

APPLICANT:
Ericsson Radio Access AB

FCC ID Number:
OPVKRB1011047-1

TEST REPORT

50 W linear power amplifier

Application for certification

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1 APPLICATION FOR CERTIFICATION, §2.1033

- (1) Manufacturer: Ericsson Radio Access AB
Box 11
SE-164 93 Stockholm
Sweden
Applicant: Ericsson Radio Access AB
Soren Norbeg
Box 11
SE-164 93 Stockholm
Sweden
- (2) FCC Identifier OPVKRB1011047-1
- (4) Type of emissions: DXW, F1D, and F8W. This amplifier is for use in the Public Mobile Service (CFR title 47 part 22 Subpart H , and according to 22.901(d) Cellular Radiotelephone Service)
- (5) Frequency range: 869 to 894 MHz
- (6) Range of operating power: 1 - 50 W
- (7) Maximum power rating: 50 W, distributed to minimum 2 and maximum 32 carriers.
- (8) DC voltage and current: Voltage: 27±1 V DC
Current: 30 A (MCPA current consumption)
- (10) Tune up procedure: The amplifier is factory tuned. The only necessary and possible installation tuning is to adjust the RF input power level. When the amplifier is properly installed in a radio base station (as indicated in Figure 1: MCPA environment) the Cellular Radio Exchange (CRE) will supervise and control the output power per carrier. If a fault condition should arise in the amplifier, this is signalled to the CRE. In case of severe faults the amplifier is automatically shut down.

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2 GENERAL AMPLIFIER DESCRIPTION

The MCPA Cabinet is a power amplifier, for highly linear amplification of a composite input signal of up to 24 digitally or analogue modulated carriers. The amplifier power output is 50 W.

The amplifier is primarily intended for use together with RBS 884 base stations.

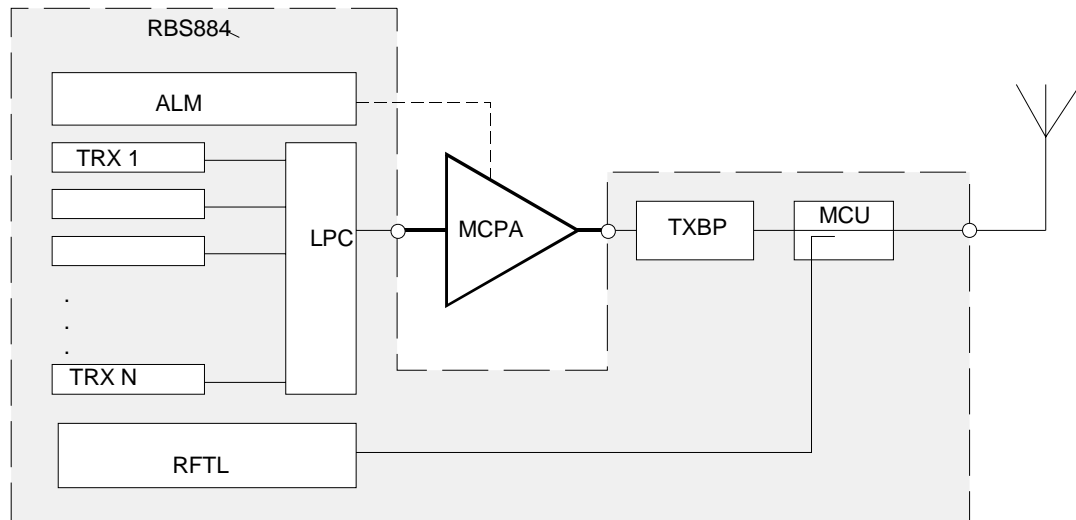


Figure 1: MCPA environment

2.1 ABBREVIATIONS

MCPA	Multi Carrier Power Amplifier
ALM	Alarm module
MCU	Measurement Coupler Unit
LPC	Low Power Combiner
RFTL	Radio Frequency Test Loop
TXBP	Transmitter BandPass filter
TRX	Transmitter & Receiver unit

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2.2 COMMENT ON FILTER FUNCTIONS

To fulfil the cellular standard (e.g. IS-138-A) it is necessary to use a bandpass filter to restrict spurious emissions outside the TX-band. This filter is included in the normal base station structure (cf. Figure 1: MCPA environment)

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2.2.1 Necessary filter performance

In order to fulfil §2.1051, Spurious emission at antenna terminal, a low pass filter must be inserted between the amplifier output terminal and the antenna.

