



香港標準及檢定中心  
Hong Kong Standards and Testing Centre

Date : 2004-10-11

No. : HM152336

**TEST REPORT**

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**Applicant:**

Ngai Keung Metal & Plastic Manufactory Ltd.  
Room 1108-1112 Harbour Crystal Centre,  
100 Granville Road, TST., East Kowloon,  
Hong Kong

**Description of Samples:**

Model name: 1:32 Full Function Radio Control Car  
Model no.: 88819  
Brand name: NKOK  
FCC ID: M8QF88849TX

**Date Samples Received:**

2004-08-19

**Date Tested:**

2004-09-01

**Investigation Requested:**

FCC Part 15 Subpart C

**Conclusions:**

The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

**Remarks:**

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K C Lee, EMC  
for Chief Executive

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**1.0 General Details**

**1.1 Test Laboratory**

The Hong Kong Standards and Testing Centre Ltd.  
EMC Laboratory  
10 Dai Wang Street, Taipo Industrial Estate  
New Territories, Hong Kong

**1.2 Applicant Details**  
**Applicant**

Ngai Keung Metal & Plastic Manufactory Ltd.  
Room 1108-1112 Harbour Crystal Centre,  
100 Granville Road, TST., East Kowloon, Hong Kong

**HKSTC Code Number for Applicant**

**NGK002**

**Manufacturer**

Ngai Keung Metal & Plastic Manufactory Ltd.  
Room 1108-1112 Harbour Crystal Centre,  
100 Granville Road, TST., East Kowloon, Hong Kong

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**1.3 Equipment Under Test [EUT]  
Description of Sample**

Model Name: 1:32 Full Function Radio Control Car  
Manufacturer: Ngai Keung Metal & Plastic Manufactory Ltd.  
Brand Name: NKOK  
Model Number: 88819  
Input Voltage: 4.5Vd.c ("AAA" size battery x 3)  
Additional Model Number: 88824, 88875, 88876, 88880

**1.3.1 Description of EUT Operation**

The Equipment Under Test (EUT) is a Ngai Keung Metal & Plastic Manufactory Ltd., 1:32 Full Function Radio Control Car. The transmitter is a 4 buttons transmitter. The EUT continues to transmit while button is being pressed, Modulation by IC. and type is pulse modulation.

**1.4 Date of Order**

2004-08-19

**1.5 Submitted Sample(s):**

2 Samples per model

**1.6 Test Duration**

2004-09-01

**1.7 Country of Origin**

China

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**1.8 Additional Information of EUT**

User Manual  
Part List  
Circuit Diagram  
Printed Circuit Board [PCB] Layout  
Block diagram  
FCC ID Label

Submitted

☒  
☒  
☒  
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☒  
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Not Available

☐  
☐  
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☐  
☐  
☐

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**2.0 Technical Details**

**2.1 Investigations Requested**

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 and ANSI C63.4:2003 for FCC Certification.

**2.2 Test Standards and Results Summary Tables**

| EMISSION<br>Results Summary                                  |                  |                 |                  |                                     |                          |                                     |
|--------------------------------------------------------------|------------------|-----------------|------------------|-------------------------------------|--------------------------|-------------------------------------|
| Test Condition                                               | Test Requirement | Test Method     | Class / Severity | Test Result                         |                          |                                     |
|                                                              |                  |                 |                  | Pass                                | Failed                   | N/A                                 |
| Field Strength of Fundamental Emissions & Spurious Emissions | FCC 47CFR 15.235 | ANSI C63.4:2003 | N/A              | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Radiated Emissions, 30MHz to 1GHz                            | FCC 47CFR 15.209 | ANSI C63.4:2003 | Class B          | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Conducted Emissions on AC, 0.15MHz to 30MHz                  | FCC 47CFR 15.207 | ANSI C63.4:2003 | Class B          | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Note: N/A - Not Applicable

