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Compliance Laboratory

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ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

Multi-Mode MONITOR
MODEL: ITD-318 & IT-313C
FCC ID: ST2-DM31Y

January 16, 2013

This report concerns (check one): Original grant <input checked="" type="checkbox"/> Class II change <input type="checkbox"/>	
Equipment type: <u>Low Power Intentional Radiator</u>	
Deferred grant requested per 47 CF 0.457(d)(1)(ii)?	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>
If yes, defer until: _____ (date)	
Company agrees to notify the Commission by	_____ (date)
of the intended date of announcement of the product so that the grant can be issued on that date.	
Transition Rules Request per 15.37?	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>
If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision.	
Report prepared for:	CENTRAK, INC.
Report prepared by:	Advanced Compliance Lab
Report number:	0048-130114-02-FCC



Lab Code: 200101

The test result in this report IS supported and covered by the NVLAP accreditation

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1. GENERAL INFORMATION

1.1 Verification of Compliance

EUT: Multi-Mode MONITOR

Model: ITD-318 & IT-313C

Applicant: CENTRAK, INC.

Test Type: FCC Part 15C CERTIFICATION*

Result: PASS

Tested by: ADVANCED COMPLIANCE LABORATORY

Test Date: January 16, 2013

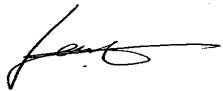
Report Number: 0048-130114-02-FCC

* This application is for 900MHz band operation only.

The above equipment was tested by Compliance Laboratory, Advanced Technologies, Inc. for compliance with the requirement set forth in the FCC rules and regulations Part 15 subpart C. This said equipment in the configuration described in the report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB)	Uncertainty(dB)	Uncertainty(dB)
		30-1000MHz	1-6.5GHz	Conducted
Combined Std. Uncertainty u_c	norm.	± 2.36	± 2.99	± 1.83



Wei Li
Lab Manager
Advanced Compliance Lab

Date January 16, 2013

1.2 Equipment Modifications

N/A

1.3 Product Information

System Configuration

ITEM	DESCRIPTION	FCC ID	CABLE
Product	Multi-Mode MONITOR, Model ITD-318 & IT-313C ⁽¹⁾	ST2-DM31Y	
Housing	PLASTICS		
Power Supply	3V DC Battery		
Operation Freq.	904MHz ~ 926MHz		
Receiver	ITD-318 & IT-313C(RX)	Verification	

(1) EUT submitted for grant.

1.4 Test Methodology

Radiated tests were performed according to the procedures in ANSI C63.4-2003 at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated and conducted data are located at Hillsborough, New Jersey. This site has been accepted by FCC to perform measurements under Part 15 or 18 in a letter dated February 21, 2012 (Test Firm Registration # 90601). The NVLAP Lab code for accreditation of FCC EMC Test Method is: 200101-0.

1.6 Test Equipment

Manufacture	Model	Serial No.	Description	Cal Due dd/mm/yy
Hewlett-Packard	HP8546A	3448A0029 0	EMI Receiver	15/10/13
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	15/01/14
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	15/01/14
Fischer Custom	LISN-2	900-4-0008	Line Impedance Stabilization Networks	18/03/13
Electro-Meterics	ALR-25M/30	289	10KHz-30MHz Active Loop Antenna	28/05/13
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	24/03/13
EMCO	3115	4945	Double Ridge Guide Horn Antenna	22/01/14

All Test Equipment Used are Calibrated Traceable to NIST Standards.

1.7 Statement for the Document Use

This report shall not be reproduced except in full, without the written approval of the laboratory. And this report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

2. PRODUCT LABELING

FCC ID: ST2-DM31Y
***Contains FCC ID: ST2-CEN8B**

This device complies with part 15 of the FCC Rules. Operating is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Figure 2.1 FCC ID Label
(* This line is for Model ITD-318 Only)