The filter attenuation must greater or equal to:

Frequency range (MHz)	Attenuation (dB)
910 – 1788	45
1788 – 2700	20

This text is also included in the installation manual, § 1.5, "Legal information".

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3 RF OUTPUT POWER, §2.1046

- (b) Maximum RF output power is 50 W.
If the amplifier is severely overloaded, more than 2 dB, it will shut down.

All the following tests are performed at 50 W output power.

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4 TEST RESULTS

All results are valid at 50 W RF output power, at MCPA output terminal.

4.1 TEST EQUIPMENT FOR SPURIOUS EMISSION AND OCCUPIED BANDWIDTH

RF Signal generator	Solartron Stabilock 4040	Analogue RF signal generation
AF Signal generator	HP 33120A	Modulation input to RF signal generator
Preamplifier	Mini Circuits ZHL-42	
Base station transceiver (AMPS / D-AMPS)	Ericsson: KRC 121 10/1	Digital RF signal generation
Attenuator	R&S RBU 100 JFW 50FHB-020-10	MCPA output signal conditioning
Power meter	R&S NRVD + NRV-Z51	MCPA output power measurement
Spectrum analyser	R&S FSEA R&S FSEM	
Network analyser	HP 8753D	Calibration
TXBP (Refer to 2.2, Comment on Filter functions)	Ericsson: KRF 102 116/1	Bandpass filter for spurious emissions measurements

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4.2 BLOCK DIAGRAM

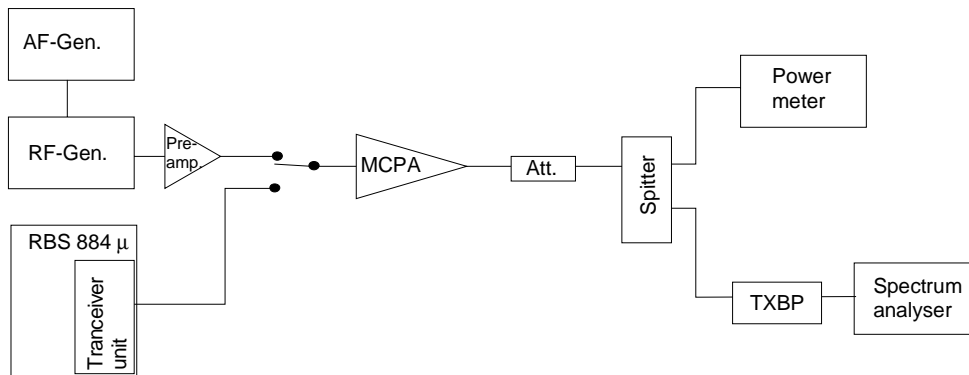
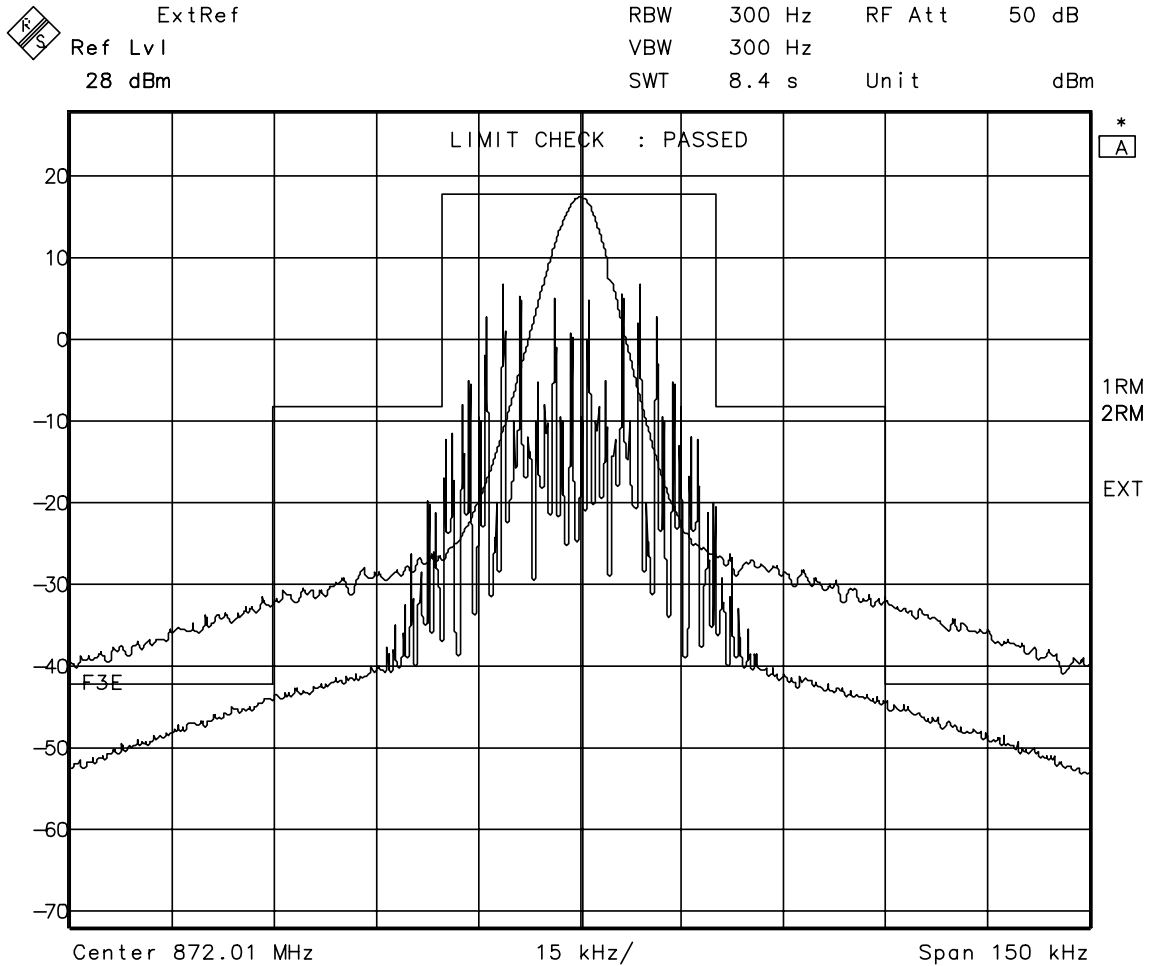


