Agilent RF & Universal Frequency Counter/Timers Programming Comparison Guide

Technical Overview

53200 Series (53210A, 53220A, 53230A)
531xxA Series (53131A, 53132A, 53181A)

Agilent Technologies

Introduction

The Agilent 53200 Series emulation mode enables the Agilent 53131A, 53132A, 53181A (531xxA Series) Standard Commands for Programmable Instruments (SCPI) command set to be used with a 53210A, 53220A, or 53230A (53200 Series) counter. This programming comparison guide will list those areas where 531xxA Series users might find differences in operation when using a 53200 Series counter. These differences are few, but documented in order to make it easier to verify programs.

With 531xxA Series compatibility mode selected, all programming is through the counter's remote interface (LAN, USB, GPIB). The counter display responds according to the remote commands received. Pressing any front panel key while in 531xxA Series compatibility mode returns the counter to 53200 Series mode as prompted. Setting or changing to either mode requires the instrument to be restarted.

When the 531xxA compatibility mode has been selected, most SCPI commands should execute semantically the same as the SCPI commands described in the Agilent 53181A and 53131A/132A 225 MHz Universal Counter Programming Guides available in the library section of each the product's web pages found at www.agilent.com/find/frequencycounters.

:CALCulate Subsystem

The 531xxA CALCulate1:IMMediate, CALCulate1: IMMediate:AUTO, CALCulate2: IMMediate, and CALCulate2: IMMediate:AUTO commands, which allowed recalculation of old measurements, are not supported.

Measurement Instructions

The 531xxA READ?, FETCh?, and MEASure? commands returned a variable-length ASCII string whose number of digits depended on the actual measurement resolution. The 53200 Series will always return 15 digits.

The 531xxA READ:<function>? and FETch:<function>? commands do not allow data conversion from one function to another. <function> must match the currently configured measurement function.

:SENSe Subsytem – Trigger events

Hysteresis

The 53200 series hardware has only two input hysteresis levels, compared to three on the 531xxA counters.

For 53131A/132A:
Sending the 53131A/132A SENSe:EVENt{1|2}:HYSTeresis 50 or 100 command enables noise rejection (INPut{1|2}:NREJect ON) in the 53220A/230A; SENSe:EVENt{1|2}:HYSTeresis 0 disables noise rejection.

For 53181A:
Sending the 53181A SENSe:EVENt:HYSTeresis 50 or 100 command enables noise rejection (INPut:NREJect ON) in the 53210A; SENSe:EVENt:HYSTeresis 0 disables noise rejection.

Reference Levels for pulse width and duty cycle

The 53131A/132A allowed you to set different reference levels for the rising and falling edges for pulse width and duty cycle measurements using the SENSe:EVENt{1|2}:LEVel subsystem commands. The 53220A/230A uses the same reference level for both edges. If you require different references levels for the two edges, you can accomplish this by using the time interval measurement function instead of pulse width or duty cycle.

The 53131A/132A models allowed the lower and upper reference values for rise and fall time measurements to be in different units (percent vs. voltage). The 53220A/230A models require the same units for both reference values (both must be percent, or both must be voltage).

Gate Time Resolution

The 53131A/53132A had different resolutions for long and short gate times and delays for the following commands:

CONFigure:TOTalize:TIMed
MEASure:TOTalize:TIMed?
SENSe:FREQuency:ARM:STOP:TIMer
SENSe:TINTerval:ARM:STOP:TIMer
SENSe:TINTerval:ARM:ESTOP:LAYer 1:TIMer
SENSe:TOTalize:ARM:STOP:TIMe

The resolution for gate time and delay does not change based on value on the 53220A/230A models.

The 53181A had different resolutions for long and short gate times for the SENSe:FREQuency:ARM:STOP:TIMer command. The 53210A has the same, better resolution regardless of the gate time.

External Reference Signals

The 53181A & 53131A could automatically adapt to external reference signals of 1 MHz, 5 MHz, or 10 MHz. The 53132A only accepted 10 MHz signals. The SENSe:ROSCillator:EXTernal:FREQuency? query would measure and return which frequency was present. The 53200 Series accepts 1 MHz, 5 MHz, or 10 MHz, but you need to specify via the SENSe:ROSCillator:EXTernal:FREQuency command which frequency is present. This command form is available in 53181A/53131A/53132A compatibility mode; the query form returns the programmed value, not a measured value.

The 53181A/53131A/53132A SENSe:ROSCillator:EXTernal:CHECk command controlled whether the instrument would detect and report errors if the external reference signal was not present at the end of a measurement. The 53200 Series will always detect this condition and report errors. The 531xxA command is accepted by the 53200 Series, but has no effect on the instrument.

SCPI Macros

The 531xxA SCPI macro capability is not supported in the 53200 Series, including the *DMC, *EMC, *EMC?, *GMC?, *LMC?, *PMC, MEMory:DELete:MACRo, and MEMory:FREE:MACRo? commands.

RS-232 Commands

The 53200 Series does not include an RS-232 port, and does not support hard copy output. The associated HCOPy:CONTinuous and SYStem:COMMunicate:SERial subsystem SCPI commands of the 531xxA Series 53131A/132A are accepted by the 53200 Series, but have no effect on the instrument.

Diagnostics and Calibration

Due to significant hardware differences between the 53200 series and the 531xxA counters, the calibration procedure and some of the CALibration subsystem commands are different. The 531xxA DIAGnostic subsystem commands are not supported.

Front Panel Operation

Given the complete redesign of the front panel, the 531xxA SYSTem:KEY and SYSTem:KEY:LOG? commands, which simulate the pressing of a front-panel key, are not supported.

Input Protection

When 50 ohm input impedance is selected, the 531xxA and the 53200 Series specifications limit the input voltage to 5 Vrms to prevent damage to the input termination resistor. If higher voltage is present, 53200 Series will automatically switch the input impedance to 1 Mohm to prevent damage; the 531xxA counters do not have this protection capability. If the automatic protection is triggered on the 53200 Series, you will need to send the 53131A/132A INPut{1|2}:IMPedance SCPI command to reset the input impedance to 50 ohms (on 53181A: INPut:IMPedance).

For additional specification information for these frequency counters, please refer to the data sheets available on each model's web page at: www.agilent.com/find/frequency-counters

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