HINP16C Revision 3
Pin out

Pin number:	1
Pin name:	**NEG_CAP_VDD_LEFT**
Pin type:	Analog input
Description:	Connect to a clean +5VDC.

Pin number:	2
Pin name:	**POS_CAP_GND_LEFT**
Pin type:	Analog input
Description:	Connect to a clean circuit ground.

Pin number:	3
Pin name:	**CFD_AVSS_LEFT**
Pin type:	Analog supply pin. Return currents for channels 0-7 for CFD circuits.
Description:	Connect to circuit ground.

Pin number:	4
Pin name:	**CFD_AVSS_LEFT**
Pin type:	Analog supply pin. Return currents for channels 0-7 for CFD circuits.
Description:	Connect to circuit ground.

Pin number:	5
Pin name:	**DAC_AGND_LEFT**
Pin type:	Analog input
Description:	Analog ground (2.5 Volts)

Pin number:	6
Pin name:	**CFD_AVDD_LEFT**
Pin type:	Analog supply pin. Supply for channels 0-7 for CFD circuits.
Description:	Connect to +5VDC.

Pin number:	7
Pin name:	**CFD_AVDD_LEFT**
Pin type:	Analog supply pin. Supply for channels 0-7 for CFD circuits.
Description:	Connect to +5VDC.

Pin number:	8
Pin name:	**ZC1_AGND_LEFT**
Pin type:	Analog input
Description:	Analog ground (2.5 Volts)

Pin number:	9
Pin name:	**ZC2_AGND_LEFT**
Pin type:	Analog input
Description:	Analog ground (2.5 Volts)

Pin number:	10
Pin name:	**or_out**
Pin type:	Digital output
Description:	The “or_out” pin will be HIGH if any hit register on the chip is set. A LOW on this pin indicates that NONE of the “hit” registers is set.

Pin number:	11
Pin name:	**acq_ack**
Pin type:	Digital output
Description:	The “acq_ack” pin will be HIGH during the acquisition process and will go LOW once all channels have been acquired.

Pin number:	12
Pin name:	**token_in**
Pin type:	Digital input
Description:	This is the token into the chip. It is active LOW.

Pin number:	13
Pin name:	**token_out**
Pin type:	Digital output
Description:	This is the token_out of the chip. It is active LOW. When the line is high, an acquisition is in progress.

Pin number:	14
Pin name:	**veto_rst**
Pin type:	Digital input
Description:	After a channel has been hit, the time-to-voltage and peak sampling circuits as well as the hit and active registers will automatically be reset UNLESS “veto_rst” is asserted (HIGH). The “veto_rst” signal must be continued to be asserted until the time when the automatic reset would have taken place.

Pin number:	15
Pin name:	**force_rst**
Pin type:	Digital input
Description:	A positive going pulse on this line will reset the time-to-voltage and peak sampling circuits as well as the hit and active registers in ALL channels.

Pin number: 16
Pin name: **common_stop**
Pin type: Digital input
Description: When HIGH, halts the time-to-voltage converter in every channel. The time-to-voltage conversions will STOP even if the start conversion signal is still asserted.

Pin number: 17
Pin name: **global_cfd_en**
Pin type: Digital input
Description: When LOW, the CFDs for all channels are DISABLED. When HIGH, a channel's CFD will be enabled provided the corresponding CFD enable bit is a '0' in the configuration register.
IMPORTANT NOTE: After the "global_cfd_en" line is made active, it important that a reset be forced. This is accomplished by applying a positive pulse to the "force_rst" pin.

Pin number: 18
Pin name: **DGND_LEFT**
Pin type: Digital supply pin. Return currents for digital I/O pads.
Description: Connect to circuit ground.

Pin number: 19
Pin name: **DVDD_LEFT**
Pin type: Digital supply pin. Powers digital I/O pads.
Description: Connect to +5VDC.

Pin number: 20
Pin name: **dac_stb**
Pin type: Digital input
Description: Data on the address pins (a0-a5) are latched into an internal address latch on the rising edge of dac_stb. When dac_stb is high, data on the ext_addr lines will alter the DAC output whose channel is select by the address stored in the internal address latch. On the falling edge the data on the address pins will be latched into the DAC register.

IMPORTANT NOTE: Data on address lines a0-a5 must be stable and valid on both rising and falling edge of "dac_stb".

