TEST REPORT NO: RU1069/4858

COPY NO: ----------

ISSUE NO: 1

FCC ID: NEO50-0637Series

REPORT ON THE CERTIFICATION TESTING OF A
Aerial Facilities Limited
Channelised Bi-Driectional RF Amplifier (50-063701)
WITH RESPECT TO
THE FCC RULES CFR 47, PART 90 Subpart K
PRIVATE LAND MOBLIE REPEATER.

TEST DATE: 29th September – 6th October 2003

TESTED BY: JOHN CHARTERS (Signature Not Verified; Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2003.11.01 09:23:55 Z) ---------- J CHARTERS

APPROVED BY: Peter Green (Signature Not Verified; Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services Ltd., c=GB Date: 2003.11.01 19:10:21 Z) ---------- P GREEN
PRODUCT MANAGER
EMC

DATE: ----------

Distribution:

Copy Nos:
1. Aerial Facilities Limited
2. TCB: TRL Compliance Services Limited
3. TRL EMC

TRL COMPLIANCE SERVICES LTD EMC DIVISION
LONG GREEN FORTHAMPTON GLOUCESTER GL19 4QH UNITED KINGDOM
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E-MAIL test@trlcompliance.com www.trlcompliance.com

FS 21805

CONTENTS

Notes:

1. Component failure during test — YES [ ] NO [X]
2. If Yes, details of failure:
3. The facilities used for the testing of the product contain in this report are FCC Listed.

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	NEO50-0637Series
PURPOSE OF TEST:	CERTIFICATION
TEST SPECIFICATION:	FCC RULES CFR 47, Part 90 Subpart K
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	Channelised Bi-Driectional RF Amplifier (50-063701)
EQUIPMENT TYPE:	Private Land Mobile Repeater
MAXIMIUM GAIN	83.9dB
MAXIMUM INPUT	-56dBm
MAXIMUM OUTPUT	25dBm
ANTENNA TYPE:	Not applicable
CHANNEL SPACING:	12.5kHz

NUMBER OF CHANNELS:

Channel No.	Uplink	Downlink
1	452.050MHz	457.050MHz
2	452.300MHz	475.300MHz
3	452.775MHz	457.775MHz
4	453.225MHz	457.850MHz
5	452.850MHz	458.225MHz
6	n/a	Simplex Chanel 452.850MHz

FREQUENCY GENERATION:	N/A
MODULATION TYPE:	F3E
POWER SOURCE(s):	115Vac
TEST DATE(s):	29th September – 6th October 2003
ORDER No(s):	20424
APPLICANT:	Aerial Facilities Limited
ADDRESS:	Aerial House Latimer Park, Latimer Chesham Buckinghamshire HP5 1TU United Kingdom

TESTED BY: JOHN CHARTERS — Digitally signed by JOHN CHARTERS DN: cn=JOHN CHARTERS, o=TRL COMPLIANCE SERVICES, c=US Date: 2003.11.01 09:24:16 Z — J CHARTERS

APPROVED BY: Peter Green — Digitally signed by Peter Green DN: cn=Peter Green, o=TRL Compliance Services Ltd., c=GB Date: 2003.11.01 19:10:44 Z — P GREEN PRODUCT MANAGER EMC

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	Channelised Bi-Driectional RF Amplifier (50-063701)
EQUIPMENT TYPE:	50-063701
PURPOSE OF TEST:	CERTIFICATION
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 90 Subpart K
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	20424
APPLICANT'S CONTACT PERSON(s):	Mr Peter Bradfield
E-mail address:	Peterb@aerial.co.uk
APPLICANT:	Aerial Facilities Limited
ADDRESS:	Aerial House Latimer Park, Latimer Chesham Buckinghamshire HP5 1TU United Kingdom
TEL:	+44 (0)1494777020
FAX:	+44 (0)149477020
MANUFACTURER:	Aerial Facilities Limited
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	29th September – 6th October 2003
TEST REPORT No:	RU1069/4858

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	APPLICABILITY	RESULT
RF Power Output	90.205	Yes	Complies
Audio Frequency Response	TIA EIA-603.3.2.6	N/A	N/A
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	N/A	N/A
Modulation Limiting	TIA EIA-603.3.2.6	N/A	N/A
Occupied Bandwidth	90.210	Yes	Complies
Spurious Emissions at Antenna Terminals	90.210	Yes	Complies
Field Strength of Spurious Emissions	90.210	Yes	Complies
Frequency Stability	90.213	N/A(note 1)	N/A
Transient behaviour	90.214	N/A(note 2)	N/A

Notes:
1 The EUT does not contain modulation circuitry, therefore the test was not performed.
2 The EUT is not a keyed carrier system, therefore the test was not performed.

2. Product Use: Private Land Mobile Repeater

3. Emission Designator: F3E

4. Temperatures: Ambient (Tnom) 20°C

5. Supply Voltages: Vnom 115Vac

Note: Vnom voltages are as stated above unless otherwise shown on the test report page

6. Equipment Category:
   Single channel [ ]
   Two channel [ ]
   Multi-channel [X]

7. Channel spacing:
   Narrowband [X] 12.5kHz
   Wideband [ ]

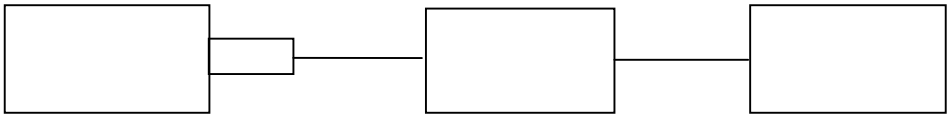
8. Test Location TRL Compliance Services
   Up Holland [X]
   Long Green [ ]

9. Modifications made during test program No modifications were performed.

COMPLIANCE TESTS

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – UPLINK

Ambient temperature = 20°C Radio Laboratory
Relative humidity = 54%
Supply voltage = 115Vac
Channel number = See test results



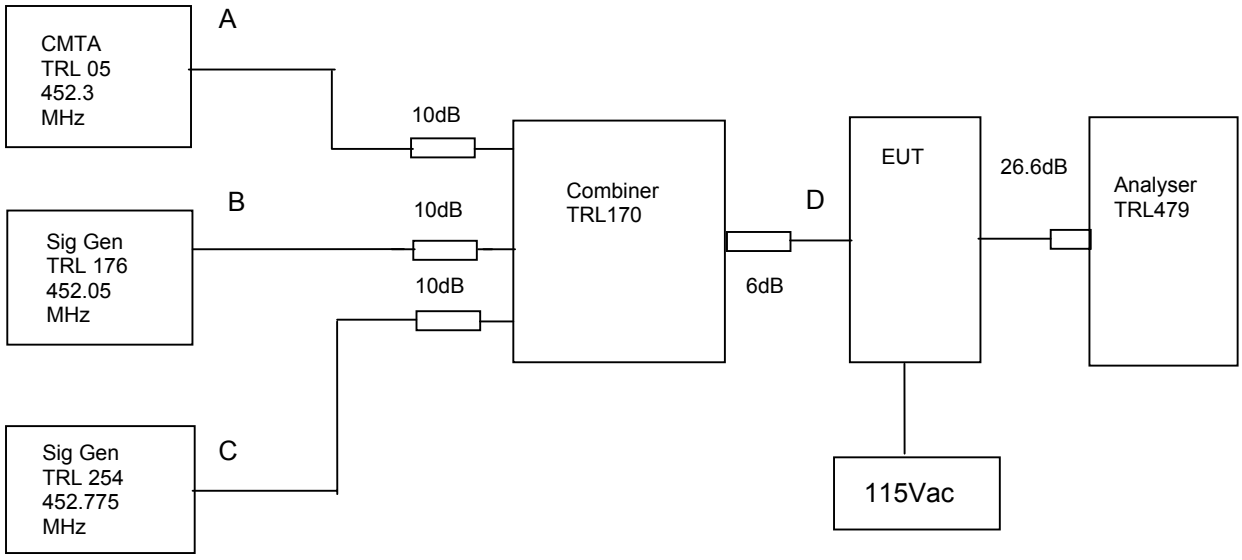
Frequency MHz	Signal Generator input level dBm	Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Gain after 20dB input level increase dBm
452.05MHz	-56.3	26.6	-2.1	80.9	80.9
452.30MHz	-56.2	26.6	-1.9	80.9	80.9
452.775MHz	-56.1	26.6	-2.5	81.05	81.05

Notes:
1. The level of the signal generator takes into consideration the loss from the cable.
2. The signal generator input was increased by 20dBs and the level of the output signal remeasured

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

AMPIFIER INTERMAODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– UPLINK

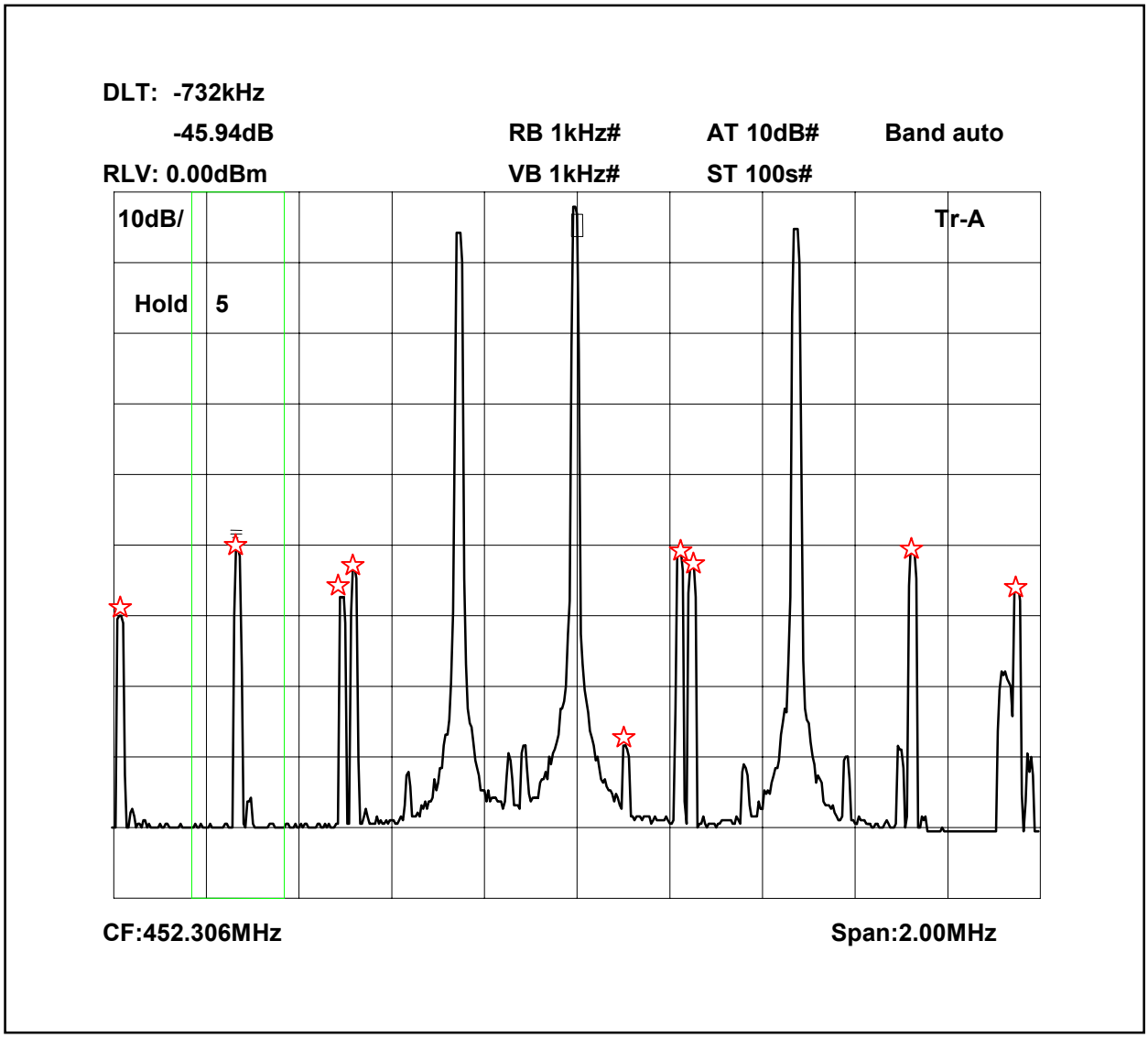
Ambient temperature	=	20°C	Radio Laboratory
Relative humidity	=	54%	
Supply voltage	=	115Vac	



The Intermodualation and spurious products were measured with the amplifier operating at maximum gain. A three tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was the maximum input of –56.1dBm The cable and attenuator loss between the EUT and the spectrum analyser was 26.6dB.

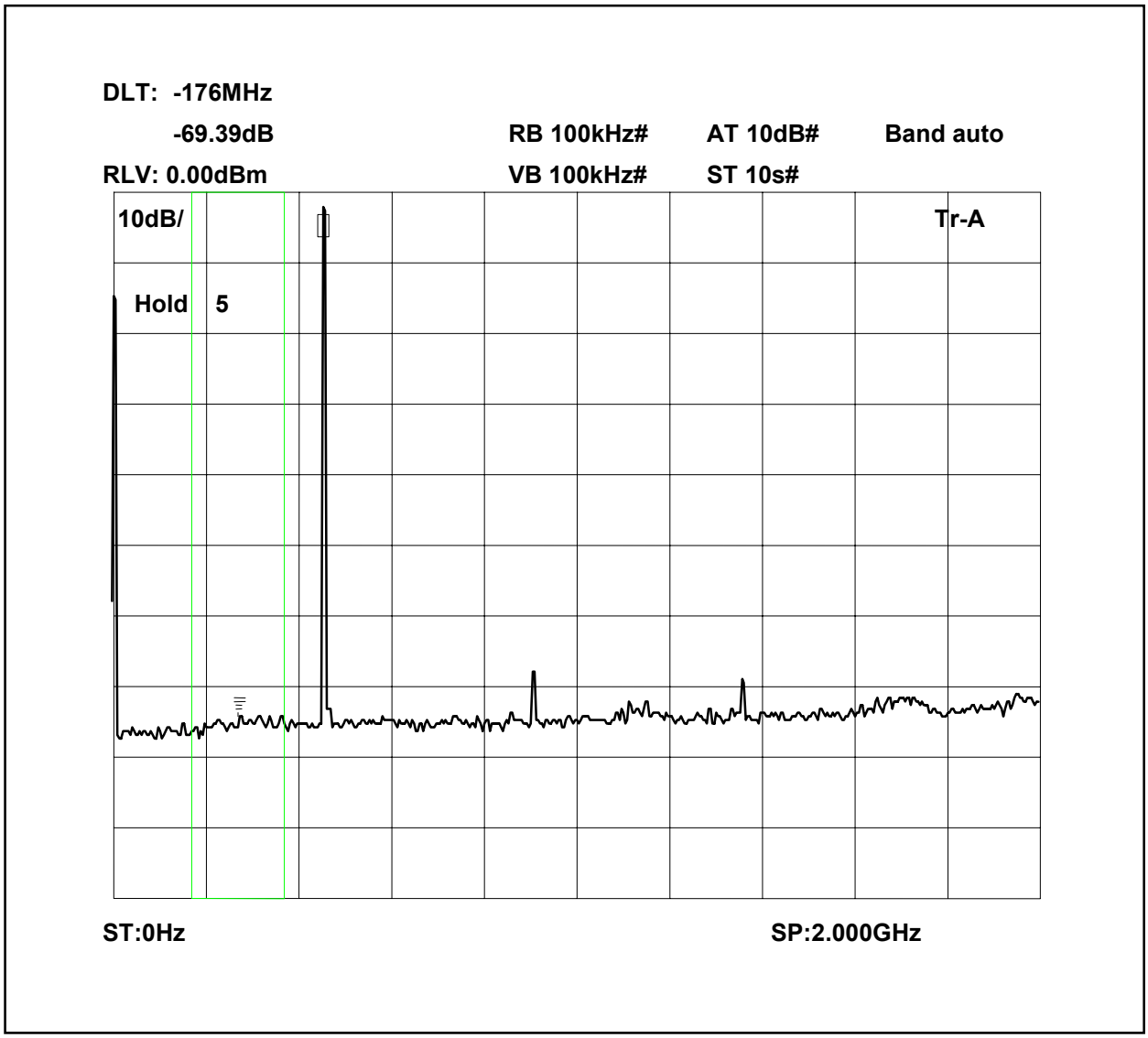
Sweep data is shown on the next page:

Intermodulaion Inband



The above plot shows that all products (designated by ☆) are at least 40dB below the fundamentals.

Intermodulation Wideband



The above plot shows that there are no products outside the bands.

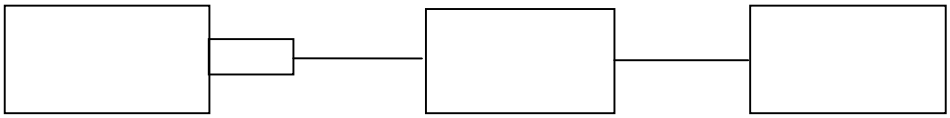
Test equipment used for intermodulation test

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
SIGNAL GENERATOR	MARCON	2042	119562/02	254	**X**
CMTA	ROHDE & SCHWARZ	CMTA52	894715/033	05	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**
COMBINER	ELCOM	RC-4-50	N/A	170	**X**

TRANSMITTER TESTS

AMPLIFER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– UPLINK

Ambient temperature	=	20°C	Radio Laboratory
Relative humidity	=	54%	
Supply voltage	=	115Vac	
Channel number	=	See test results	



Spectrum Analyser TRL479

Attenuator TRL220
Cable TRL279

EUT

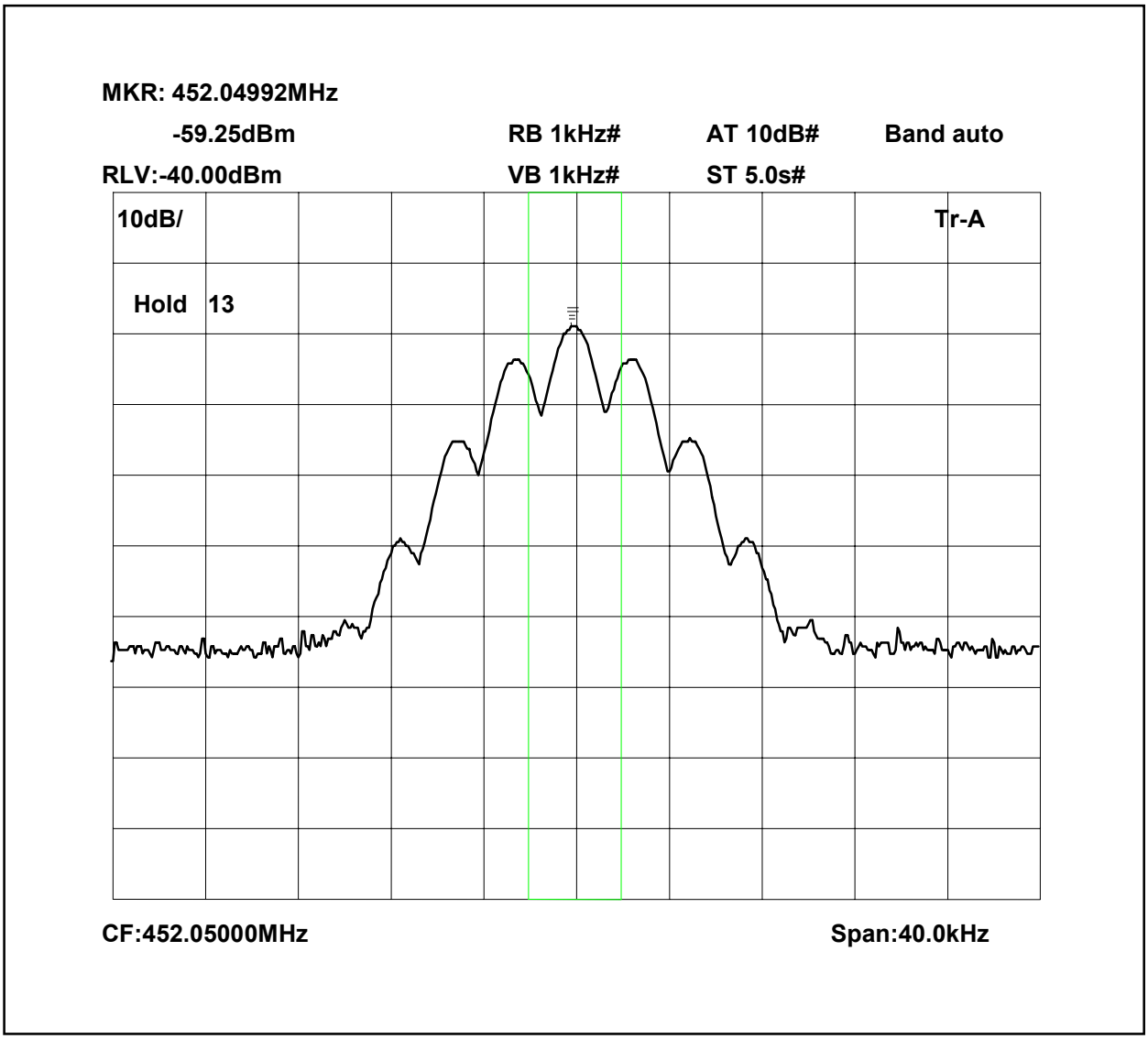
Signal Generator TRL179

This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input level (-56.1dBm) and modulated with a 2500Hz tone. The plots show the signal measured at the signal generator and the signal measured at the output of the EUT.

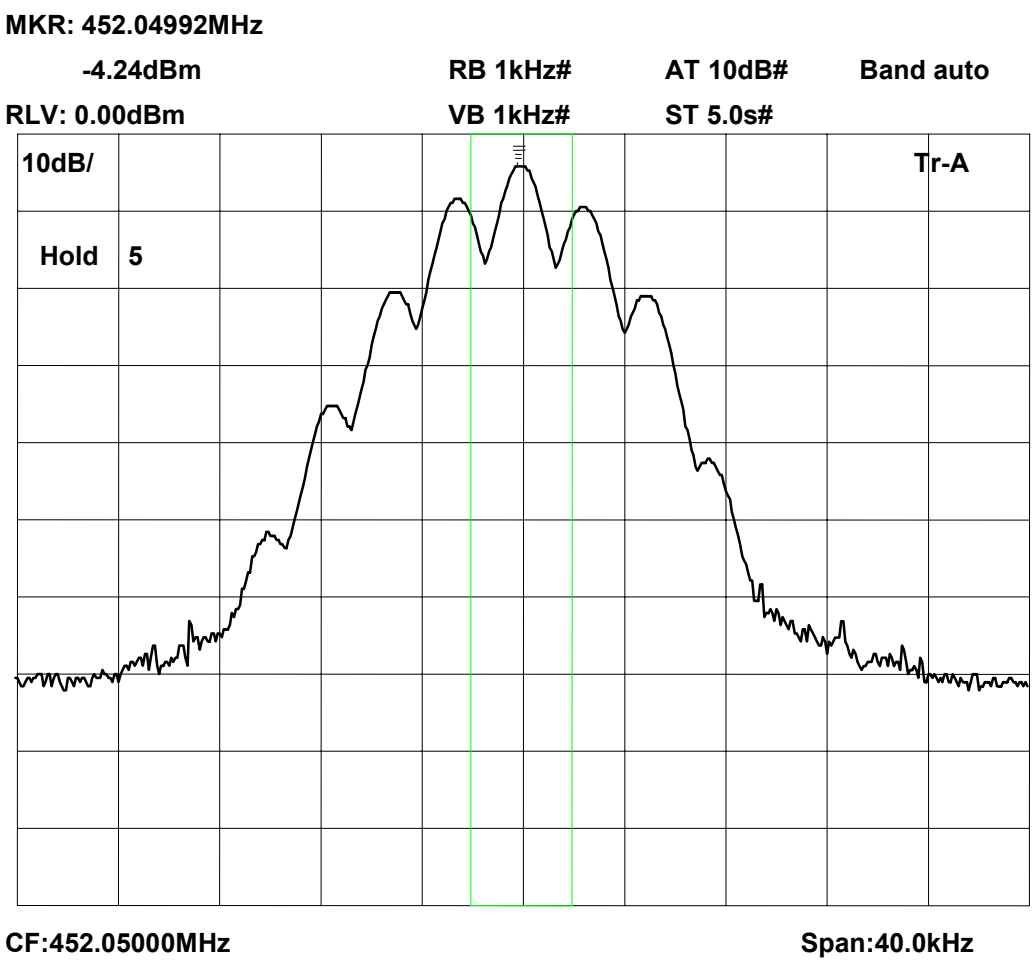
Note: The cables and attenuators had the following losses.

1. Cable TRL279 and attenuator TRL220 26.6dB
2. Cable between signal generator and EUT 0.85dB

452.05MHz Signal Generator deviation set to 2.5kHz

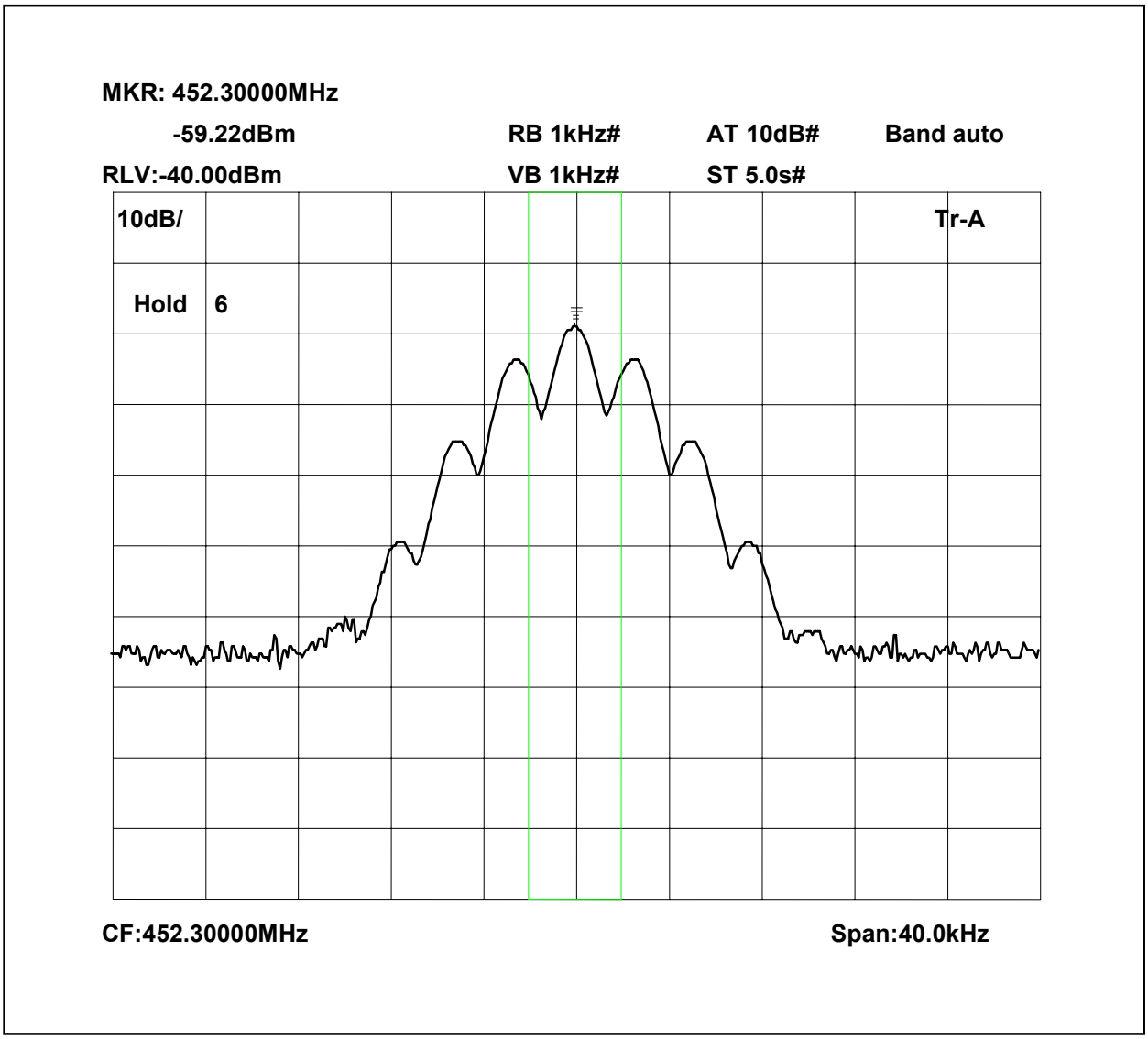


452.05MHz Signal Generator and EUT deviation set to 2.5kHz

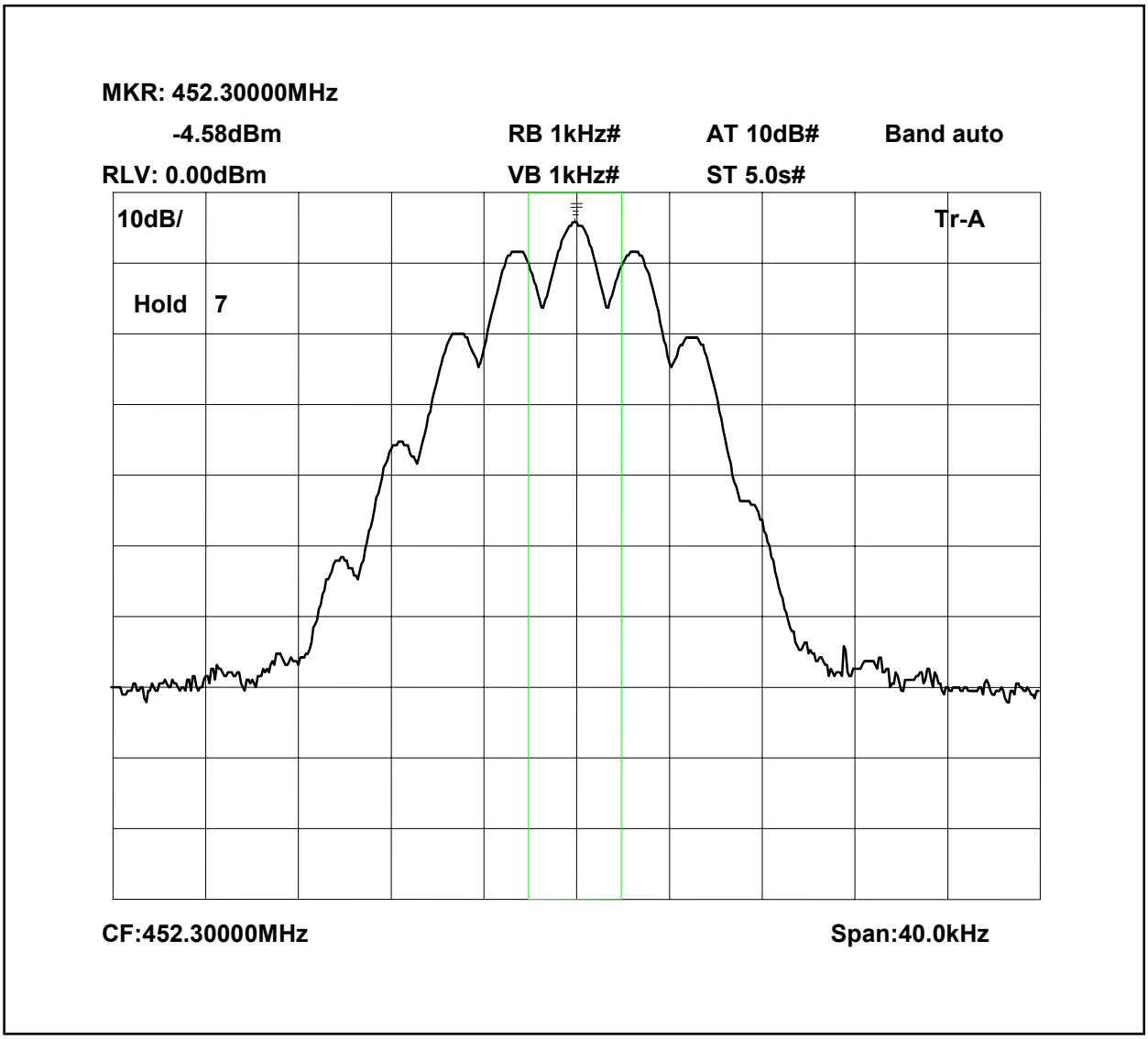


The above plots depicting the output waveshape show no measurable distortion visible, when compared to the input signal.

