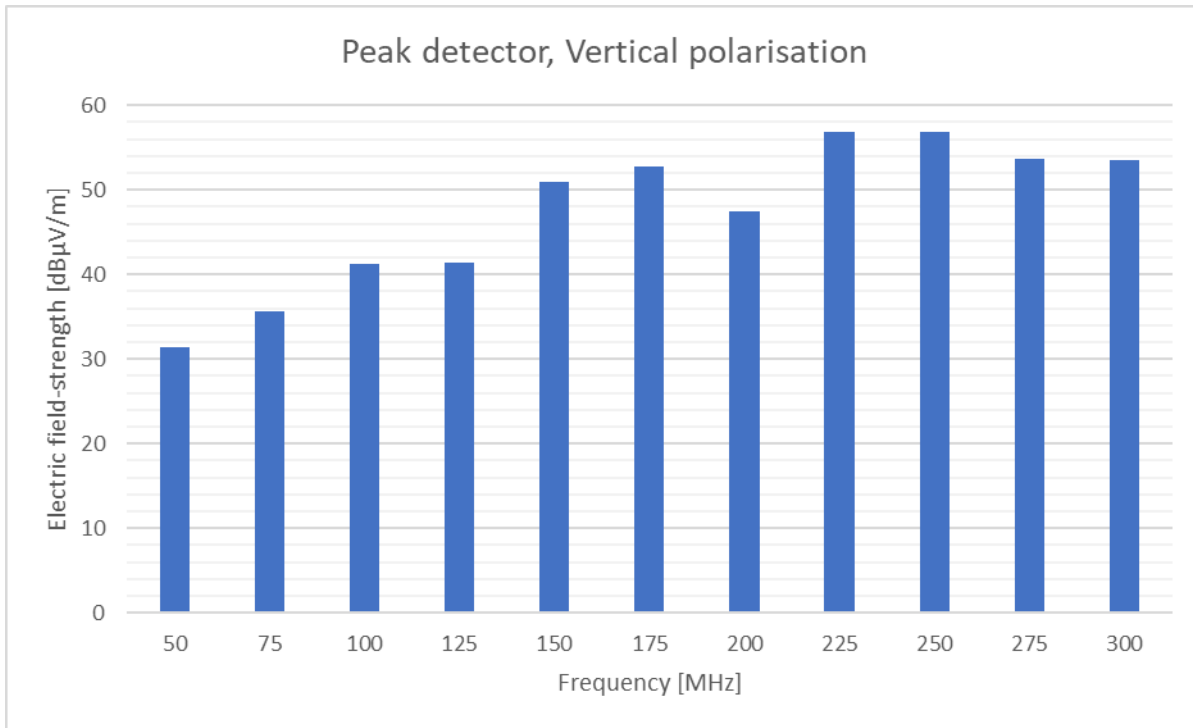


Measured with logarithmic periodic antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] | Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|
| 200             | 26,52            | 28,16           | 45,22             | 45,50            | 610             | 39,40            | 40,50           | 69,66             | 69,72            |
| 210             | 28,86            | 30,20           | 47,43             | 47,67            | 620             | 38,95            | 40,05           | 68,02             | 68,08            |
| 220             | 27,81            | 29,26           | 47,15             | 47,37            | 630             | 31,76            | 34,02           | 66,51             | 66,57            |
| 230             | 14,79            | 19,96           | 49,29             | 49,51            | 640             | 42,46            | 43,24           | 65,44             | 65,52            |
| 240             | 20,01            | 23,66           | 50,37             | 50,59            | 650             | 42,25            | 43,06           | 65,47             | 65,54            |
| 250             | 20,45            | 23,59           | 51,26             | 51,46            | 660             | 34,26            | 36,12           | 65,86             | 65,92            |
| 260             | 26,21            | 28,09           | 51,71             | 51,92            | 670             | 31,55            | 34,07           | 65,25             | 65,33            |
| 270             | 31,36            | 32,56           | 52,82             | 53,03            | 680             | 40,82            | 41,77           | 64,53             | 64,61            |
| 280             | 25,57            | 27,77           | 54,02             | 54,22            | 690             | 39,79            | 40,86           | 62,32             | 62,43            |
| 290             | 35,99            | 36,86           | 55,82             | 56,04            | 700             | 41,68            | 42,61           | 61,82             | 61,93            |
| 300             | 33,68            | 34,64           | 56,68             | 56,90            | 710             | 43,33            | 44,12           | 62,75             | 62,85            |
| 310             | 34,98            | 35,89           | 58,02             | 58,24            | 720             | 38,55            | 39,86           | 63,58             | 63,67            |
| 320             | 34,72            | 35,75           | 59,39             | 59,60            | 730             | 25,42            | 30,88           | 62,82             | 62,93            |
| 330             | 31,86            | 33,24           | 61,51             | 61,74            | 740             | 41,79            | 42,68           | 62,40             | 62,50            |
| 340             | 32,73            | 34,24           | 63,18             | 63,39            | 750             | 41,02            | 41,98           | 62,13             | 62,23            |
| 350             | 42,17            | 42,65           | 64,85             | 65,03            | 760             | 38,84            | 40,07           | 63,38             | 63,47            |
| 360             | 40,00            | 40,61           | 65,45             | 65,63            | 770             | 37,65            | 39,08           | 64,06             | 64,15            |
| 370             | 33,43            | 34,66           | 66,33             | 66,49            | 780             | 39,58            | 40,83           | 65,13             | 65,21            |
| 380             | 40,29            | 40,85           | 67,70             | 67,86            | 790             | 39,69            | 40,84           | 64,80             | 64,88            |
| 390             | 43,90            | 44,33           | 68,82             | 68,96            | 800             | 43,39            | 44,24           | 65,23             | 65,31            |
| 400             | 43,42            | 43,90           | 69,18             | 69,32            | 810             | 43,46            | 44,24           | 64,36             | 64,45            |
| 410             | 38,11            | 38,94           | 70,57             | 70,68            | 820             | 41,94            | 42,89           | 65,15             | 65,23            |
| 420             | 40,88            | 41,49           | 70,89             | 71,02            | 830             | 43,58            | 44,41           | 65,87             | 65,94            |
| 430             | 42,50            | 43,02           | 71,70             | 71,81            | 840             | 45,37            | 46,09           | 66,79             | 66,86            |
| 440             | 38,69            | 39,54           | 72,41             | 72,51            | 850             | 45,56            | 46,25           | 66,68             | 66,76            |
| 450             | 37,07            | 38,07           | 72,98             | 73,08            | 860             | 44,94            | 45,71           | 67,34             | 67,41            |
| 460             | 31,90            | 33,59           | 73,30             | 73,39            | 870             | 43,98            | 44,85           | 67,45             | 67,53            |
| 470             | 44,07            | 44,55           | 73,98             | 74,05            | 880             | 42,76            | 43,74           | 67,38             | 67,46            |
| 480             | 46,02            | 46,42           | 73,87             | 73,95            | 890             | 43,06            | 44,18           | 67,65             | 67,72            |
| 490             | 43,82            | 44,34           | 73,85             | 73,93            | 900             | 42,15            | 43,27           | 67,49             | 67,55            |
| 500             | 49,74            | 50,01           | 74,10             | 74,17            | 910             | 34,40            | 36,81           | 67,11             | 67,18            |
| 510             | 51,75            | 51,97           | 73,53             | 73,60            | 920             | 42,35            | 43,50           | 67,40             | 67,47            |
| 520             | 51,71            | 51,94           | 73,81             | 73,87            | 930             | 46,58            | 47,36           | 67,57             | 67,64            |
| 530             | 46,83            | 47,21           | 73,81             | 73,87            | 940             | 46,42            | 47,07           | 67,48             | 67,55            |
| 540             | 42,85            | 43,51           | 73,59             | 73,65            | 950             | 45,53            | 46,29           | 67,91             | 67,98            |
| 550             | 33,76            | 35,41           | 73,49             | 73,55            | 960             | 46,47            | 47,17           | 68,03             | 68,10            |
| 560             | 41,65            | 42,39           | 73,28             | 73,34            | 970             | 44,42            | 45,30           | 67,97             | 68,04            |
| 570             | 46,22            | 46,66           | 72,98             | 73,04            | 980             | 44,03            | 44,95           | 67,77             | 67,84            |
| 580             | 43,57            | 44,23           | 72,49             | 72,54            | 990             | 44,99            | 45,85           | 67,13             | 67,21            |
| 590             | 43,87            | 44,52           | 71,86             | 71,93            | 1000            | 40,01            | 41,52           | 65,50             | 65,60            |
| 600             | 44,63            | 45,23           | 71,05             | 71,10            |                 |                  |                 |                   |                  |

## TBCG3-RN2 Comb Generator

### 5.7 25 MHz comb frequency, 10 cm antenna, amplifier off, 30 MHz – 300 MHz

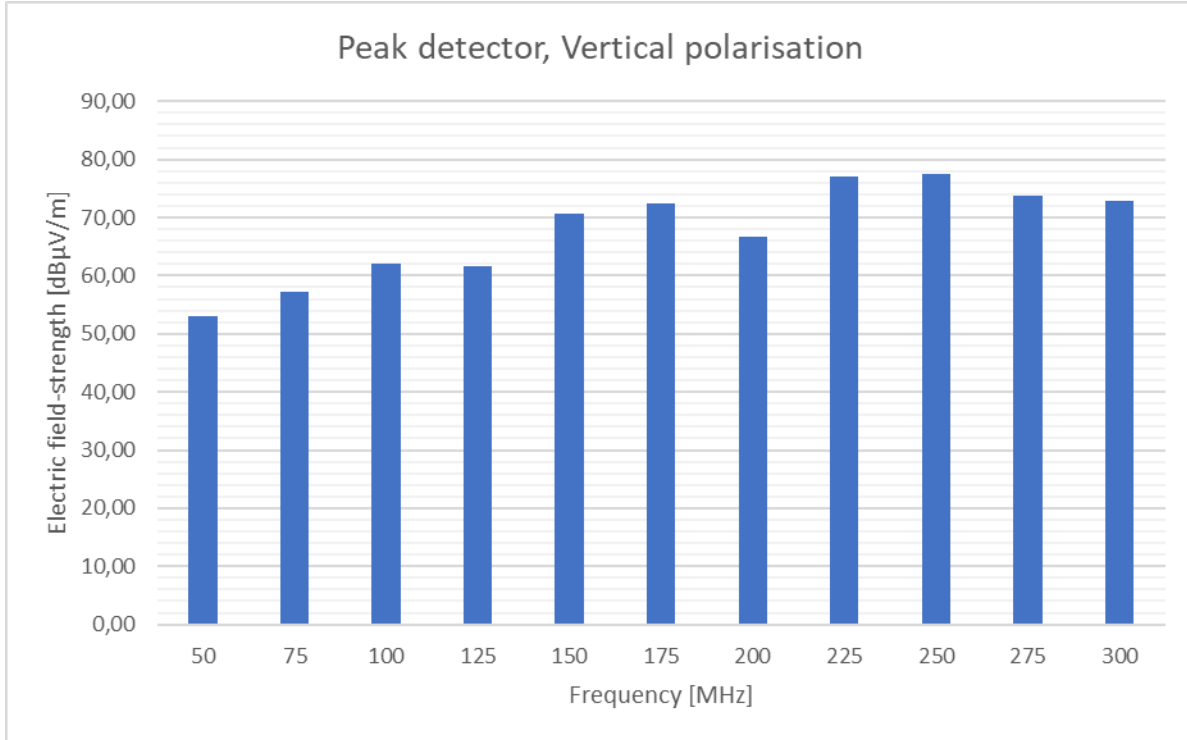


Measured with biconical antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|
| 50              | -5,04            | 12              | 30,48             | 31,43            |
| 75              | -6,15            | 8,15            | 35,37             | 35,68            |
| 100             | 9,57             | 16,05           | 40,93             | 41,19            |
| 125             | 7,97             | 17,14           | 41,1              | 41,47            |
| 150             | 23,33            | 26,54           | 50,82             | 50,98            |
| 175             | 32,19            | 33,59           | 52,67             | 52,82            |
| 200             | 21,47            | 25,6            | 47,17             | 47,46            |
| 225             | 34,82            | 36,14           | 56,73             | 56,86            |
| 250             | 29,8             | 32,27           | 56,65             | 56,79            |
| 275             | 29,2             | 31,75           | 53,42             | 53,61            |
| 300             | 25,1             | 29,87           | 53,21             | 53,47            |

