

FCC Test Report

FCC ID: 2AYGT-2K-00

Product: Thermal Monocular
Trade Mark: InfiRay
Model Number: E3 Max
Family Model: E3 Plus, E6+, E6Pro
Report No.: S22072704007002

Prepared for

IRay Technology Co., Ltd.
11GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY
DEVELOPMENT DISTRICT, YANTAI SHANDONG P.R.CHINA

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name.....: IRay Technology Co., Ltd.Address.....: 11GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY
DEVELOPMENT DISTRICT, YANTAI SHANDONG P.R.CHINA**Manufacturer's Name**.....: IRay Technology Co., Ltd.Address.....: 11GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY
DEVELOPMENT DISTRICT, YANTAI SHANDONG P.R.CHINA**Product description**

Product name.....: Thermal Monocular

Model and/or type reference : E3 Max

Family Model.....: E3 Plus, E6+, E6Pro

FCC Part15B

Standards: ANSI C63.4:2014

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with Part 15 of FCC Rules. And it is applicable only to the tested sample identified in the report.

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sample number.....: S220727040006**Date of Test**

Date (s) of performance of tests: 28 Jul. 2022 ~ 25 Aug. 2022

Date of Issue: 25 Aug. 2022

Test Result.....: **Pass**

Testing Engineer : _____



(Susan Li)

Authorized Signatory : _____



(Alex Li)

Table of Contents**Page**

1 . TEST SUMMARY	4
1.1 TEST FACILITY	5
1.2 MEASUREMENT UNCERTAINTY	5
2 . GENERAL INFORMATION	6
2.1 GENERAL DESCRIPTION OF EUT	6
2.2 DESCRIPTION OF TEST SETUP	8
2.3 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL	9
2.4 MEASUREMENT INSTRUMENTS LIST	10
3 . EMC EMISSION TEST	11
3.1 CONDUCTED EMISSION MEASUREMENT	11
3.1.1 POWER LINE CONDUCTED EMISSION	11
3.1.2 TEST PROCEDURE	12
3.1.3 TEST SETUP	12
3.1.4 EUT OPERATING CONDITIONS	12
3.1.5 TEST RESULTS	13
3.2 RADIATED EMISSION MEASUREMENT	15
3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT	15
3.2.2 TEST PROCEDURE	15
3.2.3 TEST SETUP	16
3.2.4 TEST RESULTS	17
3.2.5 TEST RESULTS(1000~18000MHz)	19

1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
FCC Part15B ANSI C63.4: 2014	Conducted Emission	Class A	PASS	
	Radiated Emission	Class A	PASS	

NOTE:

- (1) 'N/A' denotes test is not applicable in this Test Report
- (2) For client's request and manual description, the test will not be executed.

1.1 TEST FACILITY

Shenzhen NTEK Testing Technology Co., Ltd

Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

CNAS-Lab. The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2018 (identical to ISO/IEC 17025:2017)

The Certificate Registration Number is L5516

IC-Registration The Certificate Registration Number is CN0074

FCC- Accredited Test Firm Registration Number: 463705

Designation Number: CN1184

A2LA-Lab. The Certificate Registration Number is 4298.01

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
NTEKC01	ANSI	150 KHz ~ 30MHz	$\pm 2.80\text{dB}$	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
NTEKA01	ANSI	30MHz~1000MHz	$\pm 2.64\text{dB}$	
		1GHz~6GHz	$\pm 2.40\text{dB}$	
		6GHz~26.5GHz	$\pm 2.52\text{dB}$	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Thermal Monocular	
Trade Mark	InfiRay	
Model Name	E3 Max	
Family Model	E3 Plus, E6+, E6Pro	
Model Difference	All models are the same circuit and RF module, except the Lens size.	
Product Description	Connecting I/O port:	N/A
	Operation Frequency:	2.4 GHz(Declaration by factory)
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	
Adapter	Adapter Model: LX18AA-120300-ZX Adapter Rating: Input: AC 100-240V, 50/60Hz, 0.7A Output: DC 5.0V, 3.0A DC 9.0V, 2.0A DC 12.0V, 1.5A	
Battery	DC 3.6V, 4200mAh	
Power supply	DC 3.6V from battery or DC 5V from Adapter.	
HW Version	V1.0	
SW Version	0459	

2.1.1 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

All test modes in the table below are tested, the worst case is listed on this report.

