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FCC PART 22 AND 24 TEST REPORT

Applicant	Iwow Connections Pte Ltd.
	13 Serangoon North Ave 5, #03-00
	Singapore 554787
FCC ID	QPB-TR8000506
Product Description	GSM/GPRS Module
Date Sample Received	May 16, 2006
Date Tested	June 7, 2006
Tested By	Nam Nguyen
Approved By	Mario de Aranzeta
Timco Report No.	1036AUT6
Test Results	☒ Pass ☐ Fail

ACCREDITED
Certificate # 0955-01

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STATEMENT OF COMPLIANCE

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

Authorized by: Mario de Aranzeta

Signature:

Function: Engineer

Date: June 20th 2006

Tested by: Nam Nguyen

Signature: on file

Date: June 20th 2006

GENERAL INFORMATION

DUT Specification

The test results relate only to the items tested.			
FCC Rule Part(s)	§ 22H, § 24E		
DUT Description	GSM/GPRS Module EGSM900 / DCS 1800 / PCS 1900		
FCC ID	QPB-TR8000506		
Model Name	TR-800		
Tx Frequency	824.2 - 848.8 MHz (GSM 850) / 1850.2 - 1909.8 MHz (PCS 1900)		
Max. Power Rating	850 MHz 1.2 Watts 1900 MHz 0.66Watts		
Emission Designators	300KGXW (GSM850), 300KGXW (GSM 1900)		
Modulation(s)	GSM		
User Power Control	☐ Yes	☒ No	
DUT Power Source	☐ 110–120Vac/50– 60Hz		
	☒ DC Power		
	☐ Battery Operated Exclusively		
Test Item	☐ Prototype	☒ Pre-Production	☐ Production
Type of Equipment	☐ Fixed	☐ Mobile	☒ Portable
Antenna	monopole		
Antenna Connector	SMA		
Antenna Gain			

Test Facility: The test sites used by Timco Engineering Inc. for radiated and conducted emission data is located at 849 NW State Road 45 Newberry, FL 32669 USA.

Test Condition: The DUT was tested in the laboratory in an environment with normal temperature and humidity. The temperature was 26°C with a relative humidity of 50%.

Modification to the DUT: No modification was made to the DUT during testing.

Test Exercise (e.g software description, test signal, etc.): The DUT was placed in continuous transmit mode of operation.

DESCRIPTION OF PRODUCT AND MODULAR APPROVAL INFORMATION

This device is a drop in module and is intended as an OEM drop in device for cellular service handset, portable, and mobile devices.

1: The module has it's own shielding.

2. The module has buffered I/O inputs.

3. The module has it's own VCO built in. Regulators are outboard.

4. The RF connector is unique (hirose).

5. The antenna is custom for every application.

6. The module was tested essentially standalone.

7. Power Line conducted was done on the module.

8. No external ferrites are used.

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
Analyzer Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/13/05	4/13/07
Analyzer Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 9/5/05	9/5/07
Analyzer Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/13/05	4/13/07
Analyzer Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 12/8/04	12/8/06
Analyzer Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 4/27/04	12/8/06
Analyzer Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 12/8/04	12/8/06
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/05	12/8/07
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/05	12/8/07
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/05	12/7/07
Antenna: BiconiLog	EMCO	3143	9409-1043		No Cal Required
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Antenna: Biconnical	Eaton	94455-1	1096	CAL 8/17/04	8/17/06
Antenna: Biconnical	Eaton	94455-1	1057	CAL 12/12/05	12/12/07
Antenna: Dipole Kit	Electro-Metrics	TDA-30/1-4	152	CAL 3/3/06	3/3/09
Antenna: Double-Ridged Horn	Electro-Metrics	RGA-180	2319	CAL 12/29/04	12/29/06
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	CAL 9/27/04	9/27/06
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	CAL 11/17/04	11/17/06
Antenna: Horn *(at 3 meters)	Electro-Metrics	EM-6961	6246	CAL 4/27/06	4/27/08
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	CAL 8/26/04	8/26/06
Antenna: Log-Periodic	Electro-Metrics	LPA-30	409	CAL 5/2/05	5/2/07
Antenna: Log-Periodic	Eaton	96005	1243	CAL 12/14/05	12/14/07

TEST PROCEDURE

Power Line Conducted Interference: The procedure used was ANSI Standard C63.4-2003 using a 50uH LISN. Both lines were observed with the UUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

Bandwidth 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Power Output: The RF power output was measured at the antenna feed point using a peak power meter.

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz, the VBW = 3 MHz, and the span 50 MHz.

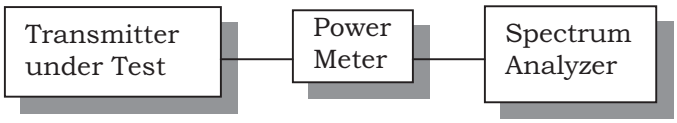
Radiation Interference: The test procedure used was ANSI STANDARD TIA-603-C using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

RF POWER OUTPUT

Rules Part No.: Part 2.1046(a), Part 22.913

Requirements:

Method of Measuring: This test was conducted per TIA/EIA STANDARD 603 using the. RF power is measured by connecting a 50ohm, resistive wattmeter to the RF output connector.



