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Compliance test report ID **214834-1TRFWL**

Date of issue
July 12, 2012

FCC 47 CFR Part 15, Subpart C, Chapter 15.231

Periodic operation in the band 40.66–40.70 MHz and above 70 MHz

Applicant **American Technology Components Inc.**
Product **RF Controller**
Model **GS; GS-W**
FCC ID **YGN-RFKTBX001**

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

SCC Accredited LAB
LAB Accrédité CCN

Test location

Nemko Canada Inc.
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Ottawa, ON, K1V 1H2
Canada
Test site FCC ID: 176392 (3 m semi anechoic chamber)

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Tested by Kevin Ma, Wireless/EMC Specialist, Technical Assessor

Reviewed by 

Andrey Adelberg, Senior Wireless/EMC Specialist

July 12, 2012
Date

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Copyright notification

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Section 1 Report summary

1.1 Applicant and manufacturer

American Technology Components Inc.
2905 Lavanture Place
Elkhart, IN 46514,
United States

1.2 Test specifications

FCC 47 CFR Part 15, Subpart C, Chapter 15.231

Periodic operation in the band 40.66–40.70 MHz and above 70 MHz

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.4 Exclusions

None

1.5 Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued

Section 2 Summary of test results

2.1 FCC Part 15 Subpart C – Intentional Radiators, test results

Part	Test description	Verdict
§15.207(a)	Conducted limits	Not applicable[1]
§15.231(a)	Conditions for intentional radiators to comply with periodic operation	Pass
§15.231(b)	Field strength of emissions	Pass
§15.231(c)	Emission bandwidth	Not tested[2]
§15.231(d)	Requirements for devices operating within 40.66–40.70 MHz band	Not applicable
§15.231(e)	Conditions for intentional radiators to comply with periodic operation	Not applicable

Notes: [1] EUT is a battery power device; a new battery was used during all the measurement.
[2] See original test report

Section 3 Equipment under test (EUT) details

3.1 Sample information

Receipt date	May 16, 2012
Nemko sample ID number	1

3.2 EUT information

Product name	RF Controller
Model	GS; GS-W
Serial number	None
Brand name	Genesis

3.3 Technical information

Operating band	433.855 MHz
Operating frequency	433.855 MHz
Modulation type	FSK
Occupied bandwidth	See original test report
Power requirements	12 V_{DC}
Antenna information	2 dBi internal antenna The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature: 15–30 °C
Relative humidity: 20–75 %
Air pressure: 86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 “Uncertainty in EMC measurements.” Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Section 7 Test equipment

7.1 Test equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Mar. 09/13
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	April 27/13
Active loop antenna	Emco	6502	FA001686	1 year	July 27/12
Biconical antenna	Sunol	BC2	FA002078	1 year	Jan. 04/13
Horn antenna #2	EMCO	3115	FA000825	1 year	Feb. 24/13
1–18 GHz pre-amplifier	Jca	JCA118-503	FA002091	1 year	Aug. 15/12
Note: NCR - no calibration required					

Section 8 Testing data

8.1 Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation

8.1.1 Definitions and limits

The provisions of this section are restricted to periodic operation within the band 40.66–40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition

5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

8.1.2 Test summary

Test date	May 18, 2012	**Test engineer**	Kevin Ma	**Verdict**	Pass
Temperature	22 °C	**Air pressure**	1001 mbar	**Relative humidity**	31 %

8.1.3 Observations/special notes

None

8.1.4 Test data

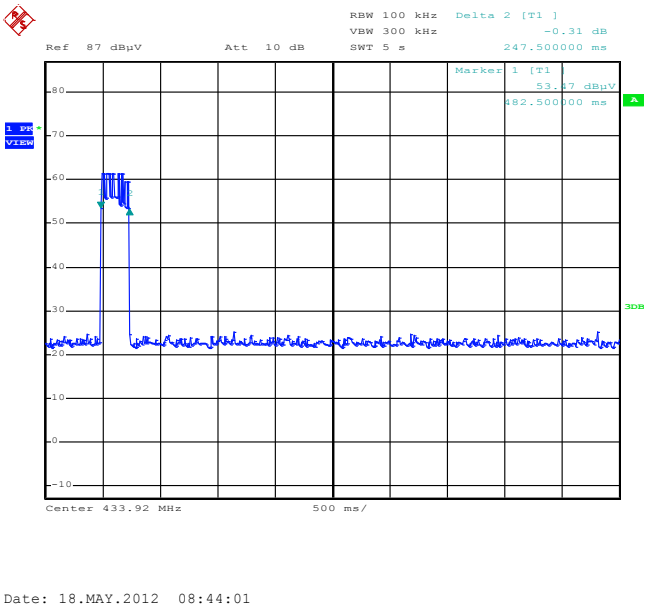
1) The EUT is manually triggered.
   See attached plot for the timing of a manually trigger event.

