



FCC CFR 47 Part 90 Test Report

| | |
|-----------------------------|--|
| APPLICANT | STANDARD COMMUNICATIONS PTY.LTD. |
| ADDRESS | PO BOX 96 WINSTON HILLS NSW 2153 AUSTRALIA |
| FCC ID | TXJCM60U25 |
| MODEL NUMBER | CM60-U25B |
| PRODUCT DESCRIPTION | UHF MOBILE TRANSCEIVER |
| DATE SAMPLE RECEIVED | 4/11/2018 |
| FINAL TEST DATE | 4/27/2018 |
| TESTED BY | Franklin Rose |
| APPROVED BY | Tim Royer |
| TEST RESULTS | <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL |

| Report Number | Report Version | Description | Issue Date |
|------------------------------|----------------|-----------------|------------|
| 492AUT18 PT90_TestReport_ | Rev1 | Initial Issue | 04/27/2018 |
| 492AUT18 PT90_TestReport_ | Rev2 | Clerical Update | 05/30/2018 |

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

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GENERAL REMARKS

Summary

The device under test does:

- ☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.
- ☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669
Designation #: US1070

Tested by:



| | |
|-----------------------|---|
| Name and Title | Franklin Rose, Project Manager / EMC Testing Technician |
| Date | 04/27/2018 |

Reviewed and Approved by:



| | |
|-----------------------|---|
| Name and Title | Tim Royer, Project Manager / EMC Testing Engineer |
| Date | 04/27/2018 |

GENERAL INFORMATION

| | |
|--------------------------------|--|
| EUT Description | UHF MOBILE TRANSCEIVER |
| FCC ID | TXJCM60U25 |
| Model Number | CM60-U25B |
| Operating Frequency | Band 1: 450 – 454 MHz Band 2: 456 – 462.5375 MHz Band 3: 462.7375 – 467.5375 MHz Band 4: 467.7375 - 512 MHz |
| Test Frequencies | Band 1: 450.0075, 453.9925 MHz Band 2: 456.0075, 462.53 MHz Band 3: 462.745, 467.53 MHz Band 4: 467.745, 490.00, 511.9925 MHz |
| Type of Emission | 11K2F3E (Narrowband Analog FM Voice), 8K61F1E (P25 Phase I C4FM Voice), 8K61F1D (P25 Phase I C4FM Data) |
| Modulation | FM |
| EUT Power Source | <input type="checkbox"/> 110–120Vac/50– 60Hz |
| | <input checked="" type="checkbox"/> DC Power (13.8 V) |
| | <input type="checkbox"/> Battery Operated Exclusively |
| Test Item | <input type="checkbox"/> Prototype |
| | <input checked="" type="checkbox"/> Pre-Production |
| | <input type="checkbox"/> Production |
| Type of Equipment | <input type="checkbox"/> Fixed |
| | <input checked="" type="checkbox"/> Mobile |
| | <input type="checkbox"/> Portable |
| Antenna Connector | BNC |
| Test Conditions | The temperature was 26°C Relative humidity of 50%. |
| Modification to the EUT | No Modification to EUT. |
| Test Exercise | The EUT was placed in continuous transmit and was operated in "Test Mode" for digital emissions tests. |
| Applicable Standards | ANSI/TIA 603-E:2016, ANSI C63.26, FCC CFR 47 Part 2, Part 90 |
| Test Facility | Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070 |

RESULTS SUMMARY

| Rule Part No. | Test Item | Results |
|----------------------------|---|-------------|
| 2.1046(a), 90.205(h),(i) | RF Power Output | PASS |
| 2.1033(c)(4), 90.209(b)(5) | Modulation Characteristics | PASS |
| 2.1047(a) | Audio Frequency Response and Low Filter | PASS |
| 2.1047(b) | Modulation Limiting | PASS |
| 2.1049 (c) | Occupied Bandwidth | PASS |
| 90.210(d)(1), (2) | Emission Masks | PASS |
| 2.1051(a), 90.210(d)(3) | Spurious Emissions at Antenna Terminals | PASS |
| 2.1053(a), 90.210(d)(3) | Field Strength of Spurious Emissions | PASS |
| 2.1055(a)(2), 90.213 | Frequency Stability < 5 ppm | PASS |
| 90.214 | Transient Frequency Response | PASS |

RF POWER OUTPUT

FCC Rule Parts: FCC Part 2.1046(a), 90.205(h), (i)

(h) 450-470 MHz. (1) The maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with table 2. Applicants requesting an ERP in excess of that listed in table 2 must submit an engineering analysis based upon generally accepted engineering practices and standards that includes coverage contours to demonstrate that the requested station parameters will not produce coverage in excess of that which the applicant requires.

(2) Applications for stations where special circumstances exist that make it necessary to deviate from the ERP and antenna heights in Table 2 will be submitted to the frequency coordinator accompanied by a technical analysis, based upon generally accepted engineering practices and standards, that demonstrates that the requested station parameters will not produce a signal strength in excess of 39 dBu at any point along the edge of the requested service area. The coordinator may then recommend any ERP appropriate to meet this condition.

(3) An applicant for a station with a service area radius greater than 32 km (20 mi) must justify the requested service area radius, which may be authorized only in accordance with table 2, note 4. For base stations with service areas greater than 80 km, all operations 80 km or less from the base station will be on a primary basis and all operations outside of 80 km from the base station will be on a secondary basis and will be entitled to no protection from primary operations.

TABLE 2—450-470 MHz—MAXIMUM ERP/REFERENCE HAAT FOR A SPECIFIC SERVICE AREA RADIUS

| | Service area radius (km) | | | | | | | | | |
|---------------------------------------|--------------------------|-----|------|------|------|------|-----------------|-----------------|-----------------|-----------------|
| | 3 | 8 | 13 | 16 | 24 | 32 | 40 ⁴ | 48 ⁴ | 64 ⁴ | 80 ⁴ |
| Maximum ERP (w) ¹ | 2 | 100 | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 |
| Up to reference HAAT (m) ³ | 15 | 15 | 15 | 27 | 63 | 125 | 250 | 410 | 950 | 2700 |

¹Maximum ERP indicated provides for a 39 dBu signal strength at the edge of the service area per FCC Report R-6602, Fig. 29 (See §73.699, Fig. 10 b).

²Maximum ERP of 500 watts allowed. Signal strength at the service area contour may be less than 39 dBu.

³When the actual antenna HAAT is greater than the reference HAAT, the allowable ERP will be reduced in accordance with the following equation: $ERP_{allow} = ERP_{max} \times (HAAT_{ref} / HAAT_{actual})^2$.

⁴Applications for this service area radius may be granted upon specific request with justification and must include a technical demonstration that the signal strength at the edge of the service area does not exceed 39 dBu.

(i) 470-512 MHz. Power and height limitations are specified in §90.307 and 90.309.

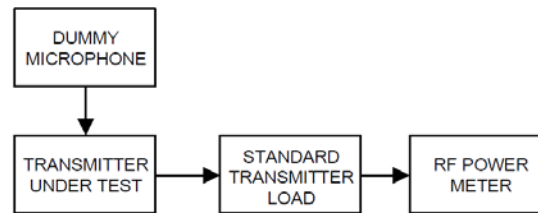
§90.307 Protection criteria.

The tables and figures listed in §90.309 shall be used to determine the effective radiated power (ERP) and antenna height of the proposed land mobile base station and the ERP for the associated control station (control station antenna height shall not exceed 31 meters (100 feet) above average terrain (AAT)).

(c) Mobile units and control stations operating on the frequencies available for land mobile use in any given urbanized area shall afford protection to co-channel and adjacent channel television stations in accordance with the values set forth in table C in §90.309 and paragraph (d) of this section except for channel 15 in New York, NY, and Cleveland, OH, and channel 16 in Detroit, MI, where protection will be in accordance with the values set forth in table D in §90.309 and paragraph (d) of this section.

RF POWER OUTPUT

Method of Measurement: TIA-603-E, 2.2.1



Test Data: Power Measurement Table

| Peak Power Output | | | | | |
|-------------------|-------|-------|-------|------|------|
| dBm | | | Watts | | |
| High | Med | Low | High | Med | Low |
| 43.96 | 39.98 | 29.99 | 24.89 | 9.95 | 1.00 |

Part 2.1033 (c)(8) DC Input into Final Amplifier

INPUT POWER: (13.8 V) (6.0 A) = **82.8 Watts**

Result: Meets Requirements

MODULATION CHARACTERISTICS

FCC Rule Parts: Part 2.1033(c)(4), 90.209(b)(5)

STANDARD CHANNEL SPACING/BANDWIDTH

| Frequency band (MHz) | Channel spacing (kHz) | Authorized bandwidth (kHz) |
|----------------------|-----------------------|----------------------------|
| 406-512 ² | ¹ 6.25 | ¹³⁶ 20/11.25/6 |

¹For stations authorized on or after August 18, 1995.

²Bandwidths for radiolocation stations in the 420-450 MHz band and for stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis.

³Operations using equipment designed to operate with a 25 kHz channel bandwidth will be authorized a 20 kHz bandwidth. Operations using equipment designed to operate with a 12.5 kHz channel bandwidth will be authorized a 11.25 kHz bandwidth. Operations using equipment designed to operate with a 6.25 kHz channel bandwidth will be authorized a 6 kHz bandwidth. All stations must operate on channels with a bandwidth of 12.5 kHz or less beginning January 1, 2013, unless the operations meet the efficiency standard of §90.203(j)(3).

⁶Operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the Adjacent Channel Power limits of §90.221.

11K2F3E (Narrowband Analog FM Voice) Bandwidth

$$B_n = 2M + 2Dk$$

$$B_n = (2 \times 3) + (2 \times 2.5) = 11.0 \text{ kHz}$$

Where:

f_m = modulating frequency, kHz

f_d = deviation, kHz

k = constant (= 1)

Necessary Bandwidth for 11K2F3E = **11.0 kHz**

90. 209(b)(5) Authorized Bandwidth for 11K2F3E = **11.25 kHz**

8K61F1E/F1D (C4FM Voice/Data) Bandwidth

Necessary Bandwidth for 8K61F1E/F1D (99% Occupied Bandwidth) = **8.61 kHz**

90. 209(b)(5) Authorized Bandwidth for 8K61F1E/F1D = **11.25 kHz**

Result: Meets Requirements

AUDIO FREQUENCY RESPONSE & LOW PASS FILTER

Rule Part No.: 2.1047(a)

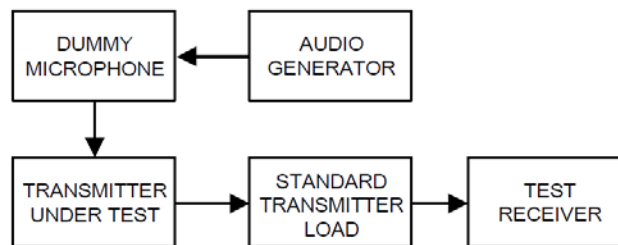
Requirements:

(a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

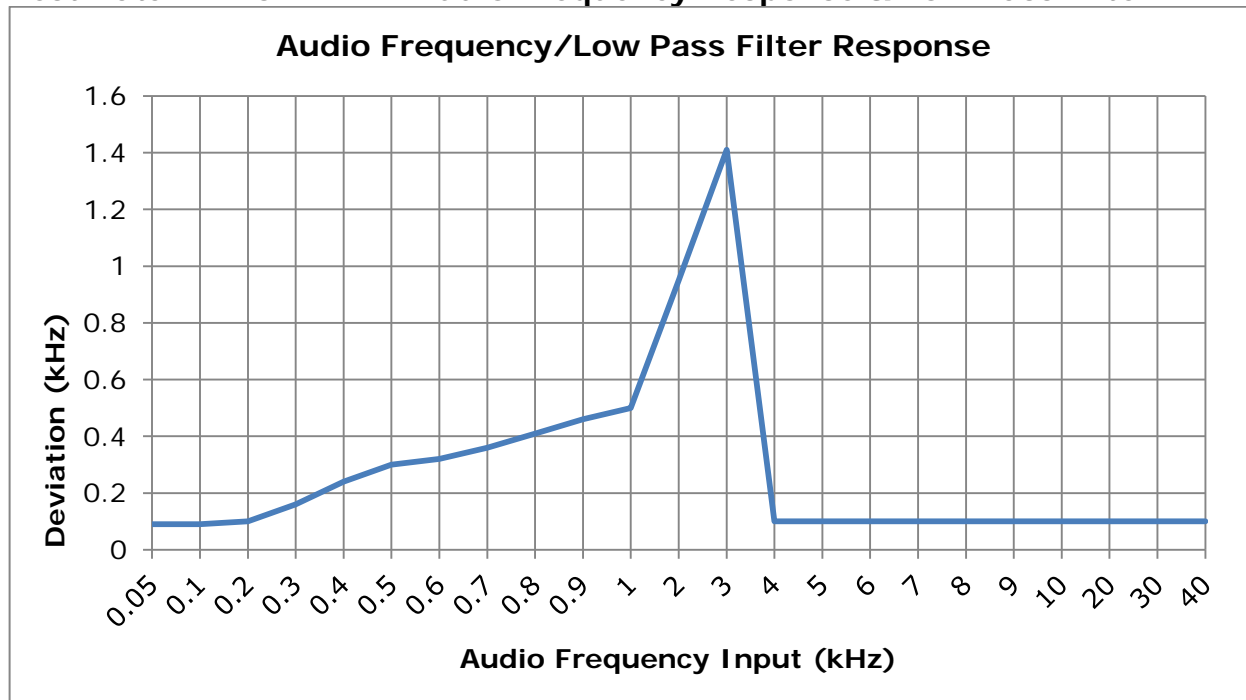
Test Procedure: TIA 603-E, 2.2.6.2.2, 2.2.15 (Using the Test Setup from section 2.2.6)

Note: The Low Pass Filter is digital, and has no "input" or "output" as found in the method of measurement, above. Testing has been altered accordingly to show the operation of the filter.

Note: Testing deviates from TIA 603-E 2.2.6.2.2 and 2.2.15. The Audio Frequency Response and Low Pass Filter Response plot data has been taken simultaneously using the Modulation Meter reading of Deviation (kHz), satisfying the requirements above.



Test Data: 12.5 kHz FM Audio Frequency Response & Low Pass Filter



MODULATION LIMITING

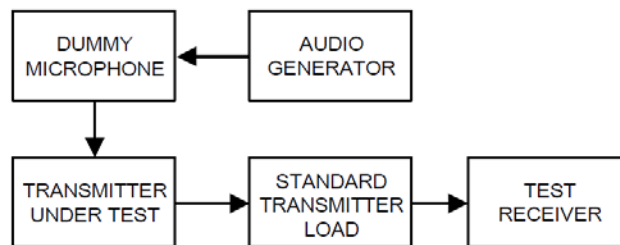
Rule Part No.: 2.1047(b)

Requirements:

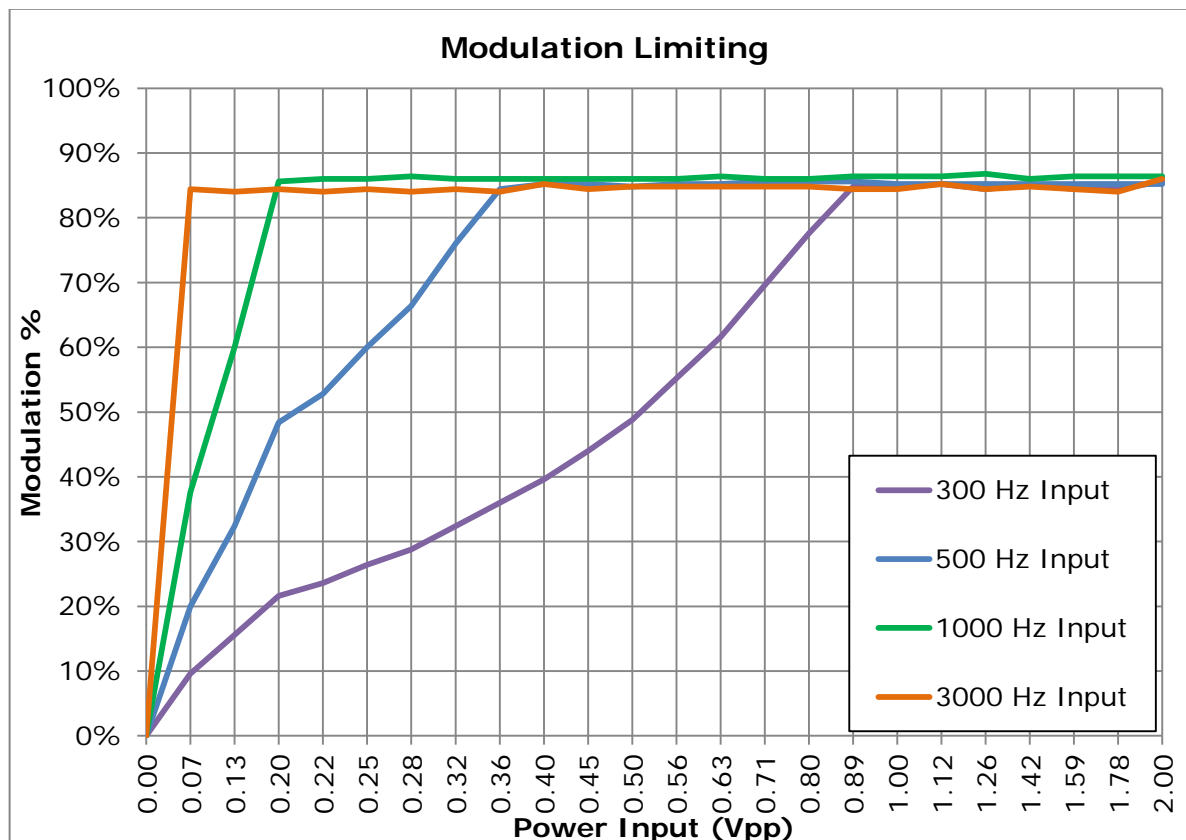
(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

Test Procedure: TIA 603-E, 2.2.3

Note: The test method alone is not sufficient to meet the standard of FCC Pt. 2.1047(b). Deviation (kHz), as recorded from test equipment, has been converted into percentage as required above.



Test Data: 12.5 kHz FM Modulation Limiting



OCCUPIED BANDWIDTH

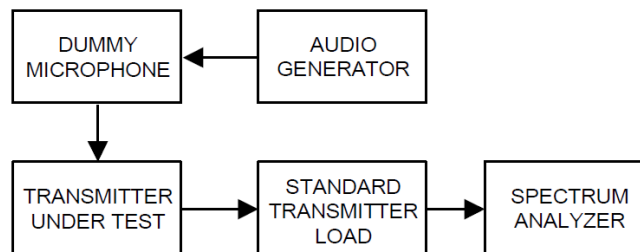
FCC Rule Parts: 2.1049 (c)

(c) Radiotelephone transmitters equipped with a device to limit modulation or peak envelope power shall be modulated as follows. For single sideband and independent sideband transmitters, the input level of the modulating signal shall be 10 dB greater than that necessary to produce rated peak envelope power.

(1) Other than single sideband or independent sideband transmitters—when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

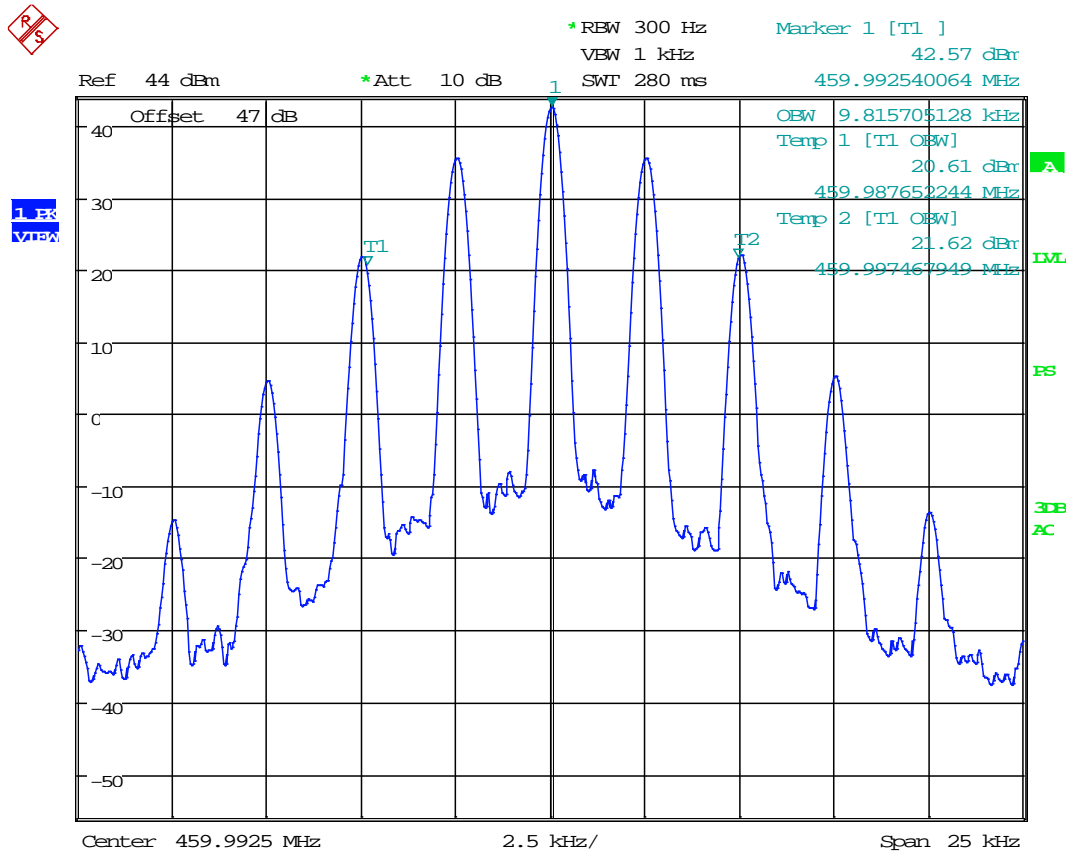
Method of Measurement: ANSI C63.26, 5.4.4 (using Test Setup from TIA 603-E 2.2.11, below)

Note: The receiver's automatic 99% Occupied Bandwidth function was used. The function is identical in operation to ANSI C63.26, 5.4.4, Step e).



OCCUPIED BANDWIDTH 99%

Test Data: 11K2F3E (Narrowband Analog FM Voice)

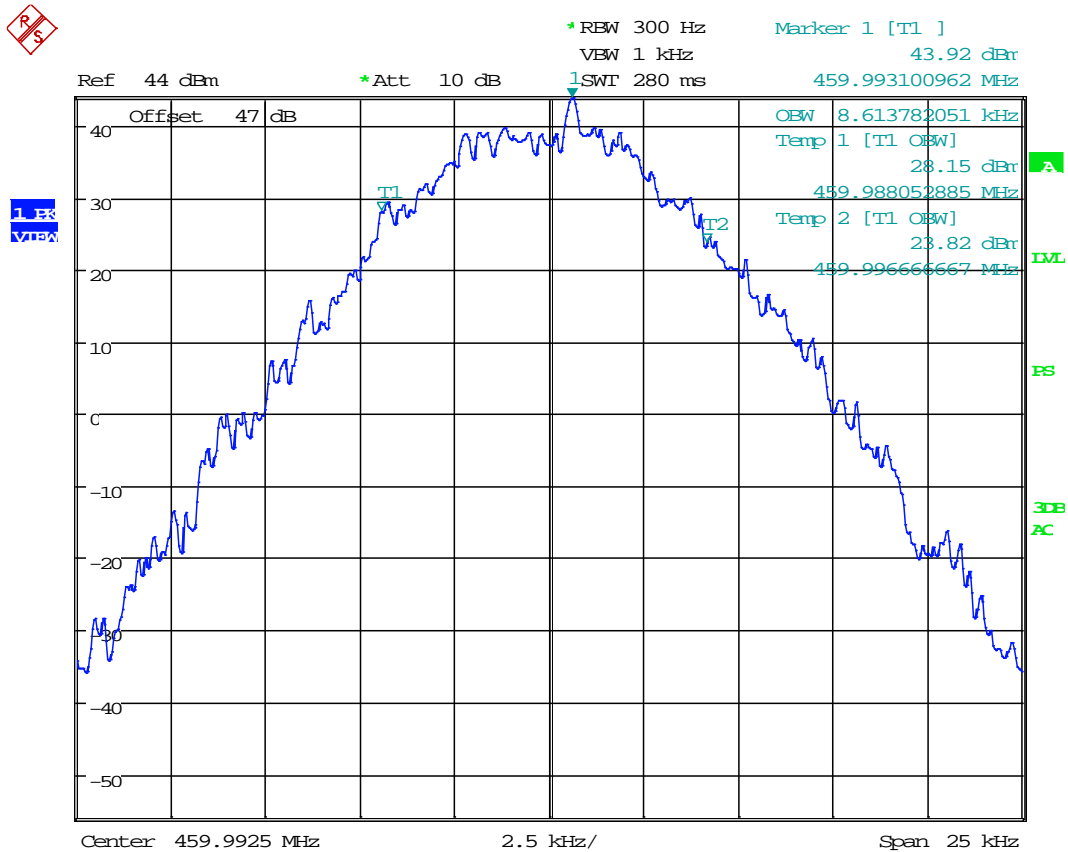


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99% OBW = 9.82 kHz

OCCUPIED BANDWIDTH 99%

Test Data: 8K61F1E/F1D (C4FM Voice/Data)



Date: 26.APR.2018 19:41:48

99% OBW = 8.61 kHz

Result: Meets Requirements

EMISSION MASKS

FCC Rule Parts: 90.210(d)(1), (2)

APPLICABLE EMISSION MASKS

| Frequency band (MHz) | Mask for equipment with audio low pass filter | Mask for equipment without audio low pass filter |
|------------------------|---|--|
| 421-512 ^{2 5} | B, D, or E | C, D, or E |

²Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.

⁵Equipment may alternatively meet the Adjacent Channel Power limits of §90.221.

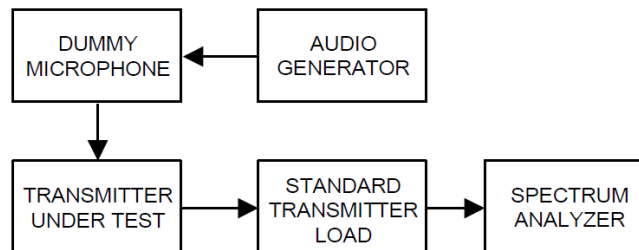
Requirements:

(d) *Emission Mask D—12.5 kHz channel bandwidth equipment.* For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB.

Method of Measurement: ANSI C63.26, 5.4.4 (using Test Setup from TIA 603-E 2.2.11, below)



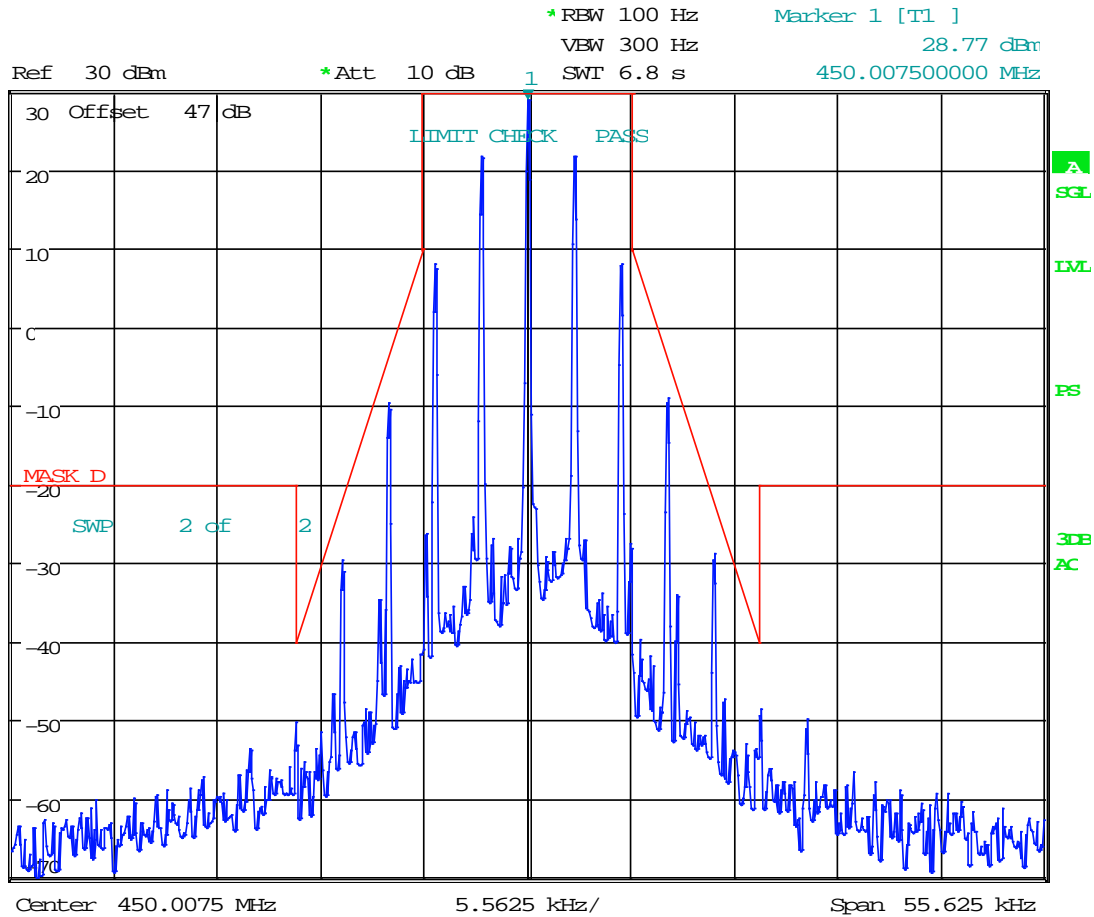
EMISSION MASK D - NARROWBAND FM (12.5 kHz)

