Radio Test Report-GPS
ETSI EN 303 413 V1.2.1 (2021-04)

Client Information:

Applicant:	DOKE COMMUNICATION (HK) LIMITED
Applicant add.:	RM 1902 EASEY COMM BLDG 253-261 HENNESSY ROAD WANCHAI HK CHINA

Product Information:

Product Name:	Tablet
Model No.:	Active 6
Serial Model:	N/A
Brand Name:	Blackview
Test Sample.:	AIT23071306-1

Prepared By:

Dongguan Yaxu (AiT) Technology Limited

No.22, Jinqianling Third Street, Jitigang, Huangjiang,Dongguan, Guangdong, China

Tel.: +86-769-8202 0499 Fax.: +86-769-8202 0495

Date of Receipt: 2023.07.13 Date of Test: 2023.07.13~2023.08.07

Date of Issue: 2023.08.08 Test Result: Pass

This device has been tested and found to comply with the stated standard(s), which is (are) required by the council directive of 2014/53/EU and indicated in the test report and are applicable only to the tested sample identified in the report.

Reviewed by: Simba huang

Approved by: Seal.chen

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2023.08.01	Valid	Initial release

TABLE OF CONTENTS

1. TECHNICAL INFORMATION

1.1. EUT DESCRIPTION

Details of technical specification refer to the description in follows:

Manufacturer:	Shenzhen DOKE Electronic Co., Ltd
Manufacturer Address:	801, Building3, 7th Industrial Zone, Yulv Community, Yutang Road, Guangming District, Shenzhen, China.
Hardware Version	DK051-T616-V1.0
Software Version	Active6_EEA_T30_V1.0_20230711V01
Antenna Gain	0.7dBi
Antenna type	PIFA Antenna
Power Supply	3.87V 13000mAh for Battery
GPS	
Test Mode	GPS Mode (Only receive)
Receiver Frequency	1575.42 MHz±1.023 MHz
Modulation Technology	CDMA
Modulation Type	BPSK
GLONASS	
Test Mode	GLONASS Mode (Only receive)
Receiver Frequency	1602 MHz+ n x0.5625 MHz ("n" is a satellite's frequency channel number from -7~6)
Modulation Technology	FDMA
Modulation Type	BPSK
BDS	
Test Mode	BDS Mode (Only receive)
Receiver Frequency	1561.098 MHz±2.046MHz
Modulation Technology	CDMA
Modulation Type	BPSK
GALILEO	
Test Mode	GALILEO Mode (Only receive)
Receiver Frequency	1575.42 MHz±1.023 MHz
Modulation Technology	CDMA
Modulation Type	CBOC

Note: For more details, please refer to the user's manual.

1.2. OBJECTIVE

Perform Radio Spectrum tests for CE Marking according to the provisions of article 3.2 of the Radio Equipment Directive (2014/53/EU) for the Satellite Earth Stations and Systems (SES)Global Navigation Satellite System (GNSS) receivers.

1.3. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Test Site	Dongguan Yaxu (AiT) Technology Limited
Location	Add: No.22, Jinqianling 3rd Street, Jitigang, Huangjiang,Dongguan, Guangdong, China
CNAS- Registration No	L6177

1.4. ENVIRONMENTAL CONDITIONS

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C - 35°C	-10°C ~-50°C Note: (1)
Relative Humidity	20% - 75%	N/A
Supply Voltage	DC 3.87V	LV:DC 3.483V/HV: DC 4.257V
Note: (1) The HT40°C and LT0°C was declarated by manufacturer		

1.5. TEST CONFIGURATION AND REQUIREMENTS

☒ GNSS are provided for GPS, GLONASS, BDS and GALILEO:

GNSS	RNSS FREQUENCY
GPS	1575.42MHz
GLONASS	1605.375MHz
BDS	1561.098MHz
GALILEO	1575.42MHz

EUT CONFIGURE MODE	APPLICABLE TO			DEXCRIPTION
	ASS	SE＜1G	SE≥1G	
GPS/GLONASS/BDS/GALILEO	√	√	√	-

Where

ASS: Adjacent signal selectivity

SE<1G: Unwanted Emissions in the Spurious Domain below 1 GHz

SE≥ ≥1G: Unwanted Emissions in the Spurious Domain above 1 GHz

NOTE: 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when Positioned on **X-plane.**

ADJACENT SIGNAL SELECTIVITY：

☒ Following Supported GNSS(s) was (were) selected for the final test as listed below.