## TBCG3-RN2 Comb Generator

### 5.8 25 MHz comb frequency, 10 cm antenna, amplifier on, 30 MHz – 300 MHz

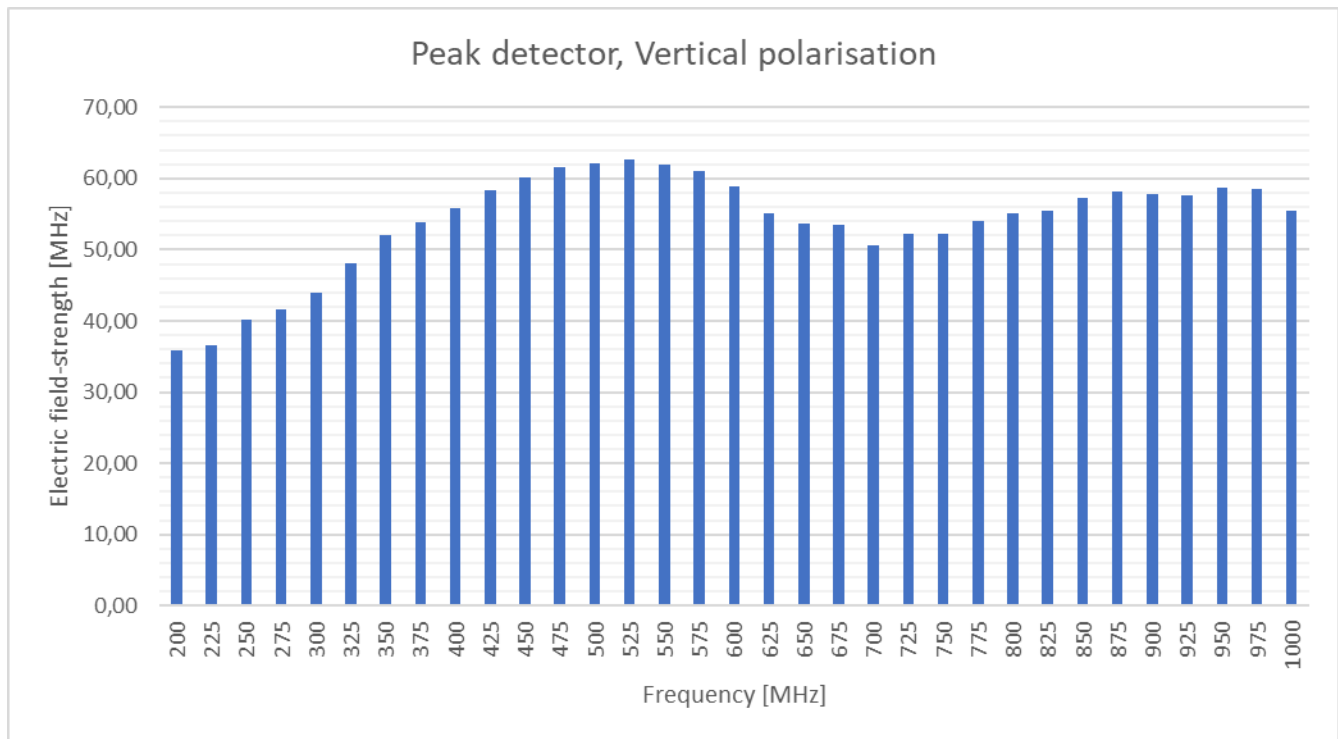


Measured with biconical antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|
| 50              | 17,46            | 20,81           | 52,94             | 53,03            |
| 75              | 16,88            | 19,18           | 57,20             | 57,26            |
| 100             | 31,67            | 32,40           | 62,09             | 62,15            |
| 125             | 28,77            | 30,17           | 61,54             | 61,61            |
| 150             | 43,61            | 43,94           | 70,68             | 70,74            |
| 175             | 51,89            | 52,06           | 72,35             | 72,41            |
| 200             | 41,98            | 42,52           | 66,53             | 66,60            |
| 225             | 55,26            | 55,40           | 77,04             | 77,11            |
| 250             | 50,84            | 51,09           | 77,41             | 77,48            |
| 275             | 48,99            | 49,29           | 73,63             | 73,71            |
| 300             | 45,72            | 46,25           | 72,82             | 72,90            |

## TBCG3-RN2 Comb Generator

### 5.9 25 MHz comb frequency, 10 cm antenna, amplifier off, 200 MHz – 1 GHz

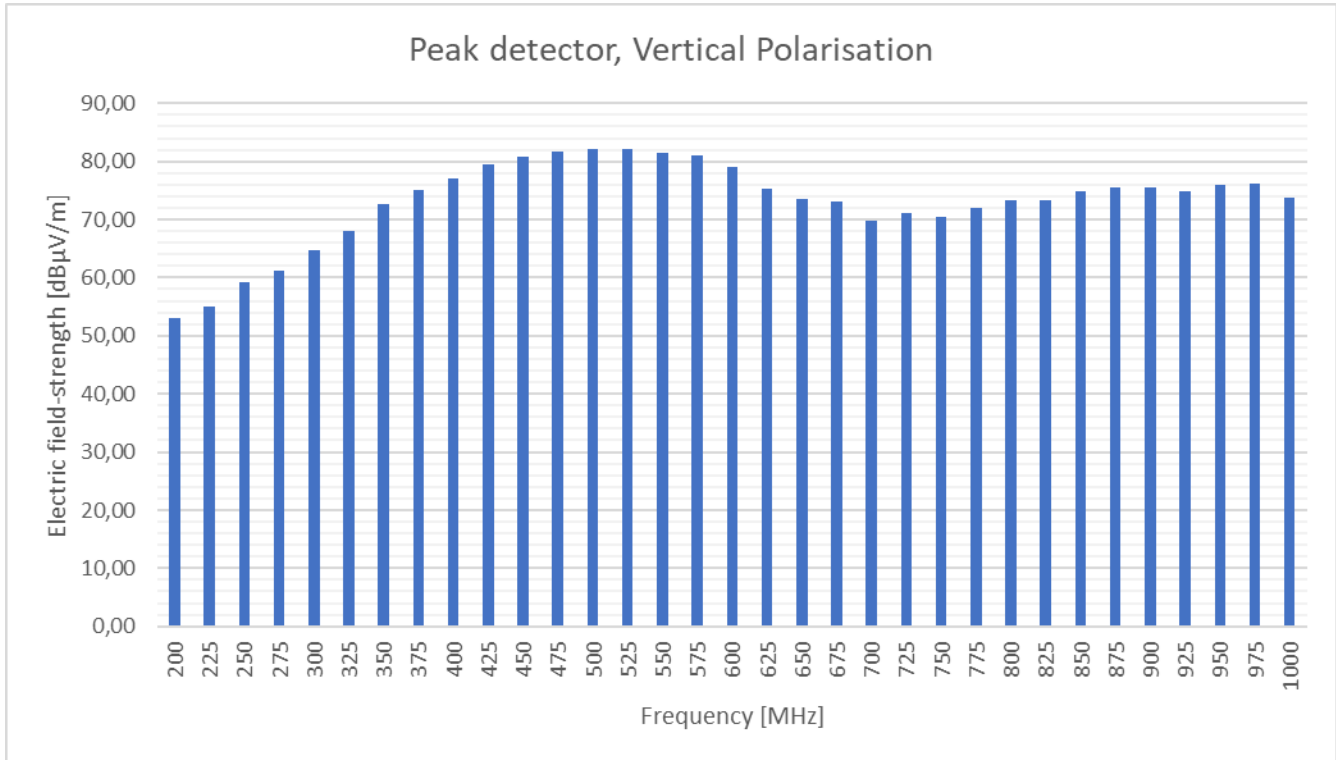


Measured with logarithmic periodic antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dB $\mu$ V/m] | PK HOR [dB $\mu$ V/m] | AVG VERT [dB $\mu$ V/m] | PK VERT [dB $\mu$ V/m] | Frequency [MHz] | AVG HOR [dB $\mu$ V/m] | PK HOR [dB $\mu$ V/m] | AVG VERT [dB $\mu$ V/m] | PK VERT [dB $\mu$ V/m] |
|-----------------|------------------------|-----------------------|-------------------------|------------------------|-----------------|------------------------|-----------------------|-------------------------|------------------------|
| 200             | 13,38                  | 19,15                 | 35,28                   | 35,93                  | 625             | 3,80                   | 22,13                 | 54,94                   | 55,13                  |
| 225             | 1,98                   | 15,07                 | 35,99                   | 36,59                  | 650             | 27,30                  | 31,07                 | 53,43                   | 53,66                  |
| 250             | 9,92                   | 17,72                 | 39,83                   | 40,26                  | 675             | 29,27                  | 32,56                 | 53,29                   | 53,52                  |
| 275             | 13,48                  | 19,98                 | 41,11                   | 41,56                  | 700             | 28,68                  | 32,22                 | 50,33                   | 50,68                  |
| 300             | 22,34                  | 25,41                 | 43,60                   | 43,93                  | 725             | 25,73                  | 30,61                 | 52,03                   | 52,32                  |
| 325             | 21,19                  | 25,14                 | 47,81                   | 48,03                  | 750             | 31,55                  | 34,17                 | 51,89                   | 52,22                  |
| 350             | 28,91                  | 30,70                 | 51,81                   | 51,99                  | 775             | 27,67                  | 31,45                 | 53,75                   | 53,98                  |
| 375             | 14,88                  | 21,83                 | 53,76                   | 53,90                  | 800             | 31,49                  | 34,25                 | 54,89                   | 55,13                  |
| 400             | 28,13                  | 30,36                 | 55,76                   | 55,89                  | 825             | 30,70                  | 34,07                 | 55,21                   | 55,44                  |
| 425             | 25,18                  | 28,66                 | 58,34                   | 58,43                  | 850             | 34,84                  | 36,99                 | 57,16                   | 57,35                  |
| 450             | 23,49                  | 27,31                 | 60,12                   | 60,20                  | 875             | 30,14                  | 33,77                 | 58,06                   | 58,24                  |
| 475             | 36,08                  | 37,36                 | 61,50                   | 61,59                  | 900             | 29,64                  | 33,49                 | 57,88                   | 58,05                  |
| 500             | 38,94                  | 39,84                 | 61,99                   | 62,07                  | 925             | 34,59                  | 36,91                 | 57,41                   | 57,62                  |
| 525             | 39,74                  | 40,57                 | 62,54                   | 62,61                  | 950             | 35,53                  | 37,76                 | 58,48                   | 58,67                  |
| 550             | 26,99                  | 30,34                 | 61,83                   | 61,91                  | 975             | 34,82                  | 37,36                 | 58,43                   | 58,61                  |
| 575             | 29,89                  | 32,76                 | 61,05                   | 61,14                  | 1000            | 29,72                  | 34,04                 | 55,12                   | 55,41                  |
| 600             | 29,05                  | 32,21                 | 58,78                   | 58,91                  |                 |                        |                       |                         |                        |

