

# **EMC TEST REPORT**

(FULL COMPLIANCE)

Report Number: 102218261BOX-001b Project Number: G102218261

Report Issue Date: 09/16/2015

Model(s) Tested:M372Model(s) Partially Tested:NoneModel(s) Not Tested but declared equivalent by the client:TW2P81700 & TWG012600

Standards: FCC 47CFR Part 15 Subpart C 15.247 (8/2015), FCC 47CFR Part 15 Subpart B (8/2015)

Tested by: Intertek Testing Services NA, Inc. 70 Codman Hill Road Boxborough, MA 01719 USA Client: Timex Group USA, Inc. 555 Christian Road Middlebury, CT 06762 USA

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# 1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

### 2 Test Summary

Section	Test full name	Result
3	Client Information	
4	Description of Equipment Under Test	
5	System Setup and Method	
6	Maximum Peak Output Power, Human RF Exposure, & Duty Cycle CFR47 FCC Part 15:2015 Subpart C, Section 15.247 (b)(3)	Pass
7	Transmitter Radiated Spurious Emissions CFR47 FCC Part 15:2015 Subpart C Section 15.247 (d) CFR47 FCC Part 15:2015 Subpart C Section 15.209	Pass
8	6 dB Bandwidth & 99% Power Bandwidth CFR47 FCC Part 15:2015 Subpart C Section 15.247 (a)(2)	Pass
9	Power Spectral Density CFR47 FCC Part 15:2015 Subpart C Section 15.247 (e)	Pass
10	Band-edge Compliance CFR47 FCC Part 15:2015 Subpart C Section 15.247 (d)	Pass
11	Digital Devices Radiated Spurious Emissions CFR47 FCC Part 15:2015 Subpart B Section 15.109	Pass
	Receiver Radiated Spurious Emissions CFR47 FCC Part 15:2015 Subpart B Section 15.109	Exempt, above 960 MHz
	AC Mains Conducted Emissions CFR47 FCC Part 15:2013 Subpart B Section 15.207	N/A
12	Revision History	

### 3 Client Information

This EUT was tested at the request of:

Client:	Timex Group USA, Inc. 555 Christian Road Middlebury, CT 06762 USA
Contact:	Sam Everett
Telephone:	203-346-5603
Fax:	203-573-5139
Email:	severett@timexgroup.com

### 4 Description of Equipment Under Test and Variant Models

Manufacturer:	Timex Group USA, Inc. 555 Christian Road
	Middlebury, CT 06762 USA

Equipment Under Test				
Description Manufacturer Model Number Serial Number				
Watch	Timex Group USA, Inc.	M372	QC 009-10 (CCC)	

Receive Date:	07/01/2015 & 08/03/2015
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)

The equipment under test is a watch.

### FEATURES

- Bluetooth connection with your phone to track all day activity
- (steps, distance and calories)
- Dial display shows Step Count / Distance and % to Goal for each
- App on phone to view detailed/historic data
  - Sleep feature to be added Spring 2016

### **BENEFITS**

- Aesthetic analog design
- Quick-release straps to easily change for versatility STRAP OPTIONS AVL.
- Extra straps available on timex.com
- 50 meters water resistant
- 42mm Case
   INDIGLO<sup>®</sup> Night-Light

BATTERY POWER CR2025 (life approx. 18 months/ Sleep Mode 16 months) COMPATABILITY iOS compatibility (8.12 or higher) iPhone (4S and above) iPod touch (5th generation or higher) Android compatibility (4.4.2 or higher) Requires a Bluetooth Low Energy smartphone

Equipment Under Test Power Configuration					
Rated Voltage Rated Current Rated Frequency Number of Phases					
3 V Lithium Coin Battery	N/A	N/A	N/A		

### Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmit Mode: Low, Mid, and High Channels
2	Idle/Receive Mode

### Software used by the EUT:

No.	Descriptions of EUT Exercising
1	None

Radio/Receiver Characteristics			
Frequency Band(s)	2400-2483.5 MHz		
Modulation Type(s)	GFSK		
Maximum Output Power	0.05mW		
Test Channels	40 (BLE)		
Occupied Bandwidth	1.165 MHz		
Frequency Hopper: Number of Hopping			
Channels	N/A		
Frequency Hopper: Channel Dwell Time	N/A		
Frequency Hopper: Max interval between			
two instances of use of the same channel	N/A		
MIMO Information (# of Transmit and			
Receive antenna ports)	N/A		
Equipment Type	Standalone		
ETSI LBT/Adaptivity	Non-Adaptive		
ETSI Adaptivity Type	Non-LBT		
ETSI Temperature Category (I, II, III)	1		
ETSI Receiver Category (1, 2, 3)	3		
Antenna Type and Gain	Integrated, 0 dBi		

### Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

- TW2P81700, Silver Tone Finish, Black Dial / Red Accents, Black Perforated Leather Strap.
- TWG012600, Black Finish, Black Dial / Orange Accents, Black Silicone Strap.

# 5 System Setup and Method

	Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination	
	None					

Support Equipment					
Description Manufacturer Model Number Serial Number					
None					

### 5.1 Method:

Configuration as required by FCC 47CFR Part 15.247:2015, ANSI C63.4-2014, ANSI C63.10-2013, and KDB558074 v03r03 DTS 06-09-2015.

# 5.2 EUT Block Diagram:

EUT		

# 6 Maximum Peak Output Power, Human RF Exposure, & Duty Cycle

### 6.1 Method

Tests are performed in accordance with CFR47 FCC Part 15:2015 Subpart C, Section 15.247 (b)(3).

### TEST SITE: 10m ALSE

**The 10m ALSE** is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

### Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6	6.3
Radiated Emissions, 3m	30-1000 MHz	5.3	6.3
Radiated Emissions, 3m	1-6 GHz	4.5	5.2
Radiated Emissions, 3m	6-15 GHz	5.2	5.5
Radiated Emissions, 3m	15-18 GHz	5.0	5.5
Radiated Emissions, 3m	18-40 GHz	5.0	5.5

### Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF +	· CF - AG
Where	FS = Field Strength in $dB\mu V/m$
	RA = Receiver Amplitude (including preamplifier) in $dB\mu V$
	CF = Cable Attenuation Factor in dB
	AF = Antenna Factor in dB
	AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

 $\label{eq:result} \begin{array}{l} {\sf RA} = 52.0 \ dB\mu V \\ {\sf AF} = \ 7.4 \ dB/m \\ {\sf CF} = \ 1.6 \ dB \\ {\sf AG} = 29.0 \ dB \\ {\sf FS} = 32 \ dB\mu V/m \end{array}$ 

To convert from  $dB\mu V$  to  $\mu V$  or mV the following was used:

 $UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$  $NF = \text{Net Reading in } dB\mu\text{V}$ 

### Example:

FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0 UF =  $10^{(32 \text{ dB}_{\mu}\text{V} / 20)}$  = 39.8  $\mu$ V/m

Alternately, when C5 Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". "AF" is the Antenna Factor; "PA+CL" are Preamp and Cable Loss. These are already accounted for in the "Level" column.

### 6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
ETS001'	1-18GHz DRG Horn Antenna	ETS-Lindgren	3117	00143259	01/14/2015	01/14/2016
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/14/2015	03/14/2016
145-416'	Cables 145-400 145-402 145-404 145-408	Huber + Suhner	3m Track B cables	multiple	10/04/2014	10/04/2015

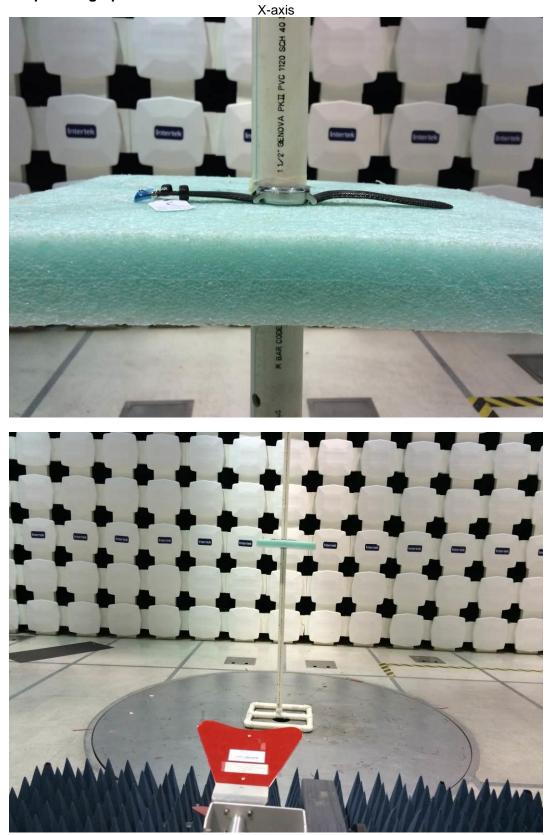
#### Software Utilized:

Name	Manufacturer	Version
EMI Boxborough.xl	s Intertek	08/27/2010

### 6.3 Results:

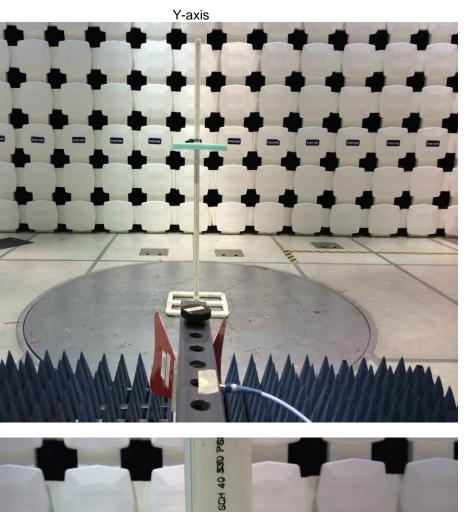
The sample tested was found to comply. The EIRP must not exceed 20.97 dBm. The Human RF Exposure limit is 1 mW/cm<sup>2</sup>.

# 6.4 Setup Photographs:



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### 6.5 Test Data:

### Low Channel Output Power (Radiated Emissions)

Company: Model #:		up USA , Inc						a & Cables: ETS001 01	N -14-16.txt	,	LF, HF, SHF I-14-16.txt
Serial #:	QC 009-10						Cable(s):	145-416 3m	Track B 1-1	5GHz Cable	10-04-15.txt
Engineers:	Kouma Sin	n			Location:	10m Chamber	Barometer:	DAV004		Filter:	NONE
Project #:	G10221826	51	Date(s):	08/07/15							
Standard:	FCC Part 1	5 Subpart C	; 15.247				Temp/Humic	dity/Pressure:	22 deg C	42%	1004 mB
Receiver:	R&S ESI (1	45-128) 03-	14-2016	Limit Di	stance (m):	3					
PreAmp:	NONE.			Test Di	stance (m):	3					
Р	reAmp Use	d? (Y or N):	Ν	Voltage/	/Frequency:	3V B	attery	Freque	ncy Range:	Funda	amental
		ding (dBuV/	,		,		· ·	. ,		,	
Peak: F	PK Quasi-P	eak: QP Av	erage: AVG	RMS: RM	S; NF = Noi	se Floor, RE	3 = Restricte	d Band; Ba	ndwidth den	oted as RB	W/VBW
	Ant.			Antenna	Cable	Pre-amp	Distance				
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm (EIRP)	dBm	dB	
								t power, no			
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRI	<b>D</b>
PK	V	2402.000	28.92	31.96	5.87	0.00	0.00	-28.47			100/300 kHz
PK	Н	2402.000	29.83	31.96	5.87	0.00	0.00	-27.56			100/300 kHz
PK	V	2402.000	33.18	31.96	5.87	0.00	0.00	-24.21	20.97	-45.18	1/3 MHz
PK	Н	2402.000	33.31	31.96	5.87	0.00	0.00	-24.08	20.97	-45.05	1/3 MHz
PK	V	2402.000	39.38	31.96	5.87	0.00	0.00	-18.01	20.97	-38.98	5/10 MHz
PK	Н	2402.000	39.79	31.96	5.87	0.00	0.00	-17.60	20.97	-38.57	5/10 MHz
		Y-Axis	(Watch was	s crown up,	Low Channe	el = 2402 M	Hz), Output	power, no p	re-amp		
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRI	5
PK	V	2402.000	29.51	31.96	5.87	0.00	0.00	-27.88			100/300 kHz
PK	Н	2402.000	32.41	31.96	5.87	0.00	0.00	-24.98			100/300 kHz
PK	V	2402.000	32.85	31.96	5.87	0.00	0.00	-24.54	20.97	-45.51	1/3 MHz
PK	Н	2402.000	35.32	31.96	5.87	0.00	0.00	-22.07	20.97	-43.04	1/3 MHz
PK	V	2402.000	38.15	31.96	5.87	0.00	0.00	-19.24	20.97	-40.21	5/10 MHz
PK	Н	2402.000	40.07	31.96	5.87	0.00	0.00	-17.32	20.97	-38.29	5/10 MHz
		Z-Axis (	Watch was	crown to rig	ht, Hi Chan	nel = 2402N	1Hz), Output	t power, no	ore-amp		
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRI	>
PK	V	2402.000	31.26	31.96	5.87	0.00	0.00	-26.13			100/300 kHz
PK	Н	2402.000	29.67	31.96	5.87	0.00	0.00	-27.72			100/300 kHz
PK	V	2402.000	35.29	31.96	5.87	0.00	0.00	-22.10	20.97	-43.07	1/3 MHz
PK	н	2402.000	33.26	31.96	5.87	0.00	0.00	-24.13	20.97	-45.10	1/3 MHz
PK	V	2402.000	39.93	31.96	5.87	0.00	0.00	-17.46	20.97	-38.43	5/10 MHz
PK	Н	2402.000	33.00	31.96	5.87	0.00	0.00	-24.39	20.97	-45.36	5/10 MHz