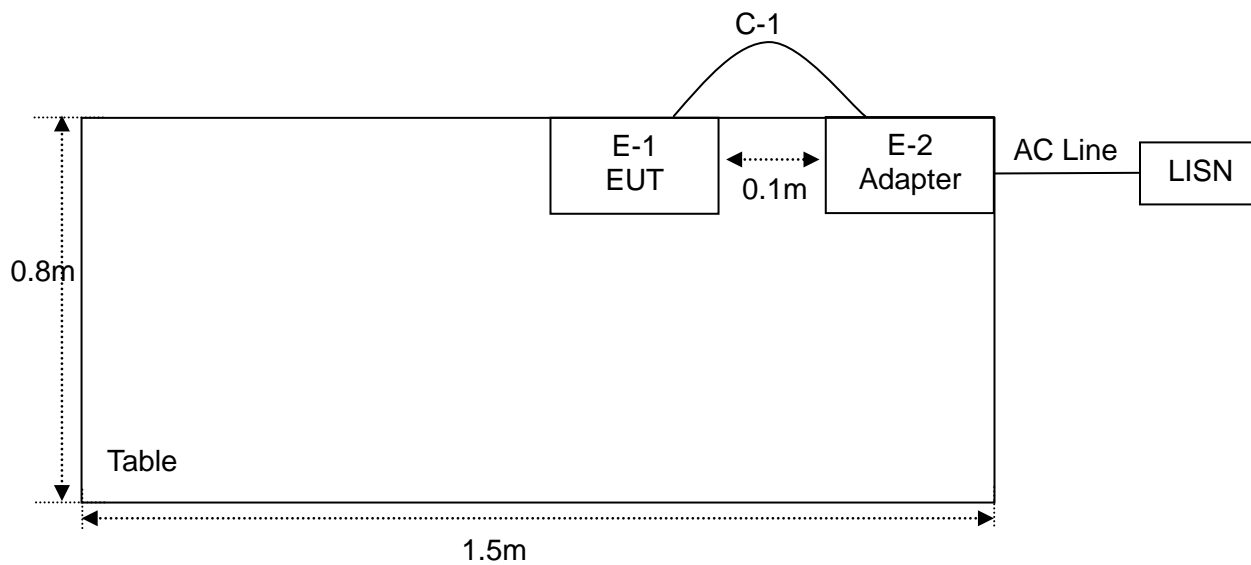
Pretest Mode	Description
Mode 1	Charging
Mode 2	Data Transmission

For Conducted Test	
Final Test Mode	Description
Mode 1	Charging
Mode 2	Data Transmission

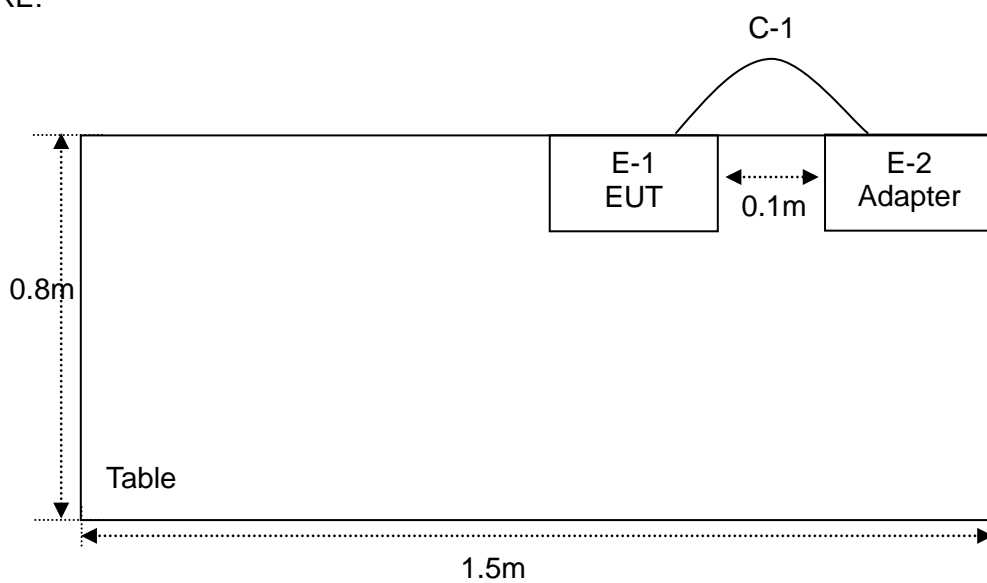
For Radiated Test	
Final Test Mode	Description
Mode 1	Charging
Mode 2	Data Transmission

2.2 DESCRIPTION OF TEST SETUP

CE:



RE:



2.3 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	Thermal Monocular	InfiRay	E3 Max	N/A	EUT
E-2	Adapter	LvXiangYuan	LX18AA-120300-ZX	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C-1	YES	NO	100cm	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.