## TBCG3-RN2 Comb Generator

### 5.10 25 MHz comb frequency, 10 cm antenna, amplifier on, 200 MHz – 1 GHz



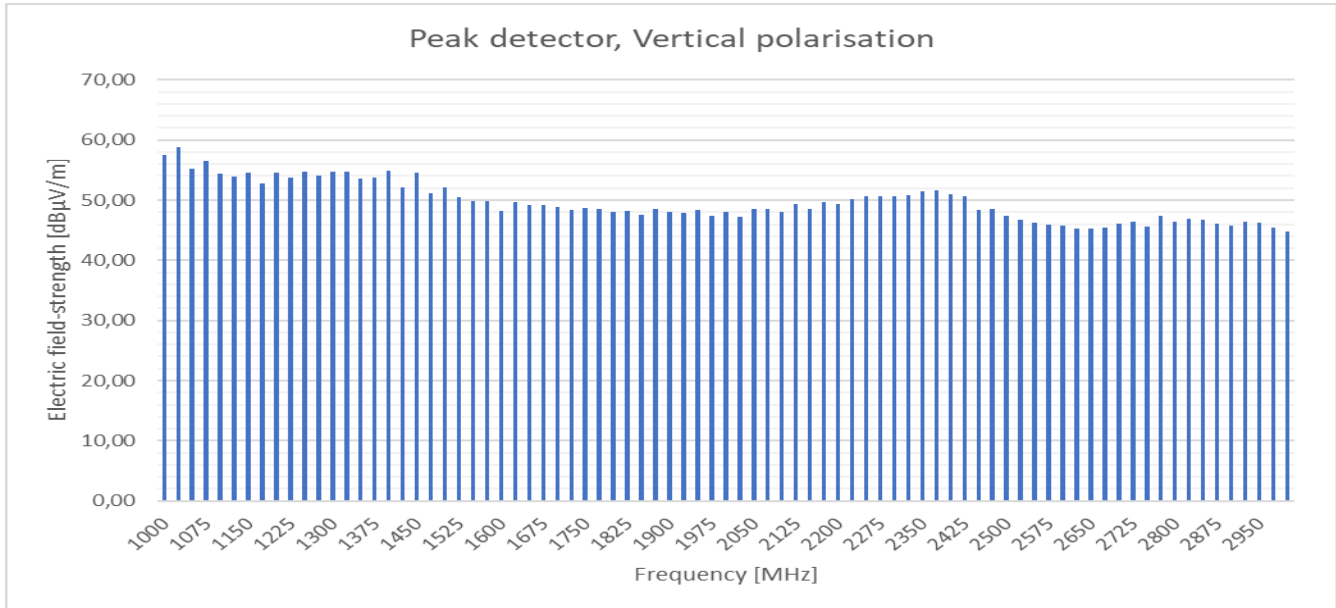
Measured with logarithmic periodic antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] | Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|
| 200             | 35,84            | 36,48           | 52,98             | 53,09            | 625             | 34,66            | 36,50           | 75,29             | 75,33            |
| 225             | 24,94            | 26,87           | 55,02             | 55,12            | 650             | 49,02            | 49,44           | 73,49             | 73,52            |
| 250             | 28,43            | 29,89           | 59,16             | 59,25            | 675             | 47,28            | 47,75           | 72,97             | 73,01            |
| 275             | 26,22            | 28,30           | 61,02             | 61,11            | 700             | 49,18            | 49,60           | 69,79             | 69,83            |
| 300             | 40,52            | 40,99           | 64,67             | 64,77            | 725             | 44,04            | 44,76           | 71,17             | 71,22            |
| 325             | 44,42            | 44,75           | 67,88             | 67,96            | 750             | 49,40            | 49,78           | 70,48             | 70,53            |
| 350             | 49,04            | 49,26           | 72,57             | 72,65            | 775             | 46,08            | 46,66           | 71,99             | 72,03            |
| 375             | 42,12            | 42,58           | 75,03             | 75,09            | 800             | 51,02            | 51,39           | 73,23             | 73,27            |
| 400             | 49,43            | 49,69           | 77,10             | 77,16            | 825             | 50,23            | 50,61           | 73,32             | 73,36            |
| 425             | 49,46            | 49,72           | 79,44             | 79,49            | 850             | 52,45            | 52,81           | 74,77             | 74,81            |
| 450             | 44,74            | 45,18           | 80,86             | 80,90            | 875             | 50,79            | 51,22           | 75,46             | 75,50            |
| 475             | 53,50            | 53,67           | 81,70             | 81,75            | 900             | 49,91            | 50,44           | 75,56             | 75,59            |
| 500             | 58,34            | 58,44           | 82,09             | 82,13            | 925             | 51,53            | 51,93           | 74,92             | 74,96            |
| 525             | 58,57            | 58,67           | 82,00             | 82,03            | 950             | 53,81            | 54,11           | 75,92             | 75,95            |
| 550             | 42,28            | 42,94           | 81,40             | 81,43            | 975             | 51,90            | 52,29           | 76,17             | 76,21            |
| 575             | 52,54            | 52,78           | 80,92             | 80,95            | 1000            | 48,23            | 48,85           | 73,60             | 73,65            |
| 600             | 52,02            | 52,29           | 79,01             | 79,05            |                 |                  |                 |                   |                  |



## TBCG3-RN2 Comb Generator

### 5.11 25 MHz comb frequency, 10 cm antenna, amplifier off, 1 GHz – 3 GHz

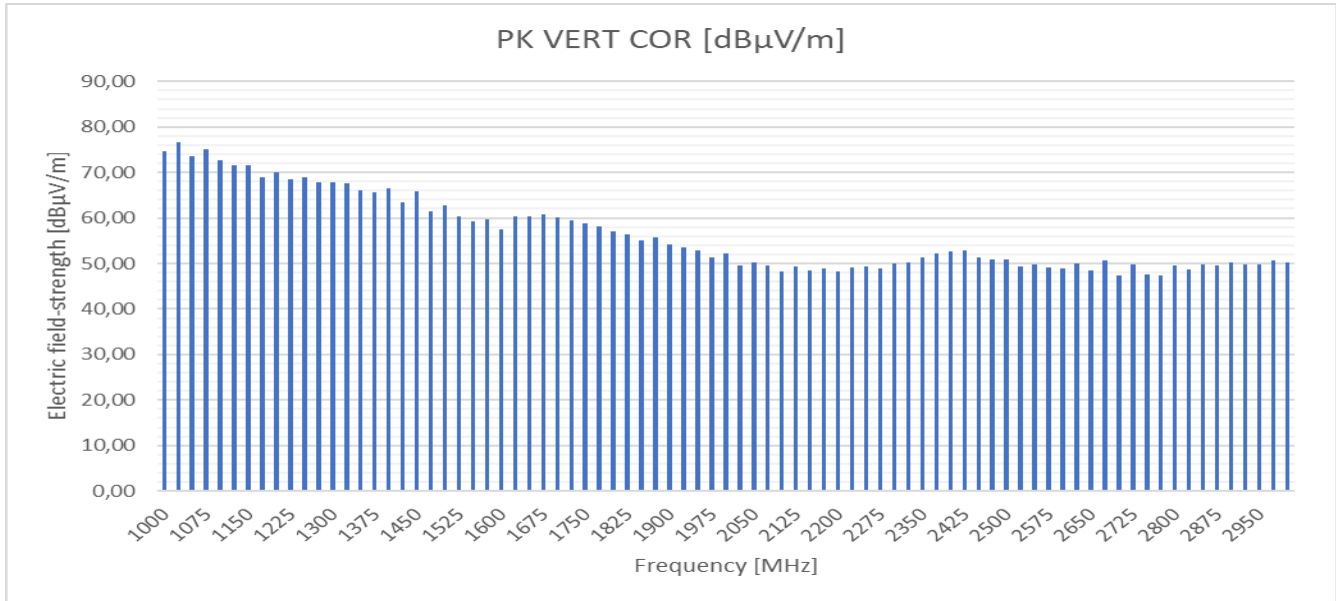


Measured with horn antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] | Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|
| 1000            | 29,42            | 42,14           | 56,23             | 57,42            | 2025            | 28,94            | 42,70           | 41,03             | 47,20            |
| 1025            | 29,16            | 41,31           | 57,73             | 58,81            | 2050            | 29,15            | 42,09           | 43,42             | 48,47            |
| 1050            | 26,58            | 39,44           | 54,01             | 55,29            | 2075            | 29,61            | 42,96           | 42,71             | 48,59            |
| 1075            | 26,38            | 39,12           | 55,38             | 56,44            | 2100            | 30,02            | 43,11           | 41,17             | 47,96            |
| 1100            | 26,09            | 39,37           | 53,01             | 54,45            | 2125            | 30,48            | 43,93           | 43,49             | 49,26            |
| 1125            | 26,16            | 39,25           | 52,31             | 53,91            | 2150            | 30,99            | 44,76           | 42,14             | 48,54            |
| 1150            | 27,32            | 40,91           | 53,02             | 54,54            | 2175            | 31,37            | 45,13           | 44,02             | 49,74            |
| 1175            | 26,64            | 39,67           | 50,86             | 52,82            | 2200            | 31,79            | 44,83           | 42,80             | 49,40            |
| 1200            | 27,32            | 39,98           | 52,95             | 54,56            | 2225            | 32,02            | 44,48           | 43,90             | 50,23            |
| 1225            | 27,11            | 39,69           | 51,99             | 53,82            | 2250            | 32,16            | 45,38           | 45,10             | 50,63            |
| 1250            | 26,69            | 39,61           | 53,05             | 54,65            | 2275            | 32,01            | 44,76           | 44,12             | 50,61            |
| 1275            | 26,63            | 41,03           | 52,44             | 54,08            | 2300            | 31,84            | 45,68           | 45,22             | 50,61            |
| 1300            | 26,66            | 39,80           | 53,07             | 54,73            | 2325            | 32,12            | 45,06           | 44,88             | 50,76            |
| 1325            | 26,58            | 39,82           | 53,21             | 54,78            | 2350            | 32,63            | 45,34           | 45,49             | 51,47            |
| 1350            | 26,60            | 39,92           | 52,04             | 53,65            | 2375            | 33,45            | 46,25           | 44,32             | 51,61            |
| 1375            | 26,56            | 39,38           | 51,95             | 53,71            | 2400            | 34,21            | 46,78           | 42,85             | 50,97            |
| 1400            | 26,78            | 39,70           | 53,32             | 54,89            | 2425            | 33,72            | 47,16           | 42,21             | 50,70            |
| 1425            | 26,68            | 40,25           | 50,02             | 52,06            | 2450            | 33,01            | 46,74           | 38,21             | 48,43            |
| 1450            | 26,94            | 40,03           | 52,80             | 54,50            | 2475            | 32,72            | 46,01           | 37,87             | 48,48            |
| 1475            | 27,08            | 40,16           | 48,29             | 51,08            | 2500            | 32,62            | 45,28           | 36,34             | 47,41            |
| 1500            | 27,30            | 40,77           | 49,76             | 52,19            | 2525            | 32,31            | 45,40           | 34,41             | 46,81            |
| 1525            | 27,48            | 40,45           | 47,41             | 50,55            | 2550            | 32,10            | 45,01           | 34,15             | 46,23            |
| 1550            | 27,70            | 41,53           | 46,47             | 49,79            | 2575            | 32,03            | 45,00           | 33,15             | 45,86            |
| 1575            | 27,80            | 40,43           | 46,68             | 49,84            | 2600            | 31,87            | 44,80           | 32,84             | 45,74            |
| 1600            | 27,46            | 40,42           | 44,21             | 48,14            | 2625            | 31,93            | 44,71           | 32,99             | 45,23            |
| 1625            | 27,34            | 39,83           | 46,51             | 49,75            | 2650            | 32,13            | 45,45           | 32,55             | 45,30            |
| 1650            | 27,32            | 39,93           | 45,77             | 49,11            | 2675            | 32,26            | 45,07           | 32,75             | 45,48            |
| 1675            | 27,26            | 40,52           | 45,88             | 49,23            | 2700            | 32,48            | 45,87           | 32,46             | 46,01            |
| 1700            | 27,27            | 40,39           | 45,21             | 48,80            | 2725            | 32,59            | 45,59           | 32,68             | 46,47            |
| 1725            | 27,54            | 40,60           | 44,70             | 48,39            | 2750            | 32,77            | 45,53           | 32,79             | 45,64            |
| 1750            | 27,87            | 40,56           | 44,42             | 48,66            | 2775            | 33,63            | 46,53           | 33,58             | 47,43            |
| 1775            | 28,00            | 40,94           | 44,16             | 48,56            | 2800            | 33,41            | 47,57           | 33,37             | 46,41            |
| 1800            | 27,68            | 40,58           | 43,68             | 47,98            | 2825            | 33,69            | 47,10           | 33,64             | 46,87            |
| 1825            | 27,80            | 40,69           | 43,83             | 48,15            | 2850            | 33,87            | 47,23           | 33,83             | 46,77            |
| 1850            | 27,70            | 41,63           | 43,17             | 47,61            | 2875            | 33,04            | 46,25           | 33,00             | 46,02            |
| 1875            | 27,93            | 40,92           | 44,49             | 48,45            | 2900            | 32,99            | 45,98           | 32,94             | 45,82            |
| 1900            | 28,08            | 42,54           | 43,44             | 48,00            | 2925            | 32,64            | 45,76           | 32,59             | 46,39            |
| 1925            | 28,20            | 41,37           | 43,28             | 47,87            | 2950            | 32,49            | 45,42           | 32,47             | 46,28            |
| 1950            | 28,48            | 41,84           | 43,19             | 48,35            | 2975            | 32,30            | 45,91           | 32,25             | 45,41            |
| 1975            | 28,47            | 41,18           | 42,18             | 47,42            | 3000            | 31,85            | 44,98           | 31,84             | 44,82            |
| 2000            | 28,55            | 41,93           | 43,39             | 48,12            |                 |                  |                 |                   |                  |

