

Report Reference ID:	372837-6TRFWL	
Test specification:	Title 47 – Telecommunication Chapter I – Federal Communications Commission Subchapter A – General Part 24 – Personal Communication Services Subpart D – Narrowband PCS	
	TEKO Telecom Srl.	
Applicant:	Via Meucci, 24/a I-40024 Castel S. Pietro Terme (BO) (Italy)	
Apparatus:	Medium Power Remote Unit	
Model:	TRU7FL8P9PWM/AC-WT	
FCC ID:	XM2-MP7FL8P9PP	

Testing laboratory:	Nemko Italy Spa Via del Carroccio, 4 20853 Biassono (MB) – Italy Telephone: +39 039 2201201 Facsimile: +39 039 2201221
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	Name and title	Date
Tested by:	Bailun Park P. Barbieri, Wireless/EMC Specialist	06/24/2019
Reviewed by:	R. Giampaglia, Wireless/EMC Specialist	06/24/2019

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Section 1: Report summary

1.1 Test spe	ecification
Specifications	Part 24 Subpart D, Narrowband PCS

1.2 Statement of compliance		
Compliance	In the configuration tested the EUT was found compliant Yes No This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Spa. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 24. Radiated tests were conducted in accordance with ANSI C63.26-2015.	

1.3 Exclusion	ons
Exclusions	None

1.4Registration numberTest site FCC682159ID number682159

1.5 Test report revision history			
Revision #	Revision # Details of changes made to test report		
TRF	Original report issued		
R1TRF			

1.6 Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

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Section 2: Summary of test results

Part	Methods	Test description	Verdict	
	§ 935210 D05v01r03 (3.2)	AGC threshold	Pass	
	§ 935210 D05v01r03 (3.3)	Out of band rejection	Pass	
§24.131	§ 935210 D05v01r03 (3.4)	Occupied bandwidth	Pass	
§24.132(c)	§ 935210 D05v01r03 (3.5)	Peak output power at RF antenna connector	Pass	
§24.133	§ 935210 D05v01r03 (3.6)	Spurious emissions at RF antenna connector	Pass	
§24.133	§ 935210 D05v01r03 (3.8)	Radiated spurious emissions	Pass	
§24.135	§ 935210 D05v01r03 (3.7)	Frequency stability	N/A a)	
Notes:				



Section 3: Equipment under test (EUT) and application details

3.1 Applicant of	details	
Applicant	Name:	Teko Telecom Srl
complete	Federal	
business name	Registration	0018963462
	Number (FRN):	
	Grantee code	XM2
Mailing address	Address:	Via Meucci, 24/a
	City:	Castel S. Pietro Terme
	Province/State:	Bologna
	Post code:	40024
	Country:	Italy

3.2 Modular ed	quipment	
a) Single modular	Single modular approval	
approval	Yes 🗌 No 🖂	
b) Limited single	Limited single modular approval	
modular approval	Yes 🗌 No 🖂	

3.3 Product de	tails	
FCC ID	Grantee code:	XM2
	Product code:	-MP7FL8P9PP
Equipment class	B2I	
Description of		
product as it is marketed	Model name/number:	TRU7FL8P9PWM/AC-WT
	Serial number:	1012793001

3.4 Application	n purpo	se	
Type of	\boxtimes	Original certification	
application		Change in identification of presently authorized equipment	
		Original FCC ID: Grant date:	
		Class II permissive change or modification of presently authorized	
		equipment	



Section 3: Equipment under test

3.5 Composite	/related equipment			
a) Composite	The EUT is a composite device subject to an additional equipment			
equipment	authorization			
	Yes 🛛 No 🗌			
b) Related	The EUT is part of a system that operates with, or is marketed with,			
equipment	another device that requires an equipment authorization			
	Yes 🗌 No 🖂			
c) Related FCC ID	If either of the above is "yes":			
	has been granted under the FCC ID(s) listed below:			
	is in the process of being filled under the FCC ID(s) listed below:			
	is pending with the FCC ID(s) listed below:			
	\Box has a mix of pending and granted statues under the FCC ID(s)			
	listed below:			
	i FCC ID: XM2-MP7FL8P9PP			
	ii FCC ID:			