Test Data: 450.0075 MHz

Low Power



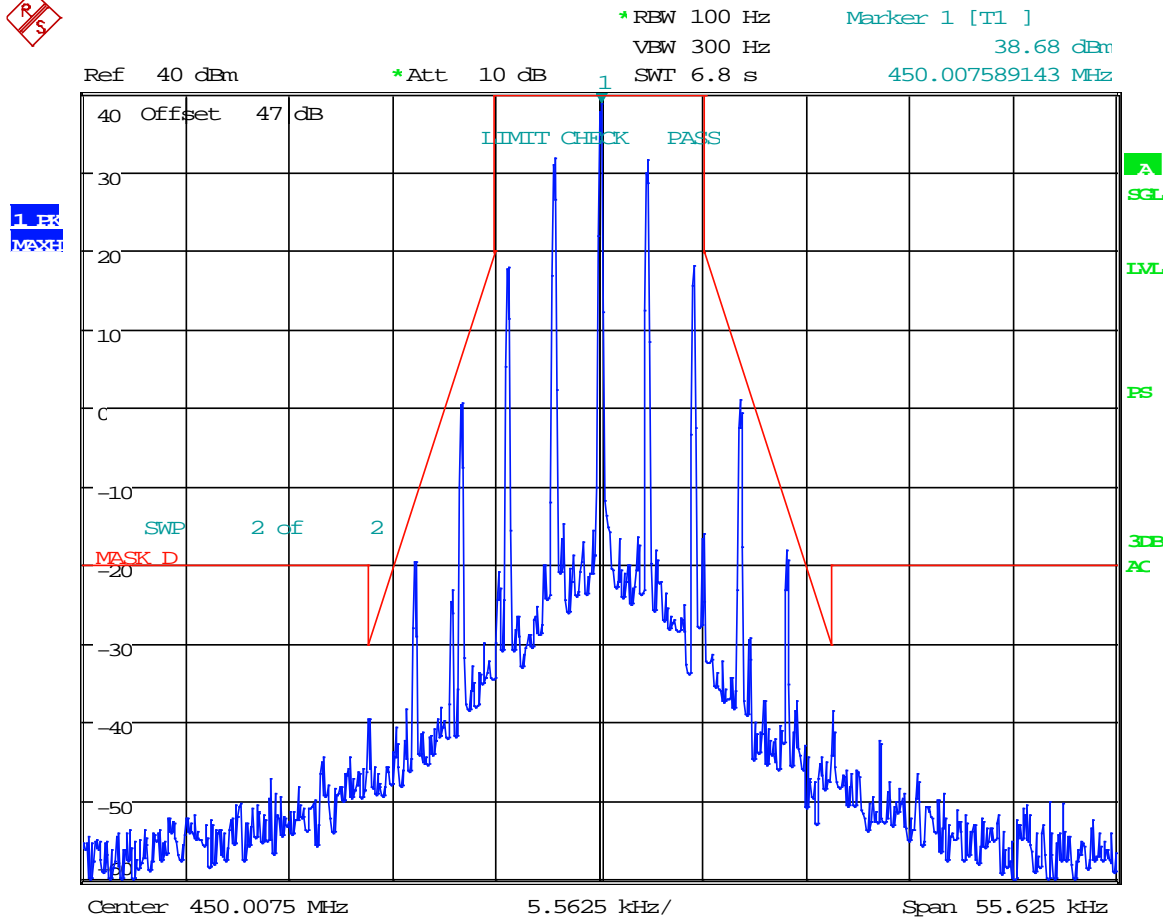
1. EK
MAXI



Date: 26.APR.2018 18:55:49

EMISSION MASK D

Medium Power



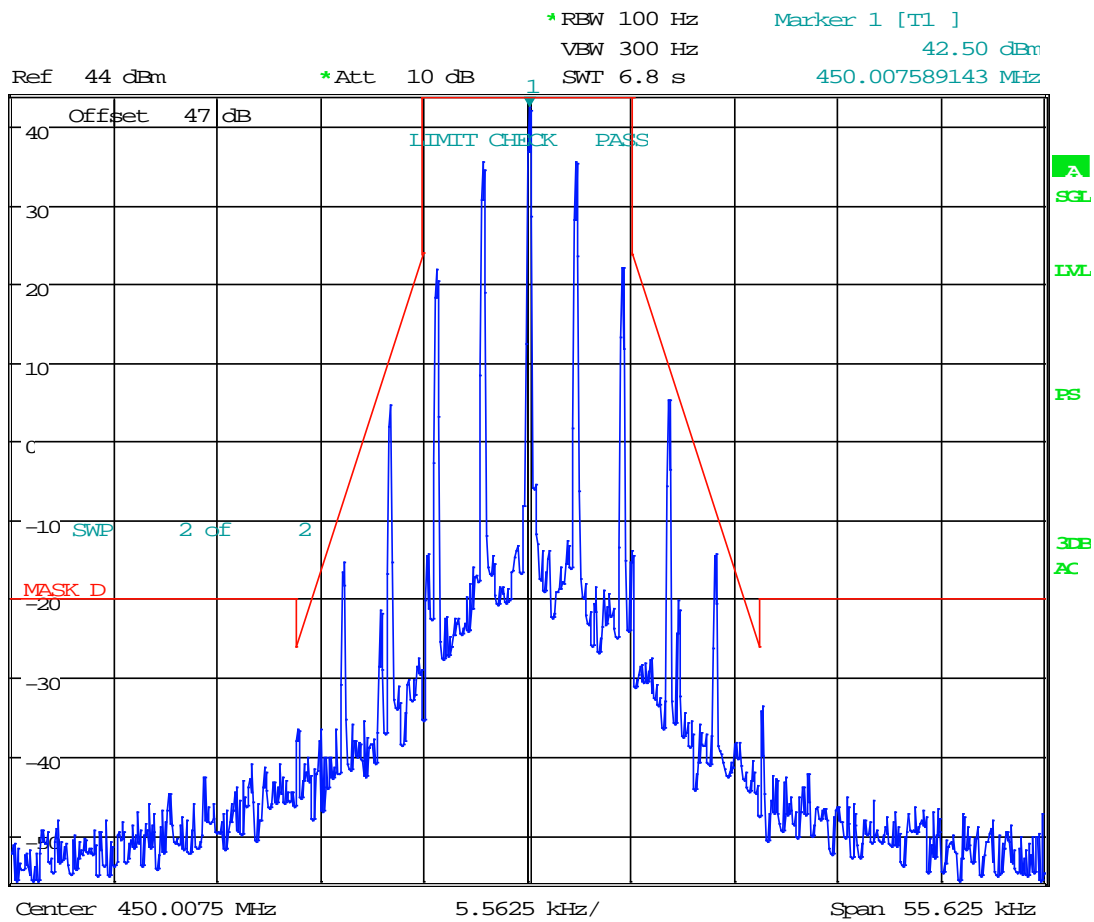
Date: 26.APR.2018 18:44:22

EMISSION MASK D

High Power



1 PK
MAXH



Date: 26.APR.2018 18:20:03

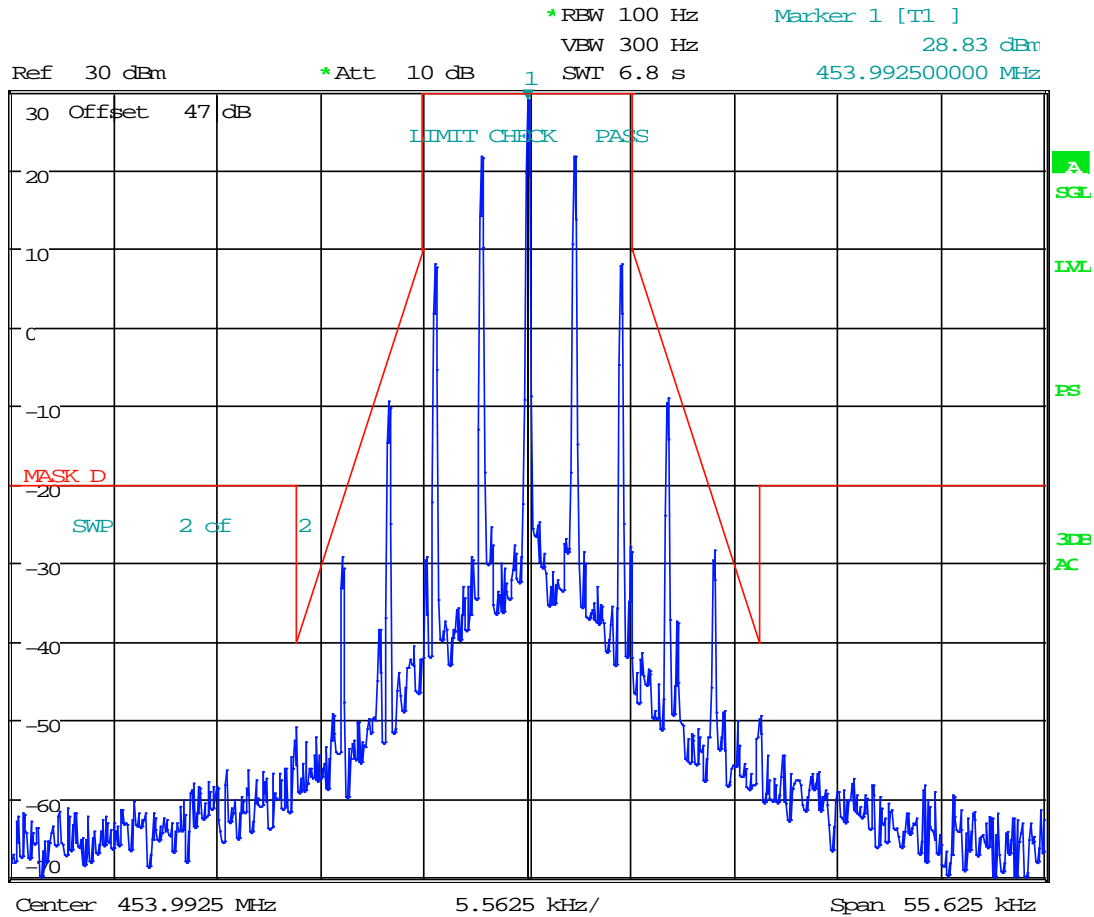
EMISSION MASK D

Test Data: 453.9925 MHz

Low Power



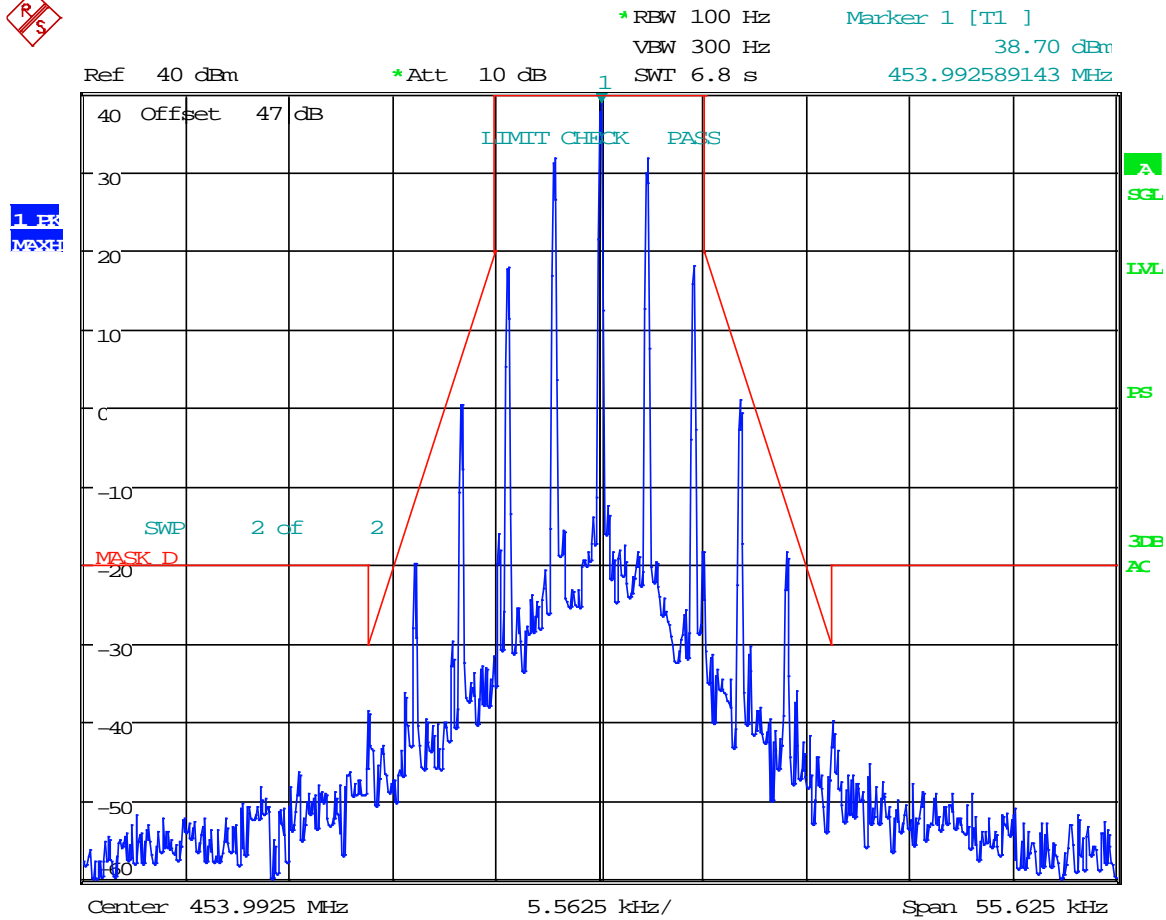
1. EK
MAX



Date: 26.APR.2018 18:56:21

EMISSION MASK D

Medium Power



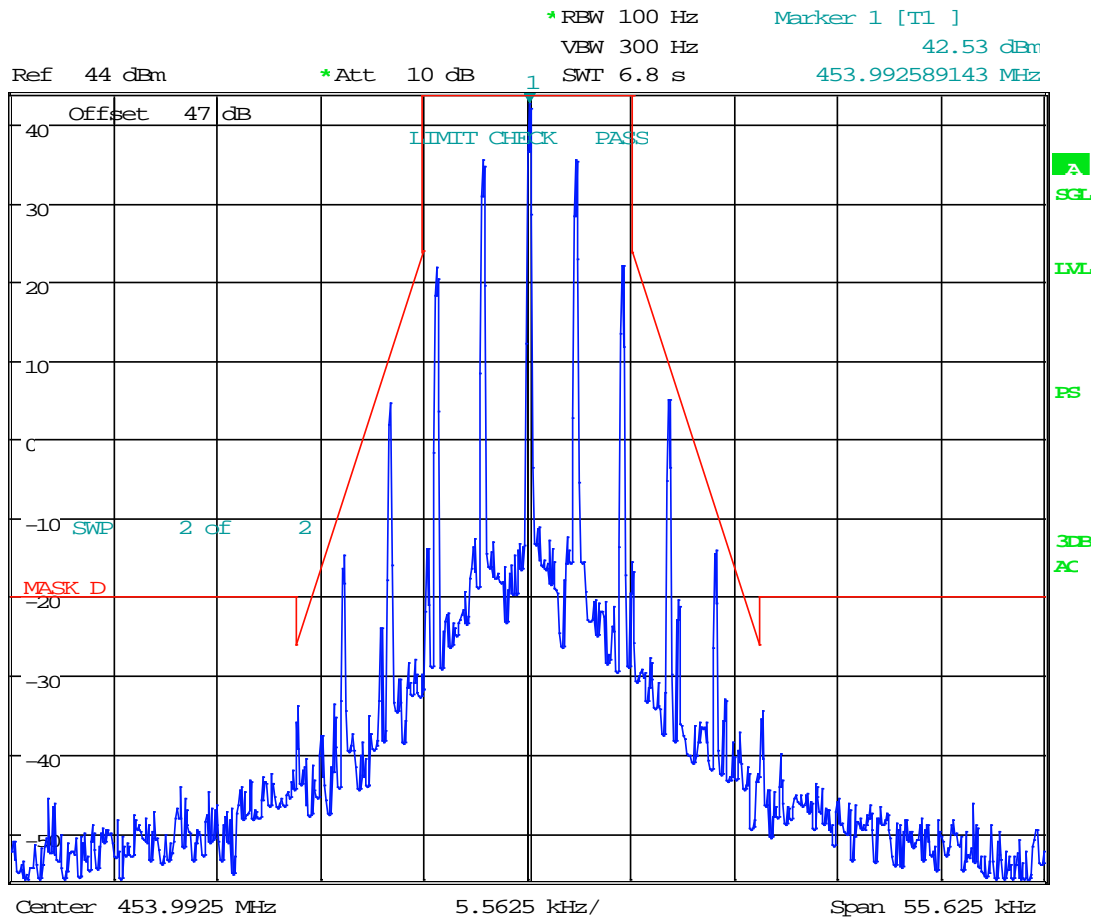
Date: 26.APR.2018 18:44:52

EMISSION MASK D

High Power



1 PK
MAX



Date: 26.APR.2018 18:20:55

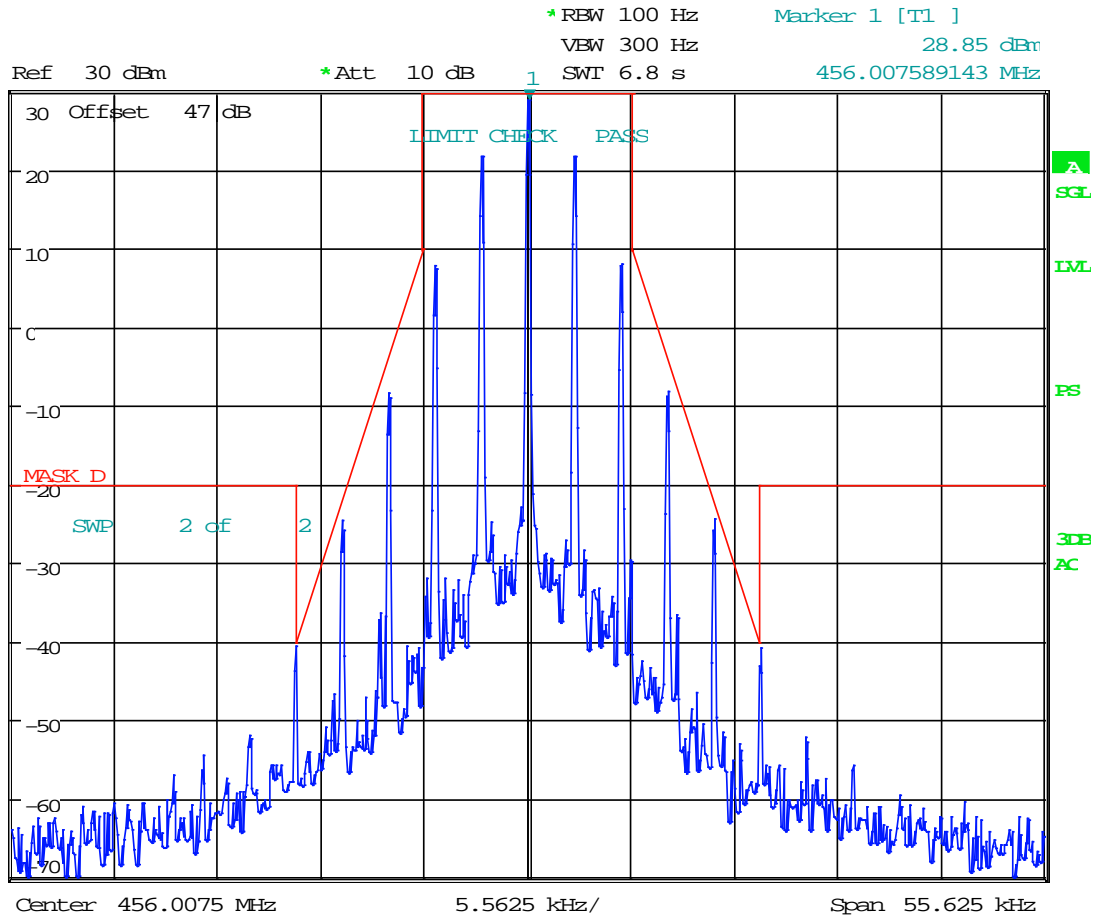
EMISSION MASK D

Test Data: 456.0075 MHz

Low Power



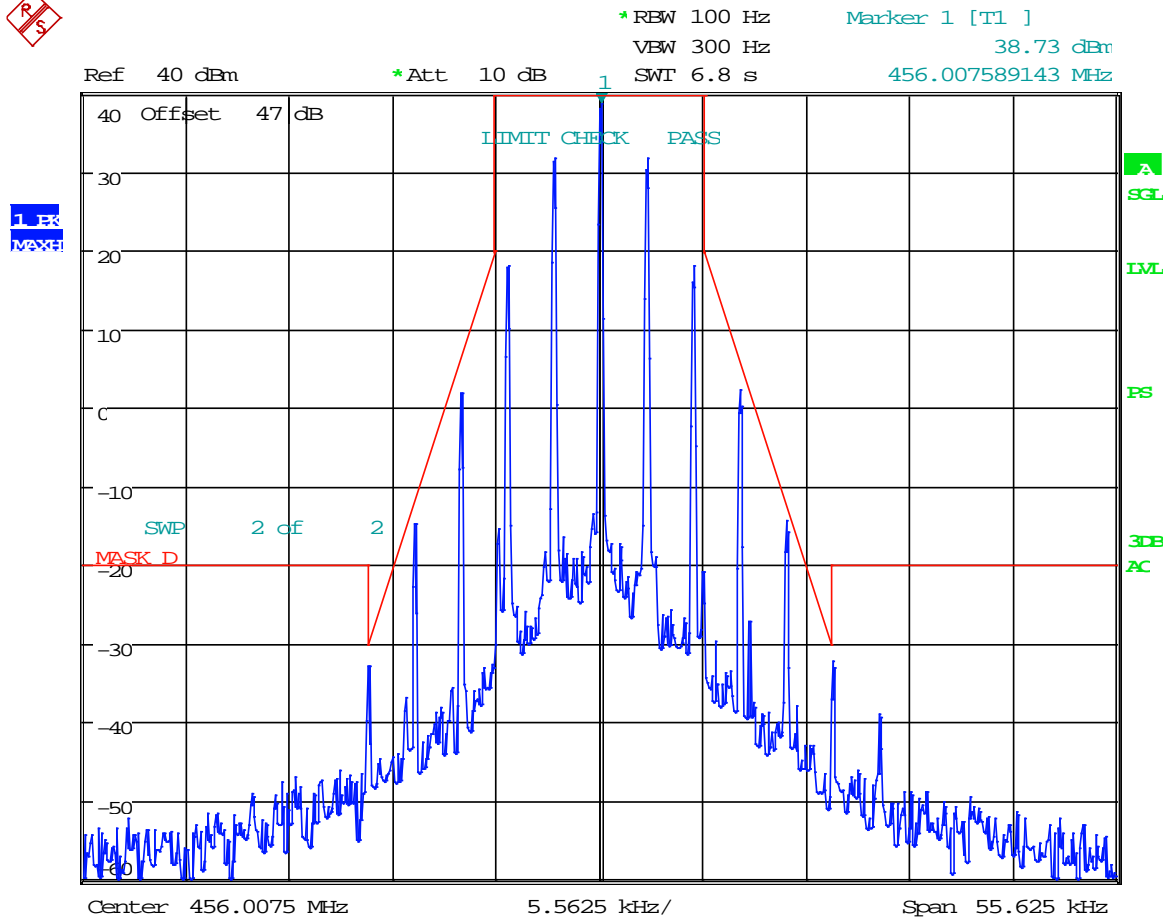
1. EK
MAX



Date: 26.APR.2018 18:57:24

EMISSION MASK D

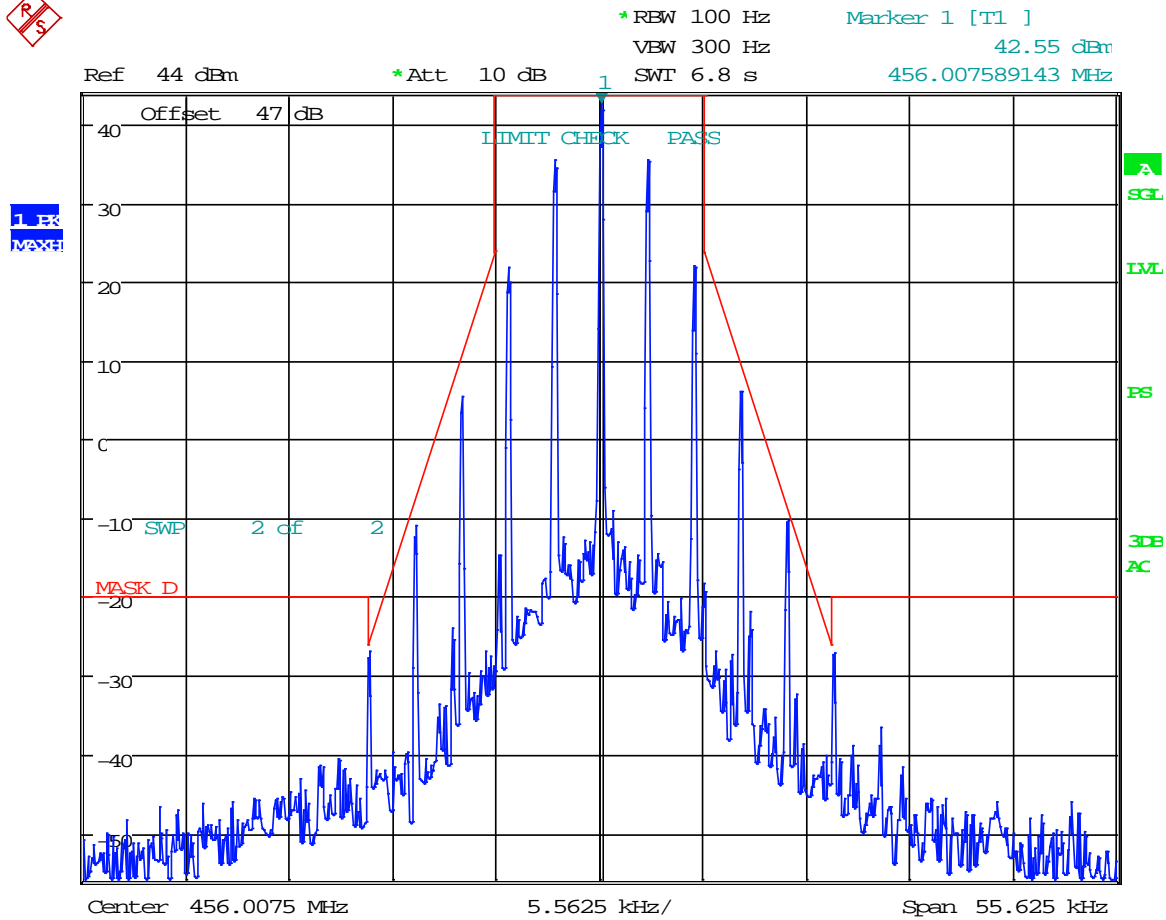
Medium Power



Date: 26.APR.2018 18:47:04

EMISSION MASK D

High Power

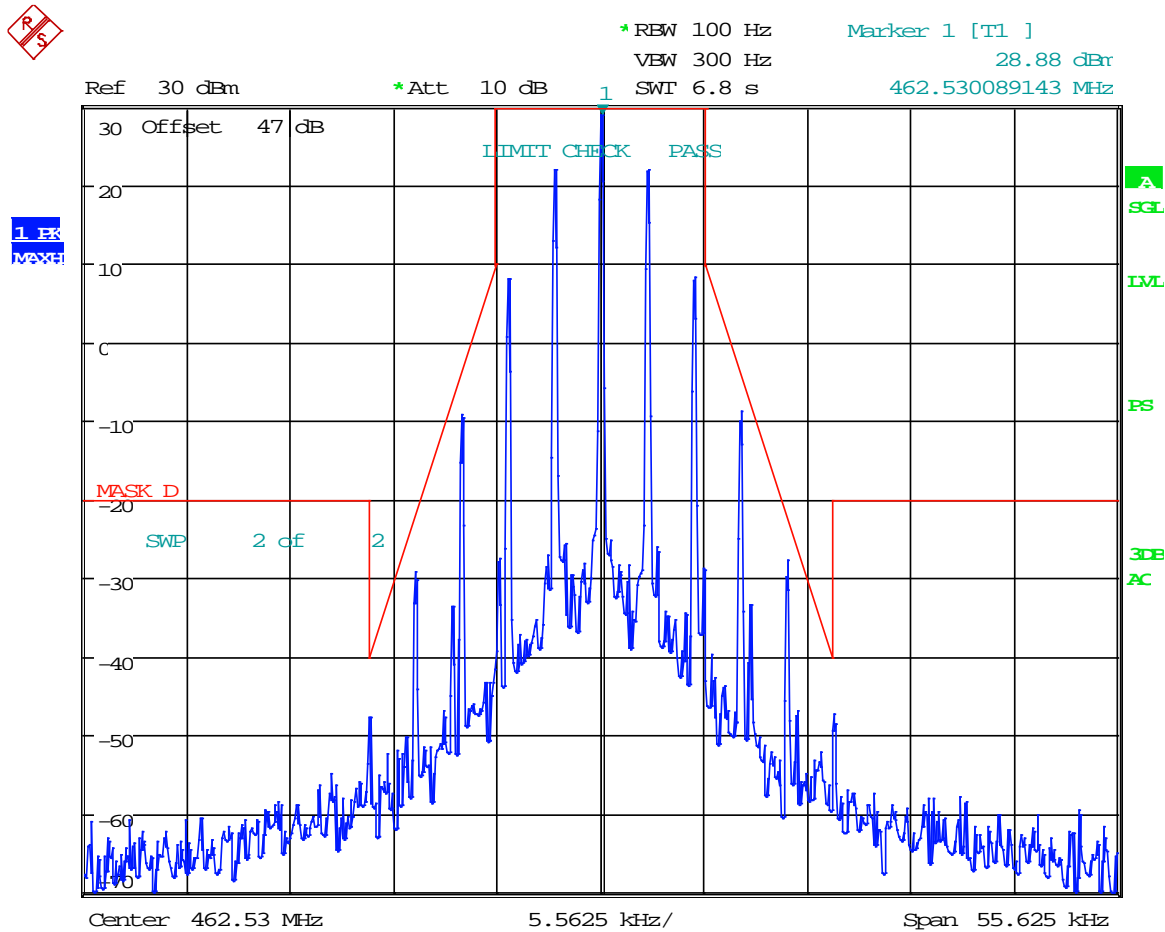


Date: 26.APR.2018 18:22:13

EMISSION MASK D

