



EMC TEST REPORT

Applicant Doro AB
FCC ID WS5DFC0270
Product 4G Clamshell Smart Feature Phone
Brand Doro
Model DFC-0270
Report No. R2103A0299-E1
Issue Date June 17, 2021

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2020)/ ANSI C63.4 (2014)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of measurement results

Number	Test Case	Clause in FCC Rules	Conclusion
1	Radiated Emission	FCC Part15.109, ANSI C63.4-2014	PASS
2	Conducted Emission	FCC Part15.107, ANSI C63.4-2014	PASS
Date of Testing: August 23, 2020 ~September 15, 2020 and May 8, 2021 ~ June 9, 2021			
Date of Sample Received: August 23, 2020			
Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

This report is only used for changes software version and Hardware Version code, no change in product. There is only tested Radiated Emission for variant in this report. Other test case please refer to the original report number R2008A0539-E1.

The detailed product change description please refers to the Product Change Description

DFC-0270 (Report No.: R2008A0539-E1) is a variant model of DFC-0270 (Report No.: R1905A0242-E1). All test cases were tested for variant in this report. The detailed product change description please refers to the *Product Change Description_Variant*.

1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City: Shanghai
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E-mail: fanguangchang@ta-shanghai.com

2 General Description of Equipment under Test

2.1 Applicant and Manufacturer Information

Applicant	Doro AB
Applicant address	Jörgen Kocksgatan 1B, SE 211 20 MALMÖ, SWEDEN
Manufacturer	Doro AB
Manufacturer address	Jörgen Kocksgatan 1B, SE 211 20 MALMÖ, SWEDEN

2.2 General information

EUT Description			
Device Type:	Portable Device		
Model:	DFC-0270		
IMEI:	Original	IMEI 1:356755101510963 IMEI 2:356755101510971	
	HW code 5061	IMEI 1:356755102717849 IMEI 2:356755102717856	
	HW code 5071	IMEI 1:356755102717401 IMEI 2:356755102717419	
	HW code 5081	IMEI 1:356755102759882 IMEI 2:356755102759890	
	HW code 5091	IMEI 1:356755102760245 IMEI 2:356755102760252	
	HW code 5101	IMEI 1:356755102760682 IMEI 2:356755102760690	
HW Version:	V01C(HW code: 5011/5061/5071/5081/5091/5101)		
SW Version:	DFC0270_VF292_N_S01A_V18_M210325_CE		
Antenna Type:	Internal Antenna		
Frequency:	Band	Tx (MHz)	Rx (MHz)
	GSM 1900	1850 ~ 1910	1930 ~ 1990
	WCDMA Band II	1850 ~ 1910	1930 ~ 1990
	LTE Band 7	2500 ~ 2570	2620 ~ 2690
	Bluetooth:	2402 ~ 2480	2402 ~ 2480
	WIFI 2.4G:	2412 ~ 2462	2412 ~ 2462
Modulation:	GSM: GMSK GPRS: GMSK		



	EGPRS: GMSK/8PSK WCDMA RMC: QPSK HSDPA: QPSK HSUPA: QPSK DC-HSDPA: 64QAM LTE: QPSK / 16QAM Bluetooth: GFSK, $\pi/4$ -DQPSK, 8-DPSK Bluetooth v4.2 LE: GFSK WLAN 802.11b: DSSS WLAN 802.11g/n: OFDM
EUT Accessory	
Adapter 1	Manufacturer: TEN PAO INDUSTRIAL CO.,LTD Model: S003ATB0500055 (Halogen free)
Adapter 2	Manufacturer: Dongguan Aohai Power Technology CO.,LTD Model: A31A-050055U-EU1(Halogen free)
Adapter 3	Manufacturer: Dongguan Aohai Power Technology CO.,LTD Model: A806A-050100U-UK1(Halogen free)
Adapter 4	Manufacturer: Dongguan Aohai Power Technology CO.,LTD Model: A2-501000(Halogen free)
Adapter 5	Manufacturer: Shenzhen BaiJunDa ELECTRONIC CO.,Ltd Model: UT-133E-5100
Adapter 6	Manufacturer: Mobewire Mobiles (Ningbo) Co.,Ltd Model: DFC-0240/0270 (Halogen free)
Battery 1	Manufacturer: NINGBO VEKEN BATTERY CO., LTD Model: DBX-1350A
Battery 2	Manufacturer: ZhongshanTianmao Battery Co., Ltd Model: DBX-1350B
Earphone 1	Manufacturer: Shenzhen Juwei Electronics Co.,Ltd Model: JWEP0944-M01R (Halogen free)
Earphone 2	Manufacturer: Shenzhen Juwei Electronics Co.,Ltd Model: JWEP0782-M01 (Halogen free)
USB Cable	Manufacturer: SHENZHEN FKY-QY HARDWARE ELECTRONIC CO.,LTD Model: M039B0800150 (Halogen free)
Auxiliary test equipment	
PC	PC Manufacturer: Microsoft Corporation Model: L20170076
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant. 2. There are more than one Adapter, Battery and Earphone, each one should be applied throughout the compliance test respectively, however, only the worst case (Adapter4,Battery1, Earphone1) will be recorded in this report.	



