



White Paper #7

Compression measurements on EMC amplifiers:



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EMC immunity testing

When performing EMC immunity tests, the linearity of the used RF power amplifier must be checked at all applicable test frequencies. The verification shall be performed as follows:

Determine the power required to generate the desired test level, INCLUDING modulation. For example:

Test level : 10 V/m
Modulation : 80% AM, 1 kHz

Required field strength including modulation : 18 V/m.

The required power at a specific frequency is determined by the calibration file that was measured during the n-point homogeneity calibration (in the example above, the power to generate 18 V/m in the homogeneous plane).

Then carry out the following check for all frequency points:

1. Set the signal generator level so that the amplifier supplies the required output power.
2. Then lower the signal generator level by 5,1 dB.
3. Check that the amplifier's output power decreases by at least 3,1 dB. If the power decreases by less than 3.1 dB, then the amplifier was too far in compression and the amplifier does not meet the compression requirements.

With the above described test it will be checked for each frequency point whether the amplifier exhibits less than 2 dB compression, measured from the required (maximum) power for the desired test level (including modulation), over an amplitude range of 5,1 dB.

For comparison, a 1 dB compression point test measures the point at which the gain (gain) of the amplifier has decreased by 1 dB. The "small signal gain" of the amplifier is taken as a starting point (typical 20 dB under full power) and it is measured at which output power the gain has decreased by 1 dB. This measurement is therefore performed over a much larger amplitude range, so that compression is achieved earlier.

The 1 dB method is mainly used in the telecom market, where linearity over a large amplitude range is important.

This is in contrast to EMC testing, where the only relevant point is how the amplifier behaves around the power point where the amplifier is applied, with the aim of ensuring that the AM modulation is not distorted too much.

The 1 dB compression point therefore provides too strict a requirement for EMC measurements.



Depending on the amplifier technology used, an amplifier will exhibit a “soft” or a “hard” compression behavior. In the first case, the amplifier will deliver a lot of extra “usable” power above the 1 dB compression point, while amplifiers with a “hard” compression behavior often lock just above the 1 dB compression point.

Especially amplifiers with GaN transistors show a soft compression behavior. The advantage of this relatively new transistor technology is the longer life and higher efficiency compared to Silicon and GaAs based amplifiers.

The RadiMation software has the necessary test routines to check whether the amplifier meets the linearity requirements of the EMC Directive. For further information on this, check the link below.

[RadiMation Link](#)



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