3.6 Sample inf	ormation
Receipt date:	05/27/2019
Nemko sample ID number:	

3.7 EUT techn	ical specifications
Operating band:	Down Link 930-931 MHz
Operating frequency:	Narrowband
Modulation type:	iDEN
Occupied bandwidth:	Standard
Channel spacing:	standard
Emission designator:	D7W
RF Output	Down Link: 33dBm (2,00W) Up Link: N.A. (The EUT does not transmit over the air in the up-link direction)
Gain	Down Link: 38dB Up Link: N.A. (The EUT does not transmit over the air in the up-link direction)
Antenna type:	External Antenna is not provided, equipment that has an external 50 Ω RF connector
Power source:	100-240 Vac



Section 3: Equipment under test

3.8 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

Item # 1	
Type of equipment:	Master Unit - Subrack
Brand name:	Teko Telecom srl
Model name or number:	SUB-TRX-PSU
Serial number:	101083001
Nemko sample number:	
Connection port:	
Cable length and type:	
Item # 2	
Type of equipment:	Master Unit – Management Module
Brand name:	Teko Telecom srl
Model name or number:	TSPV-R
Serial number:	110942253
Nemko sample number:	
Connection port:	LAN port
Cable length and type:	
Item # 3	
Type of equipment:	Master Unit – Optical Module
Brand name:	Teko Telecom srl
Model name or number:	TTRU4W-S-M
Serial number:	110679007
Nemko sample number:	
Connection port:	DL/UL RF connector (to connect to the base station)
	Optical port (to connect to remote unit)
Cable length and type:	
Item # 4	
Type of equipment:	Master Unit – Power Supply
Brand name:	Teko Telecom srl
Model name or number:	TPSU/AC
Serial number:	081063004
Nemko sample number:	
Connection port:	
Cable length and type:	



3.9 Operation	of the EUT during testing
Details:	In down-link direction, normal working at max gain with max RF power output.
3.10 EUT setu	o diagram
optical module (to c signal in RF signal i connected directly t FCC ID) to exercise module in the Maste	ote Unit is the EUT. Master Unit includes only management module and onvert RF signal in optical signal in down link direction and viceversa optical n up link direction). As described in "Operational description", master unit is o base station, so the system doesn't use another equipment (under another the EUT. Signal generator is linked directly to the RF connector of optical er Unit.
	al modulated enerator EUT Spectrum Analyzer
max gain. Raise the	modulated generator to the input of the EUT, so that the EUT works at the input level to the EUT until reach the maximum output power. Connect the to the RF output connector of the EUT.



Section 4: Engineering considerations

4.1 Modificatio	ns incorporated in the EUT
Modifications	Modifications performed to the EUT during this assessment
	None Yes , performed by Client or Nemko
	Details:

4.2 Deviations	from laboratory tests procedures
Deviations	Deviations from laboratory test procedures None \square Yes \square - details are listed below:

4.3 Technical	judgment
Judgment	None



Section 5: Test conditions

5.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

5.2 Test condit	5.2 Test conditions, power source and ambient temperatures			
Normal temperature, humidity and air pressure test conditions	Temperature: 15–30 °C Relative humidity: 20–75 % Air pressure: 86–106 kPa			
	When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.			
Power supply range:	The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ± 5 %, for which the equipment was designed.			



