

RADIATING COMB GENERATOR

1 Introduction

The TBCG1-100MHz is a radiating comb generator with an internal antenna and a base frequency of 100MHz. It radiates a comb spectrum characterized up to 6GHz. The comb generator is built and characterized to serve as a rough reference for testing radiated noise measurement set ups in anechoic chambers, TEM/GTEM cells, shielded chambers, etc.

It is a portable device, powered by a 9V alkaline cell.

Its compact size makes it handy for inserting into enclosures to check for RF leakage.



2 Specification

Base frequency:	100MHz
Characterized comb spectrum:	30MHz - 6 GHz
Tolerance:	+/- 2.5 dB
Power supply:	9V PP3 (E-block) alkaline battery
Current consumption:	175mA
Dimensions:	80mm x 61mm x 27mm
Weight including battery:	76g

Warning: the TBCG1-100MHZ radiates across a wide spectrum, significantly exceeding radiating noise limits specified in any CISPR standard. Use it only in a shielded environment to avoid interference with other electronic products.

Turn off the device after its use, to prevent battery drainage ($I_{ON} = 175mA$)



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3 Spectrum Plots

3.1 Orientation 1

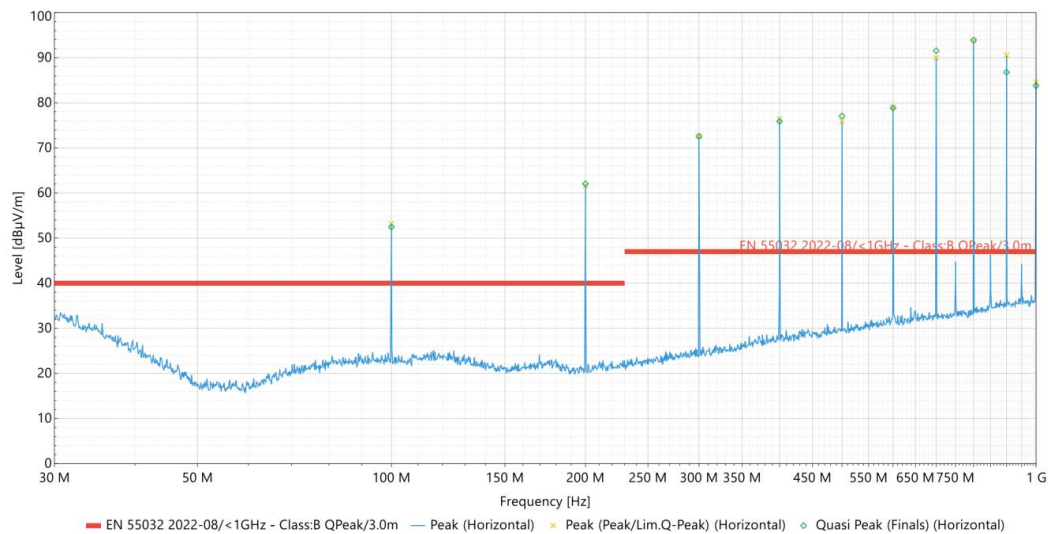


Measurements in the range 30 MHz -1 GHz were taken with and without absorbers on the floor

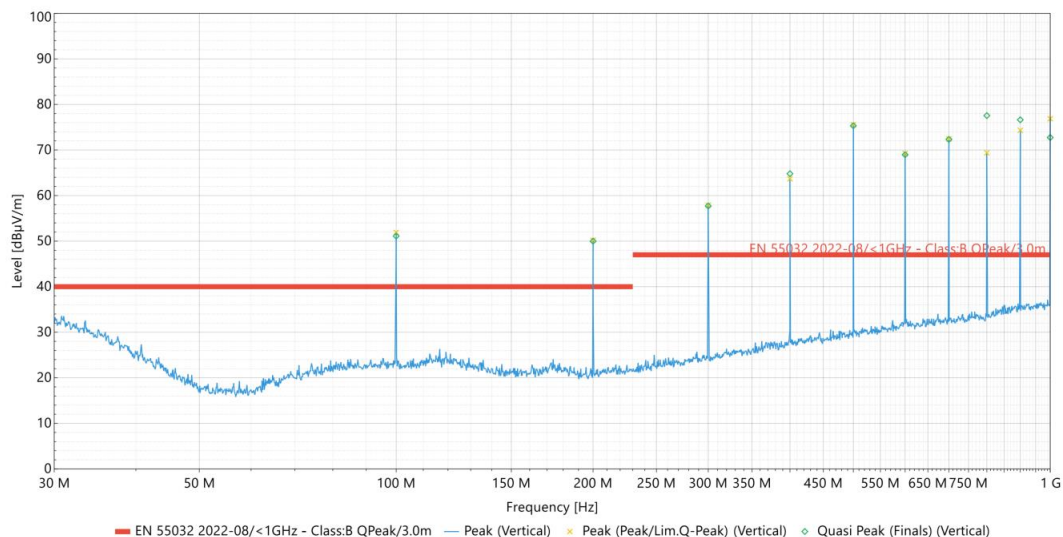
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Semi Anechoic Chamber, 3m distance, without absorber								
Polarisation	Horizontal				Vertical			
Height Scan	1 cm steps		1 m steps		1 cm steps		1 m steps	
f [MHz]	Quasi Peak [dBμV/m]	Height [m]	Peak [dBμV/m]	Height [m]	Quasi Peak [dBμV/m]	Height [m]	Peak [dBμV/m]	Height [m]
100	52,48	2,79	53,17	3	51,1	1	51,92	1
200	62,04	1,79	61,64	1	49,99	1	50,21	1
300	72,55	1	72,65	1	57,71	1,79	57,9	2
400	75,89	1	76,42	1	64,8	1,81	63,68	1
500	77,07	1,79	75,92	2	75,32	1,29	75,55	1
600	78,83	2,81	79,1	3	68,96	1	69,26	1
700	91,54	1,27	89,97	1	72,33	1,81	72,41	1
800	93,89	1	93,73	1	77,55	1,27	69,38	2
900	86,77	1,81	90,57	1	76,63	1,27	74,33	2
1000	83,76	2,32	84,52	2	72,74	1,27	76,86	1