HW code	Chipset	2.8 LCD	Flash	Rear CAM
5011	MT6731	Sanlong IC7789V2	Nanya (NE1484KALAXA7-MD)	GC2385
5061	MT8765B	Sanlong IC7789V2	Nanya (NE1484KALAXA7-MD)	02M2
5071	MT6731	Sanlong IC7789V2	Nanya (NE1484KALAXA7-MD)	02M2
5081	MT8765B	Sanlong IC7789V3	Nanya (NE1484KALAXA7-MD)	02M2
5091	MT6731	Sanlong IC7789V3	Nanya (NE1484KALAXA7-MD)	02M2
5101	MT8765B	Digital IC GC9306	Nanya (NE1484KALAXA7-MD)	02M2
There are more than one Configure, each one should be applied throughout the compliance test respectively, however, only the worst case (HW code: 5101) will be recorded in this report.				

2.3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards

FCC Code CFR47 Part15B (2020)

ANSI C63.4 (2014)

2.4 Test Mode

Test Mode	
Mode 1:	Adapter +USB cable+ earphone + Front camera On
Mode 2:	Adapter +USB cable+ earphone + Rear camera On
Mode 3:	Adapter + USB cable + earphone + Mp4
Mode4:	Front Camera On +earphone + BT ON/WIFI ON
Mode 5:	Rear camera On +earphone + BT ON/WIFI ON
Mode 6:	Earphone + MP4

During the test, the preliminary test was performed in all modes with all adapters, USB and batteries, mode 1 is selected as the worst condition. The test data of the worst-case condition was recorded in this report.

3 Test Case Results

3.1 Radiated Emission

Ambient condition

Temperature	Relative humidity	Pressure
24°C~26°C	45%~50%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated signal level.

The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. During the test, the EUT is worked at maximum output power.

Set the spectrum analyzer in the following:

Below 1GHz:

RBW=100 kHz / VBW=300 kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK Detector: RBW=1MHz / VBW=3MHz/ Sweep=AUTO

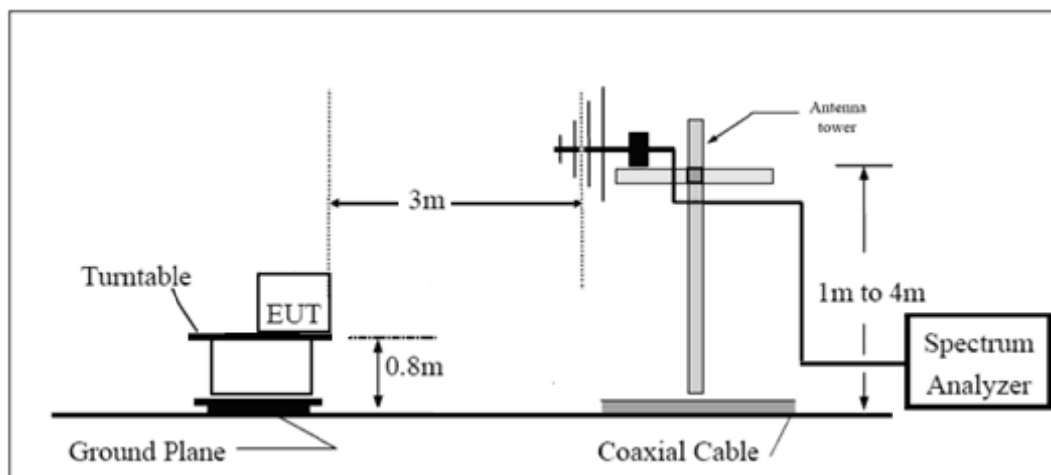
(b) AVERAGE Detector: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