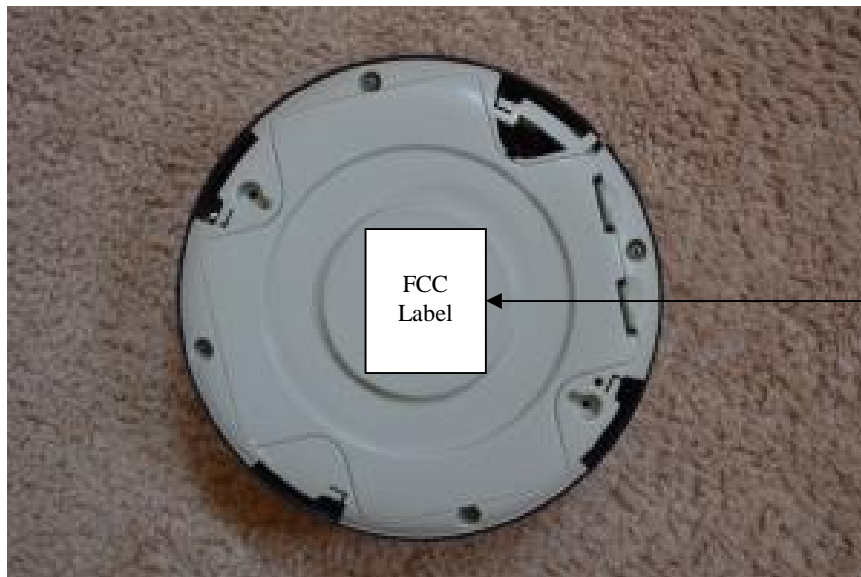


Figure 2.2 FCC Label Location

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). And its antenna was permanently attached to the EUT. Testing was performed as EUT was continuously operated at the following frequency channels: Low=904MHz, Middle= 915MHz, High=926MHz.

Fresh external battery was used for extended operating time in battery mode.

Based on pre-scan results, model ITD-318 was used for final data recording as worse case between Model IT-313C (without Wi-Fi module installed) & ITD-318 (with Wi-Fi Module installed).

3.2 Special Accessories

N/A

3.3 Configuration of Tested System

Figure 3.X illustrate this system, which is tested standing along.



Figure 3.1 Radiated Test Setup, Battery Mode



Figure 3.2 Radiated Test Setup, AC Mode





4. SYSTEM SCHEMATICS

See Attachment

Figure 4.1 System Schematics

5. RADIATED EMISSION DATA

5.1 Field Strength Calculation

The corrected field strength is automatically calculated by EMI Receiver using following:

$$FS = RA + AF + CF + AG$$

where FS: Corrected Field Strength in dB μ V/m

RA: Amplitude of EMI Receiver before correction in dB μ V

AF: Antenna Factor in dB/m

CF: Cable Attenuation Factor in dB

AG: Built-in Preamplifier Gain in dB (Stored in receiver as part of the calibration data)

THE "DUTY CYCLE CORRECTION FACTOR" FOR SPURIOUS RADIATED EMISSIONS IS;
 $20 \log * (4 \text{ ms} / 100 \text{ ms}) = -28 \text{ dB}$, WHICH WAS USED TO CORRECT THE AVERAGE RADIATED EMISSION READINGS.

5.2 Test Methods and Conditions

The initial step in collecting radiated data is a EMI Receiver scan of the measurement range below 30MHz using peak detector and 9KHz IF bandwidth / 30KHz video bandwidth. For the range 30MHz - 1GHz, 100KHz IF bandwidth / 100KHz video bandwidth are used. Both bandwidths are 1MHz for above 1GHz measurement. Up to 10th harmonics were investigated.

5.3 Test Data

The following data lists the significant emission frequencies, polarity and position, peak reading of the EMI Receiver, the FCC limit, and the difference between the peak reading and the limit. Explanation of the correction and calculation are given in section 5.1.

Test Personnel: _____



Typed/Printed Name: Edward Lee

Date: January 16, 2013

Radiated Test Data (CH-904MHz/914MHz/926MHz)

Frequency (MHz)	Polarity (V,H) Position (X,Y,Z)	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Peak Reading After Correction (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
904	V	1.2	180	88.1	88.1	94	-5.9
1808	V	1.1	015	50.8	22.8	54	-31.2
2712	V	1.1	180	63.9	35.9	54	-18.1
904	H	1.2	235	90.5	90.5	94	-3.5
1808	H	1.1	180	50.3	22.3	54	-31.7
2712	H	1.1	270	59.7	31.7	54	-22.3
915	V	1.2	180	87.6	87.6	94	-6.4
1830	V	1.1	000	49.7	21.7	54	-32.3
2745	V	1.0	180	63.9	35.9	54	-18.1
915	H	1.2	235	90.8	90.8	94	-3.2
1830	H	1.1	090	50.3	22.3	54	-31.7
2745	H	1.1	180	59.1	31.1	54	-22.9
926	V	1.2	180	88.6	88.6	94	-5.4
1852	V	1.1	000	49.5	21.5	54	-32.5
2778	V	1.1	270	62.4	34.4	54	-19.6
926	H	1.2	235	90.4	90.4	94	-3.6
1852	H	1.0	180	51.8	23.8	54	-30.2
2778	H	1.0	135	59.1	31.1	54	-22.9