GNSS	GNSS Signals			
BDS	☒ B1			
GALILEO	☒ E1	☐ E5a	☐ E5b	☐ E6
GLONASS	☒ G1	☐ G2		
GPS	☒ L1	☐ L2	☐ L5	

☒ GNSS, GNSS signals and RNSS frequency bands

GNSS	GNSS Signal Designations	RNSS Frequency Band(mhz)
BDS	B1	1559 to 1610
GALILEO	E1	1559 to 1610
	E5a	1164 to 1215
	E5b	1164 to 1215
	E6	1215 to 1300
GLONASS	G1	1559 to 1610
	G2	1215 to 1300
GPS	L1	1559 to 1610
	L2	1215 to 1300
	L5	1164 to 1215

☒ Frequency bands, adjacent frequency signal test point centre frequencies and power levels for the 1559 MHz to 1610 MHz RNSS band

Frequency band(MHz)	Test point center frequency(MHz)	Adjacent frequency signal power level(dBm)	Comments
1518-1525	1524	-65	MSS(space-to-Earth) band
1525-1549	1548	-95	MSS(space-to-Earth) band
1549-1559	1554	-105	MSS(space-to-Earth) band
1559-1610	GUE RNSS band under test		
1610-1626	1615	-105	MSS(space-to-Earth)

			band
1626-1640	1627	-85	MSS(space-to-Earth) band

☒ Frequency bands, adjacent frequency signal test point centre frequencies and power levels for the 1164 MHz to 1300 MHz RNSS band

Frequency band (MHz)	Test point center frequency (MHz)	Adjacent frequency signal power level(dBm)	Comments
960-1164	1154	-75	AM(R)S, ARNS band
1164-1215	GUE RNSS band under test		
1215-1260	GUE RNSS band under test		
1260-1300	GUE RNSS band under test		
1300-1350	1310	-85	Radiolocation, ARNS, RNSS(Earth-to-space)band

☒ GUE RNSS band under test

GNSS	Parameters	Value
GPS	(Maximum) signal level	-128.5dBm
Galileo	(Maximum) signal level	-127.0dBm
GLONASS	(Maximum) signal level	-131.0dBm
SBAS	(Maximum) signal level	-131.0dBm

UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN TEST (BELOW 1 GHZ):

☒ Following GNSS(s) was (were) selected for the final test as listed below.

EUT Configure Mode	GNSS	GNSS Signal Designations	RNSS Frequency (MHz)
	GPS	L1	1575.420 MHz
	GLONASS	G1	1605.375 MHz
	BDS	B1	1561.098 MHz
	GALILEO	E1	1575.420 MHz

UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN TEST (ABOVE1 GHZ):

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	GNSS	GNSS Signal Designations	RNSS Frequency (MHz)
-	GPS	L1	1575.420 MHz
	GLONASS	G1	1605.375 MHz
	BDS	B1	1561.098 MHz
	GALILEO	E1	1575.420 MHz

1.6. TEST ITEMS AND THE RESULTS

Test items and the results are as bellow:

BASIC STANDARD	TEST TYPE	RESULT
EN 303 413 Clause 4.2.1	Adjacent signal selectivity	Pass
EN 303 413 Clause 4.2.2	Receiver spurious emissions	Pass

1.7. MEASUREMENT UNCERTAINTY

All the measurement equipments and accessories have been carefully selected to meet the maximum measurement uncertainty specified below:

Parameters	Uncertainty
Radio frequency	±1*10^{-7}
Radiated emission of receiver, valid to 26.5GHz	±6dB
Radiated emission of receiver, valid between 26.5GHz and 66GHz	±8dB
Temperature	±1℃
Humidity	±5%
Voltage (DC)	±1%
Voltage (AC, < 10kHz)	±2%
Note: For radiated emissions above 26.5GHz it may not be possible to achieve measurement uncertainties complying with the levels specified in this table. In these cases alone it is acceptable to employ the alternative interpretation procedure specified in clause 10.1	