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**3.0 Test Results**

**3.1 Emission**

**3.1.1 Radiated Emissions (30 – 1000MHz)**

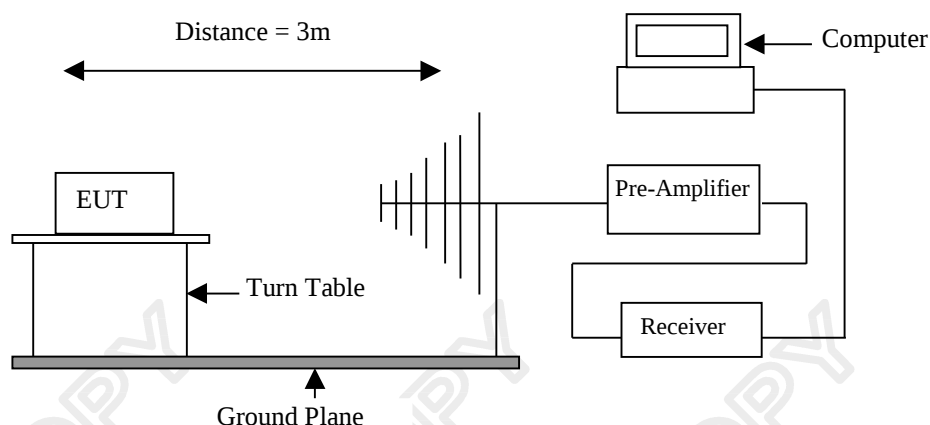
|                    |                  |
|--------------------|------------------|
| Test Requirement:  | FCC 47CFR 15.235 |
| Test Method:       | ANSI C63.4:2003  |
| Test Date:         | 2004-09-01       |
| Mode of Operation: | On mode          |

**Test Method:**

The sample was placed 0.8m above the ground plane on the OATS \*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\*: OATS [Open Area Test Site] located at HKSTC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 90657.

**Test Setup:**



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**Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.235]:**

| Frequency Range of Fundamental<br>[MHz] | Field Strength of Fundamental Emission<br>[Peak]<br>[ $\mu\text{V/m}$ ] | Field Strength of Fundamental Emission<br>[Average]<br>[ $\mu\text{V/m}$ ] |
|-----------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------|
| 49.82-49.90                             | 100,000                                                                 | 10,000                                                                     |

**Results:**

| Field Strength of Fundamental Emissions<br>Peak Value |                                          |                                         |                                      |                                   |                              |                  |
|-------------------------------------------------------|------------------------------------------|-----------------------------------------|--------------------------------------|-----------------------------------|------------------------------|------------------|
| Frequency<br>MHz                                      | Measured Level @3m<br>dB $\mu\text{V/m}$ | Correction Factor<br>dB $\mu\text{V/m}$ | Field Strength<br>dB $\mu\text{V/m}$ | Field Strength<br>$\mu\text{V/m}$ | Limit @3m<br>$\mu\text{V/m}$ | E-Field Polarity |
| 49.86                                                 | 65.6                                     | 10.2                                    | 75.8                                 | 6,166.0                           | 100,000                      | Vertical         |

| Field Strength of Fundamental Emissions<br>Average |                                          |                              |                                         |                                      |                                   |                              |                  |
|----------------------------------------------------|------------------------------------------|------------------------------|-----------------------------------------|--------------------------------------|-----------------------------------|------------------------------|------------------|
| Frequency<br>MHz                                   | Measured Level @3m<br>dB $\mu\text{V/m}$ | Adjusted by Duty Cycle<br>dB | Correction Factor<br>dB $\mu\text{V/m}$ | Field Strength<br>dB $\mu\text{V/m}$ | Field Strength<br>$\mu\text{V/m}$ | Limit @3m<br>$\mu\text{V/m}$ | E-Field Polarity |
| 49.86                                              | 61.0                                     | -4.6                         | 10.2                                    | 71.2                                 | 3,630.8                           | 10,000                       | Vertical         |

According to FCC 47CFR15.35, the limit on the radio frequency emissions as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

**Remarks:**

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz  $\pm 4.1\text{dB}$

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**Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:**

| Frequency Range<br>[MHz] | Quasi-Peak Limits<br>[μV/m] |
|--------------------------|-----------------------------|
| 30-88                    | 100                         |
| 88-216                   | 150                         |
| 216-960                  | 200                         |
| Above 960                | 500                         |

The emission limits shown in the above table are based on measurement employing a CISPR quasi - peak detector and above 1000MHz are based on measurements employing an average detector.

