

Annex 1: Measurement diagrams 22-1-0076802T12a-A1

Number of pages:	80	Date of Report:	2022-Nov-07
Testing company:	CETECOM GmbH Im Teelbruch 116 45219 Essen Germany Tel. + 49 (0) 20 54 / 95 19-0 Fax: + 49 (0) 20 54 / 95 19-150	Applicant:	WITTE-Velbert GmbH & Co.KG
Product: Model:	Automotive NFC Outer Door Handle INTTAGEBTP		
FCC ID:	V2T-INTTAGEBTP	IC:	7575A-INTTAGEBTP
Testing has been carried out in accordance with:	FCC Regulations Title 47 CFR, Chapter I, Subchapter A, Part 15, Subpart C §15.225 ISED Regulations RSS-Gen, Issue 5 + Amendment 2 RSS-210, Issue 10 Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".each section under "Test method and limit".		

Table of Contents

1	Measurement diagrams.....	3
1.1	Radiated field strength emissions and emission mask	3
1.2	Radiated field strength emissions below 30 MHz	5
1.3	Radiated field strength emissions 30 MHz – 1 GHz	9
1.4	Occupied Channel Bandwidth	11
1.4.1	Set1Op1_20dBc.....	11
1.4.2	Set1Op1_99%OBW	12
1.4.3	Set2Op2_20dBc.....	13
1.4.4	Set2Op2_99%OBW	14
1.5	Frequency stability	15
1.5.1	Temperature variation	15
1.5.2	Voltage variation.....	68

1 Measurement diagrams

1.1 Radiated field strength emissions and emission mask

2.01a_SpektrumMask_TX_OpMode1_Setup1_EUT_standing

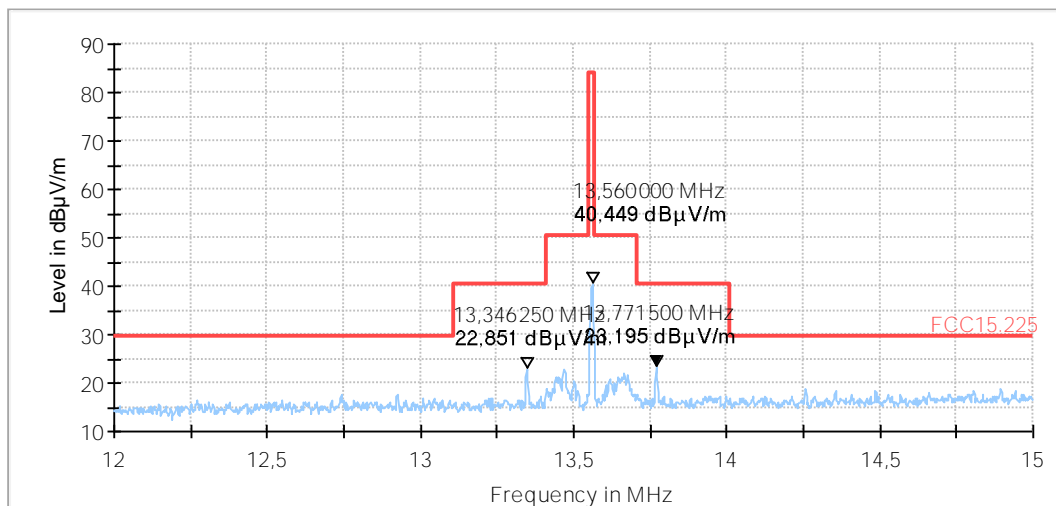
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous mode without tag
Environmental Conditions::	Humidity : 62%RH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S16_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



2.02a_SpektrumMask_TXRX_OpMode2_Setup2_EUT_st anding

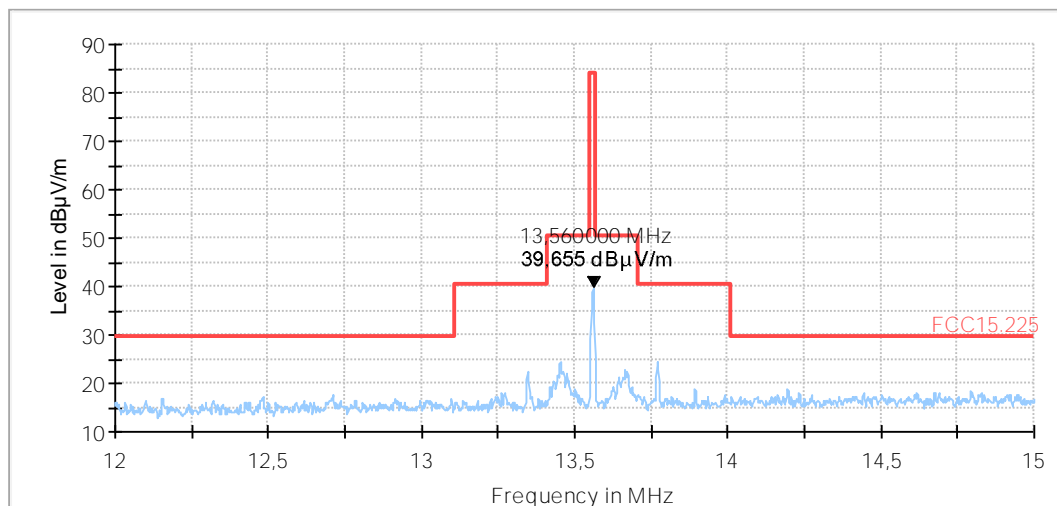
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous communication with tag
Environmental Conditions:	Humidity : 62%rH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S17_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



1.2 Radiated field strength emissions below 30 MHz

2.03a_RSE_TX_OpMode1_Setup1_EUT_standing

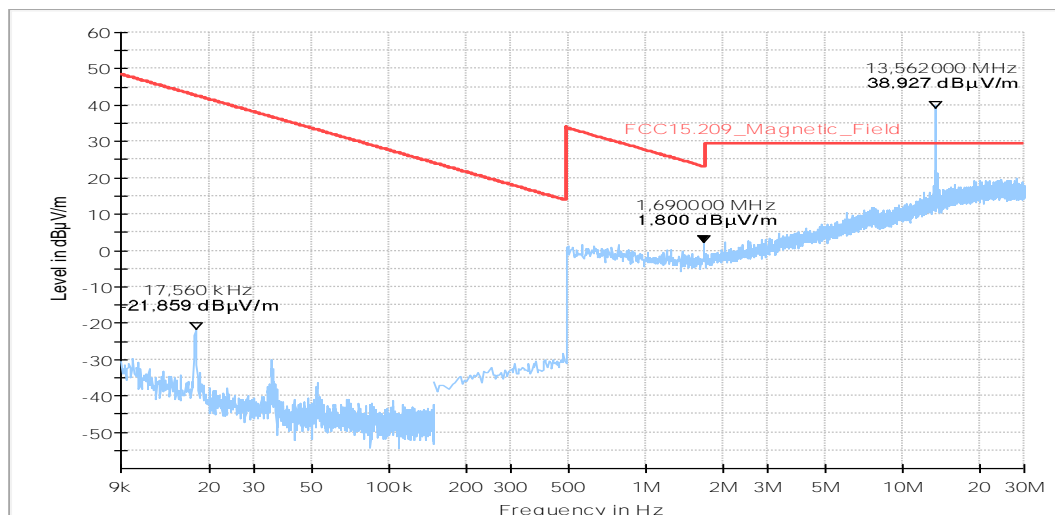
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous mode without tag
Environmental Conditions::	Humidity : 62%rH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S16_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



Remark: emissions in the lower frequency range are external interferer caused by an electrical antenna mast inside the chamber

2.03b_RSE_TX_OpMode1_Setup1_EUT_laying

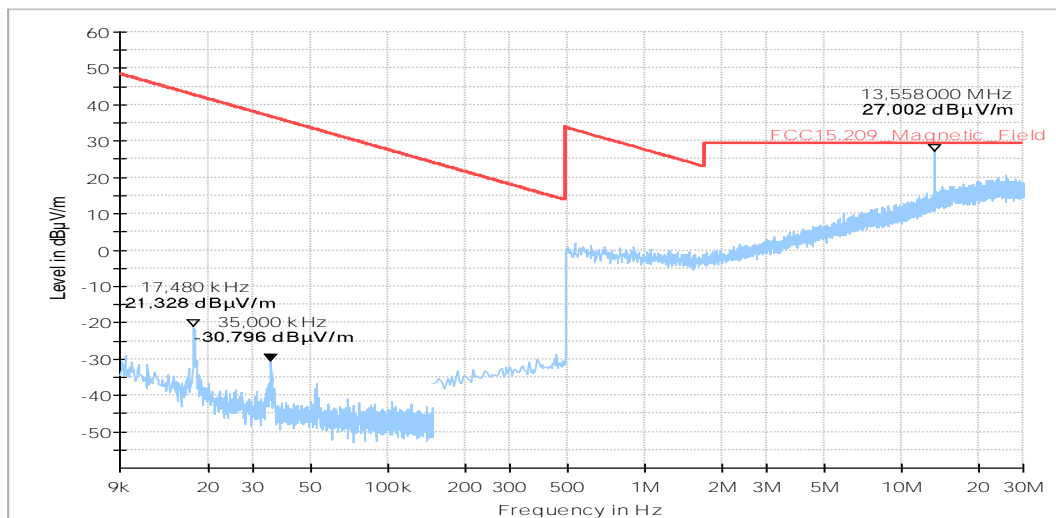
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous mode without tag
Environmental Conditions::	Humidity : 62%RH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S16_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



Remark: emissions in the lower frequency range are external interferer caused by an electrical antenna mast inside the chamber

2.04a_RSE_TXRX_OpMode2_Setup2_EUT_standing

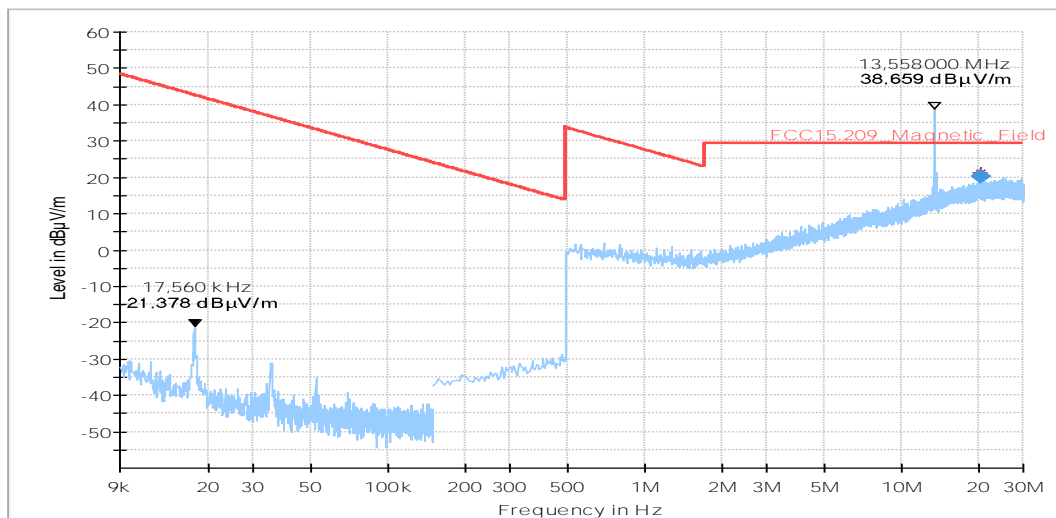
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous communication with tag
Environmental Conditions::	Humidity : 62%RH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S17_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



Remark: emissions in the lower frequency range are external interferer caused by an electrical antenna mast inside the chamber

2.04b_RSE_TXRX_OpMode2_Setup2_EUT_laying

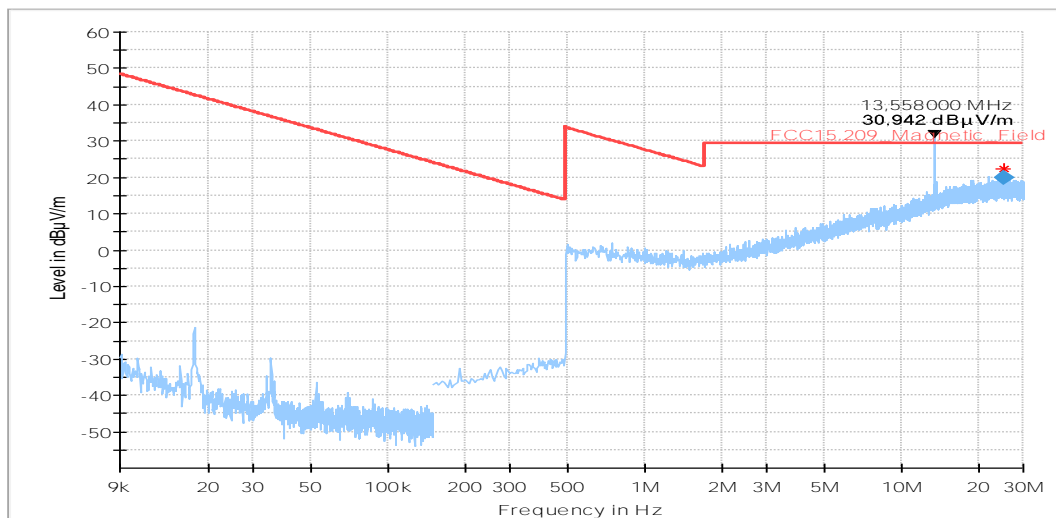
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous communication with tag
Environmental Conditions::	Humidity : 62%rH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S17_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



Remark: emissions in the lower frequency range are external interferer caused by an electrical antenna mast inside the chamber

1.3 Radiated field strength emissions 30 MHz – 1 GHz

3.01a_RSE_TX_OpMode1_Setup1_EUT_standing

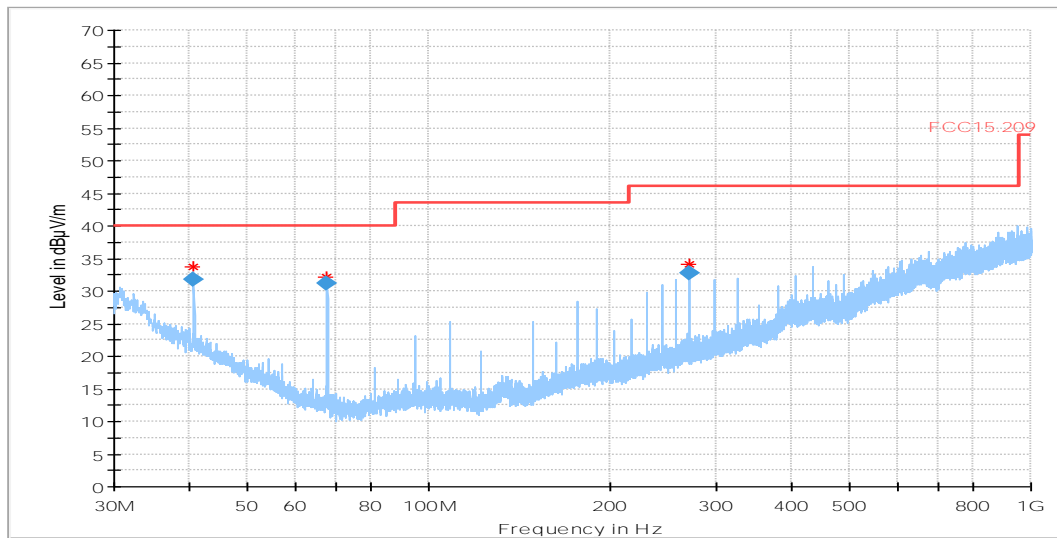
Common Information

Test Description: Radiated field strength emission in 3m distance
 Test Site: CETECOM GmbH Essen
 Test Standard: FCC 15.205&15.209 & RSS Gen. Issue 5
 Antenna polarisation: horizontal/vertical

Environmental Conditions: Humidity : 59%rH; Temperature: 22°C
 Operator Name: Lor
 EUT: S05
 Operating Mode: NFC Test-Mode CW
 Power supply: 12v DC car battery
 Comment: Channel no. nominal
 Verdict: Passed

EUT Information

PMT number: 22-1-00768S16_C01
 Manufacturer: WITTE-Velbert GmbH & Co.KG
 Power Supply: 12V DC
 Comments: car battery powered



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Trd Corr. (dB/m)
40.670000	31.79	40.00	8.21	120.000	105.0	V	63.0	16.2	0.0	15.6
67.790000	31.25	40.00	8.75	120.000	154.0	V	176.0	6.5	0.0	5.7
271.190000	32.65	46.00	13.35	120.000	111.0	H	334.0	14.4	0.0	12.8

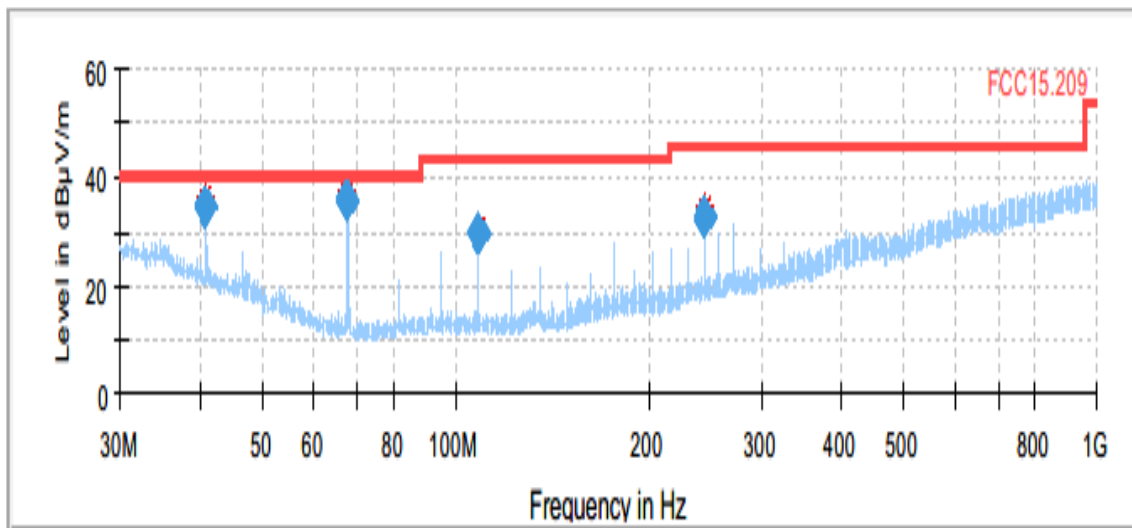
3.02a_RSE_TXRX_OpMode2_Setup2_EUT_standing

Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205&15.209 & RSS Gen. Issue 5
Antenna polarisation:	horizontal/vertical
Environmental Conditions::	Humidity : 58%rH; Temperature: 22°C
Operator Name:	Lor
EUT:	S11
Operating Mode:	NFC normal mode, communicating to NFC-Tag
Power supply:	12v DC car battery
Comment:	Channel no. nominal
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S17_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

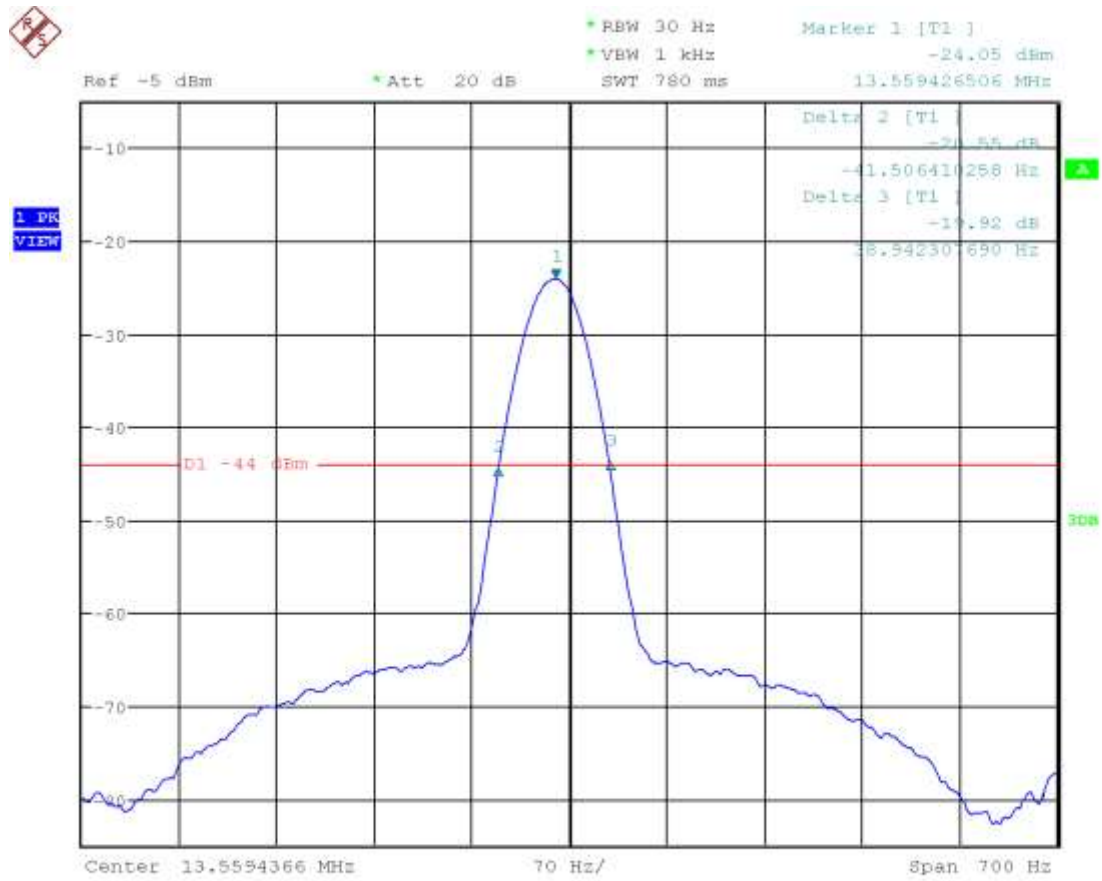


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Trd Corr. (dB/m)
40.670000	34.56	40.00	5.44	120.000	105.0	V	78.0	16.2	15.6
67.790000	36.10	40.00	3.90	120.000	125.0	V	251.0	6.5	5.7
108.470000	29.63	43.50	13.87	120.000	109.0	V	130.0	7.7	6.6
244.070000	32.86	46.00	13.14	120.000	120.0	H	205.0	12.9	11.3

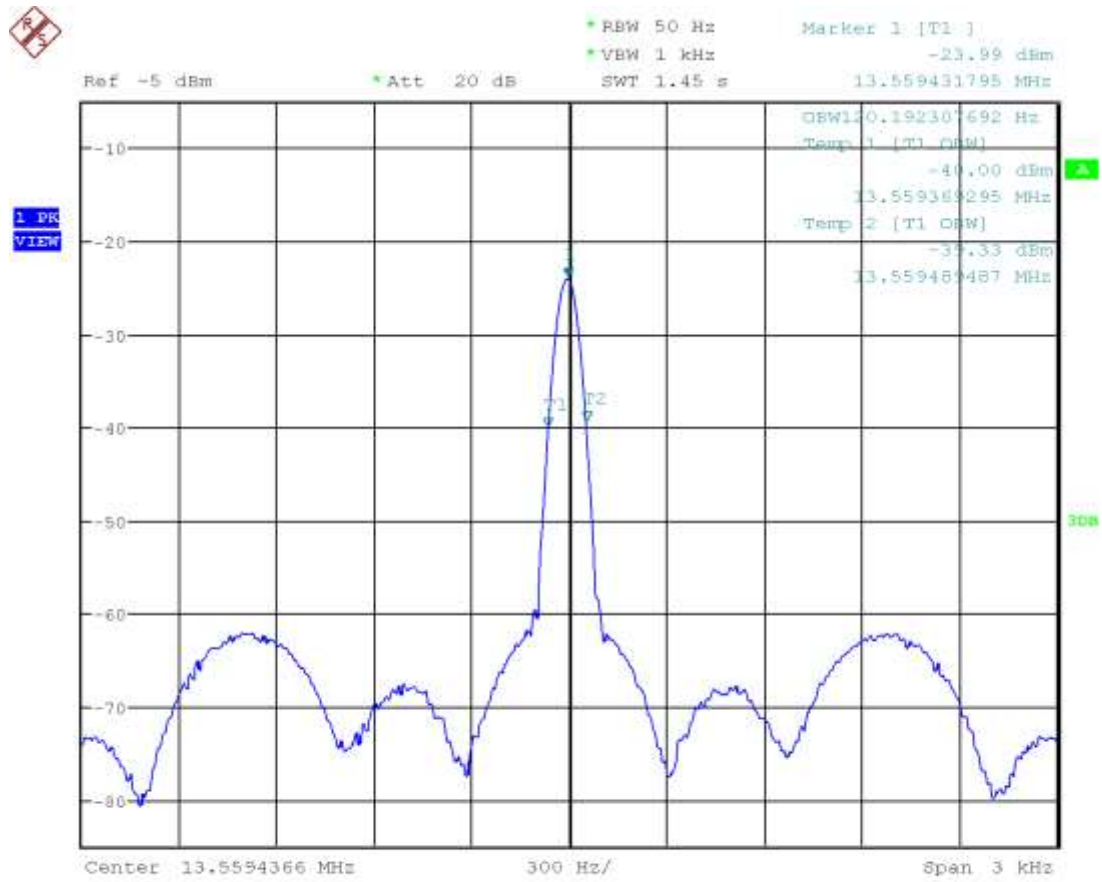
1.4 Occupied Channel Bandwidth

1.4.1 Set1Op1_20dBc



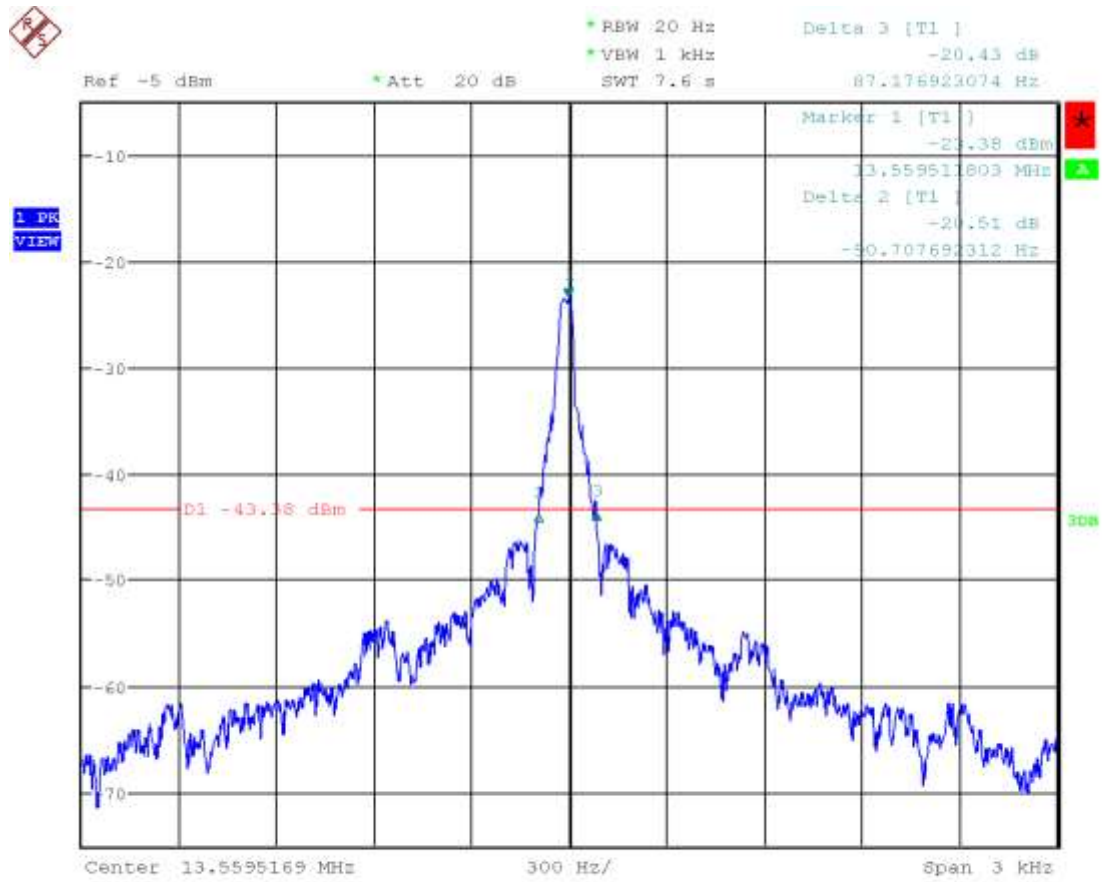
Date: 30.SEP.2022 08:27:47

1.4.2 Set1Op1_99%OBW



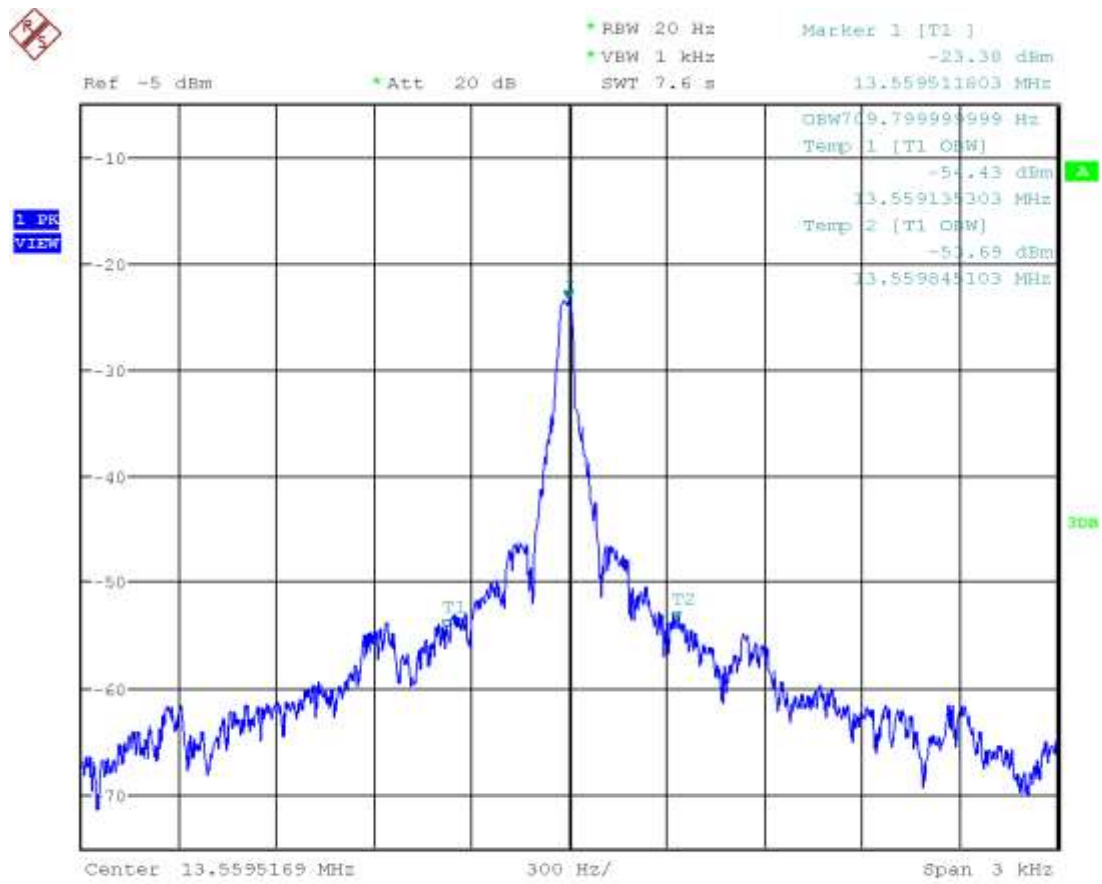
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1.4.3 Set2Op2_20dBc



