MOTOROLA SOLUTIONS

MS ISO/IEC 17025
TESTING
SAMM No. 0825

MOTOROLA PENANG ADV. COMM. LABORATORY
Motorola Solutions Malaysia Sdn Bhd
Plot 2A, Medan Bayan Lepas,
Mukim 12 S.W.D, 11900 Bayan Lepas,
Penang, Malaysia.

FCC / ISED TEST REPORT

Report Revision : Rev.E

Date/s Tested	:	29-JAN-2019 - 10-JAN-2021
Report Issue Date	:	14-SEP-2020
Manufacturer/Location	:	Motorola Solutions Inc. (Elgin)
Requestor	:	TEH TIAN HONG
Product Type	:	Base Station
Model Number	:	T7039A (GTR8000-UHF130W)
Frequency Band	:	380 - 435 MHz
Low / Max RF Output Power	:	2 Watts / 33 Watts
Application Name	:	Motorola Solutions Inc
Manufacturer Address	:	1303 E Algonquin Road, Room 1043, Schaumburg, IL, 60196
ISED Registrations	:	MY0001
FCC Registrations	:	461337
Firmware Version	:	35.0.9

The equipment was tested accordance to the requirement listed below:

(LMR)	
FCC 47 CFR Part 90	**PASS**
ISED RSS- Gen Issue 5 / 119 Issue 12	

Prepared By:

Khor Wei Loong
Test Personnel

Approved Signatory:

Vincent Foong Chuen Kit
Deputy Technical Manager

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Report Revision History

Revision History	Description	Date	Originator
Rev. A	Initial Report	27-MAR-2019	Khor Wei Loong
Rev. B	Report date re-issue, power sensor detector added	14-SEPT-2020	Vincent Foong
Rev. C	MU information added	9-NOV-2020	Vincent Foong
Rev. D	Cover page updated	10-NOV-2020	Vincent Foong
Rev. E	Added missing points	22-JAN-2021	Vincent Foong

1.0 General Information

EUT Description:

Technologies	Land Mobile Radio (LMR)
Modulation Type	Analog, C4FM , LSM, FSK, Phase II (H-DQPSK)

General Description of Applied Standards
The EUT is a RF Product. According to the specifications of the manufacturer, the EUT is to comply with the requirements of the following standards:

ANSI C63.4-2014
ANSI C63.26-2015

2.0 Summary of Test Results

FCC General Rules Part (47CFR)	ISED General Rules Part	Test Item	Result	Remark
2.1046,22.565, 74.461,74.534, 80.215	RSS-119	RF Power Output	Pass	-
2.1055, 90.213,22.355	-	Frequency Stability	Pass	-
2.1047, 74.463, 80.213, RSS 119	RSS-119	Audio Frequency Response	Pass	-
2.1047, 74.463, 80.213, RSS 119	RSS-119	Audio Low Pass Filter Response	Pass	-
2.1047, 74.463, 80.213, RSS 119	RSS-119	Modulation limiting	Pass	-
2.1049, 90.210, 22.359, 74.462, 74.535, 80.211(c), 80.211(f)	RSS-119	Occupied Bandwidth	Pass	16K0F3E – 14.83kHz 11K0F3E - 9.99kHz 8K10F1D/E/W - 7.73kHz 8K70D7D/E/W - 7.73kHz 9K80D7D/E/W – 7.68kHz 10K0F1D - 5.46kHz 16K0F1D – 7.96kHz
-	-	Band Edge Conducted Spurious Emission	NA	-
90.214	-	Transient Frequency Behavior	Pass	-
-	-	Adjacent Channel Power	NA	-
2.1051,22.359	RSS-119	Conducted Spurious Emissions	Pass	Highest Radiated Emission Level -29.51dBm
2.1053, 90.543	RSS-119	Radiated Spurious Emission	Pass	Highest Radiated Emission Level -41.50dBm
-	-	GNSS (EIRP for 1559 – 1610MHz)	NA	-
-	-	Effective Radiated Power (ERP)	NA	-

NA → **Not Applicable**

3.0 Measurement Uncertainty

Measurement	Frequency	Expended Uncertainty (k=1.96) (±)
AC Power Line Conducted Spurious Emission	150KHz ~ 30MHz	3.43 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	4.25 dB
	200MHz ~ 1000MHz	4.25 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	4.94 dB
	18GHz ~ 25GHz	4.94 dB
Conducted Spurious Emissions	9kHz ~ 12.75GHz	2.82 dB
Frequency Stability	9kHz ~ 12.75GHz	0.0085 ppm
Audio Frequency Response / Low Pass Filter Response	300Hz – 20kHz	4.09 %
Modulation Limiting	300Hz – 3kHz	1.15 %
Occupied Bandwidth	9kHz ~ 12.75GHz	2.82 dB
Band Edge Conducted Spurious Emission	9kHz ~ 12.75GHz	2.82 dB
Transient Frequency Behavior	9kHz ~ 12.75GHz	5.4 ms
Adjacent Channel Power	9kHz ~ 12.75GHz	2.82 dB

4.0 Equipment List

FCC Analog ATE#1: (SW version: 2.4.5 & FCC_Frequency Stability 1.0.3 rev.)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
CHAMBER	SH-641	92009188	06-Mar-20	06-Mar-21
DSA Dynamic Signal Analyzer	35670A	MY42507095	19-Jun-20	19-Jun-21
ANALYZER AUDIO	8903B	3514A15797	29-Oct-20	29-Oct-21
POWER METER	E4416A	MY45102699	26-Jun-20	26-Jun-21
POWER SENSOR	E9301B	MY41498918	12-Aug-20	12-Aug-21
POWER SUPPLY	6031A	3325A02771	13-Mar-20	13-Mar-21
SIGNAL GENERATOR	2042	119718/063	24-Jun-20	24-Jun-21
ANALYZER MODULATION	8901B	3122A03662	08-Jul-20	08-Jul-21
N to N RF Cable # 1	M17/128-RG400	NA	NA	NA
BNC to N RF Cable # 1	RG 58	NA	NA	NA
BNC to BNC RF Cable # 1	RG 58	NA	NA	NA
BNC to BNC RF Cable # 2	RG 58	NA	NA	NA
BNC to BNC RF Cable # 3	RG 58	NA	NA	NA
BNC to BNC RF Cable # 4	RG 58	NA	NA	NA
BNC to BNC RF Cable # 5	RG 58	NA	NA	NA
BNC to BNC RF Cable # 6	RG 58	NA	NA	NA
BNC to BNC RF Cable # 7	RG 58	NA	NA	NA
N to SMA RF Cable # 1	RG 58	NA	NA	NA
N to SMA RF Cable # 2	RG 58	NA	NA	NA
N to SMA RF Cable # 3	RG 58	NA	NA	NA
Aeroflex Attenuator 30dB	49-30-34-LIM	NA	NA	NA

FCC Transient ATE #1: (SW version: FCC Transient ATE_R1.1.2)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
SWITCH CONTROL UNIT	3488A	2719A36210	CNR	CNR
ATTENUATOR / SWITCH DRIVER	11713A	2508A10141	CNR	CNR
POWER METER	E4416A	GB41293866	26-Feb-19	26-Feb-21
POWER SUPPLY	6032A	MY41002067	22-Feb-20	22-Feb-21
SIGNAL GENERATOR	8657A	3250A05137	19-Jun-20	19-Jun-21
STEP ATTENUATOR	8494G	MY42143006	12-Jun-20	12-Jun-21
STEP ATTENUATOR	8496G	MY42143012	13-Jun-20	13-Jun-21
OSCILLOSCOPE	MSO8104A	MY45002372	26-Jun-20	26-Jun-21
ANALYZER MODULATION	8901B	3438A05093	23-Jun-20	23-Jun-21
ANALYZER AUDIO	8903B	3011A12671	11-Mar-20	11-Mar-21
ANALYZER AUDIO	8903B	3011A08952	29-Jul-20	29-Jul-21
SPECTRUM ANAYLYZER	E4440A	MY46181974	2-Aug-20	2-Aug-21
N to N RF Cable # 1	SF126/11N/11N	NA	NA	NA
N to N RF Cable # 2	M17/128-RG400	NA	NA	NA
N to N RF Cable # 3	M17/128-RG400	NA	NA	NA
N to N RF Cable # 4	M17/128-RG400	NA	NA	NA
N to N RF Cable # 5	M17/128-RG400	NA	NA	NA
N to N RF Cable # 6	M17/128-RG400	NA	NA	NA
N to N RF Cable # 7	M17/128-RG400	NA	NA	NA
N to N RF Cable # 8	M17/128-RG400	NA	NA	NA
N to N RF Cable # 9	M17/128-RG400	NA	NA	NA
BNC to BNC RF Cable # 1	RG 58	NA	NA	NA
BNC to BNC RF Cable # 2	RG 58	NA	NA	NA
BNC to BNC RF Cable # 3	RG 58	NA	NA	NA
BNC to BNC RF Cable # 4	RG 58	NA	NA	NA
BNC to BNC RF Cable # 5	RG 58	NA	NA	NA
BNC to BNC RF Cable # 6	RG 58	NA	NA	NA
BNC to N RF Cable # 1	RG 58	NA	NA	NA
Aeroflex Attenuator 10dB	49-10-43-LIM	NA	NA	NA
Aeroflex Attenuator 10dB	33-10-34-LIM	NA	NA	NA
SWITCH CONTROL UNIT	3488A	2719A36210	CNR	CNR

CONDUCTED SPUR EMISSION ATE # 1 (SW version: Conducted Spur ATE_rev 1.23.02)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
SWITCH CONTROL UNIT	3488A	2719A32735	CNR	CNR
ANALYZER SPECTRUM	E4440A	MY46185415	10-Jan-20	10-Jan-22
POWER SUPPLY	6031A	3543A03489	05-Jun-20	05-Jun-21
HIGH PASS FILTER SWITCH BOX	-	CS001	2-Jul-20	2-Jul-21
N to N RF Cable # 1	SF126/11N/11N	NA	NA	NA
N to N RF Cable # 2	SF126/11N/11N	NA	NA	NA
BNC to BNC RF Cable # 1	RG 58	NA	NA	NA
Aeroflex Attenuator 30dB	49-30-43-LIM	NA	NA	NA
Aeroflex Attenuator 10dB	33-10-34-LIM	NA	NA	NA

EMC Chamber 1

DESCRIPTION	MODEL	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
DRG HORN FREQ.	SAS-571	720	21-Mar-19	21-Mar-21
DRG HORN FREQ.	SAS-571	1143	14-Feb-19	14-Feb-21
POWER SUPPLY	6032A	2615A01178	21-May-20	21-May-21
SIGNAL GENERATOR	SMB 100A	181117	8-Nov-18	8-Nov-21
EMI TEST RECEIVER	ESW44	101731	3-Dec-19	3-Feb-21
EMI TEST RECEIVER	ESIB26	100017	19-Jul-19	19-Jan-21
5m SEMI-ANECHOIC CHAMBER	S800-HX	J2308	No Cal. Req'd	No Cal. Req'd
BILOG ANTENNA	CBL6112B	2964	23-Apr-19	23-Apr-21
BILOG ANTENNA	CBL6112B	2950	8-Jul-19	8-Jul-21
DATA LOGGER	SDL500	A.016776	4-Jun-20	4-Jun-21
SYSTEM CONTROLLER	SC104V	050806-1	CNR	CNR
TURNTABLE FLUSH MOUNT 2M	FM2011	NA	CNR	CNR
ANTENNA POSITIONING TOWER	TLT2	NA	CNR	CNR
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170255	27-Jan-20	27-Jan-21
18 - 40GHz PREAMPLIFIER	MITEQ Hi GAIN SUCOFLEX	001	CNR	CNR
PREAMPLIFIER	PAM-0118	269	24-May-19	24-May-22
LOOP ANTENNA	6502	00203479	21-Jan-20	21-Jan-21
TEST SOFTWARE	EMC_FCC_IC_BLUETOOTH_RE_TEST			
VERSION	EMC_FCC_RE_v1.6.2			

CNR → Calibration Not Require

5.0 Test Condition

5.1. Transmitter Test Conditions

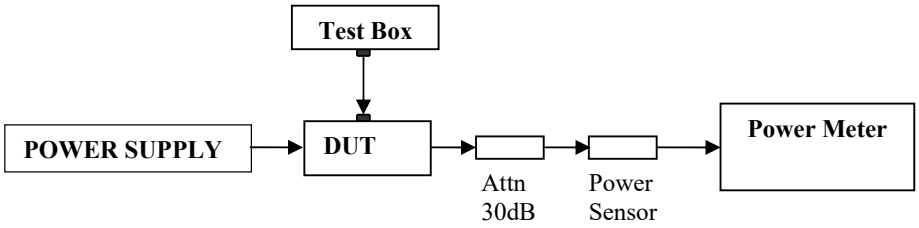
Test Item, (Channel Spacing)	Power (W)	Modulation	Test Frequency (MHz)	Tested By
RF Output Power	**Low & Max**	**Analog**	**380.0125, 406.2, 429.9875, 418.05, 434.9875**	**Dinesh**
Frequency Stability	**Max**	**Analog**	**406.2**	**Dinesh**
Audio Frequency Response (12.5kHz / 25kHz)	**Max**	**Analog**	**406.2**	**Dinesh**
Audio Low Pass Filter Response (12.5kHz / 25kHz)	**Max**	**Analog**	**406.2**	**Dinesh**
Modulation limiting (12.5kHz / 25kHz)	**Max**	**Analog**	**406.2**	**Dinesh**
Occupied Bandwidth (12.5kHz / 25kHz)	**Max**	**Analog**	**380.0125, 406.2, 429.9875, 418.05, 434.9875**	**Dinesh**
Band Edge Conducted Spurious Emissions (Part 22) (12.5kHz / 20kHz / 25kHz)	**Max**	**Analog**	**NA**	**Dinesh**
Transient Frequency Behavior *(UHF & VHF Band)* (12.5kHz / 25kHz)	**Max**	**Analog**	**406.2**	**Dinesh**
Adjacent Channel Power *(700MHz Band)* (12.5kHz)	**Max**	**Analog**	**NA**	**NA**
Conducted Spurious Emissions- (12.5kHz / 25kHz)	**Low / Max**	**Analog**	**380.0125, 406.2, 429.9875, 418.05, 434.9875**	**Dinesh**
Radiated Spurious Emission (12.5kHz / 25kHz)	**Low / Max**	**Analog**	**380.0125, 406.2, 429.9875, 418.05, 434.9875**	**Nazrin& Qawiman**
GNSS (EIRP for 1559 - 1610MHz) (12.5kHz / 25kHz)	**Max**	**Analog**	**NA**	**NA**
Effective Radiated Power (ERP) (12.5kHz / 25kHz)	**Max**	**Analog**	**NA**	**NA**

NA → Not Applicable

Transmitter Test Parameters

5.2. RF Output Power

5.2.1. Test Setup



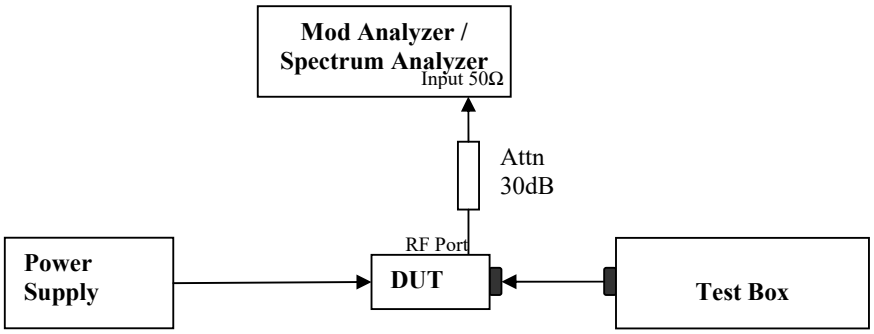
1) The DUT transmitter connected to Power Meter using the 30 dB attenuator and average power sensor with above setup.
2) Path loss for the measurement included.
3) All the measurement was done at low, mid, high frequency for each band.
4) Record the power into the test report.

