

Test Report
47 CFR FCC Part 15 subpart C
Intentional Radiators

Report reference no:	28111906 010		
FCC Designation Number	IT0008		
FCC Test Firm Registration # :	804595		
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Approved by (name + signature):	Giovanni Molteni \ TM		
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Testing Laboratory	TÜV Rheinland Italia S.r.I.		
Address:	Via Mattei 3 - 20010 - Pogliano Milanese (MI) – Italy		
Applicant's name	Sony Mobile Communication AB		
Address:	Nya Vattentornet, 223 62 Lund		
Test item description:	BLE Device		
Trade Mark:	Advagym/SONY		
Manufacturer:	Sony Mobile Communications Inc, (NOTE AB)		
FCC ID :	PY7-15706B		
Ratings:	Battery Operated – 3V CR2450 non rechargeable battery		
Sample			
Samples received on:	24-August-2018		
TUV reference samples:			
Samples tested n:	1		
Testing			
Start Date: :	24-August-2018		
End Date::	31-August-2018		
The results in this Test Report are exclusively referred to the tested samples. Without the written authorization of TÜV Rheinland Italia S.r.I., this document can be reproduced only integrally Compliance with performed tests and recorded in this technical report does not give presumption of compliance to all requirements of the reference standard			



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RELEASE CONTROL RECORD				
TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE		
28111906_002	Original release	18-sept-2018		
	-Section 2: updated reference standard table (used last version of KDB 558074 D01 15.247 August 24,2018).			
	- Section 13: added information that for emission measurements below 30 MHz SAC has been characterized so that the measurements correspond to those obtained at an open-field test site			
28111906_006	- Section 13: Added information that radiated emission has been performed by all three orthogonal axis positions and worst case has been listed	10-Jenuary-2019		
	- Section 15: RF output power. Retested with RBW=1MHz , VBW=3MHz , span=3MHz			
	- Section 16 : Out of band emissions. Added graph of fundamental as reference level			
	- Added procedure (section) of KDB 558074 D01 and ANSI C63.10 for every test item			
28111006 010	- Section 5: corrected chipset information (Nordic NRF51822)	01-April-2019		
20111900_010	- Section 11: added information that EUT duty cycle is 100%	01-April-2019		

1. Reference Standards			
Standard	Description		
FCC Part 15 (Subpart C)	§15.247 Operation within the bands 902-928 MHz, 2400-2483,5 MHz, and 5725-5850 MHz.		
FCC Part 15 (Subpart C)	§15.207 Conducted Limits		
FCC Part 15 (Subpart C)	§15.209 Radiated emission limits; general requirements		
FCC Part 15 (Subpart C)	§15.203 Antenna Requirement		
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices		
KDB 558074 D01 15.247 Meas Guidance v05:2018	Guidance for performing compliance measurements on digital transmission systems (dts) operating under §15.247		



2. Summary of testing:				
FCC Rule Part	Test Item	Result	Remarks	
15.207	AC POWER CONDUCTED EMISSION	N/A	Battery Operated	
15.205 15.209 15.247(d)	RADIATED EMISSIONS	PASS	Meet the requirement of limit	
15.247(a)(2)	6dB BANDWIDTH	PASS	Meet the requirement of limit	
15.247(b)(3)	OUTPUT POWER	PASS	Meet the requirement of limit	
15.247(d)	OUT OF BAND EMISSIONS	PASS	Meet the requirement of limit	
15.247(d)	100 kHz Bandwidth of Frequency Band Edges	PASS	Meet the requirement of limit	
15.247(e)	POWER SPECTRAL DENSITY	PASS	Meet the requirement of limit	
15.203	ANTENNA REQUIREMENT	PASS	Integral Antenna	

Possible test case verdicts:	
- test case does not apply to the test object:	N/A
- test object does meet the requirement:	PASS
- test object does not meet the requirement:	FAIL



General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

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Throughout this report a comma (point) is used as the decimal separator.

3. PHOTOGRAPHIC DOCUMENTATION	





5. General Chipset information

Bluetooth Low Energy Chipset; NORDIC Semiconductor; RF51822

6. General Antennas information

Main unit antenna specification declared by the manufacturer

The antenna efficiency on the range of frequencies is best case -3 dB.