For the test methods, according to the present document the uncertainty figures shall be calculated according to the methods described in the TR 100 028 [i.4] and shall correspond to an expansion factor (coverage factor) k = 1,96 or k = 2 (which provide confidence levels of respectively 95 % and 95,45 % in case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

2. DESCRIPTION OF TEST MODE

NO.	TEST MODE DESCRIPTION
1	RX (Operating GPS Mode)
2	RX (Operating GLONASS Mode)
3	RX (Operating BDS Mode)
4	RX (Operating GALILEO Mode)
5	Stand-by

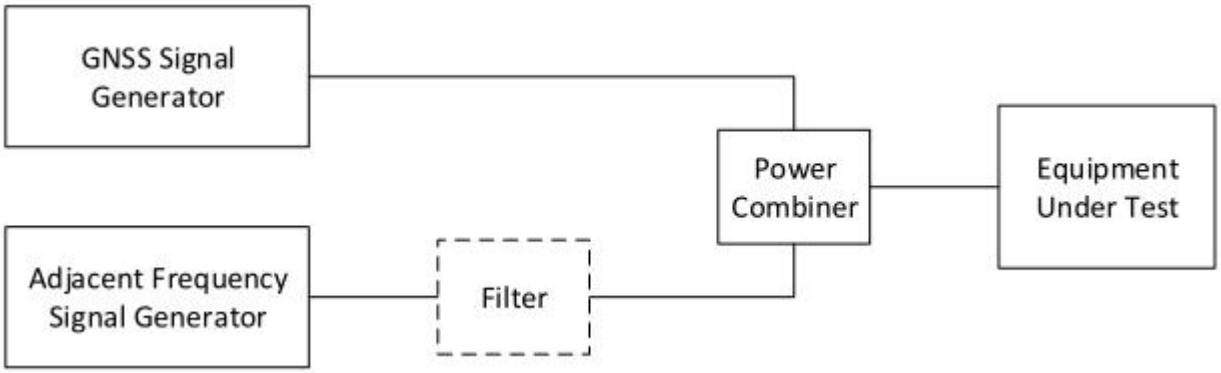
3. LIST OF EQUIPMENTS USED

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	EMI Measuring Receiver	R&S	ESR	101160	2022.09.02	2023.09.01
2	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2022.09.02	2023.09.01
3	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3207	2021.08.29	2024.08.28
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2022.09.02	2023.09.01
5	Spectrum Analyzer	R&S	FSV40	101470	2022.09.02	2023.09.01
6	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2022.09.02	2023.09.01
7	Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	452	2021.08.29	2024.08.28
8	Filter	MICRO-TRONICS	BRM50702-02	16	2022.09.02	2023.09.01
9	Filter	MICRO-TRONICS	BRC50703-02	17	2022.09.02	2023.09.01
10	Filter	MICRO-TRONICS	BRC50705-02	18	2022.09.02	2023.09.01

4. REQUIREMENT TO RECEIVER

4.1 ETSI EN 303 413 SUB. 4.2.1: ADJACENT CHANNEL BAND SELECTIVITY

TEST SETUP



SPECIFICATIONS:

The C/N_0 metric reported by the GUE for all GNSS and GNSS signals given in table 4-1 and supported by the GUE shall not degrade by more than the value given in equation 4-1 when an adjacent frequency signal is applied.