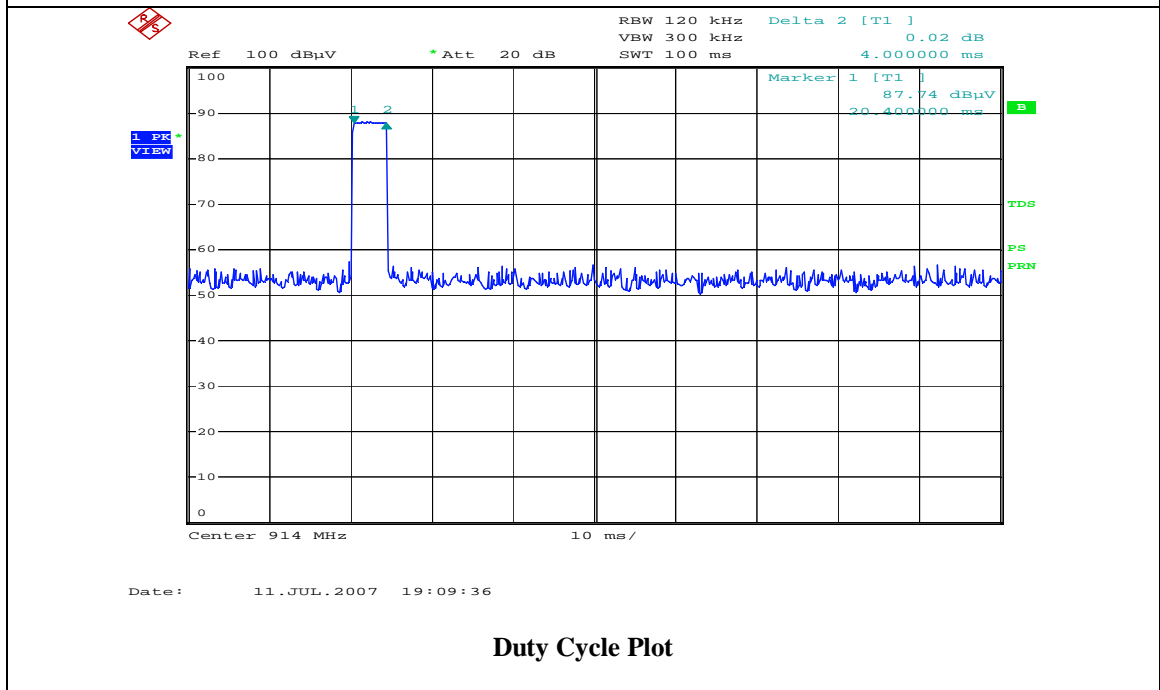
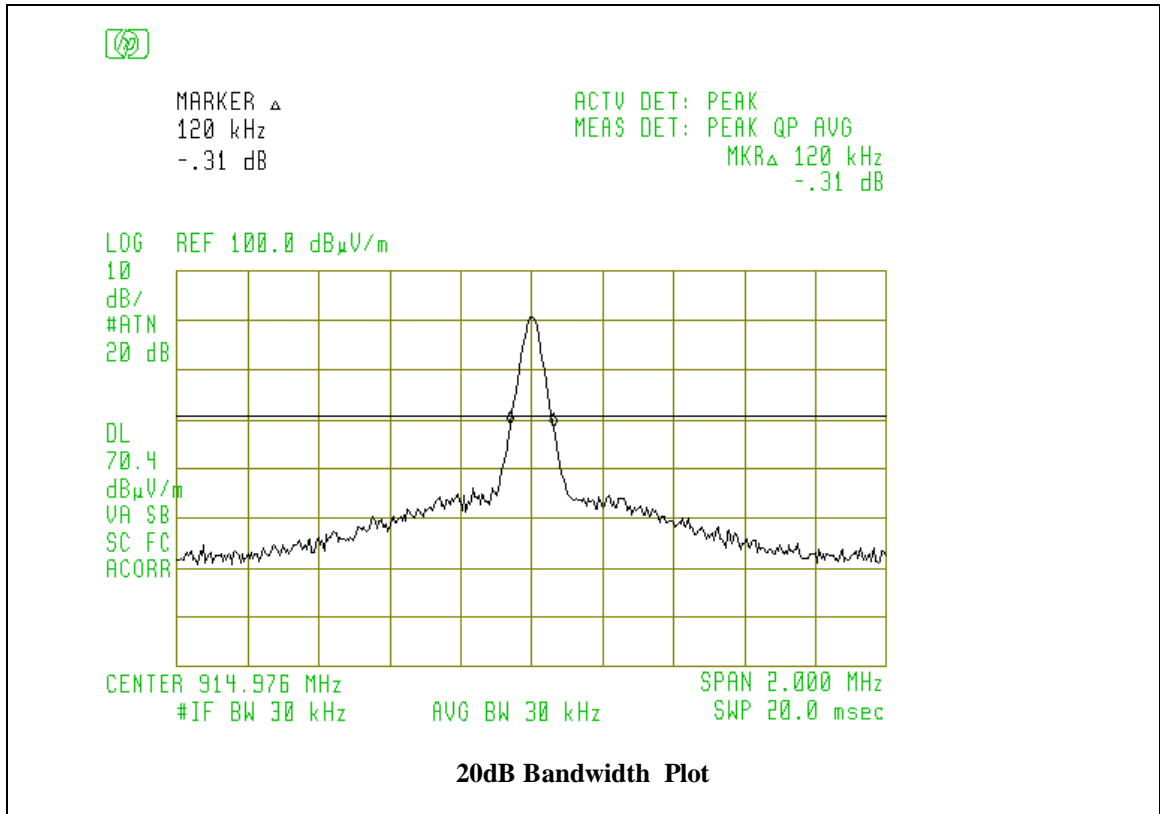
(1) The limit for emissions within the 902-926MHz band is 50mV(94dB) per Sec. 15.249. The limit for its harmonics is 500uV (54dB). Other spurious emissions shall be lower than either its fundamental by 50dB or the limit defined in Sec. 15.209, whichever is higher.

