

LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TMBK5B Mobile Transceiver

Tested in accordance with:

FCC 47 CFR Parts 22 and 90

RSS-119 Issue 12

RSS-Gen Issue 5

Report Revision: 1

Issue Date: 21 January 2025

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Test Technician

CHECKED & APPROVED BY: M. C. James


Laboratory Technical Manager



FCC Registration: 838288
ISED Registration: 737A

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.

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FCC ID: CASTMBK5B
IC : 737A-TMBK5B

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REVISION HISTORY

Date	Revision	Comments
21 January 2025	1	Initial test report

INTRODUCTION

This report is an addendum to Teltest Report 4380. It provides test results for operation on 762.025MHz.

This report supports a "Class 2" permissive change to add 20kHz channel spacing operation for this radio. This relates to Analogue and FFSK (1200bps and 2400bps) modulations.

Refer to Teltest Report 4380 for results for other frequencies

Tested in accordance with: FCC 47 CFR Parts 22 and 90
RSS-119 Issue 12
RSS-Gen Issue 5

REPORT PREPARED FOR

Tait International Ltd
245 Wooldridge Road
Harewood
Christchurch 8051
New Zealand

DESCRIPTION OF SAMPLE

Manufacturer: Tait International Limited
Equipment: Mobile Transceiver
Type: TMBK5B
Product Code: T02-00014-XFAA
Serial Number(s): 21660155
Frequency of addition: 762.025 MHz
Transmit Power:

Frequency	Very Low Power	High Power
762.025 MHz	2 W	30 W

Modulation		Channel Spacing	Speech Channels	Symbol Rate (symbols/sec)	Data Rate (bps)
Analogue FM		20 kHz	1	-	-
FFSK	Fast Frequency Shift Keying	20 kHz	-	1200	1200
		20 kHz	-	2400	2400

HARDWARE & SOFTWARE

Quantity: 1

Unit	Type	Code and Version
Head	Hardware ID	TMBC62-0100_0001
	Firmware Package	QIDMR_3.03.08.0133
	FPGA Image	QCB6G_S03_3.10.00.0000
Torso	Hardware ID	TMBB34-K510_0002
	Firmware Package	QIDMR_3.03.08.0133
	FPGA Image	QMB3G_S02_3.12.01.0000

TEST CONDITIONS

All testing was performed between 20 → 21 January 2025, and under the following conditions:

Ambient temperature: 15°C → 30°C

Relative Humidity: 20% → 75%

Standard Test Voltage: 13.8 V_{DC}

TEST REQUIREMENTS AND RESULT SUMMARY

ISED Specification	FCC Specification	Test Name	Test Methods	Result
RSS-119 5.4	FCC 47 CFR 2.1046	Transmitter Output Power (Conducted)	ANSI C63.26 5.2.4.2	N1
No specification	FCC 47 CFR 2.1047 (a)	Transmitter Audio Frequency Response – Pre-emphasis	ANSI C63.26 5.3.3.2	P
No specification	FCC 47 CFR 2.1047 (b)	Transmitter Modulation Limiting	ANSI C63.26 5.3.2	P
RSS-119 5.5	FCC 47 CFR 2.1049 (c)	Transmitter Occupied (99%) Bandwidth	ANSI C63.26 5.4.4	P
RSS-119 5.5	FCC 47 CFR 90.210	Transmitter Spectrum Masks	ANSI C63.26.5.7.3	P
RSS-119 5.8.9	FCC 47 CFR 90.543	Adjacent Channel Power Ratio	TIA-603-E 2.2.14 TIA-102.CAAA-E 2.2.8	N1
RSS-119 5.8	FCC 47 CFR 2.1051	Transmitter Spurious Emissions (Conducted)	ANSI C63.26 5.7	N1
RSS-119 5.8	FCC 47 CFR 2.1053	Transmitter Spurious Emissions (Radiated)	TIA-603-E 2.2.12	N1
No specification	FCC CFR 90.543	Transmitter Radiated Emissions in the GNSS Band	TIA-603-E 2.2.12	N1
RSS-119 5.8.9.2 rad	No specification	Transmitter Conducted Emissions in the GNSS Band	ANSI C63.26 6.5.2.7.4	N1
RSS-119 5.9	FCC 47 CFR 90.214	Transient Frequency Behaviour	ANSI C63.26 6.5.2.2	N/A 3
RSS-119 5.3	FCC 47 CFR 2.1055, FCC 47 CFR 90.213	Transmitter Frequency Stability - Temperature	ANSI C63.26 5.6.4	N1
RSS-119 5.3	FCC 47 CFR 2.1055 (d) (1), FCC 47 CFR 90.213	Transmitter Frequency Stability - Voltage	ANSI C63.26 5.6.5	N1
RSS-Gen 7.4	FCC 47 CFR 15.111	Receiver Spurious Emissions (Conducted)	TIA-603-E 2.1.2	N1