Test Data: 462.5300 MHz

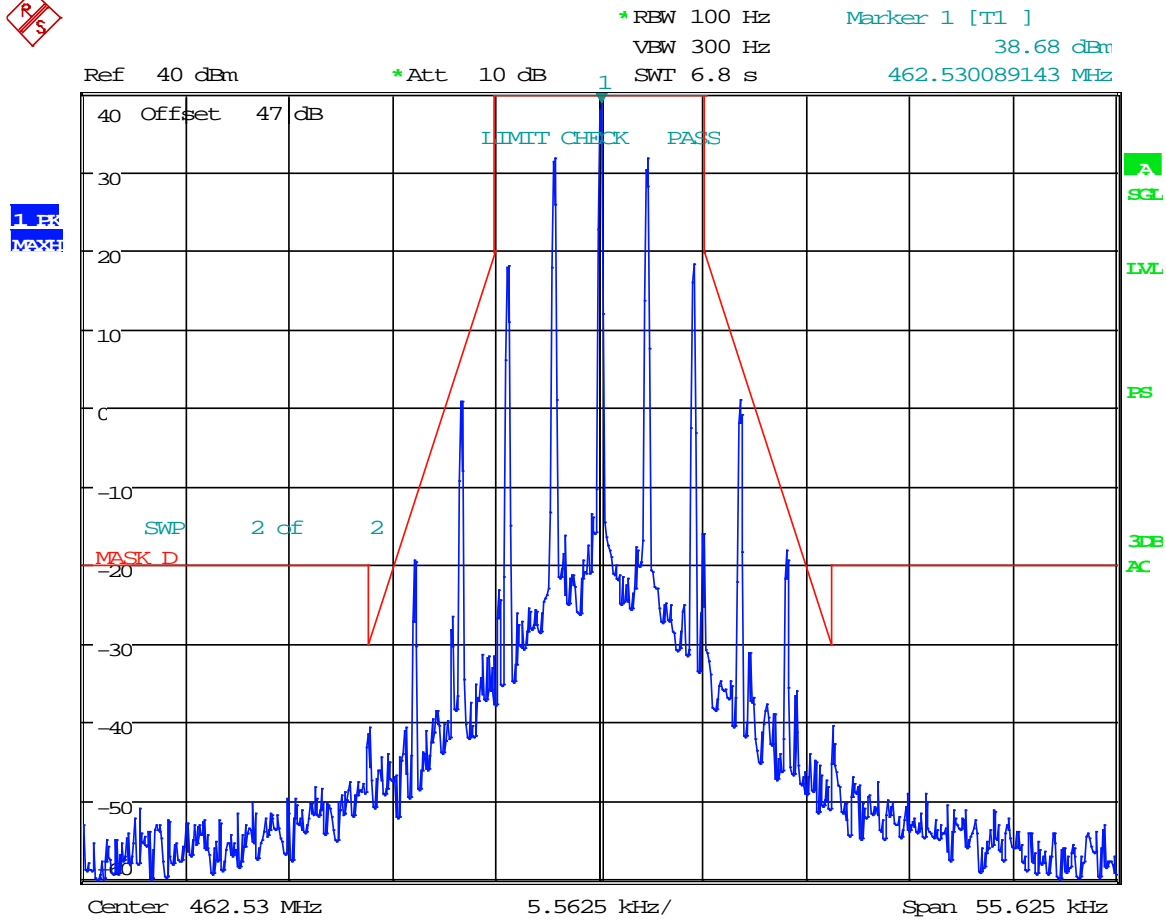
Low Power



Date: 26.APR.2018 18:58:29

EMISSION MASK D

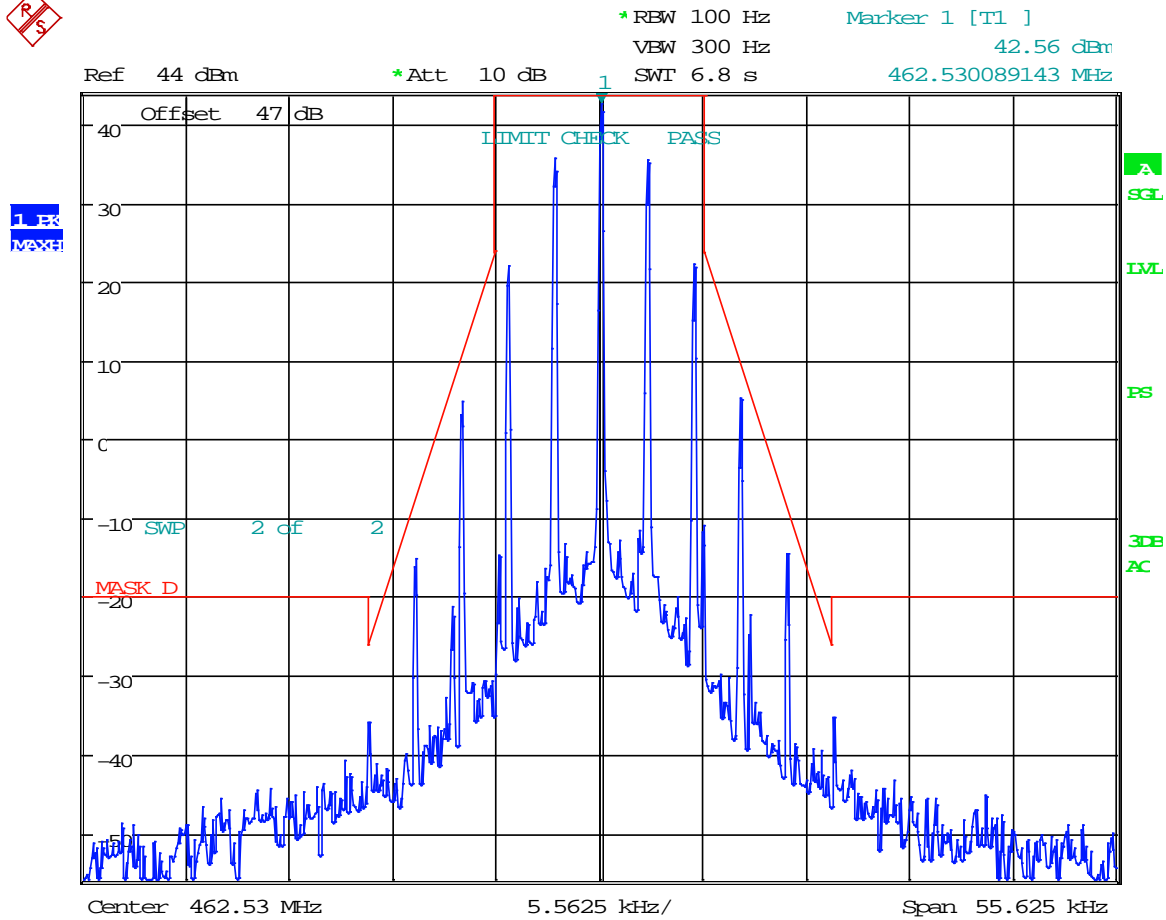
Medium Power



Date: 26.APR.2018 18:48:10

EMISSION MASK D

High Power



Date: 26.APR.2018 18:24:14

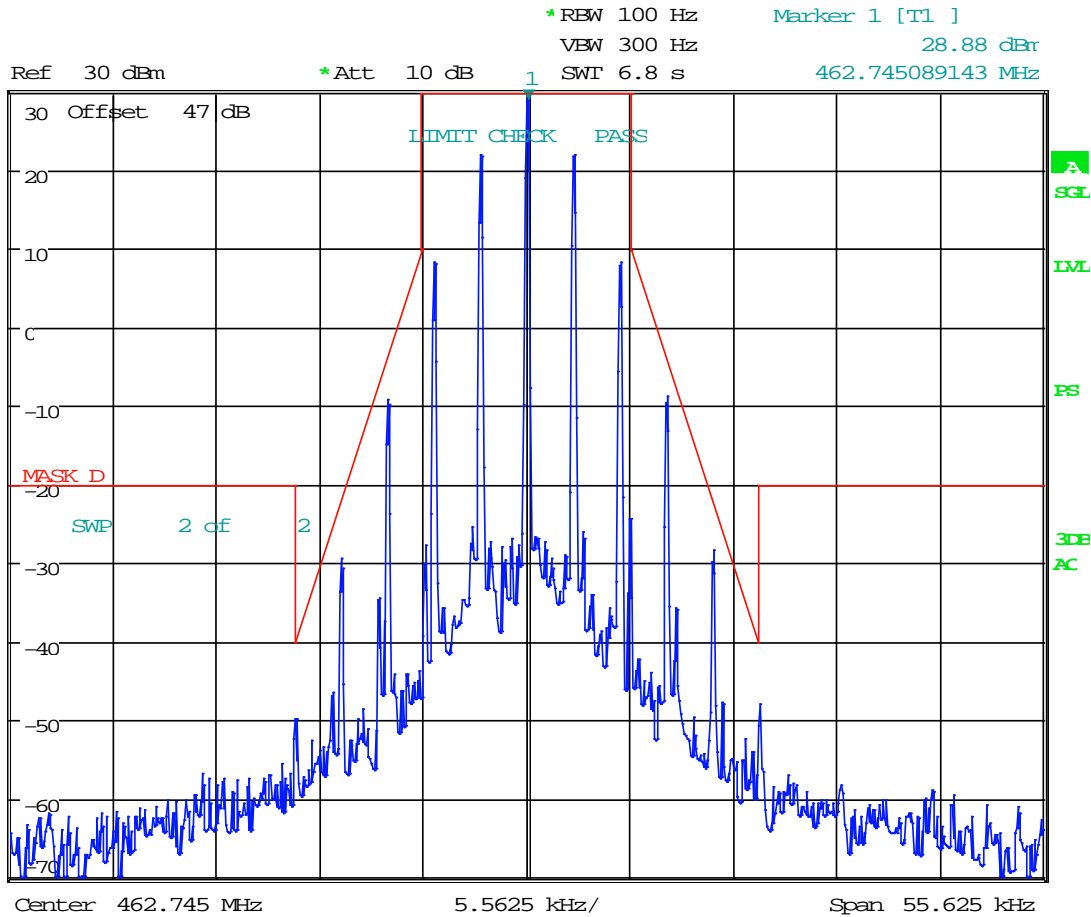
EMISSION MASK D

Test Data: 462.7450 MHz

Low Power



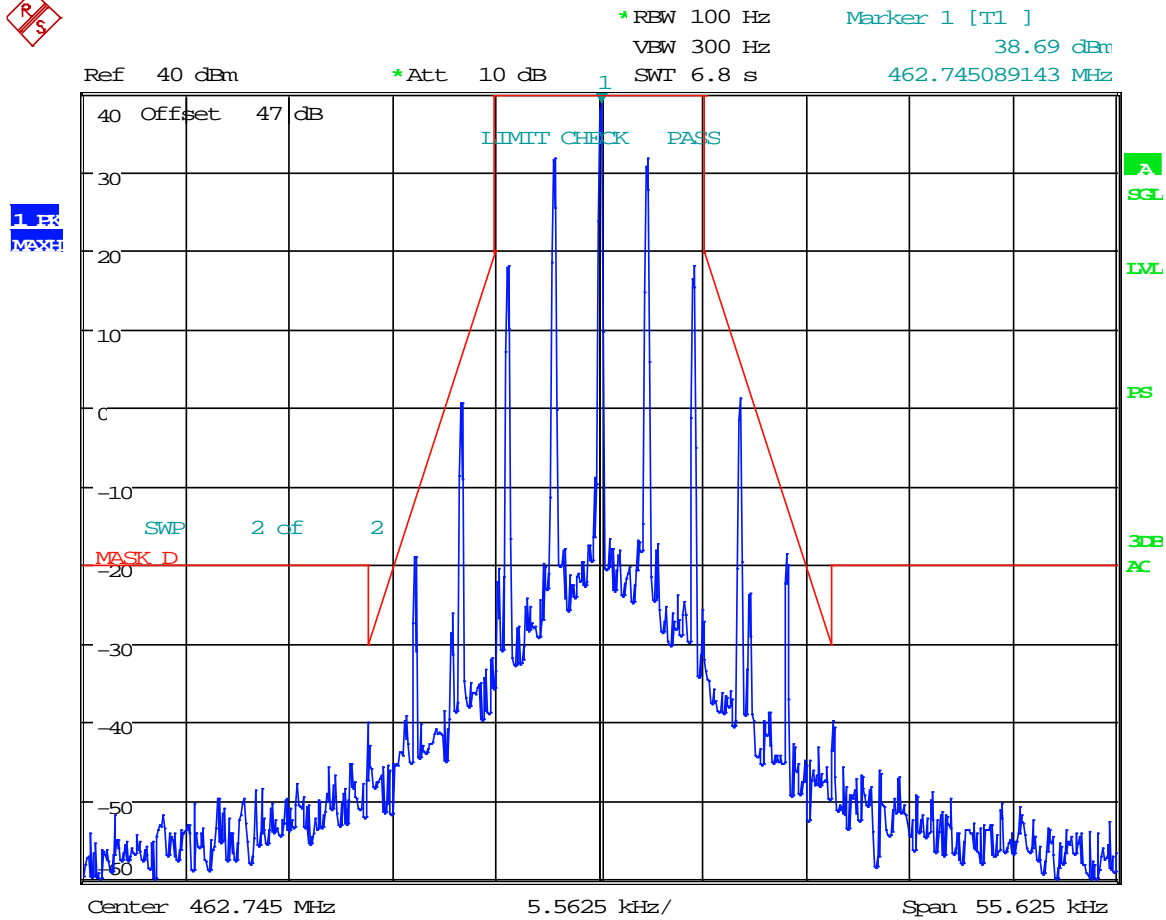
1. EX
MAX



Date: 26.APR.2018 18:58:58

EMISSION MASK D

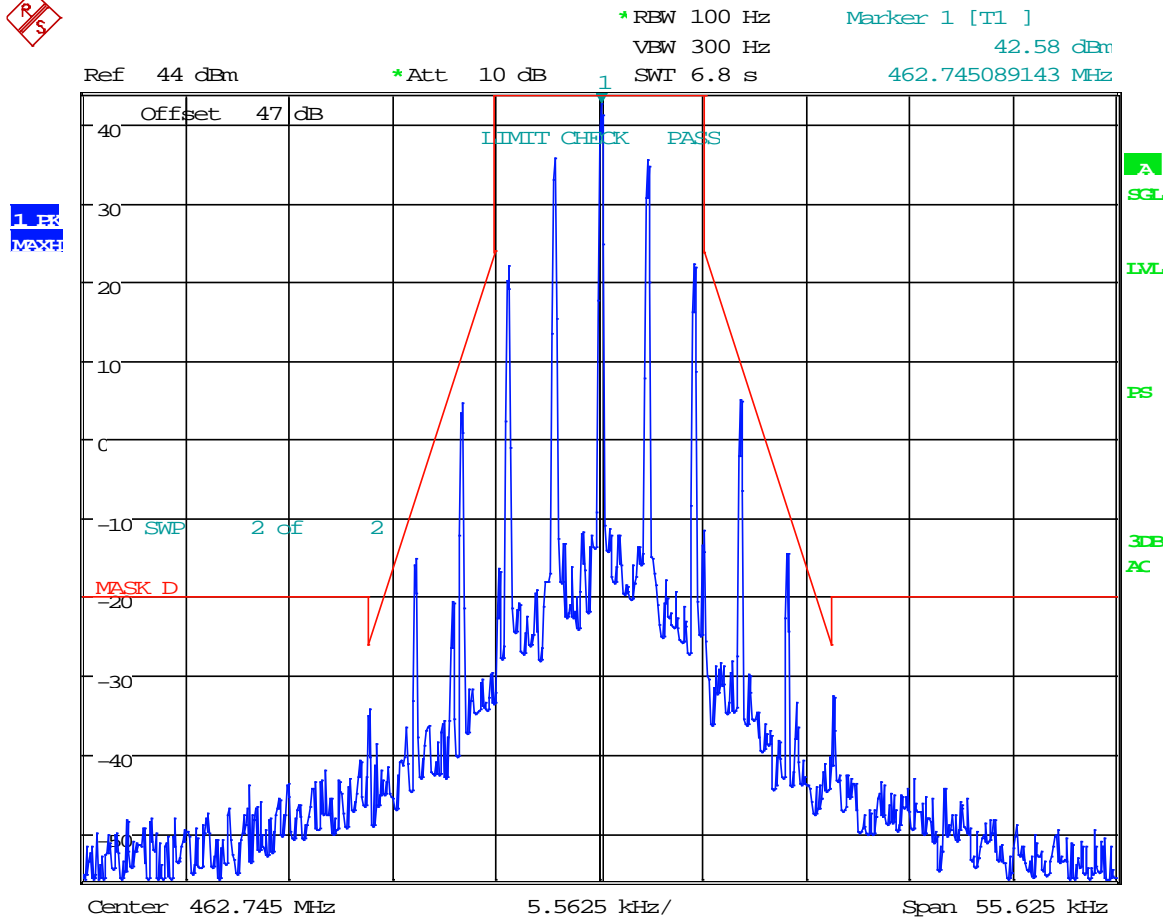
Medium Power



Date: 26.APR.2018 18:48:39

EMISSION MASK D

High Power



Date: 26.APR.2018 18:24:56

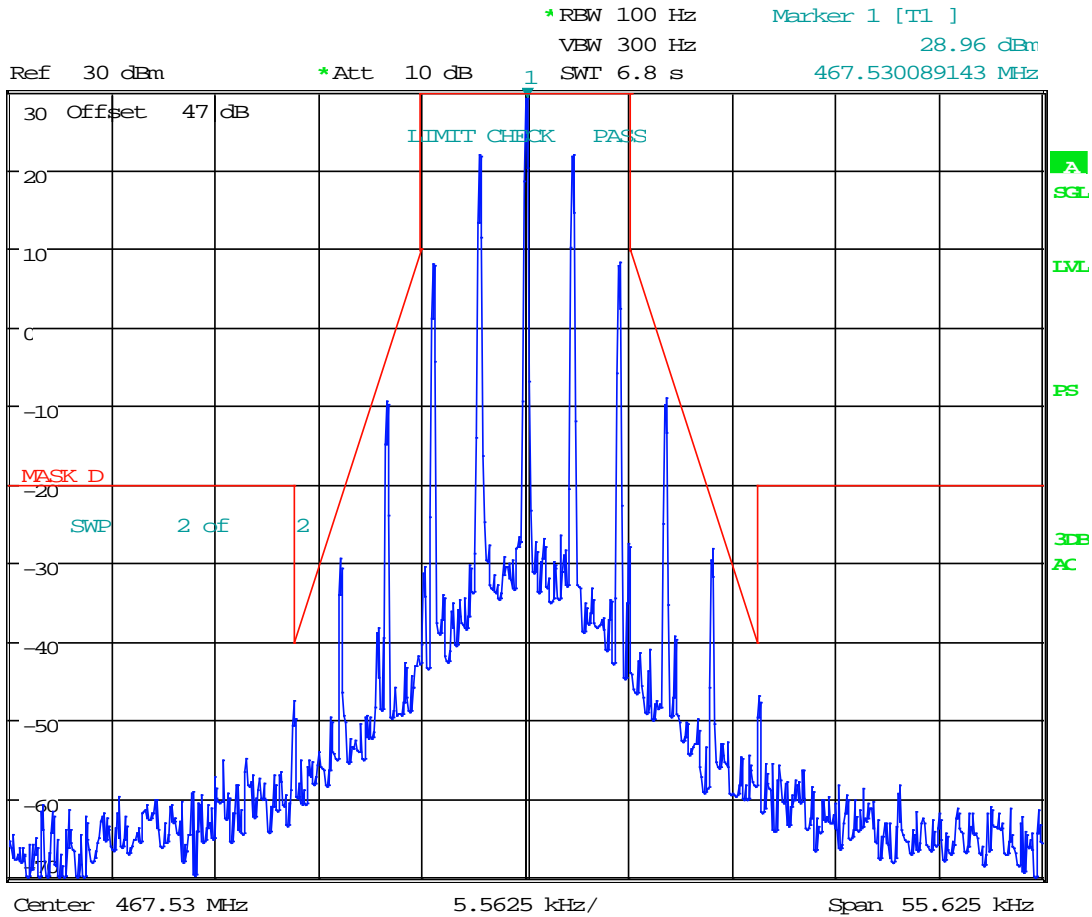
EMISSION MASK D

Test Data: 467.5300 MHz

Low Power



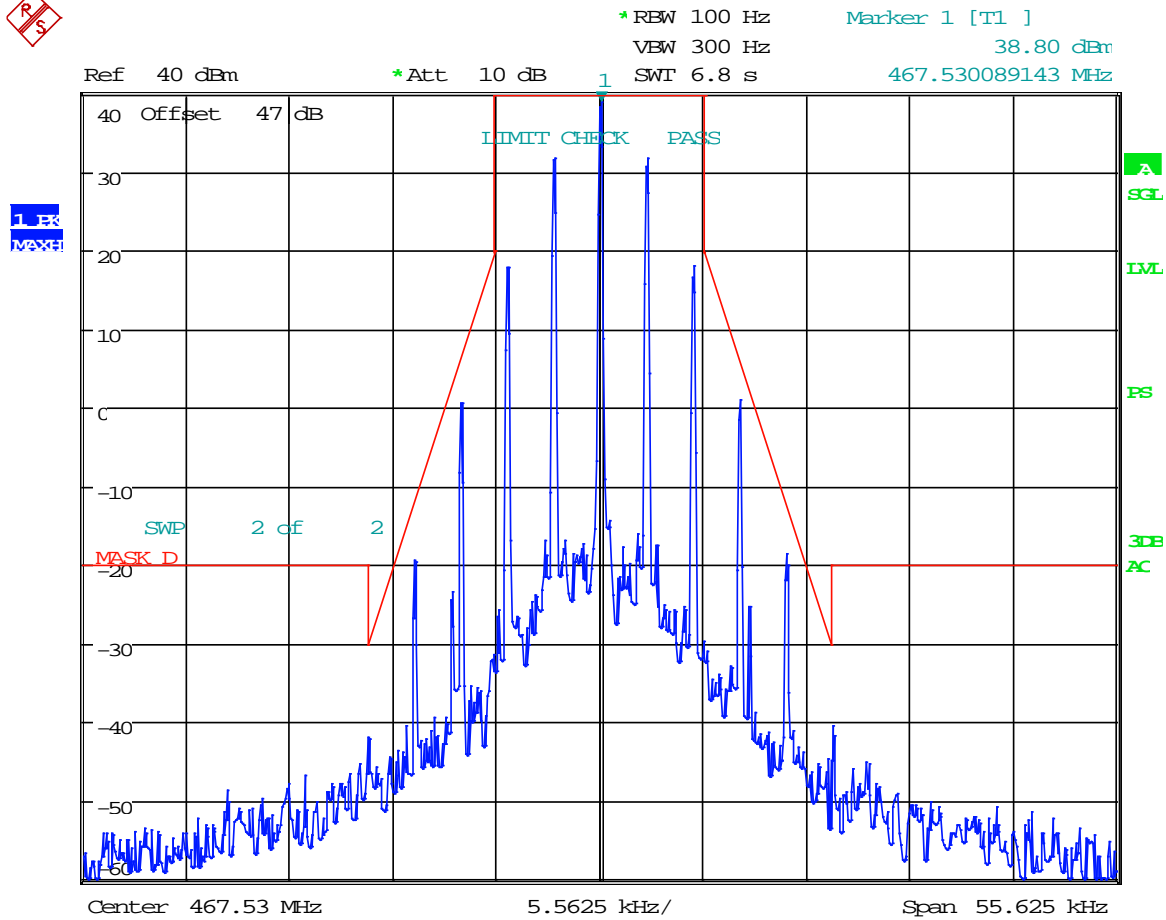
1. EK
MAX



Date: 26.APR.2018 18:59:28

EMISSION MASK D

Medium Power



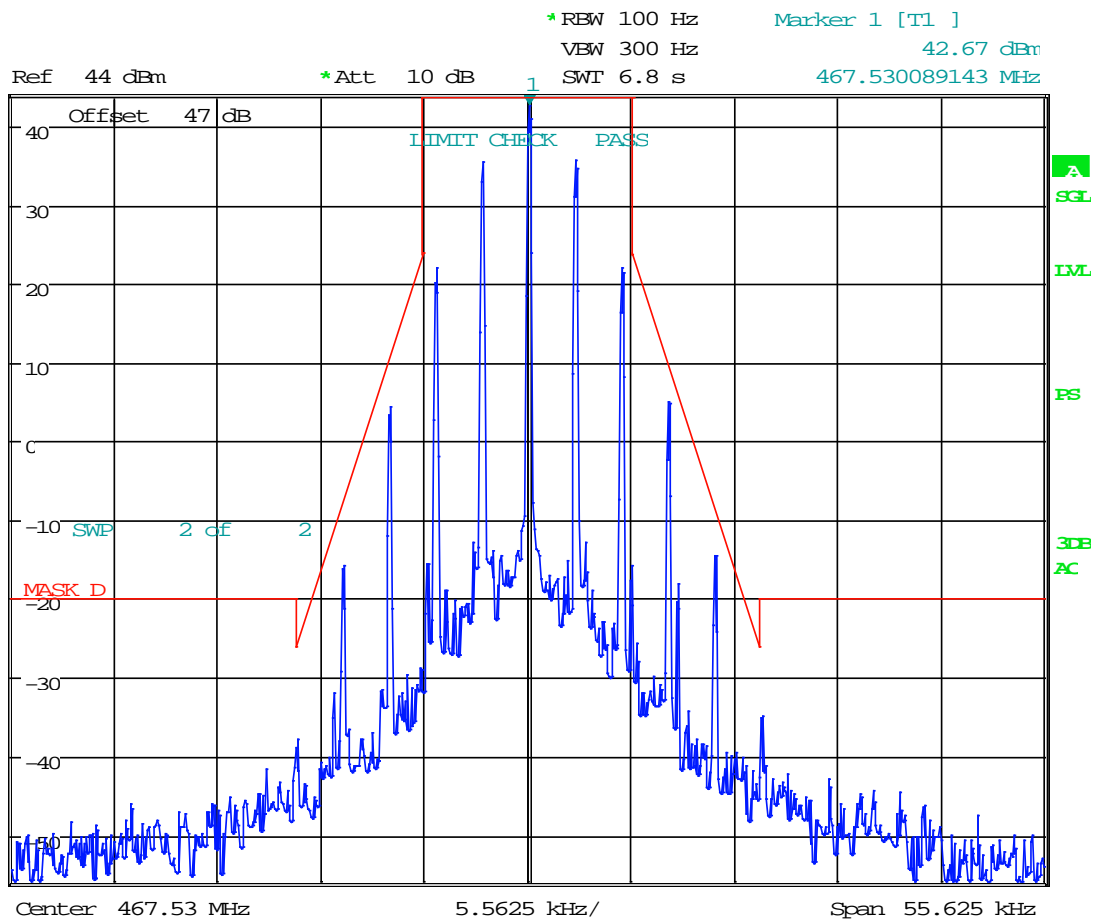
Date: 26.APR.2018 18:49:14

EMISSION MASK D

High Power



1 PK
MAXH



Date: 26.APR.2018 18:25:29

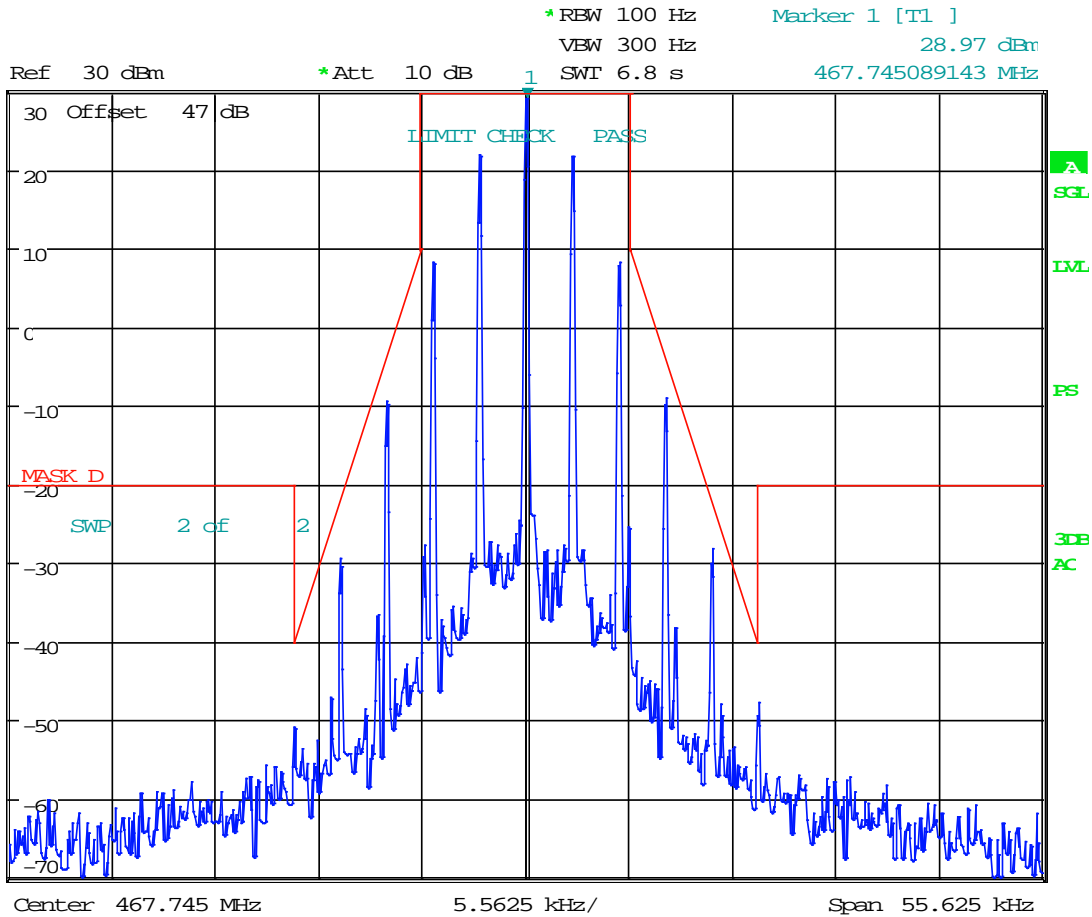
EMISSION MASK D

Test Data: 467.7450 MHz

