

EMC TEST REPORT

Report No.	: TS14020031-EME
Model No.	: TR8000i
Issued Date	: Apr. 21, 2014

Applicant:	Strength Master Fitness Tech Co. Ltd No. 10, Kung-Yeh Lane, Fengzheng Rd., Wufeng Dist., Taichung City 41357, Taiwan
Test Method/ Standard:	47 CFR FCC Part 15.249 & ANSI C63.4 2003
Test By:	Intertek Testing Services Taiwan Ltd. No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan

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Summary of Tests

Test	Reference	Results
Radiated Emission test	15.249(c), 15.209	Pass
Emission on the Band Edge	15.249(d)	Pass
Conducted Emission of AC Power	15.207	Pass
20dB Bandwidth	15.215(c)	Pass



1. General information

1.1 Identification of the EUT

Product:	Treadmill
Model No.:	TR8000i
FCC ID:	2AB9OTR8000i
Frequency Range:	$2402 MHz \sim 2480 MHz$
Channel Number:	79 Channels
Frequency of Each Channel:	2402MHz+1k, k=1~78
Type of Modulation:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Rated Power:	110-120 Vac, 60 Hz, 18 A
Power Cord:	N/A
Sample Received:	Apr. 02, 2014
Test Date(s): Note 1:	Apr. 07, 2014 ~ Apr. 14, 2014 This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.



1.2 Additional information about the EUT

The EUT is Treadmill, and was defined as fixed installation.

For more detail features, please refer to User's manual.

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain: 1 dBiAntenna Type: Chip AntennaConnector Type: Fixed



2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT is supplied with 120Vac, 60Hz.

TX mode based on "isrt v1.0.31.2786" to execute, and the connection corresponds with address on the Bluetooth module.



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2.3 Test equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2013/12/3	2014/12/2
Spectrum Analyzer	Rohde&schwarz	FSP30	100137	2013/6/21	2014/6/20
Spectrum Analyzer	Rohde&schwarz	FSEK30	100186	2014/1/20	2015/1/19
Horn Antenna (1-18G)	Schwarzbeck	BBHA 9120 D	9120D-456	2012/9/3	2014/9/3
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2012/9/5	2014/9/5
Broadband Antenna	SCHWARZBEC K	VULB 9168	9168-172	2013/8/8	2015/8/7
Pre-Amplifier	MITEQ	AFS44-00102650 42-10P-44	1495287	2013/10/27	2015/10/26
Pre-Amplifier	MITEQ	JS4-260040002 7-8A	828825	2012/9/18	2014/9/17
Power Meter	Anritsu	ML2495A	0844001	2013/10/10	2014/10/9
Power Senor	Anritsu	MA2411B	0738452	2013/10/10	2014/10/9
Temperature&Hu midity Test Chamber	TERCHY	MHU-225LRU (SA)	950838	2013/6/14	2014/6/13
Two-Line V-Network	Rohde&schwarz	ESH3-Z5	838979/014	2013/10/12	2014/10/11
Singal Analyzer	Agilent	N9030A	MY51380492	2013/9/19	2014/9/18
Loop Antenna	RolfHeine	LA-285	02/10033	2014/3/18	2016/3/16

Note: The above equipments are within the valid calibration period.



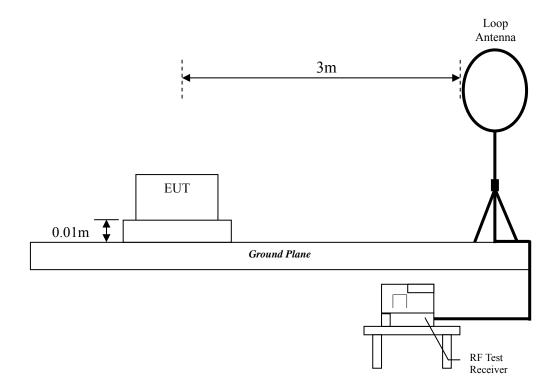
3. Radiated emission test FCC 15.249 (C)

