



When is a signal good enough ??

Here at Maxpeak we often get asked the question, what typical readings shall I have ? Is it 40 dBuV ? SNR of 15 dB ? MER of 14 dB or preBER Of $1 \times E-6$?

Well the answer is NONE. There is no universal way to say a typical value is good enough.

The MOST important thing to remember is that the meter cannot improve the signal, but it enables you to achieve the best result. The simple answer is to carefully peak the signal to the maximum. It's as simple as this.

Let's look at the complex issues of digital signals and the various means of measurement there is. E.g. typical values for RF-level, BER (PER) SNR, MER.

In addition to these readings other factors like constellation and compression (MPEG 2 / MPEG4) and for satellite what type of polarity e.g. liner or circular also has an important effect for clear and trouble free reception.

The various types of signals e.g. Cable, Satellite and Terrestrial are all different so we will look at them in turn.

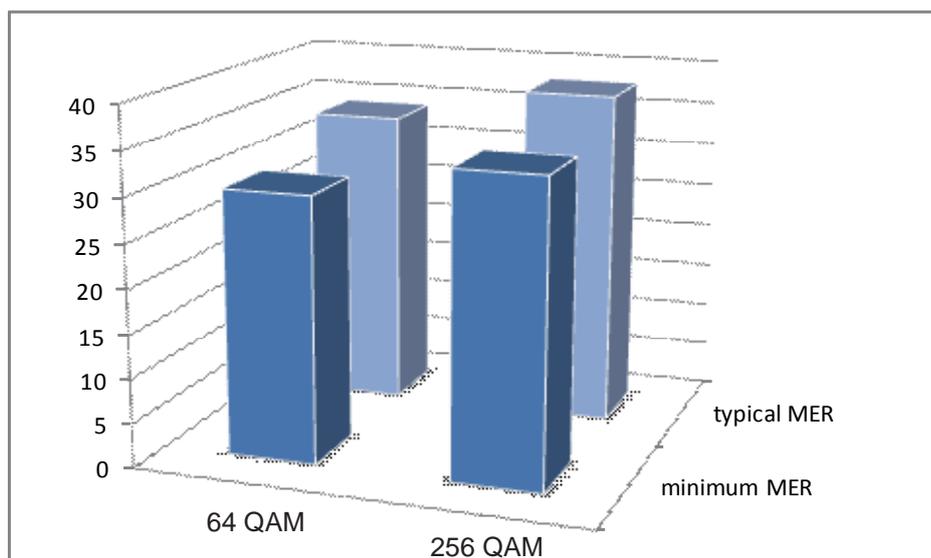
CABLE DVB-C

In cable systems, the actual signal is not travelling over the air like in Terrestrial and Satellite signals. This avoids a lot of trouble with interference in the signal. However factors like noise both in cable and amplifiers, together with interconnections play a role over the actual quality achieved.

The actual demodulation scheme e.g., what QAM mode is being used to multiplex the signal affects the quality as well. The higher QAM used makes the signal suspect to more interference.

Always make sure the maximum readings are achieved. The following readings can be used as a guide.

	Minimum value	Typical value
RF level	40 dBuV / 67 dBm	50 dBuV / 57 dBm
Noise margin	6 dB	9 dB
pre BER	1 E-6	1 E-8
MER (64QAM)	30 dB	34 dB
MER (256 QAM)	34 dB	38 dB





SATELLITE DVB-S, DVB-S2

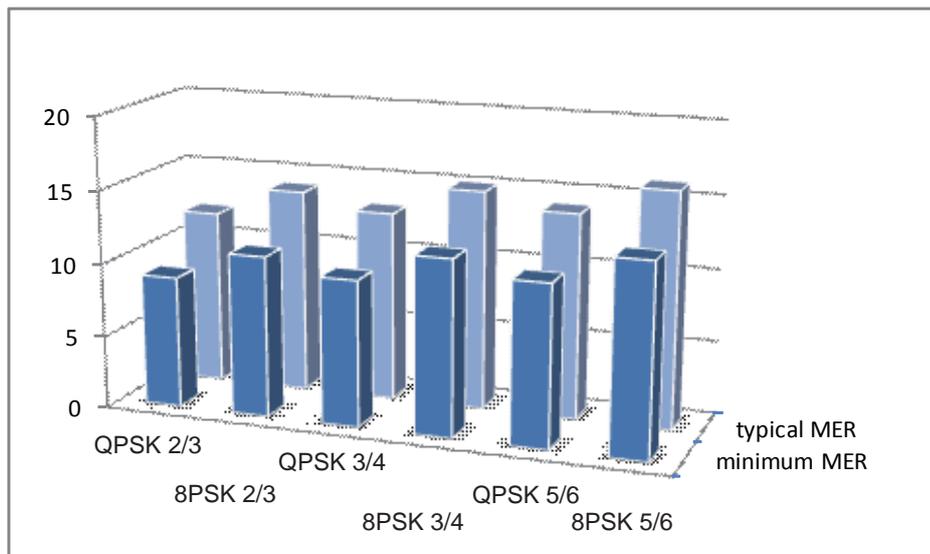
In satellite systems, the actual signal is travelling an extremely long way in space like microwaves. These tiny signals are converted into RF signals in the LNB. There is a very large amount of interference on these weak signals. Luckily there is little phase noise so MER readings are more or less the same as CNR.