Low Power



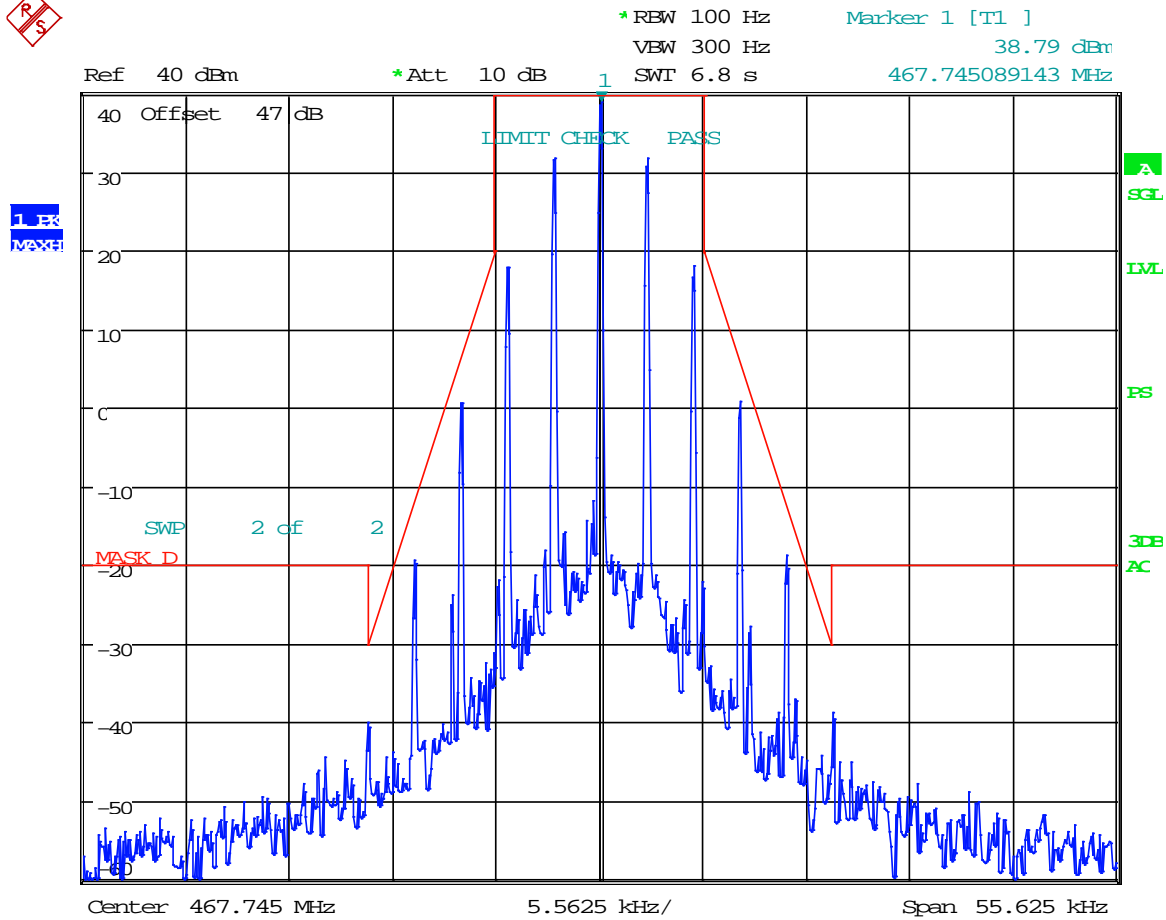
1. EK
MAX



Date: 26.APR.2018 19:00:01

EMISSION MASK D

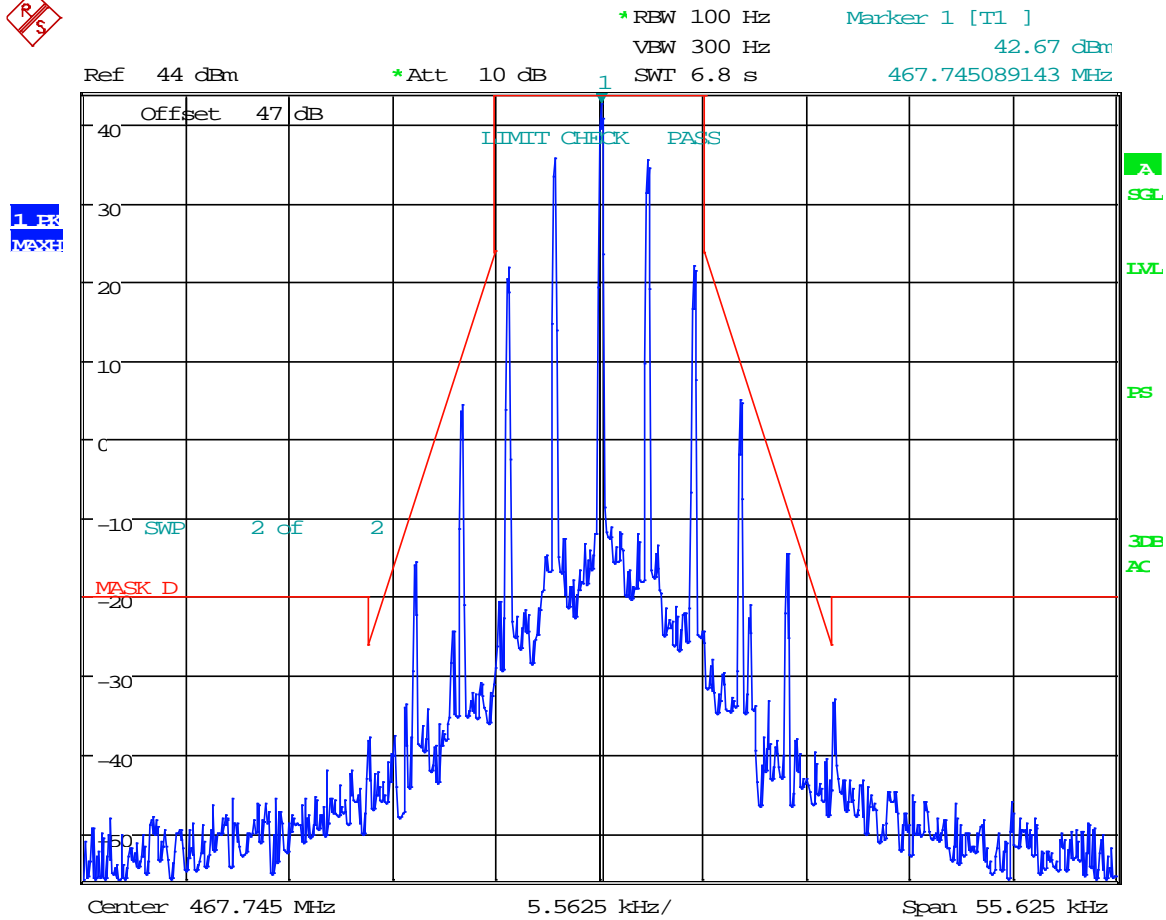
Medium Power



Date: 26.APR.2018 18:49:45

EMISSION MASK D

High Power

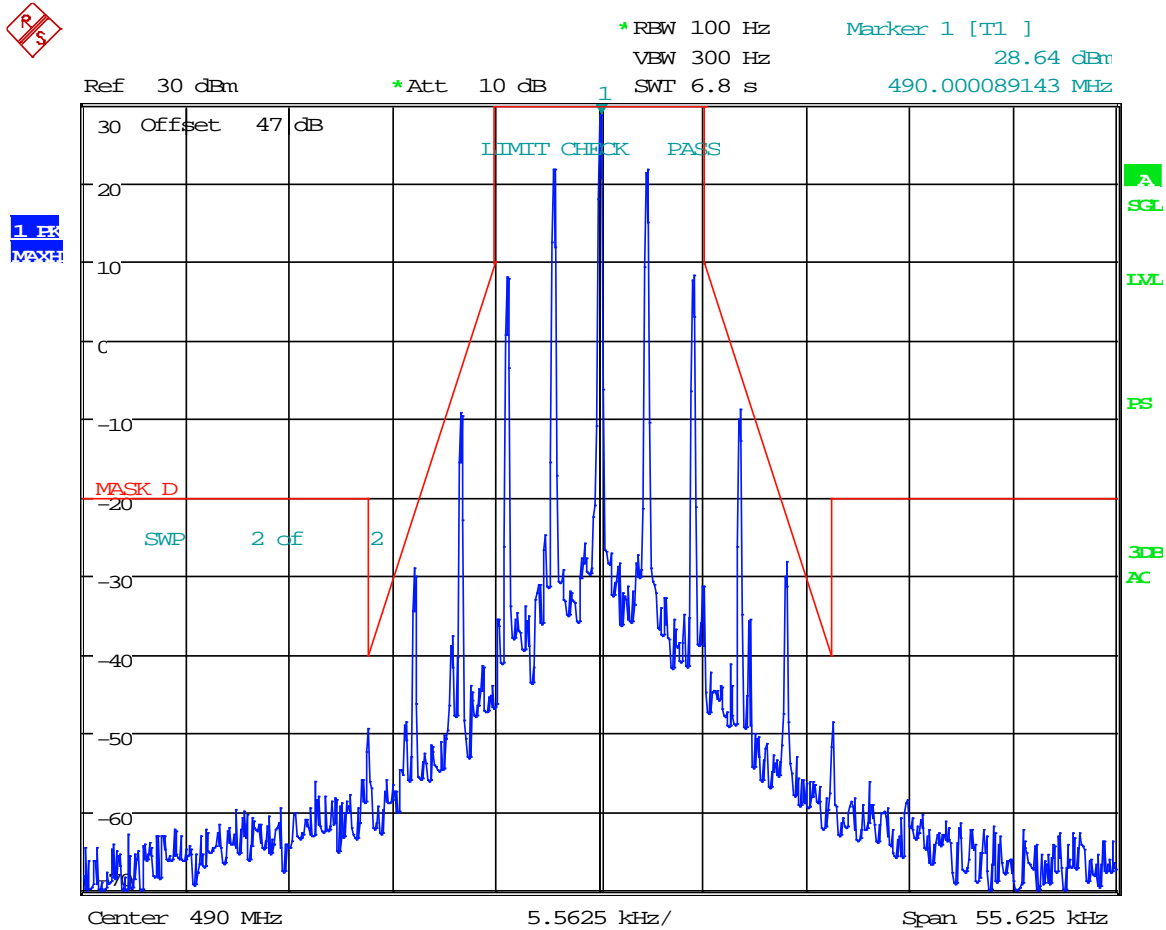


Date: 26.APR.2018 18:25:58

EMISSION MASK D

Test Data: 490.0000 MHz

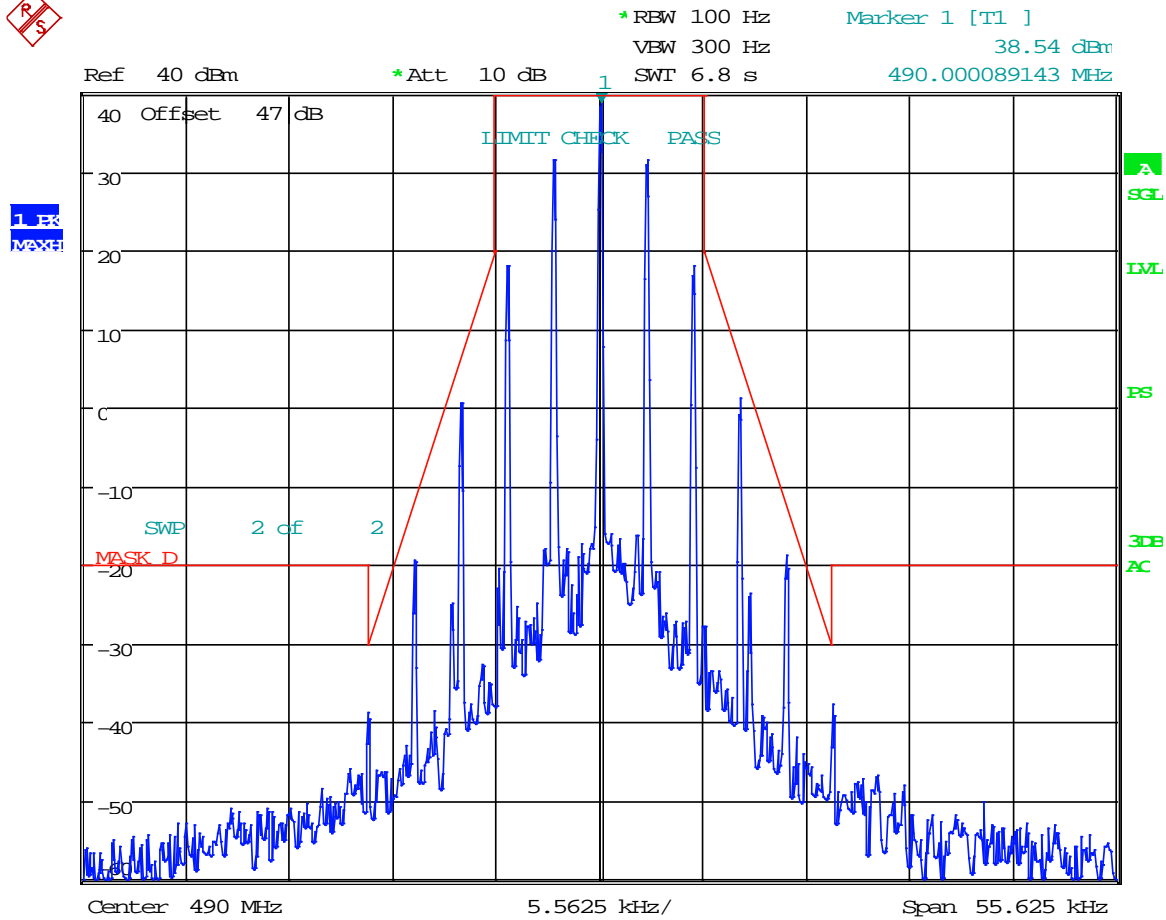
Low Power



Date: 26.APR.2018 19:01:16

EMISSION MASK D

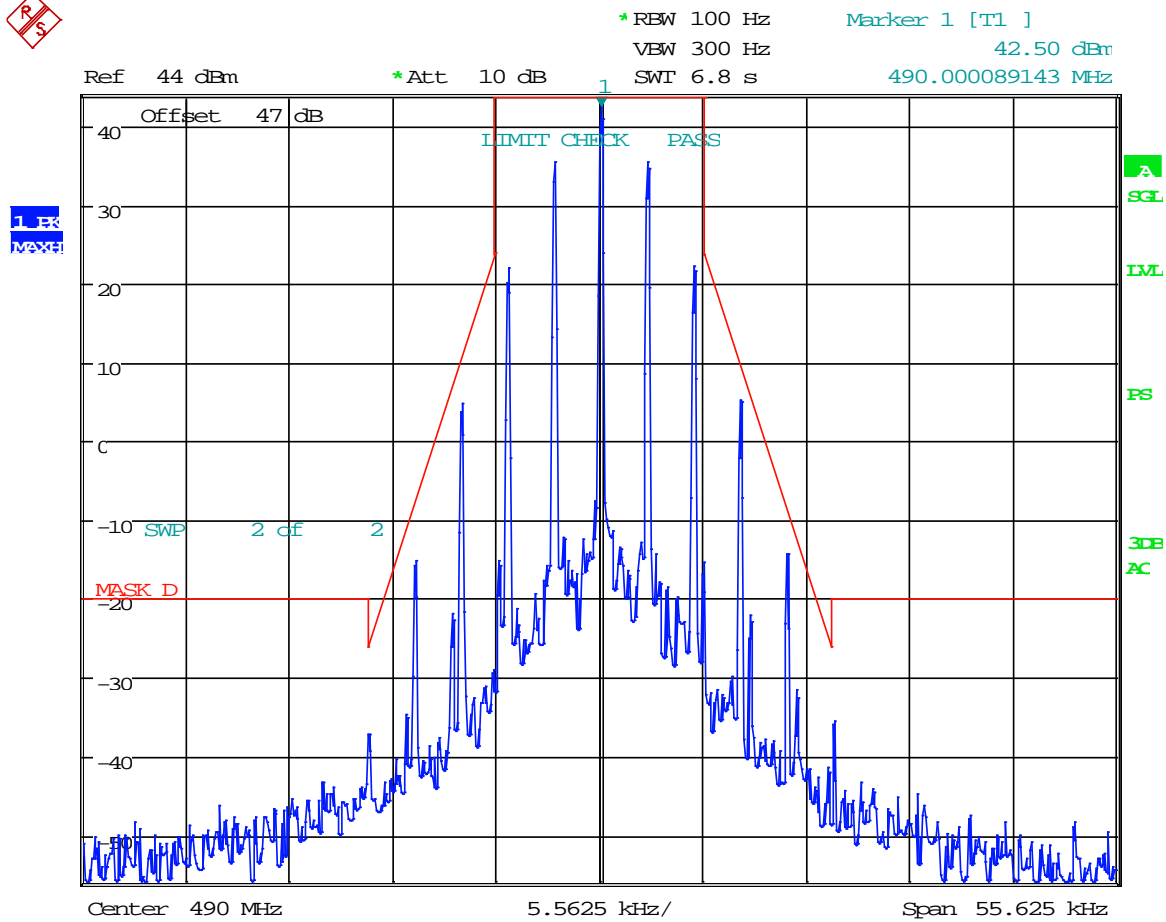
Medium Power



Date: 26.APR.2018 18:50:51

EMISSION MASK D

High Power



Date: 26.APR.2018 18:41:00

Result: Meets Requirements

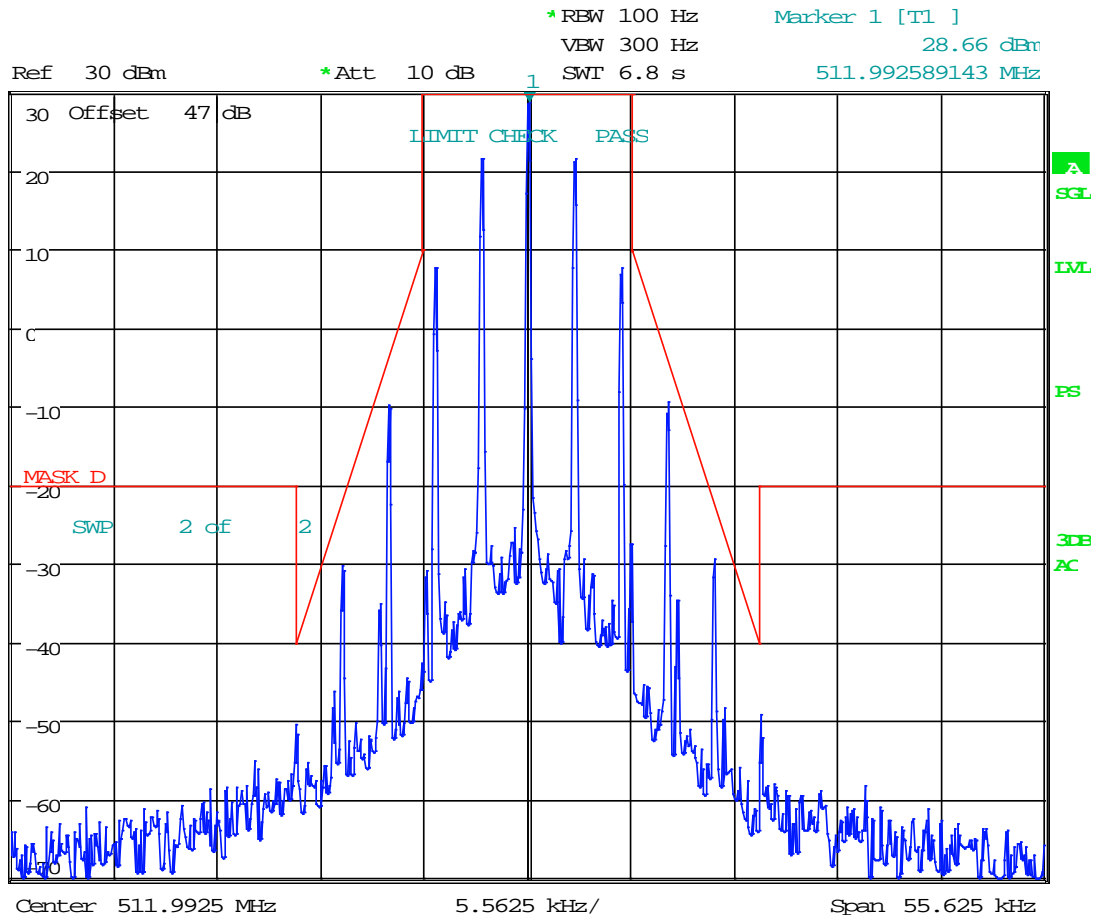
EMISSION MASK D

Test Data: 511.9925 MHz

Low Power



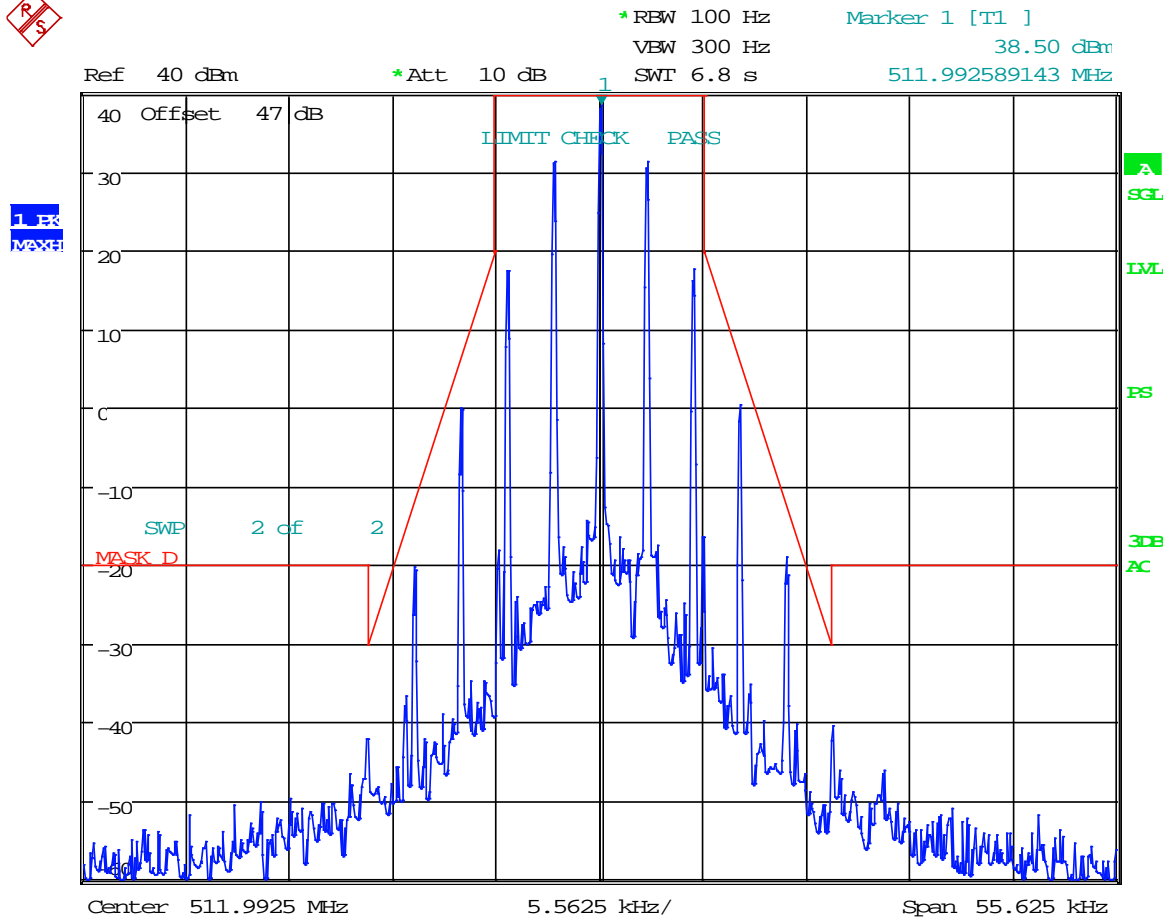
1.8K
MAXH



Date: 26.APR.2018 19:01:48

EMISSION MASK D

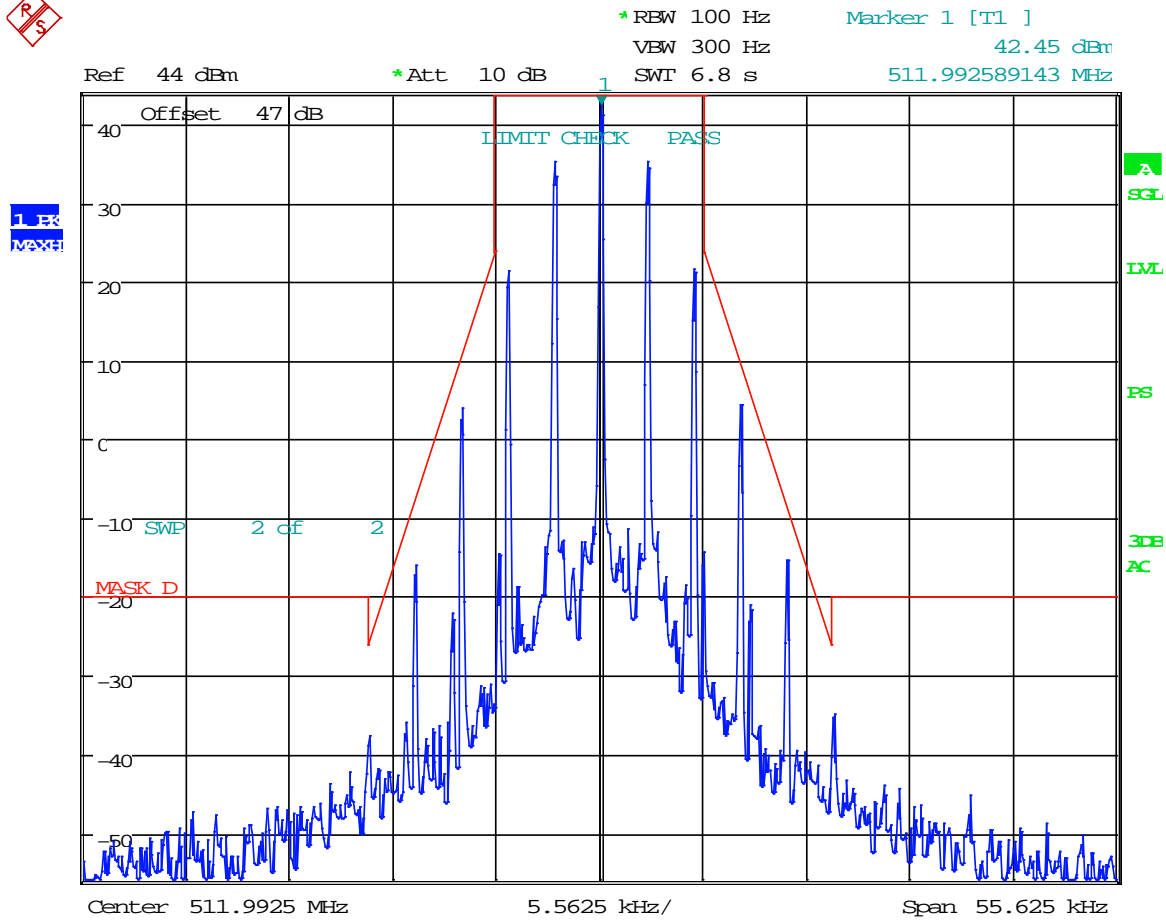
Medium Power



Date: 26.APR.2018 18:51:42

EMISSION MASK D

High Power



Date: 26.APR.2018 18:41:47

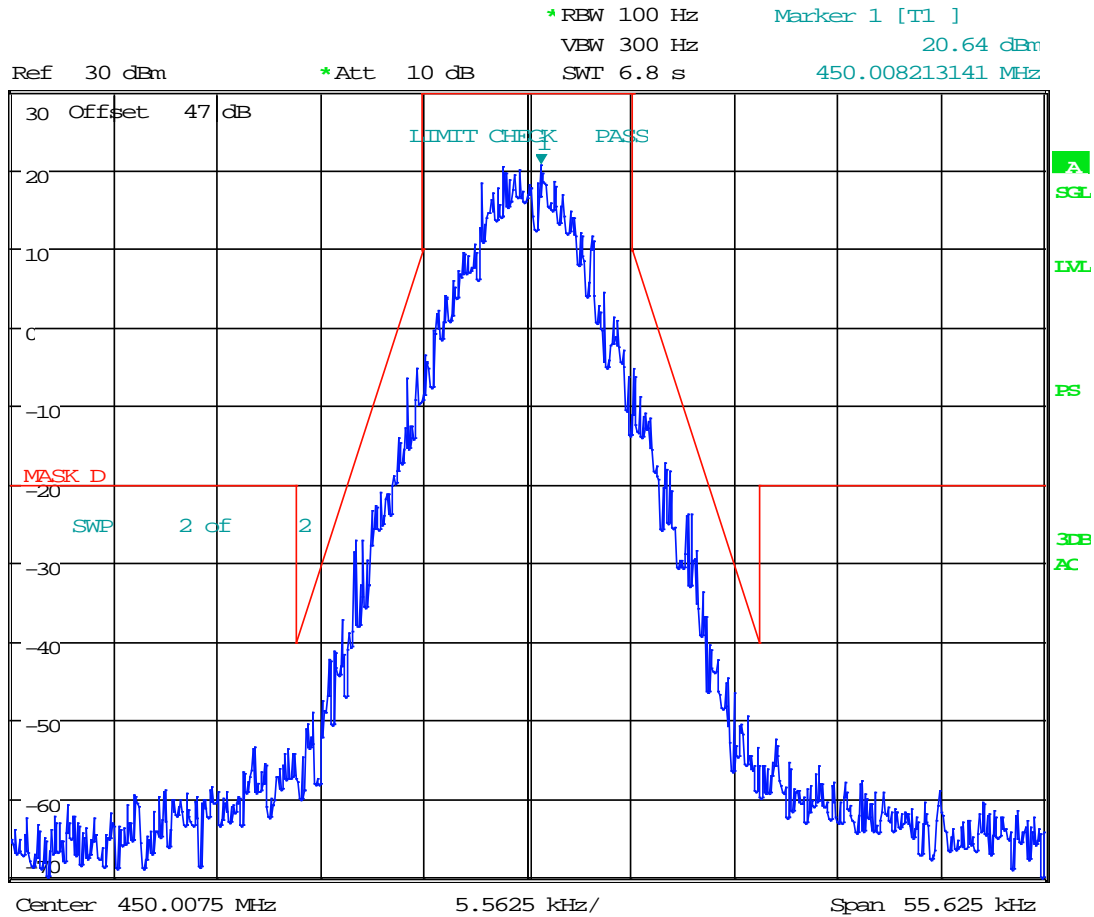
EMISSION MASK D – P25 Phase I C4FM (12.5 kHz)