3.1 Operating environment

Temperature:	25	°C
Relative Humidity:	55	%
Atmospheric Pressure	1008	hPa

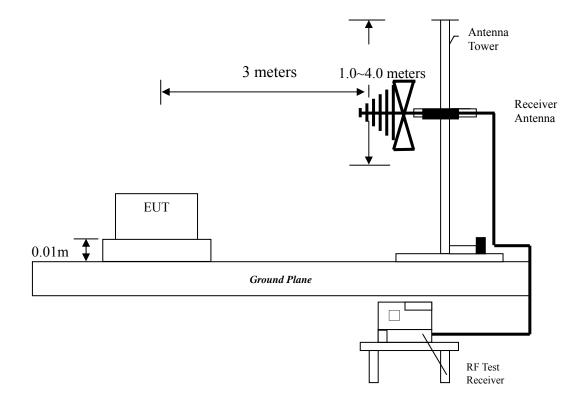
3.2 Test setup & procedure

Radiated emission from 9 kHz to 30 MHz uses Loop Antenna:

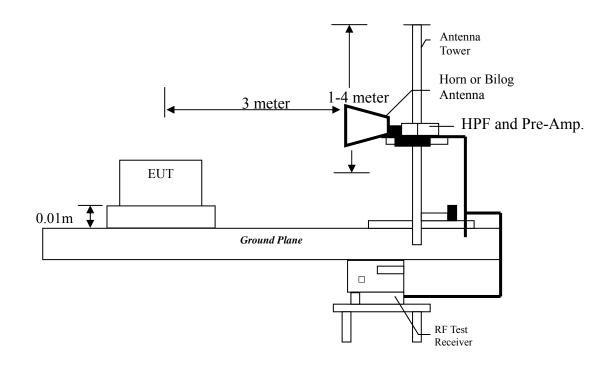




Radiated emission from 30 MHz to 1 GHz uses Bilog Antenna:



Radiated emission above 1 GHz uses Horn Antenna:





Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The EUT configuration please refer to the "Spurious set-up photo.pdf".

3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength	of Fundamental	Field Strength of Harmonics	
		(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
2400-2483.5	50	94	500	54



3.3.2 General radiated emission limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dBµV/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

- 1. In the above table, the tighter limit applies at the band edges.
- 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Measurement uncertainty was calculated in accordance with TR 100 028-1.

Parameter	Uncertainty	
Padiated Emission	Vertical: 4.13 dB	
Radiated Emission	Horizontal:3.85 dB	
Conducted Emission	2.08 dB.	

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

3.4 Radiated spurious emission test data

3.4.1 Measurement results: frequency range from 9kHz to 30MHz

Frequency (MHz)	Detector	Corrected Factor (dB/m)	Reading (dBµV)	Calculated (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dB)
		(uD/III)	(())	(uDµ //III)	(uDµ v/m)	(uD)
0.03	AV	84.20	12.93	97.13	118.06	-40.87
8	QP	38.40	19.73	58.13	69.54	-11.41
12	QP	37.14	24.10	61.24	69.54	-8.30
16	QP	36.52	27.84	64.36	69.54	-5.18



3.4.2 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under GFSK & 8-DPSK continuously transmitting mode. Channel 0, 39, 78 were verified. The worst case occurred at GFSK TX Channel 0

