

S-CEM/EMCD/TR/2016-2017/DIGI-130

**EMI/EMC TEST REPORT FOR PHIRO PRO
MANUFACTURED BY
M/s. DIGIVISION ELECTRONICS LTD., CHENNAI**

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SAMEER-CENTRE FOR ELECTROMAGNETICS

(An Institution Setup by Ministry of Communications and Information Technology, Government of India)

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December 2016

Equipment Under Test (EUT)	:	PHIRO PRO
Model Number of EUT	:	Phiro - Pro
Serial Numbers of EUT	:	00-001
Manufactured by	:	M/s. Digivision Electronics Ltd., Chennai

EMI/EMC TEST REPORT FOR PHIRO PRO
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Test Request Particulars

1. Test Request From : M/s. Digivision Electronics Ltd., Chennai
2. Equipment Under Test (EUT) : Phiro Pro
3. Number of Test Sample(s) : One
4. Types of tests requested
(Applicable Standard) : Radiated Emission Measurement as per FCC Part 15 C, 2014
5. Manufacturer by : M/s. Digivision Electronics Ltd., Chennai
6. Model Number of EUT : Phiro - Pro
7. Serial Number of EUT : 00-001
8. Test Plan Concurred by
(Customer Representative) : Mr. Harish. A, Technical Engineer
Digivision Electronics Ltd., Chennai
9. EUT Arrived On : November 22, 2016
10. Tested On : November 22, 2016
11. Test Venue : SAMEER-CEM, Chennai
12. Status of the EUT on Receipt : Functional

Certified that the data reported in this report are valid only for the test sample mentioned above at the time of and under the stated conditions of measurement. Particulars on Manufacturer / Supplier, given in this report, are based on the information given by the customer, along with test request and SAMEER-CEM does not assume any responsibility for the correctness of that information for the above mentioned equipment under test.

Test Plan & Reviewed by:

For

Elphonse
 (Dr. Sanjay Baisakhiya)
 Scientist - E

Authorized Signatory:

S. Salim
 (P. Salim)
 Scientist - E

Office Seal

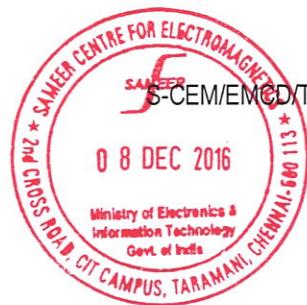


Equipment Under Test (EUT)	:	PHIRO PRO	
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**EMI/EMC TEST RESULTS AND SUMMARY FOR
PHIRO PRO**

EMC EMISSION TEST AND RESULTS

Name of the Test	Basic Standard	AC/ DC / Signal Port / Enclosure	Specifications	Observations
Radiated Emission	FCC Part 15 C	Enclosure	<u>Peak:</u> Above 960 MHz : 73.98 dB μ V/m <u>Average:</u> Above 960 MHz : 53.98 dB μ V/m	within the limits



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RADIATED EMISSION MEASUREMENT

1. Applicable Standard: Measurement as per FCC Part 15 C, 2014
 Test Procedure as per customer request based on ANSI C63.10, 2013

2. Test Instrumentation:

Item Descriptions	Make	Model Number	Serial Number	Calibration date	Calibration due date
EMI Receiver	R&S	ESI B7	100319	15/09/2016	15/09/2017
Spectrum Analyzer	Agilent	8563EC	4439A03727	12/09/2016*	12/09/2017*
Ultra log Antenna	R&S	HL562	100100	11/03/2015	11/03/2017
Double Ridged Waveguide Horn Antenna	R&S	HF906	100108	02/09/2016	02/09/2018
Shielded Semi Anechoic Chamber	Siepel-Hyfral	--	F276	29/6/2016*	29/6/2018*

* Verified in-house

3. Test Frequency Range and Limits (3mtr. distance):

Frequency (MHz)	Limits (dB μ V/m)	
	Peak	Average
Above 960	73.98	53.98

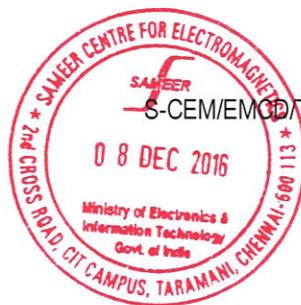
4. EUT Configuration: Given in Annexure-1