Test Data: 450.0075 MHz

Low Power



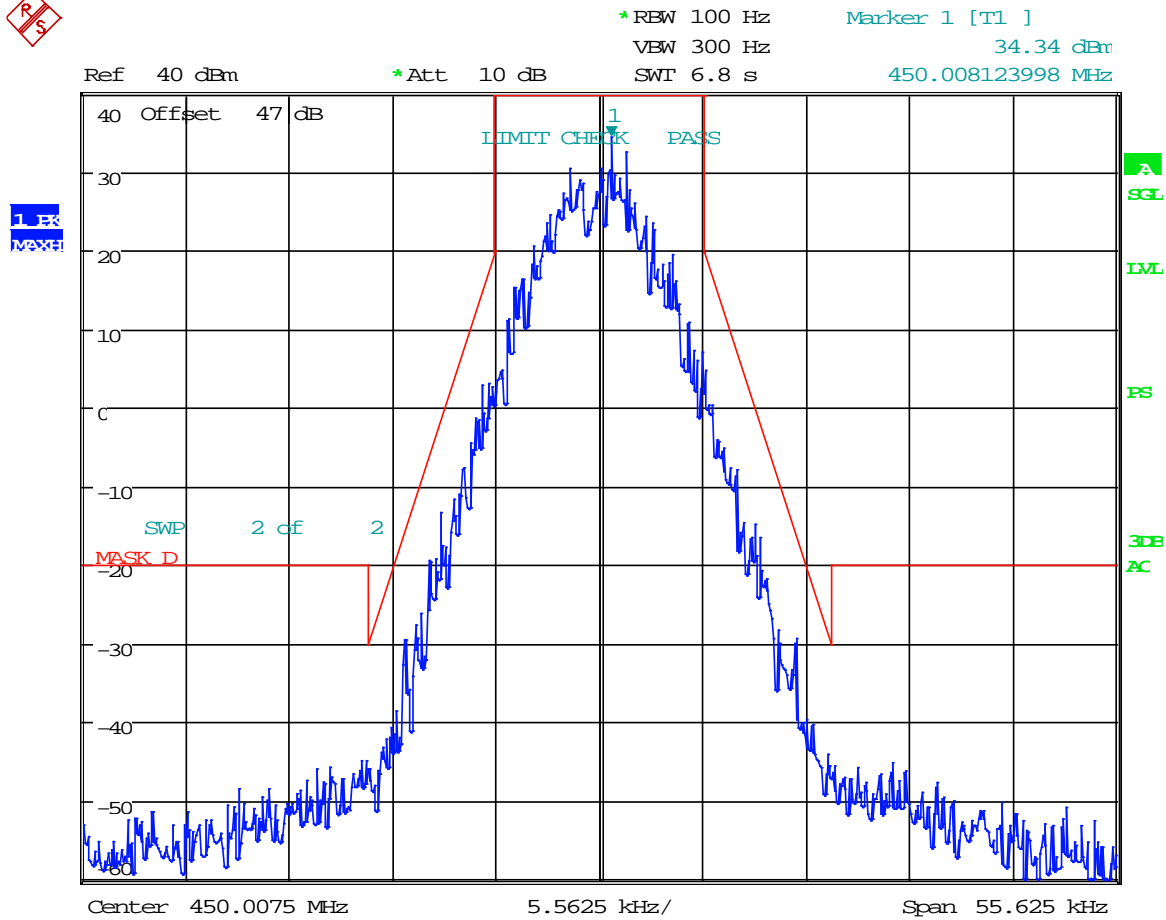
1. EK
MAXI



Date: 26.APR.2018 19:04:34

EMISSION MASK D

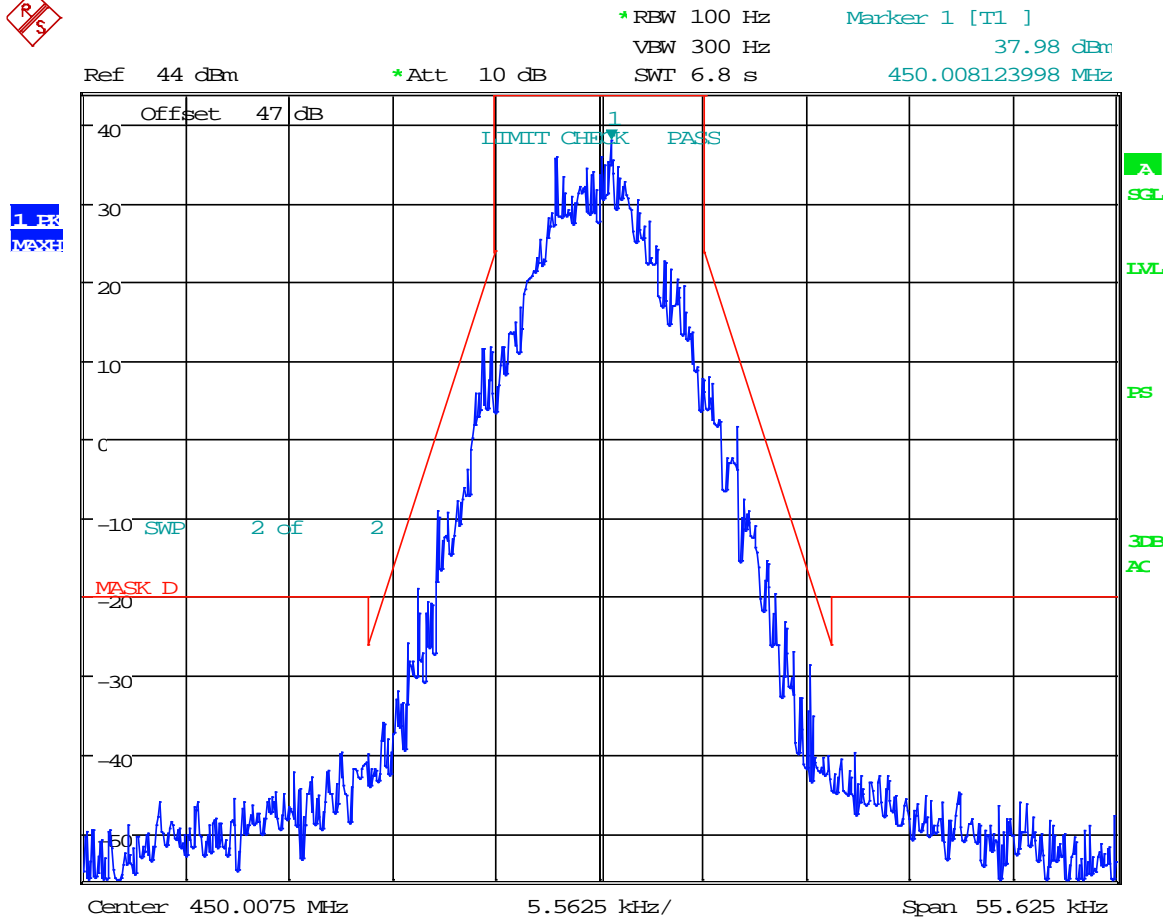
Medium Power



Date: 26.APR.2018 19:12:57

EMISSION MASK D

High Power



Date: 26.APR.2018 19:23:17

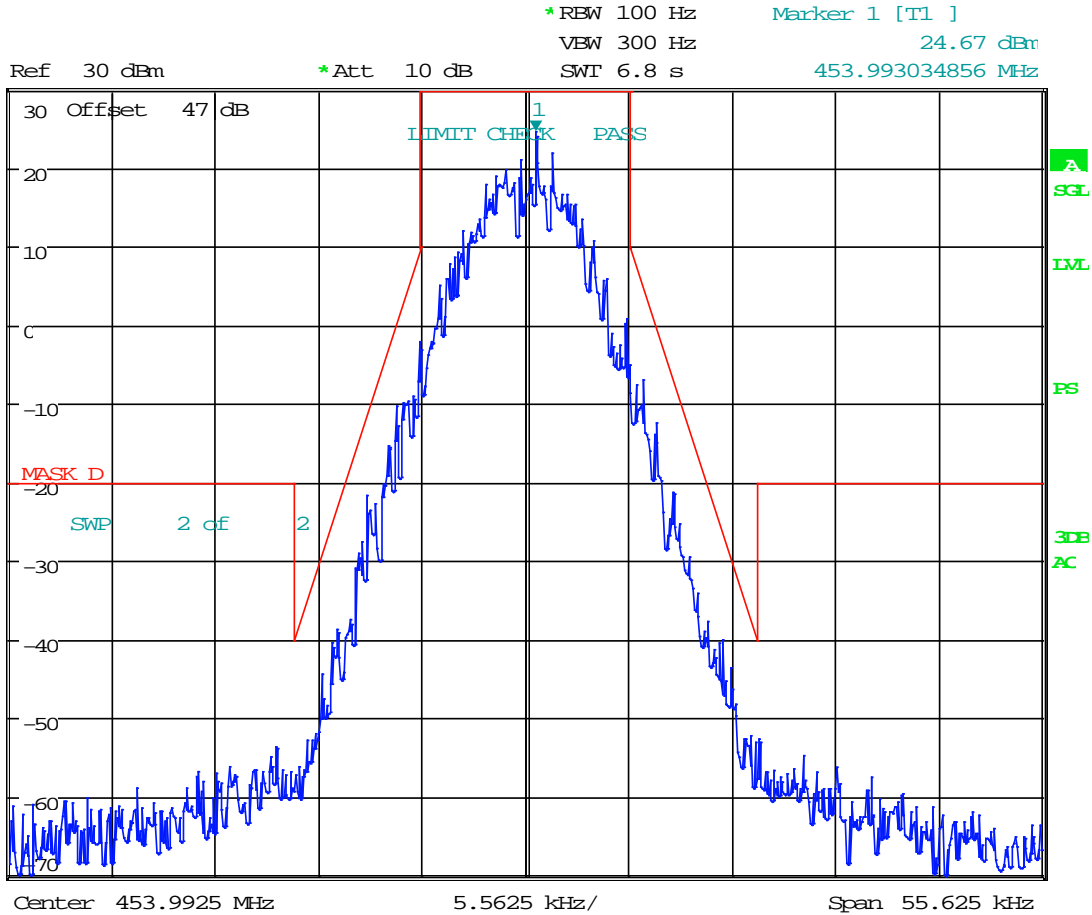
EMISSION MASK D

Test Data: 453.9925 MHz

Low Power



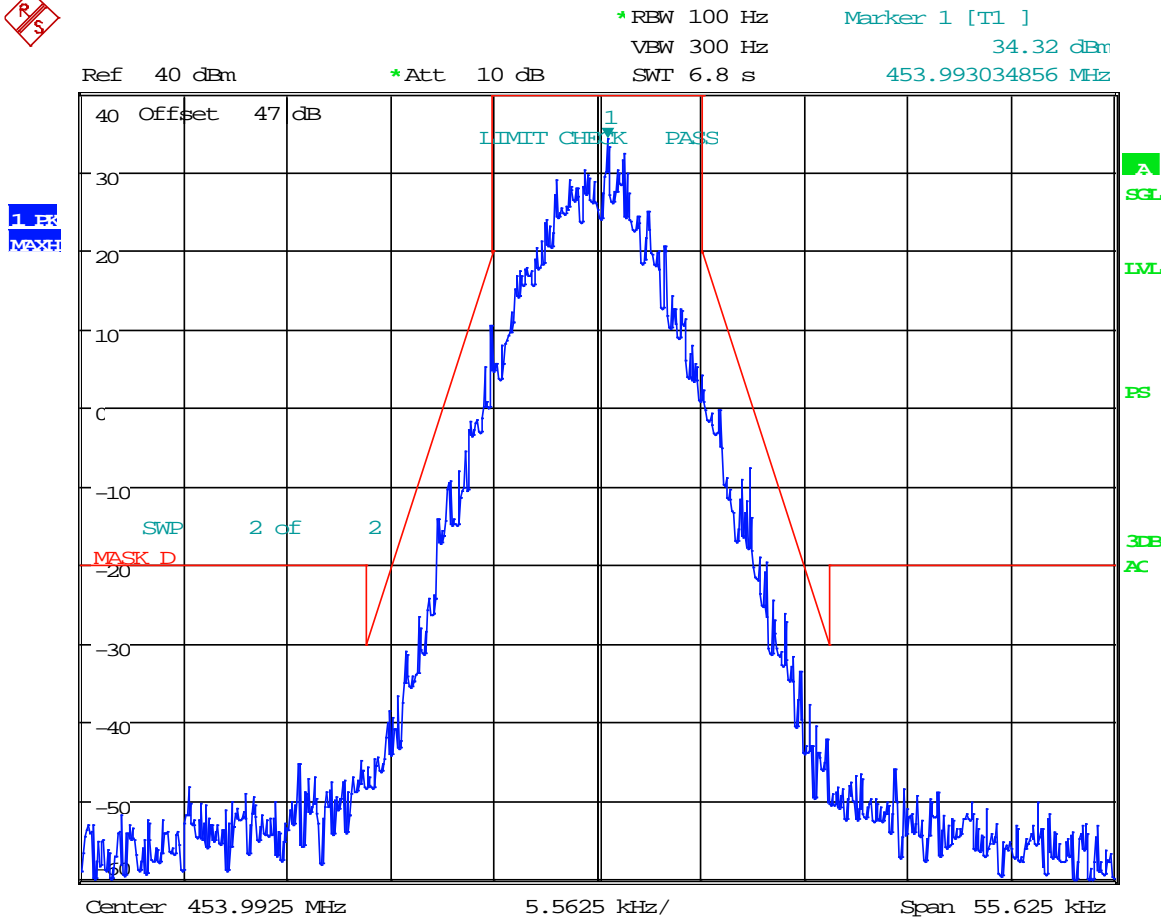
1. EK
MAX



Date: 26.APR.2018 19:05:08

EMISSION MASK D

Medium Power



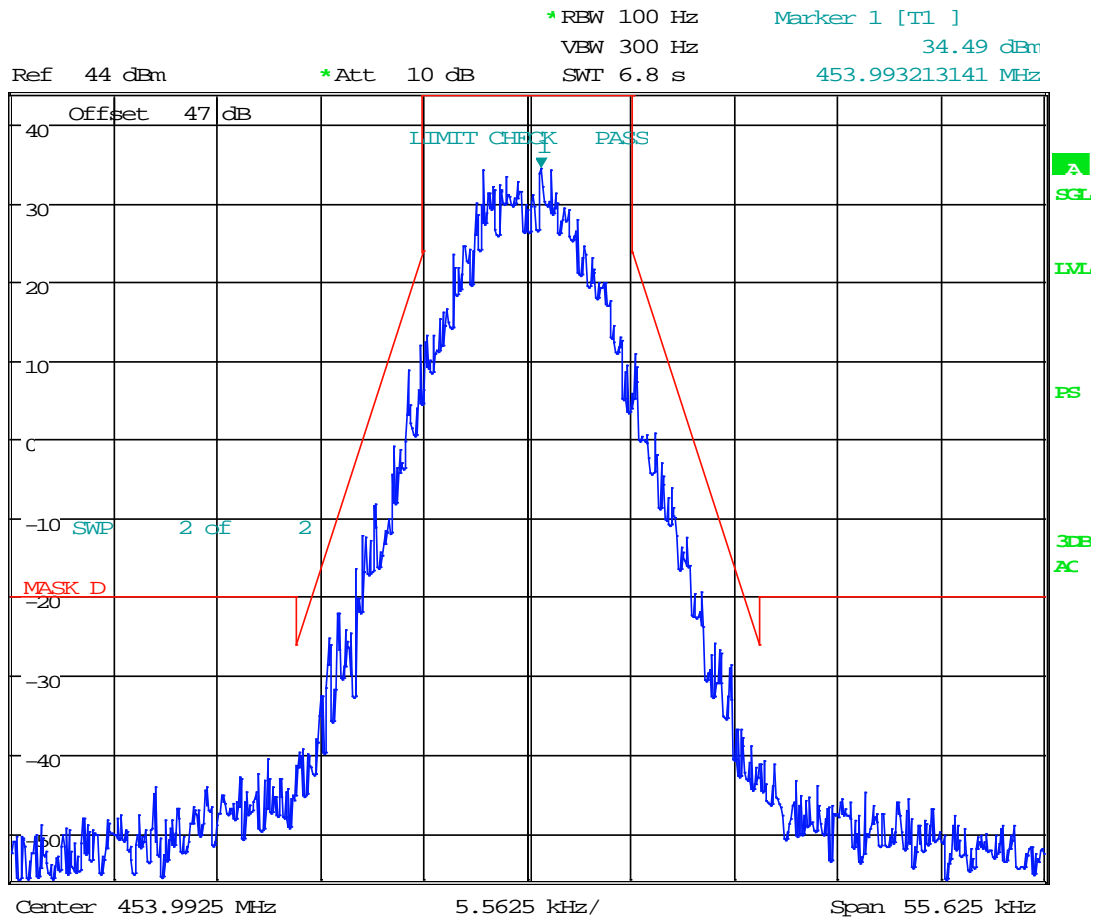
Date: 26.APR.2018 19:13:40

EMISSION MASK D

High Power



1 PK
MAX



Date: 26.APR.2018 19:23:55

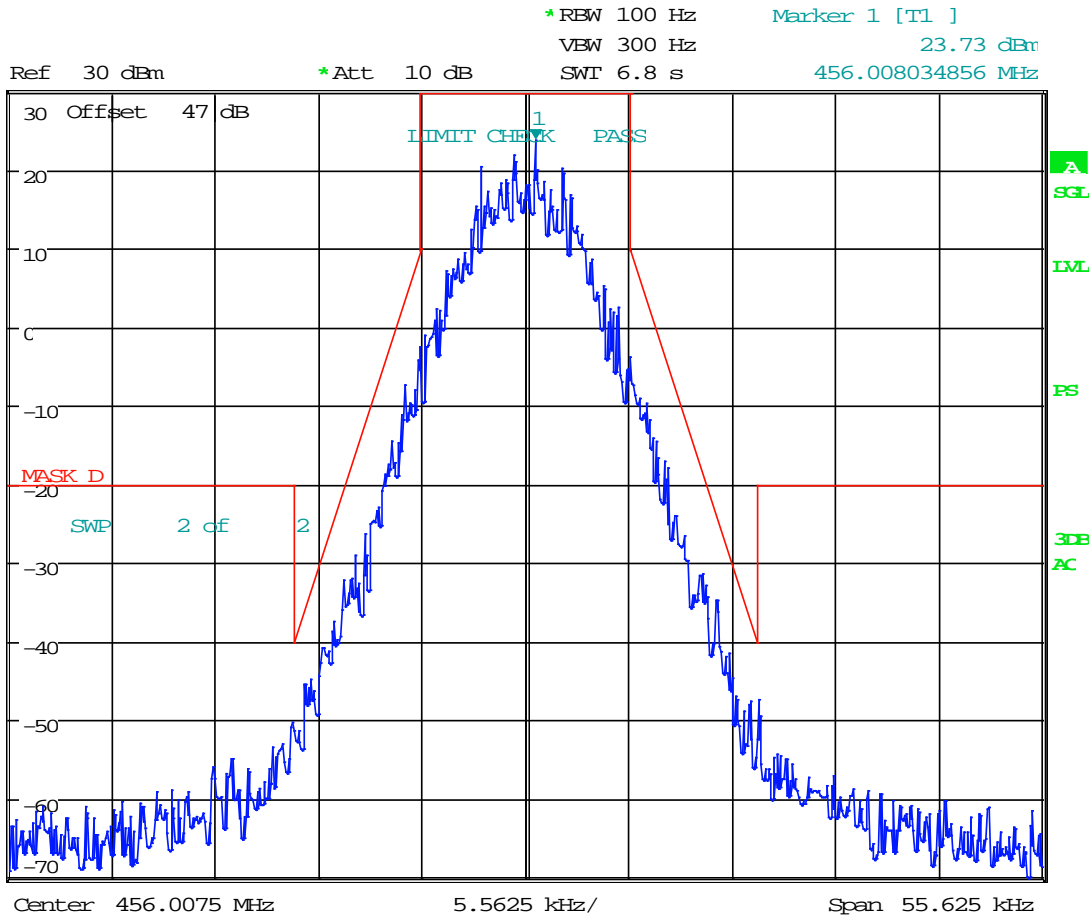
EMISSION MASK D

Test Data: 456.0075 MHz

Low Power



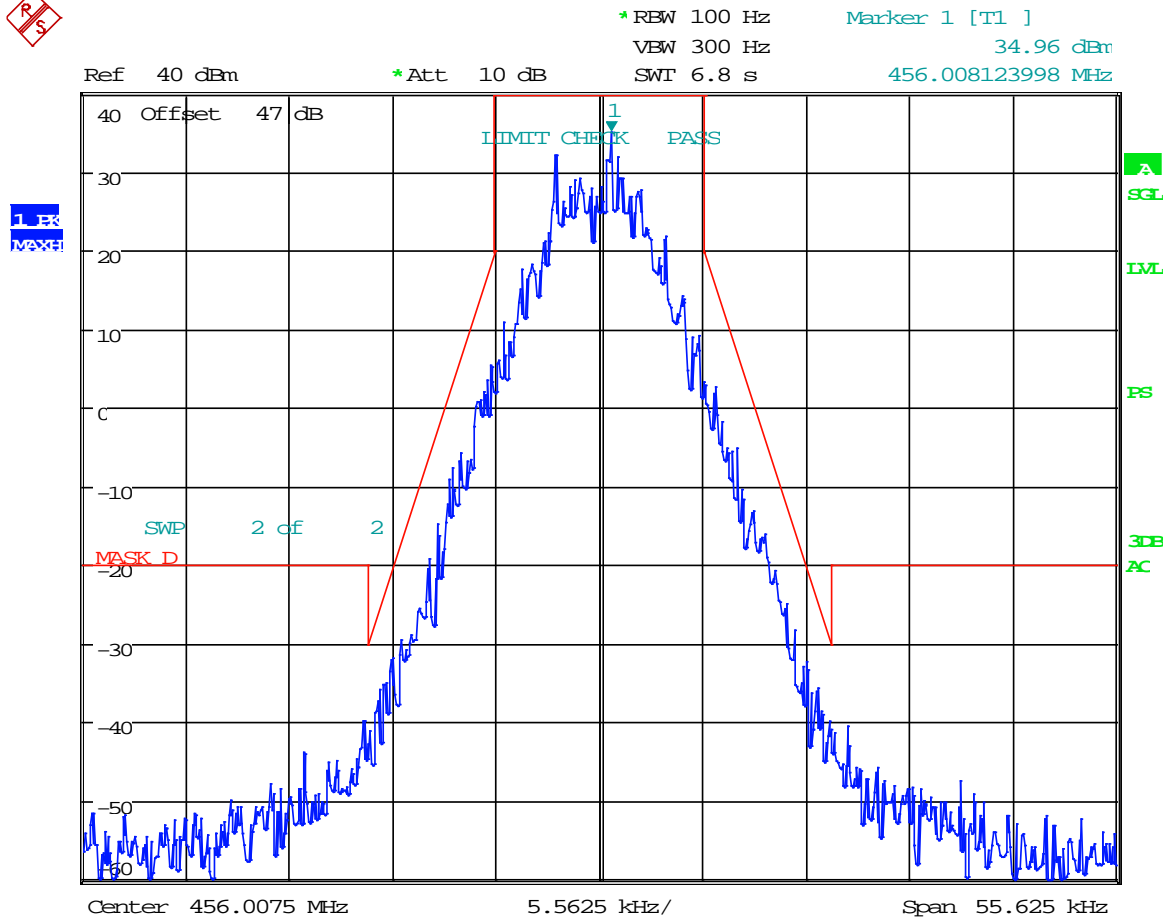
1. EK
MAX



Date: 26.APR.2018 19:06:16

EMISSION MASK D

Medium Power



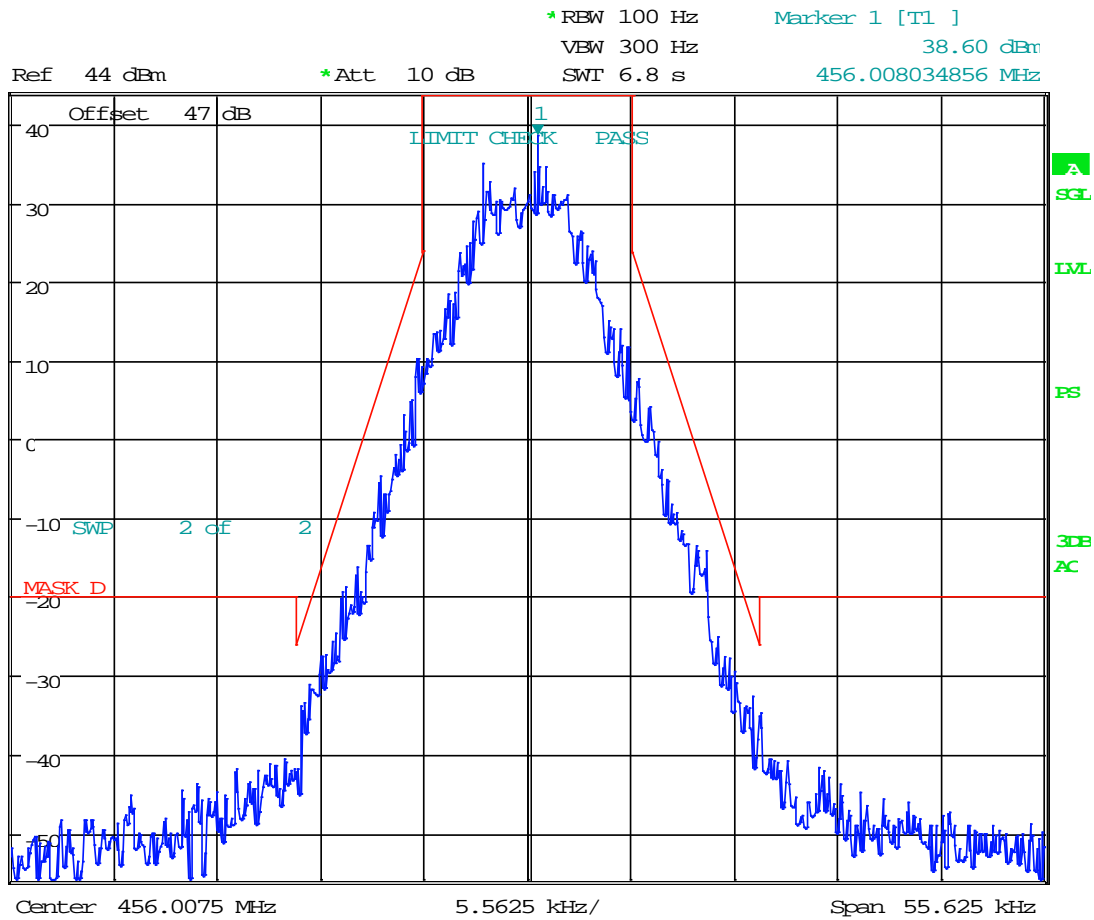
Date: 26.APR.2018 19:14:46

EMISSION MASK D

High Power



1 PK
MAX



Date: 26.APR.2018 19:24:57

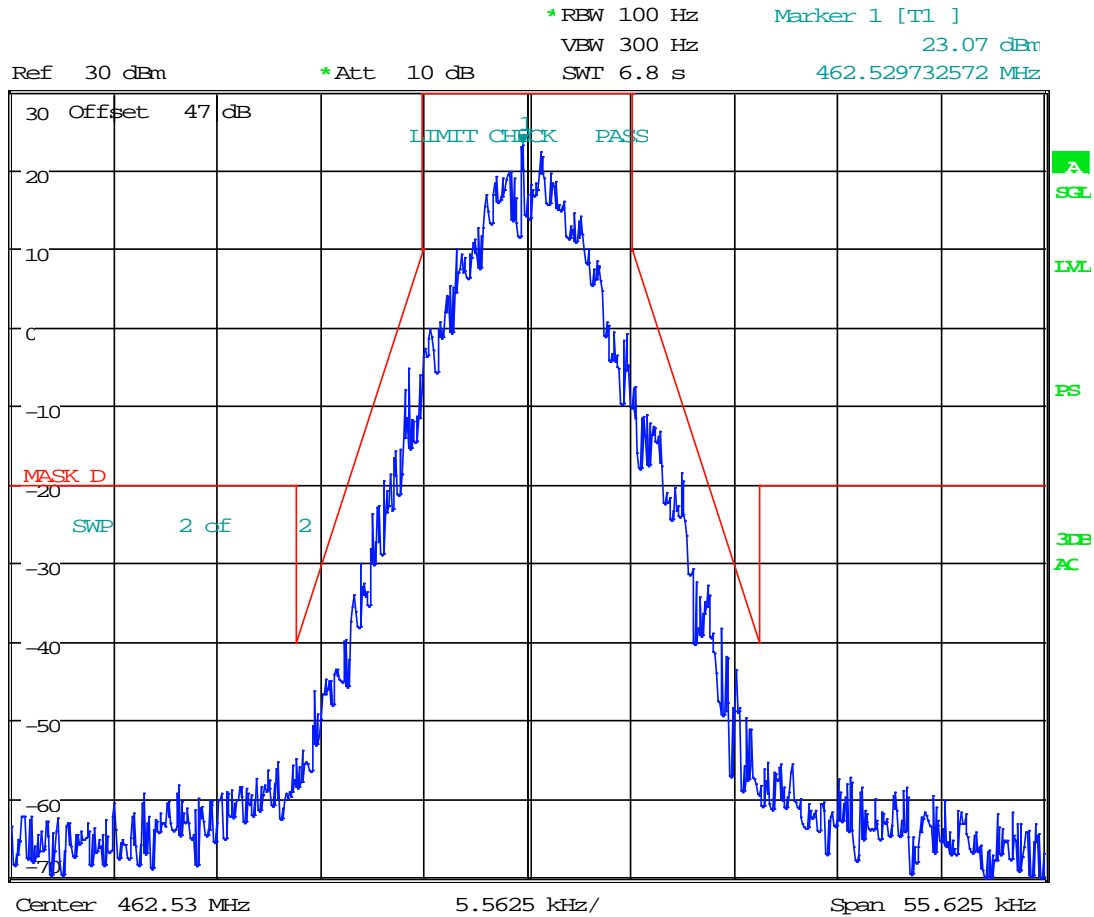
EMISSION MASK D

Test Data: 462.5300 MHz

Low Power



1.8K
MAX



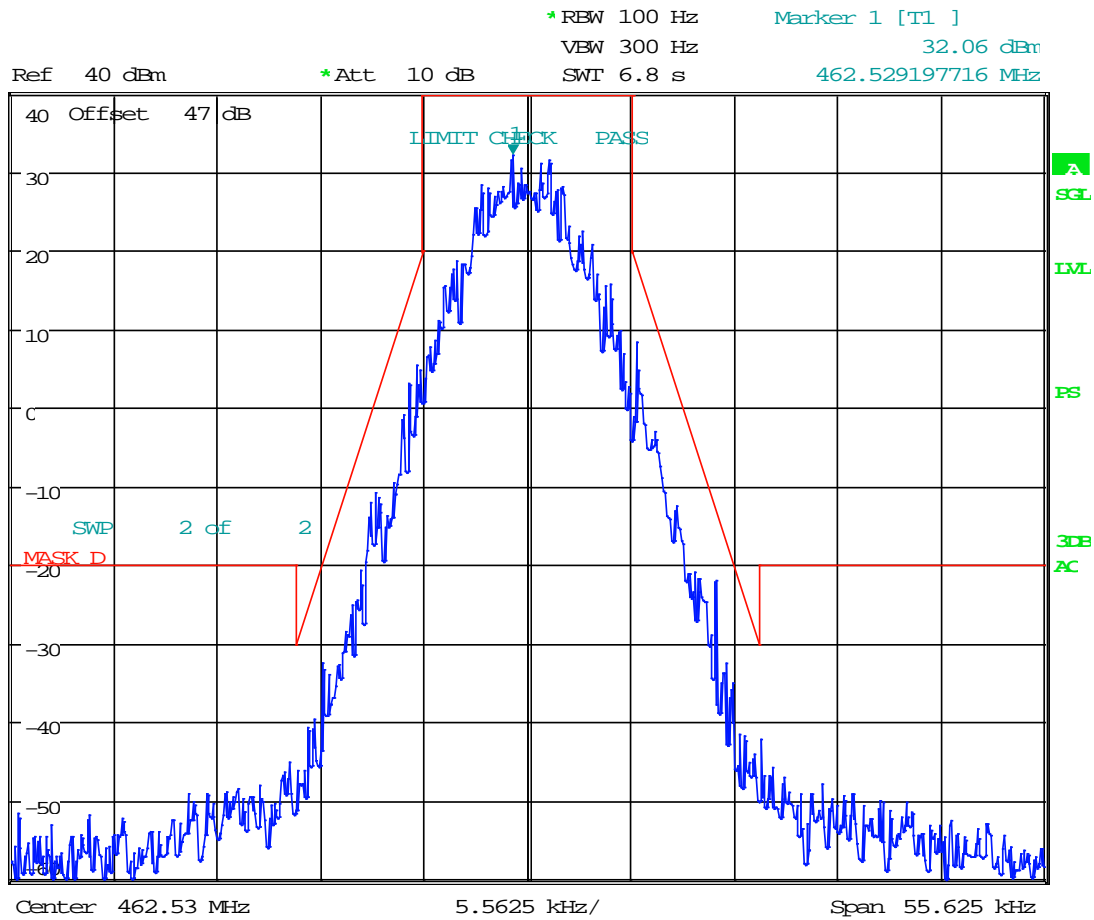
Date: 26.APR.2018 19:07:27

EMISSION MASK D

Medium Power



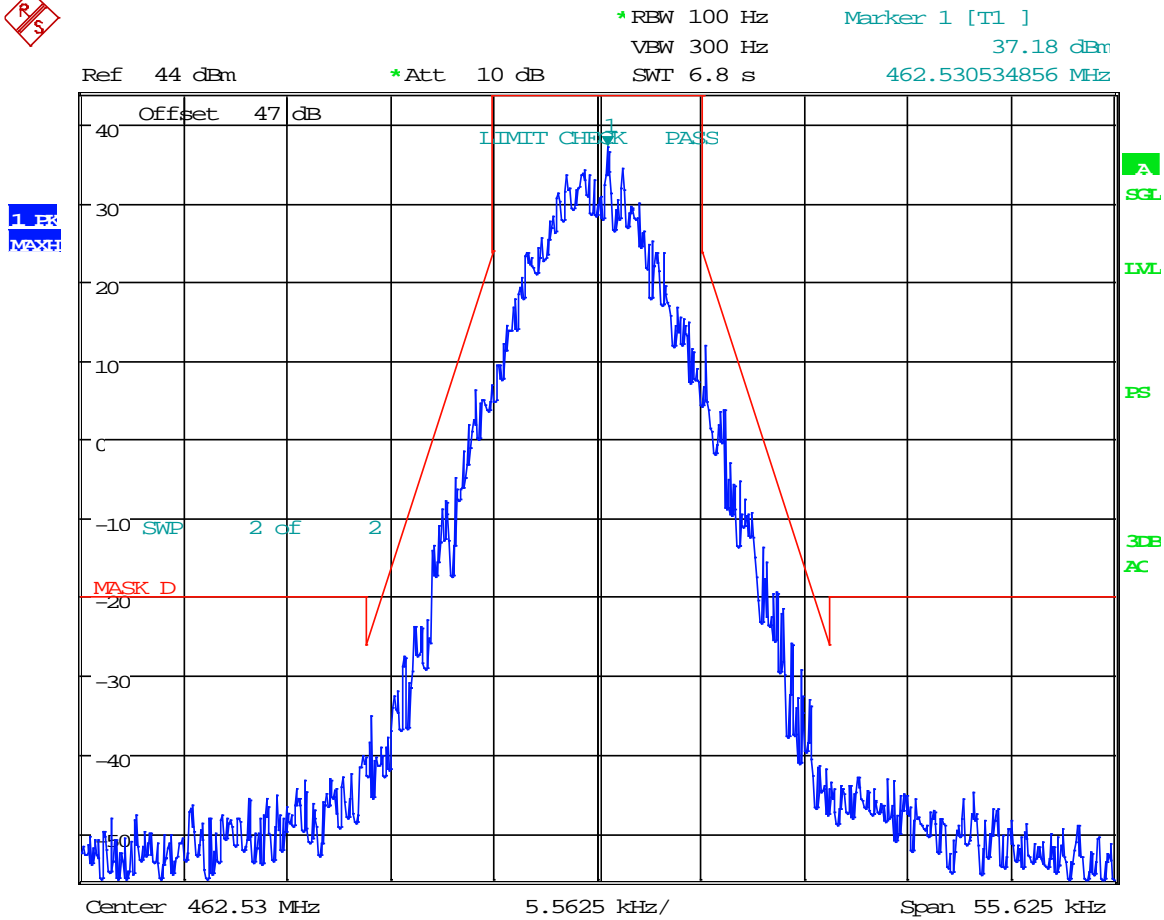
1 PK
MAXH



Date: 26.APR.2018 19:15:49

EMISSION MASK D

High Power



Date: 26.APR.2018 19:26:23

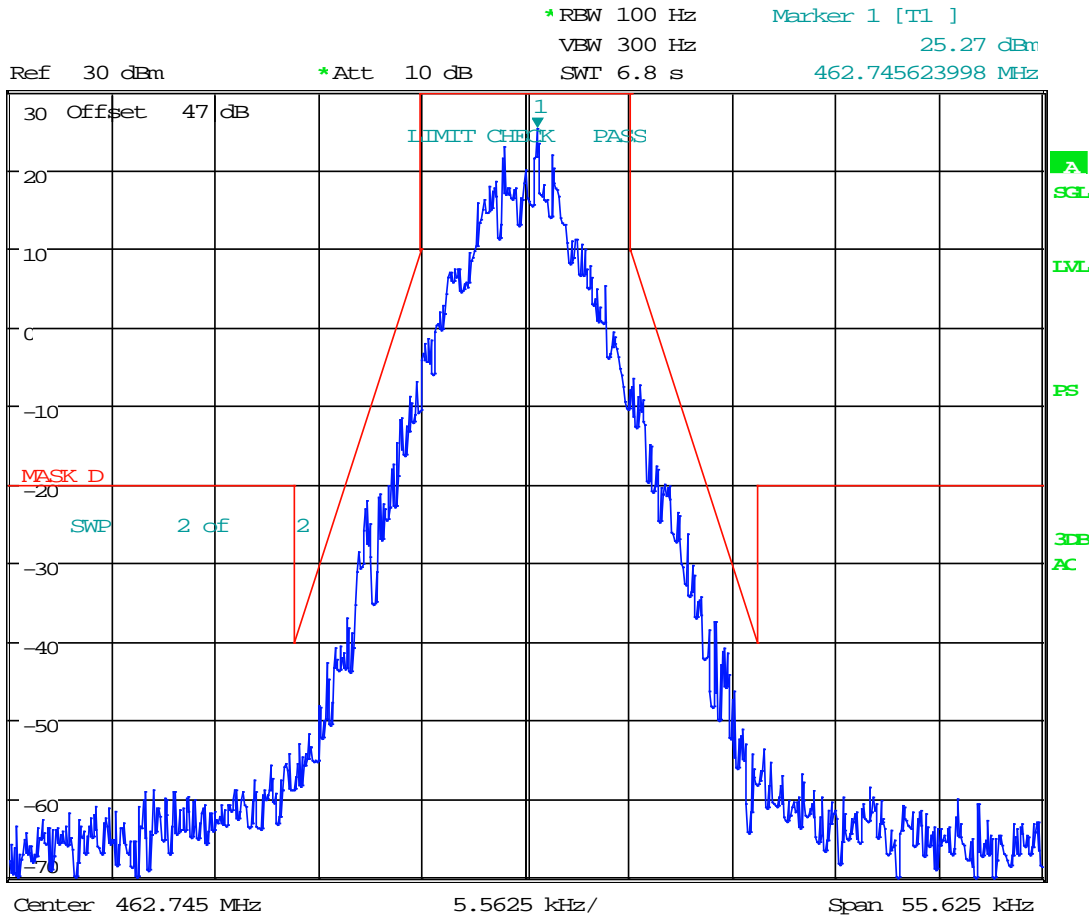
EMISSION MASK D

Test Data: 462.7450 MHz

Low Power



1. EK
MAX



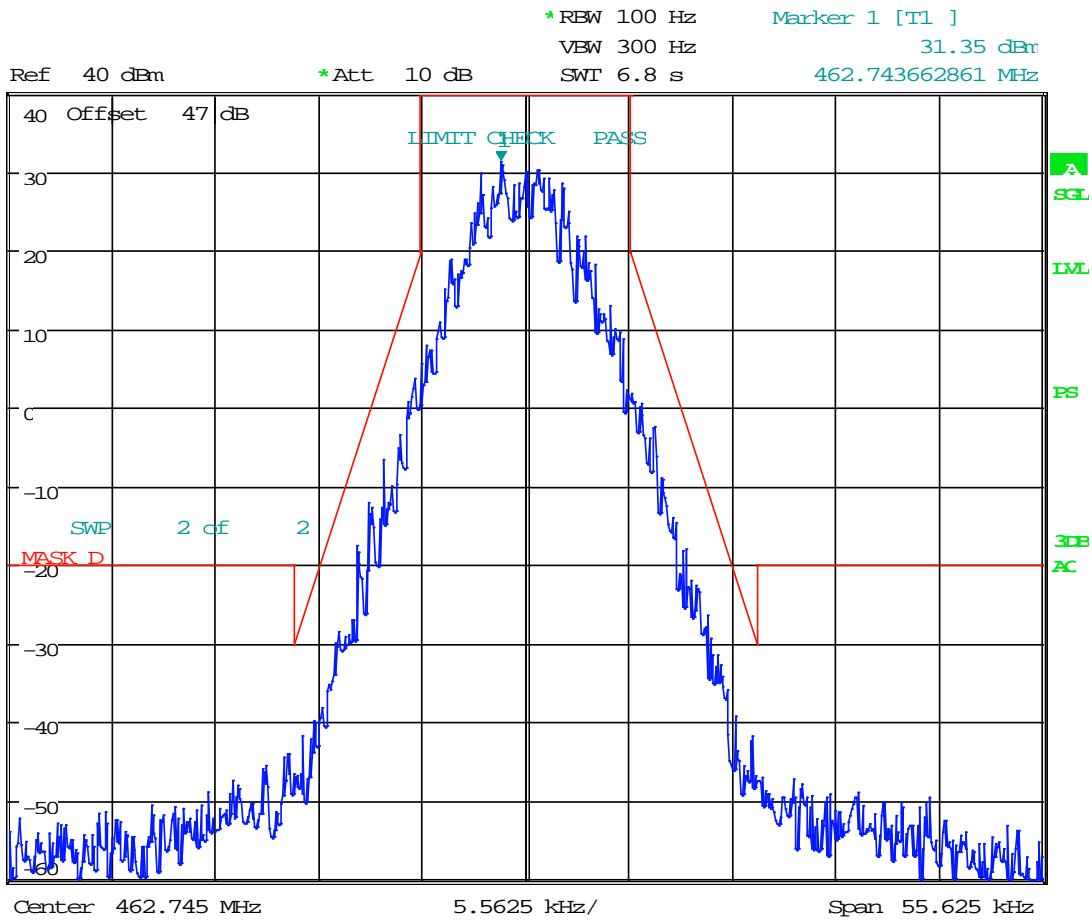
Date: 26.APR.2018 19:08:00

EMISSION MASK D

Medium Power



1 PK
MAXH



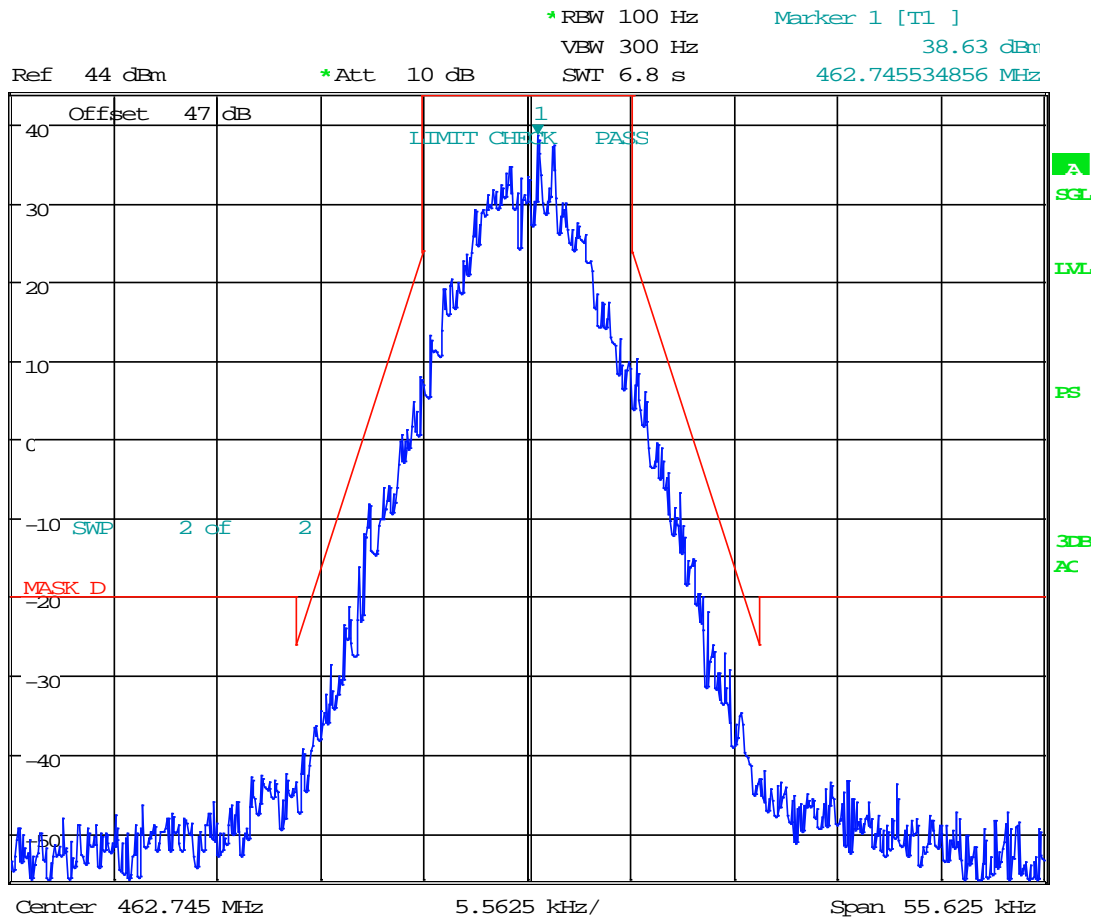
Date: 26.APR.2018 19:16:19

EMISSION MASK D

High Power



1 PK
MAX



Date: 26.APR.2018 19:26:55

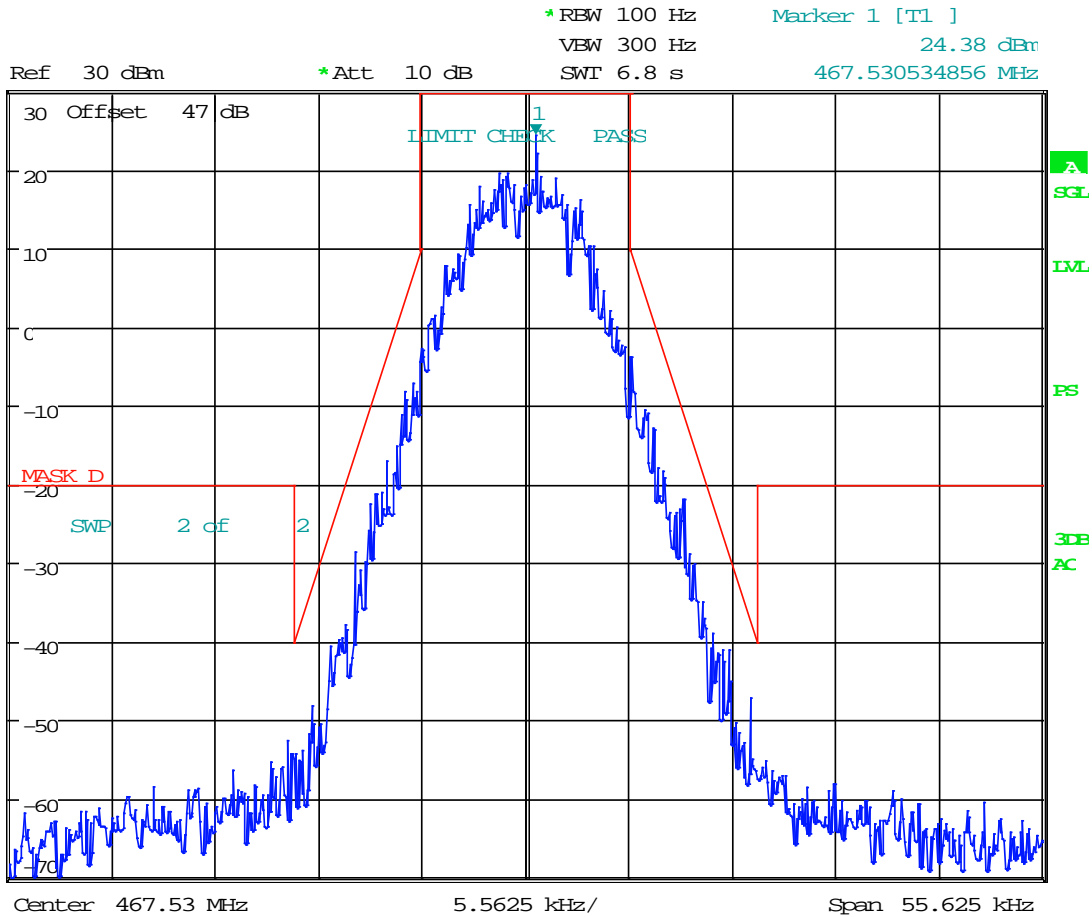
EMISSION MASK D

Test Data: 467.5300 MHz

Low Power



1. EK
MAX



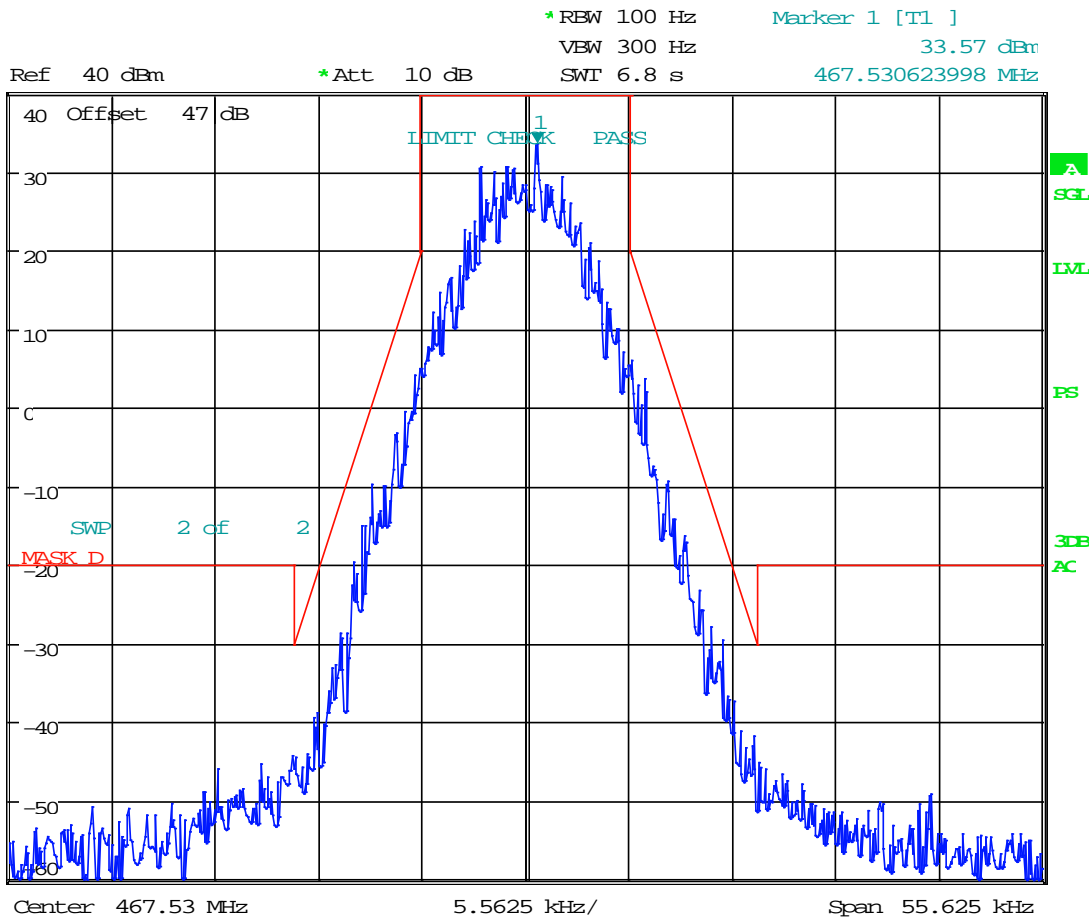
Date: 26.APR.2018 19:08:37

EMISSION MASK D

Medium Power



1 PK
MAXH



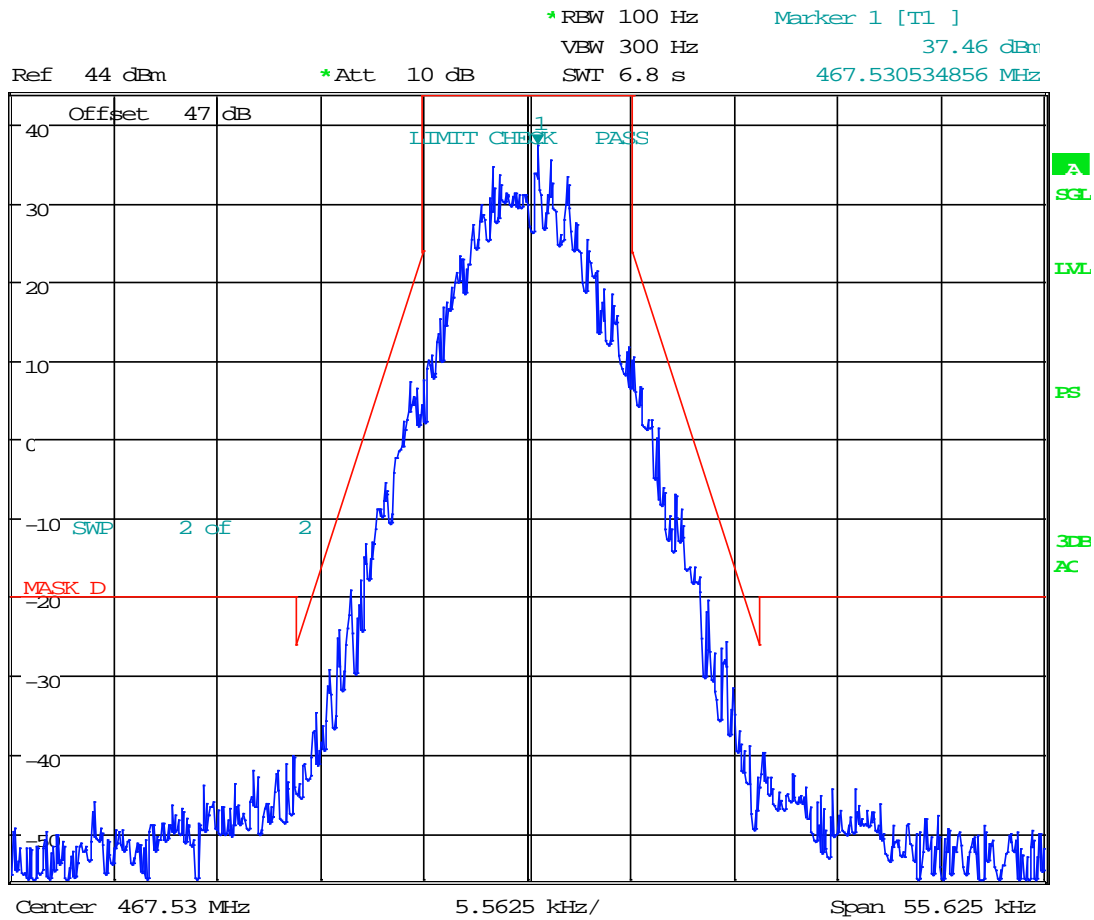
Date: 26.APR.2018 19:16:50

EMISSION MASK D

High Power



1 PK
MAX



Date: 26.APR.2018 19:27:26

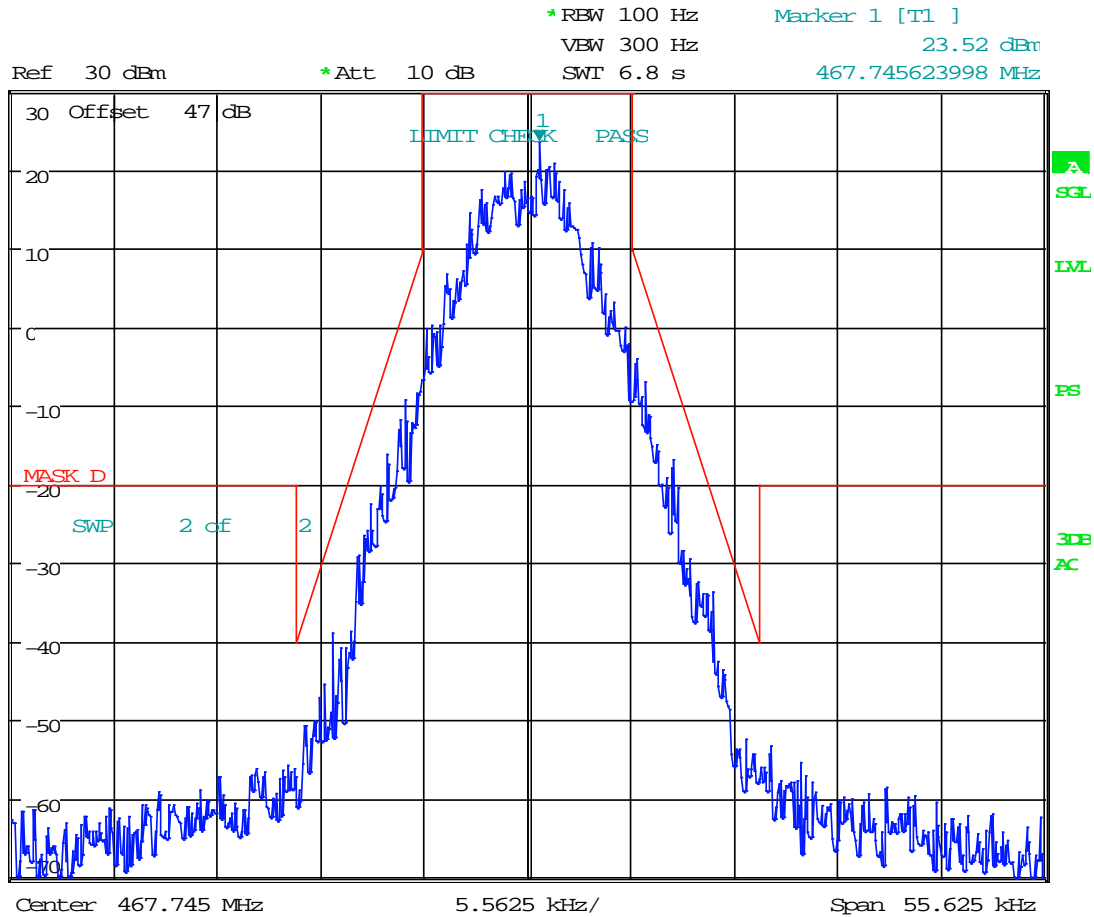
EMISSION MASK D

Test Data: 467.7450 MHz

Low Power



1. EK
MAXH



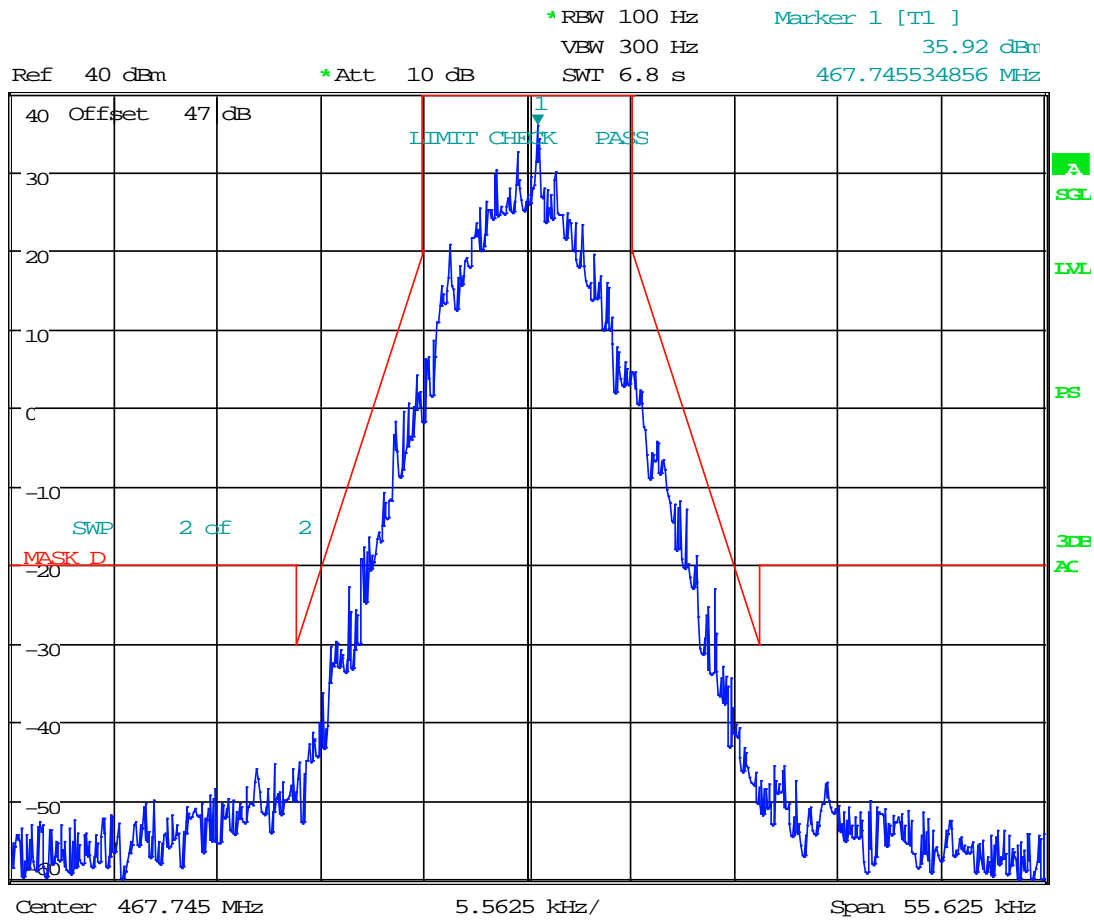
Date: 26.APR.2018 19:09:15

EMISSION MASK D

Medium Power



1 PK
MAXH



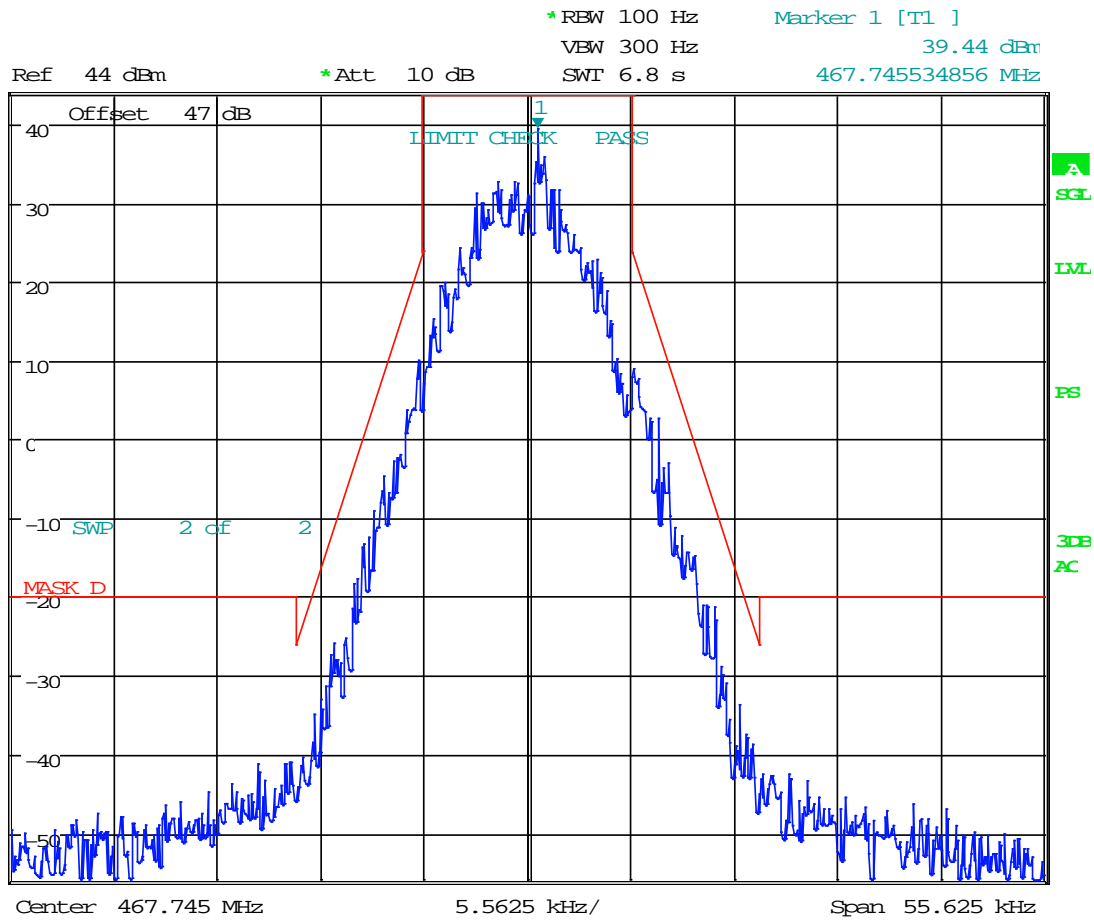
Date: 26.APR.2018 19:17:21

EMISSION MASK D

High Power



1 PK
MAX



Date: 26.APR.2018 19:27:59

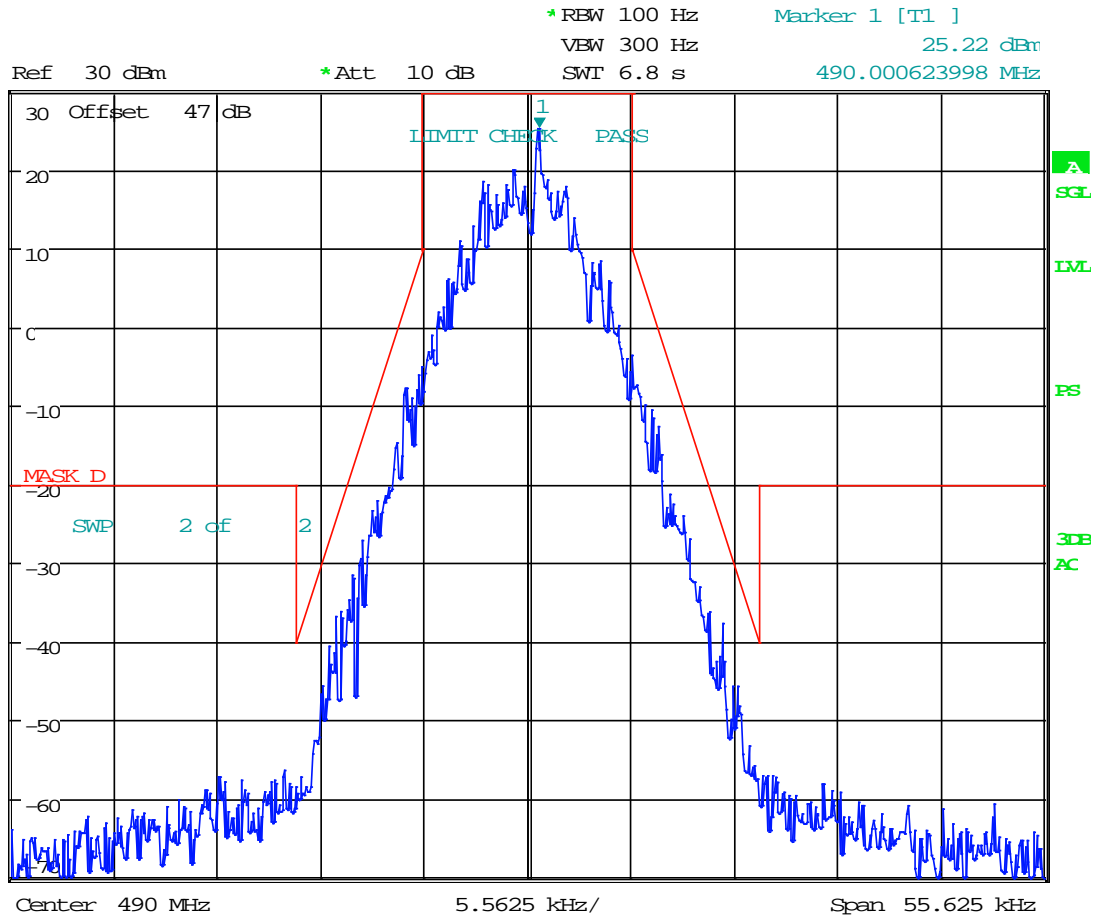
EMISSION MASK D

Test Data: 490.0000 MHz

Low Power



1.8K
MaxH



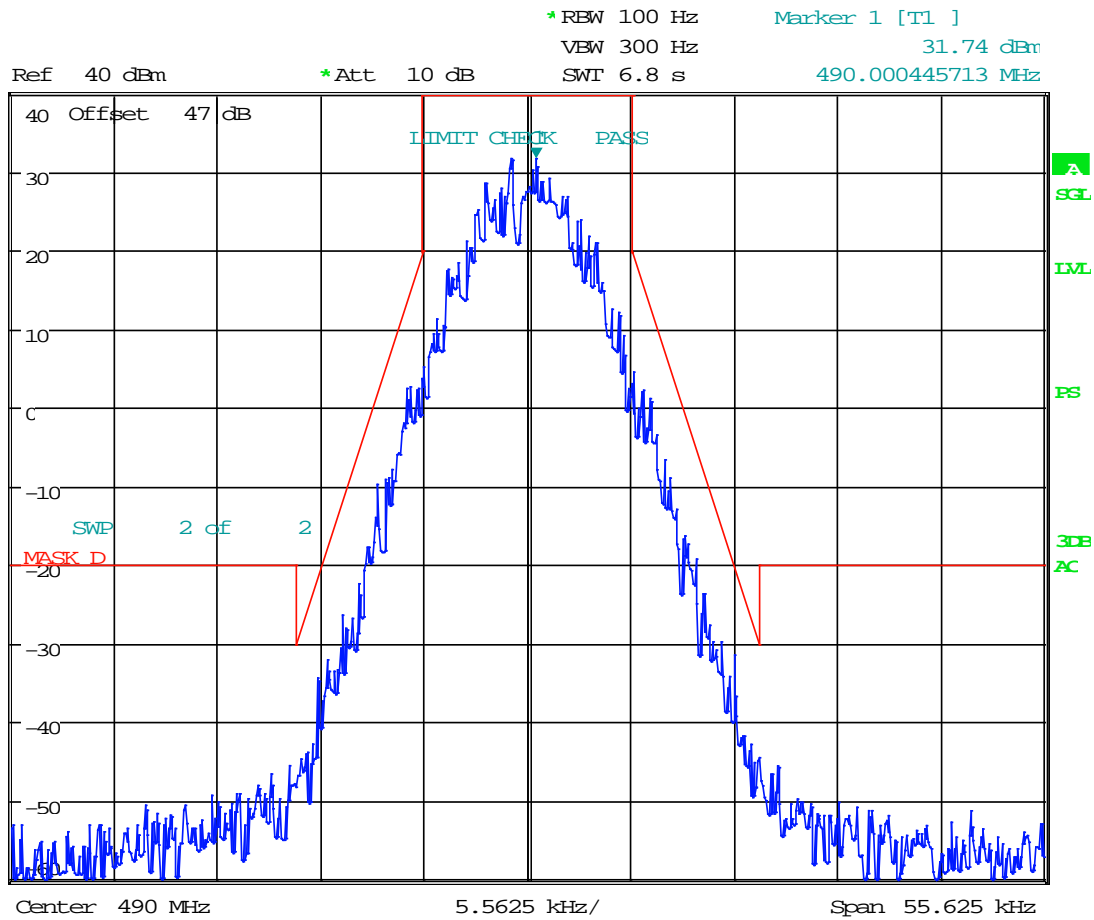
Date: 26.APR.2018 19:10:31

EMISSION MASK D

Medium Power



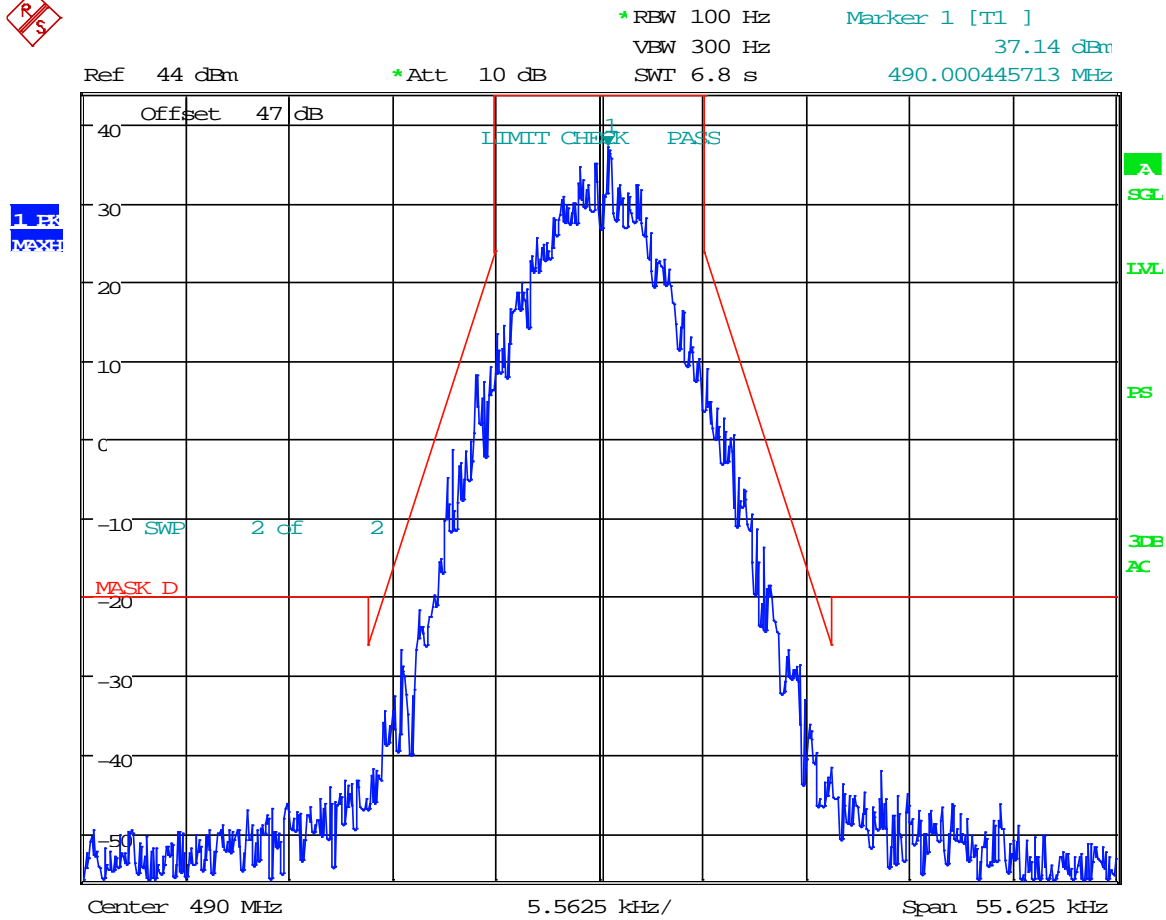
1 PK
MAXH



Date: 26.APR.2018 19:18:27

EMISSION MASK D

High Power



Date: 26.APR.2018 19:29:00

Result: Meets Requirements

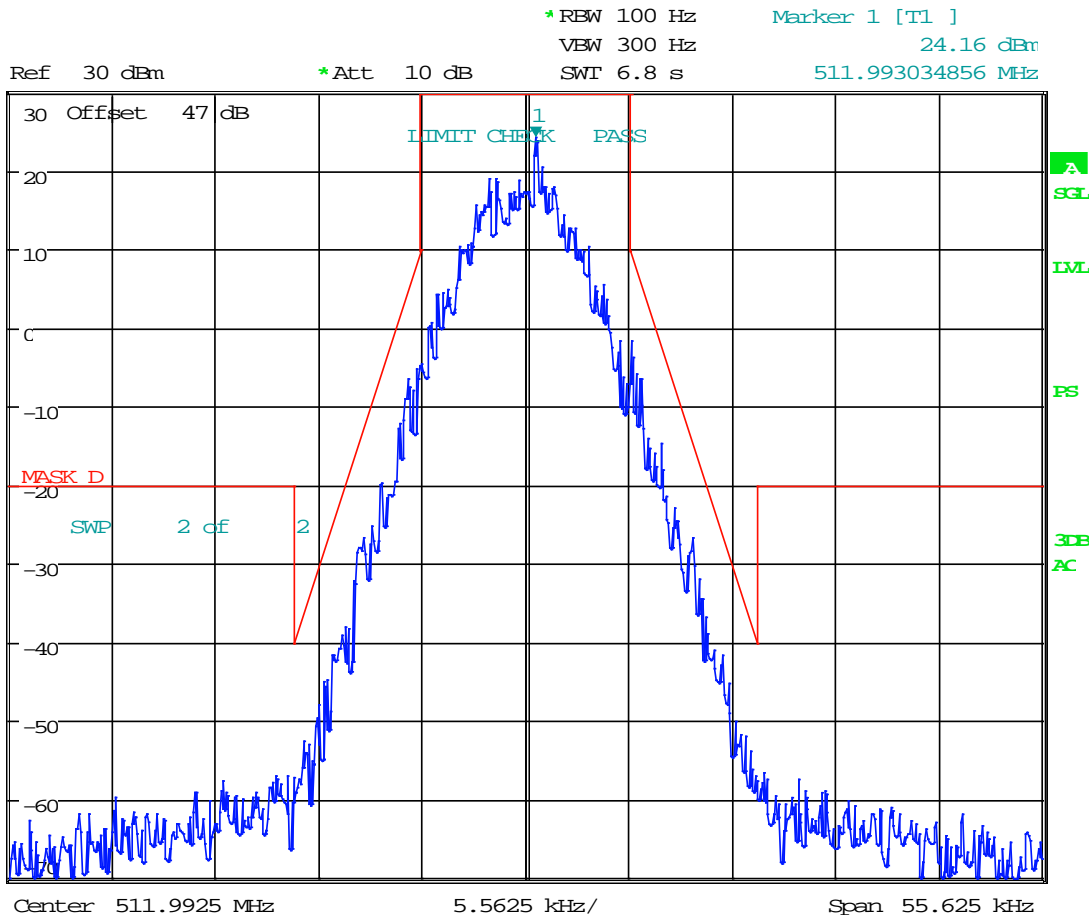
EMISSION MASK D

Test Data: 511.9925 MHz

Low Power



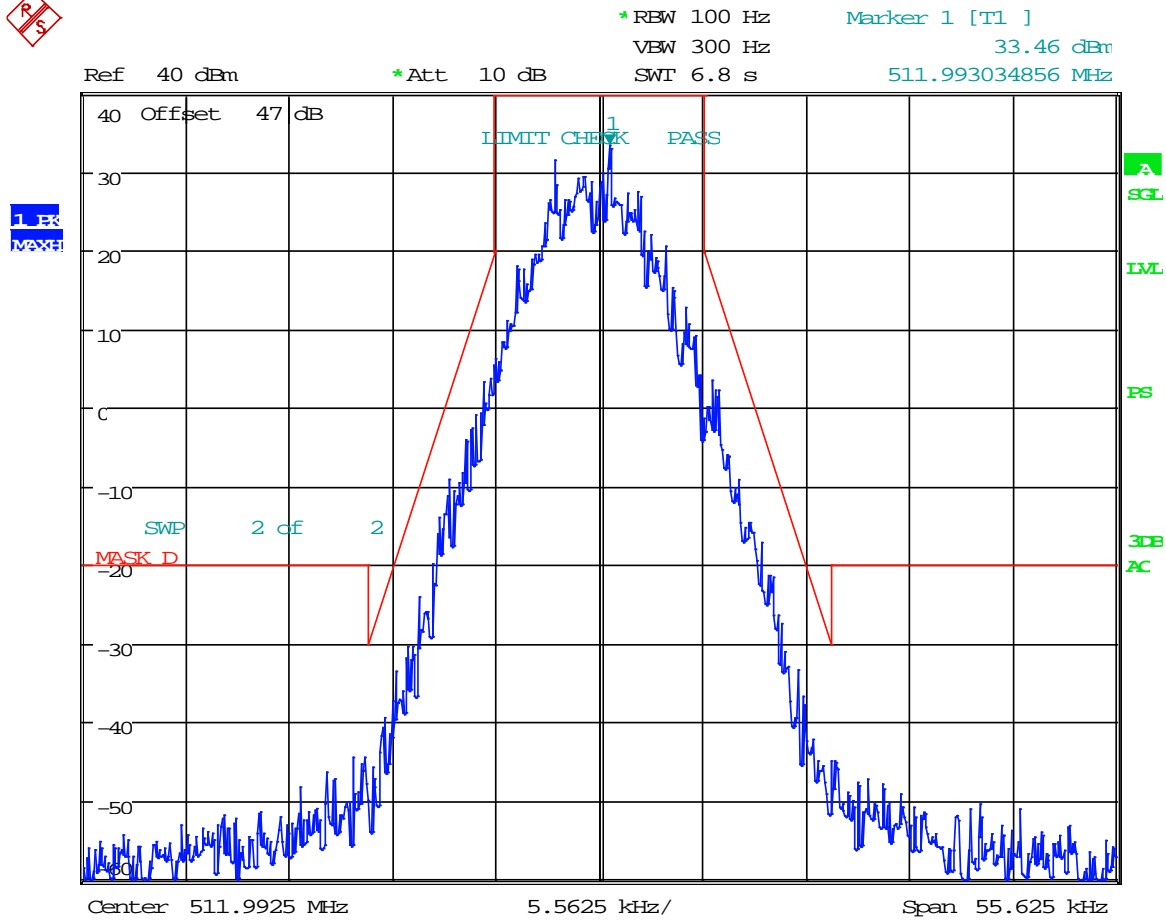
1 PK
MAXH



Date: 26.APR.2018 19:11:05

EMISSION MASK D

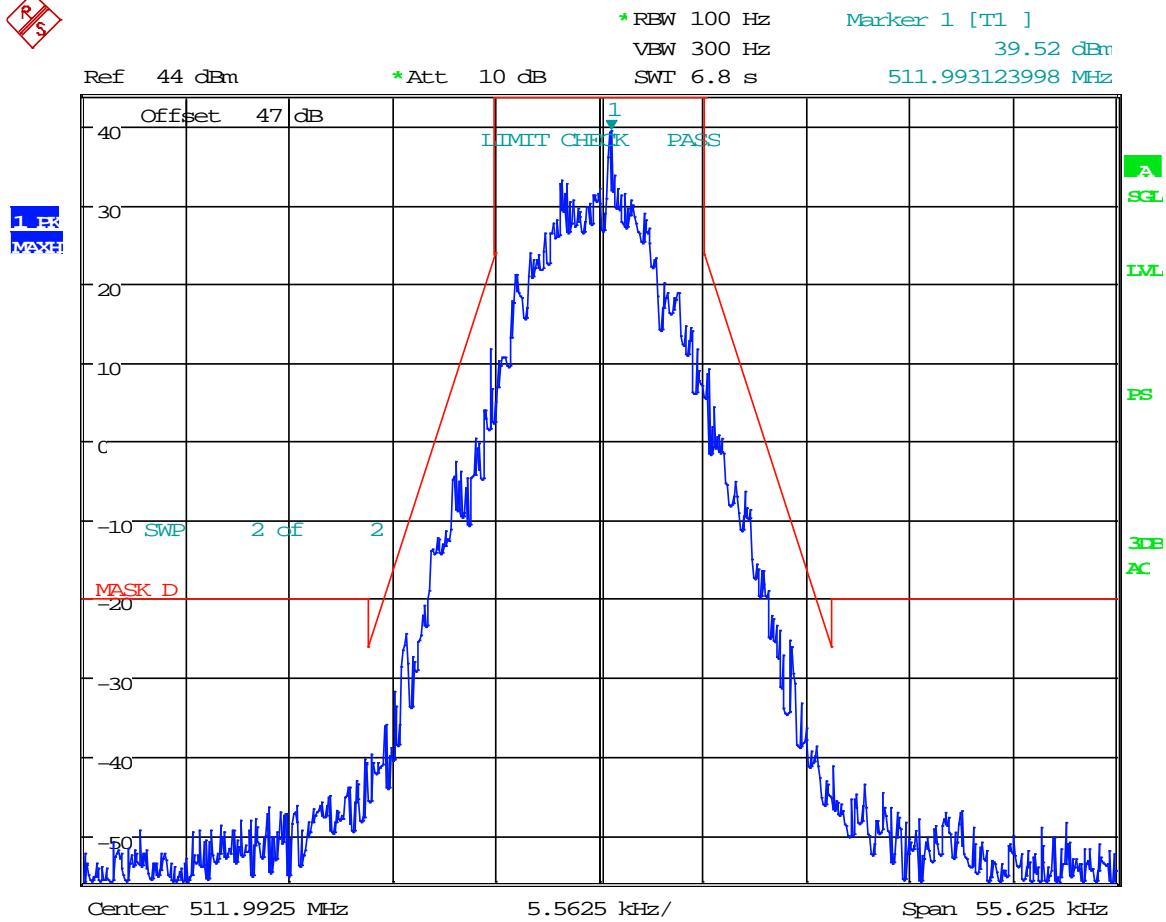
Medium Power



Date: 26.APR.2018 19:18:59

EMISSION MASK D

High Power



Date: 26.APR.2018 19:29:31

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

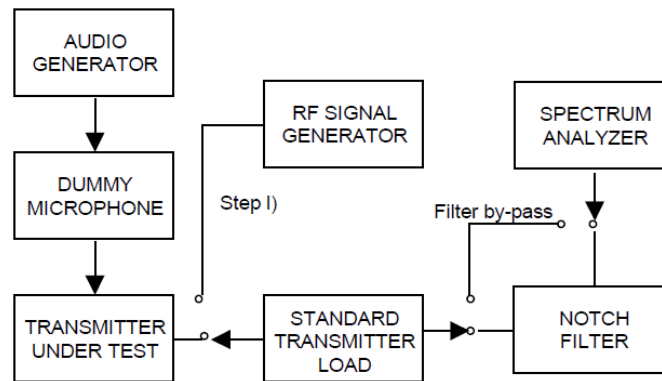
FCC Rule Parts: FCC Part 2.1051(a), 90.210(d)(3)

Requirements:

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.

Method of Measurement: TIA-603-E

Test Procedure: TIA 603-E, 2.2.13



SPURIOUS EMISSIONS - NARROWBAND FM (12.5 kHz)

Test Data: 450.0075 MHz

| Spurious Conducted Emissions, 12.5 kHz FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 450.0075 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 900.0150 | -33.87 | 13.87 | -37.66 | 17.66 | -40.56 | 20.56 |
| 3rd Harmonic 1350.0225 | -58.16 | 38.16 | -59.22 | 39.22 | -58.37 | 38.37 * |
| 4th Harmonic 1800.0300 | -55.09 | 35.09 | -53.88 | 33.88 | -57.19 | 37.19 |
| 5th Harmonic 2250.0375 | -59.37 | 39.37 | -51.01 | 31.01 | -48.40 | 28.40 |
| 6th Harmonic 2700.0450 | -55.12 | 35.12 | -57.02 | 37.02 | -60.37 | 40.37 |
| 7th Harmonic 3150.0525 | -60.09 | 40.09 | -60.78 | 40.78 | -60.98 | 40.98 |
| 8th Harmonic 3600.0600 | -58.85 | 38.85 * | -58.86 | 38.86 * | -58.24 | 38.24 * |
| 9th Harmonic 4050.0675 | -58.58 | 38.58 * | -58.59 | 38.59 * | -57.97 | 37.97 * |
| 10th Harmonic 4500.0750 | -58.24 | 38.24 * | -58.25 | 38.25 * | -57.63 | 37.63 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 453.9925 MHz

| Spurious Conducted Emissions, 12.5 kHz FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 453.9925 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 907.9850 | -38.00 | 18.00 | -39.68 | 19.68 | -39.71 | 19.71 |
| 3rd Harmonic 1361.9775 | -47.45 | 27.45 | -52.64 | 32.64 | -55.38 | 35.38 |
| 4th Harmonic 1815.9700 | -47.53 | 27.53 | -50.11 | 30.11 | -51.12 | 31.12 |
| 5th Harmonic 2269.9625 | -48.45 | 28.45 | -53.49 | 33.49 | -47.34 | 27.34 |
| 6th Harmonic 2723.9550 | -53.31 | 33.31 | -55.68 | 35.68 | -60.36 | 40.36 |
| 7th Harmonic 3177.9475 | -58.97 | 38.97 * | -58.46 | 38.46 * | -58.69 | 38.69 * |
| 8th Harmonic 3631.9400 | -58.99 | 38.99 * | -58.48 | 38.48 * | -58.71 | 38.71 * |
| 9th Harmonic 4085.9325 | -58.72 | 38.72 * | -58.21 | 38.21 * | -58.44 | 38.44 * |
| 10th Harmonic 4539.9250 | -58.38 | 38.38 * | -57.87 | 37.87 * | -58.10 | 38.1 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 456.0075 MHz

| Spurious Conducted Emissions, 12.5 kHz FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 456.0075 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 912.0150 | -35.97 | 15.97 | -37.43 | 17.43 | -38.75 | 18.75 |
| 3rd Harmonic 1368.0225 | -43.72 | 23.72 | -48.69 | 28.69 | -51.56 | 31.56 |
| 4th Harmonic 1824.0300 | -48.85 | 28.85 | -50.99 | 30.99 | -52.33 | 32.33 |
| 5th Harmonic 2280.0375 | -44.49 | 24.49 | -49.89 | 29.89 | -46.89 | 26.89 |
| 6th Harmonic 2736.0450 | -46.86 | 26.86 | -52.69 | 32.69 | -56.71 | 36.71 |
| 7th Harmonic 3192.0525 | -58.01 | 38.01 * | -58.89 | 38.89 * | -58.86 | 38.86 * |
| 8th Harmonic 3648.0600 | -58.03 | 38.03 * | -58.91 | 38.91 * | -58.88 | 38.88 * |
| 9th Harmonic 4104.0675 | -57.76 | 37.76 * | -58.64 | 38.64 * | -58.61 | 38.61 * |
| 10th Harmonic 4560.0750 | -57.42 | 37.42 * | -58.30 | 38.3 * | -58.27 | 38.27 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 462.5300 MHz

| Spurious Conducted Emissions, 12.5 kHz FM, Mask D Limit ($\geq 250\%$ Authorized BW) | High Power | | Med Power | | Low Power | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 462.5300 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 925.0600 | -35.93 | 15.93 | -37.47 | 17.47 | -38.87 | 18.87 |
| 3rd Harmonic 1387.5900 | -42.97 | 22.97 | -46.38 | 26.38 | -48.96 | 28.96 |
| 4th Harmonic 1850.1200 | -35.19 | 15.19 | -59.69 | 39.69 | -59.18 | 39.18 |
| 5th Harmonic 2312.6500 | -49.68 | 29.68 | -40.14 | 20.14 | -44.83 | 24.83 |
| 6th Harmonic 2775.1800 | -58.28 | 38.28 * | -55.82 | 35.82 | -57.73 | 37.73 |
| 7th Harmonic 3237.7100 | -58.14 | 38.14 * | -58.92 | 38.92 * | -58.63 | 38.63 * |
| 8th Harmonic 3700.2400 | -58.16 | 38.16 * | -58.94 | 38.94 * | -58.65 | 38.65 * |
| 9th Harmonic 4162.7700 | -57.89 | 37.89 * | -58.67 | 38.67 * | -58.38 | 38.38 * |
| 10th Harmonic 4625.3000 | -57.55 | 37.55 * | -58.33 | 38.33 * | -58.04 | 38.04 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 462.7450 MHz