Equation 4-1: Maximum degradation in C/N_0

$$\Delta \ C/N_0 \leqslant 1 \text{ dB}$$

Table 4-1: GNSS, GNSS signals and RNSS frequency bands

GNSS	GNSS Signal Designations	RNSS Frequency Band (MHz)
BDS	B1I	1 559 to 1 610
Galileo	E1	1 559 to 1 610
	E5a	1 164 to 1 215
	E5b	1 164 to 1 215
	E6	1 215 to 1 300
GLONASS	G1	1 559 to 1 610
	G2	1 215 to 1 300
GPS	L1	1 559 to 1 610
	L2	1 215 to 1 300
	L5	1 164 to 1 215
SBAS	L1	1 559 to 1 610
	L5	1 164 to 1 215

TEST PROCEDURE:

1. Configure the GNSS signal generator to simulate those GNSS and GNSS signals from table 4-1 declared as supported by the GUE, with power levels and other details as specified in clause B.2..
2. With the adjacent frequency signal switched off, the EUT shall be given sufficient time to acquire all simulated satellites from the declared GNSS system(s).
3. Record the baseline C/N_0 value(s) reported by the EUT. Sufficient filtering shall be used to obtain a stable value. C/N_0 may be averaged across all the satellites in view for each GNSS constellation. However, C/N_0 shall not be averaged across satellite signals in different GNSS constellations. For a multi-GNSS EUT, there shall be a separate C/N_0 value recorded for each GNSS constellation and each GNSS signal supported.
4. The adjacent frequency signal shall be switched on, and the EUT's C/N_0 value(s) recorded as in step 3) to measure the degradation with respect to the baseline value(s) recorded in step 3).
5. Test point Pass/Fail Criteria: If the C/N_0 degradation from step 5) does not exceed the value in equation 4-1,then this test point is set to "pass". If the C/N_0 degradation exceeds the value in equation 4-1, then this test point is set to "fail." For a multi-GNSS and multi-signal EUT, there shall be a separate pass/fail determination for each GNSS and for each GNSS signal supported. If the C/N_0 degradation exceeds the value in equation 4-1 for any supported GNSS or supported GNSS signal, then this test point is set to "fail".

TEST RESULT:

GPS:

Test point centre frequency (MHz)	Adjacent frequency signal power level (dBm)	No interfering signal	With interfering signal	Limit	Measurement value (Max Hold) (dB)	Result
1 554MHz	-105 dBm	40.68	40.35	Decrease ≤ 1 dB	0.47	Pass
1 615MHz	-105 dBm	41.49	40.64	Decrease ≤ 1 dB	0.06	Pass
1 548MHz	-95 dBm	41.89	40.80	Decrease ≤ 1 dB	0.16	Pass
1 627MHz	-85 dBm	40.96	39.86	Decrease ≤ 1 dB	0.70	Pass
1 524MHz	-65 dBm	40.22	40.75	Decrease ≤ 1 dB	0.33	Pass

GLONASS:

Test point centre frequency (MHz)	Adjacent frequency signal power level (dBm)	No interfering signal	With interfering signal	Limit	Measurement value (Max Hold) (dB)	Result
1 554MHz	-105 dBm	40.16	39.46	Decrease ≤ 1 dB	0.7	Pass
1 615MHz	-105 dBm	41.26	40.81	Decrease ≤ 1 dB	0.45	Pass
1 548MHz	-95 dBm	41.36	40.4	Decrease ≤ 1 dB	0.96	Pass
1 627MHz	-85 dBm	41.05	40.48	Decrease ≤ 1 dB	0.57	Pass
1 524MHz	-65 dBm	41.05	40.41	Decrease ≤ 1 dB	0.64	Pass

BDS:

Test point centre frequency (MHz)	Adjacent frequency signal power level (dBm)	No interfering signal	With interfering signal	Limit	Measurement value (Max Hold) (dB)	Result
1 554MHz	-105 dBm	40.79	40.34	Decrease ≤ 1 dB	0.45	Pass
1 615MHz	-105 dBm	41.02	40.53	Decrease ≤ 1 dB	0.49	Pass
1 548MHz	-95 dBm	40.83	40.09	Decrease ≤ 1 dB	0.74	Pass
1 627MHz	-85 dBm	41.11	40.4	Decrease ≤ 1 dB	0.71	Pass
1 524MHz	-65 dBm	41.04	40.32	Decrease ≤ 1 dB	0.72	Pass

GALILEO:

