Generation and Measurement of signals using Function Generator and Spectrum Analyzer

Step-By-Step Application Guide

Products:

- R&S® HMF 2550
- R&S® HMS-X

The purpose of this document is to allow participant to practice and navigate some of the key features of R&S®HMS-X spectrum Analyzer and R&S®HMF2550 Arbitrary Generator. By completing the exercise, user should learn how to demo some of the key feature of both the equipment and explains some of the concepts and settings. The document is separated into two part, with the first part explaining the main controls of each instrument. The second part of the document contains the lab exercise with the R&S® HMF2550 generating a signal and R&S®HMS-X displaying the generated signal.

Heng Wee Boo
08.2016- 5RAS_AG05_e001

ROHDE&SCHWARZ

History

History		
01.06.2016	Heng Wee Boo	first version

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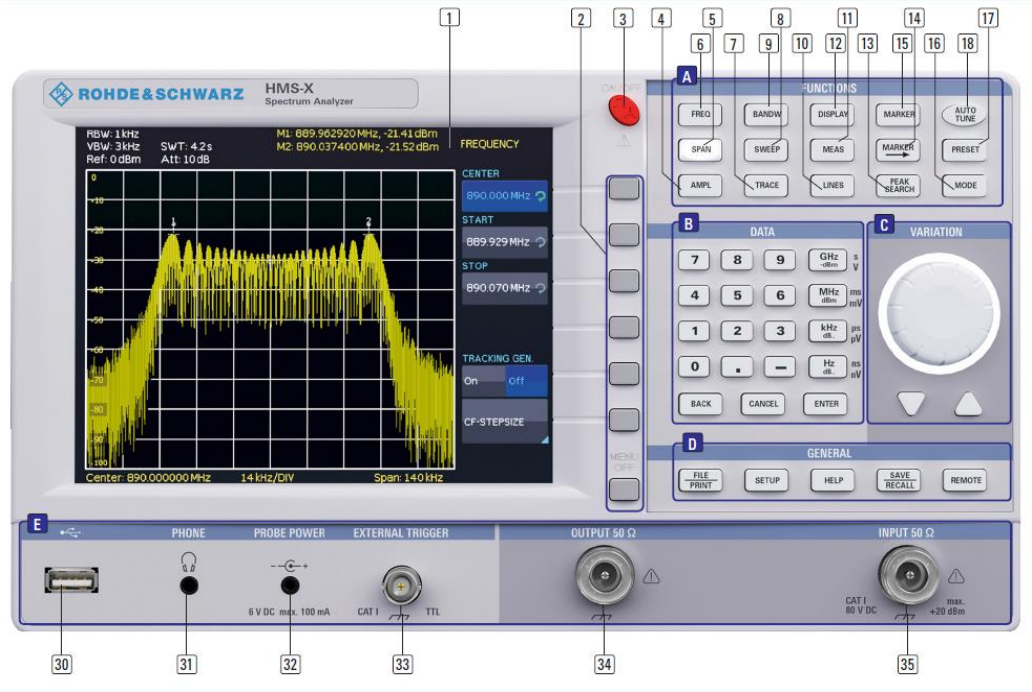
1 Introduction of Operating Elements

R&S®HMS-X Spectrum Analyzer

Front panel of R&S®HMS-X

1. Display - 6,5“ VGA TFT Display 2. Interactive Soft keys 3. POWER 4. AMPL - Setting of amplitude parameters 5. SPAN - Setting of the Span 6. FREQ - Setting of the frequency 7. TRACE - Trace configuration 8. SWEEP - Setting of the sweep time and trigger source 9. BANDW-Setting of the resolution (RBW) and video bandwidth (VBW) 10. LINES - Configuration of limit lines 11. MEAS - Implementation of extended measurements 12. DISPLAY - Setting of the display 13. PEAK SEARCH - Measuring value peak display 14. MARKER □ Next marker selection by activating more than 1 marker	15. MARKER - Selection and arrangement of the absolute and relative marker 16. MODE - Switching between SWEEP- and RECEIVER-Mode 17. PRESET - Factory reset 18. AUTO TUNE - Automatically setting of instrument settings 19. Numeric keypad - Setting of operating parameters 20. BACK - Set back inputs 21. CANCEL - Terminate the editing mode 22. ENTER - Confirm the values via keypad 23. Rotary knob - Setting and confirming parameters 24. Arrow buttons- Zoom-In / Zoom-Out functionality 25. FILE/PRINT - Selection of automatically storage of instrument settings, curves and screenshots 26. SETUP - General instrument settings 27. HELP - Instrument help function 28. SAVE/RECALL - Store and restore of instrument settings, curves and screenshots 29. REMOTE - Toggling between front panel and external operation


