

## G.SKILL International Enterprise

# TEST REPORT

**Model:**

F5-7800J3848G16GX2-TZ5RK  
(Serial models please refer to section 1.2)

**REPORT NUMBER**

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# EMC TEST REPORT

<b>Applicant:</b>	<b>G.SKILL International Enterprise 6F., No.69, Dongsing Rd., Sinyi Dist., Taipei City 11070, Taiwan</b>
<b>Product:</b>	<b>Memory Module</b>
<b>Model No.:</b>	<b>F5-7800J3848G16GX2-TZ5RK (Serial models please refer to section 1.2)</b>
<b>Brand Name:</b>	<b>NIL</b>
<b>Test Method/ Standard:</b>	<b>EN 55032: 2015+A1: 2020 EN IEC 61000-3-2: 2019+A1: 2021 EN 61000-3-3: 2013+A1: 2019 EN 55035: 2017+A11: 2020 BS EN 55032: 2015+A1: 2020 BS EN IEC 61000-3-2: 2019+A1: 2021 BS EN 61000-3-3: 2013+A1: 2019 BS EN 55035: 2017+A11: 2020</b>
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**Revision History**

<b>Report No.</b>	<b>Issue Date</b>	<b>Revision Summary</b>
221000354THC-001	Nov. 28, 2022	Original report

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**1. General Information**

**1.1 Identification of the EUT**

<b>Product:</b>	Memory Module
<b>Model No.:</b>	F5-7800J3848G16GX2-TZ5RK
<b>Rated Power:</b>	1.2Vdc
<b>Power Cord:</b>	N/A
<b>Sample receiving date:</b>	2022/10/28
<b>Sample condition:</b>	Workable
<b>Testing date:</b>	2022/11/08 ~ 2022/11/15

**1.2 Additional information about the EUT**

The customer confirmed the series models are identical in IC and different in appearance, color, capacity and speed.

Trident Z5 RGB / Z5 Neo RGB	
F5-5200J2834F16GX2-TZ5RS	F5-5200J2834F16GX2-TZ5RK
F5-5200J3636C16GA2-TZ5RS	F5-5200J3636C16GA2-TZ5RK
F5-5200J3636C16GX2-TZ5RS	F5-5200J3636C16GX2-TZ5RK
F5-5200J4040A16GA2-TZ5RS	F5-5200J4040A16GA2-TZ5RK
F5-5200J4040A16GX2-TZ5RS	F5-5200J4040A16GX2-TZ5RK
F5-5200U3636C16GA2-TZ5RS	F5-5200U3636C16GA2-TZ5RK
F5-5200U3636C16GX2-TZ5RS	F5-5200U3636C16GX2-TZ5RK
F5-5200U4040D16GX4-TZ5RS	F5-5200U4040D16GX4-TZ5RK
F5-5600J2834F16GA2-TZ5RS	F5-5600J2834F16GA2-TZ5RK
F5-5600J2834F16GX2-TZ5RS	F5-5600J2834F16GX2-TZ5RK
F5-5600J2834F32GA2-TZ5RS	F5-5600J2834F32GA2-TZ5RK
F5-5600J2834F32GX2-TZ5RS	F5-5600J2834F32GX2-TZ5RK
F5-5600J3036D16GA2-TZ5RS	F5-5600J3036D16GA2-TZ5RK
F5-5600J3036D16GX2-TZ5RS	F5-5600J3036D16GX2-TZ5RK
F5-5600J3036D32GA2-TZ5RS	F5-5600J3036D32GA2-TZ5RK
F5-5600J3036D32GX2-TZ5RS	F5-5600J3036D32GX2-TZ5RK
F5-5600J3636C16GA2-TZ5RS	F5-5600J3636C16GA2-TZ5RK
F5-5600J3636C16GX2-TZ5RS	F5-5600J3636C16GX2-TZ5RK
F5-5600J3636D32GA2-TZ5RS	F5-5600J3636D32GA2-TZ5RK
F5-5600J3636D32GX2-TZ5RS	F5-5600J3636D32GX2-TZ5RK

**TEST REPORT**

Trident Z5 RGB / Z5 Neo RGB	
F5-5600J4040C16GA2-TZ5RS	F5-5600J4040C16GA2-TZ5RK
F5-5600J4040C16GX2-TZ5RS	F5-5600J4040C16GX2-TZ5RK
F5-5600U3636C16GA2-TZ5RS	F5-5600U3636C16GA2-TZ5RK
F5-5600U3636C16GX2-TZ5RS	F5-5600U3636C16GX2-TZ5RK
F5-5600U4040C16GA2-TZ5RS	F5-5600U4040C16GA2-TZ5RK
F5-5600U4040C16GX2-TZ5RS	F5-5600U4040C16GX2-TZ5RK
F5-6000U4040E16GX2-TZ5RS	F5-6000U4040E16GX2-TZ5RK
F5-6000J3040F16GA2-TZ5RS	F5-6000J3040F16GA2-TZ5RK
F5-6000J3040F16GX2-TZ5RS	F5-6000J3040F16GX2-TZ5RK
F5-6000J3040G32GA2-TZ5RS	F5-6000J3040G32GA2-TZ5RK
F5-6000J3040G32GX2-TZ5RS	F5-6000J3040G32GX2-TZ5RK
F5-6000J3238F16GA2-TZ5RS	F5-6000J3238F16GA2-TZ5RK
F5-6000J3238F16GX2-TZ5RS	F5-6000J3238F16GX2-TZ5RK
F5-6000J3238G32GA2-TZ5RS	F5-6000J3238G32GA2-TZ5RK
F5-6000J3238G32GX2-TZ5RS	F5-6000J3238G32GX2-TZ5RK
F5-6000J3636F16GA2-TZ5RS	F5-6000J3636F16GA2-TZ5RK
F5-6000J3636F16GX2-TZ5RS	F5-6000J3636F16GX2-TZ5RK
F5-6000J4040F16GA2-TZ5RS	F5-6000J4040F16GA2-TZ5RK
F5-6000J4040F16GX2-TZ5RS	F5-6000J4040F16GX2-TZ5RK
F5-6000U3636E16GX2-TZ5RS	F5-6000U3636E16GX2-TZ5RK
F5-6000U4040E16GA2-TZ5RS	F5-6000U4040E16GA2-TZ5RK
F5-6400J3238G16GA2-TZ5RS	F5-6400J3238G16GA2-TZ5RK
F5-6400J3238G16GX2-TZ5RS	F5-6400J3238G16GX2-TZ5RK
F5-6400J3239G16GA2-TZ5RS	F5-6400J3238G32GX2-TZ5RK
F5-6400J3239G16GX2-TZ5RS	F5-6400J3239G16GA2-TZ5RK
F5-6400J3239G32GX2-TZ5RS	F5-6400J3239G16GX2-TZ5RK
F5-6400J3636G16GA2-TZ5RS	F5-6400J3239G16GX2-TZ5RK SPL
F5-6400J3636G16GX2-TZ5RS	F5-6400J3239G32GX2-TZ5RK
F5-6400J4040G16GA2-TZ5RS	F5-6400J3636G16GA2-TZ5RK
F5-6400J4040G16GX2-TZ5RS	F5-6400J3636G16GX2-TZ5RK
F5-6400U3636F16GX2-TZ5RS	F5-6400J4040G16GA2-TZ5RK
F5-6400U4040F16GA2-TZ5RS	F5-6400J4040G16GX2-TZ5RK
F5-6400U4040F16GX2-TZ5RS	F5-6400U3636F16GX2-TZ5RK
F5-6600J3440G16GA2-TZ5RS	F5-6400U4040F16GA2-TZ5RK
F5-6600J3440G16GX2-TZ5RS	F5-6400U4040F16GX2-TZ5RK