5.2.2. Test Result

Temperature	25˚C				
Voltage (V)	240V(AC)				
Frequency (MHz)	Low Power (W)	Current (A)	Max Power (W)	Current (A)	Remarks
380.0125	1.95	0.95	31.56	1.1	
406.2	1.97	0.89	31.66	1.15	
418.05	1.95	0.91	31.77	1.12	
429.9875	1.95	0.90	32.1	1.06	
434.9875	1.96	0.92	31.41	1.21	

5.3. Frequency Stability

5.3.1. Test Setup



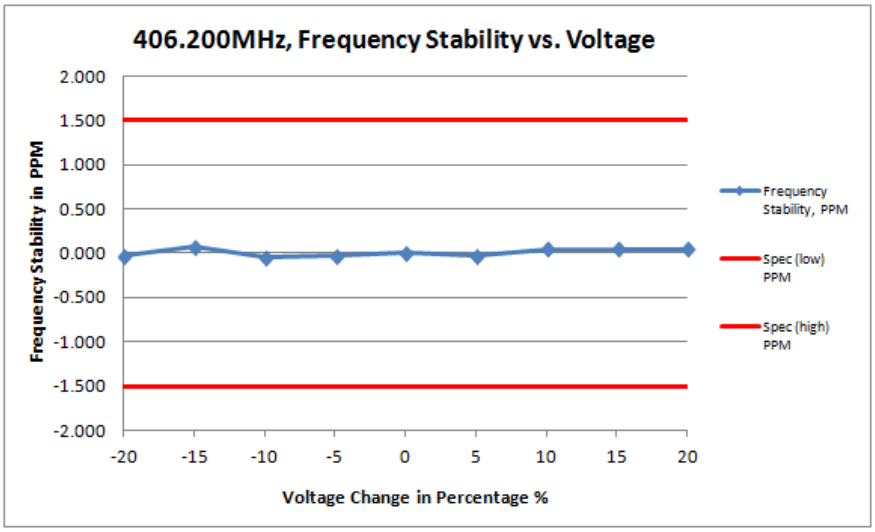
1) The DUT transmitter output port was connected to Modulation / Spectrum Analyzer.
2) Path loss for the measurement included.
3) Transmit the DUT and record the freq in MCF_{MHz}.
4) Test in 2 conditions:
   - Temperature: The frequency of the transmitter was measured from -30°C to 50°C.
   - Supply Voltage:
     -Mobile: The frequency of the transmitter was measured from 85% to 115% of the nominal operating input voltage.
     -Portable: The frequency of the transmitter was measured from nominal ± x % as specified by the manufacturer

5) Calculate the ppm frequency error by the following:

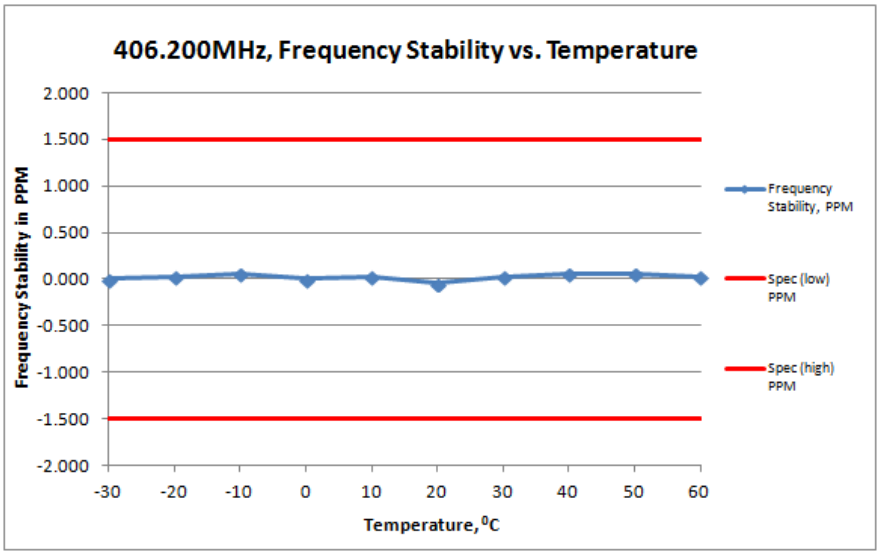
$$ppm\ error = \left(\frac{MCF_{MHz}}{ACF_{MHz}} - 1\right) * 10^6$$

Where: MCF_{MHz} is the Measured Carrier Frequency in MHz
ACF_{MHz} is the Assigned Carrier Frequency in MHz

5.3.2. Test Result



Frequency / Channel Spacing	406.200 MHz / 12.5 kHz				
Temperature, ^{0}C	25				
Voltage %	Voltage, V	Frequency, MHz	Frequency Stability, PPM	Spec (low) PPM	Spec (high) PPM
-20	192.000	406.199990	-0.025	-1.500	1.500
-15	204.000	406.200030	0.074	-1.500	1.500
-10	216.000	406.199980	-0.049	-1.500	1.500
-5	228.000	406.199990	-0.025	-1.500	1.500
0	240.000	406.200000	0.000	-1.500	1.500
5	252.000	406.199990	-0.025	-1.500	1.500
10	264.000	406.200020	0.049	-1.500	1.500
15	276.000	406.200020	0.049	-1.500	1.500
20	288.000	406.200020	0.049	-1.500	1.500



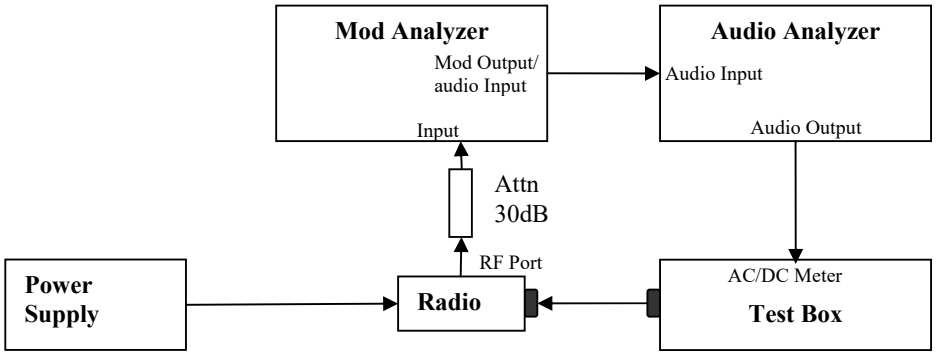
Frequency / Channel Spacing	406.2000 MHz / 12.5 kHz			
Voltage, V	240.0			
Temperature, ^{0}C	Frequency, MHz	Frequency Stability, PPM	Spec (low) PPM	Spec (high) PPM
-30	406.200000	0.000	-1.500	1.500
-20	406.200010	0.025	-1.500	1.500
-10	406.200020	0.049	-1.500	1.500
0	406.200000	0.000	-1.500	1.500
10	406.200010	0.025	-1.500	1.500
20	406.199980	-0.049	-1.500	1.500
30	406.200010	0.025	-1.500	1.500
40	406.200020	0.049	-1.500	1.500
50	406.200020	0.049	-1.500	1.500
60	406.200010	0.025	-1.500	1.500

5.3.3. Test Limit

As per manufacturer declared spec +/- 0.5ppm

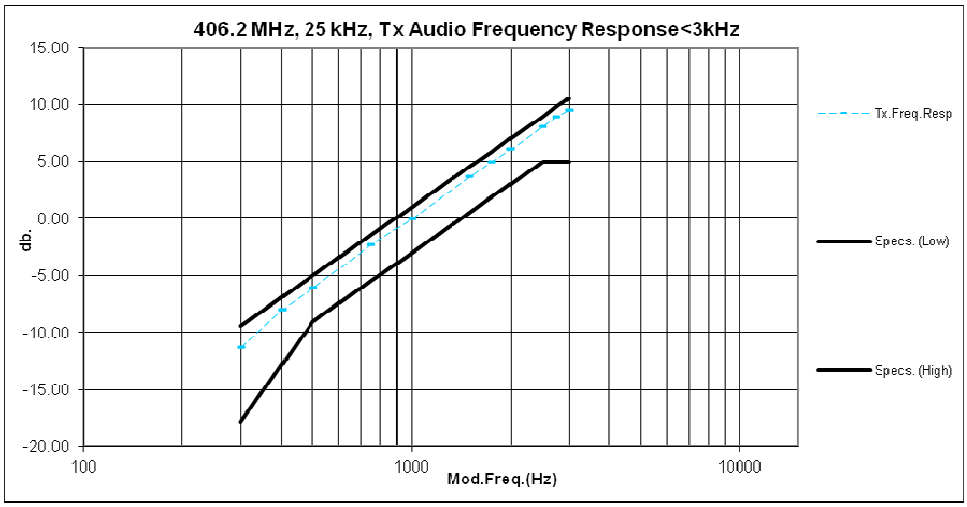
5.4. Audio Frequency Response

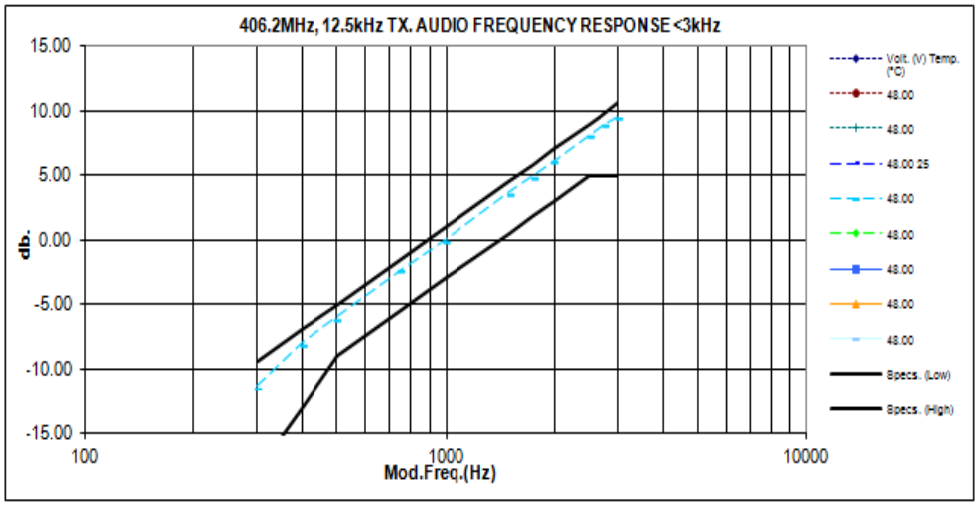
5.4.1. Test Setup



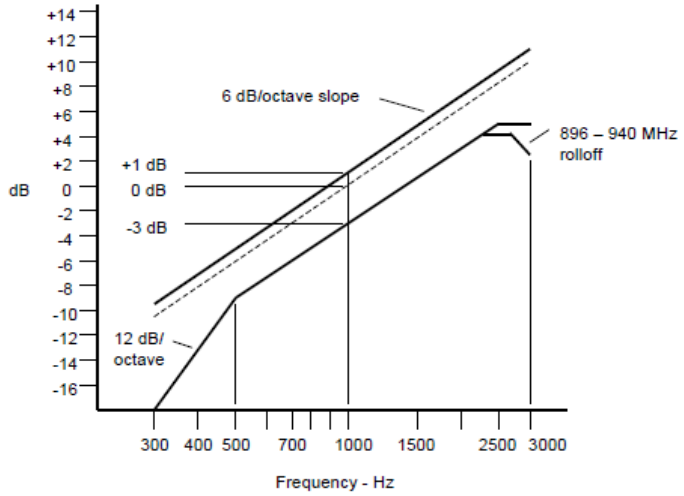
1) The DUT transmitter output port was connected to Modulation Analyzer.
2) Path loss for the measurement included.
3) Set the audio bandwidth filter to 15 kHz and 50 kHz.
4) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 20% of the Full rated system deviation.
5) On audio analyzer, set the rated level as reference to zero.
6) Vary the audio frequency from 300 Hz to 3 kHz. Record the change in dB on the audio analyzer.

5.4.2. Test Result





5.4.3. Test Limit

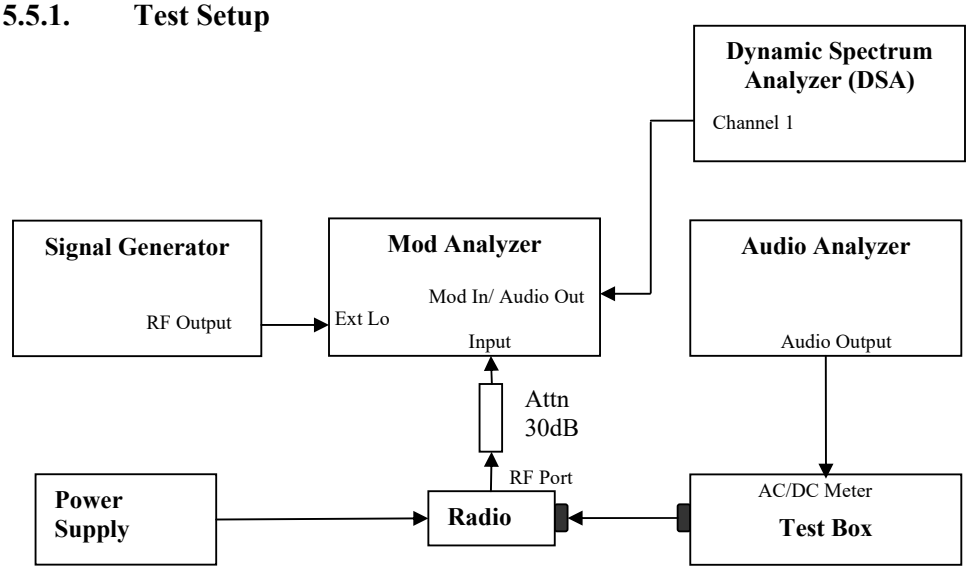


Note:

- *There are additional 6 dB per octave attenuation is allowed from 2.5KHz to 3KHz in equipment 25MHz to 869MHz radio.*
- *Additional 6 dB per octave attenuation is allowed from 2.3KHz to 2.7KHz & additional 12 dB per octave attenuation is allowed from 2.7KHz to 3KHz in equipment 896MHz to 940MHz radio.*

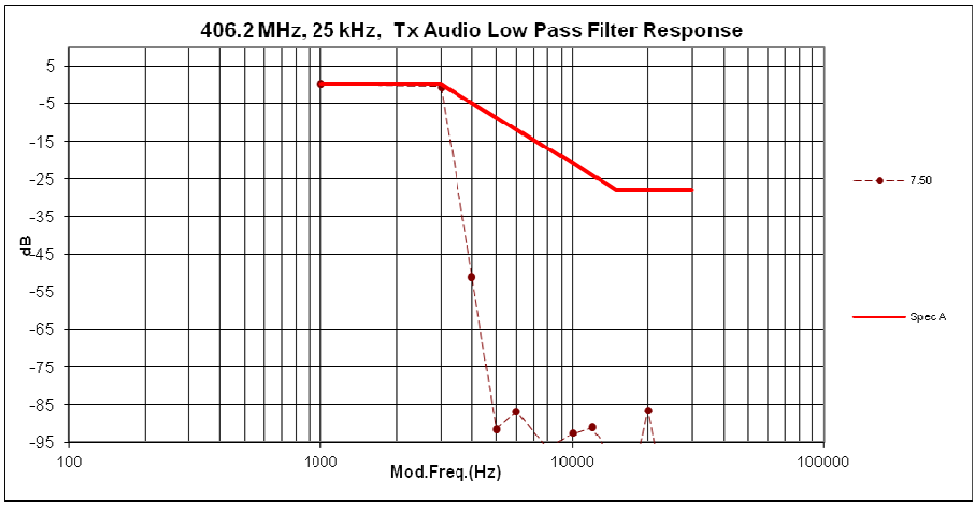
5.5. Audio Low Pass Filter Response

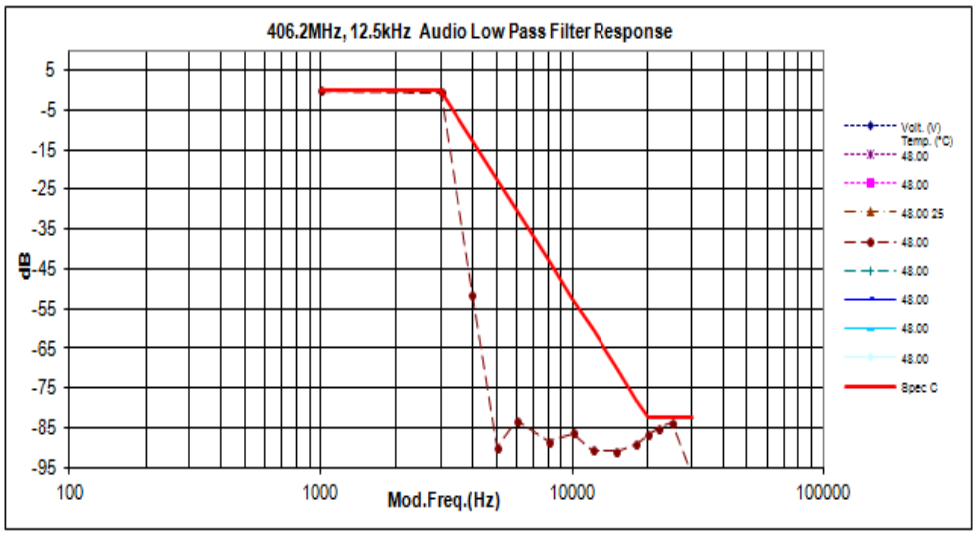
5.5.1. Test Setup



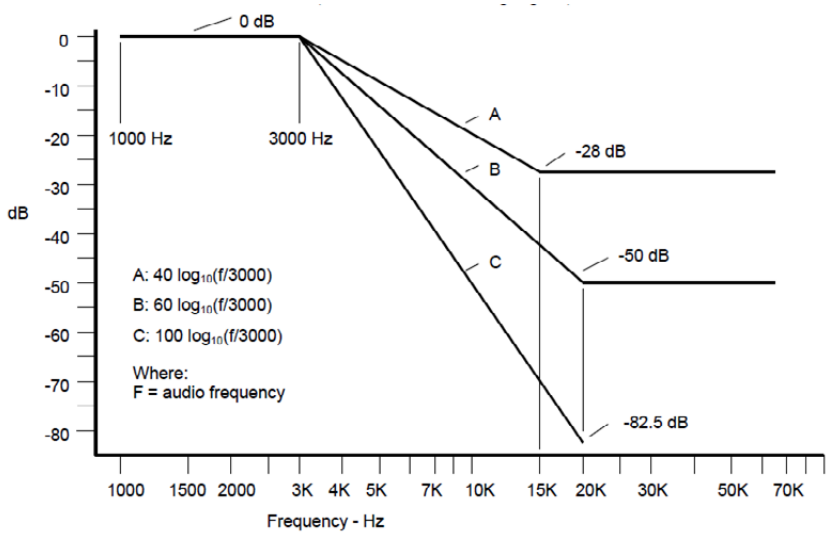
1) The DUT transmitter output port was connected to Modulation Analyzer.
2) Path loss for the measurement included.
3) Press 23.1SPCL on modulation analyzer to enable the external LO from Sigen.
4) Set the Sigen frequency to Fc + 1.5 MHz, RF output level to 0dBm without modulation.
5) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 60% of the Full rated system deviation.
6) Up the amplitude by 20dB.
7) On DSA, get the reference point to 0dB.
8) Vary the frequency on audio analyzer from 3 kHz to 20 kHz, record the audio tone from DSA.