Test Data:

GSM850 Input Power: (5.0Vdc)(0.28A) =1.40 Watts
GSM1900 Input Power: (5.0Vdc) (0.20A) = 1.00Watts

GSM 850		PCS 1900	
Channel (MHz)	Output Power (dBm)	Channel (MHz)	Output Power (dBm)
824.2	30.8	1850.2	28.2
836	30.6	1880	28.1
848.8	30.8	1909.8	28.1

VOICE MODULATION CHARACTERISTICS

Rules Part No.: Part 2.1047(a)

Requirements:

Method of Measurement:

Test Data: Not applicable, F9 or G9 type of emission.

AUDIO LOW PASS FILTER

Rules Part No.: Part 2.1047

Requirements:

Method of Measurement:

Test Data: This UUT does not have a low pass filter.

OCCUPIED BANDWIDTH

Rules Part No.: §2.1049, §22.917e, §22.917f, §22.917h, §24.238

Requirements:

Out of band emissions: The mean power of emissions must be attenuated below the mean power of the un-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by: At least 43 + 10log(Po) = dB.

Please refer to the plots below.

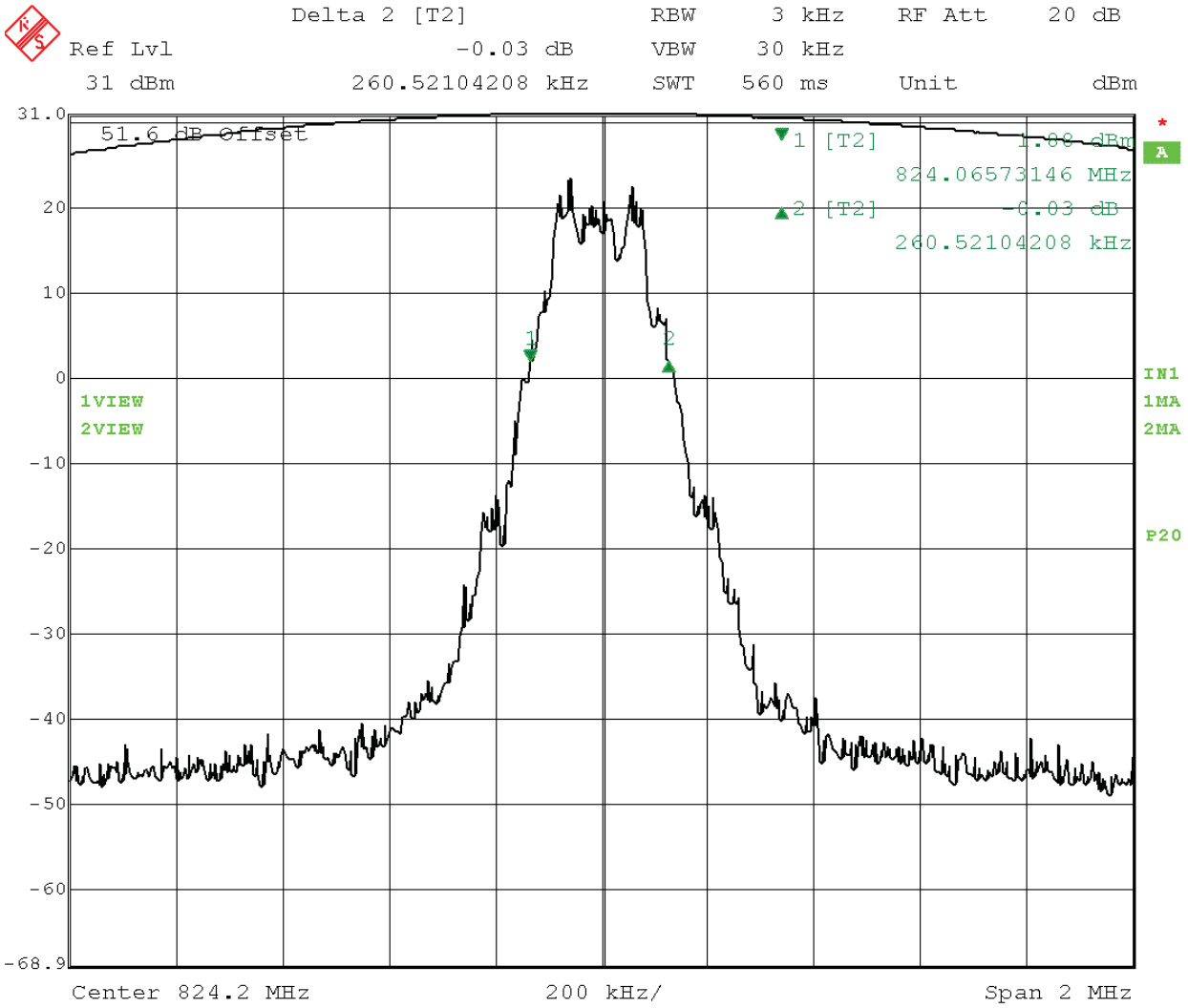
Band-edges compliance: Measurement were performed in accordance with Part 22.917 (h)

Please refer to the plots below.