				•••••••				,			
Company:	Timex Grou	up USA , Inc					Antenn	a & Cables:	Ν	Bands: N, I	_F, HF, SHF
Model #:		. ,					Antenna:	ETS001 01	-14-16.txt	ETS001 01	-14-16.txt
Serial #:	QC 009-10						Cable(s):	145-416 3m	Track B 1-1	5GHz Cable	10-04-15.txt
Engineers:	Kouma Sin	n			Location:	10m Chamber	Barometer:	DAV004		Filter:	NONE
Project #:	G10221826	61	Date(s):	08/07/15							
Standard:	FCC Part 1	5 Subpart C	; 15.247				Temp/Humic	lity/Pressure:	22 deg C	42%	1004 mB
Receiver:	R&S ESI (1	45-128) 03-	14-2016	Limit Di	stance (m):	3		•	°,		
PreAmp:	NONE.	,		Test Di	stance (m):	3					
P	reAmp Use	d? (Y or N):	Ν	Voltage/	/Frequency:	3V B	attery	Freque	ncy Range:	Funda	mental
	Net = Rea	ding (dBuV/	m) + Antenr	na Factor (d	B1/m) + Cal	ble Loss (dE	B) - Preamp	Factor (dB)	- Distance	Factor (dB)	
Peak: F	PK Quasi-P	eak: QP Av	erage: AVG	RMS: RM	S; NF = Noi	se Floor, RE	3 = Restricte	d Band; Bai	ndwidth den	oted as RB	W/VBW
	Ant.			Antenna	Cable	Pre-amp	Distance				
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm (EIRP)	dBm	dB	
	•	X-Axis (	Watch was	flat on table	, Mid Chanr	nel = 2440 N	/Hz), Outpu	t power, no	ore-amp	•	· · · · · · · · · · · · · · · · · · ·
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRF	D
PK	V	2440.000	29.70	32.11	5.92	0.00	0.00	-27.49			100/300 kHz
PK	Н	2440.000	29.00	32.11	5.92	0.00	0.00	-28.19			100/300 kHz
PK	V	2440.000	32.92	32.11	5.92	0.00	0.00	-24.27	20.97	-45.24	1/3 MHz
PK	Н	2440.000	33.17	32.11	5.92	0.00	0.00	-24.02	20.97	-44.99	1/3 MHz
PK	V	2440.000	39.79	32.11	5.92	0.00	0.00	-17.40	20.97	-38.37	5/10 MHz
PK	Н	2440.000	37.88	32.11	5.92	0.00	0.00	-19.31	20.97	-40.28	5/10 MHz
		Y-Axis	(Watch was	s crown up,	Mid Channe	el = 2440 MI	Hz), Output	power, no p	re-amp		
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRF	D
PK	V	2440.000	28.57	32.11	5.92	0.00	0.00	-28.62			100/300 kHz
PK	Н	2440.000	31.32	32.11	5.92	0.00	0.00	-25.87			100/300 kHz
PK	V	2440.000	32.53	32.11	5.92	0.00	0.00	-24.66	20.97	-45.63	1/3 MHz
PK	н	2440.000	34.87	32.11	5.92	0.00	0.00	-22.32	20.97	-43.29	1/3 MHz
PK	V	2440.000	39.52	32.11	5.92	0.00	0.00	-17.67	20.97	-38.64	5/10 MHz
PK	Н	2440.000	39.66	32.11	5.92	0.00	0.00	-17.53	20.97	-38.50	5/10 MHz
		Z-Axis (V	Vatch was o	crown to righ	nt, Mid Char	nnel = 2440 <b>i</b>	MHz), Outpu	it power, no	pre-amp		
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRF	2
PK	V	2440.000	31.92	32.11	5.92	0.00	0.00	-25.27	20.97	-46.24	100/300 kHz
PK	Н	2440.000	31.63	32.11	5.92	0.00	0.00	-25.56	20.97	-46.53	100/300 kHz
PK	V	2440.000	34.81	32.11	5.92	0.00	0.00	-22.38	20.97	-43.35	1/3 MHz
PK	Н	2440.000	35.11	32.11	5.92	0.00	0.00	-22.08	20.97	-43.05	1/3 MHz
PK	V	2440.000	39.79	32.11	5.92	0.00	0.00	-17.40	20.97	-38.37	5/10 MHz
PK	Н	2440.000	41.09	32.11	5.92	0.00	0.00	-16.10	20.97	-37.07	5/10 MHz

### Mid Channel Output Power (Radiated Emissions)

**High Channel Radiated Emissions** 

Model #:	M372	up USA , Inc.					Antenna:	a & Cables: ETS001 01		ETS001 01	_F, HF, SHF -14-16.txt		
Serial #:	QC 009-10						Cable(s):	145-416 3m Track B 1-1	5GHz Cable 10-04-15.txt	NONE.			
Engineers:	Vathana Ve	en			Location:	10M	Barometer:	DAV004		Filter:	NONE		
Project #:	G10216222	20	Date(s):	06/18/16									
Standard:	FCC Part 1	5 Subpart C	15.247				Temp/Humic	lity/Pressure:	22 deg C	43%	1003 mB		
Receiver:	R&S ESI (1	45-128) 03-	14-2016	Limit Di	istance (m):	3							
PreAmp:	145014 05-	13-16.txt		Test Di	istance (m):	3							
P	reAmp Use	ed? (Y or N):	Ν	Voltage/	Frequency:	3V B	attery	Freque	ncy Range:	Funda	mental		
	Net = Rea	ding (dBuV/r	m) + Antenn	a Factor (dl	B1/m) + Cal	ole Loss (dB	) - Preamp	Factor (dB)	- Distance F	actor (dB)			
Peak: F	YK Quasi-P	eak: QP Ave	erage: AVG	RMS: RMS	S; NF = Nois	se Floor, RB	= Restricte	d Band; Bar	ndwidth den	oted as RB	W/VBW		
	Ant.			Antenna	Cable	Pre-amp	Distance					Ī	
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth		
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(m)	dB(m)	dB		FCC	IC
. , , , , , , , , , , , , , , , , , , ,	(1)1)		. ,			el = 2480 M							
	Note: EIRP	Obtained by			-		,			= dBm EIRF	)		
PK	V	2480.000	33.10	32.26	5.98	0.00	0.00	-23.88			100/300 kHz	ł	
AVG	v	2480.000	33.10	32.26	5.98	0.00	0.00	-23.88			100/300 kHz	t	
PK	н Н	2480.000	33.41	32.26	5.98	0.00	0.00	-23.57			100/300 kHz	•	
AVG	H	2480.000	33.41	32.20	5.98	0.00	0.00	-23.57			100/300 kHz	•	
PK	V		31.59	32.20	5.98			-25.39			1/3 MHz	ł	
	 V	2480.000 2480.000				0.00	0.00		20.97	-46.36		ł	
AVG			31.59	32.26	5.98	0.00	0.00	-25.39	20.97	-46.36	1/3 MHz	+	
PK	H	2480.000	35.30	32.26	5.98	0.00	0.00	-21.68	20.97	-42.65	1/3 MHz	-	
AVG	Н	2480.000	35.30	32.26	5.98	0.00	0.00	-21.68	20.97	-42.65	1/3 MHz	ļ	
PK	V	2480.000	39.66	32.26	5.98	0.00	0.00	-17.32	20.97	-38.29	5/10 MHz	ļ	
AVG	V	2480.000	39.66	32.26	5.98	0.00	0.00	-17.32	20.97	-38.29	5/10 MHz	ļ	
PK	Н	2480.000	39.75	32.26	5.98	0.00	0.00	-17.23	20.97	-38.20	5/10 MHz	ļ	
AVG	Н	2480.000	39.75	32.26	5.98	0.00	0.00	-17.23	20.97	-38.20	5/10 MHz	ļ	
		Y-Axis	(Watch wa	s crown up,	Hi Channel	= 2480 MH	z), Output p	ower, no pre	e-amp				
I	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22 :	= dBm EIRF			
PK	V	2480.000	36.81	32.26	5.98	0.00	0.00	-20.17			100/300 kHz		
AVG	V	2480.000	36.81	32.26	5.98	0.00	0.00	-20.17			100/300 kHz		
PK	Н	2480.000	34.34	32.26	5.98	0.00	0.00	-22.64			100/300 kHz		
AVG	Н	2480.000	34.34	32.26	5.98	0.00	0.00	-22.64			100/300 kHz		
PK	V	2480.000	38.24	32.26	5.98	0.00	0.00	-18.74	20.97	-39.71	1/3 MHz		
AVG	V	2480.000	38.24	32.26	5.98	0.00	0.00	-18.74	20.97	-39.71	1/3 MHz		
PK	Н	2480.000	35.54	32.26	5.98	0.00	0.00	-21.44	20.97	-42.41	1/3 MHz	Ī	
AVG	Н	2480.000	35.54	32.26	5.98	0.00	0.00	-21.44	20.97	-42.41	1/3 MHz	Ī	
PK	V	2480.000	41.71	32.26	5.98	0.00	0.00	-15.27	20.97	-36.24	5/10 MHz	Ī	
AVG	V	2480.000	41.71	32.26	5.98	0.00	0.00	-15.27	20.97	-36.24	5/10 MHz	Ì	
PK	Н	2480.000	39.34	32.26	5.98	0.00	0.00	-17.64	20.97	-38.61	5/10 MHz	İ	
AVG	Н	2480.000	39.34	32.26	5.98	0.00	0.00	-17.64	20.97	-38.61	5/10 MHz	Î	
						nel = 2480 M						t	
	Note: EIRP	Obtained by		0			<i>,</i> ,, ,	1 1		= dBm EIRF	<b>)</b>	T	
PK	V	2480.000	33.40	32.26	5.98	0.00	0.00	-23.58			100/300 kHz	t	
AVG	v	2480.000	33.40	32.26	5.98	0.00	0.00	-23.58			100/300 kHz	ł	
PK	Н	2480.000	37.68	32.26	5.98	0.00	0.00	-19.30			100/300 kHz	•	
AVG	H	2480.000	37.68	32.26	5.98	0.00	0.00	-19.30			100/300 kHz	ł	
PK	V	2480.000	36.00	32.26	5.98	0.00	0.00	-20.98	20.97	-41.95	1/3 MHz	ł	
AVG	V	2480.000	36.00	32.20	5.98	0.00	0.00	-20.98	20.97	-41.95	1/3 MHz	ł	
PK	H	2480.000	39.58	32.20	5.98	0.00	0.00	-17.40	20.97	-38.37	1/3 MHz	ł	
		2480.000										ł	
AVG	H		39.58	32.26	5.98	0.00	0.00	-17.40	20.97	-38.37	1/3 MHz	ł	
PK	V	2480.000	43.96	32.26	5.98	0.00	0.00	-13.02	20.97	-33.99	5/10 MHz	ł	
AVG	V	2480.000	43.96	32.26	5.98	0.00	0.00	-13.02	20.97	-33.99	5/10 MHz	ł	
PK	<u>H</u>	2480.000	41.32	32.26	5.98	0.00	0.00	-15.66	20.97	-36.63	5/10 MHz	ł	
AVG	Н	2480.000	41.32	32.26	5.98	0.00	0.00	-15.66	20.97	-36.63	5/10 MHz	l	

Harmonic?

Intertek							
Report Number: 102	2218261BOX-001b		Issued: 09/16/2015				
Test Personnel:	Vathana F. Ven	Test Date:	06/18/2015				
	Kouma Sinn 43		08/07/2015				
Supervising/Reviewing Engineer:							
(Where Applicable)	N/A						
Product Standard:	FCC 47CFR Part 15.247	Limit Applied:	See Report Section 6.3				
Input Voltage:	Battery powered						
Pretest Verification w/		Ambient Temperature:	22, 22 °C				
Ambient Signals or BB Source:	BB Source	Relative Humidity:	42, 43 %				
		Atmospheric Pressure:	1004, 1003 mbars				

Deviations, Additions, or Exclusions: None

### Human RF Exposure, & Duty Cycle

§1.1310 The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices shall be evaluated according to the provisions of §2.1093 of this chapter.

Part §1.1310 Limits	for Maximum Pe	ermissible Exr	oosure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
	(A) Limits for O	ccupational/Controlled Expo	sure	
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
	(B) Limits for Gener	al Population/Uncontrolled E	xposure	
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2. <b>1</b> 9/f	*180/f <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz \* = Plane-wave equivalent power density

(1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure. The phrase *fully aware* in the context of applying these exposure limits means that an exposed person has received written and/or verbal information fully explaining the potential for RF exposure resulting from his or her employment. With the exception of *transient* persons, this phrase also means that an exposed person has received appropriate training regarding work practices relating to controlling or mitigating his or her exposure. Such training is not required for *transient* persons, but they must receive written and/or verbal information and notification (for example, using signs) concerning their exposure potential and appropriate means available to mitigate their exposure. The phrase *exercise control* means that an exposed person is allowed to and knows how to reduce or avoid exposure by administrative or engineering controls and work practices, such as use of personal protective equipment or time averaging of exposure.

(2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

### 1.1 Test Procedure

The EUT was measured in a radiated fashion. The RF output power was measured using a resolution bandwidth which encompassed the entire emission bandwidth. The data obtained was adjusted for equipment losses and converted from a field strength reading to a power reading using the provisions of FCC KDB 558074.

### 1.2 Results:

The human RF exposure limit is 1 mW/cm<sup>2</sup>. The power density S generated by some value of EIRP at a given distance d is related by the equation:

S=EIRP /  $(4\pi d^2)$ 

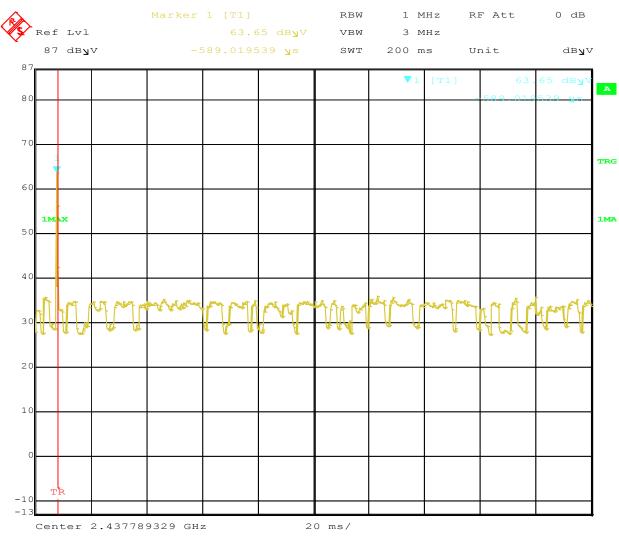
The distance, given a maximum EIRP of -13.02 dBm (0.050 mW), at which the radiated power density of the EUT is equal to the human RF exposure limit is 0.063 cm from the antenna. This result does not take averaging into account. The EUT is exempt from FCC SAR RF Exposure evaluation because the output power is below the KDB 447498 exemption threshold:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] \* [ $\sqrt{f}(GHz)$ ]  $\leq$  3.0 for 1-g SAR and  $\leq$  7.5 for 10-g extremity SAR.