(2) If each peak reading is less than the FCC average limit, it'll be not necessary to show the measured/ calculated average reading.

Other Spurious outside of the band 902-928MHz

Frequency (MHz)	Polarity (V,H) Position (X,Y,Z)	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Peak Reading After Correction (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
580	V	1.1	180	36.7		46.5	-9.8
714	V	1.1	235	39.8		46.5	-6.7
778	V	1.0	045	40.8		46.5	-5.7
500	H	1.1	180	35.2		46.5	-11.3
628	H	1.1	180	37.3		46.5	-9.2
772	H	1.0	045	39.2		46.5	-7.3
828	H	1.0	000	41.2		46.5	-5.3

Comparing to the limit defined in Sec. 15.209, emissions below the limit by 20dB were not recorded



6. AC CONDUCTED EMISSIONS DATA

The EUT was setup and located so that the distance between the boundary of the EUT and the closest surface to the LISN was 0.8m or more.

EUT test configuration was according to CISPR22 and Section 7 of ANSI C63.4/2003.

Conducted disturbance was measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.150 - 30 MHz was investigated.

The EMI receiver was set to PEAK detector setting, and swept continuously over the frequency range to be investigated. The resolution bandwidth was set to 9KHz minimum. The EMI receiver input cable was connected to LINE 1 RF measurement connection on the LISN. A 50ohm terminator was connected to the unused RF port on the LISN. For each mode of EUT operation, emissions readings were maximized by manipulating cable and wire positions. The configuration for each EUT power cord which produced emissions closest to the limit was recorded. The same procedure was repeated for LINE 2 of each EUT power cord.

Instrument Settings

Frequency Range	Peak	Quasi-Peak	Average
0.15 – 30 MHz	9 kHz	9 kHz	30 kHz

Limit: FCC Part 15 / CISPR22 Class B

Testing Data

The following plots show the neutral and line conducted emissions for the typical operation condition. The conducted test data shows the worst case emissions still below the FCC Part 15/CISPR22 Class B limits.