452.30MHz Signal Generator deviation set to 2.5kHz

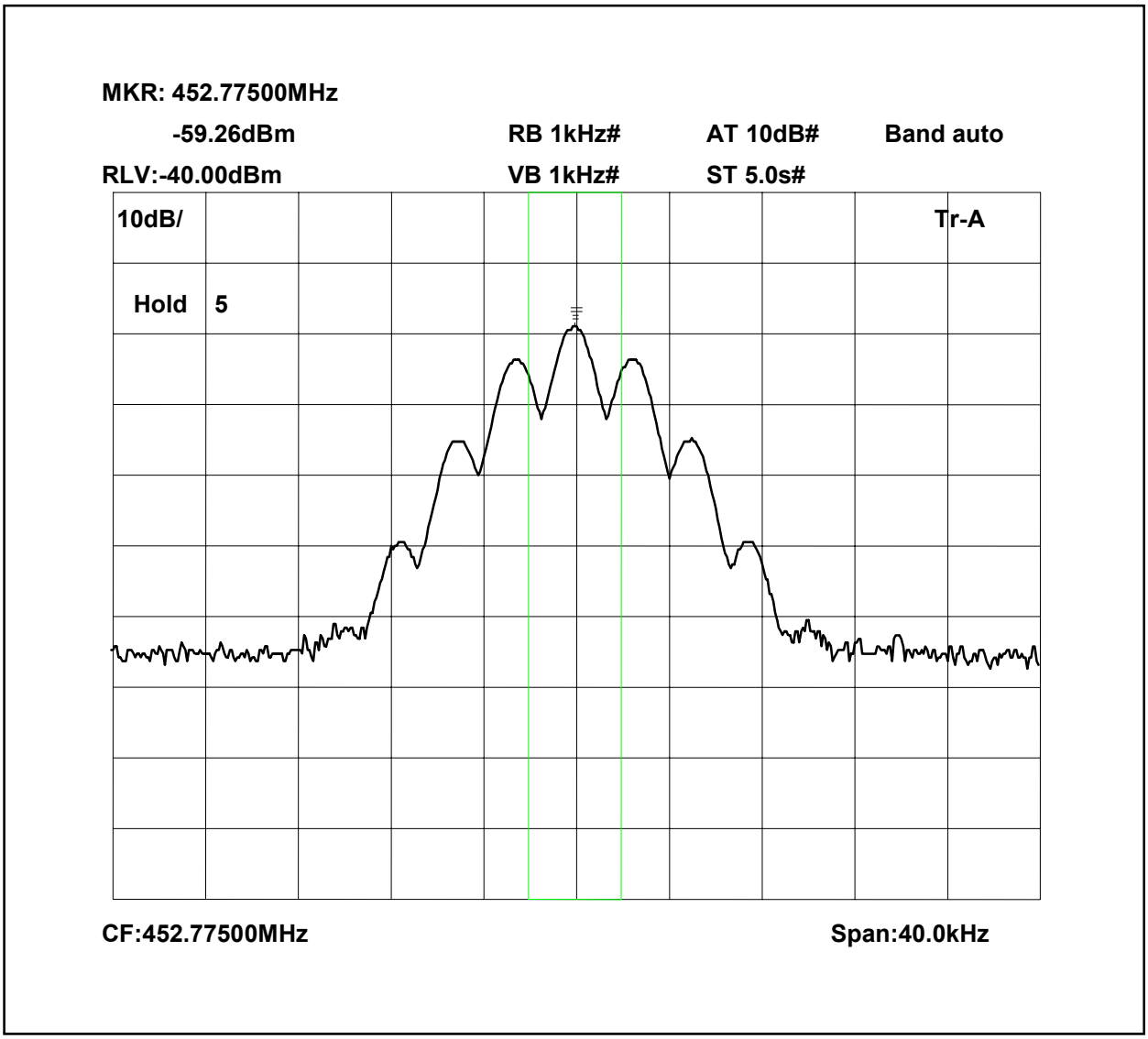


452.30MHz Signal Generator and amplifier deviation set to 2.5kHz

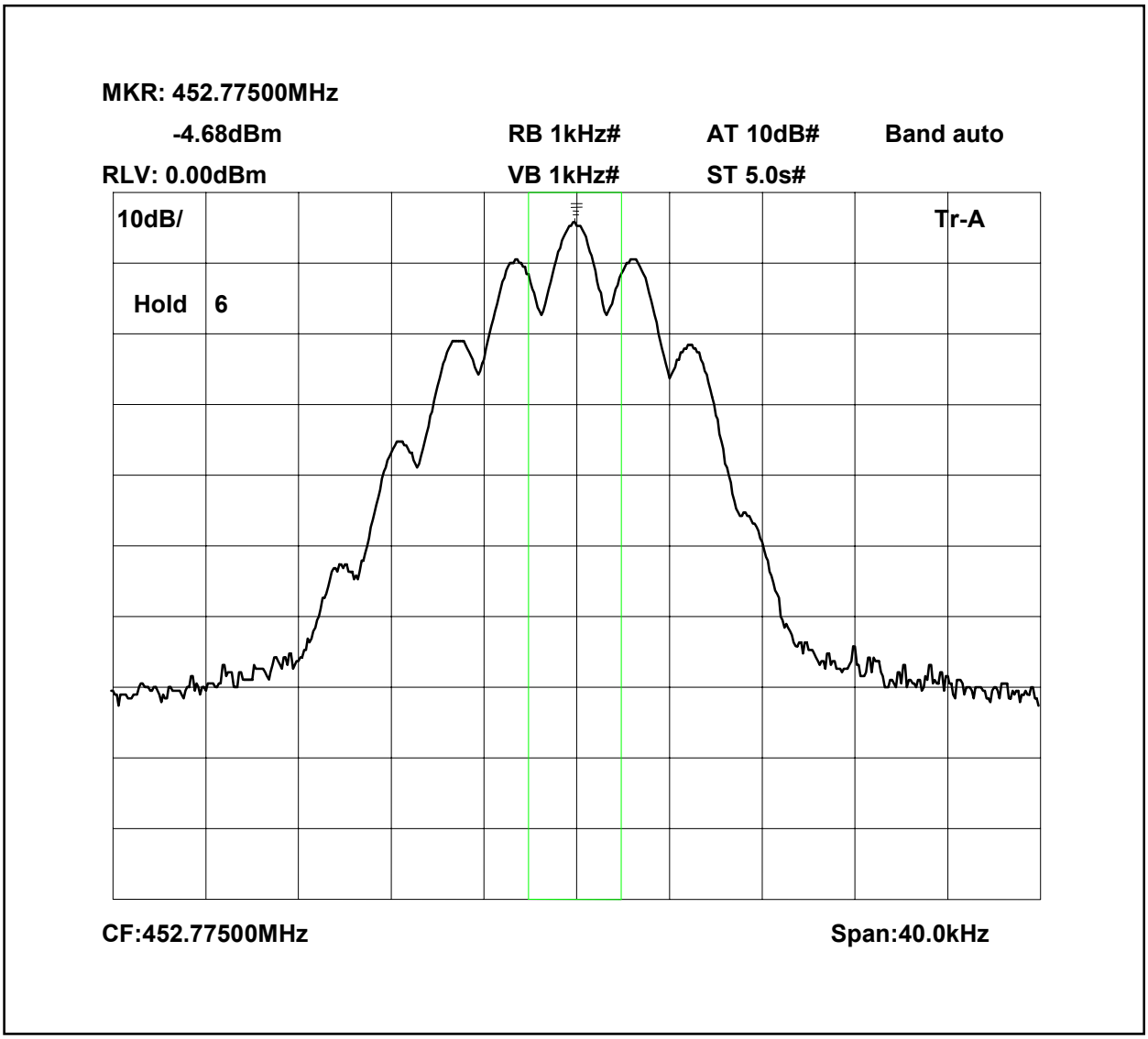


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

452.775MHz Signal Generator deviation set to 2.5kHz



452.775MHz Signal Generator deviation set to 2.5kHz



The above plots depicting the output waveshape show no measurable distortion visible, when compared to the input signal.

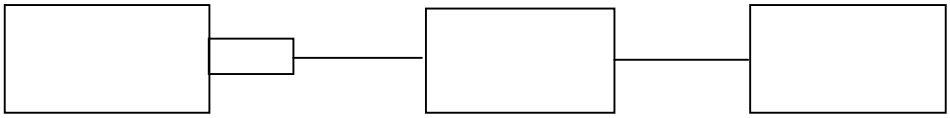
The test equipment used for the Transmitter Modulated Channel tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1051 – UPLINK

Ambient temperature	=	20°C	Radio Laboratory		
Relative humidity	=	54%	Test Signal	=	F3E
Supply voltage	=	115Vac			



Spectrum Analyser TRL479

Attenuator TRL220
Cable TRL279

EUT

Signal Generator TRL179

The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating at maximum power and on three test frequencies.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

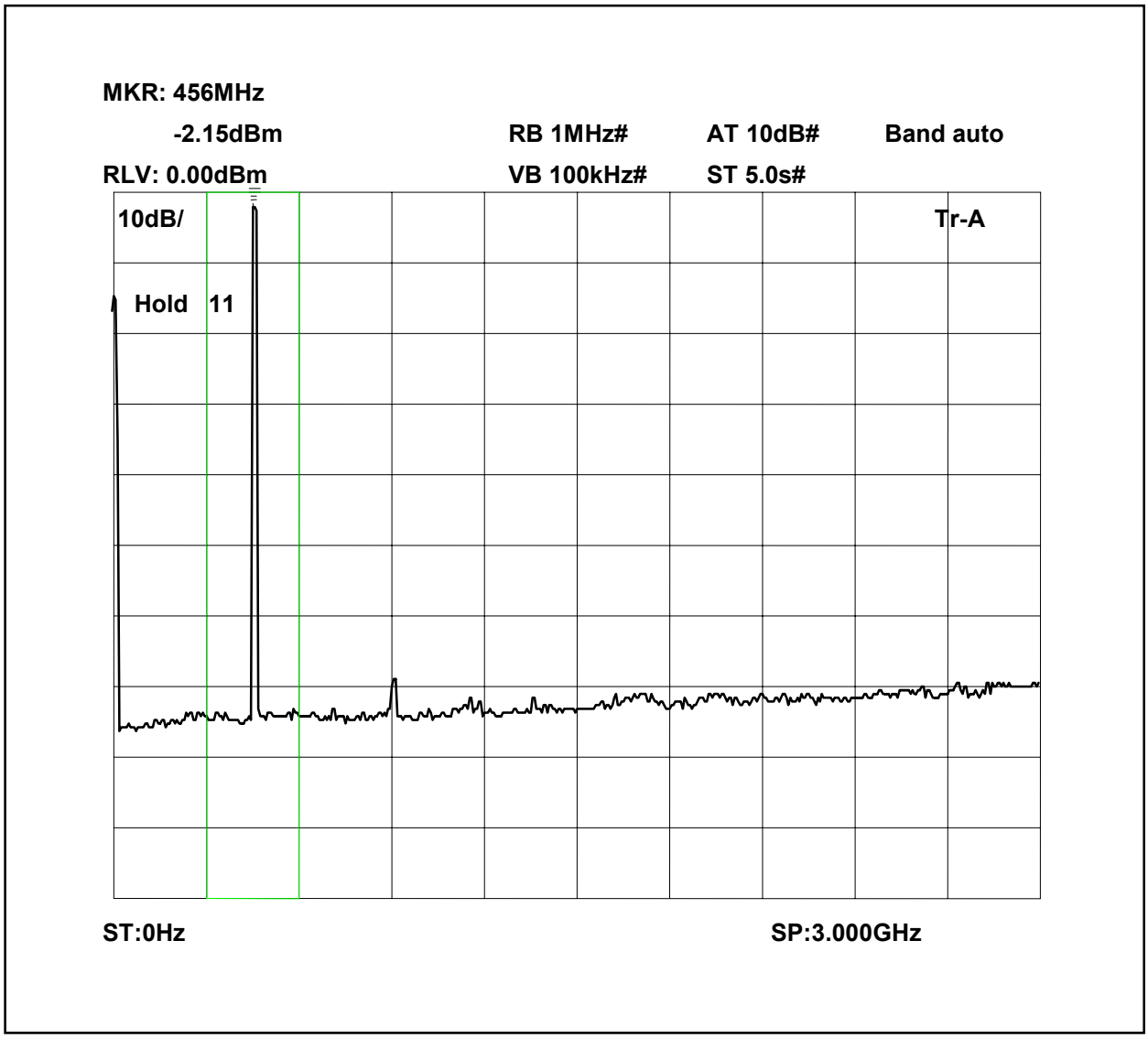
At least 43 + 10 log PdB

$(10\log P_{watts}) - (43+10\log (P_{watts} * 1000)) =$ LIMIT =-13 dBm

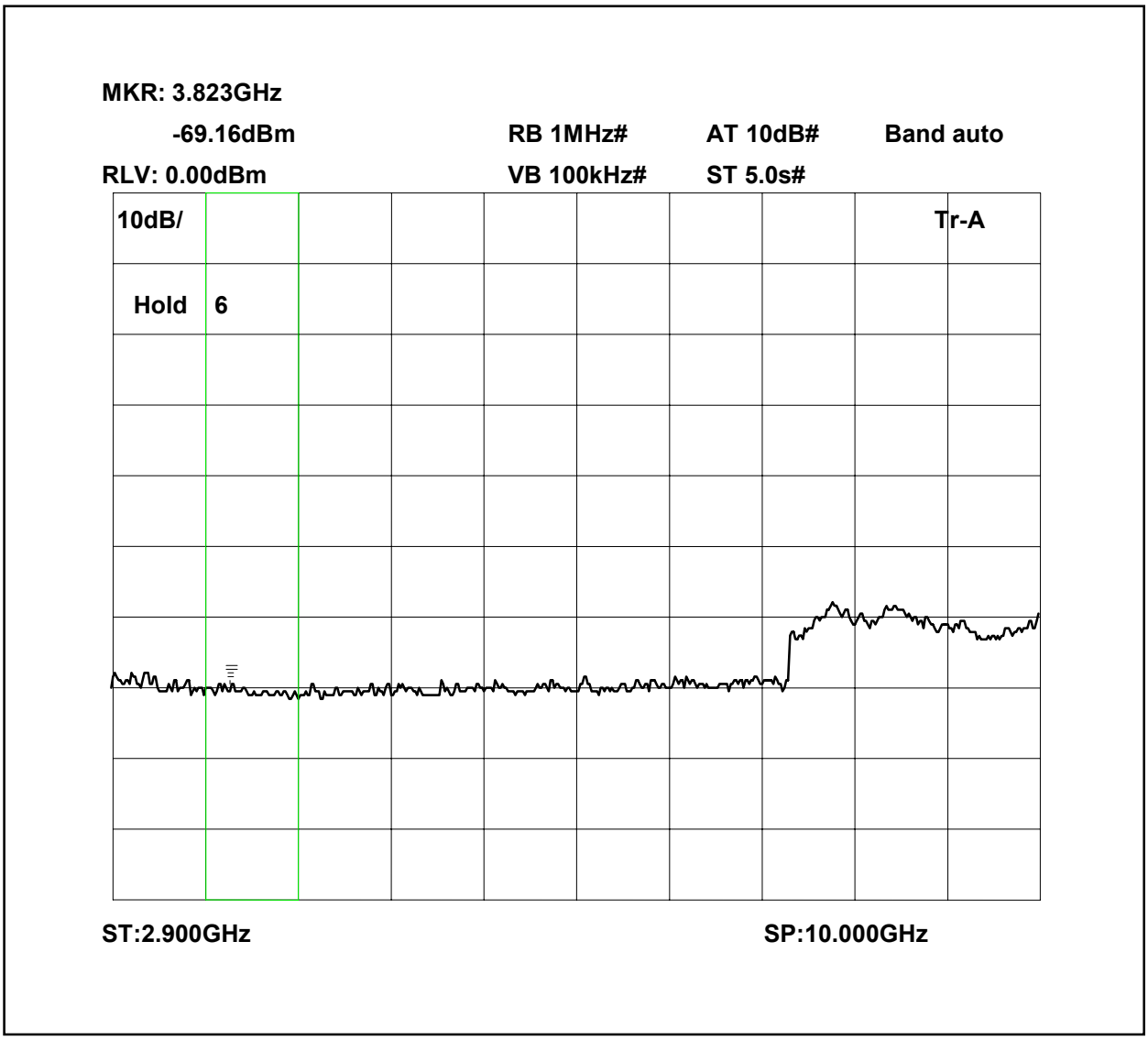
The test equipment used for the Transmitter Conducted Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

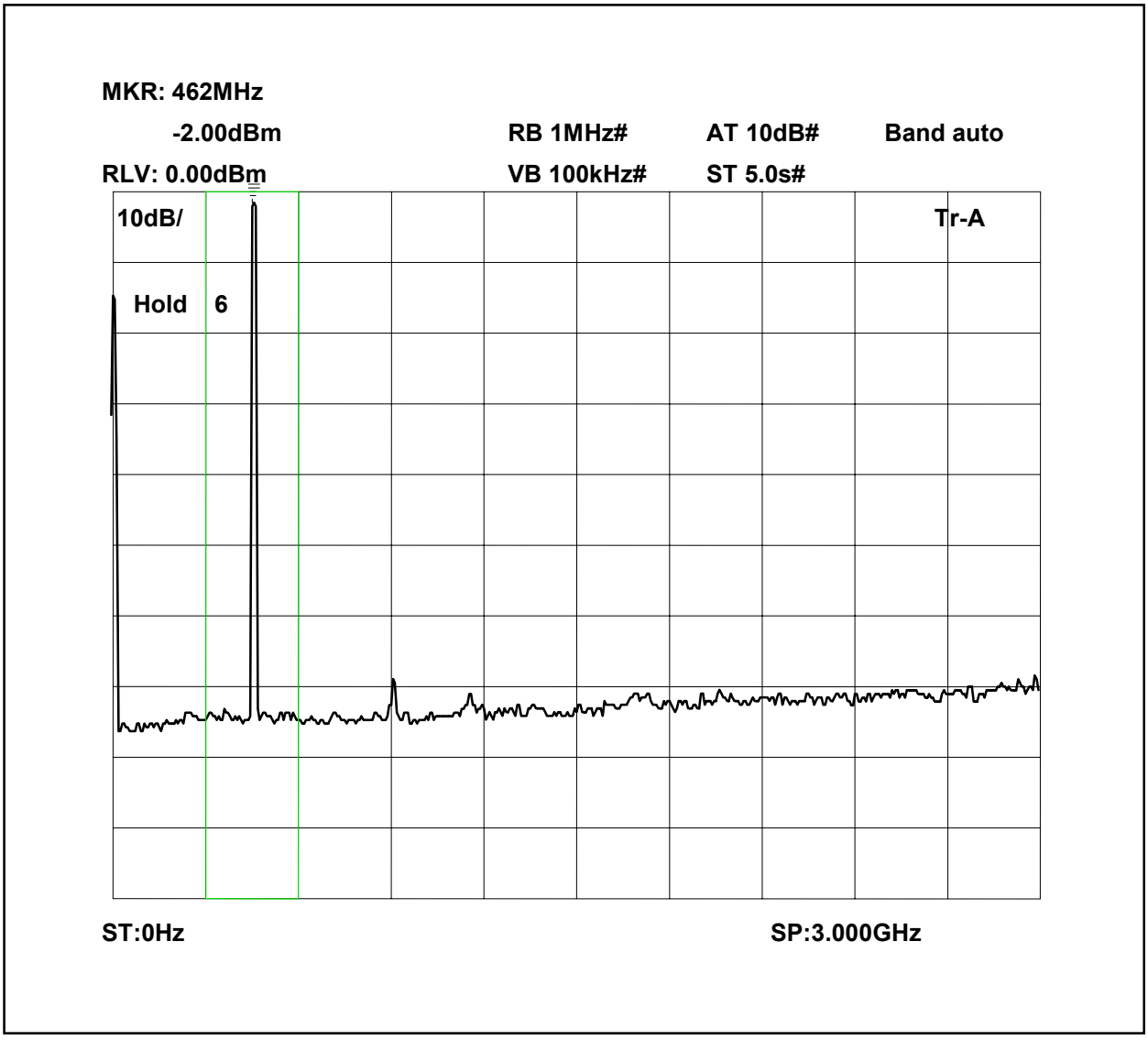
Conducted emissions 452.05MHz 0 - 3GHz



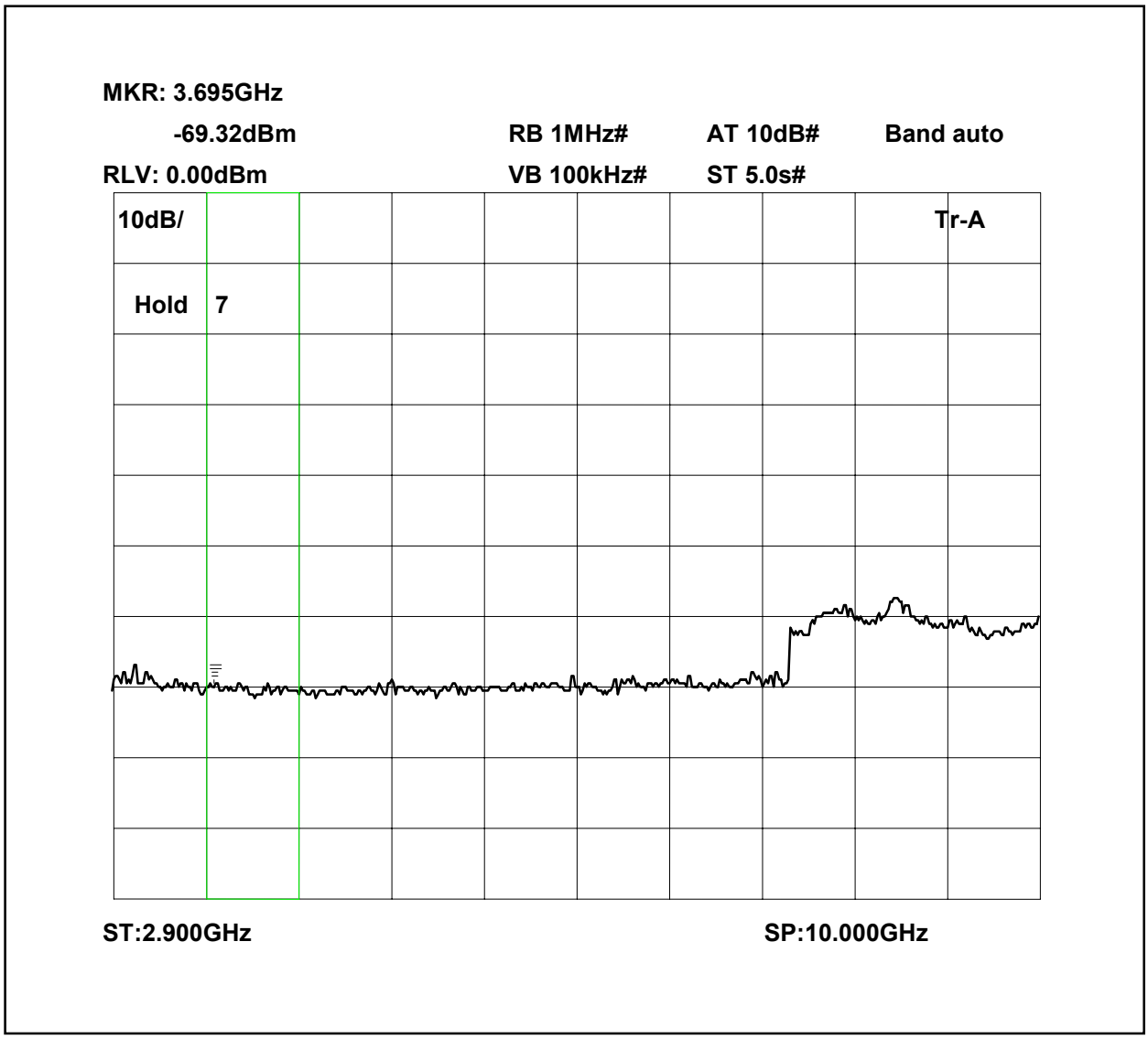
Conducted emissions 452.05MHz 2.9 - 10GHz