5.5.2. Test Result





5.5.3. Test Limit



For audio frequencies above 3000 Hz, the audio response of the post limiter low-pass filter shall meet or exceed the following requirements:

a) For equipment operating on 20, 25 or 30 kHz channel bandwidth in the 25 MHz to 174 MHz range:

At frequencies from 3000 Hz through 15,000 Hz the attenuation shall be greater than the attenuation at 1000 Hz by at least: $40 \log_{10}(f / 3000)$ dB

where: f is the audio frequency in Hz.

At frequencies above 15,000 Hz, the attenuation shall be greater than the attenuation at 1000 Hz, by at least: 28 dB.

b) For equipment operating with 25 kHz bandwidth channels between 406 and 512 MHz through 896 MHz, and between 929 MHz through 930 MHz:

At frequencies from 3000 Hz through 20,000 Hz, the attenuation shall be greater than the attenuation at 1000 Hz by at least: $60 \log_{10}(f / 3000)$ dB

where: f is the audio frequency in Hz.

At frequencies above 20,000 Hz the attenuation shall be greater than the attenuation at 1000 Hz by at least: 50 dB.

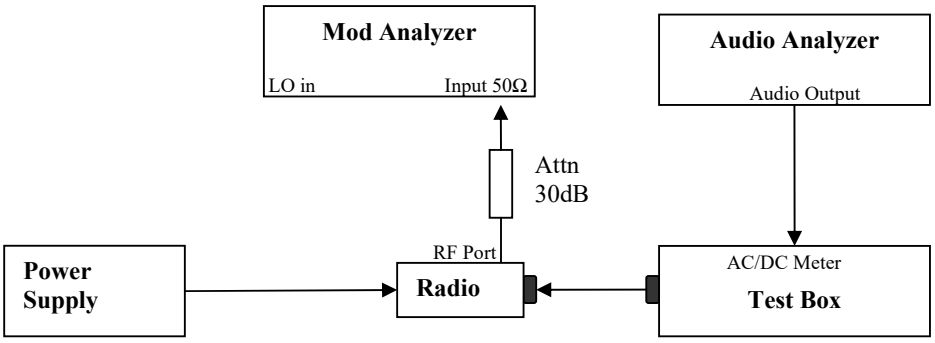
c) For equipment operating on channels between 896 MHz through 901 MHz, between 935 MHz through 940 MHz, and 12.5 or 15 kHz spaced channels in the frequency range 138-174 MHz and 406-512 MHz.

At frequencies from 3000 Hz through 20,000 Hz the attenuation shall be greater than the attenuation at 1000 Hz by at least: $100 \log_{10}(f / 3000)$ dB

where: f is the audio frequency in Hz.

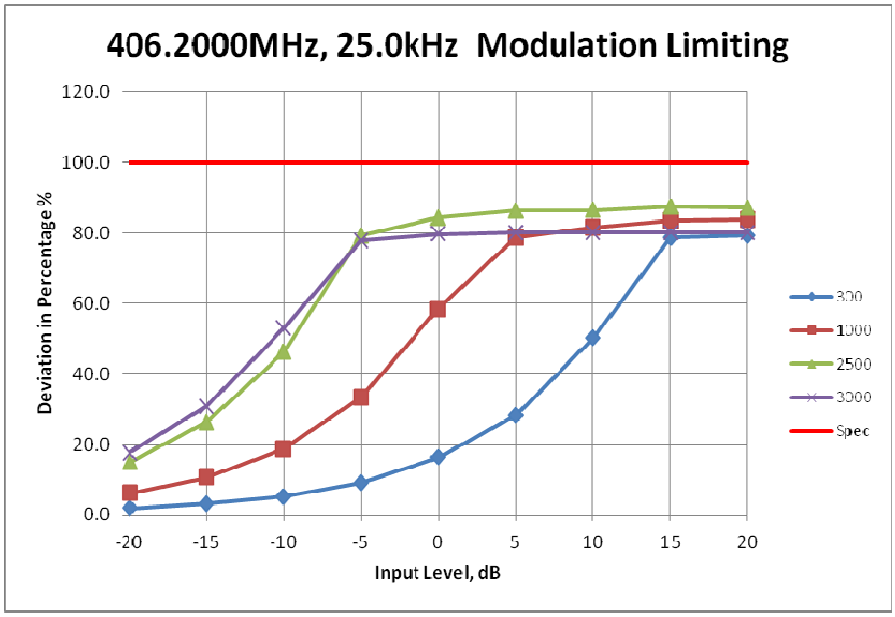
5.6. Modulation Limiting

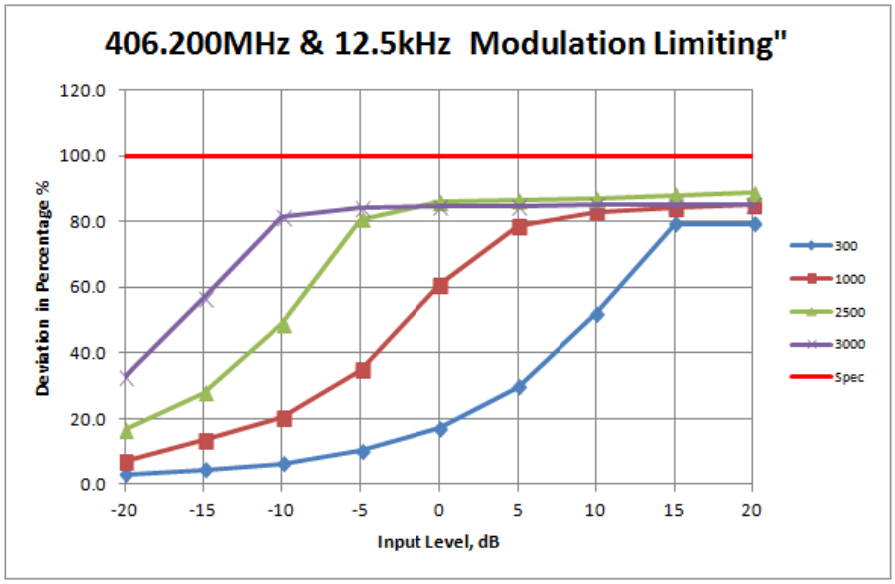
5.6.1. Test Setup



1) The DUT transmitter output port was connected to Modulation Analyzer.
2) Path loss for the measurement included.
3) Set the audio bandwidth filter to 15 kHz.
4) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 60% of the Full rated system deviation.
5) Record the frequency deviation as 0dB input level at 1kHz audio frequency.
6) Repeat the step and record the frequency deviation from -20 dB to 20dB by 5 dB increments and different audio freq 300 Hz, 2.5 kHz and 3 kHz.

5.6.2. Test Result



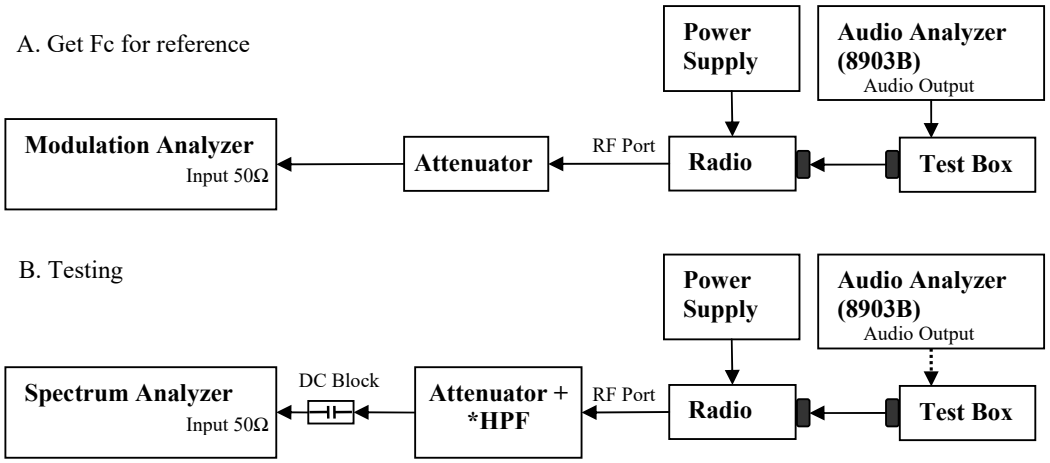


5.6.3. Test Limit

Modulation Limiting shall not exceed 100 percent.

5.7. Occupied Bandwidth

5.7.1. Test Setup (Analog)



1) The DUT transmitter output port was connected to Modulation Analyzer.
2) Set the audio bandwidth filter to 15 kHz low pass filter and 50 kHz high pass filter.
3) Transmit the radio and set the audio analyzer to 2.5 kHz audio frequency and 50% of the rated deviation. Up the amplitude by 16 dB. Dekey the DUT.
4) Path loss for the measurement included.
5) Select the Occupied Bandwidth measurement for 99% Emissions Bandwidth Measurement.
6) Key in the Fc and Resolution Bandwidth (1 ~ 5 % of emission designator).
7) Transmit the DUT and record the occupied Bandwidth frequency.
8) Preset the spectrum analyzer for sideband spectrum measurement.
9) Set the span and Resolution Bandwidth (according to FCC/ ISED standard).
10) Save the screen shot as modulated signal
11) Remove the audio tone from audio analyzer to capture unmodulated signal.

* Only HPF added for Mask 80.211 measurement with attenuator.

5.7.2. Test Result (Analog)

Standard Audio Modulation (25 kHz Channelization, Analog Voice):
Emission Designator 16K0F3E

In this case, the maximum modulating frequency is 3 kHz with a 5 kHz deviation.

BW = 2(M+D) = 2*(3 kHz + 5 kHz) = 16 kHz =➔ 16K0
F3E portion of the designator indicates voice.

Therefore, the entire designator for 25 kHz channelization analog voice is 16K0F3E

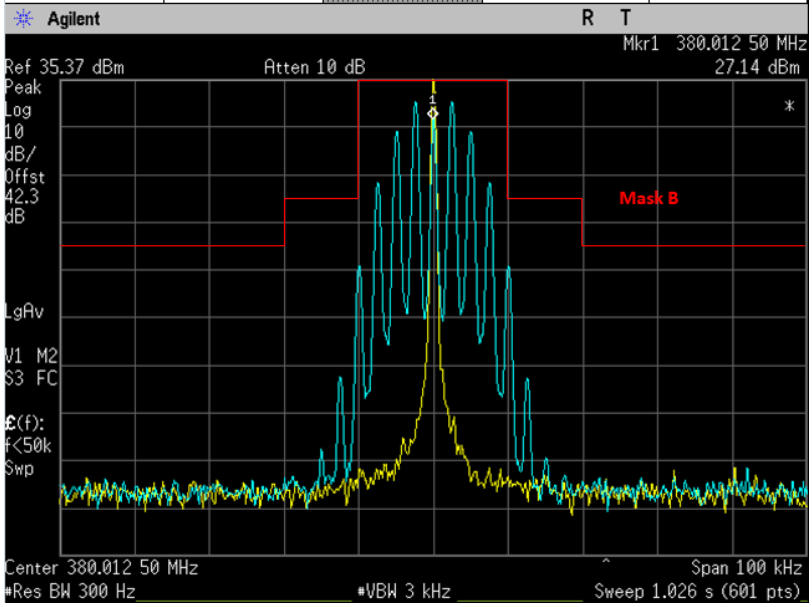
Standard Audio Modulation (12.5 kHz Channelization, Analog Voice):
Emission Designator 11K0F3E

In this case, the maximum modulating frequency is 3 kHz with a 2.5 kHz deviation.

BW = 2(M+D) = 2*(3 kHz + 2.5 kHz) = 11 kHz =➔ 11K0
F3E portion of the designator indicates voice.

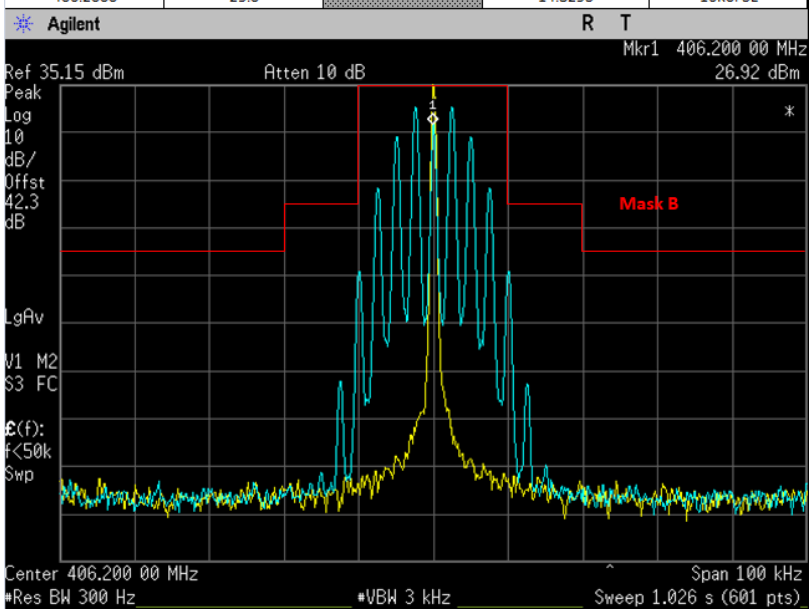
Therefore, the entire designator for 12.5 kHz channelization analog voice is 16K0F3E

Modulation			Rules Part	
Analog Voice			RSS 119	
Channel Frequency (MHz)	Channel Spacing (kHz)		99% OCB (kHz)	Emission Designator
380.0125	25.0		14.8282	16K0F3E



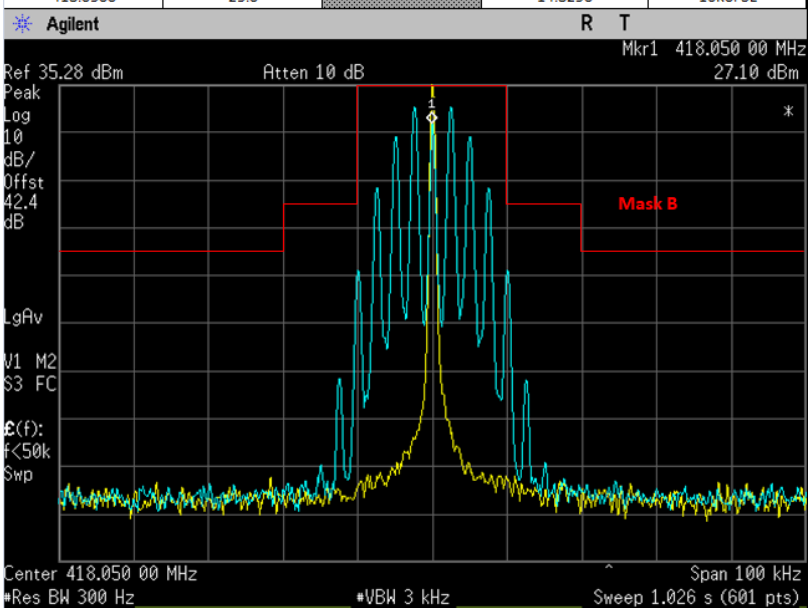
Not for FCC review

Modulation			Rules Part	
Analog Voice			RSS 119	
Channel Frequency (MHz)	Channel Spacing (kHz)		99% OCB (kHz)	Emission Designator
406.2000	25.0		14.8293	16K0F3E