Graph for subrange Horizontal



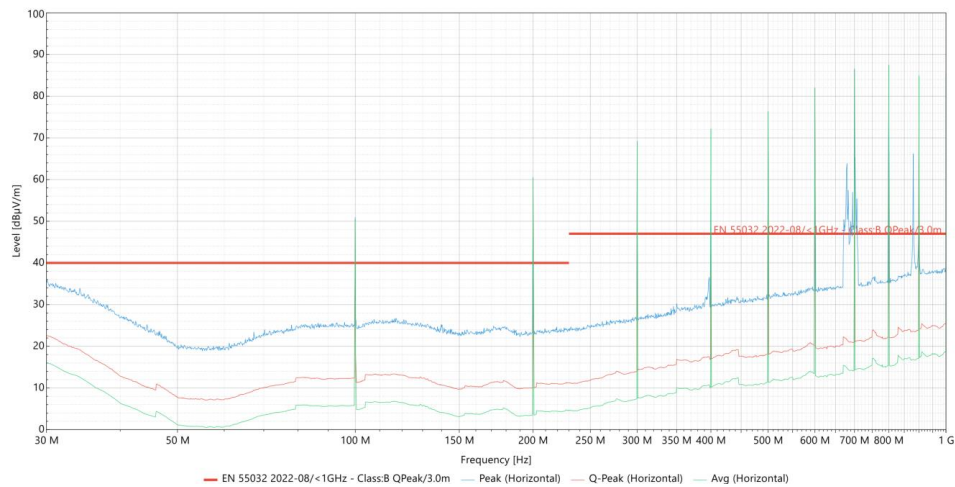
Graph for subrange Vertical



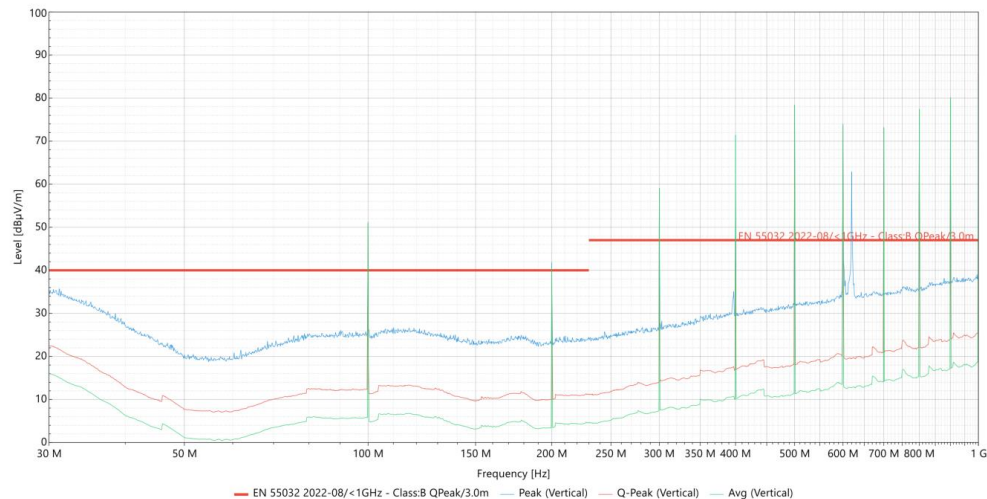
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	Semi Anechoic Chamber, 3m distance, with absorber					
Polarisation	Horizontal			Vertical		
Height Scan	constant height			constant height		
f [MHz]	Quasi Peak [dBμV/m]	Peak [dBμV/m]	Height [m]	Quasi Peak [dBμV/m]	Peak [dBμV/m]	Height [m]
100	44,75	45,61	1	50,91	51,37	1
200	60,5	60,66	1	38,98	40,25	1
300	69,2	69,31	1	58,95	59,2	1
400	72,17	72,28	1	71,35	71,47	1
500	76,3	76,39	1	78,54	78,63	1
600	82,04	82,12	1	73,61	73,75	1
700	86,19	82,26	1	73,11	73,25	1
800	87,59	87,65	1	77,42	77,54	1
900	84,93	85,01	1	78,9	79,01	1
1000	85,17	85,25	1	85,95	86,03	1