Date: 30.SEP.2022 08:38:13

1.4.4 Set2Op2_99%OBW

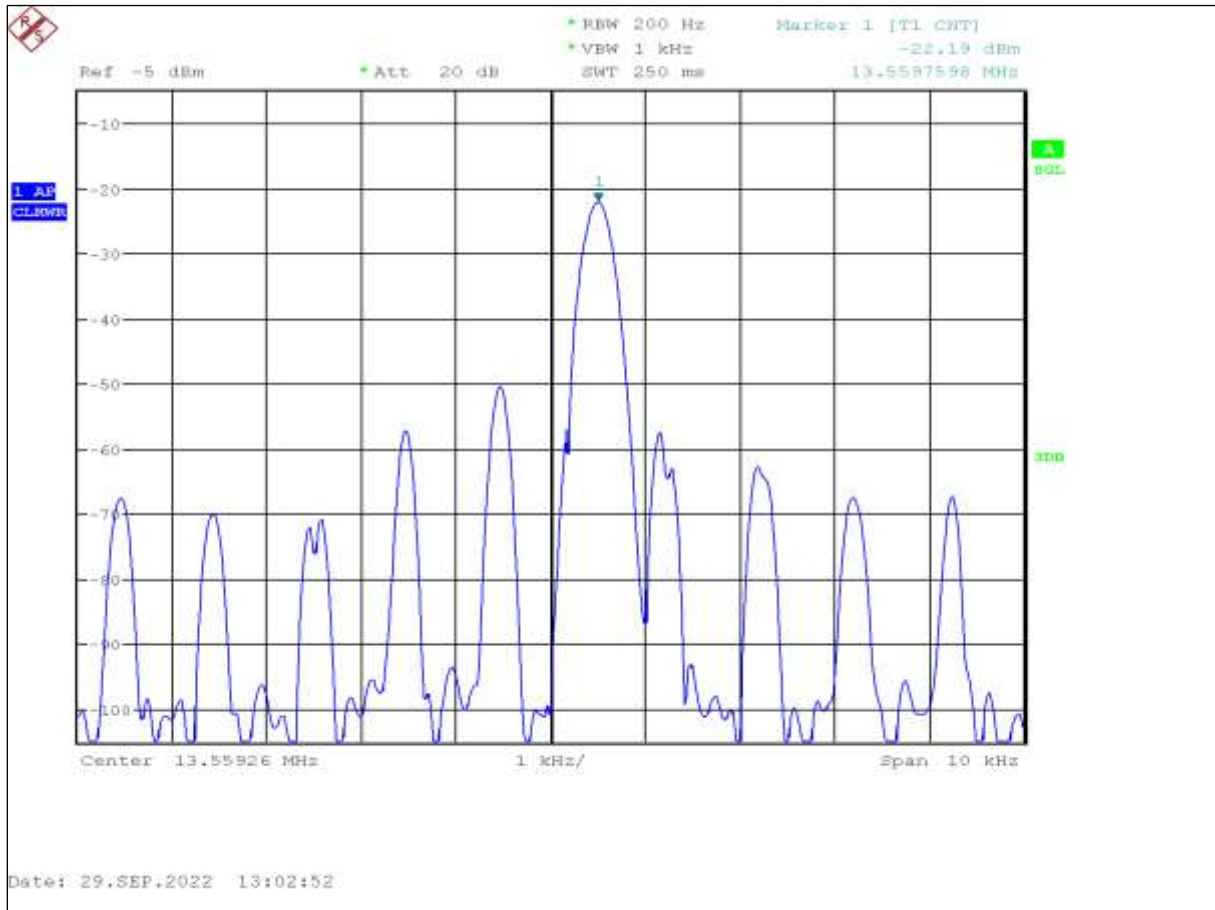


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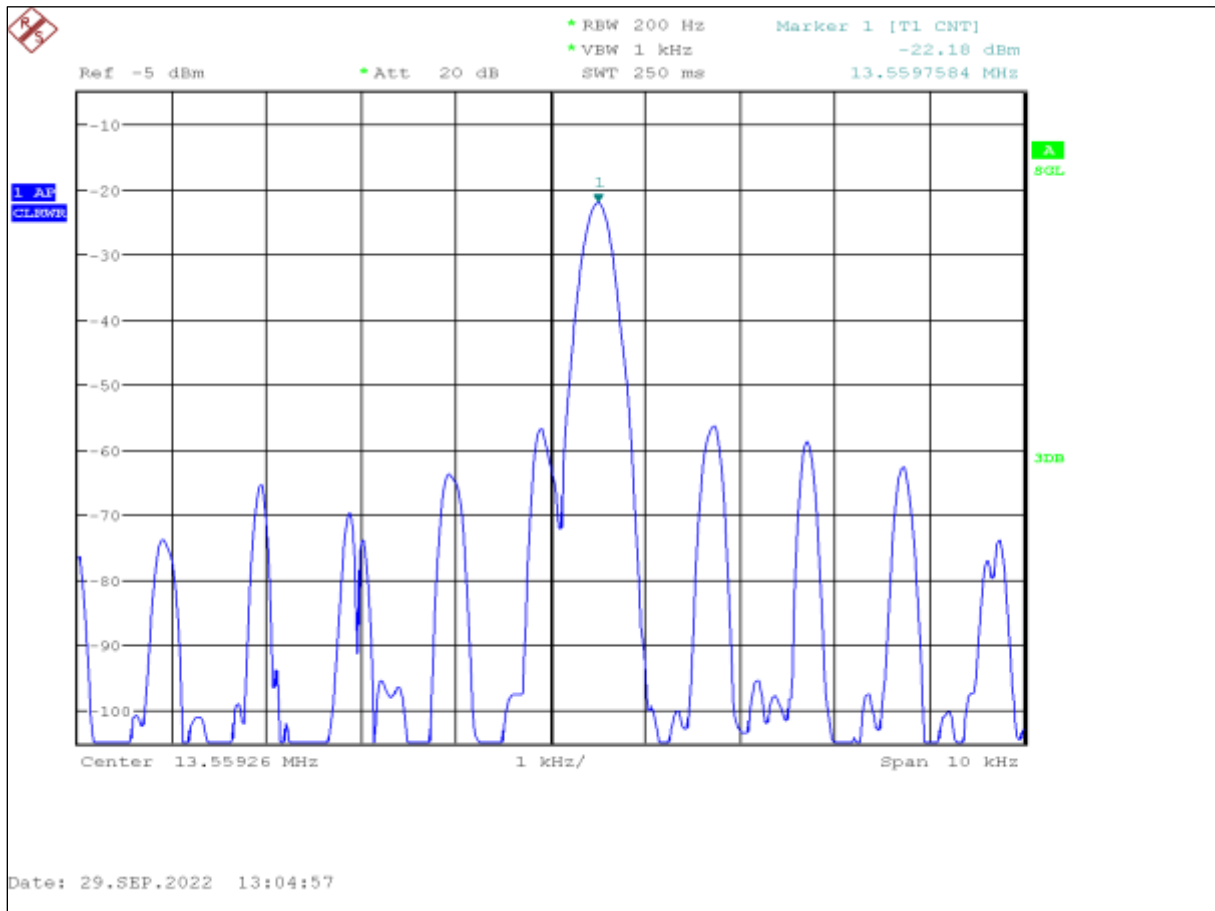
1.5 Frequency stability

1.5.1 Temperature variation

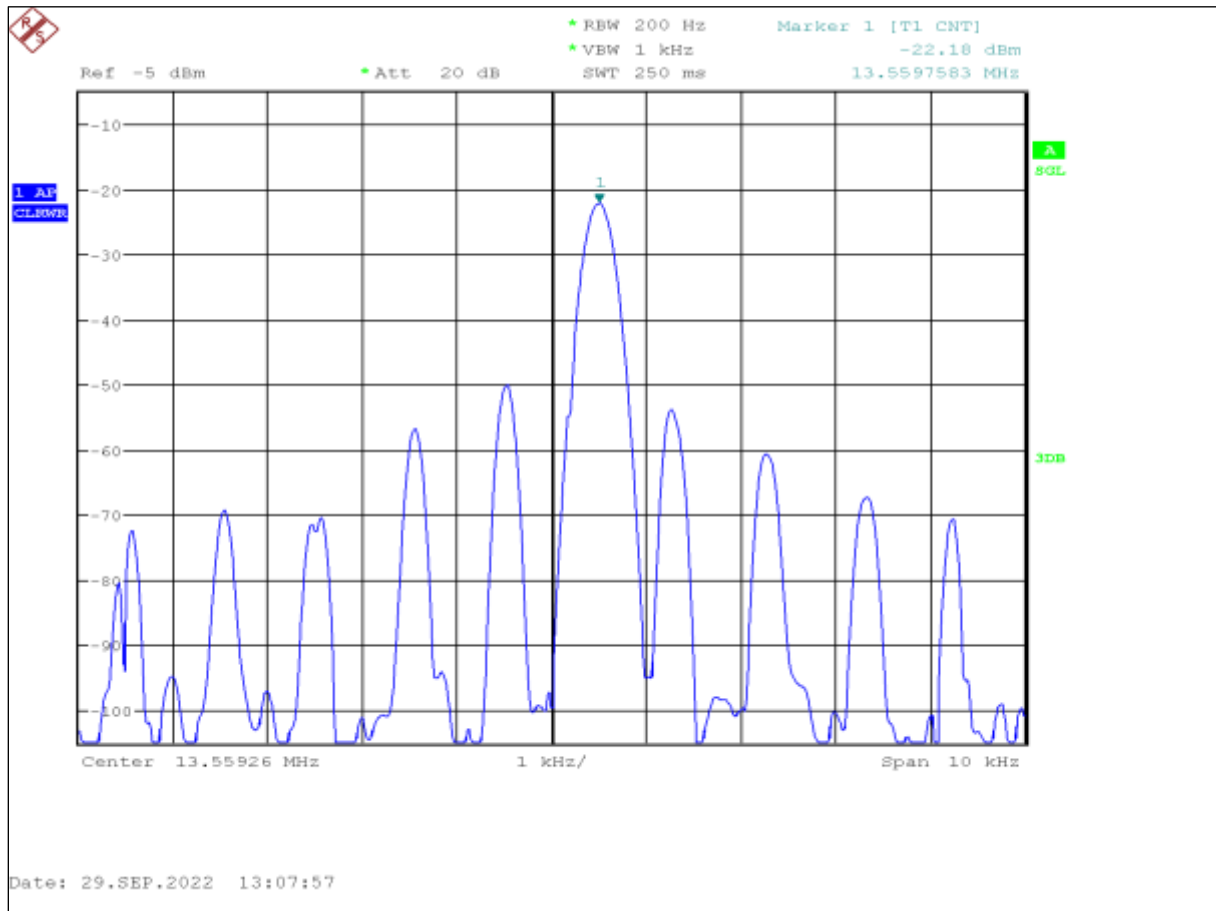
Tm10_V12_1



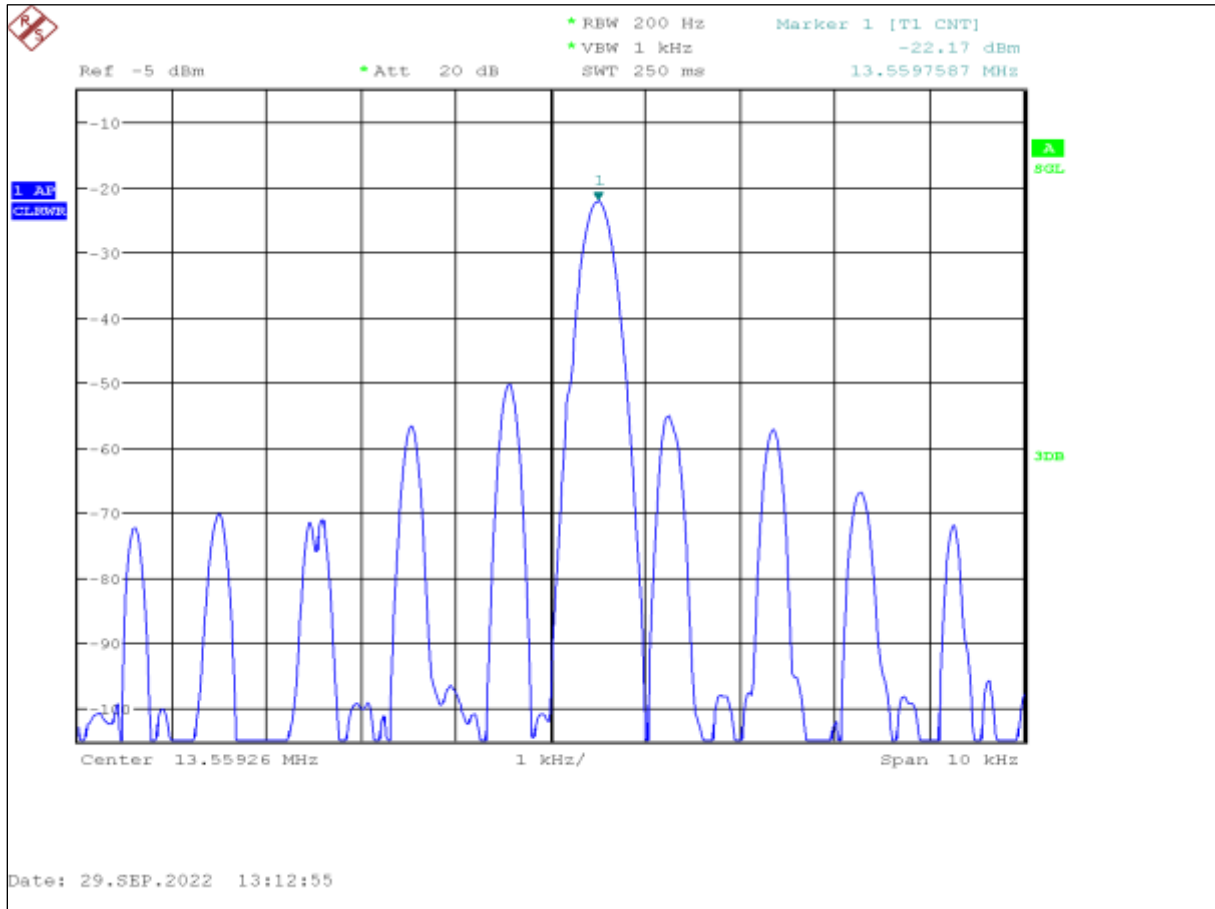
Tm10_V12_2



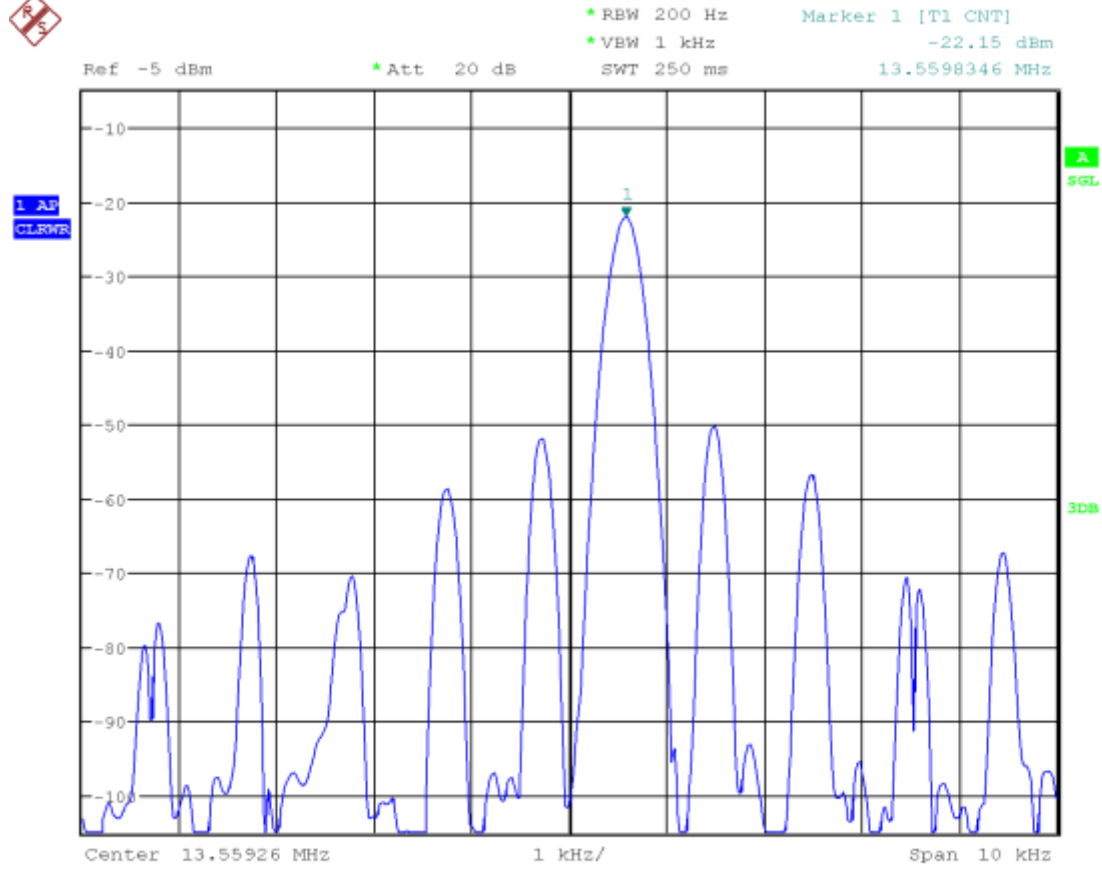
Tm10_V12_3



Tm10_V12_4

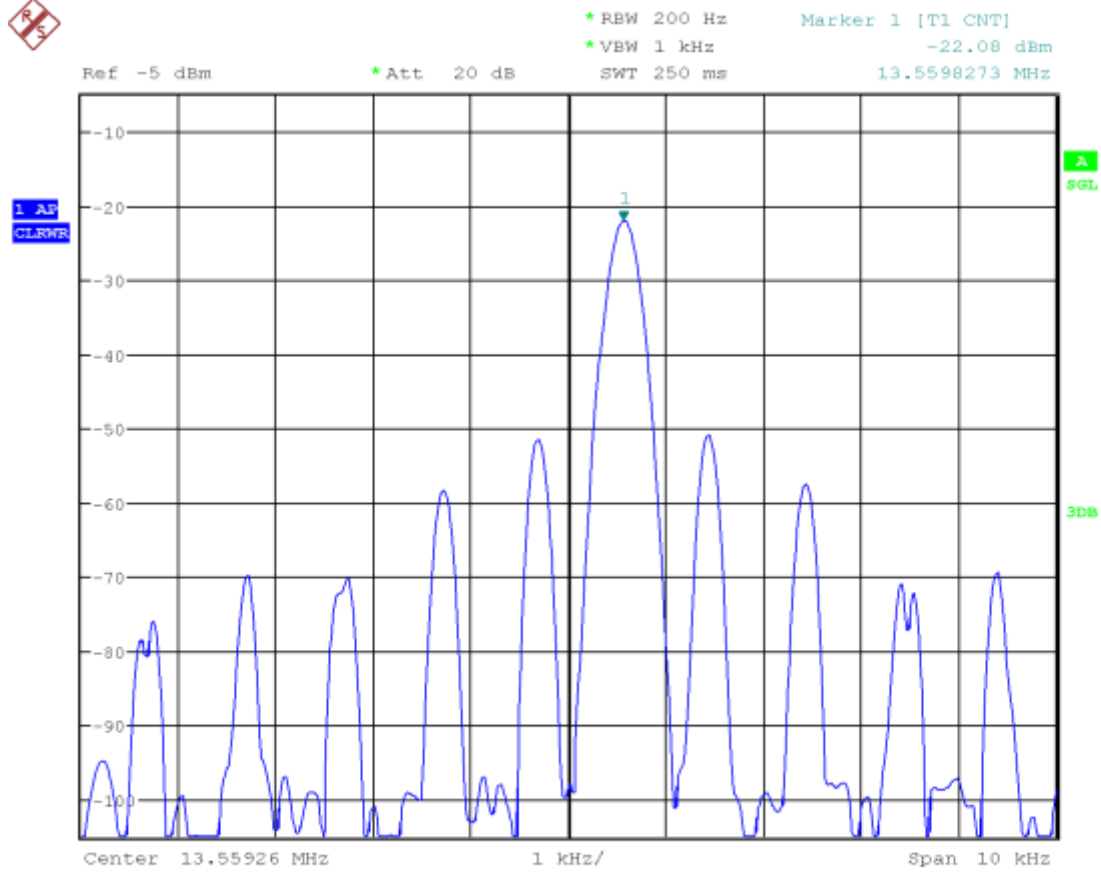


Tm20_V12_1



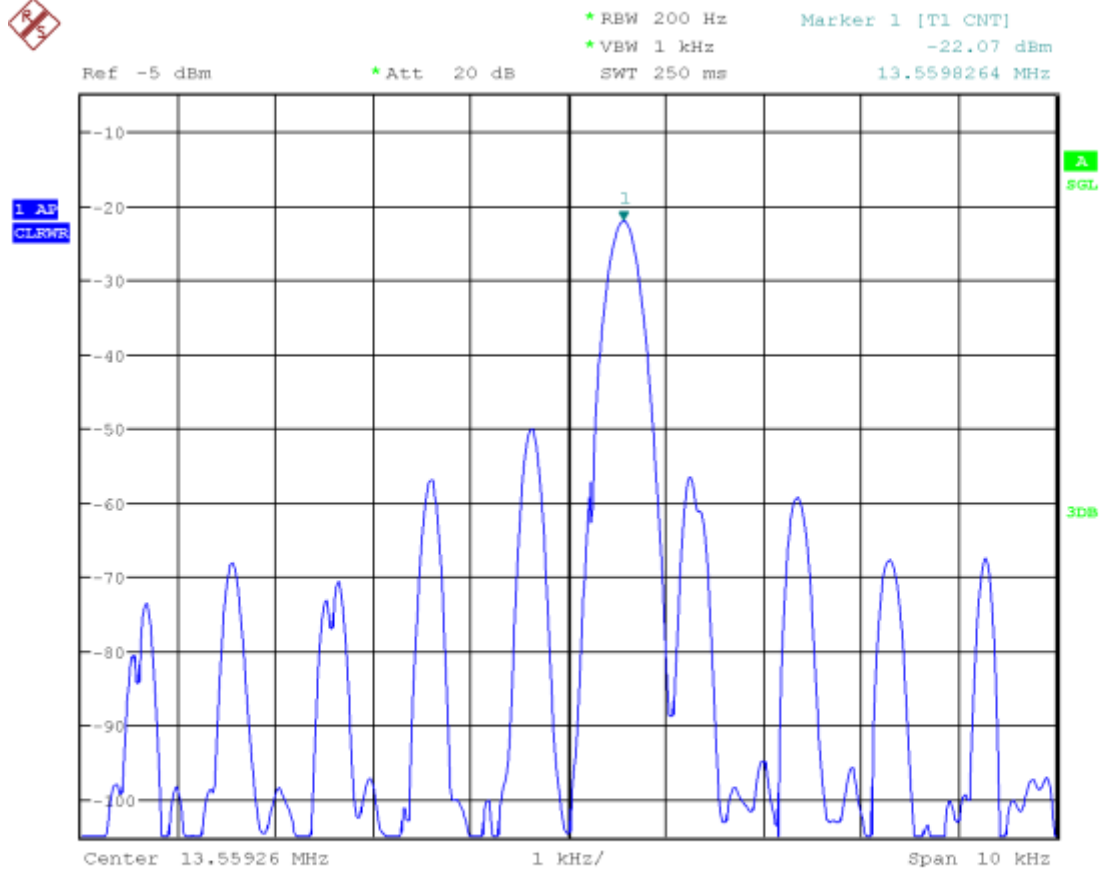
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Tm20_V12_2



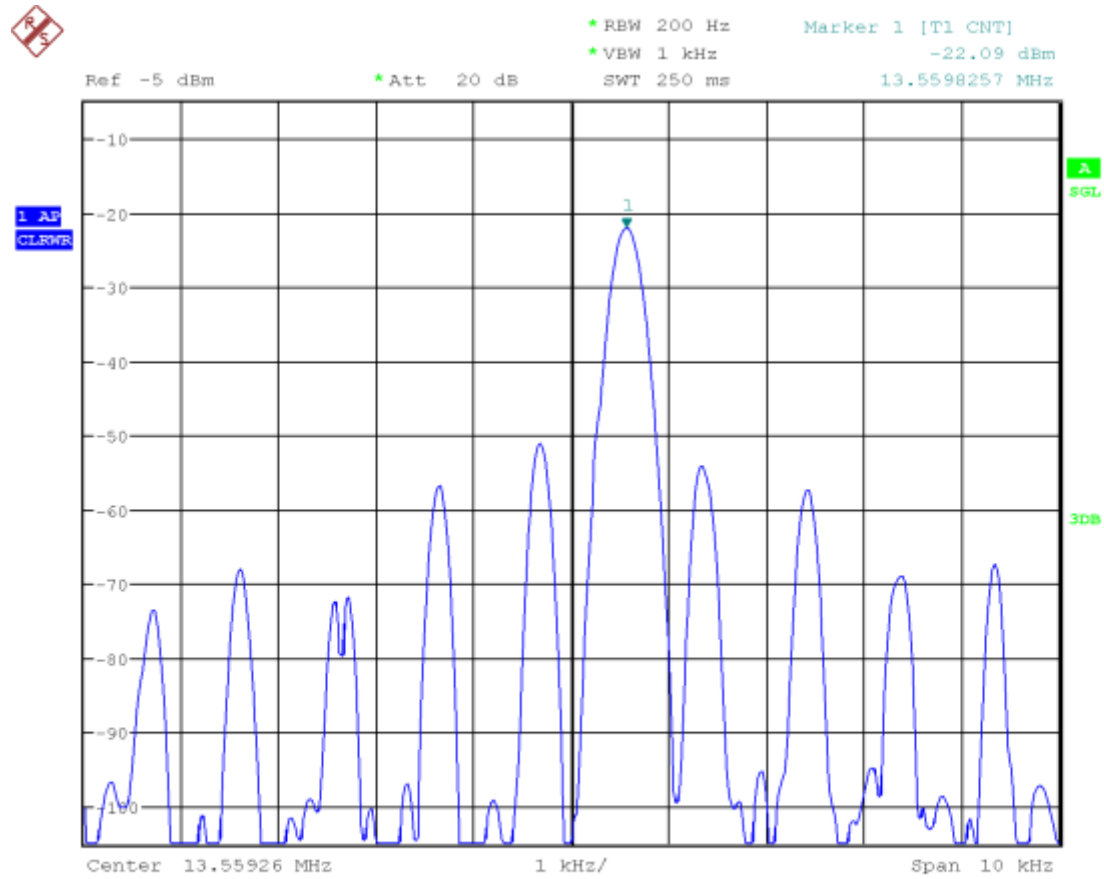
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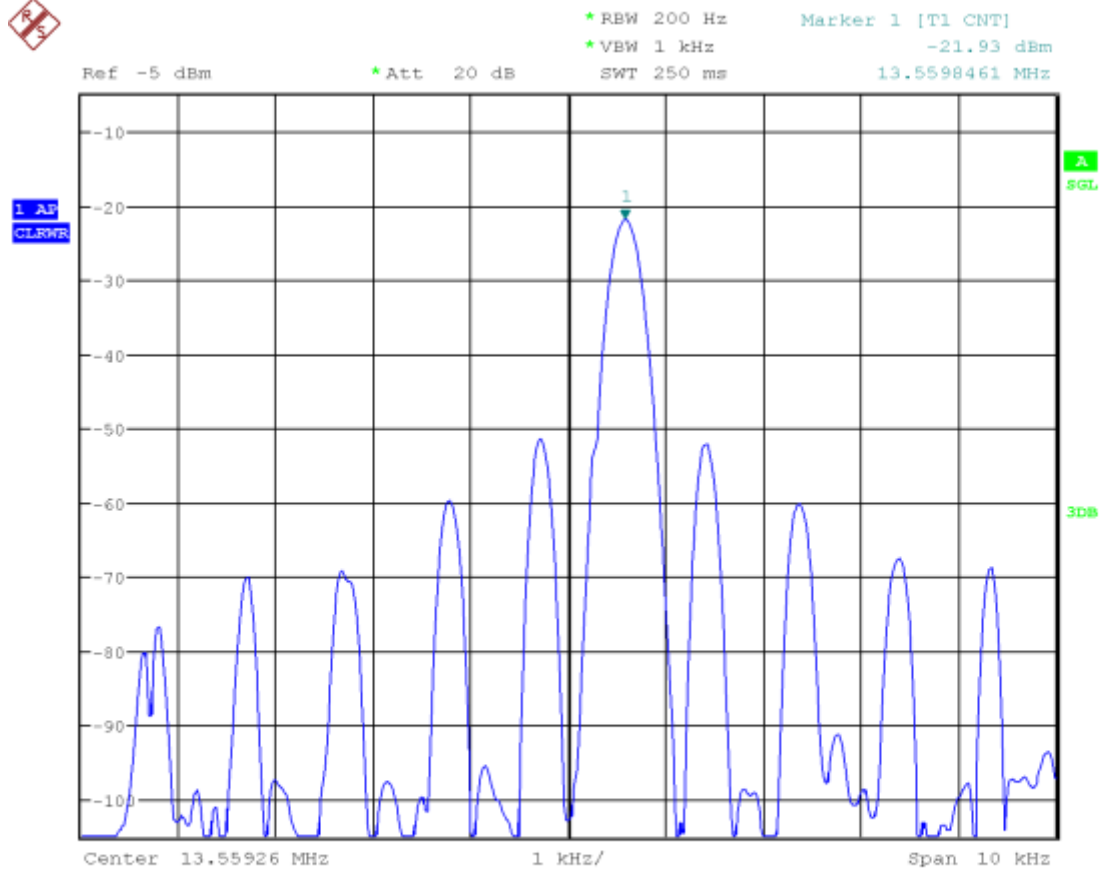
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Tm20_V12_4