2.4 MEASUREMENT INSTRUMENTS LIST

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2022.04.01	2023.03.30	1 year
2	Test Receiver	R&S	ESPI	101318	2022.04.06	2023.04.05	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2022.03.30	2023.03.29	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2020.05.11	2023.05.10	3 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2022.04.06	2023.04.05	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2022.03.31	2023.03.30	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2021.11.07	2022.11.06	1 year
8	Amplifier	EMC	EMC051835SE	980246	2022.06.17	2023.06.16	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2022.04.06	2023.04.05	1 year
10	Power Meter	DARE	RPR3006W	15I00041SNO84	2022.06.16	2023.06.15	1 year
11	Power Sensor	R&S	URV4-Z4	0395.1619.05	2022.06.16	2023.06.15	1 year
12	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2022.06.17	2025.06.16	3 year
13	High Test Cable(1G-40GHz)	N/A	R-03	N/A	2022.06.17	2025.06.16	3 year
14	High Test Cable(1G-40GHz)	N/A	R-04	N/A	2022.06.17	2025.06.16	3 year
15	Test Receiver	R&S	ESCI	101160	2022.04.06	2023.04.05	1 year

AC Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2022.04.06	2023.04.05	1 year
2	LISN	R&S	ENV216	101313	2022.04.06	2023.04.05	1 year
3	LISN	SCHWARZBECK	NNLK 8129	8129245	2022.04.06	2023.04.05	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2020.05.11	2023.05.10	3 year
5	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2020.05.11	2023.05.10	3 year
6	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2020.05.11	2023.05.10	3 year
7	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2020.05.11	2023.05.10	3 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable which is scheduled for calibration every 3 years.

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

FREQUENCY(MHz)	<input checked="" type="checkbox"/> Class A (dBμV)		<input type="checkbox"/> Class B (dBμV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 - 5.0	73.00	60.00	56.00	46.00
5.0 - 30.0	73.00	60.00	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

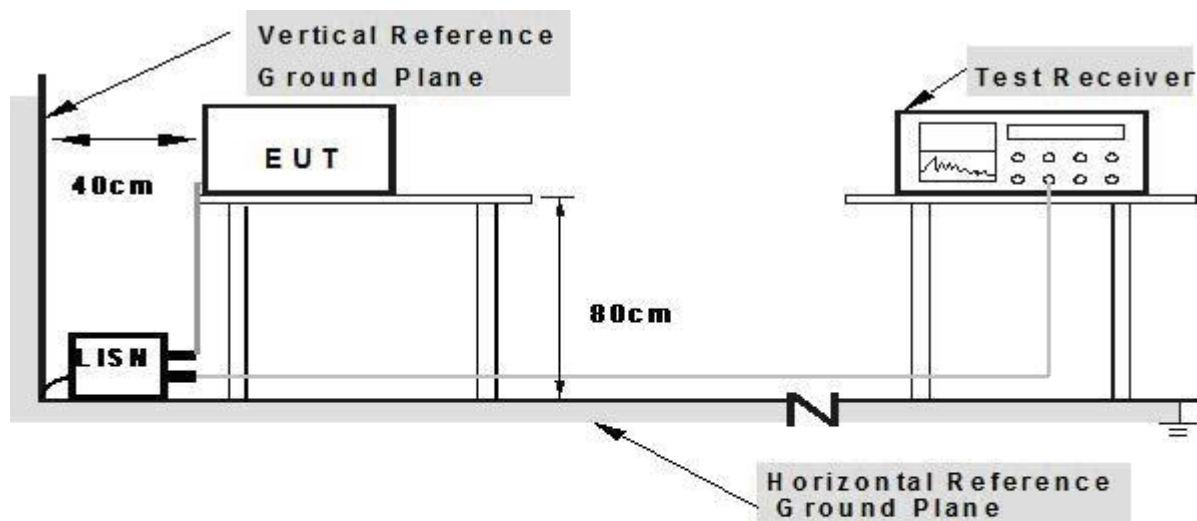
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