Graph for subrange Horizontal



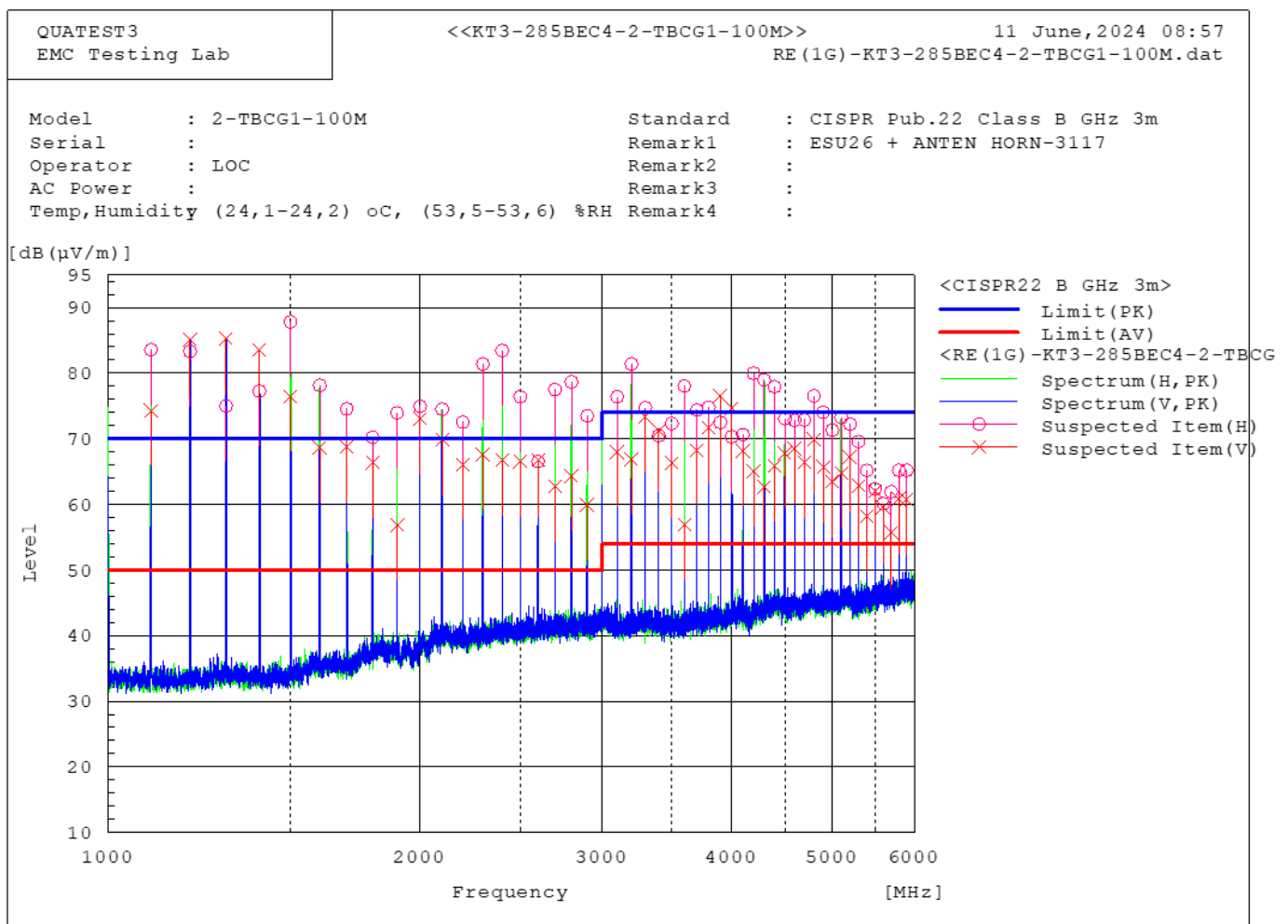
Graph for subrange Vertical



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Open Area, 3 m distance	
Horizontal	
log periodic antenna, 1m height	
f [MHz]	Peak (dB μ V/m)
100	
200	
300	67,19
400	73,41
500	76,52
600	82,4
700	88,41
800	92,55
900	86,22
1000	80,96

The measurements in the range 1 GHz – 6 GHz were taken in another semi anechoic chamber without absorbers at the floor and at a constant antenna height of 1m and at 3m distance.





