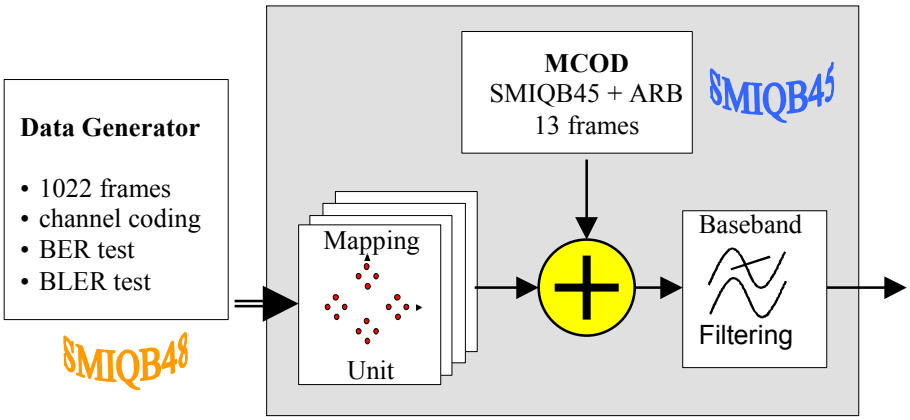
W-CDMA power settings in the reverse link

For the following considerations one block diagram as well as two power equations are the main part:



Block diagram: SMIQB45 and SMIQB48 functionality

Logarithmic power: $\frac{P_{\log}}{dBm} = 10 \cdot \log \frac{P_{lin}}{1mW}$

Linear power: $\frac{P_{lin}}{mW} = 10^{\frac{P_{\log}}{10\,dBm}}$

General procedure for W-CDMA channel power settings (up- and down link)

1. RMS level setting (the RMS power is never influenced by the following procedure)

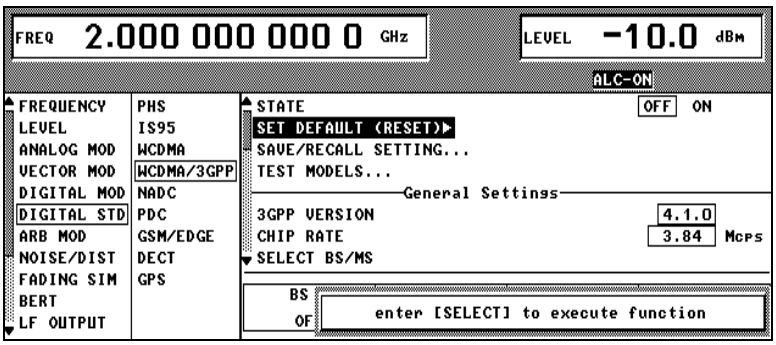
2. Relative power settings of a channel scenario

   - Input of $P_{Ch1;\,rel.}$: $X_{rel.}$ dB
   - Input of $P_{Ch2;\,rel.}$: $Y_{rel.}$ dB
   - • • • •
   - Input of $P_{ChN;\,rel.}$: $N_{rel.}$ dB

3. ADJUST TOTAL POWER leads to absolute power of each channel

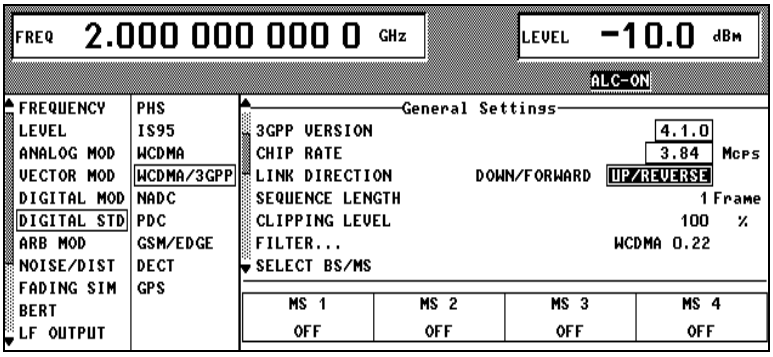
   - $P_{Ch1;\,abs.}$: RMS + $X_{abs.}$ dBm
   - $P_{Ch2;\,abs.}$: RMS + $Y_{abs.}$ dBm
   - • • • •
   - $P_{Ch1;\,abs.}$: RMS + $N_{abs.}$ dBm