Test Case Result Definitions	
No test Performed	N
Test does not apply to the test object	N/A
Test object meets requirements	P (Pass)
Test object does not meet requirements	F (Fail)
Test object is not conclusive	I (Inconclusive)

Comments:
N/A 1: Only required where the EUT is capable of Analogue modulation
N/A 2: Only required where the EUT transmits in the 768-776 or 798-806 MHz band (ISED), or 769-775 or 799-805 MHz band (FCC).
N/A 3: Only required where the EUT transmits in the 138-174 or 406.1-512 MHz band
N1: Not tested, as this parameter is unlikely to be affected by the addition of the 762.025 MHz channel and the 20 kHz channel spacing.

STATEMENT OF COMPLIANCE

We, TELTEST LABORATORIES of 558 Wairakei Road, Christchurch, New Zealand, declare under our sole responsibility that the product:

Equipment: Mobile Transceiver
Type: TMBK5B
Product Code: T02-00014-XFAA
Serial Number(s): 21660155
Quantity: 1

to which this declaration relates, is in conformity with the following standards:

FCC 47 CFR Parts 22 and 90

RSS-119 Issue 12 & RSS-Gen Issue 5

for the parameters tested in this report.

Signature:



M. C. James
Laboratory Technical Manager

Date:



The results obtained in this test report pertain only to the item tested. Teltest does not make any claims of compliance for samples or variants that were not tested.

95% measurement uncertainties are stated in this report but are not applied in the assessment of results.

CHANNEL TABLE

Label	Channel Number	Transmit Frequency MHz	Power Watts	Channel Spacing kHz
762.025H	1	762.025	30	20
762.025L	2	762.025	2	20

Programming Application Name
Terminals Programming Application

Version
0.0.0.37 (Alpha)

MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

MODULATION TYPES:

F3E Analogue Frequency Modulation (FM)
F2D FFSK 1200 bps and FFSK 2400 bps

CHANNEL SPACING: 20.0 kHz

EMISSION DESIGNATORS:

Analogue FM	14K0F3E
FFSK Data 1200 bps	8K40F2D
FFSK Data 2400 bps	9K60F2D

CALCULATIONS

Equation: $B_n = 2M + 2Dk$

(M is highest modulating frequency; D is peak allowable deviation; k is a constant of 1 for FM)

Analogue Voice: 20.0 kHz Bandwidth

Necessary bandwidth

M = 3.0 kHz

D = 4.0 kHz

$$B_n = (2 \times 3.0) + (2 \times 4.0) \times 1 \\ = 14.0 \text{ kHz}$$

Emission Designator

14K0F3E

F3E represents an FM voice transmission

Fast Frequency Shift Keying (FFSK – 1200 bps): 20.0 kHz Channel Spacing

Necessary bandwidth

M = 1.8 kHz

D = 2.4 kHz (60% of peak deviation)

$$B_n = (2 \times 1.8) + (2 \times 2.4) \times 1 \\ = 8.4 \text{ kHz}$$

Emission Designator

8K40F2D

F2D represents a FM data transmission with the use of a modulating sub carrier

Fast Frequency Shift Keying (FFSK – 2400 bps): 20.0 kHz Channel Spacing

Necessary bandwidth

M = 2.4 kHz

D = 2.4 kHz (60% of peak deviation)

$$B_n = (2 \times 2.4) + (2 \times 2.4) \times 1 \\ = 9.6 \text{ kHz}$$

Emission Designator

9K60F2D

F2D represents a FM data transmission with the use of a modulating sub carrier

TEST RESULTS

TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC 47 CFR 2.1047 (a)