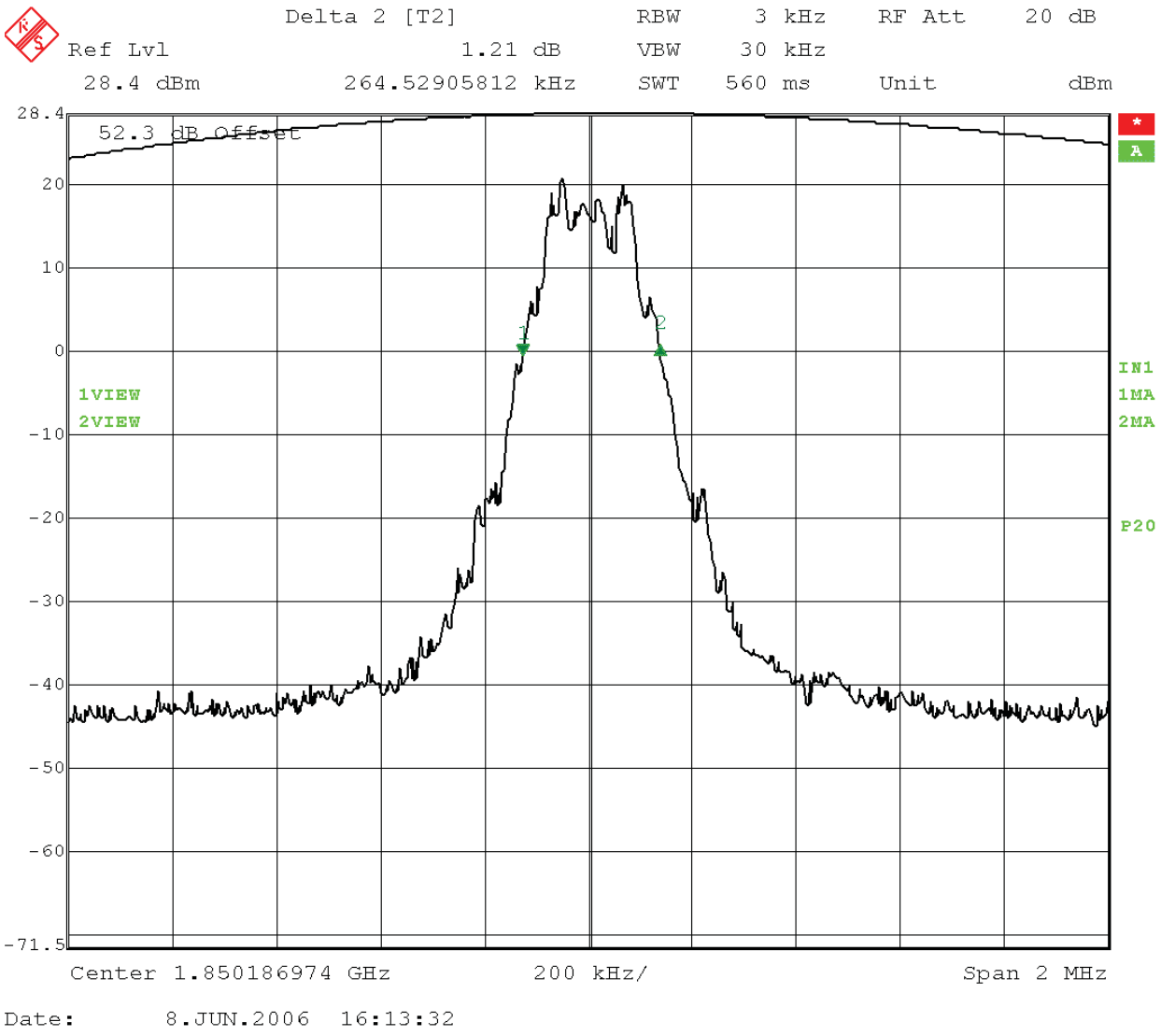
Mobile emissions in base frequency range: The measurement was performed per 22.917(f). The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed – 80 dBm at the transmit antenna connector. The Low, Mid, and High channels were tested. The worst-case emissions are reported below:

No significant emissions found

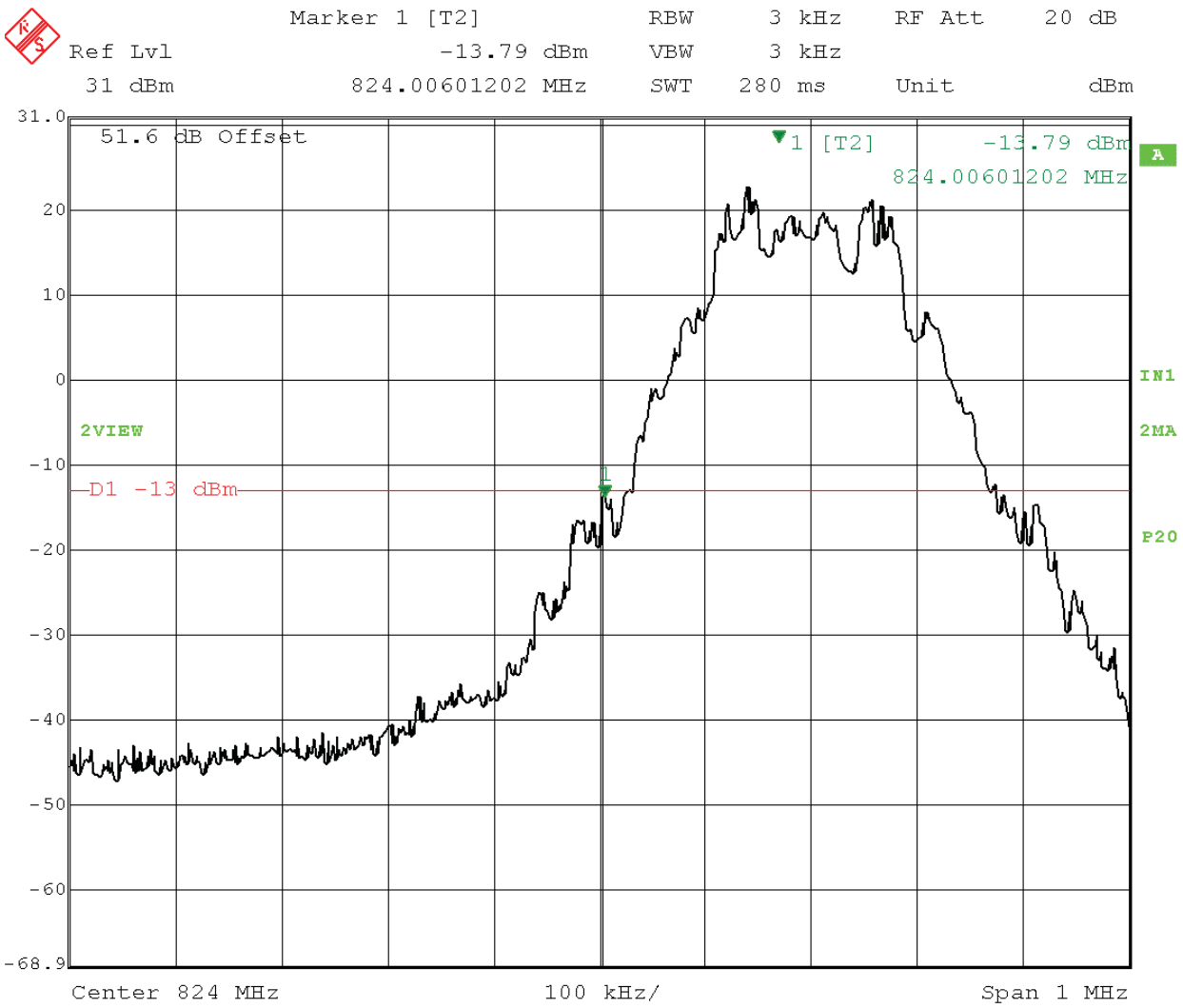
Occupied Bandwidth – GSM850



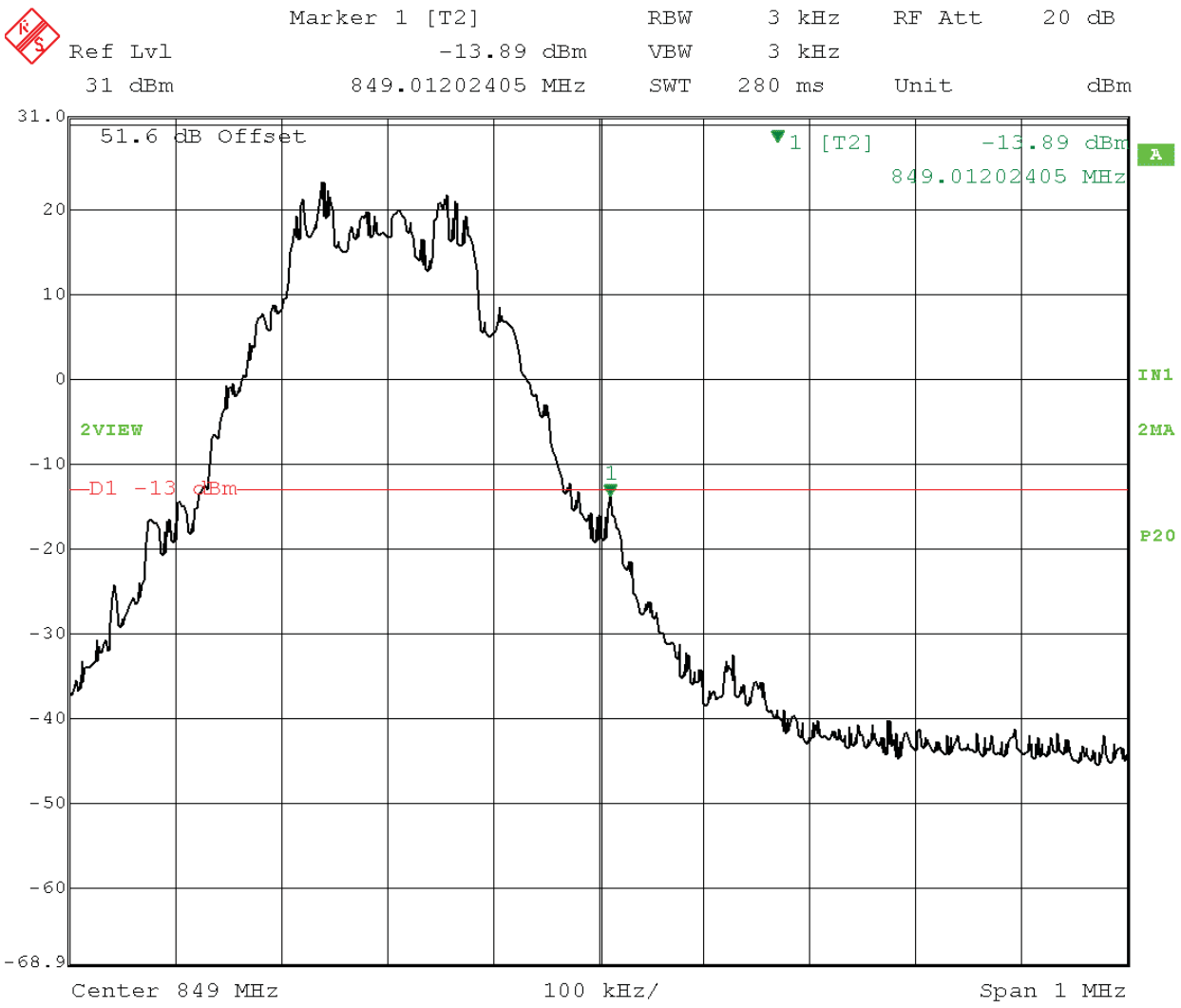
Occupied Bandwith – PCS1900



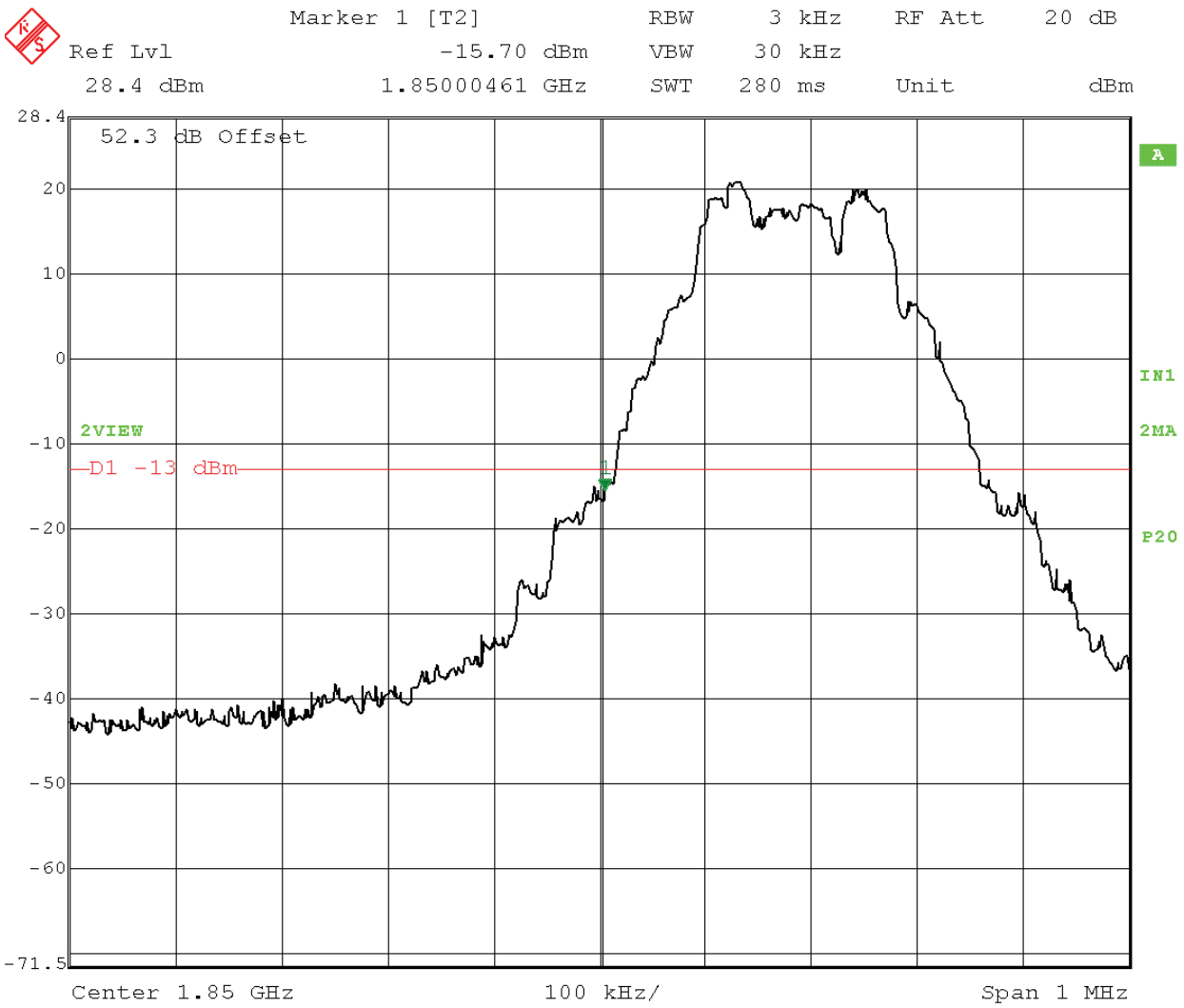
Band-Edge – GSM850 – Plot 1



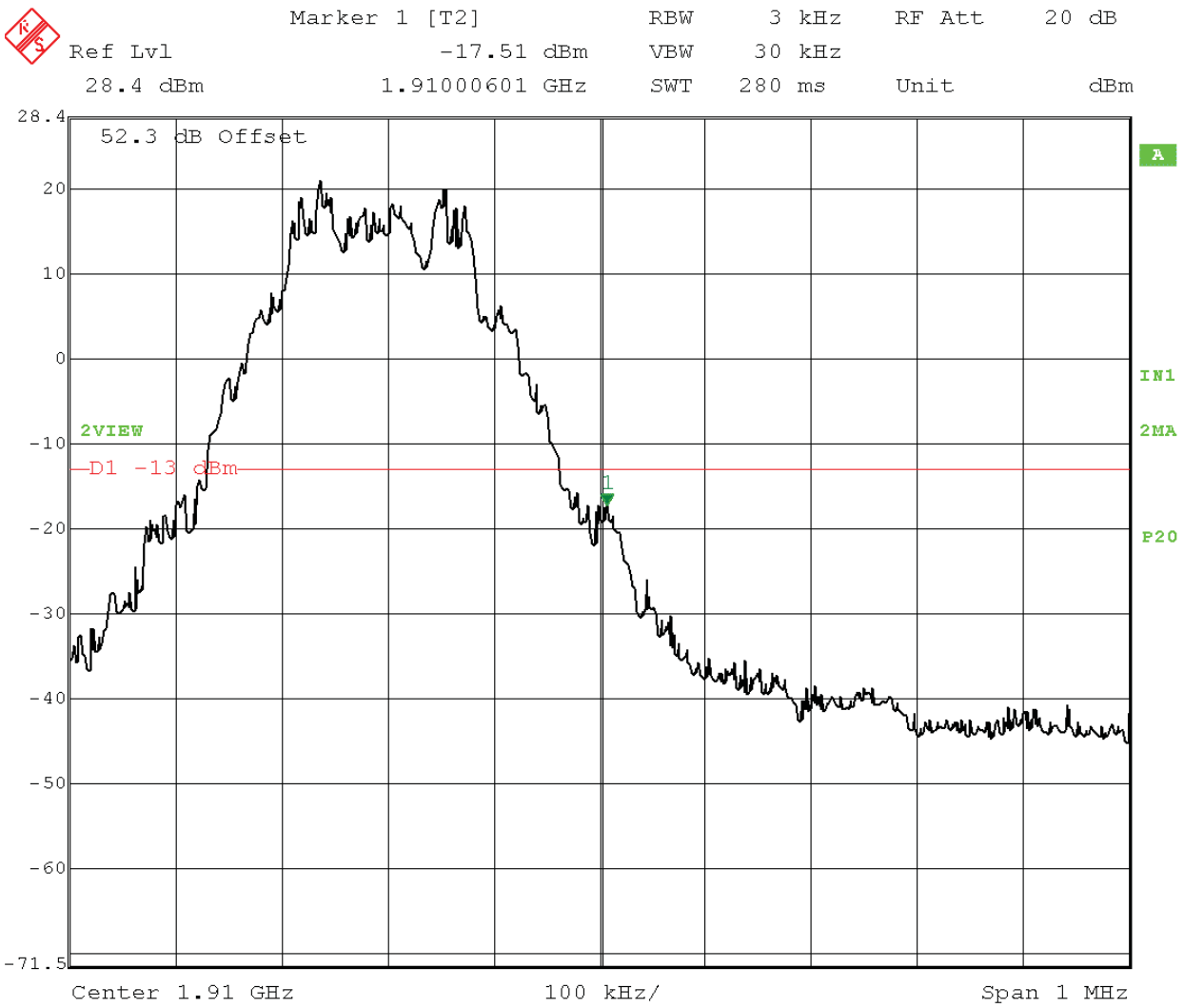
Band-Edge – GSM850 – Plot 2



Band-Edge – PCS1900 – Plot 1



Band-Edge – PCS1900 – Plot 2



SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Rules Part No.: §2.1051

Requirements: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.:

43 + 10log(.66) = 41.2 dB