[0.05 mW / 5 mm ] \* [√f(2.48 GHz)] = 0.0157 <3.0 and 7.5

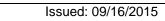
Pulse number within 200 ms

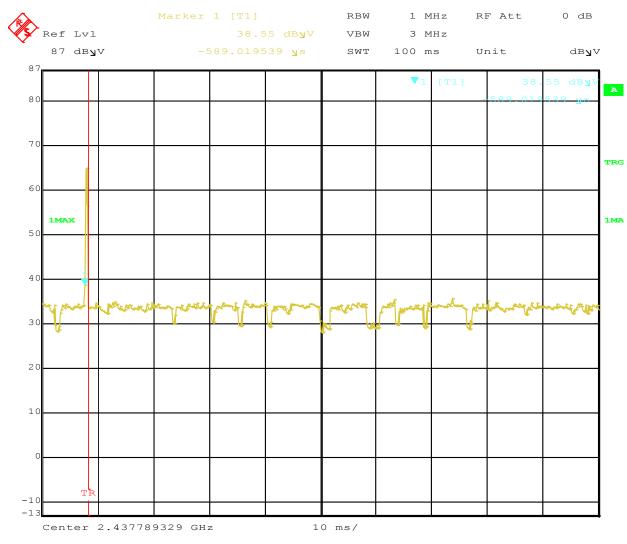
Issued: 09/16/2015



# Duty Cycle:

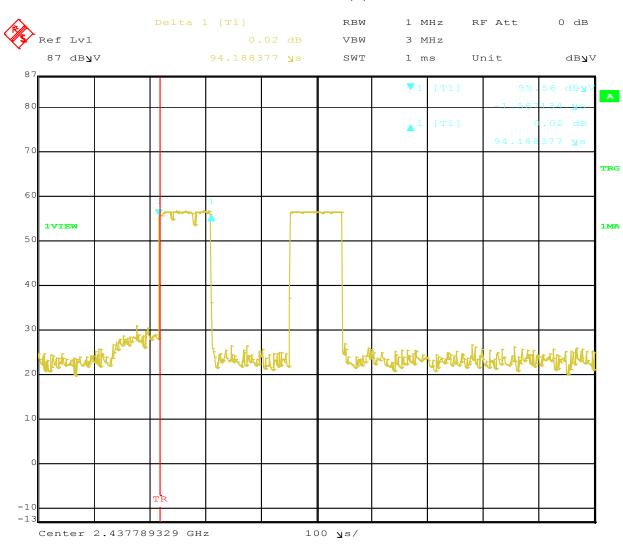
Date: 1.JAN.1997 06:04:09



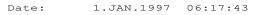


### Pulse number within 100 ms

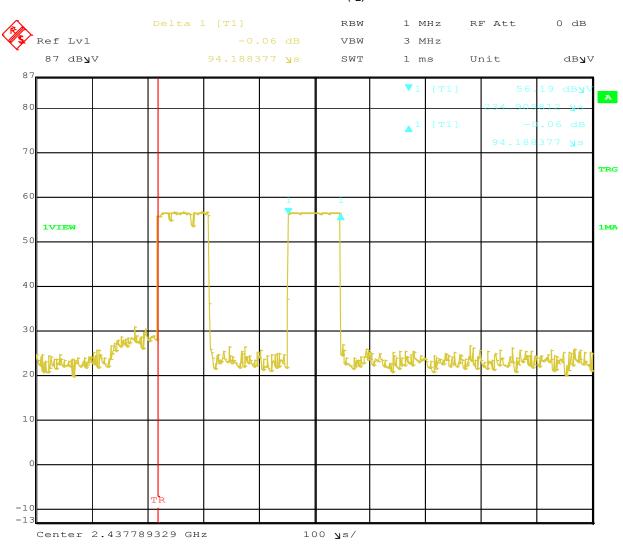
Date: 1.JAN.1997 06:04:40



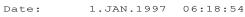
### Pulse on time (t<sub>1</sub>)



Issued: 09/16/2015



### Pulse on time $(t_2)$



Duty Cycle Calculation:

On time  $(t_1) = 0.0942 \text{ ms}$ 

On time  $(t_2) = 0.0942 \text{ ms}$ 

Duty Cycle =  $[(t_1)/(t_2)]/100$ ms or 0.189%

Average Factor = 54.5 dB

Issued: 09/16/2015

Intertek							
Report Number: 102	2218261BOX-001b		Issued: 09/16/2015				
Test Personnel: Supervising/Reviewing Engineer: (Where Applicable)	Kouma Sinn 49	Test Date:	_08/05/2015				
Product Standard: Input Voltage:	FCC Part 15.247 Battery Powered	_ Limit Applied:	N/A				
Pretest Verification w/ Ambient Signals or		Ambient Temperature:	20 °C				
BB Source:	BB Source	Relative Humidity:	43 %				

 Relative Humidity:
 43 %

 Atmospheric Pressure:
 1008 mbars

Deviations, Additions, or Exclusions: None

### 7 Transmitter Radiated Spurious Emissions

### 7.1 Method

Tests are performed in accordance with CFR47 FCC Part 15:2015 Subpart C Section 15.247 (d) and CFR47 FCC Part 15:2015 Subpart C Section 15.209.

### TEST SITE: 10m ALSE

**The 10m ALSE** is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

### Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6	6.3
Radiated Emissions, 3m	30-1000 MHz	5.3	6.3
Radiated Emissions, 3m	1-6 GHz	4.5	5.2
Radiated Emissions, 3m	6-15 GHz	5.2	5.5
Radiated Emissions, 3m	15-18 GHz	5.0	5.5
Radiated Emissions, 3m	18-40 GHz	5.0	5.5

### Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF +	· CF - AG
Where	FS = Field Strength in $dB\mu V/m$
	RA = Receiver Amplitude (including preamplifier) in $dB\mu V$
	CF = Cable Attenuation Factor in dB
	AF = Antenna Factor in dB
	AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

 $\label{eq:result} \begin{array}{l} {\sf RA} = 52.0 \ d{\sf B}\mu{\sf V} \\ {\sf AF} = \ 7.4 \ d{\sf B}/{\sf m} \\ {\sf CF} = \ 1.6 \ d{\sf B} \\ {\sf AG} = 29.0 \ d{\sf B} \\ {\sf FS} = 32 \ d{\sf B}\mu{\sf V}/{\sf m} \end{array}$ 

To convert from  $dB\mu V$  to  $\mu V$  or mV the following was used:

 $UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$  $NF = \text{Net Reading in } dB\mu\text{V}$ 

### Example:

FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0 UF =  $10^{(32 \text{ dB}_{\mu}\text{V} / 20)}$  = 39.8  $\mu$ V/m

Alternately, when C5 Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". "AF" is the Antenna Factor; "PA+CL" are Preamp and Cable Loss. These are already accounted for in the "Level" column.

### 7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61A	10/06/2014	10/06/2015
145106'	Bilog Antenna (30MHz - 5GHz)	Sunol Sciences	JB5	A111003	10/24/2014	10/24/2015
145013'	Preamplifier (150 KHz to 1.3 GHz)	Hewlett Packard	8447D	2944A07027	10/11/2014	10/11/2015
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/14/2015	03/14/2016
145-410'	Cables 145-400 145-403 145-405 145-406 145-407	Huber + Suhner	10m Track A Cables	multiple	10/04/2014	10/04/2015
ETS001'	1-18GHz DRG Horn Antenna	ETS-Lindgren	3117	00143259	01/14/2015	01/14/2016
145014'	Preamplifier (1 GHz to 26.5 GHz)	Hewlett Packard	8449B	3008A00232	05/05/2014	05/05/2015
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/14/2015	03/14/2016
145-416'	Cables 145-400 145-402 145-404 145-408	Huber + Suhner	3m Track B cables	multiple	10/04/2014	10/04/2015
EMC02'	ANTENNA, RIDGED GUIDE, 1-18 GHZ	EMCO	3115	2784	04/15/2015	04/15/2016
CBLHF201						
2-2M-2'	2m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252675002	02/05/2015	02/05/2016
REA006'	18GHz High Pass Filter	Reactel, Inc	7HS-18G/40G K11	(06)1	08/28/2014	08/28/2016
PRE9'	100MHz-40GHz Preamp	MITEQ	NSP4000-NFG	1260417	10/13/2014	10/13/2015
REA002'	2.5GHz High Pass Filter	Reactel, Inc	7HS-2.5G/18G-S11	06-1	12/30/2013	12/30/2015

#### Software Utilized:

Name	Manufacturer	Version		
EMI Boxborough.xls	Intertek	08/27/2010		
C5	Teseq	5.02.00 Build 5.26.46.46.		

### 7.3 Results:

The sample tested was found to Comply.

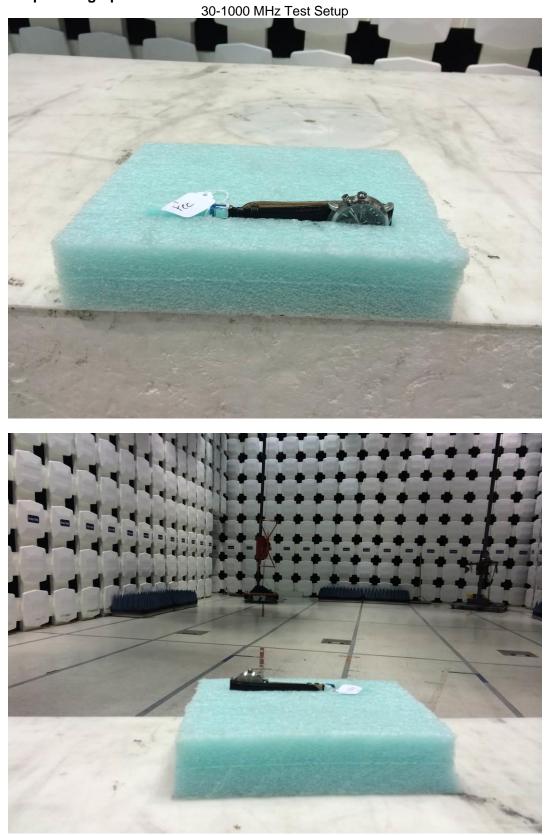
FCC Part 15.247(d) – Non Restricted Band Radiated Spurious/Harmonics Limits

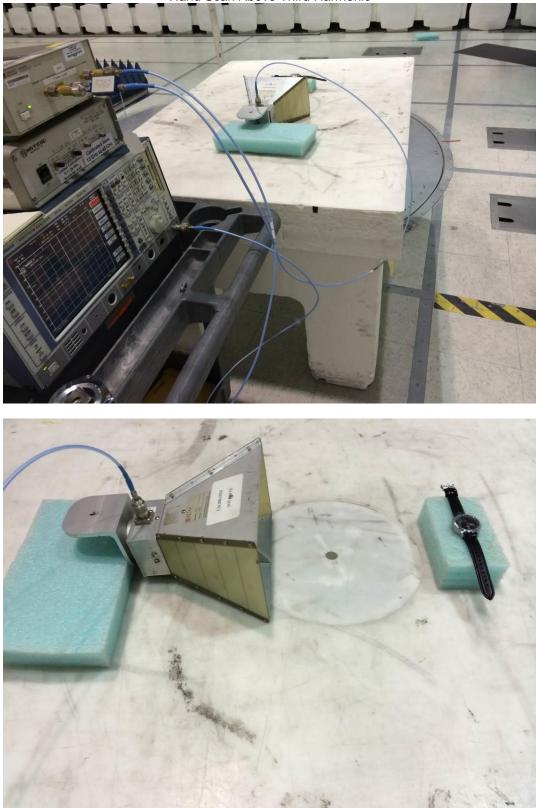
In any 100 kHz bandwidth outside the frequency band, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

FCC Par	t 15.209(a)
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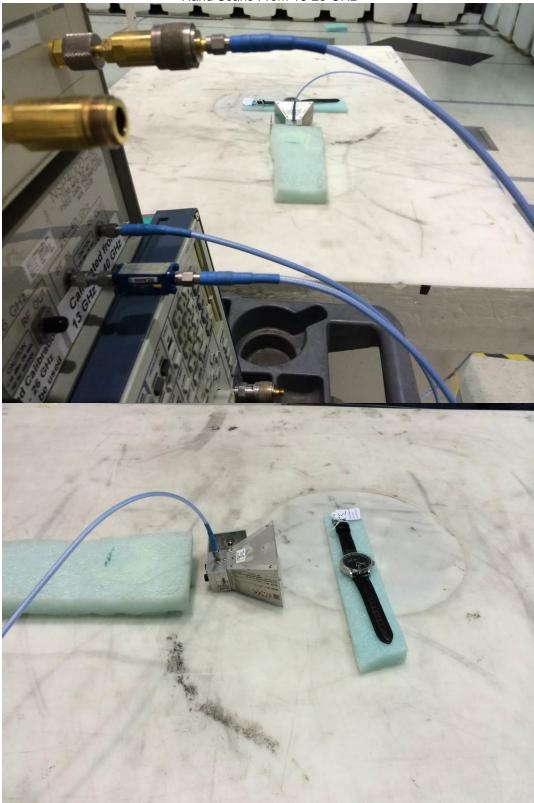
Frequency	Field	d Strength	Test Distance
(MHz)	μV/m	dBµV/m	(meters)
30–88	100	40.00	3
88–216	150	43.52	3
216–960	200	46.02	3
Above 960	500	53.98	3

# 7.4 Setup Photographs:





Hand Scan Above Third Harmonic



Hand Scans From 18-25 GHz

Additional Information

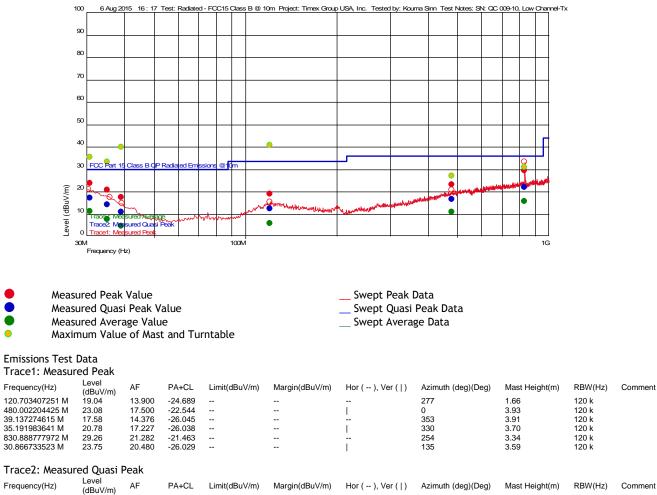
#### 7.5 Plots/Data:

Tx Low Channel: 30-1000 MHz

Test Information	
Test Details	User Entry
Test:	Radiated - FCC15 Class B @ 10m
Project:	Timex Group USA, Inc.
Test Notes:	SN: QC 009-10, Low Channel-Tx
Temperature:	24C
Humidity:	38%, DAV004mbar
Tested by:	Kouma Sinn
Test Started:	6 Aug 2015 16 : 17

Prescan Emission Graph

•



Frequency(Hz)	Level (dBuV/m)	AF	PA+CL	Limit(dBuV/m)	Margin(dBuV/m)	Hor ( ), Ver (   )	Azimuth (deg)(Deg)	Mast Height(m)	RBW(Hz)	Comment
120.703407251 M	12.44	13.900	-24.689	33.520	-21.08		277	1.66	120 k	
480.002204425 M	16.66	17.500	-22.544	36.020	-19.36		0	3.93	120 k	
39.137274615 M	10.94	14.376	-26.045	30.000	-19.06		353	3.91	120 k	
35.191983641 M	14.11	17.227	-26.038	30.000	-15.89		330	3.70	120 k	
830.888777972 M	21.98	21.282	-21.463	36.020	-14.04		254	3.34	120 k	
30.866733523 M	17.05	20.480	-26.029	30.000	-12.95		135	3.59	120 k	

#### Tx Low Channel 1-18 GHz Radiated Emissions

Company	Timex Grou	up USA , Inc					Antenn	a & Cables:	N	Bands: N	LF, HF, SHF		
Model #:		up 00A , IIIC	•					ETS001 01					
	QC 009-10						( )		Track B 1-1		10-04-15.txt		
Engineers:					Location:	10m Chamber	Barometer:	DAV004		Filter:	NONE		
	G1022182		( )	08/07/15									
Standard:	FCC Part 1	5 Subpart C	15.247				Temp/Humio	lity/Pressure:	24 deg C	39%	1003 mB		
Receiver:	R&S ESI (1	145-128) 03-	14-2016	Limit Di	stance (m):	3							
PreAmp:	145014 05	-13-16.txt		Test Di	stance (m):	3							
P	reAmp Use	d? (Y or N):	Y	Voltage/	Frequency:	3V B	attery	Freque	ncy Range:	1-18 GHz			
	Net = Rea	ding (dBuV/	m) + Antenr	na Factor (dl	B1/m) + Cal	ole Loss (dE	B) - Preamp	Factor (dB)	- Distance	Factor (dB)			
Peak: F	PK Quasi-P	eak: QP Av	erage: AVG	RMS: RMS	S; NF = Nois	se Floor, RE	= Restricte	d Band; Bai	ndwidth den	noted as RB	W/VBW		
	Ant.			Antenna	Cable	Pre-amp	Distance					I	
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth		
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB		FCC	IC
X-Axis	(Watch wa	as flat on tab	le, Low Cha	innel = 2402	MHz). No e	missions we	ere detected	I. Readings	below are i	noise foor re	adings		
				Note: Pe	eak reading	s meet aver	age limit					1	
PK, NF	V	4804.000	37.08	34.19	8.52	31.62	0.00	48.17	54.00	-5.83	1/3 MHz	RB	RB
PK, NF	V	7206.000	26.00	35.69	10.60	31.08	0.00	41.21	54.00	-12.79	100/300kHz		
Y-Ax	is (Watch w	vas crown up	, Low Chan	nel = 2402 l	MHz).No en	nissions wer	e detected.	Readings b	pelow are no	oise foor rea	adings	]	
				Note: Pe	eak reading	s meet aver	age limit						
PK, NF	V	4804.000	36.87	34.19	8.52	31.62	0.00	47.96	54.00	-6.04	1/3 MHz	RB	RB
PK, NF	V	7206.000	27.58	35.69	10.60	31.08	0.00	42.79	54.00	-11.21	100/300kHz		
Z-Axis	(Watch was	s crown to rig	ght, Low Ch	annel = 240	2MHz). No	emissions w	vere detecte	d. Reading	s below are	noise foor i	eadings		
				Note: Pe	eak reading	s meet aver	age limit						
PK, NF	V	4804.000	38.00	34.19	8.52	31.62	0.00	49.09	54.00	-4.91	1/3 MHz	RB	RB
PK, NF	V	7206.000	25.32	35.69	10.60	31.08	0.00	40.53	54.00	-13.47	100/300kHz	1	

### Tx Low Channel 18-25 GHz Radiated Emissions

Company:	Timex Grou	up USA , Inc.					Antenn	a & Cables:	N	Bands: N. I	LF, HF, SHF	
Model #:							Antenna:			,	,,	
Serial #:	QC 009-10						Cable(s):	CBLHF201	2-2M-1	CBLHF201	2-2M-2	
Engineers:	Kouma Sin	n			Location:	10m Chamber	Barometer:	DAV004		Filter:	REA006	
Project #:	G10221826	51	Date(s):	08/07/15								
Standard:	FCC Part 1	5 Subpart C	15.247				Temp/Humio	dity/Pressure:	24 deg C	39%	1003 mB	
Receiver: R&S ESI (145-128) 03-14-2016 Limit Distance (m): 3												
PreAmp:	PreAmp: PRE9 Test Distance (m): 0.3											
F	PreAmp Use	ed? (Y or N):	Y	Voltage/	Frequency:	3V B	attery	Freque	ncy Range:	18-2	5 GHz	
	Net = Rea	iding (dBuV/r	m) + Antenn	a Factor (dl	31/m) + Cat	ole Loss (dB	) - Preamp	Factor (dB)	- Distance I	actor (dB)		
Peak: I	PK Quasi-P	eak: QP Av	erage: AVG	RMS: RMS	S; NF = Nois	se Floor, RB	= Restricte	d Band; Bar	ndwidth den	oted as RB	W/VBW	
	Ant.			Antenna	Cable	Pre-amp	Distance					
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth	
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB		
	Test was p	erformed ma	nually. Test	t equipment	used: EMC	04, CBLHF2	2012-2M-1,	CBLHF2012	2-2M-2, RE/	4006, PRE9		
		No emissions were detected at 30 cm.										

# Report Number: 102218261BOX-001b

### Issued: 09/16/2015

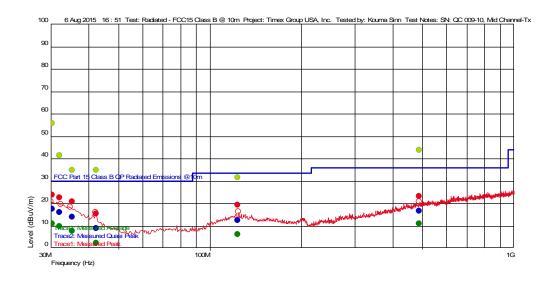
### Tx Mid Channel: 30-1000 MHz

Intertek

Test Information Test Details Test: Project: Test Notes: Temperature: Humidity: Tested by: Test Started:

User Entry Radiated - FCC15 Class B @ 10m Timex Group USA, Inc. SN: QC 009-10, Mid Channel-Tx 24C 38%, DAV004mbar Kouma Sinn 6 Aug 2015 16 : 51 Additional Information

#### Prescan Emission Graph



- Measured Peak Value
- Measured Quasi Peak Value
- Measured Average Value
- Maximum Value of Mast and Turntable

#### Emissions Test Data Trace1: Measured Peak

Frequency(Hz)	Level (dBuV/m)	AF	PA+CL	Limit(dBuV/m)	Margin(dBuV/m)	Hor ( ), Ver (   )	Azimuth (deg)(Deg)	Mast Height(m)	RBW(Hz)	Comment
42.478757918 M	15.45	11.913	-26.051				190	3.42	120 k	
124.044488864 M	19.15	13.996	-24.666				195	3.16	120 k	
489.559719577 M	23.01	17.400	-22.523				0	1.35	120 k	
35.34228413 M	20.88	17.092	-26.038			Ì	168	3.44	120 k	
32.17735499 M	22.61	19.394	-26.032				116	3.51	120 k	
30.435270541 M	23.75	20.739	-26.029				139	1.46	120 k	

Swept Peak Data

\_\_\_\_ Swept Average Data

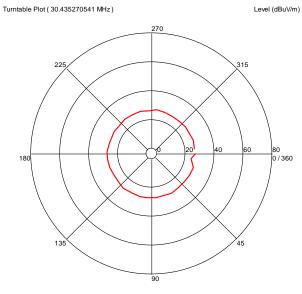
Swept Quasi Peak Data

#### Trace2: Measured Quasi Peak

Frequency(Hz)	Level (dBuV/m)	AF	PA+CL	Limit(dBuV/m)	Margin(dBuV/m)	Hor ( ), Ver (   )	Azimuth (deg)(Deg)	Mast Height(m)	RBW(Hz)	Comment
124.044488864 M	12.35	13.996	-24.666	33.520	-21.17		195	3.16	120 k	
42.478757918 M	8.88	11.913	-26.051	30.000	-21.12		190	3.42	120 k	
489.559719577 M	16.58	17.400	-22.523	36.020	-19.44	i i	0	1.35	120 k	
35.34228413 M	13.97	17.092	-26.038	30.000	-16.03		168	3.44	120 k	
32.17735499 M	16.07	19.394	-26.032	30.000	-13.93		116	3.51	120 k	
30.435270541 M	17.31	20.739	-26.029	30.000	-12.69		139	1.46	120 k	

### Issued: 09/16/2015

#### **Azimuth Plots**



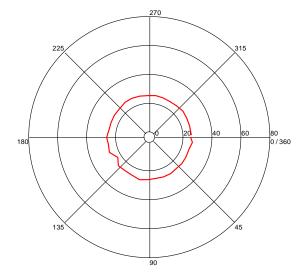
All Polarities

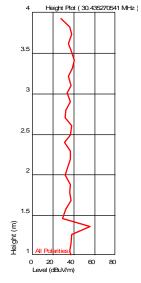
Azimuth (Degrees)

Intertek

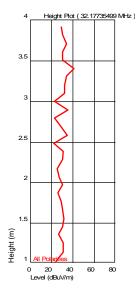
Turntable Plot ( 32.17735499 MHz )

Level (dBuV/m)





**Turntable Plots** 

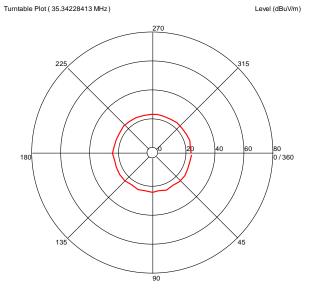


All Polarities

Azimuth (Degrees)

# Report Number: 102218261BOX-001b

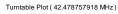
### Issued: 09/16/2015



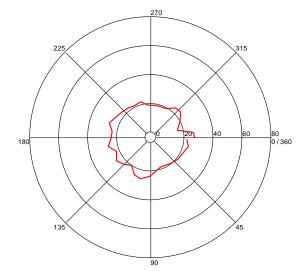
All Polarities

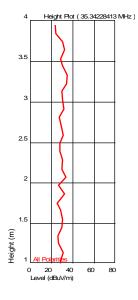
Azimuth (Degrees)

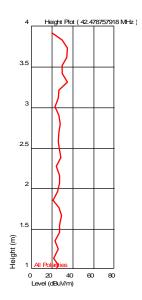
Intertek









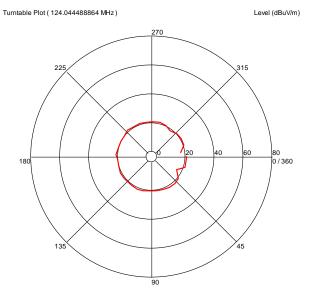


All Polarities

Azimuth (Degrees)

# Report Number: 102218261BOX-001b

# Issued: 09/16/2015



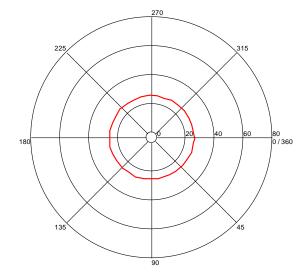
All Polarities

Azimuth (Degrees)

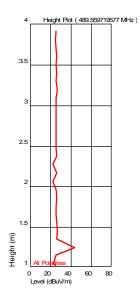
Intertek











All Polarities

Azimuth (Degrees)

#### Tx Mid Channel 1-18 GHz Radiated Emissions

Compony	Timor Grou						Antonn	a & Cablac:	Ν	Pondo: N. I			
Company: Timex Group USA , Inc.         Antenna & Cables:         N         Bands: N, LF, HF, SHF           Model #: M372         Antenna: ETS001 01-14-16.txt         ETS001 01-14-16.txt													
	QC 009-10										- 14- 10.lXl		
					1		.,	145-416 3m Track B 1-1	5GHz Cable 10-04-15.txt		NONE		
Engineers:			Dete(a)	00/07/45	Location:	10m Chamber	Barometer:	DAV004		Filter:	NONE		
,	G10221826		( )	08/07/15									
		5 Subpart C					Temp/Humic	dity/Pressure:	24 deg C	39%	1003 mB		
		45-128) 03-	14-2016		stance (m):								
PreAmp: 145014 05-13-16.txt Test Distance (m): 3													
P	reAmp Use	d? (Y or N):	Y	Voltage/	Frequency:	3V B	attery	Freque	ncy Range:	1-18 GHz			
	Net = Rea	ding (dBuV/ı	m) + Antenr	a Factor (d	B1/m) + Ca	ble Loss (dE	<ol><li>Preamp</li></ol>	Factor (dB)	- Distance I	Factor (dB)			
Peak: F	PK Quasi-P	eak: QP Av	erage: AVG	RMS: RMS	S; NF = Noi	se Floor, RE	B = Restricte	ed Band; Ba	ndwidth den	oted as RB	W/VBW	_	
	Ant.			Antenna	Cable	Pre-amp	Distance					1	
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth		
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB		FCC	IC
X-Axis	(Watch wa	as flat on tab	le, Mid Cha	nnel = 2440	MHz). No e	missions we	ere detected	. Readings	below are r	noise foor re	adings	Í	
				Note: Pe	eak reading	s meet aver	age limit					Í	
PK, NF	V	4880.000	35.48	34.16	8.65	31.60	0.00	46.68	54.00	-7.32	1/3 MHz	RB	RB
PK, NF	V	7320.000	34.89	35.61	10.73	31.05	0.00	50.18	54.00	-3.82	1/3 MHz	RB	RB
Y-Axi	is (Watch w	as crown up	, Mid Chan	nel = 2440 M	/Hz). No en	nissions wei	e detected.	Readings I	below are no	bise foor rea	adings	ĺ	
			,	Note: Pe	eak reading	s meet aver	age limit	Ŭ				ĺ	
PK, NF	V	4880.000	36.20	34.16	8.65	31.60	0.00	47.40	54.00	-6.60	1/3 MHz	RB	RB
PK, NF	V	7320.000	35.80	35.61	10.73	31.05	0.00	51.09	54.00	-2.91	1/3 MHz	RB	RB
Z-Axis	(Watch was	s crown to rig	ght, Mid Cha	annel = 244	0MHz). No	emissions w	ere detecte	d. Reading	s below are	noise foor r	eadings	Í	
Z-Axis (Watch was crown to right, Mid Channel = 2440MHz). No emissions were detected. Readings below are noise foor readings Note: Peak readings meet average limit											ĺ		
PK, NF	V	4880.000	35.57	34.16	8.65	31.60	0.00	46.77	54.00	-7.23	1/3 MHz	RB	RB
PK, NF	V	7320.000	35.50	35.61	10.73	31.05	0.00	50.79	54.00	-3.21	1/3 MHz	RB	RB

