API Documentation

API Documentation

February 19, 2014

Contents

1 Module GPIBWrap

(section) GPIBWrap.py - A Python Interface to the GPIBlib Instrument Library.

The combination of Python, the instrument-object based C++ GPIBlib instrument control library, NumPy and MatPlotLib provides a quite useful way of building measurement applications for computer controlled instruments.

Currently implemented instruments are:

HP_3325A Synthesiser/Function Generator HP_3457A Multimeter HP_3582A FFT Spectrum Analyser HP_8903E Distortion Analyser TEK_710A Transient Digitizer (partially)

Author: Nick Glazzard 2012

1.1 Functions

argerr()

callerr()

eu(*v*, *u*)

frequnits(*fu*)

ampunits(*au*)

chancodes(*ch*)

couplecodes(*cu*)

1.2 Variables

Name	Description
lib	**Value:** `cdll.LoadLibrary('./GPIBlib.so')`

1.3 Class GPIBInst

object
└ **GPIBWrap.GPIBInst**

Base class for GPIB instruments with functions common to all instruments.

1.3.1 Methods

___init___(*self*)

x.___init___(...) initializes x; see help(type(x)) for signature

Overrides: object.___init___ extit(inherited documentation)

set_obj(*self*, *obj*)

set_print_error(*self*, *b*)

Allow (b=1) or suppress (b=0) error messages.

set_print_gpib(*self*, *b*)

Log (b=1) or not (b=0) all raw GPIB traffic.

set_display_status(*self*, *b*)

Show status (b=1) or not (b=0) after each GPIB command.

set_dump_gpib(*self*, *b*)

Dump a representation (b=1) or not (b=0) of binary GPIB read data.

reset_bus(*self*)

Force a reset on the GPIB bus.

Inherited from object

___delattr___(), ___format___(), ___getattribute___(), ___hash___(), ___new___(), ___reduce___(), ___reduce_ex___(), ___repr___(), ___setattr___(), ___sizeof___(), ___str___(), ___subclasshook___()

1.3.2 Properties

Name	Description
Inherited from object	
___class___	

1.4 Class HP_3457A

object
GPIBWrap.GPIBInst
GPIBWrap.HP_3457A

HP 3457A Multimeter Object.

1.4.1 Methods

___init___(*self*, *a*, *g*)

x.___init___(...) initializes x; see help(type(x)) for signature

Overrides: object.___init___ extit(inherited documentation)

check_open(*self*)

Check the device is open. Return True if it is.

set_fast_mode(*self*, *b*)

Start using the HP 3457A for 3.5 digit measurements as fast as possible. If b=1, apply fast mode to AC measurements also (Only recommended for signals >400Hz).

clear_fast_mode(*self*)

End fast mode. Revert to high precision mode.

set_function(*self*, *f*, *v*)

Set Function to f and Range to v. f may be: 'dcv', 'acv', 'acdcv', 'ohm', 'ohm4', 'dci', 'aci', 'acdci', 'freq', 'period' v depends on f. For volts functions: 'auto', '30mv', '300mv', '3v', '30v', '300v' For ohm functions: 'auto', '30r', '300r', '3k', '30k', '300k', '3m', '30m', '3g' For time functions: 'auto'

read(*self*)

Read the last measurement from the HP 3457A.

Inherited from GPIBWrap.GPIBInst(Section 1.3)

reset_bus(), set_display_status(), set_dump_gpib(), set_obj(), set_print_error(), set_print_gpib()

Inherited from object

___delattr___(), ___format___(), ___getattribute___(), ___hash___(), ___new___(), ___reduce___(), ___reduce_ex___(), ___repr___(), ___setattr___(), ___sizeof___(), ___str___(), ___subclasshook___()

1.4.2 Properties

Name	Description
Inherited from object	
___class___	

1.5 Class HP_3325A

object
GPIBWrap.GPIBInst
GPIBWrap.HP_3325A

HP 3325A Synthesiser/Function Generator Object.