EUT : TR8000i Test Condition : Tx at 8-DPSK Channel 0

Antenna	Freq.	Receiver	Corr.	Reading	Corrected	Limit	Margin
Polariz.			Factor		Level	@ 3 m	
(V/H)	(MHz)	Detector	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
Vertical	35.82	QP	14.14	25.57	39.71	40.00	-0.29
Vertical	94.99	QP	9.49	23.00	26.57	43.50	-16.93
Vertical	123.12	QP	12.60	23.00	31.70	43.50	-11.80
Vertical	127.97	QP	12.98	23.00	32.06	43.50	-11.44
Vertical	136.61	QP	14.08	23.00	30.29	43.50	-13.21
Vertical	191.02	QP	12.13	23.00	27.52	43.50	-15.98
Horizontal	94.99	QP	12.73	23.00	35.17	43.50	-8.33
Horizontal	120.21	QP	13.17	23.00	36.53	43.50	-6.97
Horizontal	127.97	QP	13.31	23.00	35.46	43.50	-8.04
Horizontal	138.64	QP	13.49	23.00	36.33	43.50	-7.17
Horizontal	163.86	QP	13.94	23.00	36.74	43.50	-6.76
Horizontal	191.02	QP	14.41	21.00	33.02	43.50	-10.48

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss

2. Corrected Level = Reading + Corr. Factor



3.4.3 Measurement results: frequency above 1GHz

Frequency	Spectrum	Ant.	Preamp.	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Pol.	Gain	Factor		Reading	@ 3 m	
(MHz)	Detector	(H/V)	(dB)	(dB/m)	(dBµV)	$(dB\mu V/m)$	$\left(dB\mu V/m\right)$	(dB)
4804	РК	V	40.13	-0.20	50.24	50.04	74.00	-23.96
7206	РК	V	38.11	8.11	38.94	47.05	74.00	-26.95
4804	РК	Н	40.13	-0.20	43.87	43.67	74.00	-30.33

EUT : TR8000i Test Condition : Tx at GFSK channel 0

Remark:

- 1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : TR8000i Test Condition : Tx at GFSK channel 39

Frequency	Spectrum	Ant.	Preamp.	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Pol.	Gain	Factor		Reading	@ 3 m	
(MHz)	Detector	(H/V)	(dB)	(dB/m)	$(dB\mu V)$	$(dB\mu V/m)$	$(dB\mu V\!/\!m)$	(dB)
4882	РК	V	39.99	0.15	45.90	46.05	74.00	-27.95
4882	РК	Н	39.99	0.15	44.62	44.77	74.00	-29.23

- 1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.



EUT : TR8000i Test Condition : Tx at GFSK channel 78

Frequency	Spectrum	Ant.	Preamp.	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Pol.	Gain	Factor		Reading	@ 3 m	
(MHz)	Detector	(H/V)	(dB)	(dB/m)	$(dB\mu V)$	$(dB\mu V/m)$	$\left(dB\mu V/m\right)$	(dB)
4960	РК	V	39.84	0.50	43.19	43.69	74.00	-30.31
4960	PK	Н	39.84	0.50	40.82	41.32	74.00	-32.68

Remark:

11. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier

- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor..

EUT : TR8000i Test Condition : Tx at 8-DPSK channel 0

Frequency	Spectrum	Ant.	Preamp.	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Pol.	Gain	Factor		Reading	@ 3 m	
(MHz)	Detector	(H/V)	(dB)	(dB/m)	$(dB\mu V)$	$(dB\mu V/m)$	$\left(dB\mu V/m\right)$	(dB)
4804	РК	V	40.13	-0.20	44.95	44.75	74.00	-29.25
4804	PK	Н	40.13	-0.20	43.12	42.92	54.00	-11.08

Remark:

11. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier

2. Corrected Level = Reading + Correction Factor

3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor..



EUT : TR8000i Test Condition : Tx at 8-DPSK channel 39

Frequency	Spectrum	Ant.	Preamp.	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Pol.	Gain	Factor		Reading	@ 3 m	
(MHz)	Detector	(H/V)	(dB)	(dB/m)	$(dB\mu V)$	$(dB\mu V/m)$	$\left(dB\mu V/m\right)$	(dB)
4882	РК	V	39.99	0.15	46.10	46.25	74.00	-27.75
4882	PK	Н	39.99	0.15	43.50	43.65	74.00	-30.35

Remark:

- 11. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor..