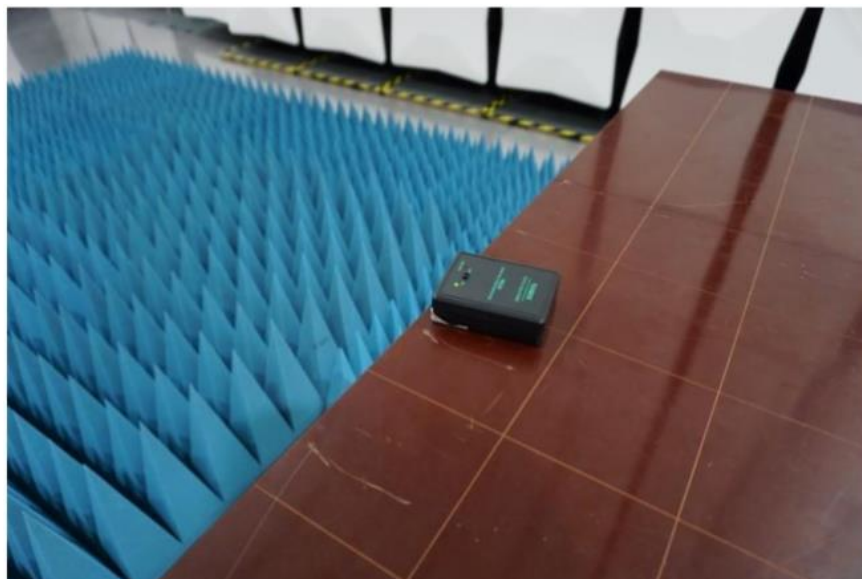
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Frequency [MHz]	Horizontal PK [dB μ V/m]	Vertical PK [dB μ V/m]	Frequency [MHz]	Horizontal PK [dB μ V/m]	Vertical PK [dB μ V/m]
1100	83,6	74,3	3600	78,1	57
1200	83,3	85,1	3700	74,4	68,3
1300	75	83,3	3800	74,8	71,7
1400	77,3	83,6	3900	72,5	76,6
1500	87,8	76,5	4000	70,3	74,7
1600	78,1	68,7	4100	70,6	68,2
1700	74,5	68,8	4200	80	65,1
1800	70,2	66,4	4300	79	62,7
1900	73,9	56,9	4400	77,9	65,8
2000	74,9	73,1	4500	73,1	67,8
2100	74,5	69,9	4600	72,8	68,5
2200	72,5	66,1	4700	72,9	66,4
2300	81,4	67,6	4800	76,5	69,9
2400	83,5	66,8	4900	74	65,7
2500	76,4	66,5	5000	71,3	63,5
2600	66,6	66,8	5100	73,3	64,7
2700	77,5	62,7	5200	72,3	67,2
2800	78,7	64,4	5300	69,6	62,9
2900	73,5	59,9	5400	65,2	58,2
3000	71,2	63,6	5500	62,3	62,1
3100	76,4	68	5600	60,1	59,5
3200	81,4	66,9	5700	61,9	55,7
3300	74,7	73,4	5800	65,2	60,9
3400	70,5	71,2	5900	65,2	60,8
3500	72,3	66,3			



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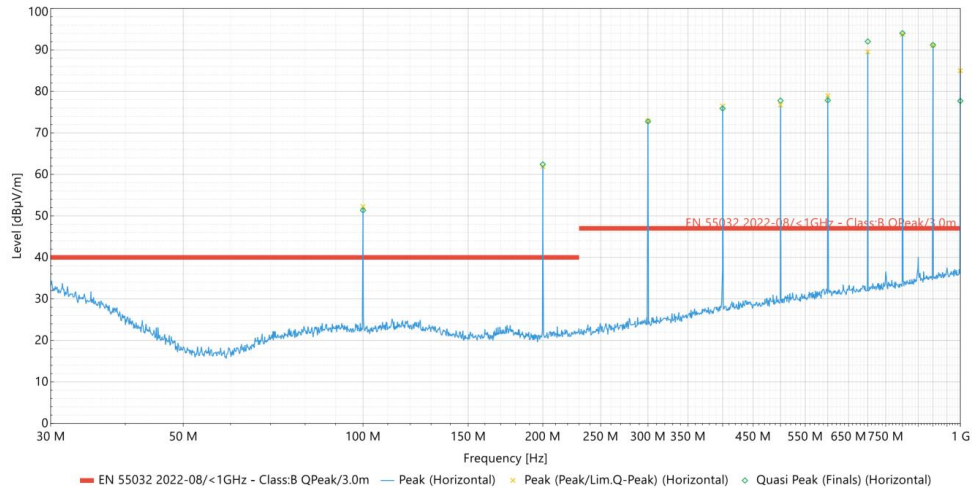
3.2 Orientation 2