**TEST REPORT**

Trident Z5 RGB / Z5 Neo RGB	
F5-6600J4040G16GA2-TZ5RS	F5-6600J3440G16GA2-TZ5RK
F5-6600J4040G16GX2-TZ5RS	F5-6600J3440G16GX2-TZ5RK
F5-6600U4040F16GX2-TZ5RS	F5-6600J4040G16GA2-TZ5RK
F5-6666U4040P16GX2-TZ5RS	F5-6600J4040G16GX2-TZ5RK
F5-6800J3245G16GX2-TZ5RS	F5-6600U4040F16GX2-TZ5RK
F5-6800J3445G16GX2-TZ5RS	F5-6666U4040P16GX2-TZ5RK
F5-6800J3445G32GX2-TZ5RS	F5-6800J3245G16GX2-TZ5RK
F5-7200J3445G16GX2-TZ5RS	F5-6800J3442G16GX2-TZ5RK
F5-7600J3646G16GX2-TZ5RS	F5-6800J3444G32GX2-TZ5RK
F5-7800J3848G16GX2-TZ5RS	F5-6800J3445G16GX2-TZ5RK
F5-7200J3445G32GX2-TZ5RS	F5-6800J3445G32GX2-TZ5RK
F5-7600J3645G16GX2-TZ5RS	F5-7200J3444G16GX2-TZ5RK
F5-7800J3845H16GX2-TZ5RS	F5-7200J3445G16GX2-TZ5RK
F5-8000J4045H16GX2-TZ5RS	F5-7200J3646G32GX2-TZ5RK
F5-7800J3646H16GX2-TZ5RS	F5-7466J3648G16GX2-TZ5RK
F5-8000J4050H16GX2-TZ5RS	F5-7600J3646G16GX2-TZ5RK
F5-8000J3848H16GX2-TZ5RS	F5-7600J3648G16GX2-TZ5RK
F5-8000J3646I16GX2-TZ5RS	F5-6000J3038F16GX2-TZ5NR
F5-7600J3545G32GX2-TZ5RS	F5-5600J2834F16GX2-TZ5NR
F5-8000J4049H16GX2-TZ5RS	F5-5600J2834F32GX2-TZ5NR
F5-7800J3847H16GX2-TZ5RS	F5-5600J3036D16GX2-TZ5NR
F5-7800J3848H16GX2-TZ5RS	F5-6000J3040G32GX2-TZ5NR
	F5-6000J3238F16GX2-TZ5NR
	F5-8000J4050H16GX2-TZ5RK
	F5-8000J4049H16GX2-TZ5RK
	F5-7800J3845H16GX2-TZ5RK
	F5-8000J4045H16GX2-TZ5RK
	F5-7800J3848H16GX2-TZ5RK
	F5-8000J3848H16GX2-TZ5RK
	F5-7200J3445G32GX2-TZ5RK
	F5-7600J3645G16GX2-TZ5RK
	F5-8000J3646I16GX2-TZ5RK
	F5-7600J3545G32GX2-TZ5RK
	F5-7800J3847H16GX2-TZ5RK



## 2. Test Summary

Emission			
Standard	Test Type	Result	Remarks
EN 55032: 2015+A1: 2020 BS EN 55032: 2015+A1: 2020	Conducted Emission	PASS	Meet Class B Limit
	Asymmetric mode Conducted emissions	N/A	N/A
	Conducted differential voltage emissions	N/A	N/A
	Radiated Emission	PASS	Meet Class B Limit
EN IEC 61000-3-2: 2019+A1: 2021 BS EN IEC 61000-3-2: 2019+A1: 2021	Harmonic current Emissions	N/A	N/A
EN 61000-3-3: 2013+A1: 2019 BS EN 61000-3-3: 2013+A1: 2019	Voltage fluctuation & Flicker	N/A	N/A

Immunity (EN 55035: 2017+A11: 2020)				
Standard	Test Type	Minimum Performance Criteria	Result	
IEC 61000-4-2: 2008	ESD	Criterion B	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3: 2020	RS	Criterion A	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4: 2012	EFT	Criterion B	N/A	N/A
IEC 61000-4-5: 2014/ AMD1: 2017	Surge	Criterion B	N/A	N/A
IEC 61000-4-6: 2013	CS	Criterion A	N/A	N/A
IEC 61000-4-8: 2009	Magnetic Field	Criterion A	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-11: 2020	Dip	Criterion B / Criterion C <sup>note1</sup>	N/A	N/A
	Interruption	Criterion C	N/A	N/A

Note: 1. Voltage dips residual voltage <5 %, Performance criteria: Criterion B;  
Voltage dips residual voltage 70%, Performance criteria: Criterion C;

Remark: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

### 3. Test Specifications

#### 3.1 Standards

**EN 55032: 2015+A1: 2020 / BS EN 55032: 2015+A1: 2020** Electromagnetic compatibility of multimedia equipment - Emission requirements

**EN IEC 61000-3-2: 2019+A1: 2021 / BS EN IEC 61000-3-2: 2019+A1: 2021** Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)

**EN 61000-3-3: 2013+A1: 2019 / BS EN 61000-3-3: 2013+A1: 2019** Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connection

**EN 55035: 2017+A11: 2020 / BS EN 55035: 2017+A11: 2020** Electromagnetic compatibility of multimedia equipment. Immunity requirements

#### 3.2 Classification of MME

The MME equipment defines Class A equipment and Class B equipment associated with two types of end-use environment.

The Class B requirements for equipment are intended to offer adequate protection to broadcast services within the residential environment.

Equipment intended primarily for use in a residential environment shall meet the Class B limits. All other equipment shall comply with the Class A limits.

Broadcast receiver equipment is class B equipment.

### 3.3 Performance criteria

The performance criteria listed below are based on those regulated in the standard.

#### Criteria A:

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

#### Criteria B:

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

#### Criteria C:

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

**TEST REPORT****3.4 Mode of operation during the test**

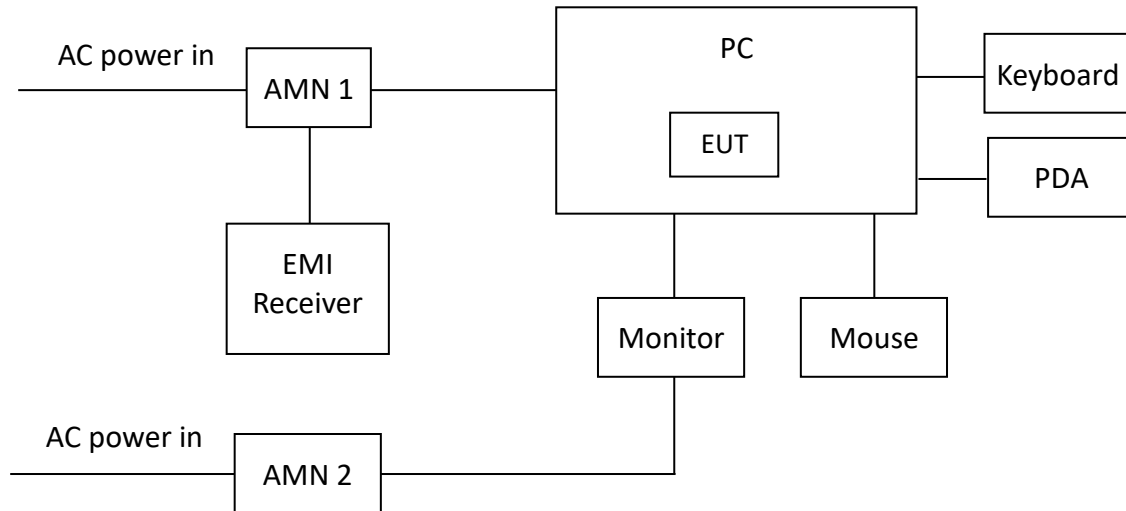
1. Install the EUT to the PC.
2. Tester executed test program "RunMemtest pro".

