

FCC Test Report

FCC ID: 2AYGT-2N-00

Product: Mate Series Thermal Imaging Attachment
Trade Mark: InfiRay
Model Number: MAH50
Family Model: MAL38, MAL25
Report No.: S23092203007001

Prepared for

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

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.
1/F, Building E, Fenda Science Park, Sanwei Community,
Xixiang Street Bao'an District, Shenzhen P.R. China
Tel. 400-800-6106, 0755-2320 0050, 0755-2320 0090
Website: <http://www.ntek.org.cn>

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.....: Mate Series Thermal Imaging Attachment
Model and/or type reference : MAH50
Family Model.....: MAL38, MAL25
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.

This report shall not be reproduced except in full, without the written approval of NTEK, this document may be altered or revised by NTEK, personnel only, and shall be noted in the revision of the document.

sample number.....: S230922030001

Date of Test

Date (s) of performance of tests: Sep 22, 2023 ~ Nov 09, 2023

Date of Issue: Nov 09, 2023

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

Prepared By: Gavan Zhang
Gavan Zhang
(Project Engineer)

Reviewed By: Aaron Cheng
Aaron Cheng
(Supervisor)

Approved By: Alex Li
Alex Li
(Manager)

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	Mate Series Thermal Imaging Attachment	
Trade Mark	InfiRay	
Model Name	MAH50	
Family Model	MAL38, MAL25	
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	N/A	
Battery	DC 3.7V, 1500mAh	
Power supply	DC 3.7V from battery or DC 5V from Type-C port.	
Hardware Version	V1.2	
Firmware version	CM_F_0_2207260919	
Software Version	CM_F_0_2207260919	

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.

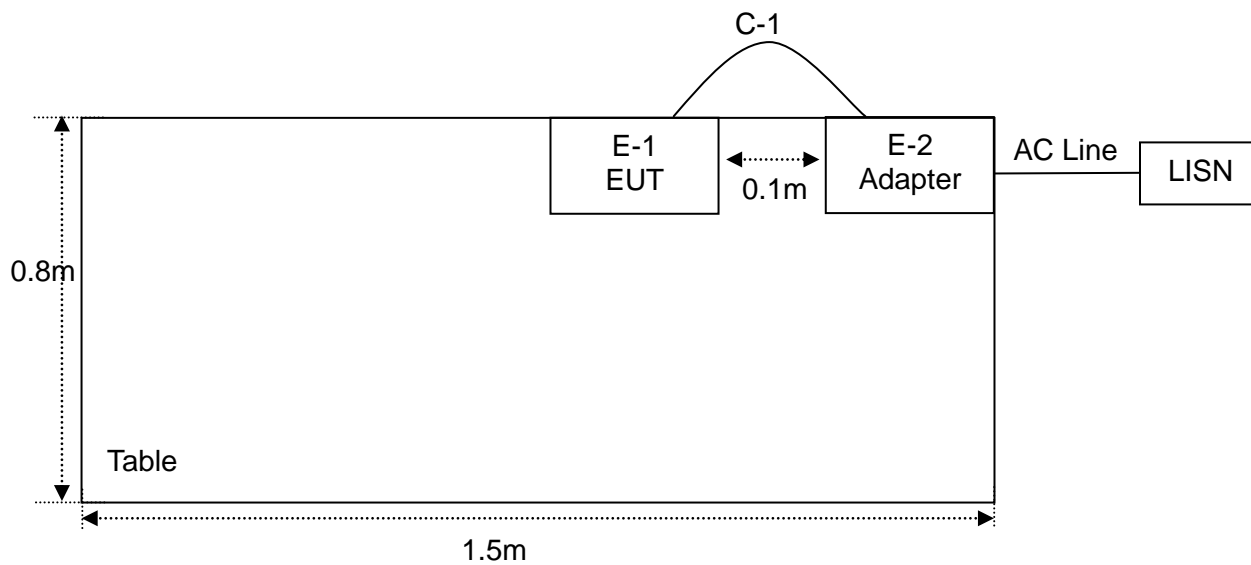
Pretest Mode	Description
Mode 1	Charging+Working
Mode 2	Data Transmission

