Parkside Laboratories

363

GLOBAL TESTING, CALIBRATION & CERTIFICATION SERVICES

◆ ELECTRICAL ◆ EMC ◆ ENVIRONMENTAL ◆

Laboratory Test Report

This report may not be reproduced except in full.
It contains no corrections or erasures.

Report No.: 8455-00
Date Issued: 25 August 2004

SUBJECT: Phitek FM Transmitter
Rating: 4.5 V d.c.

REQUESTED BY:
Phitek Systems Ltd
Level 1, 228 Queen Street
P.O. Box 7143
Auckland
NEW ZEALAND

INSTRUCTIONS: Test for compliance with FCC 47 Part 15:2002 "Code of Federal Regulations: Title 47 Telecommunication. Part 15 Radio frequency devices".

CONTENTS:

SUMMARY:

All test results in this report in relation to the Phitek FM Transmitter confirmed that the specimens Complied with the relevant provisions of FCC 47 Part 15:2002 within the window of uncertainty of 4.6 dB.

APPROVED BY:	*TESTED BY:*	*PREPARED BY:*
Manuel Shimasaki	Brian Drumm	Clare Rochford
IANZ Signatory	EMC Compliance Engineer	Technical Writer

GENERAL

a) As detailed in this report, six specimens of the Phitek FM Transmitter were received for testing.

b) The results detailed in this report are based on the specimens submitted by the manufacturer.

c) The specimens were tested for compliance with Electromagnetic Interference (EMI) in accordance with FCC 47 Part 15:2002.

d) All testing was carried out under the following environmental conditions, unless otherwise noted:

Ambient temperature	15 °C to 35 °C
Relative humidity	30 % to 60 %
Atmospheric pressure	86 kPa to 106 kPa.

e) Note: N/R = Not Relevant to design assessed, N/T = Not Tested at manufacturer's request, EUT = Equipment Under Test, DNC = Did Not Comply.

f) The reported expanded uncertainties (U) listed below are based on standard uncertainties multiplied by a coverage factor k = 2, and define an interval $\pm U$ providing a level of confidence of approximately 95 %. The uncertainty calculations have been carried out in accordance with IANZ requirements.

Radiated EMI Measurement	30 – 1000 MHz	± 4.6 dB

g) For radiated emission measurements, maximum peak disturbance scans were performed over the entire frequency range of 30 MHz to 1 GHz while varying the products azimuth 0° to 360° and the antenna height, from 1 to 4 meters with both horizontal and vertical polarities. The 26 maxima were then subjected to a Quasi-Peak analysis for > 1 s at each point where the exact azimuth, height, polarity and frequency of the disturbance occurred. All 26 quasi-peak points were manually verified and ambient signal results removed.

TEST SPECIFICATION

FCC 47 Part 0 to 19 :2002	"Code of Federal Regulations: Title 47 Telecommunication. Part 15 Radio frequency devices"

This specification was applicable at the time of testing.

DATE OF TEST

Testing was completed on 13 August 2004.

DESCRIPTION

The Phitek FM Transmitter was housed in a circular plastic case with a hinged 3.5 mm stereo plug for connection to the output of an audio device on one side. Diametrically opposite was a four position slide switch which set the transmitter frequency to 88.1, 88.3, 88.5 or 88.7 MHz.

On the top of the Phitek FM Transmitter was an on-off push switch and an LED while on the bottom there was a battery compartment which was accessed by rotating the cover. A 92 mm wire antenna was exited the case under the battery compartment cover.

The highest oscillator frequency of the Phitek FM Transmitter was 7.6 MHz.