1



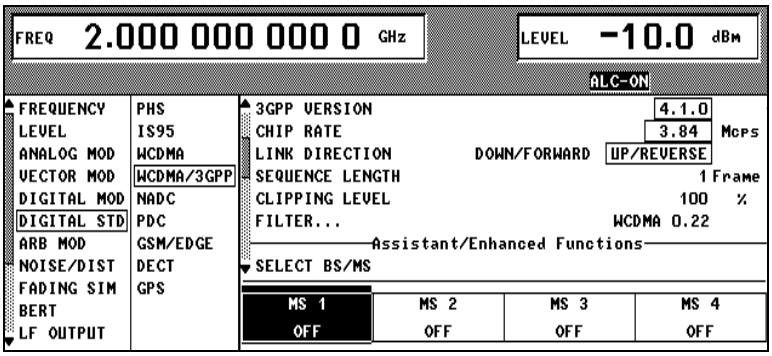
Start with SET DEFAULT (main menu)

2



To get later on the DPDCH and DPCCH scenario select link direction UP/REVERSE

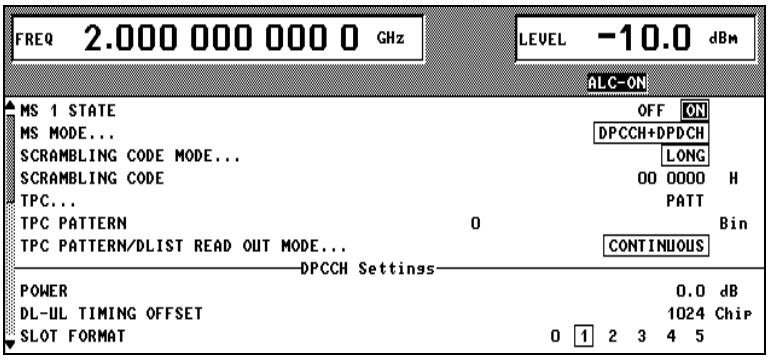
3



Select MS 1

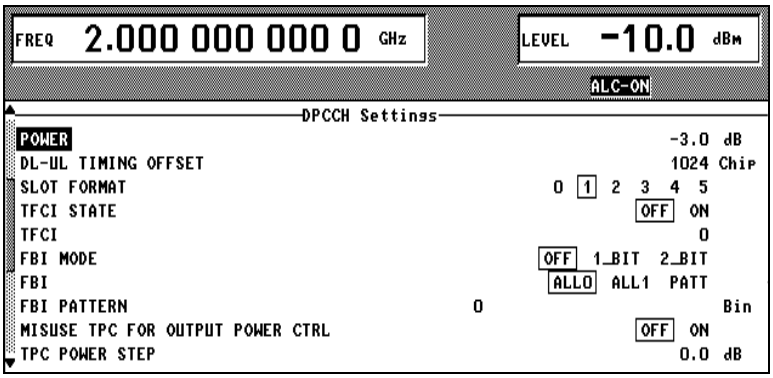
!!! The RMS power of –10dBm is never influenced by the following procedure !!!

4



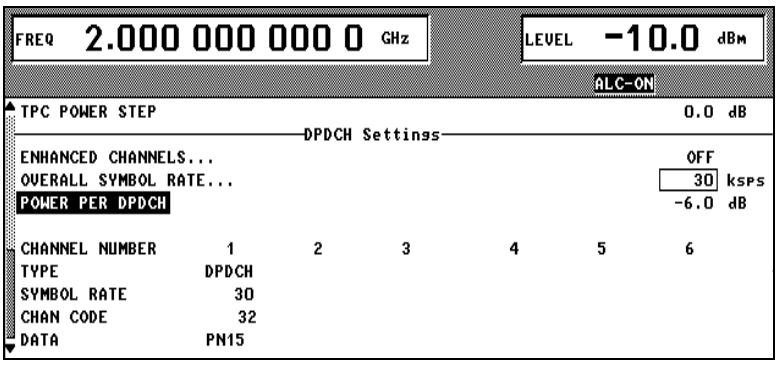
Switch MS 1 STATE on
MS MODE... : DPCCH + DPDCH (is automatically set by SET DEFAULT (RESET) in step 1)