Figure 2: Test equipment block diagram

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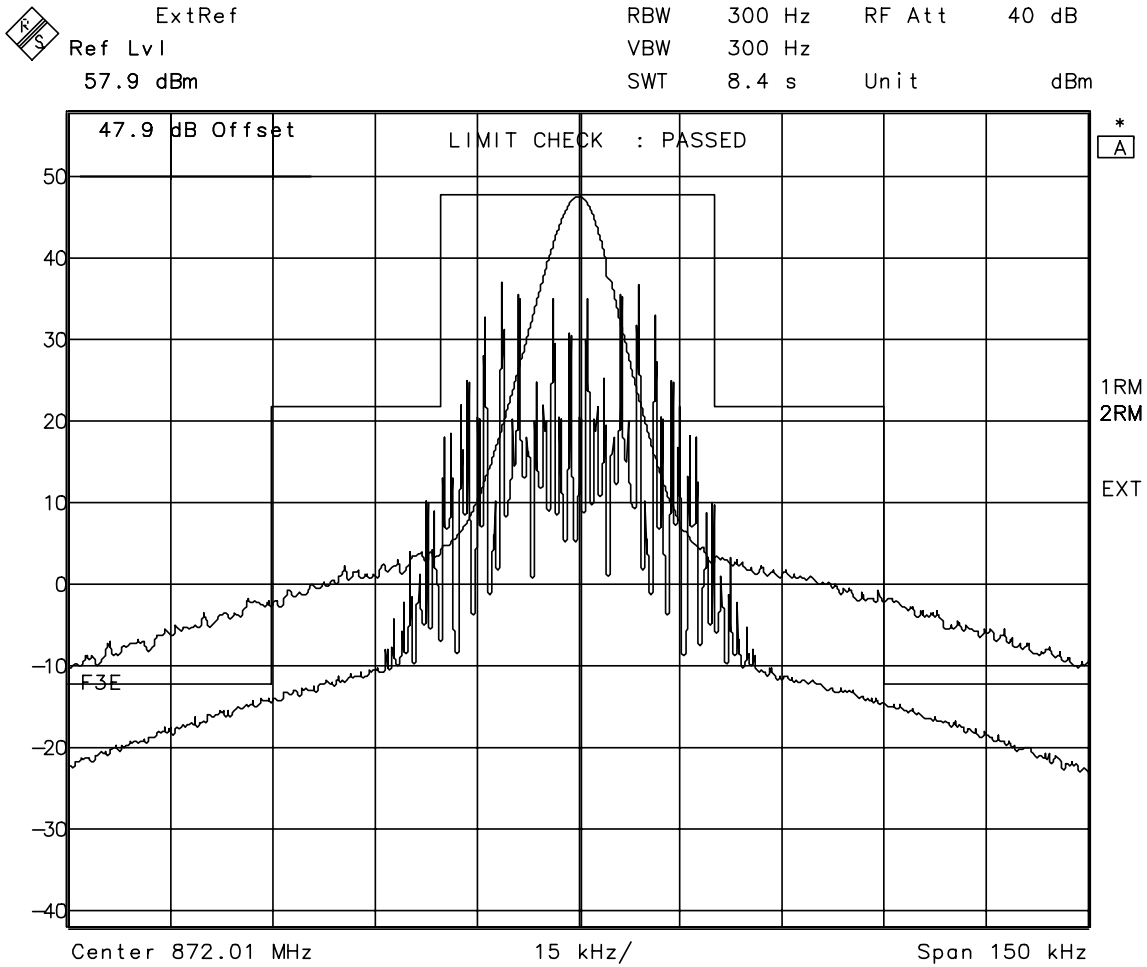
4.3 OCCUPIED BANDWIDTH, §2.1049



