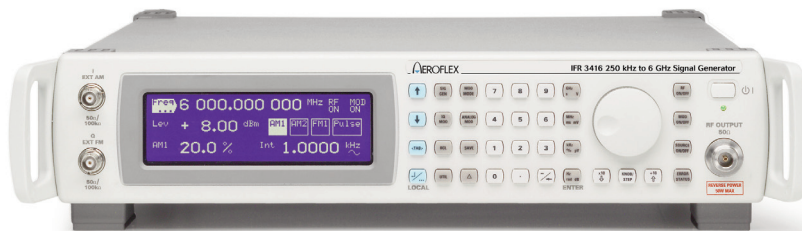


# Technical Note



## Enhanced ACP (EACP) RF Mode for 3410 Series



This document shows the gains in performance possible with the use of Enhanced ACP RF Mode using different types of waveforms to clearly show the effects on performance under different conditions. Also included is a summary of the effect on certain parameters which need to be considered when using this mode.

Even high performance instruments will experience small variations in their performance of critical parameters from instrument to instrument. When the user is searching for the last dB or so of dynamic range, be it for the best intermodulation products or ACP performance, any gains can be desirable.

EACP mode can further improve the ACP and intermodulation performance of the 3410 by providing an alternative mode of operation which increases the headroom in the output amplifier circuitry by removing 6 dB of output attenuation, thus driving the output amplifier at lower levels. This new RF mode has been added to the RF Mode selection menu as shown below:



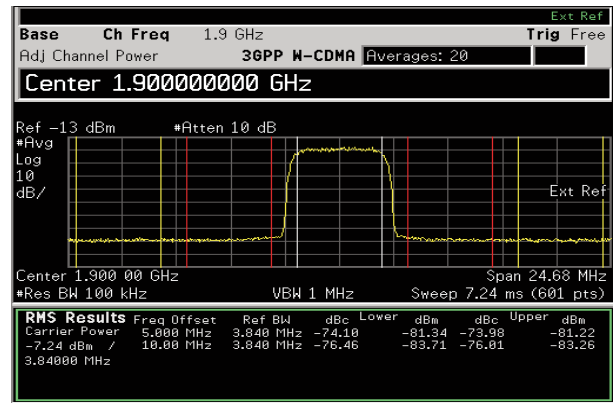
EACP mode is never selected automatically i.e. as part of AUTO RF mode.

EACP mode is supported remotely using the following IEEE488.2 GPIB command:

ISOURcel:POWer:OPTimisation EACP

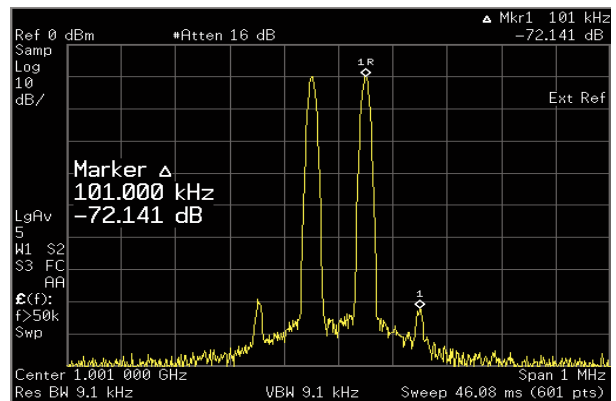
Example: SOLUR:POW:OPT EACP

Improvements when using this mode will vary from instrument to instrument, depending on the fundamental levels of performance in each instrument. However, tests have shown ACP improvements of up to 2 dB on a 3GPP\_Test Model1\_64Ch waveform e.g.