7. Photographic documentation	



8. Equipment Used During Test						
Use*	Product Type	Manufacturer	Model	Comments		
EUT	BLE Device (puck unit)	Sony Mobile Communications Inc				
AE	PC	Dell		Used to set Bluetooth Channels		
Note:						
* Use :						
ELIT - Equipment Linder Test						

AE - Auxiliary/Associated Equipment, or SIM - Simulator (Not Subjected to Test)

No other Auxiliary/Associated Equipment was connected/installed on the EUT

9. Input/Output Ports:

С	CONNECTIONS					
Port		Description	Connection	Cable lenght		
1	Enclosure	Plastic				
2	AC Power Port	AC	Not Present			
3	DC Power Port	DC	Battery Operated – 3V			
4	LAN	TP	Not Present			
5	5 USB I/O Not Present					
	*Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port (Not Involved in Process Control) TP = Telecommunication Ports					



10. P	ower Interfac	e				
Mode #	Voltage (Vdc)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	3					

11. EU	JT Operation Modes
Operation mode	Description
#1	Continuous Bluetooth Modulation RF Transmission Duty cycle: 100% RF setting during tests: Frequency: 2402 MHz (low channel); 2440 MHz (mid channel); 2480 MHz (high channel);

12. EUT	Configuration Modes
Mode #	Description
1	EUT transmitting by means of PCB antenna (standard configuration)
2	EUT equipped with temporary SMA connector for RF conducted measurements



13. Test Conditions and Results – RADIATED EMISSION

13	TEST: Radiate	d Emis	ssion			PASS
Parameters r	equired prior to	the	Laboratory Ambient Temp	erature (°C)	15 to 35 °C	
test			Relative Humidity (%)		30 to 60 %	
Parameters r	ecorded during	the	Laboratory Ambient Temp	erature (°C)	21°C	
test			Relative Humidity (%)		50%	
			Air pressure (hPa)	1020		
			Power Mode	Application Pc	oint	
Fully configue the power line	red sample teste e frequency	ed at	Batteries Operat	Enclosure		
Equipment m	iode:		Operation mode		#1	
FCC Standar	ď		§15.	205; §15.209	; §15.247	
Except as pro	ovided elsewher ngth levels speci	e in this fied in t	s subpart, the emissions fro the following table :	m an intentio	nal radiator shall not e	exceed
Except as p this section s MHz. Howev §§15.231 and Remark: In a 300 meters, a separation di 3meter) = +8 According to has been cha EUT is batter been listed	009-0.490 490-1.705 705-30.0 0-88 8-216 16-960 bove 960 provided in parage hall not be locat er, operation wit d 15.241. ccordance with parage a correction factor stance. The app 0db Extrapolatic KDB 414788 DC aracterized so th y operated and	2400/F(24000/F(30 100 150** 200** 500 graph (ed in the hin the: part 15. pr was lied for on (dB) 01v01r(at the r has be	g), fundamental emissions f he frequency bands 54-72 M se frequency bands is perm .31 (f) (2), where the measu applied in order to permit m mula for limits at 3 meter is = 40log (30meter / 3meter) 01, for emission measureme measurements correspond t en tested on all three orthog	rom intention 1Hz, 76-88 M itted under o rement dista easurement Extrapolation = +40dB ents below 30 to those obtai gonal axis pos	al radiators operating Hz, 174-216 MHz or 4 ther sections of this para nce was specified to b to be performed at a n (dB) = 40log (300me 0 MHz semi-anechoic of ined at an open-field t sitions. Worst case res	under 170-806 art, e.g., be 30 or eter / chamber est site sult has
Further inforr	nation to test se	tup (EMI Receiver & Controller	3m semi- (Shield Room)	anechoic chamber with absorbing materials)	