Approximate Dimensions [mm]: Diameter 63 × H 25

Figure 1: Phitek FM Transmitter General View Showing Hinged Plug

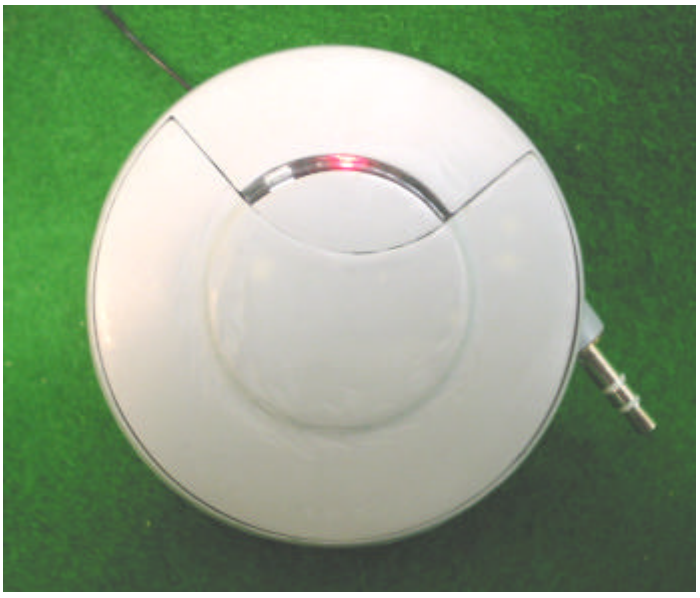


Figure 2: Phitek FM Transmitter Top View Showing Switch and LED

Figure 3: Phitek FM Transmitter Battery Compartment

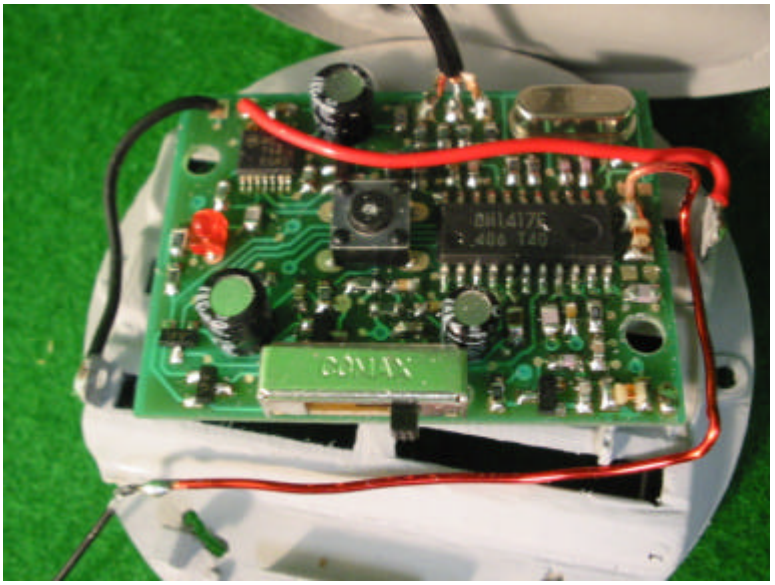


Figure 4: Phitek FM Transmitter Circuit Board

RESULTS: FCC 47 Part 15:2002 "Code of Federal Regulations: Title 47 Telecommunication. Part 15 Radio frequency devices".

SUBPART A – GENERAL	Applied
Clause 15.1 Scope of this part	Applied
Clause 15.3 Definitions	Noted
Clause 15.5 General conditions of operation	Noted
Clause 15.7 Special temporary authority	N/R
Clause 15.9 Prohibition against eavesdropping	N/A
Clause 15.11 Cross reference	Noted
Clause 15.13 Incidental radiators	N/A
Clause 15.15 General technical requirements	Noted
Clause 15.17 Susceptibility to interference	Noted
Clause 15.19 Labelling requirements	Noted

The labelling required by (a)(3) was in the user manual, as permitted by (a)(5).

Clause 15.21 Information to user	Noted

A warning against modification was included in the user manual

Clause 15.23 Home-built devices	N/R
Clause 15.25 Kits	N/R
Clause 15.27 Special accessories	Noted
Clause 15.29 Inspection by the Commission	Noted
Clause 15.31 Measurement standards	Applied

The measurements were made on an Open Air Test Site as required by paragraph (c)

New batteries were fitted to the (EUT) as required by paragraph (e)

The measurements were carried out at a distance of 3 m in accordance with paragraph (f).

Measurements were made at all radials around the (EUT) at 1 degree increments as required by paragraph (f)(5).

Measurements of radiated power were done on 88.5 MHz, near the middle of the band of operation as required by paragraph (m).