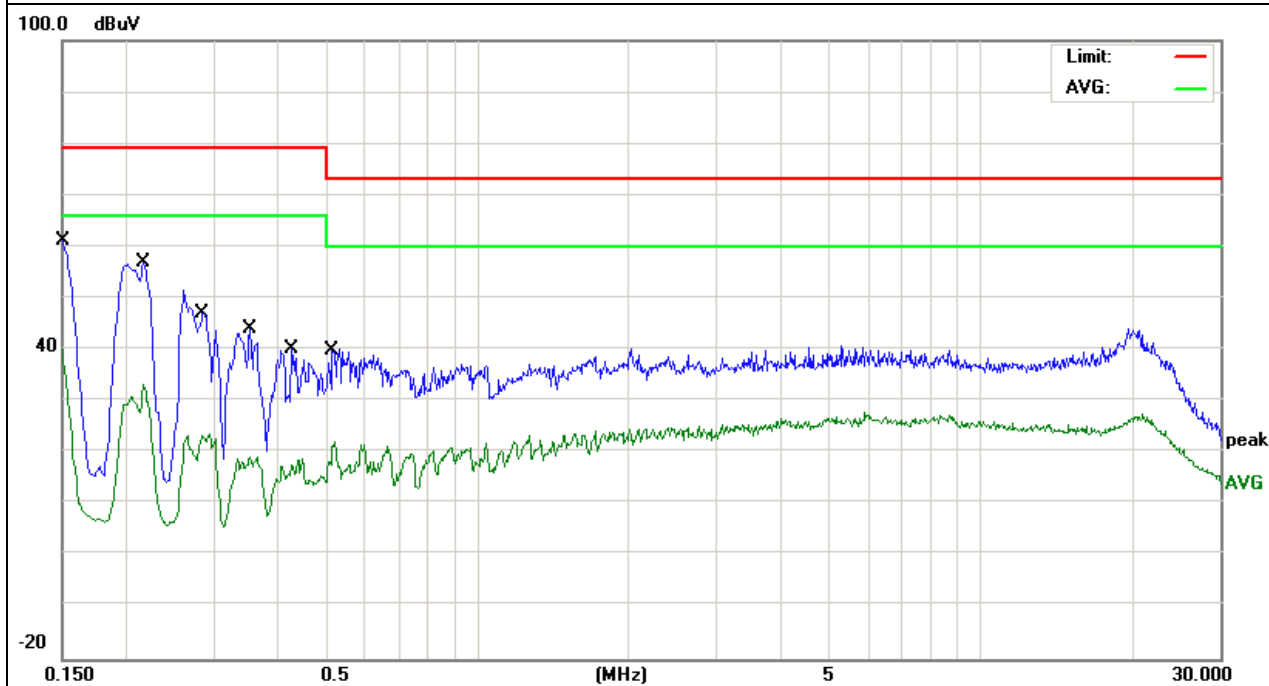
3.1.5 TEST RESULTS

EUT:	Thermal Monocular	Model Name. :	E3 Max
Temperature:	25.1℃	Relative Humidity:	67%
Pressure:	1010hPa	Test Date:	2022-08-08
Test Mode:	Mode 1	Phase :	L
Test Voltage:	AC 120V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1500	51.56	9.60	61.16	79.00	-17.84	QP
0.1500	30.50	9.60	40.10	66.00	-25.90	AVG
0.2173	47.56	9.62	57.08	79.00	-21.92	QP
0.2173	23.51	9.62	33.13	66.00	-32.87	AVG
0.2847	37.42	9.64	47.06	79.00	-31.94	QP
0.2847	13.90	9.64	23.54	66.00	-42.46	AVG
0.3537	34.43	9.64	44.07	79.00	-34.93	QP
0.3537	9.65	9.64	19.29	66.00	-46.71	AVG
0.4282	30.44	9.66	40.10	79.00	-38.90	QP
0.4282	9.13	9.66	18.79	66.00	-47.21	AVG
0.5209	30.43	9.66	40.09	73.00	-32.91	QP
0.5209	12.61	9.66	22.27	60.00	-37.73	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