Test point centre frequency (MHz)	Adjacent frequency signal power level (dBm)	No interfering signal	With interfering signal	Limit	Measurement value (Max Hold) (dB)	Result
1 554MHz	-105 dBm	42.2	41.36	Decrease ≤ 1 dB	0.84	Pass
1 615MHz	-105 dBm	42.2	41.64	Decrease ≤ 1 dB	0.56	Pass
1 548MHz	-95 dBm	42.2	41.51	Decrease ≤ 1 dB	0.69	Pass
1 627MHz	-85 dBm	42.2	41.42	Decrease ≤ 1 dB	0.78	Pass
1 524MHz	-65 dBm	42.2	41.68	Decrease ≤ 1 dB	0.52	Pass

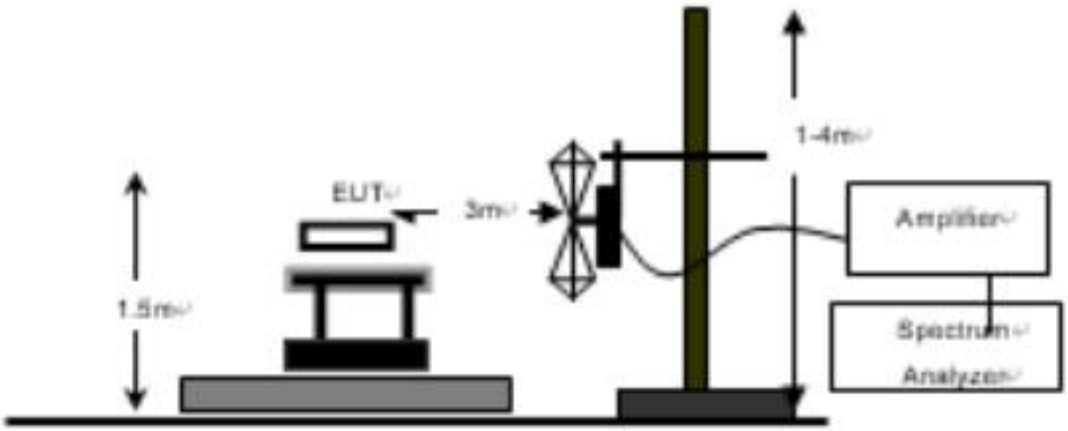
If the EUT passes the C/N_0 degradation test for all test points for all GNSS constellations and all GNSS signals declared as supported from table 4-1, the EUT shall be deemed to "pass".

4.2 ETSI EN 303 413 SUB. 4.2.2: RECEIVER SPURIOUS EMISSIONS

TEST LIMITS

The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.

TEST SETUP



TEST PROCEDURE

EUT was placed on a 1.5m outdoor wooden table. The search antenna is placed at 3m distances from the EUT and search antenna height is from 1-4m. With the transmitter operating at continuously mode, the turntable was slowly rotated to locate the direction of maximum emission. Once maximum direction is determined, the search antenna was raised and lowered in both vertical and horizontal polarizations.

The EUT was removed from the turntable and replaced with a linearly polarized antenna connected to a calibrated RF signal generator. The RF generator was set to a measured emission frequency and the search antenna was raised and lowered to produce a maximum received reading. The generator output was increased to match the radiated emission reading measured previously, and the result expressed in dB EIRP or ERP, correcting for substitution antenna gain at each frequency.

TEST RESULTS

GPS (1575.42 MHz):

Frequency. (MHz)	Antenna Polarity	Reading (dBm)	Total Factor (dB)	Corrected Power (dBm)	Limit (dBm)
366.696	H	-80.04	12.77	-67.27	-57
1568.09	H	-81.62	12.07	-69.55	-47
3249.27	H	-78.41	11.11	-67.30	-47
366.696	V	-86.96	12.08	-74.87	-57
1568.09	V	-80.37	11.62	-68.75	-47
3249.27	V	-76.00	11.66	-64.34	-47
Other (25-1000)	~	~	~	~	-57
Other (1G-26G)	~	~	~	~	-47

GLONASS (1605.375MHz):