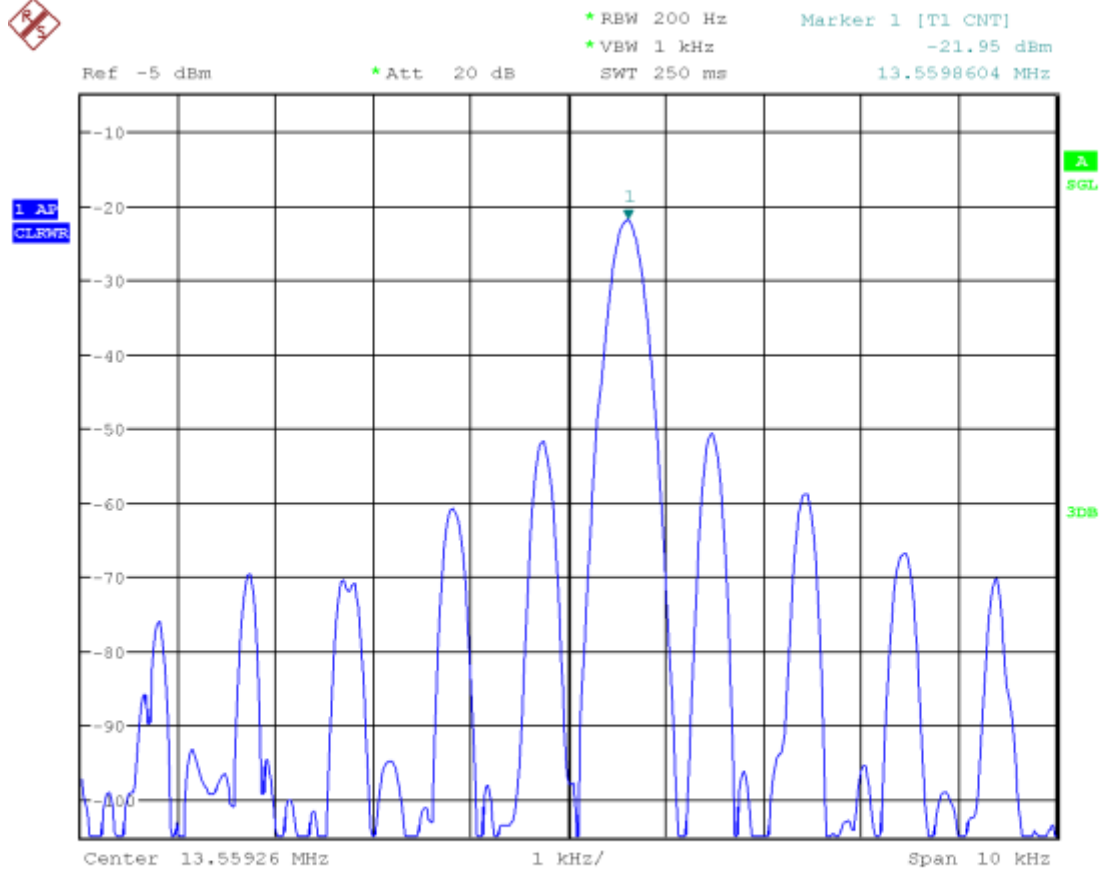
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Tm30_V12_1



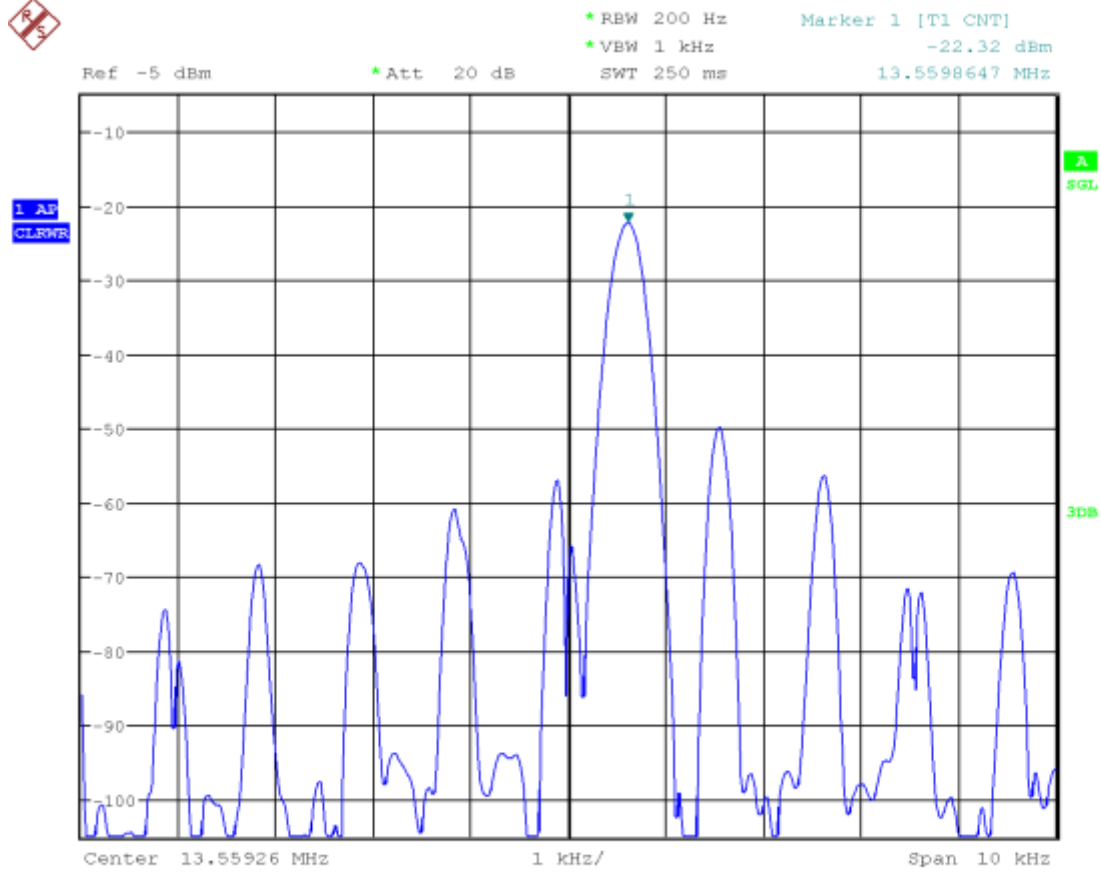
Date: 29.SEP.2022 15:02:47

Tm30_V12_2



Date: 29.SEP.2022 15:04:46

Tm30_V12_3

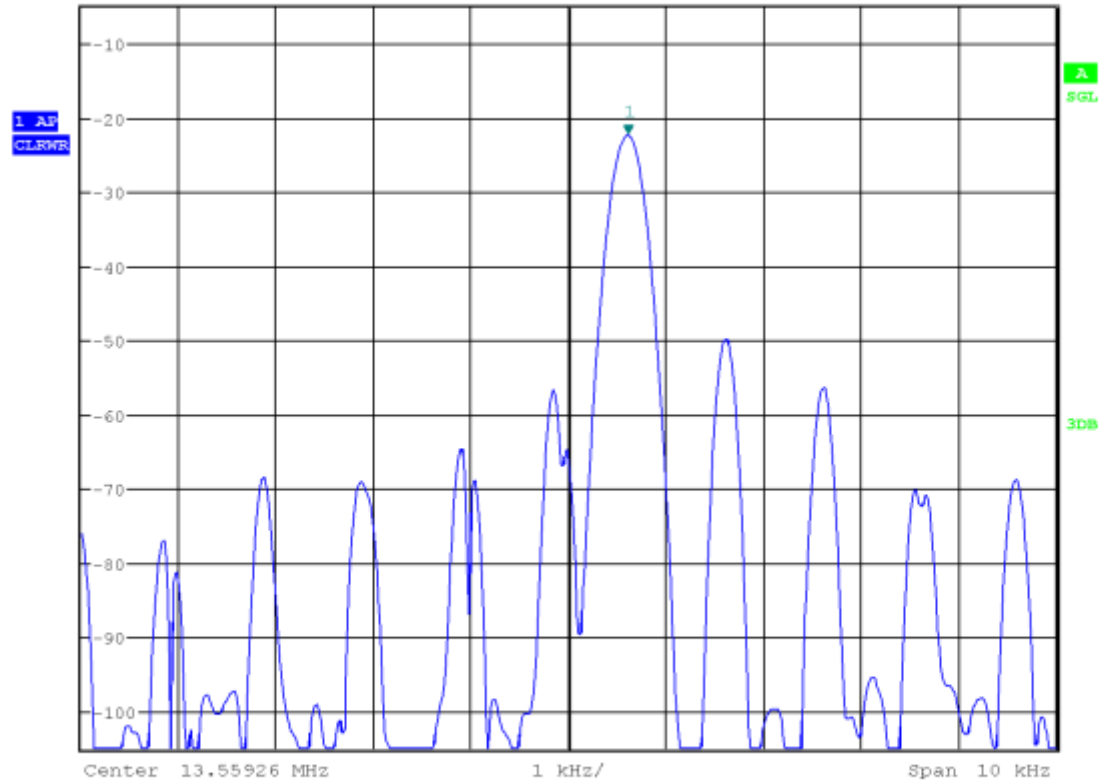


Date: 29.SEP.2022 15:07:50

Tm30_V12_4

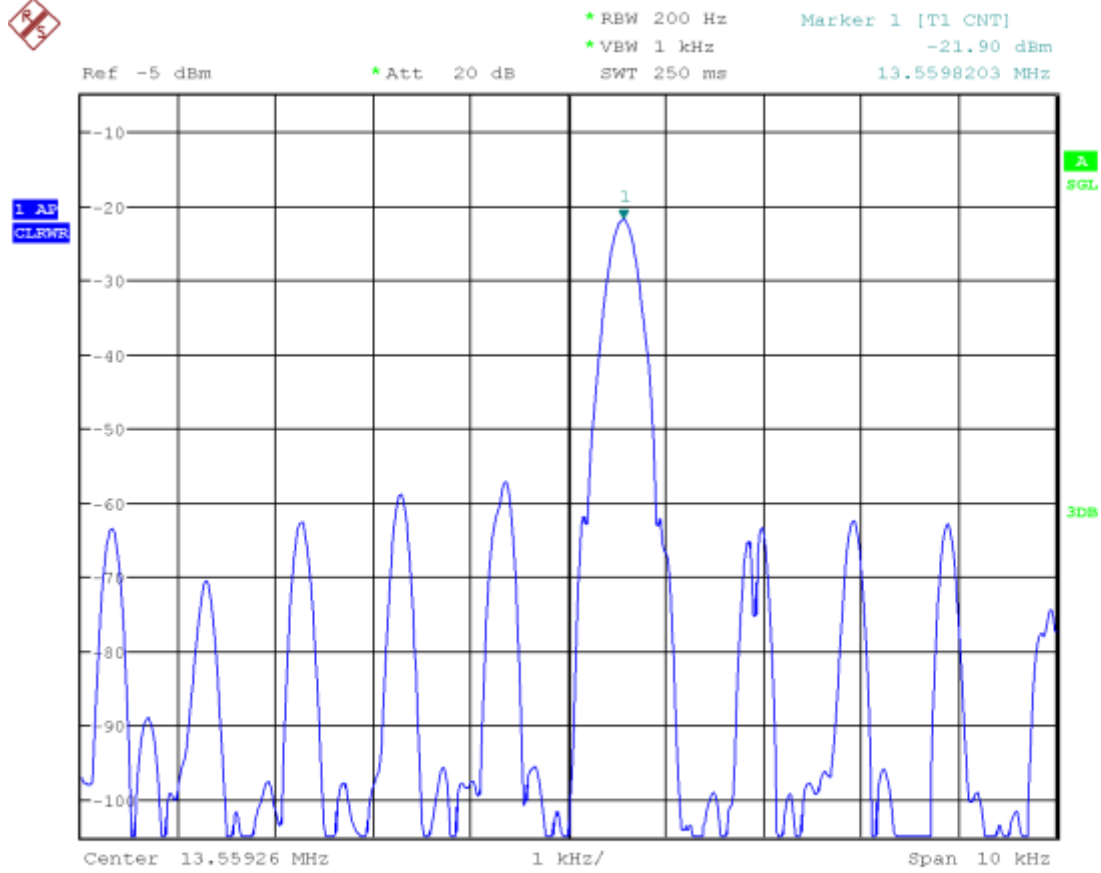


Ref -5 dBm *Att 20 dB *RBW 200 Hz Marker 1 [T1 CNT] -22.42 dBm
*VBW 1 kHz SWT 250 ms 13.5598656 MHz



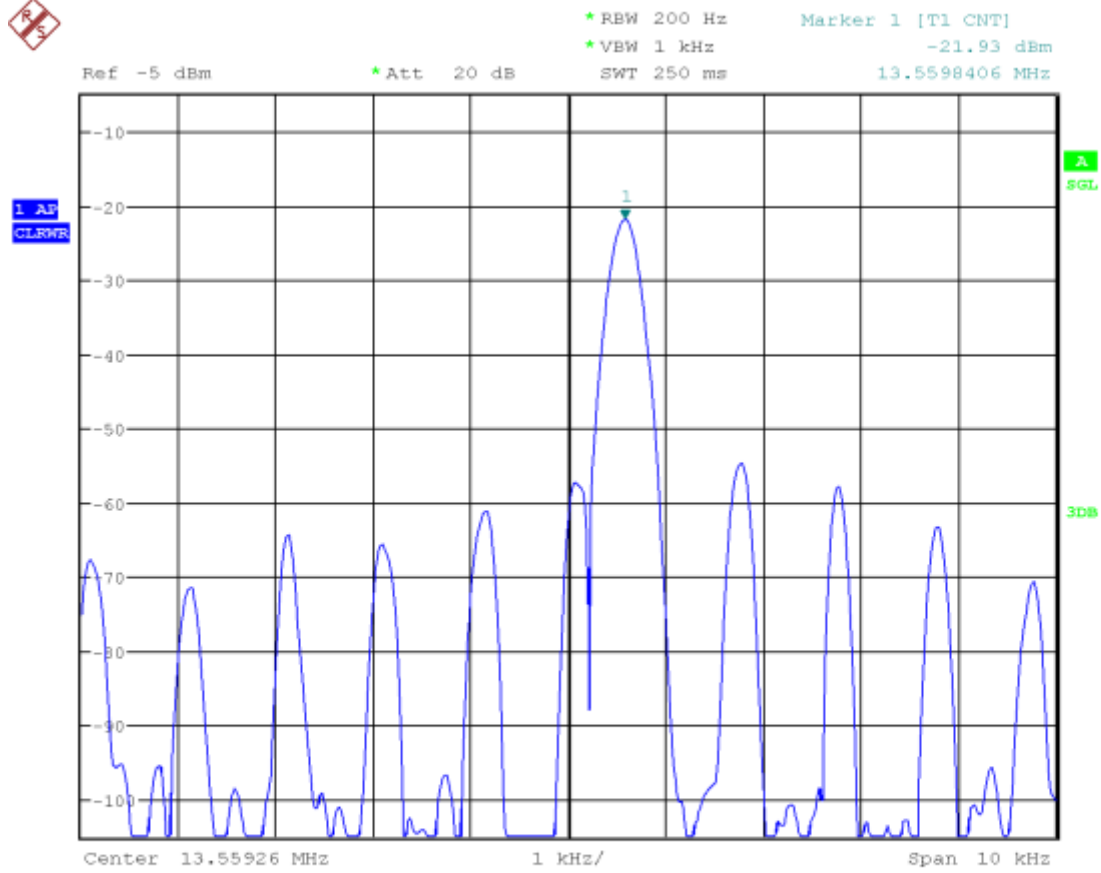
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Tm40_V12_1



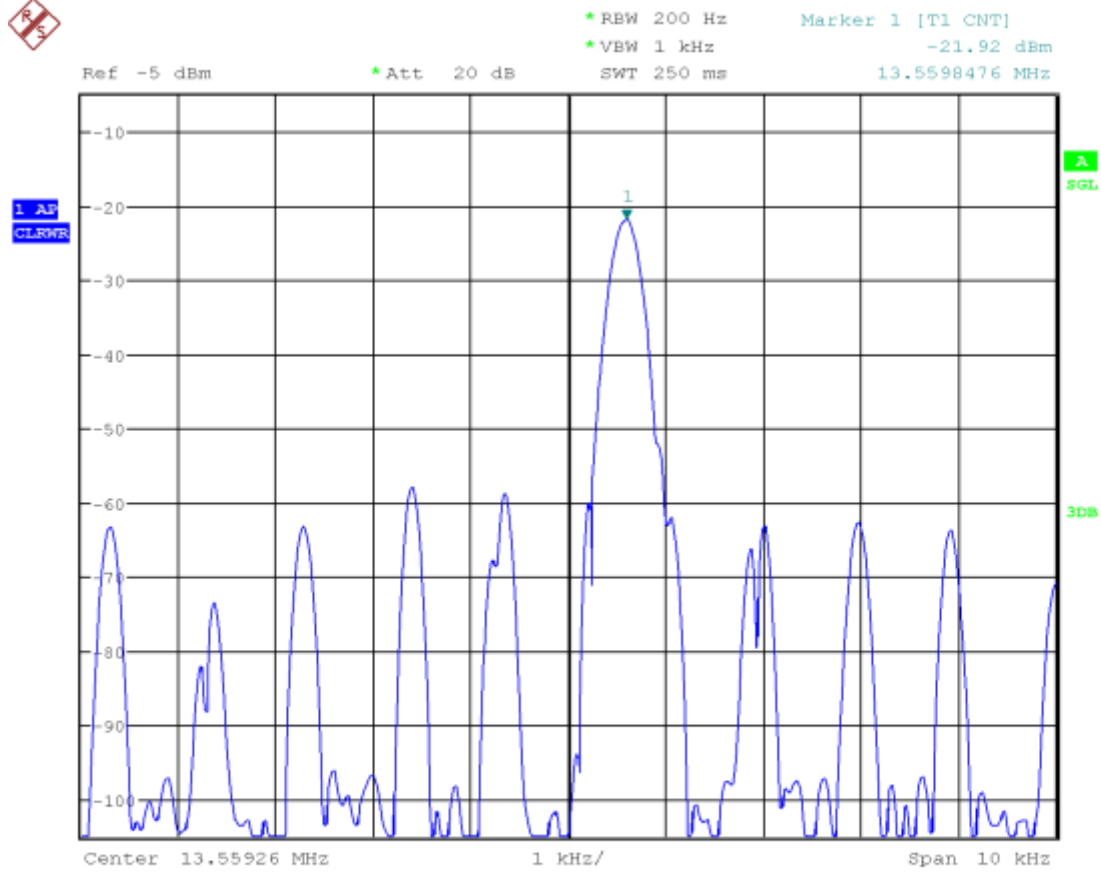
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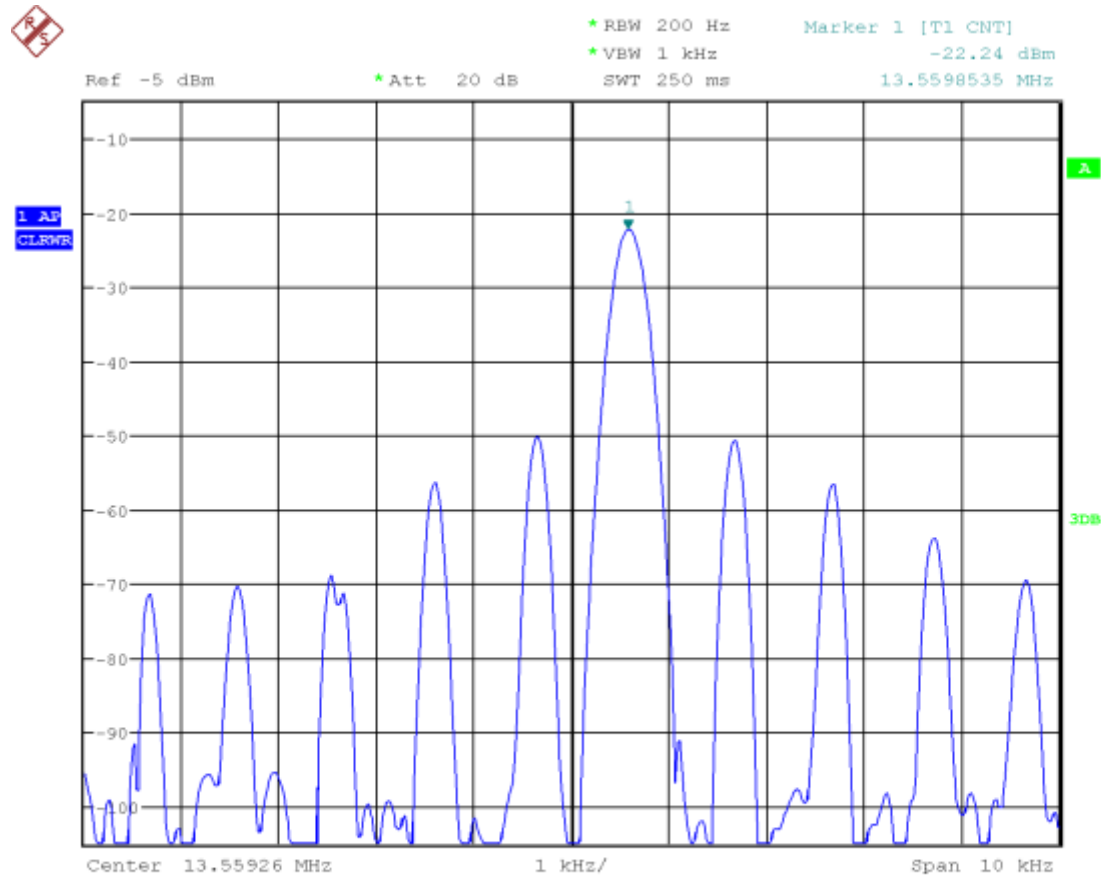
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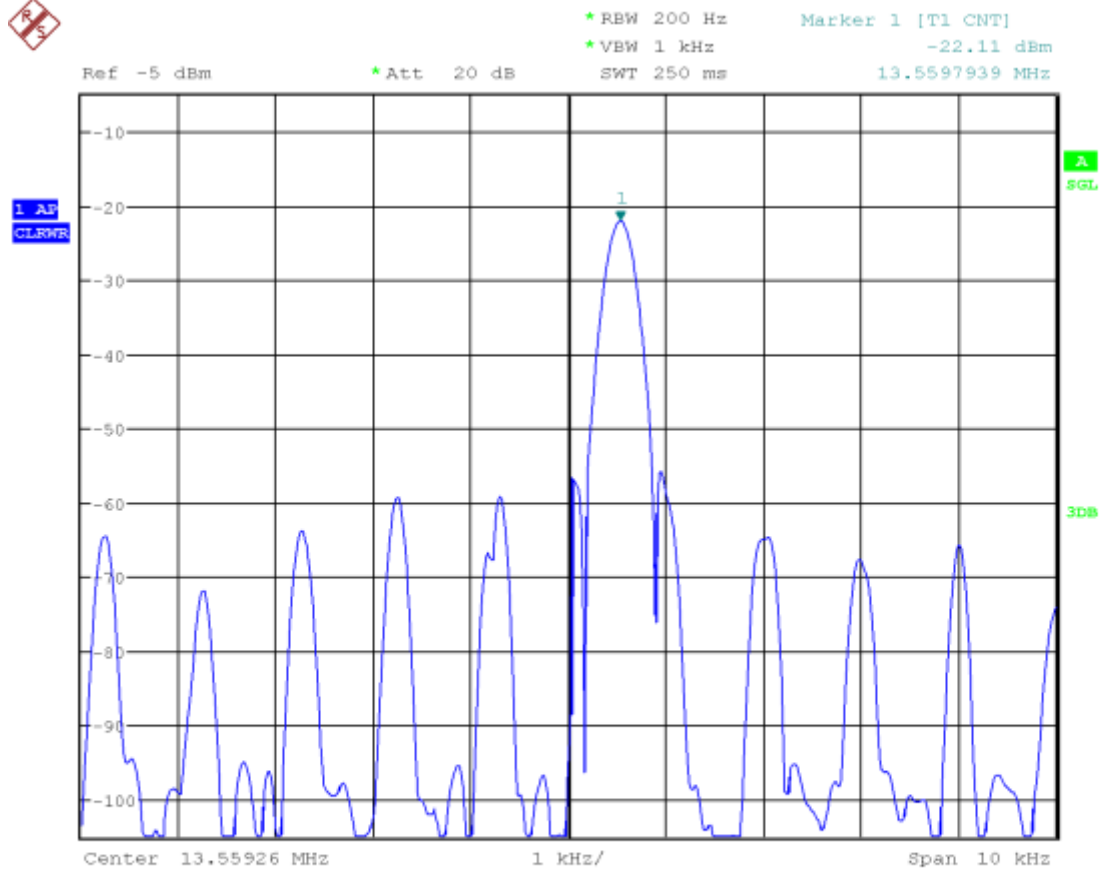
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Tm40_V12_4



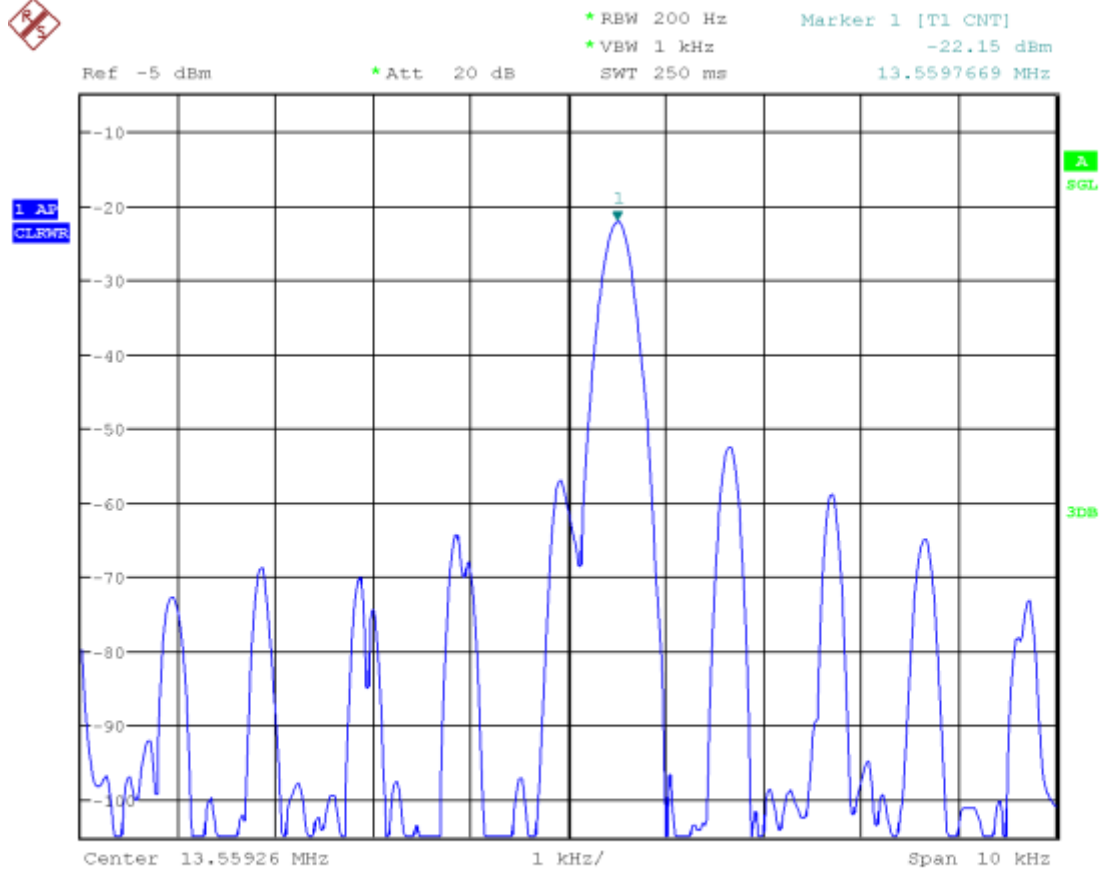
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T0_V12_1



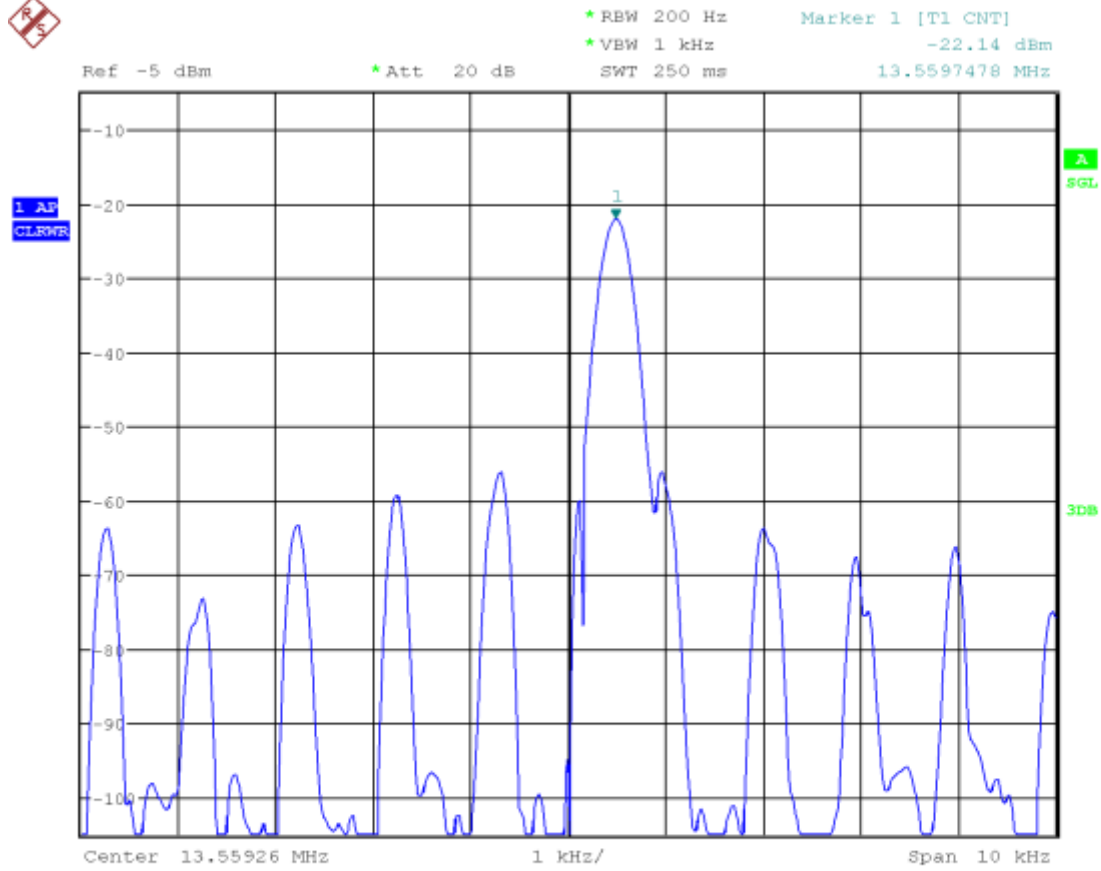
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Tm40_V12_2