		Test Equipment U	Jsed		
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
CSSA	ETS Lindgren	FACT3	87020484	06/2017	06/2019
EMI Test Receiver	R&S	ESW44	87020967	06/2018	06/2019
Loop Antenna	EMCO	6512	87020465	02/2017	02/2020
Antenna BiConiLog	ETS Lindgren	3124E	87020457	04/2017	04/2020
Antenna Horn with Preamplifier	ETS Lindgren	3117-PA	87020458	04/2017	04/2020
2xAntenna Horn with	ETS Lindgren	114514	87020459	04/2017	04/2020
Preamplifier		120722	87020460	04/2017	04/2020
Highpass Filter	Wainwright Instr.	WHKX10-2520- 2800-18000- 40ss	87020799	05/2018	05/2019

Test Procedure

In accordance to sections 6.3, 6.4, 6.5, 6.6 of ANSI C63.10









































Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel Low
Frequency: 30MHz – 1GHz Vertical



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. Antenna factor + cable loss (dB)
2304.750000	59.70		74.00	14.30	1000.000	120.0	V	161.0	-6.7
2360.500000	56.50		74.00	17.50	1000.000	104.0	V	175.0	-6.5
2390.250000	52.73		74.00	21.27	1000.000	238.0	V	199.0	-6.4
2421.500000	52.27		74.00	21.73	1000.000	125.0	V	177.0	-6.3
4804.000000		43.67	54.00	10.33	1000.000	258.0	V	71.0	-0.7





Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel Low
Frequency: 30MHz – 1GHz Horizontal



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. Antenna factor + cable loss (dB)
2304.750000	57.56		74.00	16.44	1000.000	125.0	н	192.0	-6.7
2360.250000	52.36		74.00	21.64	1000.000	111.0	Н	164.0	-6.5
4804.000000	52.48		74.00	21.52	1000.000	120.0	Н	110.0	-0.7
4804.500000	52.02		74.00	21.98	1000.000	263.0	Н	98.0	-0.7
2304.750000	57.56		74.00	16.44	1000.000	125.0	Н	192.0	-6.7



	Operation Mode: #1	Channel middle			
	Frequency: 1GH	lz – 6GHz			
	Antenna Polarizat	ion: Vertical			
00-					
80					
70-					
60					
Ε					
50-	the Later and Distance of States	Laborer and and the second	يد أحداث وراله محلم معالية في وقار بطراله محلك		<u>ilian</u> tet
₩ 40 ⊆	literate to discover elements to delete a ser				
<u></u> 30					
20					
10-					
0					
1G	2G	3G	4G	5G	(
	Frequenc	cy in Hz			

		Т	abulated re	esults of Ra	adiated E	mission Mea	asureme	ent		
	Operation Mode: #1 Channel middle									
	Frequency: 1GHz - 6GHz Vertical									
	Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. Antenna factor + cable loss (dB)
Ī	4880.000000		50.49	54.00	3.51	1000.000	229.0	V	88.0	-0.6
	4880.250000	57.56		74.00	16.44	1000.000	125.0	V	111.0	-0.6



	Operation Mode: #1	Channel middle			
	Frequency: 1G	Hz – 6GHz			
	Antenna Polarizatio	on: Horizontal			
06.4-					
80					
70-					
- 03					
				•	
50		al and a second s			in an
				power and the second	
30	- Langer and a second and a s				
20					
6.4+ 1G	2G		4G	5G	60
	Frequen	cy in Hz			

	Tabulated results of Radiated Emission Measurement											
Operation Mode: #1 Channel middle												
	Frequency: 1GHz - 6GHz Horizontal											
Frequency (MHz)	Frequency (MHz)MaxPeak (dBμV/m)Average (dBμV/m)Limit 											
4880.000000		47.84	54.00	6.16	1000.000	258.0	Н	161.0	-0.6			
4880.000000	57.05		74.00	16.95	1000.000	255.0	Н	186.0	-0.6			





	Tabulated results of Radiated Emission Measurement											
Operation Mode: #1 Channel high												
Frequency: 1GHz - 6GHz Vertical												
Frequency	MaxPeak	Average	Limit	Margin	Bandwidth	Height	Pol	Azimuth	Antenna factor			
(MHz)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	(kHz)	(cm)	-	(dea)	+ cable loss			
、								(***3)	(dB)			
2419.500000	48.59		74.00	25.41	1000.000	246.0	V	166.0	-6.3			
4960.000000	4960.000000 58.98 74.00 15.02 1000.000 125.0 V 148.0 -0.6											
4960.500000	60.00		74.00	14.00	1000.000	99.0	V	158.0	-0.6			