5. Test Procedure:

The Radiated Emissions from the EUT in the frequency range of 1GHz – 18GHz were picked up using Double Ridged Horn Antenna. The measurement was carried out inside the shielded semi anechoic chamber with EUT placed at 3m from the receiving antenna and at a height of 1.5m from the ground. Since a low dielectric material of 1.5m height was not available, a polystyrene table placed over a wooden table was used to increase the height, as described in ANSI C63.10 standard. The EUT was rotated from 0° - 360° and the receiving antenna height was varied from 1m to 2m to pickup maximum emissions. The measurement was done in the peak detection mode for both vertical and horizontal polarizations of the antenna. The emissions of considerable amplitude and their corresponding frequencies were analyzed thoroughly in peak detection mode. The emissions were recorded for horizontal and vertical orientations of the EUT. The emissions were recorded for the fundamental frequency of operation and first 5 harmonics of it.

6. Test Observation:

The Radiated Emissions from the EUT were observed to be within the limits of FCC Part 15 C standard in the test frequency range of 1 – 18 GHz. The measurement readings are given in table-1 below.



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Table -1

Low Channel – Horizontal Orientation of the EUT

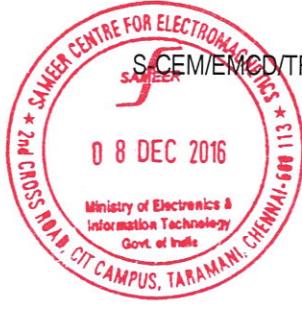
Freq. (MHz)	Table Position (Degs)	Antenna Height (m)	Measured Peak level (dB μ V) [A]	Antenna Factor (dB/m) [B]	Cable Loss (dB) [C]	Total QP level (dB μ V/m) [D=A+B+C]	Limit (dB μ V/m) [L]	Delta Level dB [L-D]	Test Observations
Vertical Polarization									
1.602	0	1	8.42	25.07	5.07	38.56	73.98	35.42	Within the limit
2.402	0	1	52.42	27.47	7.18	87.07	73.98	-13.09	*
4.804	0	1	9	33.13	6.55	48.68	73.98	25.3	Within the limit
7.206	0	1	11.33	36.03	12.77	60.13	73.98	13.85	Within the limit
9.608	0	1	10.83	37.37	16.05	64.25	73.98	9.73	Within the limit
14.412	0	1	13	37.57	15.04	65.62	73.98	8.36	Within the limit
16.814	0	1	13.25	39.71	18.34	71.03	73.98	2.95	Within the limit
12.010	0	1	11.08	38.42	16.54	66.01	73.98	7.97	Within the limit
Horizontal Polarization									
1.602	0	1	8.50	25.07	5.07	38.64	73.98	35.34	Within the limit
2.402	70	2	51.42	27.57	7.18	86.07	73.98	-12.09	*
4.804	0	1	08.42	33.13	6.55	48.10	73.98	25.88	Within the limit
7.206	0	1	11.33	36.03	12.77	60.13	73.98	13.85	Within the limit
9.608	0	1	11.75	37.37	16.05	65.17	73.98	8.81	Within the limit
14.412	0	1	10.50	37.57	15.04	65.43	73.98	8.55	Within the limit
16.814	0	1	12.67	39.71	18.34	65.29	73.98	8.69	Within the limit
12.010	0	1	13.08	38.42	16.54	71.13	73.98	2.85	Within the limit