1.5.1 Methods

___init___(*self*, *a*, *g*)

x.___init___(...) initializes x; see help(type(x)) for signature

Overrides: object.___init___ extit(inherited documentation)

check_open(*self*)

Check the device is open. Return True if it is.

check_error(*self*)

Check the last HP_3325A specific command executed OK. Return True if so.

set_function(*self*, *sw*)

Set the output waveform to sw. sw may be: 'dc', 'sine', 'square', 'triangle', 'ramp_up', 'ramp_down'

set_frequency(*self*, *freq*, *sunits*)

Set the output frequency to freq (in sunits). sunits may be: 'Hz', 'kHz', 'MHz'

set_amplitude(*self*, *amp*, *sunits*)

Set the output amplitude to amp (in sunits). sunits may be: 'v', 'mv', 'v_pp', 'mv_pp', 'v_rms', 'mv_rms', 'dbm'

set_dc_offset(*self*, *dc*, *sunits*)

Set the output DC offset to dc (in sunits). sunits may be: 'v', 'mv'

set_phase(*self*, *degrees*)

Set the phase offset to degrees degrees.

set_sweep_start_frequency(*self*, *freq*, *sunits*)

Set the frequency at the start of a sweep (in sunits). sunits may be: 'Hz', 'kHz', 'MHz'

set_sweep_end_frequency(*self*, *freq*, *sunits*)

Set the frequency at the end of a sweep (in sunits). sunits may be: 'Hz', 'kHz', 'MHz'

set_sweep_marker_frequency(*self*, *freq*, *sunits*)

Set the frequency at which to output the marker signal during a sweep (in sunits). sunits may be: 'Hz', 'kHz', 'MHz'

set_sweep_mode(*self*, *ssweep_mode*)

Set the sweep mode to 'lin' or 'log'.

set_sweep_time(*self*, *secs*)

Set the time over which to do a sweep (in seconds).

start_sweep_single(*self*, *waitfin*)

Do a single sweep. If waitfin=1, wait for it to end.

start_sweep_continuous(*self*)

Start sweeping continuously.

use_amplitude_modulation(*self*, *yes*)

Turn amplitude modulation on (1) or off (0).

use_phase_modulation(*self*, *yes*)

Turn phase modulation on (1) or off (0).

Inherited from GPIBWrap.GPIBInst(Section 1.3)

reset_bus(), set_display_status(), set_dump_gpib(), set_obj(), set_print_error(), set_print_gpib()

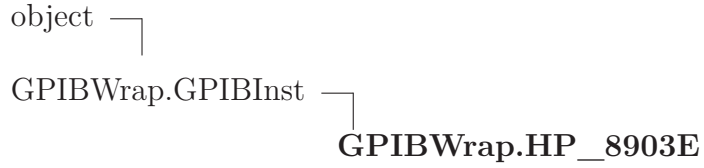
Inherited from object

___delattr___(), ___format___(), ___getattribute___(), ___hash___(), ___new___(), ___reduce___(), ___reduce_ex___(), ___repr___(), ___setattr___(), ___sizeof___(), ___str___(), ___subclasshook___()

1.5.2 Properties

Name	Description
Inherited from object	
___class___	

1.6 Class HP_8903E



HP 8903E Distortion Analyzer Object.

1.6.1 Methods

___init___(*self*, *a*, *g*)

x.___init___(...) initializes x; see help(type(x)) for signature

Overrides: object.___init___ extit(inherited documentation)

check_open(*self*)

Check the device is open. Return True if it is.

get_ac_volts(*self*)

Measure the AC voltage present at the input.

get_distortion(*self*)

Measure the distortion of the signal present at the input.

Inherited from GPIBWrap.GPIBInst(Section 1.3)

reset_bus(), set_display_status(), set_dump_gpib(), set_obj(), set_print_error(), set_print_gpib()

Inherited from object

___delattr___(), ___format___(), ___getattribute___(), ___hash___(), ___new___(), ___reduce___(), ___reduce_ex___(), ___repr___(), ___setattr___(), ___sizeof___(), ___str___(), ___subclasshook___()

1.6.2 Properties

Name	Description
Inherited from object ___class___	

1.7 Class HP_3582A

object
GPIBWrap.GPIBInst
GPIBWrap.HP_3582A

HP 3582A Spectrum Analyzer Object.

1.7.1 Methods

___init___(*self*, *a*, *g*)

x.___init___(...) initializes x; see help(type(x)) for signature

Overrides: object.___init___ extit(inherited documentation)

check_open(*self*)

Check the device is open. Return True if it is.

set_input_mode(*self*, *c*)

Set which channels to use. c may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2', 'both', 'chboth'

coupling(*self*, *c*, *m*)

Set the coupling mode for channel c to mode m. c may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2', 'both', 'chboth' m may be: 'ac':1, 'dc'

set_sensitivity(*self*, *c*, *v*)

Set the sensitivity of channel c to v volts rms. c may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2', 'both', 'chboth' v is a voltage in the range 0.0 (30mV lowest range) to 30.0.

set_sensitivity_db(*self*, *c*, *v*)

Set the sensitivity of channel c to v volts rms in dB wrt 1V. c may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2', 'both', 'chboth' v is dBV in the range -50.0 to 30.0.