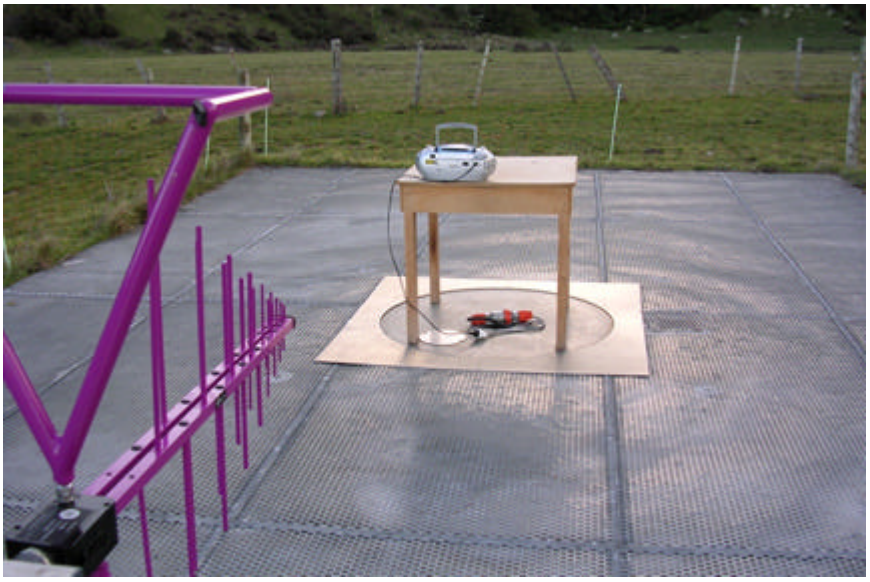


Figure 5: Measurement Test Set-up

Figure 6: Measurement Test Set-up showing EUT Attached to CD Player

Clause 15.32 Test procedures for CPU boards and computer power supplies N/R

Clause 15.33 Frequency range of radiated measurements Applied

Radiated measurements were made from 30 MHz to 1000 MHz.

Investigations were carried out at 7.6 MHz, the frequency of the lowest radio frequency signal generated in the device, at 15.2 MHz and at 22.4 MHz. Using a Rohde & Schwarz Electric Field Probe with a +/- 3 dB response from 9 kHz to 1 GHz.

The highest reading on the fundamental frequency of 88.5 MHz was with the probe tip close to the antenna and was used as a reference. On 7.6 MHz the highest reading with the probe tip touching the outside of the case was - 35 dB while on 15.2 MHz the level was - 62 dB. There was no significant result at 22.4 MHz.

Further investigation with a ZESPOL AMZ-3A/50 loop antenna set showed no detectable emissions greater than 1 m from the loop. The antenna factor of the loop at 7.6 MHz was 29.5 dB.

Clause 15.35 Measurement detector functions and bandwidths Applied

The measuring equipment used was a Rohde & Schwarz ESCS 30 receiver complying with the requirements of paragraph (a). The calibration of the ESCS 30 is valid until 21 August 2004.

Clause 15.37 Transition provisions for compliance with the rules — Noted

SUBPART B – UNINTENTIONAL RADIATORS — N/R

SUBPART C - INTENTIONAL RADIATORS — Complied

Clause 15.201 Equipment authorisation requirement — Noted

Clause 15.203 Antenna requirement — Complied

The Phitek FM Transmitter had a permanently attached antenna.

Clause 15.204 External radio frequency power amplifiers and antenna modifications — Noted

Clause 15.205 Restricted bands of operation — Noted

Clause 15.207 Conducted limits — N/A

Clause 15.209 Radiated emission limits, general requirements — Complied

Emissions from the (EUT) did not exceed the limits specified in paragraph (a). A frequency scan is attached.

The level of unwanted emissions did not exceed the level of the fundamental emission as required by paragraph (c).

Measurements were made using a quasi-peak detector as required by paragraph (d).

Clause 15.211 Tunnel radio systems — N/R

Clause 15.213 Cable locating equipment — N/R

Clause 15.214 Cordless telephones	N/R
Clause 15.215 Additional provisions to the general radiated emission limitations	Noted
Clause 15.217 Operation within the band 160 – 190 kHz	N/R
Clause 15.219 Operation within the band 510 – 1705 kHz	N/R
Clause 15.221 Operation within the band 525 – 1705 kHz	N/R
Clause 15.223 Operation within the band 1.705 – 10 MHz	N/R
Clause 15.225 Operation within the band 13.553 – 13.567 MHz	N/R
Clause 15.227 Operation within the band 26.96 – 27.28 MHz	N/R
Clause 15.229 Operation within the band 40.66 – 40.70 MHz	N/R
Clause 15.231 Periodic operation in the band 40.66 – 40.70 MHz and above 70 MHz	N/R
Clause 15.233 Operation within the bands 43.71 – 44.49 MHz, 46.60 – 46.98 MHz, 48.75 – 49.51 MHz and 49.66 – 50.0 MHz	N/R
Clause 15.235 Operation within the band 49.82 – 49.90 MHz	N/R
Clause 15.237 Operation in the bands 72.0 – 73.0 MHz, 74.6 – 74.8 MHz and 75.2 – 76.0 MHz	N/R

Clause 15.239 Operation in the band 88 – 108 MHz — Complied

Emissions were confined within a 200 kHz bandwidth lying wholly within the frequency range 88 - 108 MHz.