Title: Occupied bandwidth. MCPA input signal.
Comment A: Modulation: 2500 Hz sine at 12 kHz deviation = 6 kHz at 2 kHz deviation. (Source Stabilock 4040)
Date: 24.SEP.99 18:25:58

Figure 3: Signal generator output occupied bandwidth, analogue modulation. The upper curve is the CW

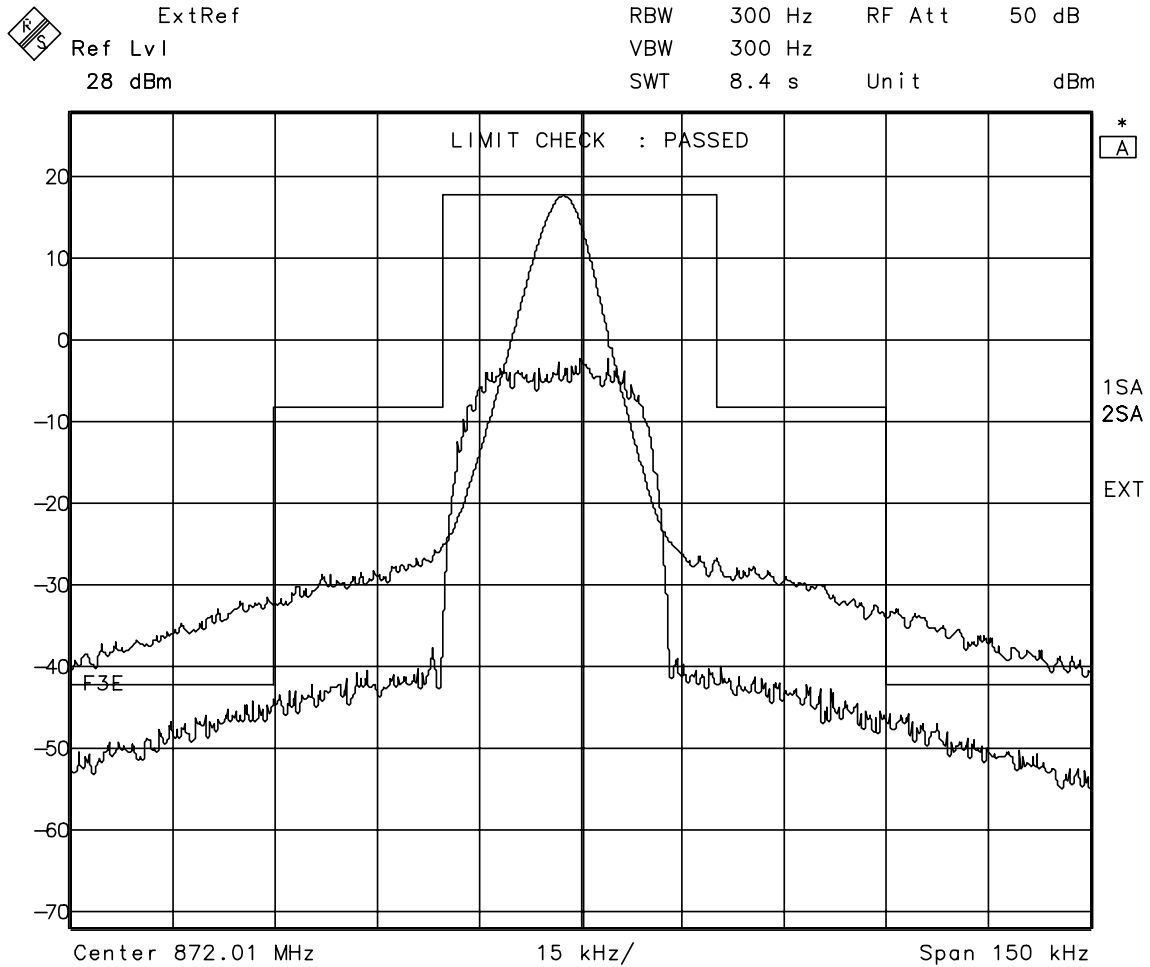
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Title: Occupied bandwidth. MPCA output signal (50 W).
Comment A: Modulation: 2500 Hz sine at 12 kHz deviation = 6 kHz at 2 kHz deviation. (Source Stabilock 4040)
Date: 24.SEP.99 18:18:15