GUIDE: ANSI C63.26 5.3.3.2

MEASUREMENT PROCEDURE:

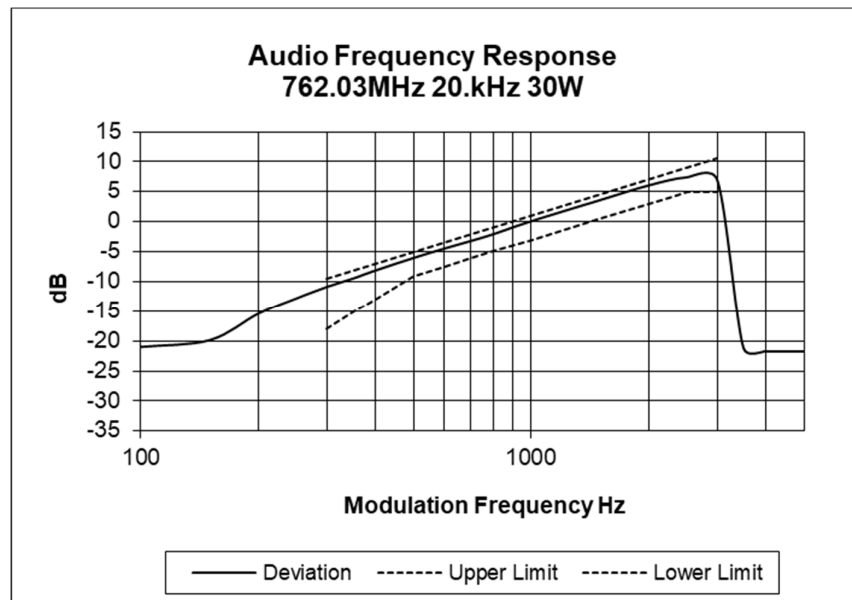
1. Refer Annex A for Equipment set up.
2. An audio input tone of 1000 Hz was applied with the level set to obtain 20% of maximum deviation. This was used as the 0 dB reference point.
3. The AF was varied while the audio level was held constant.
4. The response in dB relative to 1000 Hz was measured.

MEASUREMENT RESULTS:

See the plots on the following pages for 20kHz channel spacing tested at 30W transmit power.

MEASUREMENT UNCERTAINTY: $\pm 1.5\%$

Tx FREQUENCY: 762.025 MHz 30 W 20 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC 47 CFR 2.1047 (b)

GUIDE: ANSI C63.26 5.3.2

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment set up.
2. An audio input tone of 1000 Hz was applied with the level set to obtain 60% of maximum deviation. This was used as the 0 dB reference point.
3. The modulation response was measured at four audio frequencies while increasing the input level in 5dB steps.
4. Additionally, the level used to measure sideband spectrum (occupied bandwidth) was included in the level sweep.
5. Measurements were made for both Positive and Negative Deviation.

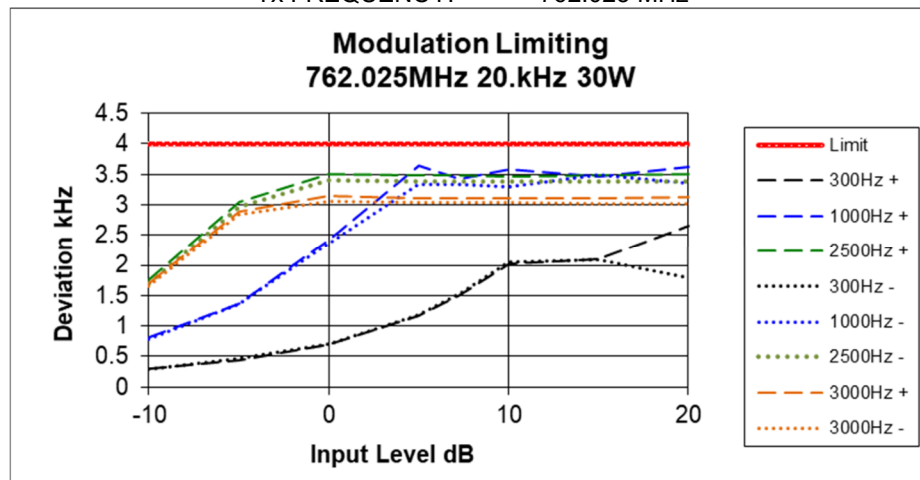
MEASUREMENT RESULTS:

See the plots on the following pages for 20 kHz channel spacing tested at 30W transmit power.