EUT : TR8000i Test Condition : Tx at 8-DPSK channel 78

Frequency	Spectrum	Ant.	Preamp.	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Pol.	Gain	Factor		Reading	@ 3 m	
(MHz)	Detector	(H/V)	(dB)	(dB/m)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	(dB)
4960	РК	V	39.84	0.50	47.97	48.47	74.00	-25.53
7440	РК	V	37.91	9.12	38.68	47.80	74.00	-26.20
4960	РК	Н	39.84	0.50	45.10	45.60	74.00	-28.40
7440	РК	Н	37.91	9.12	41.83	50.95	74.00	-23.05

- 11. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor..



3.4.4 Measurement results: Fundamental and harmonics emission

Frequency	Spectrum	Antenna	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Polariz.	Factor		Level	@ 3 m	
(MHz)	Detector	(H/V)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
2402	РК	V	32.55	57.78	90.33	94.00	-3.67
2402	РК	Н	32.55	64.27	96.82	114.00	-17.18
2402	AV	Н	32.55	49.97	82.52	94.00	-11.48

EUT : TR8000i Test Condition : Tx at GFSK Channel 0

Remark:

- 1. Correction Factor = Antenna Factor + Cable Loss
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT: TR8000iTest Condition: Tx at GFSK Channel 39

Frequency	Spectrum	Antenna	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Polariz.	Factor		Level	@ 3 m	
(MHz)	Detector	(H/V)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
2441	РК	V	32.69	58.11	90.80	94.00	-3.20
2441	РК	Н	32.69	59.23	91.92	94.00	-2.08

- 1. Correction Factor = Antenna Factor + Cable Loss
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.



EUT: TR8000iTest Condition: Tx at GFSK Channel 78

Frequency	Spectrum	Antenna	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Polariz.	Factor		Level	@ 3 m	
(MHz)	Detector	(H/V)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
2480	PK	V	32.83	57.45	90.28	94.00	-3.72
2480	РК	Н	32.83	59.99	92.82	94.00	-1.18

Remark:

- 1. Correction Factor = Antenna Factor + Cable Loss
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : TR8000i Test Condition : Tx at 8-DPSK Channel 0

Frequency	Spectrum	Antenna	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Polariz.	Factor		Level	@ 3 m	
(MHz)	Detector	(H/V)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
2402	РК	V	32.55	58.73	91.28	94.00	-2.72
2402	PK	Н	32.55	64.33	96.88	114.00	-17.12
2402	AV	Н	32.55	52.28	84.83	94.00	-9.17

- 1. Correction Factor = Antenna Factor + Cable Loss
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.



EUT : TR8000i Test Condition : Tx at 8-DPSK Channel 39

Frequency	Spectrum	Antenna	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Polariz.	Factor		Level	@ 3 m	
(MHz)	Detector	(H/V)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
2441	PK	V	32.69	57.85	90.54	94.00	-3.46
2441	РК	Н	32.69	58.12	90.81	94.00	-3.19

Remark:

- 1. Correction Factor = Antenna Factor + Cable Loss
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : TR8000i Test Condition : Tx at 8-DPSK Channel 78

Frequency	Spectrum	Antenna	Correction	Reading	Corrected	Limit	Margin
	Analyzer	Polariz.	Factor		Level	@ 3 m	
(MHz)	Detector	(H/V)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
2480	РК	V	32.83	57.32	90.15	94.00	-3.85
2480	РК	Н	32.83	60.20	93.03	94.00	-0.97

- 1. Correction Factor = Antenna Factor + Cable Loss
- 2. Corrected Level = Reading + Correction Factor
- 3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.