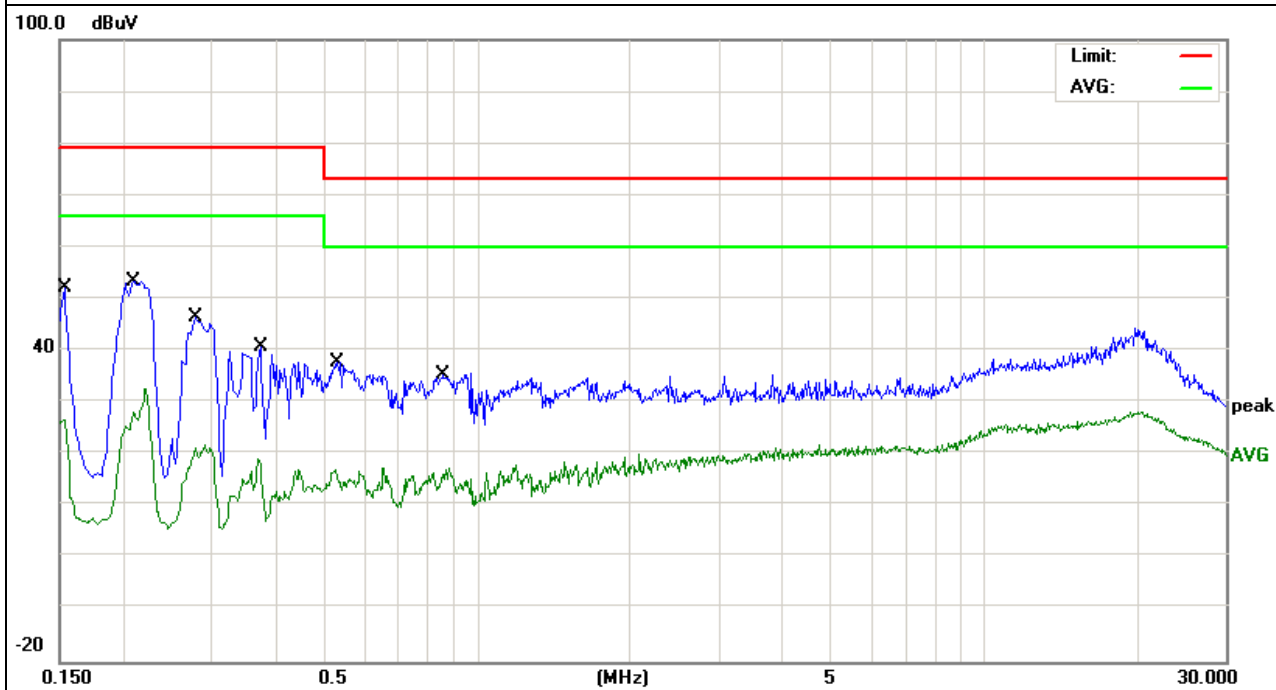


EUT:	Thermal Monocular	Model Name. :	E3 Max
Temperature:	25.1℃	Relative Humidity:	67%
Pressure:	1010hPa	Test Date:	2022-08-08
Test Mode:	Mode 1	Phase :	N
Test Voltage:	AC 120V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1532	42.55	9.60	52.15	79.00	-26.85	QP
0.1532	17.17	9.60	26.77	66.00	-39.23	AVG
0.2094	43.76	9.62	53.38	79.00	-25.62	QP
0.2094	19.80	9.62	29.42	66.00	-36.58	AVG
0.2773	36.87	9.64	46.51	79.00	-32.49	QP
0.2773	12.32	9.64	21.96	66.00	-44.04	AVG
0.3691	31.05	9.64	40.69	79.00	-38.31	QP
0.3691	9.57	9.64	19.21	66.00	-46.79	AVG
0.5237	28.12	9.66	37.78	73.00	-35.22	QP
0.5237	7.53	9.66	17.19	60.00	-42.81	AVG
0.8572	25.78	9.68	35.46	73.00	-37.54	QP
0.8572	7.55	9.68	17.23	60.00	-42.77	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	<input checked="" type="checkbox"/> Class A (at 3m)	<input type="checkbox"/> Class B (at 3m)
	dB μ V/m	dB μ V/m
30 ~ 88	49.5	40.0
88 ~ 216	53.9	43.5
216 ~ 960	56.9	46.0
Above 960	60.0	54.0

Notes:

- (1) The limit for radiated test was performed according to as following:
FCC PART 15B /ICES-003.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dB μ V/m)=20log Emission level (uV/m).

3.2.2 TEST PROCEDURE

Test Arrangement for Radiated Emissions up to 1 GHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency below 1GHz.

Test Arrangement for Radiated Emissions above 1 GHz.