For Conducted Test	
Final Test Mode	Description
Mode 1	Charging+Working

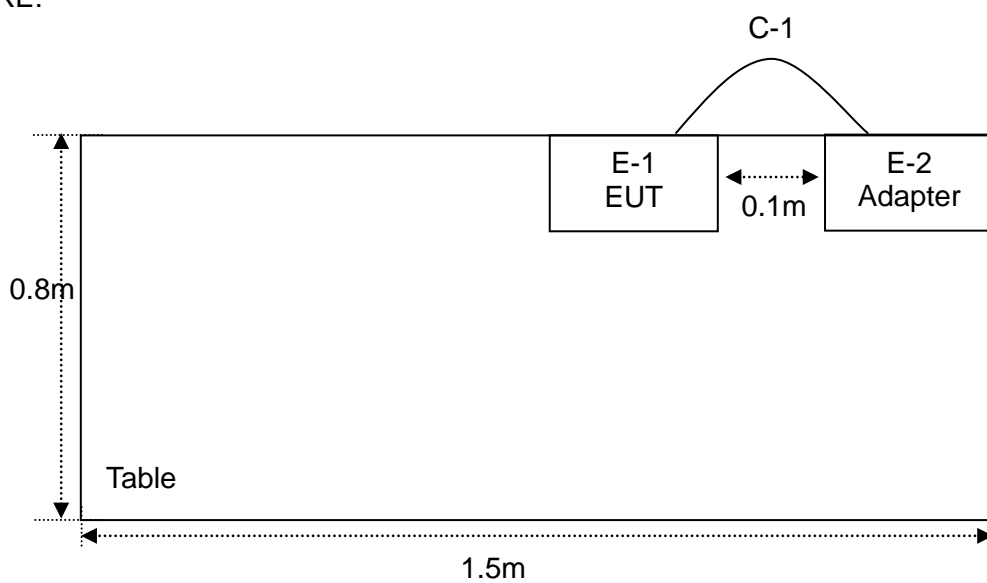
For Radiated Test	
Final Test Mode	Description
Mode 1	Charging+Working
Mode 2	Data Transmission

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	Mate Series Thermal Imaging Attachment	InfiRay	MAH50	N/A	EUT
E-2	Adapter	N/A	LX10B-050200E	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	2023.03.27	2024.03.26	1 year
2	Test Receiver	R&S	ESPI	101318	2023.03.27	2024.03.26	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2023.03.27	2024.03.26	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2023.03.27	2024.03.26	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2023.03.27	2024.03.26	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2023.03.27	2024.03.26	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2023.03.27	2024.03.26	1 year
8	Amplifier	EMC	EMC051835SE	980246	2023.05.29	2024.05.28	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2023.05.29	2024.05.28	1 year
10	Power Meter	DARE	RPR3006W	15I00041SNO84	2022.11.08 2023.05.29	2023.11.07 2024.05.28	1 year
11	Power Sensor	R&S	URV4-Z4	0395.1619.05	2023.03.27	2024.03.26	1 year
12	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2023.05.06	2026.05.05	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	2023.05.06	2026.05.05	3 year
15	Test Receiver	R&S	ESCI	101160	2023.03.27	2024.03.26	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	2023.03.27	2024.03.26	1 year
2	LISN	R&S	ENV216	101313	2023.03.27	2024.03.26	1 year
3	LISN	SCHWARZBECK	NNLK 8129	8129245	2023.03.27	2024.03.26	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2023.05.06	2026.05.05	3 year
5	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2023.05.06	2026.05.05	3 year
6	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2023.05.06	2026.05.05	3 year
7	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2023.05.06	2026.05.05	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 (dB μ V)		<input type="checkbox"/> Class B (dB μ V)	
	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.