LIMIT CLAUSE: TIA/EIA-603E 1.3.4.4

MEASUREMENT UNCERTAINTY: $\pm 1.5\%$

Tx FREQUENCY: 762.025 MHz



TRANSMITTER OCCUPIED (99%) BANDWIDTH

SPECIFICATION: FCC 47 CFR 2.1046
RSS-119 5.5

GUIDE: ANSI C63.26 5.4.4

MEASUREMENT PROCEDURE:

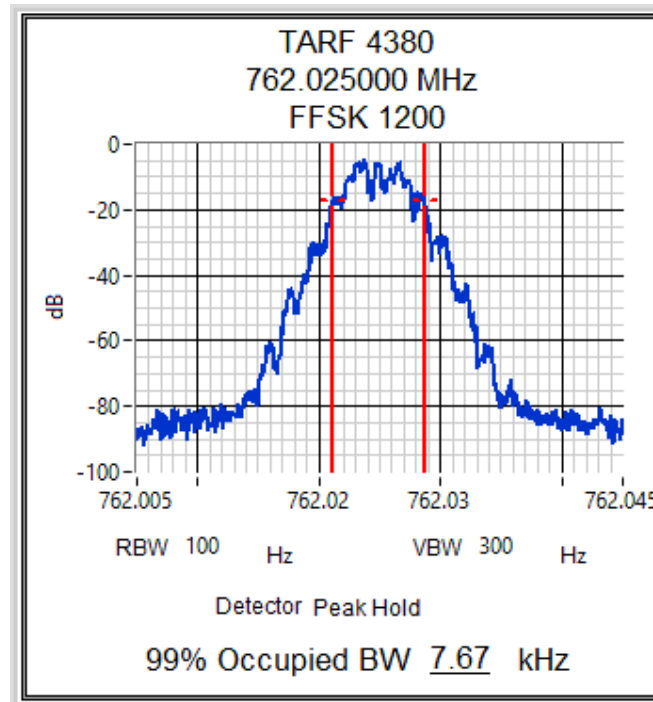
1. Refer Annex A for Equipment Set up.
2. For Analogue measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.
For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as follows.
Resolution Bandwidth = 100 Hz, Video Bandwidth = 300 Hz

MEASUREMENT RESULTS:

		Bandwidths (kHz)		
Channel Frequency (MHz)	Channel Spacing (kHz)	Analogue	FFSK 1200 bps	FFSK 2400 bps
762.025 MHz	20.0	10.2	7.67	9.07
<u>Limit</u> Authorized Bandwidth 47 CFR 90.209 RSS 119 5.5		20.0	20.0	20.0
Necessary BW used in emission designator		14.0	8.4	9.6
Result		Pass	Pass	Pass

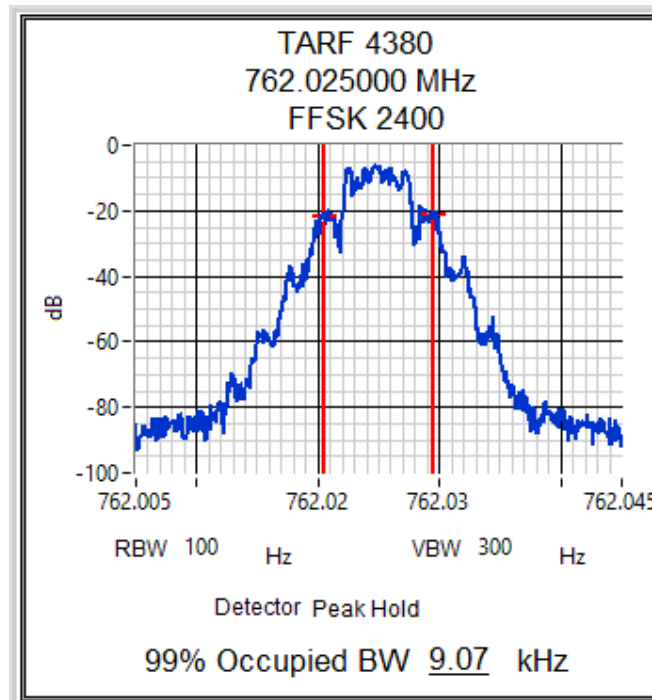
Transmitter Occupied (99%) Bandwidth – FFSK 1200 bps