Pin number: 21
Pin name: **dac_sgn**
Pin type: Digital input
Description: While the magnitude of the DAC value is placed on the bidirectional external address lines (a0-a5), the algebraic sign has a dedicated input pin

Pin number: 22
Pin name: **rst**
Pin type: Digital input
Description: Master reset. Resets all of the digital logic. All bits of the configuration register are cleared. All of the DAC registers on chip are also cleared.

Pin number: 23
Pin name: **acq_all**
Pin type: Digital input
Description: A positive-going pulse will set the "hit" register in each of the channels. This can be useful if one wants to force the acquisition of all channels on chip.

Pin number: 24
Pin name: **sin**
Pin type: Digital input
Description: Serial input for 48-bit configuration register. Data on "sin" pin must be valid on rising edge of "sclk".

Pin number: 25
Pin name: **sclk**
Pin type: Digital input
Description: Serial clock for 48-bit configuration register. Data on "sin" pin must be valid on rising edge sclk.

Pin number: 26
Pin name: **force_track**
Pin type: Digital input
Description: When active (HIGH) forces all peak sampling circuits into track mode even if CFDs have not fired. Force_track must be asserted 500 nsec prior to peaking of shaper circuits. Must be held active until all data has been acquired. Releasing force_track causes a reset of peak sampling circuit.

Pin number: 27
Pin name: **quiet**
Pin type: Digital input
Description: When active (HIGH) mutes analog portions of CFD circuits.

Pin number: 28
Pin name: **ENERGY_AGND_LEFT**
Pin type: Analog input
Description: Analog ground (2.5 Volts)

Pin number:	29
Pin name:	**ENERGY_AVSS_LEFT**
Pin type:	Analog supply pin. Return currents for channels 0-7 for shaper, gain amp, and peak sampling circuits.
Description:	Connect to circuit ground.

Pin number:	30
Pin name:	**ENERGY_AVSS_LEFT**
Pin type:	Analog supply pin. Return currents for channels 0-7 for shaper, gain amp, and peak sampling circuits.
Description:	Connect to circuit ground.

Pin number:	31
Pin name:	**ENERGY_AVDD_LEFT**
Pin type:	Analog supply pin. Supply for channels 0-7 for shaper, gain amp, and peak sampling circuits.
Description:	Connect to +5VDC.

Pin number:	32
Pin name:	**ENERGY_AVDD_LEFT**
Pin type:	Analog supply pin. Supply for channels 0-7 for shaper, gain amp, and peak sampling circuits.
Description:	Connect to +5VDC.

Pin number:	33
Pin name:	**NOWLIN_AGND_LEFT**
Pin type:	Analog input
Description:	Analog ground (2.5 Volts)

Pins 34-35: UNUSED

Pin number:	36
Pin name:	**CH_IN0**
Pin type:	Analog input
Description:	Channel 0 detector input

Pin number:	37
Pin name:	**CH_IN1**
Pin type:	Analog input
Description:	Channel 1 detector input

Pin number:	38
Pin name:	**CH_IN2**
Pin type:	Analog input
Description:	Channel 2 detector input

Pin number: 39
Pin name: **CH_IN3**
Pin type: Analog input
Description: Channel 3 detector input

Pin number: 40
Pin name: **CH_IN4**
Pin type: Analog input
Description: Channel 4 detector input

Pin number: 41
Pin name: **CH_IN5**
Pin type: Analog input
Description: Channel 5 detector input

Pin number: 42
Pin name: **CH_IN6**
Pin type: Analog input
Description: Channel 6 detector input

Pin number: 43
Pin name: **CH_IN7**
Pin type: Analog input
Description: Channel 7 detector input

Pin number: 44
Pin name: **CSA_AVDD**
Pin type: Analog supply pin
Description: Connect to +5VDC.

Pin number: 45
Pin name: **CSA_AVDD**
Pin type: Analog supply pin
Description: Connect to +5VDC.

Pin number: 46
Pin name: **CSA_AVSS**
Pin type: Analog supply pin
Description: Connect to circuit ground

Pin number: 47
Pin name: **CSA_AVSS**
Pin type: Analog supply pin
Description: Connect to circuit ground

Pin number: 48
Pin name: **CSA_REF**
Pin type: Analog input
Description: This is a reference voltage for the CSA circuits. For negative polarity, connect to 4.0 VDC. For positive polarity, connect to 5.0 VDC.