## TBCG3-RN2 Comb Generator

### 5.12 25 MHz comb frequency, 10 cm antenna, amplifier on, 1 GHz – 3 GHz

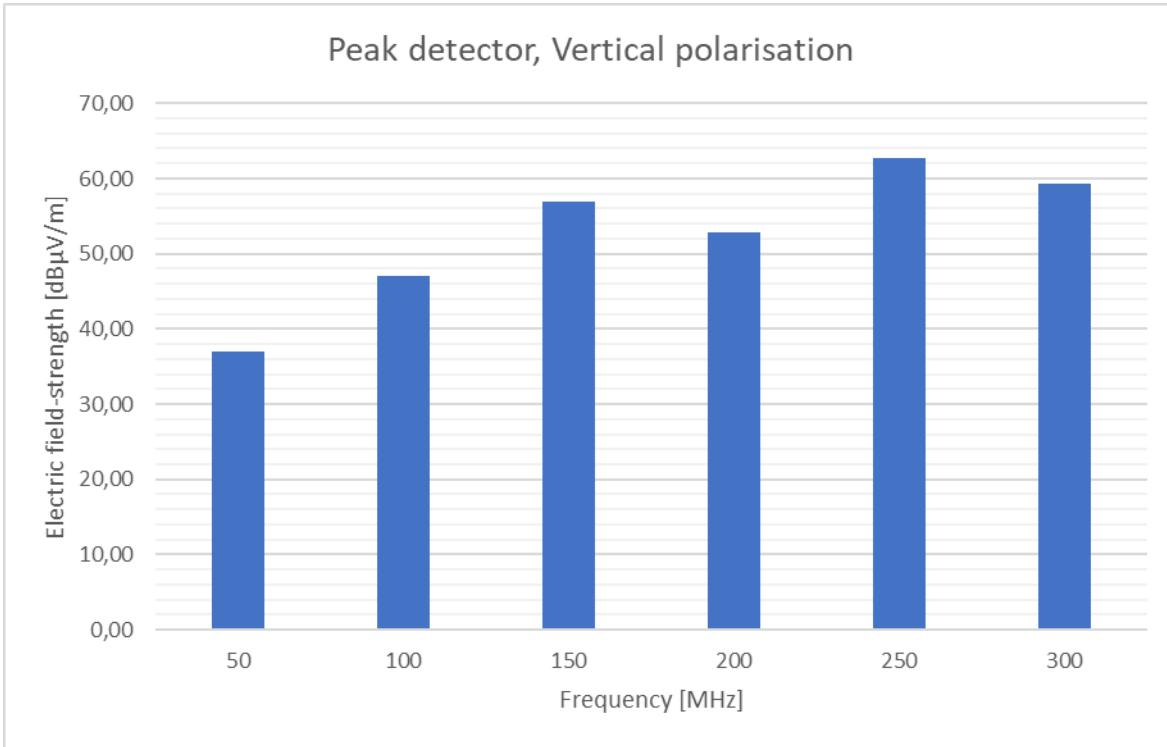


Measured with horn antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] | Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|
| 1000            | 43,69            | 48,09           | 74,59             | 74,75            | 2025            | 28,94            | 42,37           | 45,11             | 49,46            |
| 1025            | 43,07            | 48,05           | 76,57             | 76,71            | 2050            | 29,15            | 42,14           | 46,44             | 50,33            |
| 1050            | 38,97            | 44,42           | 73,43             | 73,58            | 2075            | 29,62            | 42,27           | 44,97             | 49,47            |
| 1075            | 38,40            | 44,39           | 74,96             | 75,09            | 2100            | 30,01            | 43,32           | 42,47             | 48,31            |
| 1100            | 33,14            | 41,90           | 72,56             | 72,73            | 2125            | 30,47            | 43,60           | 43,83             | 49,39            |
| 1125            | 31,17            | 41,87           | 71,41             | 71,61            | 2150            | 30,98            | 44,10           | 41,83             | 48,41            |
| 1150            | 38,15            | 44,20           | 71,35             | 71,56            | 2175            | 31,35            | 44,85           | 42,57             | 49,00            |
| 1175            | 29,38            | 40,71           | 68,55             | 68,87            | 2200            | 31,77            | 45,35           | 40,74             | 48,29            |
| 1200            | 31,66            | 41,97           | 69,84             | 70,10            | 2225            | 32,00            | 45,19           | 41,42             | 49,04            |
| 1225            | 35,30            | 43,20           | 68,24             | 68,54            | 2250            | 32,13            | 45,12           | 42,36             | 49,31            |
| 1250            | 29,89            | 41,14           | 68,68             | 68,95            | 2275            | 32,00            | 44,80           | 41,69             | 48,96            |
| 1275            | 27,53            | 40,27           | 67,49             | 67,82            | 2300            | 31,83            | 45,01           | 43,47             | 50,03            |
| 1300            | 29,90            | 41,73           | 67,55             | 67,87            | 2325            | 32,11            | 45,57           | 43,96             | 50,26            |
| 1325            | 28,68            | 40,61           | 67,29             | 67,63            | 2350            | 32,62            | 46,11           | 45,77             | 51,29            |
| 1350            | 29,22            | 41,20           | 65,67             | 66,08            | 2375            | 33,47            | 46,59           | 46,49             | 52,21            |
| 1375            | 28,47            | 40,77           | 65,26             | 65,65            | 2400            | 34,20            | 47,45           | 46,58             | 52,64            |
| 1400            | 29,12            | 40,46           | 66,20             | 66,58            | 2425            | 33,76            | 46,87           | 47,44             | 52,94            |
| 1425            | 27,44            | 40,06           | 62,80             | 63,36            | 2450            | 33,04            | 45,95           | 44,63             | 51,35            |
| 1450            | 27,12            | 40,07           | 65,45             | 65,88            | 2475            | 32,74            | 45,88           | 44,86             | 50,79            |
| 1475            | 27,44            | 40,61           | 60,72             | 61,43            | 2500            | 32,63            | 46,08           | 44,36             | 50,90            |
| 1500            | 30,63            | 41,78           | 62,22             | 62,84            | 2525            | 32,32            | 45,01           | 41,84             | 49,33            |
| 1525            | 27,92            | 40,58           | 59,47             | 60,34            | 2550            | 32,26            | 44,98           | 43,11             | 49,78            |
| 1550            | 28,22            | 41,79           | 58,27             | 59,26            | 2575            | 32,04            | 44,86           | 41,33             | 49,13            |
| 1575            | 31,24            | 42,14           | 58,67             | 59,59            | 2600            | 32,86            | 45,17           | 41,86             | 48,81            |
| 1600            | 28,26            | 41,08           | 56,46             | 57,57            | 2625            | 32,25            | 45,50           | 44,26             | 49,93            |
| 1625            | 27,56            | 40,94           | 59,43             | 60,31            | 2650            | 32,29            | 45,42           | 40,73             | 48,53            |
| 1650            | 27,56            | 40,58           | 59,39             | 60,26            | 2675            | 32,26            | 45,18           | 44,89             | 50,62            |
| 1675            | 27,68            | 40,55           | 59,93             | 60,76            | 2700            | 32,61            | 46,32           | 35,35             | 47,43            |
| 1700            | 30,78            | 41,85           | 59,38             | 60,23            | 2725            | 32,61            | 45,82           | 42,67             | 49,87            |
| 1725            | 31,95            | 42,17           | 58,65             | 59,56            | 2750            | 32,92            | 46,14           | 36,78             | 47,59            |
| 1750            | 31,56            | 42,31           | 57,81             | 58,87            | 2775            | 33,79            | 46,96           | 34,57             | 47,31            |
| 1775            | 30,20            | 42,00           | 56,90             | 58,12            | 2800            | 33,48            | 46,54           | 38,66             | 49,52            |
| 1800            | 28,14            | 40,92           | 55,54             | 56,94            | 2825            | 33,72            | 47,01           | 37,47             | 48,72            |
| 1825            | 28,74            | 41,21           | 55,03             | 56,46            | 2850            | 34,04            | 46,70           | 41,13             | 49,87            |
| 1850            | 28,41            | 41,06           | 53,61             | 55,14            | 2875            | 33,18            | 46,05           | 41,23             | 49,50            |
| 1875            | 28,15            | 41,59           | 54,10             | 55,67            | 2900            | 33,96            | 46,67           | 43,09             | 50,28            |
| 1900            | 28,38            | 41,42           | 52,18             | 54,10            | 2925            | 33,05            | 46,27           | 42,84             | 49,83            |
| 1925            | 28,50            | 41,06           | 51,21             | 53,48            | 2950            | 32,60            | 45,96           | 42,93             | 49,76            |
| 1950            | 28,65            | 42,65           | 50,26             | 52,88            | 2975            | 32,82            | 46,19           | 44,92             | 50,73            |
| 1975            | 28,51            | 41,39           | 48,38             | 51,31            | 3000            | 31,93            | 45,60           | 44,29             | 50,22            |
| 2000            | 28,57            | 41,33           | 48,91             | 52,30            |                 |                  |                 |                   |                  |

## TBCG3-RN2 Comb Generator

### 5.13 50 MHz comb frequency, 10 cm antenna, amplifier off, 30 MHz – 300 MHz

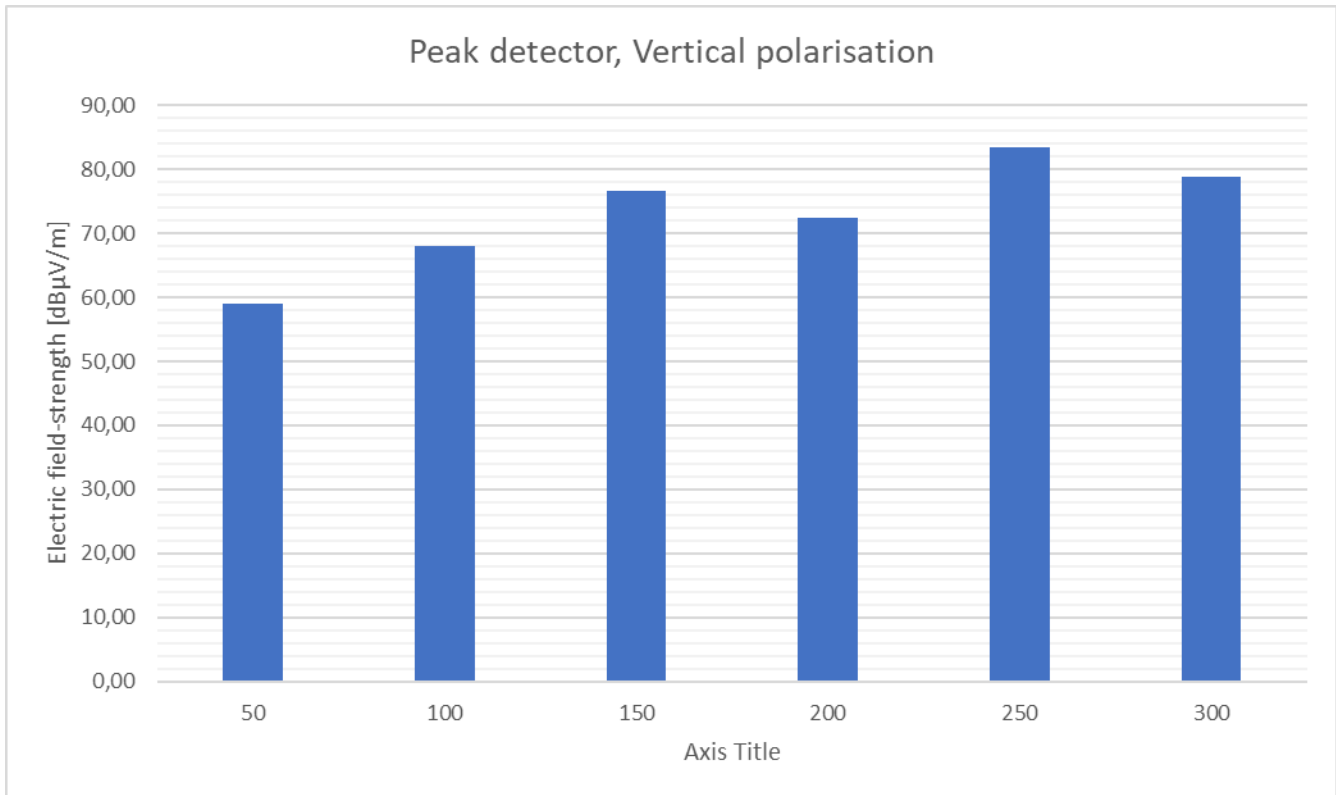


Measured with biconical antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|
| 50              | -0,35            | 13,09           | 36,45             | 36,92            |
| 100             | 16,00            | 20,18           | 46,90             | 47,05            |
| 150             | 29,54            | 31,11           | 56,76             | 56,85            |
| 200             | 28,24            | 30,42           | 52,72             | 52,88            |
| 250             | 35,96            | 37,26           | 62,63             | 62,70            |
| 300             | 31,69            | 34,17           | 59,21             | 59,34            |