762.025 MHz, 30 W



Transmitter Occupied (99%) Bandwidth – FFSK 2400 bps

762.025 MHz, 30W



TRANSMITTER SPECTRUM MASKS

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

GUIDE: ANSI C63.26.5.7.3

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment Set up.
2. For Analogue measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.
For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as noted on the recorded plots.

MEASUREMENT RESULTS:

See the plots on the following pages for 20.0 kHz channel spacing.

MEASUREMENT UNCERTAINTY: 95% \pm 0.65dB

LIMIT CLAUSE: FCC 47 CFR 90.210 RSS-119 5.5

EMISSION MASKS

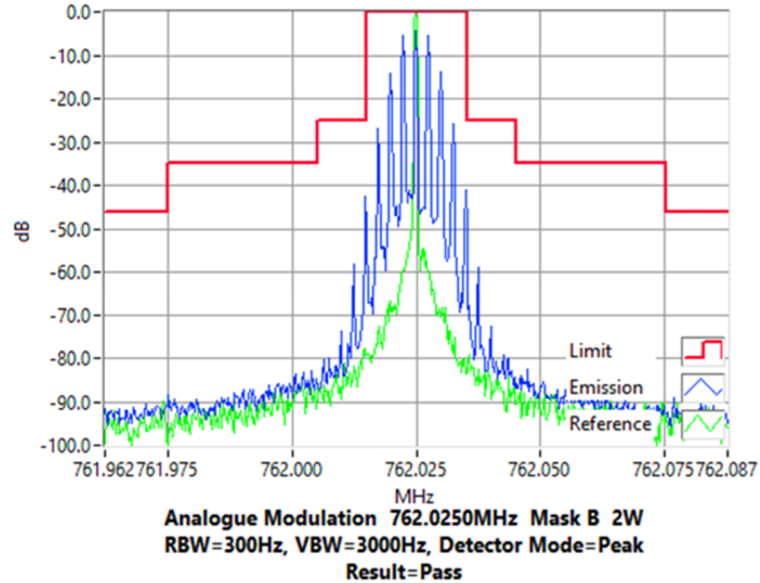
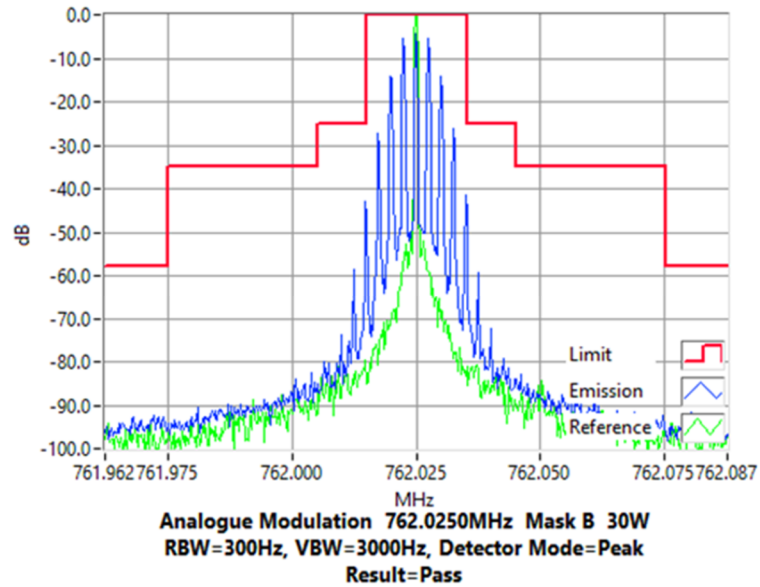
Emission Mask B	20 kHz Channel Spacing	Analogue
Emission Mask G	20 kHz Channel Spacing	FFSK 1200bps & FFSK 2400bps