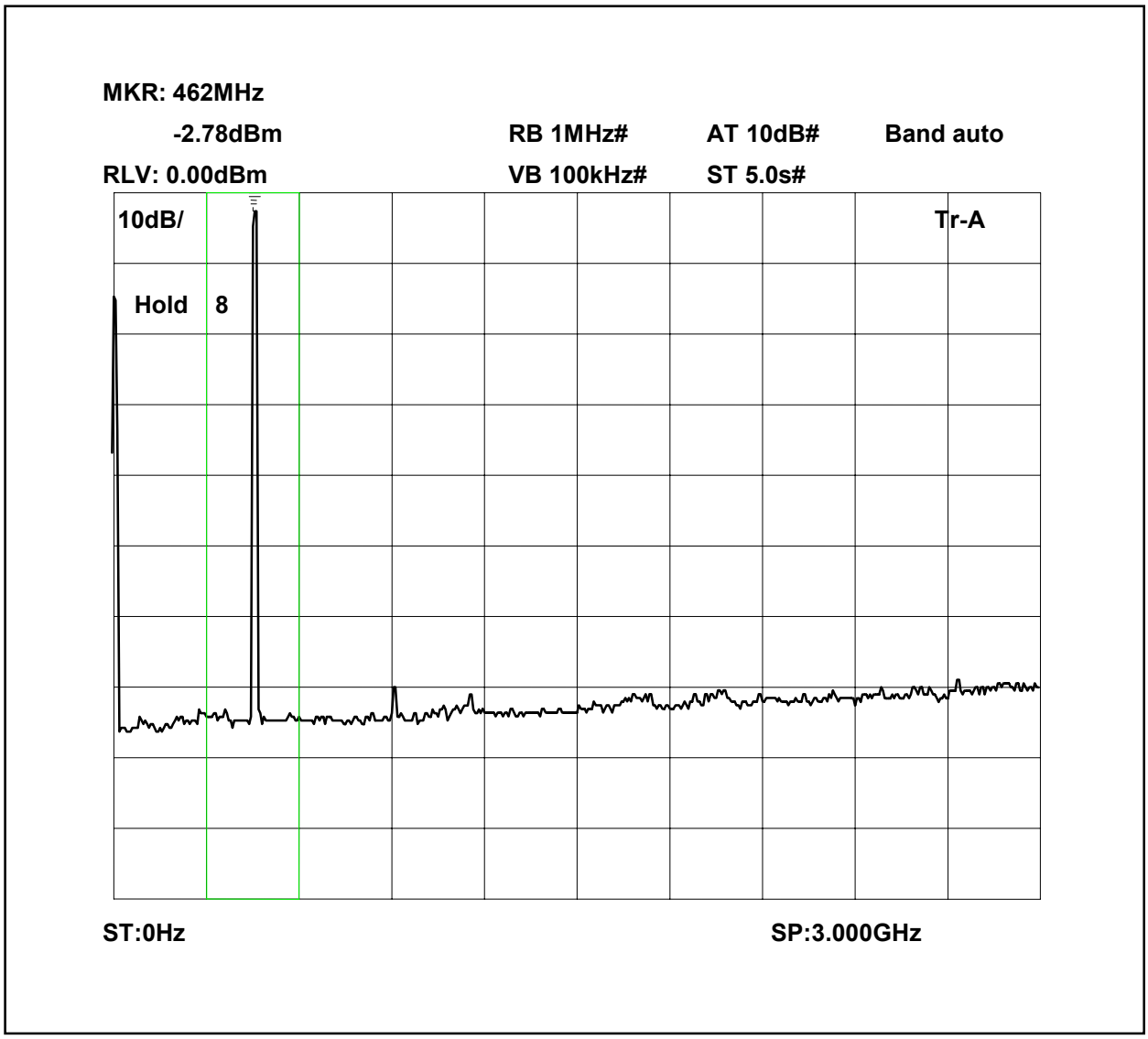
Conducted emissions 452.30MHz 0 - 3GHz



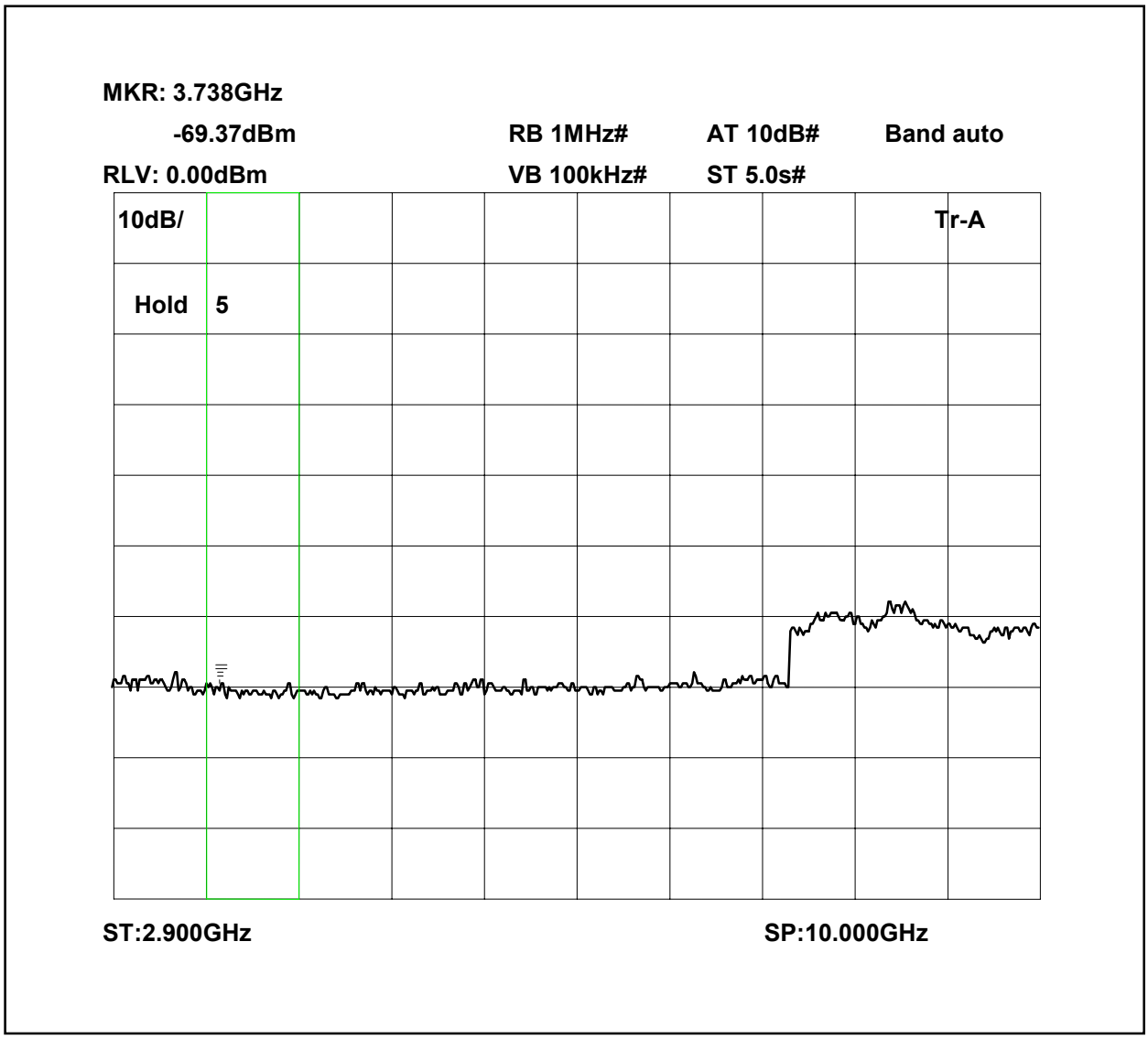
Conducted emissions 452.30MHz 2.9 - 10GHz



Conducted emissions 452.775MHz 0 - 3GHz



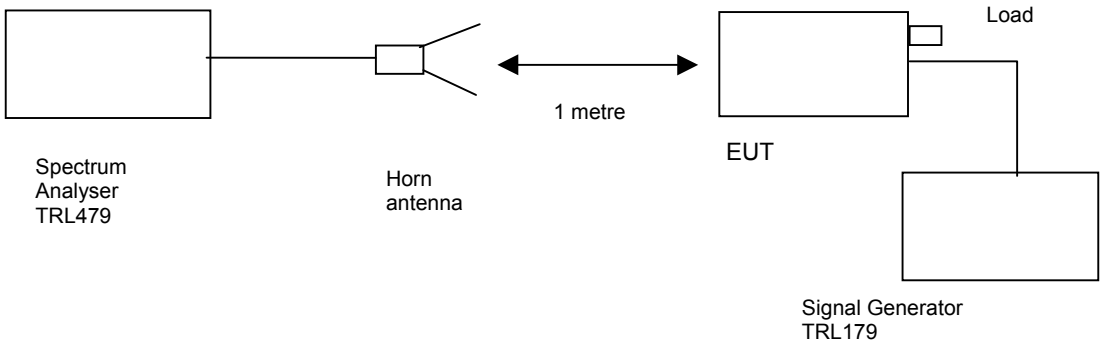
Conducted emissions 452.775MHz 2.9 - 10GHz



TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK

Ambient temperature	=	20°C	Test Signal	=	F3E
Relative humidity	=	54%			
Conditions	=	OATS			
Supply voltage	=	115Vac			
Supply Frequency	=	N/A			



The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating maximum power on three test frequencies with a 50 ohm load on the output. The unit was also tested with the signal generator replaced by another 50ohm load.

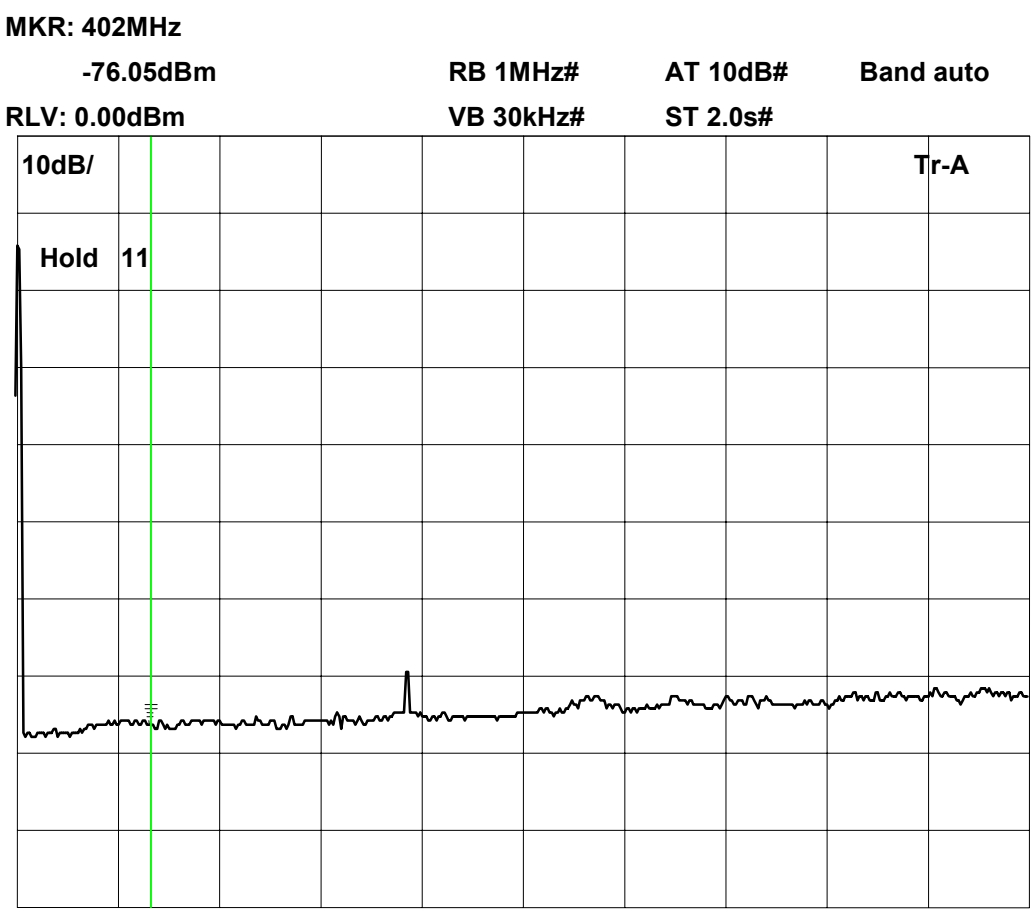
The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

At least 43 + 10 log PdB

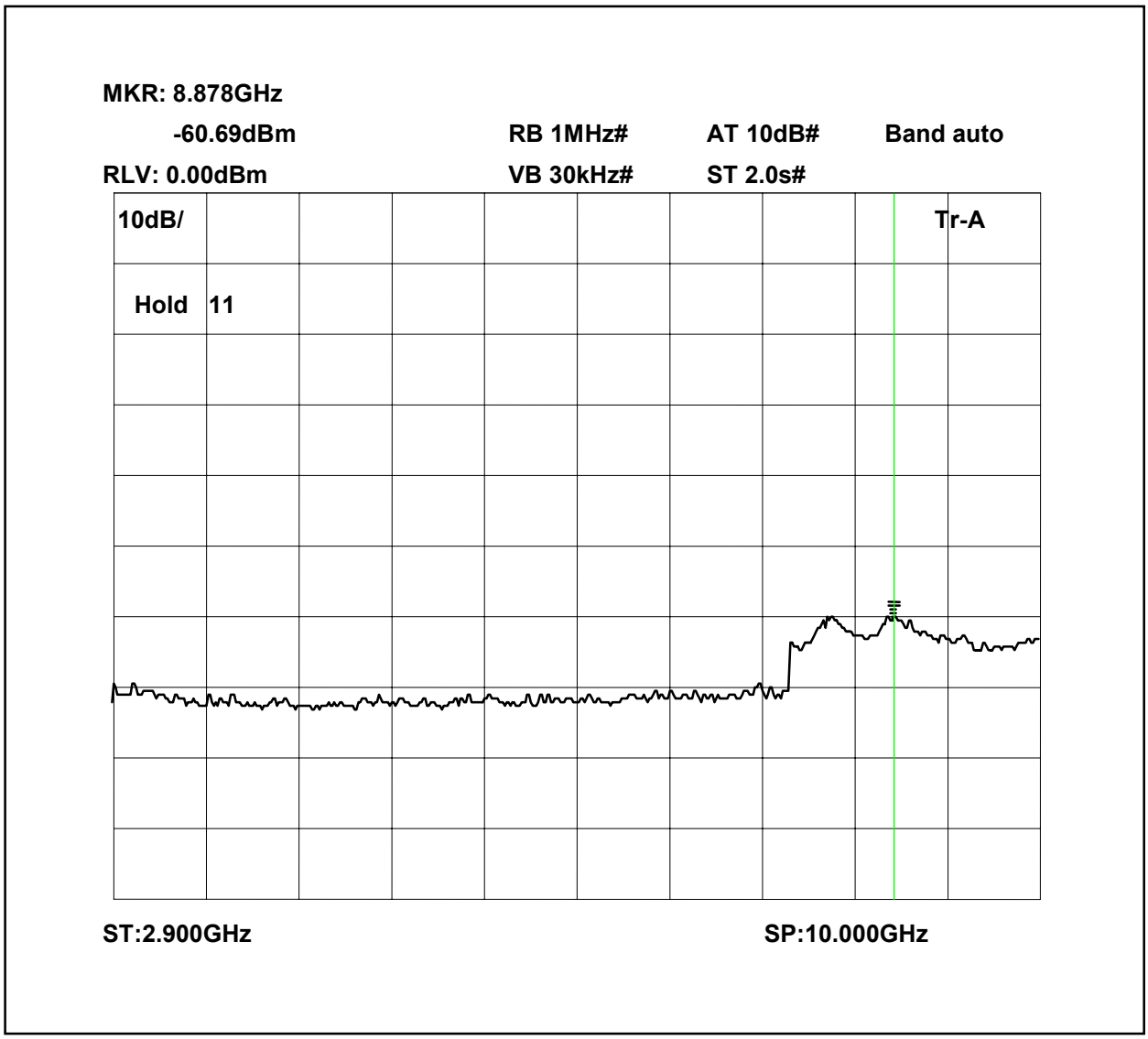
$(10\log P_{watts}) – (43+10\log (P_{watts} * 1000))$ = LIMIT =-13 dBm

Radiated emissions 452.05MHz 0-3GHz



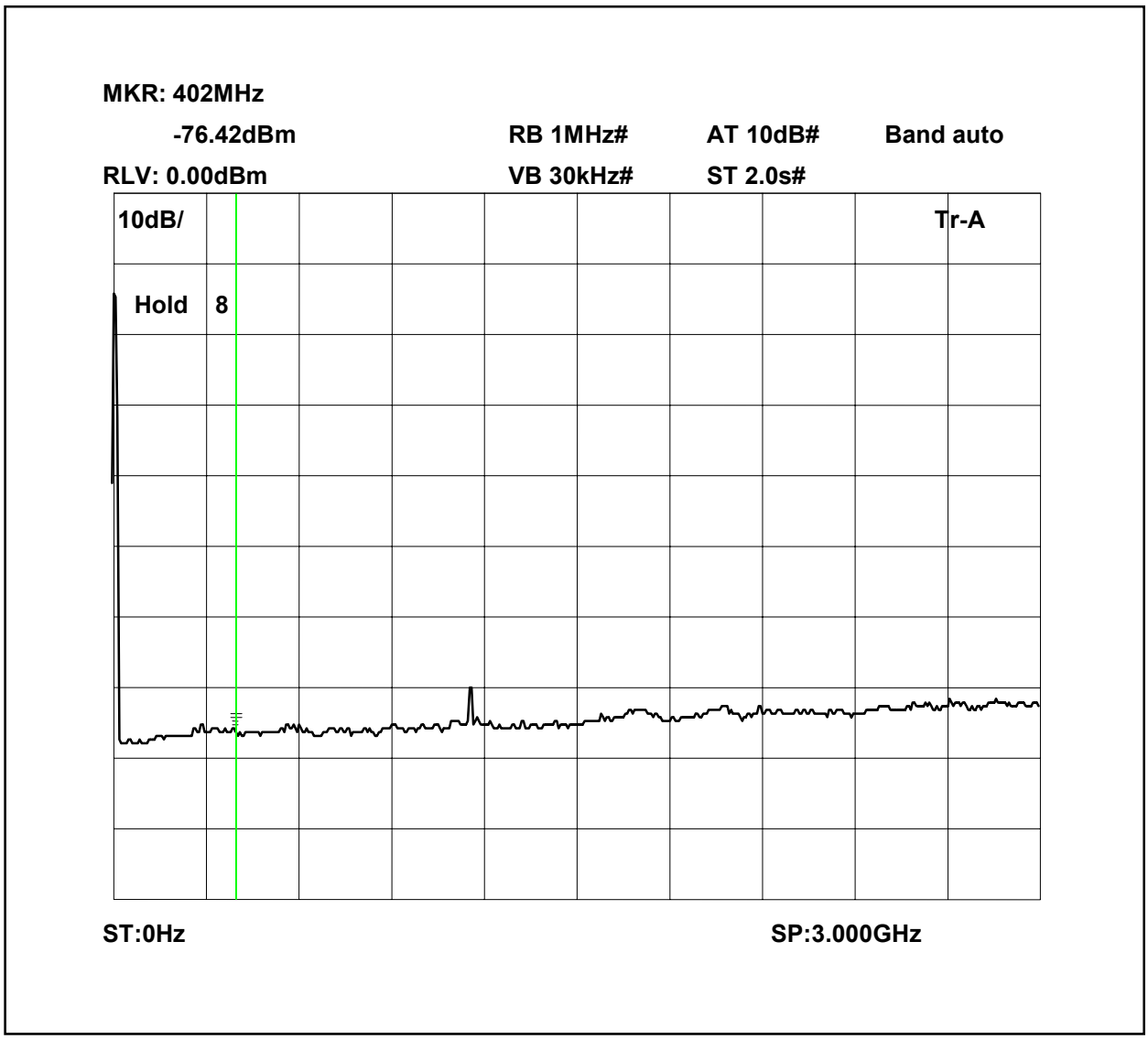
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 452.05MHz 2.9-10GHz



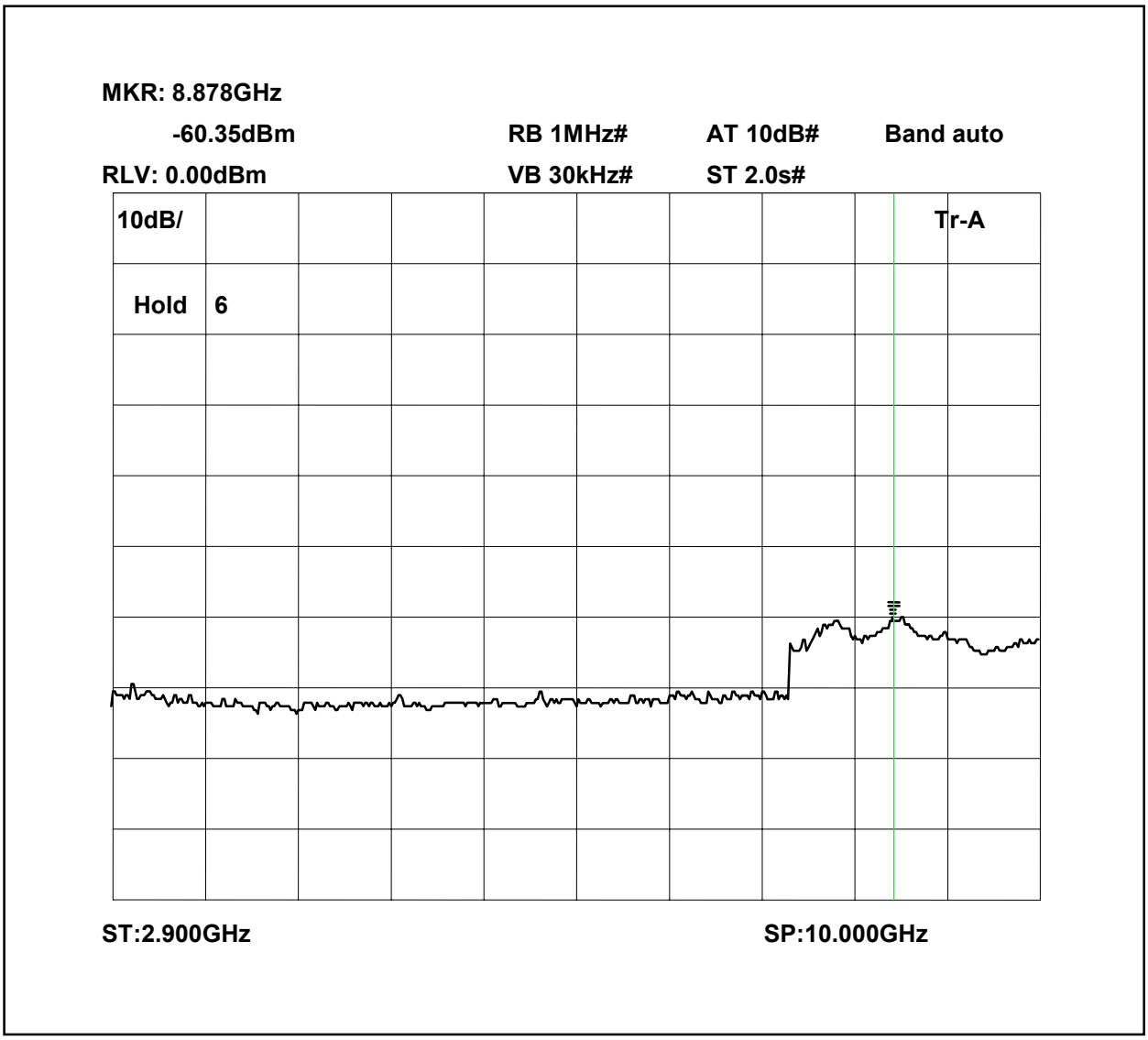
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 452.30MHz 0-3GHz



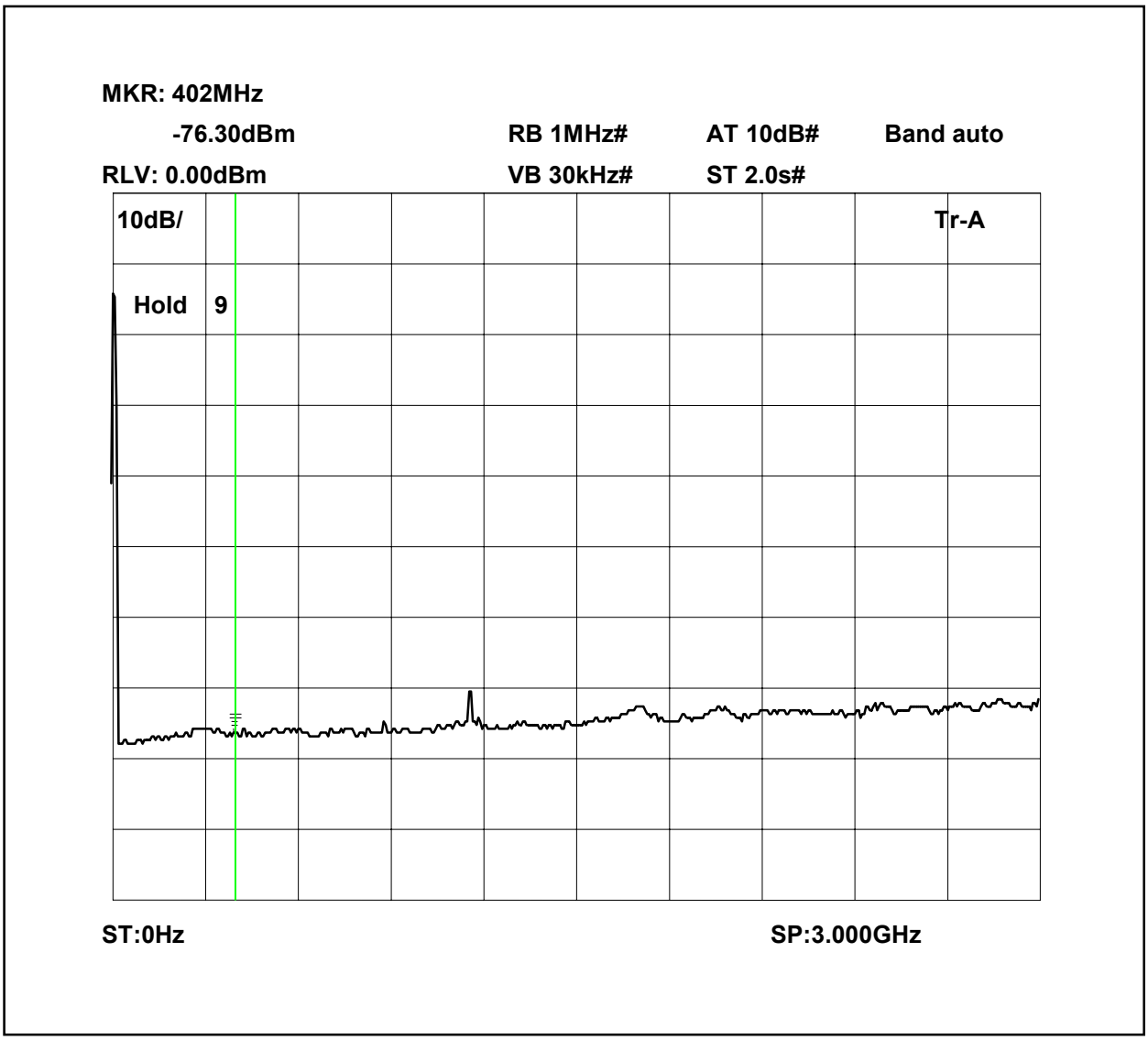
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 452.30MHz 2.9-10GHz



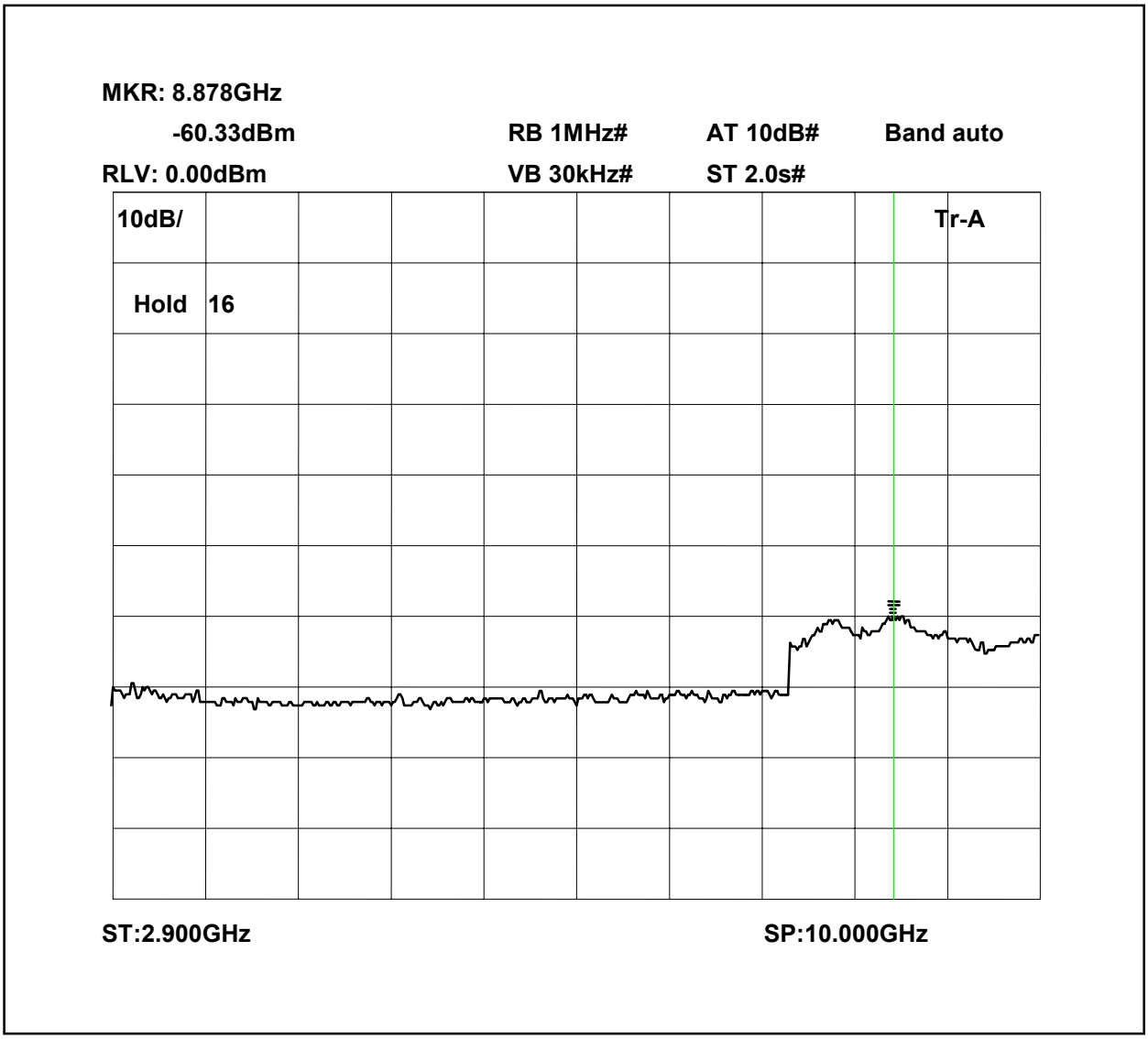
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 452.775MHz 0-3GHz



