

# Generation and Measurement of signals using Function Generator and Programmable Counter

## Step-By-Step Application Guide

### Products:

- | R&S® HMF2550
- | R&S® HM8123

The purpose of this document is to allow participant to practice and navigate some of the key features of R&S®HM8123 Programmable Counter and R&S®HMF2550 Function 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®HM8123 programmable counter measuring the generated signal.

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## History

History		
01.06.2016	Heng Wee Boo	first version

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# 1 Introduction of Operating Elements

## R&S®HM8123 Programmable Counter

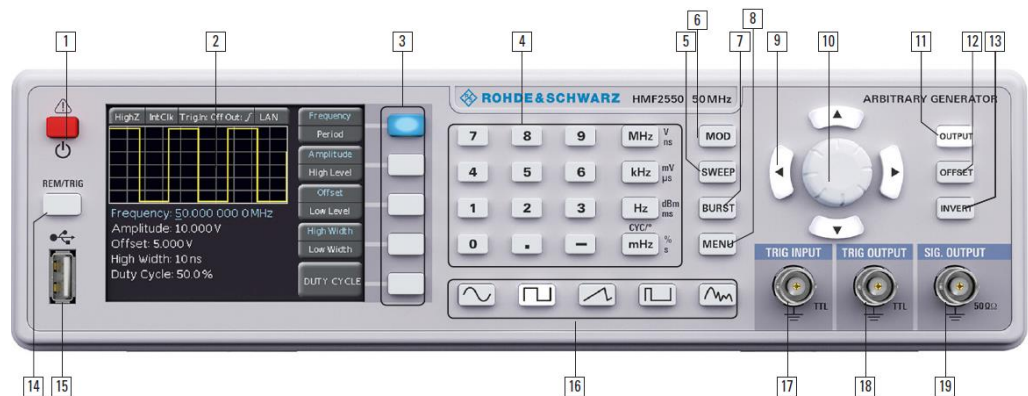
### Front panel of R&S®HM8123

1. POWER (Pushbutton)	15. Slope (pushbutton)
2. GATE (LED)	16. 1 : 10 pushbutton Input attenuator, total attenuation 100 times.
3. REMOTE (LED and pushbutton)	17. 50 Ω (pushbutton)
4. Display (LCD)	18. LP 50 kHz (pushbutton)
5. Display (LCD)	19. TRIG (LED)
6. ENTER (pushbutton)	20. INPUT A (BNC connectors)
7. SELECT (pushbutton)	21. AUTO TRIG (pushbutton)
8. ▲▼◀▶ pushbuttons	22. INPUT B (BNC connectors)
9. Rotating knob	23. TRIG (LED)
Knob for entering parameters	24. INPUT C (SMA connector)
10. GATE TIME (pushbutton)	25. RESET / V (pushbutton)
11. LEVEL B (pushbutton)	26. TRIG / GHz/s (pushbutton)
12. LEVEL A (pushbutton)	27. HOLD / mV (pushbutton)
13. 1 : 10 pushbutton Input attenuator, total attenuation 100 times.	
14. DC (pushbutton) Selects the coupling of the corresponding channel. Button DC lit = DC coupling Button DC dark = AC coupling	



## R&S®HMF2550 Arbitrary Generator

<ol style="list-style-type: none"> <li>1. POWER - Power switch turns the instrument on/off</li> <li>2. Display (TFT) - All parameters including the current waveform are shown concurrently</li> <li>3. Interactive Softkeys - Direct access of all relevant functions</li> <li>4. Numerical keyboard - Setting of all operating parameters with respective units</li> <li>5. SWEEP - Selection of the parameters for sweep mode</li> <li>6. MOD - Modulation modes</li> <li>7. BURST - Add user defined period to the waveform depending on internal or external trigger signal</li> <li>8. MENU - Open the menu options</li> </ol>	<ol style="list-style-type: none"> <li>9. Arrow buttons - Cursor keys for shifting the cursor to the position to be changed, increase/decrease value of the selected parameter</li> <li>10. Rotary knob - Knob to adjust the values / confirm settings by pushing the knob</li> <li>11. OUTPUT - Turn on/off the output</li> <li>12. OFFSET - Add a user defined DC voltage to the signal output</li> <li>13. INVERT - Inverses the pulse signal output</li> <li>14. REM/TRIG - Toggling between front panel and remote operation or force trigger</li> <li>15. USB stick port - USB stick port for storing parameters and load waveforms</li> <li>16. Signal functions - Selection of the signal: sine wave, square wave, triangle, pulse, arbitrary</li> </ol>
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## 2 Exercise

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

#### Equipment Needed:

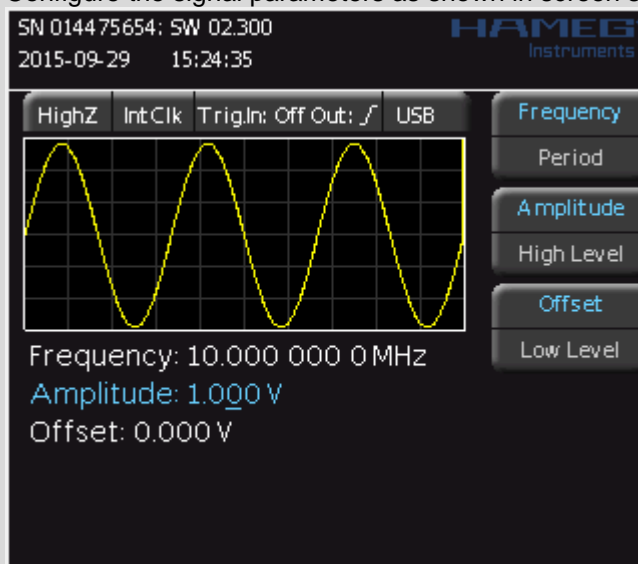
- R&S®HM2550

#### 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 R&S®HMF2550 Programmable Counter

### Equipment Needed:

- R&S®HM8123 Programmable Counter
- 2x BNC – BNC RF Cables

### Instrument Settings:

1. Power on the R&S®HM8123 Programmable Counter
2. Connect the signal output of R&S®HMF2550 to Input A of R&S®HM8123
3. Click on the OUTPUT key of R&S®HMF2550



4. Press Reset on R&S®HM8123

### Question 1

What is the measured frequency of the signal? Is it at 10 MHz? If not, why?

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5. Connect 10 MHz Reference Out (R&S®HMF2550) to 10 MHz Reference In (R&S®HM8123)
6. Press SELECT (Menu) -> Select Reference->Reference->External (Using arrows and ENTER (menu))

### Question 2

What is the measured frequency of the signal now? Can you explain the reason why change in measured values.

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7. Please feel free to try changing the Frequency output of R&S®HMF2550 and observe the measurement result on R&S®HM8123
8. Explore on other features of both R&S®HMF2550 and R&S®HM8123

**Summary**

**This short exercise show how two instruments can be used to demo the functionary of both the instruments. It also illustrate the importance of setting references between source and measuring instruments will improve on the measurement result.**



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