Agilent 33250A
Function/Arbitrary Waveform Generator
Quick Reference Guide

- Square brackets ([ ]) indicate optional keywords or parameters.
- Braces ({ }) enclose parameters within a command. Default parameters are shown in bold.
- Triangle brackets (< >) enclose parameters for which you must substitute a value.
- A vertical bar ( | ) separates multiple choices.

The APPLy Commands
(see page 144 in User's Guide)

APPLY
 :SINusoid [<frequency> [,<amplitude> [,<offset>]]]
 :SQUare [<frequency> [,<amplitude> [,<offset>]]]
 :RAMP [<frequency> [,<amplitude> [,<offset>]]]
 :PULSe [<frequency> [,<amplitude> [,<offset>]]]
 :NOISE [ <frequency>|DEF> [,<amplitude> [,<offset>]]]
 :DC [ <frequency>|DEF> [,<amplitude>|DEF> [,<offset>]]]
 :USER [ <frequency> [,<amplitude> [,<offset>]]]
APPLy?

This parameter has no effect for this command but you MUST specify a value or “DEFault”.

State Storage Commands
(see page 209 in User's Guide)

*SAV {0|1|2|3|4}
*RCL {0|1|2|3|4}
MEMORY:STATE
 :NAME {0|1|2|3|4} [,<name>]
 :NAME? {0|1|2|3|4}
 :DELeTe {0|1|2|3|4}
 :RECall:AUTO {OFF|ON}
 :RECall:AUTO?
 :VALid? {0|1|2|3|4}
MEMORY:NSTates?
Output Configuration Commands

(see page 153 in User’s Guide)

FUNCTION {SINu | SQU | RAMP | PULSe | NOISE | DC | USER}

FREQuency {<frequency>|MINimum|MAXimum}
FREQuency? [MINimum|MAXimum]

VOLTage {<amplitude>|MINimum|MAXimum}
VOLTage? [MINimum|MAXimum]

VOLTage:OFFSet {<offset>|MINimum|MAXimum}
VOLTage:OFFSet? [MINimum|MAXimum]

VOLTage:HIGH {<voltage>|MINimum|MAXimum}
VOLTage:HIGH? [MINimum|MAXimum]

VOLTage:LOW {<voltage>|MINimum|MAXimum}
VOLTage:LOW? [MINimum|MAXimum]

VOLTage:RANGe:AUTO {OFF | ON | ONCE}
VOLTage:RANGe:AUTO?

VOLTage:UNIT {VPP | VRMS | DBM}
VOLTage:UNIT?

FUNCTION:SQUare:DCYCle {<percent>|MINimum|MAXimum}
FUNCTION:SQUare:DCYCle? [MINimum|MAXimum]

FUNCTION:RAMP:SYMMetry {<percent>|MINimum|MAXimum}
FUNCTION:RAMP:SYMMetry? [MINimum|MAXimum]

OUTPut {OFF | ON}
OUTPut?

OUTPut:LOAD {<ohms>|INFinity|MINimum|MAXimum}
OUTPut:LOAD? [MINimum|MAXimum]

OUTPut:POLarity {NORMAL | INVerted}
OUTPut:POLarity?

OUTPut:SYNC {OFF | ON}
OUTPut:SYNC?

Pulse Configuration Commands

(see page 166 in User’s Guide)

PULSe:PERiod {<seconds>|MINimum|MAXimum}
PULSe:PERiod? [MINimum|MAXimum]

PULSe:WIDTH {<seconds>|MINimum|MAXimum}
PULSe:WIDTH? [MINimum|MAXimum]

PULSe:TRANSition {<seconds>|MINimum|MAXimum}
PULSe:TRANSition? [MINimum|MAXimum]
Modulation Commands

(see page 169 in User’s Guide)

AM Commands

AM:INTernal
   :FUNCTION (SIN|SQU|RAMP|NRAMP|TRI|NOISE|USER)
   :FUNCTION?

AM:INTernal
   :FREQuency {<frequency>|MINimum|MAXimum}
   :FREQuency? [MINimum|MAXimum]

AM:DEPTh {<depth in percent>|MINimum|MAXimum}

AM:STATe {OFF|ON}

FM Commands

FM:INTernal
   :FUNCTION (SIN|SQU|RAMP|NRAMP|TRI|NOISE|USER)
   :FUNCTION?