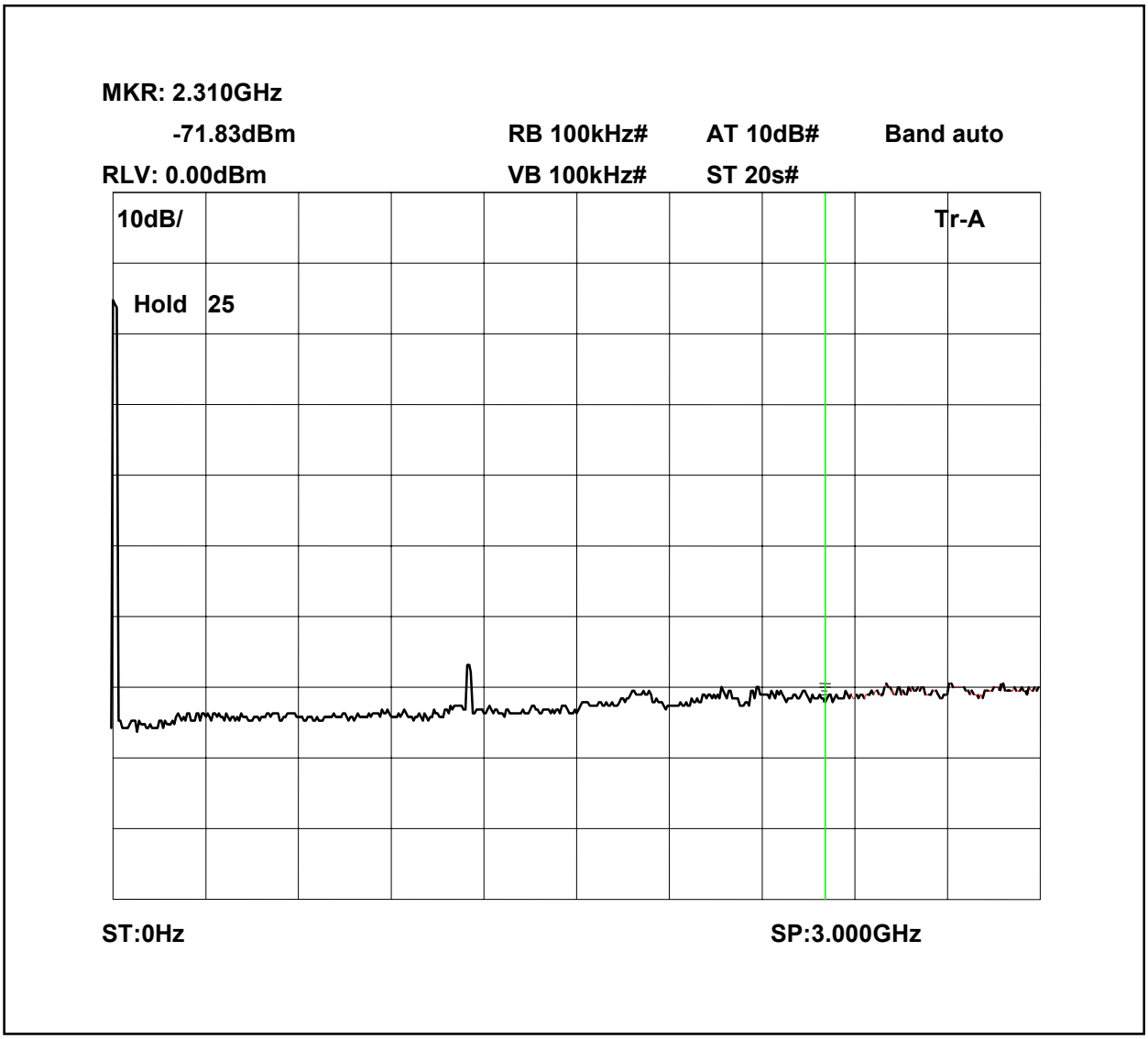
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 452.775MHz 2.9-10GHz



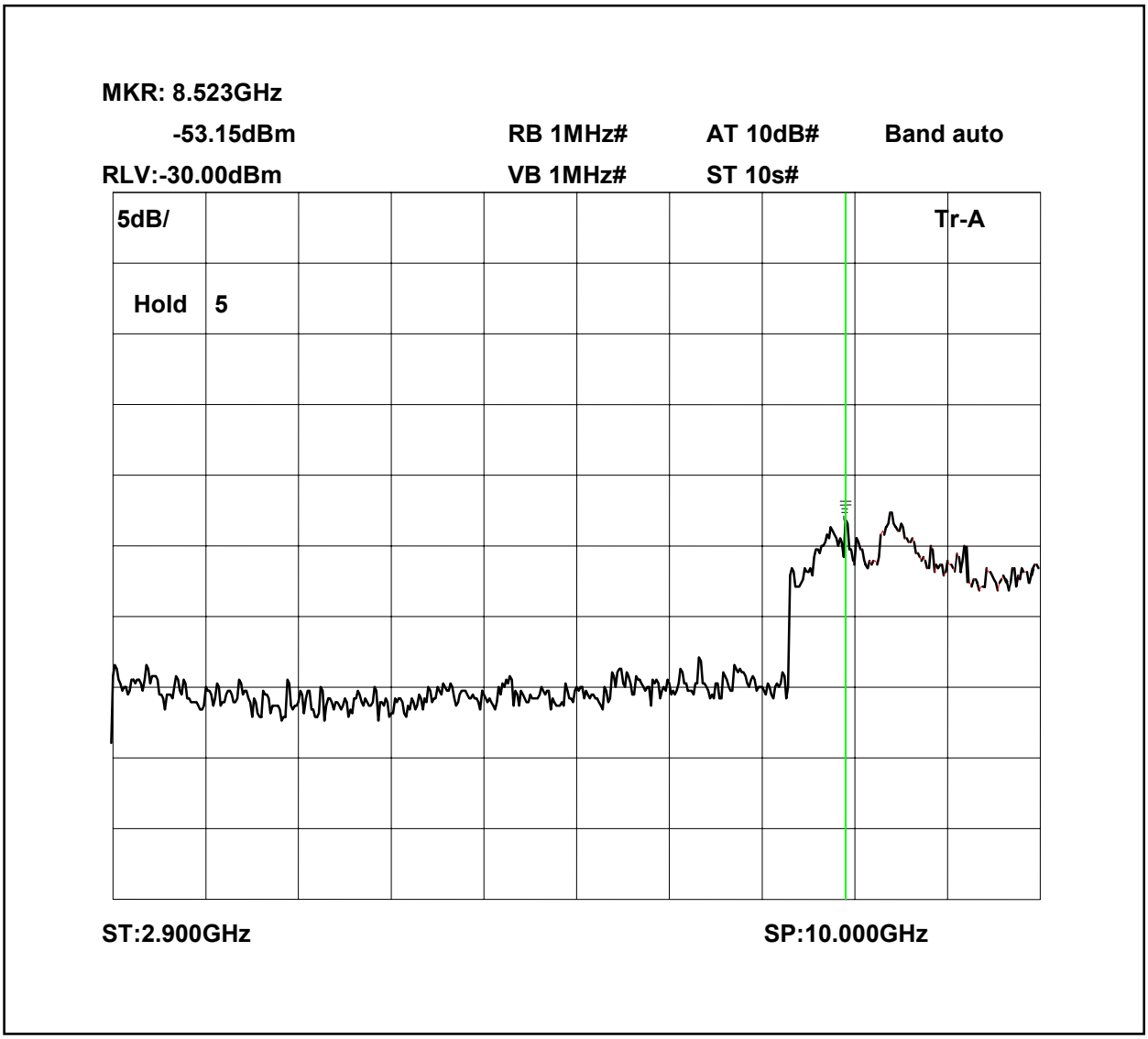
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions no input signal 0-3GHz



The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions no input signal 2.9-10GHz



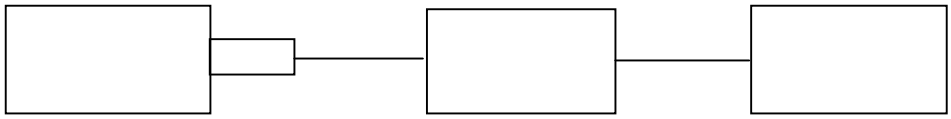
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

The test equipment used for the Transmitter Spurious Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
HORN	EMCO	3115	9010-3581	139	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – DOWNLINK

Ambient temperature	=	20°C	Radio Laboratory
Relative humidity	=	54%	
Supply voltage	=	115Vac	
Channel number	=	See test results	



Spectrum Analyser TRL479 | Attenuator TRL220 Cable TRL279 | EUT | Signal Generator TRL179

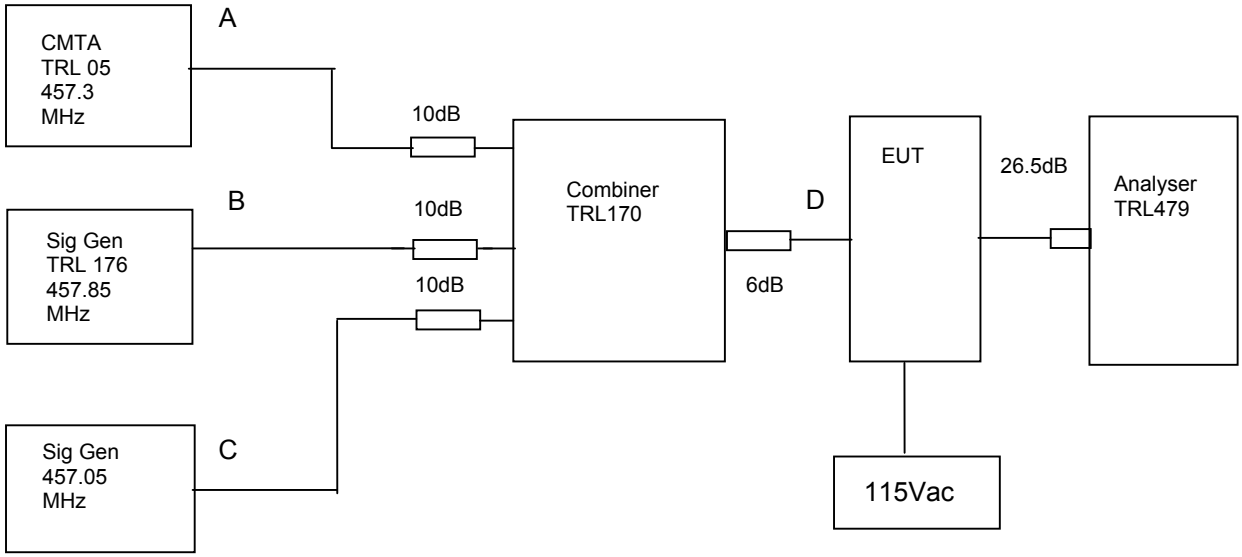
Frequency MHz	Signal Generator input level dBm	Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Gain after 20dB input level increase dBm
457.05MHz	-58.4	26.6	-3.9	81.95	81.95
457.30MHz	-58.6	26.6	-3.3	83.05	83.05
457.85MHz	-60.3	26.6	-3.0	83.9	83.9

Notes:
1. The level of the signal generator takes into consideration the loss from the cable.
2. The signal generator input was increased by 20dBs and the level of the output signal remeasured

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ATTENUATOR	BIRD	8304-200	N/A	103	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

AMPIFIER INTERMAODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– DOWNLINK

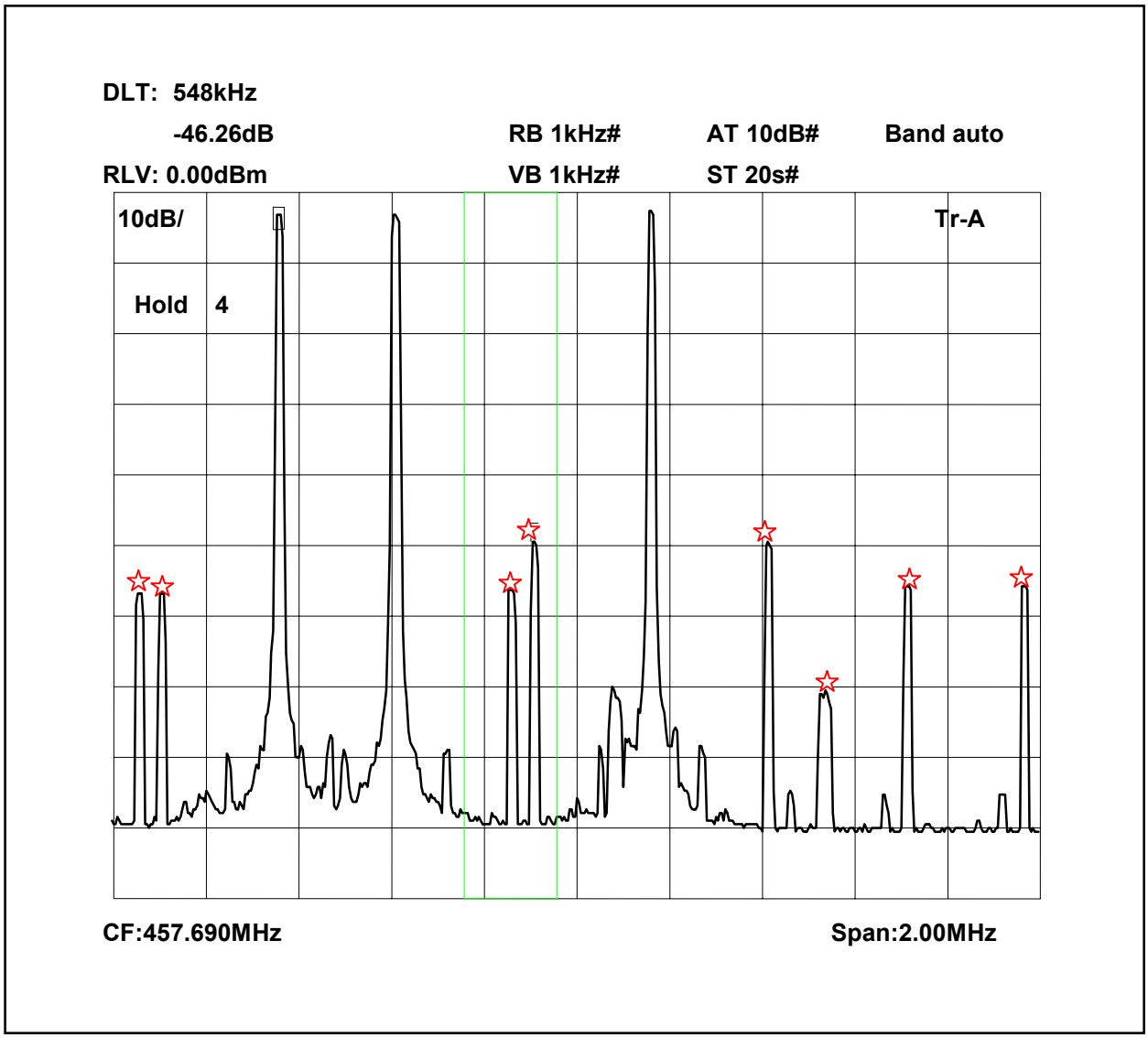
Ambient temperature	=	20°C	Radio Laboratory
Relative humidity	=	54%	
Supply voltage	=	115Vac	



The Intermodualation and spurious products were measured with the amplifier operating at maximum gain. A three tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was the maximum input of -58.4dBm The cable and attenuators loss between the EUT and the spectrum analyser was 26.6dB.

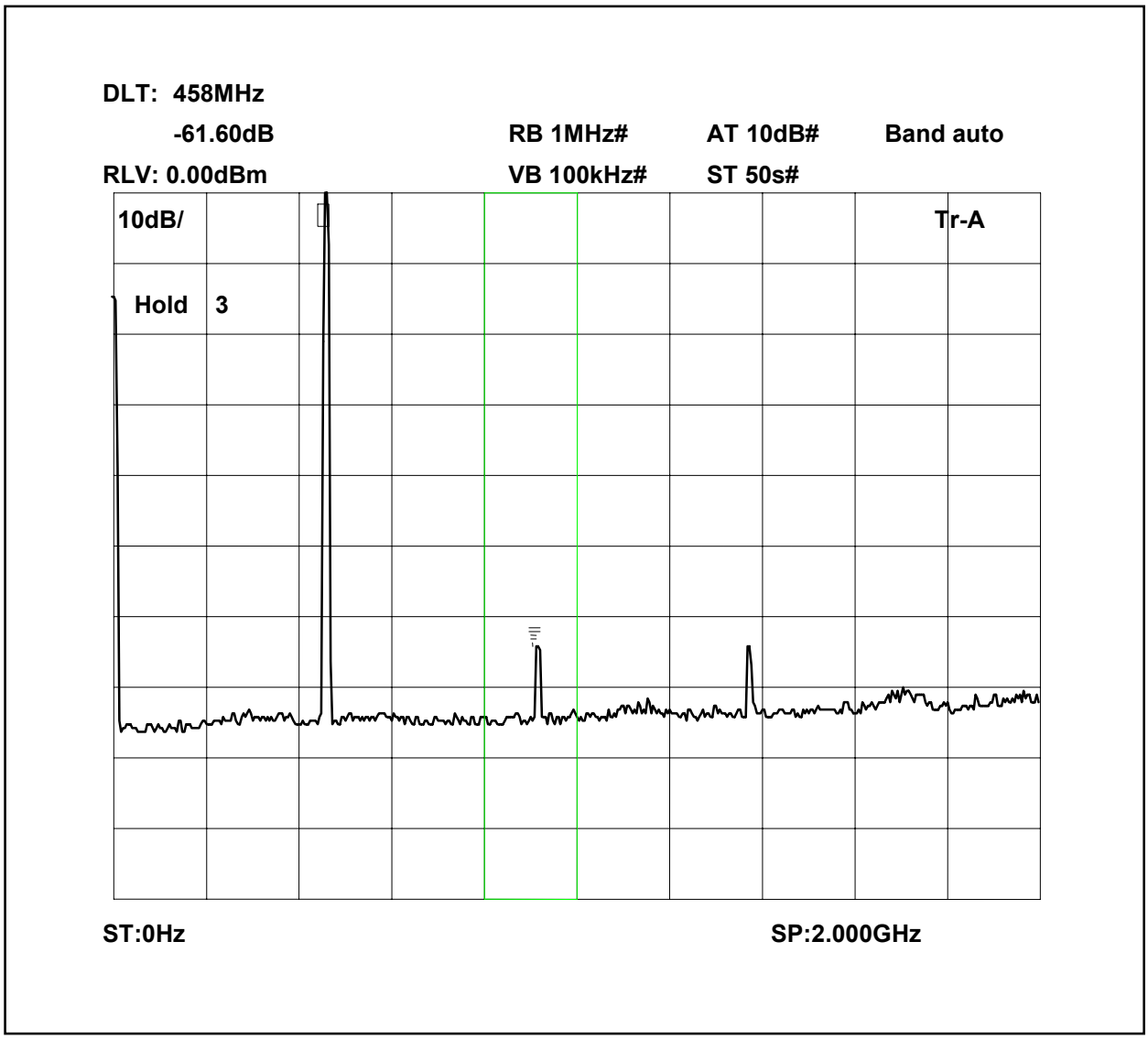
Sweep data is shown on the next page:

Intermodulaion Inband



The above plot shows that all products (designated by ☆) are at least 40dB below the fundamentals.

Intermodulation Wideband



The above plot shows that there are no products outside the bands.

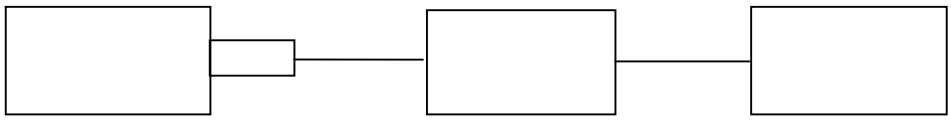
Test equipment used for intermodulation test

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
SIGNAL GENERATOR	MARCON	2042	119562/02	254	**X**
CMTA	ROHDE & SCHWARZ	CMTA52	894715/033	05	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**
COMBINER	ELCOM	RC-4-50	N/A	170	**x**

TRANSMITTER TESTS

AMPLIFER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– DOWNLINK

Ambient temperature	=	20°C	Radio Laboratory
Relative humidity	=	54%	
Supply voltage	=	115Vac	
Channel number	=	See test results	

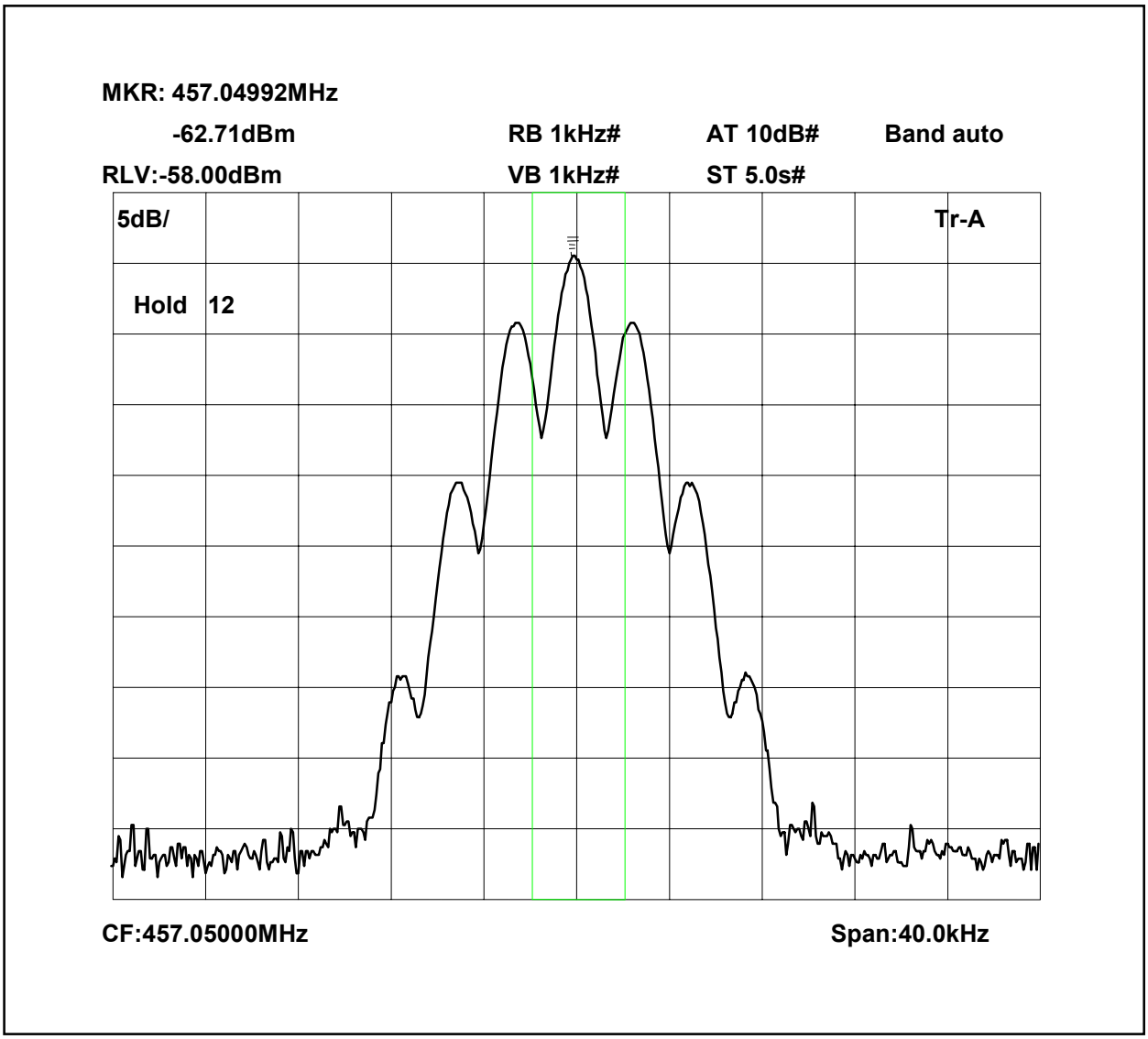


This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input level (-58.4dBm) and modulated with a 2500Hz tone. The plots show the signal measured at the signal generator and the signal measured at the output of the EUT.

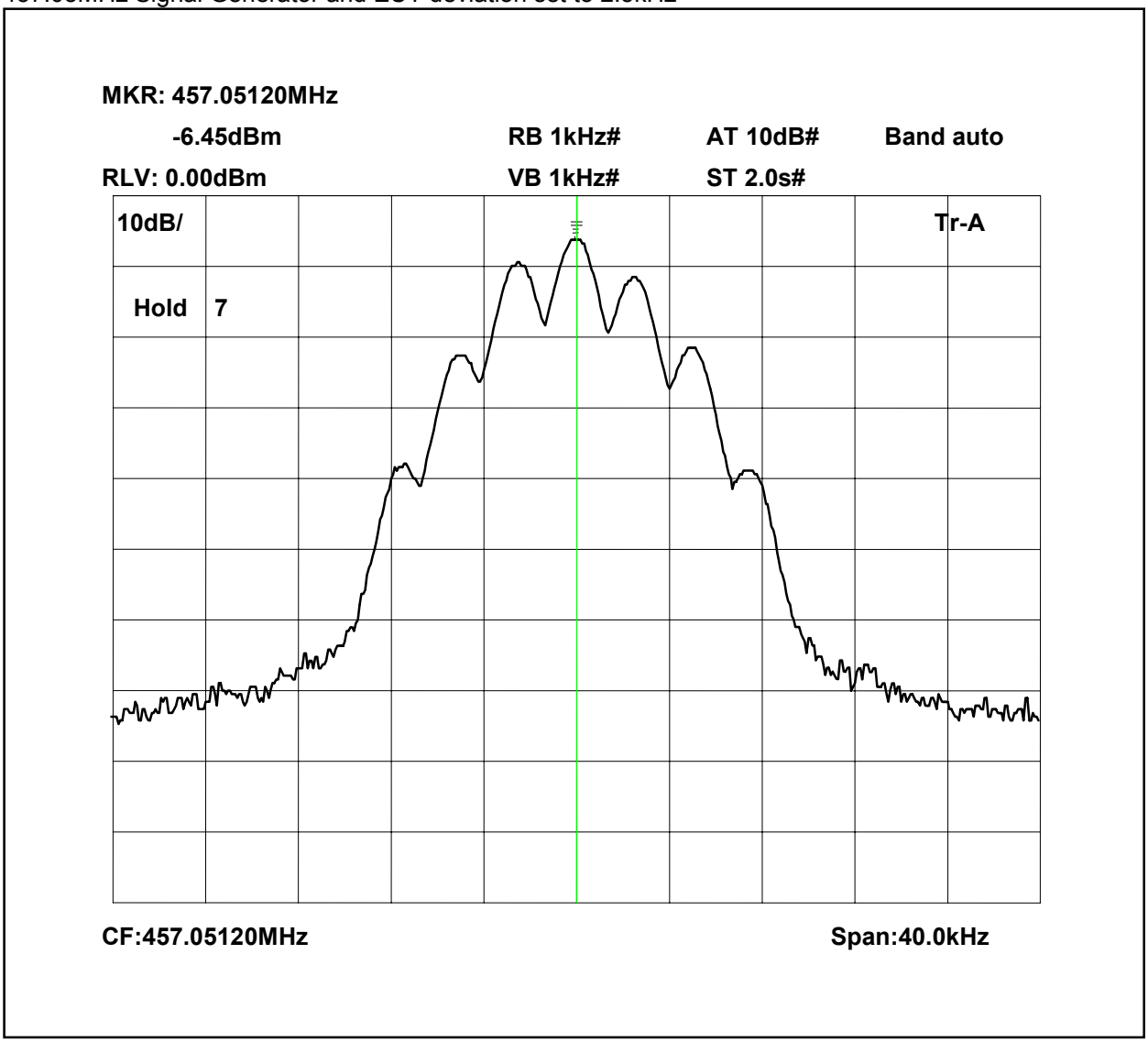
Note: The cables and attenuators had the following losses.

