Annex J (Channel spacing DSCAN - FSCAN)

The following text describes different aspects of the channel spacing at DSCAN and FSCAN.

With firmware release 1.60 it is possible to change the channel spacing behavior in the DSCAN by means of a remote-control-command and thus to increase the accuracy.

With the new firmware for reasons of compatibility the behavior of the channel spacing stays at first identical. It is however possible to put the unit into a state where the channel spacing behavior of DSCAN corresponds to that of FSCAN by means of the remote-control-command:

[SENSe]:FREQuency:DSCan:FCHannel ON.

The default state can be regained by command

SENSe]:FREQuency:DSCan:FCHannel OFF

or

**RST*

DSCAN principle

The DSCAN is not a faster FSCAN !

The determination of the level measurement values on the respective frequency is comparable with the procedure which is applied at spectrum analyzers. The synthesizer is incremented in very small frequency steps. The result is a quasi-continuously increasing frequency. Through the mixture of synthesizer frequency and receive frequency the IF filter glides over the receive spectrum.

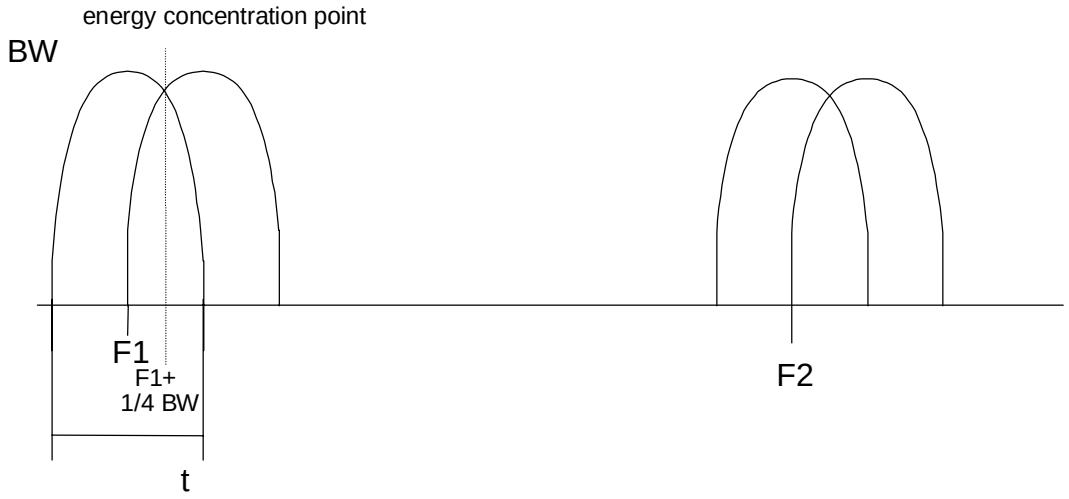
At discreet times the current energy is measured in the IF filter. The measurement takes place in the DSCAN each time a frequency range matching half the IF bandwidth was covered. From that the attainable frequency accuracy of the measurements in the DSCAN after correction of all dynamic factors is at best +/- 1/4 of the set IF bandwidth.

For a frequency allocation evaluation the FSCAN is more precise and therefore more eligible.

The channel spacing in the DSCAN refers always to the start frequency. Depending on channel spacing and start frequency the function MARKER TO PEAK supplies the frequency of the searched signal only with an accuracy of +/- 1/4 of the set IF bandwidth.

Depending on the respective transient response of the chosen IF bandwidth and dependent on the chosen DSCAN rate (LOW, NORMAL or HIGH) a receive signal represents itself in the displayed spectrum in different width.

With MTIME PER CHANNEL a step-by-step incrementing of the frequency as in the F-SCAN is used and not hardware-dependent sweep mechanism of the DSCAN. This makes it possible to measure the level at each channel with a defined measuring time.



Previous state (DSCAN)

(up to firmware release 1.54).

The SWEEP with the IF filter "BW", begins at start frequency F1 and ends at stop frequency F2.

The level measurement value of the first channel is determined at the time t_{mess} at which the receive frequency has reached

$$F1+\frac{1}{2}BW$$

Thus the energy which was received within the frequency range

$$F1-\frac{1}{2}BW$$

up to the frequency

$$F1+BW$$

is evaluated.

Arithmetically this level measurement value is to be assigned to the middle of this frequency range with the width 3/2 BW and thereby it lies at frequency F1 + 1/4 BW. This systematical inaccuracy is compensated in the new firmware by a sweep start with a frequency offset down by 1/4 BW.

Remote

The frequency of the first output channel equals the start frequency F1.

The corresponding measured value is determined at F1+1/4BW.