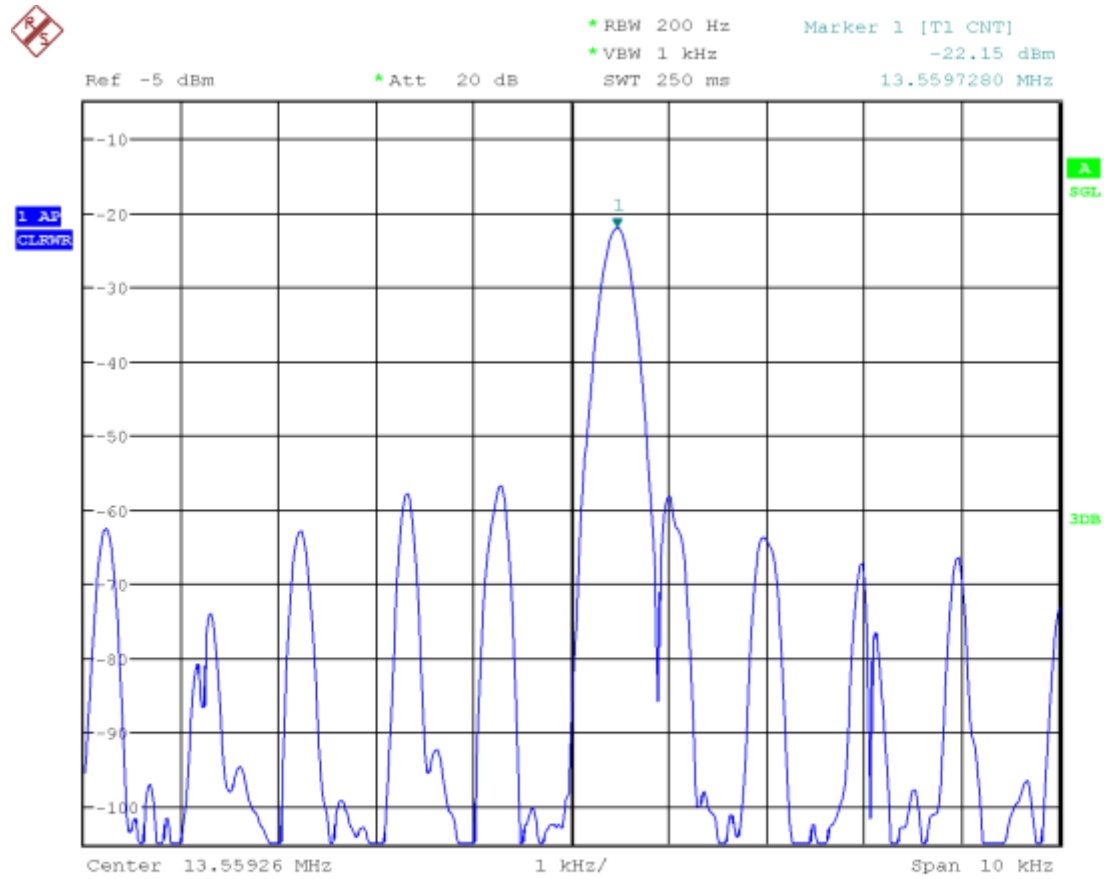
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Tm40_V12_3



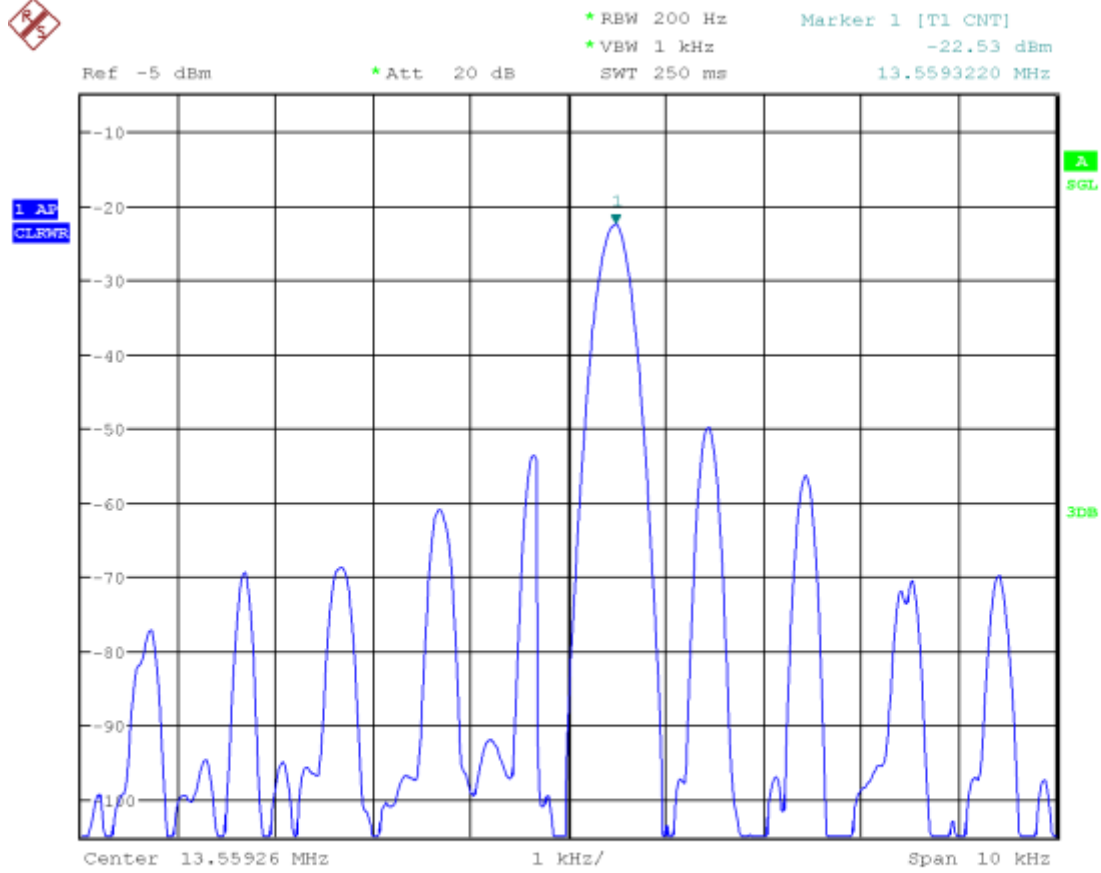
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Tm40_V12_4



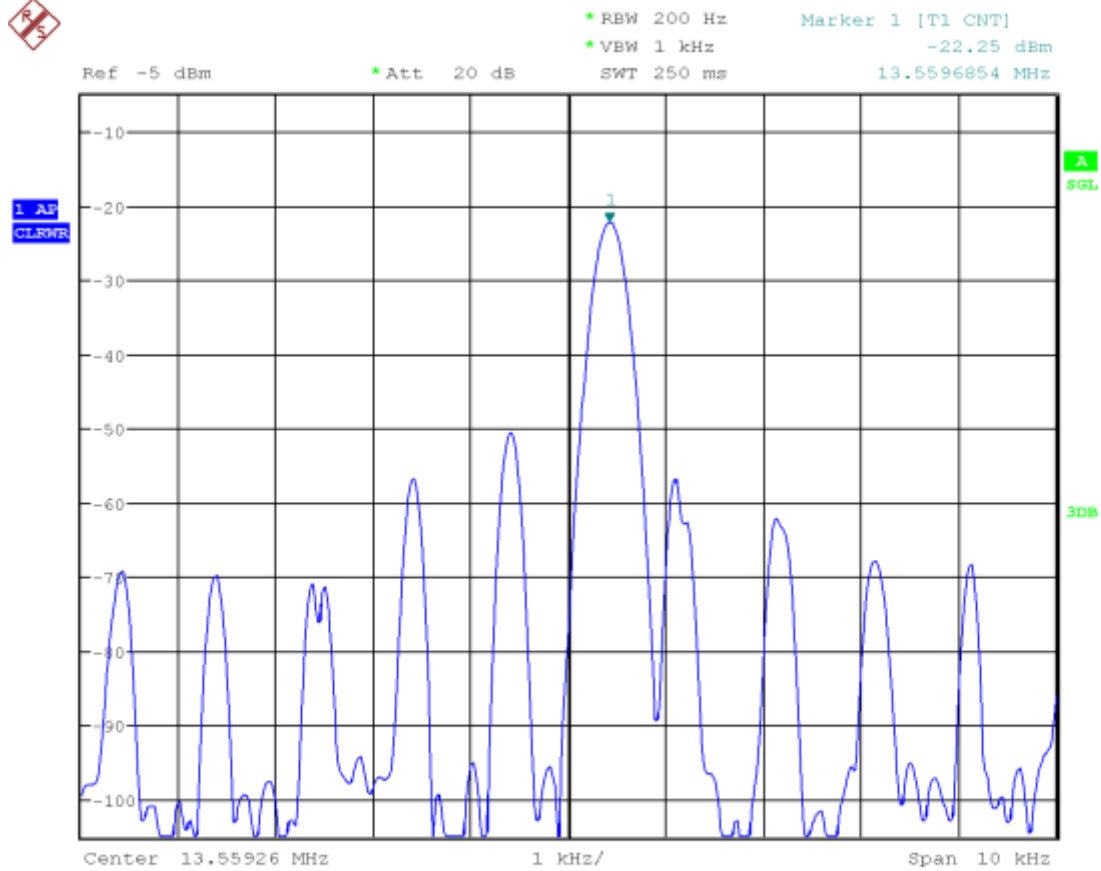
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T0_V12_1



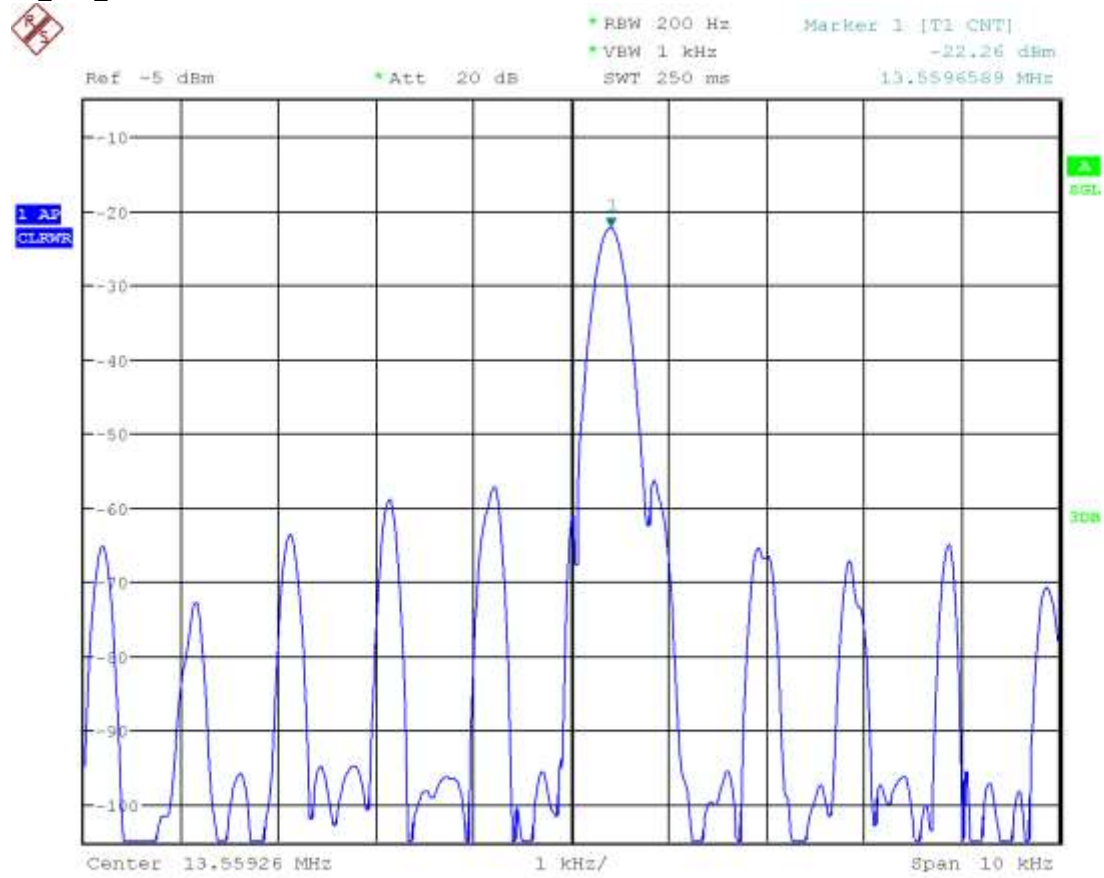
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T0_V12_2



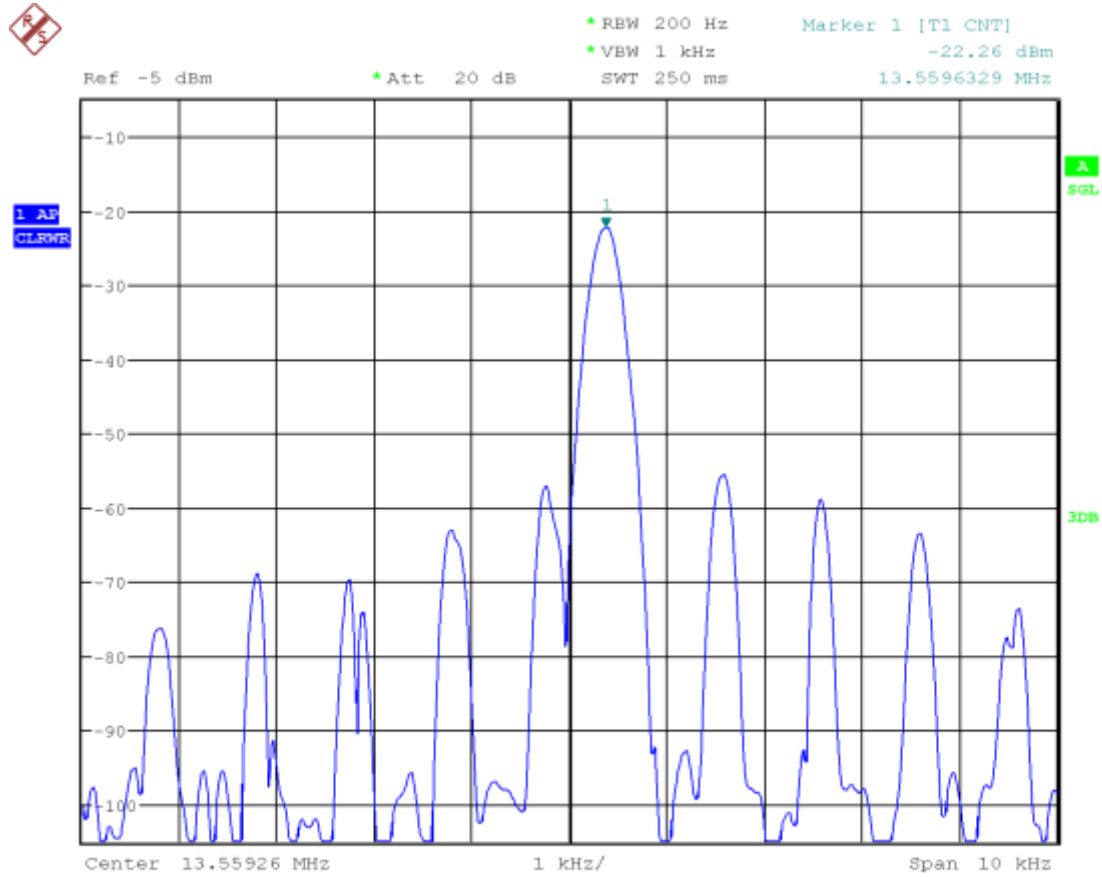
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T0_V12_3



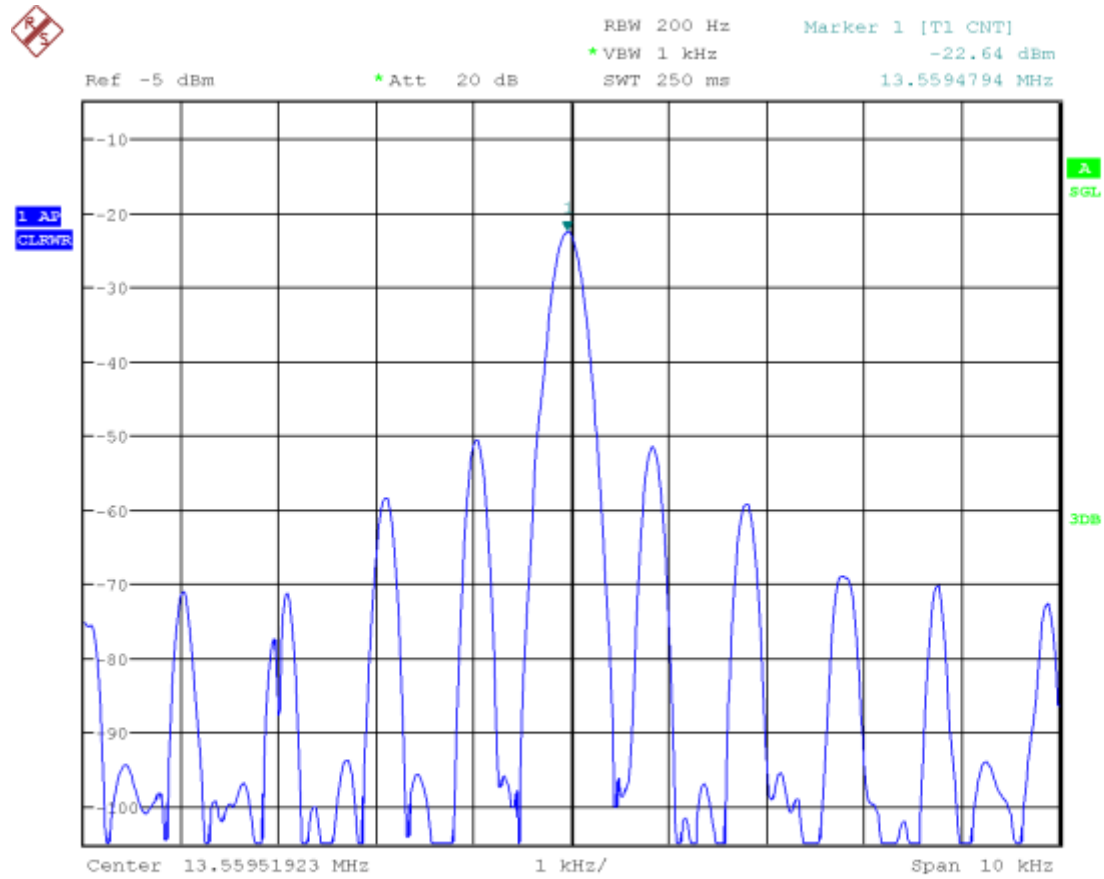
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T0_V12_4



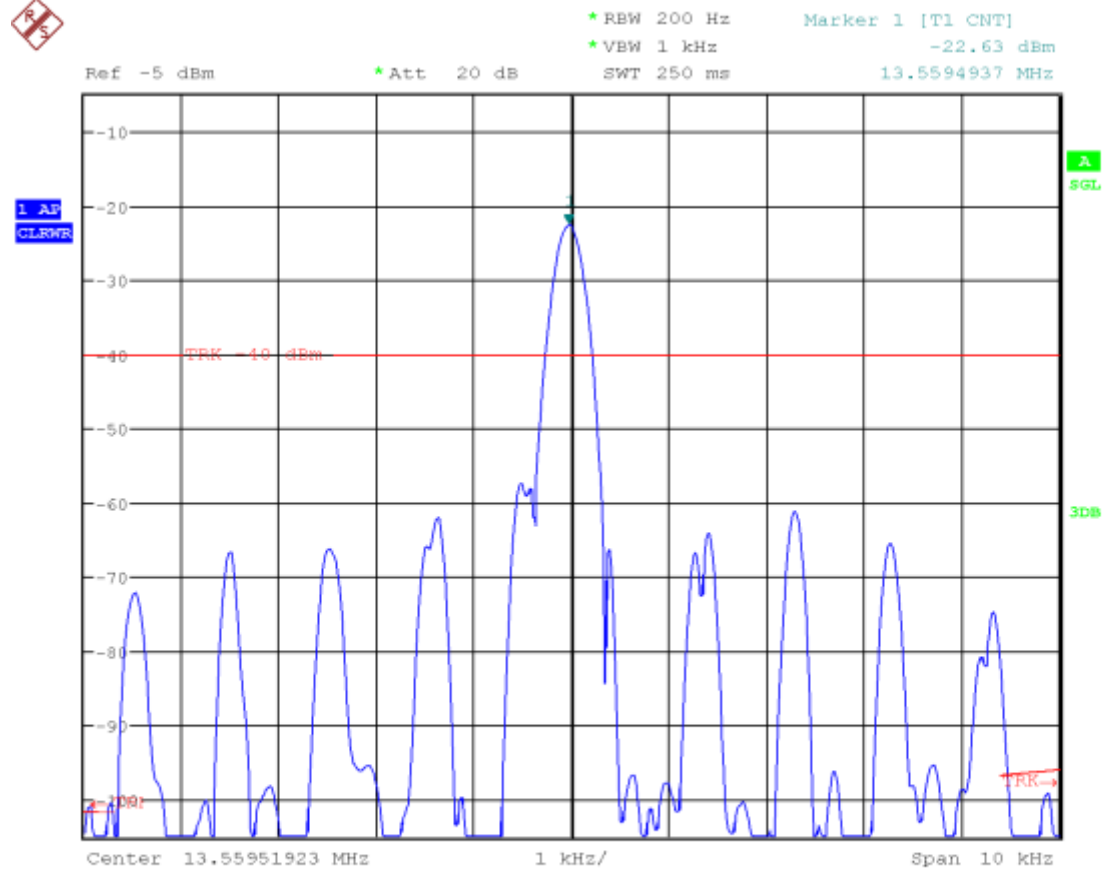
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T20_ref



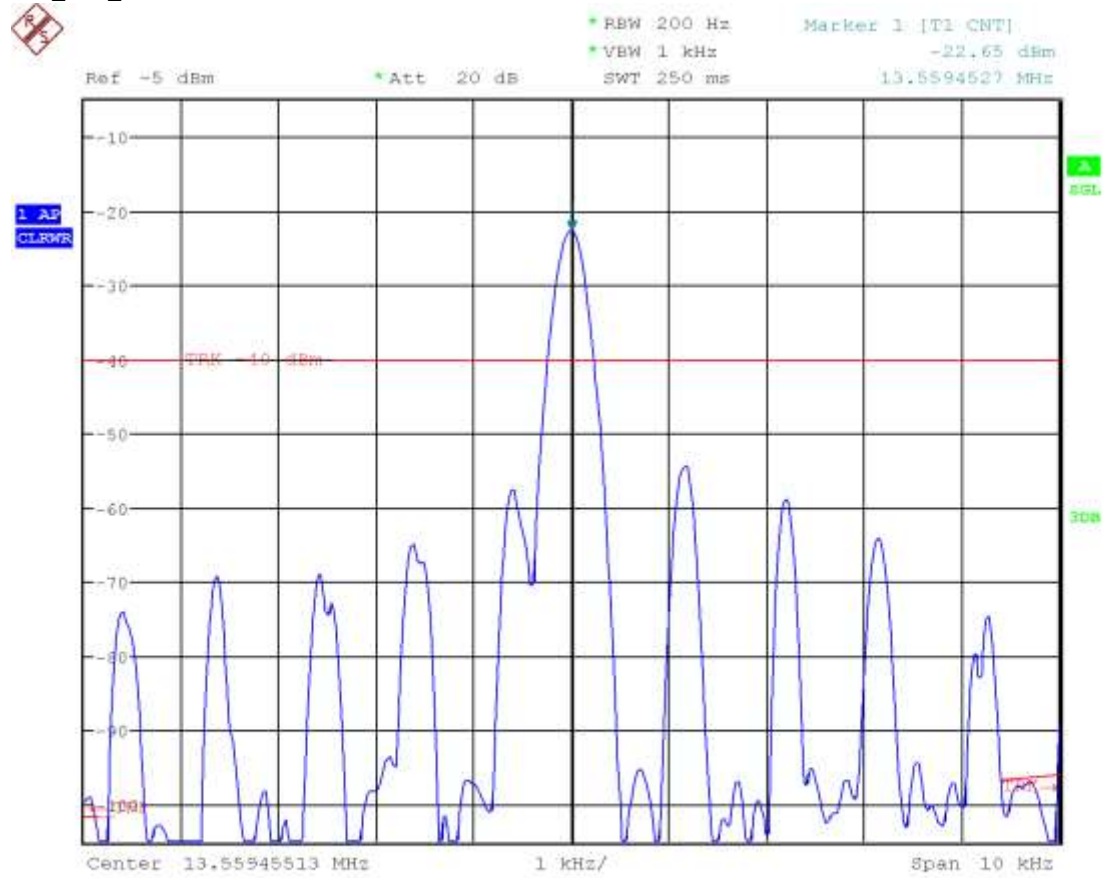
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T30_V12_1



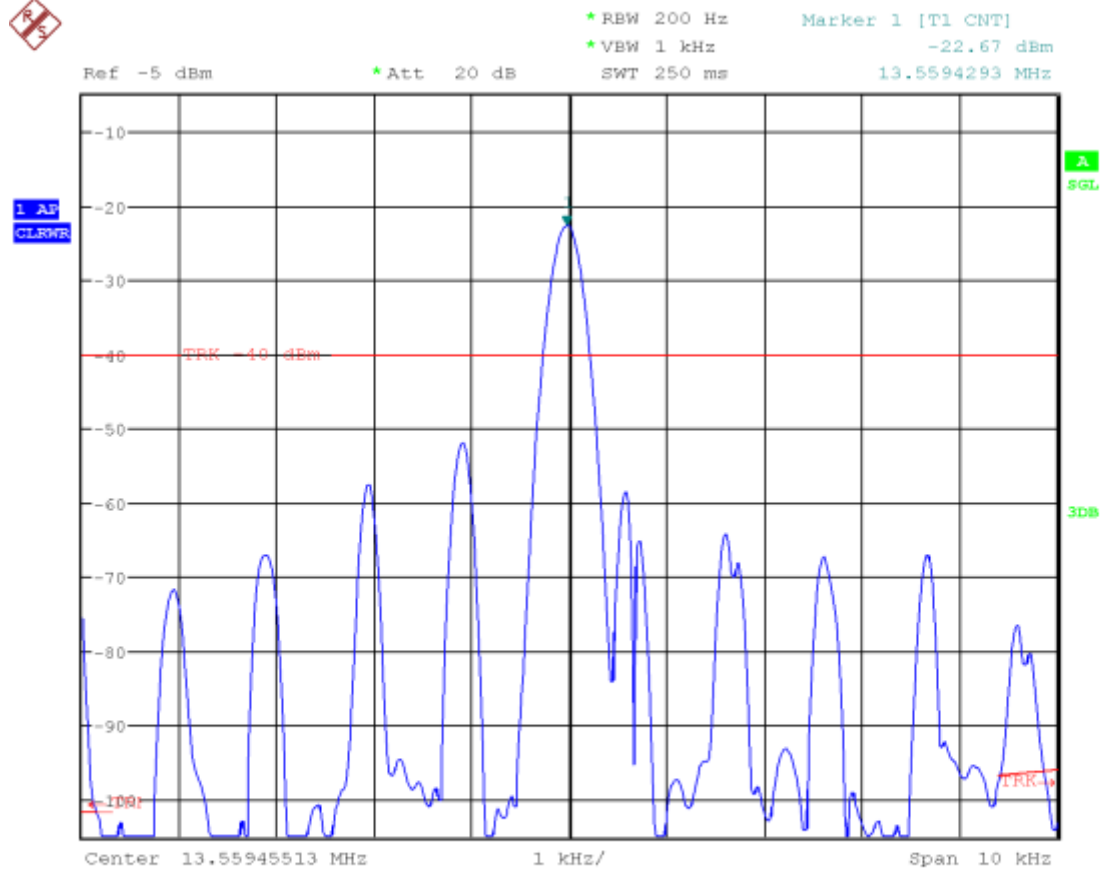
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T30_V12_2