1. Cable TRL279 and attenuators TRL220 = 26.6dB
2. Cable between signal generator and EUT = 0.85dB

457.05MHz Signal Generator deviation set to 2.5kHz

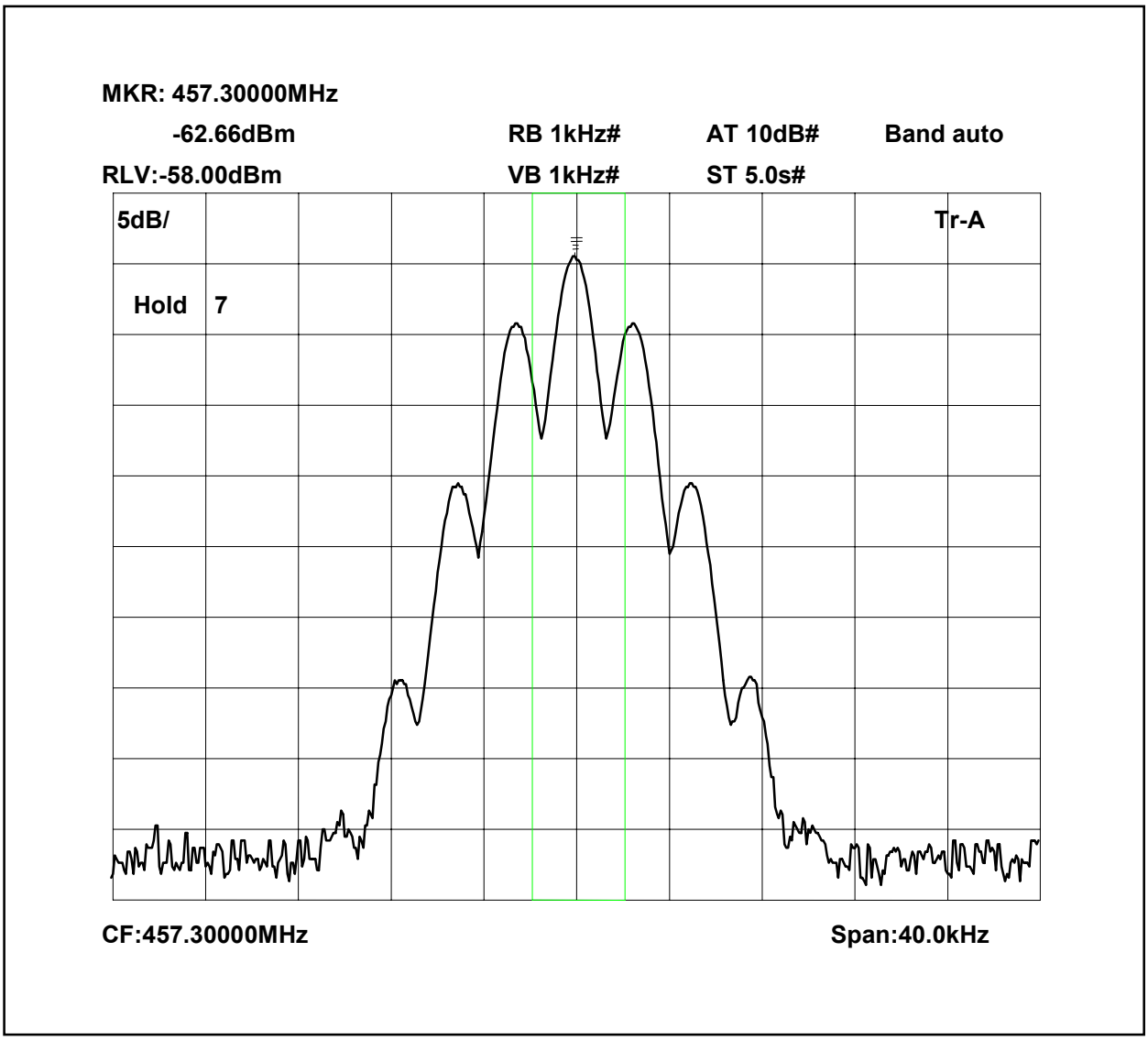


457.05MHz Signal Generator and EUT deviation set to 2.5kHz

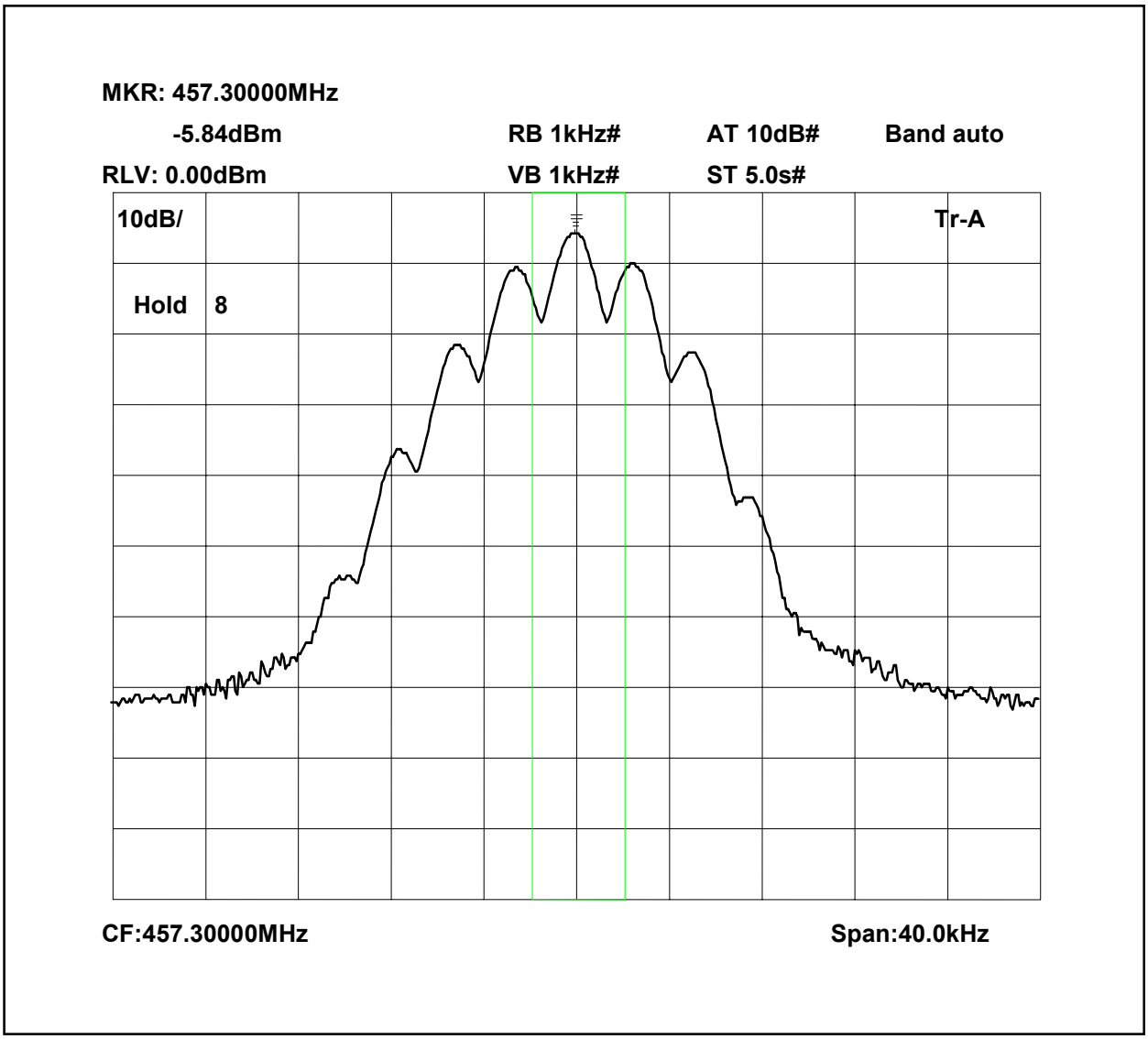


The above plots depicting the output waveshape show no measurable distortion visible, when compared to the input signal.

457.30MHz Signal Generator deviation set to 2.5kHz

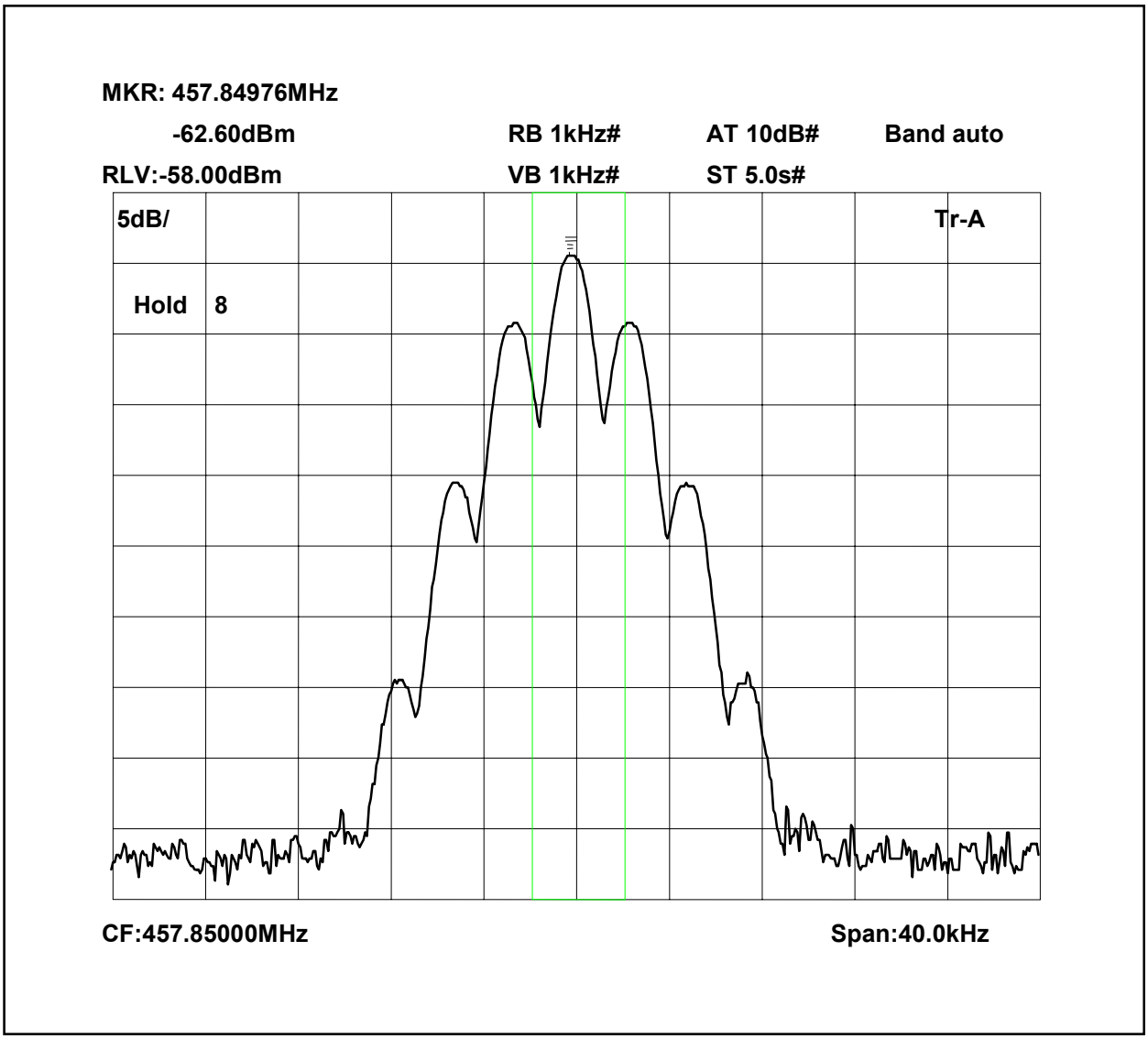


457.30MHz Signal Generator and amplifier deviation set to 2.5kHz

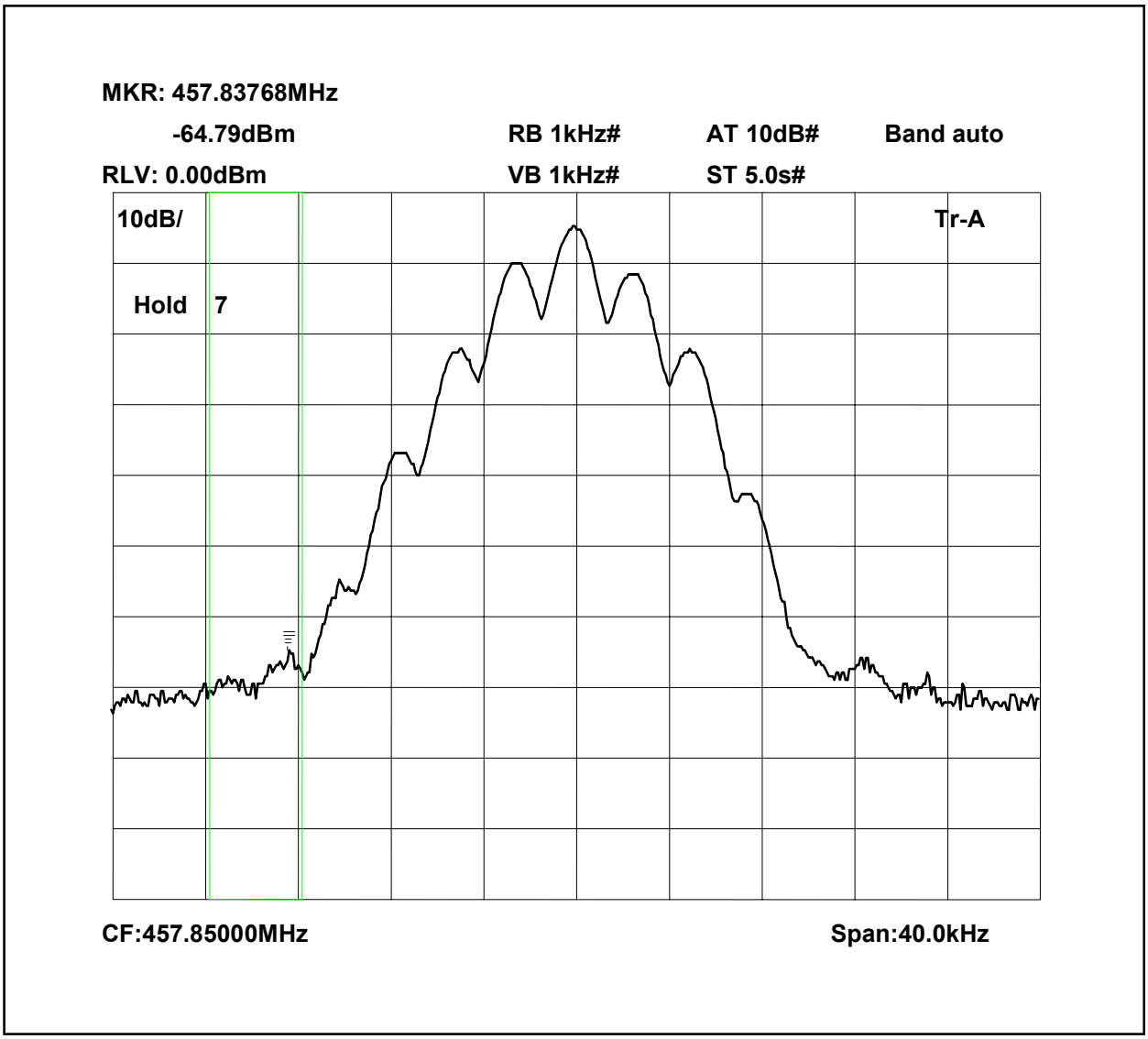


The above plots depicting the output waveshape show no measurable distortion visible, when compared to the input signal.

457.85MHz Signal Generator deviation set to 2.5kHz



457.85MHz Signal Generator deviation set to 2.5kHz



The above plots depicting the output waveshape show no measurable distortion visible, when compared to the input signal.

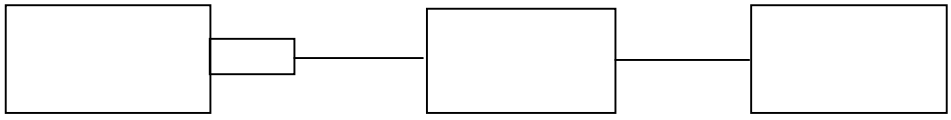
The test equipment used for the Transmitter modulated channel tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ATTENUATOR	BIRD	8304-200	N/A	103	
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1051 – DOWNLINK

Ambient temperature	=	20°C	Radio Laboratory		
Relative humidity	=	54%	Test Signal	=	F3E
Supply voltage	=	115Vac			



Spectrum Analyser TRL479 | Attenuator TRL220 Cable TRL279 | EUT | Signal Generator TRL179

The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating at maximum power and on three test frequencies.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

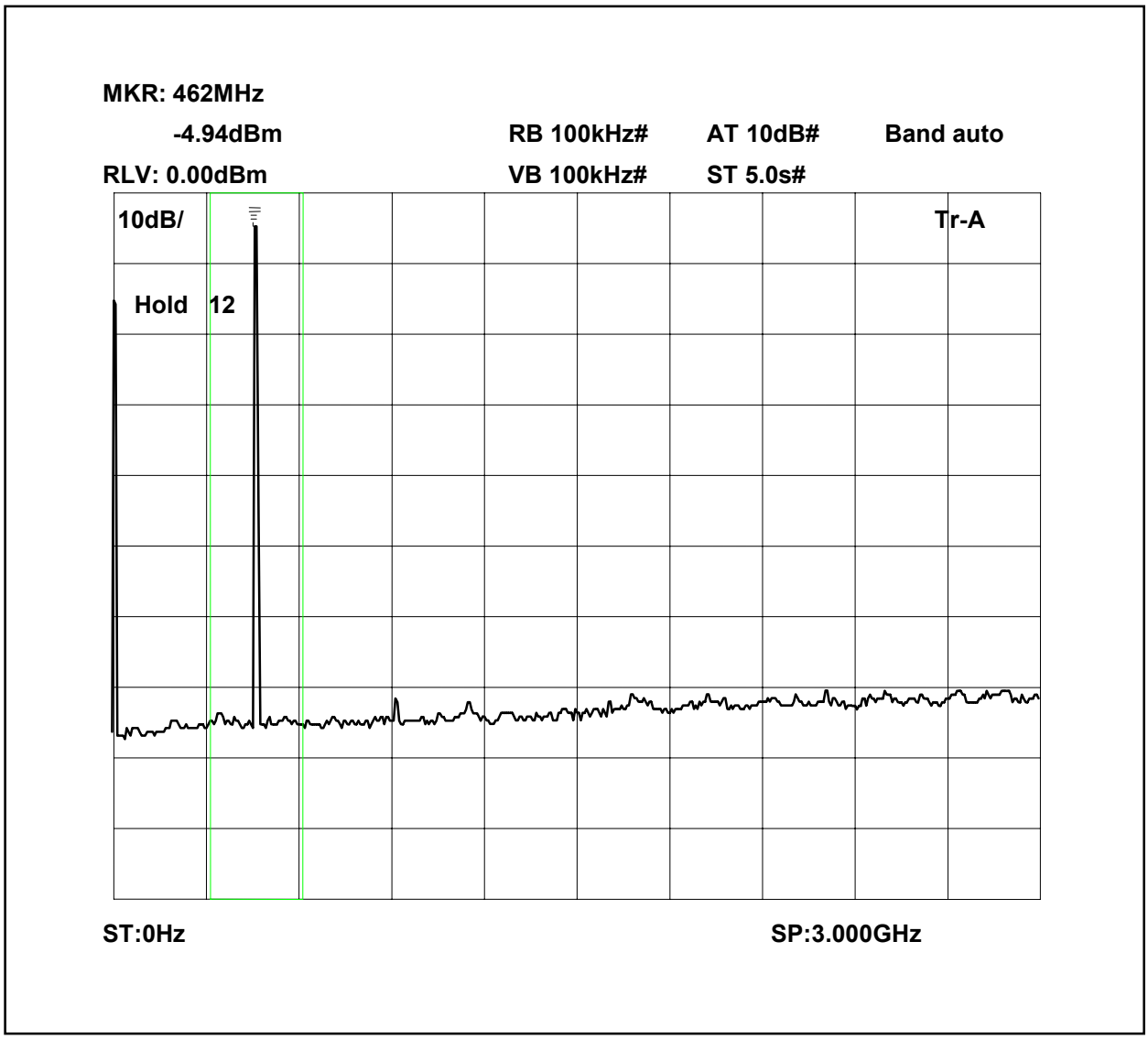
At least 43 + 10 log PdB

$(10\log P_{watts}) - (43+10\log (P_{watts} * 1000)) =$ LIMIT =-13 dBm

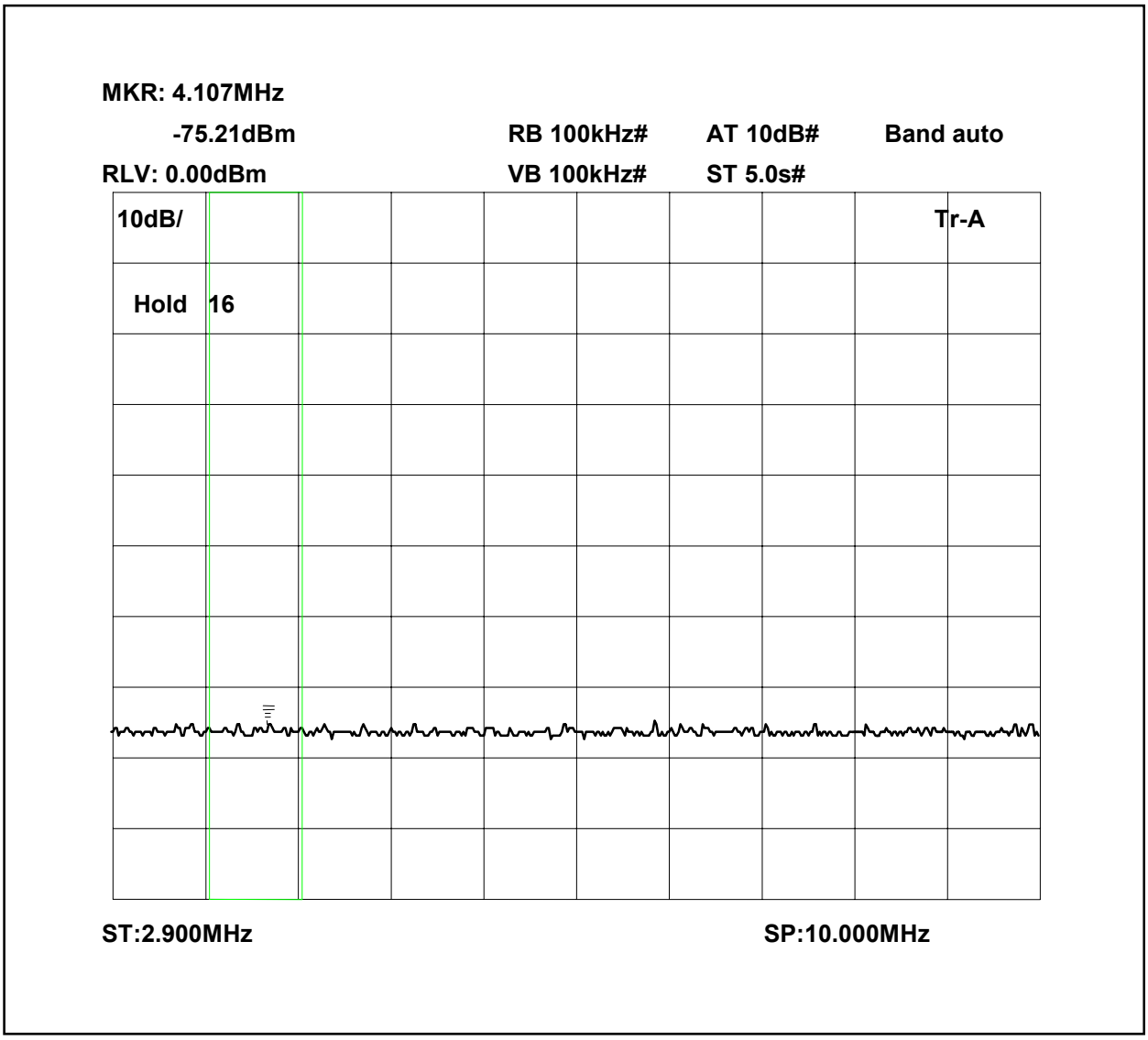
The test equipment used for the Transmitter Conducted Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ATTENUATOR	BIRD	8304-200	N/A	103	
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