Y axis (worst case)

	Tabulated results of Radiated Emission Measurement											
	Operation Mode: #1 Channel high											
	Frequency: 1GHz - 6GHz Horizontal											
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Antenna factor + cable loss (dB)			
4960.000000		47.85	54.00	6.15	1000.000	229.0	Н	182.0	-0.6			
4960.000000	4960.000000 55.44 74.00 18.56 1000.000 125.0 H 161.0 -0.6											
4960.500000	4960.500000 56.77 74.00 17.23 1000.000 229.0 H 182.0 -0.6											



Graphical representation of Radiated Emission Measurement											
	Operatio	n Mode: #1 Cl	nannel low								
	Frequ	ency: 6GHz –	18GHz								
	Antenn	a Polarization	Vertical								
MultiView 🗄 Spectrum 🛛 🤌 🖾	Receiver 🖾										
Meas BW (6dB)1 MHz Meas Tim Att 10 dB Preamp Input 1 AC PS TDF Input1 "EMI RAD 1-18GHz"	e 100 ms On Step TD Scan On Notch Off			Frequency	8.9002500 GHz						
1 Bargraph											
Max Peak dBµV/m	ר <mark>5 20</mark>	30 40	50 60	70 80	90 105						
2 Scan		10 GHz			●1Pk Max●2Av Max						
90 dBµV/m											
80 dBµV/m											
FCC 1-26GHZ PK /// dBµV/m											
60 dBµV/m			May many water and the start of	hy and the second s	and the second and the second s						
FCC 1-26GHZ AVaacharden and Martin Strand Burger	with work and the second second	And water and the second second			· ····································						
40 dBµV/m											
30 dBµV/m											
20 dBu//m											
10 00HA/UI											
Start 6.0 GHz	· · ·	Range 3			Stop 18.0 GHz						
			canning	28.08.2018 21:13:43	Att Meas BW						
	Y	axis (worst ca	se)								



	Graphical representation of Radiated Emission Measurement											
		0	peration	Mode	:#1 Cł	nannel lo	W					
			Freque	ency: 6	GHz –	18GHz						
		Ą	ntenna	Polariz	ation: H	Horizonta	al					
MultiView 8 S	pectrum 🔌 🖾	Receiver	X									
Att Input TDF Input1 "EMI RAD	10 dB Preamp 1 AC PS 1-18GHz"	On Step On Note	n TD Scan ch Off					F	requency 1	7.24025	500 GHz	
Max Peak	dBµV/m	5	20	30	40	50	60	70	80	90	105	
2 Scan				10 GHz					M2[2]	1Pk Max • 42.5	2Av Max 7 dBuV/m	
90 dBµV/m									M1[1]	7.20550 55.0 7.20525	0000 GHz 2 dBµV/m 0000 GHz	
80 dBµV/m												
FCC 1-26GHZ PK /U dBµV/m-												
60 dBµV/m	M1	and the second sec		~ mendom	and the second	no aller and aller	harring and the second s	Maren Maren and Maren Same	and and a second se	mmuth	and marked and	
FCC 1-26GHZ AV	M2	unomina									Warner and	
40 dBµV/m						<u> </u>						
30 dBµV/m												
20 dBµV/m												
10 dBµV/m												
Start 6.0 GHz				Rar	nge 3	canning (28.0 22	98.2018 1:15:22	Stop	18.0 GHz Meas BW	
			Y	axis (w	orst ca	se)						

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Antenna factor + cable loss (dB)
7205.250000	55.02		74.00	18.98	1000.000	150.0	н	110.0	+3.8
7205.500000		42.57	54.00	11.43	1000.000	150.0	Н	110.0	+3.8