* It is the intended frequency of operation of the EUT

Low Channel – Vertical Orientation of the EUT

Freq. (MHz)	Table Position (Degs)	Antenna Height (m)	Measured Peak level (dB μ V) [A]	Antenna Factor (dB/m) [B]	Cable Loss (dB) [C]	Total QP level (dB μ V/m) [D=A+B+C]	Limit (dB μ V/m) [L]	Delta Level dB [L-D]	Test Observations
Vertical Polarization									
1.602	151	1.4	8.32	25.07	5.07	38.46	73.98	35.52	Within the limit
2.402	268	1.3	53.31	27.47	7.18	87.96	73.98	-13.98	*
4.804	0	1	8.42	33.13	6.55	48.10	73.98	25.88	Within the limit
7.206	0	1	11.58	36.03	12.77	60.38	73.98	13.6	Within the limit
9.608	0	1	10.67	37.37	16.05	64.09	73.98	9.89	Within the limit
12.010	0	1	10.50	38.42	16.51	65.43	73.98	8.55	Within the limit
14.412	0	1	13.33	37.57	15.04	65.95	73.98	8.03	Within the limit
16.814	0	1	13.42	39.71	18.34	71.47	73.98	2.51	Within the limit
Horizontal Polarization									
1.602	176	1.8	10.25	25.07	5.07	40.39	73.98	33.59	Within the limit
2.402	127	1.4	54.62	27.47	7.18	89.27	73.98	-15.29	*
4.804	0	1	12.43	33.13	6.55	52.11	73.98	21.87	Within the limit
7.206	0	1	11.67	36.03	12.77	60.47	73.98	13.51	Within the limit
9.608	0	1	11.50	37.37	16.05	64.92	73.98	9.06	Within the limit
12.010	0	1	12.02	38.42	16.51	66.95	73.98	7.03	Within the limit
14.412	0	1	13.75	37.57	15.04	66.37	73.98	7.61	Within the limit
16.814	0	1	13.42	39.71	18.34	71.47	73.98	2.51	Within the limit

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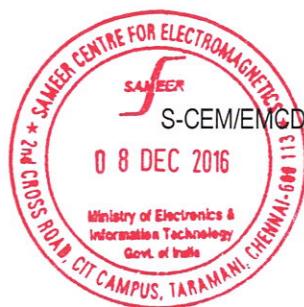
7. Enclosed Documents:

Plot 1 to 6 : Radiated Emissions from the EUT.

Annexure-2 : Photograph of EUT and Radiated Emission Measurement Setup.

Test Conducted by:

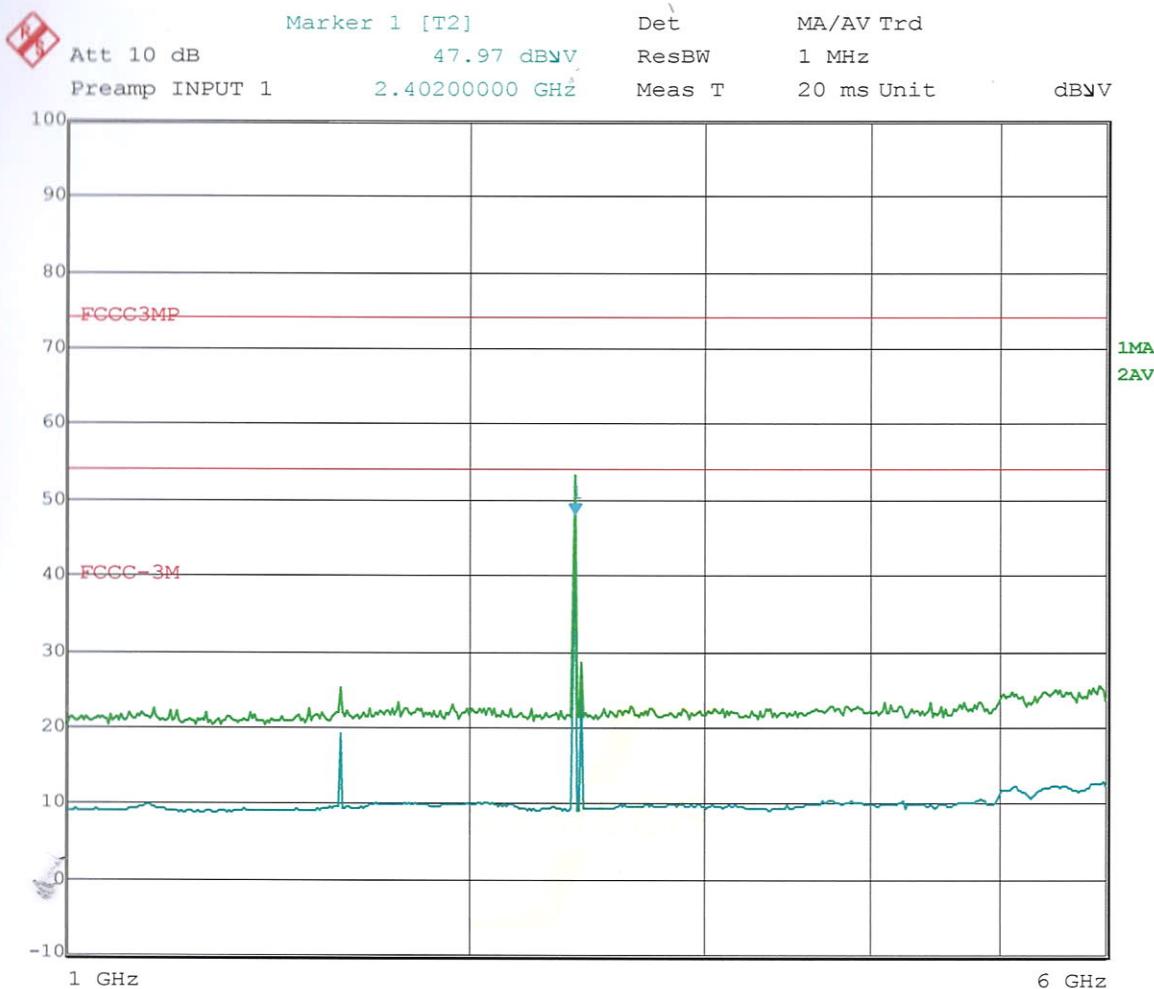
B. Srinath
(B. Srinath)
Research Scientist