## TBCG3-RN2 Comb Generator

### 5.14 50 MHz comb frequency, 10 cm antenna, amplifier on, 30 MHz – 300 MHz

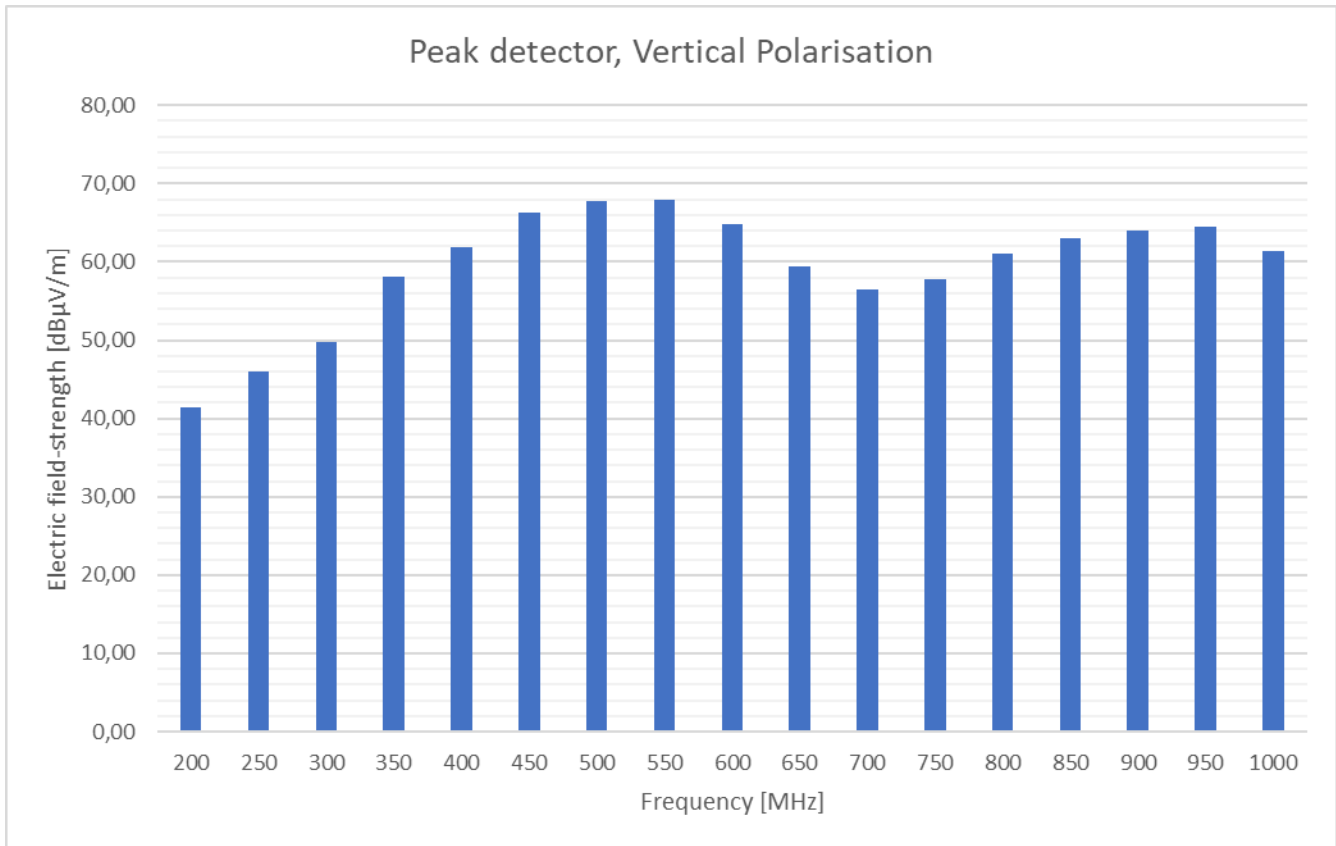


Measured with biconical antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|
| 50              | 23,58            | 25,53           | 58,90             | 58,95            |
| 100             | 37,66            | 38,05           | 68,09             | 68,12            |
| 150             | 49,56            | 49,74           | 76,64             | 76,67            |
| 200             | 48,16            | 48,43           | 72,43             | 72,48            |
| 250             | 56,87            | 56,99           | 83,41             | 83,45            |
| 300             | 51,71            | 52,00           | 78,84             | 78,89            |

## TBCG3-RN2 Comb Generator

### 5.15 50 MHz comb frequency, 10 cm antenna, amplifier off, 200 MHz – 1000 MHz

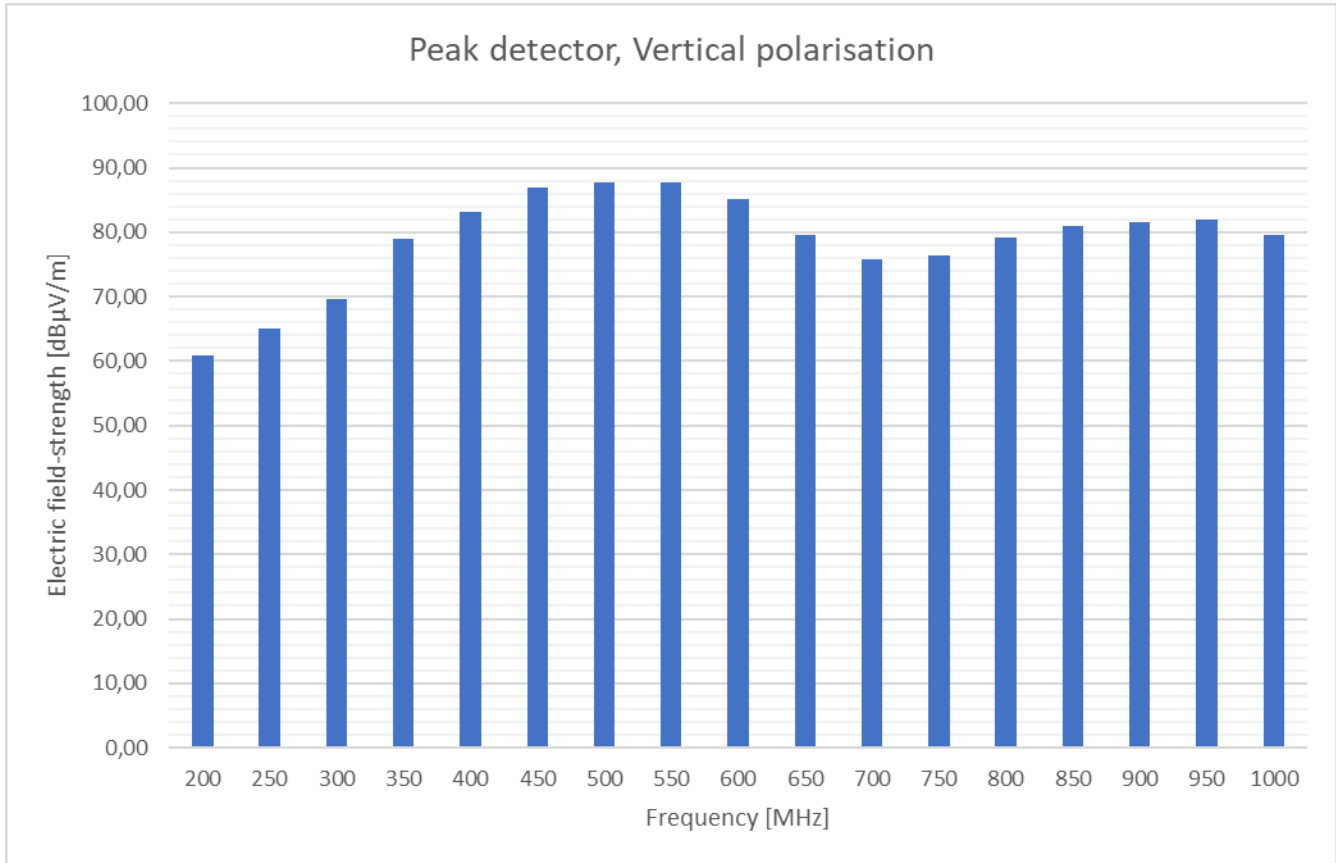


Measured with logarithmic periodic antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|
| 200             | 19,38            | 22,79           | 41,03             | 41,38            |
| 250             | 16,35            | 20,97           | 45,83             | 46,05            |
| 300             | 28,65            | 30,41           | 49,63             | 49,80            |
| 350             | 35,32            | 36,29           | 57,97             | 58,05            |
| 400             | 34,19            | 35,33           | 61,77             | 61,84            |
| 450             | 29,87            | 32,03           | 66,23             | 66,27            |
| 500             | 44,61            | 45,11           | 67,72             | 67,77            |
| 550             | 33,35            | 35,16           | 67,85             | 67,89            |
| 600             | 35,11            | 36,84           | 64,79             | 64,86            |
| 650             | 33,31            | 35,41           | 59,39             | 59,50            |
| 700             | 34,80            | 36,80           | 56,24             | 56,42            |
| 750             | 37,37            | 38,79           | 57,62             | 57,77            |
| 800             | 37,63            | 39,12           | 60,91             | 61,03            |
| 850             | 40,58            | 41,74           | 62,86             | 62,96            |
| 900             | 36,08            | 38,19           | 63,97             | 64,06            |
| 950             | 41,46            | 42,62           | 64,39             | 64,48            |
| 1000            | 36,00            | 38,24           | 61,21             | 61,35            |