| Spurious Conducted Emissions, 12.5 kHz FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 462.7450 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 925.4900 | -36.34 | 16.34 | -37.47 | 17.47 | -38.92 | 18.92 |
| 3rd Harmonic 1388.2350 | -43.90 | 23.90 | -47.67 | 27.67 | -49.69 | 29.69 |
| 4th Harmonic 1850.9800 | -56.99 | 36.99 | -60.48 | 40.48 | -59.73 | 39.73 |
| 5th Harmonic 2313.7250 | -35.23 | 15.23 | -40.46 | 20.46 | -44.73 | 24.73 |
| 6th Harmonic 2776.4700 | -50.09 | 30.09 | -56.60 | 36.60 | -58.63 | 38.63 |
| 7th Harmonic 3239.2150 | -58.29 | 38.29 | -58.87 | 38.87 * | -59.16 | 39.16 * |
| 8th Harmonic 3701.9600 | -58.27 | 38.27 | -58.02 | 38.02 | -59.18 | 39.18 * |
| 9th Harmonic 4164.7050 | -54.83 | 34.83 | -58.62 | 38.62 * | -58.91 | 38.91 * |
| 10th Harmonic 4627.4500 | -58.46 | 38.46 * | -58.28 | 38.28 * | -58.57 | 38.57 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 467.5300 MHz

| Spurious Conducted Emissions, 12.5 kHz FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 467.5300 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 935.0600 | -34.66 | 14.66 | -37.40 | 17.40 | -39.02 | 19.02 |
| 3rd Harmonic 1402.5900 | -43.88 | 23.88 | -48.99 | 28.99 | -49.95 | 29.95 |
| 4th Harmonic 1870.1200 | -58.84 | 38.84 * | -61.55 | 41.55 | -59.83 | 39.83 |
| 5th Harmonic 2337.6500 | -35.02 | 15.02 | -41.18 | 21.18 | -43.35 | 23.35 |
| 6th Harmonic 2805.1800 | -55.62 | 35.62 | -57.99 | 37.99 | -59.23 | 39.23 |
| 7th Harmonic 3272.7100 | -60.10 | 40.10 | -59.14 | 39.14 * | -58.12 | 38.12 * |
| 8th Harmonic 3740.2400 | -59.03 | 39.03 * | -59.16 | 39.16 * | -58.14 | 38.14 * |
| 9th Harmonic 4207.7700 | -53.96 | 33.96 | -58.89 | 38.89 * | -57.87 | 37.87 * |
| 10th Harmonic 4675.3000 | -58.42 | 38.42 * | -58.55 | 38.55 * | -57.53 | 37.53 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 467.7450 MHz

| Spurious Conducted Emissions, 12.5 kHz FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 467.7450 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 935.4900 | -36.79 | 16.79 | -37.87 | 17.87 | -39.03 | 19.03 |
| 3rd Harmonic 1403.2350 | -47.07 | 27.07 | -53.23 | 33.23 | -51.30 | 31.30 |
| 4th Harmonic 1870.9800 | -59.04 | 39.04 * | -58.48 | 38.48 * | -60.03 | 40.03 |
| 5th Harmonic 2338.7250 | -34.98 | 14.98 | -41.24 | 21.24 | -43.11 | 23.11 |
| 6th Harmonic 2806.4700 | -53.60 | 33.60 | -58.30 | 38.30 | -60.69 | 40.69 |
| 7th Harmonic 3274.2150 | -59.21 | 39.21 * | -58.65 | 38.65 * | -58.56 | 38.56 * |
| 8th Harmonic 3741.9600 | -59.23 | 39.23 * | -58.67 | 38.67 * | -58.58 | 38.58 * |
| 9th Harmonic 4209.7050 | -56.91 | 36.91 | -58.40 | 38.4 * | -58.31 | 38.31 * |
| 10th Harmonic 4677.4500 | -58.62 | 38.62 * | -58.06 | 38.06 * | -57.97 | 37.97 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 490.0000 MHz

| Spurious Conducted Emissions, 12.5 kHz FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 490.0000 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 980.0000 | -37.93 | 17.93 | -37.22 | 17.22 | -37.09 | 17.09 |
| 3rd Harmonic 1470.0000 | -48.37 | 28.37 | -52.38 | 32.38 | -50.36 | 30.36 |
| 4th Harmonic 1960.0000 | -50.41 | 30.41 | -58.21 | 38.21 | -62.00 | 42.00 |
| 5th Harmonic 2450.0000 | -34.50 | 14.50 | -44.21 | 24.21 | -48.36 | 28.36 |
| 6th Harmonic 2940.0000 | -55.85 | 35.85 | -59.33 | 39.33 | -60.93 | 40.93 |
| 7th Harmonic 3430.0000 | -58.27 | 38.27 * | -58.67 | 38.67 * | -58.49 | 38.49 * |
| 8th Harmonic 3920.0000 | -58.29 | 38.29 * | -58.69 | 38.69 * | -58.51 | 38.51 * |
| 9th Harmonic 4410.0000 | -58.02 | 38.02 * | -58.42 | 38.42 * | -58.24 | 38.24 * |
| 10th Harmonic 4900.0000 | -57.68 | 37.68 * | -58.08 | 38.08 * | -57.90 | 37.9 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 511.9925 MHz

| Spurious Conducted Emissions, 12.5 kHz FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 490.0000 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 980.0000 | -31.02 | 11.02 | -31.24 | 11.24 | -31.46 | 11.46 |
| 3rd Harmonic 1470.0000 | -46.67 | 26.67 | -48.33 | 28.33 | -49.77 | 29.77 |
| 4th Harmonic 1960.0000 | -47.91 | 27.91 | -54.16 | 34.16 | -56.01 | 36.01 |
| 5th Harmonic 2450.0000 | -48.54 | 28.54 | -53.21 | 33.21 | -55.45 | 35.45 |
| 6th Harmonic 2940.0000 | -55.21 | 35.21 | -55.05 | 35.05 | -53.61 | 33.61 |
| 7th Harmonic 3430.0000 | -58.91 | 38.91 * | -58.76 | 38.76 | -59.31 | 39.31 |
| 8th Harmonic 3920.0000 | -52.13 | 32.13 | -58.94 | 38.94 * | -58.85 | 38.85 * |
| 9th Harmonic 4410.0000 | -58.66 | 38.66 * | -58.67 | 38.67 * | -58.58 | 38.58 * |
| 10th Harmonic 4900.0000 | -58.32 | 38.32 * | -58.33 | 38.33 * | -58.24 | 38.24 * |

* Indicates Noise Floor of Measurement

Result: Meets Requirement

SPURIOUS EMISSIONS – P25 Phase I C4FM (12.5 kHz)

Test Data: 450.0075 MHz

| Spurious Conducted Emissions, C4FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 450.0075 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 900.0150 | -39.67 | 19.67 | -38.27 | 18.27 | -39.39 | 19.39 |
| 3rd Harmonic 1350.0225 | -50.28 | 30.28 | -58.43 | 38.43 | -55.78 | 35.78 |
| 4th Harmonic 1800.0300 | -51.92 | 31.92 | -47.47 | 27.47 | -48.50 | 28.50 |
| 5th Harmonic 2250.0375 | -56.43 | 36.43 | -48.90 | 28.90 | -45.68 | 25.68 |
| 6th Harmonic 2700.0450 | -56.60 | 36.60 | -61.06 | 41.06 | -59.49 | 39.49 * |
| 7th Harmonic 3150.0525 | -60.65 | 40.65 | -58.79 | 38.79 * | -59.35 | 39.35 * |
| 8th Harmonic 3600.0600 | -57.90 | 37.9 * | -58.81 | 38.81 * | -59.37 | 39.37 * |
| 9th Harmonic 4050.0675 | -57.63 | 37.63 * | -58.54 | 38.54 * | -59.10 | 39.1 * |
| 10th Harmonic 4500.0750 | -57.29 | 37.29 * | -58.20 | 38.2 * | -58.76 | 38.76 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 453.9925 MHz

| Spurious Conducted Emissions, C4FM, Mask D Limit ($\geq 250\%$ Authorized BW) | High Power | | Med Power | | Low Power | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 453.9925 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 907.9850 | -38.53 | 18.53 | -39.10 | 19.10 | -39.48 | 19.48 |
| 3rd Harmonic 1361.9775 | -47.80 | 27.80 | -52.40 | 32.40 | -53.67 | 33.67 |
| 4th Harmonic 1815.9700 | -45.93 | 25.93 | -49.24 | 29.24 | -50.72 | 30.72 |
| 5th Harmonic 2269.9625 | -48.31 | 28.31 | -53.82 | 33.82 | -47.44 | 27.44 |
| 6th Harmonic 2723.9550 | -52.70 | 32.70 | -56.80 | 36.80 | -58.16 | 38.16 |
| 7th Harmonic 3177.9475 | -58.61 | 38.61 * | -59.04 | 39.04 * | -59.04 | 39.04 * |
| 8th Harmonic 3631.9400 | -58.63 | 38.63 * | -59.06 | 39.06 * | -59.06 | 39.06 * |
| 9th Harmonic 4085.9325 | -58.36 | 38.36 * | -58.79 | 38.79 * | -58.79 | 38.79 * |
| 10th Harmonic 4539.9250 | -58.02 | 38.02 * | -58.45 | 38.45 * | -58.45 | 38.45 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 456.0075 MHz

| Spurious Conducted Emissions, C4FM, Mask D Limit ($\geq 250\%$ Authorized BW) | High Power | | Med Power | | Low Power | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 456.0075 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 912.0150 | -36.68 | 16.68 | -37.23 | 17.23 | -38.84 | 18.84 |
| 3rd Harmonic 1368.0225 | -43.71 | 23.71 | -48.84 | 28.84 | -51.42 | 31.42 |
| 4th Harmonic 1824.0300 | -48.81 | 28.81 | -50.89 | 30.89 | -52.75 | 32.75 |
| 5th Harmonic 2280.0375 | -44.23 | 24.23 | -50.98 | 30.98 | -47.27 | 27.27 |
| 6th Harmonic 2736.0450 | -50.13 | 30.13 | -53.96 | 33.96 | -57.41 | 37.41 |