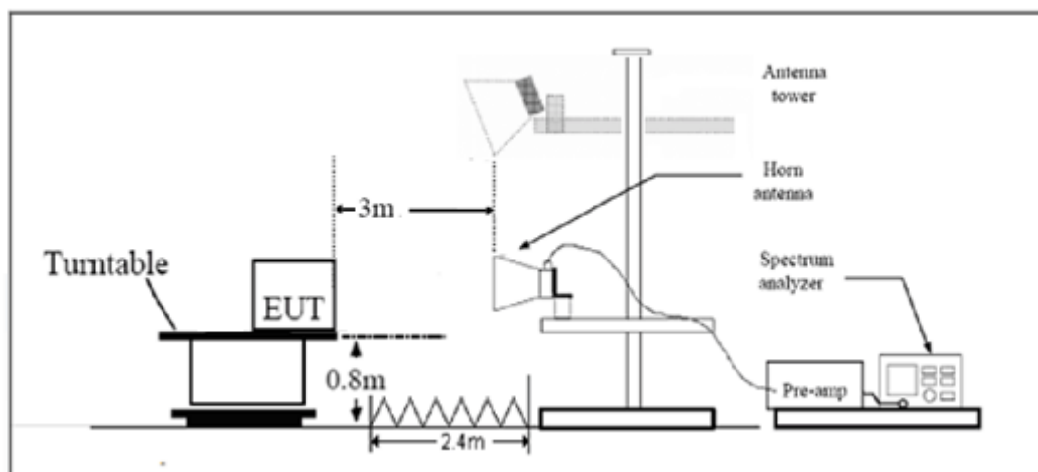
During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

Test Setup

Below 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Antenna Tower meets ANSI C63.4 requirements for measurements above 1 GHz by keeping the antenna aimed at the EUT during the antenna's ascent/ descent along the antenna mast.

Limits

Class B

Frequency (MHz)	Field Strength (dB μ V/m)	Detector
30 -88	40.0	Quasi-peak
88-216	43.5	Quasi-peak
216 – 960	46.0	Quasi-peak
960-1000	54.0	Quasi-peak
1000-5 th harmonic of the highest frequency or 40GHz, which is lower	54 74	Average Peak

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

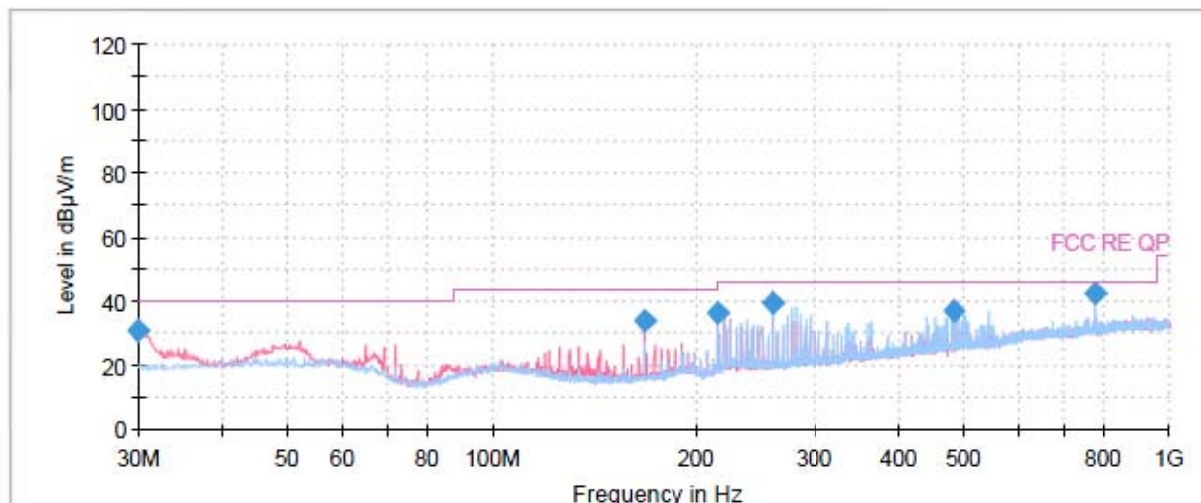
Frequency	Uncertainty
30MHz~200MHz	4.17 dB
200MHz~1000MHz	4.84 dB
1GHz~18GHz	4.35 dB
18GHz~26.5GHz	5.90 dB
26.5GHz~40GHz	5.92 dB