Section 5: Test conditions, continued

EUT	Туре	Test	Range and Setup features	Measurement Uncertainty	Notes
		Frequency error	0.001 MHz ÷ 40 GHz	0.08 ppm	(1)
		Carrier power RF Output Power	10 kHz ÷ 30 MHz	1.0 dB	(1)
			30 MHz ÷ 18 GHz	1.5 dB	(1)
			18 MHz ÷ 40 GHz	3.0 dB	(1)
		Adjacent channel power	1 MHz ÷ 18 GHz	1.6 dB	(1)
			10 kHz ÷ 26 GHz	3.0 dB	(1)
		Conducted spurious emissions	26 GHz ÷ 40 GHz	4.5 dB	(1)
		Intermodulation attenuation	1 MHz ÷ 18 GHz	2.2 dB	(1)
		Attack time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Attack time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Release time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
	Conducted	Release time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
ransmitter		Transient behaviour of the transmitter– Transient frequency behaviour	1 MHz ÷ 18 GHz	0.2 kHz	(1)
		Transient behaviour of the transmitter – Power level slope	1 MHz ÷ 18 GHz	9%	(1)
		Frequency deviation - Maximum permissible frequency deviation	0.001 MHz ÷ 18 GHz	1.3%	(1)
		Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz	0.001 MHz ÷ 18 GHz	0.5 dB	(1)
		Dwell time	-	3%	(1)
		Hopping Frequency Separation	0.01 MHz ÷ 18 GHz	1%	(1)
		Occupied Channel Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Modulation Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Radiated spurious emissions	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
	Radiated	hadiated spundus emissions	26.5 GHz ÷ 40 GHz	8.0 dB	(1)
	naulateu	Effective radiated power	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
		transmitter	26,5 GHz ÷ 40 GHz	8.0 dB	(1)
		Podiated anurious amissions	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
	Radiated	Radiated spurious emissions	26.5 GHz ÷ 40 GHz	8.0 dB	(1)
Receiver		Sensitivity measurement	1 MHz ÷ 18 GHz	6.0 dB	(1)
	Constructor		10 kHz ÷ 26 GHz	3.0 dB	(1)
	Conducted	Conducted spurious emissions	26 GHz ÷ 40 GHz	4.5 dB	(1)

probability distribution with infinite degrees of freedom and for a coverage probability of 95 %



quipment	Manufacturer	Model No.	Asset/Serial No.	Next cal
ector Signal enerator	Agilent	E4432B ESG	GB38450308	08/2019
ctor Signal nerator	Agilent	E4438C ESG	MY45094485	08/2019
ectrum Analyzer	Agilent	N9030A PXA	MY53120882	12/2019
og Broad Band enna 25-8000 MHz	Schwarzbeck	VULB 9162	VULB 9162-25	07/2021
enna 1-18 GHz	Schwarzbeck	STLP 9148	STPL 9148-123	07/2021
ble ridge horn nna (4 ÷ 40 GHz)	RFSpin	DRH40	061106A40	02/2020
adband preamplifier ÷ 40 GHz)	Miteq	JS44-18004000-35-8P- R	1.627	09/2019
adband preamplifier 8 GHz	Schwarzbeck	BBV 9718	9718-137	08/2019
l receiver 20 Hz ÷ 8 z	R&S	ESU8	100202	01/2020
I receiver 2 Hz ÷ 44 z	R&S	ESW44	101620	05/2019
draulic revolving tform	Nemko	RTPL 01	4.233	NCR
ning-table	R&S	HCT	835 803/03	NCR
enna mast	R&S	HCM	836 529/05	NCR
troller	R&S	HCC	836 620/7	NCR
ni-anechoic mber	Nemko	10m semi-anechoic chamber	530	09/2021
elded room	Siemens	10m control room	1947	NCR
ni-anechoic mber	Nemko	10m semi-anechoic chamber	70	NCR
ielded Room	Siemens	3m semi-anechoic chamber	3	NCR
or controller	Emco	1051-25	9012-1559	NCR
or controller	Emco	1061-1.521	9012-1508	NCR
enna Tower	Emco	2071-2	9601-1940	NCR
ntroller pole/table	Emco	2090	9511-1099	NCR

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use (*) Equipment supplied by manufacturer's