Gra	phical representation	on of Radiated	Emission Mea	asurement	
	Operation	Mode: #1 Cha	nnel middle		
	Frequ	ency: 6GHz –	18GHz		
	Antenn	a Polarization:	Vertical		
MultiView 🗄 Spectrum 🛛 🔆 🛽	Receiver 🖾				
Meas BW (6dB) 1 MHz Meas Tim Att 10 dB Preamp Input 1 AC PS TDF Input1 "EMI RAD 1-18GHz"	e 100 ms On Step TD Scan On Notch Off			Freque	ncy 8.8602500 GHz
Max Peak dBµV/n	n 5 20	30 40	50 60	70 80	90 105
2 Scan					• 1Pk Max • 2Av Max
90 dBµV/m		10 GHz		M M	1[1] 54.43 dBμV/m 7.31900000 GHz 2[2] 41.86 dBμV/m
80 dBµV/m					7.319500000 GHz
FCC 1-26GHZ PK 7/U dbµV/m					
60 dBµV/mМ1			and a second and a second and and and and and and and and and a	and all the second s	market and the second and the second se
FCC 1-26GHZ AV. And Marker And Marker SU dBuv/m-	A state of the second				
40 dBµV/m					-
30 dBµV/m					
20 dBµV/m					
10 dBµV/m					
Start 6.0 CHz		Range 3			Stop 19.0 CU
		8	canning 🚺	28.08.2018 21:21:44	Att Meas BW
	Y	axis (worst ca	se)		

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Antenna factor + cable loss
7319.000000	54.43		74.00	19.75	1000.000	150.0	v	110.0	+3.8
7319.500000		41.86	54.00	12.14	1000.000	150.0	V	110.0	+3.8



Graphical representation of Radiated Emission Measurement											
		Ор	eration	Mode: #	#1 Cha	nnel mio	dle				
			Frequ	iency: 6	GHz –	18GHz					
		1	Antenna	ı Polariz	ation: H	lorizonta	al				
MultiView B Spect	trum 🔌 🖾 Iz Meas Time	Receiver								1 42025	
Input 1 A TDF Input1 "EMI RAD 1-18	AC PS AGHz"	On Ste	tch Off	:					requency 1	.1.42023	UU GHZ
Max Peak	dBµV/m	5	20	30	40	50	60	70	80	90	105
2 Scan				10 GHz					M1[1]	• 1Pk Max • 56.2	2Av Max 9 dBµV/m
90 dBµV/m									M2[2]	7.32075 44.1 7.31950	0000 GHz 2 dBµV/m 0000 GHz
80 dBµV/m-											
/U dBµV/m										and when	What a walk
FCC 1-26GHZ AV	MI	un u	and an and the second second	Hundon America	-	ne son to ne for the		Alter in specific weeks	Josef allow from the contraction of the contraction		
40 dBµV/m	M2							~~~~~		u	Manural
30 dBµV/m											
20 dBµV/m											
10 dBµV/m											
Start 6.0 GHz				Rar	nge 3					Stop	18.0 GHz
					Sc	anning I		28.0	1:20:02	Att	Meas BW
			Y	′ axis (w	orst cas	se)					

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Antenna factor + cable loss (dB)
7320.750000	56.29		74.00	17.71	1000.000	150.0	Н	110.0	+3.8
7319.500000		44.12	54.00	9.88	1000.000	150.0	Н	110.0	+3.8



Grap	hical representation	Graphical representation of Radiated Emission Measurement											
	Operation	Mode: #1 Ch	annel high										
	Freque	ncy: 6GHz –	18GHz										
	Antenna	Polarization	Vertical										
MultiView 🗄 Spectrum 🛛 🔆 🖾	Receiver 🖾												
Meas BW (6dB) 1 MHz Meas Time Att 10 dB Preamp Input 1 AC PS TDF Input1 "EMI RAD 1-18GHz"	100 ms On Step TD Scan On Notch Off				Frequency	9.1402500	GHz						
Max Peak dBµV/m	5 20	30 40	50 (60 70	80	90	105						
2 Scan		10 GHz			M1[1]	●1Pk Max●2Av 52,62 dB	Max µV/m						
90 dBµV/m						7,43925000	0 GHz						
80 dBµV/m													
FCC 1-26GHZ PK /U dBµV/m													
60 dBµV/m		الاستعماد محمد المحمد المحم	hunder and the second	and the for your have the second	and	manyman	man						
FCC 1-26GHZ AV and when the second se	ahanturana har an						www						
40 dBµV/m													
30 dBµV/m													
20 dBµV/m													
10 dBµV/m													
		Range 3											
Start 6.0 GHz		5	canning 🔳	28 V	.08.2018 20:56:08	Stop 18.0	s BW						
	Ya	axis (worst ca	se)										