**3.5 Peripherals equipment**

Peripherals	Brand	Model No.	Serial No.	Description of Data Cable
PC	ASUSTEK	ROG MAXIMUS Z690 HERO	N/A	N/A
Keyboard	Microsoft	1366	N/A	N/A
PDA	HP	IPAQ112	N/A	N/A
Mouse	HP	MOHQQUO	N/A	N/A
Monitor	DELL	P2415qb	N/A	N/A

## 4. Conducted Emission Test

### 4.1 Test Procedure



The EUT along with its peripherals were placed on a 1.0 meter(W)×1.5meter(L) and 0.8 meter in height wooden table and the EUT was adjusted to maintain a 0.4meter space from a vertical reference plane. The EUT was connected to power mains through a Artificial Mains Network (AMN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.

The excess power cable between the EUT and the AMN was bundled. All connecting cables of EUT and peripherals were moved to find the maximum emission

### 4.2 Test Equipment

Test Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	R&S	ESCS30	825788/014	2022/04/08	2023/04/07
AMN	R&S	ESH3-Z5	835239/023	2022/07/26	2023/07/25
AMN	R&S	ENV216	101160	2022/07/13	2023/07/12
CON-2 Cable	SUHNER	EMCCFD300-BM-NM-6000	170502	2022/04/29	2023/04/28
Test software	Audix	e3	V4.20040112L	NCR	NCR

Note: No Calibration Required (NCR).

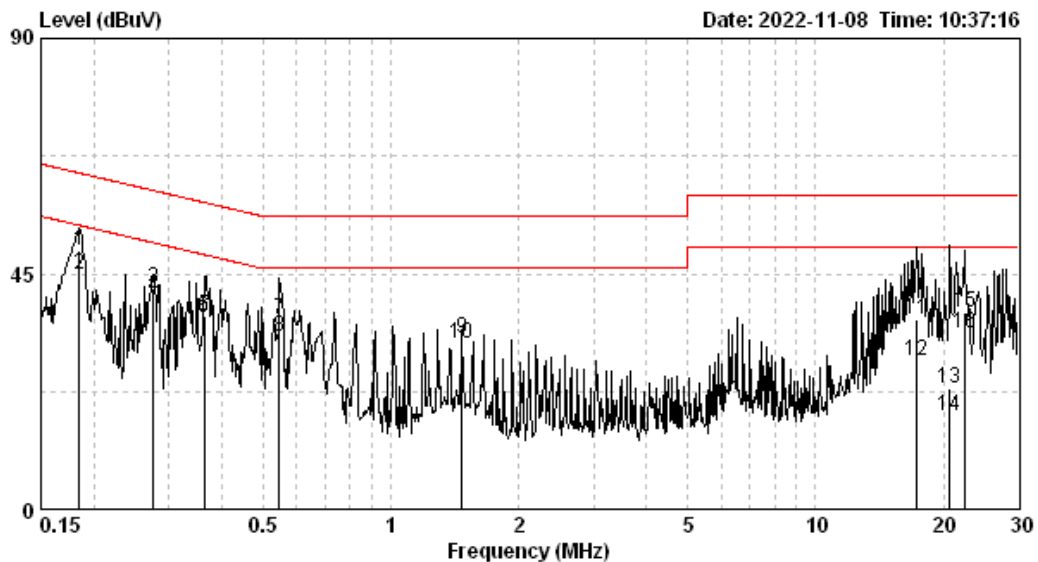
**4.3 Conducted Emission Limit**

Frequency (MHz)	Maximum RF Line Voltage	
	Class B Equipment (dB $\mu$ V)	
	Q.P.	Avg.
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.0	60	50

## TEST REPORT

### 4.4 Conducted Emission Data

Model No.:	F5-7800J3848G16GX2-TZ5RK
Remark:	N/A

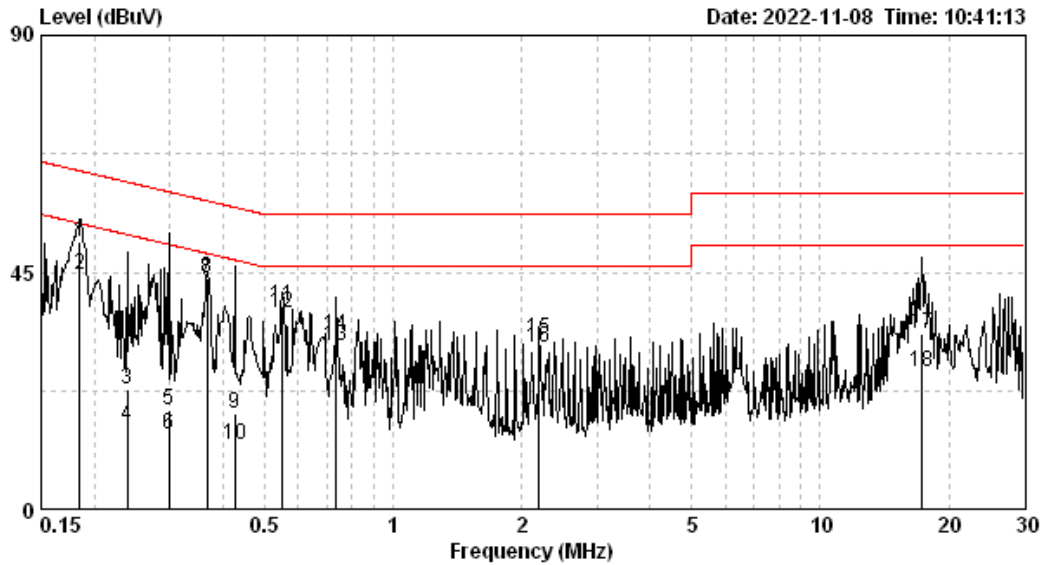


Test voltage :AC 230V/50Hz  
 Temp. / R.H. :22°C / 52%RH  
 Atmospheric pressure :1002hPa

Phase	Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB)	
									QP	AV
LINE	0.184	9.65	39.69	49.34	64.28	35.31	44.96	54.28	-14.94	-9.32
LINE	0.276	9.65	32.42	42.07	60.94	30.85	40.50	50.94	-18.87	-10.44
LINE	0.363	9.66	27.39	37.05	58.65	27.09	36.75	48.65	-21.60	-11.90
LINE	0.546	9.66	26.44	36.10	56.00	23.20	32.86	46.00	-19.90	-13.14
LINE	1.472	9.70	22.88	32.58	56.00	21.82	31.52	46.00	-23.42	-14.48
LINE	17.291	9.83	26.59	36.42	60.00	18.67	28.50	50.00	-23.58	-21.50
LINE	20.704	9.86	13.23	23.09	60.00	7.98	17.84	50.00	-36.91	-32.16
LINE	22.416	9.90	27.76	37.66	60.00	23.59	33.49	50.00	-22.34	-16.51

Remark:

1. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)



Test voltage :AC 230V/50Hz  
 Temp. / R.H. :22°C / 52%RH  
 Atmospheric pressure :1002hPa

