The RZ5D BioAmp Processor

System 3

Overview. The RZ5D is a versatile solution for real-time processing and simultaneous acquisition and stimulation. It combines the power of user programmable digital signal processing and an optimized communications interface with support for Z-Series amplifiers, headstage manifolds, and stimulators. The RZ5D standard configuration includes one standard DSP and two specialized DSPs, which can be used either to analyze and store acquired data or to generate stimuli. Fiber optic input and output ports ensure low noise, optical isolation, and flexible system configuration. This versatility makes the RZ5D a very cost effective solution for users who need a multichannel recording system, 16 to 32 channels, and/or a system for electrical stimulation.

Data can be input from a PZ amplifier or digital headstage manifold at a sampling rate of up to ~50 kHz. Used with one of these devices, the system can provide excellent dynamic range for wide bandwidth multichannel acquisition in a compact package.

The RZ5D also supports microstimulation applications. The RZ5D can be used with TDT's IZ2 stimulus isolator, for up to 128 channels of stimulation, to comprise a complete microstimulation system.

The RZ5D also features eight channels of analog I/O, 24 bits of digital I/O and an onboard monitor speaker with volume control. PCM analog outputs support a wide variety of signal production tasks, including control of motors and monitoring analog signals during acquisition.

Software Control. Software control is implemented with circuit files developed using TDT's RP Visual Design Studio (RPvdsEx). Circuits are loaded to the processor through TDT run-time applications such as OpenEx or custom applications via ActiveX controls.

Power and Communication. The Optical Gigabit PC interface ensures fast and reliable data transfer from the RZ5D to the PC and is integrated into the device. The RZ5D's power supply is also integrated into the device and is shipped from the factory configured for the desired voltage setting (110 V or 220 V).

PZ Amplifier Fiber Optic Port. The port labeled PZ is a high-speed fiber optic port that allows a direct connection to a Z-Series preamplifier. It can input up to 32 channels at a maximum sampling rate of ~50 kHz.

IZ Stimulator Fiber Optic Port. The output port labeled IZ can be used to transfer microstimulation waveforms to the IZ2 Stimulator. This port can output up to 128 channels of stimulation at a maximum sampling rate of ~50 kHz.

RZ5 Base Station Part Numbers:
RZ5D, BioAmp Processor with 3 DSPs
RZDSP, DSP for RZ Processor

The RZ5D BioAmp Processor

Digital Input/Output. The digital I/O is divided into three bytes (A, B, and C). All digital I/O lines are accessed via the 25-pin connector on the front of the RZ5D and bits 0 - 3 of byte C are available through BNC connectors on the front panel labeled Digital I/O.

Onboard Analog Input/Output. The RZ5D is equipped with four channels of 16-bit PCM D/A and four channels of 16-bit PCM A/D. All eight channels can be accessed via front panel BNCs marked ADC and DAC or via a 25-pin analog I/O connector.

Technical Specifications for the RZ5D BioAmp Processor

The RZ5D is rack mountable in a standard 19" rack and is 3 U (5 1/4") tall.

DSPs:	Three or four: 400 MHz DSPs, 2.4 GFLOPS peak per DSP
Memory:	64 MB SDRAM per DSP
Digital-to-Analog Converter:	4 channels, 16-bit PCM
Sample Rate:	Up to 48828.125 Hz
Frequency Response:	DC-0.44*Fs (Fs=sample rate)
Voltage Out:	+/- 10.0 V
Signal-to-Noise (typical):	82 dB (20 Hz - 20 kHz at 9.9 V)
Output Impedance	10 Ohms
Analog-to-Digital Converter:	4 channels, 16-bit PCM
Sample Rate:	Up to 48828.125 Hz
Frequency Response:	DC - 7.5 kHz (3 dB corner, 2nd order, 12 dB per octave)
Voltage In:	+/- 10.0 V
Signal-to-Noise (typical):	82 dB (20 Hz - 7.5 kHz at 9.9 V)
Input Impedance	10 KOhms
IZ Fiber Optic Port:	One output for IZ2, up to 128 channels
PZ Fiber Optic Port :	One input for PZ2, PZ4, or PZ5; up to 32 channels
Digital Input/Output:	8 programmable bits: 3.3 V, 25 mA max load
	2 programmable bytes (16 bits): 5.0 V, 35 mA max load