## TBCG3-RN2 Comb Generator

### 5.16 50 MHz comb frequency, 10 cm antenna, amplifier on, 200 MHz – 1000 MHz

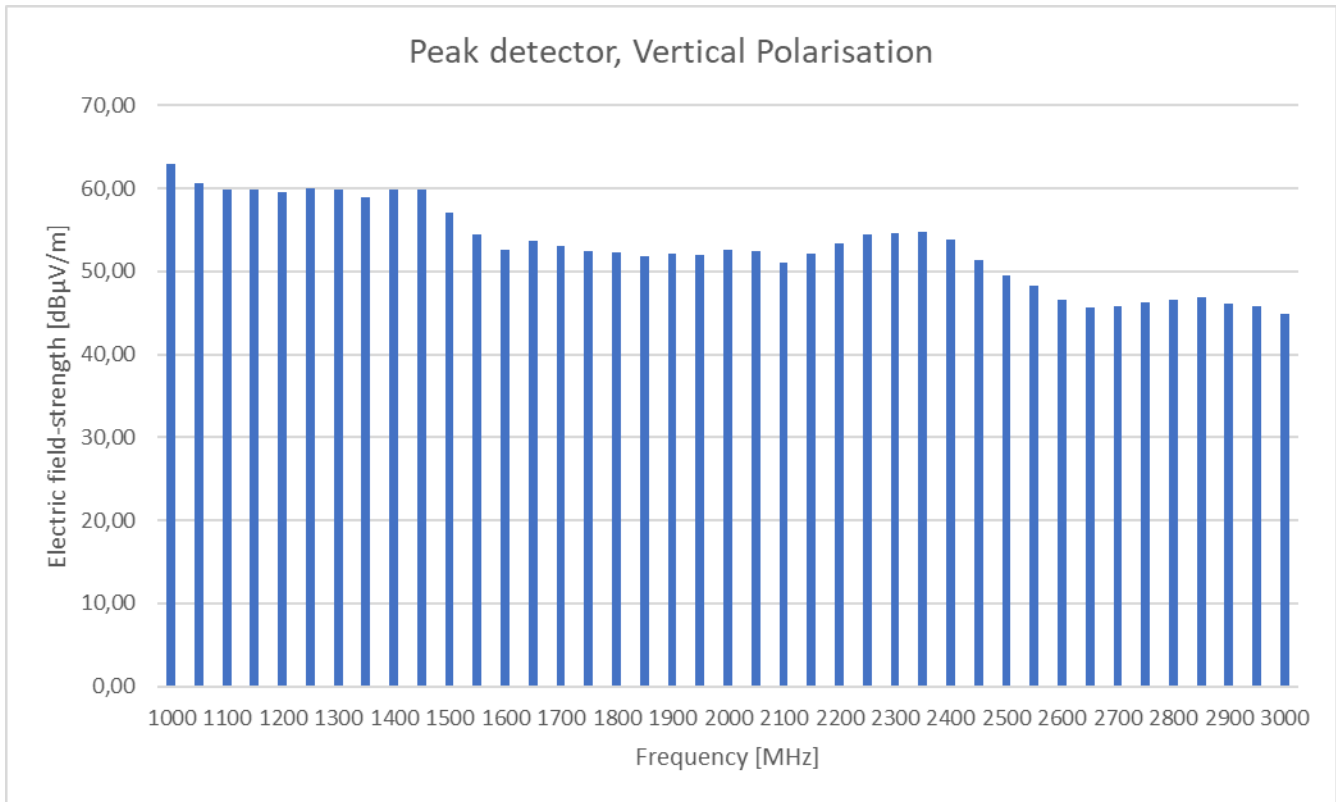


Measured with logarithmic periodic antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG COR [dBµV/m] | PK HOR [dBµV/m] | AVG COR [dBµV/m] | PK COR [dBµV/m] |
|-----------------|------------------|-----------------|------------------|-----------------|
| 200             | 42,32            | 42,61           | 60,81            | 60,86           |
| 250             | 34,57            | 35,31           | 65,10            | 65,14           |
| 300             | 46,56            | 46,81           | 69,57            | 69,62           |
| 350             | 55,20            | 55,31           | 78,92            | 78,97           |
| 400             | 55,50            | 55,61           | 83,06            | 83,10           |
| 450             | 50,91            | 51,11           | 86,94            | 86,97           |
| 500             | 64,36            | 64,42           | 87,71            | 87,74           |
| 550             | 47,25            | 47,65           | 87,60            | 87,63           |
| 600             | 58,25            | 58,38           | 85,13            | 85,16           |
| 650             | 55,14            | 55,32           | 79,62            | 79,65           |
| 700             | 55,19            | 55,41           | 75,67            | 75,71           |
| 750             | 55,23            | 55,43           | 76,33            | 76,36           |
| 800             | 57,18            | 57,35           | 79,22            | 79,25           |
| 850             | 58,36            | 58,52           | 80,91            | 80,94           |
| 900             | 56,18            | 56,40           | 81,52            | 81,55           |
| 950             | 59,86            | 60,01           | 81,96            | 81,99           |
| 1000            | 54,67            | 54,97           | 79,58            | 79,61           |

## TBCG3-RN2 Comb Generator

### 5.17 50 MHz comb frequency, 10 cm antenna, amplifier off, 1 GHz – 3 GHz

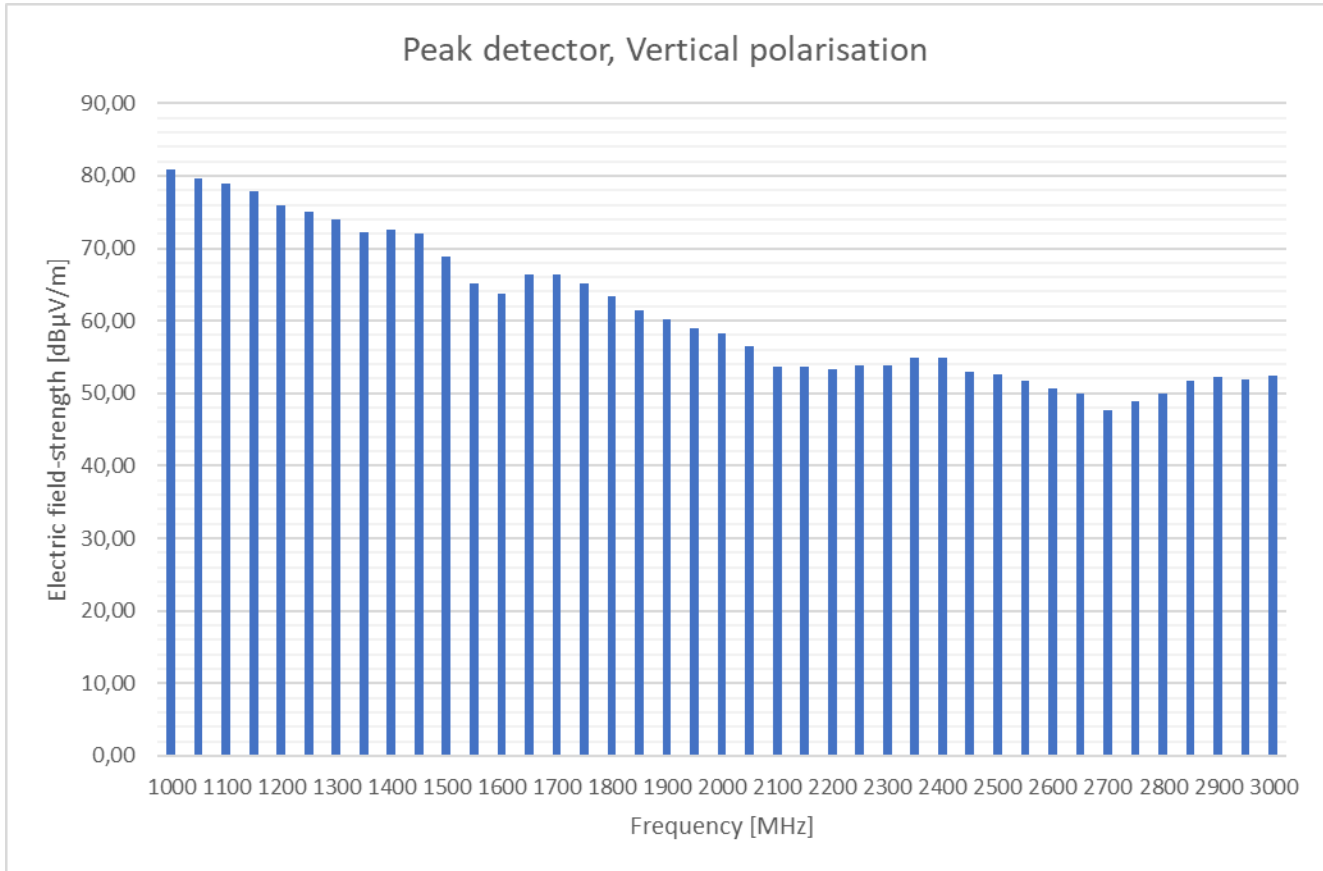


### Measured with horn antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] | Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|
| 1000            | 32,42            | 44,08           | 62,29             | 62,95            | 2050            | 29,18            | 41,95           | 49,56             | 52,38            |
| 1050            | 28,40            | 40,43           | 59,95             | 60,65            | 2100            | 30,09            | 42,85           | 47,18             | 51,05            |
| 1100            | 59,10            | 59,88           | 59,10             | 59,88            | 2150            | 31,14            | 44,73           | 48,37             | 52,19            |
| 1150            | 28,60            | 41,10           | 59,17             | 59,91            | 2200            | 31,90            | 46,08           | 48,94             | 53,30            |
| 1200            | 27,31            | 40,07           | 58,63             | 59,50            | 2250            | 32,17            | 45,31           | 51,02             | 54,38            |
| 1250            | 27,18            | 39,78           | 59,18             | 60,00            | 2300            | 31,90            | 44,97           | 51,48             | 54,59            |
| 1300            | 27,19            | 40,25           | 59,02             | 59,79            | 2350            | 32,69            | 45,56           | 51,58             | 54,82            |
| 1350            | 26,92            | 39,75           | 58,04             | 58,97            | 2400            | 34,21            | 47,29           | 48,96             | 53,77            |
| 1400            | 26,75            | 39,67           | 59,12             | 59,90            | 2450            | 33,04            | 46,37           | 44,17             | 51,36            |
| 1450            | 27,09            | 39,85           | 58,89             | 59,82            | 2500            | 32,62            | 45,55           | 41,90             | 49,50            |
| 1500            | 28,12            | 41,01           | 55,94             | 57,12            | 2550            | 32,14            | 45,19           | 38,47             | 48,21            |
| 1550            | 28,03            | 41,09           | 52,43             | 54,41            | 2600            | 31,94            | 45,16           | 34,92             | 46,51            |
| 1600            | 27,57            | 40,70           | 50,34             | 52,65            | 2650            | 32,13            | 45,79           | 33,38             | 45,64            |
| 1650            | 27,32            | 40,89           | 51,84             | 53,68            | 2700            | 32,47            | 46,10           | 32,46             | 45,76            |
| 1700            | 27,78            | 40,40           | 51,15             | 53,07            | 2750            | 32,77            | 45,95           | 32,89             | 46,23            |
| 1750            | 28,23            | 41,30           | 50,40             | 52,51            | 2800            | 33,41            | 46,60           | 33,46             | 46,56            |
| 1800            | 27,75            | 40,83           | 49,96             | 52,22            | 2850            | 33,87            | 47,03           | 33,90             | 46,94            |
| 1850            | 27,91            | 40,66           | 49,23             | 51,79            | 2900            | 32,98            | 45,96           | 32,98             | 46,12            |
| 1900            | 28,26            | 41,11           | 49,37             | 52,08            | 2950            | 32,49            | 45,81           | 32,47             | 45,76            |
| 1950            | 28,60            | 41,30           | 49,19             | 52,01            | 3000            | 31,84            | 45,40           | 31,91             | 44,92            |
| 2000            | 28,52            | 41,51           | 49,95             | 52,56            |                 |                  |                 |                   |                  |