Emissions from the (EUT) did not exceed 250 mV per metre at 3 m as required by paragraph (b).

The field strength of any emissions from the (EUT) outside of the 200 kHz band did not exceed the general radiated emission limits in 15.209 as required by paragraph (c).

Clause 15.241 Operation in the band 174 – 216 MHz — N/R

Clause 15.242 Operation in the bands 174 – 216 MHz and 470 – 668 MHz — N/R

Clause 15.243 Operation in the band 890 – 940 MHz — N/R

Clause 15.245 Operation in the bands 902 – 928 MHz, 2435 – 2465 MHz, 5785 – 5815 MHz, 10500 – 10550 MH and 24075 – 24175 MHz — N/R

Clause 15.247 Operation in the bands 902 – 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz — N/R

Clause 15.249 Operation in the bands 902 – 928 MHz, 2400 – 2483.5 MHz, 5725 – 5875 MHz and 24.0 – 24.25 GHz — N/R

Clause 15.251 Operation in the bands 2.9 – 3.26 GHz, 3.267 – 3.332 GHz, 3.339 – 3.3458 GHz and 3.358 – 3.6 GHz — N/R

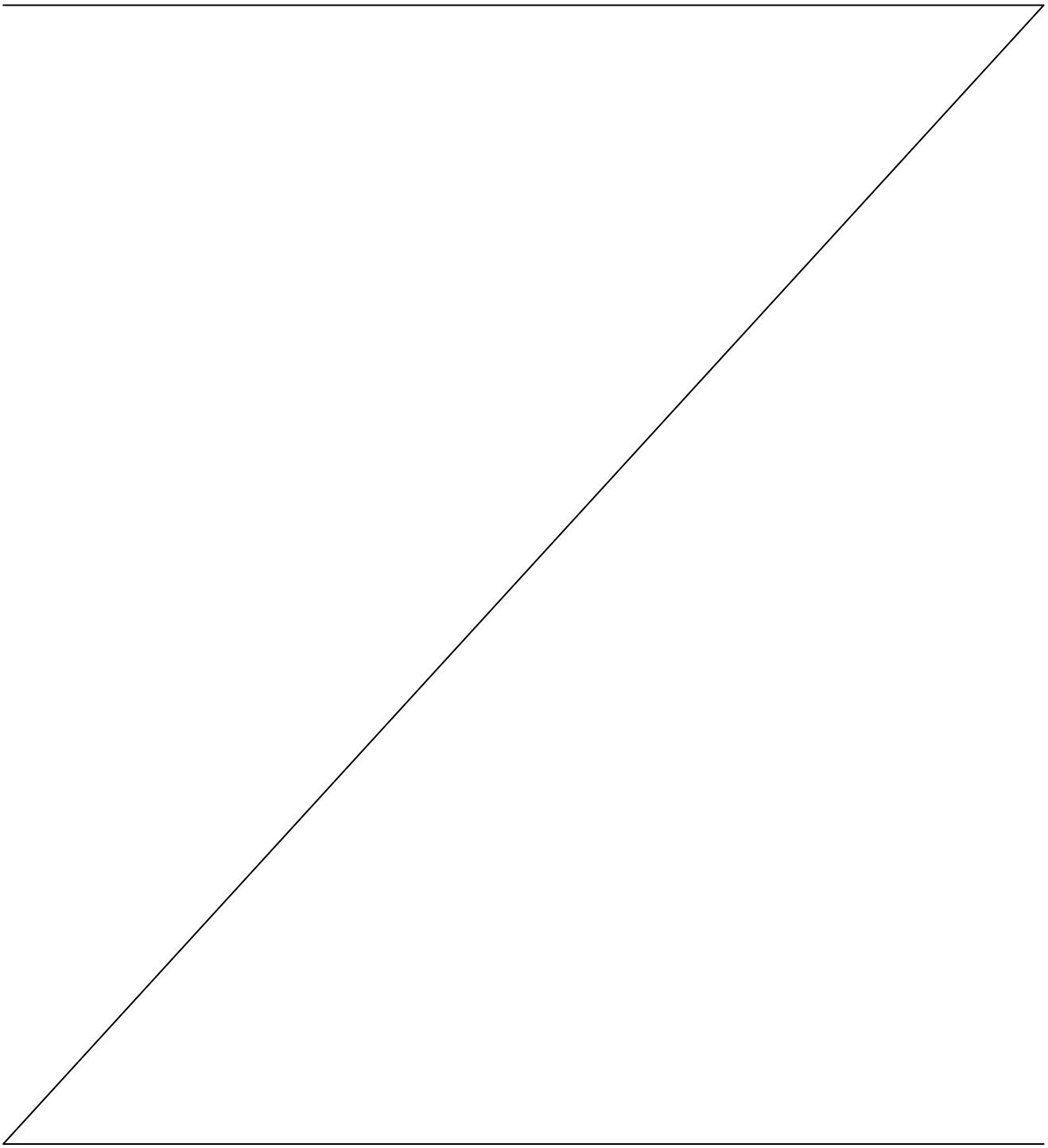
Clause 15.253 Operation in the bands 46.7 – 46.9 GHz and 76.0 – 77.0 GHz — N/R