Highest Data for AC Main Conducted Emissions						
Frequency (MHz)	0.15	0.16	0.18	0.20	1.57	13.7
Peak Reading(dBuV) from Line*	41.5	39.8	37.4	36.7	24.4	23.5
Frequency (MHz)	0.15	0.16	.018	0.25	0.58	13.7
Peak Reading(dBuV) from Neutral *	43.5	39.8	37.9	31.5	24.6	23.6

* No average reading is needed since the peak reading is already below average limit.

Result: No non-compliance noted

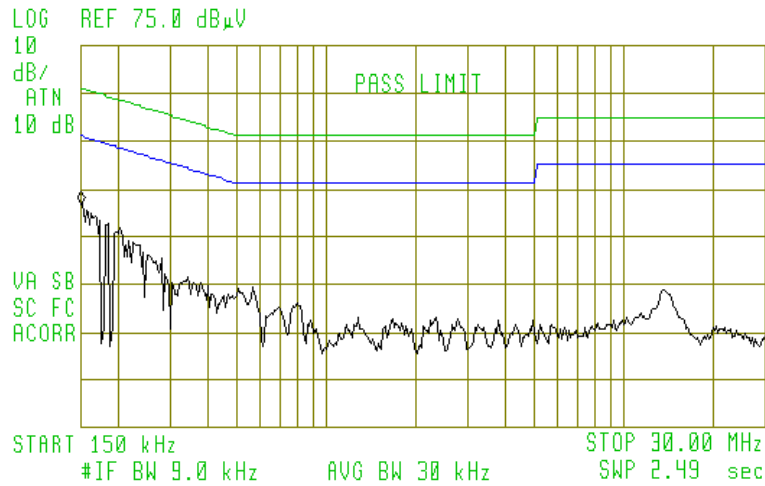
Line Conducted Emission for AC Mode

Frequency: 150kHz to 30MHz



MARKER
150 kHz
41.46 dB μ V

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 150 kHz
41.46 dB μ V



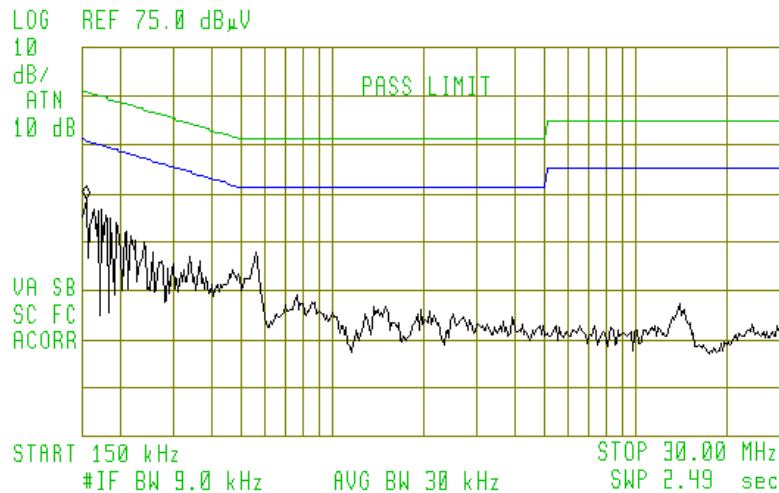
Neutral Conducted Emission for AC mode

Frequency: 150kHz to 30MHz



MARKER
150 kHz
43.56 dB μ V

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 150 kHz
43.56 dB μ V



7. EUT RECEIVING MODE VERIFICATION

Radiated Test Data for Receiving Mode (worst case: Z-position)

Frequency (MHz)	Polarity (H or V)	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m(2) (dBuV/m)	FCC 3m Limit(1) (dBuV/m)	Difference (dBuV/m)
454	H	1.3	045	35.7	46.5	-10.8
600	H	1.1	000	36.6	46.5	-9.9
702	H	1.1	090	38.7	46.5	-7.8
868	H	1.1	180	41.5	46.5	-5.0
884	H	1.0	235	41.6	46.5	-4.9
306	V	1.1	270	33.2	46.5	-13.3
500	V	1.1	090	36.0	46.5	-10.5
762	V	1.1	180	40.1	46.5	-6.4
788	V	1.0	235	40.0	46.5	-6.5
978	V	1.0	235	42.4	46.5	-4.1

(1) Receiving mode spurious emissions shall be lower than the limit defined in Sec. 15.209.

(2) If each peak reading is less than the FCC average limit, it'll be not necessary to show the measured/ calculated average reading.

8. PHOTOS OF TESTED EUT

The following photos show the inside details of the EUT.