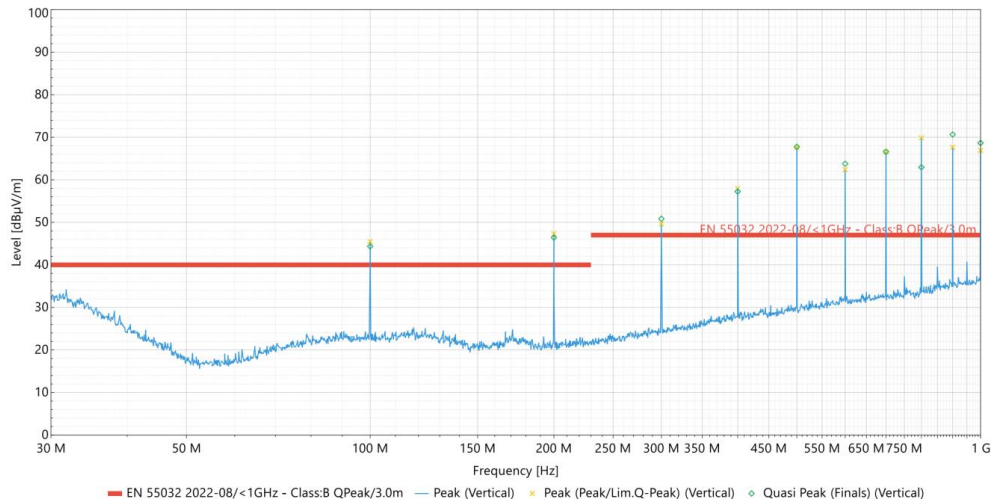
RADIATING COMB GENERATOR

	Semi Anechoic Chamber, 3m distance, without absorber							
Polarisation	Horizontal				Vertical			
Height Scan	1 cm steps		1 m steps		1 cm steps		1 m steps	
f [MHz]	Quasi Peak [dBμV/m]	Height [m]	Peak [dBμV/m]	Height [m]	Quasi Peak [dBμV/m]	Height [m]	Peak [dBμV/m]	Height [m]
100	51,34	3	52,23	4	44,35	4	45,48	4
200	62,42	1,79	61,93	1	46,4	2,32	47,32	2
300	72,77	1	72,9	1	50,83	1,29	49,61	1
400	75,89	1	76,47	1	57,23	2,79	57,94	3
500	77,78	1,81	76,71	2	67,74	1,81	67,59	2
600	77,84	3,32	78,96	3	63,76	1,27	62,39	1
700	92,03	1,27	89,53	1	66,59	1	66,54	1
800	94,03	1	93,77	1	62,94	2,32	69,86	2
900	91,17	1	91,09	1	70,64	2,81	67,63	3
1000	77,7	1,79	84,98	1	68,65	2,34	66,89	2