DATA SPEED

FFSK	20 kHz Channel Spacing	1200 bps & 2400 bps
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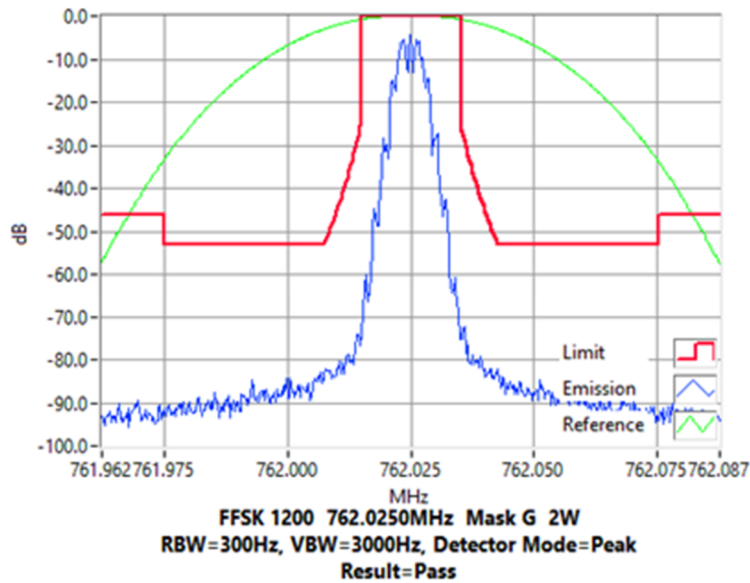
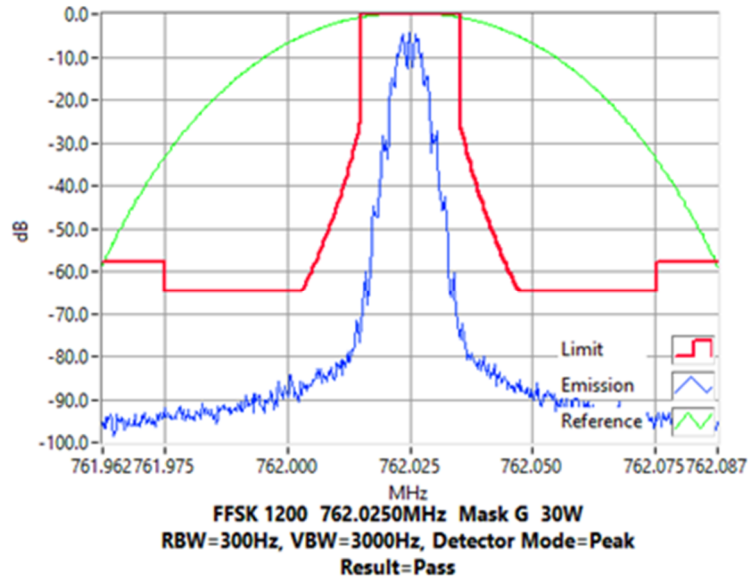
Transmitter Spectrum Masks – Analogue

