

# Data Extraction

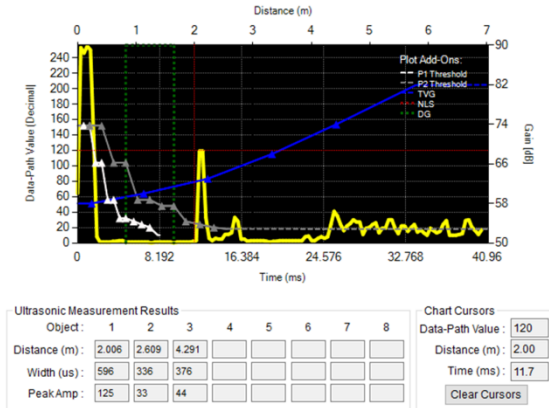
## TI Precision Labs - Ultrasonic Position Sensing

Presented by Akeem Whitehead

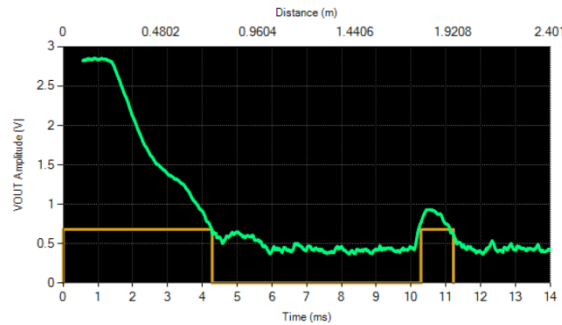
Prepared by Akeem Whitehead

# Output Types

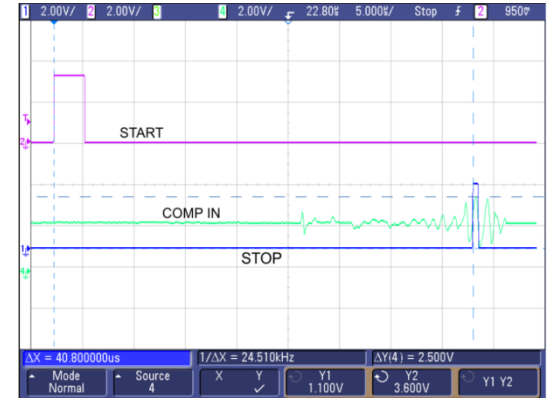
There are a variety of ultrasonic measurement result output options:



Digital Interface



Analog Waveform



Hybrid Analog/Digital

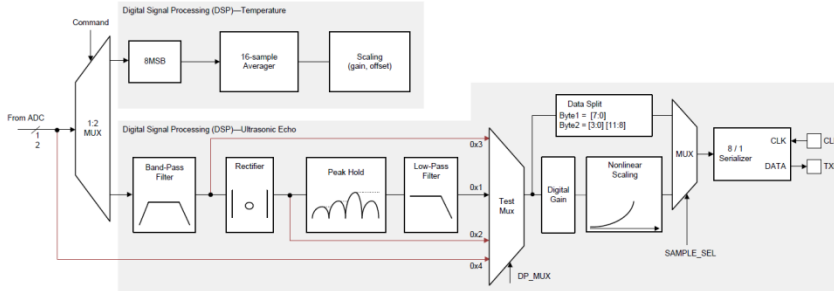
# Digital Interface Output

PGA460 device supports the following digital interfaces:

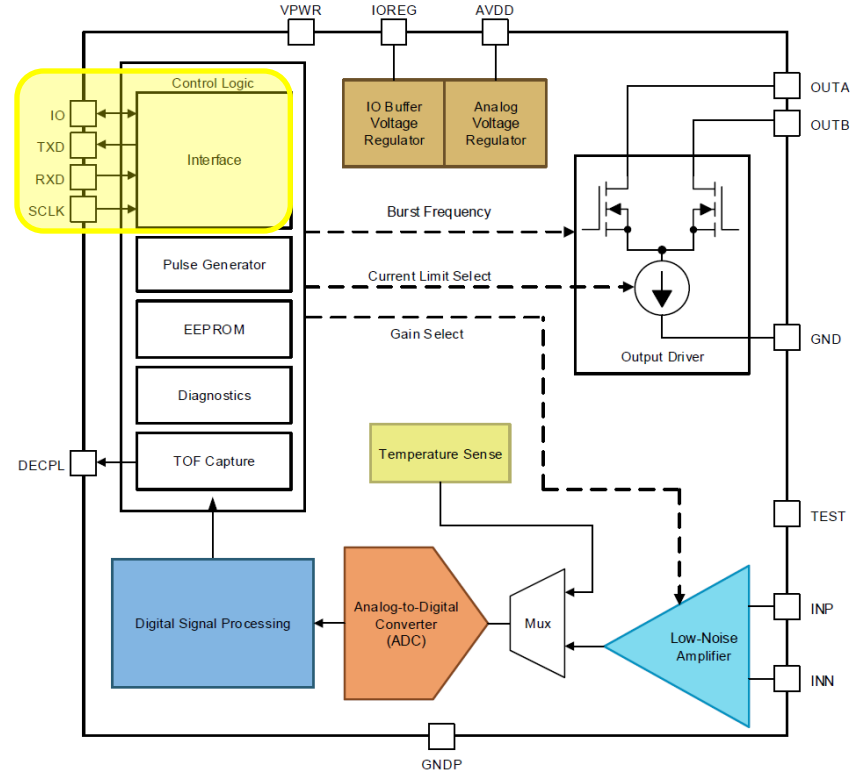
- UART / USART
- Time Command Interface (TCI)
- One-Wire UART (OWU)