Graph for subrange Horizontal



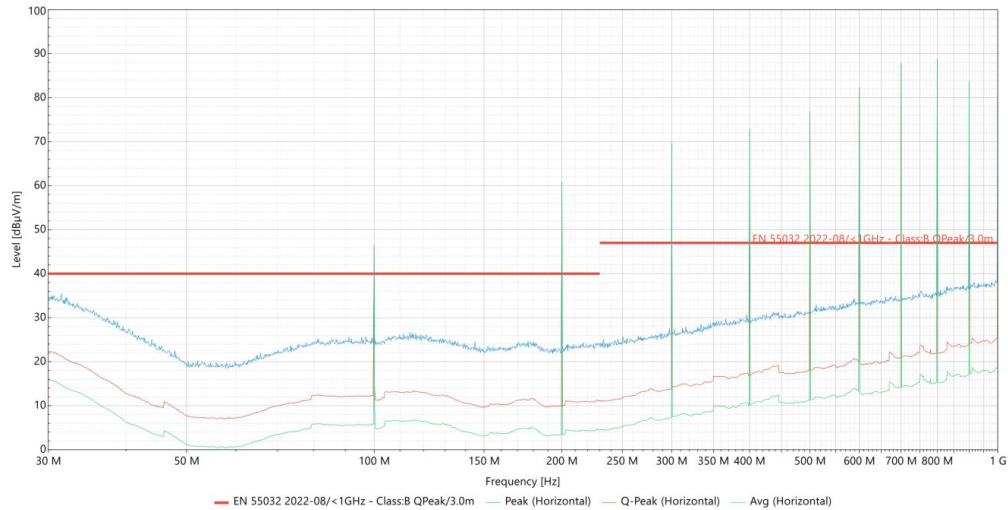
Graph for subrange Vertical



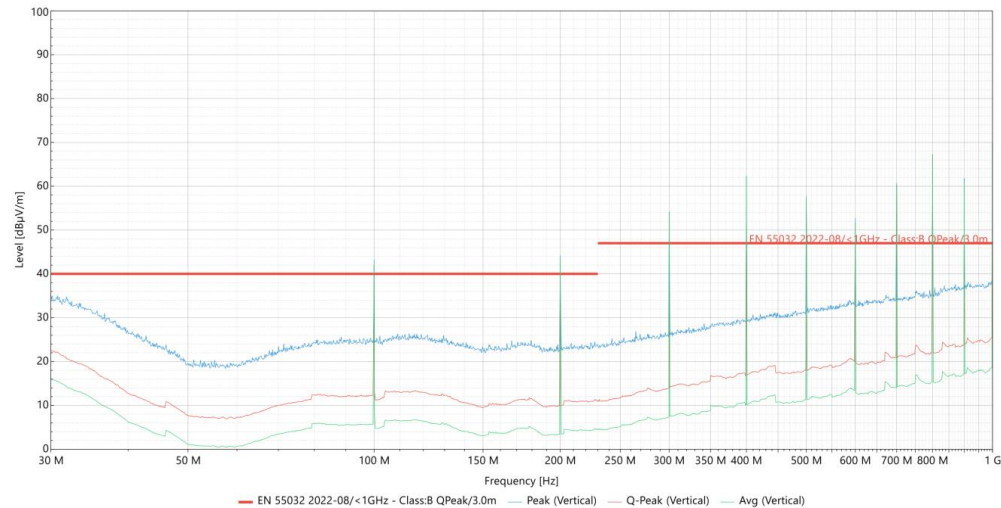
RADIATING COMB GENERATOR

Semi Anechoic Chamber, 3m distance, with absorber						
Polarisation	Horizontal			Vertical		
Height Scan	constant height			constant height		
f [MHz]	Quasi Peak [dBμV/m]	Peak [dBμV/m]	Height [m]	Quasi Peak [dBμV/m]	Peak [dBμV/m]	Height [m]
100	45,88	46,6	1	43,1	43,2	1
200	60,44	60,87	1	43,3	43,9	1
300	69,62	69,72	1	53,83	54,22	1
400	72,87	72,97	1	62,03	62,3	1
500	76,79	76,96	1	57,21	57,67	1
600	82,27	82,34	1	51,69	52,71	1
700	87,79	87,85	1	60,27	60,72	1
800	88,45	88,92	1	66,98	66,95	1
900	83,75	83,83	1	61,24	61,77	1
1000	79,66	79,77	1	69,33	69,94	1

Graph for subrange Horizontal



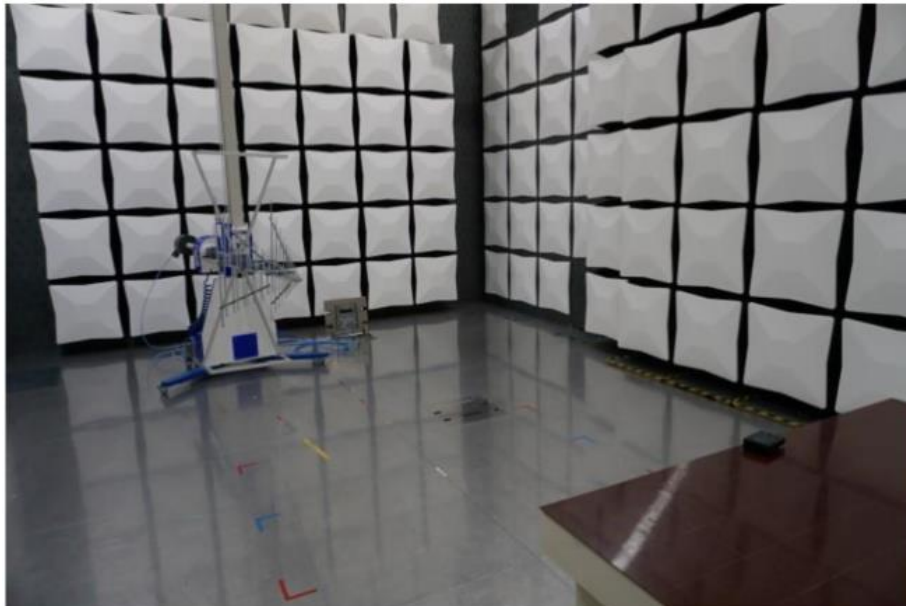
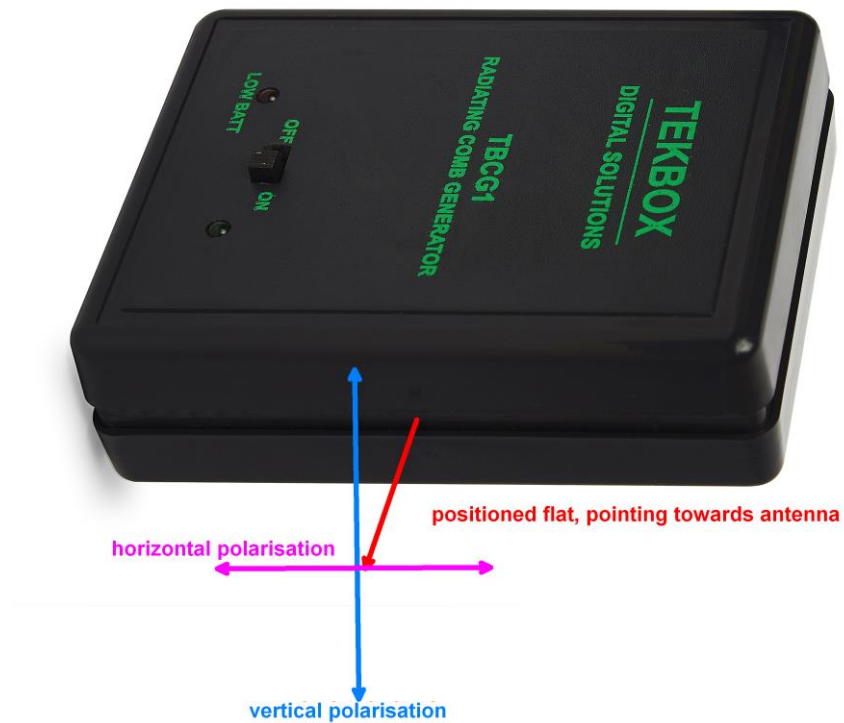
Graph for subrange Vertical





