

Three Channel IEPE Interface Module

MODEL 6006

Key Features

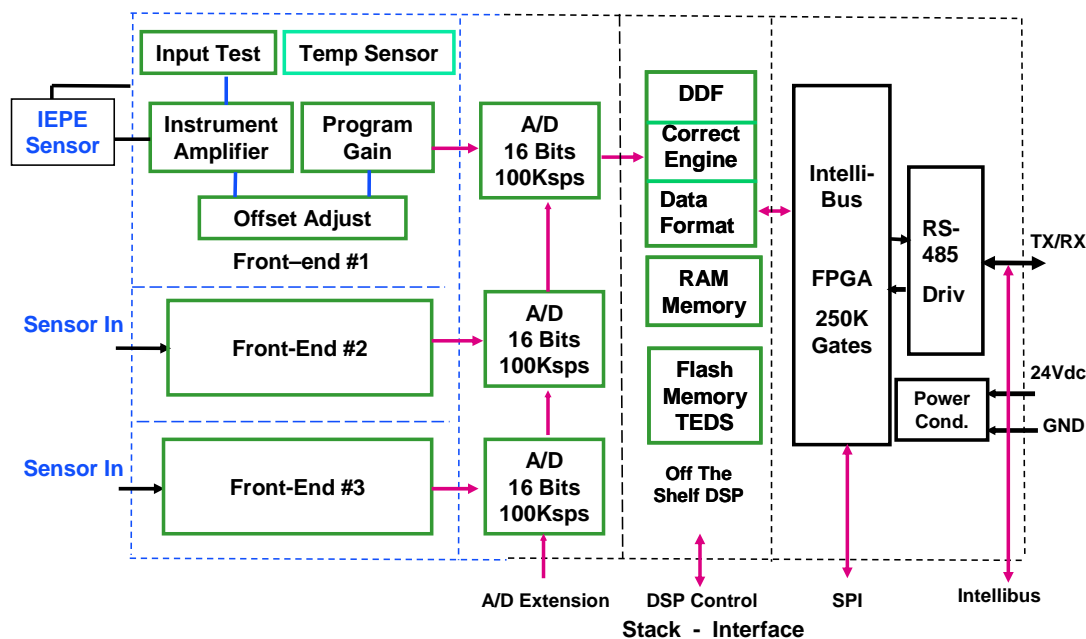
- 3 Integral Electronic Piezoelectric Transducer Inputs
- Programmable Gain and Offset
- Programmable Digital Filter
 - 64 Order FIR Type
 - Filter Corners: 10 Hz to 12 KHz
- A/D Converter
 - 16 Bits, Programmable Sample Rate up to 250 Ksps/ch, 300 Ksps Aggregate
- IntelliBus Network Interface



1.5" x 1.5" x 0.6"

Description

VIP's Module Model 6006 is the same than the Model 6003 but with IEPE inputs. It consists of three channels of instrumentation amplifiers with programmable gain (0.5 to 1000) and programmable offset which allow conditioning of Integral Electronics Piezoelectric accelerometers. Each of the front end signal conditioners is followed by two selectable 3-pole anti-aliasing filters, one with a cut-off frequency at 2 kHz and another at 360 Hz. There is one 16-bit A/D converter per channel with programmable sample rate up to 250 ksps, but the aggregate rate for all three channels must be less than 300 kHz. The Base IBIM Model 6006 constitutes a node in the network; therefore it has its own address and accesses IntelliBus directly.



Functional Block Diagram

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Description

Over-sampled data is acquired simultaneously in all three channels and piped into a powerful DSP processor capable of implementing real time digital signal processing algorithms. The processor also performs self-testing functions of its electronics.

Each of the IBIM Channels have dedicated non-volatile memory to store the Transducer Electronic Data Sheet (TEDS)