Data points that can be extracted by a controller:

CMD[4:0]	COMMAND NAME	PGA460-Q1 RESPONSE	M-TO-S DATA BYTES	MASTER-TO-SLAVE DATA BYTES DESCRIPTION	S-TO-M DATA BYTES	SLAVE-TO-MASTER DATA BYTES DESCRIPTION
<b>SINGLE ADDRESS</b>						
5	Ultrasonic measurement result <sup>(1)(2)</sup>	Yes	0		4 × N	Byte1–Byte2: Object 1 time-of-flight (μs) (MSB, LSB) Byte3: Object 1 width Byte4: Object 1 peak amplitude  Byte(3 × N – 3) – Byte(3 × N – 2): Object N time-of-flight (μs) (MSB, LSB) Byte(4 × N – 1): Object N width Byte(4 × N): Object N peak amplitude
6	Temperature and noise level result	Yes	0		2	Byte1: Temperature value Byte2: Noise level value
7	Transducer echo data dump	Yes	0		128	Byte1–Byte128: Echo data dump (array of 128 samples)
8	System diagnostics <sup>(3)</sup>	Yes	0		2	Byte1: Transducer frequency Byte2: Decay period time

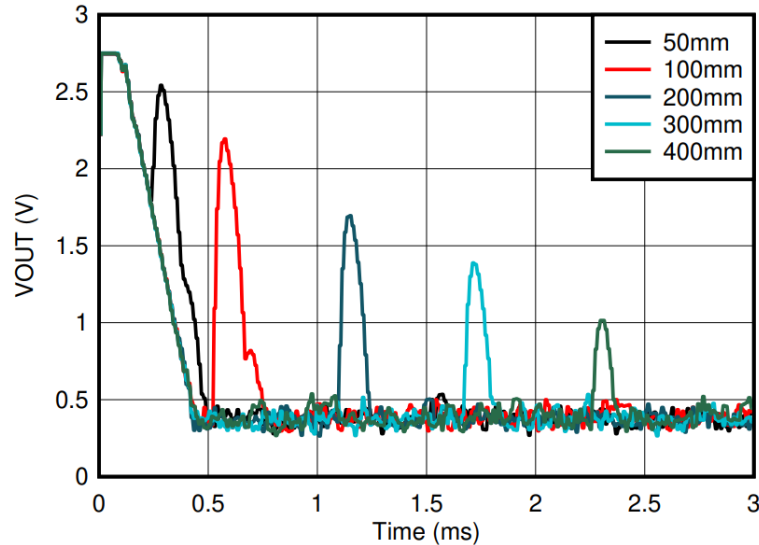


This feature is only possible in USART Synchronous Mode.