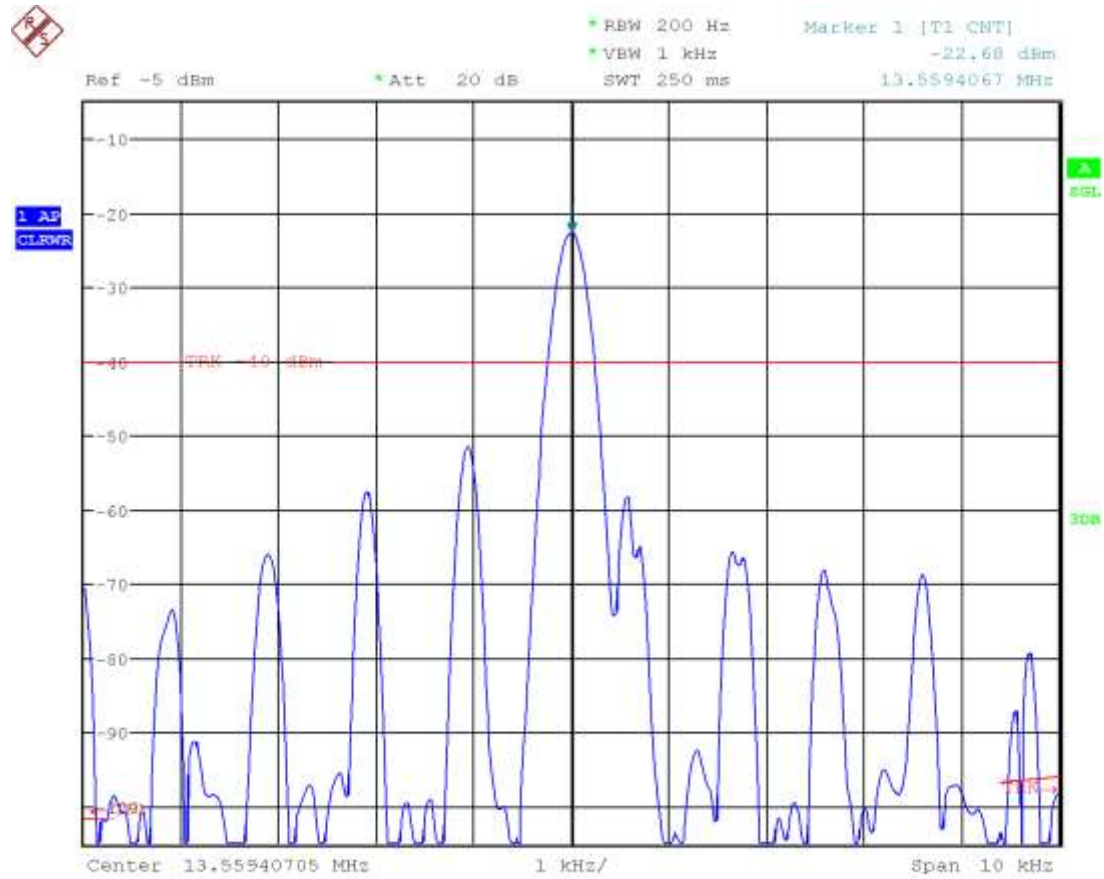
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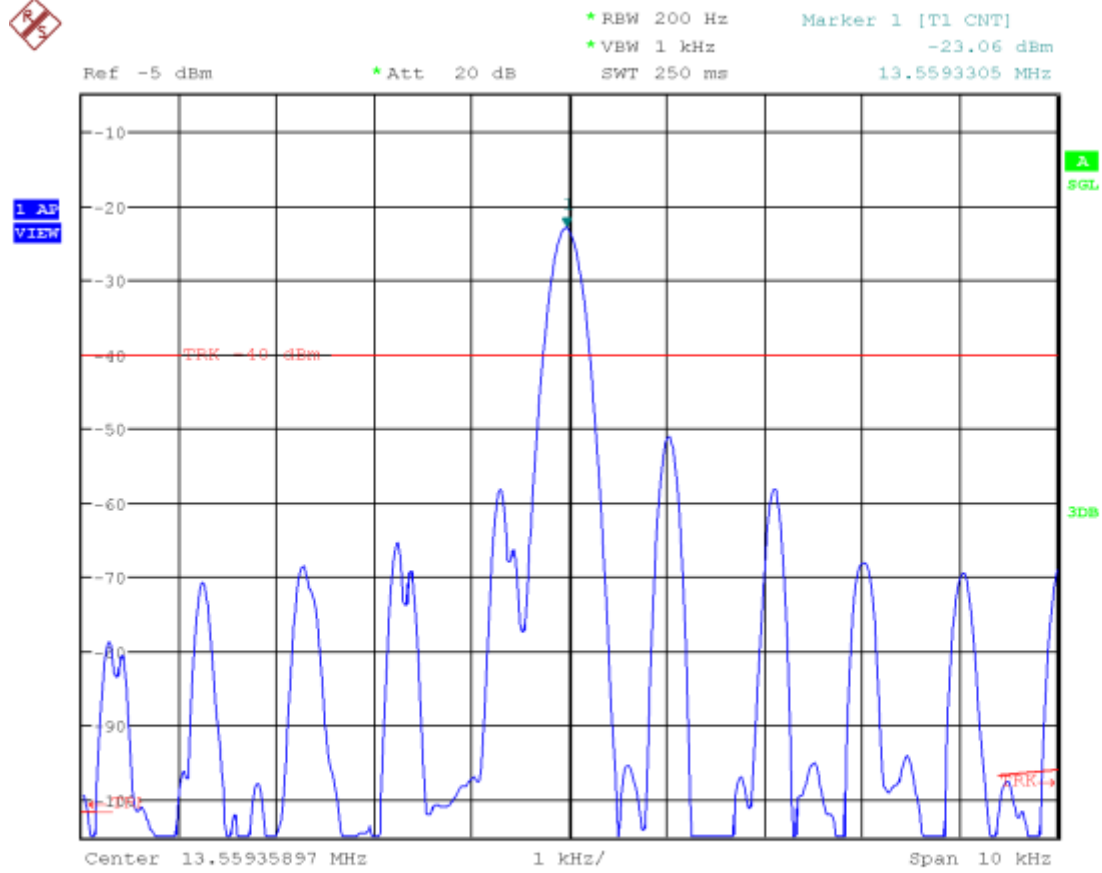
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T30_V12_4



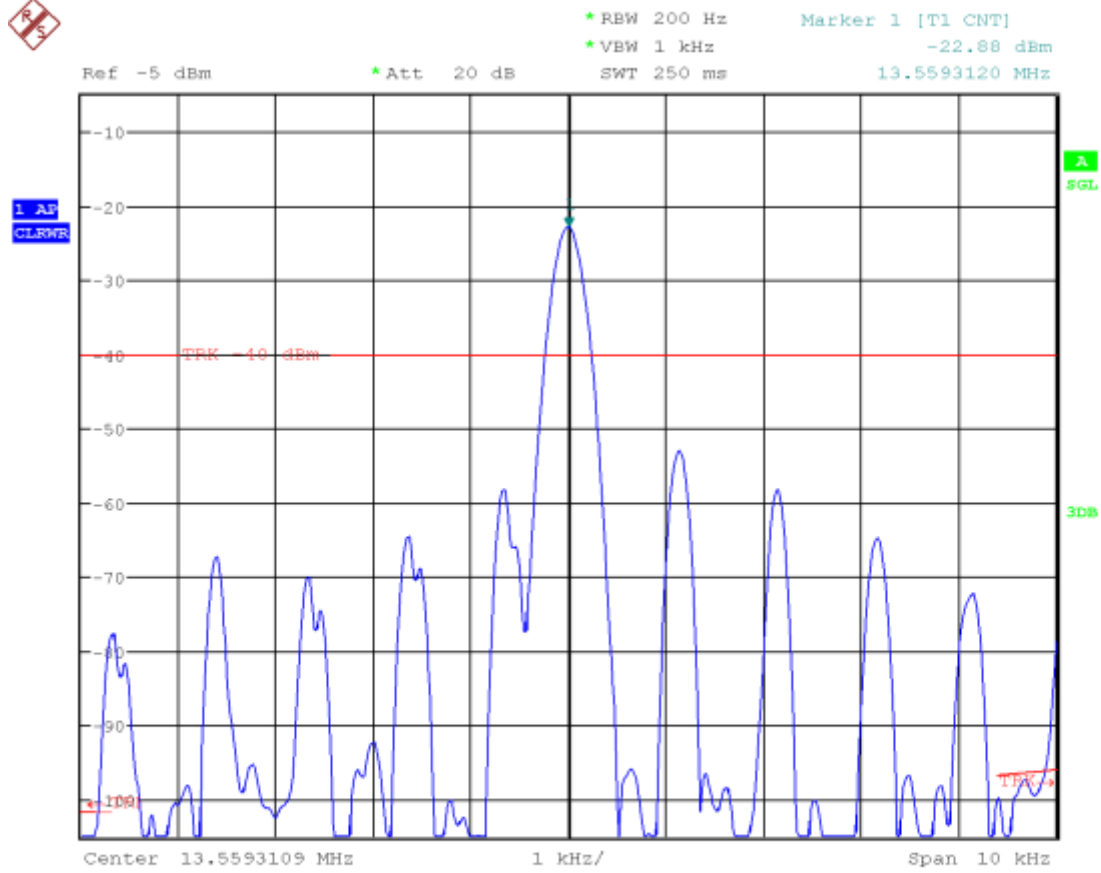
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T40_V12_1



Date: 28.SEP.2022 14:15:59

T40_V12_2

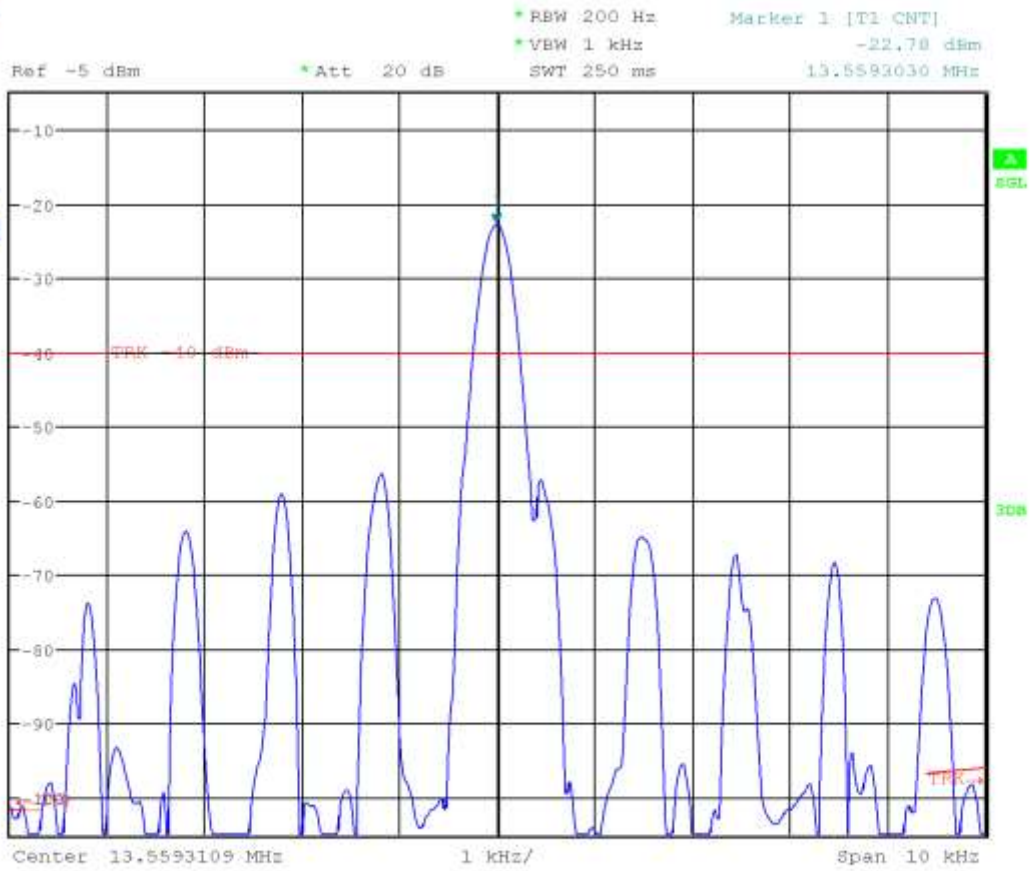


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T40_V12_3

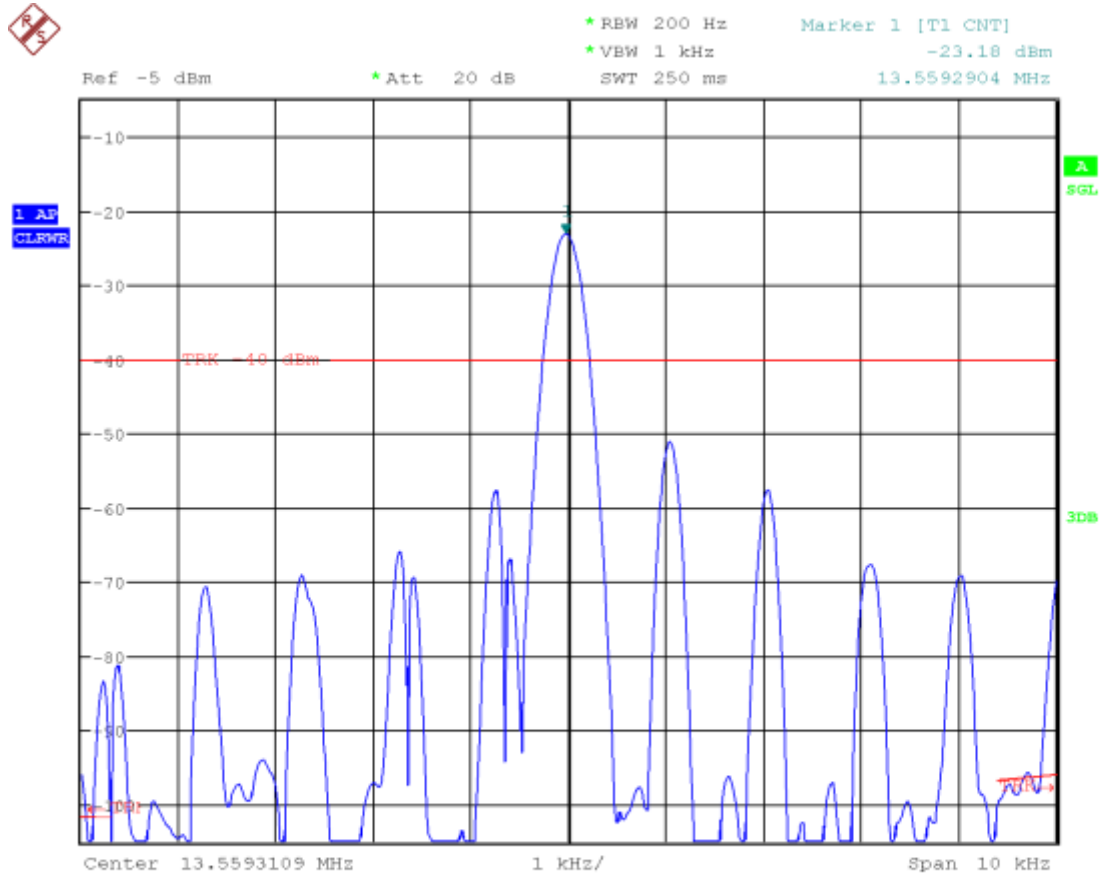


1 AP
CLEAR



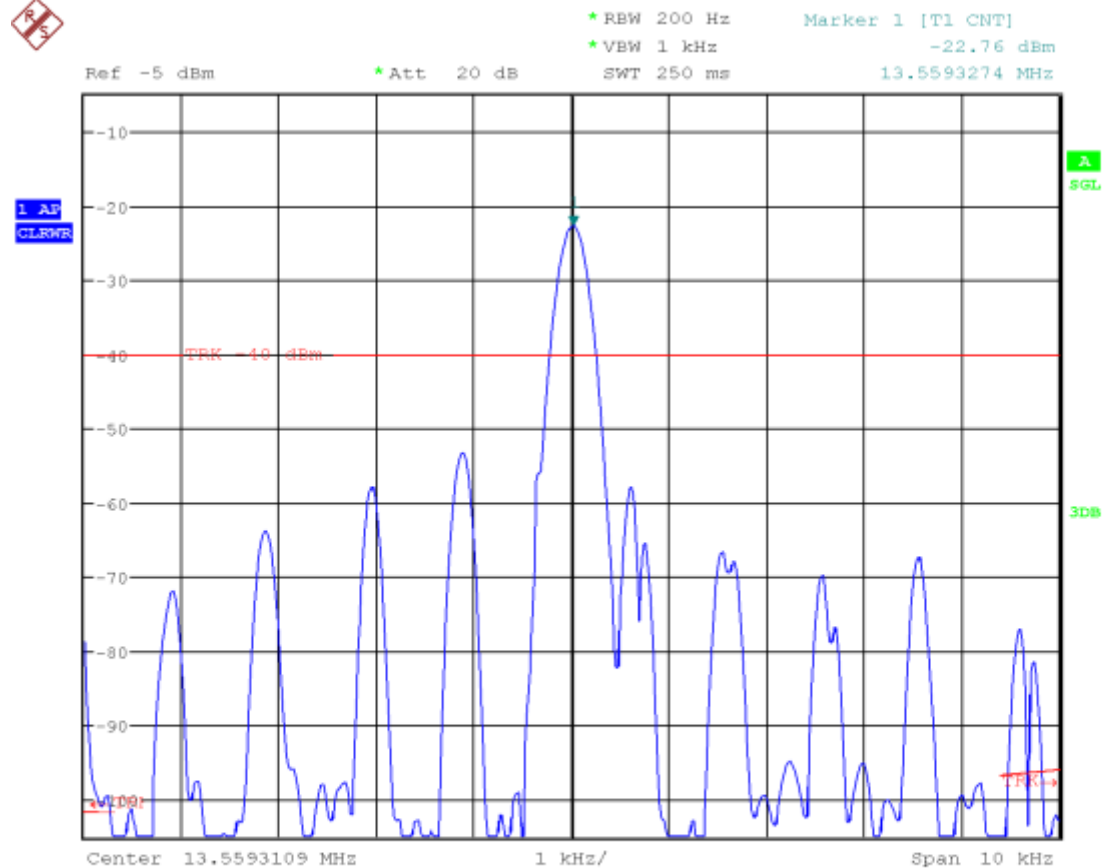
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T40_V12_4