**Results:**

| Radiated Emissions<br>Quasi-Peak |                                 |                                |                             |                           |                   |                     |
|----------------------------------|---------------------------------|--------------------------------|-----------------------------|---------------------------|-------------------|---------------------|
| Frequency<br>MHz                 | Measured<br>Level @3m<br>dBμV/m | Correction<br>Factor<br>dBμV/m | Field<br>Strength<br>dBμV/m | Field<br>Strength<br>μV/m | Limit @3m<br>μV/m | E-Field<br>Polarity |
| 99.72                            | < 1.0                           | 10.8                           | < 11.8                      | < 3.9                     | 100               | Vertical            |
| 149.58                           | < 1.0                           | 9.8                            | < 10.8                      | < 3.5                     | 100               | Vertical            |
| 199.44                           | < 1.0                           | 11.5                           | < 12.5                      | < 4.2                     | 150               | Vertical            |
| 249.30                           | 22.8                            | 15.2                           | 38.0                        | 79.4                      | 200               | Horizontal          |
| 299.16                           | < 1.0                           | 17.4                           | < 18.4                      | < 8.3                     | 200               | Vertical            |
| 349.02                           | < 1.0                           | 17.2                           | < 18.2                      | < 8.1                     | 200               | Vertical            |
| 398.88                           | < 1.0                           | 18.8                           | < 19.8                      | < 9.8                     | 200               | Vertical            |
| 448.74                           | < 1.0                           | 19.7                           | < 20.7                      | < 10.8                    | 200               | Vertical            |
| 498.60                           | < 1.0                           | 20.6                           | < 21.6                      | < 12.0                    | 200               | Vertical            |

**Remarks:**

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz ±4.1dB

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**3.1.2 Conducted Emissions (0.15MHz to 30MHz)**

|                    |                  |
|--------------------|------------------|
| Test Requirement:  | FCC 47CFR 15.107 |
| Test Method:       | ANSI C63.4:2003  |
| Test Date:         | N/A              |
| Mode of Operation: | N/A              |

**Results:** N/A

The EUT is operated by a single source of internal battery power [located in the battery compartment], therefore power line conducted emission was deemed unnecessary.

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**3.2 20dB Bandwidth of Fundamental Emission**

|                    |                                  |
|--------------------|----------------------------------|
| Test Requirement:  | FCC 47 CFR 15.235                |
| Test Method:       | ANSI C63.4:2003 (Section 13.1.7) |
| Test Date:         | 2004-09-01                       |
| Mode of Operation: | On mode                          |

**Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

**Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

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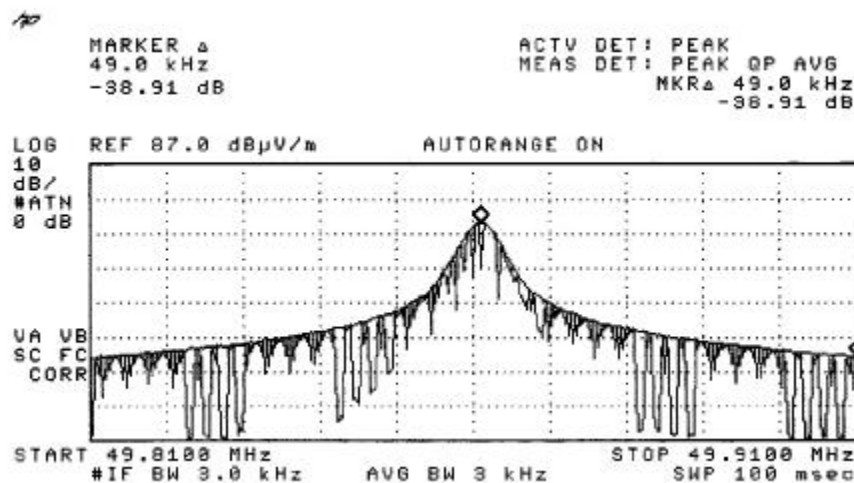
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**Limits for 20dB Bandwidth of Fundamental Emission:**

| Frequency Range<br>[MHz] | 20dB Bandwidth<br>[KHz] | FCC Limits<br>[MHz] |
|--------------------------|-------------------------|---------------------|
| 49.86                    | 48.3                    | within 49.82-49.90  |