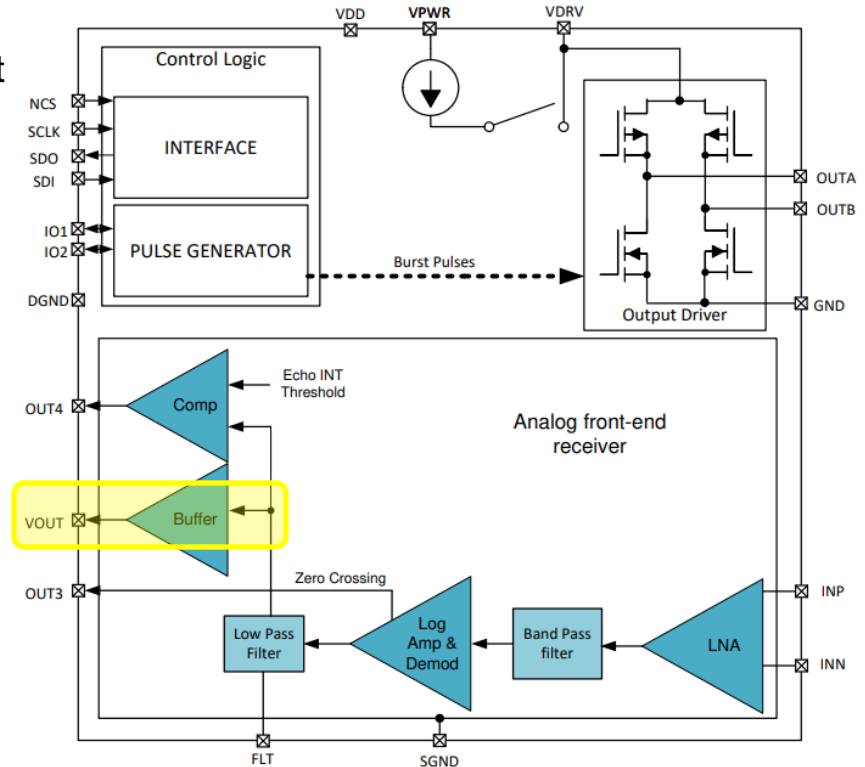


# Analog Waveform Output

TUSS44x0 supports a demodulate log amp output that must be captured by an external ADC for post-processing to extract the time-of-flight information.

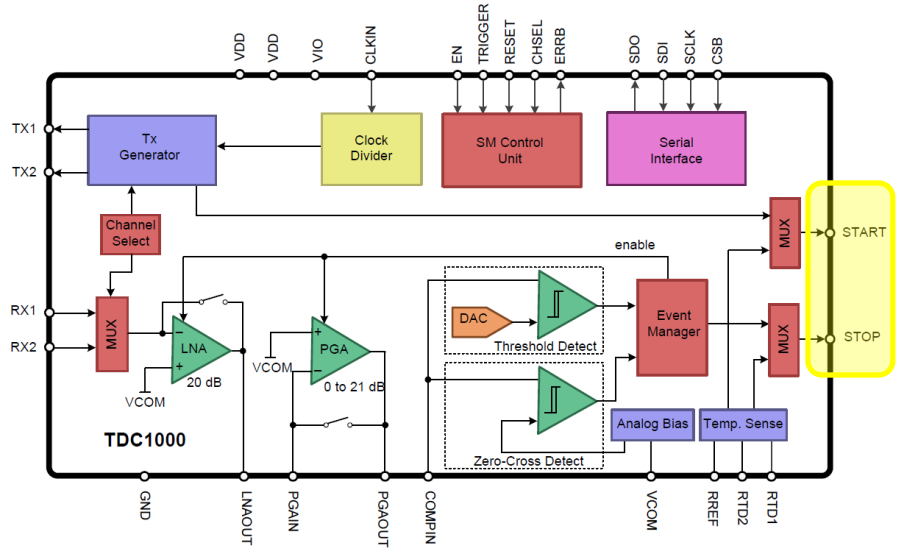
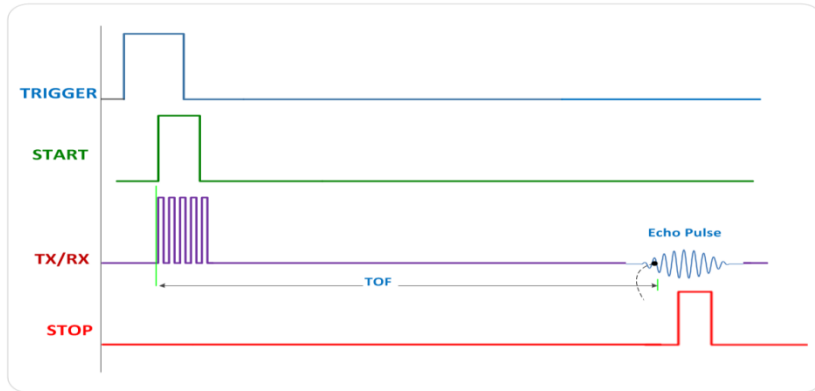


TUS4470 400 kHz Ranging at 20-V Driver Example



# Hybrid Output

TDC10xx generates an output pulse on the START pin, which is used as the time reference to begin a TOF measurement. The receiver detects the ultrasound wave that traveled through the medium and generates STOP signals.



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