Pin number: 49
Pin name: **CH_IN8**
Pin type: Analog input
Description: Channel 8 detector input

Pin number: 50
Pin name: **CH_IN9**
Pin type: Analog input
Description: Channel 9 detector input

Pin number: 51
Pin name: **CH_IN10**
Pin type: Analog input
Description: Channel 10 detector input

Pin number: 52
Pin name: **CH_IN11**
Pin type: Analog input
Description: Channel 11 detector input

Pin number: 53
Pin name: **CH_IN12**
Pin type: Analog input
Description: Channel 12 detector input

Pin number: 54
Pin name: **CH_IN13**
Pin type: Analog input
Description: Channel 13 detector input

Pin number: 55
Pin name: **CH_IN14**
Pin type: Analog input
Description: Channel 14 detector input

Pin number: 56
Pin name: **CH_IN15**
Pin type: Analog input
Description: Channel 15 detector input

Pin number: 57
Pin name: **PULSER_AVSS**
Pin type: Analog supply pin
Description: Connect to circuit ground for the pads.

Pin number: 58
Pin name: **PULSER_AVDD**
Pin type: Analog supply pin
Description: Connect to +5VDC for the pads.

Pin number: 59
Pin name: **ODD_PULSER**
Pin type: Analog input
Description: Pulser input for odd channels (1, 3, 5, 7, etc.)

Pin number: 60
Pin name: **EVEN_PULSER**
Pin type: Analog input
Description: Pulser input for even channels (0, 2, 4, 6, etc.)

Pin 61: UNUSED

Pin number: 62
Pin name: **NOWLIN_AGND_RIGHT**
Pin type: Analog input
Description: Analog ground (2.5 Volts)

Pin 63: UNUSED

Pin number: 64
Pin name: **EXT_SHAPER**
Pin type: Analog input
Description: Can be used to apply a simulated SHAPER signal to the PEAK SAMPLING circuit. For this to happen the configuration register bit 37 should be active high.

Pin number: 65
Pin name: **ENERGY_AVDD_RIGHT**
Pin type: Analog supply pin. Supply for channels 8-15 for shaper, gain amp, and peak sampling circuits.
Description: Connect to +5VDC.

Pin number:	66
Pin name:	**ENERGY_AVDD_RIGHT**
Pin type:	Analog supply pin. Supply for channels 8-15 for shaper, gain amp, and peak sampling circuits.
Description:	Connect to +5VDC.

Pin number:	67
Pin name:	**ENERGY_AVSS_RIGHT**
Pin type:	Analog supply pin. Return currents for channels 8-15 for shaper, gain amp, and peak sampling circuits.
Description:	Connect to circuit ground.

Pin number:	68
Pin name:	**ENERGY_AVSS_RIGHT**
Pin type:	Analog supply pin. Return currents for channels 8-15 for shaper, gain amp, and peak sampling circuits.
Description:	Connect to circuit ground.

Pin number:	69
Pin name:	**ENERGY_AGND_RIGHT**
Pin type:	Analog input
Description:	Analog ground (2.5 Volts)

Pin number:	70
Pin name:	**sout**
Pin type:	Digital output
Description:	Serial output from 48-bit configuration register.

Pin number:	71
Pin name:	**sel_ext_addr**
Pin type:	Digital input
Description:	When HIGH, this signal selects the external address as input to the 5-32 decoder used for selecting one of the 16 channels. When HIGH, makes a0-a5 lines as well as id0-id7 lines *inputs*.

Pin number:	72
Pin name:	**id7**
Pin type:	Bidirectional.
Description:	Bit 7 of the chip identification code. When "sel_ext_addr" is HIGH, id7 is an *input*.

Pin number:	73
Pin name:	**id6**
Pin type:	Bidirectional.
Description:	Bit 6 of the chip identification code. When "sel_ext_addr" is HIGH, id6 is an *input*.

Pin number: 74
Pin name: **id5**
Pin type: Bidirectional.
Description: Bit 5 of the chip identification code. When "sel_ext_addr" is HIGH, id5 is an *input*.

Pin number: 75
Pin name: **id4**
Pin type: Bidirectional.
Description: Bit 4 of the chip identification code. When "sel_ext_addr" is HIGH, id4 is an *input*.

Pin number: 76
Pin name: **id3**
Pin type: Bidirectional.
Description: Bit 3 of the chip identification code. When "sel_ext_addr" is HIGH, id3 is an *input*.

