

UNDERSTANDING PRESELECTION IN EMI RECEIVERS

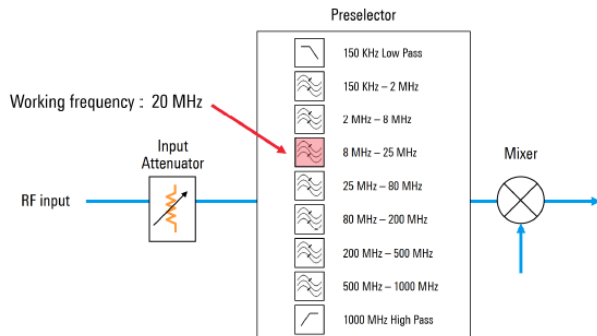
Preselection is the most effective means of ensuring accurate and reliable results during electromagnetic interference (EMI) testing.

R&S®ESW44 EMI Test Receiver



Your task

EMI test receivers are intended to characterize unknown signals, that is, signals that the user is neither intentionally generating nor can control. Failure to protect the mixer in a spectrum-measuring instrument can easily lead to inaccurate measurement results. The most effective solution to this problem is preselection, which is typically implemented as a switchable filter bank.



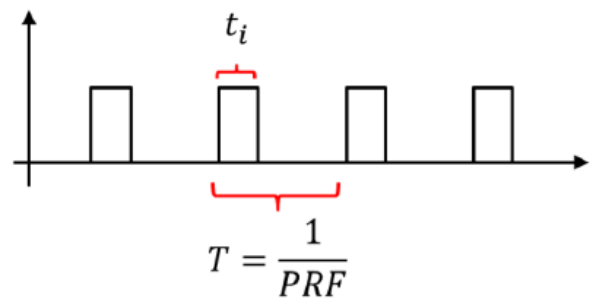
T & M solution

Most of the problems involved in accurately detecting and quantifying spurious or unwanted emissions in EMI testing are related to the unpredictable and/or rapidly changing level of the measured signal(s). Controlling the level of signals presented to our instrument, or more precisely, to the first mixer in our instrument, is critically important for all types of EMI testing.

Given that we do not have control over, or potentially even knowledge of, the signals that may be appearing at the receiver input, preselection is a necessity for these applications because it reduces the risk of overload and increases the instrument's dynamic range.

Preselection in an EMI receiver normally cannot be switched off, and part of the reason for this is that preselection is necessary to make the receiver – or “measurement apparatus” - comply with various EMI standards, such as CISPR 16-1-1.

One of the tests required for CISPR compliance is testing with pulsed signals. These tests are conducted with different pulse repetition frequencies, or PRFs.



Application Card
Version 01.00

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The measurement apparatus must be able to accurately measure these pulses using a quasipeak detector.

EMI Receiver with Preselection Enabled/Disabled

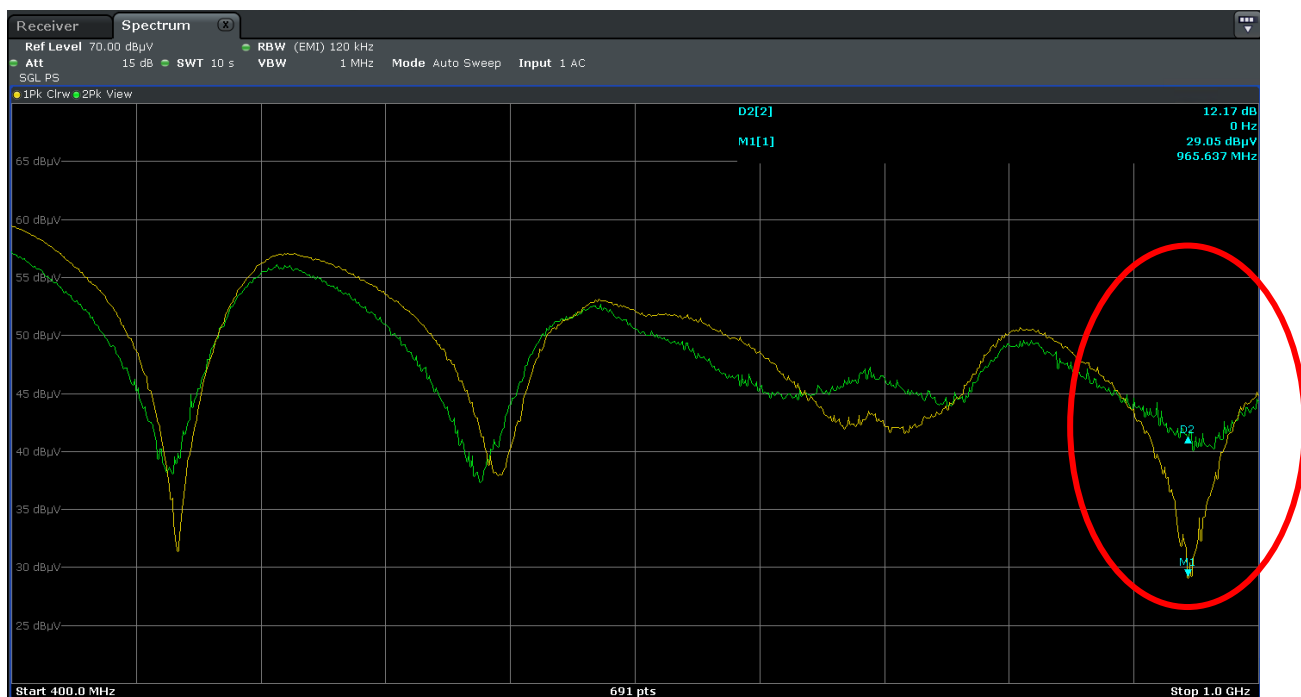
As shown in the figure below, an EMI test receiver is measuring from 400MHz to 1GHz, and two traces are recorded as described below:

- Green trace: Preselection disabled
- Yellow trace: Preselection enabled

By comparing the yellow trace to the green trace, the receiver shows differences in amplitude up to 12dB without changing anything at the input except for whether preselection was on or off.

How is preselection different in a spectrum analyzer?

Traditional swept-tuned spectrum analyzers are primarily used to make measurements of known signals. In other words, users characterize signals that are intentionally generated. The user of a spectrum analyzer typically controls all of the signals that are present in the measurement setup, so there is little or no need for preselection. Thus, most spectrum analyzers do not have the type of preselector that is used with an EMI test receiver. When preselection is available on a spectrum analyzer, it can usually be switched on and off by the user.



Ordering information

Pre-compliance receivers (preselection optional)

ESRP3	EMI Test Receiver, 9kHz – 3.6GHz	1316.4500.03
ESRP7	EMI Test Receiver, 9kHz – 7GHz	1316.4500.07
ESRP-B2	Preselection and RF Preamplifier	1316.4700.02

Full-compliance receivers (preselection standard)

ESR3	EMI Test Receiver (10Hz) 9kHz – 3.6GHz	1316.3003.03
ESR7	EMI Test Receiver (10Hz) 9kHz – 7GHz	1316.3003.07
ESR26	EMI Test Receiver (10Hz) 9kHz – 26.5GHz	1316.3003.26
ESW8	EMI Test Receiver 1Hz – 8GHz	1328.4100.08
ESW26	EMI Test Receiver 1Hz – 26.5GHz	1328.4100.26
ESW44	EMI Test Receiver 1Hz – 44GHz	1328.4100.44

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