## TBCG3-RN2 Comb Generator

### 5.18 50 MHz comb frequency, 10 cm antenna, amplifier on, 1 GHz – 3 GHz



Measured with horn antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] | Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|
| 1000            | 49,82            | 52,24           | 80,76             | 80,84            | 2050            | 29,26            | 42,64           | 54,79             | 56,46            |
| 1050            | 44,93            | 48,37           | 79,64             | 79,71            | 2100            | 30,21            | 43,27           | 50,92             | 53,66            |
| 1100            | 38,95            | 44,38           | 78,80             | 78,88            | 2150            | 31,25            | 43,90           | 50,46             | 53,64            |
| 1150            | 44,89            | 48,28           | 77,84             | 77,93            | 2200            | 31,91            | 45,68           | 49,60             | 53,28            |
| 1200            | 37,39            | 44,63           | 75,79             | 75,92            | 2250            | 32,16            | 44,99           | 50,30             | 53,88            |
| 1250            | 35,11            | 43,27           | 74,98             | 75,12            | 2300            | 31,87            | 45,41           | 50,48             | 53,85            |
| 1300            | 33,57            | 42,86           | 73,76             | 73,91            | 2350            | 32,69            | 46,01           | 51,43             | 54,87            |
| 1350            | 33,49            | 42,48           | 71,95             | 72,14            | 2400            | 34,21            | 47,03           | 51,03             | 54,87            |
| 1400            | 33,76            | 42,79           | 72,46             | 72,62            | 2450            | 33,13            | 46,65           | 48,57             | 53,00            |
| 1450            | 27,62            | 40,64           | 71,76             | 71,96            | 2500            | 32,66            | 45,22           | 47,88             | 52,69            |
| 1500            | 34,11            | 43,32           | 68,54             | 68,86            | 2550            | 32,52            | 45,79           | 47,10             | 51,79            |
| 1550            | 29,90            | 41,86           | 64,68             | 65,16            | 2600            | 33,85            | 46,36           | 45,40             | 50,71            |
| 1600            | 29,85            | 41,67           | 63,17             | 63,75            | 2650            | 32,43            | 46,47           | 44,13             | 50,04            |
| 1650            | 28,12            | 41,08           | 66,00             | 66,44            | 2700            | 32,87            | 46,40           | 37,76             | 47,75            |
| 1700            | 35,79            | 44,33           | 66,00             | 66,39            | 2750            | 33,22            | 46,04           | 40,29             | 48,98            |
| 1750            | 36,07            | 44,01           | 64,57             | 65,08            | 2800            | 33,55            | 46,50           | 42,36             | 49,95            |
| 1800            | 30,85            | 42,00           | 62,82             | 63,40            | 2850            | 34,24            | 47,14           | 44,89             | 51,67            |
| 1850            | 30,73            | 42,14           | 60,65             | 61,39            | 2900            | 35,21            | 47,17           | 47,13             | 52,32            |
| 1900            | 29,93            | 41,95           | 59,28             | 60,17            | 2950            | 32,90            | 45,84           | 46,86             | 51,88            |
| 1950            | 29,62            | 42,18           | 57,70             | 58,90            | 3000            | 32,06            | 45,14           | 48,46             | 52,48            |
| 2000            | 28,71            | 41,68           | 56,97             | 58,31            |                 |                  |                 |                   |                  |

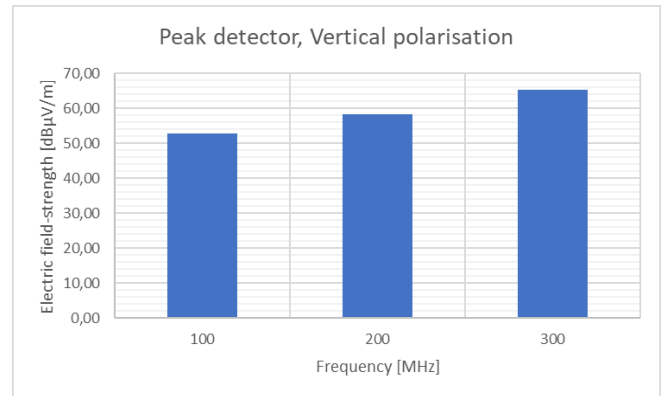


## TBCG3-RN2 Comb Generator

### 5.19 100 MHz comb frequency, 10 cm antenna, amplifier off, 30 MHz – 300 MHz

| Frequency [MHz] | AVG HOR [dBμV/m] | PK HOR [dBμV/m] | AVG VERT [dBμV/m] | PK VERT [dBμV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|
| 100             | 22,13            | 24,08           | 52,77             | 52,84            |
| 200             | 34,14            | 35,42           | 58,29             | 58,37            |
| 300             | 37,69            | 39,13           | 65,26             | 65,33            |

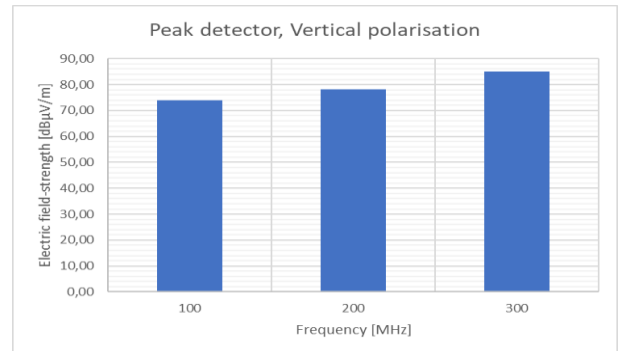
Measured with biconical antenna,  
3m distance, 1m height



### 5.20 100 MHz comb frequency, 10 cm antenna, amplifier on, 30 MHz – 300 MHz

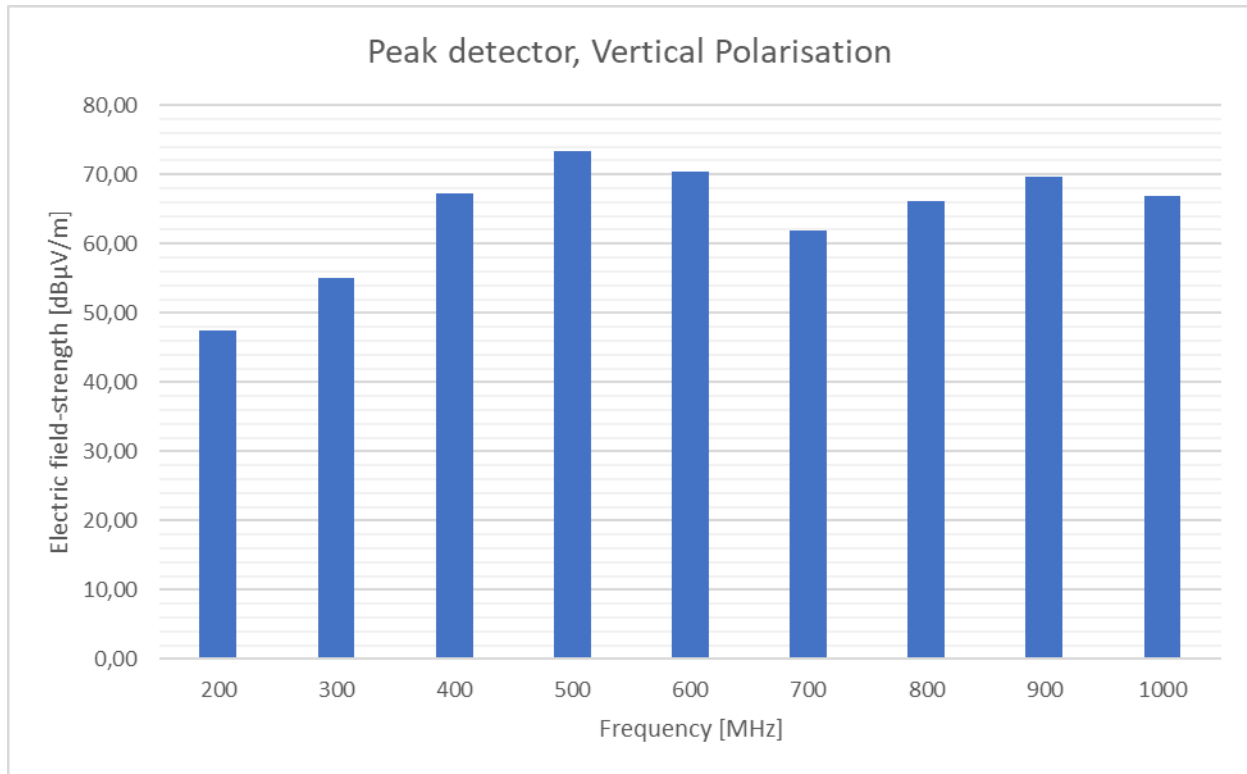
| Frequency [MHz] | AVG HOR [dBμV/m] | PK HOR [dBμV/m] | AVG VERT [dBμV/m] | PK VERT [dBμV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|
| 100             | 43,59            | 43,79           | 73,98             | 74,01            |
| 200             | 53,93            | 54,06           | 78,16             | 78,19            |
| 300             | 57,66            | 57,83           | 85,02             | 85,05            |

Measured with biconical antenna,  
3m distance, 1m height



## TBCG3-RN2 Comb Generator

### 5.21 100 MHz comb frequency, 10 cm antenna, amplifier off, 200 MHz – 1 GHz

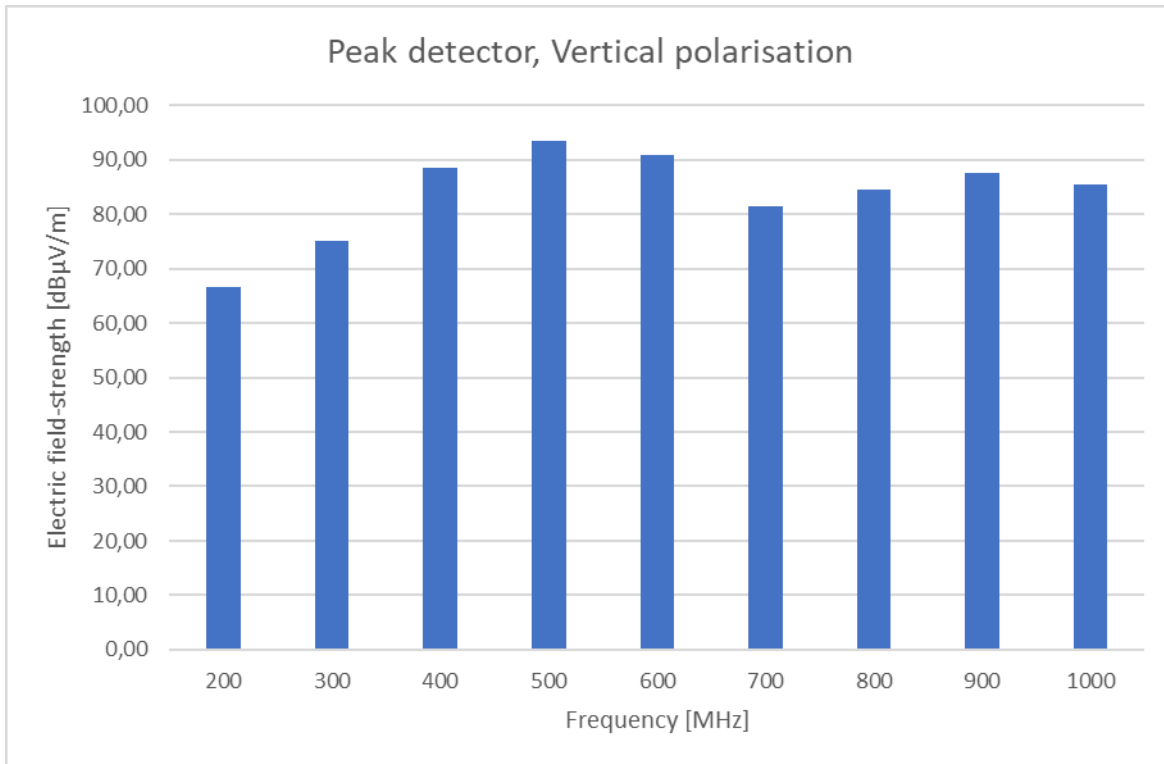


Measured with logarithmic periodic antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|
| 200             | 27,18            | 28,68           | 47,21             | 47,37            |
| 300             | 33,78            | 34,73           | 54,95             | 55,05            |
| 400             | 41,27            | 41,79           | 67,17             | 67,20            |
| 500             | 49,24            | 49,52           | 73,42             | 73,45            |
| 600             | 43,55            | 44,19           | 70,38             | 70,42            |
| 700             | 41,05            | 42,00           | 61,75             | 61,85            |
| 800             | 43,50            | 44,23           | 66,02             | 66,09            |
| 900             | 43,94            | 44,77           | 69,65             | 69,70            |
| 1000            | 41,44            | 42,74           | 66,76             | 66,84            |