Phase	Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBUV)	Level QP (dBUV)	Limit QP (dBUV)	Reading AV (dBUV)	Level AV (dBUV)	Limit AV (dBUV)	Margin (dB)	
									QP	AV
NEUTRAL	0.184	9.66	41.09	50.75	64.28	35.00	44.66	54.28	-13.53	-9.62
NEUTRAL	0.239	9.66	13.00	22.66	62.13	6.05	15.71	52.13	-39.47	-36.42
NEUTRAL	0.299	9.66	9.11	18.77	60.28	4.37	14.03	50.28	-41.50	-36.24
NEUTRAL	0.367	9.67	34.27	43.94	58.56	33.86	43.53	48.56	-14.63	-5.04
NEUTRAL	0.426	9.67	8.55	18.22	57.33	2.63	12.30	47.33	-39.11	-35.03
NEUTRAL	0.552	9.68	28.98	38.66	56.00	27.54	37.22	46.00	-17.34	-8.78
NEUTRAL	0.735	9.69	23.35	33.04	56.00	21.42	31.11	46.00	-22.96	-14.89
NEUTRAL	2.201	9.71	22.68	32.39	56.00	20.79	30.50	46.00	-23.61	-15.50
NEUTRAL	17.291	9.89	23.31	33.20	60.00	16.03	25.92	50.00	-26.80	-24.08

Remark:

1. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
2. Level (dBUV) = Corr. Factor (dB) + Reading (dBUV)
3. Margin (dB) = Level (dBUV) – Limit (dBUV)

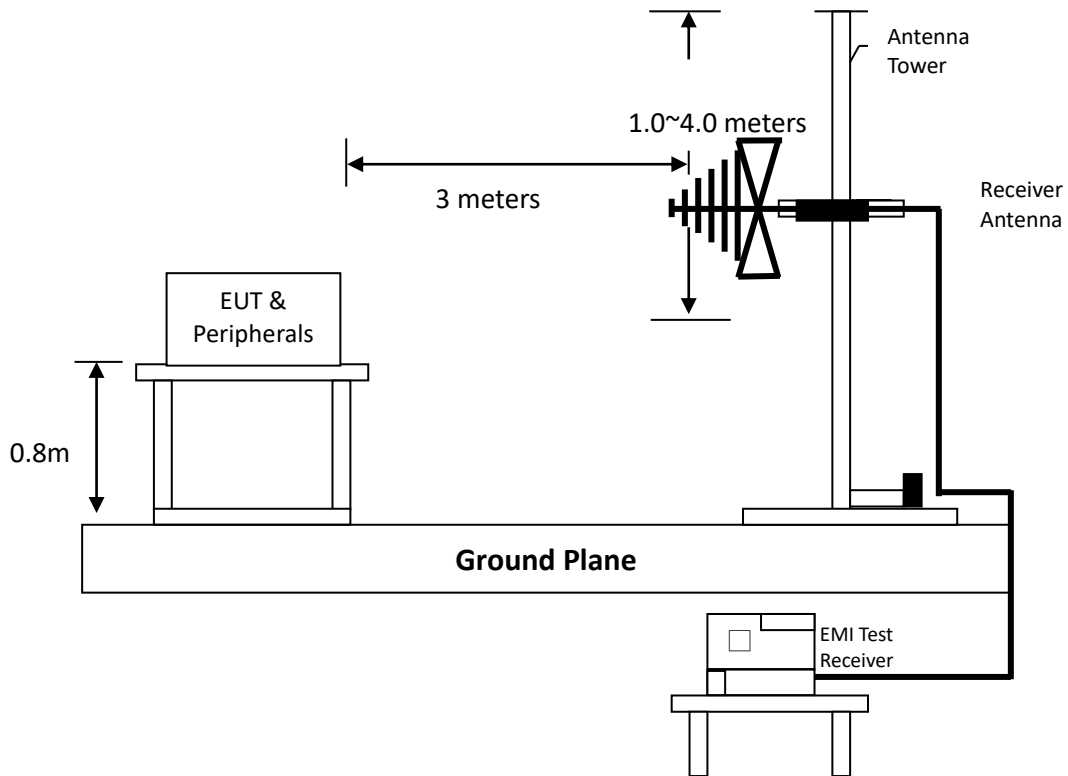


### 5. Radiated Emission Test

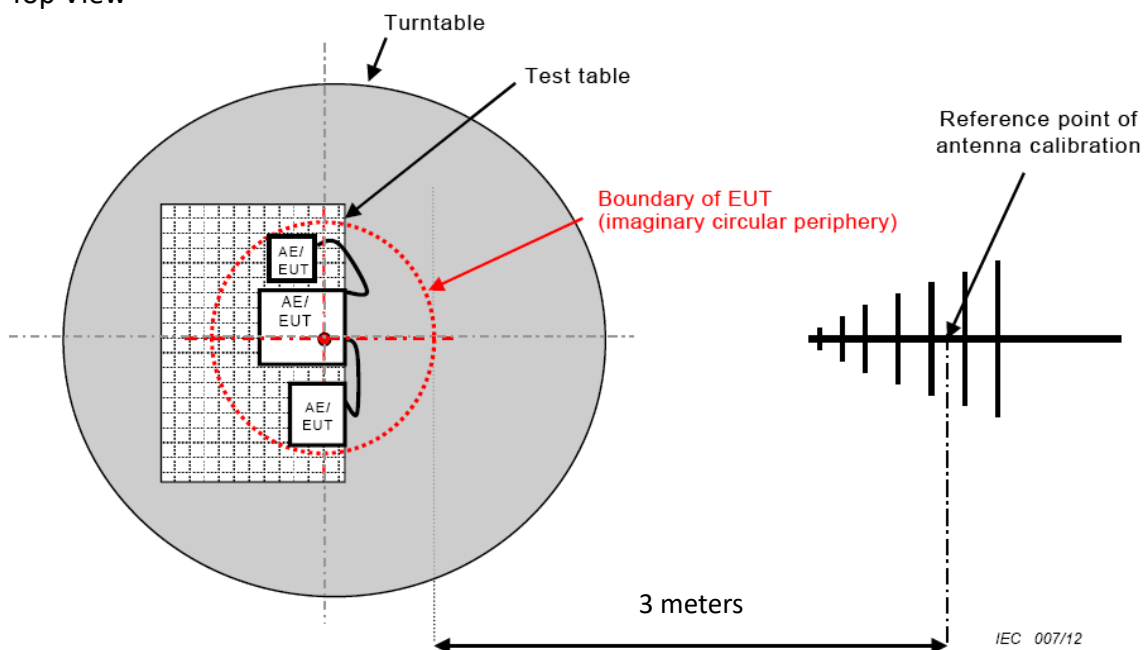
#### 5.1.1 Test Procedure from 30 MHz to 1000 MHz

The figure below shows the test setup, which is utilized to make these measurements.

Side View



Top View



**TEST REPORT**

Radiated testing was performed at a 3 meters semi-anechoic chamber. The equipment under test were placed on a turntable top 0.8 meter above ground. The table was 360 degrees to determine the position of the highest radiation. EUT is set 3 meters from the EMI receiving antenna, which is mounted on a variable height mast. The antenna height is varied between one meter and four meters above ground to find the maximum value of the field strength. Both horizontal polarization and vertical polarization of the antenna was set to conduct the measurement.

The bandwidth was set on the EMI meter 120 kHz.

The levels are quasi peak value readings. The frequency spectrum from 30 MHz to 1000 MHz was investigated.