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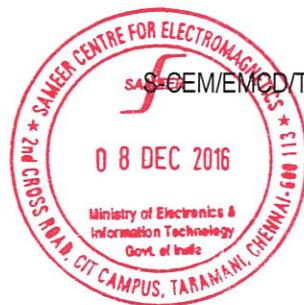
PLOT-1



Title: RADIATED EMISSION TEST AS PER ANSI C 63.10 LOW CHANNEL
 Comment B: EUT:PHIRO WITH BLUETOOTH, MAKE:PHIRO ROBOTIX USA, MODEL NO:P
 HIRO_PRO, S.NO:PHIRO 001, POS:176, ANT.HT:1.4m POL:HOR
 Date: 21.NOV.2016 16:24:54

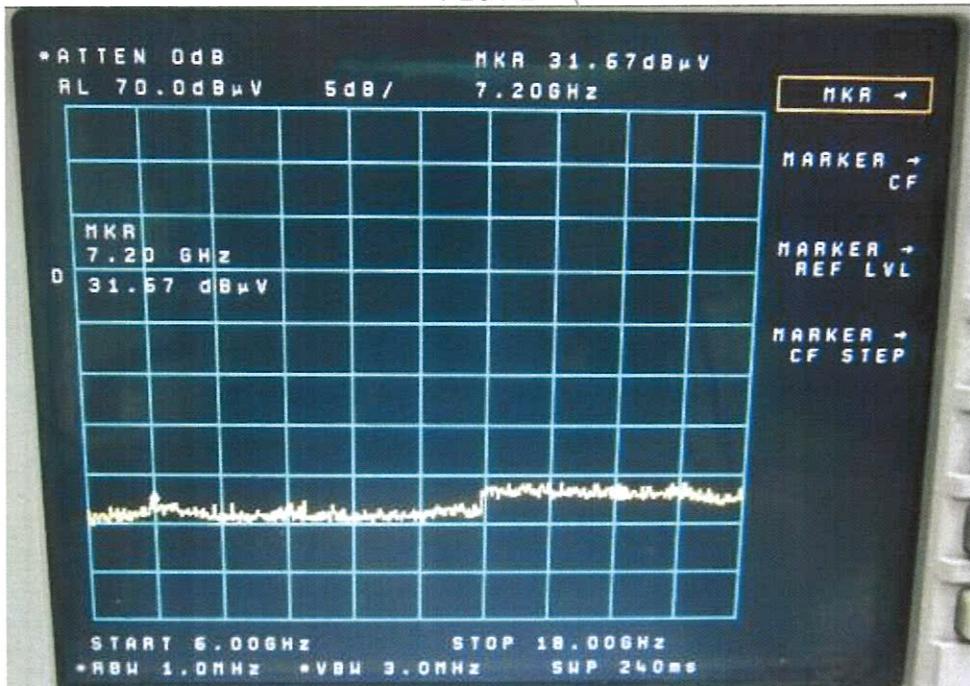
Radiated Emission from EUT Vertical Orientation Low Channel 1-6 GHz (Horizontal Polarization)

Note: The plot shows only the emission pattern from the EUT with peak detector and the values in the plot were not maximized emission as required by standard. For maximized emission please refer table-1