set_frequency(*self*, *m*, *span*, *freq*)

Set the frequency axis of the spectrum. The use of span and freq depends on mode m. 'full': 0->25kHz [span] and [freq] ignored. 'zero_start: 0->[span], [freq] ignored. 'set_start': [freq]->[freq]+[span] 'set_center: [freq]-[span]/2 -> [freq]+[span]/2

display(*self*, *c*, *ym*)

Select which channel(s) to display (c) and the Y scaling mode (ym). c may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2', 'both', 'chboth' ym may be: 'linear', '10dB', '2dB' (per division).

set_amp_ref_level_db(*self*, *r*)

Set the display full scale point to be r dB below input full scale. r will be forced to be a multiple of 10dB.

get_amp_ref_level_db(*self*)

Get the display full scale point in dB.

window(*self*, *w*)

Set the window function to w. w may be: 'flattop', 'hanning', 'uniform'.

start_measurement(*self*, *a*, *c*, *m*)

Start a measurement. The averaging mode is a: 'off', 'rms'. The number of spectra to average is c. This will be made a power of 2 internally. The maximum time to wait for completion is m seconds (rounded up to a multiple of 5). N.B. Call this BEFORE get_spectrum().

read_annotation(*self*)

Read the display annotation.

parse_channel_annotation(*self*, *ann*, *c*)

Return the annotation for channel c. ann is the result of read_annotation(). c may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2'

parse_average_annotation(*self*, *ann*)

Return information on averaging from annotation ann.

parse_bandwidth_annotation(*self*, *ann*)

Return bandwidth information from annotation ann.

get_spectrum(*self*)

Read a spectrum. This returns a tuple: (frq,cha,chb,samps,aok,bok). frq is a NumPy array of frequencies. cha is a NumPy array of channel A amplitudes at the frq frequencies. chb is a NumPy array of channel B amplitudes at the frq frequencies. samps in the number of values in the arrays. aok is True if channel A was measured. bok is True if channel B was measured.

Inherited from GPIBWrap.GPIBInst(Section 1.3)

reset_bus(), set_display_status(), set_dump_gpib(), set_obj(), set_print_error(),

set_print_gpib()

Inherited from object

___delattr___(), ___format___(), ___getattribute___(), ___hash___(), ___new___(), ___reduce___(), ___reduce_ex___(), ___repr___(), ___setattr___(), ___sizeof___(), ___str___(), ___subclasshook___()

1.7.2 Properties

Name	Description
Inherited from object	
___class___	

1.8 Class TEK_710A

object
└
GPIBWrap.GPIBInst
└
GPIBWrap.TEK_710A

Sony/Tektronix RTD-710A Transient Digitizer Object.

1.8.1 Methods

___init___(*self*, *a*, *g*)

x.___init___(...) initializes x; see help(type(x)) for signature

Overrides: object.___init___ extit(inherited documentation)

range(*self*, *c*, *v*)

Set the sensitivity of channel c to v volts. c may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2'

offset(*self*, *c*, *v*)

Set the offset of channel c to v volts. c may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2'

coupling(*self*, *c*, *m*)

Set the coupling mode for channel c. c may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2' m may be: 'ac', 'dc', 'gnd', 'ac_lf_reject', 'ac_hf_reject'

bw_limit(*self*, *b*)

Turn on bandwidth limiting (b=1) or turn it off (b=0).

ch1_only(*self*, *b*)

Turn on Channel 1 only mode (b=1) or turn it off (b=0).

sample_interval(*self*, *t*)

Set the interval between samples to be t seconds.

samples(*self*, *n*)

Set the number of samples to take to n.

sample_hold(*self*, *b*)

Stop sampling (b=1) or start again (b=0).

record_wave(*self*, *waitms*)

Record a waveform. Allow waitms milliseconds for this to complete.

read_wave(*self*, *location*, *c*)

Read a waveform back from a specified location number and channel, c. chan may be: 'a', 'cha', 'b', 'chb', 'ch1', 'ch2'

Inherited from GPIBWrap.GPIBInst(Section 1.3)

reset_bus(), set_display_status(), set_dump_gpib(), set_obj(), set_print_error(), set_print_gpib()

Inherited from object

___delattr___(), ___format___(), ___getattribute___(), ___hash___(), ___new___(), ___reduce___(), ___reduce_ex___(), ___repr___(), ___setattr___(), ___sizeof___(), ___str___(), ___subclasshook___()

1.8.2 Properties

Name	Description
Inherited from object	
__class__	

Index