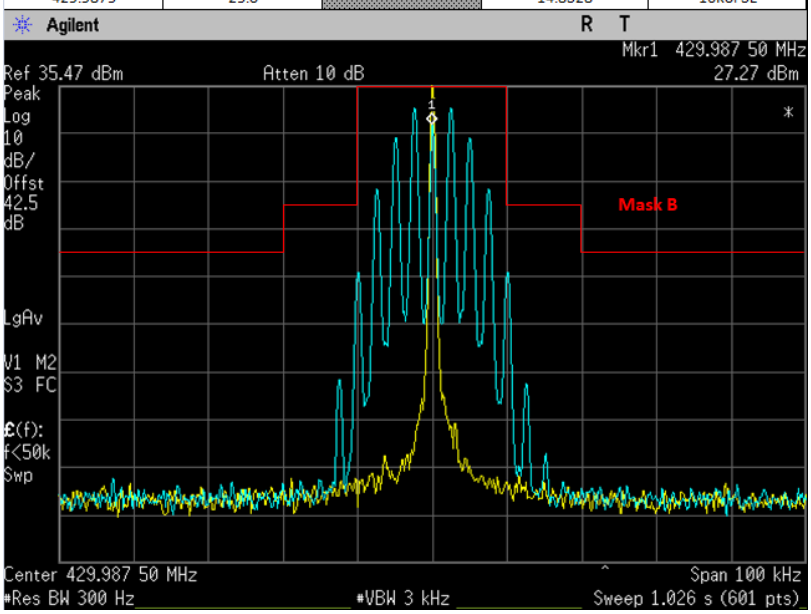
Not for FCC review

Modulation			Rules Part	
Analog Voice			RSS 119	
Channel Frequency (MHz)	Channel Spacing (kHz)		99% OCB (kHz)	Emission Designator
418.0500	25.0		14.8290	16K0F3E



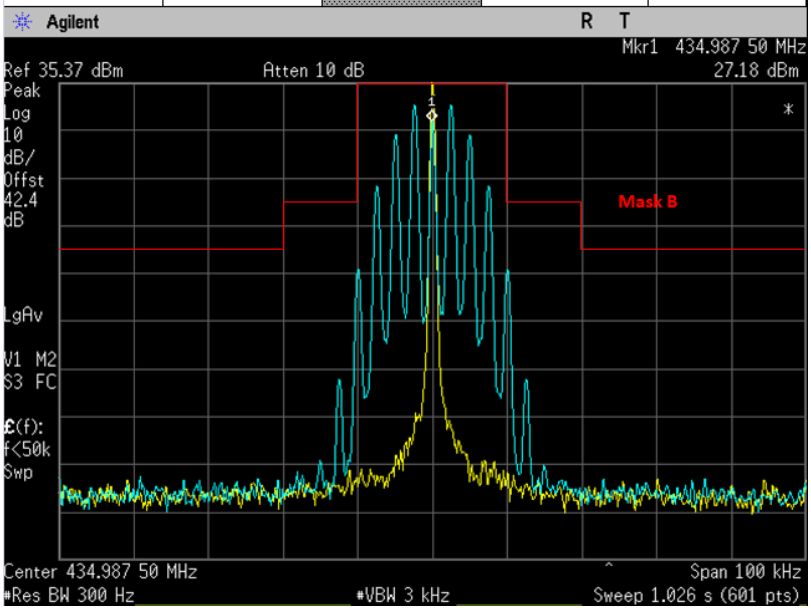
Not for FCC review

Modulation			Rules Part	
Analog Voice			RSS 119	
Channel Frequency (MHz)	Channel Spacing (kHz)		99% OCB (kHz)	Emission Designator
429.9875	25.0		14.8328	16K0F3E



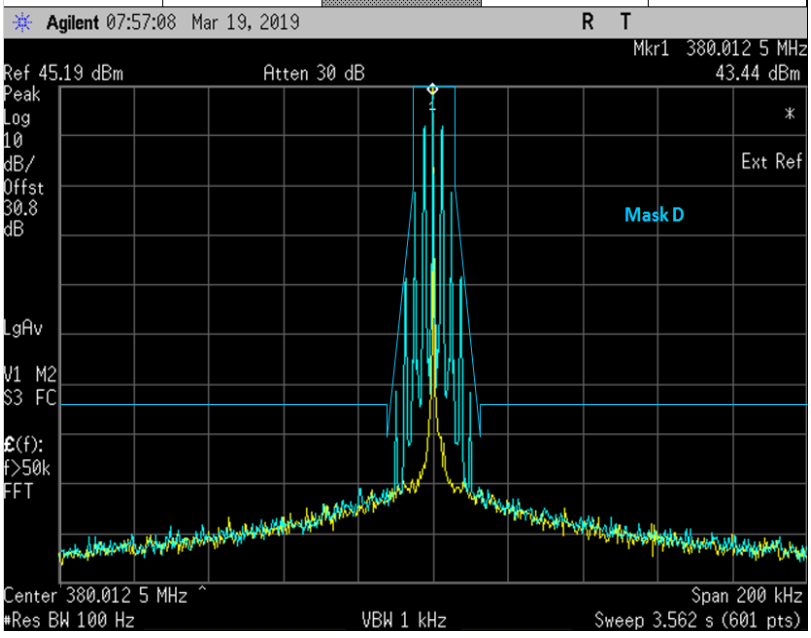
Not for FCC review

Modulation			Rules Part	
Analog Voice			RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
434.9875	25.0		14.8320	16K0F3E

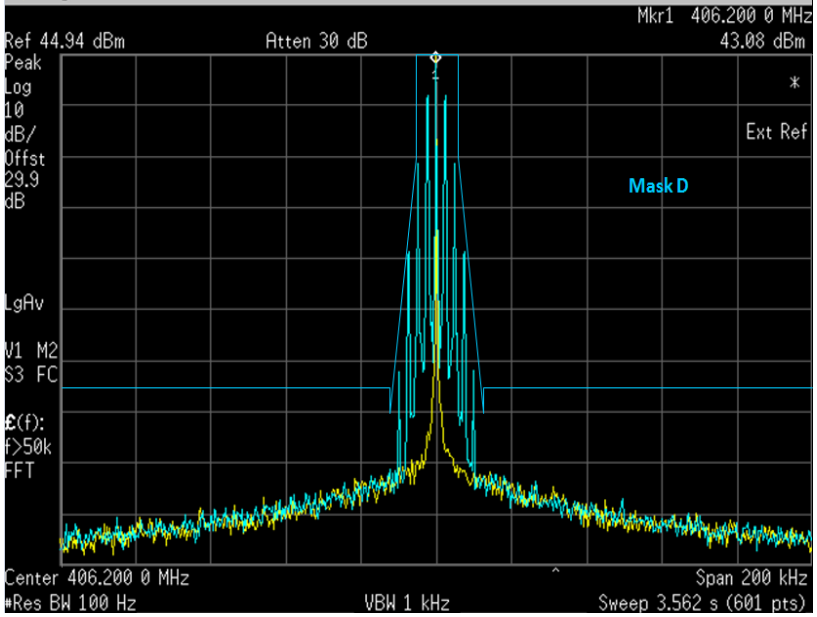


Not for FCC review

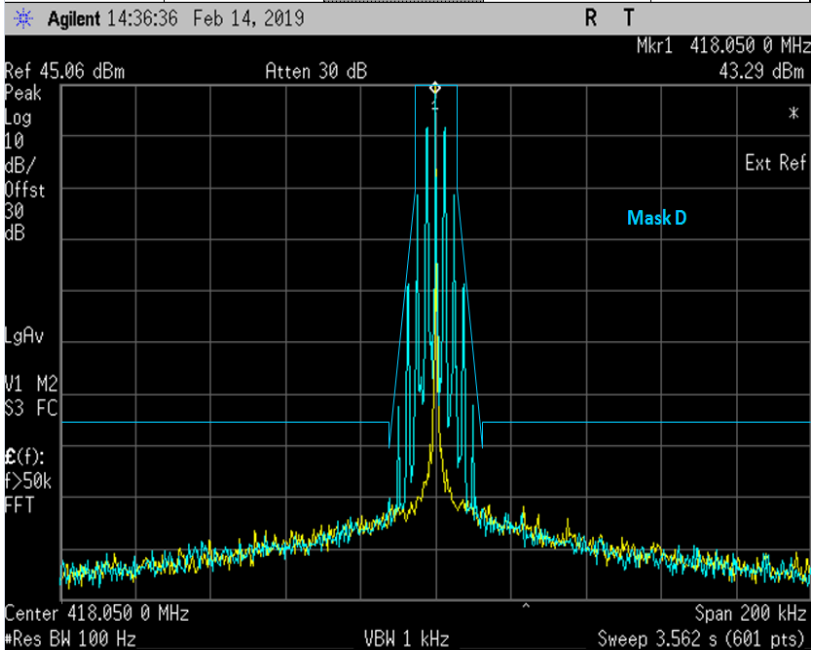
Modulation			Rules Part	
Analog Voice			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
380.0125	12.5		9.9852	11K0F3E



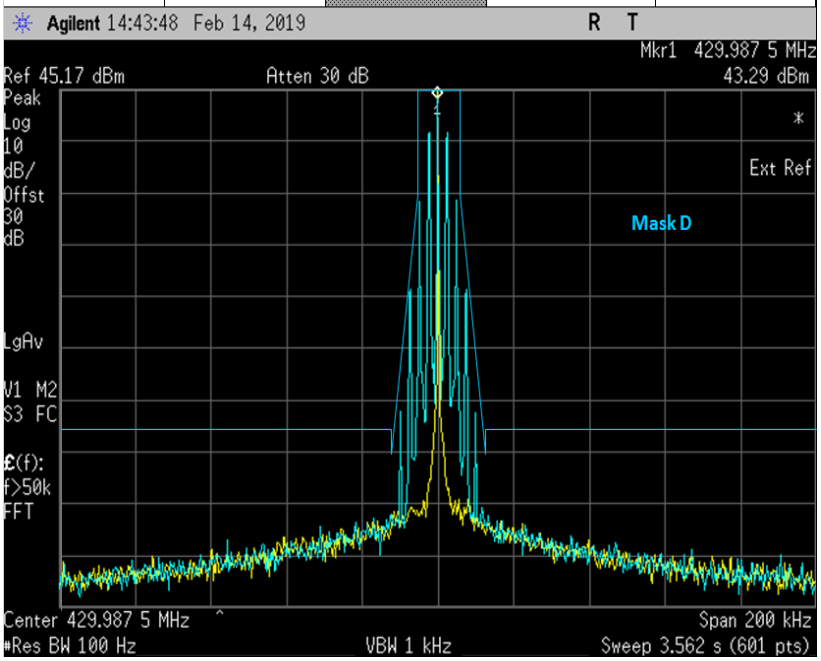
Modulation	Rules Part			
Analog Voice	FCC Part 90 / RSS 119			
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
406.2000	12.5		9.9556	11K0F3E



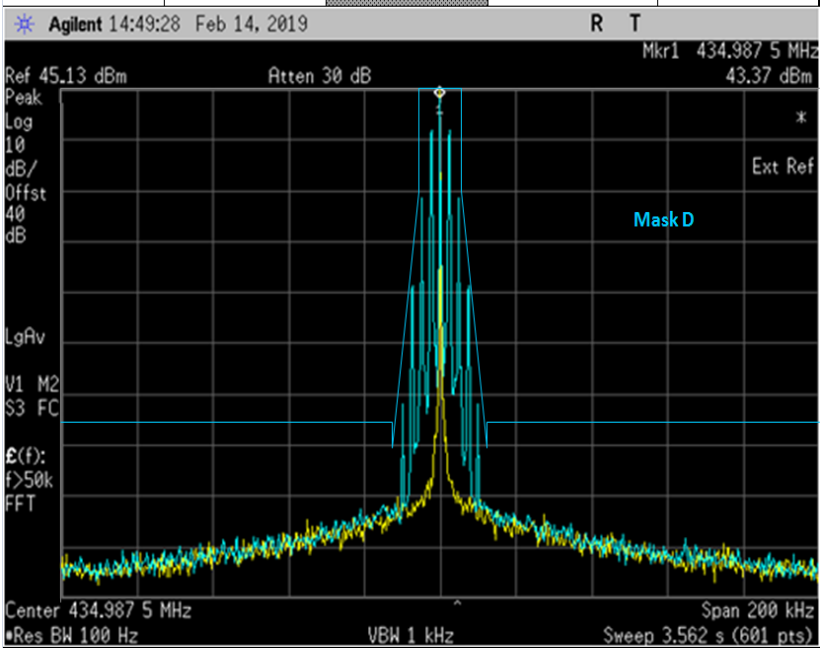
Modulation	Rules Part			
Analog Voice	FCC Part 90 / RSS 119			
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
418.0500	12.5		9.8586	11K0F3E



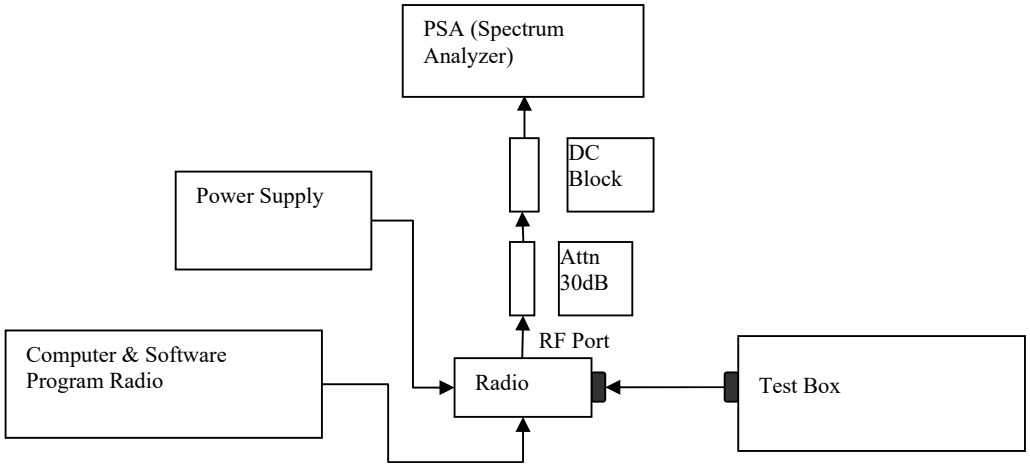
Modulation	Rules Part			
Analog Voice	FCC Part 90 / RSS119			
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
429.9875	12.5		9.8592	11K0F3E



Modulation	Rules Part			
Analog Voice	FCC Part 90			
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
434.9875	12.5		9.9850	11K0F3E



5.7.3. Test Setup (Digital)



1) Program and set radio to operate in desire test frequency and digital mode with modulation. (*4FSK, C4FM or other digital modulation form).
2) Path loss for the measurement included.
3) Select the Occupied Bandwidth measurement for 99% Emissions Bandwidth Measurement.
4) Key in the Fc and Resolution Bandwidth (1 ~ 5 % of emission designator).
5) Transmit the DUT and record the occupied Bandwidth frequency.
6) Preset the spectrum analyzer for modulation emission spectrum measurement.
7) Set the span and Resolution Bandwidth (according to FCC/ ISED standard).
8) Capture the screen shot as modulated signal.

*Note:

- For Digital Modulation, 12.5 kHz Data F1D & FXD would be the same. Therefore only measurements with F1D modulation shown below.
- For Digital Modulation, 12.5 kHz Data F1E & FXE would be the same. Therefore only measurements with F1E modulation shown below.

5.7.4. Test Result (Digital)

Digital C4FM (12.5 kHz Channelization, Data/Voice/Data+Voice):
Emission Designator 8K10F1D/E/W

The 99% energy rule (title 47CFR 2.989) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X kHz, in this case, 8.10 kHz Measurements were performed in accordance with TIA/EIA TSB102.CAAB Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).

F1D/E/W portion of the designator indicates data/voice/data+voice.

Therefore, the entire designator for 12.5 kHz channelization digital data is 8K10F1D/E/W.

Linear Simulcast Modulation (12.5 kHz Channelization, Data/Voice/Data+Voice):
Emission Designator 8K70D1D/E/W

The 99% energy rule (title 47CFR 2.989) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X kHz, in this case, 8.70 kHz Measurements were performed in accordance with TIA/EIA TSB102.CAAB Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).

D1D/E/W portion of the designator indicates data/voice/data+voice.

Therefore, the entire designator for 12.5 kHz channelization digital data is 8K70D1D/E/W.