| 7th Harmonic 3192.0525 | -58.85 | 38.85 * | -58.68 | 38.68 * | -58.99 | 38.99 * |
| 8th Harmonic 3648.0600 | -58.87 | 38.87 * | -58.70 | 38.7 * | -59.01 | 39.01 * |
| 9th Harmonic 4104.0675 | -58.60 | 38.6 * | -58.43 | 38.43 * | -58.74 | 38.74 * |
| 10th Harmonic 4560.0750 | -58.26 | 38.26 * | -58.09 | 38.09 * | -58.40 | 38.4 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 462.5300 MHz

| Spurious Conducted Emissions, C4FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 462.5300 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 925.0600 | -37.46 | 17.46 | -37.42 | 17.42 | -38.90 | 18.90 |
| 3rd Harmonic 1387.5900 | -44.91 | 24.91 | -48.40 | 28.40 | -50.14 | 30.14 |
| 4th Harmonic 1850.1200 | -61.47 | 41.47 | -59.97 | 39.97 | -58.78 | 38.78 |
| 5th Harmonic 2312.6500 | -35.51 | 15.51 | -40.55 | 20.55 | -45.00 | 25.00 |
| 6th Harmonic 2775.1800 | -49.41 | 29.41 | -55.63 | 35.63 | -58.85 | 38.85 |
| 7th Harmonic 3237.7100 | -59.21 | 39.21 * | -58.22 | 38.22 * | -59.17 | 39.17 * |
| 8th Harmonic 3700.2400 | -59.23 | 39.23 * | -58.24 | 38.24 * | -59.19 | 39.19 * |
| 9th Harmonic 4162.7700 | -55.29 | 35.29 | -57.97 | 37.97 * | -58.92 | 38.92 * |
| 10th Harmonic 4625.3000 | -58.62 | 38.62 * | -57.63 | 37.63 * | -58.58 | 38.58 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 462.7450 MHz

| Spurious Conducted Emissions, C4FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 462.7450 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 925.4900 | -37.27 | 17.27 | -37.63 | 17.63 | -38.95 | 18.95 |
| 3rd Harmonic 1388.2350 | -43.91 | 23.91 | -49.02 | 29.02 | -49.67 | 29.67 |
| 4th Harmonic 1850.9800 | -59.73 | 39.73 | -62.06 | 42.06 | -58.51 | 38.51 |
| 5th Harmonic 2313.7250 | -35.23 | 15.23 | -40.85 | 20.85 | -44.55 | 24.55 |
| 6th Harmonic 2776.4700 | -50.15 | 30.15 | -56.48 | 36.48 | -58.30 | 38.30 |
| 7th Harmonic 3239.2150 | -59.98 | 39.98 | -59.47 | 39.47 * | -61.33 | 41.33 |
| 8th Harmonic 3701.9600 | -59.03 | 39.03 * | -59.49 | 39.49 * | -58.47 | 38.47 * |
| 9th Harmonic 4164.7050 | -58.48 | 38.48 | -59.22 | 39.22 * | -58.20 | 38.2 * |
| 10th Harmonic 4627.4500 | -58.42 | 38.42 * | -58.88 | 38.88 * | -57.86 | 37.86 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 467.5300 MHz

| Spurious Conducted Emissions, C4FM, Mask D Limit (≥250% Authorized BW) | High Power | | Med Power | | Low Power | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 467.5300 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 935.0600 | -37.18 | 17.18 | -37.92 | 17.92 | -39.04 | 19.04 |
| 3rd Harmonic 1402.5900 | -45.79 | 25.79 | -54.25 | 34.25 | -51.61 | 31.61 |
| 4th Harmonic 1870.1200 | -58.32 | 38.32 * | -63.22 | 43.22 | -61.25 | 41.25 |
| 5th Harmonic 2337.6500 | -35.05 | 15.05 | -41.26 | 21.26 | -43.09 | 23.09 |
| 6th Harmonic 2805.1800 | -52.55 | 32.55 | -57.18 | 37.18 | -59.88 | 39.88 |
| 7th Harmonic 3272.7100 | -58.49 | 38.49 * | -58.54 | 38.54 * | -58.61 | 38.61 * |
| 8th Harmonic 3740.2400 | -58.51 | 38.51 * | -58.56 | 38.56 * | -58.63 | 38.63 * |
| 9th Harmonic 4207.7700 | -56.26 | 36.26 | -58.29 | 38.29 * | -58.36 | 38.36 * |
| 10th Harmonic 4675.3000 | -57.90 | 37.9 * | -57.95 | 37.95 * | -58.02 | 38.02 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 467.7450 MHz

| Spurious Conducted Emissions, C4FM, Mask D Limit ($\geq 250\%$ Authorized BW) | High Power | | Med Power | | Low Power | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 467.7450 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 935.4900 | -37.38 | 17.38 | -37.75 | 17.75 | -39.08 | 19.08 |
| 3rd Harmonic 1403.2350 | -47.34 | 27.34 | -51.44 | 31.44 | -52.46 | 32.46 |
| 4th Harmonic 1870.9800 | -59.24 | 39.24 * | -62.99 | 42.99 | -62.45 | 42.45 |
| 5th Harmonic 2338.7250 | -35.07 | 15.07 | -41.26 | 21.26 | -43.32 | 23.32 |
| 6th Harmonic 2806.4700 | -54.82 | 34.82 | -59.25 | 39.25 | -60.68 | 40.68 |
| 7th Harmonic 3274.2150 | -59.41 | 39.41 * | -59.24 | 39.24 * | -58.48 | 38.48 * |
| 8th Harmonic 3741.9600 | -59.43 | 39.43 * | -59.26 | 39.26 * | -58.50 | 38.5 * |
| 9th Harmonic 4209.7050 | -56.88 | 36.88 | -58.99 | 38.99 * | -58.23 | 38.23 * |
| 10th Harmonic 4677.4500 | -58.82 | 38.82 * | -58.65 | 38.65 * | -57.89 | 37.89 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 490.0000 MHz

| Spurious Conducted Emissions, C4FM, Mask D Limit ($\geq 250\%$ Authorized BW) | High Power | | Med Power | | Low Power | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 490.0000 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 980.0000 | -35.87 | 15.87 | -36.66 | 16.66 | -37.74 | 17.74 |
| 3rd Harmonic 1470.0000 | -48.46 | 28.46 | -50.53 | 30.53 | -50.81 | 30.81 |
| 4th Harmonic 1960.0000 | -50.77 | 30.77 | -58.88 | 38.88 | -60.21 | 40.21 |
| 5th Harmonic 2450.0000 | -34.19 | 14.19 | -40.88 | 20.88 | -46.34 | 26.34 |
| 6th Harmonic 2940.0000 | -48.47 | 28.47 | -58.94 | 38.94 | -59.41 | 39.41 * |
| 7th Harmonic 3430.0000 | -58.78 | 38.78 * | -59.05 | 39.05 * | -59.27 | 39.27 * |
| 8th Harmonic 3920.0000 | -58.80 | 38.8 * | -59.07 | 39.07 * | -59.29 | 39.29 * |
| 9th Harmonic 4410.0000 | -58.53 | 38.53 * | -58.80 | 38.8 * | -59.02 | 39.02 * |
| 10th Harmonic 4900.0000 | -58.19 | 38.19 * | -58.46 | 38.46 * | -58.68 | 38.68 * |

* Indicates Noise Floor of Measurement

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: 511.9925 MHz

| Spurious Conducted Emissions, C4FM, Mask D Limit ($\geq 250\%$ Authorized BW) | High Power | | Med Power | | Low Power | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | dBm | 43.96 | dBm | 39.98 | dBm | 29.99 |
| | Watts | 24.89 | Watts | 9.95 | Watts | 1.00 |
| | Limit (dBm) | -20 | Limit (dBm) | -20 | Limit (dBm) | -20 |
| Frequency (MHz) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) | Peak (dBm) | Margin (dB) |
| Fundamental 490.0000 | 43.96 | 0.00 | 39.98 | 0.00 | 29.99 | 0.00 |
| 2nd Harmonic 980.0000 | -30.68 | 10.68 | -31.14 | 11.14 | -31.57 | 11.57 |
| 3rd Harmonic 1470.0000 | -41.91 | 21.91 | -44.91 | 24.91 | -48.28 | 28.28 |
| 4th Harmonic 1960.0000 | -47.71 | 27.71 | -54.11 | 34.11 | -53.46 | 33.46 |
| 5th Harmonic 2450.0000 | -44.57 | 24.57 | -53.43 | 33.43 | -53.16 | 33.16 |
| 6th Harmonic 2940.0000 | -53.73 | 33.73 | -53.22 | 33.22 | -53.38 | 33.38 |
| 7th Harmonic 3430.0000 | -58.65 | 38.65 | -58.82 | 38.82 * | -59.48 | 39.48 |
| 8th Harmonic 3920.0000 | -52.32 | 32.32 | -58.83 | 38.83 | -59.40 | 39.4 * |
| 9th Harmonic 4410.0000 | -58.06 | 38.06 * | -58.63 | 38.63 | -59.13 | 39.13 * |
| 10th Harmonic 4900.0000 | -57.72 | 37.72 * | -58.23 | 38.23 * | -58.79 | 38.79 * |

* Indicates Noise Floor of Measurement

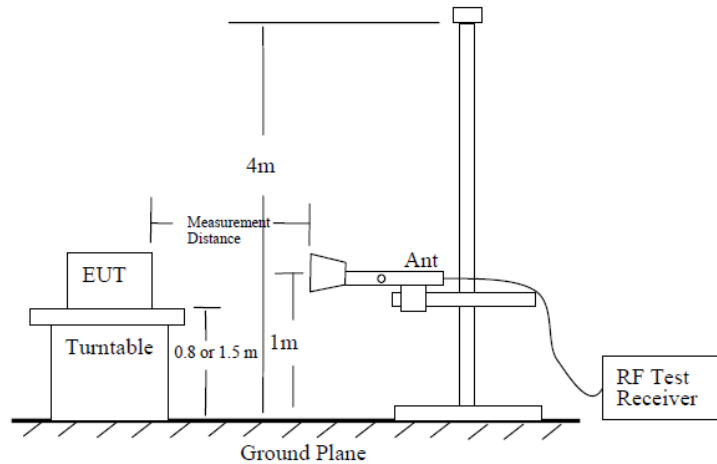
Result: Meets Requirement

FIELD STRENGTH OF SPURIOUS EMISSIONS

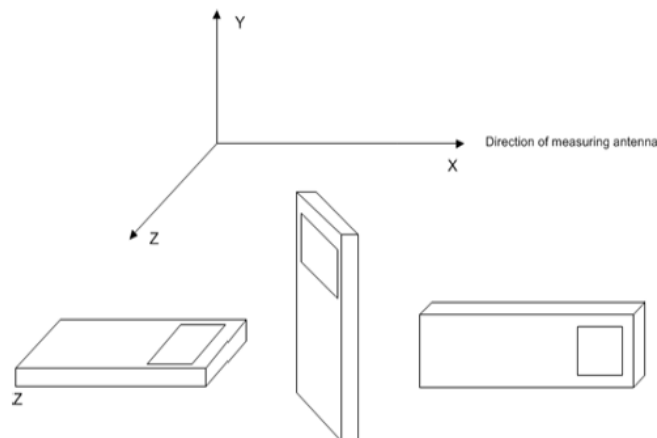
FCC Rule Parts: FCC Part 2.1053(a), 90.210(d)(3)

Method of Measurement: ANSI C63.26, 5.5.4

Test Site Setup:



EUT Orientation(s):



Note: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from the lowest frequency generated internally to at least the tenth harmonic of the fundamental. This test was conducted in accordance with the standard listed above using the substitution method. Measurements were made at the test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669. The measurements below represent the worst case of all the frequencies tested.