762.025 MHz, 20 kHz Channel Spacing, 30 W and 2 W Tx Power



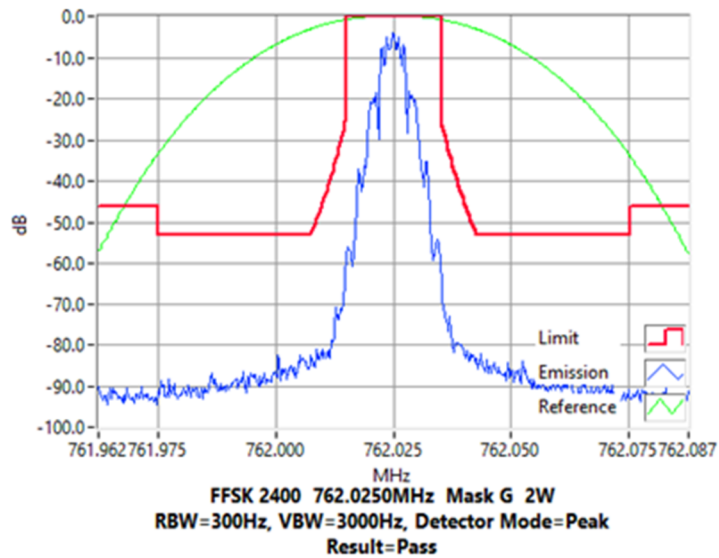
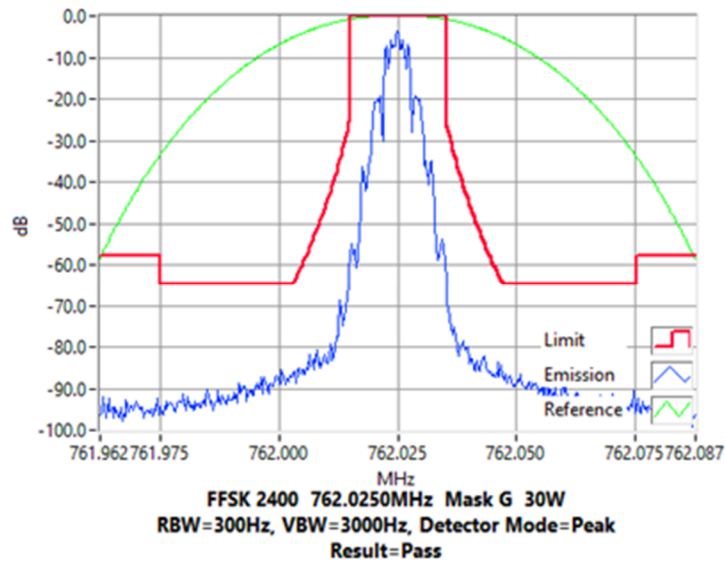
Transmitter Spectrum Masks – FFSK 1200 bps

762.025 MHz, 20 kHz Channel Spacing, 30 W and 2 W Tx Power



Transmitter Spectrum Masks – FFSK 2400 bps

762.025 MHz, 20 kHz Channel Spacing, 30 W and 2 W Tx Power



TEST EQUIPMENT LIST

Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
Audio Analyser	TREVA1	Hewlett Packard	HP8903A	2437A04625	E4986	5-Oct-25
Coax Cable	2m Black	Suhner	RG214HF/Nm/ Nm/2000	TeltestBlack4	E4653	10-Sep-25
Coax Cable	3m Blue	Suhner	Sucoflex 126EA	503429/126EA	E5015	11-Sep-25
Modulation Analyser	TREVA1	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	9-Oct-25
Power Meter	TREVA1 Power Head for HP8901	Hewlett Packard	HP11722A	3111A05573	E7054	7-Oct-25
Power Supply	TREVA 1 60V/25A	Agilent	N5767A	US23D6941R	E11372	5-Oct-25
RF Attenuator	20dB 50W	Weinschel	24-20-44	AW1266	E3562	13-Sep-25
RF Attenuator	TREVA1 3dB	Weinschel	Model 1	BL9958	E4081	13-Sep-25
RF Attenuator	TREVA1 20dB 150W	Weinschel	40-20-23	MF817	E4082	13-Sep-25
RF Combiner	TREVA1	Minicircuits	ZFSC-4-1	-	E4083	
Spectrum Analyser	26.5GHz	Agilent	PXA N9030A	MY49432161	E4907	2-Mar-25
Temp & Humidity datalogger		TP-Link TAPO	T315	22383M6000671	E11377	8-Feb-25
TREVA 1		Teltest	-	1	-	23-Oct-25
Testware	Occupied Bandwidth		TTEL_OCCBW 2.00.01	-	-	
Testware	Sideband Spectrum		February 2017	-	-	
Testware	TREVA		TTEL_TREVA 2.00.00	-	-	

* NOTE: Items without calibration dates are calibrated immediately before use or set using calibrated instruments.

[illegible]

Report Revision: 1
Issue Date: 21 January 2025