2) The EUT is not activated not activated automatically.
   See attached plot for the timing of an automatically trigger event.

3) The EUT is not a periodic transmitter.

4) The EUT usage is not for radio control purposes during emergencies.
   The EUT operates as in 15.231(a)(2) during an alarm state.

5) The EUT does not transmit set-up information



Plot 8.1-1: *Timing measurement*

8.2 Clause 15.231(b) Field strength of emissions

8.2.1 Definitions and limits

In addition to the provisions of §15.205 the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Table 8.2-1: *Field strength limits*

Fundamental frequency (MHz)	Field strength of fundamental (µV/m)	(dBµV/m)	Field strength of spurious emissions (µV/m)	(dBµV/m)
40.66–40.70	2,250	67	225	47
70–130	1,250	61.9	125	41.9
130–174	1,250 to 3,750*	61.9 to 71.5*	125 to 375*	41.9 to 51.5*
174–260	3,750	71.5	375	51.5
260–470	3,750 to 12,500*	71.5 to 81.9*	375 to 1,250*	51.5 to 61.9*
Above 470	12,500	81.9	1,250	61.9
* Linear interpolations				

1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.
2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.
3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

8.2.2 Test summary

Test date	May 18, 2012	**Test engineer**	Kevin Ma	**Verdict**	Pass
Temperature	23 °C	**Air pressure**	1001 mbar	**Relative humidity**	32 %

8.2.3 Observations/special notes

Table 8.2-2: *§15.209 – Radiated emission limits*

Frequency (MHz)	Field strength (µV/m)	Measurement distance (dBµV/m)	(m)
0.009–0.490	2400/F	67.6−20log(F)	300
0.490–1.705	24000/F	87.6−20log(F)	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

– F = fundamental frequency in kHz
– In the emission table above, the tighter limit applies at the band edges.
– For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

8.2.3 Observations/special notes, continued

Table 8.2-3: *§15.205 – Restricted bands of operation*

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

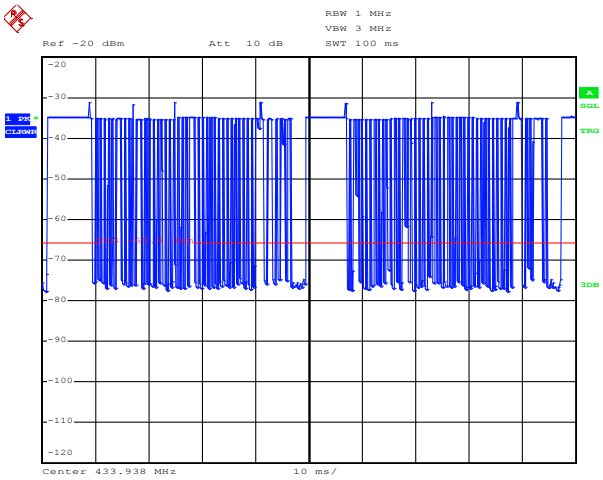
- The spectrum was searched from 30 MHz to the 10th harmonic.
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- All measurements were performed:
- within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
- above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results and using a duty cycle/average factor for average results calculations.

8.2.4 Test data

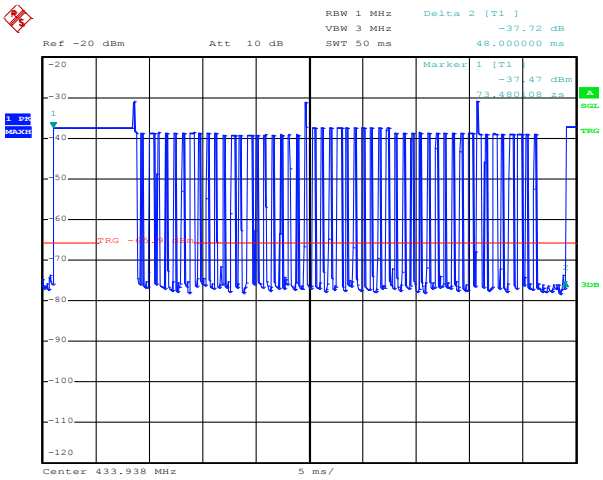
Duty cycle/average factor calculations

§15.35(c) When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed; the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