Appendix A: Test results

Clause 935210 D05v01 (3.2) AGC threshold

Measure of EUT AGC Threshold

Test date: 05/27/2019 to 06/24/2019 Test results: Pass

Special notes

Test data



iDEN signal, nominal input signal

Center Fre	eq 930.5000	00 MHz #IFGain:Low ↔	Center Freq: 930.5 Trig: Free Run #Atten: 12 dB	00000 MHz Avg Hold:>10/10	Radio Std: None Radio Device: BTS
l0 dB/div	Ref 35.00	dBm			
25.0		D	- 000 - 0 0000000	mann	
5.00	- And			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	my
5.00 15.0					
25.0					han
15.0					
55.0					
Center 93 Les BW 3			VBW 3.6 k	Hz	Span 37.5 kł Sweep 344.8 n
Channel Power		Power Spectral Density			
33.40 dBm / 25 kHz		-10.58 dBm /нz			

iDEN signal, nominal input signal + 1dB



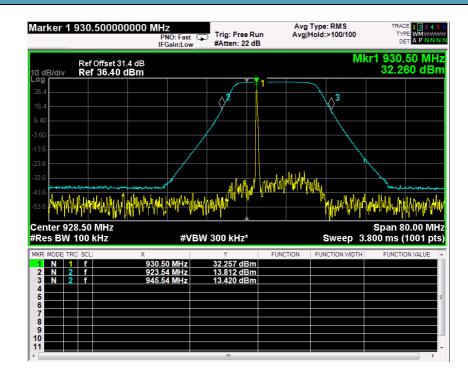
Clause 935210 D05v01 (3.3) Out of band rejection

Out of Band Rejection - Test for rejection of out of band signals.

Test date: 05/27/2019 to 06/24/2019 Test results: Pass

Special notes

Test data





Clause 24.131 Occupied bandwidth

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test date: 05/27/2019 to 06/24/2019

Test results: Pass

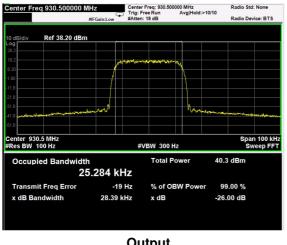
Special notes

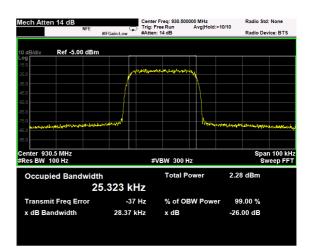


Clause 24.131 Occupied bandwidth, continued

Test data

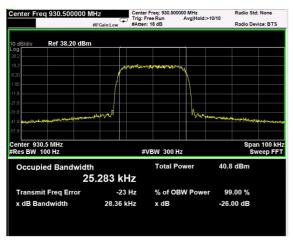
iDEN signal, nominal input signal





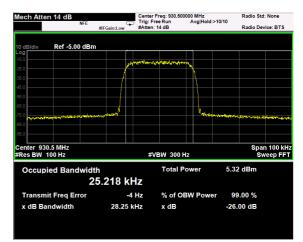
Output

iDEN signal, nominal input signal + 3dB



Output

Input



Input



Clause 24.132(c) Peak output power at RF antenna connector

(c) Base stations transmitting in the 930-931 MHz and 940-941 MHz bands are limited to 3500 watts e.r.p. per authorized channel and are unlimited in antenna height except as provided in paragraph (d) of this section.

Test date: 05/27/2019 to 06/24/2019 Test results: Pass

Special notes

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Clause 24.132(c) Peak output power at RF antenna connector

Test data

iDEN signal, nominal input signal

Test data					
Direction	Modulation	Frequency (MHz)	RF output Power (dBm)	RF output channel Power (W)	PAR (dB)
Down-link	iDEN (25kHz)	930.5	33.07	2.027	5.76

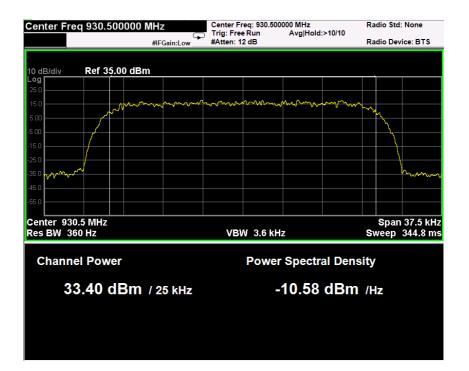


PAR measure is performed by the "CCDF" function installed on Spectrum analyzer that provides average power (the same measured with "Channel power" function), peak power and PAR.