4. Radiated emission on the band edge FCC 15.249(d)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental (2402~2480MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

	Frequency	Spectrum	Ant.	Correction	Reading	Corrected	Limit	Margin	
Mode		Analyzer	Pol.	Factor		Reading	@ 3 m		band
	(MHz)	Detector	(H/V)	(dB/m)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V\!/\!m)$	(dB)	(MHz)
	2390.00	РК	Н	32.51	23.72	56.23	74	-17.77	2310~2390
	2390.00	AV	Н	32.51	12.36	44.87	54	-9.13	2310~2390
	2402.00	РК	Н	32.55	64.27	96.82	-	96.82	
GFSK	2402.00	AV	Н	32.55	49.97	82.52	-	82.52	-
ULPK	2480.00	РК	Н	32.83	59.99	92.82	-	92.82	
	2480.00	AV	Н	32.83	49.07	81.90	-	81.90	-
	2483.50	РК	Н	32.84	26.10	58.94	74	-15.06	2483.5~2500
	2483.50	AV	Н	32.84	16.57	49.41	54	-4.59	2483.3~2300
	2390.00	РК	Н	32.51	24.45	56.96	74	-17.04	2310~2390
	2390.00	AV	Н	32.51	12.38	44.89	54	-9.11	2310~2390
	2402.00	РК	Н	32.55	64.33	96.88	-	96.88	
8-DPSK	2402.00	AV	Н	32.55	52.28	84.83	-	84.83	-
0-DPSK	2480.00	РК	Н	32.83	60.20	93.03	-	93.03	
	2480.00	AV	Н	32.83	46.86	79.69	-	79.69	-
	2483.50	РК	Н	32.84	26.09	58.93	74	-15.07	2482 5 2500
	2483.50	AV	Н	32.84	16.13	48.97	54	-5.03	2483.5~2500

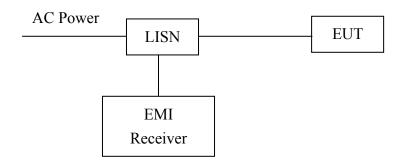


5. Conducted emission test FCC 15.207

5.1 Operating environment

Temperature:	25	°C
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa

5.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCI 30) is set at 9kHz.

The EUT configuration please refer to the "Conducted set-up photo.pdf".

Freq.	Conducted L	imit (dBuV)
(MHz)	Q.P.	Ave.
0.15~0.50	66 – 56*	56 - 46*
0.50~5.00	56	46
5.00~30.0	60	50

5.3 Emission limit

*Decreases with the logarithm of the frequency.

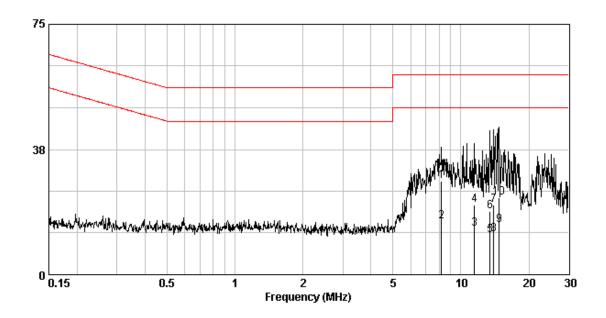


5.4 Conducted emission data FCC 15.207

Phase:	Live Line
Model No.:	TR8000i
Test Condition:	Normal mode

Frequency	Corr. Factor	Level Op (APW)	Limit Op (apv)	Level Av (ARN)	Limit Av APT	Margin (dB)
(MHz)	(dB)	(dBu∛)	(dBu∛)	(dBu∛)	(dBu∛)	Qp Av
8.192 11.498 13.479 13.989 14.750	9.76 9.81 9.84 9.85 9.86	28.01 20.88 18.83 20.88 22.99	60.00 60.00 60.00 60.00 60.00	15.99 13.67 11.72 12.17 14.72	S0.00 S0.00 S0.00 S0.00 S0.00 S0.00	-31.99 -34.01 -39.12 -36.33 -41.17 -38.28 -39.12 -37.83 -37.01 -35.28