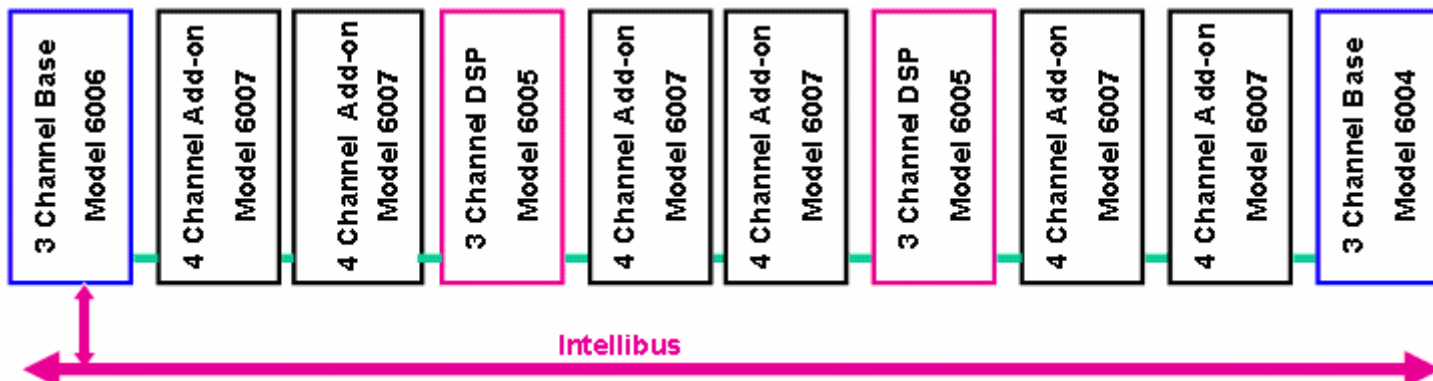
Filters (programmable filter types and corner frequencies, such as 6 pole low pass type), are easily implemented by choosing the proper filter coefficients and storing them as part of TEDS through the transducer bus.



Base with Stack-Up Access

Multiple IBIM's may be stacked to increase the channel count density per node. The Model 6006, underneath its top plate, contains the necessary connectors to support stacking of multiple modules.

Interconnection within a stack is done through the SPI port, the DSP processor control lines or through IntelliBus without the need of additional bus connectors. A single Base Module may support up to thirty three channel stack with one node bus address as shown below. An additional Base Add-on module 6004 with its own node address may expand the stack to another set of thirty three channels without the need of additional IntelliBus connectors.



IBIM Stack: The Three Channel Base Module Allows Stacking up to 33 Channels With a Single IntelliBus Network Drop Address

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SPECIFICATIONS

The following performance specifications are at +75°F (+24°C) and 100 Hz, unless otherwise noted.

IEPE Input

Compliance Voltage	24V
Constant Current Excitation	3.95 mA
Full Scale Input Voltage	5 V pk-pk

Electrical Transfer Characteristics

Gain	Programmable 0.5 to 1000
Accuracy	0.2%
Linearity	0.005%
Bandwidth Without Filter	DC to $\geq 30K$ Hz
Anti-aliasing Low Pass Filter	3 pole Butterworth
-3dB Upper Freq. Corner	2,000 Hz or 360 Hz S/W selectable and factory customized
Programmable Filter	64th Order FIR type – TEDS programmable coefficients
Programmable Cutoff Freq	Proportional to SR, decimat. factor and coefficients. See appl Notes
Residual Noise	< 2mV RMS RTO
Analog/Digital Conversion	196 Ksps maximum or 250 Ksps aggregate for all 3 chann
Resolution	16-Bits

Electrical Output Characteristics

Excitation Voltage Output	5Vdc 40 mA Maximum
Transducer Bus	½ Duplex IntelliBus compatible
Data Rate	15Mbps. See sample rate Vs Number of IBIMs plot
Supply Voltage	12 to 28 VDC 2.4 Watts Maximum
Warm-Up Time	3 seconds to within 10% of final basis
Case Isolation	Output and signal ground, 100 MΩ minimum @ 100 Vdc

ENVIRONMENTAL CONDITIONS (MIL-STD-810)

Temperature	Operating -40°F TO 185°F (-40°C TO +85°C) Non-operating -76°F TO 302°F (-60°C TO +150°C)
Vibration	Sine 30g, 10 Hz to 2,000 Hz Random 30g, 10z to 2,00 Hz
Shock	50g, half sine
Humidity	95% RH non-condensing
EMI	Per MIL-STD-461, 462

PHYSICAL

Case Material	Anodized Aluminum
Network Cable Type	Double shielded 2 pairs, 24AWG: Tensolite NF24Q100-01
IntelliBus Connector	Lemo: FGG-OB-304-CLAD42 and FGG-OB-304-CLLD42

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Digital Filter:

Different analysis and control functions may be implemented using DSP algorithms that can be downloaded to an IBIM through the transducer bus. A 64 order FIR filter is provided as a standard function. Its coefficients may be customized and downloaded through the IntelliBus network as part of the system setup and stored in TEDS memory. The low pass filter cutoff frequency (F_c) is determined by the A/D sample frequency and a preset constant

$$F_c = F_{ad}/R$$

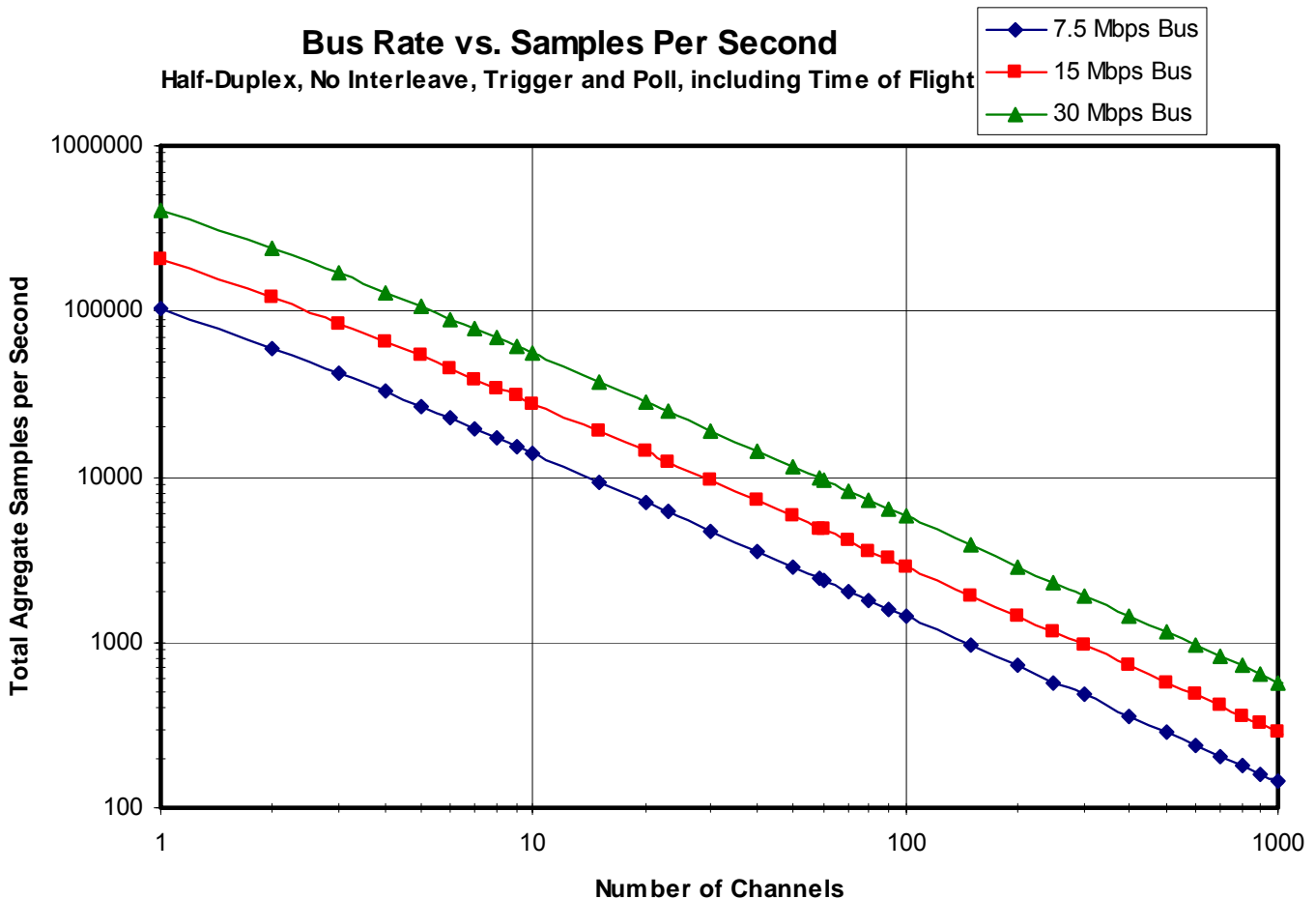
Where $R = 4, 8, 12, 16, 24, 32$

The Sample rate frequency over the transducer bus (F_s) is determined by the A/D sample frequency and the decimation factor D

$$F_s = F_{ad}/D$$

Where $D \leq R/2$ Integer

One of the two anti-aliasing filters is selected depending on the over sample frequency according to the Nyquist criteria. The recommended over sample frequency should be between 100 kHz and 16 kHz when the 2 kHz anti-aliasing filter is used, or between 11,520 Hz and 2,880 Hz when the 360 Hz anti-aliasing filter is used.



Bus Transfer Rate – Sample Rate Versus Number of IBIMs