Figure 4: MPCA output occupied bandwidth, analogue modulation. The upper curve is the CW reference.

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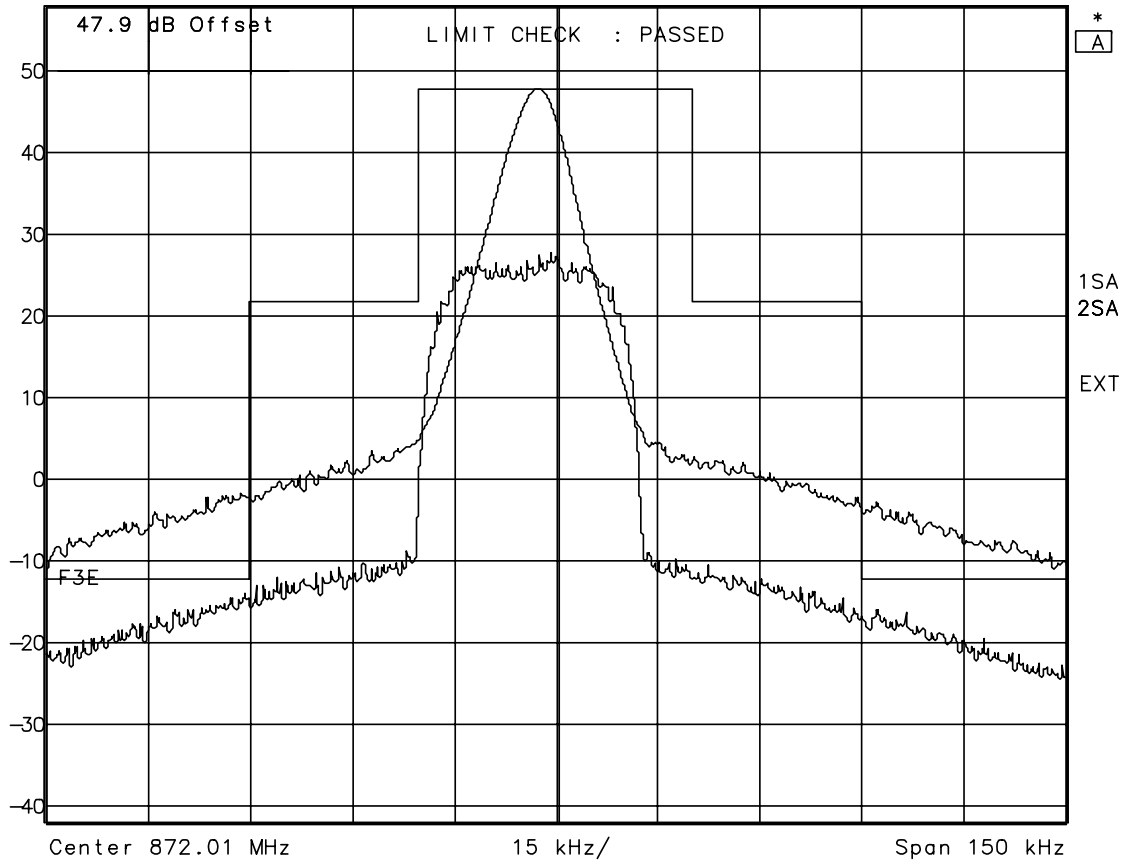


Title: Occupied bandwidth. MCPA input signal .
Comment A: Modulation: pi/4-DQPSK, 38.6 kbit/s. (Source RBS 884 micro)
Date: 24.SEP.99 16:37:47

Figure 5: Signal generator (RBS 884) output occupied bandwidth, digital modulation. The upper curve is the CW reference.