**5.1.2 Test Equipment**

Test Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	R&S	ESU40	100381	2022/05/16	2023/05/15
Bi-log Hybrid Antenna	ETC	MCTD2786	BL13S03017	2022/05/19	2023/05/18
966-1(A) Cable	SUHNER	SMA / SUCOFLEX 104	29510614	2022/04/08	2023/04/07
966-1(B) Cable	JUNFLON	SMA / J12J100880-00	AUG-26-08-001	2022/04/08	2023/04/07
966-1_3m Semi-Anechoic Chamber	966_1	CEM-966_1	N/A	2022/01/07	2023/01/06
Test software	Audix	e3	V4.20040112L	NCR	NCR

Note: No Calibration Required (NCR).

**5.1.3 Radiated Emission Limit**

Frequency (MHz)	Distance(m)	Class B Equipment (dBµV/m)
30 to 230	3	40
230 to 1000	3	47

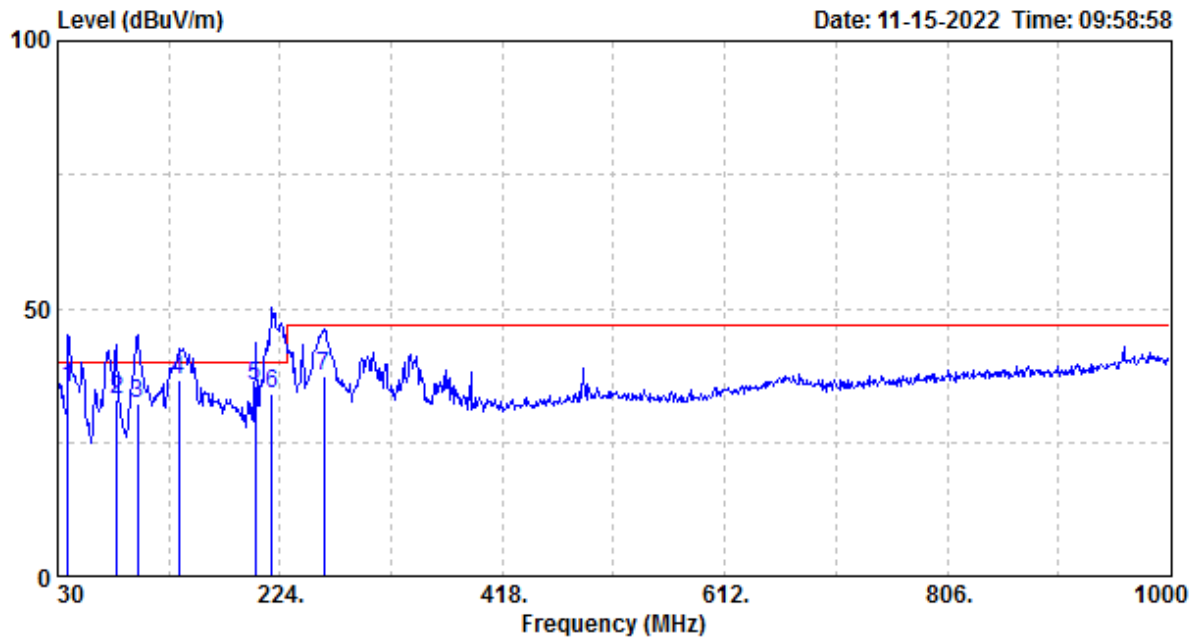
Note:

1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the EUT to antenna.

## TEST REPORT

### 5.1.4 Radiated Emission Test Data from 30 MHz to 1000 MHz

Model No.:	F5-7800J3848G16GX2-TZ5RK
Remark:	N/A

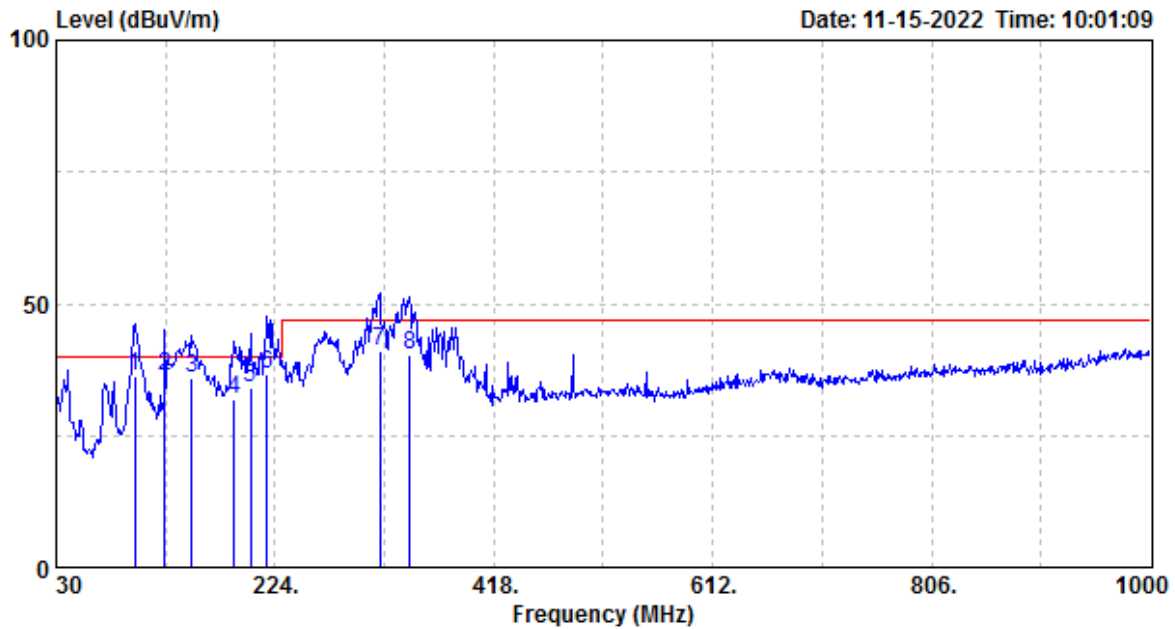


Testing Voltage :AC 230V / 50Hz  
 Temp. :32 °C  
 Relative Humidity :55 %RH  
 Atmospheric pressure:1003 hPa

Freq	Pol/Phase	Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz		dB	dBuV	dBuV/m	dBuV/m	dB	
38.730	VERTICAL	22.62	12.41	35.03	40.00	-4.97	QP
81.410	VERTICAL	16.83	16.26	33.09	40.00	-6.91	QP
99.840	VERTICAL	20.00	12.13	32.13	40.00	-7.87	QP
135.730	VERTICAL	21.19	15.26	36.45	40.00	-3.55	QP
202.660	VERTICAL	19.51	15.96	35.47	40.00	-4.53	QP
217.210	VERTICAL	20.67	13.55	34.22	40.00	-5.78	QP
261.830	VERTICAL	22.95	14.29	37.24	47.00	-9.76	QP

Remark:

- Factor = Antenna Factor (dB/m) + Cable Loss (dB)
- Level (dBμV/m) = Factor (dB) + Read Level (dBμV)
- Over Limit (dB) = Level (dBμV/m) – Limit Line (dBμV/m)



Testing Voltage :AC 230V / 50Hz  
 Temp. :32 °C  
 Relative Humidity :55 %RH  
 Atmospheric pressure:1003 hPa