Note: The six (6) highest emissions or more of each worst-case operational modes of the EUT are represented below. Emissions 20 dB below the limit are not required to be reported.

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 450.0075 MHz

Low Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 29.99 | 1.00 | 49.99 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 450.01 | 900.01 | V | -41.937 | 21.94 |
| 450.01 | 2250.02 | V | -33.952 | 13.95 |
| 450.01 | 2700.03 | V | -40.067 | 20.07 |
| 450.01 | 2700.03 | H | -39.827 | 19.83 |

Medium Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 39.98 | 9.95 | 59.98 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 450.01 | 900.01 | V | -39.267 | 19.27 |
| 450.01 | 2250.02 | V | -33.502 | 13.50 |
| 450.01 | 2700.03 | H | -38.427 | 18.43 |
| 450.01 | 2700.03 | V | -38.397 | 18.40 |

High Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 43.96 | 24.89 | 63.96 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 450.01 | 900.01 | H | -40.497 | 20.50 |
| 450.01 | 1800.02 | H | -37.787 | 17.79 |
| 450.01 | 1800.02 | V | -39.867 | 19.87 |
| 450.01 | 2250.02 | V | -30.492 | 10.49 |
| 450.01 | 2250.02 | H | -40.592 | 20.59 |

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 453.9925 MHz

Low Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 29.99 | 1.00 | 49.99 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 453.99 | 907.99 | V | -40.579 | 20.58 |
| 453.99 | 2269.98 | H | -39.620 | 19.62 |
| 453.99 | 2269.98 | V | -36.120 | 16.12 |

Medium Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 39.98 | 9.95 | 59.98 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 453.99 | 1815.98 | H | -39.817 | 19.82 |
| 453.99 | 1815.98 | V | -41.377 | 21.38 |
| 453.99 | 2269.98 | V | -36.390 | 16.39 |
| 453.99 | 2269.98 | H | -41.730 | 21.73 |

High Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 43.96 | 24.89 | 63.96 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 453.99 | 1815.98 | H | -36.027 | 16.03 |
| 453.99 | 1815.98 | V | -40.617 | 20.62 |
| 453.99 | 2723.97 | V | -36.858 | 16.86 |
| 453.99 | 2723.97 | H | -41.608 | 21.61 |

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 456.0075 MHz

Low Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 29.99 | 1.00 | 49.99 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 456.01 | 912.01 | V | -41.311 | 21.31 |
| 456.01 | 2280.02 | H | -40.119 | 20.12 |
| 456.01 | 2280.02 | V | -41.179 | 21.18 |
| 456.01 | 2736.03 | V | -33.394 | 13.39 |
| 456.01 | 2736.03 | H | -37.834 | 17.83 |

Medium Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 39.98 | 9.95 | 59.98 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 456.01 | 912.01 | H | -38.421 | 18.42 |
| 456.01 | 912.01 | H | -41.151 | 21.15 |
| 456.01 | 1824.02 | H | -39.857 | 19.86 |
| 456.01 | 2280.02 | V | -34.969 | 14.97 |
| 456.01 | 2280.02 | H | -41.299 | 21.30 |

High Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 43.96 | 24.89 | 63.96 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 456.01 | 912.01 | H | -40.171 | 20.17 |
| 456.01 | 1824.02 | V | -39.117 | 19.12 |
| 456.01 | 1824.02 | H | -33.637 | 13.64 |
| 456.01 | 2736.03 | H | -39.774 | 19.77 |
| 456.01 | 2736.03 | V | -36.344 | 16.34 |

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 462.5300 MHz

Low Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 29.99 | 1.00 | 49.99 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 462.53 | 2776.46 | H | -39.905 | 19.91 |
| 462.53 | 2776.46 | V | -39.945 | 19.95 |

Medium Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 39.98 | 9.95 | 59.98 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 462.53 | 2312.66 | V | -33.481 | 13.48 |
| 462.53 | 2312.66 | H | -36.311 | 16.31 |

High Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 43.96 | 24.89 | 63.96 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 462.53 | 2312.66 | H | -31.091 | 11.09 |
| 462.53 | 2312.66 | V | -28.401 | 8.40 |
| 462.53 | 2775.20 | H | -33.637 | 13.64 |
| 462.53 | 2775.20 | V | -33.207 | 13.21 |

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 462.7450 MHz

Low Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 29.99 | 1.00 | 49.99 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 462.74 | 2776.46 | V | -36.045 | 16.05 |
| 462.74 | 2776.46 | H | -39.255 | 19.26 |

Medium Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 39.98 | 9.95 | 59.98 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 462.74 | 925.48 | V | -39.497 | 19.50 |
| 462.74 | 1388.23 | V | -41.907 | 21.91 |
| 462.74 | 2313.71 | H | -37.319 | 17.32 |
| 462.74 | 2313.71 | V | -36.309 | 16.31 |

High Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 43.96 | 24.89 | 63.96 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 462.74 | 925.48 | H | -40.987 | 20.99 |
| 462.74 | 925.48 | V | -41.597 | 21.60 |
| 462.74 | 2313.71 | V | -27.759 | 7.76 |
| 462.74 | 2313.71 | H | -32.719 | 12.72 |

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 467.5300 MHz

Low Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 29.99 | 1.00 | 49.99 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 467.53 | 935.07 | V | -41.262 | 21.26 |
| 467.53 | 2337.66 | V | -34.608 | 14.61 |
| 467.53 | 2337.66 | H | -39.978 | 19.98 |

Medium Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 39.98 | 9.95 | 59.98 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 467.53 | 1402.60 | V | -40.883 | 20.88 |
| 467.53 | 2805.20 | H | -38.332 | 18.33 |
| 467.53 | 2805.20 | V | -41.992 | 21.99 |

High Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 43.96 | 24.89 | 63.96 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 467.53 | 935.07 | V | -41.922 | 21.92 |
| 467.53 | 935.07 | H | -41.262 | 21.26 |
| 467.53 | 1402.60 | V | -39.133 | 19.13 |
| 467.53 | 2337.66 | H | -34.088 | 14.09 |
| 467.53 | 2337.66 | V | -34.308 | 14.31 |

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 467.7450 MHz

Low Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 29.99 | 1.00 | 49.99 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 467.74 | 1870.97 | V | -37.417 | 17.42 |
| 467.74 | 2338.71 | V | -29.507 | 9.51 |
| 467.74 | 2338.71 | H | -34.257 | 14.26 |

Medium Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 39.98 | 9.95 | 59.98 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 467.74 | 935.48 | H | -40.272 | 20.27 |
| 467.74 | 2338.71 | H | -31.737 | 11.74 |
| 467.74 | 2338.71 | V | -28.377 | 8.38 |

High Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 43.96 | 24.89 | 63.96 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 467.74 | 935.48 | H | -39.642 | 19.64 |
| 467.74 | 935.48 | V | -40.362 | 20.36 |
| 467.74 | 2338.71 | V | -30.297 | 10.30 |
| 467.74 | 2338.71 | V | -28.387 | 8.39 |
| 467.74 | 2806.46 | V | -35.730 | 15.73 |
| 467.74 | 2806.46 | H | -35.280 | 15.28 |

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 490.0000 MHz

Low Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 29.99 | 1.00 | 49.99 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 490.00 | 980.00 | H | -41.957 | 21.96 |
| 490.00 | 1470.00 | V | -41.405 | 21.41 |

Medium Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 39.98 | 9.95 | 59.98 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 490.00 | 980.00 | V | -40.347 | 20.35 |
| 490.00 | 980.00 | H | -40.117 | 20.12 |
| 490.00 | 1470.00 | H | -40.145 | 20.15 |
| 490.00 | 2940.00 | H | -41.587 | 21.59 |

High Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 43.96 | 24.89 | 63.96 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 490.00 | 980.00 | H | -39.297 | 19.30 |
| 490.00 | 980.00 | V | -39.897 | 19.90 |
| 490.00 | 2940.00 | V | -31.837 | 11.84 |
| 490.00 | 2940.00 | H | -28.997 | 9.00 |

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: 511.9925 MHz

Low Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 29.99 | 1.00 | 49.99 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 511.99 | 2047.98 | H | -34.560 | 14.56 |
| 511.99 | 2047.98 | V | -33.080 | 13.08 |

Medium Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 39.98 | 9.95 | 59.98 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 511.99 | 2047.98 | H | -30.860 | 10.86 |
| 511.99 | 2047.98 | V | -32.000 | 12.00 |
| 511.99 | 3071.97 | H | -39.924 | 19.92 |

High Power

| Power Output | | Limit | | |
|----------------|------------------------|------------------|-----------|-------------|
| dBm | Watts | dBc | dBm | |
| 43.96 | 24.89 | 63.96 | -20.00 | |
| Tuned Freq MHz | Emission Frequency MHz | Antenna Polarity | ERP (dBm) | Margin (dB) |
| 512.00 | 2047.98 | H | -22.990 | 2.99 |
| 512.00 | 2047.98 | V | -25.320 | 5.32 |
| 512.00 | 2559.98 | V | -23.925 | 3.93 |
| 512.00 | 2559.98 | H | -24.615 | 4.62 |
| 512.00 | 3583.97 | V | -36.062 | 16.06 |
| 512.00 | 3583.97 | H | -35.552 | 15.55 |

FREQUENCY STABILITY

FCC Rule Parts: FCC Part 2.1055(a)(2), 90.213

MINIMUM FREQUENCY STABILITY

[Parts per million (ppm)]

| Frequency range (MHz) | Fixed and base stations | Mobile stations | |
|-----------------------|-------------------------|---------------------------|------------------------------|
| | | Over 2 watts output power | 2 watts or less output power |
| 421-512 | 7 11 14 _{2.5} | ⁸ ₅ | ⁸ ₅ |

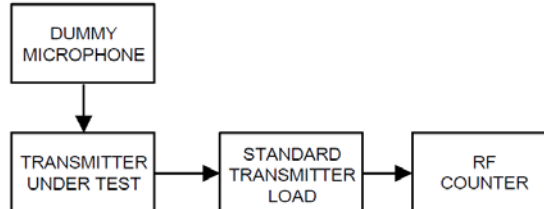
⁷In the 421-512 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.

⁸In the 421-512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

¹¹Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band.

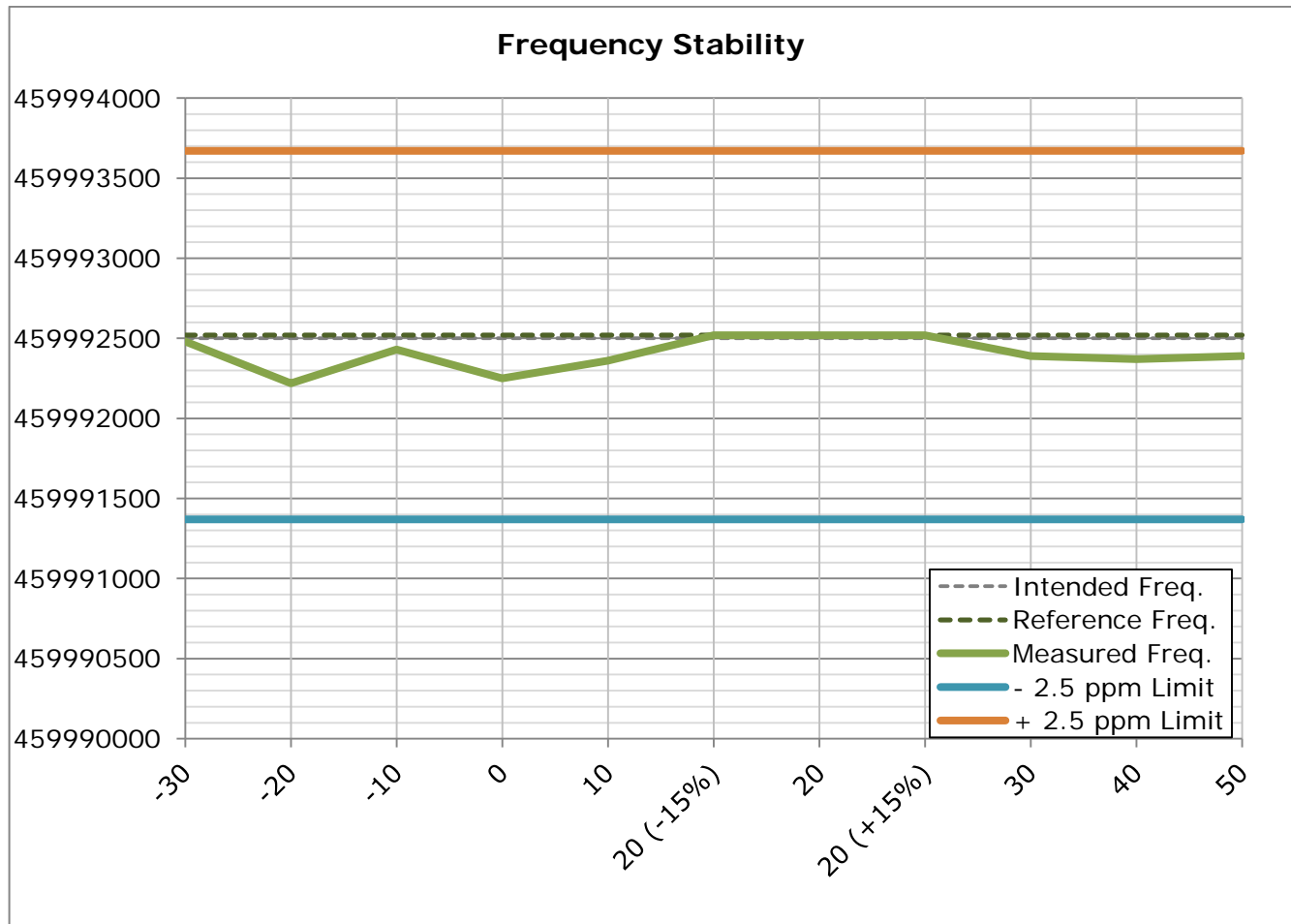
¹⁴Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

Method of Measurements: TIA 603-E, 2.2.2



FREQUENCY STABILITY

Test Data: Frequency Error Measurement Plot



FREQUENCY STABILITY

Test Data: Frequency Error Measurement Table

| Limit: | | 2.5 | ppm | |
|------------------|------------------------|-------------------------|-----------------------------------|----------------|
| Temperature (°C) | Supplied Voltage (VDC) | Intended Frequency (Hz) | Measured Reference Frequency (Hz) | Deviation (Hz) |
| 20°C (reference) | 13.8 | 459992500 | 459992520 | -20 |

| @ 20°C (reference) | | | | |
|----------------------|------------------------|----------------|----------------|-------|
| Supplied Voltage (%) | Supplied Voltage (VDC) | Frequency (Hz) | Deviation (Hz) | PPM |
| -15% | 11.73 | 459992520 | 0 | 0.000 |
| 15% | 15.87 | 459992520 | 0 | 0.000 |

| Temperature (°C) | Supplied Voltage (VDC) | Frequency (Hz) | Deviation (Hz) | PPM |
|------------------|------------------------|----------------|----------------|-------|
| 50 | 13.8 | 459992390 | 130 | 0.283 |
| 40 | 13.8 | 459992370 | 150 | 0.326 |
| 30 | 13.8 | 459992390 | 130 | 0.283 |
| 20 | 13.8 | 459992520 | 0 | 0.000 |
| 10 | 13.8 | 459992360 | 160 | 0.348 |
| 0 | 13.8 | 459992250 | 270 | 0.587 |
| -10 | 13.8 | 459992430 | 90 | 0.196 |
| -20 | 13.8 | 459992220 | 300 | 0.652 |
| -30 | 13.8 | 459992480 | 40 | 0.087 |

RESULT: Meets Requirements

TRANSIENT FREQUENCY BEHAVIOR

FCC Rule Parts: 90.214

Requirements:

Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

| Time intervals ^{1 2} | Maximum frequency difference ³ | All equipment | |
|---|---|----------------|----------------|
| | | 150 to 174 MHz | 421 to 512 MHz |
| Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels | | | |
| t ₁ ⁴ | ±25.0 kHz | 5.0 ms | 10.0 ms |
| t ₂ | ±12.5 kHz | 20.0 ms | 25.0 ms |
| t ₃ ⁴ | ±25.0 kHz | 5.0 ms | 10.0 ms |
| Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels | | | |
| t ₁ ⁴ | ±12.5 kHz | 5.0 ms | 10.0 ms |
| t ₂ | ±6.25 kHz | 20.0 ms | 25.0 ms |
| t ₃ ⁴ | ±12.5 kHz | 5.0 ms | 10.0 ms |
| Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels | | | |
| t ₁ ⁴ | ±6.25 kHz | 5.0 ms | 10.0 ms |
| t ₂ | ±3.125 kHz | 20.0 ms | 25.0 ms |
| t ₃ ⁴ | ±6.25 kHz | 5.0 ms | 10.0 ms |

¹ t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.

t_1 is the time period immediately following t_{on} .

t_2 is the time period immediately following t_1 .

t_3 is the time period from the instant when the transmitter is turned off until t_{off} .

t_{off} is the instant when the 1 kHz test signal starts to rise.

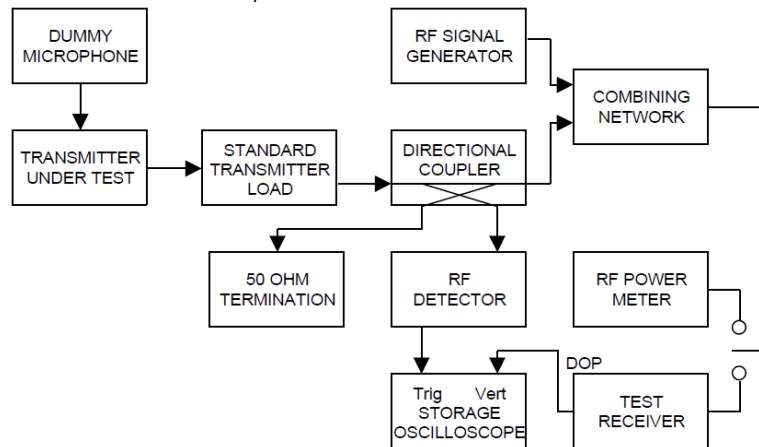
² During the time from the end of t_2 to the beginning of t_3 , the frequency difference must not exceed the limits specified in §90.213.

³ Difference between the actual transmitter frequency and the assigned transmitter frequency.

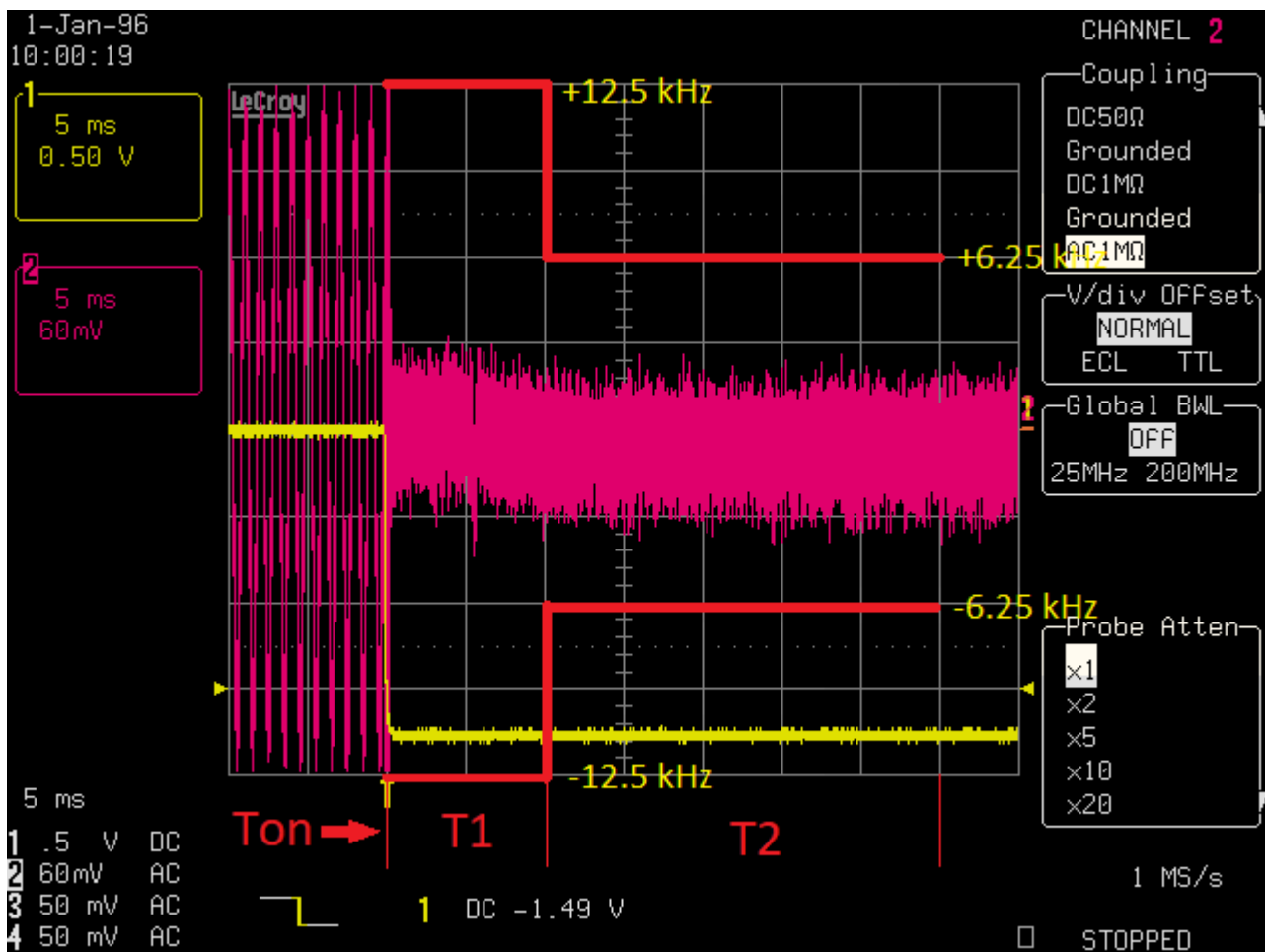
⁴ If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

TRANSIENT FREQUENCY BEHAVIOR

Method of Measurement: TIA-603-E, 2.2.19.3

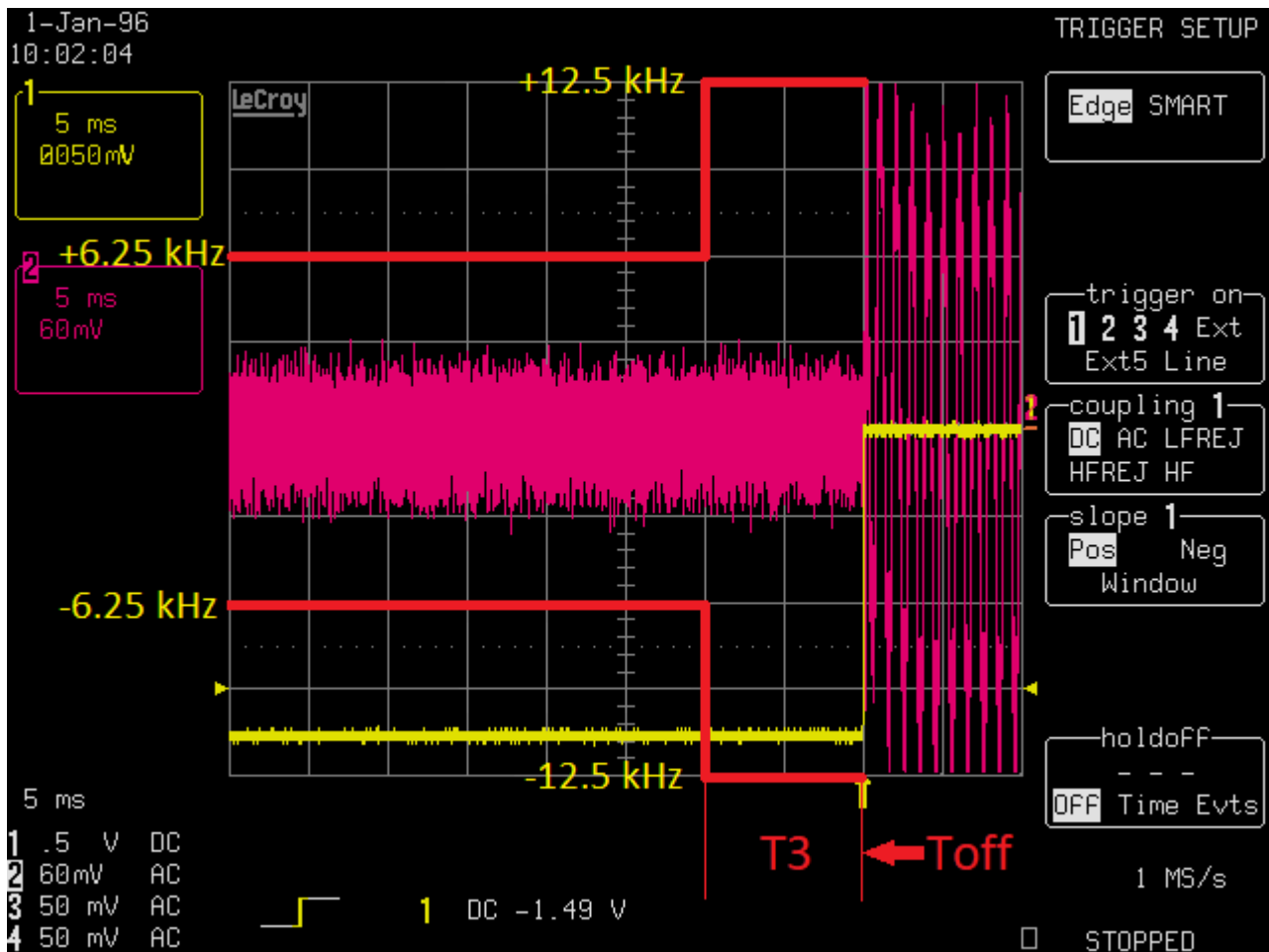


Test Data: 12.5 kHz Turn-On Period (t_1)



TRANSIENT FREQUENCY BEHAVIOR

Test Data: Turn-Off Period (t_3)



STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16-4 or ENTR 100-028 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: “Uncertainty in EMC Measurements” and is documented in the Timco Engineering, Inc. quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Timco Engineering, Inc. is reported:

| Test Items | Measurement Uncertainty | Notes |
|---|-------------------------|-------|
| RF Frequency Accuracy | ± 49.5 Hz | (1) |
| RF Conducted Power | ± 0.93 dB | (1) |
| Conducted spurious emission of transmitter valid up to 40GHz | ± 1.86 dB | |
| Occupied Bandwidth | $\pm 2.65\%$ | |
| Audio Frequency Response | ± 1.86 dB | |
| Modulation limiting | $\pm 1.88\%$ | |
| Radiated RF Power | ± 1.4 dB | |
| Maximum frequency deviation: Within 300 Hz and 6kHz of audio freq. | $\pm 1.88\%$ | |
| Within 6kHz and 25kHz of audio Freq. | $\pm 2.04\%$ | |
| Rad Emissions Sub Meth up to 26.5GHz | ± 2.14 dB | |
| Adjacent channel power | ± 1.47 dB | (1) |
| Transient Frequency Response | $\pm 1.88\%$ | |
| Temperature | $\pm 1.0^\circ\text{C}$ | (1) |
| Humidity | $\pm 5.0\%$ | |

Notes: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

EMC EQUIPMENT LIST

| Device | Manufacturer | Model | Serial Number | Cal/Char Date | Due Date |
|--|--------------------|------------------------------|--|---------------|----------|
| Coaxial Cable - BMBM-0065-01 Black DC-2G | Belden | | BMBM-0065-01 | 07/18/16 | 07/18/18 |
| Antenna: Biconical 1096 | Eaton | 94455-1 | 1096 | 08/01/17 | 08/01/19 |
| Antenna: Log-Periodic 1122 | Electro-Metrics | LPA-25 | 1122 | 07/26/17 | 07/26/19 |
| Temperature Chamber LARGE | Tenney Engineering | TTRC | 11717-7 | 09/01/16 | 09/01/18 |
| Frequency Counter Small Chamber | HP | 5385A | 3242A07460 | 08/22/17 | 08/22/19 |
| Coaxial Cable - Chamber 3 cable set (backup) | Micro-Coax | Chamber 3 cable set (backup) | KMKM-0244-02 KMKM-0670-01 KFKF-0197-00 | N/A | N/A |
| CHAMBER | Panashield | 3M | N/A | 04/25/16 | 5/31/18 |
| Antenna: Double-Ridged Horn/ETS Horn 2 | ETS-Lindgren | 3117 | 00041534 | 03/01/17 | 03/01/19 |
| Software: Field Strength Program | Timco | N/A | Version 4.10.7.0 | N/A | N/A |
| Antenna: Passive Loop | EMCO | 6512 | 9706-1211 | 07/26/17 | 07/26/19 |
| Type K J Thermometer | Martel | 303 | 080504494 | 11/02/17 | 11/02/19 |
| EMI Test Receiver R & S ESIB 40 | Rohde & Schwarz | ESIB 40 | 100274 | 08/18/16 | 08/18/18 |
| EMI Test Receiver R & S ESU 40 | Rohde & Schwarz | ESU 40 | 100320 | 04/01/16 | 04/01/19 |
| Attenuator N 20dB 20W DC-12G | Narda | 768-20-SP | 155 | 07/10/17 | 07/10/19 |
| Attenuator N 20dB 20W DC-12G | Narda | 768-20-SP | 344 | 07/10/17 | 07/10/19 |
| Attenuator N 30dB 100W DC-6G | Pasternack | PE7214-30 | #109 | 05/24/17 | 05/24/19 |
| Attenuator BNC 10dB DC-2G | MiniCircuits | HAT-10+ | #54 | 07/14/17 | 07/14/19 |
| Bore-sight Antenna Positioning Tower | Sunol Sciences | TLT2 | N/A | N/A | N/A |
| Tunable Notch Filter 250-850 MHz | Eagle | TNF-200 | 250-850 MHz (#19) | 11/19/17 | 11/19/19 |
| Terminator N 20W DC-18G | Narda | 8205 | #14 | 04/06/17 | 04/06/19 |
| Attenuator BNC 6dB 50Ohm DC-2G | Mini-Circuits | HAT-6+ | #53 | 07/14/17 | 07/14/19 |
| Attenuator N 30dB 100W DC-6G | Pasternack | PE7214-30 | #109 | 05/24/17 | 05/23/19 |
| DC Power Supply | HP | 6286A | 1744A03842 | N/A | N/A |
| Modulation Analyzer | HP | 8901A | 3050A05856 | 04/13/17 | 04/13/19 |
| Function Generator | Standford | DS340 | 25200 | 02/21/18 | 02/21/20 |
| Terminator N 20W DC-18G | Narda | 8205 | #14 | 04/06/17 | 04/06/19 |

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

END OF TEST REPORT