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Antenna factor + cable loss (dB)
7439.250000	52.62		74.00	21.38	1000.000	150.0	V	110.0	+3.9



Graphical	Graphical representation of Radiated Emission Measurement									
	Operation Mode: #1 Channel high									
	Frequency: 6GHz – 18GHz									
	Antenna Polarization: Horizontal									
MultiView Spectrum ★ ∞ Rece ■ Meas BW (6dB) 1 MHz Meas Time 100 ms	s Eiver									
Att 10 dB Preamp Or Input 1 AC PS Or TDF Input1 "EMI RAD 1-18GHz"	n Step TD Scan n Notch Off	Frequency 12.7802500 GHz								
1 Bargraph										
Max Peak dBµV/m 5	20 30 40 50 60	70 80 90 105								
2 Scan	10 GHz	● 1Pk Max ● 2Av Max M1[1] 54.83 dBµV/m 7.439500000 GHz								
90 dBµV/m										
80 dBµV/m										
РСС 1-266H2 PK //U dBµV/m										
60 dBµV/mM1	and the set of the set	and the second of the second o								
50 dBuV/m										
40 dBµV/m										
30 dBµV/m										
20 dBµV/m										
10 06baλu										
Start 6.0 GHz	Range 3	Stop 18.0 GHz								
	Scanning	20:51:04								
	Y axis (worst case)									

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Antenna factor + cable loss (dB)
7439.250000	54.83		74.00	19.17	1000.000	150.0	V	110.0	+3.9



Frequency: 18GHz – 25GHz						
Operation Mode: #1 , #2, #3						
Antenna Polarization: Vertical						
No emission detected above noise floor in the range 18-25 GHz						

Frequency: 18GHz – 25GHz						
Operation Mode: #1 , #2, #3						
Antenna Polarization: Horizontal						
No emission detected above noise floor in the range 18-25 GHz						



	Graphical representation of Radiated Emission Measurement									
BAND ENDGE LO	N									
MultiView ** Spectr • Meas BW (6dB) 1 MHz	um X Rec Meas Time 10 m	eiver X					Free		360000	
Input 1 AC TDF Input1 "EMI RAD 1-18G 1 Bargraph	Preamp C PS C Hz"	Notch Off					Frequ	ency z.		, GHZ
Max Peak	dBµV/m 0	10 20	30	40	50	60	70	80	90	100
2 Scan								• 1 M2[2]	Pk Max ● 2A 35.66 d 2.4000000	v Max BµV/m 00 GHz
90 dBµV/m						\bigwedge		-м1[1] :	55.23 d 2.4000000	BµV/m 00 GHz
FCC 1-26GHZ PK /// dBµV/m										
60 dBµV/m			\land		M1					
FCC 1-26GHZ AV	~~						\	~~~~		<i></i>
40 dBµV/m					MŹ					
30 dBµV/m										
10 dBµV/m										
			Range 3							
Start 2.36 GHz				Scanning	(11111	TT) 🚧	30.08.2018	Att	Stop 2.4	as BW
		Ya	ixis (worst	t case)						