Clause 15.255 Operation in the band 57 – 64 GHz — N/R

SUBPART D – UNLICENSED PERSONAL COMMUNICATIONS SERVICE DEVICES N/R

SUBPART E – UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE DEVICES N/R

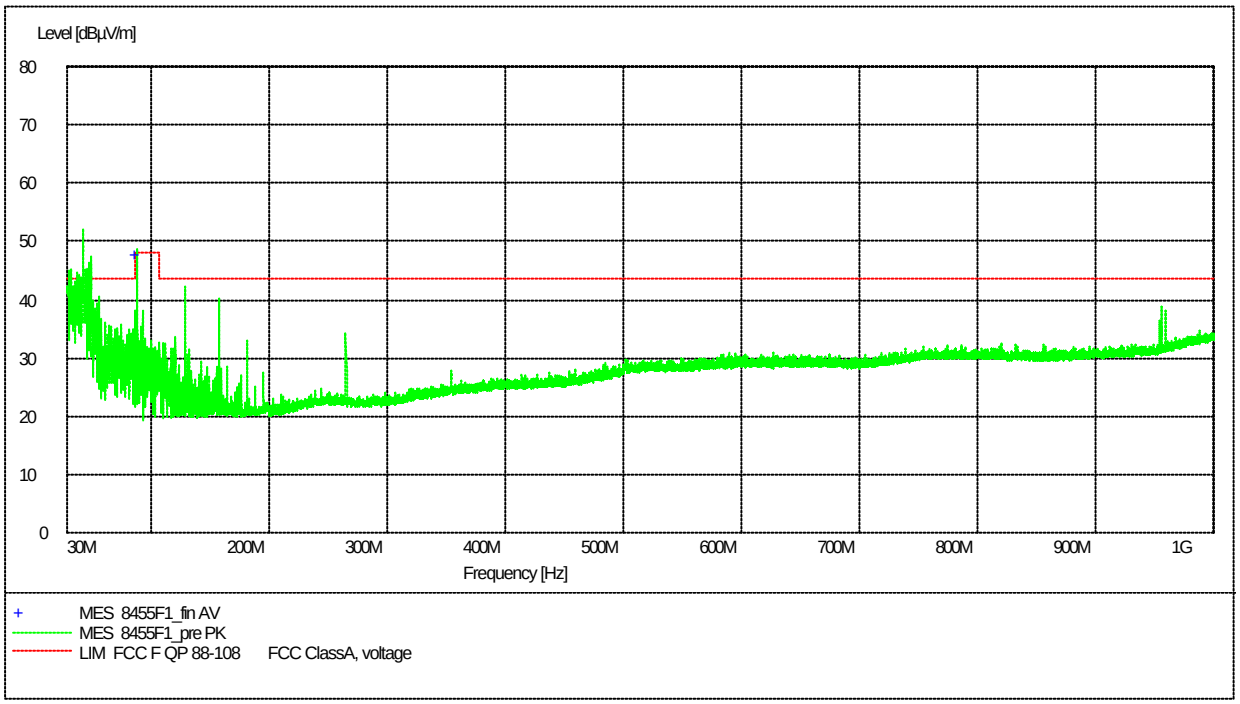
SUBPART F – ULTRA-WIDEBAND OPERATION N/R



