

APPLICATION NOTE

HOW TO PROGRAM MULTI-CHANNEL SYNTHESIZERS

This application note describes how to program devices featuring multiple channels.

The basic multi-channel programming command syntax is introduced.

An example shows how to configure multiple channels individually.

INTRODUCTION

Devices with only one single channel provide one source and one output programming node. The `[:SOURce]:...` and `:OUTPut:...` ranges of command enable remote programming of reference configuration, source setup (frequency, power, modulations etc.) and output state (RF on/off).

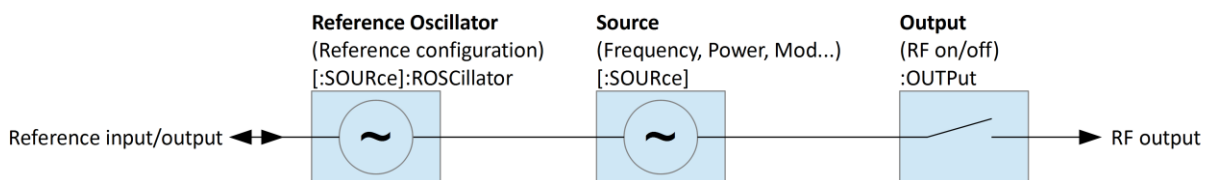


Figure 1: Single channel device configuration

Multi-channel devices provide multiple `[:SOURce]:...` and `:OUTPut:...` programming nodes, each of it dedicated to one of the channels. However, some sub-nodes are common to all channels. For example, frequency, power and modulations can be set per channel while the reference part is common to all channels.

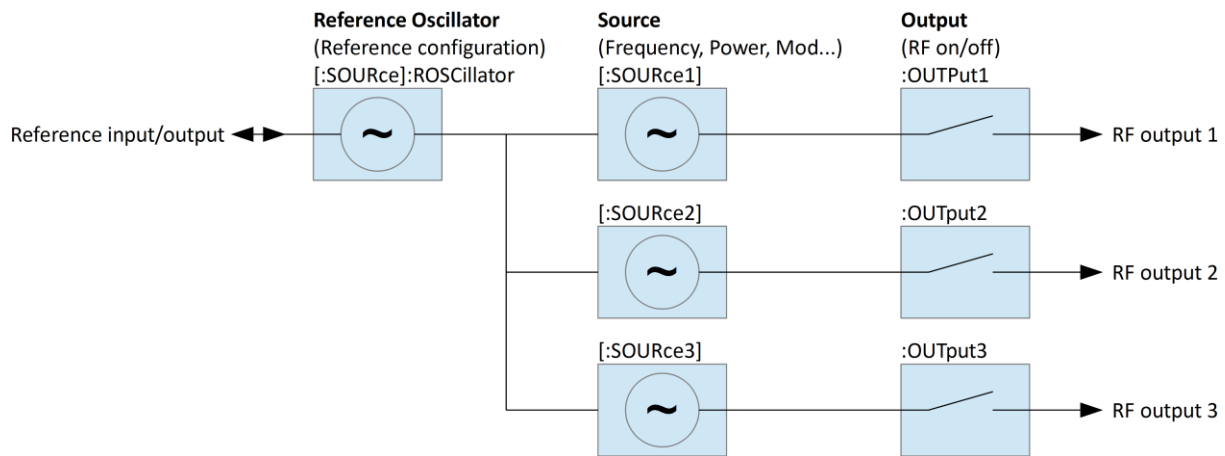


Figure 2: Multi channel device configuration

CHANNEL SELECTION

The channel can be selected in two different ways.

- Append a channel index to the [:SOURce] and :OUTPut nodes: [:SOURce#] and [:OUTPut#], e.g. :SOURce1.
- Select the default source and output nodes. Commands within the [:SOURce] or OUTPut nodes will apply to a selected default source if no channel index is appended.

INDIVIDUAL AND SHARED SETTINGS

Some [:SOURce] and :OUTPut sub-nodes are common to all channels. Programming such sub-nodes will affect all channels at once. Channel index and default source selection won't have any effect. This applies to the following sub-nodes:

- [:SOURce]:ROSCillator Reference configuration. Common for all sources.
- [:SOURce]:SElect Default source selection.

QUICK COMMAND REFERENCE

This quick command reference covers basic multi-channel functionality: reference configuration, channel selection, per-channel frequency, power and output state settings. Please refer to the signal generator programmer's manual for a complete command reference.

`[[:SOURce]:SEL?`

`[[:SOURce]:SEL? MINimum`

`[[:SOURce]:SEL? MAXimum`

`[[:SOURce]:SEL <x>`

Gets or sets default source and output channel selection. Range 1...number of channels. The MAXimum query returns the number of sources available.

Reset (*RST) default: 1.

`[[:SOURce#]:FREQuency?`

`[[:SOURce#]:FREQuency <x>`

Gets or sets source frequency. Applies to currently selected default source if `[[:SOURce#]` node or source index # is omitted. Applies to source # (range 1...number of channels) otherwise.

`[[:SOURce#]:POWer?`

`[[:SOURce#]:POWer <x>`

Gets or sets source power. Applies to currently selected default source if `[[:SOURce#]` node or source index # is omitted. Applies to source # (range 1...number of channels) otherwise.

`[[:SOURce]:ROSCillator:SOURce?`

`[[:SOURce]:ROSCillator:SOURce INTernal|EXTernal`

Gets or sets reference source. Applies to all channels.

Reset (*RST) default: INTernal.

```
[ :SOURce]:ROSCillator:OUTPut[:STATe]?  
[:SOURce]:ROSCillator:OUTPut[:STATe] 0|1|OFF|ON
```

Gets or sets reference output state.

Reset (*RST) default: 0|OFF.

```
:OUTPut#[:STATe]?  
:OUTPut#[:STATe] 0|1|OFF|ON
```

Gets or sets output state. Applies to currently selected default output if the output index # is omitted. Applies to output # (range 1...number of sources) otherwise.

Reset (*RST) default: 0|OFF.

PROGRAMMING EXAMPLES

Programming of the following setup:

Reference source external, reference output enabled

Source 1: 0 dBm, 1 GHz, output enabled

Source 2: 5 dBm, 2 GHz, output enabled

Source 3: 6 dBm, 2.1 GHz, output enabled

METHOD A: SPECIFYING SOURCE AND OUTPUT INDICES

```
ROSC:SOUR EXT  
ROSC:OUTP ON  
SOUR1:POW 0 DBM  
SOUR1:FREQ 1 GHZ  
OUTP1 ON  
SOUR2:POW 5 DBM  
SOUR2:FREQ 2 GHZ  
OUTP2 ON  
SOUR3:POW 6 DBM
```

SOUR3:FREQ 2.1 GHZ

OUTP3 ON

METHOD B: CHANGING THE DEFAULT SOURCE SELECTION

SOUR:SEL 1

POW 0 DBM

FREQ 1 GHZ

OUTP ON

SOUR:SEL 2

POW 5 DBM

FREQ 2 GHZ

OUTP ON

SOUR:SEL 3

POW 6 DBM

FREQ 2.1 GHZ

OUTP ON