### Mid Channels 18-25 GHz Radiated Emissions

Company:	Timex Grou	up USA , Inc			Antenna & Cables: N Ba			Bands: N, I	Bands: N, LF, HF, SHF		
Model #:	M372						Antenna:	EMC04			
Serial #:	QC 009-10					Cable(s):	CBLHF201	2-2M-1	CBLHF201	2-2M-2	
Engineers:	Kouma Sin	n		Location:	10m Chamber	Barometer:	DAV004		Filter:	REA006	
Project #: G102218261 Date(s): 08/07/15											
Standard:	FCC Part 1	5 Subpart C	15.247				Temp/Humio	dity/Pressure:	24 deg C	39%	1003 mB
Receiver: R&S ESI (145-128) 03-14-2016 Limit Distance (m): 3											
PreAmp: PRE9 Test Distance (m): 0.3											
F	PreAmp Use	ed? (Y or N):	Y	Voltage/Frequency: 3V B			attery Frequency Range:			: 18-25 GHz	
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)											
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW											
	Ant.			Antenna	Cable	Pre-amp	Distance				
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB	
Test was performed manually. Test equipment used: EMC04, CBLHF2012-2M-1, CBLHF2012-2M-2, REA006, PRE9											
No emissions were detected at 30 cm.											

## Tx High Channel: 30-1000 MHz

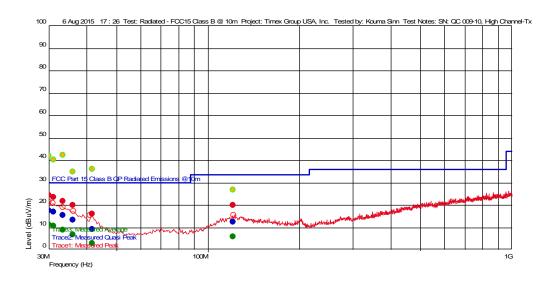
Intertek

Test Information Test Details Test: Project: Test Notes: Temperature: Humidity: Tested by: Test Started:

User Entry Radiated - FCC15 Class B @ 10m Timex Group USA, Inc. SN: QC 009-10, High Channel-Tx 24C 38%, DAV004mbar Kouma Sinn 6 Aug 2015 17 : 26

Additional Information

#### Prescan Emission Graph



- Measured Peak Value
- Measured Quasi Peak Value
- Measured Average Value
- Maximum Value of Mast and Turntable

#### \_\_\_ Swept Peak Data \_\_\_ Swept Quasi Peak Data

\_\_\_ Swept Average Data

#### Emissions Test Data Trace1: Measured Peak

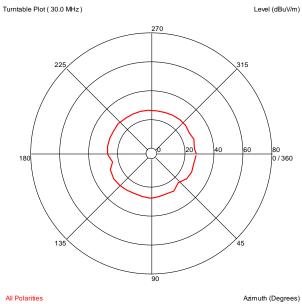
Frequency(Hz)	Level (dBuV/m)	AF	PA+CL	Limit(dBuV/m)	Margin(dBuV/m)	Hor ( ), Ver (   )	Azimuth (deg)(Deg)	Mast Height(m)	RBW(Hz)	Comment
41.830661613 M	15.97	12.335	-26.050			1	128	3.77	120 k	
121.356512631 M	19.71	13.936	-24.685			Ì	79	1.04	120 k	
36.166131994 M	19.80	16.400	-26.039			Ì	139	1.67	120 k	
33.493186766 M	21.57	18.456	-26.034				7	3.68	120 k	
31.165931976 M	23.47	20.251	-26.030				203	3.51	120 k	
30.0 M	24.32	21.000	-26.028				135	2.61	120 k	

#### Trace2: Measured Quasi Peak

Frequency(Hz)	Level (dBuV/m)	AF	PA+CL	Limit(dBuV/m)	Margin(dBuV/m)	Hor ( ), Ver (   )	Azimuth (deg)(Deg)	Mast Height(m)	RBW(Hz)	Comment
121.356512631 M	12.48	13.936	-24.685	33.520	-21.04		79	1.04	120 k	
41.830661613 M	9.10	12.335	-26.050	30.000	-20.90	1	128	3.77	120 k	
36.166131994 M	13.28	16.400	-26.039	30.000	-16.72	1	139	1.67	120 k	
33.493186766 M	15.24	18.456	-26.034	30.000	-14.76		7	3.68	120 k	
31.165931976 M	16.93	20.251	-26.030	30.000	-13.07		203	3.51	120 k	
30.0 M	17.58	21.000	-26.028	30.000	-12.42		135	2.61	120 k	

#### Issued: 09/16/2015

#### **Azimuth Plots**

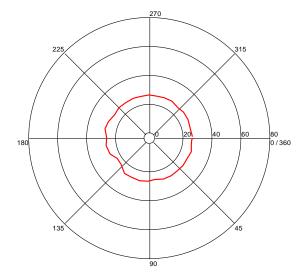


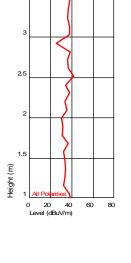
Azimuth (Degrees)

Intertek

Turntable Plot ( 31.165931976 MHz )

Level (dBuV/m)



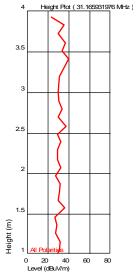


Height Plot (30.0 MHz)

**Turntable Plots** 

4

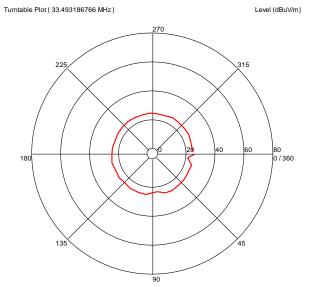
3.5



All Polarities

# Report Number: 102218261BOX-001b

#### Issued: 09/16/2015



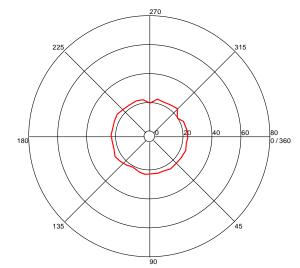
All Polarities

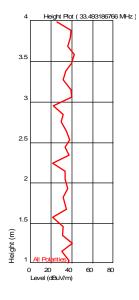
Azimuth (Degrees)

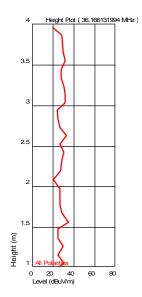
Intertek



Level (dBuV/m)



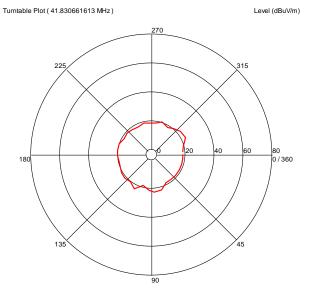




All Polarities

# Report Number: 102218261BOX-001b

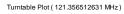
## Issued: 09/16/2015



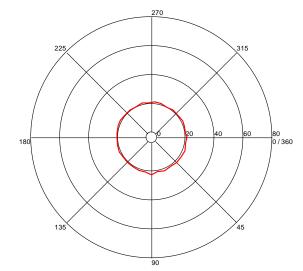
All Polarities

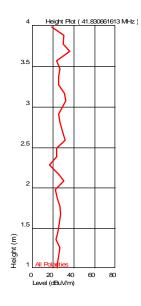
Azimuth (Degrees)

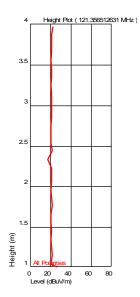
Intertek











All Polarities

#### Tx High Channel 1-25 GHz Radiated Emissions

Intertek

Company: Timex Group USA , Inc. Antenna & Cables: N Bands: N, LF, HF, S										I, LF, HF, SHF				
Model #:	M372						Antenna:	ETS001 01	-14-16.txt	ETS001 07	1-14-16.txt			
Serial #:	QC 009-10						Cable(s):	145-416 3m Track B 1-1	5GHz Cable 10-04-15.txt	NONE.				
Engineers:	Vathana Ve	en			Location:	10M	Barometer:	DAV004		Filter:	NONE			
Project #:	G10216222	20	Date(s):	06/18/16										
Standard:	FCC Part 1	5 Subpart C	15.247				Temp/Humio	dity/Pressure:	23 deg C	42%	1002 mB			
Receiver:	R&S ESI (1	45-128) 03-	14-2016	Limit Di	stance (m):	3								
PreAmp:	145014 05-	13-16.txt		Test Di	stance (m):	1								
F	PreAmp Use	d? (Y or N):	Y	Voltage/	Frequency:	3 VDC	battery	Freque	ncy Range:	1-	25 GHz			
	Net = Re	eading (dBu\	//m) + Antei	nna Factor (	dB1/m) + C	able Loss (	dB) - Pream	p Factor (dE	3) - Distance	e Factor (dE	3)			
Peak	: PK Quasi	Peak: QP A	verage: AV	G RMS: RM	/IS; NF = N	oise Floor, F	RB = Restric	ted Band; B	andwidth de	enoted as R	BW/VBW			
	Ant.			Antenna	Cable	Pre-amp	Distance					I		
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth			
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB		FCC	IC	Harmonic?
			W	/orst-case a	ixis, hi Char	nnel = 2480	MHz, Refer	ence				1		
PK	Н	2480.000	33.41	32.26	5.98	0.00	0.00	71.65			100/300 kHz			
AVG	Н	2480.000	25.10	32.26	5.98	0.00	0.00	63.34			100/300 kHz			
PK	V	4960.000	37.57	34.24	8.78	31.58	0.00	49.01	74.00	-24.99	1/3 MHz	RB	RB	Noise floor
AVG	V	4960.000	26.40	34.24	8.78	31.58	0.00	37.84	54.00	-16.16	1/3 MHz	RB	RB	Noise floor
PK	V	7440.000	37.25	35.63	10.82	31.03	0.00	52.68	74.00	-21.32	1/3 MHz	RB	RB	Noise floor
AVG	V	7440.000	35.00	35.63	10.82	31.03	0.00	50.43	54.00	-3.57	1/3 MHz	RB	RB	Noise floor
PK	V	9920.000	27.47	37.01	12.51	28.02	0.00	48.96	51.65	-2.69	100/300 kHz	1		Noise floor
PK	V	12400.000	26.39	38.99	11.65	25.12	9.54	42.37	51.65	-9.28	100/300 kHz	1m		Noise floor
PK	V	14880.000	26.17	39.76	14.49	26.48	9.54	44.39	51.65	-7.26	100/300 kHz	1m		Noise floor
PK	V	17360.000	24.91	41.83	17.04	26.52	9.54	47.71	51.65	-3.94	100/300 kHz	1m		Noise floor

Test was performed manually from 18-25 GHz. Test equipment used: EMC04, CBLHF2012-2M-1, CBLHF2012-2M-2, REA006, PRE9 No emissions were detected at 30 cm.

Test Personnel:	Vathana F. Ven
	Kouma Sinn 493
Supervising/Reviewing	
Engineer:	N/A
(Where Applicable) Product Standard:	N/A FCC Part 15.247
Input Voltage:	Battery Powered
1 0	Dattery i owered
Pretest Verification w/ Ambient Signals or	
BB Source:	BB Source

Deviations, Additions, or Exclusions: None

# Test Date: 06/18/2015 08/06/2015

Limit Applied:	See Report Section 7.3
Ambient Temperature:	24 °C
Relative Humidity:	39 %
Atmospheric Pressure:	1003 mbars

## 8 6 dB Bandwidth & 99% Power Bandwidth

## 8.1 Method

Tests are performed in accordance with CFR47 FCC Part 15:2015 Subpart C Section 15.247 (a)(2).

#### TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

#### 8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	10/06/2014	10/06/2015
EMC02'	ANTENNA, RIDGED GUIDE, 1-18 GHZ	EMCO	3115	2784	04/15/2015	04/15/2016
CBLHF20						
12-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/05/2015	02/05/2016
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/04/2015	06/04/2016

#### Software Utilized:

Name	Manufacturer	Version
None		

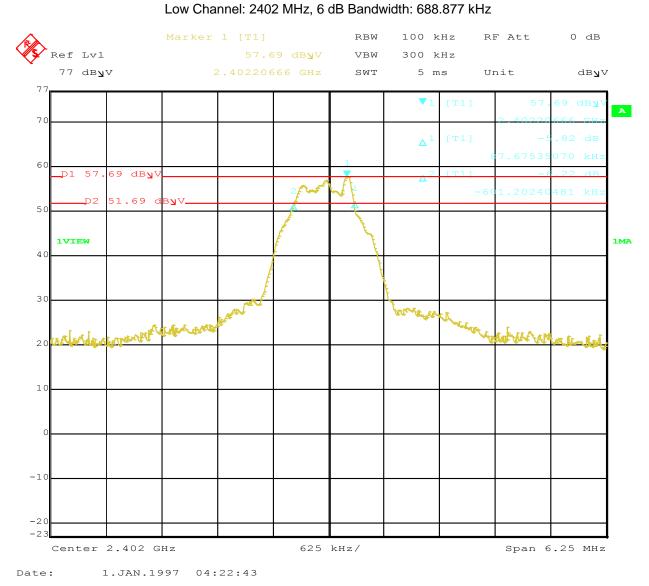
## 8.3 Results:

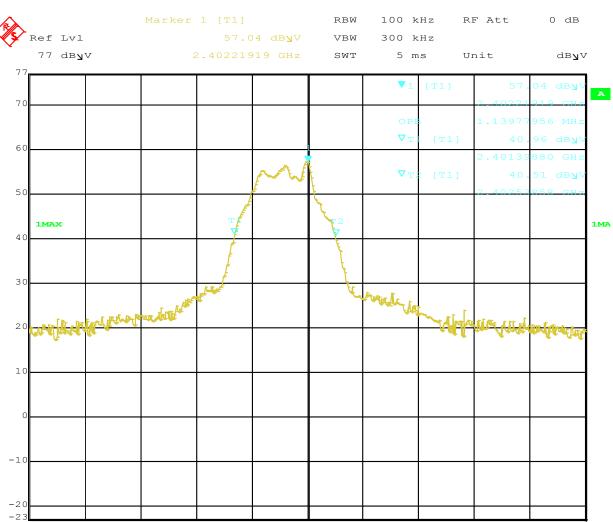
The sample tested was found to Comply. The 99% power bandwidth, or 6 dB bandwidth, must not be less than 500 kHz.