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	ExtRef	RBW	300 Hz	RF Att	40 dB
	Ref Lvl	VBW	300 Hz		
	57.9 dBm	SWT	8.4 s	Unit	dBm



Title: Occupied bandwidth. MCPA output signal (50 W).
Comment A: Modulation: pi/4-DQPSK, 38.6 kbit/s. (Source RBS 884 micro)
Date: 24.SEP.99 17:07:19

**Figure 6: MCPA output occupied bandwidth, digital modulation.
The upper curve is the CW reference.**

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4.4 CONDUCTED SPURIOUS EMISSION, § 2.1051

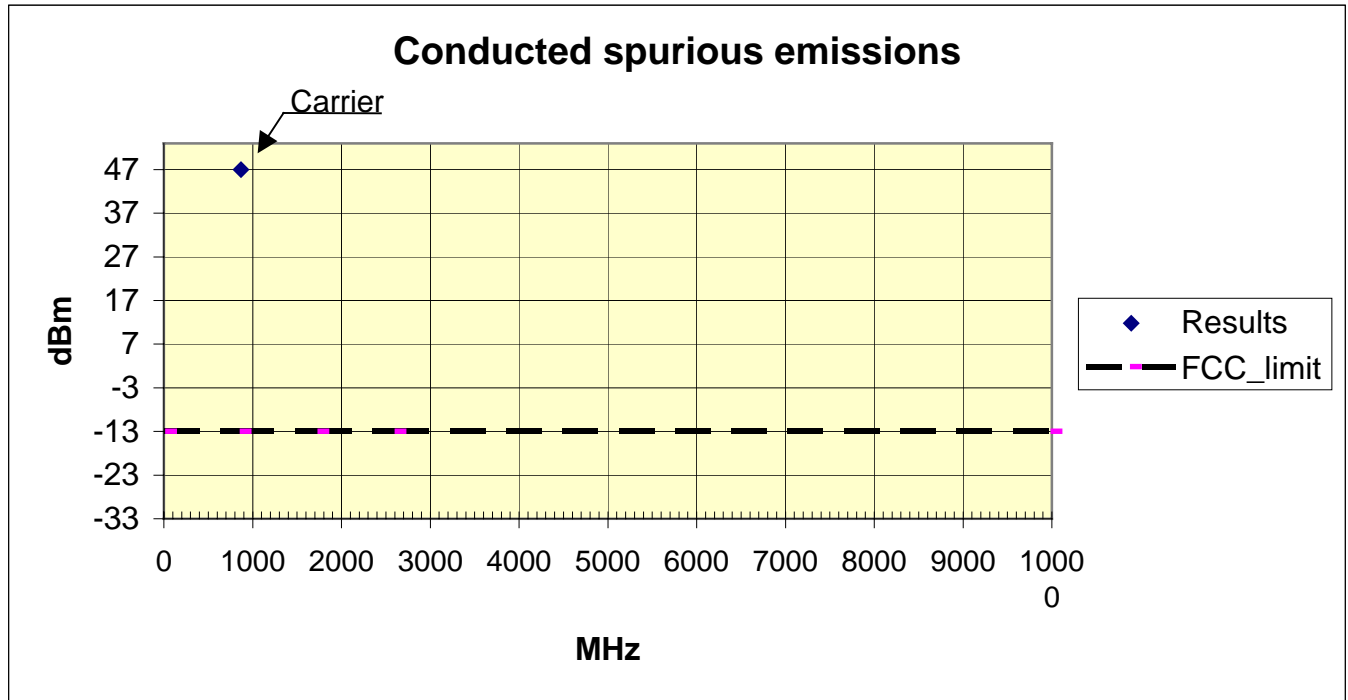


Figure 7: Spurious emission at output terminal.

No spurious emissions within, 20 dB from FCC-limit, found at output terminal.