Frequency. (MHz)	Antenna Polarity	Reading (dBm)	Total Factor (dB)	Corrected Power (dBm)	Limit (dBm)
366.809	H	-78.72	12.36	-66.35	-57
1567.39	H	-81.55	11.64	-69.91	-47
3249.35	H	-73.59	10.42	-63.17	-47
366.809	V	-82.49	11.86	-70.63	-57
1567.39	V	-78.69	11.63	-67.06	-47
3249.35	V	-74.34	11.46	-62.87	-47
Other (25-1000)	~	~	~	~	-57
Other (1G-26G)	~	~	~	~	-47

BDS (1561.098MHz):

Frequency. (MHz)	Antenna Polarity	Reading (dBm)	Total Factor (dB)	Corrected Power (dBm)	Limit (dBm)
270.452	H	-77.30	12.80	-64.50	-57
1471.22	H	-82.26	11.73	-70.53	-47
3153.18	H	-73.35	10.78	-62.57	-47
359.55	V	-82.93	12.10	-70.83	-57
1825.411	V	-79.52	11.38	-68.13	-47
3179.096	V	-74.82	11.34	-63.49	-47
Other (25-1000)	~	~	~	~	-57
Other (1G-26G)	~	~	~	~	-47

GALILEO (1575.42MHz):

Frequency. (MHz)	Antenna Polarity	Reading (dBm)	Total Factor (dB)	Corrected Power (dBm)	Limit (dBm)
270.452	H	-81.19	12.60	-68.59	-57
1471.22	H	-81.71	11.57	-70.14	-47
3153.18	H	-78.19	10.88	-67.32	-47
359.55	V	-87.40	11.99	-75.41	-57
1825.411	V	-80.95	11.75	-69.20	-47
3179.096	V	-77.06	11.29	-65.77	-47
Other (25-1000)	~	~	~	~	-57
Other (1G-26G)	~	~	~	~	-47

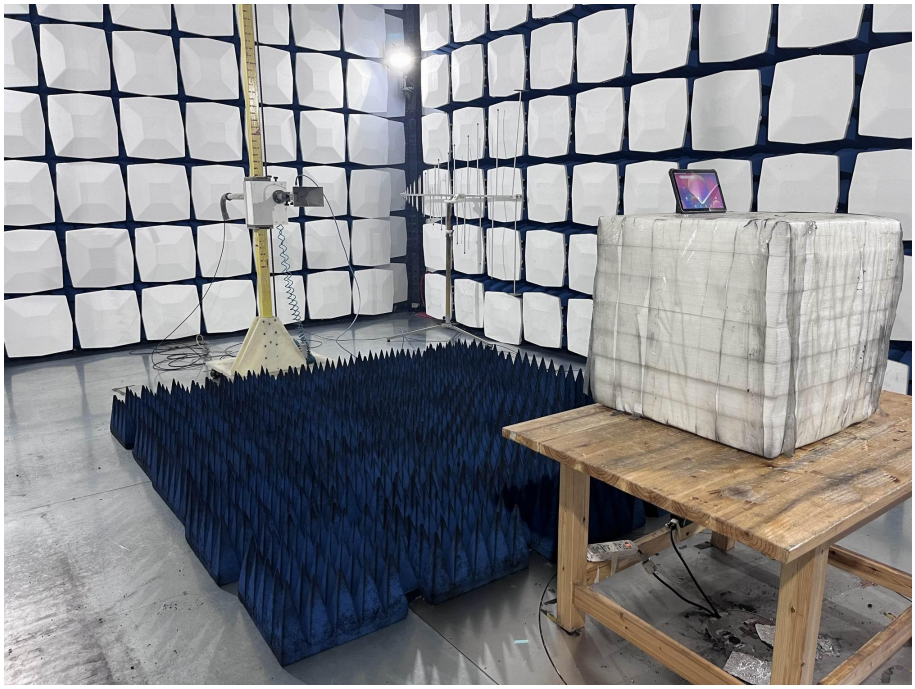
Note:

“~” in the table above means that the emissions are too small to be measured and are at least 20 dB below the limit. The frequency range below 1GHz is 30MHz to 1GHz and the frequency range above 1GHz is 1GHz to 26GHz.

5. PHOTOGRAPHS OF Test SETUP

RADIATED EMISSION TEST SETUP

RADIATED EMISSION ABOVE 1G TEST SETUP



----END OF REPORT----