

**Advanced
Compliance Laboratory**

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ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

SECURE TAG
MODEL: IT-728E
FCC ID: ST2-IT728E IC:6012A-IT728E

June 8, 2018

This report concerns (check one): Original grant ☒ Class II change ☐ Equipment type: <u>Low Power Intentional Radiator</u>	
Deferred grant requested per 47 CF 0.457(d)(1)(ii)? yes ☐ no ☒ 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 ☐ no ☒ 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:	0048-180530-01-FCC-IC



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: SECURE TAG

Model: IT-728E

Applicant: CENTRAK, INC.

Test Type: FCC Part 15C Sec. 15.249 CERTIFICATION
IC RSS-210 (Issue 9 & RSS-Gen (Issue 5) CERTIFICATION

Result: PASS

Tested by: ADVANCED COMPLIANCE LABORATORY

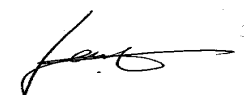
Test Date: May 30, 2018 ~ June 8, 2018

Report Number: 0048-180530-01-FCC-IC

The above equipment was tested by Compliance Laboratory, Advanced Technologies, Inc. for compliance with the requirement set forth in the FCC/IC 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 June 8, 2018

1.2 Equipment Modifications

N/A

1.3 Product Information

System Configuration

ITEM	DESCRIPTION	ID	CABLE
Product	SECURE TAG ⁽¹⁾	FCC ID: ST2-IT728E, IC: 6012A-IT728E	
Housing	PLASTICS		
Power Supply	3V DC Lithium Battery		
Operation Freq.	904MHz ~ 926MHz		
Receiver	IT728E(RX)	Verification	

(1) EUT submitted for grant.

1.4 Test Methodology

Radiated tests were performed according to the procedures in ANSI C63.4-2014 & & ANSI C63.10-2013 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, which is designated by IC as “ site IC 3130A” This site has been accepted by FCC to perform measurements under Part 15 or 18 in a letter dated May 19, 1997 (Refer to: 31040/PRV 1300F2). 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	3448A00290	EMI Receiver	25/09/18
Agilent	E4440A	US40420700	3Hz-26.5GHz Spectrum Analyzer	17/06/18
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	12/11/18
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	13/11/18
ARA	MWH-1826/B	1013	18-26GHZ Horn Antena	10/2/19
EMCO	3115	49225	Double Ridge Guide Horn Antenna	28/11/18

Electro-Meterics	ALR-25M/30	289	10KHz-30MHz Active Loop Antenna	28/05/19
COM-POWER	L1215A	191994	Line Impedance Stabilization Networks	24/03/19
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	18/03/19
Belden	9913	ACL23	70' RF cable for Radiated Emission Test	3/16/18
Megaphase	TM8S1S1180	ACL53	18' RF Cable for Radiated Emission Test	9/25/18
Megaphase	TM8 NKS536	ACL54	3' RF Cable for Radiated Emission Test	9/25/18
MegaPhase	TM8S1S1240	ACL20	24' RF Cable for Conducted Emission Test (used with limiter HP 11947A)	9/25/18
R&S	SMH	8942280/010	Signal Generator	1/15/19
Narda	BW-10W5	3037	10dB , 5W in-line Power Attenuator	1/15/19
RES-NET	RFA500NFF 30	0108	30dB in-line Power Attenuator	1/15/19
Lorch Microwave	5NF-800/1000-S	AC3	Notch Filter	1/15/19
Lorch Microwave	5NF-1800/2200-S	AE10	Notch Filter	1/15/19
Narda	3022	80986	Directional Coupler	1/15/19
Lorch Microwave	5NF-800/1000-S	AC3	Notch Filter	1/15/19

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

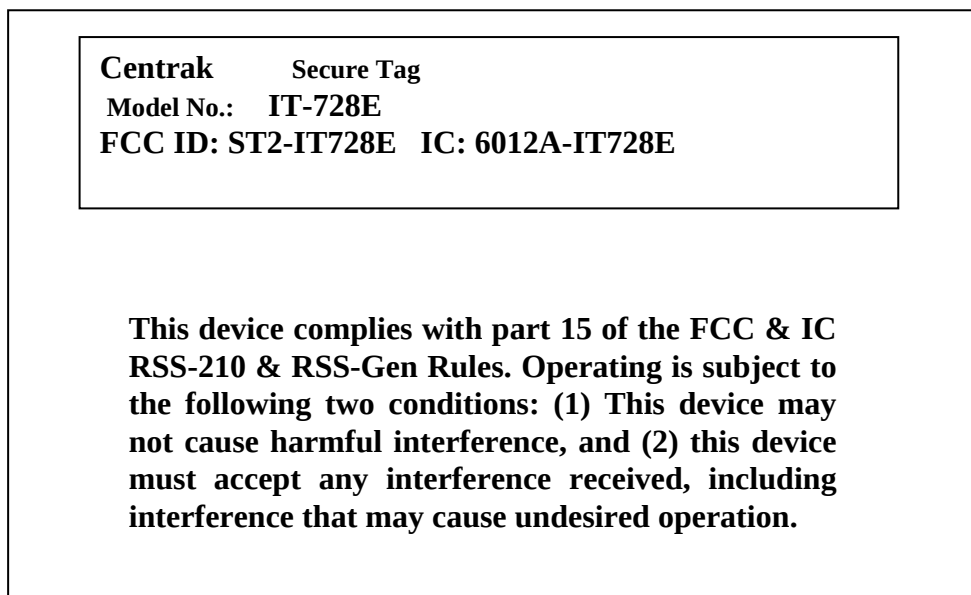


Figure 2.1 FCC ID Label (statement shown in its manual)

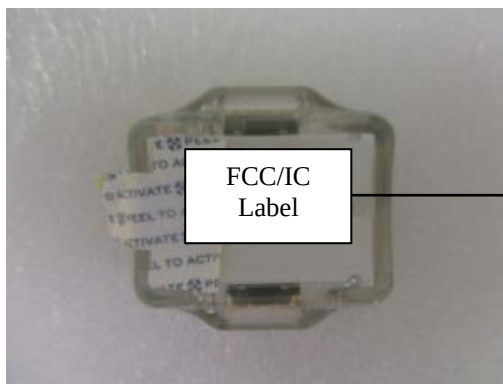


Figure 2.2 Location of Label on EUT

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 with max length, 2". 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.