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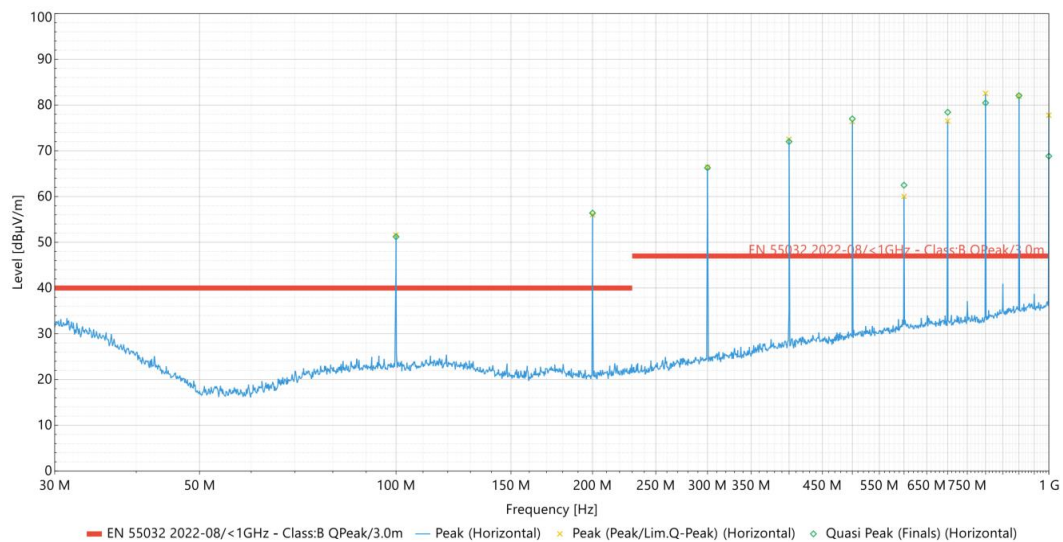
3.3 Orientation 3



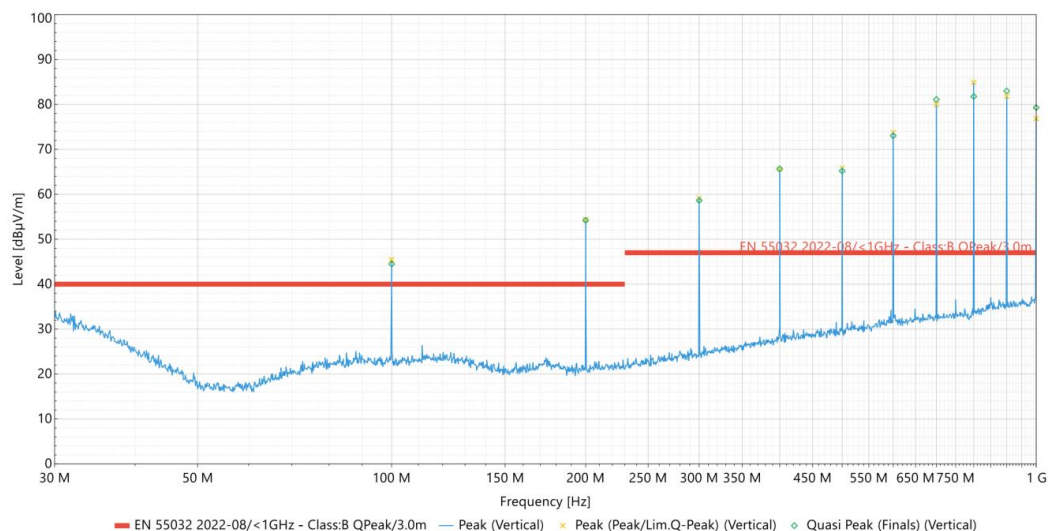
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Semi Anechoic Chamber, 3m distance, without absorber								
Polarisation	Horizontal				Vertical			
Height Scan	1 cm steps		1 m steps		1 cm steps		1 m steps	
f [MHz]	Quasi Peak [dBμV/m]	Height [m]	Peak [dBμV/m]	Height [m]	Quasi Peak [dBμV/m]	Height [m]	Peak [dBμV/m]	Height [m]
100	51,21	2,27	51,59	3	44,48	3	45,45	4
200	56,39	1,27	56,05	1	54,22	1,79	54,34	2
300	66,29	1	66,43	1	58,64	3,34	59,12	3
400	72	1	72,51	1	65,66	2,81	65,58	3
500	76,98	1,81	76,41	2	65,21	1,27	65,86	1
600	62,48	1,79	60,01	2	73,04	1,81	73,75	1
700	78,42	1,29	76,51	1	81,11	1,27	80	1
800	80,47	1,27	82,55	1	81,77	2,32	84,91	2
900	82,05	1	81,95	1	83	2,81	81,82	3
1000	68,83	1,81	77,78	1	79,3	2,32	76,85	2