FM:INTernal
   :FREQuency {<frequency>|MINimum|MAXimum}
   :FREQuency? [MINimum|MAXimum]

FM:DEViation {<peak deviation in Hz>|MINimum|MAXimum}

FM:STATe {OFF|ON}

FSK Commands

FSKey:FREQuency {<frequency>|MINimum|MAXimum}

FSKey:INTernal:RATE {<rate in Hz>|MINimum|MAXimum}

FSKey:STATe {OFF|ON}

FSKey:STATe?
**Sweep Commands**

(see page 179 in User’s Guide)

- **FREQuency**
  - :START (<frequency>|MINimum|MAXimum)
  - :START? [MINimum|MAXimum]
  - :STOP (<frequency>|MINimum|MAXimum)
  - :STOP? [MINimum|MAXimum]

- **FREQuency**
  - :CENTer (<frequency>|MINimum|MAXimum)
  - :CENTer? [MINimum|MAXimum]
  - :SPAN (<frequency>|MINimum|MAXimum)
  - :SPAN? [MINimum|MAXimum]

- **SWEep**
  - :SPACing {LINear|LOGarithmic}
  - :SPACing? [MINimum|MAXimum]
  - :TIME (<seconds>|MINimum|MAXimum)
  - :TIME? [MINimum|MAXimum]

- **SWEep**:STATE {OFF|ON}
  - SWEep:STATE?

- **TRIGger:SOURce** {IMMediate|EXTernal|BUS}
  - TRIGger:SOURce?

- **TRIGger:SLOPe** {POSitive|NEGative}
  - TRIGger:SLOPe?

- **OUTPut**
  - :TRIGger:SLOPe {POSitive|NEGative}
  - :TRIGger:SLOPe?

- **MARKer:FREQuency** (<frequency>|MINimum|MAXimum)
  - MARKER:FREQuency? [MINimum|MAXimum]

- **MARKer** {OFF|ON}
  - MARKer?

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**Triggering Commands**

(see page 195 in User’s Guide)

These commands are used for Sweep and Burst only.

- **TRIGger:SOURce** {IMMediate|EXTernal|BUS}
  - TRIGger:SOURce?

- **TRIGger**
  - *TRG

- **TRIGger:DElay** (<seconds>|MINimum|MAXimum)
  - TRIGger:DElay? [MINimum|MAXimum]

- **TRIGger:SLOPe** {POSitive|NEGative}
  - TRIGger:SLOPe?

- **BURSt::GATE:POLarity** {NORMal|INVerted}
  - BURSt::GATE:POLarity?

- **OUTPut**
  - :TRIGger:SLOPe {POSitive|NEGative}
  - :TRIGger:SLOPe?
  - :TRIGger {OFF|ON}
  - :TRIGger?
Burst Commands

(see page 187 in User's Guide)

BURSt:MODE {TRIGgered|GAted}
BURSt:MODE?
BURSt:NCYCles {<# cycles>|INfinity|MINimum|MAXimum}
BURSt:NCYCles? [MINimum|MAXimum]
BURSt:INTernal:PERiod {<seconds>|MINimum|MAXimum}
BURSt:INTernal:PERiod? [MINimum|MAXimum]
BURSt:PHASe {<angle>|MINimum|MAXimum}
BURSt:PHASe? [MINimum|MAXimum]
BURSt:STATe {OFF|ON}
BURSt:STATe?
UNIT:ANGLe {DEGree|RAdian}
UNIT:ANGLe?
TRIGger:SOURce {IMMediate|EXTernal|BUS}
TRIGger:SOURce?
TRIGger:DELay {<seconds>|MINimum|MAXimum}
TRIGger:DELay? [MINimum|MAXimum]
TRIGger:SLOPe {POSitive|NEGative}
TRIGger:SLOPe?
BURSt:GATE:POLarity {NORMal|INVerted}
BURSt:GATE:POLarity?
OUTPut
 :TRIGger:SLOPe {POSitive|NEGative}
 :TRIGger:SLOPe?
 :TRIGger {OFF|ON}
 :TRIGger?