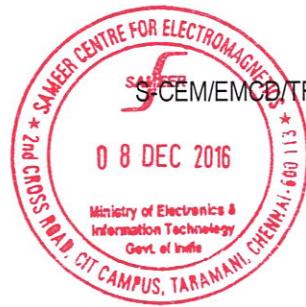
Equipment Under Test (EUT)	: PHIRO PRO
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PLOT-2



Radiated Emission from EUT Vertical Orientation Low channel 6-18 GHz (Horizontal Polarization)

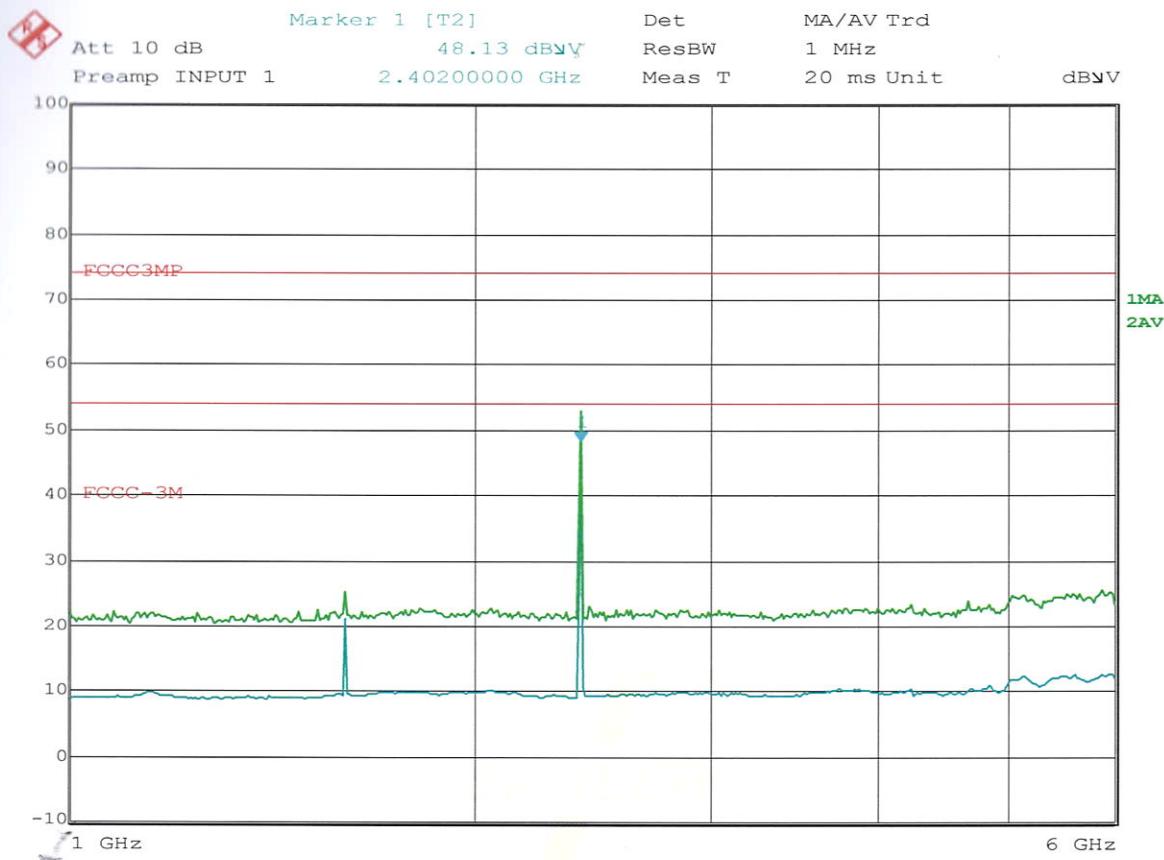
Note: The plot shows only the emission pattern from the EUT with peak detector and the values in the plot were not maximized emission as required by standard. For maximized emission please refer table-1



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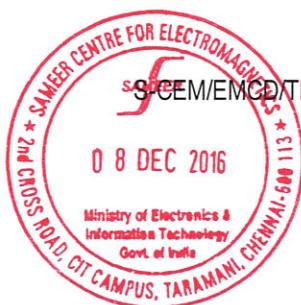
PLOT-3