5



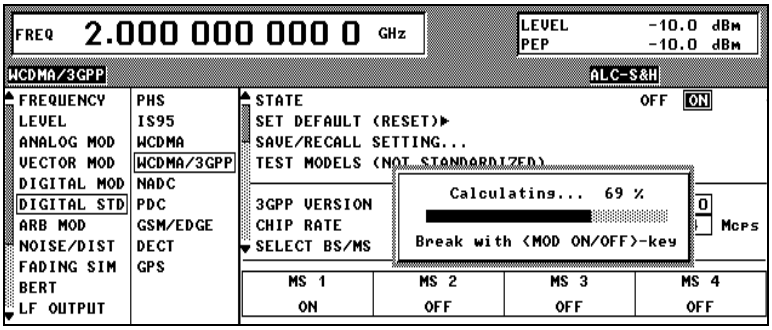
Example: The DPCCH channel should have doubled power of DPDCH
Adjust the DPCCH power to –3dB (in this menu plane the DPCCH as well as the DPDCH is calculated and stored by the SMIQB45; not enhanced !)

6



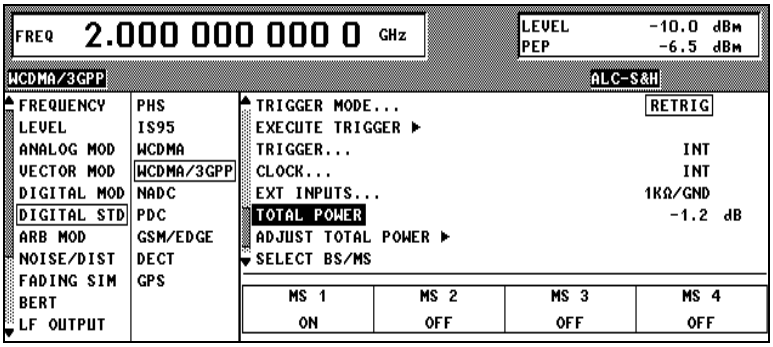
Make the power settings for the DPDCH on the left (-6dB). The power displays of DPCCH and DPDCH are relative ones.
Hint: it is automatically one DPDCH channel with a symbol rate of 30 ksps adjusted by pressing SET DEFAULT in step 1 and activating the UP/REVERSE link in step 2.

7



Start the calculation of this scenario by pressing STATE on.

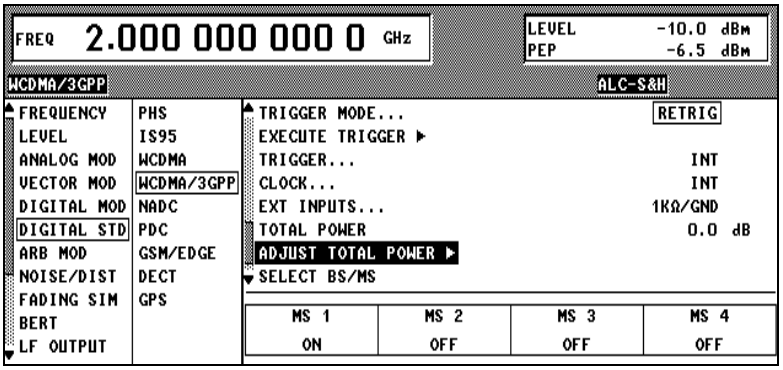
8



The TOTAL POWER of –1.2 dB is displayed.
Rel. power of DPCCH: -3.0 dB
⇨ $P_{DPCCH, lin} = 0.5$
Rel. power of DPCCH: -6.0 dB
⇨ $P_{DPDCH, lin} = 0.25$