Thanks to the clever FEC arrangement the signals are quite robust.

The actual demodulation scheme e.g., QPSK for DVB-S2 and 8PSK for DVB-S2 comes in play. An even bigger factor is the FEC rate e.g. the rate of error correction v signal. The lower rate e.g. 1/2 gives the most forgiving signals e.g. more robust. Whilst the higher 7/8 gives the most sensitive e.g. weak signals.

In addition symbol rate has an effect as well as that circular polarization is more forgiving than liner. MPEG2 v MPEG4 encryption also plays a factor.

	Minimum value	Typical value
RF level	40 dBuV / 67 dBm	50 dBuV / 57 dBm
Noise margin	3 dB	6 dB
pre BER	1 E-6	1 E-8
MER (DVB-S 2/3 FEC)	9 dB	12 dB
MER (DVB-S2 2/3 FEC)	11 dB	14 dB
MER (DVB-S 3/4 FEC)	10 dB	13 dB
MER (DVB-S2 3/4 FEC)	12 dB	15 dB
MER (DVB-S 5/6 FEC)	11 dB	14 dB



TERRESTRIAL DVB-T

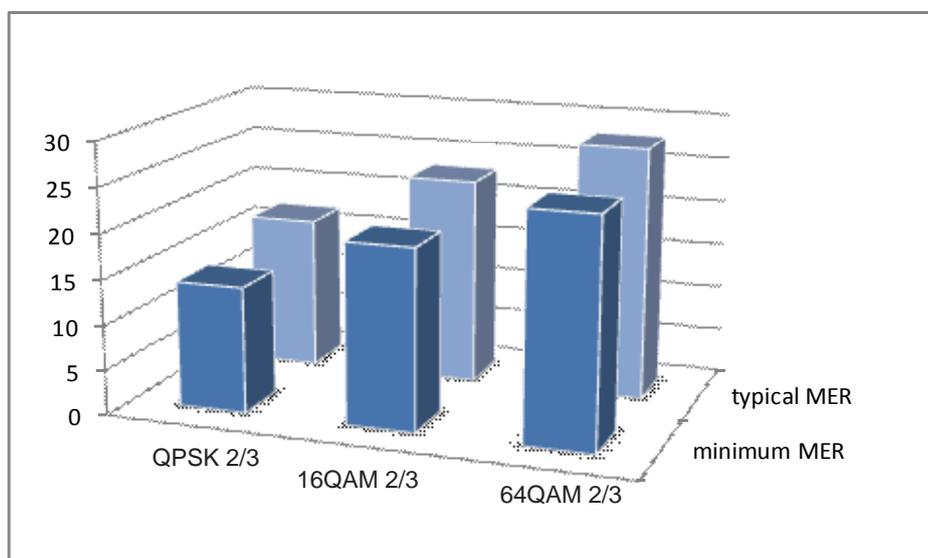
In terrestrial systems, the actual signal is travelling over the air and is prone to airborne interference. These small signals are then picked up by an aerial (off air antenna) and possibly an amplifier. There is a large amount of interference on these weak signals.

Thanks to the clever FEC arrangement the signals are quite robust.

The actual demodulation scheme e.g., QPSK or QAM comes in play. In addition if it's a 2 K (short mode) or 8 K (long mode) together with the FEC rate has an effect as well.

MPEG2 v MPEG4 encryption also plays a factor.

	Minimum value	Typical value
RF level	40 dBuV / 67 dBm	50 dBuV / 57 dBm
Noise margin	6 dB	9 dB
pre BER	1 E-6	1 E-8
MER (QPSK 2/3 FEC)	14 dB	17 dB
MER (16 QAM 2/3 FEC)	20 dB	23 dB



CONCLUSION

There are an awful lot of different readings to remember, not to mention if you are fortunate to know what's in the signal e.g. demodulation scheme and all other digital factors like FEC etc.

So remember the simple rule, the test equipment can't improve a bad signal, but it enables you to get the best of the signal, simply by adjusting to the maximum.

In Maxpeak's product we have a very effective way of simplifying this jungle of names and readings. We have our own quality reading i.e. Q. Not to be confused with such readings on other instruments or in the STB / IDU. Behind the scene inside the meter we have various look up tables to simply display in percentage quality. No need to know what the signal is as the meter already knows this. In simple terms 15 % is the threshold point. Below is no picture, or problematic picture with pixilation etc. Above is a perfect picture, but remember not to stop here. You need to get the maximum of Q. This simple way of measuring is the same for cable, terrestrial or satellite signals.