System-Related Commands

(see page 213 in User's Guide)

SYSTem:ERRor?
*IDN?
DISPlay {OFF|ON}
DISPlay?
DISPlay
 :TEXT <quoted string>
 :TEXT?
 :TEXT:CLEar
*RST
*TST?
SYSTem:VERSion?
SYSTem
 :BEEPer
 :BEEPer:STATe {OFF|ON}
 :BEEPer:STATe?
*LRN?
*OPC
*OPC?
*WAI
Arbitrary Waveform Commands

(see page 198 in User’s Guide)

DATA VOLATILE, <value>, <value>, ...
DATA
:DAC VOLATILE, {<binary block>|<value>, <value>, ... }
FORMAT:BORDer {NORMAL|SWAPped}
FORMAT:BORDer?
DATA:COPY <destination arb name> [, VOLATILE]
FUNCTION:USER {<arb name>1|VOLATILE}
FUNCTION:USER?
FUNCTION USER
FUNCTION?
DATA
:CATalog?
:NVOLatile:CATalog?
:NVOLatile:FREE?
DATA:DELeete <arb name>
DATA:DELeete:ALL
DATA
:ATTRIBUTE:AVERAGE? [<arb name>1]
:ATTRIBUTE:CFACTor? [<arb name>1]
:ATTRIBUTE:POINTS? [<arb name>1]
:ATTRIBUTE:PPeak? [<arb name>1]

1 The names of the built-in arb waveforms are:
   EXP_RISE, EXP_FALL, NEG_RAMP, SINC, and CARDIAC.

Interface Configuration Commands

(see page 218 in User’s Guide)

SYSTem:INTerface {GPIB|RS232}
SYSTem:LOCAL
SYSTem:RWLock
**Status Reporting Commands**

(see page 235 in User’s Guide)

*STB?
*SRE <enable value>
*SRE?

STATus
:QUEStionable:CONDition?
:QUEStionable[:EVENT]?
:QUEStionable:ENABLE <enable value>
:QUEStionable:ENABLE?

*ESR?
*ESE <enable value>
*ESE?
*CLS
STATus:PRESet
*PSC (0|1)
*PSC?
*OPC

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**SCPI Status System**

(see page 225 in User’s Guide)

![SCPI Status System Diagram]

NOTES:

C = Condition Register
EV = Event Register
EN = Enable Register
OVL = Overload

<table>
<thead>
<tr>
<th>C</th>
<th>EN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV</td>
<td>OVL</td>
</tr>
<tr>
<td>EN</td>
<td>OVL</td>
</tr>
</tbody>
</table>

Output Buffer

Standard Event Register

Operation Complete
Query Error
Device Error
Execution Error

Power On

ESR

ESR

Error Queue
**Phase-Lock Commands**

(see page 223 in User’s Guide)

PHASE {<angle>|MINimum|MAXimum}  
PHASE? [MINimum|MAXimum]  
PHASE:Reference  
PHASE:UNLock:ERROR:STATE {OFF|ON}  
PHASE:UNLock:ERROR:STATE?  
UNIT:ANGLE {DEGree|RAdian}  
UNIT:ANGLE?

**Calibration Commands**

(see page 239 in User’s Guide)

CALibration?  
CALibration  
:SECure:STATE {OFF|ON},<code>  
:SECure:STATE?  
:SECure:CODE <new code>  
:SETup <0|1|2|3| . . . |115>  
:SETup?  
:VALUE <value>  
:VALUE?  
:COUNT?  
:STRING <quoted string>  
:STRING?

**IEEE 488.2 Common Commands**

*CLS  
*ESR?  
*ESE <enable value>  
*ESE?  
*IDN?  
*LRN?  
*OPC  
*OPC?  
*PSC (0|1)  
*PSC?  
*RST  
*SAV {0|1|2|3|4}  
*RCL {0|1|2|3|4}  
*STB?  
*SRE <enable value>  
*SRE?  
*TRG  
*TST?
Simplified Programming Overview

Using the APPLy Command

The APPLy command provides the most straightforward method to program the function generator over the remote interface. For example, the following command string sent from your computer will output a 3 Vpp sine wave at 5 kHz with a -2.5 volt offset.

```
APPL:SIN 5.0E+3, 3.0, -2.5
```

Using the Low-Level Commands

Although the APPLy command provides the most straightforward method to program the function generator, the low-level commands give you more flexibility to change individual parameters. For example, the following command strings sent from your computer will output a 3 Vpp sine wave at 5 kHz with a -2.5 volt offset.

```
FUNC SIN
FREQ 5000
VOLT 3.0
VOLT:OFFS -2.5
```

Reading a Query Response

Only the query commands (commands that end with “?”) will instruct the function generator to send a response message. Queries return internal instrument settings. For example, the following command string sent from your computer will read the function generator’s error queue and retrieve the response from the most recent error.

```
dimension statement
SYST:ERR?
enter statement
```