Test Results

Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier, the Emissions in the frequency band 18GHz- 26.5GHz is more than 20dB below the limit are not reported.

The following graphs display the maximum values of horizontal and vertical by software.

For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.

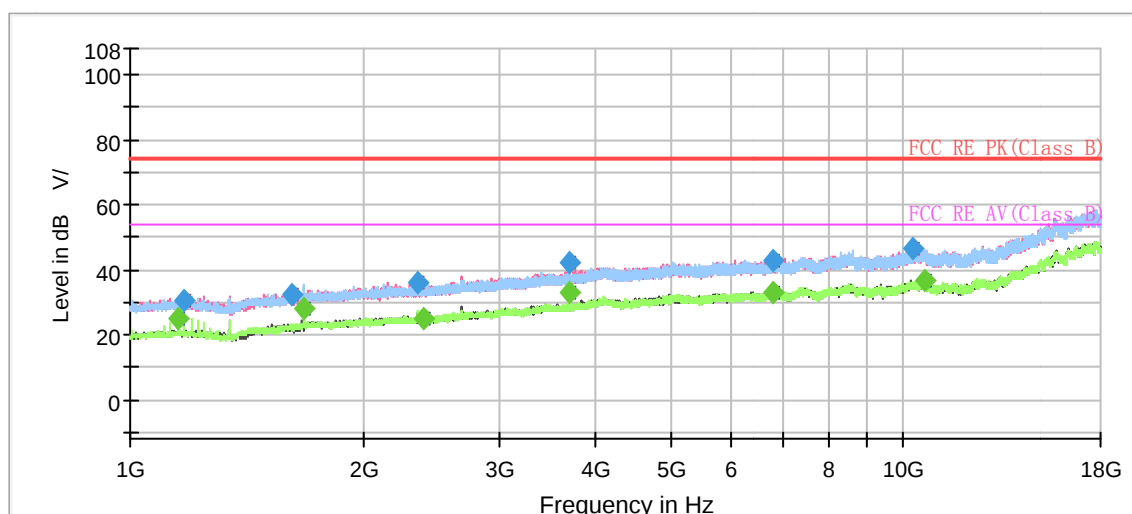


Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
30.000000	30.47	115.0	V	12.0	12.2	9.53	40.00
167.982500	33.79	100.0	V	251.0	10.0	9.71	43.50
215.997500	36.12	115.0	H	1.0	12.4	7.38	43.50
260.011250	39.13	100.0	H	132.0	13.8	6.87	46.00
481.010000	36.72	193.0	H	101.0	19.1	9.28	46.00
780.012500	42.27	105.0	H	290.0	23.4	3.73	46.00