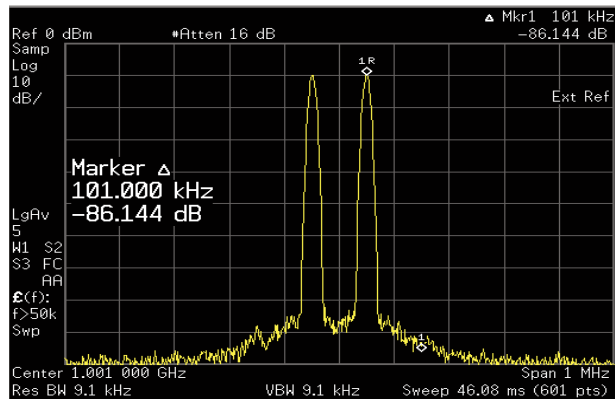


EACP mode

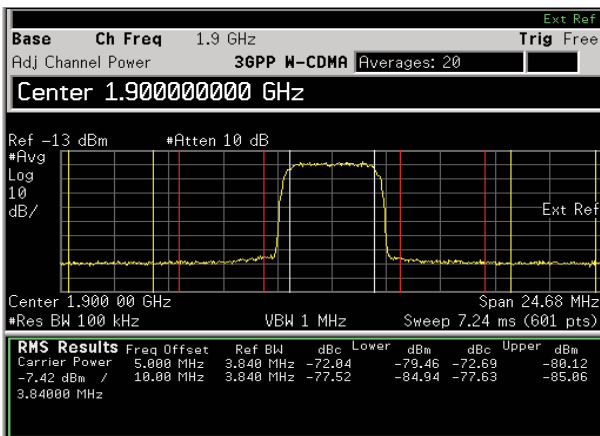
In excess of 10 dB improvement in 2-tone intermodulation products can be seen when generating a 2-tone waveform, depending on tone spacing and carrier frequency.



ACP mode

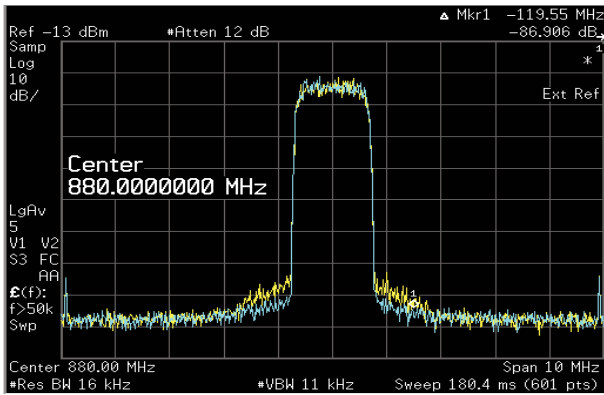


EACP mode



ACP mode

The next example shows the improvement made to an IS-95 signal – the EACP mode is the blue trace.



The fact that 6 dB of output attenuation is removed means that this new mode should only be invoked at RF levels below -6 dBm. The following table shows how EACP mode relates to the other RF modes with respect to RF level versus key performance characteristics.

Mode	Auto Level (dBm) CW/AM/FM		Auto Level (dBm) IQ		Manual Level (dBm)		Floor Noise @ >5 MHz Offset (dBc/Hz)	Linearity	Maximum Crest Factor (dB)
	Max	Min	Max	Min	Max	Min			
Power	+16	10.01	n/a	n/a	+16***	-128	<-142 typically -148	No requirement	3
Noise	+10	-134	+10	+0.01	+10***	-134	<-142 typically -148	Meets AM specs.	9
ACP	-134.01	-140	0	-140	0	-140	<-140	Meets 3GPP and TETRA ACPR spec.	15**
EACP	n/a	n/a	n/a	n/a	-6	-140	typically <-140	Meets 3GPP and TETRA ACPR spec.	15**

(For carrier frequencies between 10 and 3000 MHz; principle applies throughout frequency range)

Other notable considerations when using EACP mode:

- The published specification on the data sheet is not affected.
- RF level accuracy is typically as per AUTO mode.
- Repeatability and linearity may not be as per AUTO mode.
- Temperature stability is not warranted.
- Noise floor may be slightly degraded depending on RF level.
- Pulse modulator video breakthrough - RF levels are 6 dB lower.

All other specifications where reference is made to ACP mode apply to EACP mode.

EACP RF Mode was introduced in issue 4.11 firmware which is present in all instruments from serial number 341006/563.

This feature can be retrofitted to any 3410 by just upgrading the firmware. Please contact your nearest Aeroflex office or distributor for more information.

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