EMSCAN Technical Support
Email: support@emscan.com
Toll Free (NA): +1-877 367 2261
International: +1-403 291 0313 x2

TECHNICAL BULLETIN # 15 March 15, 2014

To: All EMxpert End-Users

Re: EMxpert Sensitivity Test

Abstract

This report gives an analysis of the lowest level of emission that the EMxpert EMX and EHX models are able to detect. Tests show that the EMxpert EMX scanner can detect emissions from a microstrip trace with a power as low as -135 dBm and the EMxpert EHX scanner as low as -130 dBm in the best setup conditions with the highest performance spectrum analyzer available.

Details

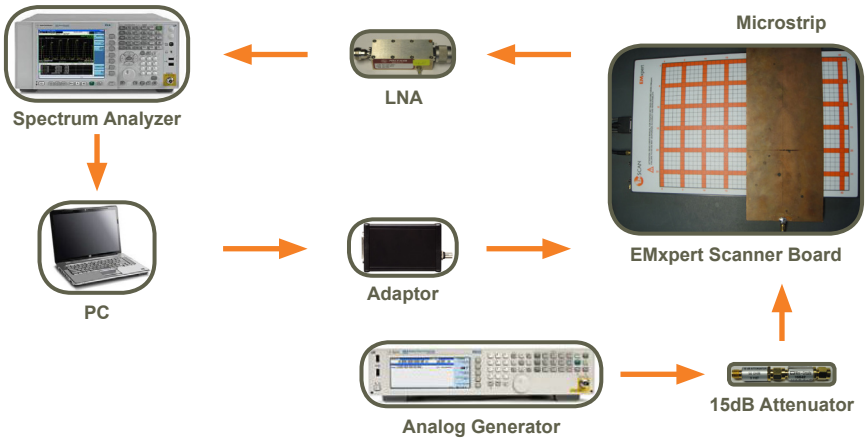
1. Equipment used for the test:
   - EMxpert EMX:
     - EMxpert EMX scanner version EMX-0225115-1218
     - EMxpert software version 4.3.0 and firmware version 5.1.12
   - EMxpert EHX:
     - EMxpert EHX scanner version EHX-0830131-1378
     - EMxpert software version 4.4.0 and firmware version 5.1.37
   - 50 Ohm terminated microstrip line
   - Spectrum analyzer PXA N9030A software revision A-08-03 from Agilent
   - Miteq LNA 782 from 50 kHz to 2.5 GHz
   - Miteq LNA 1390080 from 2.6 GHz to 4 GHz
   - Miteq Power amplifier 38 dB gain, NF 5 dB
   - Analog signal generator N5181A MXG from Agilent
   - Attenuator 15 dB from Microchips

Test Setup

A 50 Ohm terminated microstrip line is placed strip down directly on the scanner surface. The input of the microstrip line is fed from a signal generator. The power into the microstrip line is started with a fairly high power level and reduced in small steps. As long as the emissions from the microstrip line can be discerned by a human operator the EMxpert is determined to be within its operating range. Once the microstrip is no longer discernible, the limit of the EMxpert sensitivity at a certain frequency is reached.

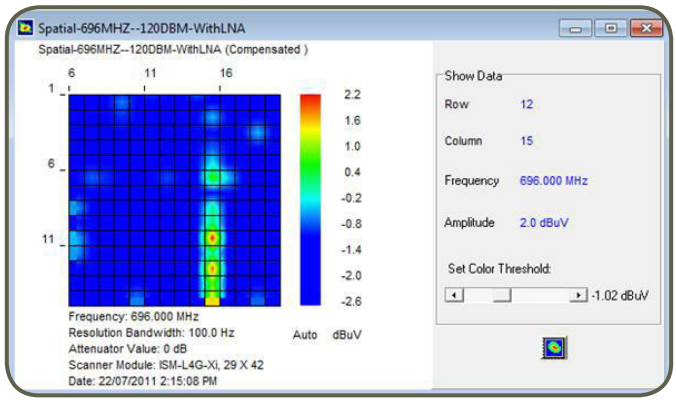
The LNAs listed were set at 40 dB across all frequencies and the RBW of the PXA was set to 100 Hz.

The power amplifier listed was set at 38 dB across all frequencies and the RBW of the PXA was set to 100 Hz.



Results

The following result shows a marginal result where the entire microstrip line is no longer discernible. This would then be the limit of the sensitivity even though emissions from some of the line can still be seen.



A summary of the minimum sensitivity across the working frequency range of the EMxpert EMX is shown below. The best sensitivity is between 300 MHz and 3000 MHz where emissions lower than -105 dBm can easily be seen.

Frequency (MHz)	0.05	1	300	696	1500	2000	2600	3000	3500	4000
Sensitivity	-3	-50	-100	-108	-107	-100	-95	-85	-85	-80
Sensitivity with 40 dB LNA	-20	-60	-135	-120	-135	-115	-115	-105	-100	-90

A summary of the minimum sensitivity across the working frequency range of the EMxpert EHX is shown below. The best sensitivity is between 696 MHz and 3500 MHz where emissions lower than -95 dBm can easily be seen.

Frequency (MHz)	0.15	0.5	1	300	696	1500	2000	2600	3000	3500
Sensitivity	0	-15	-25	-68	-75	-79	-83	-85	-85	-86
Sensitivity with 40 dB LNA	-10	-25	-45	-90	-95	-100	-100	-130	-95	-100

Frequency (MHz)	4000	4500	5000	5500	6000	6500	7000	7500	8000
Sensitivity	-78	-68	-70	-75	-70	-65	-70	-60	-60
Sensitivity with 38 dB Power Amp.	-91	-85	-90	-88	-85	-90	-85	-70	-63