Date: 28.SEP.2022 14:25:55

T50_V12_1

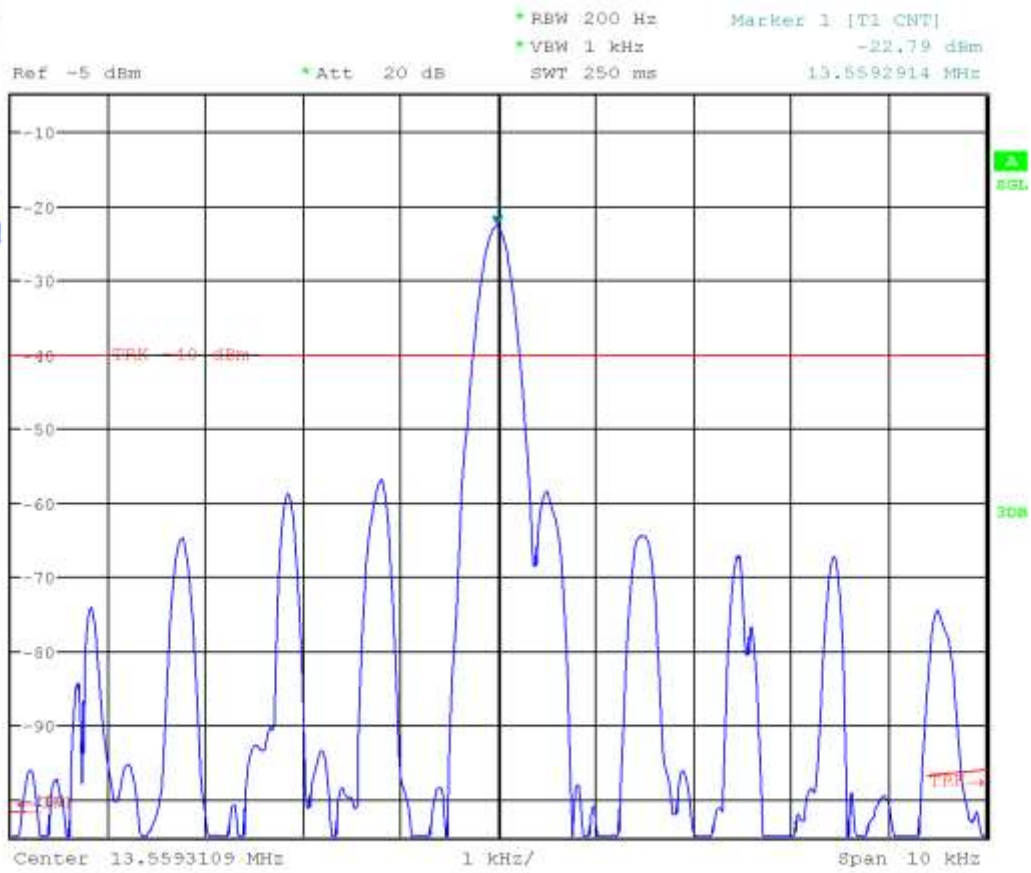


Date: 28.SEP.2022 14:56:58

T50_V12_2

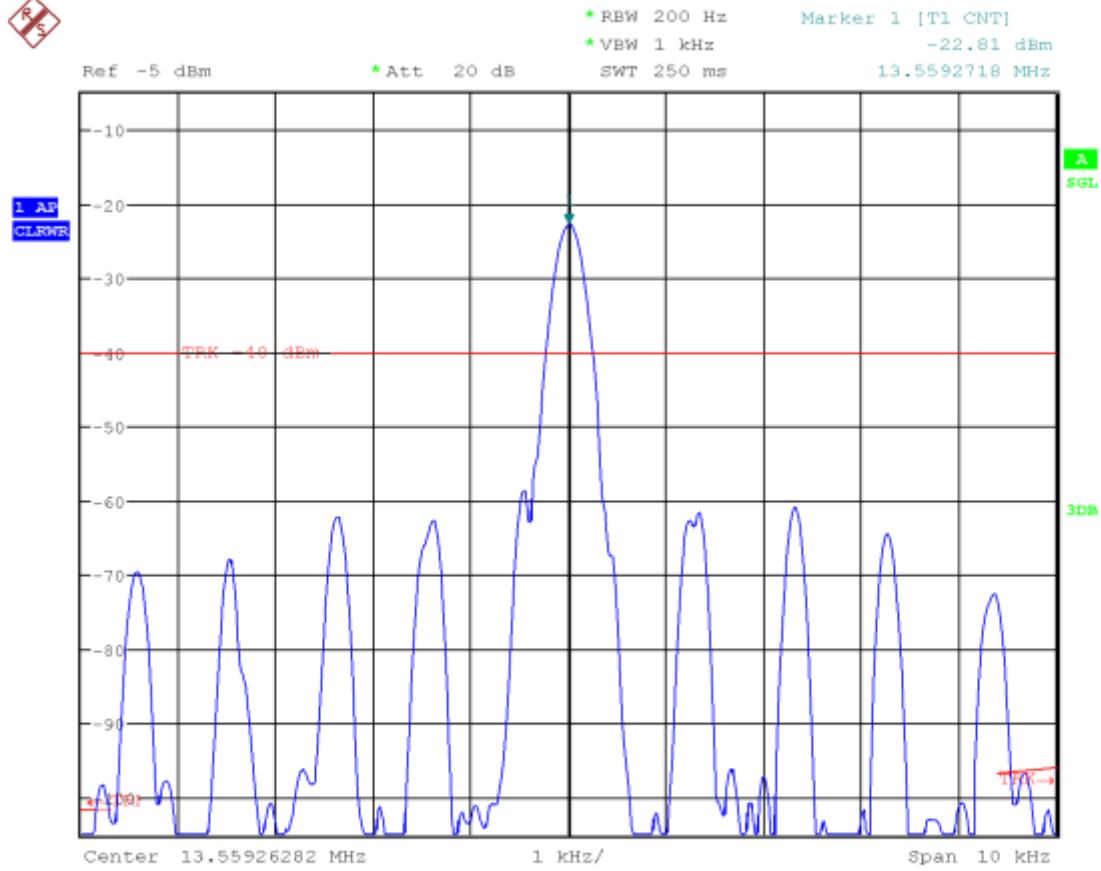


1 AP
CLEAR



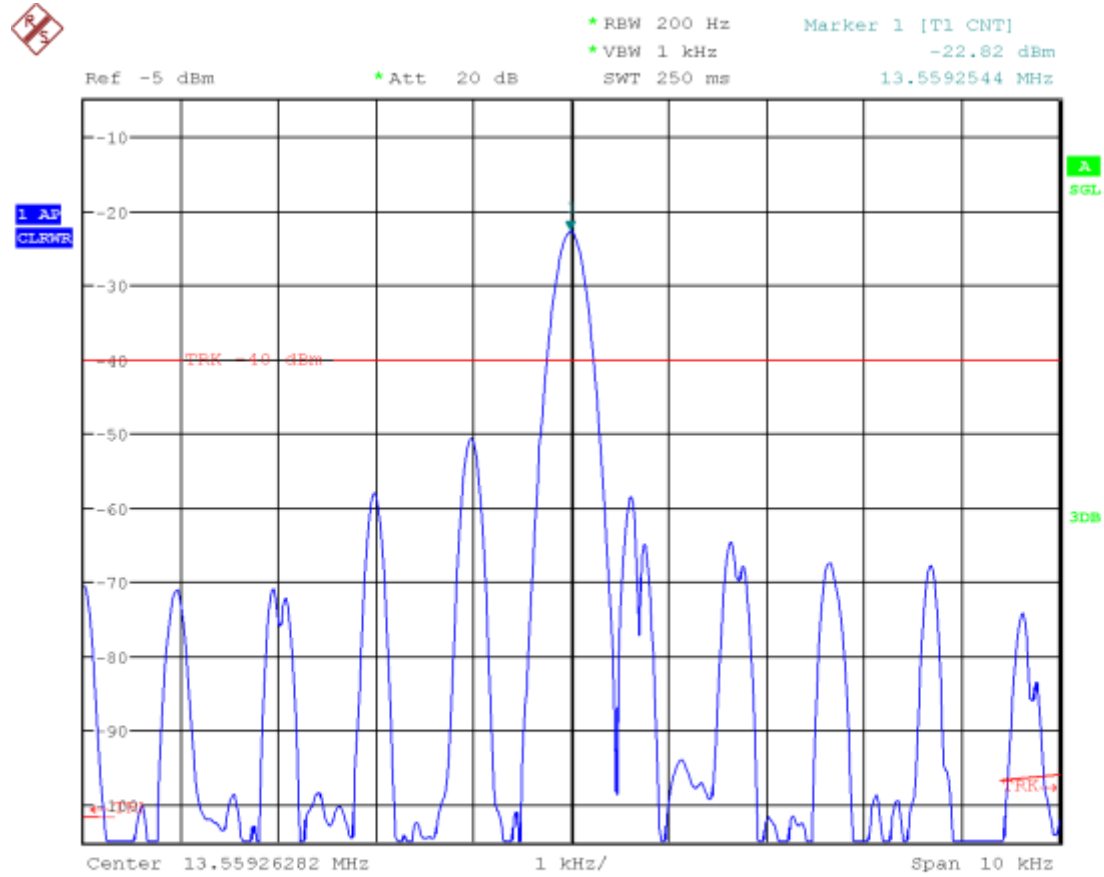
Date: 28.SEP.2022 14:59:03

T50_V12_3



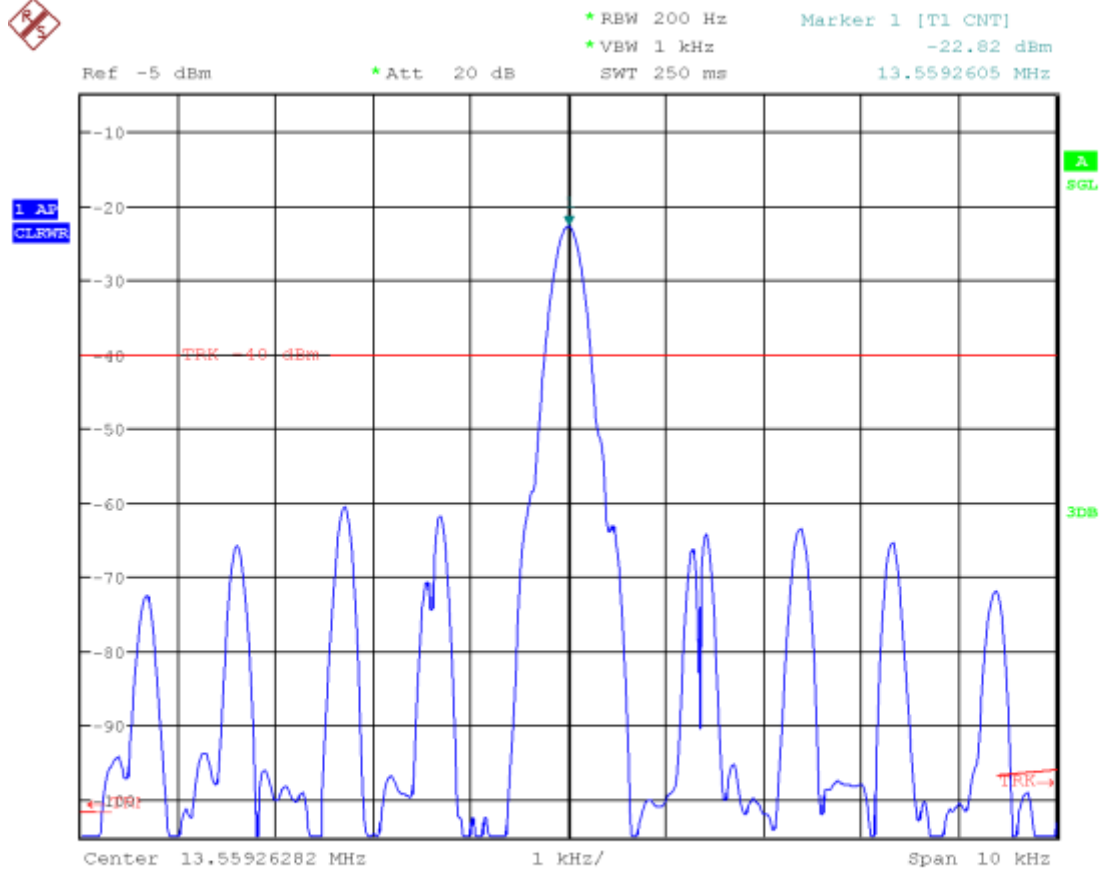
Date: 28.SEP.2022 15:02:20

T50_V12_4



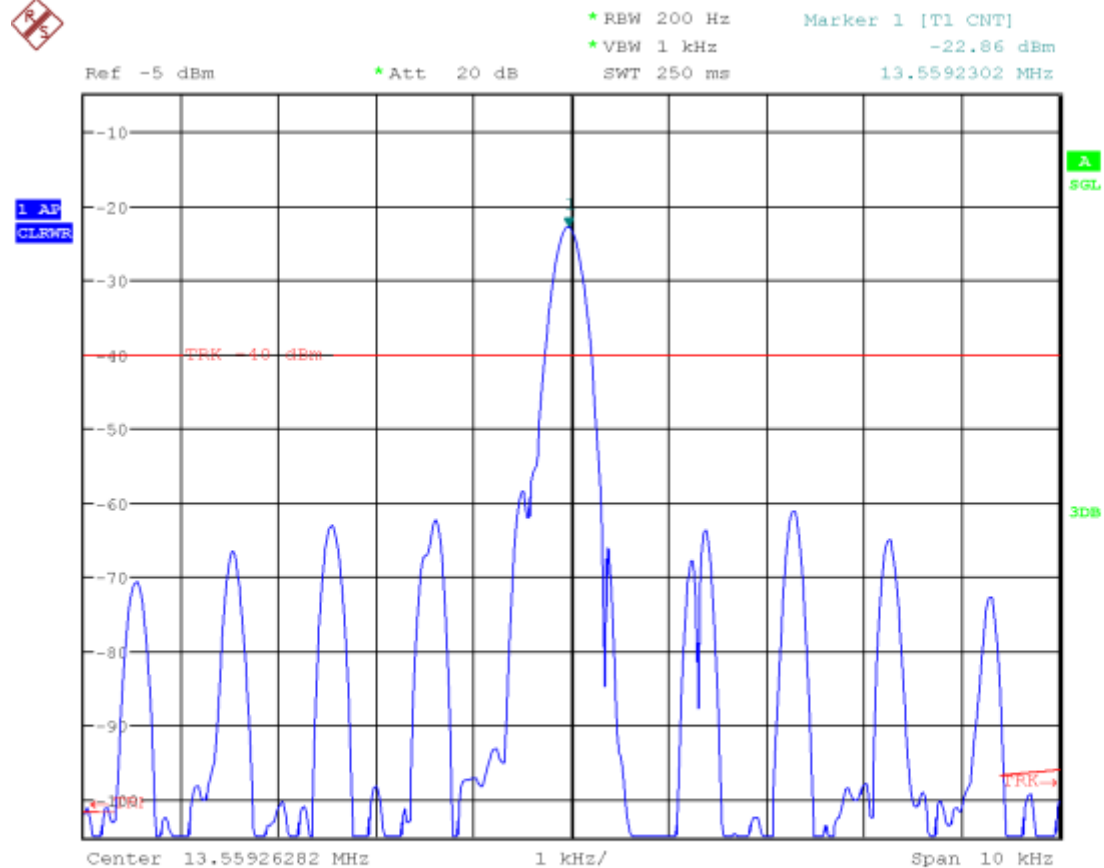
Date: 28.SEP.2022 15:08:01

T60_V12_1



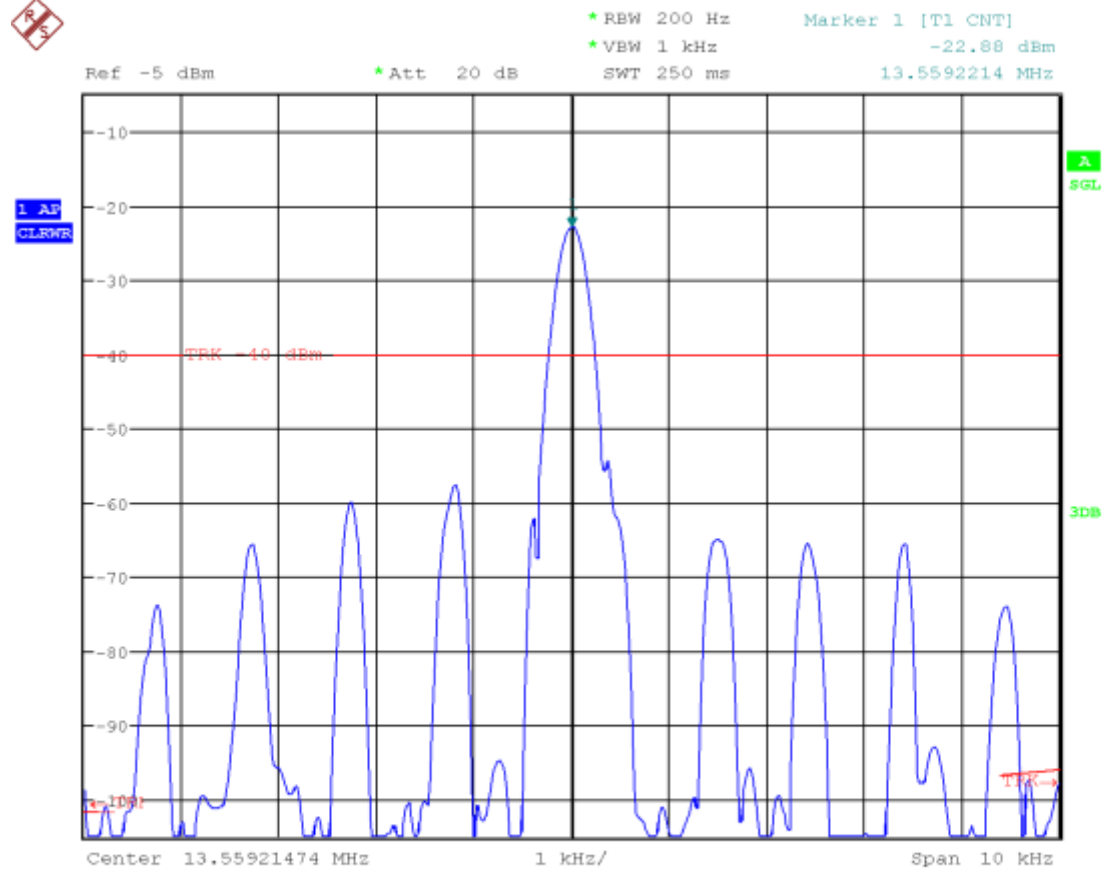
Date: 28.SEP.2022 15:41:09

T60_V12_2



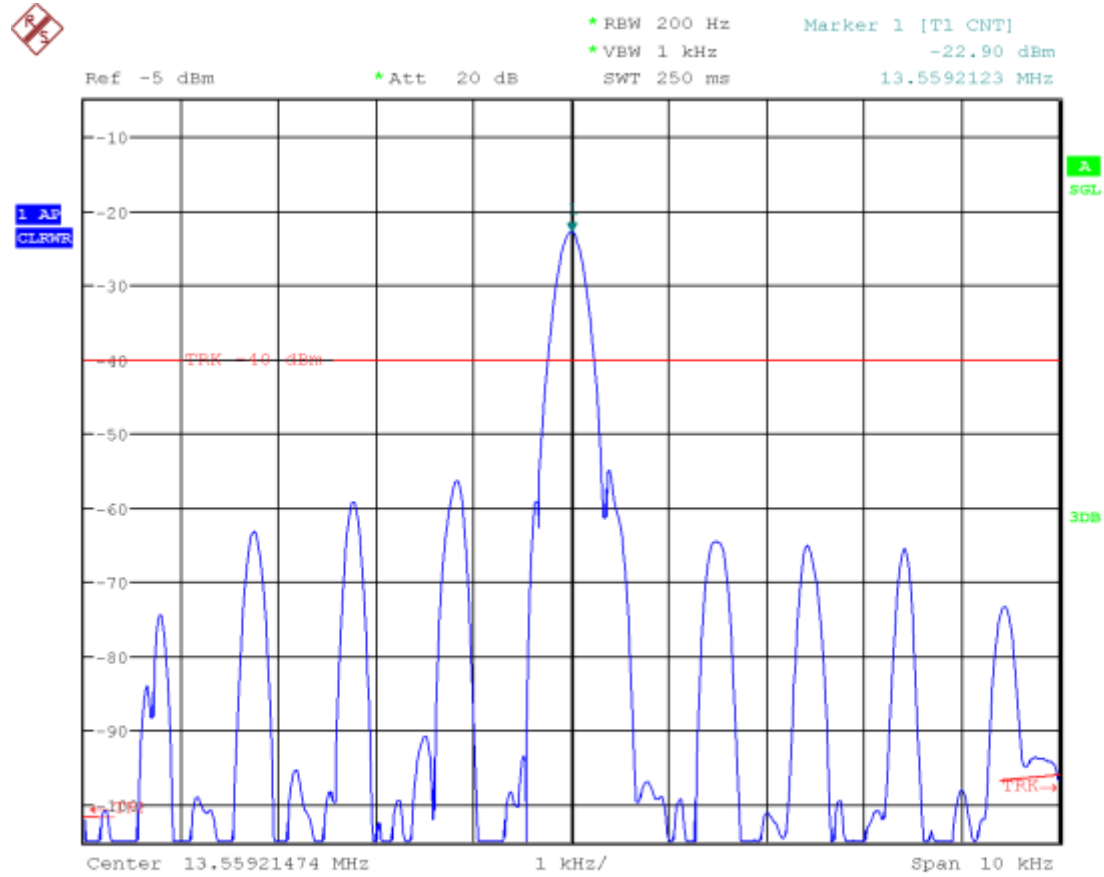
Date: 28.SEP.2022 15:43:42

T60_V12_3



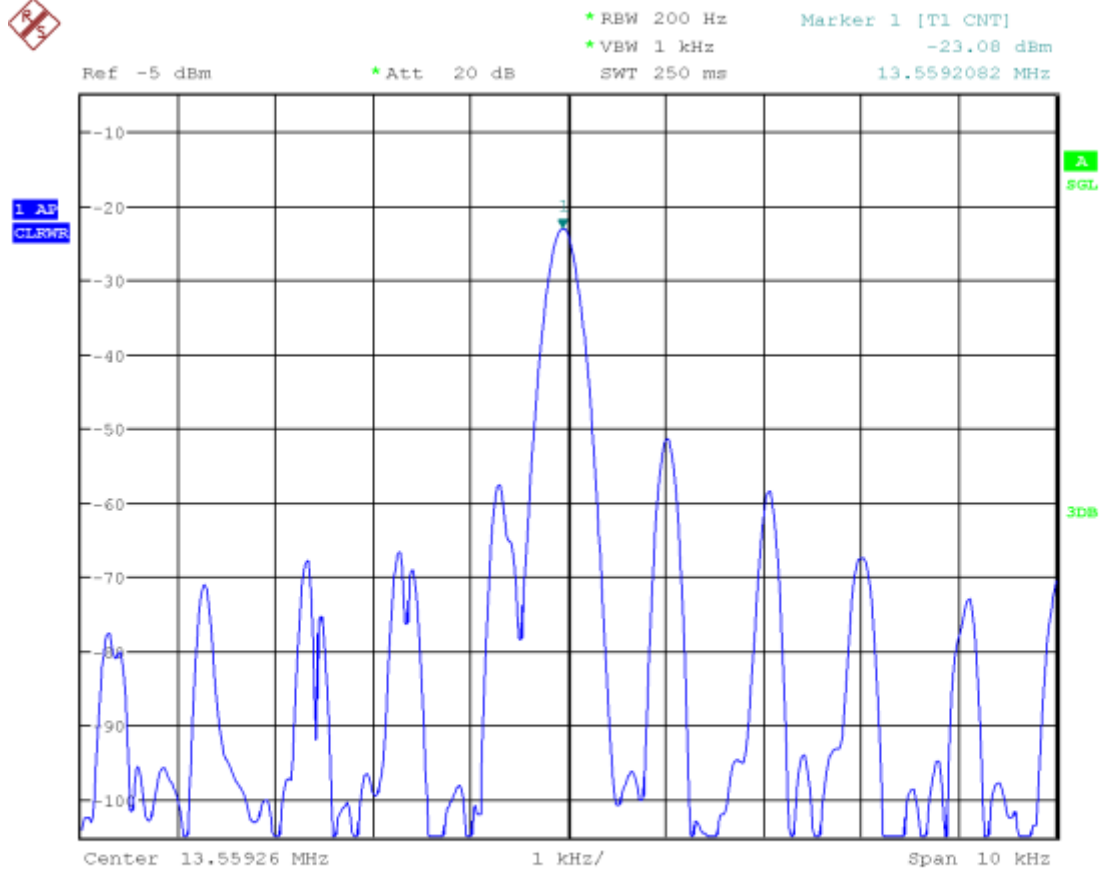
Date: 28.SEP.2022 15:46:18

T60_V12_4



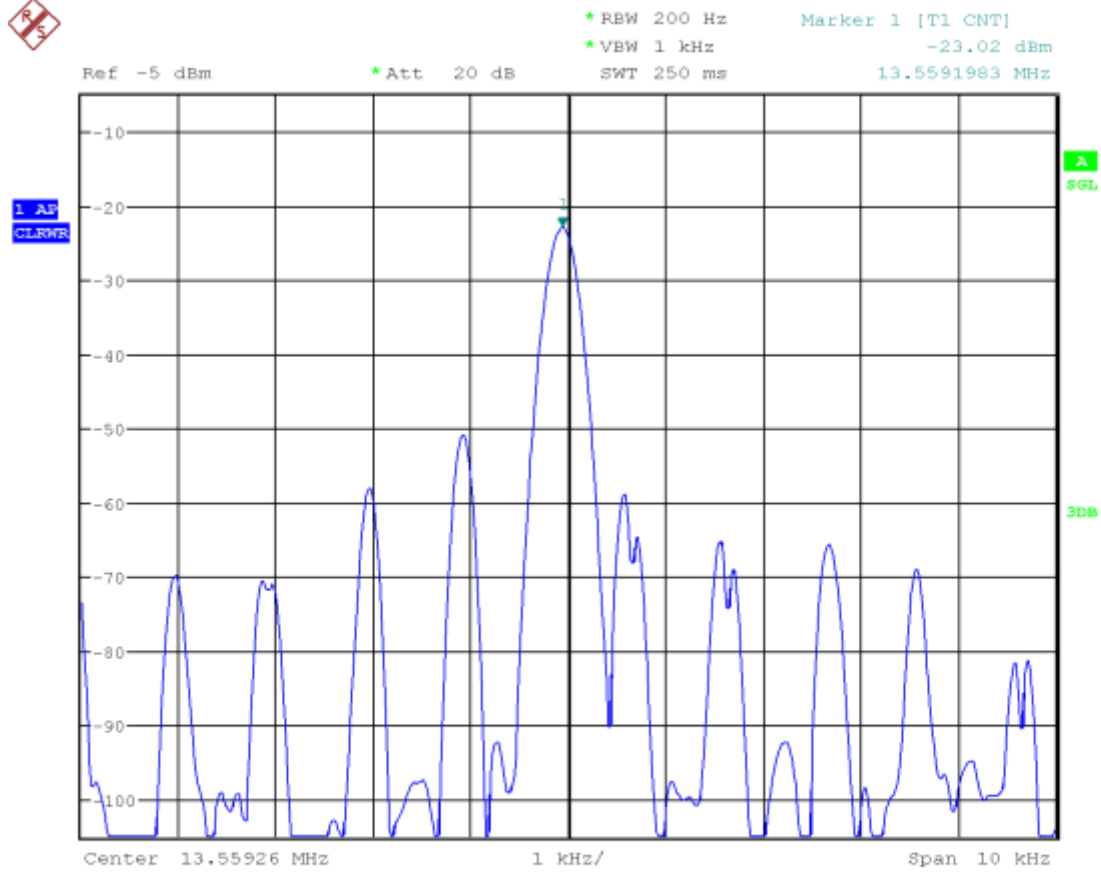
Date: 28.SEP.2022 15:51:16

T70_V12_1



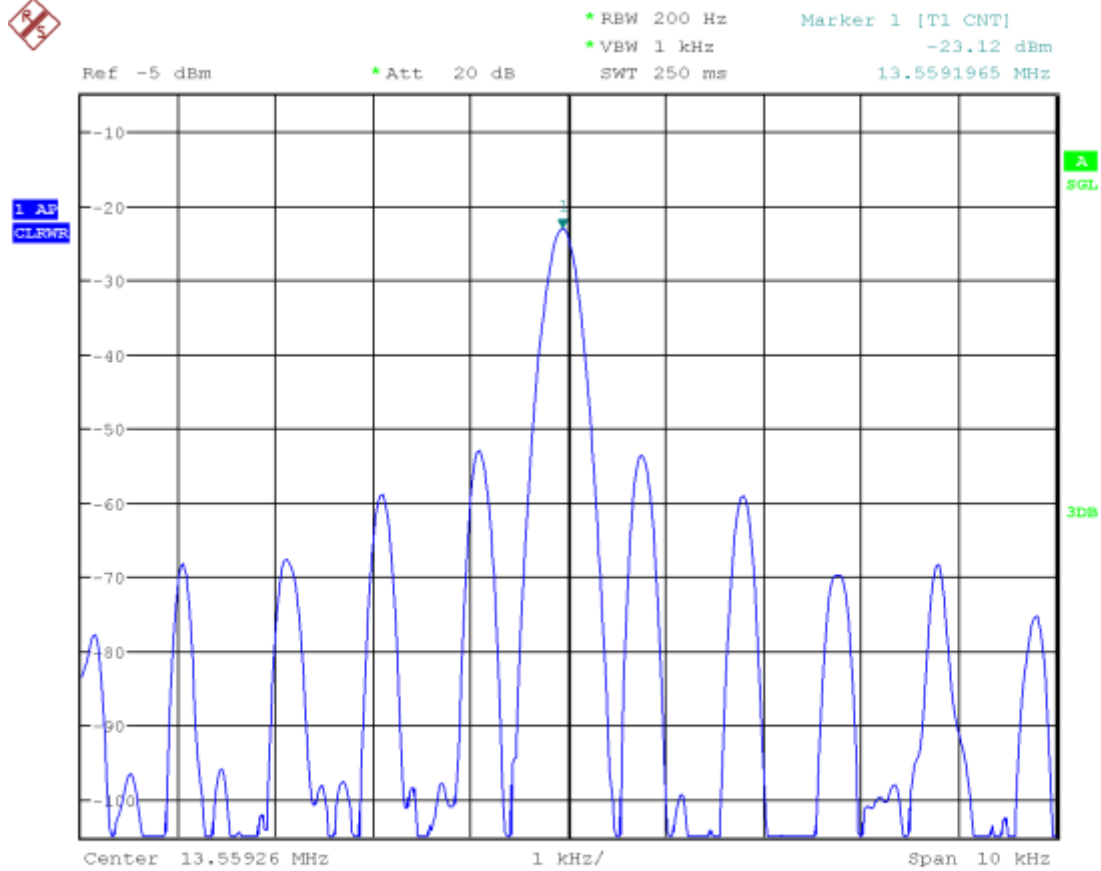
Date: 29.SEP.2022 08:12:36

T70_V12_2



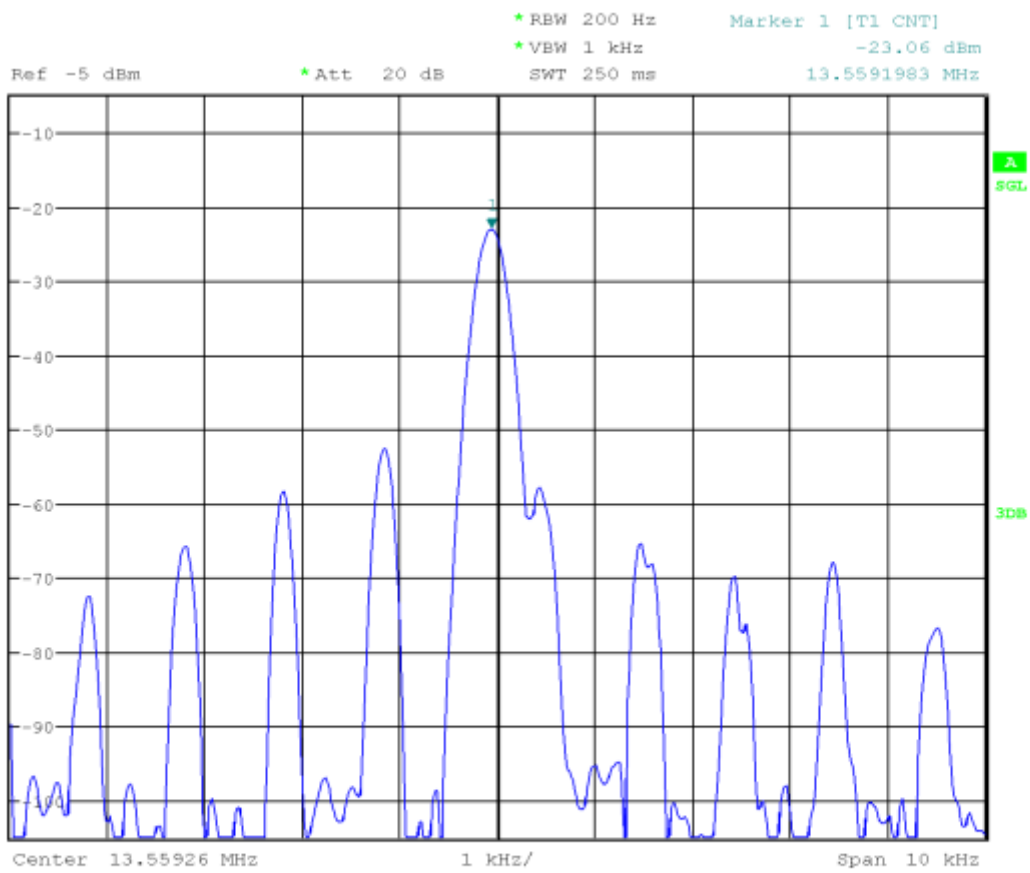