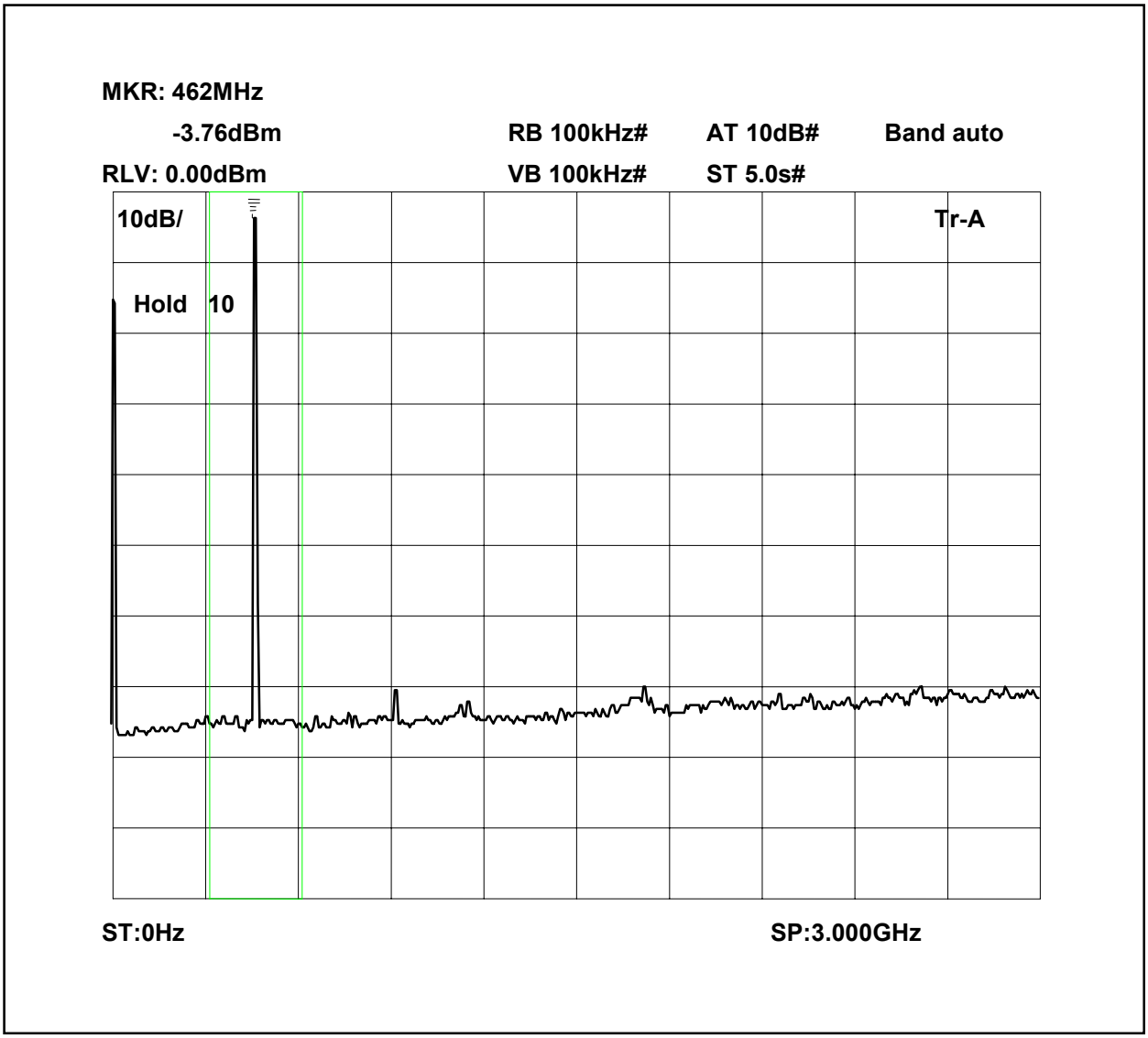
Conducted emissions 457.05MHz 0-3GHz



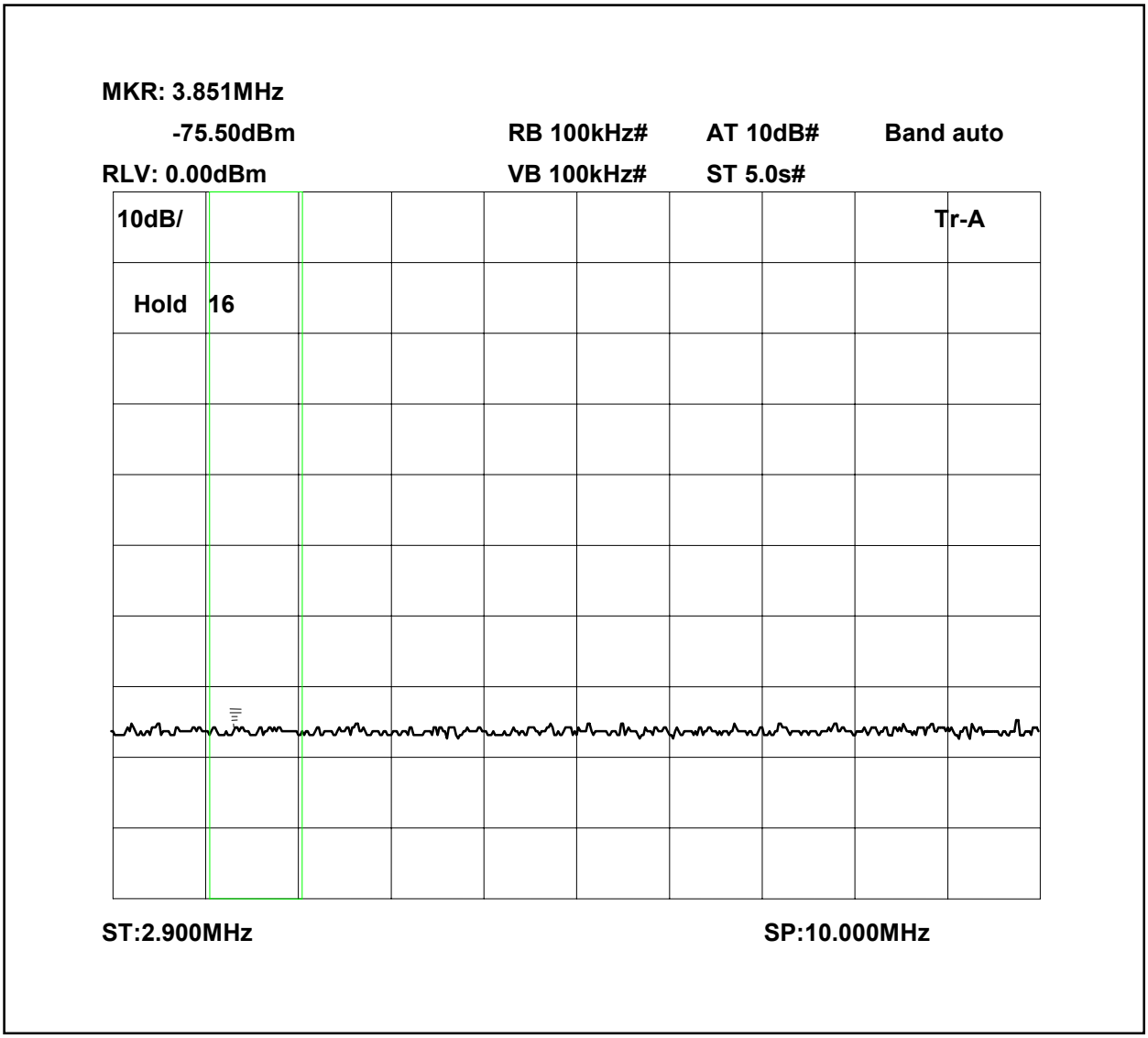
Conducted emissions 457.05MHz 2.9-10GHz



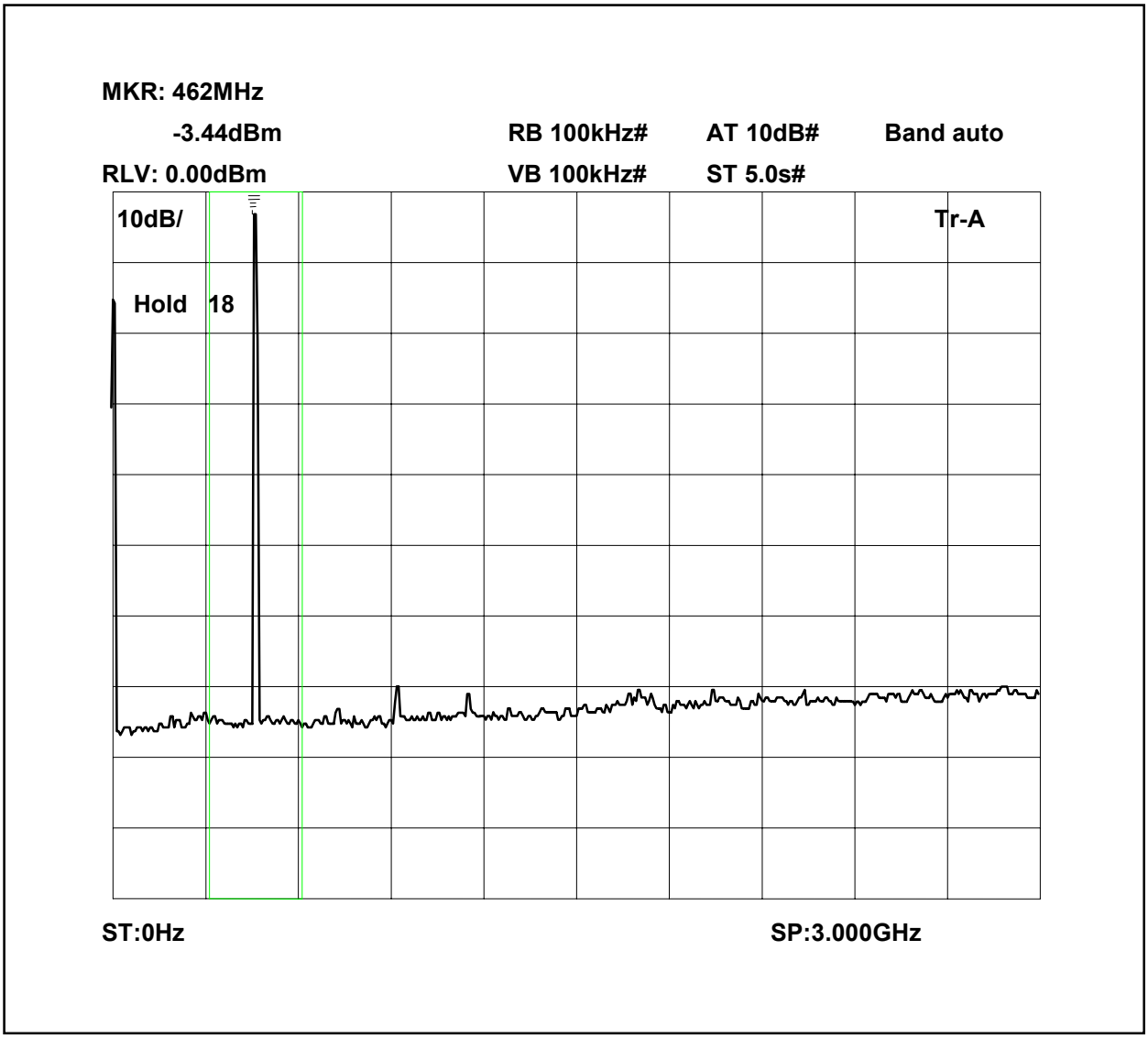
Conducted emissions 457.30MHz 0-3GHz



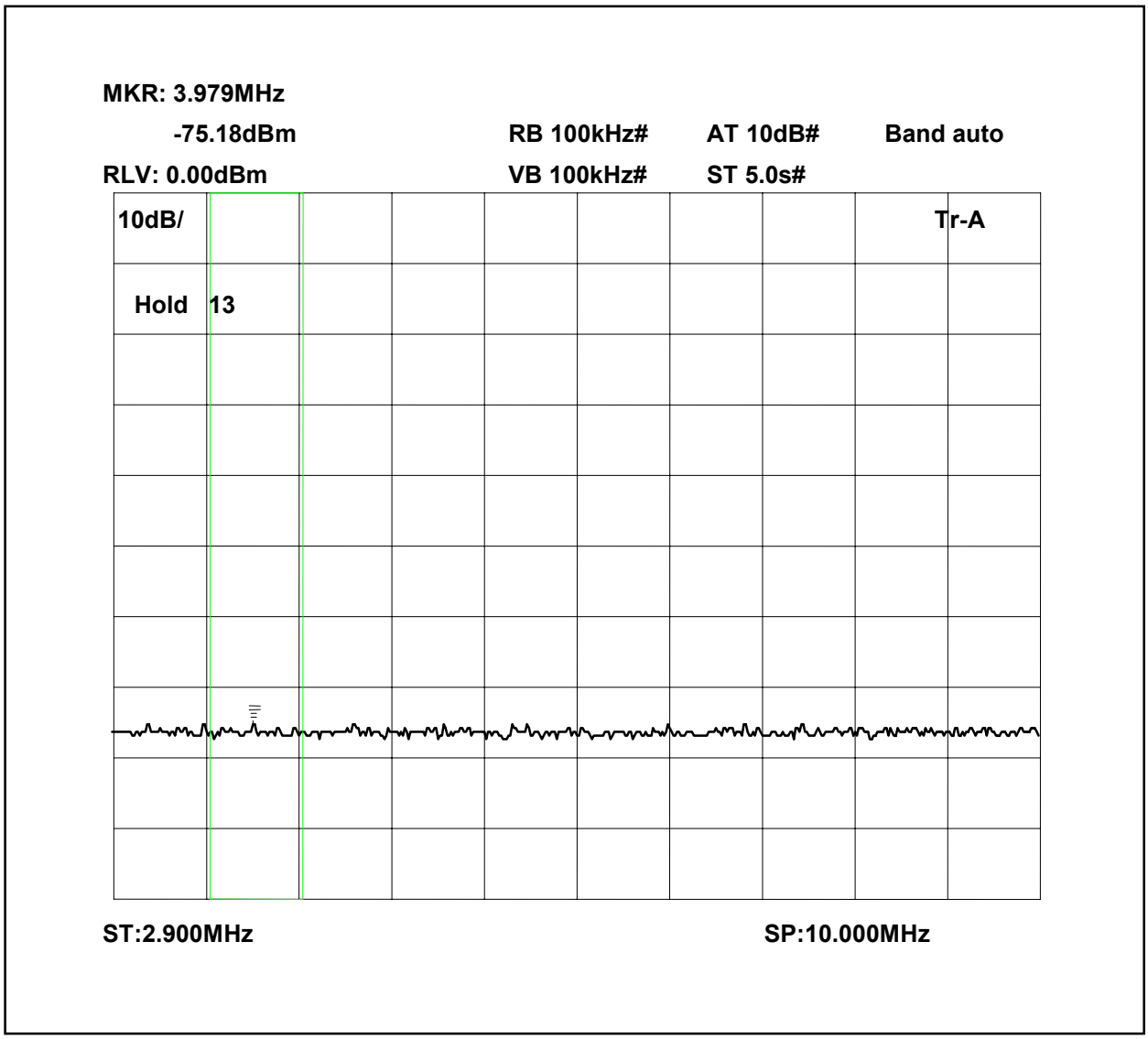
Conducted emissions 457.30MHz 2.9-10GHz



Conducted emissions 457.85MHz 0-3GHz



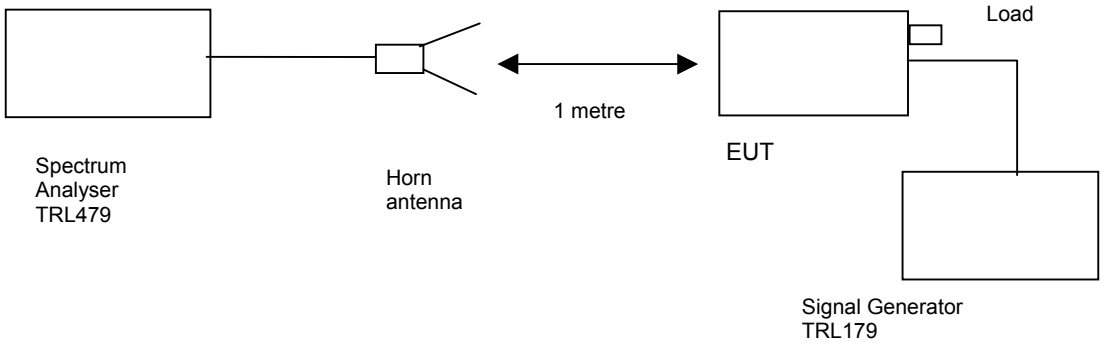
Conducted emissions 457.85MHz 2.9-10GHz



TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– DOWNLINK

Ambient temperature	=	20°C	Test Signal	=	F3E
Relative humidity	=	54%			
Conditions	=	OATS			
Supply voltage	=	115Vac			
Supply Frequency	=	N/A			



The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating maximum power on three test frequencies with a 50 ohm load on the output. The unit was also tested with the signal generator replaced by another 50ohm load.

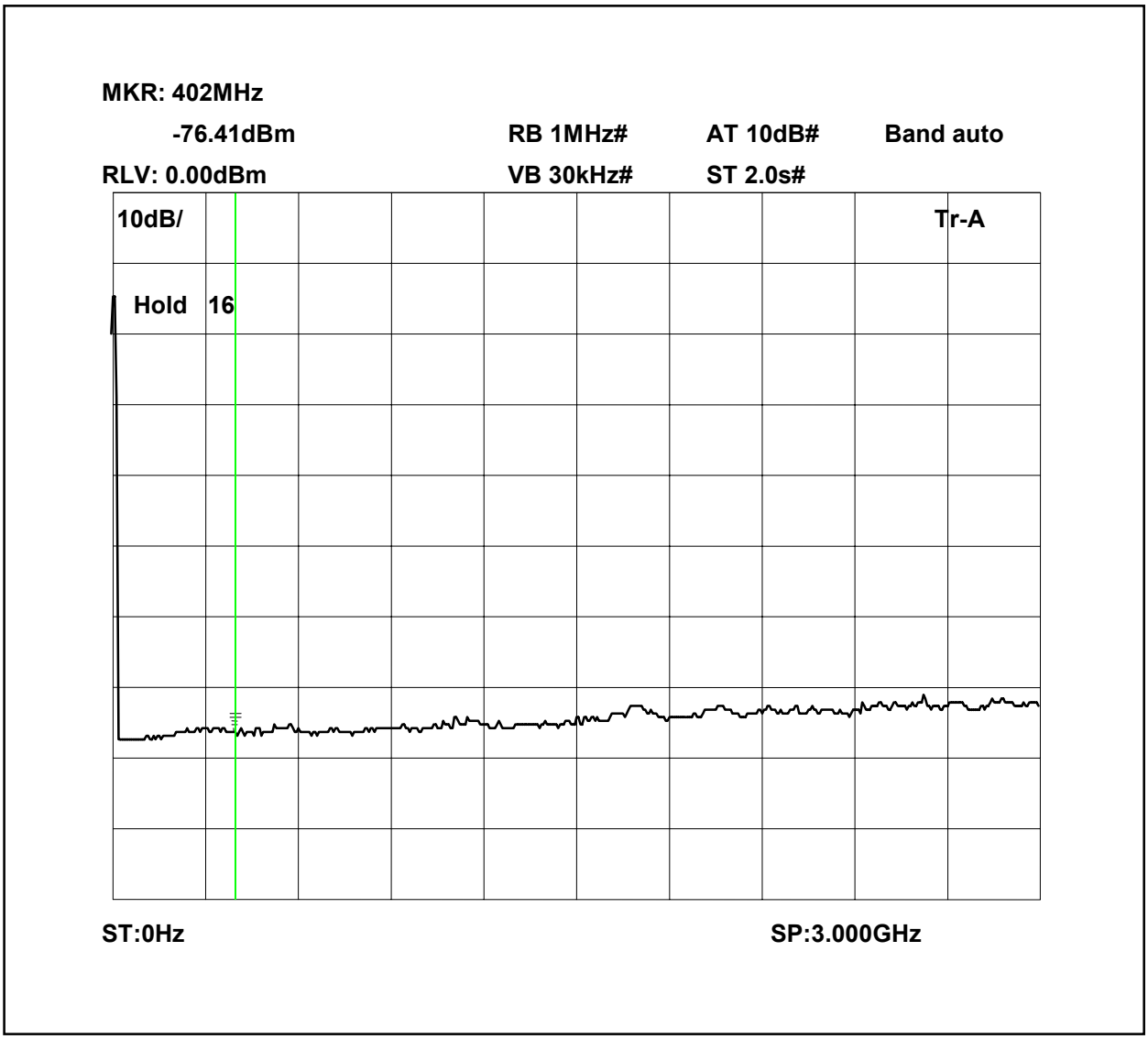
The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

At least 43 + 10 log PdB

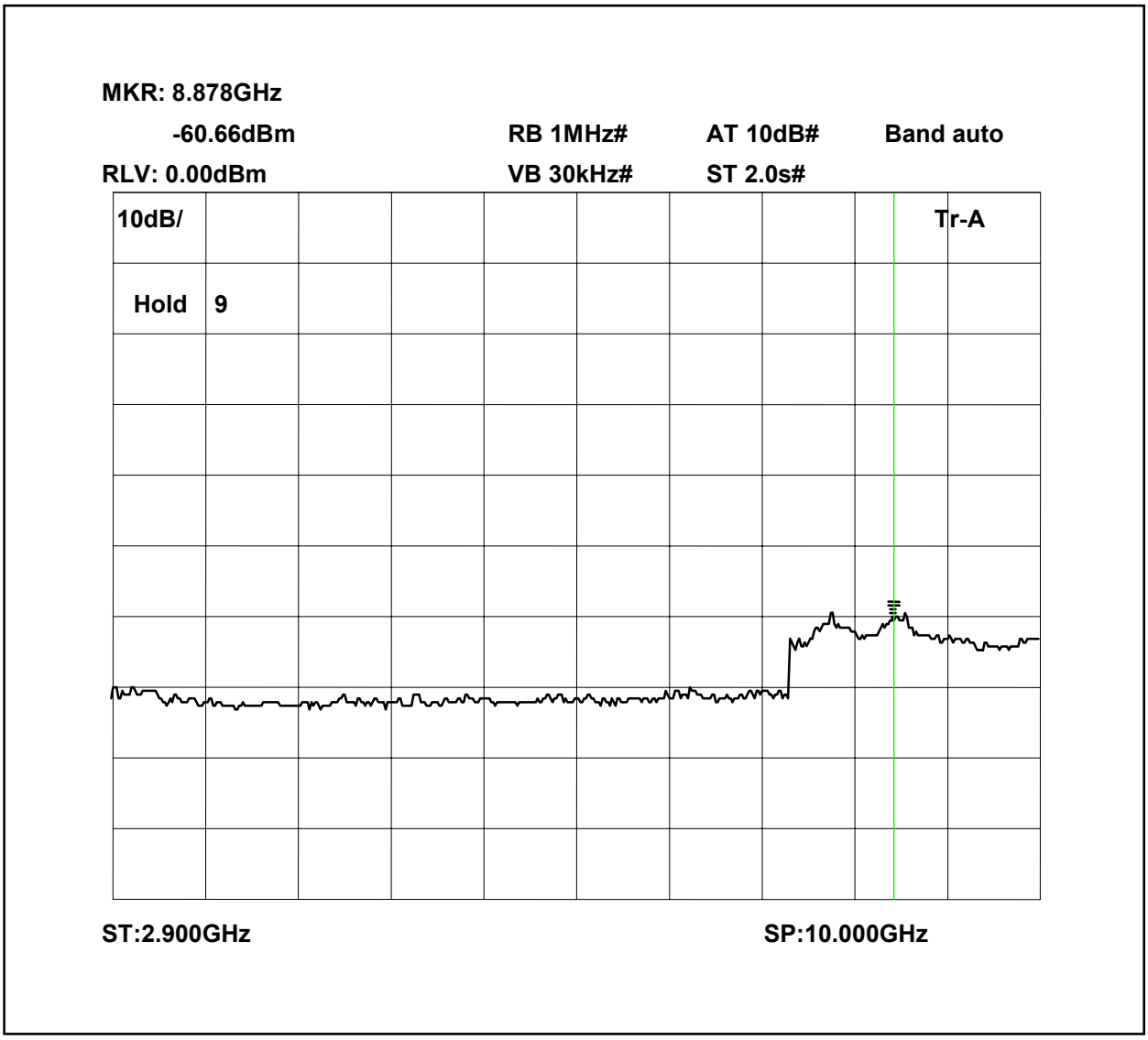
$(10\log P_{watts}) – (43+10\log (P_{watts} * 1000)) =$ LIMIT =-13 dBm

Radiated emissions 457.05MHz 0-3GHz



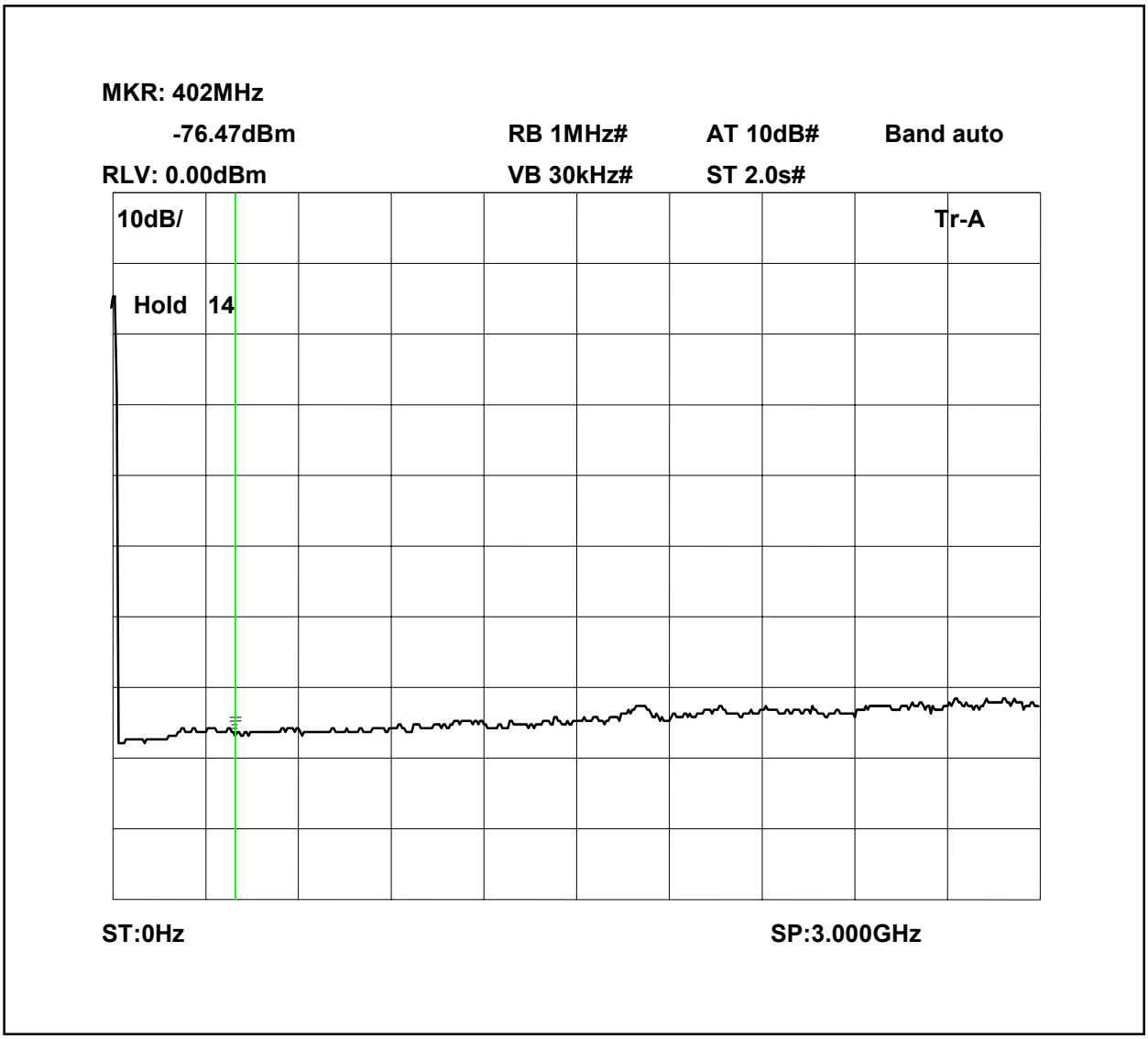
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 457.05MHz 2.9-10GHz



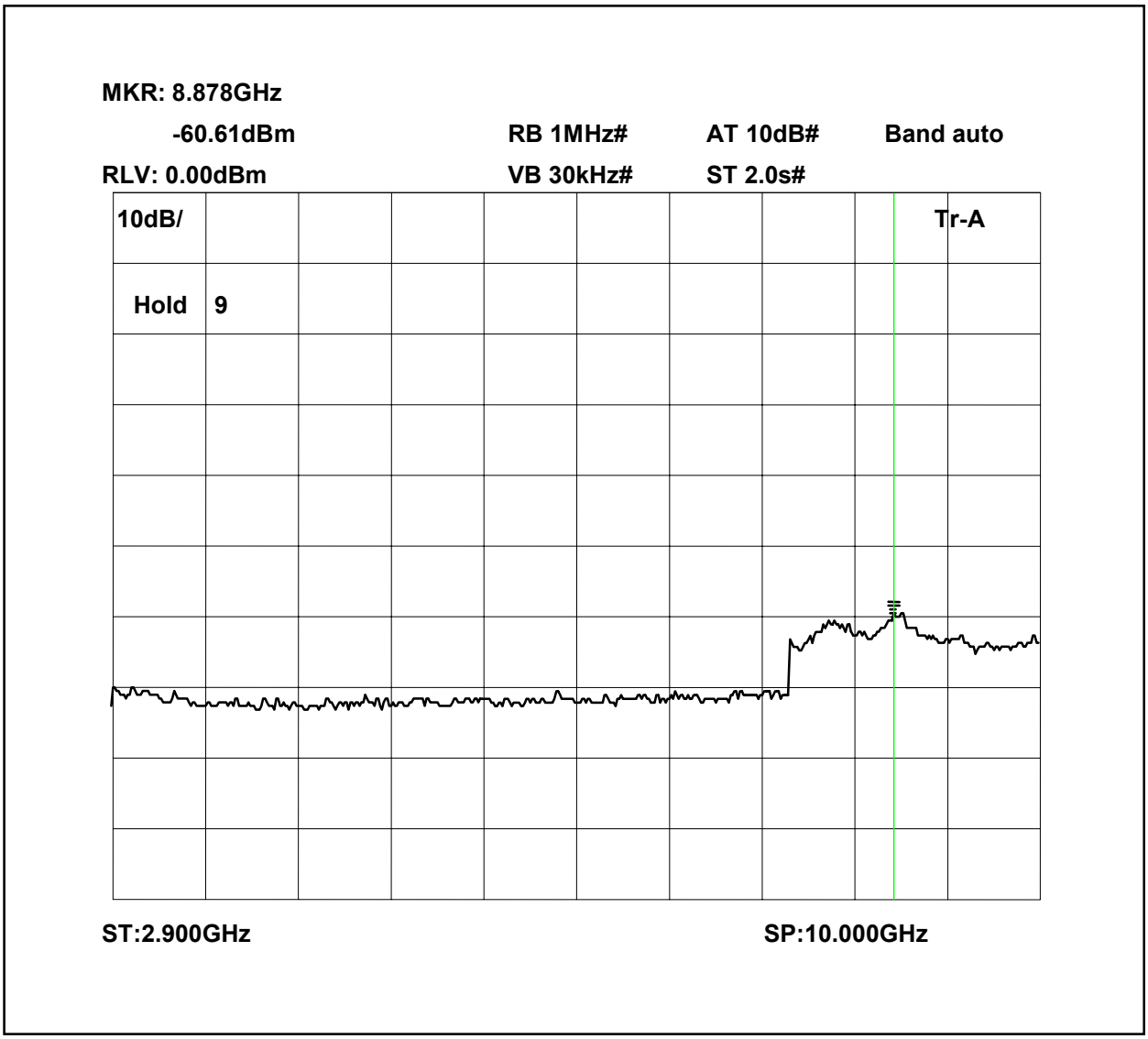
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 457.30MHz 0-3GHz