43 + 10log(1.2) = 43.8 dB

Method of Measurement: For analog modulation, the carrier was modulated 100% using a 2500 Hz tone. For digital modulation, the carrier is modulated to its maximum extent. The spectrum was scanned from 9kHz or the lowest frequency used to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

824.20	dBc	836.00	dBc	848.80	dBc
1648.40	70.58	1672.00	67.73	1697.60	65.02
2472.60	96.71	2508.00	97.53	2546.40	80.04
3296.80	85.44	3344.00	94.49	3395.20	71.06
4121.00	96.9	4180.00	106.3	4244.00	83.21
4945.20	NF 102.01	5016.00	NF 103.65	5092.80	83.82
5769.40	NF 99.01	5852.00	NF 100.38	5941.60	81.87
6593.60	NF	6688.00	NF	6790.40	NF

1850.20	dBc	1880.00	dBc	1909.80	dBc
3700.40	96.53	3760.00	91.32	3819.60	91.94
5550.60	108.73	5640.00	104.44	5729.40	102.77
7400.80	NF 97.88	7520.00	NF 97.29	7639.20	NF 97.87
9251.00	NF 98.75	9400.00	NF 98.22	9549.00	NF 96.98
11101.20	NF 98.99	11280.00	NF 96.9	11458.80	NF 97.55
12951.40	NF 97.03	13160.00	NF 124.86	13368.60	NF 95.99
14801.60	NF	15040.00	NF 91.32	15278.40	NF

NF is noise floor

Note: 1: Emissions were tested to the tenth harmonic.