H-DQPSK P25 Two Slot TDMA Digital Modulation (12.5 kHz Channelization, Data/Voice/Data+Voice):
Emission Designator 9K80D7D/E/W

The 99% energy rule (title 47CFR 2.989) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X kHz, in this case, 9.80 kHz Measurements were performed in accordance with TIA/EIA TSB102.CAAB Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).

D7D/E/W portion of the designator indicates data/voice/data+voice.

Therefore, the entire designator for 12.5 kHz channelization digital data is 9K80D7D/E/W.

3600bps high speed trunking control data (25 kHz Channelization, Data):
Emission Designator 16K0F1D

The 99% energy rule (title 47CFR 2.989) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X kHz, in this case, 16 kHz Measurements were performed in accordance with TIA/EIA TSB102.CAAB Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).

F1D portion of the designator indicates data

Therefore, the entire designator for 12.5 kHz channelization digital data is 16K0F1D

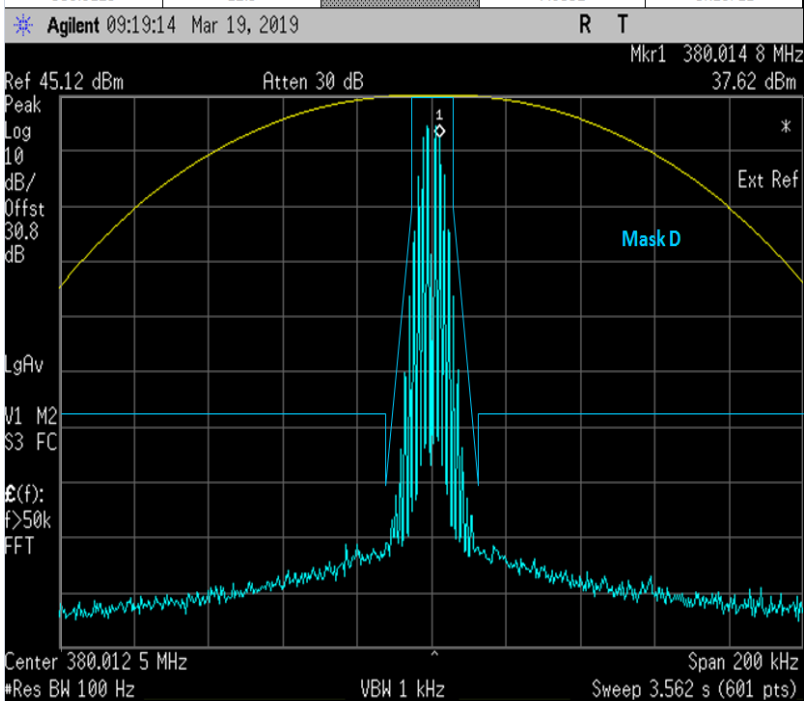
3600bps high speed trunking control data (12.5 kHz Channelization, Data):
Emission Designator 10K0F1D

The 99% energy rule (title 47CFR 2.989) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X kHz, in this case, 10 kHz Measurements were performed in accordance with TIA/EIA TSB102.CAAB Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).

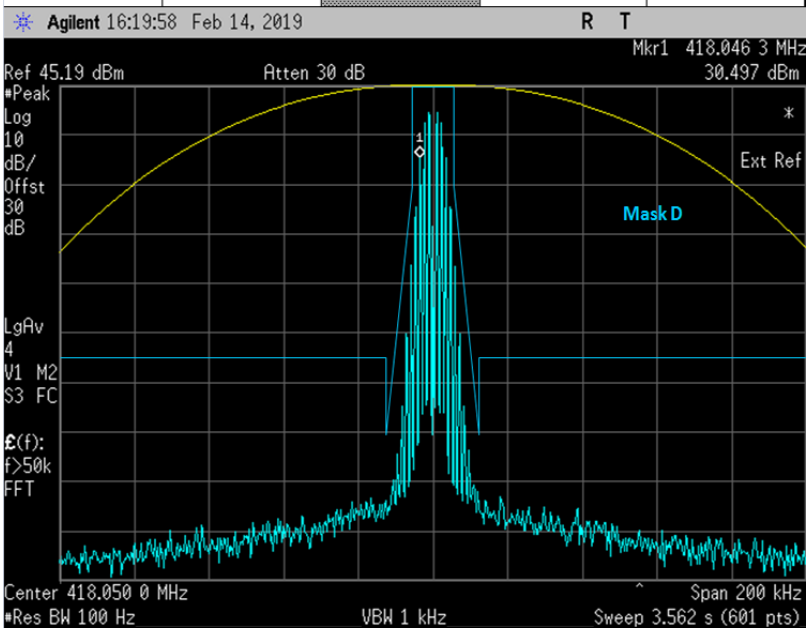
F1D portion of the designator indicates data

Therefore, the entire designator for 12.5 kHz channelization digital data is 10K0F1D

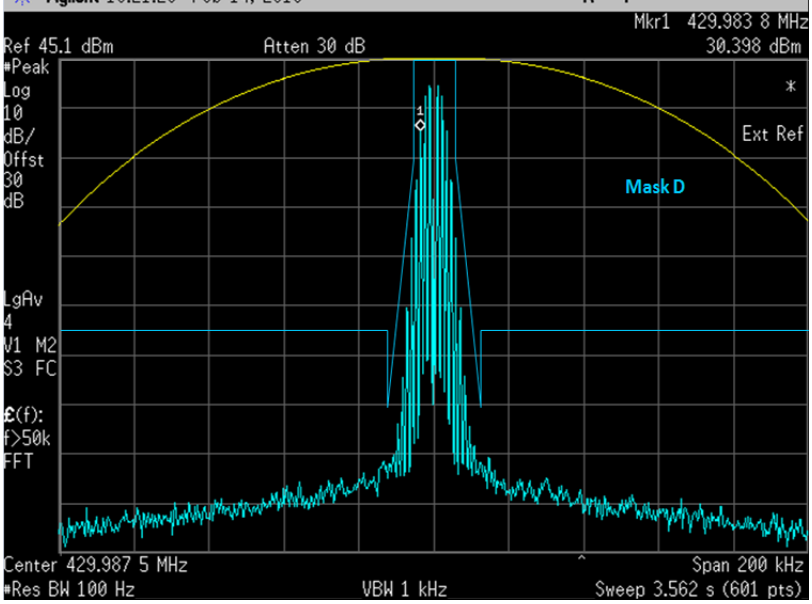
Modulation			Rules Part	
Digital Voice			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
380.0125	12.5		7.6832	8K10F1E



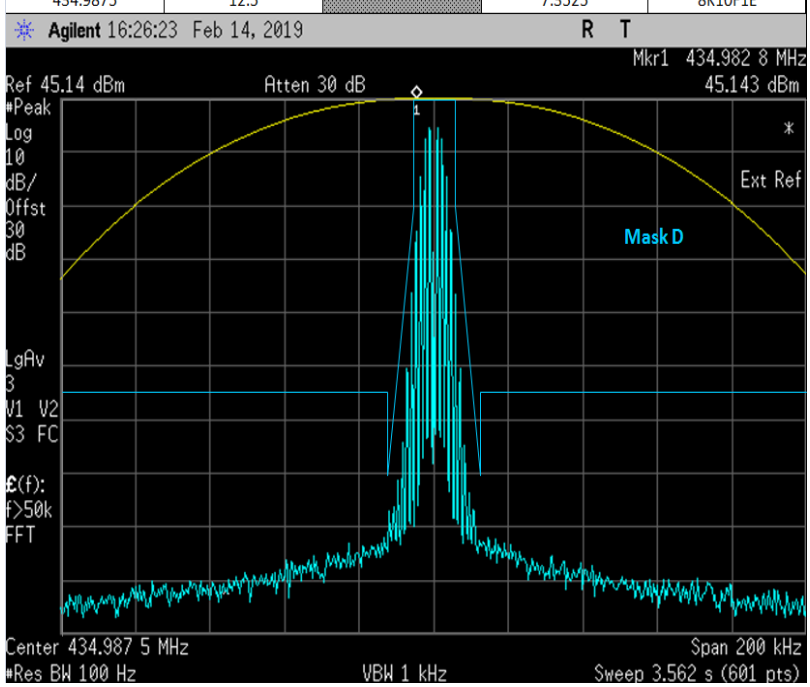
Modulation			Rules Part	
Digital Voice			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
418.0500	12.5		7.7319	8K10F1E



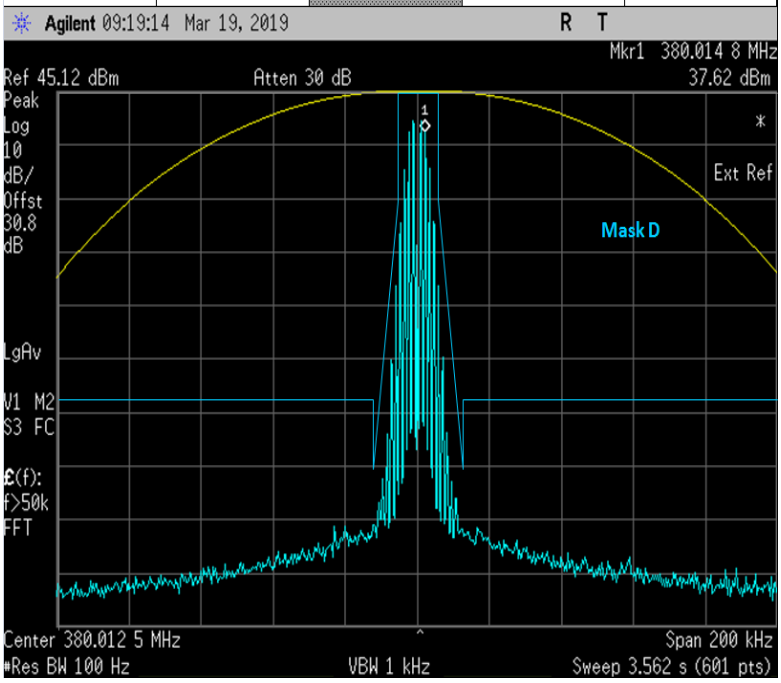
Modulation			Rules Part	
Digital Voice			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
429.9875	12.5		7.3522	8K10F1E



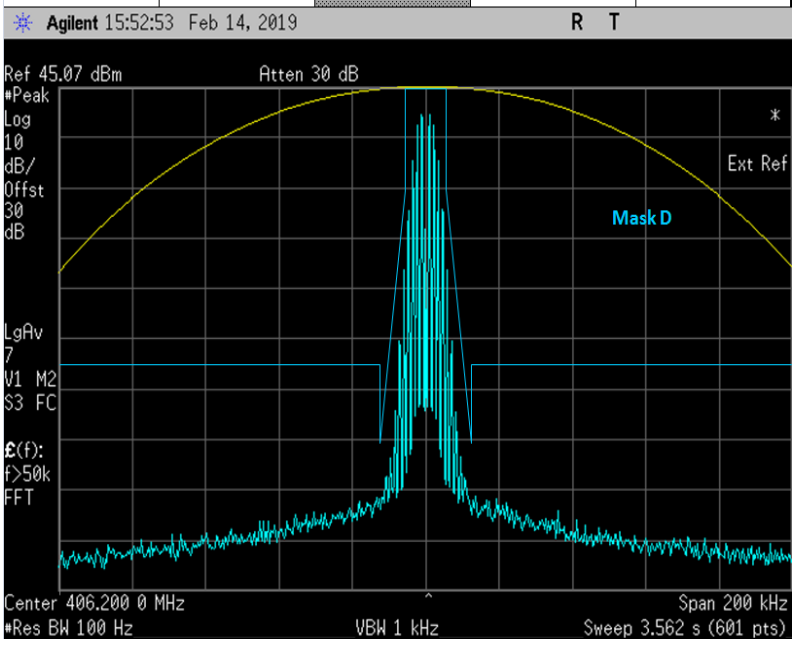
Modulation			Rules Part	
Digital Voice			FCC Part 90	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
434.9875	12.5		7.3525	8K10F1E



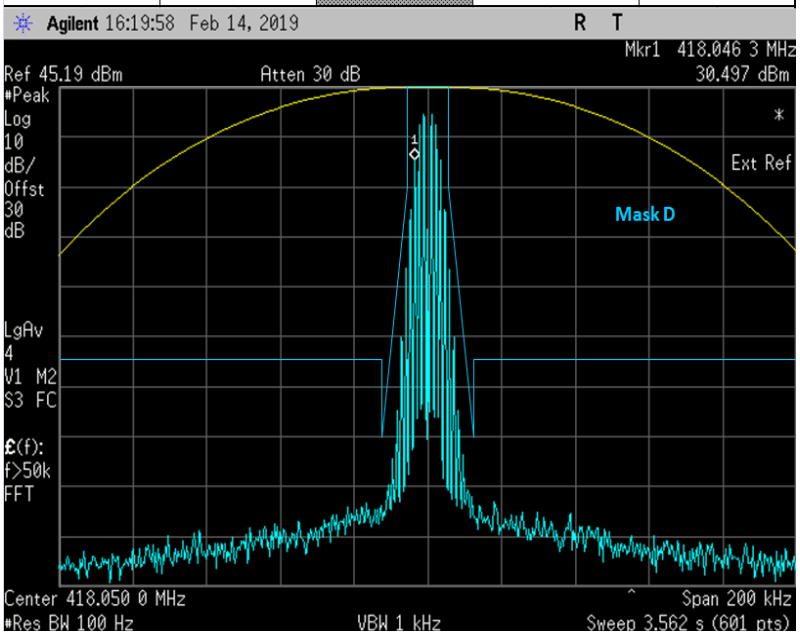
Modulation			Rules Part	
Digital Voice			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
380.0125	12.5		7.6832	8K70D1E



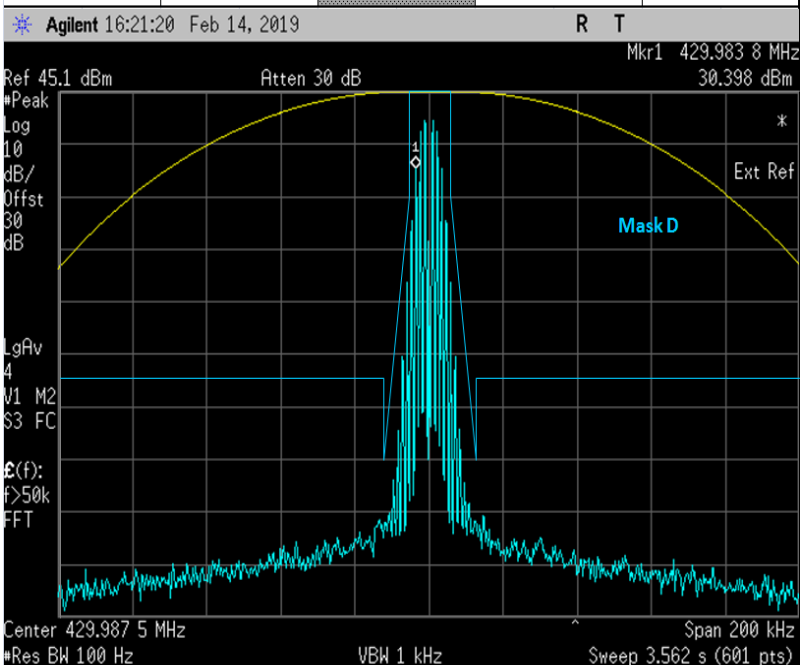
Modulation			Rules Part	
Digital Voice			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
406.2000	12.5		7.3526	8K70D1E



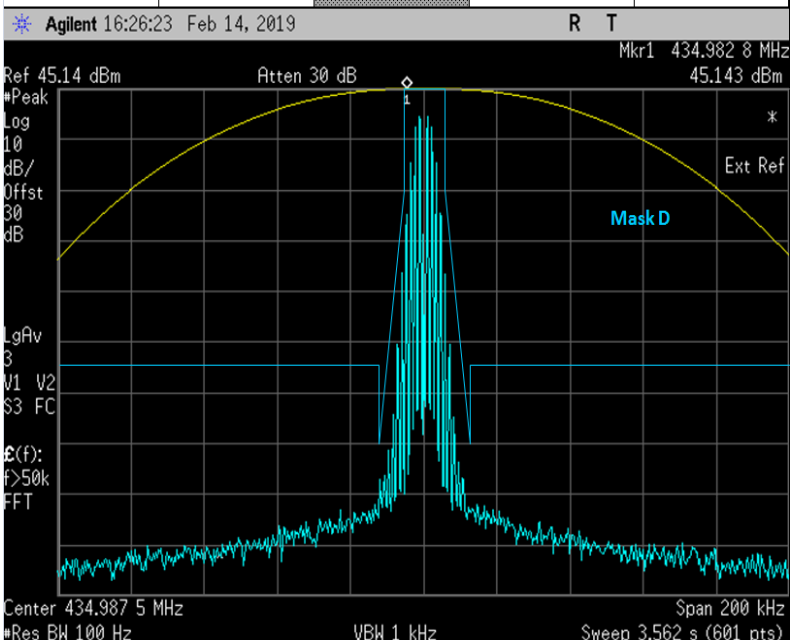
Modulation			Rules Part	
Digital Voice			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
418.0500	12.5		7.7319	8K70D1E