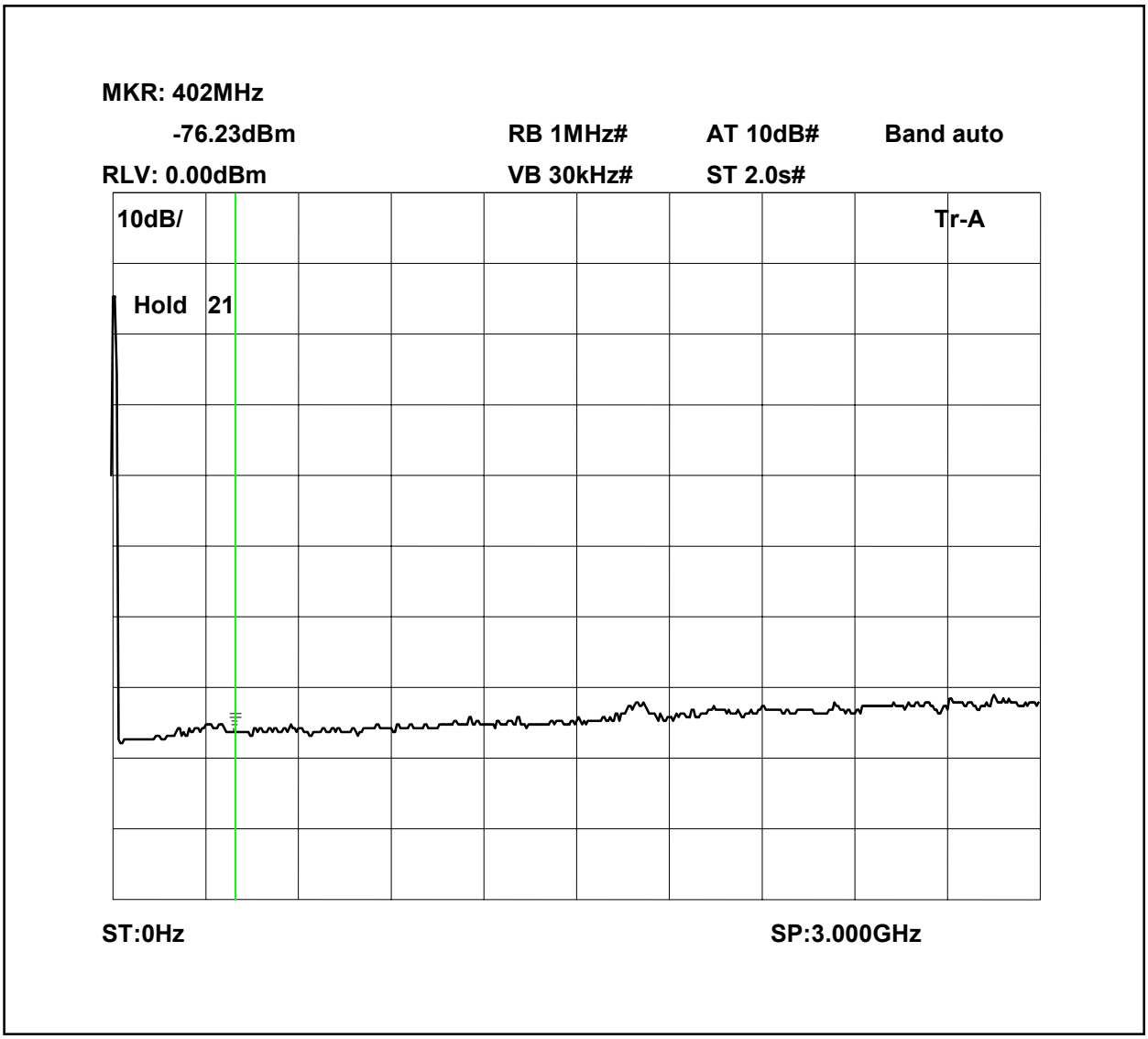
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 457.30MHz 2.9-10GHz



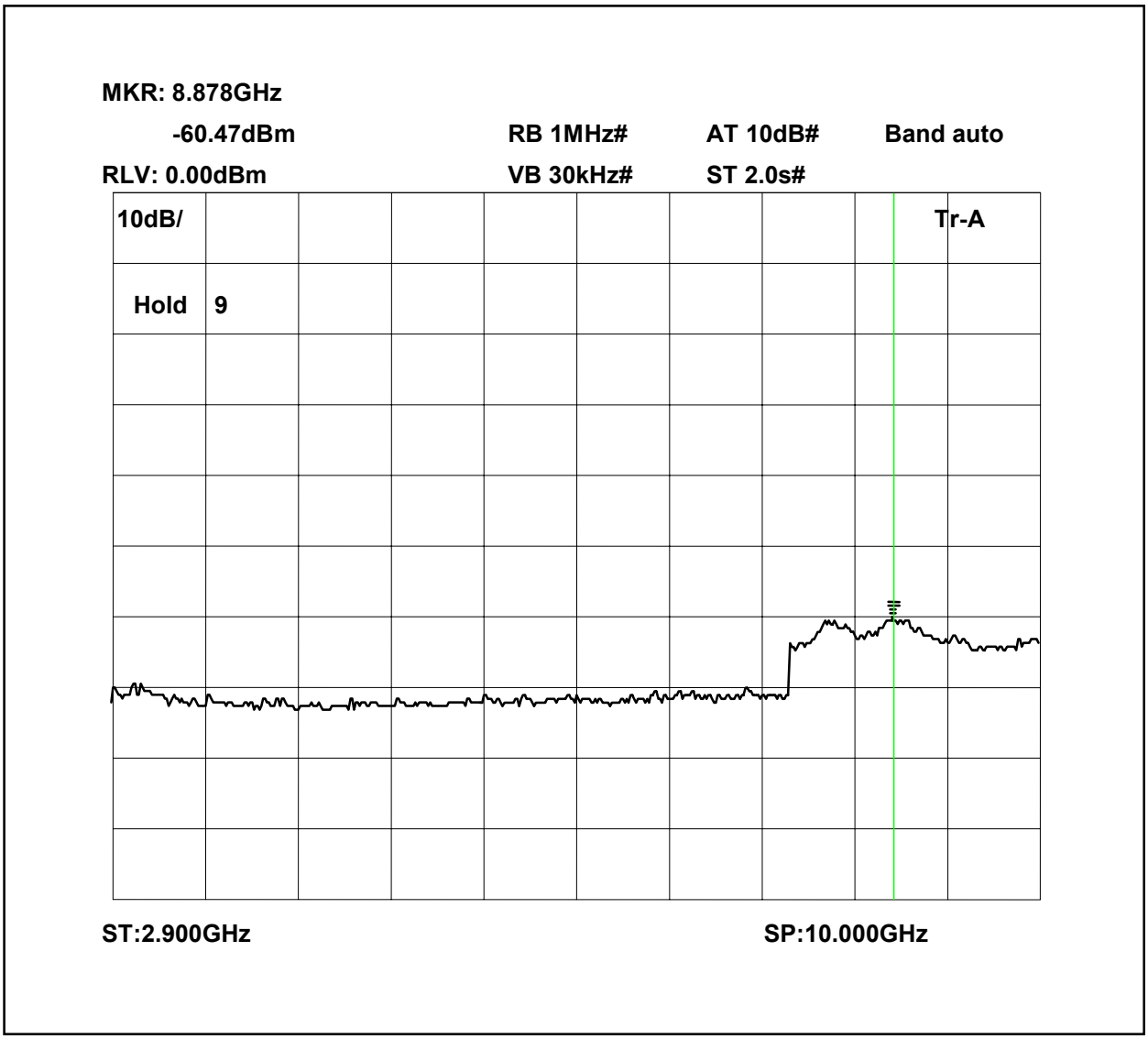
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 457.85MHz 0-3GHz



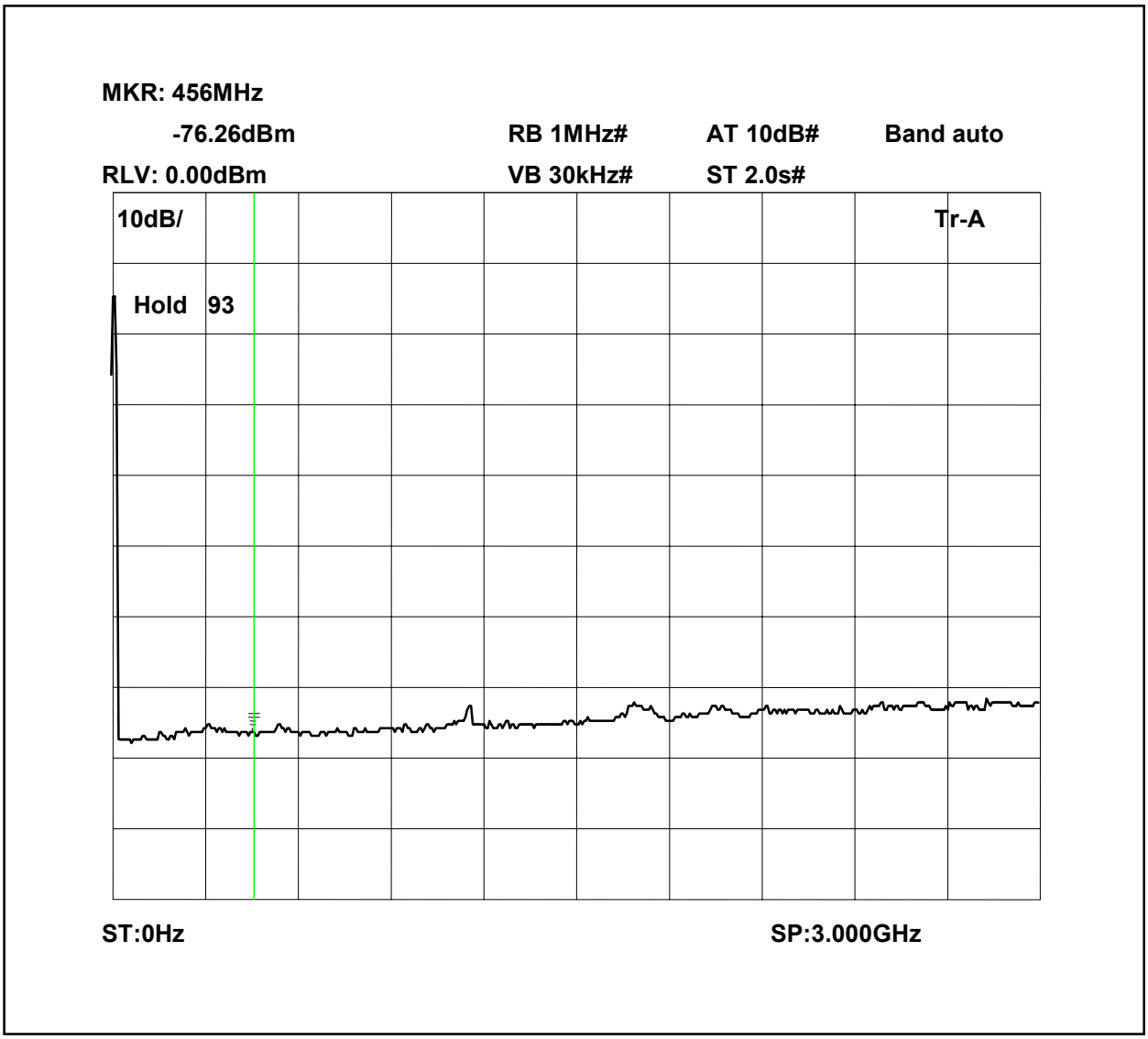
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 457.85MHz 2.9-10GHz



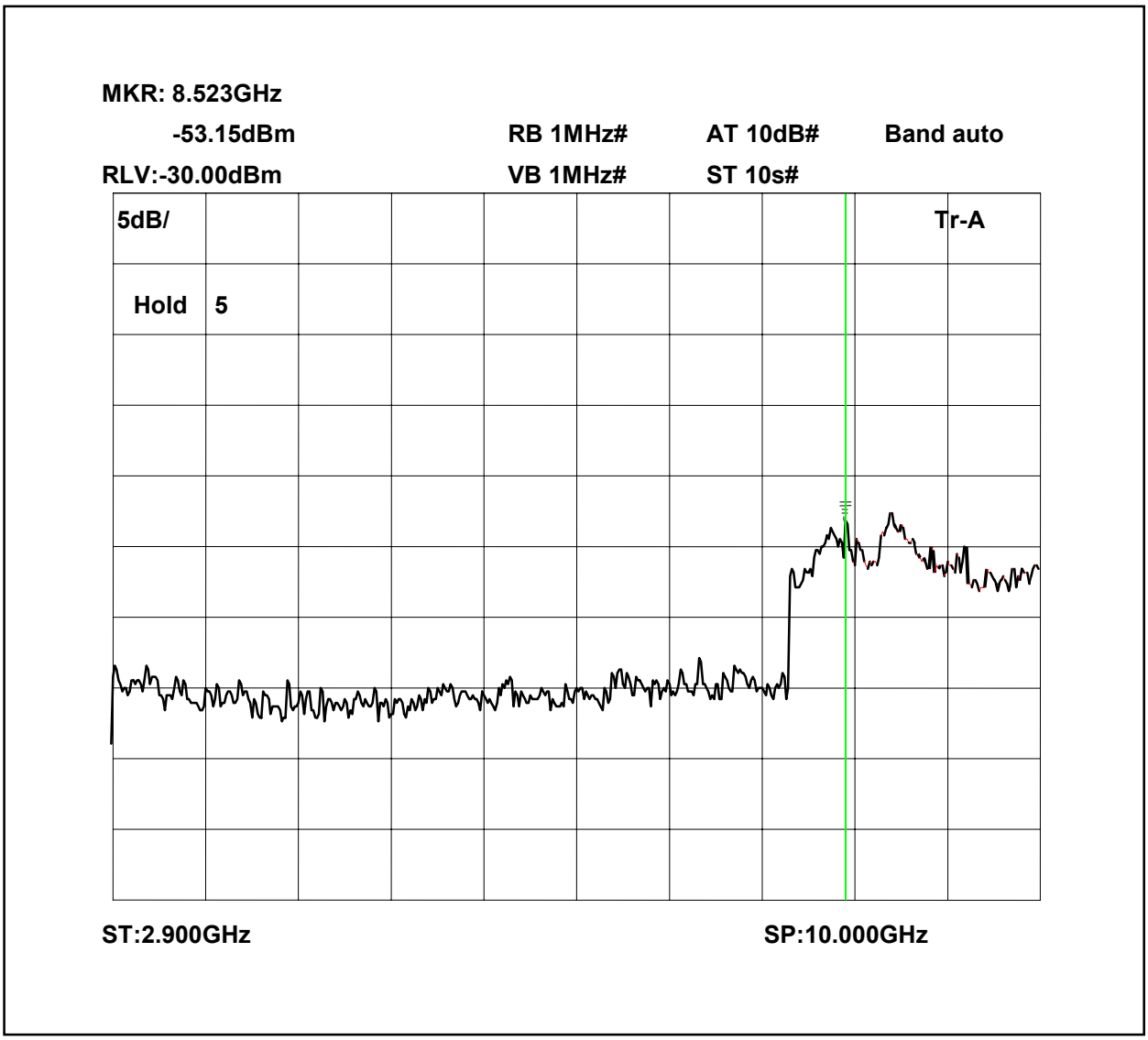
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions no input signal 0-3GHz



The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions no input signal 2.9-10GHz



The above test results show that there were no emissions within 20dBs of the –13dBm limit.

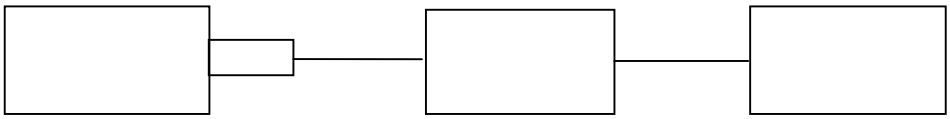
The test equipment used for the Transmitter Spurious Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
HORN	EMCO	3115	9010-3581	139	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
ATTENUATOR	BIRD	8308-100	N/A	112	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

COMPLIANCE TESTS

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – SIMPLEX

Ambient temperature = 20°C Radio Laboratory
Relative humidity = 54%
Supply voltage = 115Vac
Channel number = See test results



Spectrum Analyser TRL479

Attenuator TRL220
Cable TRL279

EUT

Signal Generator TRL179

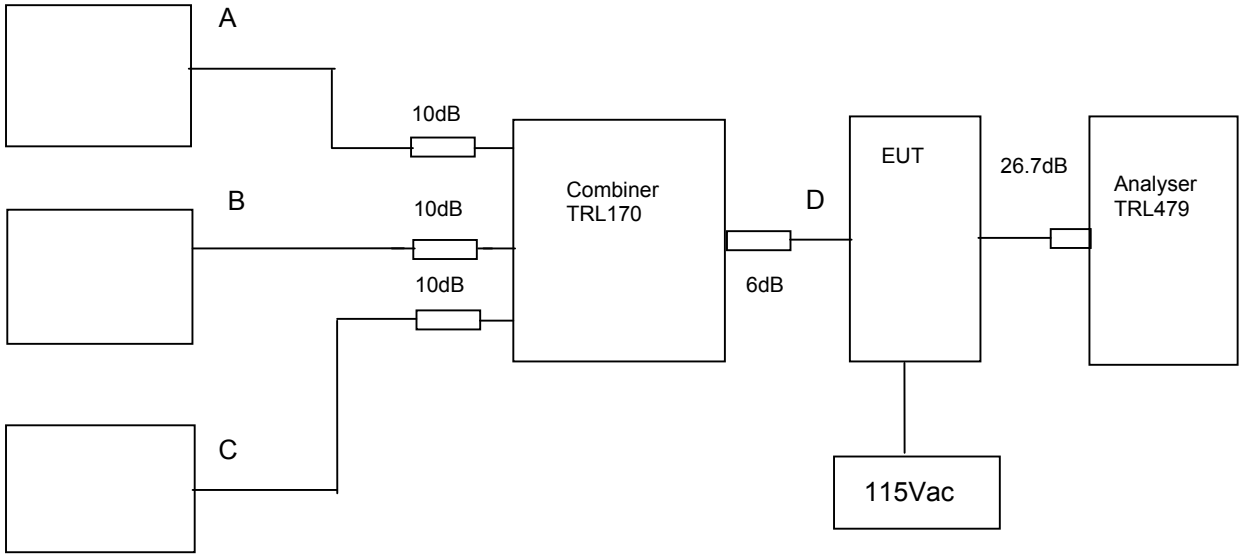
Frequency MHz	Signal Generator input level dBm	Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Gain after 20dB input level increase dBm
452.85MHz	-55.5	26.6	-4.45	77.65	77.65

Notes:
1.The level of the signal generator takes into consideration the loss from the cable.
2.The signal generator input was increased by 20dBs and the level of the output signal remeasured

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

AMPIFIER INTERMAODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– SMIPLEX

Ambient temperature	=	N/A	Radio Laboratory
Relative humidity	=	N/A	
Supply voltage	=	115Vac	



The Intermodualation and spurious products test was not performed as the this part of the unit only has one channel and separate RF inputs and outputs.

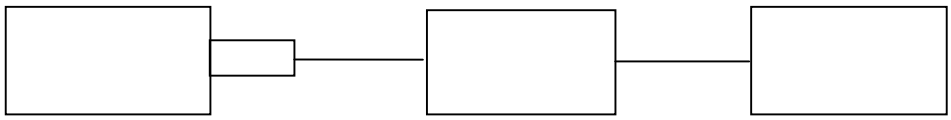
Test equipment used for intermodulation test

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	
SIGNAL GENERATOR	MARCON	2042	119562/02	254	
CMTA	ROHDE & SCHWARZ	CMTA52	894715/033	05	
SIGNAL GENERATOR	MARCON	2042	119388/080	179	
COMBINER	ELCOM	RC-4-50	N/A	170	

TRANSMITTER TESTS

AMPLIFER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– UPLINK

Ambient temperature	=	20°C	Radio Laboratory
Relative humidity	=	54%	
Supply voltage	=	115Vac	
Channel number	=	See test results	



Spectrum Analyser TRL479

Attenuator TRL220
Cable TRL279

EUT

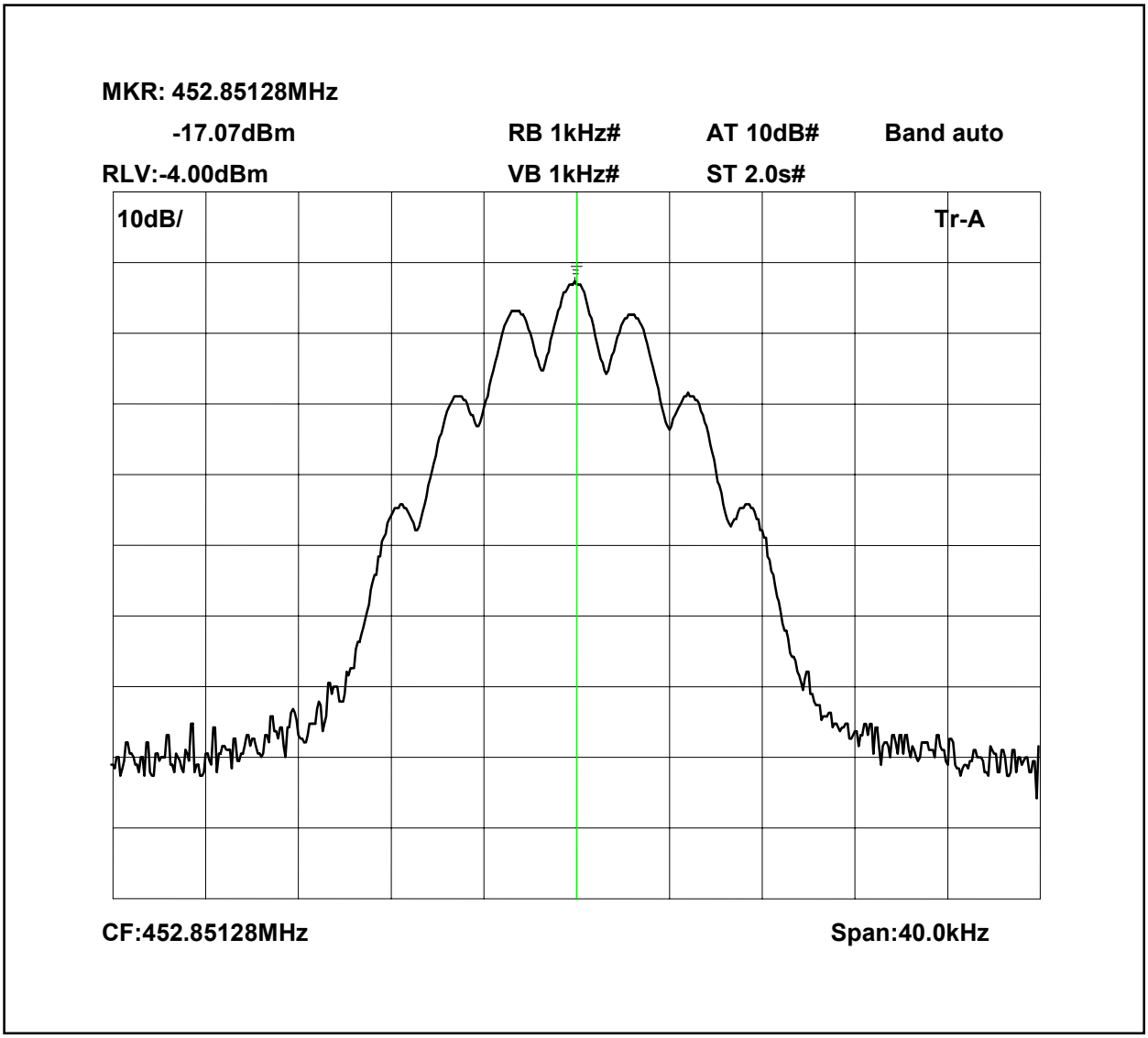
Signal Generator TRL179

This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input level (-29.1dBm) and modulated with a 2500Hz tone. The plots show the signal measured at the signal generator and the signal measured at the output of the EUT.

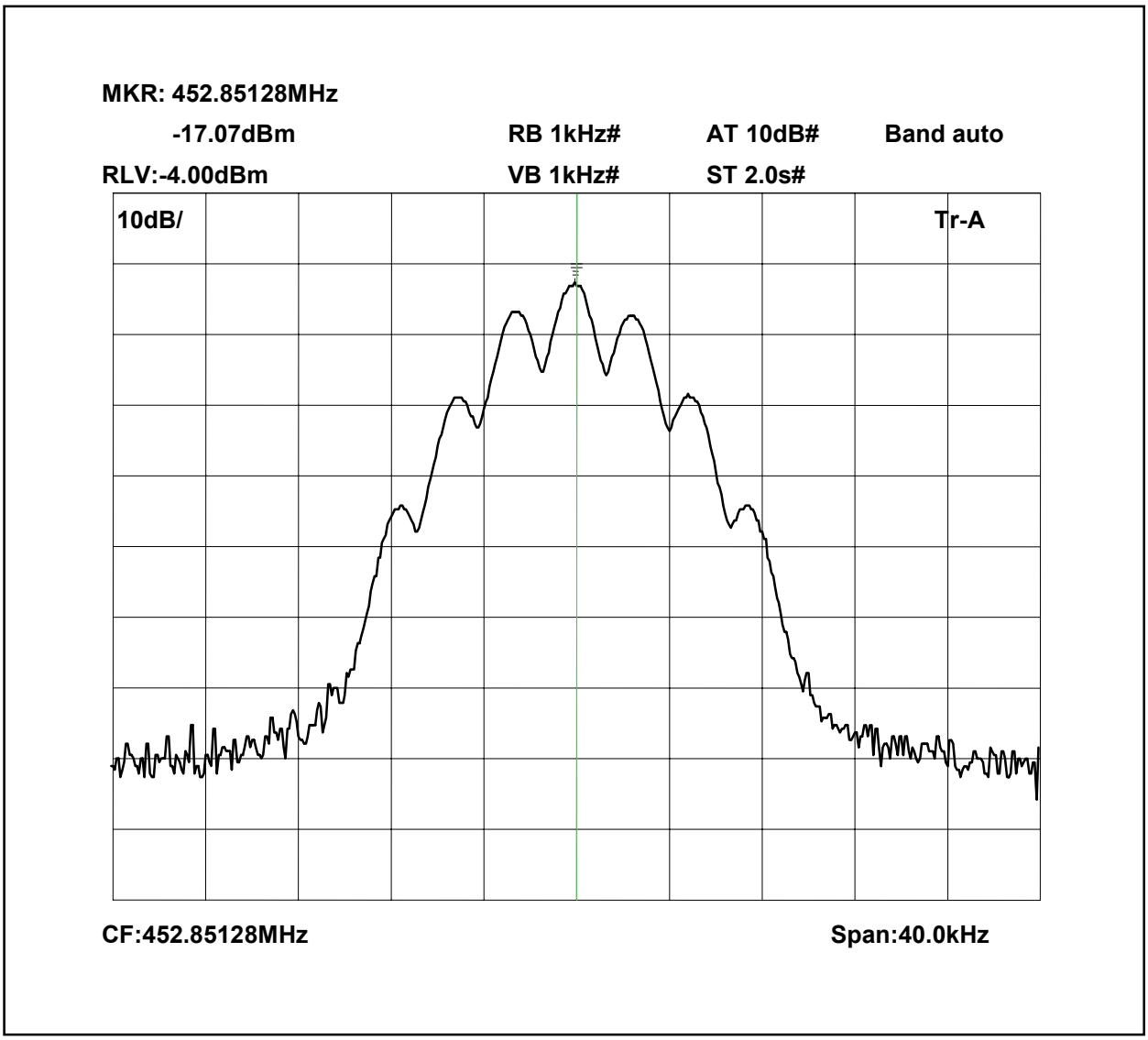
Note: The cables and attenuators had the following losses.