3.2 Special Accessories

N/A

3.3 Configuration of Tested System

Figure 3.1 to Figure 3.3 illustrate this system, which is tested standing along.



X position



Y position



Z position

Figure 3.1 Radiated Test Setup_X,Y,Z



Figure 3.2 Radiated Configuration Test Setup

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: David Tu

Date: June 8, 2018

Radiated Test Data (CH-904MHz/915MHz/926MHz & Harmonics)

Frequency (MHz)	Polarity (V,H) Position (Zup,Zdown)	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Reading After Correction (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
904	V/Z	1.1	235	91.6		94	-2.4
1808	V/Z	1.1	090	63.4	35.4	54	-18.6
2712	V/Z	1.1	045	52.2	24.2	54	-29.8
904	H/Z	1.0	000	91.2		94	-2.8
1808	H/Z	1.1	000	57.8	29.8	54	-24.2
2712	H/Z	1.1	330	51.3	23.3	54	-30.7
915	V/Z	1.1	235	90.5		94	-3.5
1830	V/Z	1.1	000	61.3	33.3	54	-20.7
2745	V/Z	1.1	000	51.6	23.6	54	-30.4
915	H/Z	1.0	000	88.4		94	-5.6
1830	H/Z	1.1	000	58.1	30.1	54	-23.9
2745	H/Z	1.1	330	52.3	24.3	54	-29.7
926	V/Z	1.1	235	89.8		94	-4.2
1852	V/Z	1.1	000	60.2	32.2	54	-21.8
2778	V/Z	1.1	000	51.1	23.1	54	-30.9
926	H/Z	1.0	000	84.5		94	-9.5
1852	H/Z	1.1	135	58.3	30.3	54	-23.7
2778	H/Z	1.1	330	50.5	22.5	54	-31.5
904	V/Y	1.1	235	90.1		94	-3.9
1808	V/Y	1.1	090	64.2	36.2	54	-17.8
2712	V/Y	1.1	090	52.4	24.4	54	-29.6
904	H/Y	1.0	330	91.1		94	-2.9
1808	H/Y	1.1	000	60.4	32.4	54	-21.6
2712	H/Y	1.1	000	51.1	23.1	54	-30.9
915	V/Y	1.1	235	87.9		94	-6.1
1830	V/Y	1.1	090	63.6	35.6	54	-18.4
2745	V/Y	1.1	235	51.5	23.5	54	-30.5
915	H/Y	1.0	000	89.7		94	-4.3
1830	H/Y	1.1	000	59.2	31.2	54	-22.8
2745	H/Y	1.1	000	51.6	23.6	54	-30.4

926	V/Y	1.1	235	85.5		94	-8.5
1852	V/Y	1.1	090	62.8	34.8	54	-19.2
2778	V/Y	1.1	235	50.5	22.5	54	-31.5
926	H/Y	1.0	000	84.5		94	-9.5
1852	H/Y	1.1	000	57.8	29.8	54	-24.2
2778	H/Y	1.1	045	51.5	23.5	54	-30.5
904	V/X	1.1	090	85.9		94	-8.1
1808	V/X	1.1	000	59.1	31.1	54	-22.9
2712	V/X	1.1	330	51.0	23.0	54	-31.0
904	H/X	1.0	135	90.9		94	-3.1
1808	H/X	1.1	270	61.6	33.6	54	-20.4
2712	H/X	1.1	235	51.8	23.8	54	-30.2
915	V/X	1.1	090	84.5		94	-9.5
1830	V/X	1.1	000	57.9	29.9	54	-24.1
2745	V/X	1.1	330	49.8	21.8	54	-32.2
915	H/X	1.0	235	92.4		94	-1.6
1830	H/X	1.1	270	60.6	32.6	54	-21.4
2745	H/X	1.1	235	51.2	23.2	54	-30.8
926	V/X	1.1	135	82.5		94	-11.5
1852	V/X	1.1	090	56.9	28.9	54	-25.1
2778	V/X	1.1	090	49.7	21.7	54	-32.3
926	H/X	1.0	235	90.7		94	-3.3
1852	H/X	1.0	270	59.4	31.4	54	-22.6
2778	H/X	1.1	235	49.1	21.1	54	-32.9

(1) The limit for emissions within the 902-928MHz 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 & RSS-210, 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)	Position V/Z,H/X	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (dBuV/m)	FCC 3m Limit (dBuV/m)	Difference (dBuV/m)
750.5	V/Z	1.1	330	31.8	46.5	-14.7
825.6	V/Z	1.1	090	32.1	46.5	-14.4
865.9	V/Z	1.1	090	33.5	46.5	-13.0
974.0	V/Z	1.0	045	33.4	46.5	-13.1
751.8	H/X	1.0	000	33.3	46.5	-13.2
850.0	H/X	1.0	235	31.9	46.5	-14.6
868.9	H/X	1.0	270	33.3	46.5	-13.2
934.0	H/X	1.0	000	33.1	46.5	-13.4

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

20 dB & 99% Bandwidth : 900MHz Band

