



Maximum output level in Single Channel Amplifiers

The output level (measured in dB μ V) of an active element is defined as the sum of the signal input level (also measured in dB μ V) and the gain (dB). Should this output level exceed the specified maximum, a phenomena know as "intermodulation" is observed, lowering the output signal quality. Whilst intermodulation is never completely eliminated from TV signals, it's effects are unperceivable below the amplifier's max output level.

Single Channel Amplifiers :

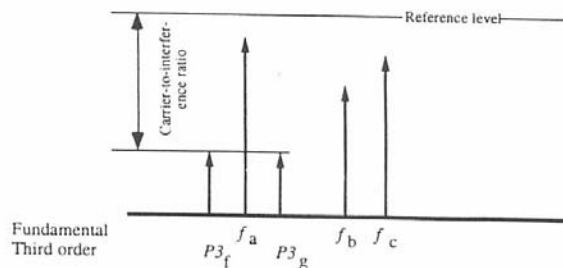
The Single Channel Amplifiers maximum output level, is measured according the EN-50083-5 4.1, equivalent to the previous DIN45004K.

EUROPEAN STANDARD

EN 50083-5

Table 1: Test signal levels in decibels relative to reference level

System		B, G, H, I	L
		Test signal	
Vision carrier	(f_a)	-8	0
Colour subcarrier	(f_b)	-17	0
Sound carrier	(f_c)	-10	0



When the amplifiers are to be used with; PAL B,G,H,I system, this standard describes the method of measurement using three test carriers (vision @ -8 dB, colour @ -17 dB, and sound @ -11 dB). The maximum output level specified in this catalog, is measured when the distance to the generated intermodulation is 54dB, corresponding to grade 2 and grade 3 Head-Ends. When the Head-End is grade 1, the maximum permitted intermodulation is @ -66dBc. For grade 1 amplifiers (intermodulation 66dB) the specified level should be reduced by 12 dB.

Head End Grade PAL B,G,H,I	GRADE 1	GRADE 2	GRADE 3
Specified reduction	-12 dB	0 dB	0 dB

As described in the EN standard, if using a single channel amplifier for SECAM L signals, measurements should be taken using three carriers of the same level. This therefore requires a signal reduction of 11dB for grade 3 head ends (intermodulation at -42dB) and 15dB for grade 1 or grade 2 head ends (intermodulation at -48dB)

Head End Grade SECAM L	GRADE 1	GRADE 2	GRADE 3
Specified reduction	-15 dB	-15 dB	-11 dB



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When the single channel amplifier, is to be used with digital terrestrial television, the previous measurement method, DTT signal is less sensitive to intermodulation, and the number of carriers are much more than in analogue television. Since DTT signals have none of the three carrier measurement methods provide any significant information to the quality of the amplified signal, because we are facing a signal with 6.818 carriers (8K system) or 1.706 carriers (2 K system).

The maximum output level of single channel amplifier, when used to amplify DTT is specified in this catalog, by using the ETR290 method recommended by the "European Telecommunications Standards Institute".

The ETR290 method consists in injecting into the amplifier (a real Digital terrestrial television signal). When the output level is far significantly lower than the maximum output level, a signal that fully occupies it channels but that does not go out of its boundaries is shown on the spectrum analyzer screen.

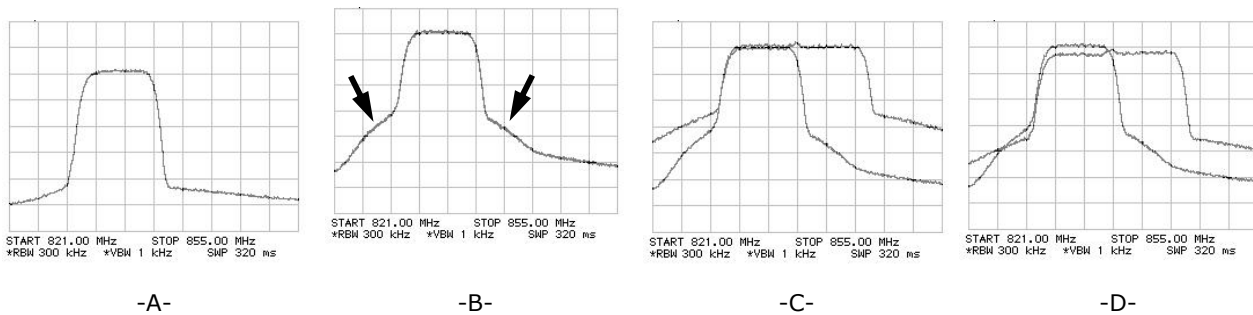


Figure -A- Shows a DTT channel without apparent intermodulation.

Figure -B- Shows the same channel, but as the output level is higher, the intermodulation appears on the neighbour channels ("shoulders" marked with the arrows).

These shoulders are the intermodulation products of thousands of carriers inside the DTT channel. Although not seen, the intermodulation factors of each channel distort the signal and degrade its quality.

The IRCO single channel amplifiers, are specified for a maximum output level where the distance to the shoulders is 30 dB, sufficient for problem free DTT signal distribution.

Nevertheless it is necessary to bear in mind that shoulders; are themselves an interfering signal (noise) for the neighbouring channels. If the neighbour channel is analogue, then the signal to noise ratio is degraded. To avoid analogue channel degradation the output level should be adjusted to ensure that the distance between the level of analogue channel and shoulders is at least 46 dB.

In such cases it always good practice to adjust the digital channels level at **least 8 dB lower than the analogue channels.**

Remember to measure the digital channel selecting the digital mode measurement on your instrument. If you field strength meter does not include this function conversion of analogue measurement into digital, the meter bandwidth is required.

$$\text{Correction to be applied : } 10 \cdot \log(\text{Meter Bandwidth} / 7.62)$$

Figure -C- shows a comparison the intermodulation, increase produced in an amplifier when it is used to amplify one and two channels. A significant increase a shoulder size and height.

Figure -D- illustrates the importance of a 3dB reduction in signal level when injecting a second digital channel into a multi-channel amplifier in order to maintain the same shoulder height. For a third channel or fourth channel, signal levels should be reduced by 5dB and 6dB respectively.