Graphical representation of Radiated Emission Measurement						
BAND ENDGE HIGH						
MultiView Spectrum * • Meas BW (6dB) 1 MHz Meas Time Att 10 dB Preamp Input 1 AC PS TDF Input1 "EMI RAD 1-18GHz" 1 Bargraph	Receiver X 10 ms Off Step TD Scan On Notch Off		Frequ	ency 2.5005000 GHz		
Max Peak dBµV/m	0 10 20 30	40 50	60 70	80 90 100		
2 Scan				● 1Pk Max ● 2Av Max		
2 SUGIT 90 dBµV/m- 80 dBµV/m- FCC 1-26GHZ PK /U dBµV/m- 60 dBµV/m- 40 dBµV/m- 30 dBµV/m-						
20 dBµV/m						
V1	Range 3					
Start 2.47 GHz		Scapping	30.08.2018	Stop 2.53 GHz Att Meas BW		
	Y axis (wors	t case)	20:46:07	0 0		



14. Test Conditions and Results – 6dB BANDWIDTH

14	TEST: 6dB Bandwid	th	PASS		
Parameters required prior to the		Laboratory Ambient Temperature (°C)	15 to 35 °C		
		Relative Humidity (%)	30 to 60 %		
Parameters recorded during the		Laboratory Ambient Temperature (°C)	22°C		
test		Relative Humidity (%)	49%		
		Air pressure (hPa)	1020		
		Power Mode	Application Point		
Fully configut	red sample tested at e frequency	Batteries Operated	SMA connector		
Equipment m	iode:	Operation mode	#1		
FCC Standar	ď	§15.247	7		
Systems usir 5725-5850 N	ng digital modulation te IHz bands. The minimu	chniques may operate in the 902-928 M Im 6 dB bandwidth shall be at least 500	Hz, 2400-2483.5 MHz, and kHz.		
Further inforr	nation to test setup				
		EUT Attenuator (optional)	Spectrum Analyzer (or Power Meter)		



Test Equipment Used							
Description	Identifier	Calibration date	Calibration due				
EMI Test Receiver	R&S	ESU40	87020455	05/2018	05/2019		

Test Procedure
Section 2.1 of KDB 558074
Subclause 11.8.1 Option 2 of ANSI C63.10 is applied
DTS Bandwidth













Frequency (MHz)	Channel	6dB BW (MHz)
2402	Low	0.713
2440	Middle	0.721
2480	High	0.713



15	TEST: Output Power			PASS
Parameters required prior to the		Laboratory Ambient Temperature (°C)	15 to 35 °C	;
test		Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test		Laboratory Ambient Temperature (°C)	22,5°C	
		Relative Humidity (%)	51%	
		Air pressure (hPa)	1020	
		Power Mode	Application Point	
Fully configur	red sample tested at e frequency	Batteries Operated	SMA	
Equipment m	ode:	Operation mode	#1	
FCC Standar	d	§15.247		

15. Test Conditions and Results – RF OUTPUT POWER

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 nonoverlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.





Test Equipment Used							
Description	Manufacturer	Identifier	Calibration date	Calibration due			
EMI Test Receiver	R&S	ESU40	87020455	05/2018	05/2019		

Test Procedure						
Section 8.3.1 of KDB 558074						
Subclause 11.9.1.1 of ANSI C63.10 is applied						
Maximum peak conducted power						
RBW =1MHz, VBW=3MHz, Detector = Peak						
Sweep time = auto, Trace mode= max hold, Allow trace to fully stabilize.						

Test result of Maximum Output Power

Channel	Channel Frequency	Output power (conducted)	Limit	Output power (conducted)	Limit
	(MHz)	(dBm)	(dBm)	(W)	(W)
Low Channel	2402	-4,98	30	0.000317687	1
Middle Channel	2440	-5,99	30	0.000251768	1
High Channel	2480	-7,62	30	0.000172982	1















16	TEST: Out of Band E	missions	PASS	
Parameters required prior to the test		Laboratory Ambient Temperature (°C) 15 to 3		•
		Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test		Laboratory Ambient Temperature (°C)	21°C	
		Relative Humidity (%) 49%		
		Air pressure (hPa) 1020		
_		Power Mode	Application Po	pint
Fully configured sample tested at the power line frequency		Batteries Operated	SMA Connector	
Equipment m	ode:	Operation mode #1		
FCC Standar	d	§15.247(D)		

16. Test Conditions and Results – Out of Band Emissions

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).