Pin number: 77
Pin name: **id2**
Pin type: Bidirectional.
Description: Bit 2 of the chip identification code. When "sel_ext_addr" is HIGH, id2 is an *input*.

Pin number: 78
Pin name: **id1**
Pin type: Bidirectional.
Description: Bit 1 of the chip identification code. When "sel_ext_addr" is HIGH, id1 is an *input*.

Pin number: 79
Pin name: **id0**
Pin type: Bidirectional.
Description: Bit 0 of the chip identification code. Least significant bit. When "sel_ext_addr" is HIGH, id0 is an *input*.

Pin number: 80
Pin name: **DVDD_RIGHT**
Pin type: Digital supply pin. Powers digital I/O pads.
Description: Connect to +5VDC.

Pin number: 81
Pin name: **DGND_RIGHT**
Pin type: Digital supply pin. Return currents for digital I/O pads.
Description: Connect to circuit ground.

Pin number: 82
Pin name: **a4**
Pin type: Bidirectional
Description: This is external address line a4. See description for address line a0.

Pin number: 83
Pin name: **a3**
Pin type: Bidirectional
Description: This is external address line a3. See description for address line a0.

Pin number: 84
Pin name: **a2**
Pin type: Bidirectional
Description: This is external address line a2. See description for address line a0.

Pin number: 85
Pin name: **a1**
Pin type: Bidirectional
Description: This is external address line a1. See description for address line a0.

Pin number: 86
Pin name: **a0**
Pin type: Bidirectional
Description: This is external address line a0. When the “sel_ext_addr” pin is HIGH, this line will be a DIGITAL INPUT and is the least significant bit of the address of the channel the user wishes to select. When the “sel_ext_addr” pin is LOW, this line will be a DIGITAL OUTPUT and will be the least significant bit of the address of the channel that is currently in need of attention.

Pin number: 87
Pin name: **acq_clk**
Pin type: Digital input
Description: This is the clock signal used for acquisition. The rising edge of “acq_clk” causes the active register to be set in a channel whose “hit” register is set AND whose “token_in” is active i.e. LOW. The falling edge of “acq_clk” in turn causes the “hit” register and “active” register to be cleared. This is turn will potentially allow the “token_out” of the channel to be active i.e. LOW; thereby, enabling the next channel in the chain.

Pin number: 88
Pin name: **cfd_out**
Pin type: Digital output
Description: This is the output (for the selected channel) of the 100 ns one-shot that is triggered by the narrow output pulse from the CFD. The CFD outputs from all 16 channels are multiplexed. This is the output of the multiplexer.

Pin number: 89
Pin name: **ZC2_AGND_RIGHT**
Pin type: Analog input
Description: Analog ground (2.5 Volts)

Pin number: 90
Pin name: **ZC1_AGND_RIGHT**
Pin type: Analog input
Description: Analog ground (2.5 Volts)

Pin number: 91
Pin name: **CFD_AVDD_RIGHT**
Pin type: Analog supply pin. Supply for channels 8-15 for CFD circuits.
Description: Connect to +5VDC.

Pin number: 92
Pin name: **CFD_AVDD_RIGHT**
Pin type: Analog supply pin. Supply for channels 8-15 for CFD circuits.
Description: Connect to +5VDC.

Pin number: 93
Pin name: **DAC_AGND_RIGHT**
Pin type: Analog input
Description: Analog ground (2.5 Volts)

Pin number: 94
Pin name: **CFD_AVSS_RIGHT**
Pin type: Analog supply pin. Return currents for channels 8-15 for CFD circuits.
Description: Connect to circuit ground.

Pin number: 95
Pin name: **CFD_AVSS_RIGHT**
Pin type: Analog supply pin. Return currents for channels 8-15 for CFD circuits.
Description: Connect to circuit ground.

Pin number: 96
Pin name: **POS_CAP_GND_RIGHT**
Pin type: Analog input
Description: Connect to a clean circuit ground.

Pin number: 97
Pin name: **NEG_CAP_VDD_RIGHT**
Pin type: Analog input
Description: Connect to a clean +5VDC.

Pins 98-99: UNUSED

Pin number: 100
Pin name: **TVC_CAP_GND_RIGHT**
Pin type: Analog input
Description: Connect to a clean circuit ground.