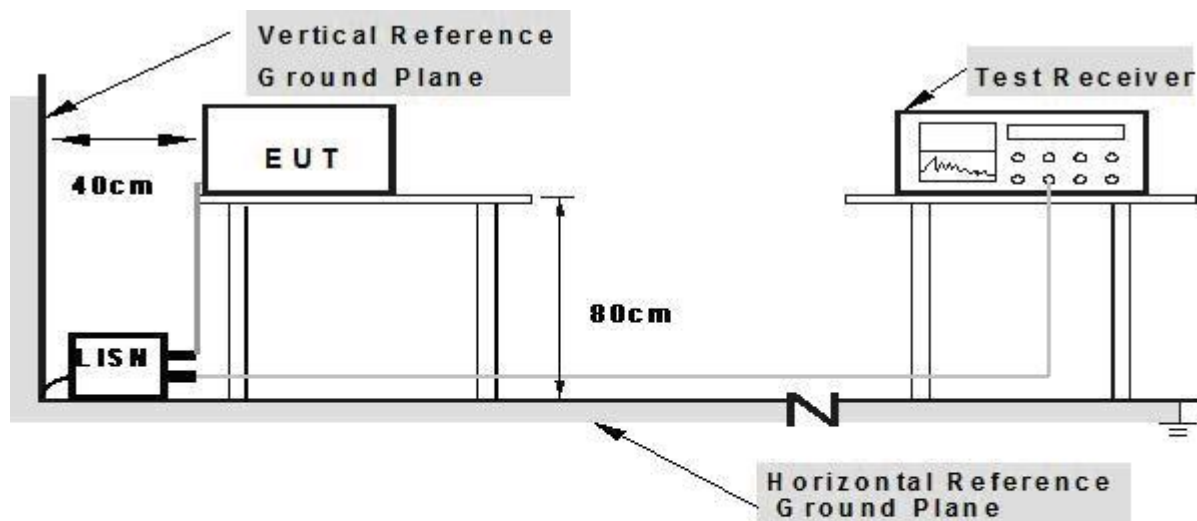
The following table is the setting of the receiver

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 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.