Test Equipment Used							
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due		
EMI Test Receiver	R&S	ESU40	87020455	05/2018	05/2019		



Test Procedure

Section 8.5 of DTS *KDB 558074* Subclause 11.11 of ANSI C63.10 is applied







Frequency (MHz)	Level (dBm)	Fundamental Level (dBm)	Difference (dB)	Limit (at least) (dB)	Rusult
1198,71	-51,83	-4,65	47,18		compliant
2317,30	-43,75		39,10		compliant
2371,79	-43,88		39,23	20	compliant
4802,88	-49,55		44,90	20	compliant
7205,12	-48,24		43,59		compliant
9608,97	-55,48		50,83		compliant









Frequency (MHz)	Level (dBm)	Fundamental Level (dBm)	Difference (dB)	Limit (at least) (dB)	Rusult
1216,66	-51,83	-5,57	46,26		compliant
2493,58	-46,75		41,18		compliant
2564,10	-48,75		43,18	20	compliant
4879,80	-49,06		43,49	20	compliant
7320,51	-50,44		44,87		compliant
9762,82	-57,81		52,24		compliant









Frequency (MHz)	Level (dBm)	Fundamental Level (dBm)	Difference (dB)	Limit (at least) (dB)	Rusult
387,53	-66,03	-7,73	58,30		compliant
2493,58	-44,02		36,29		compliant
2504,10	-48,83		41,10	20	compliant
4961,53	-49,46		41,73	20	compliant
7435,89	-49,40		41,67		compliant
9923,07	-55,98		48,25		compliant



17. Test Conditions and Results - 100 knz Dandwidth of Frequency Dand Edges	17.	Test	Conditions	and Results -	100 kHz	Bandwidth	of Frequenc	y Band Edge
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17	TEST: 100 kHz Bandy	vidth of Frequency Band Edges PA				
Parameters required prior to the test		Laboratory Ambient Temperature (°C)	15 to 35 °C	;		
		Relative Humidity (%)	30 to 60 %			
Parameters recorded during the test		Laboratory Ambient Temperature (°C)	21°C			
		Relative Humidity (%)	49%			
		Air pressure (hPa)	1020			
_		Power Mode	Application Po	oint		
Fully configured sample tested at the power line frequency		Batteries Operated	SMA Connector			
Equipment m	ode:	Operation mode #1				
FCC Standar	ď	§15.247(D)				

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.205(c)).

Further information to test setup				
	EUT	Attenuator (optional)	Spectrum Analyzer (or Power Meter)	

Test Equipment Used							
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due		
EMI Test Receiver	R&S	ESU40	87020455	05/2018	05/2019		



Test Procedure

Section 8.5 of DTS *KDB 558074* Subclause 11.11 of ANSI C63.10 is applied



Frequency (MHz	Measured power at the band edge (dBm)	Measured peak power at fundamental frequency (dBm)	Difference Peak / band edge (dB)	Peak Limit at PK power –20 dB (dBm)	Margin (dB)
2400	-48,30	-4,94	43,36	-24,94	23,36







18. Test Conditions and Results – POWER SPECTRAL DENSITY

18	TEST: Power Spect	al Density PAS						
Parameters required prior to the test		Laboratory Ambient	Cemperature (°C)	15 to 35 °C				
		Relative Humidity (%)	30 to 60 %				
Parameters recorded during the test		Laboratory Ambient	Cemperature (°C)	24°C				
		Relative Humidity (%)	37%				
		Air pressure (hPa)		1020				
		Power N	lode	Application Point				
Fully configured sample tested at the power line frequency		Batteries Operated		Enclosure				
Equipment mode:		Operation mode	Operation mode		#1			
FCC Standard			§15.247					
(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.								
Further inform	Further information to test setup							
		EUT	Attenuator (optional)	Spectrum Analyzer (or Power Meter)				

Test Equipment Used								
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due			
EMI Test Receiver	R&S	ESU40	87020455	05/2018	05/2019			

Test Procedure		
Section 8.4 of DTS KDB 558074 Subclause 11.10 of ANSI C63.10 is applicable.		















Frequency (MHz)	Channel	PSD (dBm)
2402	Low	-17.84
2440	Middle	-18.05
2480	High	-20.15



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