Date: 29.SEP.2022 08:15:01

T70_V12_3



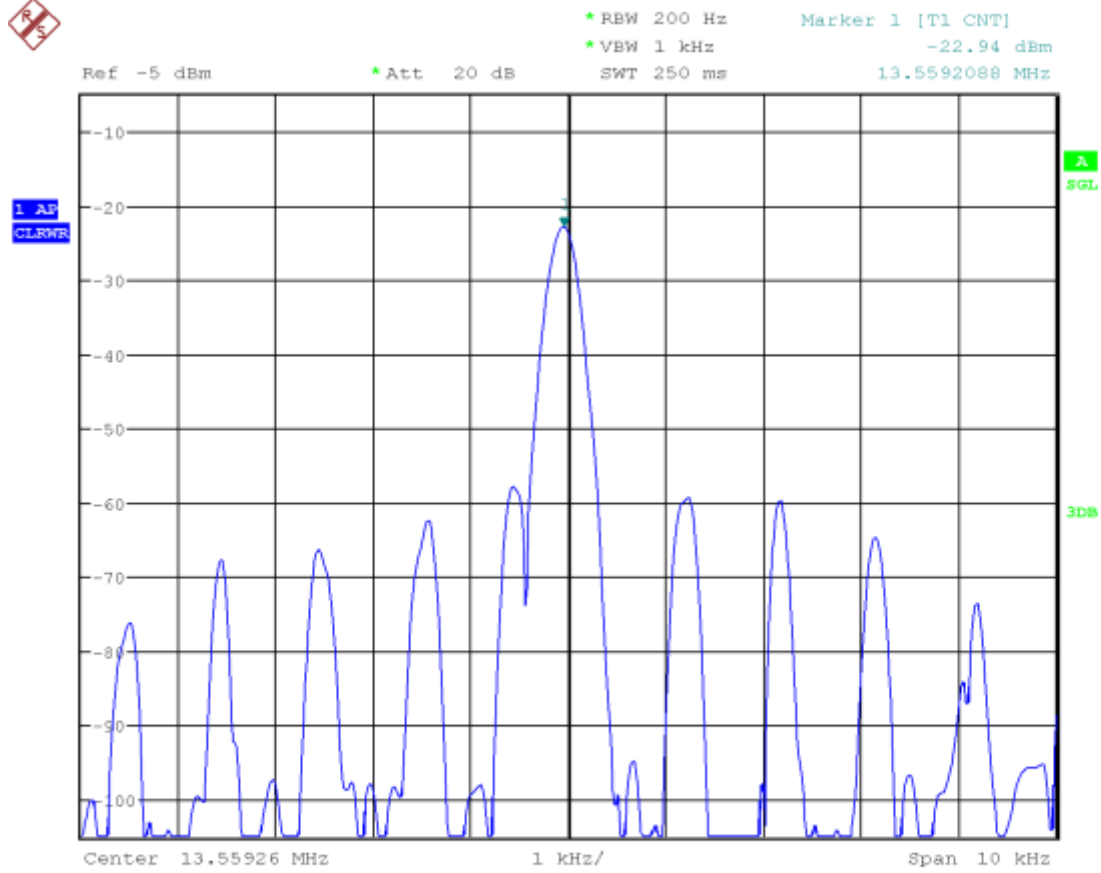
Date: 29.SEP.2022 08:17:43

T70_V12_4



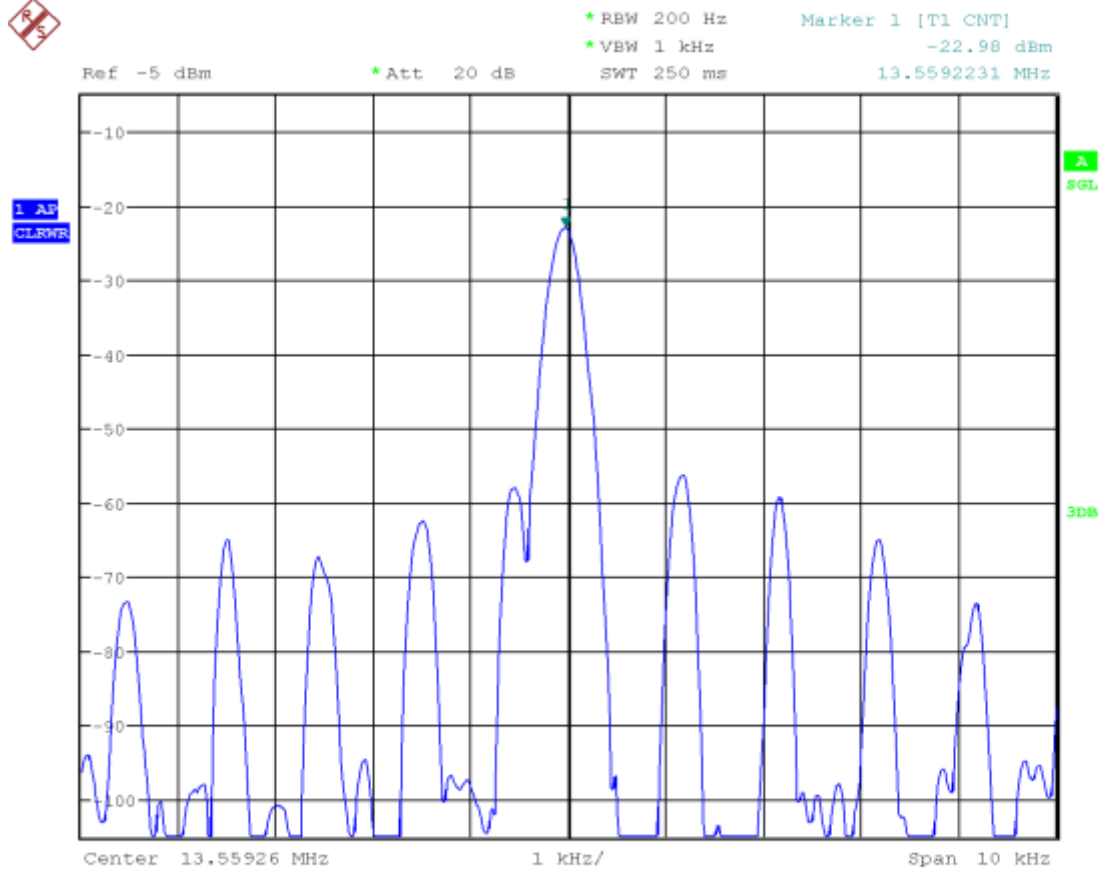
Date: 29.SEP.2022 08:22:53

T80_V12_1



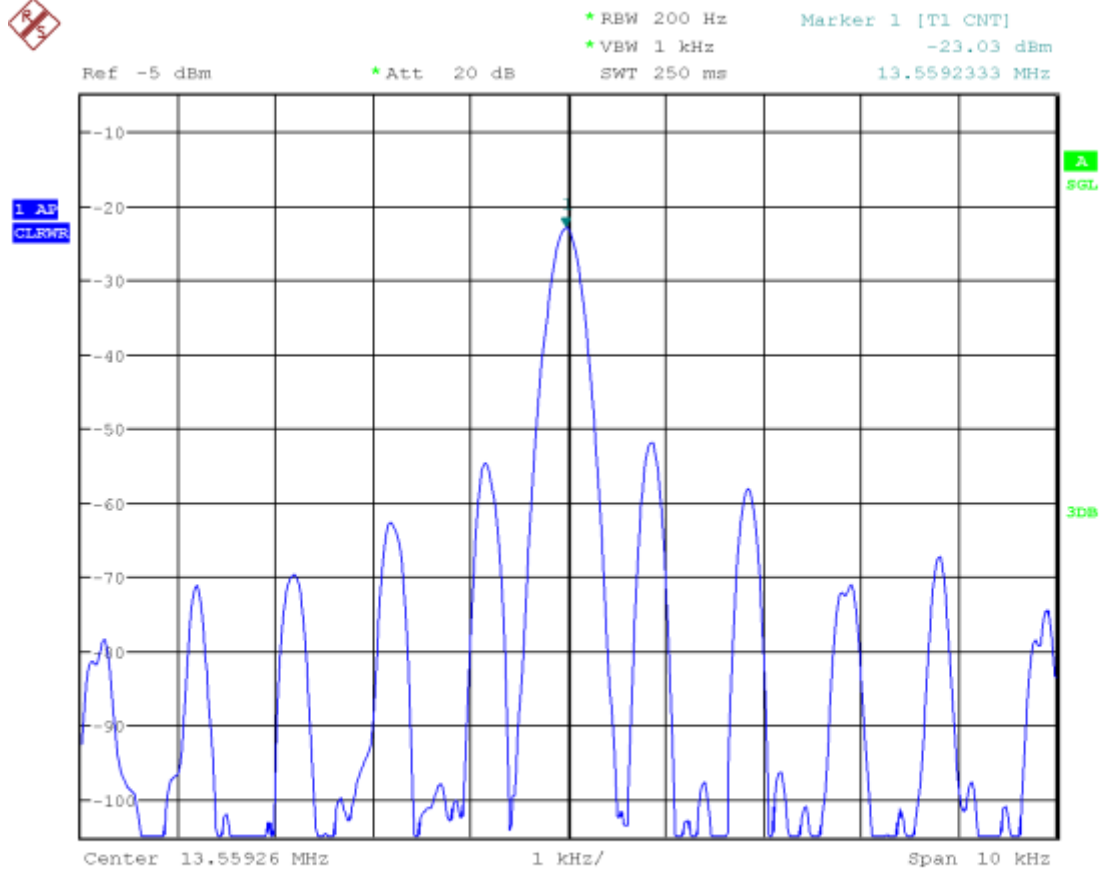
Date: 29.SEP.2022 09:19:23

T80_V12_2



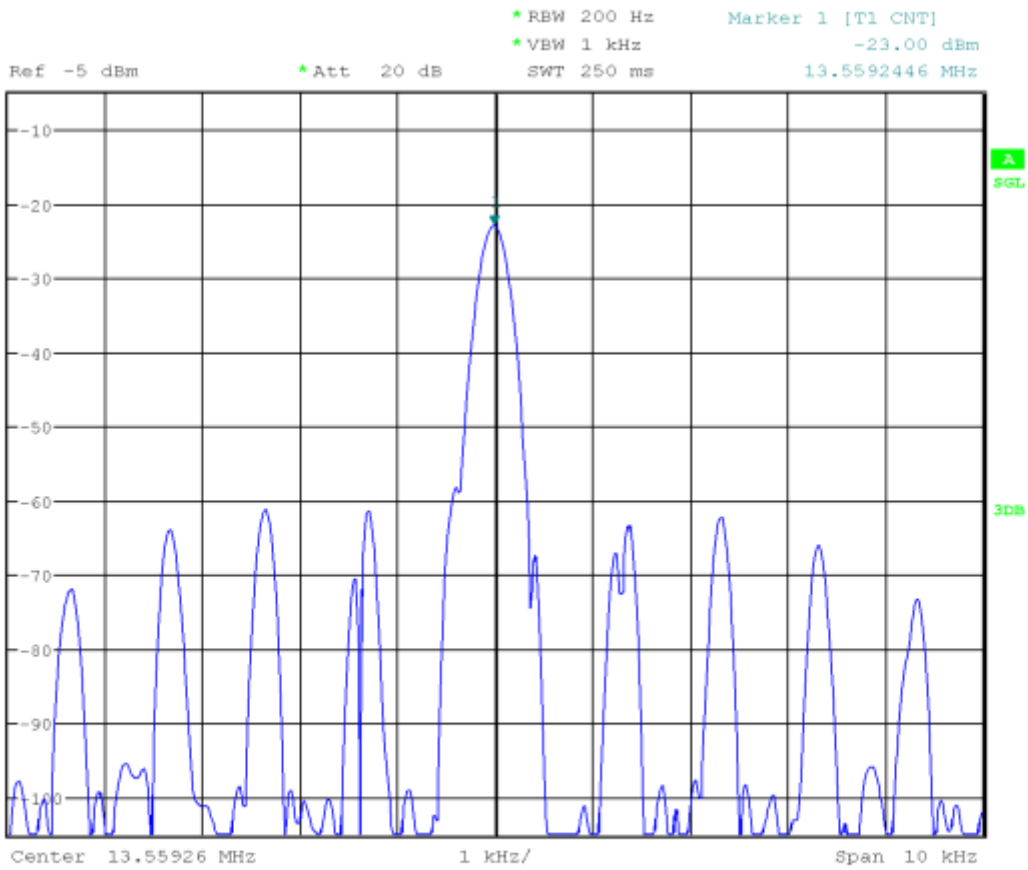
Date: 29.SEP.2022 09:21:34

T80_V12_3



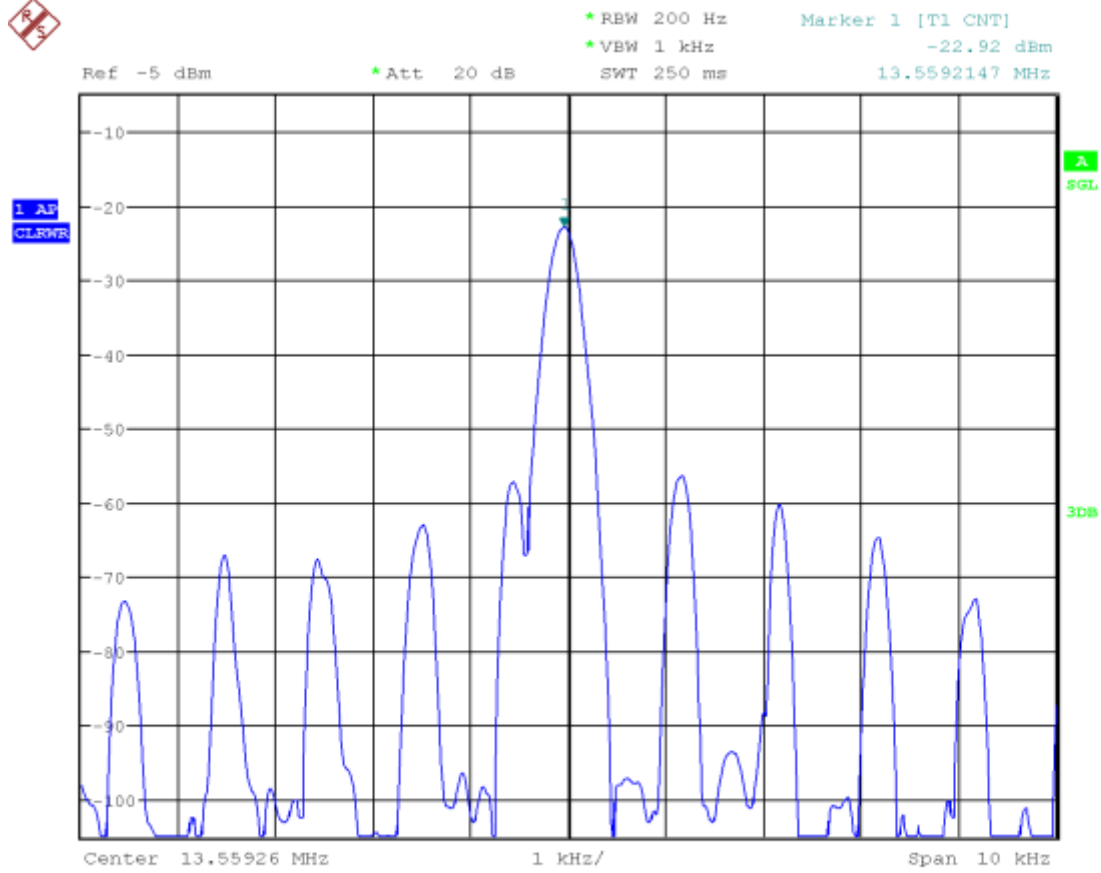
Date: 29.SEP.2022 09:24:31

T80_V12_4



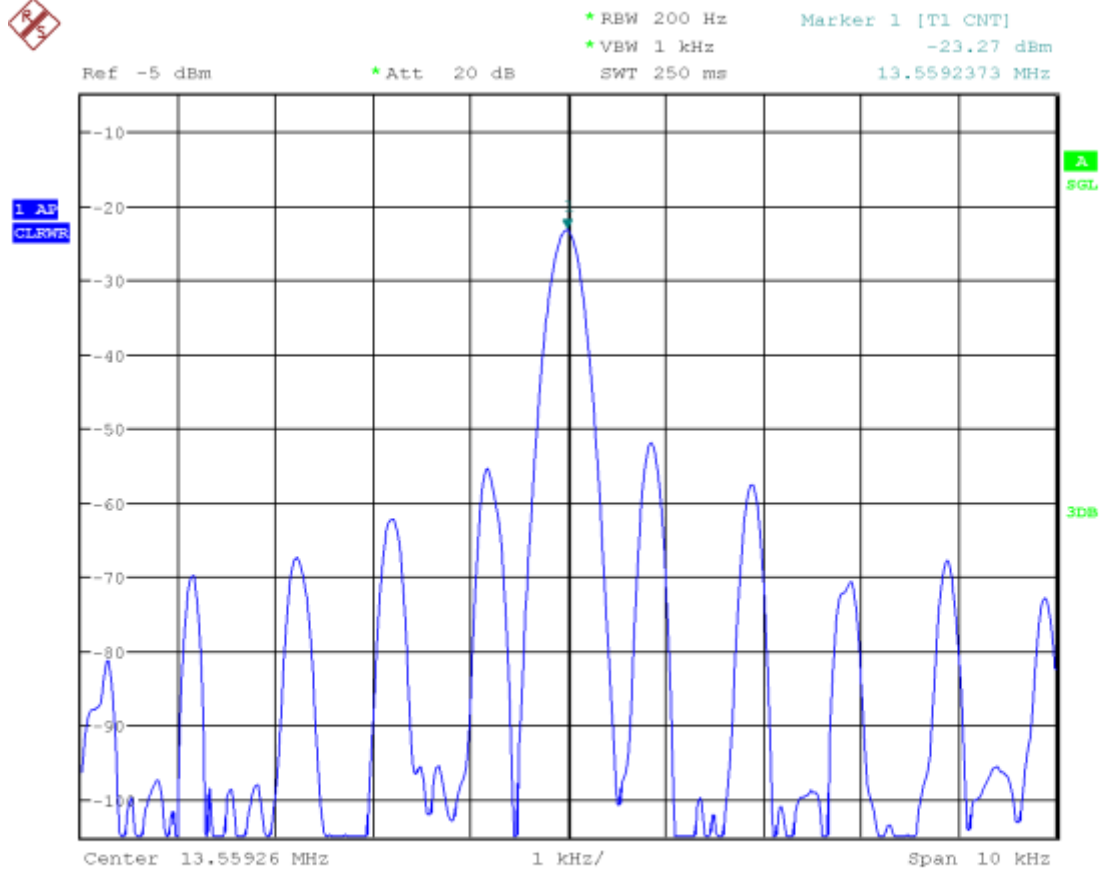
Date: 29.SEP.2022 09:29:31

T85_V12_1



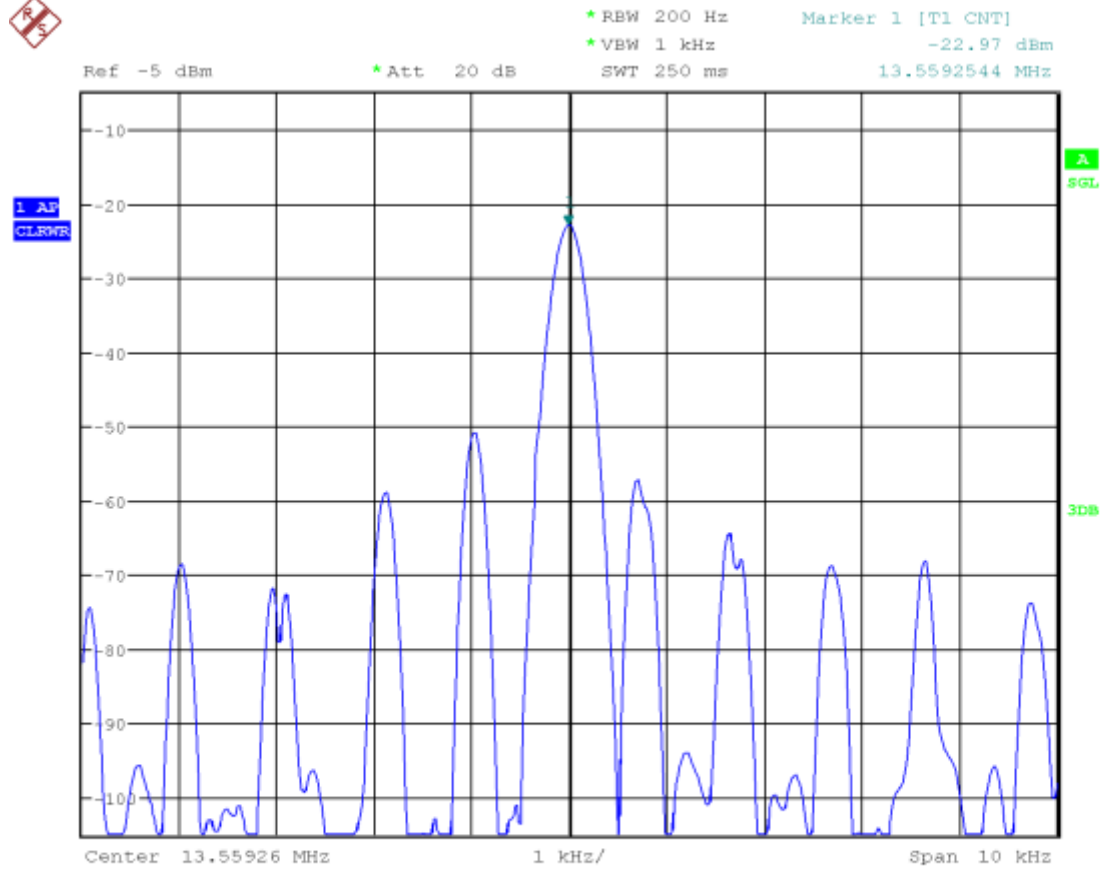
Date: 29.SEP.2022 09:58:57

T85_V12_2



Date: 29.SEP.2022 10:01:02

T85_V12_3

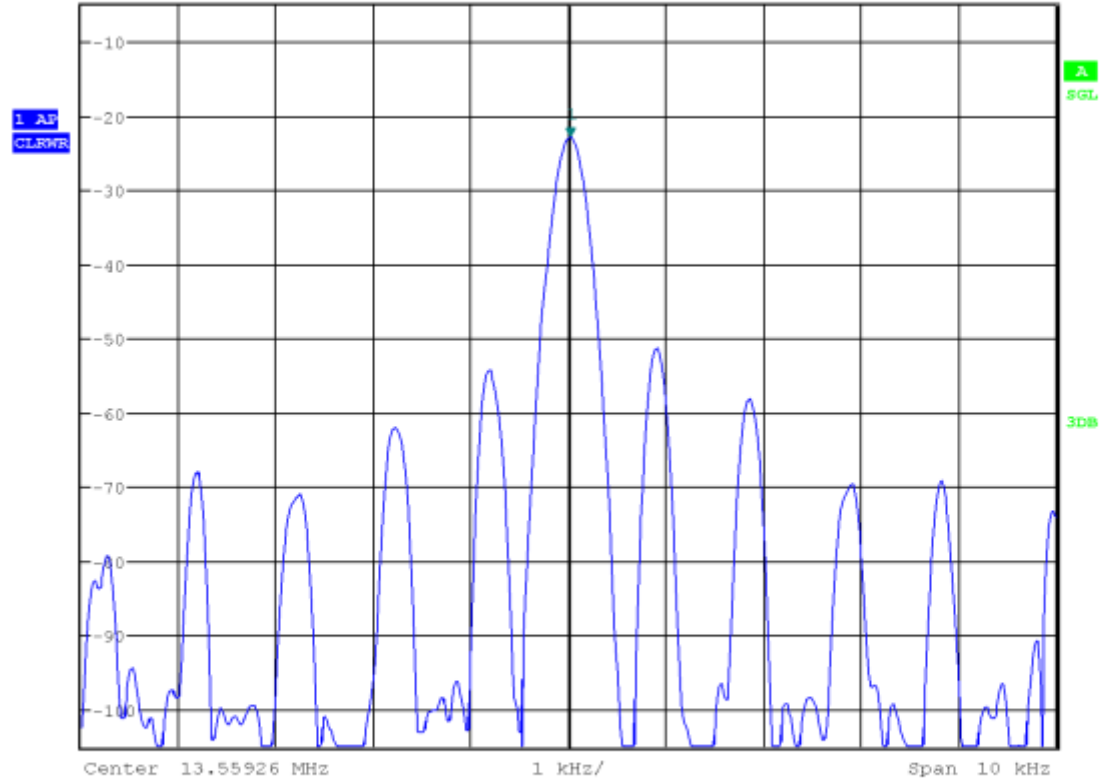


Date: 29.SEP.2022 10:03:58

T85_V12_4



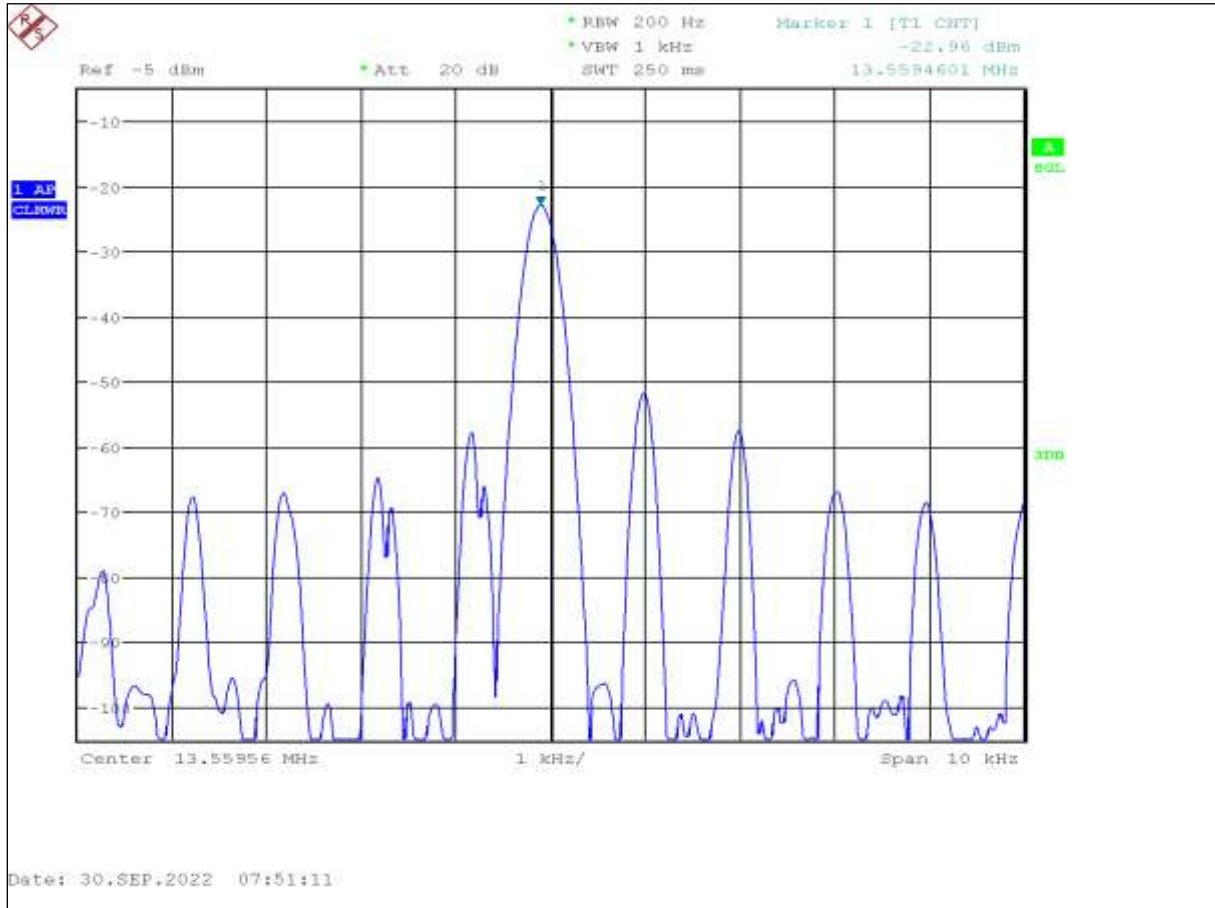
Ref -5 dBm *Att 20 dB *RBW 200 Hz Marker 1 [T1 CNT] -22.99 dBm
*VBW 1 kHz SWT 250 ms 13.5592750 MHz