3. Cable TRL279 and attenuator TRL220 26.6dB
4. Cable between signal generator and EUT 0.4dB

452.85MHz Signal Generator deviation set to 2.5kHz



452.85MHz Signal Generator and EUT deviation set to 2.5kHz



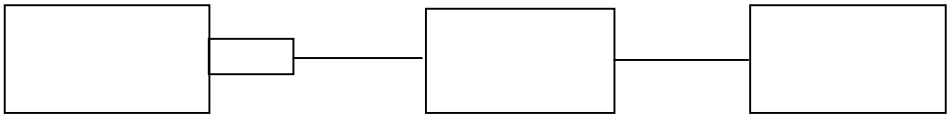
The above plots depicting the output waveshape show no measurable distortion visible, when compared to the input signal.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1051 – UPLINK

Ambient temperature	=	20°C	Radio Laboratory		
Relative humidity	=	54%	Test Signal	=	F3E
Supply voltage	=	115Vac			



Spectrum Analyser TRL479

Attenuator TRL220
Cable TRL279

EUT

Signal Generator TRL179

The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating at maximum power and on three test frequencies.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

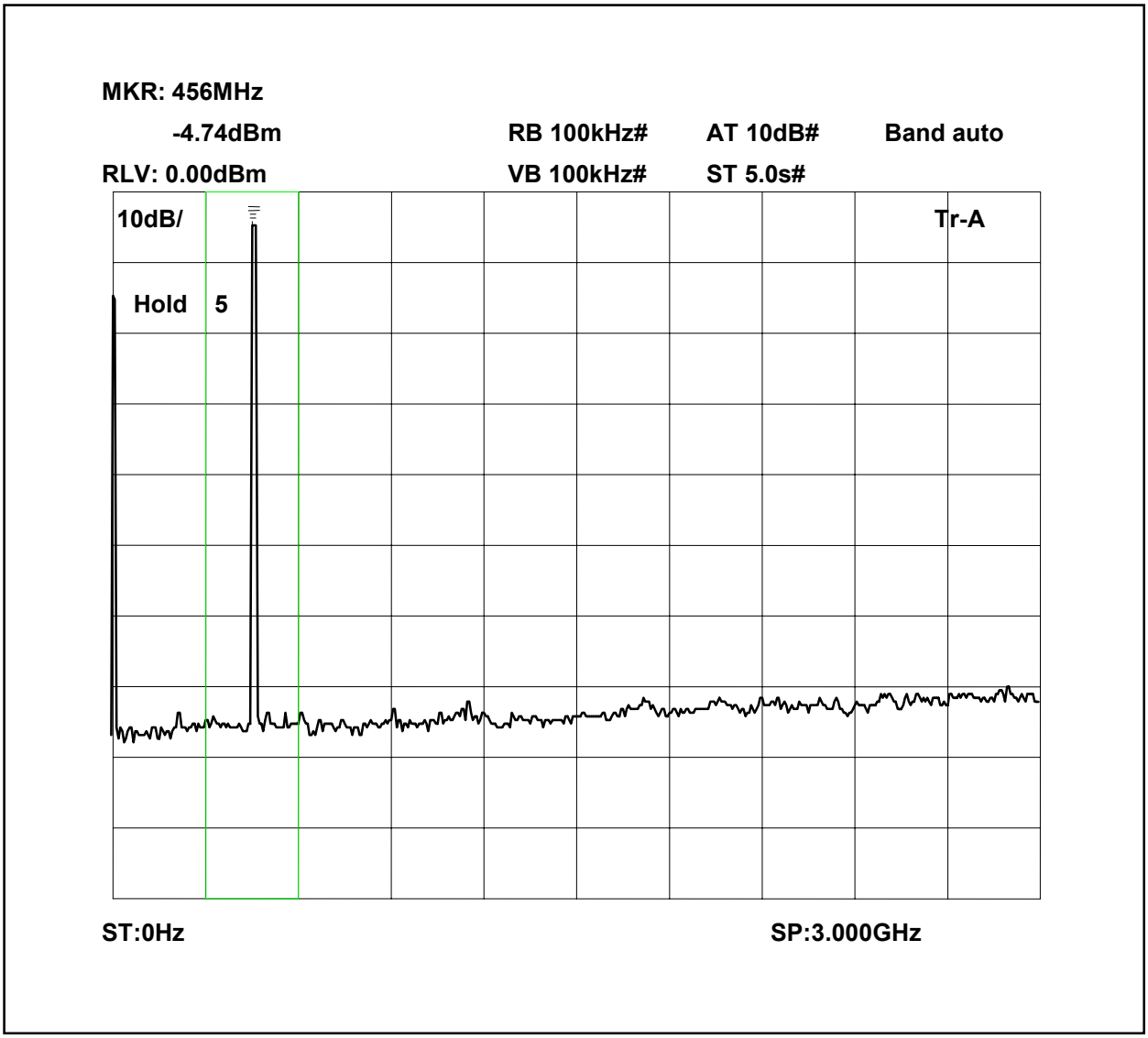
At least 43 + 10 log PdB

$(10\log P_{watts}) – (43+10\log (P_{watts} * 1000)) =$ LIMIT =-13 dBm

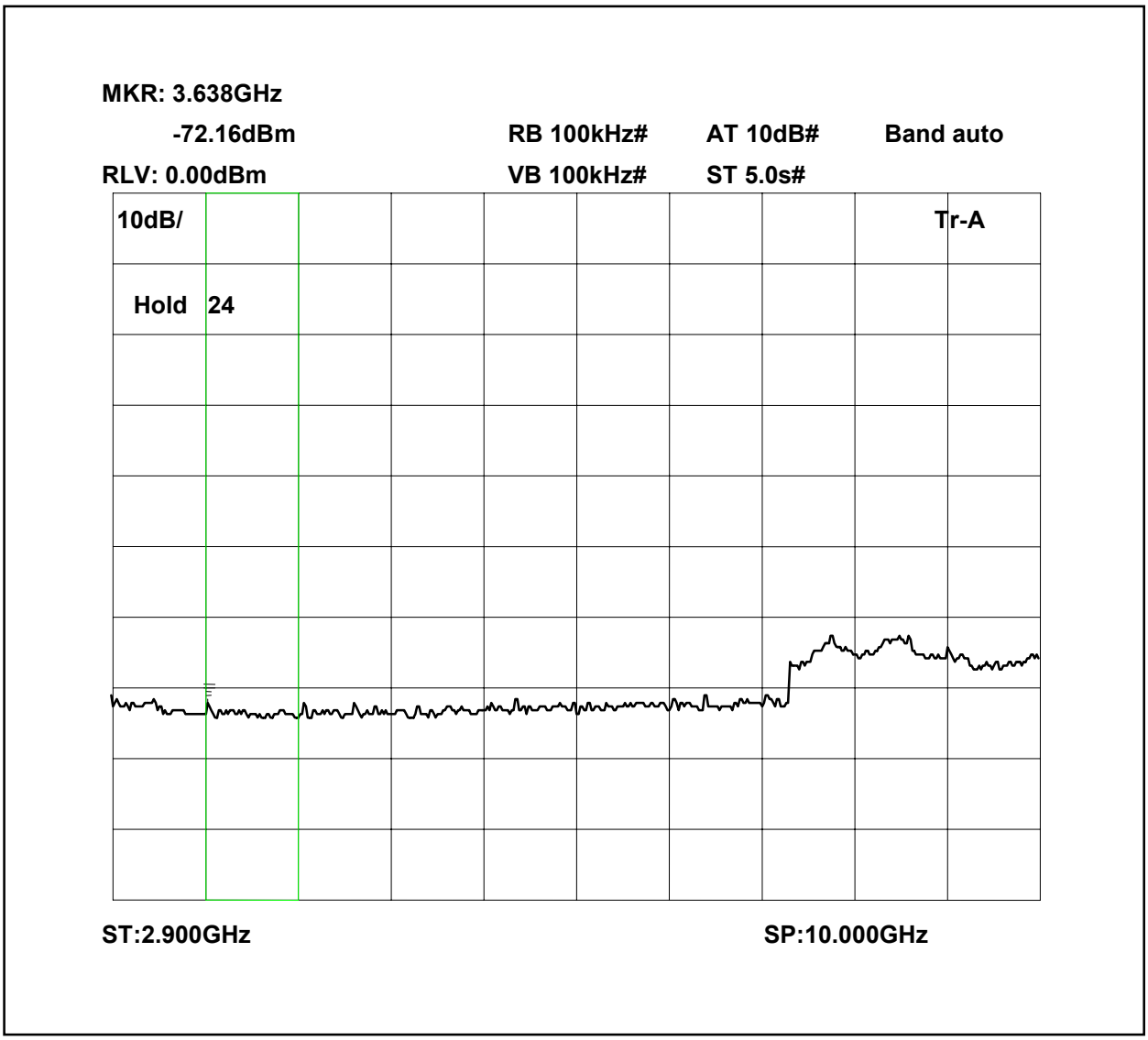
The test equipment used for the Transmitter Conducted Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

Conducted emissions 452.85MHz 0 - 3GHz



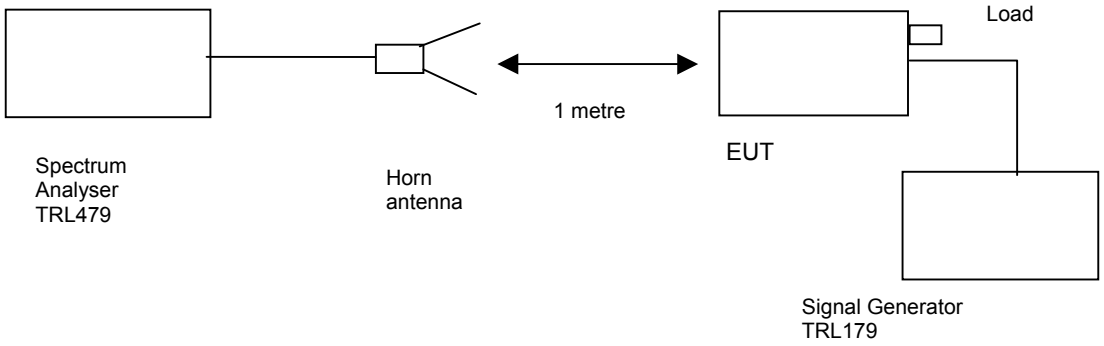
Conducted emissions 452.85MHz 2.9 - 5GHz



TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK

Ambient temperature	=	20°C	Test Signal	=	F3E
Relative humidity	=	54%			
Conditions	=	OATS			
Supply voltage	=	115Vac			
Supply Frequency	=	N/A			



The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating maximum power on three test frequencies with a 50 ohm load on the output. The unit was also tested with the signal generator replaced by another 50ohm load.

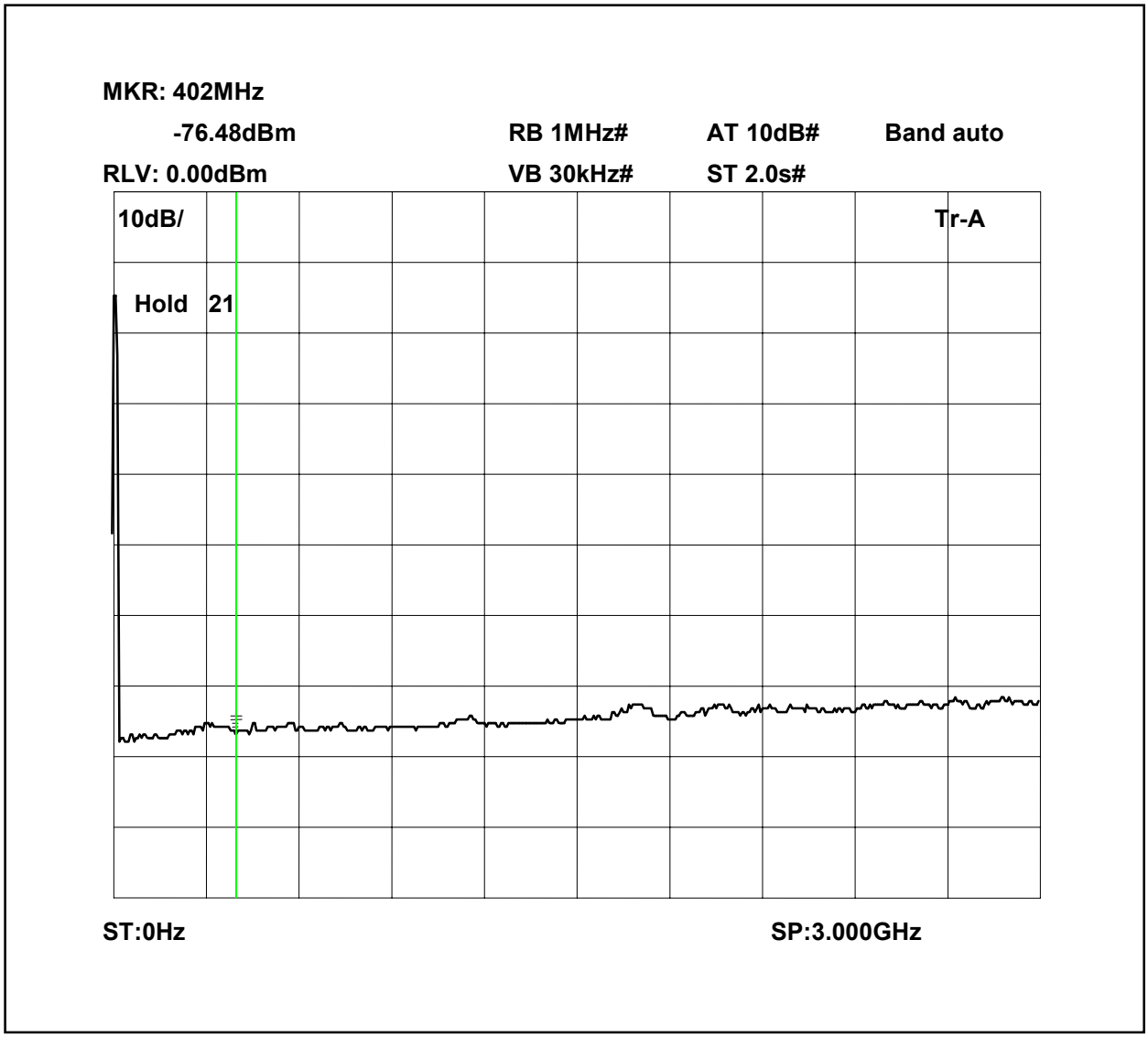
The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

At least 43 + 10 log PdB

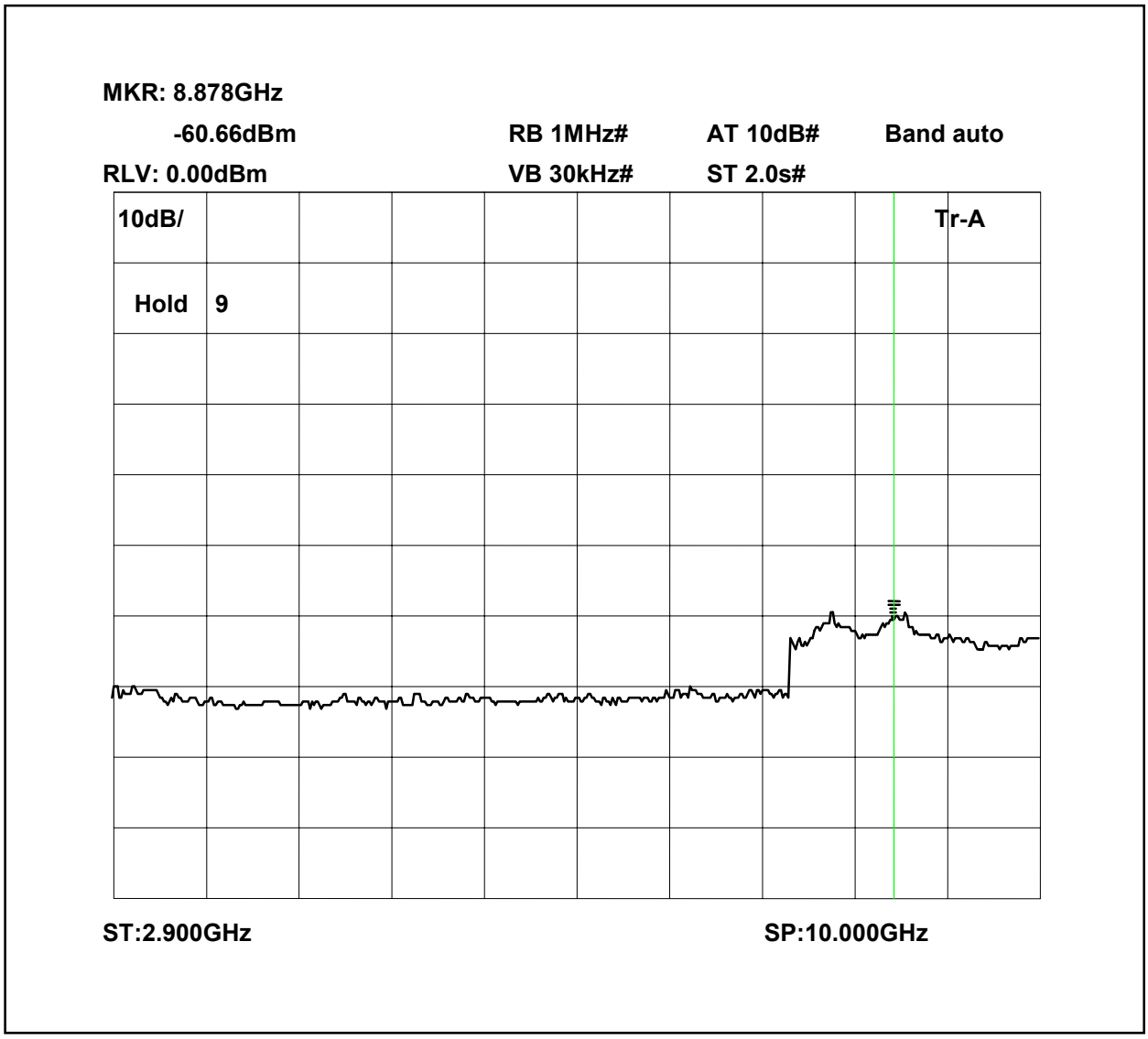
$(10\log P_{watts}) – (43+10\log (P_{watts} * 1000))$ = LIMIT =-13 dBm

Radiated emissions 452.85MHz 0-3GHz



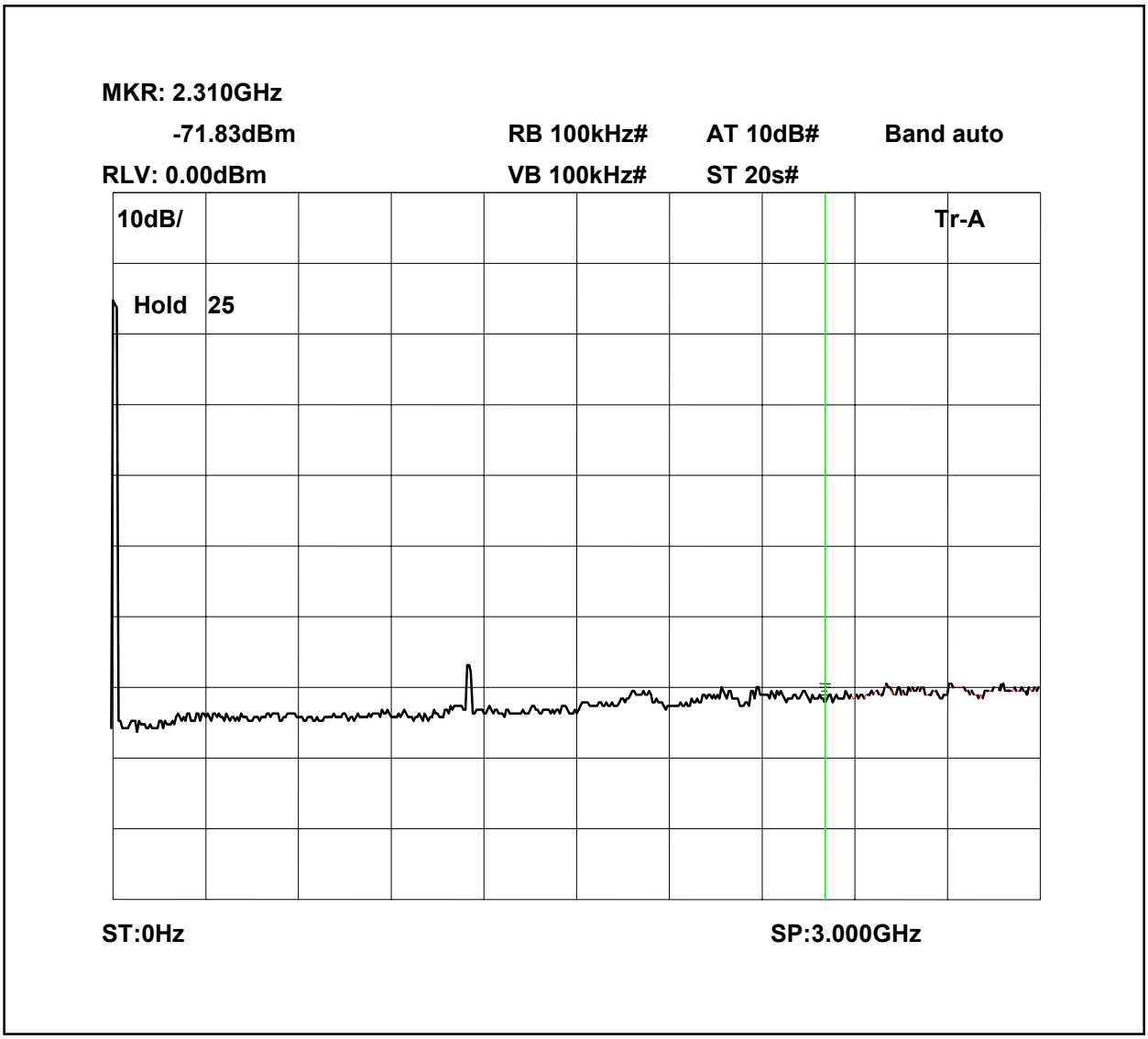
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions 452.85MHz 2.9-10GHz



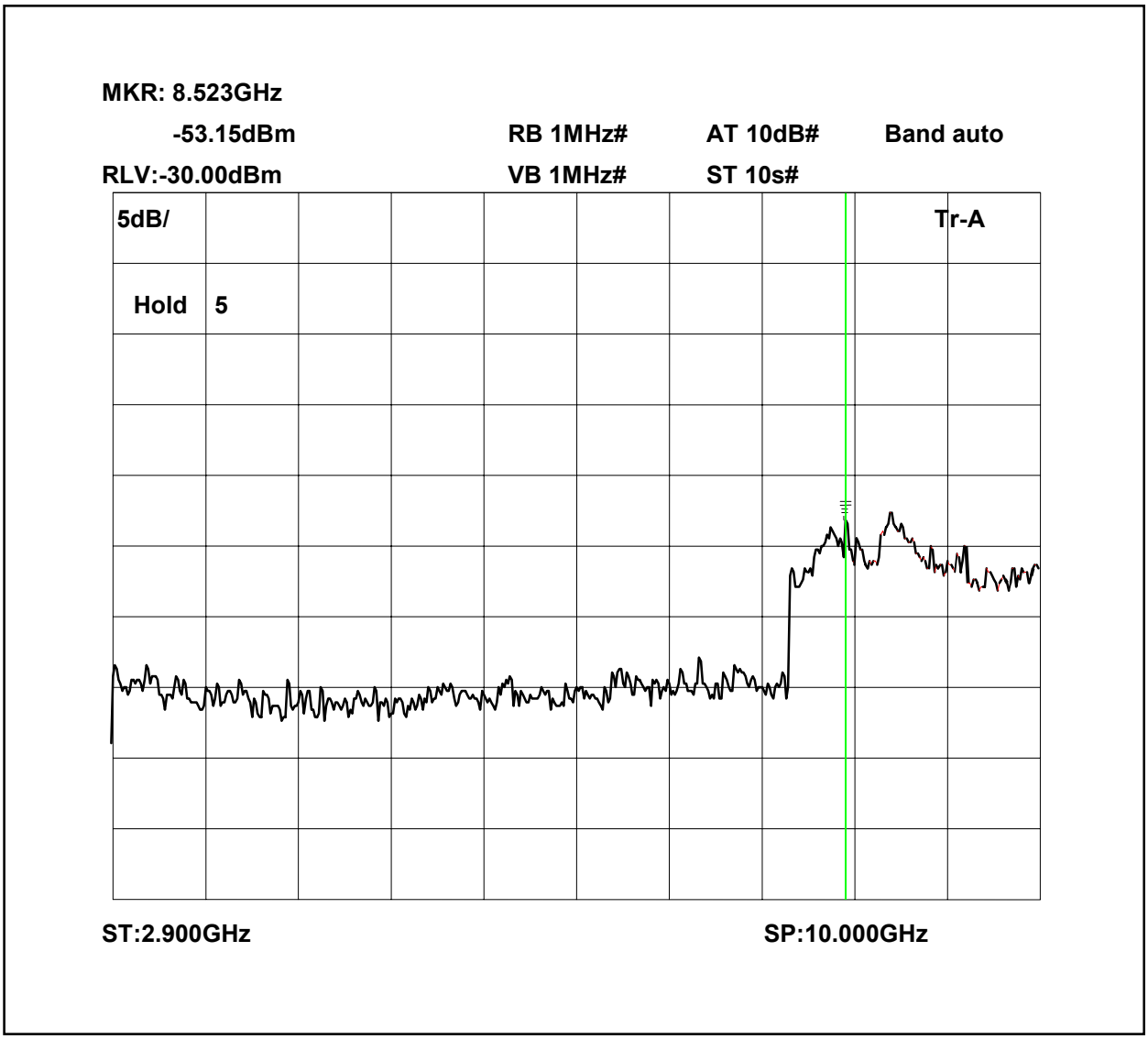
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions no input signal 0-3GHz



The above test results show that there were no emissions within 20dBs of the –13dBm limit.

Radiated emissions no input signal 2.9-10GHz



The above test results show that there were no emissions within 20dBs of the –13dBm limit.

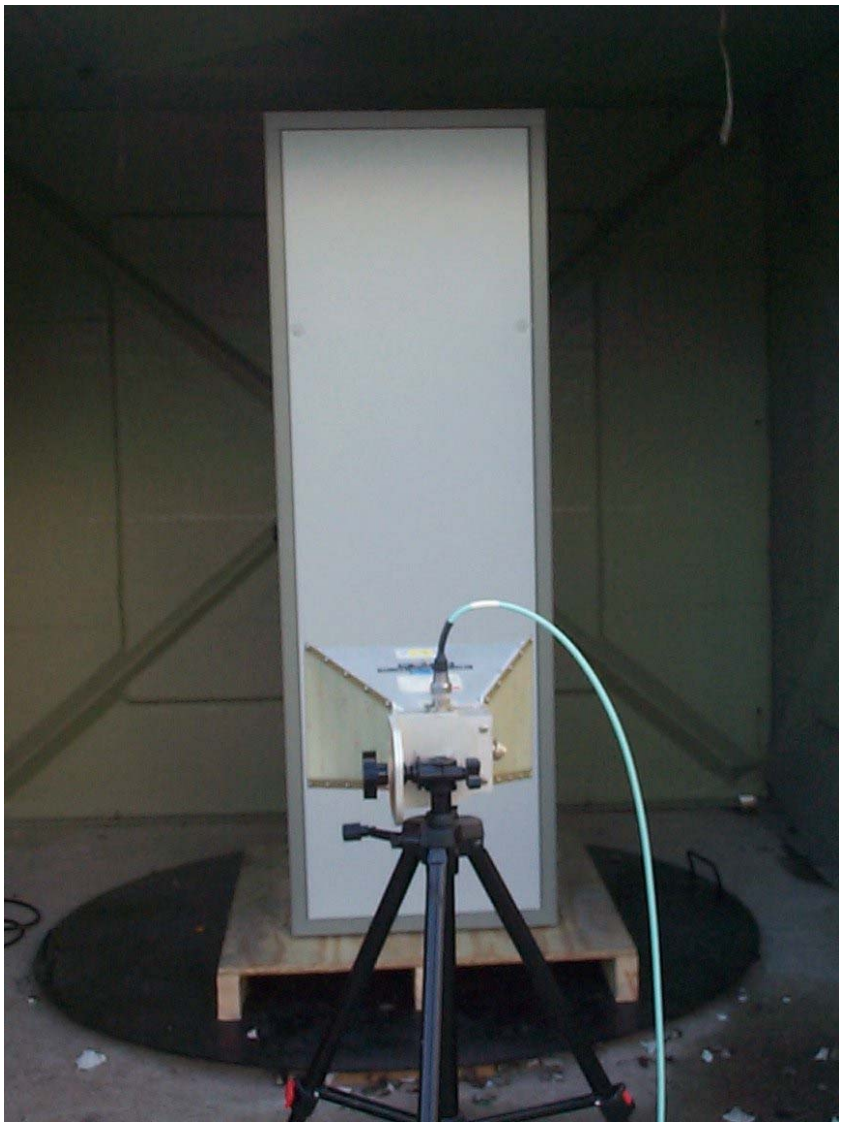
The test equipment used for the Transmitter Spurious Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
HORN	EMCO	3115	9010-3581	139	**X**
ATTENUATOR	BIRD	8304-300-N	N/A	220	**X**
CABLE	ROSENBERGER	MICRO COAX	N/A	279	**X**
SIGNAL GENERATOR	MARCON	2042	119388/080	179	**X**

ANNEX A

PHOTOGRAPHS

PHOTOGRAPH No. 1 **TEST SETUP**



PHOTOGRAPH No. 2 **TEST SETUP**

ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[ ]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[ ]
e.	LABELLING	-	PHOTOGRAPHS	[ ]
		-	DECLARATION	[ ]
		-	DRAWINGS	[ ]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
h.	CIRCUIT DIAGRAMS	-	Tx	[ ]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
i.	COMPONENT LOCATION	-	Tx	[ ]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
j.	PCB TRACK LAYOUT	-	Tx	[ ]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
k.	BILL OF MATERIALS	-	Tx	[ ]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]