ROHDE&SCHWARZ
HMS-X
Spectrum Analyzer
RBW: 1 kHz
VBW: 3 kHz
SWT: 4.2 s
Ref: 0 dBm
Att: 10 dB
M1: 889.962920 MHz, -21.41 dBm
M2: 890.037400 MHz, -21.52 dBm
FREQUENCY
CENTER
890.000 MHz
START
889.929 MHz
STOP
890.070 MHz
TRACKING GEN
On
Off
CF-STEPSIZE
Center: 890.000000 MHz
14 kHz/DIV
Span: 140 kHz
A
FUNCTIONS
FREQ
BANDW
DISPLAY
MARKER
AUTO TUNE
SPAN
SWEEP
MEAS
MARKER
PRESET
AMPL
TRACE
LINES
PEAK SEARCH
MODE
B
DATA
C
VARIATION
BACK
CANCEL
ENTER
D
GENERAL
FILE PRINT
SETUP
HELP
SAVE RECALL
REMOTE
E
PHONE
PROBE POWER
6 V DC max. 100 mA
EXTERNAL TRIGGER
CAT I
TTL
OUTPUT 50 Ω
INPUT 50 Ω
CAT I
80 V DC
max. +20 dBm
1
2
3
4
5
6
7
8
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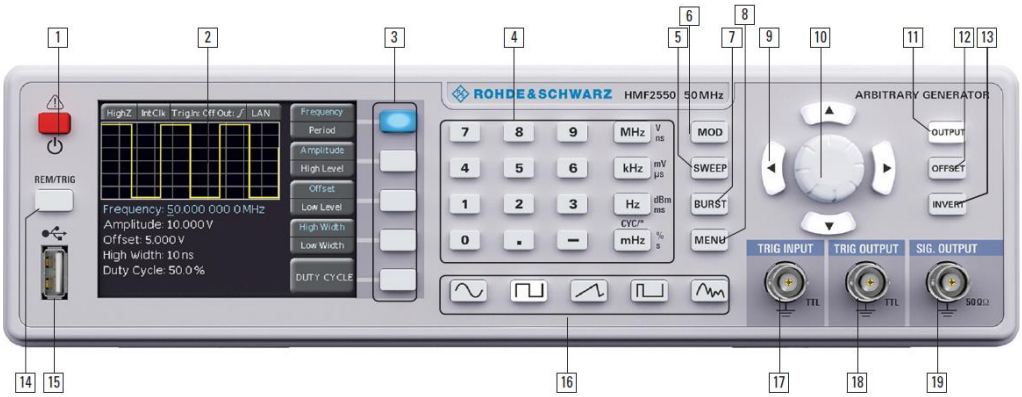
R&S®HMF2550 Arbitrary Generator

1. POWER - Power switch turns the instrument on/off 2. Display (TFT) - All parameters including the current waveform are shown concurrently 3. Interactive Softkeys - Direct access of all relevant functions 4. Numerical keyboard - Setting of all operating parameters with respective units 5. SWEEP - Selection of the parameters for sweep mode 6. MOD - Modulation modes 7. BURST - Add user defined period to the waveform depending on internal or external trigger signa 8. MENU - Open the menu optionsl	9. Arrow buttons - Cursor keys for shifting the cursor to the position to be changed, increase/decrease value of the selected parameter 10. Rotary knob - Knob to adjust the values / confirm settings by pushing the knob 11. OUTPUT - Turn on/off the output 12. OFFSET - Add a user defined DC voltage to the signal output 13. INVERT - Inverses the pulse signal output 14. REM/TRIG - Toggling between front panel and remote operation or force trigger 15. USB stick port - USB stick port for storing parameters and load waveforms 16. Signal functions - Selection of the signal: sine wave, square wave , triangle , pulse , arbitrary



2 Exercise

Creating a Sine Signal using R&S®HMF2550 Arbitrary Generator. (CW Signal)