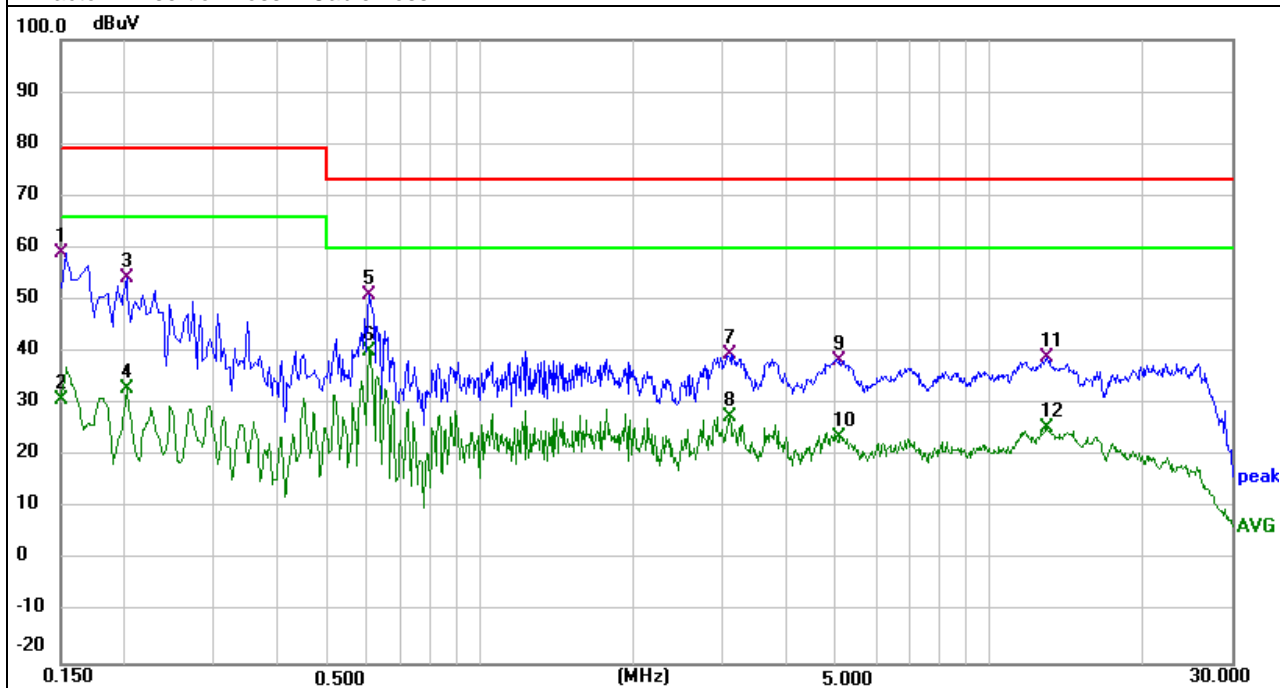
3.1.5 TEST RESULTS

EUT:	Mate Series Thermal Imaging Attachment	Model Name. :	MAH50
Temperature:	25.1℃	Relative Humidity:	67%
Pressure:	1010hPa	Test Date:	2023-09-27
Test Mode:	Mode 1	Phase :	L
Test Voltage:	AC 120V/60Hz		

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1500	49.14	9.93	59.07	79.00	-19.93	QP
0.1500	20.80	9.93	30.73	66.00	-35.27	AVG
0.2020	44.21	10.04	54.25	79.00	-24.75	QP
0.2020	22.82	10.04	32.86	66.00	-33.14	AVG
0.6060	39.97	10.87	50.84	73.00	-22.16	QP
0.6060	29.43	10.87	40.30	60.00	-19.70	AVG
3.1020	29.76	9.67	39.43	73.00	-33.57	QP
3.1020	17.75	9.67	27.42	60.00	-32.58	AVG
5.0900	28.64	9.67	38.31	73.00	-34.69	QP
5.0900	14.12	9.67	23.79	60.00	-36.21	AVG
13.0140	29.18	9.70	38.88	73.00	-34.12	QP
13.0140	15.73	9.70	25.43	60.00	-34.57	AVG

Remark:

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

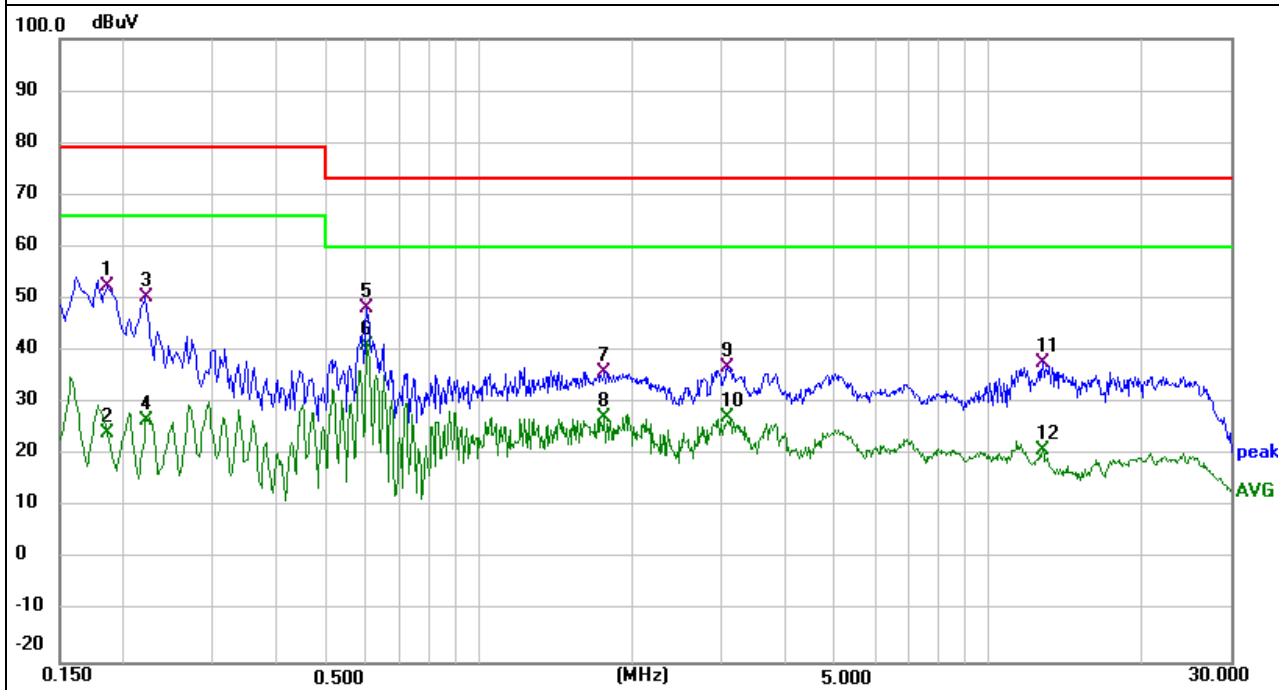


EUT:	Mate Series Thermal Imaging Attachment	Model Name. :	MAH50
Temperature:	25.1℃	Relative Humidity:	67%
Pressure:	1010hPa	Test Date:	2023-09-27
Test Mode:	Mode 1	Phase :	N
Test Voltage:	AC 120V/60Hz		

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1860	42.36	10.01	52.37	79.00	-26.63	QP
0.1860	14.34	10.01	24.35	66.00	-41.65	AVG
0.2220	40.27	10.08	50.35	79.00	-28.65	QP
0.2220	16.68	10.08	26.76	66.00	-39.24	AVG
0.6020	37.25	10.85	48.10	73.00	-24.90	QP
0.6020	30.09	10.85	40.94	60.00	-19.06	AVG
1.7660	22.77	13.20	35.97	73.00	-37.03	QP
1.7660	14.05	13.20	27.25	60.00	-32.75	AVG
3.0860	27.15	9.67	36.82	73.00	-36.18	QP
3.0860	17.68	9.67	27.35	60.00	-32.65	AVG
12.8139	28.20	9.70	37.90	73.00	-35.10	QP
12.8139	11.22	9.70	20.92	60.00	-39.08	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.

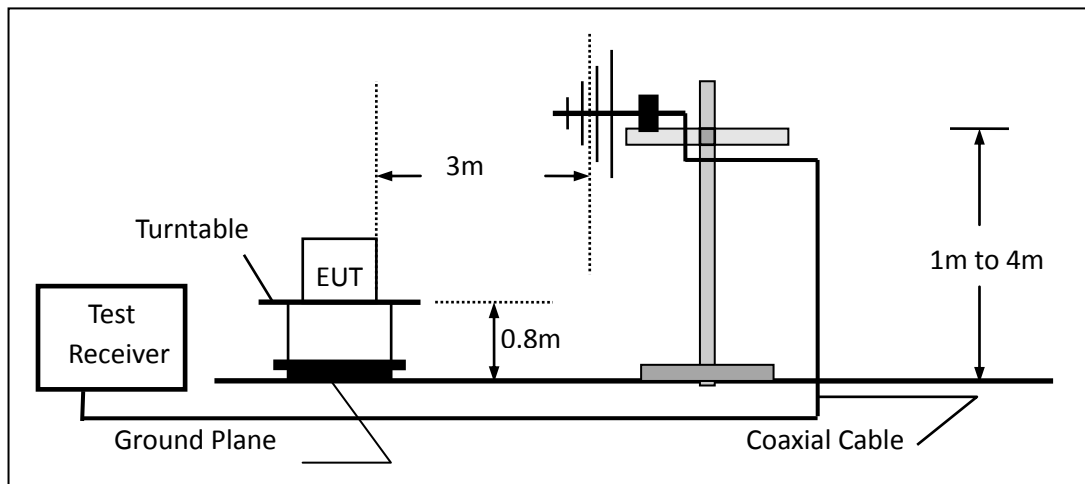
Note: For the hand-held device, the EUT should be measured for all 3 axes and only the