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4.5 RADIATED SPURIOUS EMISSION, §2.1053

This test was performed at Southwest Research Institute, 6220 Culebra Road, San Antonio, Texas 78228-0510. Southwest Research Institute is accredited by the American Association for Laboratory Accreditation to the ISO/IEC Guide 25 for electromagnetic compatibility testing

4.5.1 Equipment used & description

Signal generators	R&S SME03 R&S SME03
Preamplifiers	IFI 5500 IFI M5480
Dummy load	Bird 8301
Antenna 100 MHz	EMCO 3121DB2
Antenna 270 MHz	EMCO 3121DB3
Antenna 700 MHz	EMCO 3121DB4
Antenna Dual Ridge	EMCO 3115
Spectrum analyser	HP 8566B HP 8568B
Spectrum analyser preamplifier	SWRI: UTC10-221-1 JCA: JCA018-505

Two carriers, 25 W each, one $\pi/4$ -DQPSK and one FM modulated, were used as MCPA stimuli. Total MCPA output: 50 W. Appropriate cables were connected to the MCPA during test.

4.5.2 Test results

No spurious emissions found within 20 dB of the limit, except the carriers, which are 10 dB below the limit. The limit is calculated to 81.4 dB μ V/m (output power 25 W).

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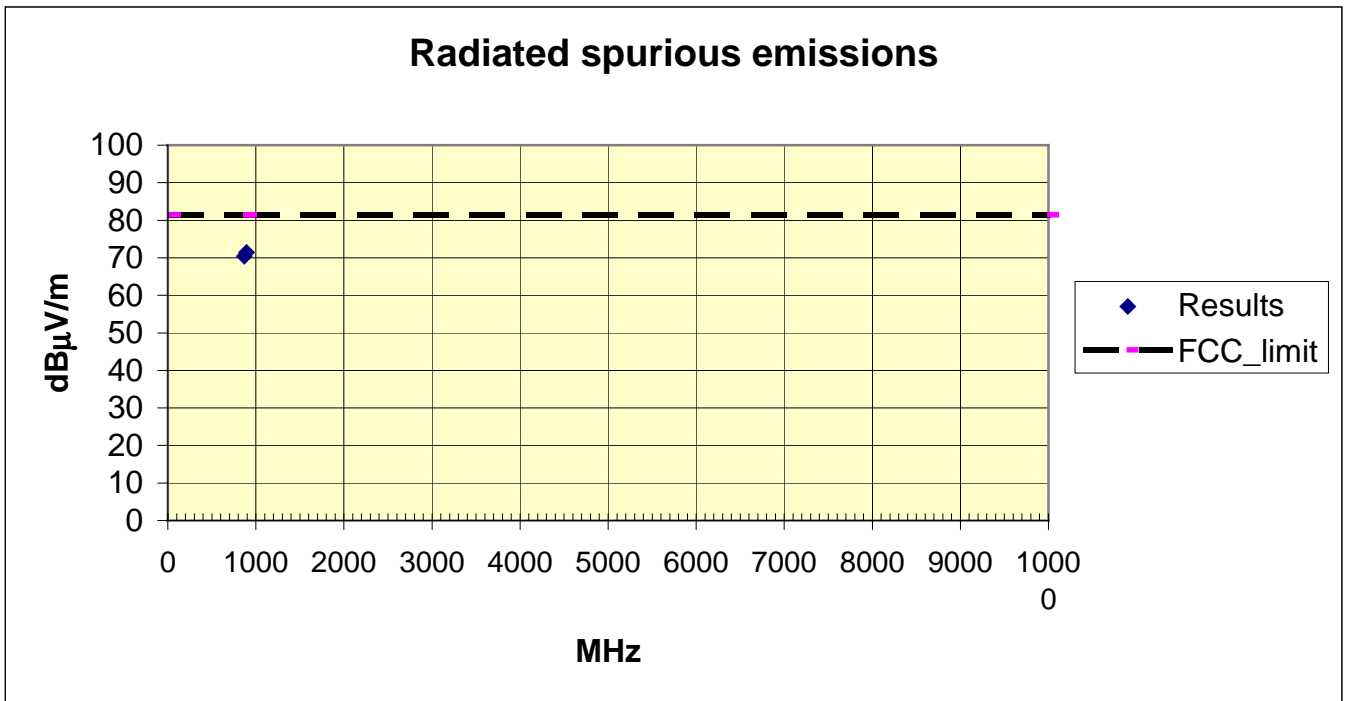


Figure 8: Radiated spurious emission