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

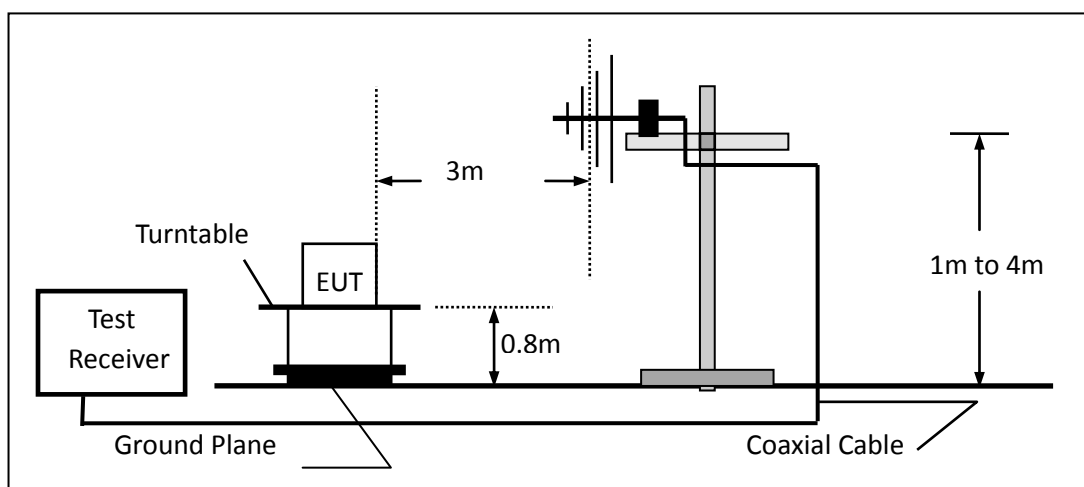
Note: For the hand-held device, the EUT should be measured for all 3 axes and only the

worst case is recorded in the report
 During the radiated emission test, according to ANSI C63.4-2014(4.2), the Spectrum Analyzer was set with the following configurations:

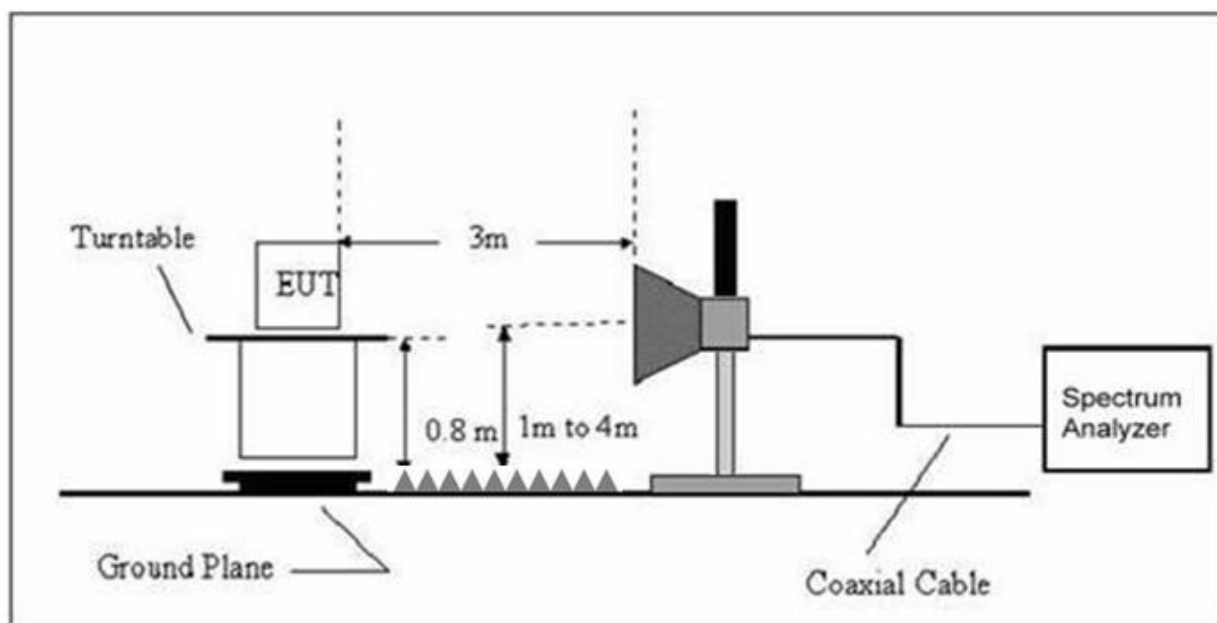
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Avg	1 MHz	10 Hz

3.2.3 TEST SETUP

For Radiated Emission 30~1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz



3.2.4 TEST RESULTS

All the modulation modes have been tested, and the worst result was report as below:

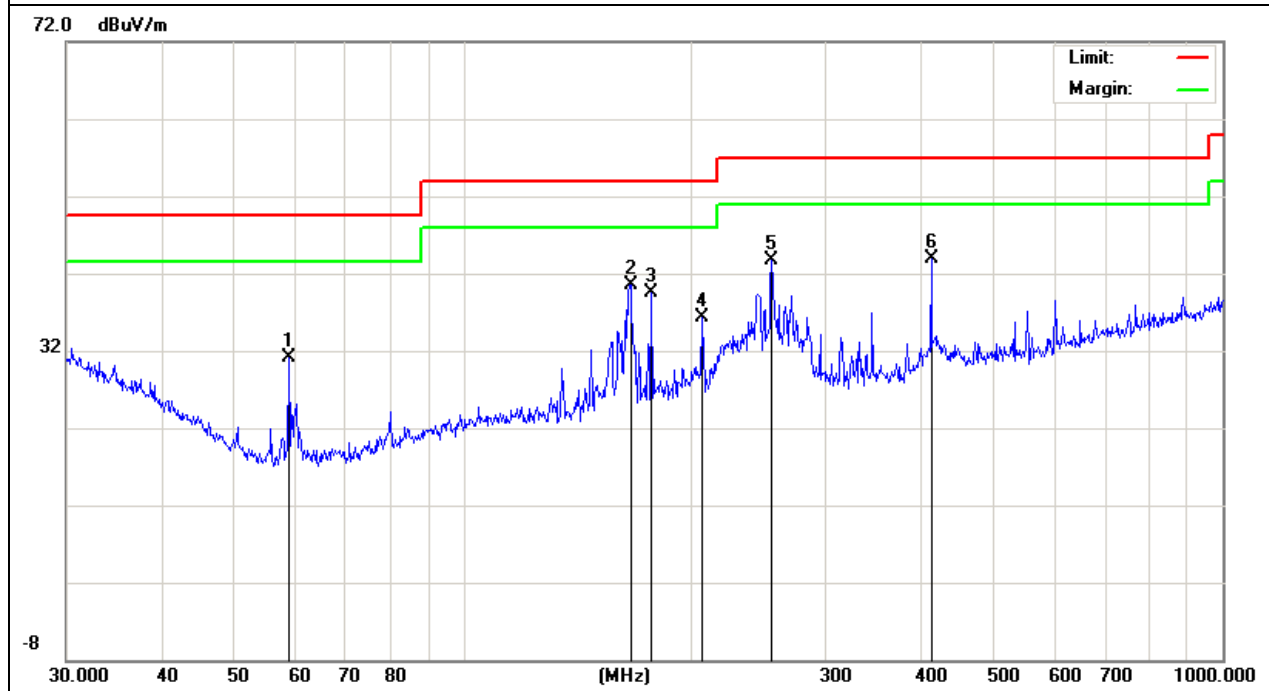
TEST RESULTS (30~1000 MHz)

EUT:	Thermal Monocular	Model Name:	E3 Max
Temperature:	25.4℃	Relative Humidity:	53%
Pressure:	1010 hPa	Test Date :	2022-08-05
Test Mode :	Mode 2	Polarization :	Horizontal
Test Power :	AC 120V/60Hz		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	59.0251	18.91	12.22	31.13	49.50	-18.37	QP
H	166.0680	22.96	17.61	40.57	53.90	-13.33	QP
H	176.8875	22.35	17.12	39.47	53.90	-14.43	QP
H	206.3976	19.99	16.39	36.38	53.90	-17.52	QP
H	254.7281	24.32	19.39	43.71	56.90	-13.19	QP
H	413.2706	20.34	23.61	43.95	56.90	-12.95	QP

Remark:

Factor = Antenna Factor + Cable Loss - Amplifier.