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:

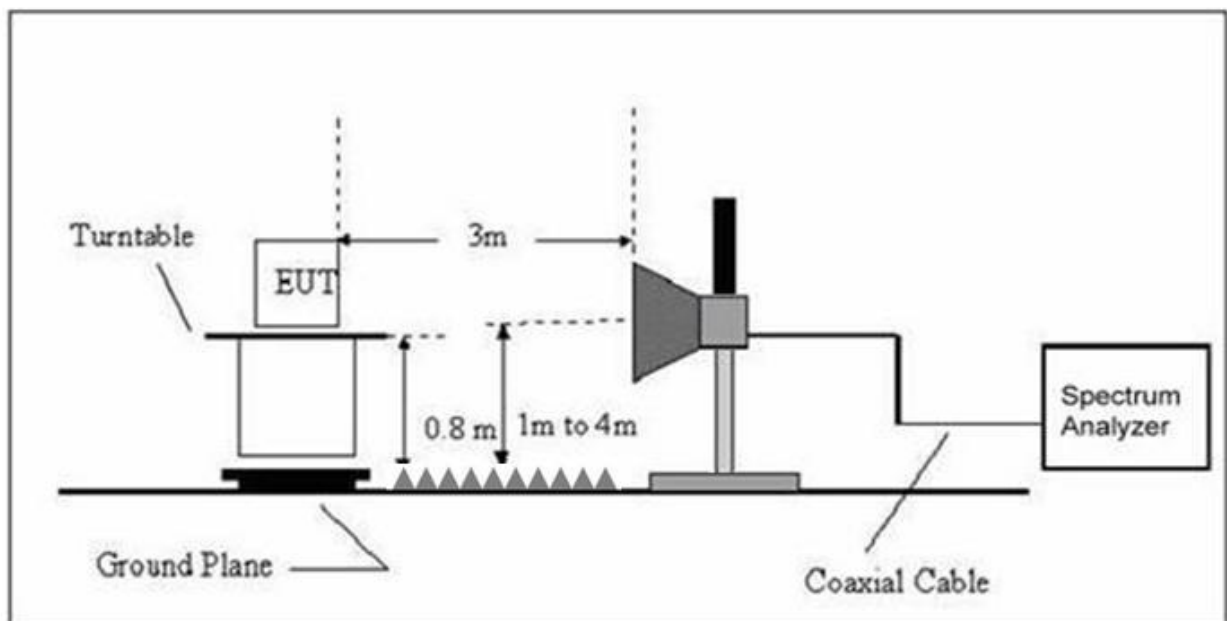
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Avg	1 MHz	10 Hz

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:

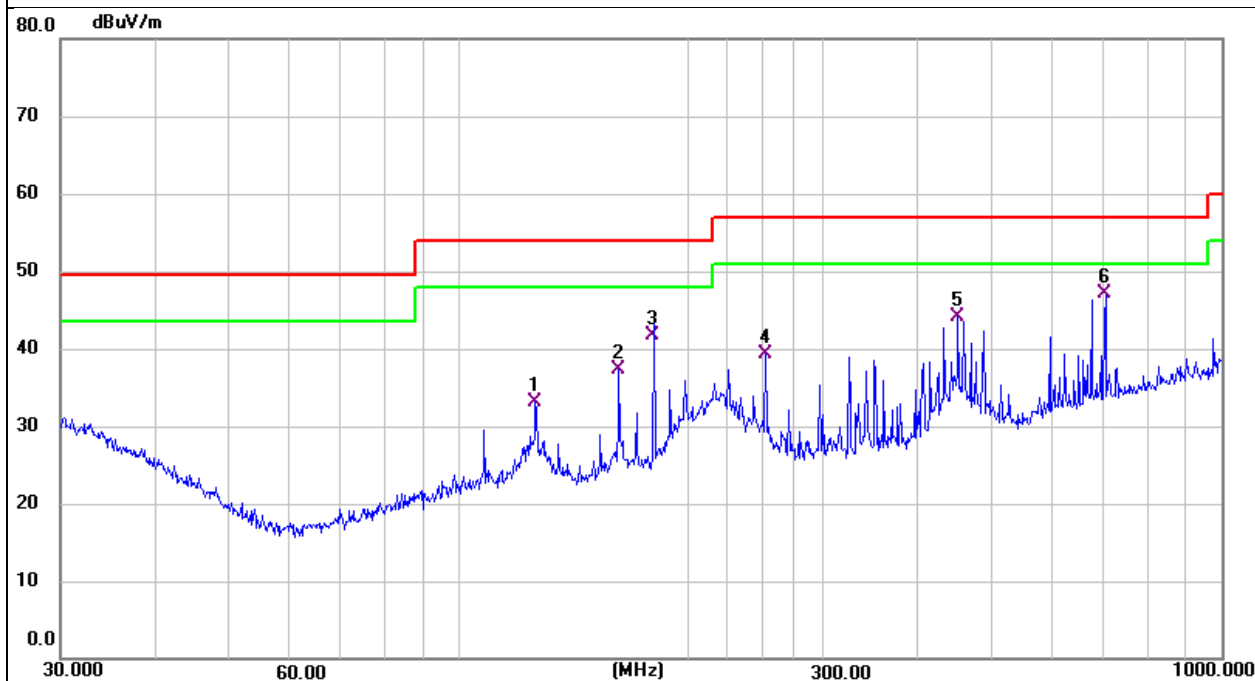
TEST RESULTS (30~1000 MHz)

EUT:	Mate Series Thermal Imaging Attachment	Model Name:	MAH50
Temperature:	25.4℃	Relative Humidity:	53%
Pressure:	1010 hPa	Test Date :	2023-09-27
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	125.8863	14.45	18.66	33.11	53.90	-20.79	QP
H	162.0413	19.58	17.80	37.38	53.90	-16.52	QP
H	180.0065	25.01	16.78	41.79	53.90	-12.11	QP
H	252.0627	20.38	18.90	39.28	56.90	-17.62	QP
H	451.1350	20.08	24.09	44.17	56.90	-12.73	QP
H	702.0061	19.17	27.84	47.01	56.90	-9.89	QP

Remark:

Factor = Antenna Factor + Cable Loss - Amplifier.