**20dB Bandwidth of Fundamental Emission**



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**Appendix A**

**List of Measurement Equipment**

**Radiated Emission**

| EQP NO. | DESCRIPTION                                                                  | MANUFACTURER                                          | MODEL NO.                      | SERIAL NO.                             | LAST CAL |
|---------|------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------|----------------------------------------|----------|
| EM007   | SPECTRUM ANALYZER                                                            | HEWLETT PACKARD                                       | HP85660B                       | 3144A21192                             | 15/06/04 |
| EM008   | SPECTRUM ANALYZER DISPLAY                                                    | HEWLETT PACKARD                                       | HP85662A                       | 3144A20514                             | 15/06/04 |
| EM009   | QUASI PEAK ADAPTOR                                                           | HEWLETT PACKARD                                       | HP85650A                       | 3303A01702                             | 15/06/04 |
| EM010   | RF PRESELECTOR                                                               | HEWLETT PACKARD                                       | HP85685A                       | 3221A01410                             | 15/06/04 |
| EM011   | ATTENUATOR/SWITCH                                                            | HEWLETT PACKARD                                       | HP11713A                       | 2508A10595                             | 15/06/04 |
| EM012   | PRE-AMPLIFIER                                                                | HEWLETT PACKARD                                       | HP8449B                        | 3008A00262                             | 15/06/04 |
| EM013   | CONTROLLER (COMPUTER),<br>COLOR MONITOR, KEYBOARD &<br>MOUSE<br>FLOPPY DRIVE | HEWLETT PACKARD<br>HEWLETT PACKARD<br>HEWLETT PACKARD | HP9000<br>HP A1097C<br>HP9133L | 6226A60314<br>3151J39517<br>2623A02468 | 15/06/04 |
| EM020   | HORN ANTENNA                                                                 | EMCO                                                  | 3115                           | 4032                                   | 15/06/04 |
| EM022   | LOOP ANTENNA                                                                 | EMCO                                                  | 6502                           | 1189-2424                              | 04/08/00 |
| EM072   | SIGNAL GENERATOR                                                             | HEWLETT PACKARD                                       | 8640B                          | 1948A11892                             | N/A      |
| EM083   | HKSTC OPEN AREA TEST SITE                                                    | HKSTC                                                 | N/A                            | N/A                                    | 08/11/02 |
| EM131   | PORTABLE SPECTRUM<br>ANALYSER                                                | HEWLETT PACKARD                                       | 8595EM                         | 3710A00155                             | 13/01/04 |
| EM145   | EMI TEST RECEIVER                                                            | R & S                                                 | ESCS 30                        | 830245/021                             | 02/08/03 |
| EM219   | BICONILOG ANTENNA                                                            | EMCO                                                  | 3142C                          | 00029071                               | 28/10/03 |
| EM195   | ANTENNA POSITIONING MAST                                                     | EMCO                                                  | 2075                           | 2368                                   | N/A      |
| EM196   | MULTI-DEVICE CONTROLLER                                                      | EMCO                                                  | 2090                           | 1662                                   | N/A      |

**Conducted Emission**

| EQP NO. | DESCRIPTION                         | MANUFACTURER                     | MODEL NO.  | SERIAL NO.          | LAST CAL |
|---------|-------------------------------------|----------------------------------|------------|---------------------|----------|
| EM078   | VARIAC                              | SHANGHAI VOLTAGE                 | TDGC-3/0.5 | N/A                 | CM       |
| EM081   | SMALL SCREENED ROOM                 | MIKO INST HK                     | N/A        | N/A                 | 17/10/03 |
| EM119   | LISN                                | R & S                            | ESH3-Z5    | 0831.5518.52        | 01/10/02 |
| EM127   | ISOLATION TRANSFORMER 220<br>TO 300 | WING SUN                         | N/A        | N/A                 | CM       |
| EM142   | PULSES LIMITER                      | R & S                            | ESH3Z2     | 357.8810.52         | 07/07/03 |
| EM181   | EMI TEST RECEIVER                   | R & S                            | ESIB7      | 100072              | 06/01/04 |
| EM154   | SHIELDING ROOM                      | SIEMENA MATSUSHITA<br>COMPONENTS | N/A        | 803-740-057-<br>99A | 17/10/03 |
| EM197   | LISN                                | EMCO                             | 4825/2     | 1193                | 08/04/03 |

Remarks:

CM Corrective Maintenance  
N/A Not Applicable or Not Available  
TBD To Be Determined