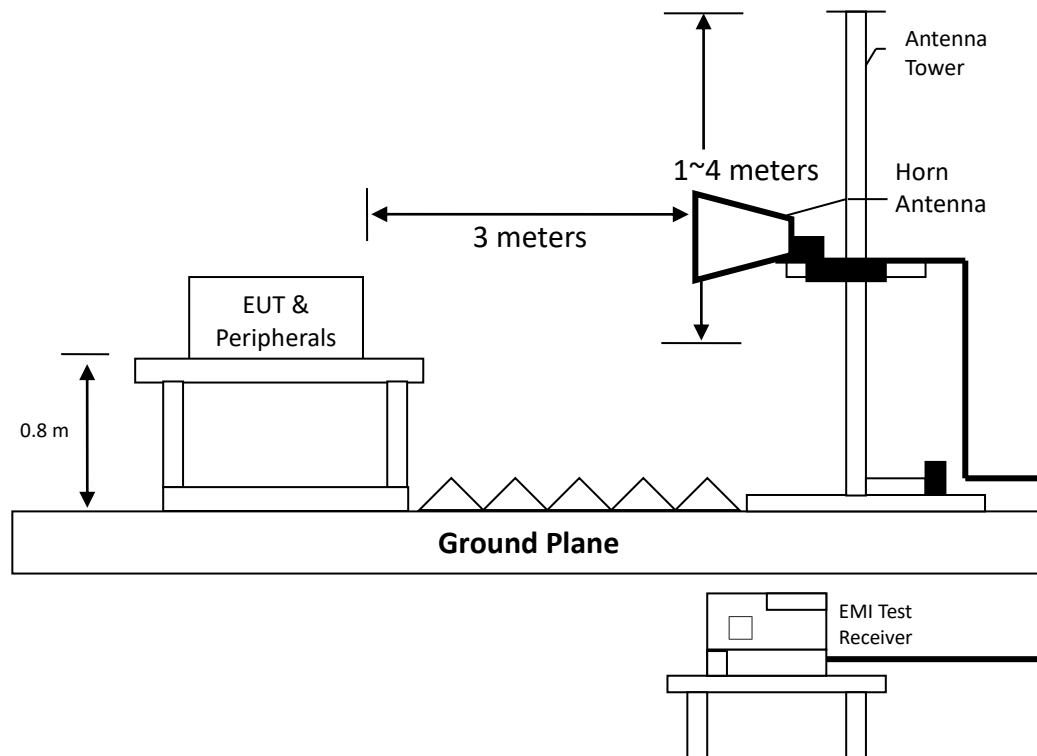
Freq	Pol/Phase	Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz		dB	dBuV	dBuV/m	dBuV/m	dB	
99.840	HORIZONTAL	20.00	16.30	36.30	40.00	-3.70	QP
126.030	HORIZONTAL	20.99	15.13	36.11	40.00	-3.89	QP
150.280	HORIZONTAL	21.37	14.63	36.00	40.00	-4.00	QP
188.110	HORIZONTAL	18.76	13.20	31.96	40.00	-8.04	QP
202.660	HORIZONTAL	19.51	14.66	34.17	40.00	-5.83	QP
217.210	HORIZONTAL	20.67	16.07	36.74	40.00	-3.26	QP
317.120	HORIZONTAL	24.22	16.89	41.11	47.00	-5.89	QP
343.310	HORIZONTAL	24.84	15.33	40.16	47.00	-6.84	QP

Remark:

1. Factor = Antenna Factor (dB/m) + Cable Loss (dB)
2. Level (dBμV/m) = Factor (dB) + Read Level (dBμV)
3. Over Limit (dB) = Level (dBμV/m) – Limit Line (dBμV/m)

### 5.2.1 Test Procedure above 1 GHz

The figure below shows the test setup, which is utilized to make these measurements.



Radiated testing was performed at a 3 meters semi-anechoic chamber. The equipment under test were placed on a turntable top 0.8 meter above ground. The table was 360 degrees to determine the position of the highest radiation. EUT is set 3 meters from the EMI receiving antenna, which is mounted on a variable height mast. The antenna height is varied between one meter and four meters above ground to find the maximum value of the field strength. Both horizontal polarization and vertical polarization of the antenna was set to conduct the measurement.

The bandwidth was set on the EMI meter 1 MHz.

The levels are peak and average value readings. The frequency spectrum above 1 GHz was investigated.

**TEST REPORT**

**5.2.2 Test Equipment**

Test Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	R&S	ESU40	100381	2022/05/16	2023/05/15
Horn Antenna	EMCO	3115	9906-5822	2022/05/11	2023/05/10
Pre-Amplifier	AML	AML0120L3401	0419-114	2022/01/17	2023/01/16
966-1(A) Cable	SUHNER	SMA / SUCOFLEX 104	29510614	2022/04/08	2023/04/07
966-1(B) Cable	JUNFLON	SMA / J12J100880-00	AUG-26-08-001	2022/04/08	2023/04/07
966-1_3m Semi-Anechoic Chamber	966_1	CEM-966_1	N/A	2022/01/07	2023/01/06
Test software	Audix	e3	V4.20040112L	NCR	NCR

Note: No Calibration Required (NCR).

**5.2.3 Radiated Emission Limit**

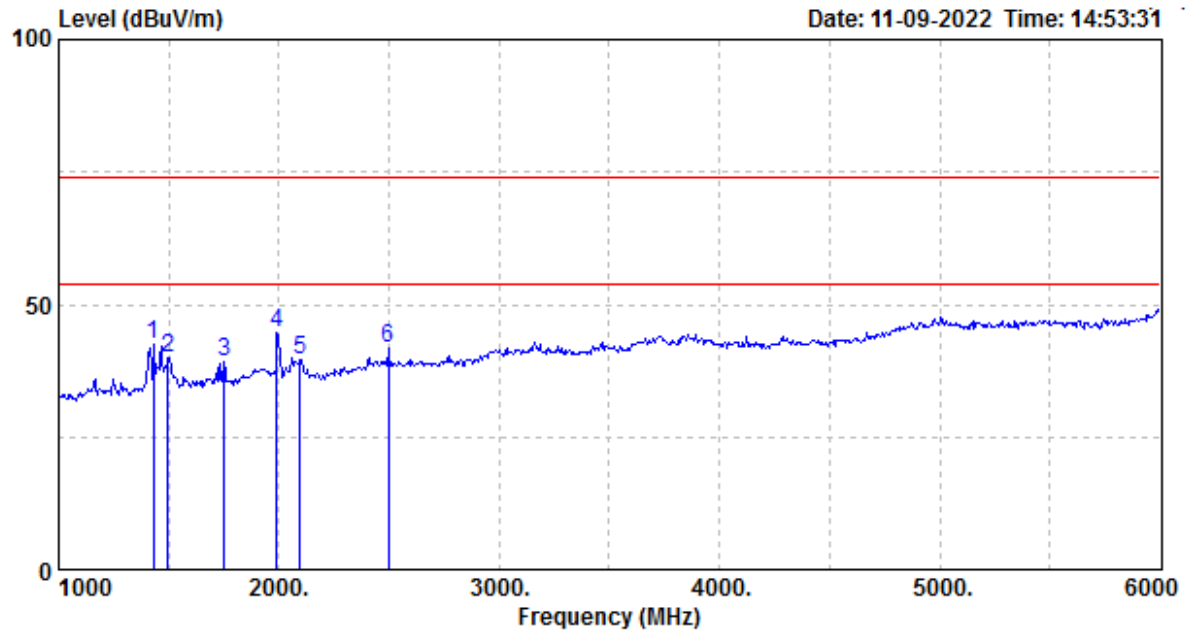
Frequency (GHz)	Distance (meter)	Class B Equipment	
		Average limit (dB $\mu$ V/m)	Peak limit (dB $\mu$ V/m)
1 to 6	3	54	74

Note: The lower limit applies at the transition frequency.