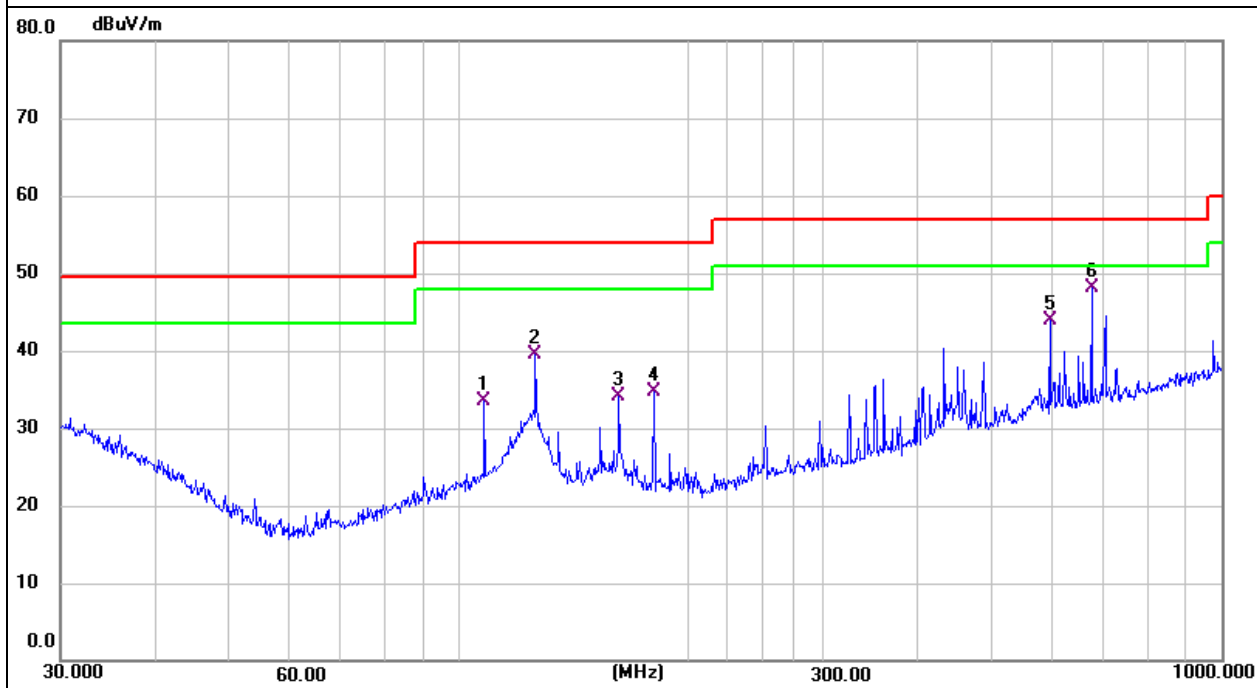


EUT:	Mate Series Thermal Imaging Attachment	Model Name :	MAH50
Temperature:	25.4℃	Relative Humidity:	53%
Pressure:	1010 hPa	Test Date :	2023-09-27
Test Mode :	Mode 2	Polarization :	Vertical
Test Power :	AC 120V/60Hz		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	107.8876	15.46	18.13	33.59	53.90	-20.31	QP
V	125.8863	20.82	18.66	39.48	53.90	-14.42	QP
V	162.0413	16.39	17.80	34.19	53.90	-19.71	QP
V	180.0164	17.92	16.78	34.70	53.90	-19.20	QP
V	595.1326	17.59	26.22	43.81	56.90	-13.09	QP
V	675.2080	20.72	27.43	48.15	56.90	-8.75	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:	Mate Series Thermal Imaging Attachment	Model Name :	MAH50
Temperature:	25.3℃	Relative Humidity:	55%
Pressure:	1010 hPa	Test Date :	2023-09-27
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	7919.000	32.87	20.25	53.12	80.00	-26.88	peak
V	7919.000	17.37	20.25	37.62	60.00	-22.38	AVG
V	13920.000	31.52	25.69	57.21	80.00	-22.79	peak
V	13920.000	16.89	25.69	42.58	60.00	-17.42	AVG
V	17966.000	30.95	25.66	56.61	80.00	-23.39	peak
V	17966.000	20.93	25.66	46.59	60.00	-13.41	AVG
H	7460.000	32.13	19.33	51.46	80.00	-28.54	peak
H	7460.000	17.15	19.33	36.48	60.00	-23.52	AVG
H	12866.000	29.92	24.58	54.50	80.00	-25.50	peak
H	12866.000	17.57	24.58	42.15	60.00	-17.85	AVG
H	17898.000	31.49	25.43	56.92	80.00	-23.08	peak
H	17898.000	20.82	25.43	46.25	60.00	-13.75	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