# 8.4 Setup Photograph:



## 8.5 Plots/Data:





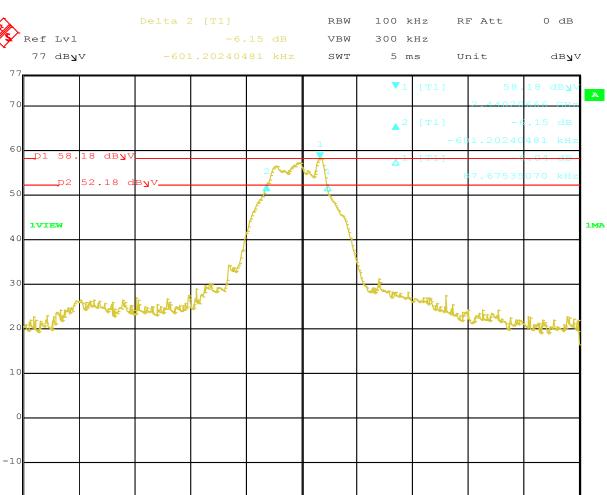
625 kHz/

## Low Channel: 2402 MHz, 99% Bandwidth: 1.134 MHz

Date: 1.JAN.1997 04:26:21

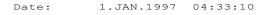
Center 2.402219188 GHz

Span 6.25 MHz



625 kHz/

## Mid Channel: 2440 MHz, 6 dB Bandwidth: 388.877 kHz

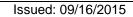


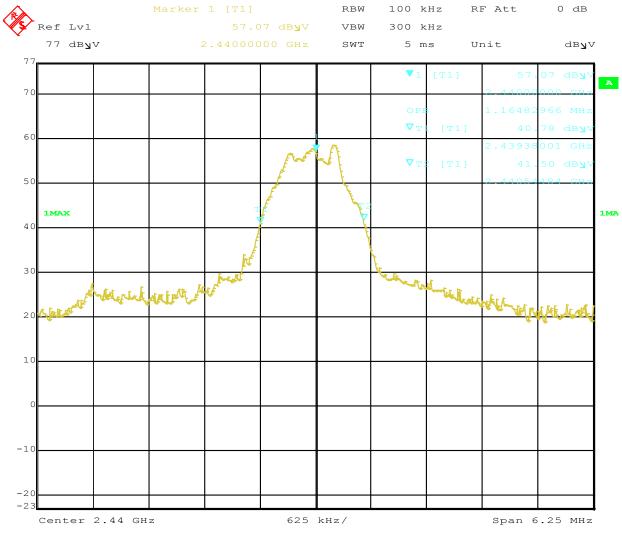
Center 2.44 GHz

-20

Span 6.25 MHz

Issued: 09/16/2015





## Mid Channel: 2440 MHz, 99% Bandwidth: 1.165 MHz

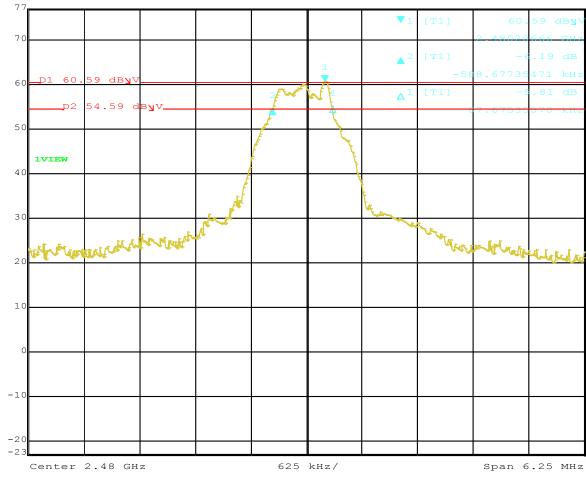
Intertek

Date: 1.JAN.1997 04:28:32

Ref Lvl 77 dB**y**V

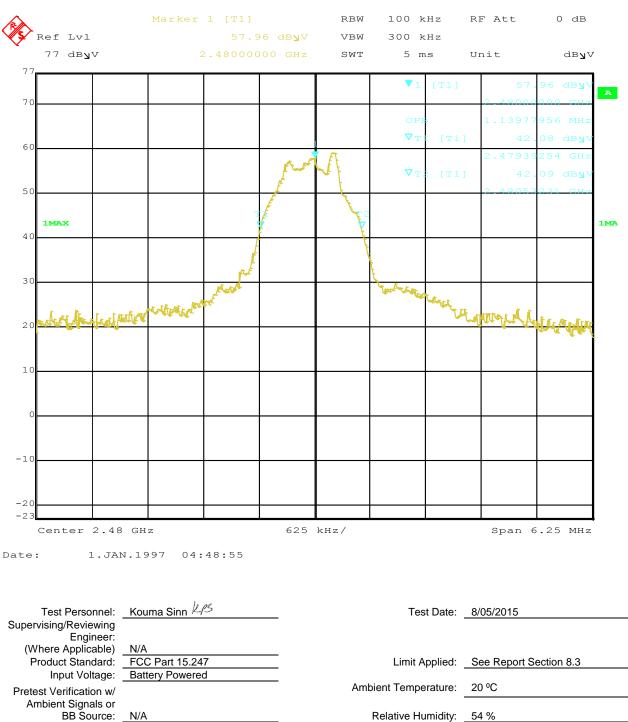


## High Channel: 2480 MHz, 6 dB Bandwidth: 656.352 kHz



Date: 1.JAN.1997 04:35:35

**1MA** 



High Channel: 2480 MHz, 99% Bandwidth: 1.140 MHz

Deviations, Additions, or Exclusions: None

Atmospheric Pressure: 1000 mbars

# 9 Power Spectral Density

## 9.1 Method

Tests are performed in accordance with CFR47 FCC Part 15:2015 Subpart C Section 15.247(e).

#### TEST SITE: 10m ALSE

**The 10m ALSE** is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

#### Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6	6.3
Radiated Emissions, 3m	30-1000 MHz	5.3	6.3
Radiated Emissions, 3m	1-6 GHz	4.5	5.2
Radiated Emissions, 3m	6-15 GHz	5.2	5.5
Radiated Emissions, 3m	15-18 GHz	5.0	5.5
Radiated Emissions, 3m	18-40 GHz	5.0	5.5

## Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF +	· CF - AG
Where	FS = Field Strength in $dB\mu V/m$
	RA = Receiver Amplitude (including preamplifier) in $dB\mu V$
	CF = Cable Attenuation Factor in dB
	AF = Antenna Factor in dB
	AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

 $\label{eq:result} \begin{array}{l} {\sf RA} = 52.0 \ dB\mu V \\ {\sf AF} = \ 7.4 \ dB/m \\ {\sf CF} = \ 1.6 \ dB \\ {\sf AG} = 29.0 \ dB \\ {\sf FS} = 32 \ dB\mu V/m \end{array}$ 

To convert from  $dB\mu V$  to  $\mu V$  or mV the following was used:

 $UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$  $NF = \text{Net Reading in } dB\mu\text{V}$ 

## Example:

FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0 UF =  $10^{(32 \text{ dB}_{\mu}\text{V} / 20)}$  = 39.8  $\mu$ V/m

Alternately, when C5 Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". "AF" is the Antenna Factor; "PA+CL" are Preamp and Cable Loss. These are already accounted for in the "Level" column.

## 9.2 Test Equipment Used:

Asset	Description	Manufacturer	Serial	Cal Date	Cal Due	
ETS001'	1-18GHz DRG Horn Antenna	ETS-Lindgren	3117	00143259	01/14/2015	01/14/2016
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/14/2015	03/14/2016
145-416'	Cables 145-400 145-402 145-404 145-408	Huber + Suhner	3m Track B cables	multiple	10/04/2014	10/04/2015

#### Software Utilized:

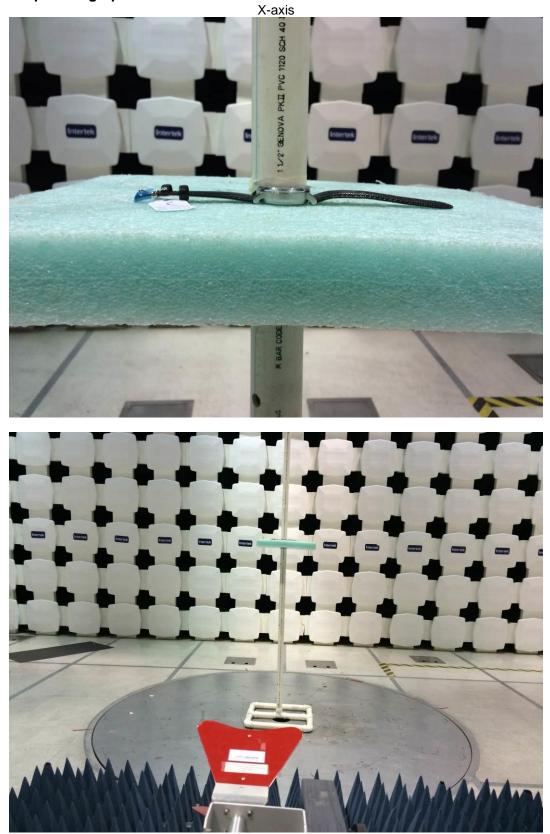
Name	Manufacturer	Version
EMI Boxborough.xls	Intertek	08/27/2010

## 9.3 Results:

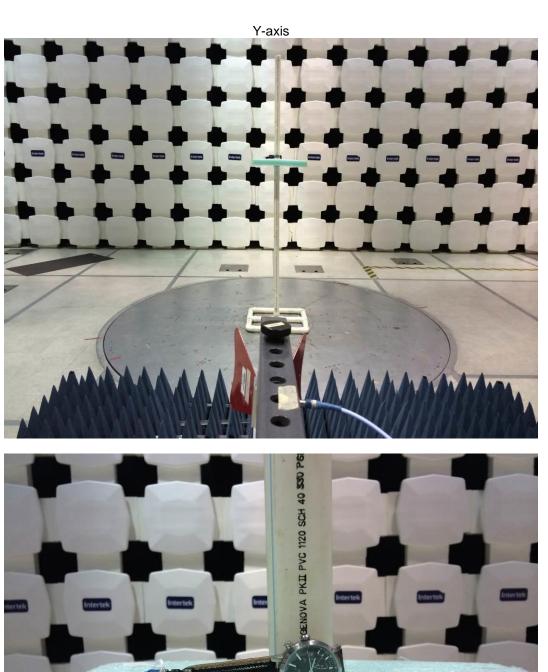
The sample tested was found to Comply. The peak power spectral density must not exceed 8 dBm in any 3 kHz bandwidth.

Intertek

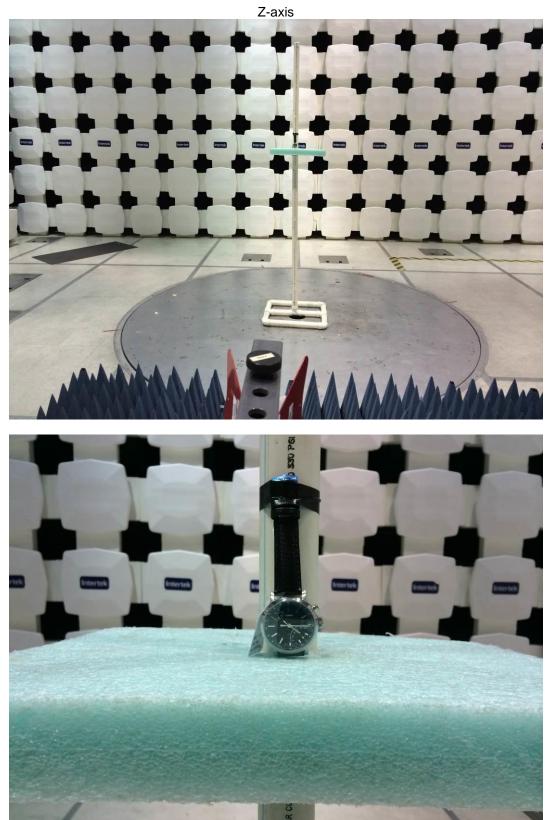
# 9.4 Setup Photographs:



Report Number: 102218261BOX-001b







Intertek

Report Number: 102218261BOX-001b

Issued: 09/16/2015

# 9.5 Test Data:

Company:	Timex Gro	up USA , Inc					Antenna & Cables: N Bands: N, LF,			_F, HF, SHF	
Model #:	M372	. ,					Antenna:	ETS001 01	-14-16.txt	ETS001 01	-14-16.txt
Serial #:	QC 009-10						Cable(s):	145-416 3m	Track B 1-1	5GHz Cable	10-04-15.txt
Engineers:	Kouma Sin	n			Location:	10m Chamber	Barometer:	DAV004		Filter:	NONE
Project #:	G10221826	51	Date(s):	08/07/15							
Standard:	FCC Part 1	5 Subpart C	: 15.247				Temp/Humic	dity/Pressure:	22 deg C	42%	1004 mB
Receiver:	R&S ESI (1	45-128) 03-	14-2016	Limit Di	stance (m):	3			-		
PreAmp:	NONE.	,		Test Di	stance (m):	3					
P	reAmp Use	d? (Y or N):	Ν	Voltage	Frequency:	3V B	attery	Freque	ncy Range:	Funda	mental
	Net = Rea	ding (dBuV/	m) + Antenr	na Factor (d	B1/m) + Cal	ole Loss (dE	B) - Preamp	Factor (dB)	- Distance	Factor (dB)	
Peak: F	PK Quasi-P	eak: QP Av	erage: AVG	RMS: RM	S; NF = Nois	se Floor, RE	B = Restricte	d Band; Ba	ndwidth der	oted as RB	W/VBW
	Ant.			Antenna	Cable	Pre-amp	Distance				
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm (EIRP)	dBm	dB	
		X-Axis (	Watch was	flat on table	, Low Chanr	nel = 2402 N	/IHz), Outpu	t power, no	pre-amp		
Peak	Power Spe	ctral Density	, normalize	d from 100k	Hz to 3 kHz	using Band	width Corre	ction Factor	10LOG(3/1	00 kHz)=-1	5.2 dB
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRF	D
	_	-		Note: Powe	r Density me	easured in a	3 kHz RBV	/	-	-	
PK	V	2402.000	23.78	31.96	5.87	0.00	0.00	-48.81	8.00	-56.81	3/10 kHz
PK	Н	2402.000	24.30	31.96	5.87	0.00	0.00	-48.29	8.00	-56.29	3/10 kHz
		Y-Axis	(Watch was	s crown up,	Low Channe	el = 2402 MI	Hz), Output	power, no p	re-amp		
		ctral Density				<u> </u>				,	
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRF	C
					r Density me				1		
PK	V	2402.000	25.04	31.96	5.87	0.00	0.00	-47.55	8.00	-55.55	3/10 kHz
PK	Н	2402.000	29.47	31.96	5.87	0.00	0.00	-43.12	8.00	-51.12	3/10 kHz
		,		0	nt, Low Char		,				
		ctral Density	-			<u> </u>				,	
	Note: EIRP	Obtained by		•				,	3m - 95.22	= dBm EIRI	2
					r Density me						
PK	V	2402.000	27.62	31.96	5.87	0.00	0.00	-44.97	8.00	-52.97	3/10 kHz
PK	Н	2402.000	24.28	31.96	5.87	0.00	0.00	-48.31	8.00	-56.31	3/10 kHz

## Mid Channel Power Spectral Density (Radiated Emissions)

Company: Timex Group USA , Inc. Model #: M372							a & Cables: ETS001 01		,	_F, HF, SHF	
	QC 009-10										10-04-15.txt
	Kouma Sin				Location:	10m Chambar	Barometer:		Hack D I-I	Filter:	NONE
0	G10221826		Data(a):	08/07/15	Location.	Tom Chamber	Darometer.	DA 1004			NONE
			. ,	00/07/13			Tomp/Humis	lity/Drocourou	22 dog C	42%	1004 mB
	Standard: FCC Part 15 Subpart C 15.247         Temp/Humidity/Pressure: 22 deg C         42%         1004 mB           Receiver: R&S ESI (145-128) 03-14-2016         Limit Distance (m): 3         Li										
		45-128) 03-	14-2016		· · /						
PreAmp:		-12 (V ar NI);	N		stance (m):		atta n i	Freesue	nev Dennev	<b>F</b> unda	mentel
Р	•	d? (Y or N):	N	0	Frequency:		attery	•	ncy Range:		mental
		0.	,		B1/m) + Cat		, .	, ,		. ,	
Peak: F		eak: QP Av	erage: AVG		S; NF = Nois			d Band; Bai	ndwidth den	oted as RB	W/VBW
_	Ant.	_		Antenna	Cable	Pre-amp	Distance				
Detector	Pol.	Frequency	•	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dBm (EIRP)	dBm	dB	
	X-Axis (Watch was flat on table, Mid Channel = 2440 MHz), Output power, no pre-amp										
		,	-		Hz to 3 kHz	0				,	
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRF	>
	-				r Density me	easured in a	3 kHz RBW	/	-		
PK	V	2440.000	25.06	32.11	5.92	0.00	0.00	-47.33	8.00	-55.33	3/10 kHz
PK	Н	2440.000	24.55	32.11	5.92	0.00	0.00	-47.84	8.00	-55.84	3/10 kHz
		Y-Axis	(Watch was	s crown up,	Mid Channe	el = 2440 MH	Iz), Output	power, no p	re-amp		
Peak	Power Spee	ctral Density	, normalized	d from 100k	Hz to 3 kHz	using Band	width Corre	ction Factor	10LOG(3/1	00 kHz)=-1	5.2 dB
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRF	2
				Note: Powe	r Density me	easured in a	3 kHz RBW	1			
PK	V	2402.000	23.90	31.96	5.87	0.00	0.00	-48.69	8.00	-56.69	3/10 kHz
PK	Н	2402.000	27.92	31.96	5.87	0.00	0.00	-44.67	8.00	-52.67	3/10 kHz
		Z-Axis (V	Vatch was o	rown to rigl	nt, Mid Chan	nel = 2440N	MHz), Outpu	it power, no	pre-amp	-	
Peak	Power Spee	ctral Density	, normalized	d from 100k	Hz to 3 kHz	using Band	width Corre	ction Factor	10LOG(3/1	00 kHz)=-1	5.2 dB
	Note: EIRP	Obtained by	applying th	e path loss	correction for	or a 3m test	distance, E	(dBuV/m)@	3m - 95.22	= dBm EIRF	2
				Note: Powe	r Density me	easured in a	3 kHz RBW	1			
PK	V	2440.000	28.76	32.11	5.92	0.00	0.00	-43.63	8.00	-51.63	3/10 kHz
PK	Н	2440.000	27.65	32.11	5.92	0.00	0.00	-44.74	8.00	-52.74	3/10 kHz

IC

#### Company: Timex Group USA , Inc. Antenna & Cables: Ν Bands: N, LF, HF, SHF Model #: M372 Antenna: ETS001 01-14-16.txt ETS001 01-14-16.txt Serial #: QC 009-10 Cable(s): 145-416 3m Track B 1-15GHz Cable 10-04-15.bt NONE. NONE Engineers: Vathana Ven Location: 10M Barometer: DAV004 Filter: Date(s): 06/18/16 Project #: G102162220 Standard: FCC Part 15 Subpart C 15.247 1003 mB Temp/Humidity/Pressure: 22 deg C 43% Receiver: R&S ESI (145-128) 03-14-2016 Limit Distance (m): 3 PreAmp: 145014 05-13-16.txt Test Distance (m): 3 PreAmp Used? (Y or N): Ν Voltage/Frequency: **3V Battery** Frequency Range: Fundamental Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB) Peak: PK Quasi-Peak: QP Average: AVG RMS; RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW Ant. Antenna Cable Pre-amp Distance Frequency Detector Pol. Reading Factor Loss Factor Factor Net Limit Margin Bandwidth Туре (V/H) MHz dB(uV) dB(1/m) dB dB dB dB(m) dB(m) dB FCC X-Axis (Watch was flat on table, Hi Channel = 2480 MHz), Output power, no pre-amp Peak Power Spectral Density, normalized from 100kHz to 3 kHz using Bandwidth Correction Factor 10LOG(3/100 kHz)=-15.2 dB Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP Note: Power Density measured in a 3 kHz RBW ΡK V 2480.000 30.30 32.26 5.98 0.00 0.00 -41.88 8.00 -49.88 3/10 kHz AVG V 2480.000 30.30 32.26 5.98 0.00 0.00 -41.88 8.00 -49.88 3/10 kHz ΡK 2480.000 Н 40.00 32.26 5.98 0.00 0.00 -32.18 8.00 -40.18 3/10 kHz AVG 2480.000 40.00 5.98 н 32.26 0.00 0.00 -32.18 8.00 -40.18 3/10 kHz Y-Axis (Watch was crown up, Hi Channel = 2480 MHz), Output power, no pre-amp Peak Power Spectral Density, normalized from 100kHz to 3 kHz using Bandwidth Correction Factor 10LOG(3/100 kHz)=-15.2 dB Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP Note: Power Density measured in a 3 kHz RBW -37.54 ΡK ν 2480.000 -45.54 3/10 kHz 34.64 32.26 5.98 0.00 0.00 8.00 AVG 2480.000 -37.54 -45.54 3/10 kHz V 34.64 32.26 5.98 0.00 0.00 8.00 ΡK 2480.000 30.70 32.26 5.98 0.00 0.00 -41.48 8.00 -49.48 3/10 kHz н AVG Н 2480.000 30.70 32.26 5.98 0.00 0.00 -41.48 8.00 -49.48 3/10 kHz Z-Axis (Watch was crown to right, Hi Channel = 2480 MHz), Output power, no pre-amp Peak Power Spectral Density, normalized from 100kHz to 3 kHz using Bandwidth Correction Factor 10LOG(3/100 kHz)=-15.2 dB Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP Note: Power Density measured in a 3 kHz RBW ΡK 2480.000 ν 30.90 32.26 5.98 0.00 0.00 -41.28 8.00 -49.28 3/10 kHz AVG ν 2480.000 30.90 32.26 5.98 0.00 0.00 -41.28 8.00 -49.28 3/10 kHz 2480.000 PK Н 35.30 32.26 5.98 0.00 0.00 -36.88 8.00 -44.88 3/10 kHz

Intertek

High Channel Power Spectral Density (Radiated Emissions)

Test Personnel:	Vathana F. Ven
	Kouma Sinn 43
Supervising/Reviewing	
Engineer:	
(Where Applicable)	N/A
Product Standard:	FCC 47CFR Part 15.247
Input Voltage:	Battery powered
Pretest Verification w/ Ambient Signals or	
BB Source:	BB Source

32.26

5.98

0.00

0.00

-36.88

Test Date:

	08/07/2015
Limit Applied:	See Report Section 9.3
Ambient Temperature:	22, 22 °C
Relative Humidity:	42, 43 %
Atmospheric Pressure:	1004, 1003 mbars

06/18/2015

8.00

-44.88

3/10 kHz

Deviations, Additions, or Exclusions: None

2480.000

Н

35.30

AVG

## 10 Band-edge Compliance

## 10.1 Test Method

Tests are performed in accordance with CFR47 FCC Part 15:2015 Subpart C Section 15.247 (d).

#### TEST SITE: 10m ALSE

**The 10m ALSE** is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

#### Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6	6.3
Radiated Emissions, 3m	30-1000 MHz	5.3	6.3
Radiated Emissions, 3m	1-6 GHz	4.5	5.2
Radiated Emissions, 3m	6-15 GHz	5.2	5.5
Radiated Emissions, 3m	15-18 GHz	5.0	5.5
Radiated Emissions, 3m	18-40 GHz	5.0	5.5

## Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF +	· CF - AG
Where	FS = Field Strength in $dB\mu V/m$
	RA = Receiver Amplitude (including preamplifier) in $dB\mu V$
	CF = Cable Attenuation Factor in dB
	AF = Antenna Factor in dB
	AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

 $\label{eq:result} \begin{array}{l} {\sf RA} = 52.0 \ dB\mu V \\ {\sf AF} = \ 7.4 \ dB/m \\ {\sf CF} = \ 1.6 \ dB \\ {\sf AG} = 29.0 \ dB \\ {\sf FS} = 32 \ dB\mu V/m \end{array}$ 

To convert from  $dB\mu V$  to  $\mu V$  or mV the following was used:

 $UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$  $NF = \text{Net Reading in } dB\mu\text{V}$ 

## Example:

FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0 UF =  $10^{(32 \text{ dB}_{\mu}\text{V} / 20)}$  = 39.8  $\mu$ V/m

Alternately, when C5 Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". "AF" is the Antenna Factor; "PA+CL" are Preamp and Cable Loss. These are already accounted for in the "Level" column.

# 10.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
ETS001'	1-18GHz DRG Horn Antenna	ETS-Lindgren	3117	00143259	01/14/2015	01/14/2016
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/14/2015	03/14/2016
145-416'	Cables 145-400 145-402 145-404 145-408	Huber + Suhner	3m Track B cables	multiple	10/04/2014	10/04/2015

#### Software Utilized:

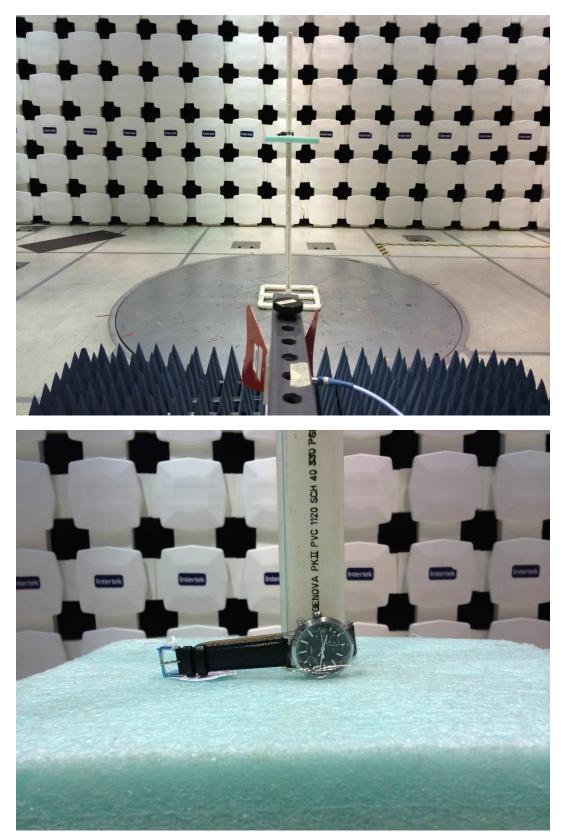
Name	Manufacturer	Version
EMI Boxborough.xls	Intertek	08/27/2010

#### 10.3 Results:

The sample tested was found to Comply.

Spurious emissions at the band edges must be at least 20 dB lower than the fundamental field strength when measured with a 100 kHz bandwidth, without the need to be below the general limits of FCC Part 15 Section 15.209. Emissions in restricted bands must meet the general limits of FCC Part 15 Section 15.209.