## TEST REPORT

### 5.2.4 Radiated Emission Test Data above 1 GHz

Model No.:	F5-7800J3848G16GX2-TZ5RK
Remark:	N/A

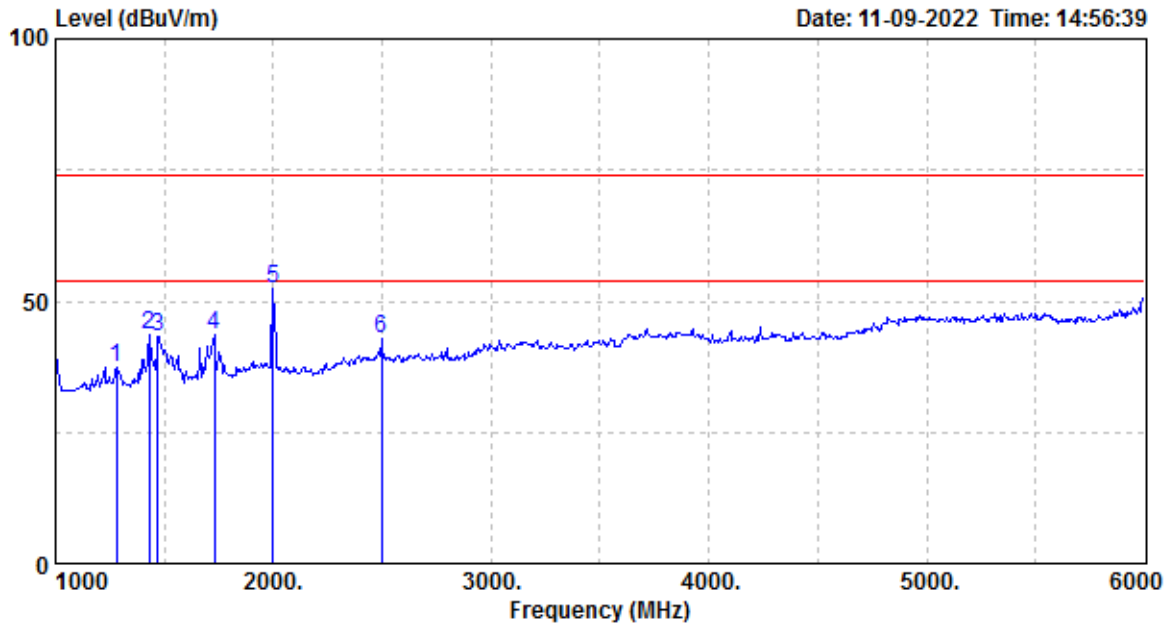


Testing Voltage :AC 230V / 50Hz  
 Temp. :26 °C  
 Relative Humidity :55 %RH  
 Atmospheric pressure:1003 hPa

Freq	Pol/Phase	Factor	Read Level	Level	Limit Line	Over Limit	Remark
MHz		dB	dBuV	dBuV/m	dBuV/m	dB	
1430.000	VERTICAL	4.91	37.56	42.46	74.00	-31.54	Peak
1495.000	VERTICAL	5.24	34.71	39.95	74.00	-34.05	Peak
1750.000	VERTICAL	6.95	32.24	39.19	74.00	-34.81	Peak
1990.000	VERTICAL	7.98	36.59	44.57	74.00	-29.43	Peak
2095.000	VERTICAL	7.97	31.67	39.64	74.00	-34.36	Peak
2495.000	VERTICAL	9.88	31.88	41.76	74.00	-32.24	Peak

Remark:

- Level (dBuV/m) = Factor (dB) + Read Level (dBuV)
- Factor = Antenna Factor (dB/m) + Cable Loss (dB) – Amplifier Gain (dB)  
 (\*The Amplifier Gain depended on measure equipment, see test equipment list.)
- Over Limit (dB) = Level (dBuV/m) – Limit Line (dBuV/m)



Testing Voltage :AC 230V / 50Hz  
 Temp. :26 °C  
 Relative Humidity :55 %RH  
 Atmospheric pressure:1003 hPa

Freq	Pol/Phase	Factor	Read Level	Level	Limit	Over	Remark
MHz		dB	dBuV	dBuV/m	dBuV/m	dB	
1280.000	HORIZONTAL	3.65	33.61	37.26	74.00	-36.74	Peak
1430.000	HORIZONTAL	4.91	38.67	43.57	74.00	-30.43	Peak
1470.000	HORIZONTAL	5.20	38.05	43.24	74.00	-30.76	Peak
1730.000	HORIZONTAL	6.57	36.84	43.41	74.00	-30.59	Peak
2000.000	HORIZONTAL	8.00	44.42	52.42	74.00	-21.58	Peak
2495.000	HORIZONTAL	9.88	32.87	42.75	74.00	-31.25	Peak

Remark:

1. Level (dBμV/m) = Factor (dB) + Read Level (dBμV)
2. Factor = Antenna Factor (dB/m) + Cable Loss (dB) – Amplifier Gain (dB)  
 (\*The Amplifier Gain depended on measure equipment, see test equipment list.)
3. Over Limit (dB) = Level (dBμV/m) – Limit Line (dBμV/m)



## **6. Harmonics Test**

Since the EUT is not connected to AC source, therefore, the test can be waived.

## **7. Voltage Fluctuations-Flicker Test**

Since the EUT is not connected to AC source, therefore, the test can be waived.

**TEST REPORT****8. Electrostatic Discharge Immunity Test****8.1 Purpose**

The object of the test is to evaluate the ESD immunity performance of EUT.

**8.2 Test Set-Up**

A horizontal coupling plane (HCP) was placed on a non-metallic table 0.8 meter above a reference ground plane (RGP) and connected to it with a cable with two 470 k $\Omega$  resistors. The EUT was placed on an insulation sheet on the HCP and was operated according to the specified operating mode.

A vertical coupling plane (VCP) was connected to the RGP with a cable with two 470 k $\Omega$  resistors.

**8.3 Test Specification**

Test level: Contact discharge ----- +/- 4 kV

Single discharge at 1 second interval positive discharge and negative discharge

The selected test points are listed in this table, the numbers refer to the figures attached.

**8.4 Test Equipment**

Test Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Electrostatic Discharge System	NoiseKen	ESS-2002	ESS0291088	2022/07/20	2023/07/19

**TEST REPORT**

**8.5 Test Result**

Temperature:	22	°C	Model No.:	F5-7800J3848G16GX2-TZ5RK
Relative Humidity:	55	%RH	Test Date :	2022/11/15
Atmospheric Pressure:	1006	hPa	Test Voltage:	230Vac, 50Hz
Remark:	N/A			

Point of Discharge	Applied Voltage (kV)	Number of Discharge	Test Result	Performance Criterion
VCP (4 sides)	±4	20	PASS	A
HCP (4 sides)	±4	20	PASS	A

**Description of Discharge Point**

Contact Discharge <u>0</u> Test points		Air Discharge	
<input type="checkbox"/>	Metallic Screws	<input type="checkbox"/>	Plastic Screws
<input type="checkbox"/>	Metallic Case	<input type="checkbox"/>	Plastic Case (gap)
<input type="checkbox"/>	Metallic Connect ports	<input type="checkbox"/>	Plastic Connect ports
<input type="checkbox"/>	Metallic Junctions	<input type="checkbox"/>	Plastic Junctions
<input type="checkbox"/>	Others:	<input type="checkbox"/>	LED indicator
		<input type="checkbox"/>	Panel Board
		<input type="checkbox"/>	Others:

**TEST REPORT****9. Radiated, Radio-Frequency, Electromagnetic Field Immunity Test****9.1 Purpose**

This test method subjects the EUT to a power source of disturbance comprising electric and magnetic field, simulating those coming from intentional RF transmitters.