Remark: 1. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

2. Margin = Limit – Quasi-Peak



Radiated Emission from 1GHz to 18GHz

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1151.866667	---	24.83	54.00	29.17	200.0	H	278.0	-17.5
1175.100000	30.53	---	74.00	43.47	200.0	V	161.0	-17.4
1617.100000	32.60	---	74.00	41.40	200.0	V	270.0	-15.0
1680.000000	---	27.69	54.00	26.31	200.0	H	153.0	-14.6
2352.066667	36.29	---	74.00	37.71	200.0	H	0.0	-11.3
2398.533333	---	24.90	54.00	29.10	100.0	V	0.0	-11.2
3696.200000	---	32.72	54.00	21.28	200.0	V	178.0	-5.5
3696.766667	42.33	---	74.00	31.67	200.0	V	169.0	-5.5
6787.933333	---	33.05	54.00	20.95	100.0	V	26.0	0.5
6795.300000	43.05	---	74.00	30.95	100.0	V	152.0	0.5
10274.066667	46.17	---	74.00	27.83	100.0	H	75.0	5.5
10677.533333	---	36.73	54.00	17.27	100.0	V	197.0	5.3

3.2 Conducted Emission

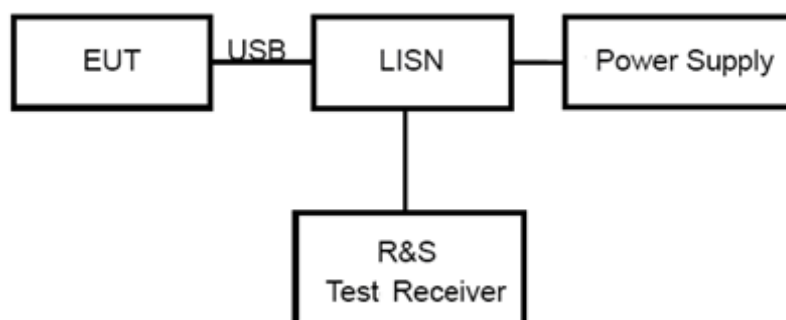
Ambient condition

Temperature	Relative humidity	Pressure
24°C ~26°C	50%~55%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

Test Setup



Note: Power Supply is AC Power source and it is used to change the voltage 120V/60Hz.

Limits

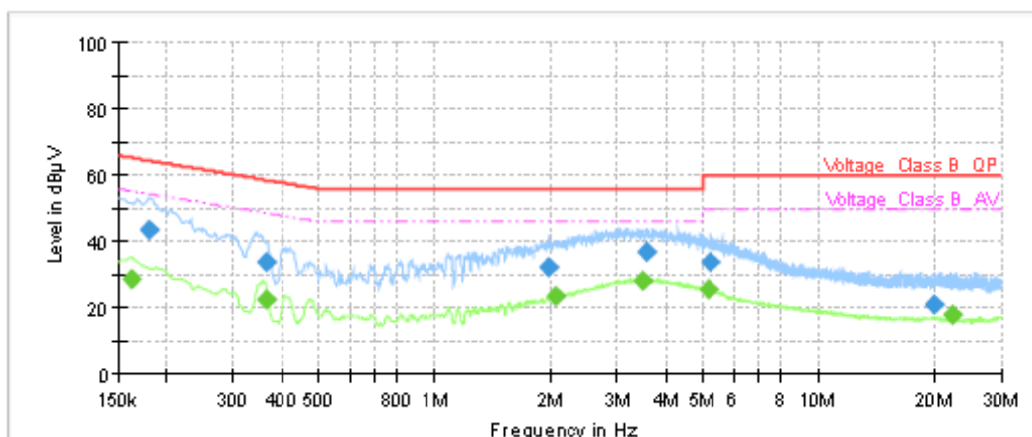
Frequency (MHz)	Conducted Limits(dB μ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50
*: Decreases with the logarithm of the frequency.		

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 2.57$ dB.

Test Results

Following plots, Blue trace uses the peak detection; Green trace uses the average detection.

