



WCDMA / CDMA2000[®]

Intermodulation Calibration for Zero IF Chipsets

Application Note

The Rohde & Schwarz CMU200 provides the signals required for 2nd order intermodulation (IM2) performance verification for WCDMA / CDMA2000[®] chipsets with zero IF design.

This application note is a guide to configure the R&S[®] CMU200 for such an application.



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1 Overview

In the traditional HW design of cellphones the RF signal is converted to and from the baseband in several steps. In the Rx path the signal is converted from RF to IF and then to baseband, in the Tx path the process occurs in the opposite direction.

However, an architecture based on a direct conversion technology or zero IF (ZIF) offers tremendous advantages by decreasing parts count, saving board space and enabling smaller form factors. IF or SAW filters are also not necessary in a zero IF HW design.

Zero IF technology has been used in the cellphone design for a long time. Technical barriers have prohibited practical implementation in ¹CDMA2000® and WCDMA devices. The mass production of direct conversion chips for CDMA2000® as well as WCDMA applications has only become feasible with recent improvements in semiconductor processes, coupled with the development of high-speed, low power digital processors.

The direct conversion technologies also create additional technical challenges, such as second-order inter-modulation (IM2).

The verification of the IM2 performance requires specific test signals with a very low broadband noise level.

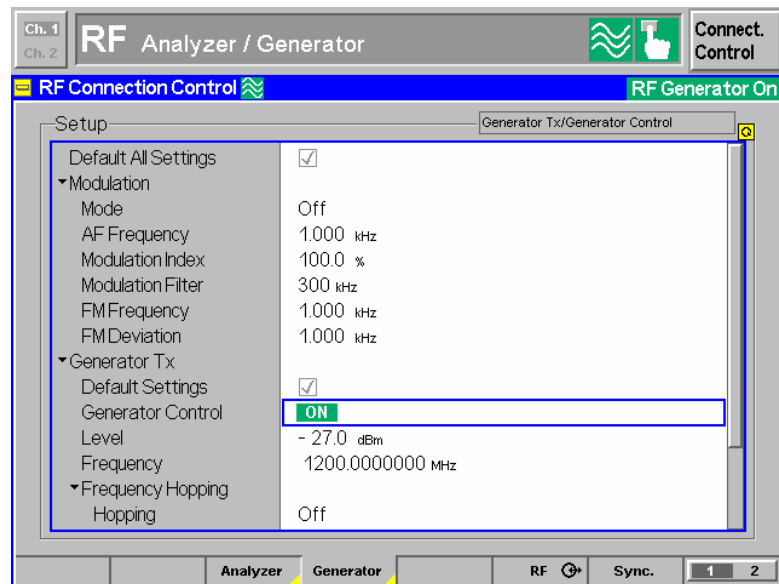
These test signals can be generated with the R&S®CMU200 using the extremely flexible RF generator (RF function group), offering e.g. FM, AM or SSB (Single Side Band), DSB (Dual Side band) modulation with configurable modulation frequency and modulation index. There is no longer any need to use an additional signal generator.

¹ CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA - USA)

2 R&S® CMU200 Configuration

For the verification of IM2 performance, a modulated carrier with certain device manufacturer specific characteristics is required.

Such a modulated test signal can be configured using the CMU's RF function group (RF Connection Control):



Remote control:

```
SOURce:RFGenerator[:TX]:LEVel <Level>
```

```
SOURce:RFGenerator[:TX]:FREQuency <Frequency>
```