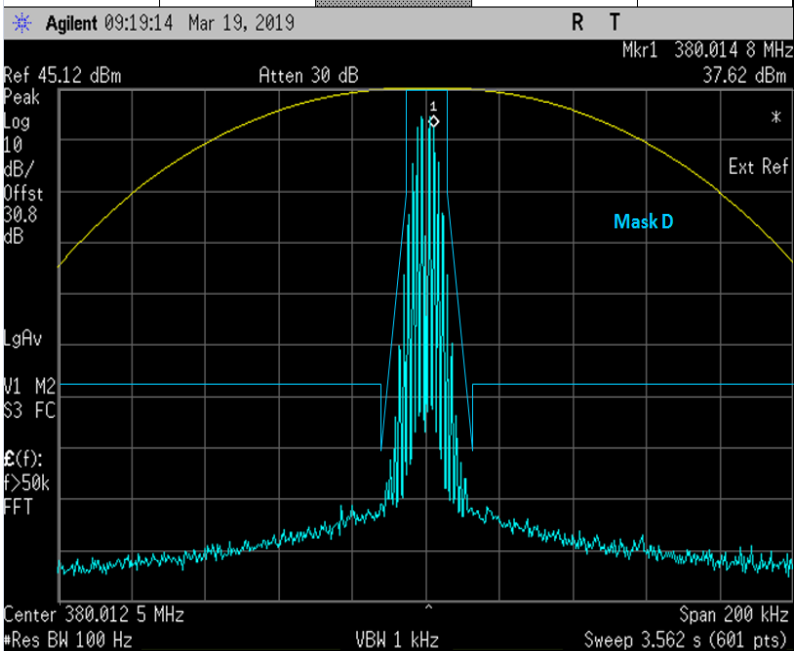
Modulation			Rules Part	
Digital Voice			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
429.9875	12.5		7.3522	8K70D1E



Modulation			Rules Part	
Digital Voice			FCC Part 90	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
434.9875	12.5		7.3525	8K70D1E

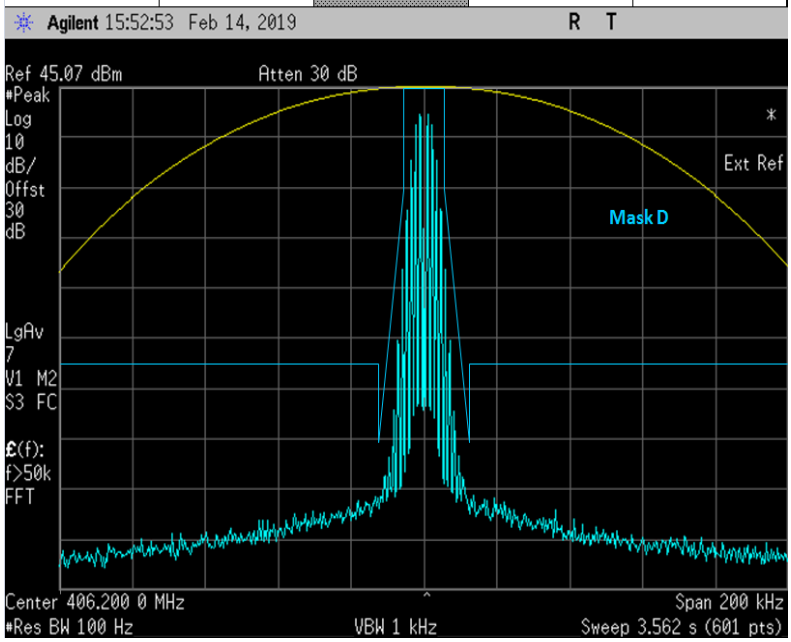


Modulation			Rules Part	
Digital Voice			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
380.0125	12.5		7.6832	9K80D7E



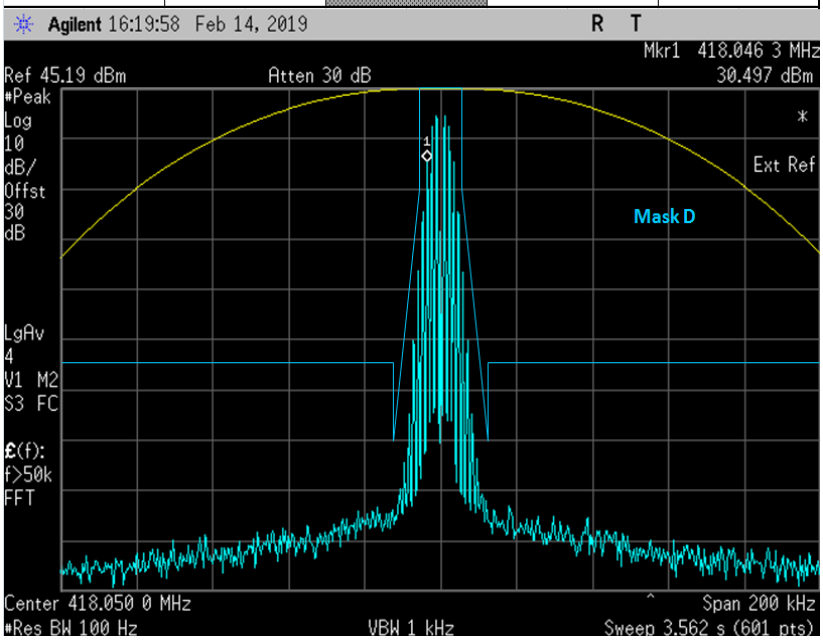
Modulation	Rules Part
Digital Voice	FCC Part 90 / RSS 119

Channel Frequency (MHz)	Channel Spacing (kHz)	99% OCB (kHz)	Emission Designator
406.2000	12.5	7.3526	9K80D7E

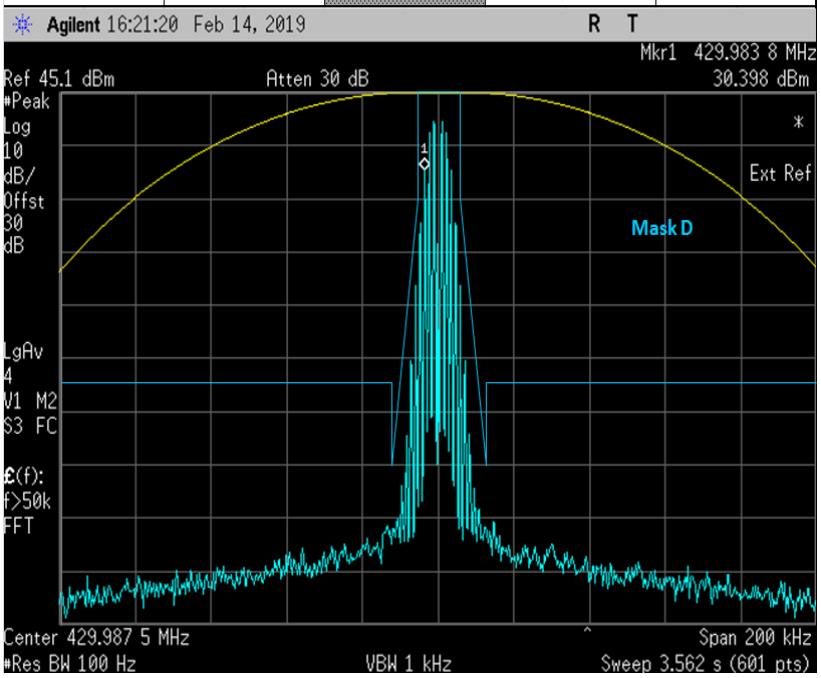


Modulation	Rules Part
Digital Voice	FCC Part 90 / RSS 119

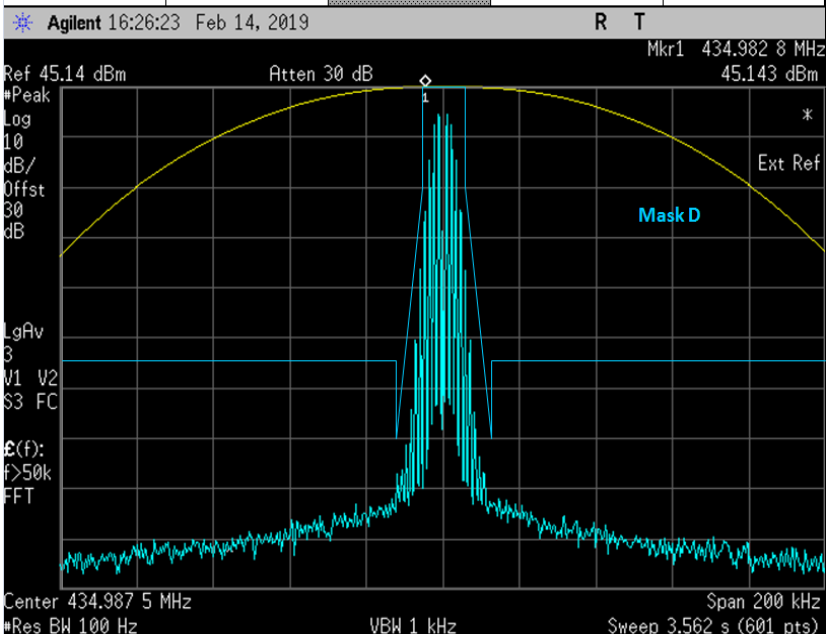
Channel Frequency	Channel Spacing	99% OCB	Emission Designator
418.0500	12.5	7.7319	9K80D7E



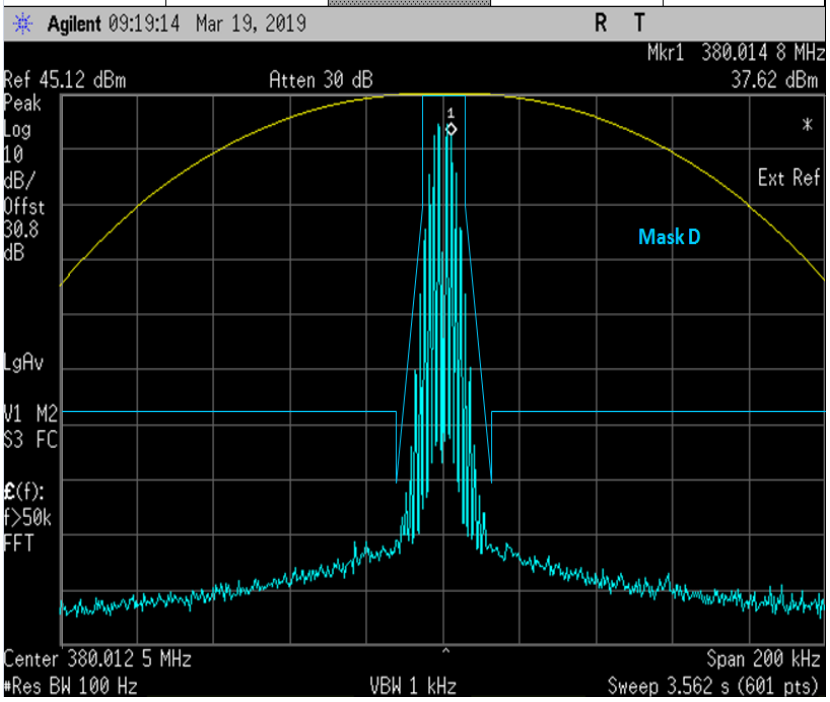
Modulation			Rules Part	
Digital Voice			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
429.9875	12.5		7.3522	9K80D7E



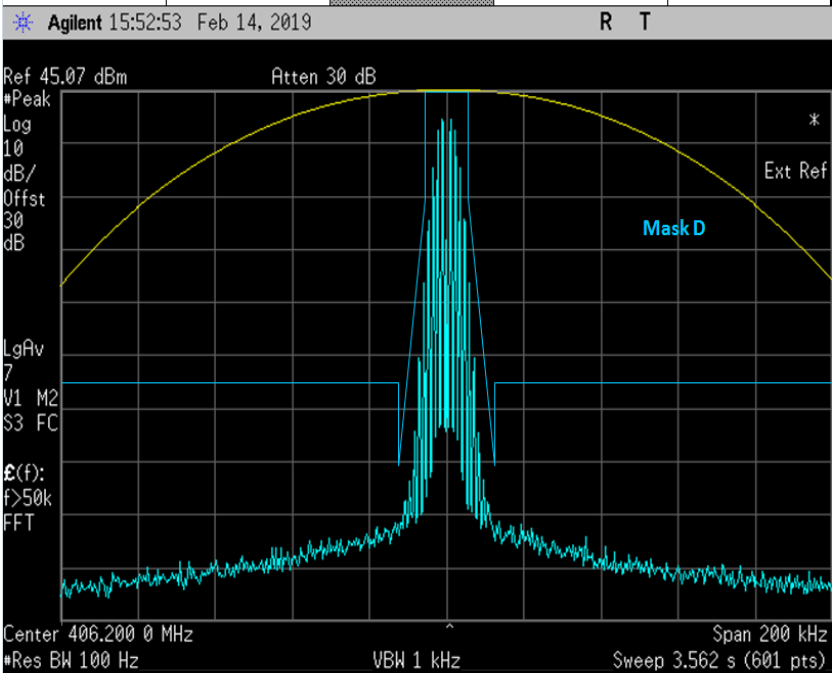
Modulation			Rules Part	
Digital Voice			FCC Part 90	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
434.9875	12.5		7.3525	9K80D7E



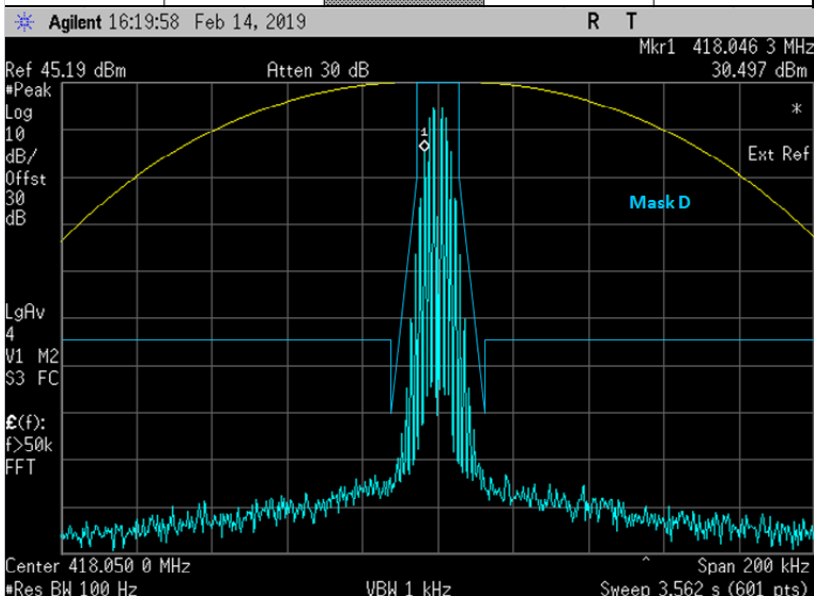
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
380.0125	12.5		7.6832	8K10F1D



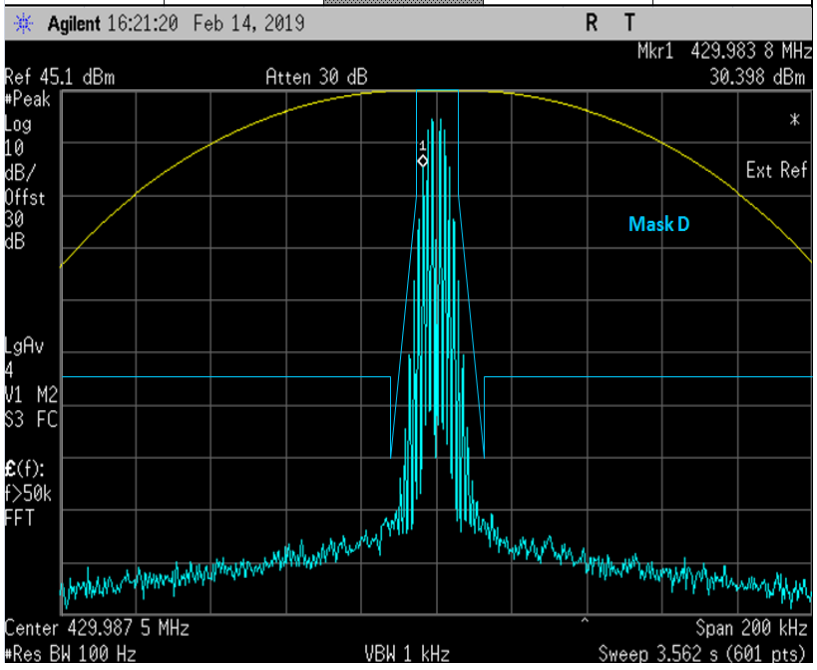
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
406.2000	12.5		7.3526	8K10F1D