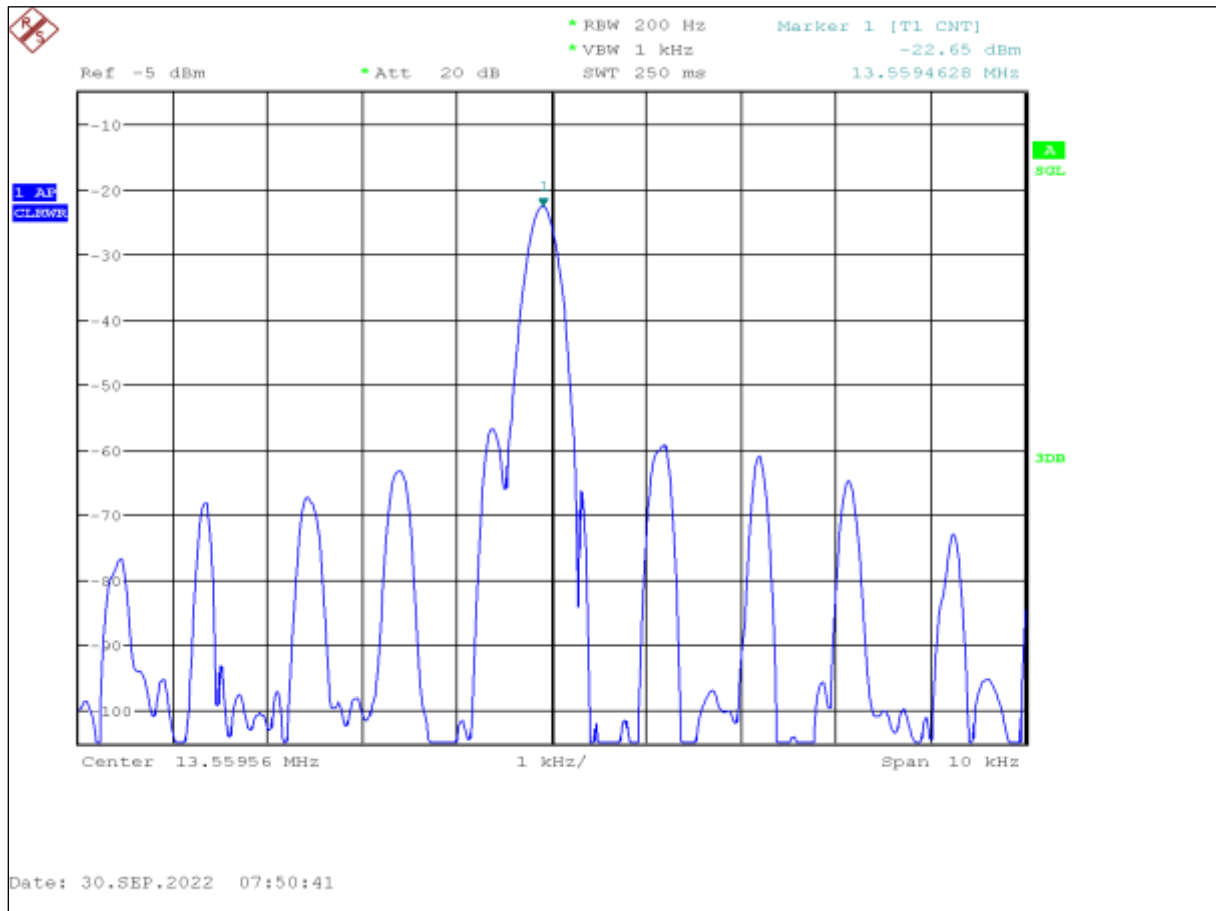
Date: 29.SEP.2022 10:09:00

1.5.2 Voltage variation

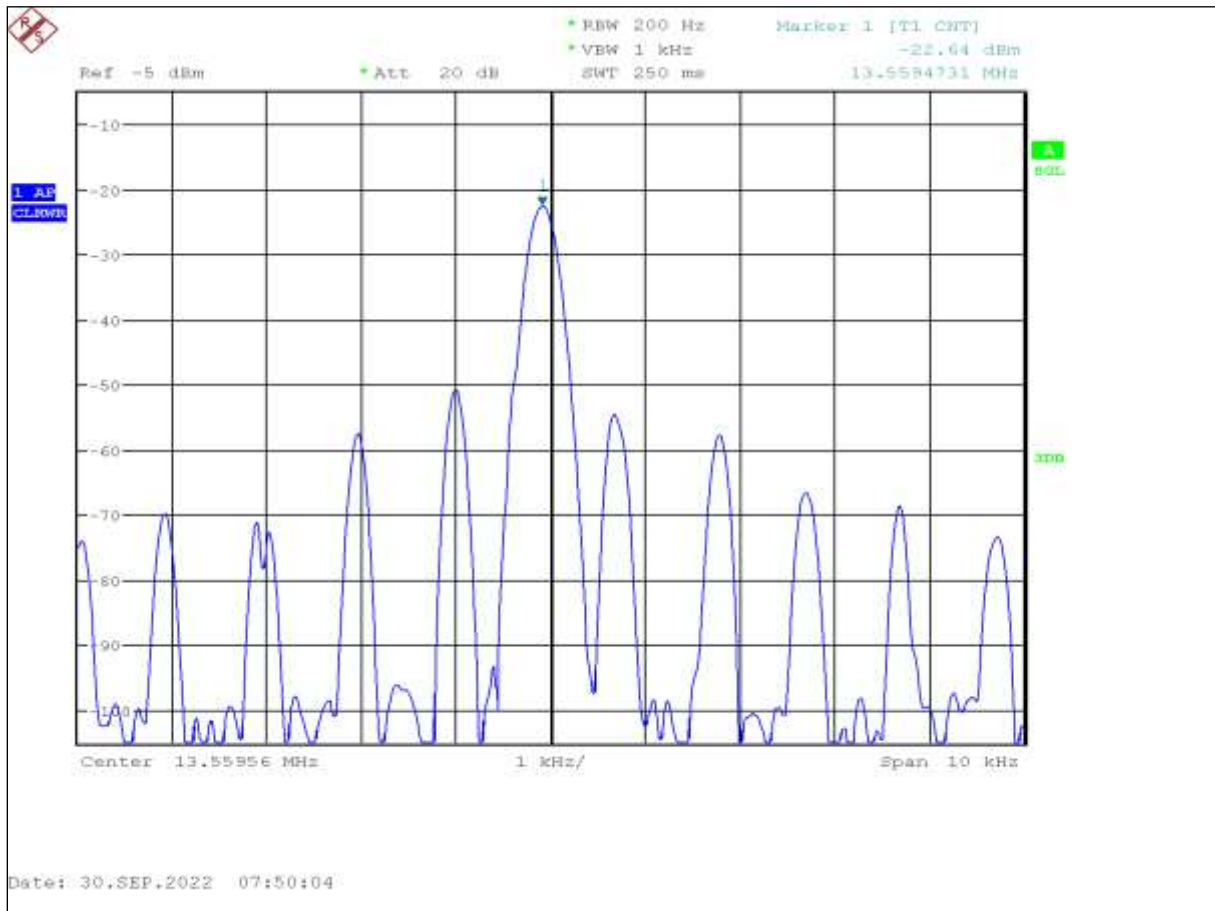
T21_V10_2



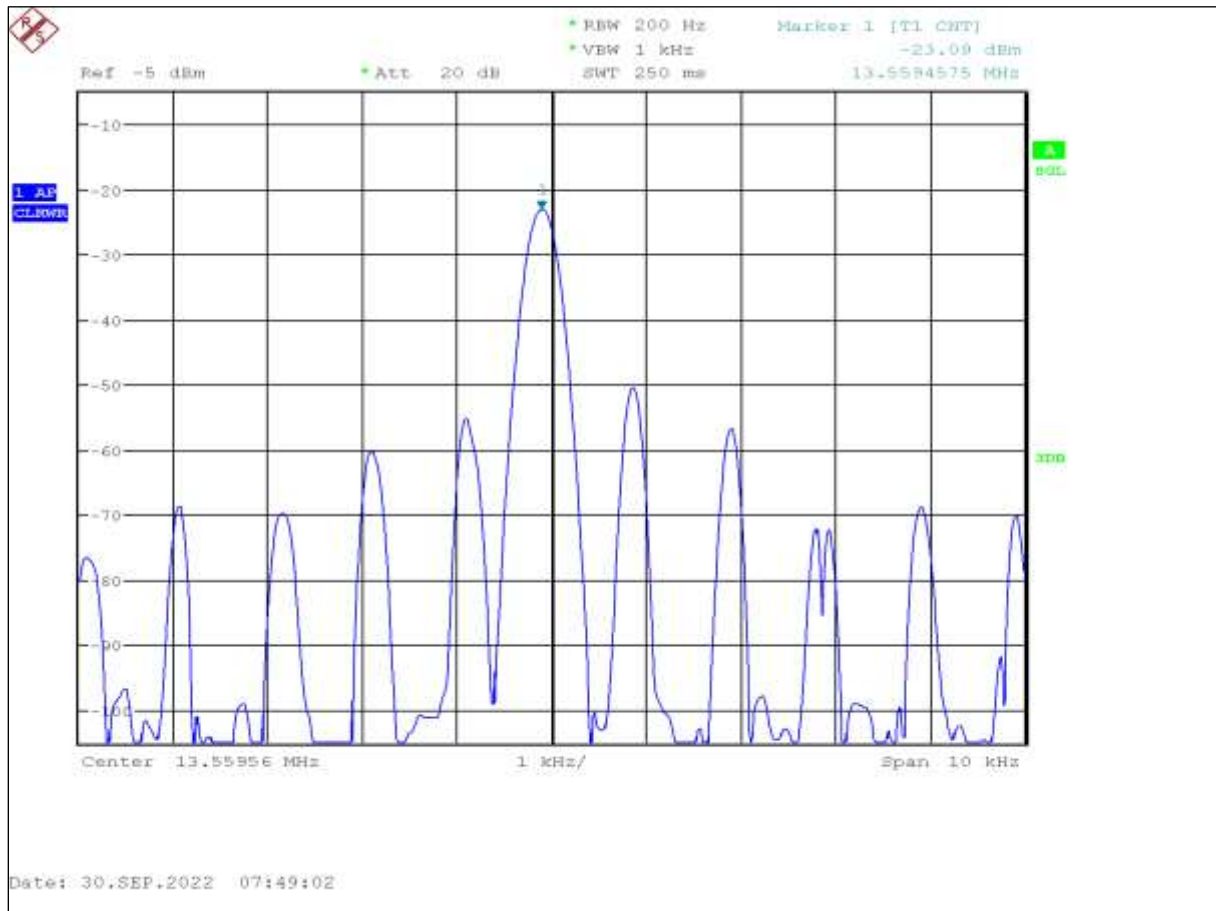
T21_V10_5



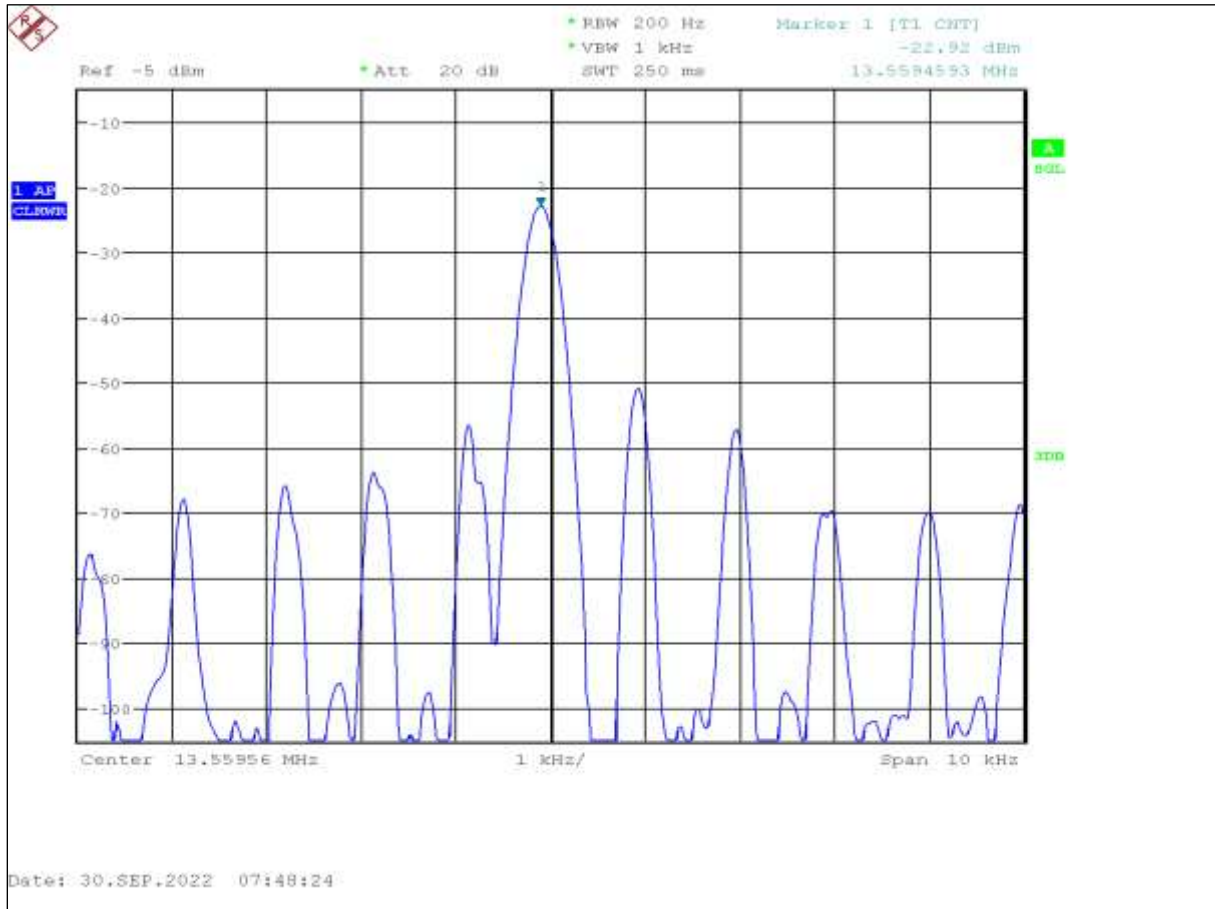
T21_V10_8



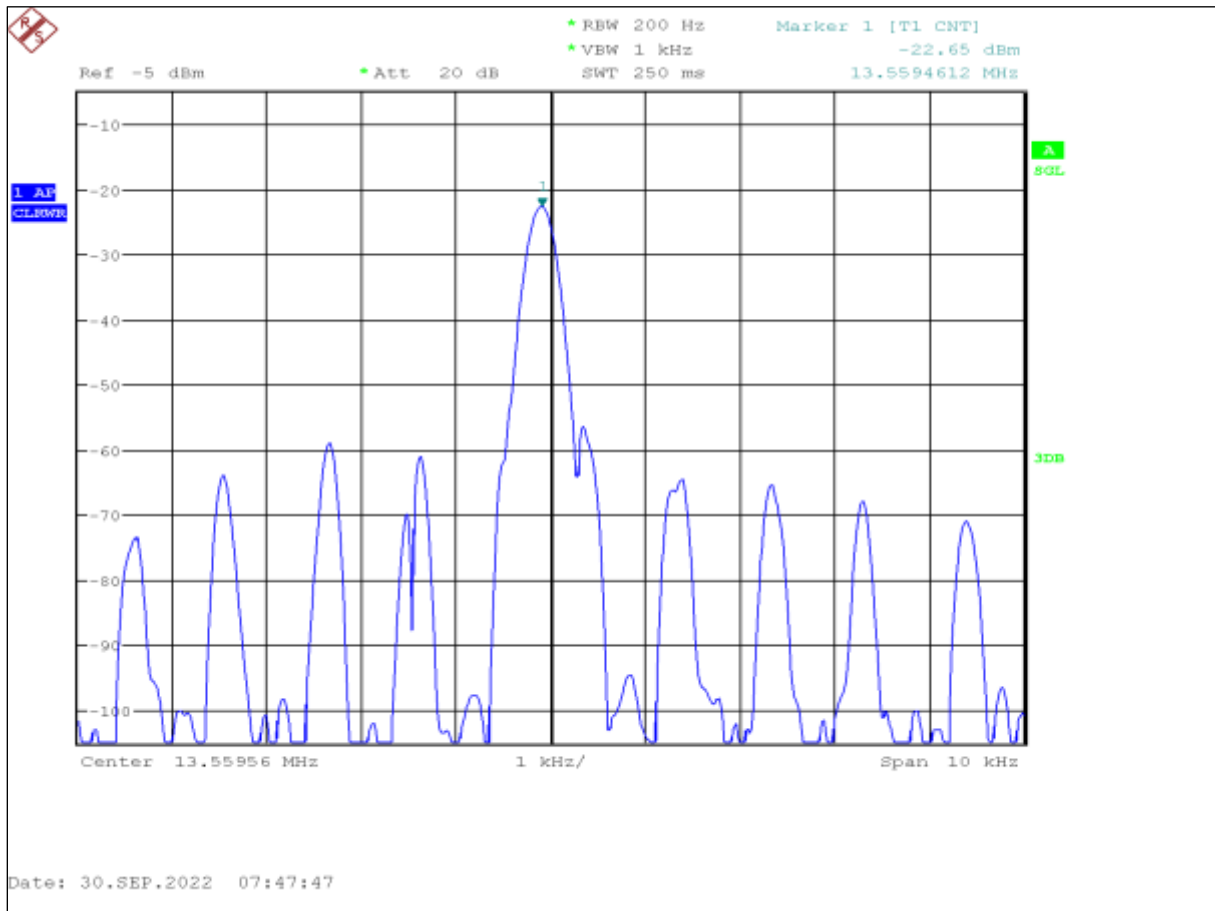
T21_V11_1



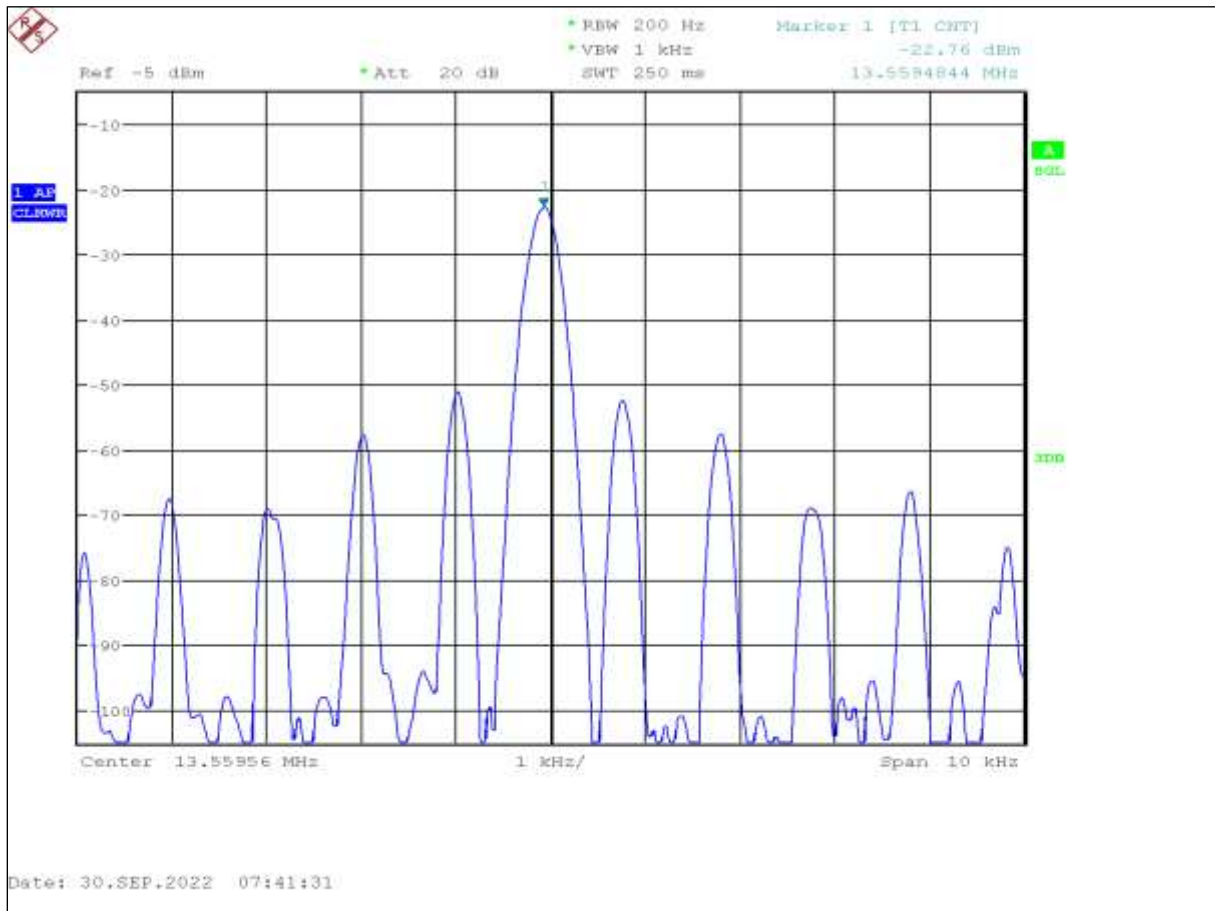
T21_V11_4



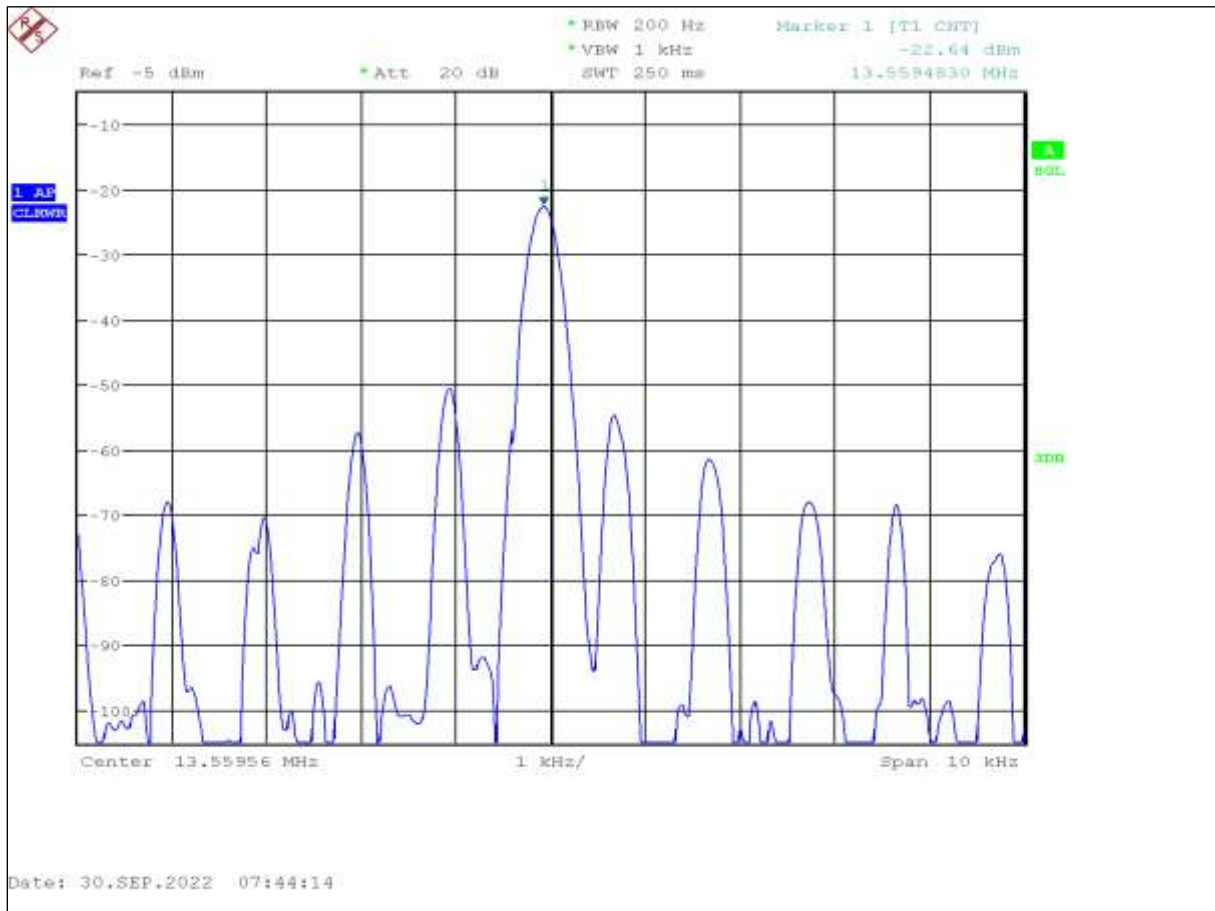
T21_V11_7



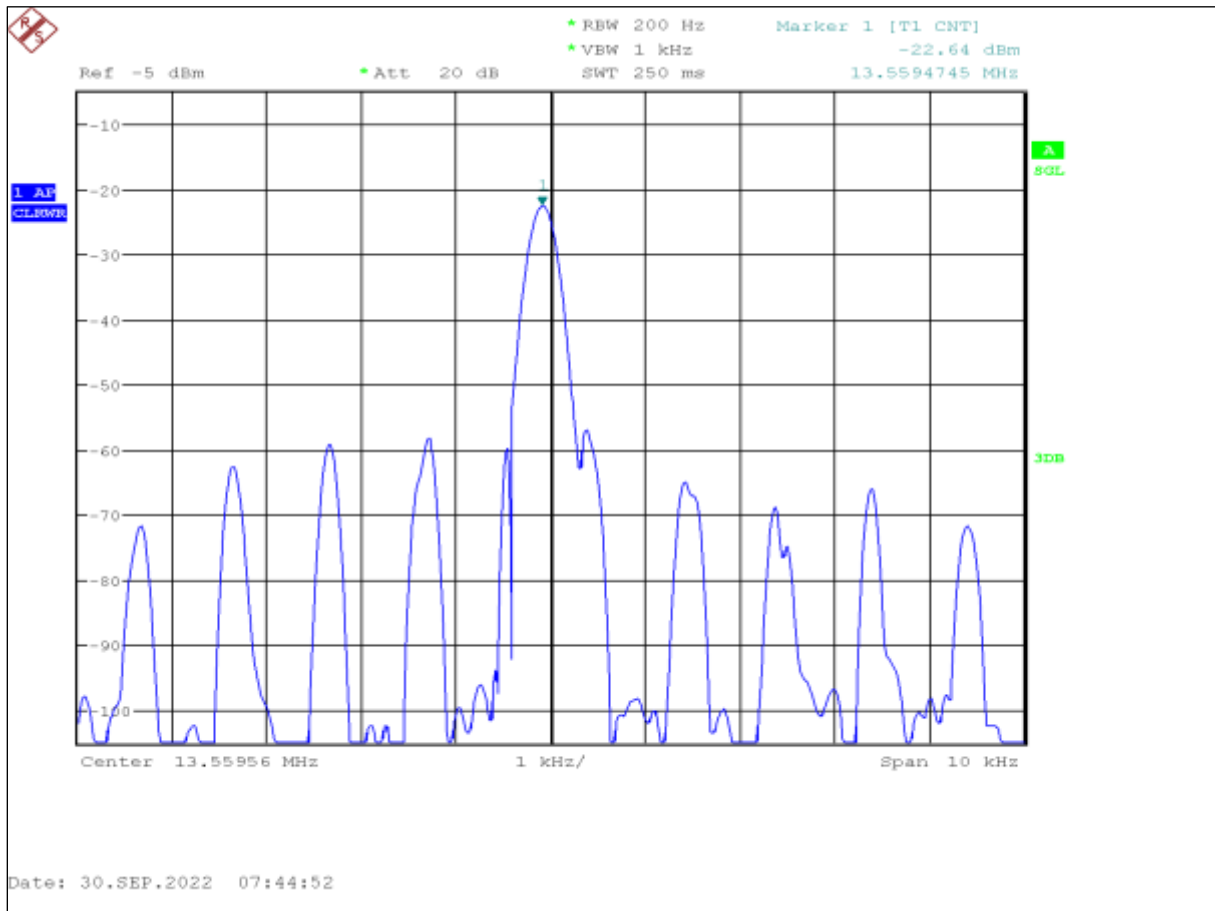
T21_V12_0



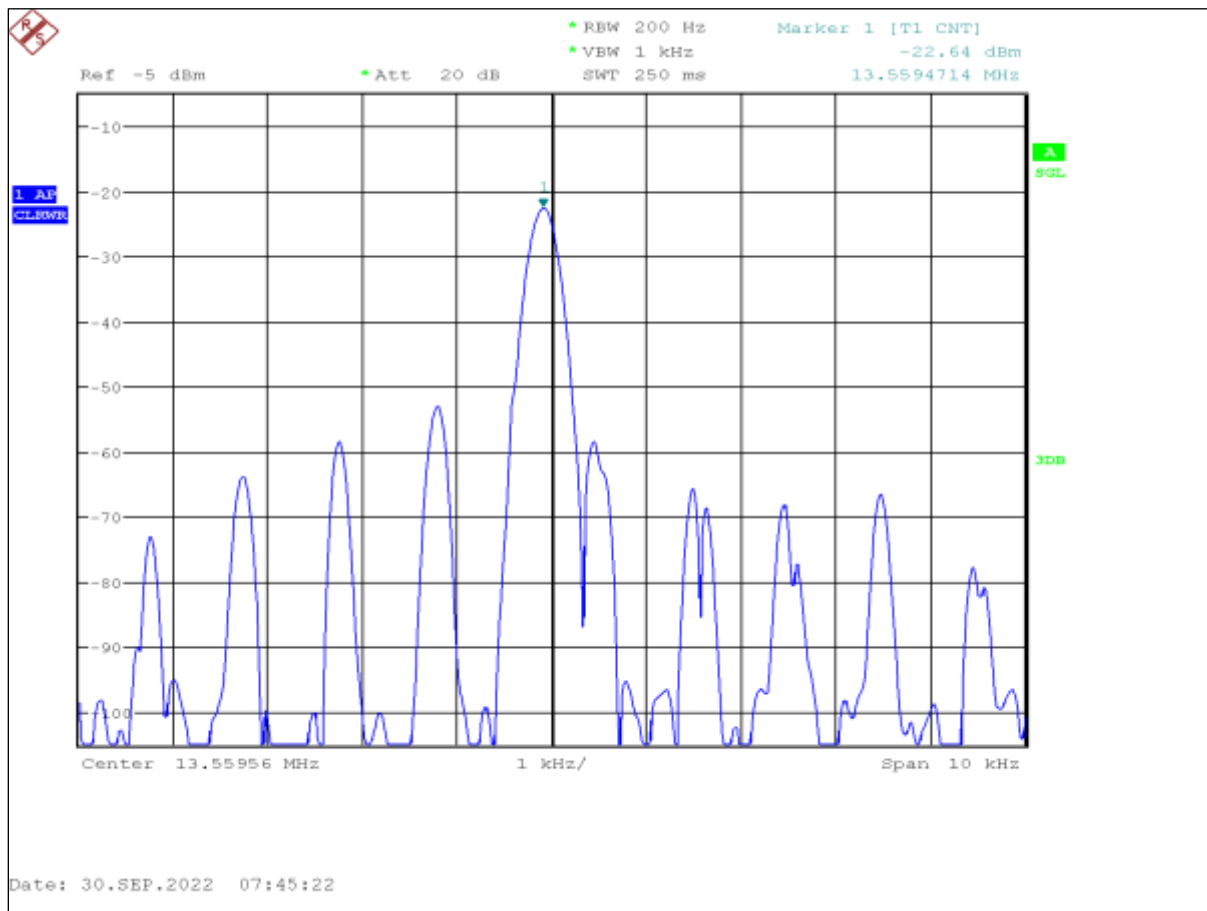
T21_V12_3



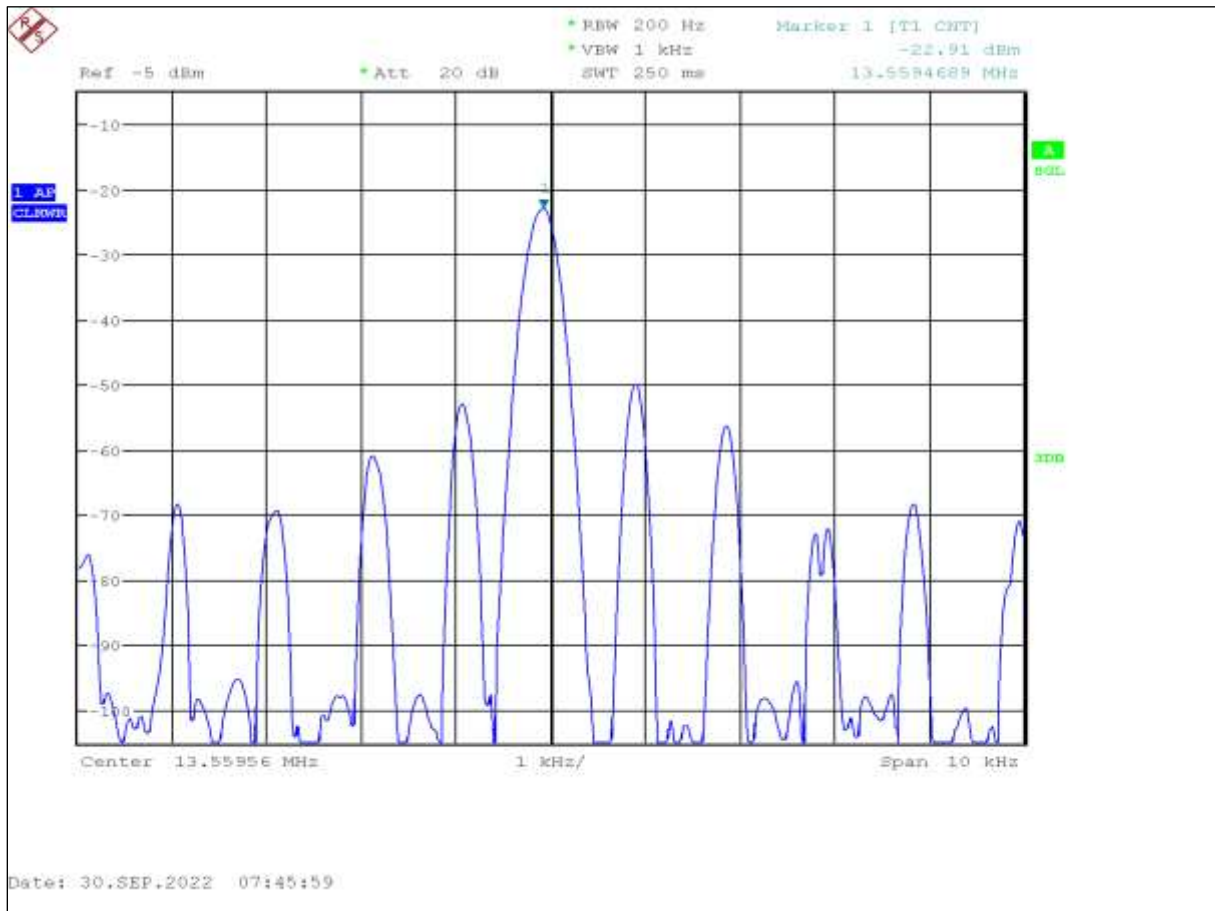
T21_V12_6



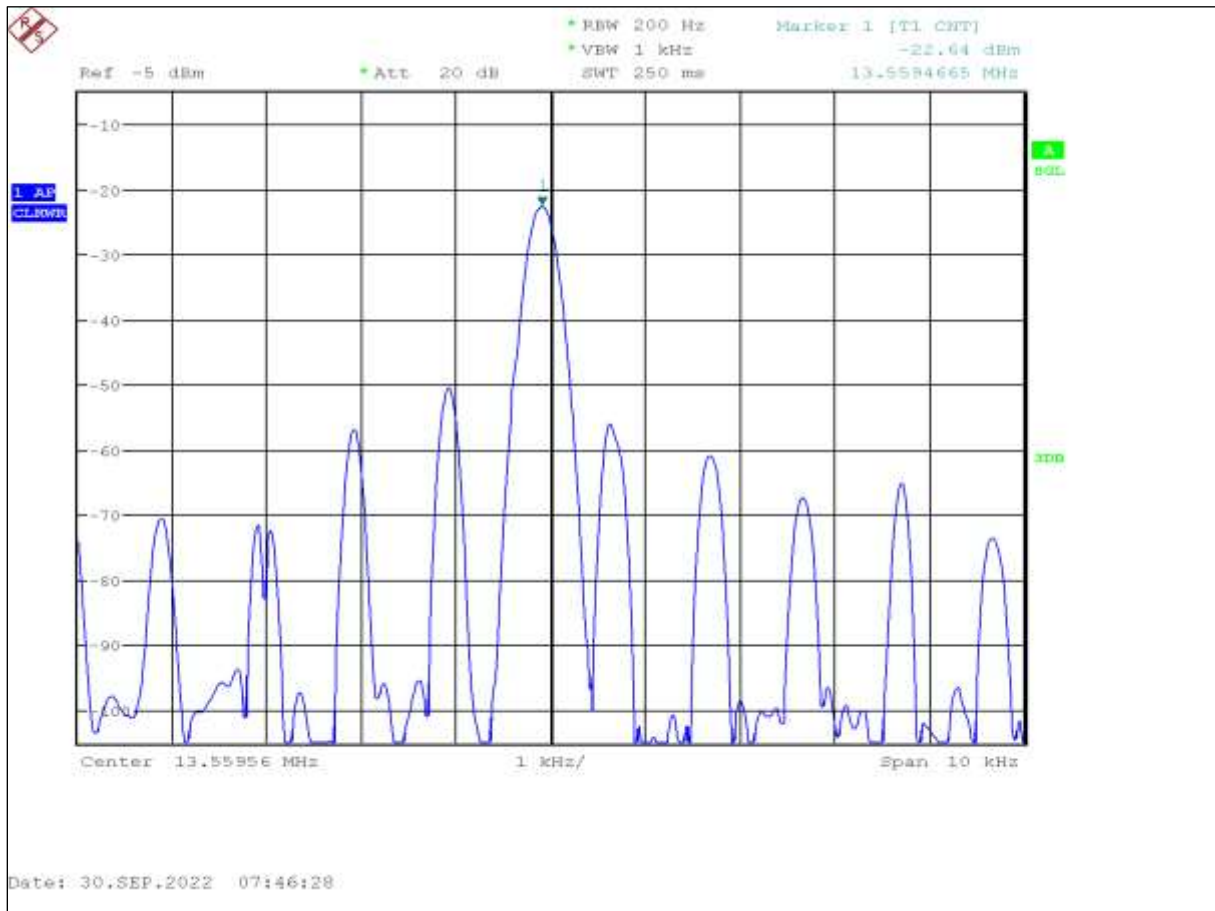
T21_V12_9



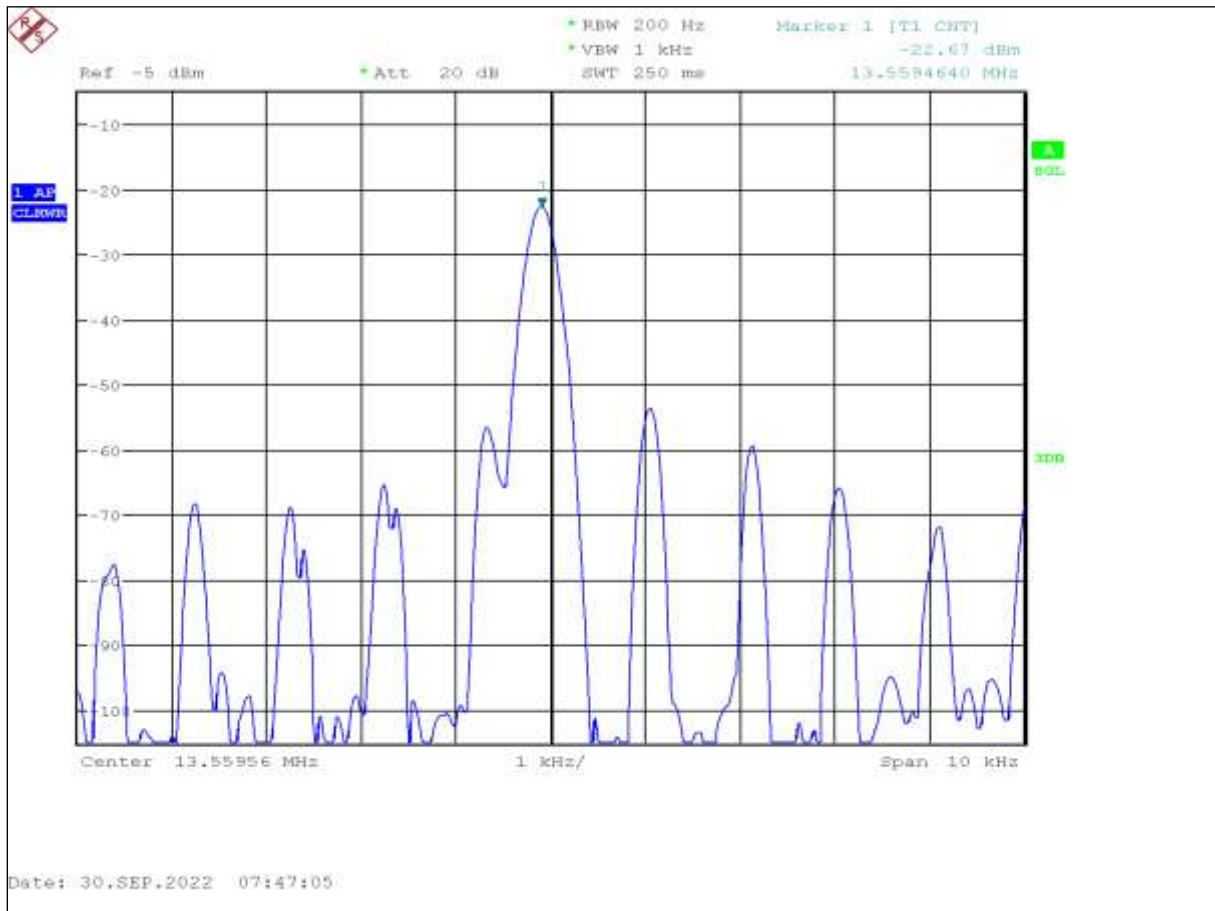
T21_V13_2



T21_V13_5



T21_V13_8



End Of Annex 1