MSK signal, nominal input signal + 3dB

Test data				
Direction	Modulation	Frequency (MHz)	RF output Power (dBm)	RF output channel Power (W)
Down-link	iDEN (25kHz)	930.5	33,40	2.19





Clause 24.133 Spurious emissions at RF antenna connector

(a) The power of any emission shall be attenuated below the transmitter power (P), as measured in accordance with §24.132(f), in accordance with the following schedule:

- (1) For transmitters authorized a bandwidth greater than 10 kHz:
 - (i) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of up to and including 40 kHz: at least 116 Log10 ((fd+10)/6.1) decibels or 50 plus 10 Log10 (P) decibels or 70 decibels, whichever is the lesser attenuation;
 - (ii) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 40 kHz: at least 43+10 Log10 (P) decibels or 80 decibels, whichever is the lesser attenuation.
- (2) For transmitters authorized a bandwidth of 10 kHz:
 - (i) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of up to and including 20 kHz: at least 116×Log10 ((fd+5)/3.05) decibels or 50+10×Log10 (P) decibels or 70 decibels, whichever is the lesser attenuation;
 - (ii) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 20 kHz: at least 43+10 Log 10 (P) decibels or 80 decibels, whichever is the lesser attenuation.

Test date: 05/27/2019 to 06/24/2019 Test results: Pass

Special notes



Clause 24.133 Spurious emissions at RF antenna connector, continued

	data .
1031	data

See Plots below

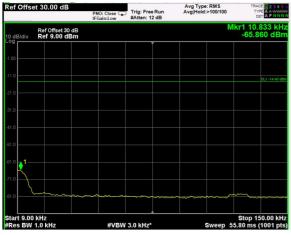
Spurious emissions me	easurement results:		
Frequency	Spurious emission	Limit	Margin
(MHz)	. (dBm)	(dBm)	(dB)
Low channel			
First channel	Negligible	-13	
Mid channel			
930,5 MHz	Negligible	-13	
High channel			
Last channel	Negligible	-13	



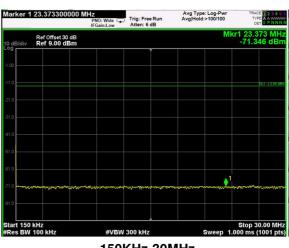
Test data: spurious emissions at antenna terminal

iDEN signal

(Plots are referred to modulated carrier at the Middle Channel)



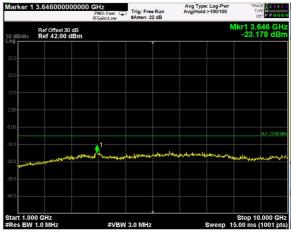
9KHz-150KHz



Marker 1 930.500000000 MHz Fast ---- Trig: Free Run #Atten: 20 dB Avg Type: Log-Pwr Avg|Hold: 100/100 Ref Offset 30 dB Ref 36.00 dBm ift 0.0300 GHz es BW 1.0 MH Stop 1.0000 #VBW 3.0 MHz

