

Agilent 33220A

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 170 in *User's Guide* (English)

APPLy

```
:SINusoid [<frequency> [, <amplitude> [, <offset>] ]]  
:SQUare [<frequency> [, <amplitude> [, <offset>] ]]  
:RAMP [<frequency> [, <amplitude> [, <offset>] ]]  
:PULSe [<frequency> [, <amplitude> [, <offset>] ]]  
:NOISe [<frequency|DEF>1 [, <amplitude> [, <offset>] ]]  
:DC [<frequency|DEF>1 [, <amplitude> | DEF>1 [, <offset>] ]]  
:USER [<frequency> [, <amplitude> [, <offset>] ]]
```

APPLY?

¹ This parameter has no effect for this command but you MUST specify a value or "DEFault".

State Storage Commands

See page 245 in *User's Guide* (English)

```
*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}  
:CAT?
```

MEMORY:NStates?



Agilent Technologies

Output Configuration Commands

See page 179 in *User's Guide (English)*

FUNCTION {**SINu** | SQU | RAMP | PULSe | NOISe | DC | USER}
FUNCTION?

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}
:HIGH? [MINimum | MAXimum]
:LOW {<voltage> | MINimum | MAXimum}
: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 192 in *User's Guide (English)*

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

FUNCTION:PULSe
:HOLD {WIDTh | DCYCLE}
:HOLD? [WIDTh | DCYCLE]
:WIDTh {<seconds> | MINimum | MAXimum}
:WIDTh? [MINimum | MAXimum]
:DCYCLE {<percent> | MINimum | MAXimum}
:DCYCLE? [MINimum | MAXimum]
:TRANSition {<seconds> | MINimum | MAXimum}
:TRANSition? [MINimum | MAXimum]

Modulation Commands

See page 197 in *User's Guide (English)*

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:DEPTH? [MINimum|MAXimum]  
  
AM:SOURCe {INTERNAL|EXTernal}  
AM:SOURCe?  
  
AM:STATE {OFF|ON}  
AM:STATE?
```

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:DEVIation? [MINimum|MAXimum]  
  
FM:SOURCe {INTERNAL|EXTernal}  
FM:SOURCe?  
  
FM:STATE {OFF|ON}  
FM:STATE?
```

PM Commands

```
PM:INTERNAL  
  :FUNCTION {SIN|SQU|RAMP|NRAMP|TRI|NOISE|USER}  
  :FUNCTION?  
  
PM:INTERNAL  
  :FREQUENCY {<frequency>|MINimum|MAXimum}  
  :FREQUENCY? [MINimum|MAXimum]  
  
PM:DEVIation {<deviation in degrees>|MINimum|MAXimum}  
PM:DEVIation? [MINimum|MAXimum]  
  
PM:SOURCe {INTERNAL|EXTernal}  
PM:SOURCe?  
  
PM:STATE {OFF|ON}  
PM:STATE?
```

FSK Commands

```
FSKey:FREQuency {<frequency>|MINimum|MAXimum}
FSKey:FREQuency? [MINimum|MAXimum]
FSKey:INTERNAL:RATE {<rate in Hz>|MINimum|MAXimum}
FSKey:INTERNAL:RATE? [MINimum|MAXimum]
FSKey:SOURce {INTERNAL|EXTernal}
FSKey:SOURce?
FSKey:STATE {OFF|ON}
FSKey:STATE?
```

PWM Commands

```
PWM:INTERNAL
  :FUNCTION {SIN|SQU|RAMP|NRAMP|TRI|NOISE|USER}
  :FUNCTION?
PWM:INTERNAL
  :FREQuency {<frequency>|MINimum|MAXimum}
  :FREQuency? [MINimum|MAXimum]
PWM:DEVIation {<deviation in seconds>|MIN|MAX}
PWM:DEVIation? [MINimum|MAXimum]
PWM:DEVIation:DCYCle {<deviation in percent>|MIN|MAX}
PWM:DEVIation:DCYCle? [MINimum|MAXimum]
PWM:SOURce {INTERNAL|EXTernal}
PWM:SOURce?
PWM:STATE {OFF|ON}
PWM:STATE?
```

Burst Commands

See page 223 in *User's Guide* (English)

```
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:SLOPe {POSitive|NEGative}
TRIGger:SLOPe?
BURSt:GATE:POLarity {NORMAL|INverted}
BURSt:GATE:POLarity?
OUTPut
  :TRIGger:SLOPe {POSitive|NEGative}
  :TRIGger:SLOPe?
  :TRIGger {OFF|ON}
  :TRIGger?
```

Sweep Commands

See page 217 in *User's Guide (English)*

```
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?
  :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?
  :TRIGger {OFF|ON}
  :TRIGger?

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

MARKer {OFF|ON}
MARKer?
```

Triggering Commands

See page 231 in *User's Guide (English)*

These commands are used for Sweep and Burst only.

```
TRIGger:SOURce {IMMEDIATE|EXTernal|BUS}
TRIGger:SOURce?

TRIGger
*TRG

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

BURSt:GATE:POLarity {NORMal|INVersed}
BURSt:GATE:POLarity?

OUTPut
  :TRIGger:SLOPe {POSitive|NEGative}
  :TRIGger:SLOPe?
  :TRIGger {OFF|ON}
  :TRIGger?
```

System-Related Commands

See page 249 in *User's Guide* (English)

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?