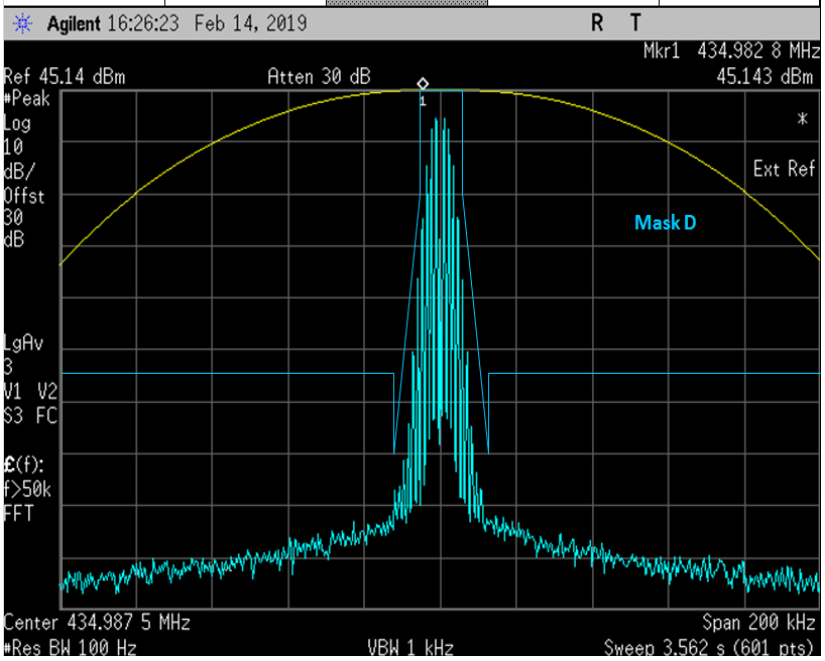
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
418.0500	12.5		7.7319	8K10F1D



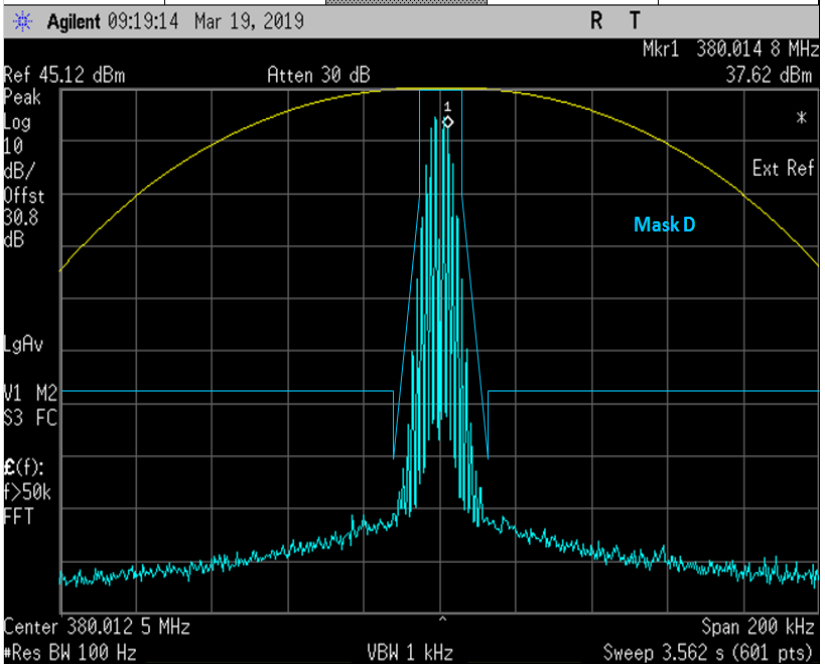
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
429.9875	12.5		7.3522	8K10F1D



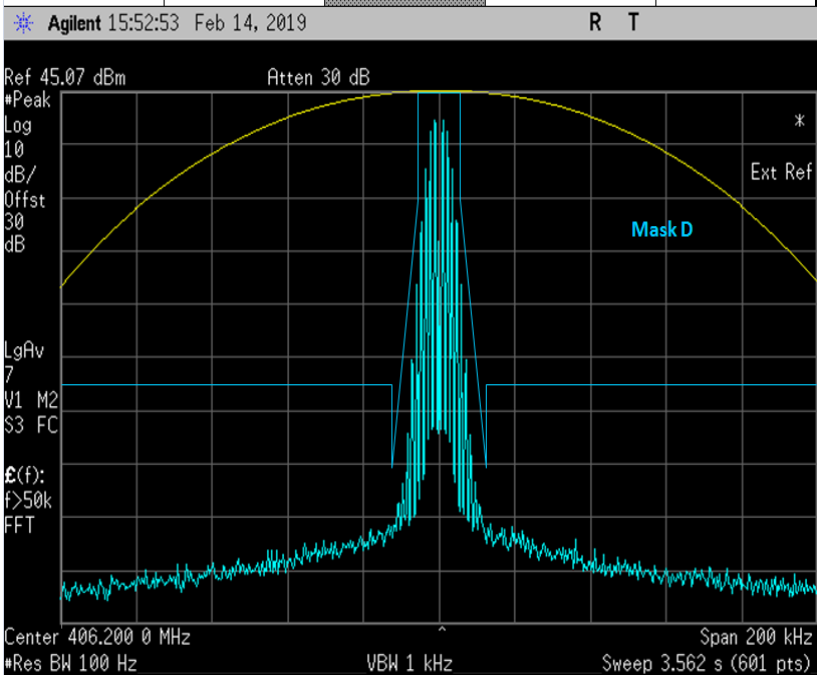
Modulation			Rules Part	
Digital Data			FCC Part 90	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
434.9875	12.5		7.3525	8K10F1D



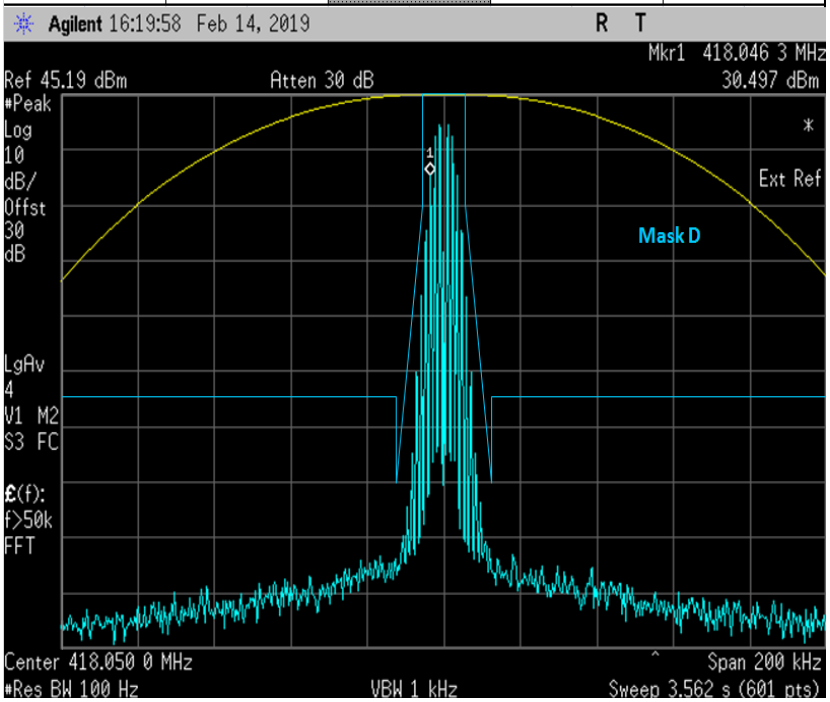
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
380.0125	12.5		7.6832	8K70D1D



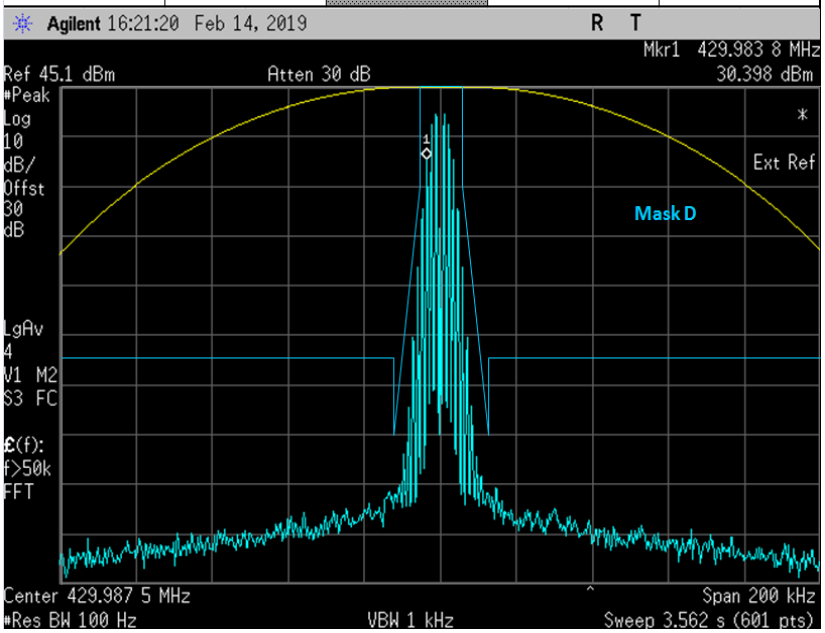
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
406.2000	12.5		7.3526	8K70D1D



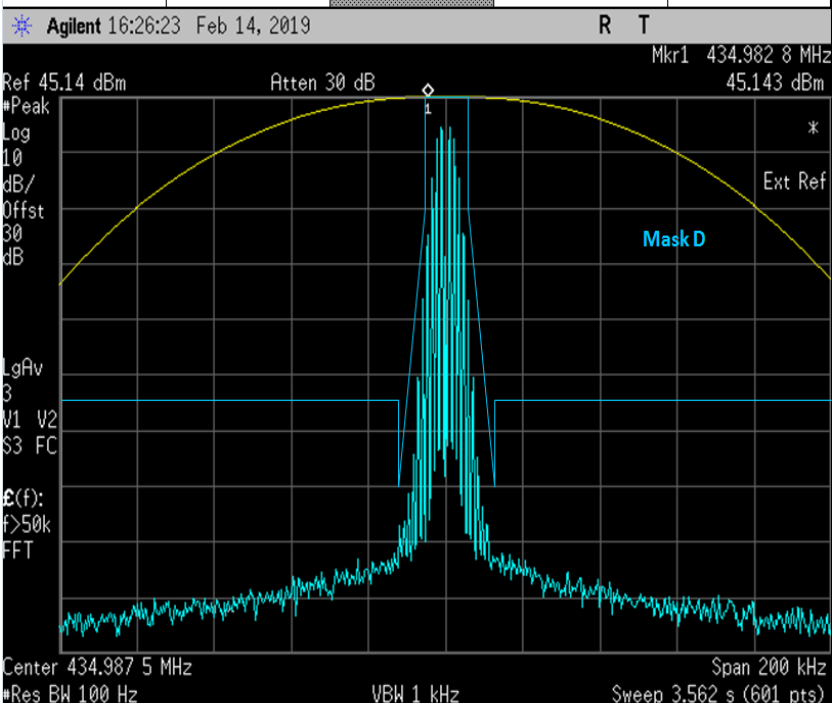
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
418.0500	12.5		7.7319	8K70D1D



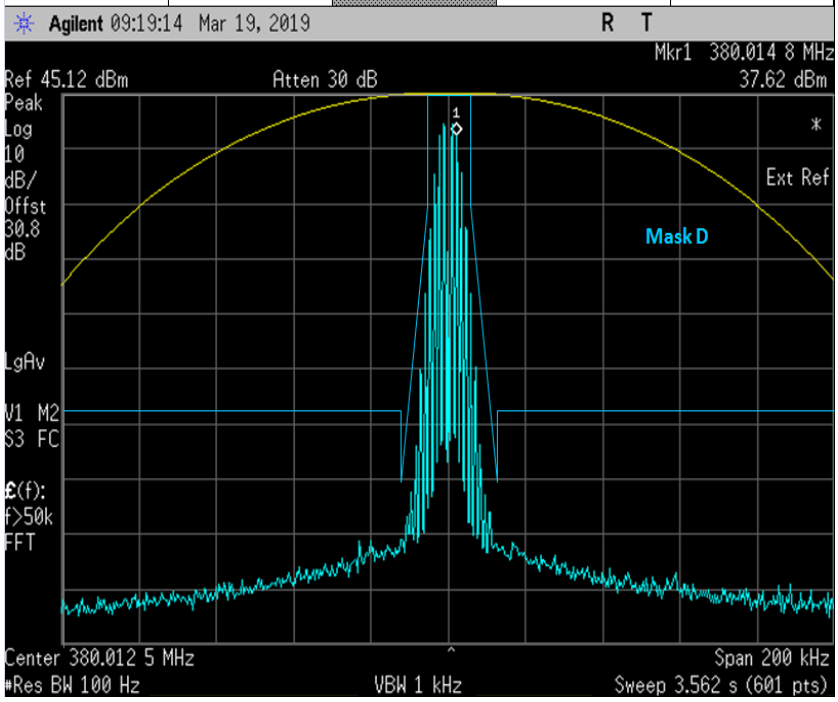
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
429.9875	12.5		7.3522	8K70D1D



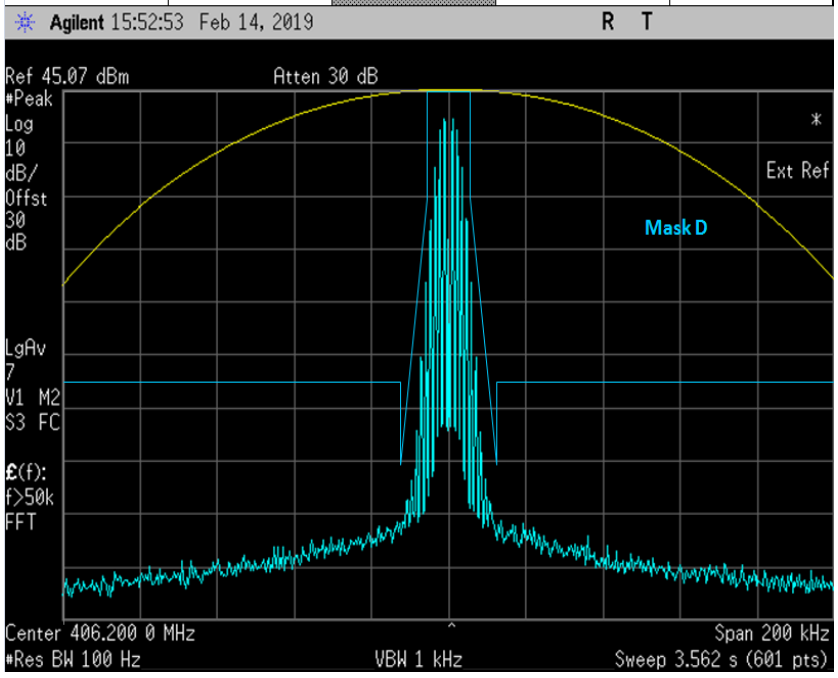
Modulation			Rules Part	
Digital Data			FCC Part 90	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
434.9875	12.5		7.3525	8K70D1D



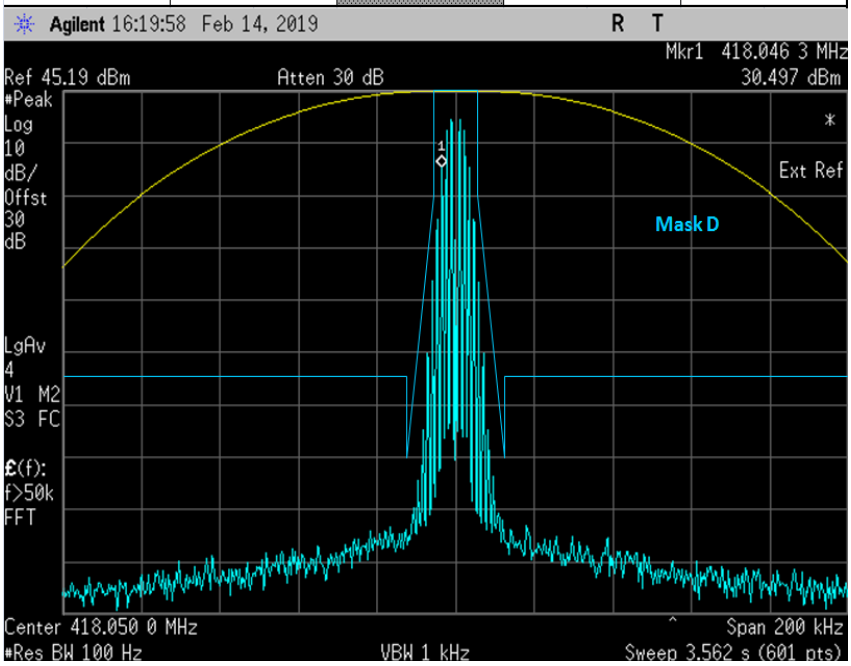
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
380.0125	12.5		7.6832	9K80D7D