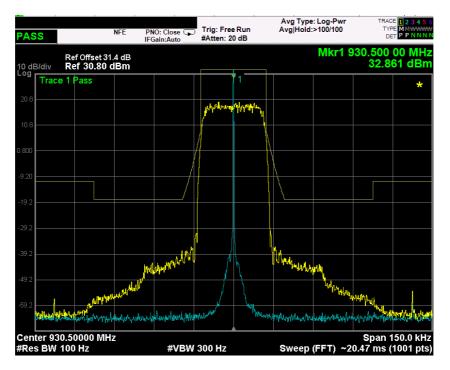
30MHz-1GHz





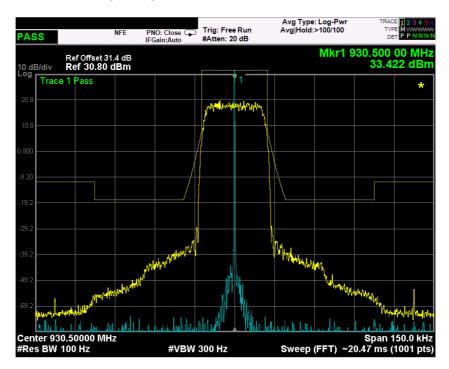
1GHz-10GHz





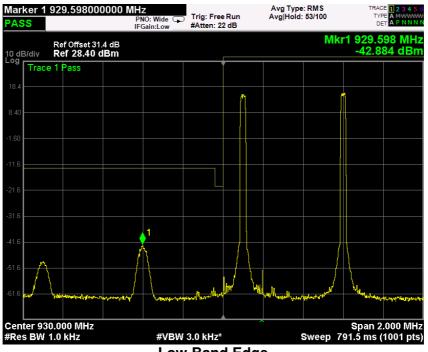
iDEN signal mask, nominal input signal

iDEN signal mask, nominal input signal + 3dB

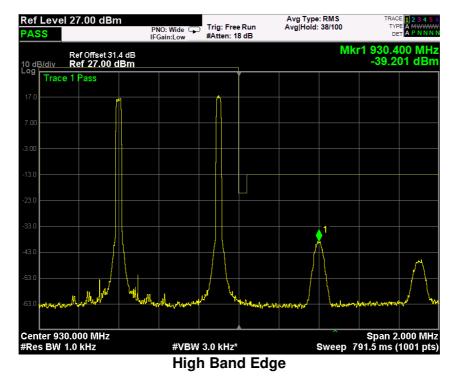


Test data, continued: band edges Inter modulation

iDEN signal, nominal input signal



Low Band Edge





Clause 24.133 Radiated Spurious emissions

a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 Log (P) dB.

Test date: 05/27/2019 to 06/24/2019 Test results: Pass

Special notes



Clause 24.133 Radiated spurious emissions, continued

Test data

The D.U.T. was positioned according to the radiated emissions set-up

The D.U.T. antenna connector was terminated by a 50 Ω shielded dummy load.

The spectrum was searched from 30 MHz to 1 GHz (RBW 100 kHz) & 1 GHz (RBW 1 MHz) to the tenth harmonic of the carrier.

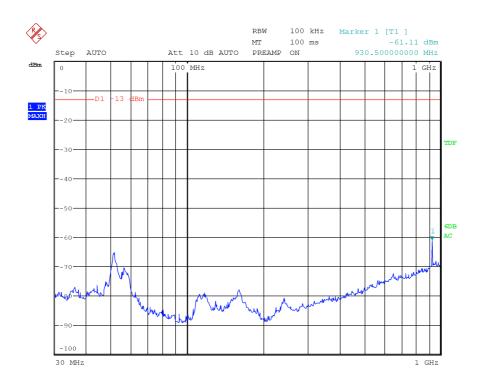
There were no emissions detected above the noise floor which was at least 20 dB below the specification limit.

Spurious emissions measurement results:

Frequency (MHz)	Polarization. V/H	Field strength (dBm)	Limit (dBm)	Margin (dB)
Low channel				
First Channel	V/H	Negligible	-13	
Mid channel				
930.5	V/H	Negligible	-13	
High channel	1			
Last Channel	V/H	Negligible	-13	

Note: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.