**9.2 Test Set-Up**

The EUT was placed on a non-metallic table 0.8 meter above the reference ground plane (RGP) and was operated according to its specified operating mode.

Ferrite tiles/absorbers were placed on the RGP between the EUT and the antenna to reduce the reflections from the RGP. The EUT and its cables were exposed for the electromagnetic field for 1.5meter vertically and 1.5m horizontally.

The distance between antenna and EUT is 3 meter.

**9.3 Test Specification**

Frequency range	Test field strength V/m	Modulation
80MHz ~ 1GHz	3	1 kHz 80% AM
1800MHz $\pm 1$ %		
2600MHz $\pm 1$ %		
3500MHz $\pm 1$ %		
5000MHz $\pm 1$ %		

The frequency steps : 1 % , Log sweep

Dwell time : 3 sec

Test ports : Enclosure port

**TEST REPORT**

**9.4 Test Equipment**

Test Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
733 Compact Full Anechoic Chamber	Comtest	9708093	N/A	2022/09/08	2023/09/07
Signal Generator	R&S	SMB100A	102385	2022/02/14	2023/02/13
Field Meter	Narda	NBM-520	D-1426	2021/12/11	2022/12/10
Field Probe	Narda	EF0691	H-0199	2021/12/11	2022/12/10
Power Amplifier	MILMEGA	80RF1000-600	1076330	NCR	NCR
Power Amplifier	MILMEGA	AS0860B-50/50	1076334	NCR	NCR
Log Periodic Antenna	AR	ATL80M1G	0345624	NCR	NCR
Broadband Antenna	FRANKONIA	BTA-S	BTA-S-802	NCR	NCR
Test software	Audix	i2	V5.160923	NCR	NCR

Note: No Calibration Required (NCR).

**9.5 Generation of the Electromagnetic Field**

The electromagnetic field is generated from a computer controlled signal generator. The output power is amplified and then radiated from broadband log periodic antennas. For each sweep a pre-recorded empty chamber calibration file is used to establish the required field strength. When using these files the field strength inside an area of 1.5/1.0 meter x 1.5 meter is in accordance with the standard.

**TEST REPORT**

**9.6 Test Results**

Temperature:	22	°C	Model No.:	F5-7800J3848G16GX2-TZ5RK
Relative Humidity:	55	%RH	Test Date :	2022/11/11
Atmospheric Pressure:	1006	hPa	Test Voltage:	230Vac, 50Hz
Remark:	N/A			

Exposed Side:  Front    Left    Rear    Right

Frequency	Antenna Polarization	Test Level	Test Result	Performance Criterion
80 MHz to 1 GHz	Vertical	3V/m	PASS	A
80 MHz to 1 GHz	Horizontal	3V/m	PASS	A
1800MHz ±1 %	Vertical	3V/m	PASS	A
1800MHz ±1 %	Horizontal	3V/m	PASS	A
2600MHz ±1 %	Vertical	3V/m	PASS	A
2600MHz ±1 %	Horizontal	3V/m	PASS	A
3500MHz ±1 %	Vertical	3V/m	PASS	A
3500MHz ±1 %	Horizontal	3V/m	PASS	A
5000MHz ±1 %	Vertical	3V/m	PASS	A
5000MHz ±1 %	Horizontal	3V/m	PASS	A

## **10. Electrical Fast Transient/Burst Immunity Test**

Since the EUT is not connected to AC source, therefore, the test can be waived.



## **11. Surge Immunity Test**

Since the EUT is not connected to AC source, therefore, the test can be waived.

**TEST REPORT**

**12. Immunity to Conducted Disturbances, Inducted by Radio-Frequency Fields**

Since the EUT is not connected to AC source, therefore, the test can be waived.

**TEST REPORT**

**13. Power Frequency Magnetic Field Immunity Test**

**13.1 Purpose**

The measurement is for evaluating the performance of EUT, when subject to power frequency magnetic field disturbance.

**13.2 Test Set-Up**

The EUT was placed on a wooden table above a reference RGP with the coupling loop antenna arrange the EUT on the RGP.

**13.3 Test Condition**

Test levels for continuous field

Level	Magnetic field strength (A/m)
1	1
2	3
3	10
4	30
5	100
X <sup>(1)</sup>	Special
Note: 1. "x" is an open level. This level can be given in the product specification.	

Test levels for short duration: 1s to 3s

Level	Magnetic field strength (A/m)
1	n.a <sup>(2)</sup>
2	n.a <sup>(2)</sup>
3	n.a <sup>(2)</sup>
4	300
5	1000
X <sup>(1)</sup>	Special
Note: 1. "x" is an open level. This level, as well the duration of the test, can be given in this product specification. 2. "n.a" = not applicable	

**TEST REPORT**

**13.4 Test Equipment.**

Test Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Induction Coil Interface	Teseq	INA 2141	1440	2022/09/28	2023/09/27
Magneticfield Coil	Teseq	INA 703	2021	2022/09/28	2023/09/27
Test software	Teseq	Win2120	V 6.00	NCR	NCR

Note: No Calibration Required (NCR).

**13.5 Test Result**

Temperature:	22	°C	Model No.:	F5-7800J3848G16GX2-TZ5RK
Relative Humidity:	55	%RH	Test Date :	2022/11/11
Atmospheric Pressure:	1006	hPa	Test Voltage:	230Vac, 50/60Hz
Remark:	N/A			

Continuous Field (50 or 60 Hz)					Short Duration				
Level	H.Field (A/m)	X	Y	Z	Level	H.Field (A/m)	X	Y	Z
		Performance Criterion					Performance Criterion		
1	1	A	A	A	1	N/A	-	-	-
2	3	-	-	-	2	N/A	-	-	-
3	10	-	-	-	3	N/A	-	-	-
4	30	-	-	-	4	300	-	-	-
5	100	-	-	-	5	1000	-	-	-
X	Special	-	-	-	X	Special	-	-	-

Note: 1. “-” means not applicable  
 2. Magnetic field ambient level: 0.03 uT

**TEST REPORT**

**14. Voltage Dips, Short Interruptions and Voltage Variations Immunity Test**

Since the EUT is not connected to AC source, therefore, the test can be waived.

**Appendix A: Uncertainty**

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

Item	Uncertainty
Conducted disturbance measurements at a mains port from 9 kHz to 30 MHz using a 50 Ω/50 μH +5Ω artificial mains network (AMN)	3.08 dB
Conducted disturbance measurements at a telecommunication port from 150 kHz to 30 MHz using an asymmetrical artificial network (AAN)	3.78 dB
Vertically polarized radiated disturbances from 30MHz~1GHz in a open area test site at a distance of 10m	5.18 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a open area test site at a distance of 10m	5.05 dB
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.16 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.02 dB
Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	5.17 dB
HARMONIC	0.39 %
FLICKER	0.17 %
ESD	7.23 %
RS	1.54 dB
RS (Audio)	1.64 dB
EFT	4.30 %
SURGE	4.20 %
CS	1.08 dB
CS (Audio)	1.18 dB
Mag.	13.00 %
DIP	0.87 %
Ring Wave	4.20 %
Immunity to low-frequency signals	0.17%

**Appendix B: Photo of EUT**



**Appendix C1: Conducted Emission Test Set-up**





**Appendix C2: Radiated Emission Test Set-up (Below 1GHz)**



**Appendix C3: Radiated Emission Test Set-up (Above 1GHz)**