⇨ $P_{TOTAL, lin} = 0.75$
⇨ $P_{TOTAL, log} = -1.2$ dB

9

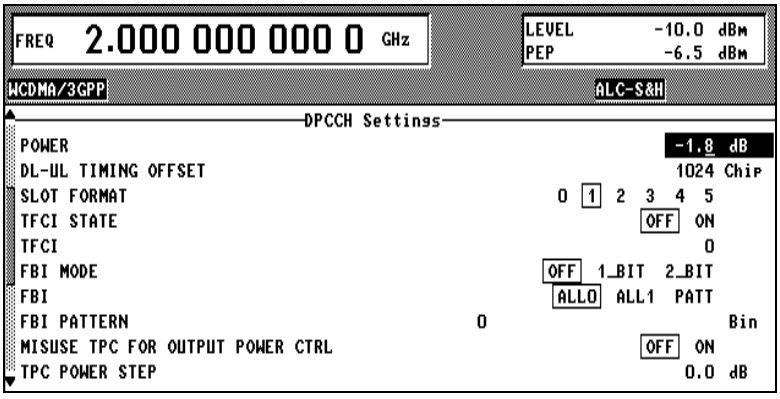


To make the evaluation of the absolute power of these two channels easier please press ADJUST TOTAL POWER

By pressing ADJUST TOTAL POWER the TOTAL POWER of this channel scenario is adjusted in a way that you get a TOTAL power of **0 dB (means $P_{TOTAL, lin} = 1$)**.

So the relative power of each active channel is increased by 1.2 dB.

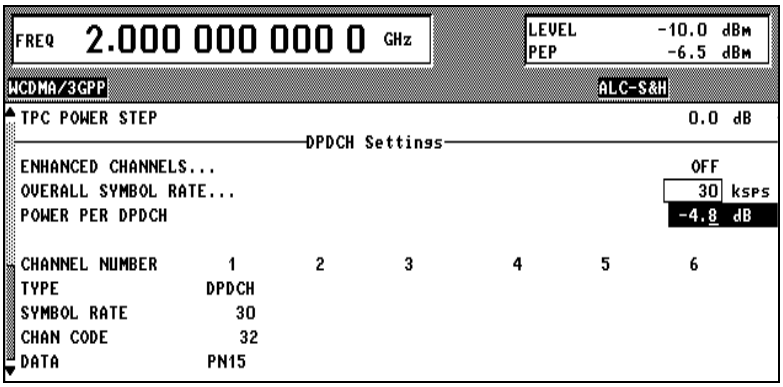
10



$P_{DPCCH, log}$ = - 3 dB + 1.2 dB
= - 1.8 dB

Abs. power of DPCCH:
-10 dBm – 1.8 dB = -11.8 dBm

11



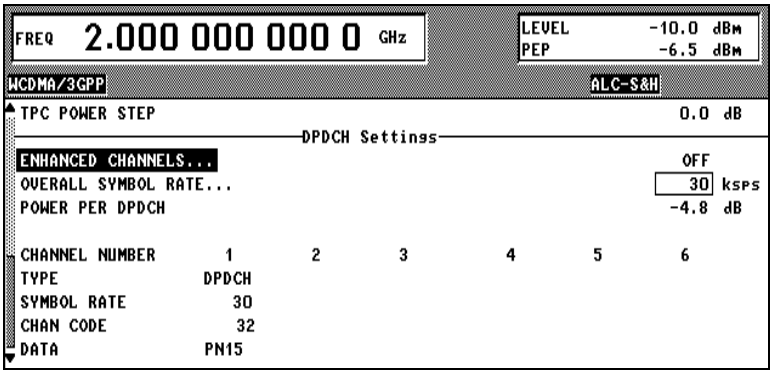
$P_{DPDCH, log}$ = - 6 dB + 1.2 dB
= - 4.8 dB

Abs. power of DPDCH:
- 10 dBm – 4.8 dB = - 14.8 dBm

Hint: The RF power of this scenario has never changed (-10 dBm).