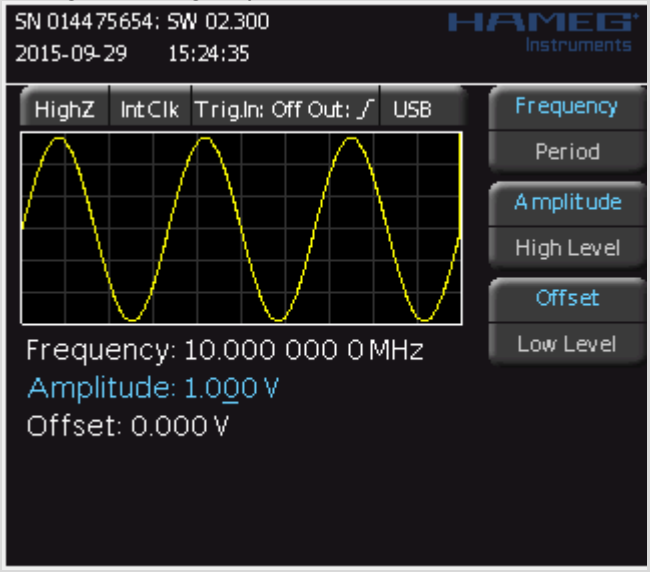
Equipment Needed:

- R&S®HM2550

Instrument Settings:

1. Power on the R&S®HM2550
2. Select the signal to be a Sine signal by pressing on the Panel keys

3. Configure the signal parameters as shown in screen shot below



Measuring the given signal using a R&S®HMS-X Spectrum Analyzer

Equipment Needed:

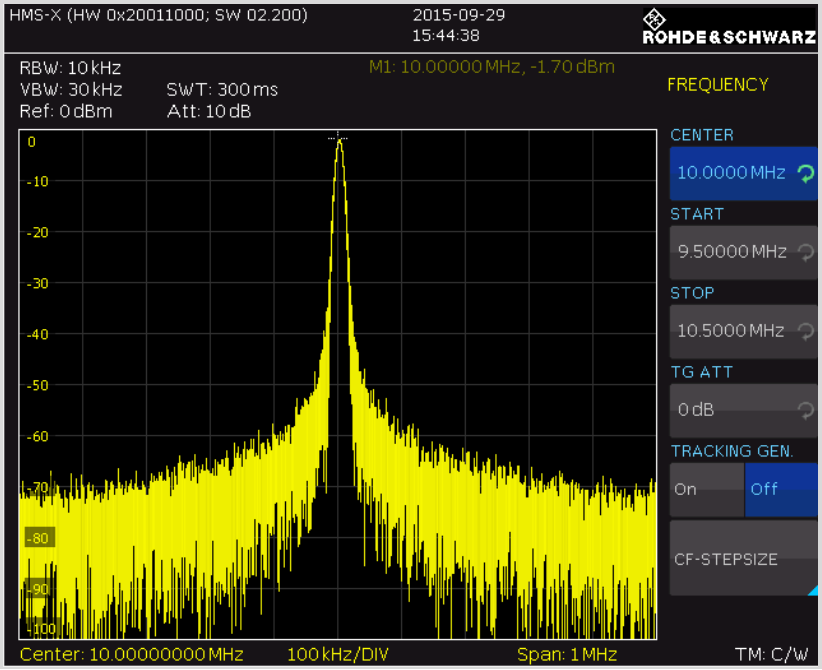
- HMS-X Spectrum Analyzer
- BNC – N TYPE RF Cables

Instrument Settings:

1. Power on the R&S®HMS-X Spectrum Analyzer
2. Connect the output of R&S®HMF2550 to R&S®HMS-X
3. Click on the OUTPUT key of R&S®HMF2550

4. Press Preset on R&S®HMS-X
5. Go to FREQ and set CENTER (center frequency) to 10MHz
6. Press AUTO TUNE

The SA screen should look like this



Question 1

What is the peak amplitude of the signal?

_____

7. Press BANDW and change the RBW

Question 2

What can you observe from the display of the instrument? (Observe in relation to sweep time, signal shape, noise floor, etc)

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Equipment:

- R&S®HMF2550
- R&S®HMS-X

Instrument Settings:

1. Increase SPAN of R&S®HMS-X to 40 MHz
2. Decrease Amplitude of Signal in R&S®HMF2550 to 0.1V
3. Change the signal from a Sine to a Square on R&S®HMF2550

Question 3

Explain what you saw on the R&S®HMS-X.

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Summary

This short exercise show how two instruments can be used to demo the functionary of both the instruments. It also show how by changing some settings in the Spectrum Analyzer, user could improve on the "noise floor" on the measurement.

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