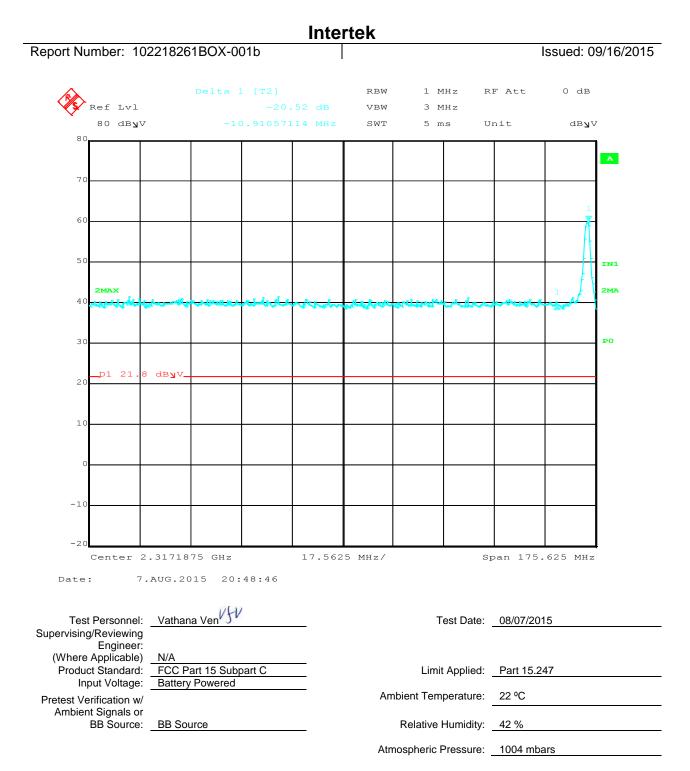
# 10.4 Setup Photographs:



# 10.5 Plots/Data:

#### **Special Radiated Emissions**

Model #: Serial #:	M372 QC 009-10	)						ETS001 01 145-416 3m Track B 1-1			1-14-16.txt
	Vathana V				Location:	10M	Barometer:			Filter:	NONE
°	G1021622		Date(s):	08/07/15							-
-		15 Subpart C					Temp/Humio	dity/Pressure:	23 deg C	41%	1003 mB
Receiver:	R&S ESI (	145-128) 03-	14-2016	Limit Di	stance (m):	3			Ū		
PreAmp:	145014 05	-13-16.txt		Test Di	stance (m):	3					
Р	reAmp Use	ed? (Y or N):	Y	Voltage/	Frequency:	Bat	tery	Freque	ncy Range:	See	below
	Net = Rea	ading (dBuV/	m) + Antenr	na Factor (dl	B1/m) + Ca	ble Loss (dE	3) - Preamp	Factor (dB)	- Distance I	Factor (dB)	
Peak: F	PK Quasi-F	Peak: QP Av	erage: AVG	RMS: RMS	S; NF = Noi	se Floor, RE	8 = Restricte	ed Band; Ba	ndwidth den	oted as RB	W/VBW
	Ant.			Antenna	Cable	Pre-amp	Distance				
Detector	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	Bandwidth
Туре	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB	F
					Upper B	and Edge	-			1	
PK	V	2483.500	37.70	32.28	5.99	32.25	0.00	43.71	74.00	-30.29	1/3 MHz F
AVG	V	2483.500	28.30	32.28	5.99	32.25	0.00	34.31	54.00	-19.69	1/3 MHz F
PK	Н	2483.500	39.68	32.28	5.99	32.25	0.00	45.69	74.00	-28.31	1/3 MHz F
AVG	Н	2483.500	28.00	32.28	5.99	32.25	0.00	34.01	54.00	-19.99	1/3 MHz
	80 c	IB <b>N</b> A		2.4835	0000 GH	z SW	т 5	ms	Unit	dB	V
											A
	70										
	60										
		Le Contraction of the second									
	50										
	IMAX			Year.							IN1
	LIMAX			Very and							1MA
	40			ų	What the	E sublid .	at the	to a la to art a	a lta a tha	the states	11. J
						A A A A A A A A A A A A A A A A A A A	- a free free and	. Carlos and and	an war		<b>1</b>
	30										<b>P0</b>
		21.8 dBy	v								
	20 p1 :	_									
	20 <b>_</b>									1	
								_			
	20										_
	20										
	20										-
	20										-
_	20										_
-	20 10 0										_
-	20 10 0										_
	20 10 0								10.590		



Deviations, Additions, or Exclusions: None

## 11 Digital Devices Radiated Spurious Emissions

## 11.1 Test Method

Tests are performed in accordance with CFR47 FCC Part 15:2015 Subpart C Section 15.247 (d) and CFR47 FCC Part 15:2015 Subpart C Section 15.209.

#### TEST SITE: 10m ALSE

**The 10m ALSE** is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

#### Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6	6.3
Radiated Emissions, 3m	30-1000 MHz	5.3	6.3
Radiated Emissions, 3m	1-6 GHz	4.5	5.2
Radiated Emissions, 3m	6-15 GHz	5.2	5.5
Radiated Emissions, 3m	15-18 GHz	5.0	5.5
Radiated Emissions, 3m	18-40 GHz	5.0	5.5

## Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF +	· CF - AG
Where	FS = Field Strength in $dB\mu V/m$
	RA = Receiver Amplitude (including preamplifier) in $dB\mu V$
	CF = Cable Attenuation Factor in dB
	AF = Antenna Factor in dB
	AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

 $\label{eq:result} \begin{array}{l} {\sf RA} = 52.0 \ dB\mu V \\ {\sf AF} = \ 7.4 \ dB/m \\ {\sf CF} = \ 1.6 \ dB \\ {\sf AG} = 29.0 \ dB \\ {\sf FS} = 32 \ dB\mu V/m \end{array}$ 

To convert from  $dB\mu V$  to  $\mu V$  or mV the following was used:

 $UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$  $NF = \text{Net Reading in } dB\mu\text{V}$ 

## Example:

FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0 UF =  $10^{(32 \text{ dB}_{\mu}\text{V} / 20)}$  = 39.8  $\mu$ V/m

Alternately, when C5 Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". "AF" is the Antenna Factor; "PA+CL" are Preamp and Cable Loss. These are already accounted for in the "Level" column.

#### 11.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61A	10/06/2014	10/06/2015
145106'	Bilog Antenna (30MHz - 5GHz)	Sunol Sciences	JB5	A111003	10/24/2014	10/24/2015
145013'	Preamplifier (150 KHz to 1.3 GHz)	Hewlett Packard	8447D	2944A07027	10/11/2014	10/11/2015
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/14/2015	03/14/2016
145-410'	Cables 145-400 145-403 145-405 145-406 145-407	Huber + Suhner	10m Track A Cables	multiple	10/04/2014	10/04/2015

#### Software Utilized:

Name	Manufacturer	Version
C5	Teseq	5.02.00 Build 5.26.46.46.

#### 11.3 Results:

The sample tested was found to Comply.

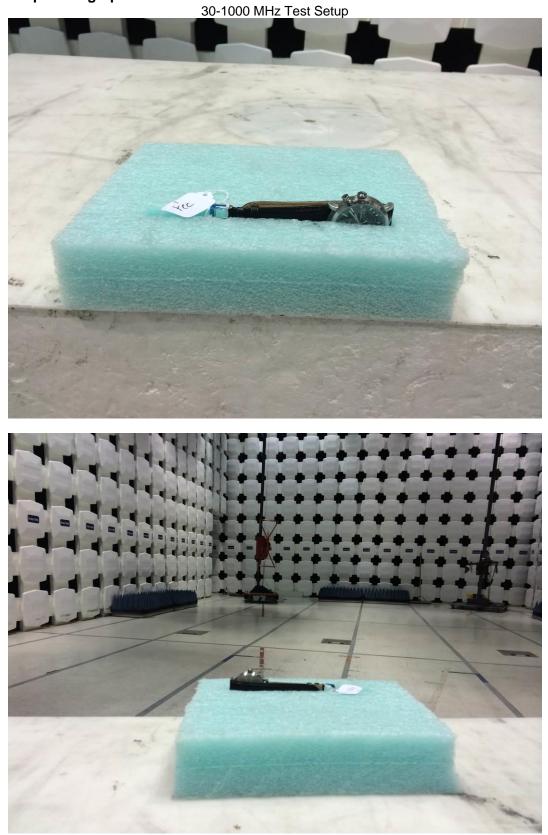
FCC Part 15.247(d) – Non Restricted Band Radiated Spurious/Harmonics Limits

In any 100 kHz bandwidth outside the frequency band, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

#### FCC Part 15.209(a)

Frequency	Field Strength		Test Distance
(MHz)	μV/m	dBµV/m	(meters)
30–88	100	40.00	3
88–216	150	43.52	3
216–960	200	46.02	3
Above 960	500	53.98	3

# 11.4 Setup Photographs:



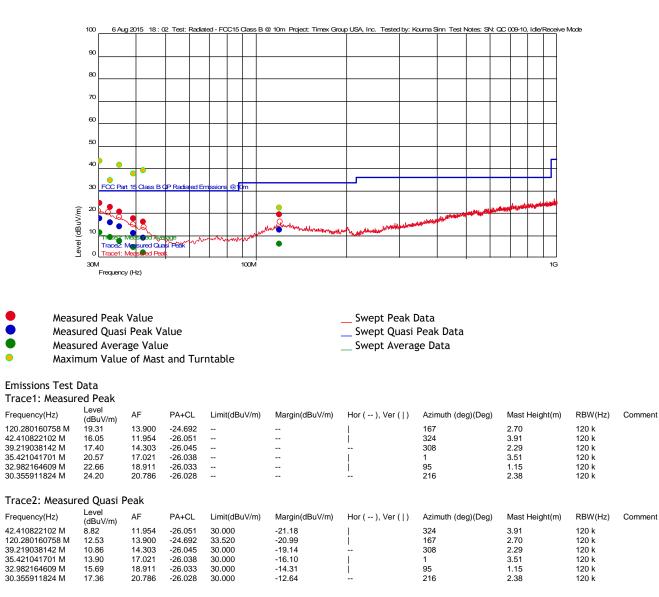
## 11.5 Plots/Data:

#### Idle/Receive Mode: 30-1000 MHz

Test Information	
Test Details	User Entry
Test:	Radiated - FCC
Project: Timex G	
Test Notes:	SN: QC 009-10
Temperature:	24C
Humidity: 38%, DAV	
Tested by:	Kouma Sinn
Test Started:	6 Aug 2015 18

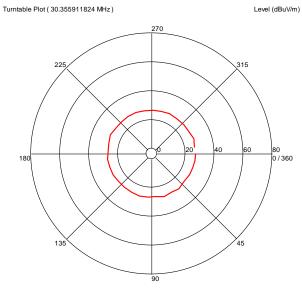
r Entry iated - FCC15 Class B @ 10m ex Group USA, Inc. QC 009-10, Idle/Receive Mode b, DAV004mbar ma Sinn g 2015 18:02 Additional Information

#### Prescan Emission Graph



## Issued: 09/16/2015

#### **Azimuth Plots**



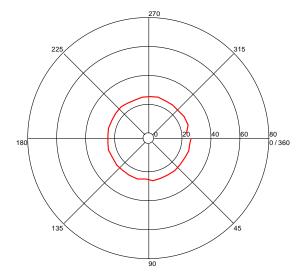
All Polarities

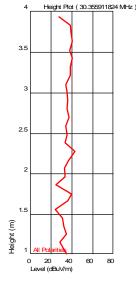
Azimuth (Degrees)

Intertek

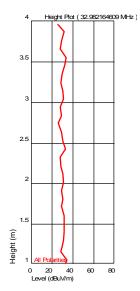
Turntable Plot ( 32.982164609 MHz )

Level (dBuV/m)





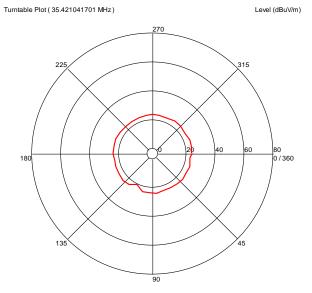
**Turntable Plots** 



All Polarities

# Report Number: 102218261BOX-001b

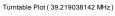
#### Issued: 09/16/2015



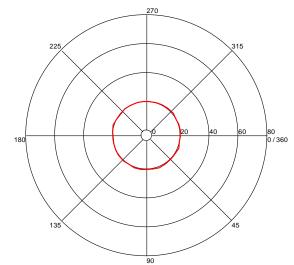
All Polarities

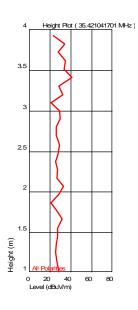
Azimuth (Degrees)

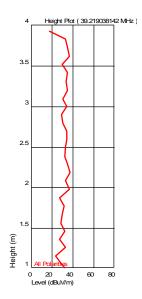
Intertek



Level (dBuV/m)



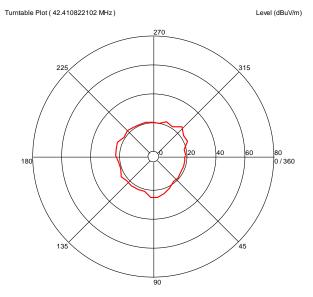




All Polarities

## Report Number: 102218261BOX-001b

#### Issued: 09/16/2015

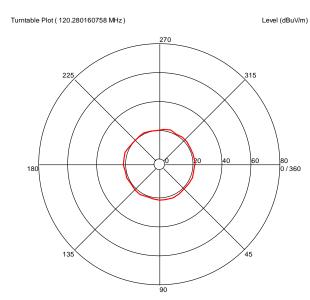


All Polarities

Azimuth (Degrees)

Azimuth (Degrees)

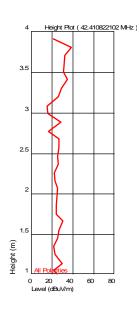
Intertek

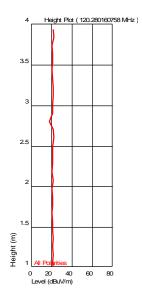


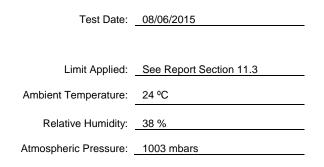


Test Personnel:	Kouma Sinn 1213
Supervising/Reviewing	
Engineer: (Where Applicable)	N/A
Product Standard:	FCC Part 15.247
Input Voltage:	Battery Powered
Pretest Verification w/ Ambient Signals or	
BB Source:	BB Source

Deviations, Additions, or Exclusions: None







# 12 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	08/25/2015	102218261BOX-001	KPS 43	MFM 🖉	Original Issue
1	09/16/2015	102218261BOX-001b	KPS	MFM 🖉	Output power correction page 5, 15, and RF Exposure on 17