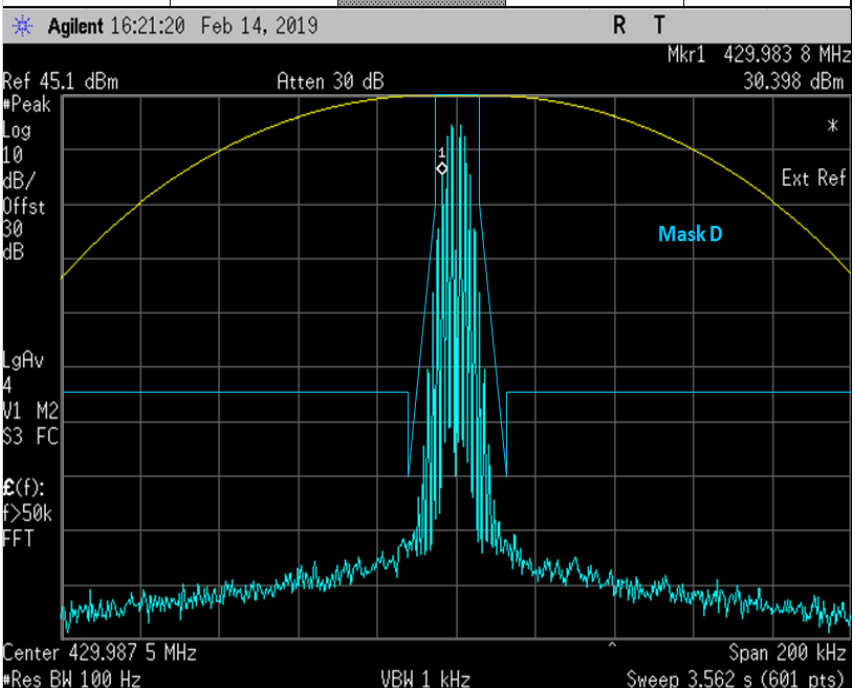
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
406.2000	12.5		7.3526	9K80D7D



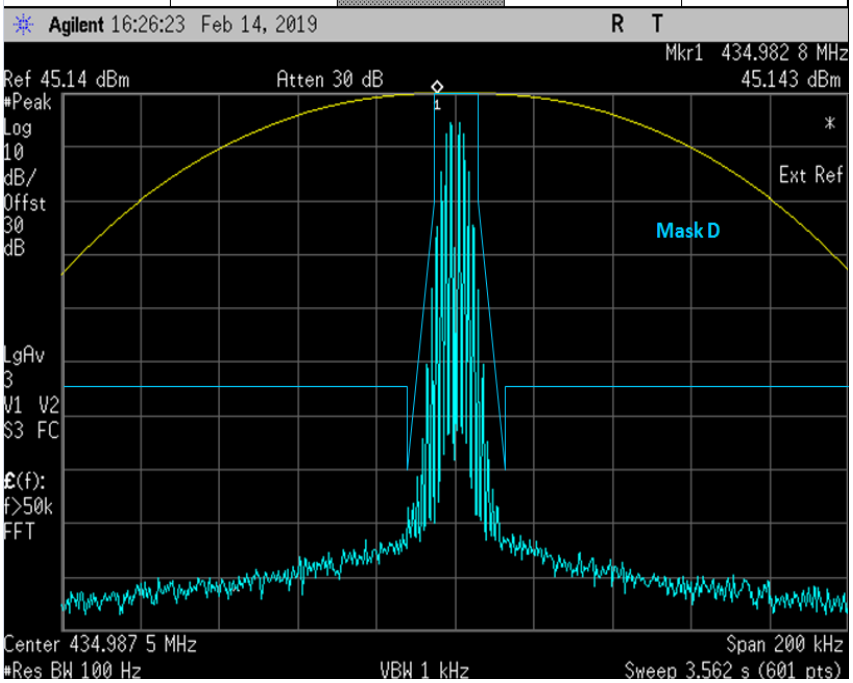
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
418.0500	12.5		7.7319	9K80D7D



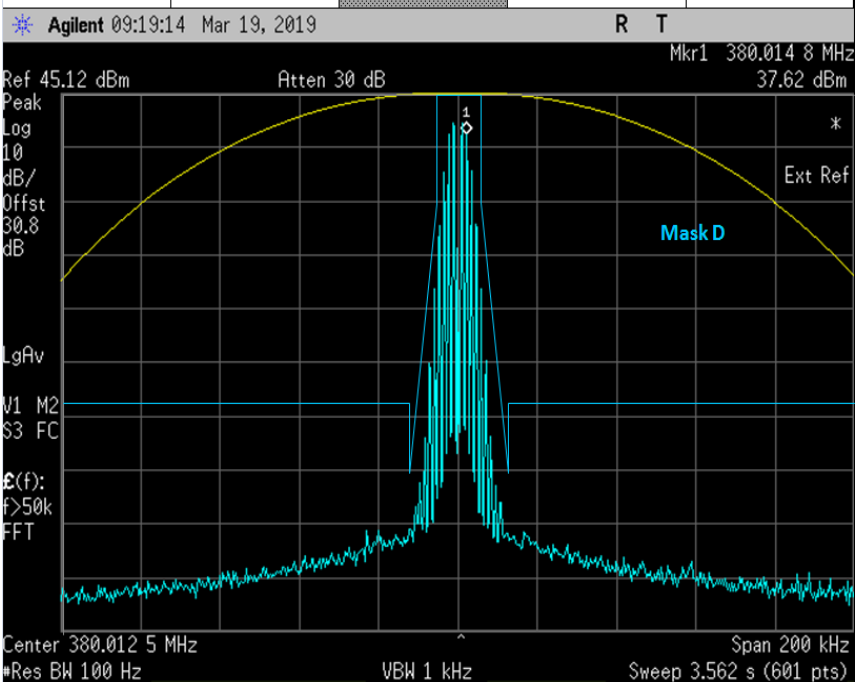
Modulation			Rules Part	
Digital Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
429.9875	12.5		7.3522	9K80D7D



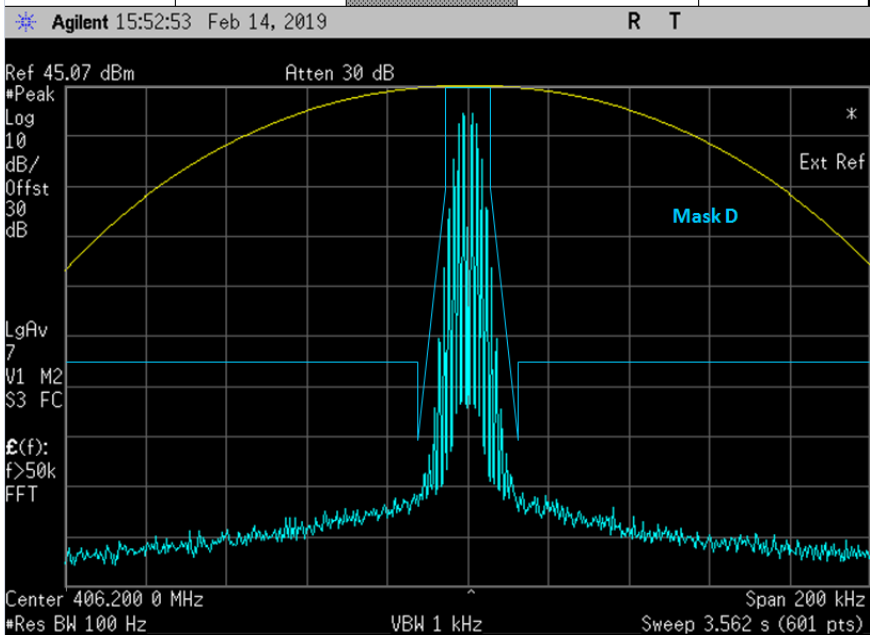
Modulation			Rules Part	
Digital Data			FCC Part 90	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
434.9875	12.5		7.3525	9K80D7D



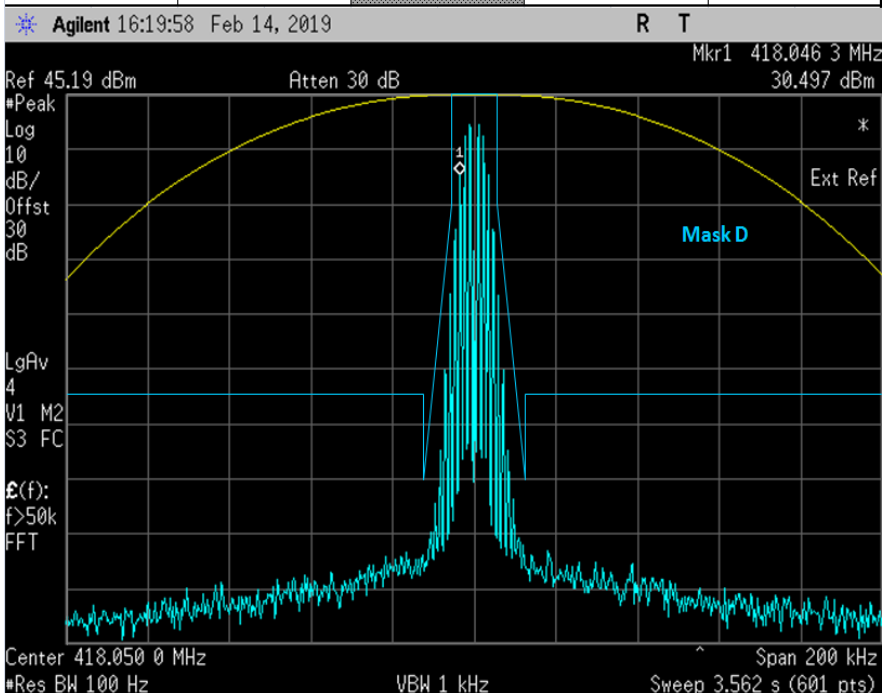
Modulation			Rules Part	
Digital Voice and Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
380.0125	12.5		7.6832	8K10F1W



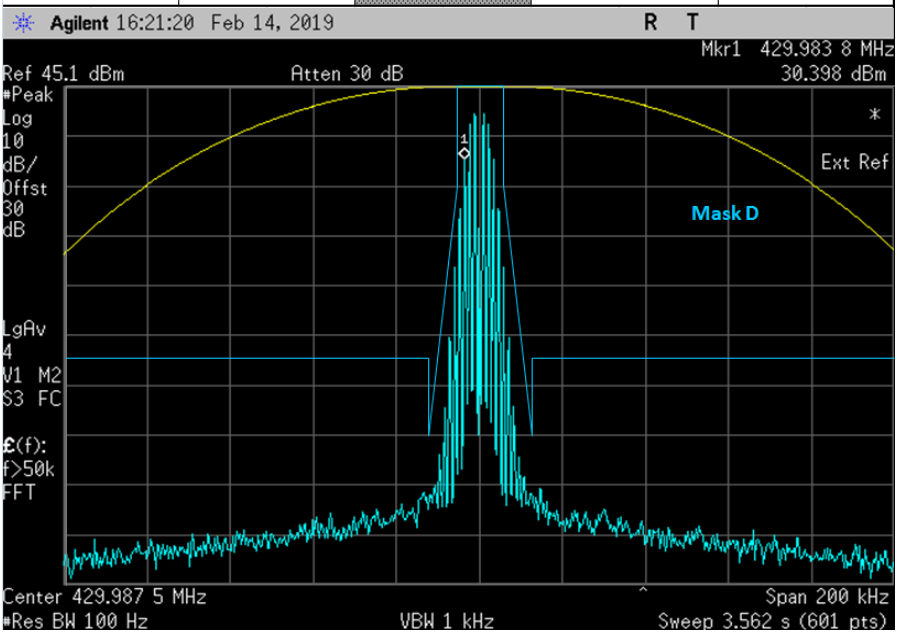
Modulation			Rules Part	
Digital Voice and Data			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
406.2000	12.5		7.3526	8K10F1W



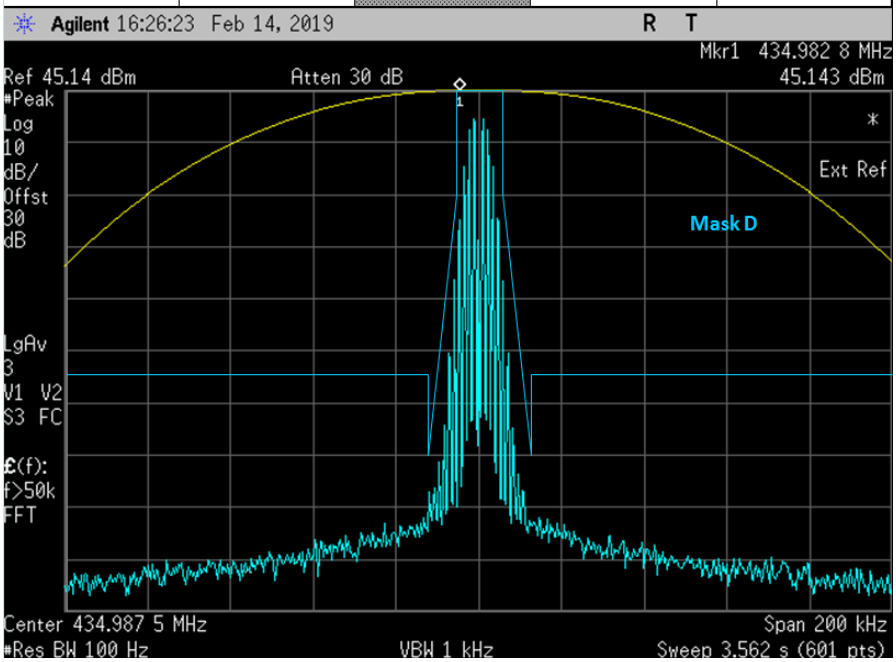
Modulation			Rules Part	
Digital Voice and Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
418.0500	12.5		7.7319	8K10F1W



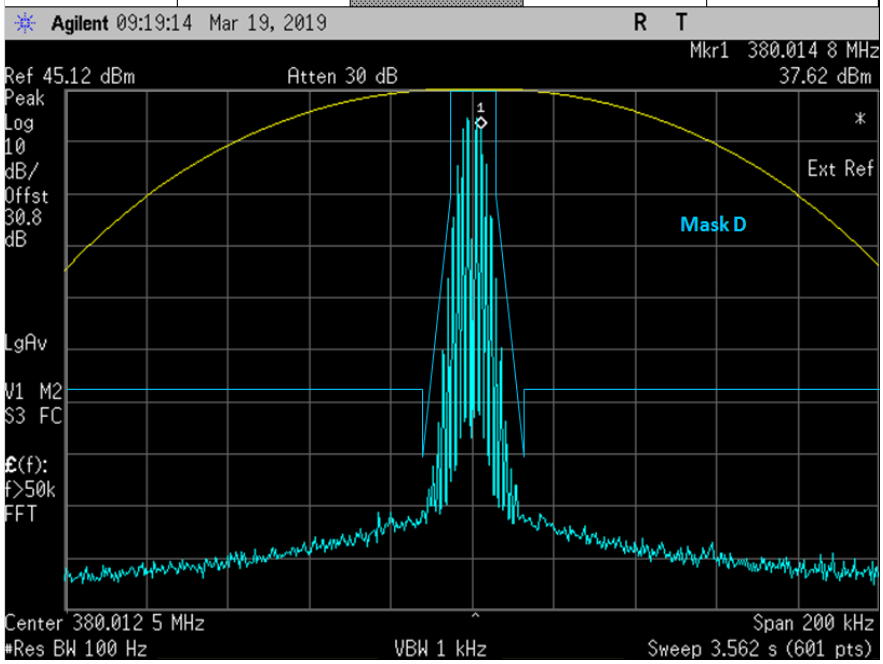
Modulation			Rules Part	
Digital Voice and Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
429.9875	12.5		7.3522	8K10F1W



Modulation			Rules Part	
Digital Voice and Data			FCC Part 90	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
434.9875	12.5		7.3525	8K10F1W



Modulation			Rules Part	
Digital Voice and Data			FCC Part 90 / RSS 119	
Channel Frequency	**Channel Spacing**		**99% OCB**	**Emission Designator**
380.0125	12.5		7.6832	8K70D1W



Modulation			Rules Part	
Digital Voice and Data			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
406.2000	12.5		7.3526	8K70D1W