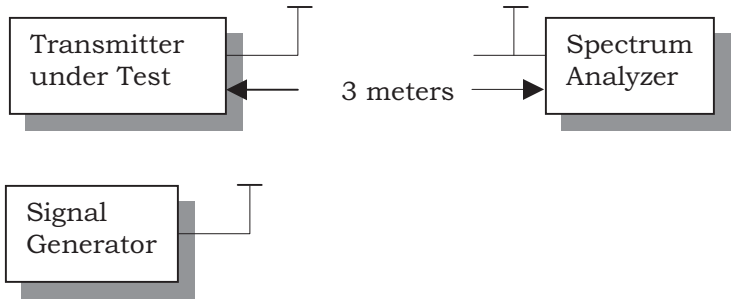
FIELD STRENGTH OF SPURIOUS EMISSIONS

Rules Part No.: Part 2.1053

Requirements: Emissions must be 43 + 10log(Po) dB below the mean power output of the transmitter.

Method of Measurements: The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA Standard 603 using the substitution method. Equipment placed 80 cm above ground on a rotating table platform. Tuned, calibrated antenna which may be raised from 1m to 4m above ground and changed in polarization.

Test Setup Diagram:



Test Data:

Emission Frequency MHz	Ant. Polarity V/H	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
GSM 850 High Channel					
1697.60	V	-49.20	1.08	5.07	72.95
2546.40	V	-40.50	1.23	6.89	62.58
3395.20	V	-52.30	1.37	7.49	73.92
4244.00	V	-51.80	1.51	7.94	73.11
5092.80	V	-50.40	1.65	7.86	71.93
5941.60	V	-56.70	1.80	8.97	77.27
6790.40	V	-56.20	1.94	7.94	77.94
7639.20	V	-56.00	2.08	8.36	77.46
8488.00	V	-53.70	2.23	8.62	75.05

Emission Frequency MHz	Ant. Polarity V/H	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
PCS 1900 Low Channel					
3700.40	V	-54.40	1.42	7.55	70.32
5550.60	V	-58.20	1.73	8.42	73.56
7400.80	V	-59.90	2.04	8.47	75.52
9251.00	V	-59.20	2.36	9.20	74.41
11101.20	V	-55.70	2.67	8.93	71.49
12951.40	V	9.50	2.98	9.80	5.73
14801.60	V	8.30	3.29	9.60	7.44
16651.80	V	8.90	3.60	13.56	3.20
18502.00	V	7.80	3.92	3.25	14.92

The worst case channels were tested.

FREQUENCY STABILITY

Rules Part No.: Part 2.1055, Part 22.355, Part 24.235

Requirements: Temperature and voltage tests were performed to verify that the frequency remains within the .00015%, 1.5ppm specification limit for.

Method of Measurement: The measurement technique is in accordance with TIA/EIA STD 603-1992. The transmitter was placed in the temperature chamber at 25° C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15-second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -30° C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15-second intervals. The worst case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to + 50 degrees C.

Test Data:

Reference Frequency (MHz)		836.000000 MHz	
Voltage (%)	Power (VDC)	Temperature (°C)	Freq. Error (PPM)
100%	5	-30	-0.11
100%	5	-20	-0.10
100%	5	-10	-0.09
100%	5	0	-0.08
100%	5	+10	-0.07
100%	5	+20	0.00
100%	5	+30	0.03
100%	5	+40	0.04
100%	5	+50	0.08
85%	4.25	+20	-0.0
115%	5.75	+20	0.0

Reference Frequency (MHz)		1880.000000 MHz	
Voltage (%)	Power (VDC)	Temperature (°C)	Freq. Error (PPM)
100%	5	-30	-0.10
100%	5	-20	-0.11
100%	5	-10	-0.08
100%	5	0	-0.07
100%	5	+10	-0.05
100%	5	+20	-0.01
100%	5	+30	0.01
100%	5	+40	0.11
100%	5	+50	0.11
85%	4.25	+20	0.02
115%	5.75	+20	0.02

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207

Requirements:

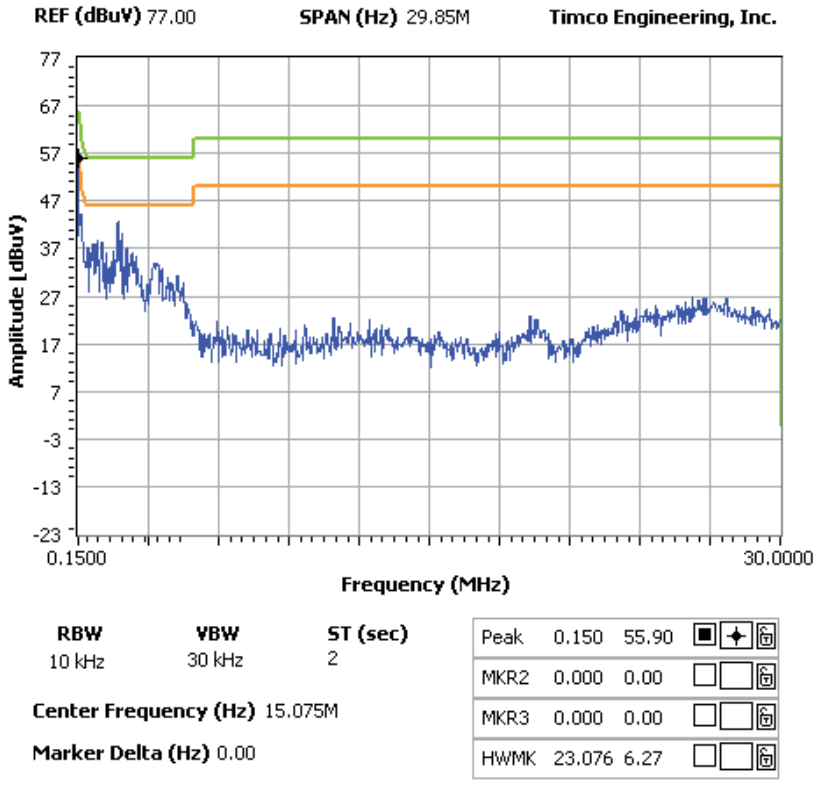
	Quasi-Peak	Average
.15 – 0.5 MHz	66-56 dBuV	56-46 dBuV
0.5 – 5.0	56	46
5.0 – 30.	60	50

Test Procedure: The spectrum was scanned from .15 to 30 MHz.

Test Data: The attached graphs represent the emissions for powerline conducted for this device.

NOTES:
IWOW CONNECTIONS PTE LTD.- MODEL NUMBER: TR-800
POWER LINE CONDUCTED PLOT - LINE 1

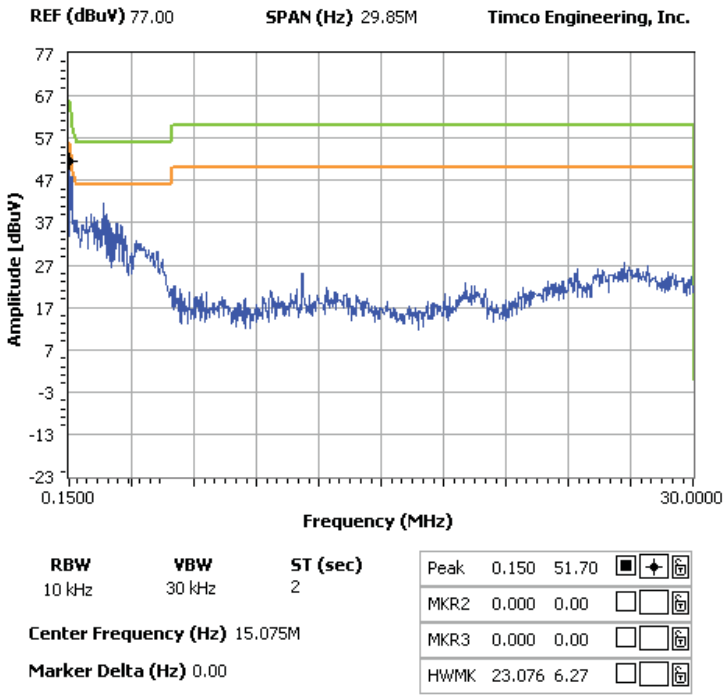
FCC 15.107 Mask Class B



NOTES:

IWOW CONNECTIONS PTE LTD.- MODEL NUMBER: TR-800
POWER LINE CONDUCTED PLOT - LINE 2

FCC 15.107 Mask Class B



RF EXPOSURE

This device is a drop in module and is intended as an OEM drop in device for cellular service handsets, portable, and mobile devices. As such the RF exposure will have to be addressed in the filing of the final product. SAR evaluation also will have to be addressed for handheld applications.

MPE calculation for 850 MHz

For a 1200 mW (30.8 dBm) transmitter.
No coax cable loss was accounted for in the calculation.

Compliance can be shown for a portable device with an antenna gain as high as 1.5 dBd.

$Po := 1200$ mWatts $dBd := 1.5$ antenna gain $f := 850$ Frequency in MHz

$G := dBd + 2.15$ gain in dBi

$Gn := 10^{\frac{G}{10}}$ gain numeric $S := \frac{f}{1500}$

$Gn = 2.317$ $S = 0.567$

$$R := \sqrt{\frac{(Po \cdot Gn)}{(4 \cdot \pi \cdot S)}} \qquad Rinches := \frac{R}{2.54}$$

$R = 19.762$ distance in centimeters required for compliance

$Rinches = 7.78$

MPE calculation for 1900 MHz

For a 661 mW (28.2 dBm) transmitter.
No coax cable loss was accounted for in the calculation.
The limit for power density (S) at frequencies above 1500 MHz is 1.

Compliance can be shown for a portable device with an antenna gain as high as 6 dBd.

$Po := 661$ mWatts $dBd := 6$ antenna gain $f := 1500$ Frequency in MHz

$G := dBd + 2.15$ gain in dBi

$Gn := 10^{\frac{G}{10}}$ gain numeric $S := \frac{f}{1500}$

$Gn = 6.531$ $S = 1$

$$R := \sqrt{\frac{(Po \cdot Gn)}{(4 \cdot \pi \cdot S)}} \qquad Rinches := \frac{R}{2.54}$$

$R = 18.535$ distance in centimeters required for compliance

$Rinches = 7.297$