RADIATED EMISSIONS SCAN 30 MHz – 1 GHz

```
EUT:                  Phitek FM Transmitter
Manufacturer:         Phitek
Operating Condition:  Connected to CD player with 1000Hz tone
Test Site:            OATS
Operator:             Brian Drumm
Test Specification:   FCC CFR 47 Part 15 Intentional Radiator
Comment:              3 metres
Start of Test:        20/07/04 / 3:00:05
```

```
SCAN TABLE: "EN 55022 Field"
Start      Stop       Step       Detector  Meas.    IF       Transducer
Frequency  Frequency  Width                Time     Bandw.
30.0 MHz   2.0 GHz    60.0 kHz   MaxPeak   5.0 ms   120 kHz CBL 6140 SN4156 RCV
```

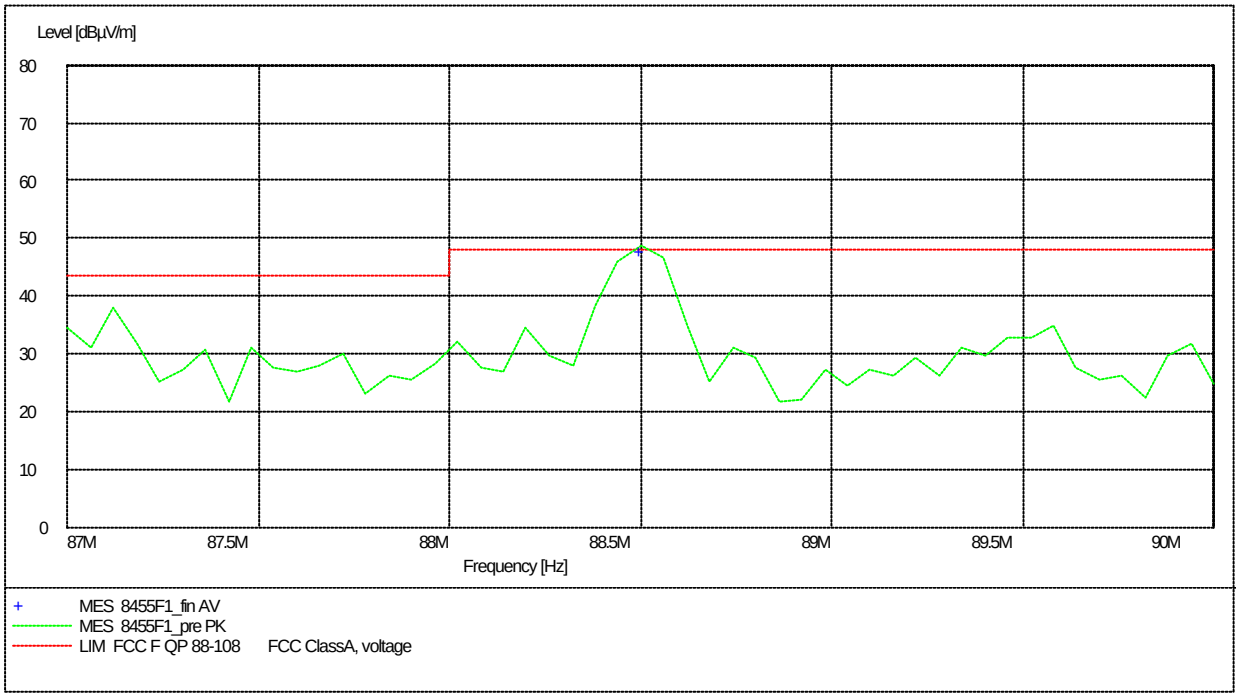



```
MEASUREMENT RESULT: "8455F1_fin AV"
Frequency    Level  Transd   Limit  Margin  Height  Azimuth  Polarisation
      MHz   dBµV/m      dB  dBµV/m      dB      cm      deg
88.500000    47.60     8.6    48.0     0.4   100.0     0.00  ---
```