Pin number: 101
Pin name: **TVC_AVSS_RIGHT**
Pin type: Analog supply pin. Return currents for channels 8-15 for TVC circuits.
Description: Connect to circuit ground.

Pin number: 102
Pin name: **TVC_AVSS_RIGHT**
Pin type: Analog supply pin. Return currents for channels 8-15 for TVC circuits.
Description: Connect to circuit ground.

Pin number: 103
Pin name: **TVC_AVDD_RIGHT**
Pin type: Analog supply pin. Supply for channels 8-15 for TVC circuits.
Description: Connect to +5VDC.

Pin number: 104
Pin name: **TVC_AVDD_RIGHT**
Pin type: Analog supply pin. Supply for channels 8-15 for TVC circuits.
Description: Connect to +5VDC.

Pin number: 105
Pin name: **SUBSTRATE**
Pin type: Analog input
Description: Biases silicon substrate. Connect to clean circuit ground.

Pin number: 106
Pin name: **MULTIPLICITY**
Pin type: Analog output
Description: Analog output voltage proportional to the number of channels whose hit registers is currently set.

Pin number: 107
Pin name: **hit_transfer**
Pin type: Digital input
Description: Rising edge on this will transfer the contents of the shadow hit register into the hit register.

Pin number: 108
Pin name: **hit_sout**
Pin type: Digital output
Description: Serial output from shadow hit register.

Pin number: 109
Pin name: **hit_sclk**
Pin type: Digital input
Description: Serial clock for shadow hit register. Data on “sin” pin must be valid on rising edge “sclk”.

Pin number: 110
Pin name: **hit_sin**
Pin type: Digital input
Description: Serial input for shadow hit register. Data on “sin” pin must be valid on rising edge of “sclk”.

Pin number: 111
Pin name: **DVDD**
Pin type: Digital supply pin for common digital circuits, CFDs, and reset logic
Description: Connect to +5VDC.

Pin number: 112
Pin name: **DVDD**
Pin type: Digital supply pin for common digital circuits, CFDs, and reset logic
Description: Connect to +5VDC.

Pin number: 113
Pin name: **DGND**
Pin type: Digital supply pin for above.
Description: Connect to circuit ground.

Pin number:	114
Pin name:	**DGND**
Pin type:	Digital supply pin for above.
Description:	Connect to circuit ground.

Pin number:	115
Pin name:	**DLY_VC**
Pin type:	Analog input
Description:	Control voltage that determines the time delay between a channel being hit and the automatic reset of the time-to-voltage converter, the peak sampling circuit, and the active and hit registers in that channel.

Pin number:	116
Pin name:	**SHAPER_OUT**
Pin type:	Analog output
Description:	Shaper output for the selected channel. Only available if the "test mode 4" bit in the configuration register is a '1'.

Pin number:	117
Pin name:	**CSA_OUT**
Pin type:	Analog output
Description:	CSA output for the selected channel. Only available if the "test mode 1" bit in the configuration register is a '1'.

Pin number:	118
Pin name:	**PEAK_OUT**
Pin type:	Analog output
Description:	Peak amplitude of shaper signal for the selected channel.

Pin number:	119
Pin name:	**TVC_OUT**
Pin type:	Analog output
Description:	Analog output voltage proportional to the duration of time that has elapsed between the channel being hit (the one presently selected) and the assertion of the "common_stop" signal.

Pin number:	120
Pin name:	**TVC_AVSS_LEFT**
Pin type:	Analog supply pin. Return currents for channels 0-7 for TVC circuits.
Description:	Connect to circuit ground.

Pin number:	121
Pin name:	**TVC_AVSS_LEFT**
Pin type:	Analog supply pin. Return currents for channels 0-7 for TVC circuits.
Description:	Connect to circuit ground.

Pin number:	122
Pin name:	**TVC_AVDD_LEFT**
Pin type:	Analog supply pin. Supply for channels 0-7 for TVC circuits.
Description:	Connect to +5VDC.

Pin number:	123
Pin name:	**TVC_AVDD_LEFT**
Pin type:	Analog supply pin. Supply for channels 0-7 for TVC circuits.
Description:	Connect to +5VDC.

Pin number:	124
Pin name:	**TVC_CAP_GND_LEFT**
Pin type:	Analog input
Description:	Connect to a clean circuit ground.

Pins 125-128:	UNUSED