- 1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
- 2. Margin (dB) = Level (dBuV) Limit (dBuV)



Intertek

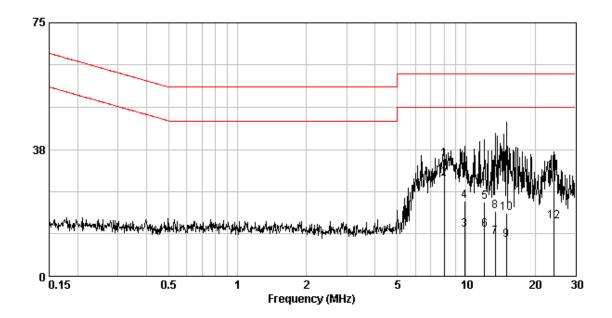
Phase:	Neutral Line
Model No.:	TR8000i
Test Condition:	Normal mode

Frequency	Corr. Factor	Level Qp	Limit Qp	Level Av	Limit Av		rgin dB)
(MHz)	(dB)	(dBu∛)	(dBu∛)	(dBu∛)	(dBu∛)	Qp	Av
8.020 9.861 12.060 13.408 14.986 24.142	9.77 9.79 9.83 9.85 9.87 9.95	34.50 22.35 22.10 19.33 18.57 31.11	60.00 60.00 60.00 60.00 60.00 60.00 60.00	28.77 13.66 13.74 11.50 10.78 16.19	S0.00 S0.00 S0.00 S0.00 S0.00 S0.00 S0.00	-25.50 -37.65 -37.90 -40.67 -41.43 -28.89	-21.23 -36.34 -36.26 -38.50 -39.22 -33.81

Remark:

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)

2. Margin (dB) = Level (dBuV) – Limit (dBuV)





6. 20dB Bandwidth test

6.1 Operating environment

Temperature:	25	°C
Relative Humidity:	50	%
Atmospheric Pressure:	1008	hPa

6.2 Test setup & procedure

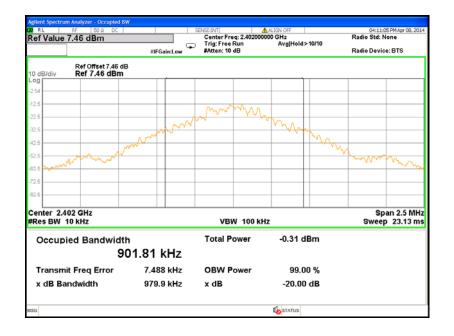
- Step 1: The 20dB bandwidth was measured using a 50 ohm spectrum analyzer
- Step 2: The span range for the SA display shall be between two times and five times the OBW.
- Step 3: The nominal IF filter bandwidth (3 dB RBW) should be approximately 1 % to 5 % of the OBW, unless otherwise specified, depending on the applicable requirement.
- Step 4: The test was performed at 3 channels (lowest, middle and highest channel). The maximum 20dB modulation bandwidth is in the following Table.

Modulation	Channel	Frequency (MHz)	Data Rate Mbps	20dB Bandwidth(MHz)	Limit (MHz)	Pass/Fail
	0	2402		0.980	0.5	Pass
GFSK	39	2441	1	0.956	0.5	Pass
	78	2480		0.925	0.5	Pass
	0	2402		1.332	0.5	Pass
8-DPSK	39	2441	1.5	1.331	0.5	Pass
	78	2480		1.326	0.5	Pass

6.3 Measured data of modulated bandwidth test results

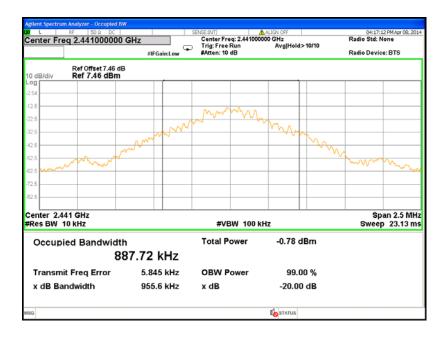
Please see the plot below.