Selecting a Trigger Source

When Sweep or Burst is enabled, the function generator will accept an immediate internal trigger, a hardware trigger from the rear-panel Trig In connector, a manual trigger from the key, or a software (bus) trigger. By default, the internal trigger source is selected. If you want to use an external or a software trigger source, you must first select that source. For example, the following command strings sent from your computer will output a 3-cycle burst each time the rear-panel Trig In connector receives the rising edge of a TTL pulse.

```
BURS:NCYC 3
TRIG:SLOP POS
TRIG:SOUR EXT
BURS:STAT ON
```
### Factory Default Settings

<table>
<thead>
<tr>
<th><strong>Output Configuration</strong></th>
<th><strong>Factory Setting</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>Sine wave</td>
</tr>
<tr>
<td>Frequency</td>
<td>1 kHz</td>
</tr>
<tr>
<td>Amplitude / Offset</td>
<td>100 mVpp / 0.000 Vdc</td>
</tr>
<tr>
<td>Output Units</td>
<td>Vpp</td>
</tr>
<tr>
<td>Output Termination</td>
<td>20W</td>
</tr>
<tr>
<td>Autorange</td>
<td>On</td>
</tr>
<tr>
<td><strong>Modulation (AM, FM, FSK)</strong></td>
<td><strong>Factory Setting</strong></td>
</tr>
<tr>
<td>Carrier Waveform</td>
<td>1 kHz Sine wave</td>
</tr>
<tr>
<td>Modulating Waveform</td>
<td>1 kHz Sine wave</td>
</tr>
<tr>
<td>AM Depth</td>
<td>100%</td>
</tr>
<tr>
<td>FM Deviation</td>
<td>100 Hz</td>
</tr>
<tr>
<td>FSK “Hop” Frequency</td>
<td>100 Hz</td>
</tr>
<tr>
<td>FSK Rate</td>
<td>10 Hz</td>
</tr>
<tr>
<td>Modulation State</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Sweep</strong></td>
<td><strong>Factory Setting</strong></td>
</tr>
<tr>
<td>Start / Stop Frequency</td>
<td>100 Hz / 1 kHz</td>
</tr>
<tr>
<td>Sweep Time</td>
<td>1 Second</td>
</tr>
<tr>
<td>Sweep Mode</td>
<td>Linear</td>
</tr>
<tr>
<td>Sweep State</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Burst</strong></td>
<td><strong>Factory Setting</strong></td>
</tr>
<tr>
<td>Burst Frequency</td>
<td>1 kHz</td>
</tr>
<tr>
<td>Burst Count</td>
<td>1 Cycle</td>
</tr>
<tr>
<td>Burst Period</td>
<td>10 ms</td>
</tr>
<tr>
<td>Burst Starting Phase</td>
<td>0°</td>
</tr>
<tr>
<td>Burst State</td>
<td>Off</td>
</tr>
<tr>
<td><strong>System-Related Operations</strong></td>
<td><strong>Factory Setting</strong></td>
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<tr>
<td>• Power-Down Recall</td>
<td>Disabled</td>
</tr>
<tr>
<td>• Display Mode</td>
<td>On</td>
</tr>
<tr>
<td>• Error Queue</td>
<td>Errors are Cleared</td>
</tr>
<tr>
<td>• Stored States, Stored Arbs</td>
<td>No Change</td>
</tr>
<tr>
<td>• Output State</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Triggering Operations</strong></td>
<td><strong>Factory Setting</strong></td>
</tr>
<tr>
<td>Trigger Source</td>
<td>Internal (Immediate)</td>
</tr>
<tr>
<td><strong>Remote Interface Configuration</strong></td>
<td><strong>Factory Setting</strong></td>
</tr>
<tr>
<td>• GPIB Address</td>
<td>10</td>
</tr>
<tr>
<td>• Interface</td>
<td>GPIB (IEEE-488)</td>
</tr>
<tr>
<td>• Baud Rate</td>
<td>57,600 Baud</td>
</tr>
<tr>
<td>• Parity</td>
<td>None (8 data bits)</td>
</tr>
<tr>
<td>• Handshake</td>
<td>DTR / DSR</td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td><strong>Factory Setting</strong></td>
</tr>
<tr>
<td>Calibration State</td>
<td>Secured</td>
</tr>
</tbody>
</table>

Parameters marked with a bullet (*) are stored in non-volatile memory.