BANDEDGE SCAN SHOWING EUT POSITION

```
EUT:                  Phitek FM Transmitter
Manufacturer:         Phitek
Operating Condition:  Connected to CD player with 1000Hz ton adjusted for
                      200 kHz
Test Site:            OATS
Operator:             Brian Drumm
Test Specification:   FCC CFR 47 Part 15 Intentional Radiator
Comment:              3 metres
Start of Test:        20/07/04 / 3:00:05

SCAN TABLE: "EN 55022 Field"
Start      Stop       Step       Detector  Meas.    IF       Transducer
Frequency  Frequency  Width                Time     Bandw.
30.0 MHz   2.0 GHz    60.0 kHz   MaxPeak   5.0 ms   120 kHz CBL 6140 SN4156 RCV
```

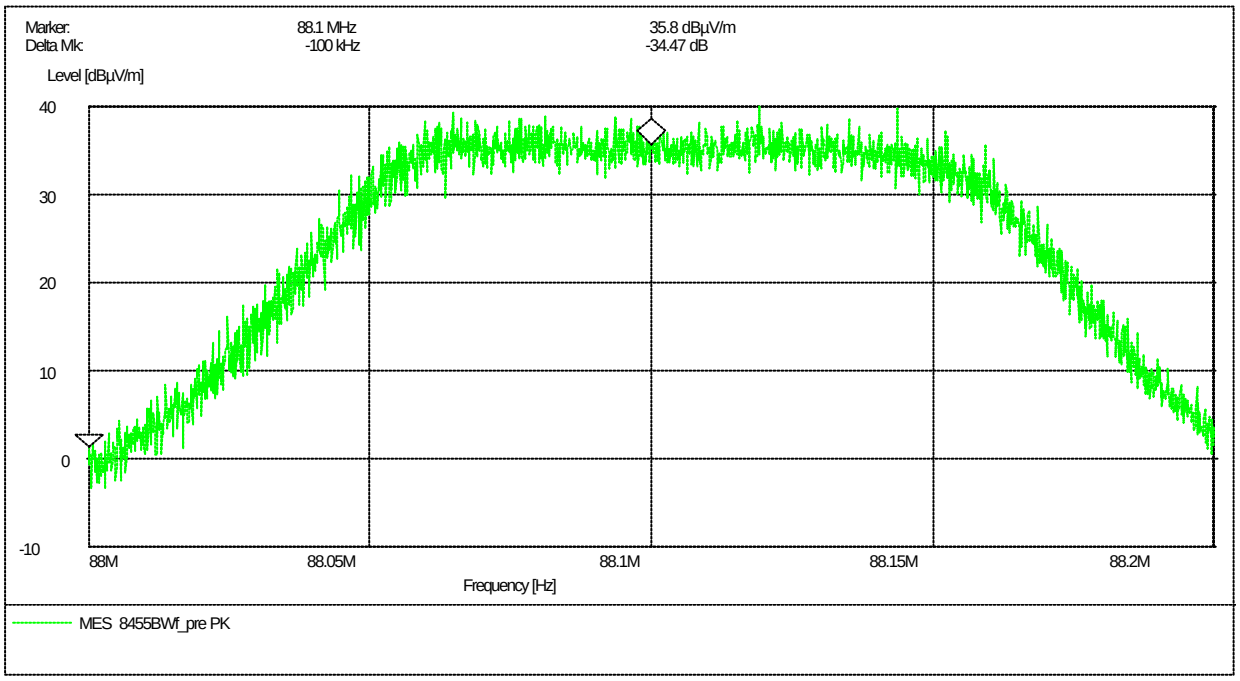



```
MEASUREMENT RESULT: "8455F1_fin AV"
Frequency    Level  Transd   Limit  Margin  Height  Azimuth  Polarisation
      MHz   dBµV/m      dB  dBµV/m      dB      cm      deg
88.500000    47.60     8.6    48.0     0.4   100.0     0.00  ---
```

200 kHz BANDWIDTH SCAN

```
EUT:                  Phitek FM Transmitter
Manufacturer:         Phitek
Operating Condition:  4.5 V d.c.  Internal battery
Test Site:            Semi-Anechoic Chamber
Operator:             Brian Drumm
Test Specification:   FCC Part 15.215 (c)  Emission Bandwidth
Comment:              3m vertical
Start of Test:        6/08/04 / 1:13:07

SCAN TABLE: "EN 55022 3m escs"
Start      Stop       Step       Detector  Meas.    IF       Transducer
Frequency  Frequency  Width                Time     Bandw.
30.0 MHz   2.0 GHz    60.0 kHz   MaxPeak   1.0 ms   120 kHz CBL 6140 SN4125 TX
```



END OF REPORT