SYSTem

:KLOCK [:STATE] {OFF|ON}

:KLOCK:EXCLude {NONE|LOCAL}

:KLOCK:EXCLude?

SYSTem:SECurity:IMMEDIATE

Caution. Clears **all** memory. Not recommended for routine applications.

*LRN?

*OPC

*OPC?

*WAI

© Copyright Agilent Technologies, Inc. 2003, 2004, 2007
Printed in Malaysia Edition 4 May 2007 E0507



33220-90008

Interface Configuration Commands

See page 254 in *User's Guide* (English)

```
SYSTem:LOCal
SYSTem:REMote
SYSTem:RWLock
SYSTem:COMMUnicatE:RLState {LOCAL|REMote|RWLokC}
SYSTem:COMMUnicatE:GPIB
  :ADDReSS <address>
  :ADDReSS?
SYSTem:COMMUnicatE:LAN
  :AUTOip[:STATe] {OFF|0|ON|1}
  :AUTOip[:STATe]?
  :IPADdress <address>
  :IPADdress?
  :LIPaddress?
  :MAC?
  :MEDiasense {OFF|0|ON|1}
  :MEDiasense?
  :NETBios {OFF|0|ON|1}
  :NETBios?
  :TELNet:PROMpt <string>
  :TELNet:PROMpt?
  :TELNet:WMESsage <string>
  :TELNet:WMESsage?
```

Arbitrary Waveform Commands

See page 234 in *User's Guide* (English)

```
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:DELETED <arb name>
DATA:DELETED:ALL
DATA
  :ATTRibute:AVERage? [<arb name>1]
  :ATTRibute:CFACTOR? [<arb name>1]
  :ATTRibute:POINTs? [<arb name>1]
  :ATTRibute:PTPeak? [<arb name>1]
```

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

Status Reporting Commands

See page 270 in *User's Guide* (English)

```
*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
```

See page 261 in the *User's Guide* (English) for a diagram of the SCPI status system.

Phase-Lock Commands

These commands require Option 001, External Timebase Reference. See page 258 in *User's Guide* (English).

```
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 274 in *User's Guide* (English)

```
CAL?
CAL
:SECure:STATE {OFF|ON},<code>
:SECure:STATE?
:SECure:CODE <new code>
:SETup <0|1|2|3| . . . |94>
: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?
```

Factory Default Settings

Output Configuration	Factory Setting
Function	Sine wave
Frequency	1 kHz
Amplitude / Offset	100 mVpp / 0.0 Vdc
Output Units	Vpp
Output Termination	50 Ω
Autorange	On
Modulation	Factory Setting
Carrier (AM, FM, PM, FSK)	1 kHz Sine wave
Carrier (PWM)	1 kHz Pulse
Modulating Waveform:	
(AM)	100 Hz Sine wave
(FM, PM, PWM)	10 Hz Sine wave
AM Depth	100%
FM Deviation	100 Hz
PM Deviation	180 degrees
FSK Hop Frequency	100 Hz
FSK Rate	10 Hz
PWM Width Deviation	10 μs
Modulation State	Off
Sweep	Factory Setting
Start / Stop Frequency	100 Hz / 1 kHz
Sweep Time	1 Second
Sweep Mode	Linear
Sweep State	Off
Burst	Factory Setting
Burst Count	1 Cycle
Burst Period	10 ms
Burst Start Phase	0 degrees
Burst State	Off
System-Related Operations	Factory Setting
• Power-Down Recall	Disabled
Display Mode	On
Error Queue	Errors are Cleared
Stored States, Stored Arbs	No Change
Output State	Off
Triggering Operations	Factory Setting
Trigger Source	Internal (Immediate)
Remote Interface Config.	Factory Setting
• GPIB Address	• 10
• DHCP	• On
• Auto IP	• On
• IP Address	• 169.254.2.20
• Subnet Mask	• 255.255.0.0
• Default Gateway	• 0.0.0.0
• DNS Server	• 0.0.0.0
• Host Name	• <i>none</i>
• Domain Name	• <i>none</i>
Calibration	Factory Setting
Calibration State	Secured

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