Title: RADIATED EMISSION TEST AS PER ANSI C 63.10 LOW CHANNEL
 Comment B: EUT:PHIRO WITH BLUETOOTH, MAKE:PHIRO ROBOTIX USA, MODEL NO:PHIRO_PRO, S.NO:PHIRO 001, POS:268, ANT.HT:1.3m POL:VER
 Date: 21.NOV.2016 15:56:31

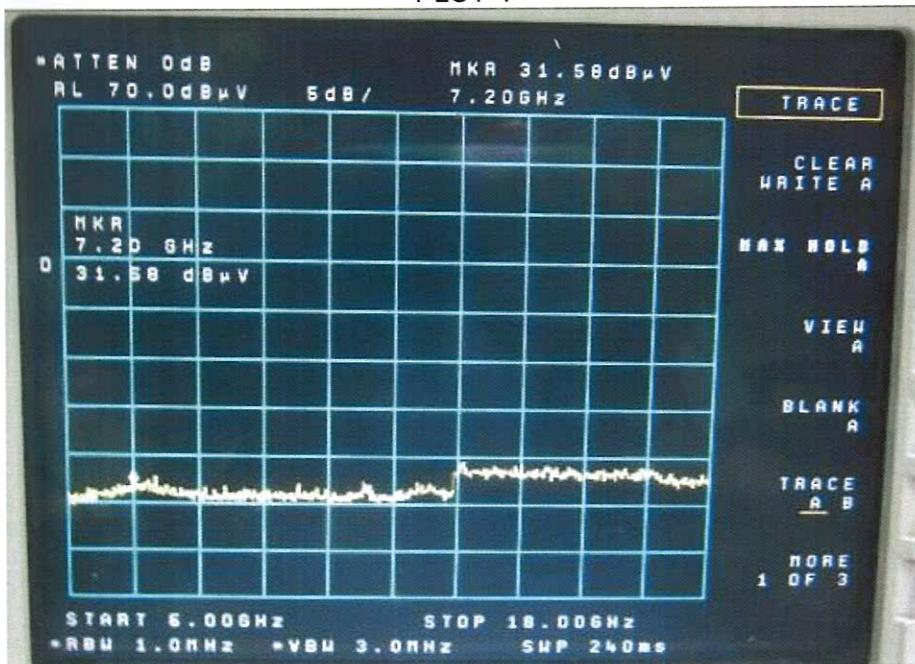
Radiated Emission from EUT Vertical Orientation Low Channel 1 – 6 GHz (Vertical Polarization)

Note: The plot shows only the emission pattern from the EUT with peak detector and the values in the plot were not maximized emission as required by standard. For maximized emission please refer table-1



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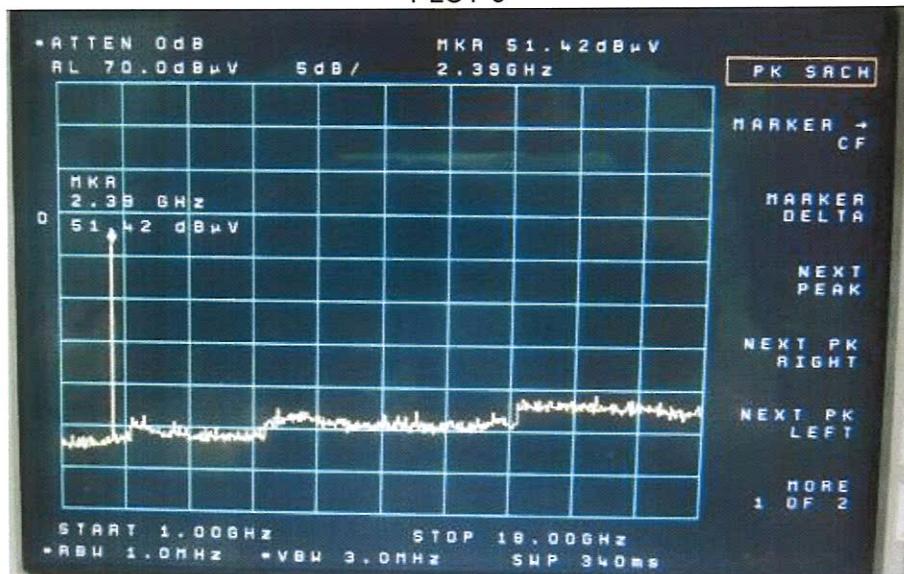
PLOT-4



Radiated Emission from EUT Vertical Orientation Low Channel 6 – 18 GHz (Vertical Polarization)