The number of the channels within is derived by formula:

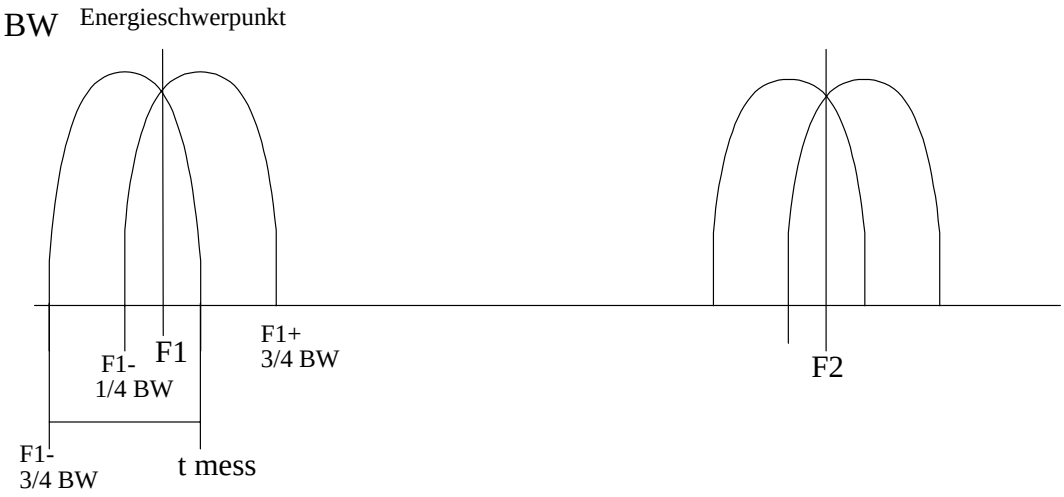
$$n = \frac{2 \bullet (F2 - F1)}{BW}$$

If F2 is not positioned on a channel boundary, one more channel is measured.

New state (DSCAN)

(from firmware version 1.60)

The SWEEP with the IF filter "BW" begins at the start frequency F1-1/4BW and ends at the stop frequency F2+1/4BW.



The level measurement value of the first channel is determined at the time t_{mess} at which the receive frequency

$$F1 + \frac{1}{4} BW$$

is reached.

Thus the energy which was received in the frequency range

$$F1-\frac{3}{4}BW$$

up to the frequency

$$F1+\frac{3}{4}BW$$

is evaluated

Arithmetically this level measurement value is to be assigned to the middle of this frequency range with the width 3/2 BW and thereby it lies at frequency F1.

Remote

The frequency of the first output channel equals the start frequency F1.

The corresponding measured value is determined also at F1.

The number of the channels within is derived by formula:

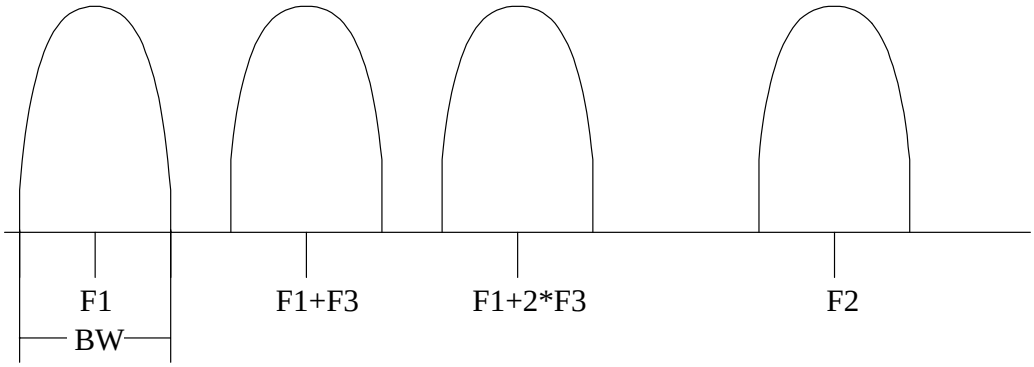
$$n=\frac{2\bullet(F2-F1)}{BW}+1$$

If F2 is not positioned on a channel boundary, one more channel is **not** measured.

If the DSCAN datagram was outpur via UDP, the minor_version_number 0x24 points out thatthe OptionalHeader includes the additional flag newStepScheme. This flag shows whether the old one or the new channel spacing was chosen.

FSCAN principle

Unlike the DSCAN, with FSCAN the unit is statically tuned onto the respective channel center frequency, and when the settling time has elapsed the energy in the IF filter BW is measured . The accuracy of the allocation of the measurements to a fixed channel spacing corresponds to the set step width and the set IF bandwidth.



In the FSCAN the first measurement occurs exactly on the start frequency.

The next measurements occur at the frequencies Fn (F3 = step frequency) :

$$Fn = F1 + n \bullet F3$$

Remote

The frequency of the first output channel equals the start frequency F1.

The corresponding measured value is determined also at F1.

The number of the channels within is derived by formula:

$$n = \frac{(F2 - F1)}{F3} + 1$$

If F2 is not positioned on a channel boundary, one more channel is **not** measured.