## TBCG3-RN2 Comb Generator

### 5.22 100 MHz comb frequency, 10 cm antenna, amplifier on, 200 MHz – 1 GHz

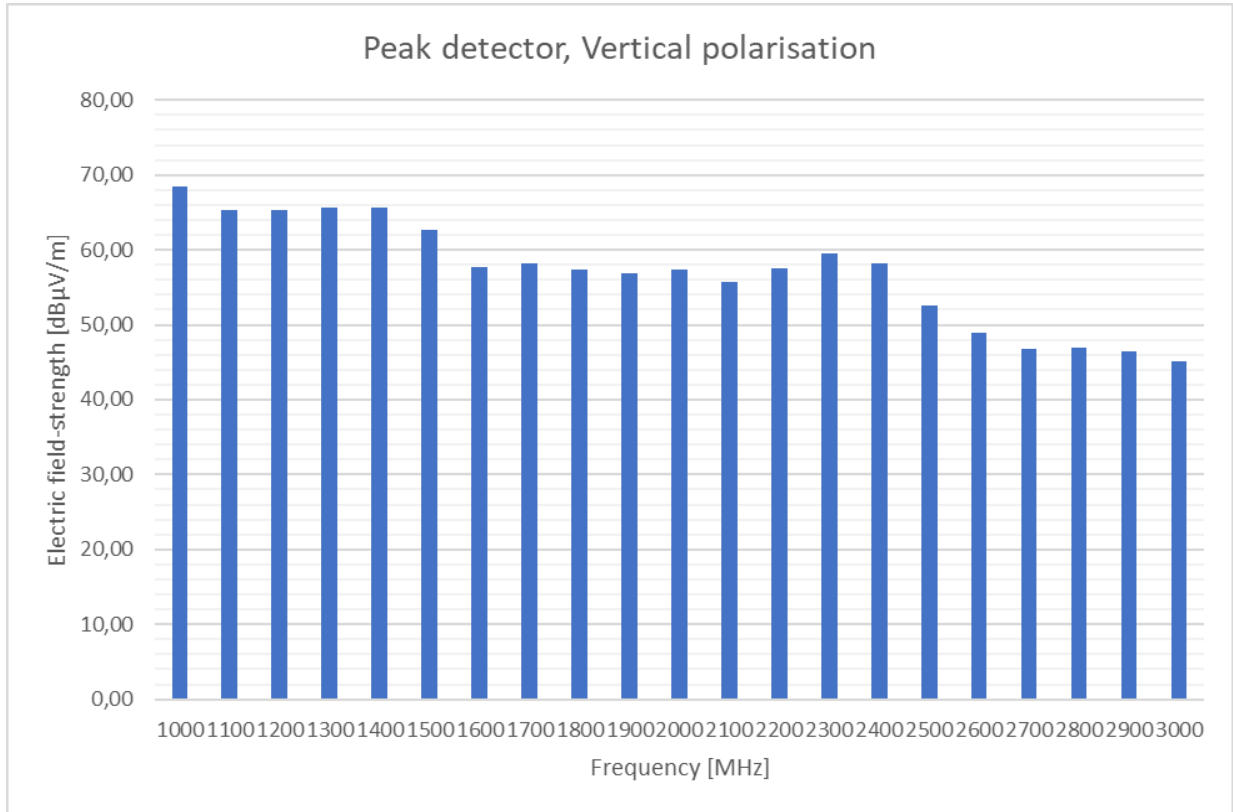


Measured with logarithmic periodic antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|-----------------|-------------------|------------------|
| 200             | 46,99            | 47,17           | 66,49             | 66,52            |
| 300             | 53,95            | 54,06           | 75,05             | 75,08            |
| 400             | 62,73            | 62,78           | 88,58             | 88,61            |
| 500             | 69,08            | 69,12           | 93,45             | 93,47            |
| 600             | 64,05            | 64,11           | 90,91             | 90,94            |
| 700             | 60,88            | 60,98           | 81,41             | 81,44            |
| 800             | 62,10            | 62,19           | 84,59             | 84,62            |
| 900             | 61,77            | 61,87           | 87,48             | 87,50            |
| 1000            | 59,99            | 60,16           | 85,37             | 85,40            |

## TBCG3-RN2 Comb Generator

### 5.23 100 MHz comb frequency, 10 cm antenna, amplifier off, 1 GHz – 3 GHz

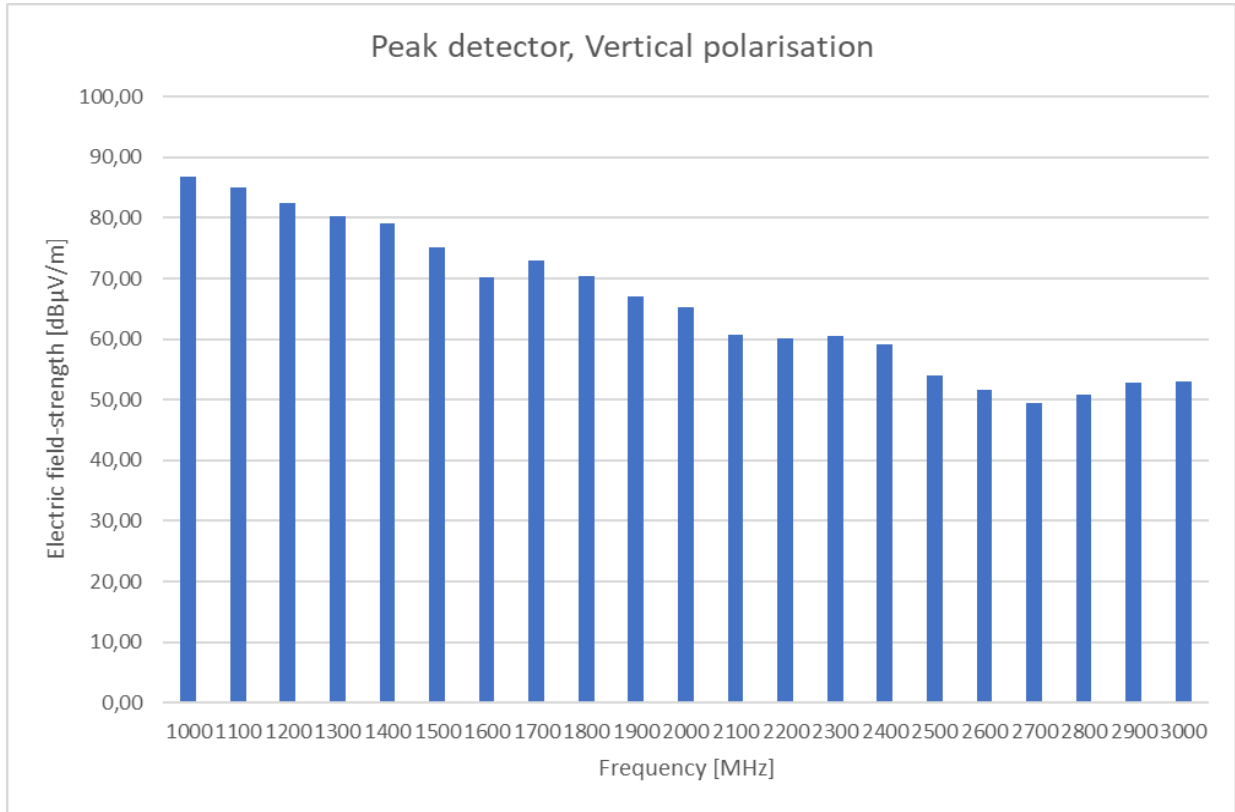


Measured with horn antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR COR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|---------------------|-------------------|------------------|
| 1000            | 37,48            | 44,71               | 68,10             | 68,45            |
| 1100            | 28,04            | 40,27               | 64,93             | 65,31            |
| 1200            | 29,40            | 41,22               | 64,94             | 65,36            |
| 1300            | 28,56            | 40,83               | 65,22             | 65,64            |
| 1400            | 28,91            | 40,52               | 65,28             | 65,68            |
| 1500            | 30,44            | 42,02               | 61,99             | 62,65            |
| 1600            | 29,15            | 41,46               | 56,55             | 57,72            |
| 1700            | 29,14            | 40,98               | 57,12             | 58,16            |
| 1800            | 28,55            | 40,78               | 56,27             | 57,42            |
| 1900            | 28,93            | 42,05               | 55,43             | 56,83            |
| 2000            | 28,99            | 42,00               | 55,91             | 57,33            |
| 2100            | 30,62            | 43,41               | 53,55             | 55,66            |
| 2200            | 32,55            | 44,94               | 55,39             | 57,52            |
| 2300            | 32,35            | 45,52               | 58,01             | 59,54            |
| 2400            | 34,25            | 47,19               | 55,37             | 58,12            |
| 2500            | 32,65            | 45,88               | 47,98             | 52,63            |
| 2600            | 32,56            | 46,43               | 40,64             | 48,87            |
| 2700            | 32,53            | 45,21               | 33,98             | 46,72            |
| 2800            | 33,41            | 46,55               | 33,70             | 46,94            |
| 2900            | 33,00            | 46,08               | 33,71             | 46,52            |
| 3000            | 31,83            | 45,18               | 31,80             | 45,10            |

## TBCG3-RN2 Comb Generator

### 5.24 100 MHz comb frequency, 10 cm antenna, amplifier on, 1 GHz – 3 GHz



Measured with horn antenna, 3m distance, 1 meter height

| Frequency [MHz] | AVG HOR [dBµV/m] | PK HOR COR [dBµV/m] | AVG VERT [dBµV/m] | PK VERT [dBµV/m] |
|-----------------|------------------|---------------------|-------------------|------------------|
| 1000            | 55,78            | 57,12               | 86,74             | 86,79            |
| 1100            | 44,80            | 48,45               | 84,92             | 84,96            |
| 1200            | 43,81            | 48,03               | 82,36             | 82,42            |
| 1300            | 39,69            | 45,31               | 80,26             | 80,34            |
| 1400            | 39,81            | 45,83               | 79,00             | 79,09            |
| 1500            | 41,02            | 46,25               | 75,00             | 75,16            |
| 1600            | 35,16            | 43,65               | 69,90             | 70,16            |
| 1700            | 42,45            | 46,90               | 72,71             | 72,90            |
| 1800            | 36,45            | 44,09               | 70,05             | 70,32            |
| 1900            | 34,33            | 44,09               | 66,61             | 67,03            |
| 2000            | 30,46            | 42,78               | 64,76             | 65,31            |
| 2100            | 31,85            | 43,65               | 59,49             | 60,64            |
| 2200            | 32,95            | 45,69               | 58,64             | 60,19            |
| 2300            | 32,47            | 45,18               | 59,18             | 60,49            |
| 2400            | 34,25            | 47,51               | 56,76             | 59,04            |
| 2500            | 32,67            | 45,22               | 49,88             | 53,99            |
| 2600            | 34,49            | 46,01               | 46,73             | 51,61            |
| 2700            | 32,91            | 45,96               | 39,38             | 49,35            |
| 2800            | 33,63            | 46,55               | 42,66             | 50,80            |
| 2900            | 35,56            | 47,23               | 48,19             | 52,73            |
| 3000            | 32,15            | 45,24               | 48,87             | 52,96            |

## TBCG3-RN2 Comb Generator

### 6 Accessories

The TBCG3-RN6 includes a charger and two monopole antennas as standard accessories. A coaxial interfacing cable for LISN is available as optional accessory.



*TBCG3-RN6 accessories*

### 7 Inserting / replacing batteries

Due to airfreight regulations concerning batteries, the TBCG3 is not supplied with batteries. Loosen the SMA-connector nut a few turns. Remove the six screws at the bottom of the comb generator housing and take off the bottom lid. Insert six AA rechargeable 1.2V NiMH batteries in the battery compartments taking care to follow the polarity indicated on the PCB. Reattach the bottom lid, then tighten the screws and the SMA-connector nut as well. Before connecting the charger plug to the unit connector, please check that the centre tip polarity is shown as (positive) “+”.

### 8 Ordering Information

| Part Number | Description  |
|-------------|--|
| TBCG3-RN2   | Comb generator, Ansmann ACS310 charger, 30 cm monopole, 10 cm monopole |

### 9 History

| Version | Date      | Author      | Changes                    |
|---------|-----------|-------------|----------------------------|
| V 1.0   | 4.2.2023  | Mayerhofer  | Creation                   |
| V 1.1   | 19.6.2023 | Minh Nguyen | Update Charger part number |

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