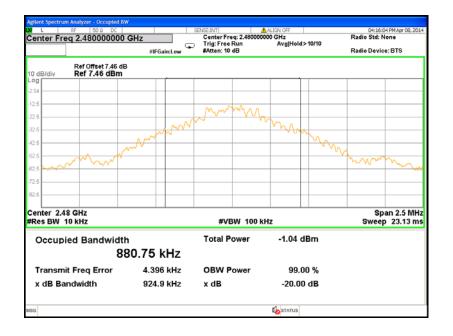


20dB Occupied Bandwidth @ GFSK mode 2402MHz

20dB Occupied Bandwidth @ GFSK mode 2441MHz







20dB Occupied Bandwidth @ GFSK mode 2480MHz

20dB Occupied Bandwidth @ 8DPSK mode 2402MHz

gilent Spectrum Analyzer - Occupied BV		SENSE:INT	ALIGN OFF	04:12:57 PM Apr 00, 20
pan 3.0000 MHz		Center Freq: 2.402000 Trig: Free Run	000 GHz Avg Hold:>10/10	Radio Std: None
	#IFGain:Low	#Atten: 10 dB	Avginola.> lorio	Radio Device: BTS
Ref Offset 7.46 dB 0 dB/div Ref 7.46 dBm				
og 2.54				
2.6				
2.5	- m	and have been by	mm	
2.5				
5 mm	~~			mon
.5				
.5				
2.5				
.5				
enter 2.402 GHz Res BW 15 kHz		VBW 150 kH	iz	Span 3 Mi Sweep 12.33 n
Occupied Bandwidth	ı	Total Power	-0.27 dBm	
1.3	3534 MHz			
Transmit Freq Error	7.409 kHz	OBW Power	99.00 %	
x dB Bandwidth	1.332 MHz	x dB	-20.00 dB	
3			STATUS	



L RF 50 Ω DC			ALIGN OFF	04:13:49 PM Apr 08, 20
enter Freg 2.441000000 G	Hz	Center Freq: 2.4410000	00 GHz	Radio Std: None
	#IFGain:Low	☐ Trig: Free Run #Atten: 10 dB	Avg Hold:>10/10	Radio Device: BTS
Ref Offset 7.46 dB dB/div Ref 7.46 dBm				
54				
2.5		0000		
2.5	- Am	and my my	man	
2.5	m		m	
				m
5				
2.5				
2.5				
enter 2.441 GHz Res BW 15 kHz		VBW 150 kH	z	Span 3 MH Sweep 12.33 m
Occupied Bandwidth		Total Power	-0.73 dBm	
	750 MHz			
Transmit Freq Error	8.725 kHz	OBW Power	99.00 %	
x dB Bandwidth	1.331 MHz	x dB	-20.00 dB	

20dB Occupied Bandwidth @ 8DPSK mode 2441MHz

20dB Occupied Bandwidth @ 8DPSK mode 2480MHz

RF 50 Ω DC			ALIGN OFF	04:14:33 PM Ap
er Freq 2.48000000	GHz	Center Freq: 2.480000	000 GHz	Radio Std: None
	#IFGain:Low	⊃ Trig: Free Run #Atten: 10 dB	Avg Hold:>10/10	Radio Device: BTS
Ref Offset 7.46 dB				
		- And	100	
	- Am	ve v v	m. my	
	~			
mmmmm	~~		- m	man mon
r 2.48 GHz				Span
BW 15 kHz		VBW 150 kH	z	Sweep 12
cupied Bandwidth	1	Total Power	-0.86 dBm	
1.3	8770 MHz			
nsmit Freq Error	8.762 kHz	OBW Power	99.00 %	
B Bandwidth	1.326 MHz	x dB	-20.00 dB	
			STATUS	