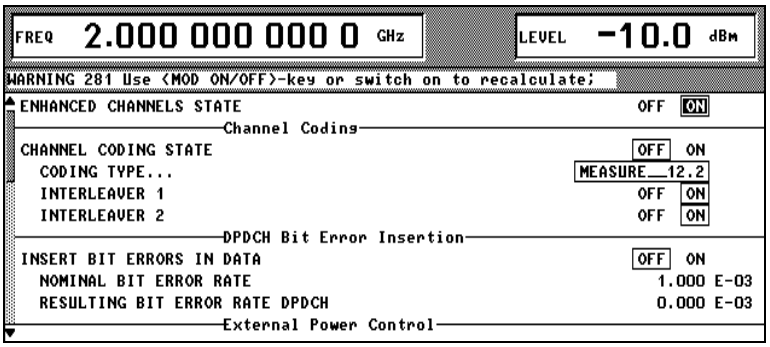
The complete scenario above is calculated and stored by the SMIQB45. For some special applications you need of course a increased sequence length (SMIQB45 maximum sequence length for W-CDMA: 13 frames; SMIQB48 up to 1022 frames, respectively 2044 frames) or more features like external power control, BER and BLER insertion. The SMIQB48 is the right choice, activated by the ENHANCED CHANNELS… mode.

12



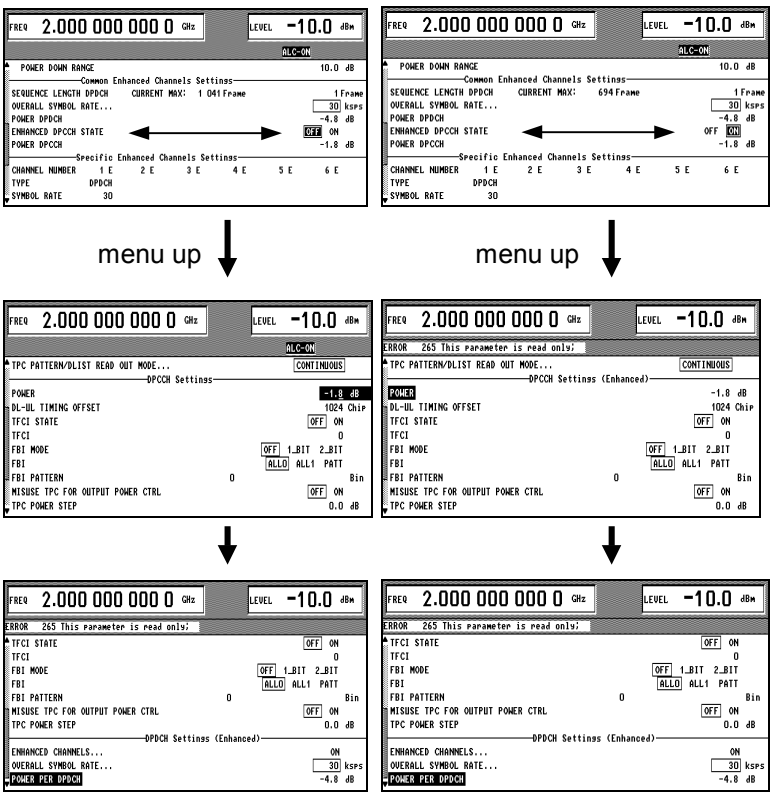
The settings of step 1 to 11 are not changed.
Scroll up and go into menu ENHANCED CHANNELS… and …

13



… switch it on (the W-CDMA signal generation is automatically switched off).

14

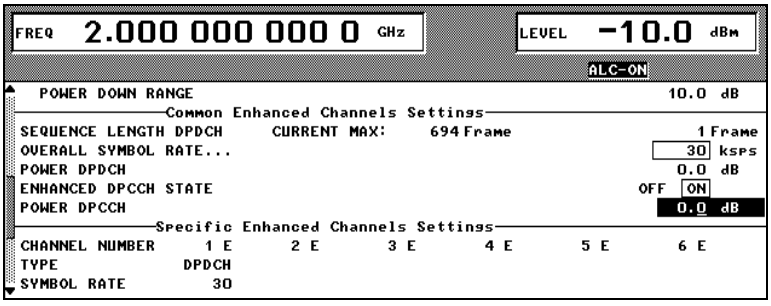


The most important setting in this menu is the ENHANCED DPCCH STATE (please have also a look into online help of SMIQ).

ENHANCED DPCCH STATE off:
The DPCCH is calculated and stored by the SMIQB45 to save memory for the DPDCH on the SMIQB48 (on the left side a max. SEQUENCE LENGTH DPDCH of 1041 frames is possible).
One menu up the DPCCH power parameter is freely adjustable (because it is calculated and stored on the SMIQB45) whereas the DPDCH power is a read only parameter (Access for power settings via ENHANCED CHANNELS…).