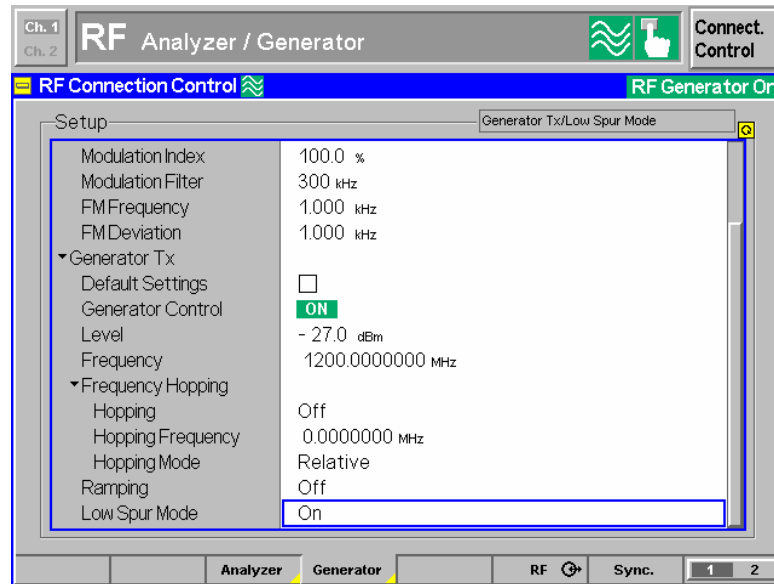
```
SOURce:RFGenerator:MODulation <Modulation>
```

```
SOURce:RFGenerator:MODulation:SSB:FREQuency <Frequency>
```

```
SOURce:RFGenerator:MODulation:AM:INDex <Modulation  
Index>
```

IM2 calibration with R&S® CMU200

To reduce the broadband noise for the IM2 calibration, the Low Spur Mode must be activated in the Generator menu (this is disabled by default).



Remote control:

```
SOURce:RFGenerator:LSMode:STATE ON
```

```
INITiate:RFGenerator
```

3 Hardware and Software Requirements

The Low Spur Mode is supported by the R&S®CMU200 Base SW V3.52 (and higher).

The hardware requirement for the R&S®CMU200 is an RxTx board revision 13 (stock number 1135.6925.02 – modification index 13.02 or higher). Alternatively an RxTx board revision 11 (stock number 1135.6702.02 – modification index from 1.10 to 1.41) can be upgraded with the Low Noise Tx Mode with the Option R&S®CMU-U84 (stock number 1159.1500.02 – upgrade kit for 10 units).

The board revision of the RxTx board can be checked in the CMU's info menu:

4 Additional Information

Please contact cmuapplication@rsd.rohde-schwarz.com for comments, further suggestions as well as questions.

5 Ordering information

R&S®CMU200	Universal Radio Communications Tester	1100.0008.02
R&S®CMU-B21 Var. 54	Universal Signalling Unit (WCDMA-3GPP FDD capable)	1100.5200.54
R&S®CMU-B68 Var. 02	Versatile baseband board for WCDMA (3GPP FDD)	1149.9809.02
R&S®CMU-B56	WCDMA (3GPP FDD) Signalling Unit	1150.1850.14
R&S®CMU-U65 Var. 04	3G Measurement DSP	1100.7402.04
R&S®CMU-K61	WCDMA (3GPP FDD) Band IV	1157.3670.02
R&S®CMU-K62	WCDMA (3GPP FDD) Band V	1157.3770.02
R&S®CMU-K63	WCDMA (3GPP FDD) Band VI	1157.3870.02
R&S®CMU-K65	WCDMA (3GPP FDD) Tx Test	1115.4891.02
R&S®CMU-K66	WCDMA (3GPP FDD) Generator	1115.5100.02
R&S®CMU-K67	WCDMA (3GPP FDD) Band III	1150.3000.02
R&S®CMU-K68	WCDMA (3GPP FDD) Band I	1115.5300.02
R&S®CMU-K69	WCDMA (3GPP FDD) Band II	1115.5400.02
R&S®CMU-B83	CDMA2000® Signalling Unit	1150.0301.12
R&S®CMU-K83	CDMA2000® (450 MHz band)	1150.3500.02
R&S®CMU-K84	CDMA2000® (Cellular band)	1150.3600.02
R&S®CMU-K85	CDMA2000® (PCS band)	1150.3700.02
R&S®CMU-K86	CDMA2000® (IMT-2000 band)	1150.3800.02
R&S®CMU-U84	Modification Low Noise Tx	1159.1500.02



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