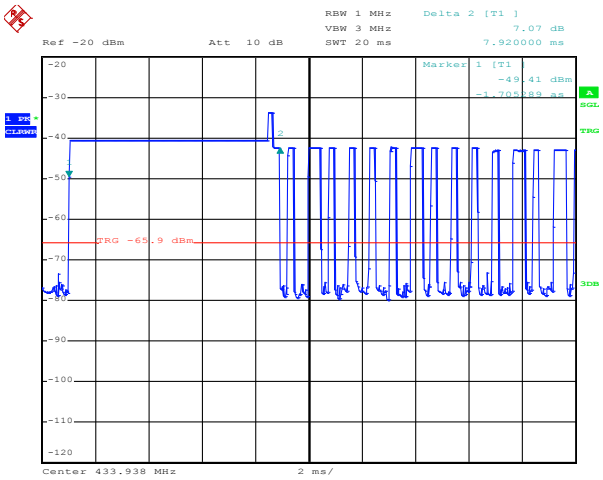
$$Duty\ cycle\ /\ average\ factor = 20 \times \log_{10}\left(\frac{Tx_{100ms}}{100\,ms}\right)$$



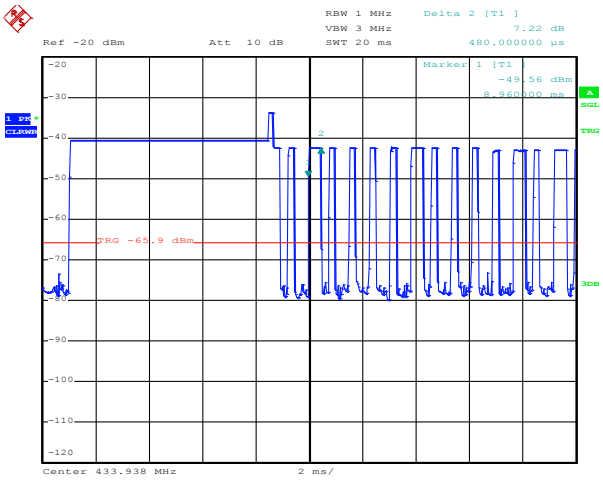
Plot 8.2-1: *100 ms transmission*



Plot 8.2-2: *Transmission train duration*

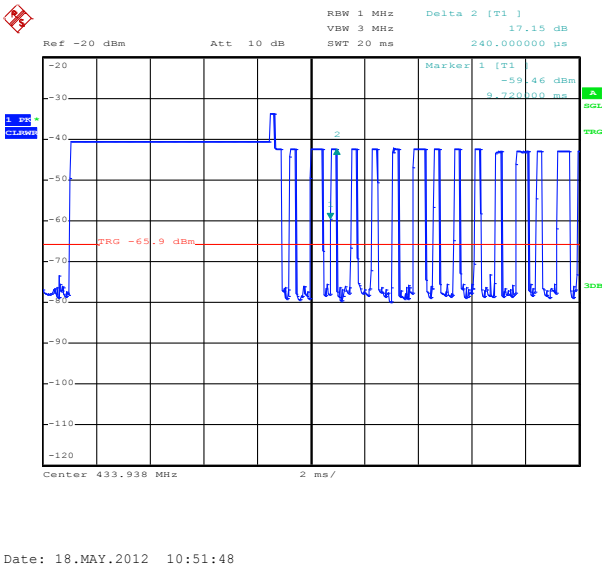


Plot 8.2-3: *Preamble duration*



Plot 8.2-4: *Long pulse duration*

8.2.4 Test data, continued



Plot 8.2-5: *Short pulse duration*

$T_{On} + T_{Off} =$ 48 ms

On time: 38 × 0.24 ms + 11 × 0.48 ms + 7.92 ms = 22.32 ms

Duty Cycle Factor: 20 × Log_{10} (22.32 ÷ 48) = −6.65 dB

Table 8.2-4: *Field strength measurement within restricted bands results*

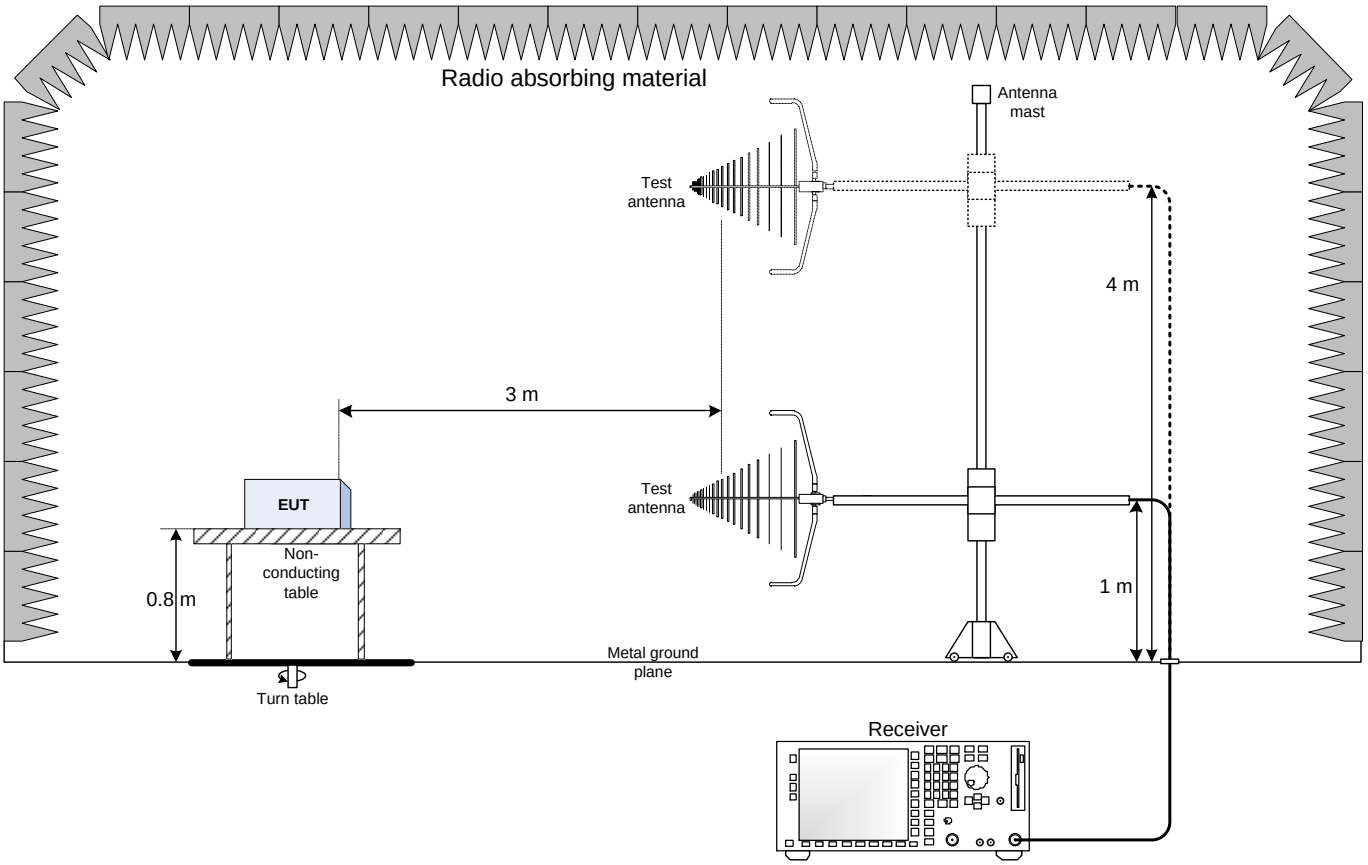
Frequency (MHz)	Peak Field strength (dBµV/m)	Peak limit (dBµV/m)	Margin (dB)	Duty cycle factor (dB)	Average field strength (dBµV/m)	Average limit (dBµV/m)	Margin (dB)
1301.5	40.28	74.00	33.72	-6.65	33.63	54.00	20.37
Note: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable. Average field strength (E_{AVG}) is calculated as follows: $E_{AVG} = E_{PEAK}$ + Duty cycle factor							

Table 8.2-5: *Field strength measurement outside restricted bands results*

Frequency (MHz)	Polarization V/H	Peak Field strength (dBµV/m)	Peak limit (dBµV/m)	Margin (dB)	Duty cycle factor (dB)	Average field strength (dBµV/m)	Average limit (dBµV/m)	Margin (dB)
Fundamental								
433.93	H	73.71	100.80	27.09	-6.65	67.06	80.80	13.74
433.93	V	61.36	100.80	39.44	-6.65	54.71	80.80	26.09
Harmonics								
867.91	V and H	39.22	80.80	41.58	-6.65	32.57	80.80	48.23
1733.5	V and H	42.67	80.80	38.13	-6.65	36.02	80.80	44.78
2170.0	V and H	45.46	80.80	35.35	-6.65	38.81	80.80	42.00
Notes: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable. Average field strength (E_{AVG}) is calculated as follows: $E_{AVG} = E_{PEAK}$ + Duty cycle factor								

Section 9 Block diagrams of test set-ups

9.1 Radiated emissions set-up



Section 10 Setup photos

10.1 Radiated setup photo