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**Appendix B**

**Duty Cycle Correction During 100msec**

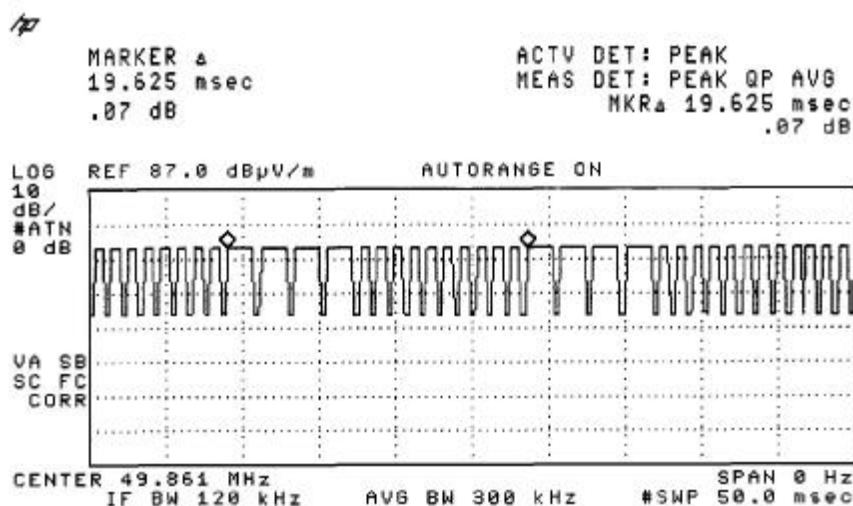
Each function key sends a different series of characters, but each packet period (19.625msec) never exceeds a series of 4 long (1.625msec) and 10 short (500µsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered  $4 \times 1.625\text{msec} + 10 \times 0.5\text{msec}$  per 19.625msec = 58.5% duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction =  $20\text{Log}(0.585) = -4.6\text{dB}$

The following figures [Figure A to Figure C] show the characteristics of the pulse train for one of these functions.

**Figure A [Pulse Train]**



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Figure B [Long Pulse]

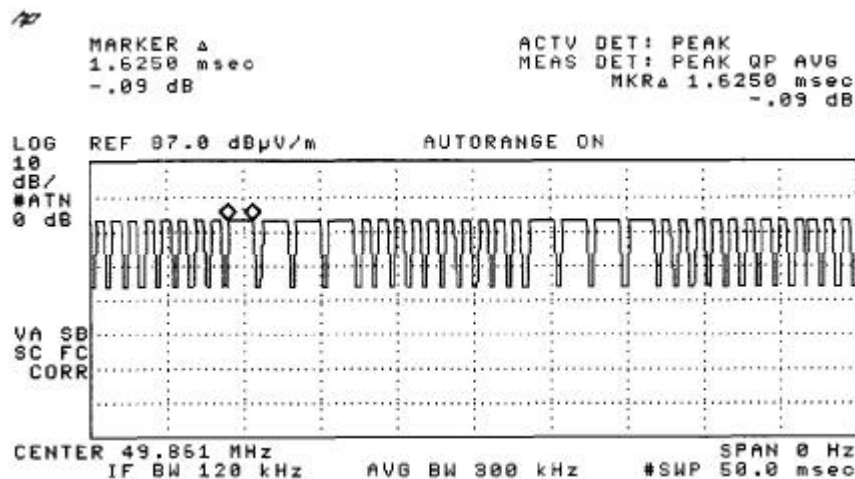
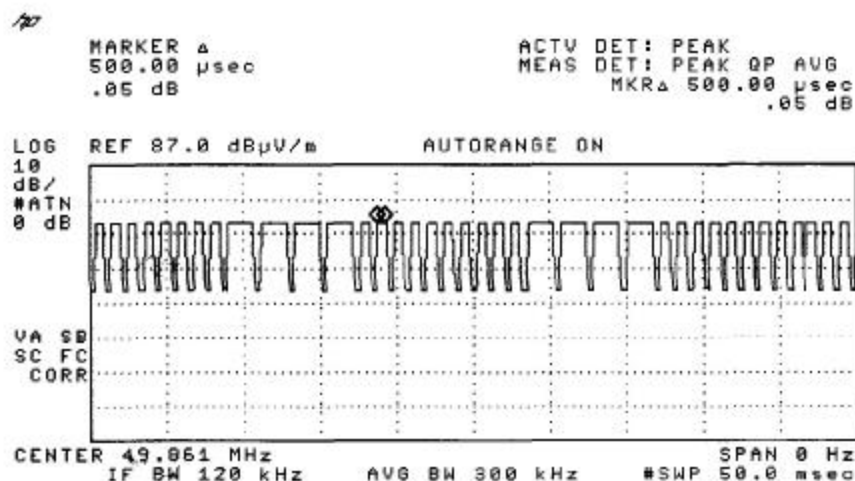


Figure C [Short Pulse]



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**Appendix C**

**Photographs of EUT**

**Front View of the product**



**Rear View of the product**



**Inner Circuit Top View**



**Inner Circuit Bottom View**



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**Photographs of EUT**

**Measurement of Radiated Emission Test Set Up**



**\*\*\*\*\* End of Test Report \*\*\*\*\***

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