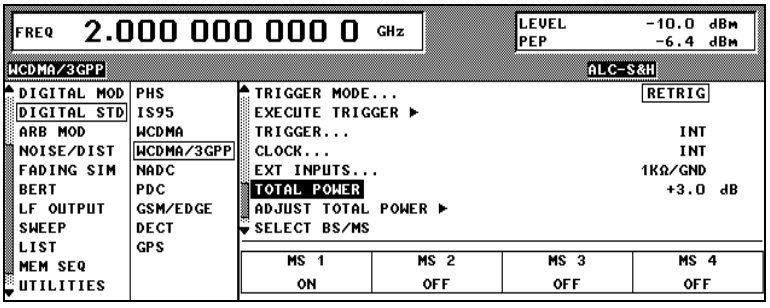
ENHANCED DPCCH STATE on:
The DPCCH as well as the DPDCH are calculated and stored by the SMIQB48 (the DPCCH and DPDCH is signed with (Enhanced)). On the right side a max. SEQUENCE LENGTH DPDCH of 694 frames is possible.
The DPCCH as well as the DPDCH are now in read only mode for the power parameter (Access for power settings via ENHANCED CHANNELS…).

15



The following power settings are not influenced by the ENHANCED DPCCH STATE “ON” or “OFF”:
Make the settings on the left for the DPDCH and DPCCH (0 dB) in enhanced mode (ENHANCED DPCCH STATE “ON”).

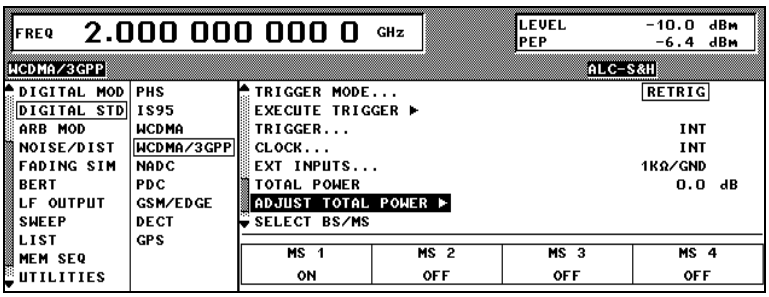
16



The TOTAL POWER of this scenario is now + 3dB after the calculation of this signal.
Rel. power of DPCCH: 0 dB
⇨ $P_{DPCCH, lin} = 1$
Rel. power of DPCCH: 0 dB
⇨ $P_{DPDCH, lin} = 1$

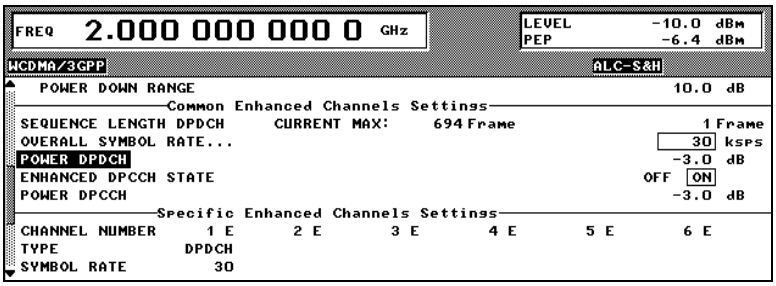
⇨ $P_{TOTAL, lin} = 2$
$P_{TOTAL, log} = +3$ dB

17



By pressing ADJUST TOTAL POWER the TOTAL POWER of this channel scenario is adjusted in this way so you get out a TOTAL power of 0 dB (before + 3dB now 0 dB !). So the relative power of each active channel is decreased by 3 dB.

18



$P_{DPCCH, log}$ = 0 dB - 3 dB
= - 3 dB

Abs. power of DPCCH:
-10 dBm – 3 dB = -13 dBm

$P_{DPDCH, log}$ = 0 dB - 3 dB
= - 3 dB

Abs. power of DPDCH:
- 10 dBm – 4.8 dB = - 13 dBm

Hint: The RF power of this scenario has never changed (-10 dBm).