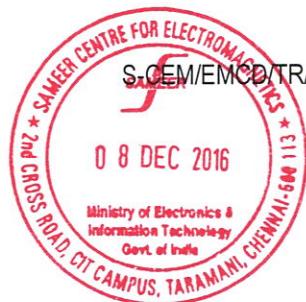
Note: The plot shows only the emission pattern from the EUT with peak detector and the values in the plot were not maximized emission as required by standard. For maximized emission please refer table-1

PLOT-5



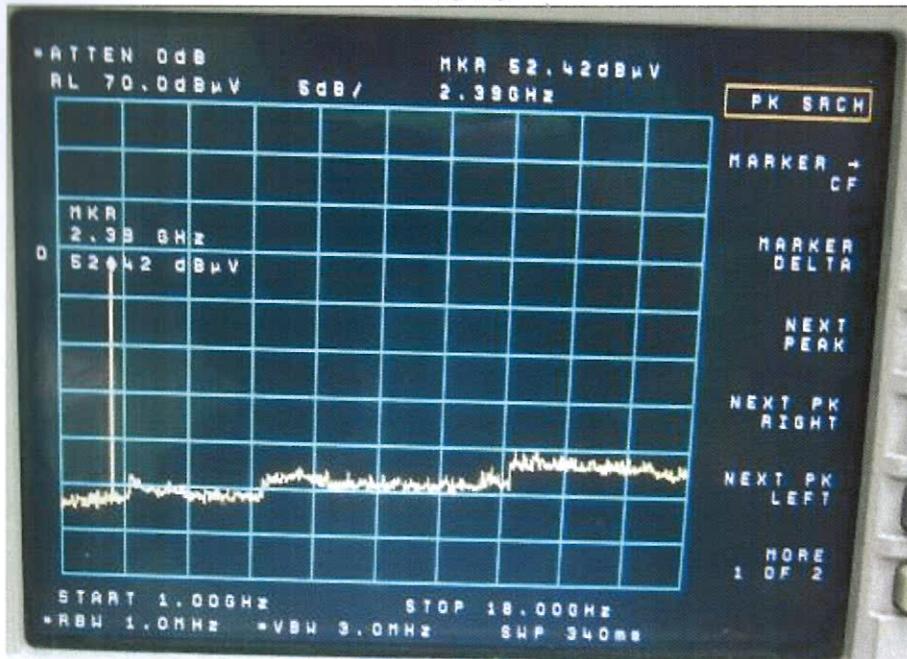
Radiated Emission from EUT Horizontal Orientation Low Channel 1 – 18 GHz (Horizontal Polarization)

Note: The plot shows only the emission pattern from the EUT with peak detector and the values in the plot were not maximized emission as required by standard. For maximized emission please refer table-1



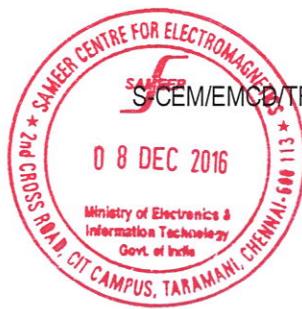
Equipment Under Test (EUT)	: PHIRO PRO
Model Number of EUT	: Phi - Pro
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Manufactured by	: M/s. Digivision Electronics Ltd., Chennai

PLOT-6



Radiated Emission from EUT Horizontal Orientation Low Channel 1 – 18 GHz (Vertical Polarization)

Note: The plot shows only the emission pattern from the EUT with peak detector and the values in the plot were not maximized emission as required by standard. For maximized emission please refer table-1



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Annexure - 1

(Given by Customer)

EUT Description:

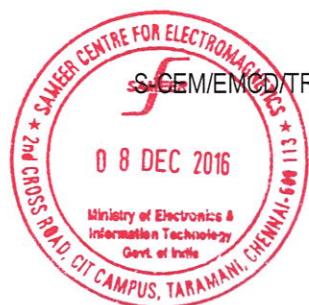
Phiro is an educational robot used to learning programming in a Graphical Manner.

EUT Configuration:

The EUT's Bluetooth was connected to the host PC through adapter to control the frequency of the Bluetooth. The EUT in normal condition operates only in hopping mode. Since the frequency to be held at LOW, MID, HIGH channels during the radiated emission test the adapter and PC were used.

Application:

It is used for Educational purpose



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