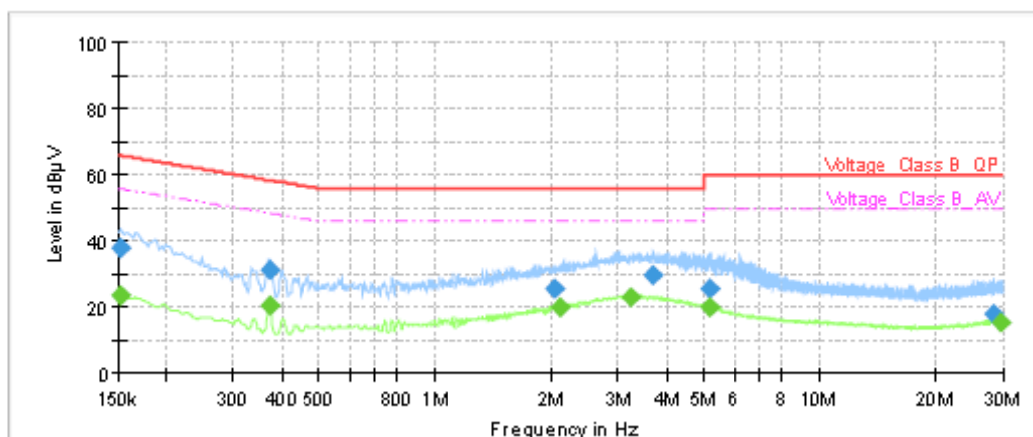


Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.16	---	28.56	55.40	26.84	1000.0	9.000	L1	ON	19
0.18	43.57	---	64.42	20.85	1000.0	9.000	L1	ON	19
0.36	---	22.63	48.64	26.01	1000.0	9.000	L1	ON	19
0.36	33.71	---	58.64	24.93	1000.0	9.000	L1	ON	19
1.98	32.20	---	56.00	23.80	1000.0	9.000	L1	ON	19
2.07	---	23.36	46.00	22.64	1000.0	9.000	L1	ON	19
3.49	---	28.12	46.00	17.88	1000.0	9.000	L1	ON	19
3.56	36.72	---	56.00	19.28	1000.0	9.000	L1	ON	19
5.19	---	25.55	50.00	24.45	1000.0	9.000	L1	ON	19
5.20	33.76	---	60.00	26.24	1000.0	9.000	L1	ON	19
20.02	21.06	---	60.00	38.94	1000.0	9.000	L1	ON	20
22.46	---	18.19	50.00	31.81	1000.0	9.000	L1	ON	20

Remark: Correct factor=cable loss + LISN factor

L line

Conducted Emission from 150 KHz to 30 MHz



Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.15	---	23.81	55.88	32.07	1000.0	9.000	N	ON	19
0.15	38.02	---	65.88	27.86	1000.0	9.000	N	ON	19
0.37	---	20.46	48.49	28.03	1000.0	9.000	N	ON	19
0.37	31.10	---	58.44	27.34	1000.0	9.000	N	ON	19
2.04	25.75	---	56.00	30.25	1000.0	9.000	N	ON	19
2.11	---	19.86	46.00	26.14	1000.0	9.000	N	ON	19
3.23	---	22.88	46.00	23.12	1000.0	9.000	N	ON	19
3.70	29.59	---	56.00	26.41	1000.0	9.000	N	ON	19
5.15	25.74	---	60.00	34.26	1000.0	9.000	N	ON	19
5.19	---	20.00	50.00	30.00	1000.0	9.000	N	ON	19
28.40	17.70	---	60.00	42.30	1000.0	9.000	N	ON	20
29.63	---	15.56	50.00	34.44	1000.0	9.000	N	ON	20

Remark: Correct factor=cable loss + LISN factor

N line

Conducted Emission from 150 KHz to 30 MHz

4 Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Time
Spectrum Analyzer	R&S	FSV40	15195-01-00	2020-05-17	2021-05-16
				2021-05-16	2022-05-15
EMI Test Receiver	R&S	ESCI	100948	2020-05-17	2021-05-16
				2021-05-16	2022-05-15
Trilog Antenna	SCHWARZBECK	VULB 9163	391	2019-12-16	2021-12-15
Horn Antenna	R&S	HF907	102723	2018-08-11	2021-08-10
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2021-06-19
EMI Test Receiver	R&S	ESR	101667	2020-05-17	2021-05-16
				2021-05-16	2022-05-15
LISN	R&S	ENV216	101171	2018-12-15	2021-12-14
Bore Sight Antenna mast	ETS	2171B	00058752	/	/
Test software	EMC32	R&S	9.26.0	/	/

*****END OF REPORT *****



ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.



ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.



ANNEX C: Product Change Description

The Product Change Description are submitted separately.