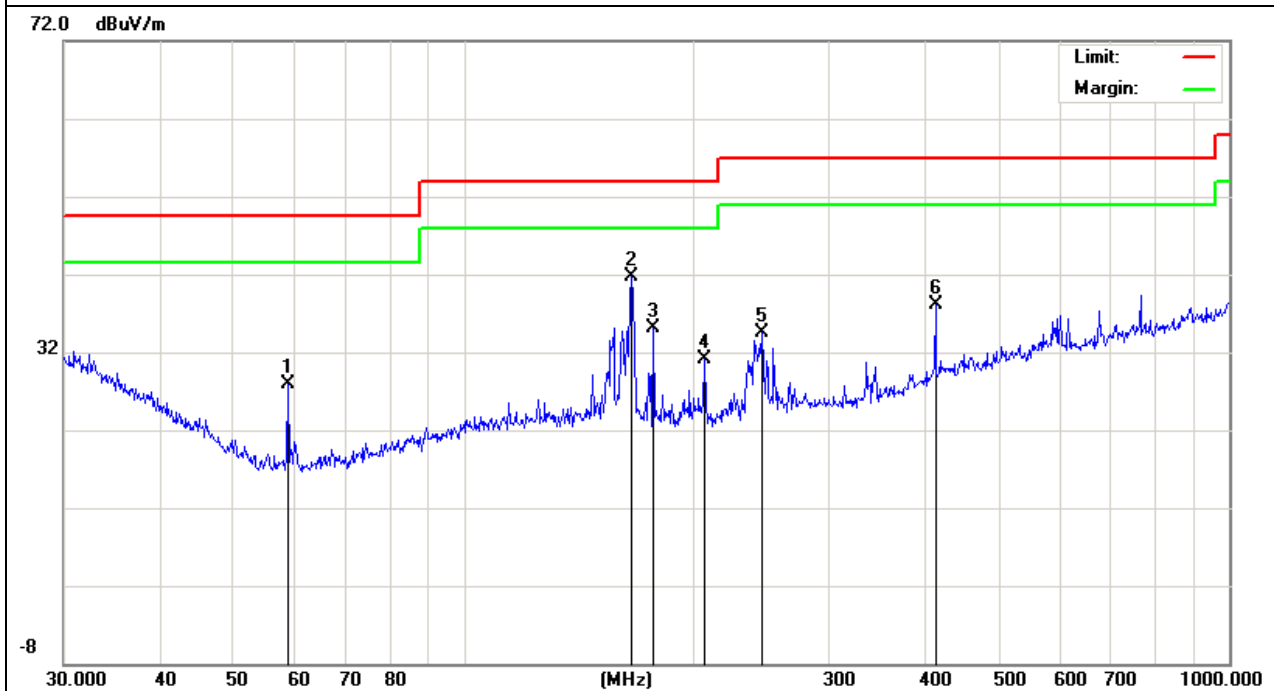


EUT:	Thermal Monocular	Model Name :	E3 Max
Temperature:	25.4℃	Relative Humidity:	53%
Pressure:	1010 hPa	Test Date :	2022-08-05
Test Mode :	Mode 2	Polarization :	Vertical
Test Power :	AC 120V/60Hz		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	59.0251	15.65	12.22	27.87	49.50	-21.63	QP
V	165.4866	24.16	17.58	41.74	53.90	-12.16	QP
V	176.8876	18.02	17.13	35.15	53.90	-18.75	QP
V	206.3976	14.66	16.39	31.05	53.90	-22.85	QP
V	245.0900	15.80	18.61	34.41	56.90	-22.49	QP
V	413.2706	14.50	23.61	38.11	56.90	-18.79	QP

Remark:

Factor = Antenna Factor + Cable Loss - Amplifier.



3.2.5 TEST RESULTS(1000~18000MHz)

All the modulation modes have been tested, and the worst result was report as below:

EUT:	Thermal Monocular	Model Name :	E3 Max
Temperature:	25.3℃	Relative Humidity:	55%
Pressure:	1010 hPa	Test Date :	2022-08-06
Test Mode :	Mode 1		
Test Power :	AC 120V/60Hz		

Polar (H/V)	Frequency	Reading	Correct	Result	Limit	Over Limit	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
V	4272.500	37.40	17.82	55.22	80.00	-24.78	peak
V	4272.500	24.83	17.82	42.65	60.00	-17.35	AVG
V	7842.500	34.96	23.72	58.68	80.00	-21.32	peak
V	7842.500	21.60	23.72	45.32	60.00	-14.68	AVG
V	16300.00	31.98	30.04	62.02	80.00	-17.98	peak
V	16300.00	18.62	30.04	48.66	60.00	-11.34	AVG
H	4272.500	37.52	17.82	55.34	80.00	-24.66	peak
H	4272.500	24.51	17.82	42.33	60.00	-17.67	AVG
H	8225.000	35.10	23.72	58.82	80.00	-21.18	peak
H	8225.000	22.25	23.72	45.97	60.00	-14.03	AVG
H	13750.00	32.80	29.14	61.94	80.00	-18.06	peak
H	13750.00	19.54	29.14	48.68	60.00	-11.32	AVG

Remark:

Result = Reading + Correct, Over Limit= Result - Limit

Note: Only the worst results data points are reported in the report.

Other emissions are attenuated 20dB below the limit that does not recorded in the report

END OF REPORT