Graph for subrange Horizontal



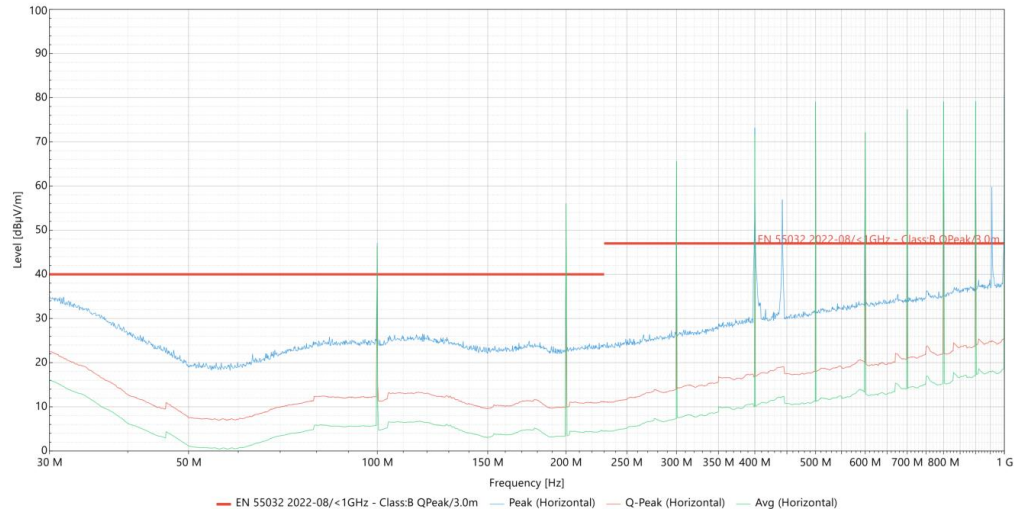
Graph for subrange Vertical



RADIATING COMB GENERATOR

	Semi Anechoic Chamber, 3m distance, with absorber					
Polarisation	Horizontal			Vertical		
Height Scan	constant height			constant height		
f [MHz]	Quasi Peak [dBμV/m]	Peak [dBμV/m]	Height [m]	Quasi Peak [dBμV/m]	Peak [dBμV/m]	Height [m]
100	46,39	47,1	1	44,79	45,62	1
200	55,78	55,69	1	47,2	47,73	1
300	65,51	65,65	1	55,02	55,39	1
400	71,45	73,2	1	52,8	53,36	1
500	78,98	79,07	1	59,52	59,77	1
600	72,04	72,18	1	59,58	60,01	1
700	77,3	77,41	1	53,39	54,24	1
800	78,87	79,1	1	72,53	72,7	1
900	79,05	79,17	1	73,78	73,96	1
1000	78,87	80,92	1	70,2	70,45	1

Graph for subrange Horizontal



Graph for subrange Vertical



RADIATING COMB GENERATOR

4 Ordering Information

Part Number	Description
TBCG1-100MHz	Radiating comb generator, 100MHz comb frequency 9V battery not included

5 History

Version	Date	Author	Changes
V 1.0	22.06.2017	Mayerhofer	Creation of the document
V 1.1	17.04.2018	Mayerhofer	Chapter 3.1 added
V 1.2	07.04.2024	Mayerhofer	Improved characterisation from 30 MHz – 1 GHz
V 1.3	16.06.2024	Mayerhofer	Improved characterisation from 1 GHz – 6 GHz

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