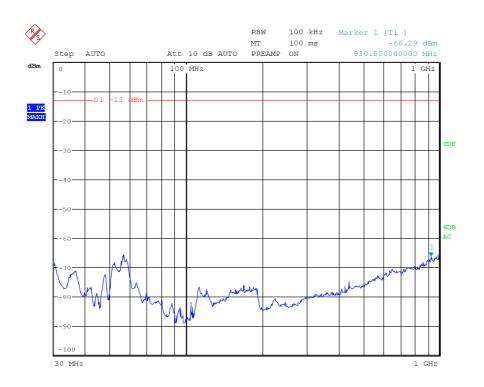


Date: 19.JUN.2019 12:10:34

30MHz-1GHz – H Pol

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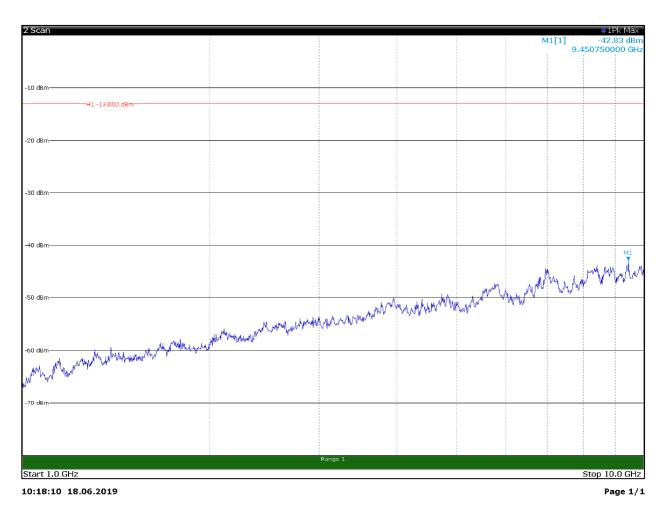


Date: 19.JUN.2019 12:09:46

30MHz-1GHz – V Pol

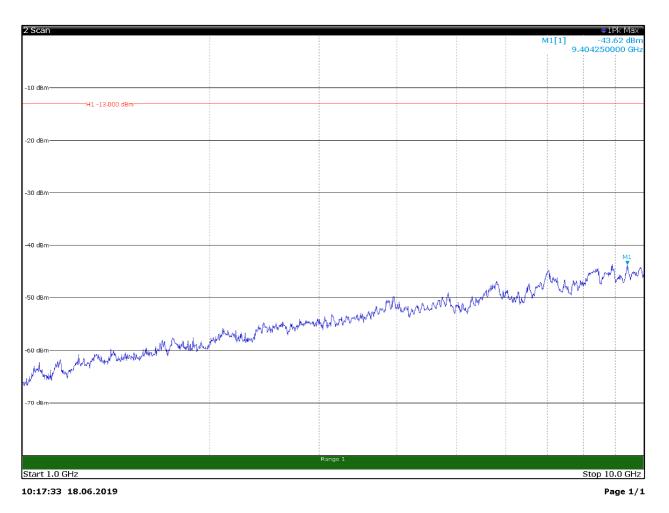
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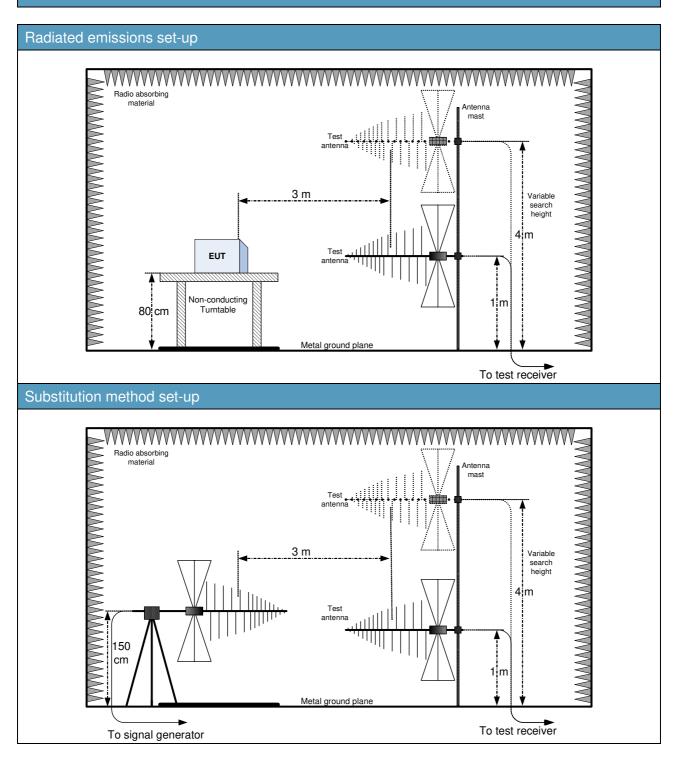








Appendix B: Block diagrams of test set-ups





Appendix C: EUT Photos

Photo Set up





Photo EUT









END OF REPORT