Quad/Octal Channel Real-Time Serial Interface Model 6075

◆ **Full-Function RS-232/RS-422/RS-485 Serial with 256 k Buffer per Channel**

◆ **Asynchronous and SDLC Modes Supported; Custom Modes Possible**

◆ **Baud Rates From 50 to 460.8 k with Internal Clock**

◆ **Fast data transfer: up to 4 MByte/s over VXI Backplane.**

◆ **Programmable Termination Resistors for RS-485 Half Duplex Operation**

◆ **Allows Continuous, Real-Time Serial Data Transfer yet Minimal VXI Overhead**

◆ **Replacement for the Legacy 6065P at the Instrument Driver Level**

The 6075 is a C-size VXI module that provides four or eight RS-232/RS-422 and RS-485 serial interfaces in a single VXI slot. Data transmission and reception can be done with word serial messages or transparently by passing data through VXI Fast Data Channel buffers. Standard firmware supports asynchronous data transmission at rates up to 460.8 k baud. Bit rates up to 1 Mb/s and other formats are possible with special firmware. Eight channel units have a programmable timing pulse output with periods from 0.1 ms to 3 seconds. A four character LED display on the front panel shows self-test status, device activity, errors,

SYSFAIL and diagnostics as alphanumeric messages.

Serial Interfaces
Each Serial channel can be set for RS-232, RS-422 or RS-485 signals. Baud rates, character formats, transmission mode and terminations are independently programmable for each channel. Baud rates for asynchronous data are selectable in all of the standard rates up to 460.8 k baud or to the closest divider value for non-standard rates. The 6075 can generate internal clocks or accept external clock inputs for isochronous systems. All operating parameters can

be configured or queried from the VXIbus and are saved in nonvolatile flash memory.

Each channel is assigned 256 kbytes of buffer space, 128 kbytes for transmit data and 128 kbytes for received data. Outgoing VXIbus data can be transferred to the module as a word serial message or placed in the Fast Data Channel buffer. Received data is buffered and held until read by the VXIbus controller. The received data can be read via Fast Data Channel transfers or as word serial messages.

Applications

There are numerous applications for a 6075 in a VXIbus test system. The serial interfaces on a standard 6075 supports asynchronous communication for testing all types of devices with RS-232 and/or RS-422/RS-485 interfaces. Devices requiring synchronous bytes, IBM bisync or other synchronous bit-oriented protocols such as IBM's HDLC can be tested by adding custom firmware to the 6075.

The 6075 can also be used to add communication links to the VXI system or output data to terminals, printers, or plotters.

Front Panel Display

The four character alphanumeric display on the front panel provides module status, SYSFAIL display, error codes and device activity information to the user. At power turn-on, the display shows SysF while SYSFAIL is asserted, then when self test is completed, the display steps through its identification sequence to display Rdy for the start of normal operation. During normal operation the display shows the currently addressed logical device. The display Mode Button changes the display mode to show an extended list of messages for debugging purposes, the module's VXI address switch setting and VXI Protocol status.


Fast Data Channel Advantages

In the past, the VXI system designer has had to chose between the ease of programming of a message-based module versus the speed of a register-based module. The data transfer rate of a message based module is limited by the VXI word serial message protocol transfer rate over the VXIbus to 10 Kbytes/second. The 10 kbytes per second assumes the VXIbus does nothing else.

The 6075 overcomes this limitation by transferring data through the VXI Fast Data Channels at rates up to 4 Mbytes/second. Each 6075 serial channel has two pairs of buffers, one pair for transmit data and one pair for receive data. Each buffer pair operates as an A-B buffer pair and appears as an extension of the VXI Controller's memory space. In the transmit direction, the Controller fills one buffer while the module transmits data from the other buffer. In the receive direction, the receiver fills one buffer while the controller empties the other buffer.

Fast Data channel transfers over the VXI backplane run at rates up to 4 Mbytes/second and easily sustains continuous operation for eight channels operating simultaneously with a combined baud rate up to 460,800 baud.

RS-485 Termination Resistors

RS-485 transmission systems require termination resistors to minimize noise and to bias the line into a known state when nothing is being transmitted.
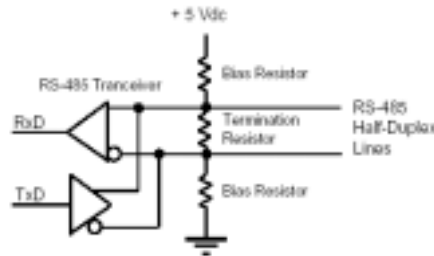
The figure shows how the terminating and bias resistors are used in a typical half-duplex circuit. If the serial channel is being used for RS-485 data transmission, an internal set of termination and bias resistors can be switched on the Tx/Rx signal pair. For

RS-422 data transmission, the resistors can be switched on the Tx signal line. Standard values are 150 ohms for the load resistor and 2.2 k ohm for the pullup and pulldown bias resistors.

Status Byte and VXIbus Interrupts

The Fast Data Channels can be set to generate VXI interrupts when there is data in the buffers, when a preset number of data bytes have been received or when the buffer is full. When the Word Serial Messages are selected, the serial channels can generate interrupts when a message has been received. Using interrupts lets data transfer occur as a background task and minimizes the programming effort.
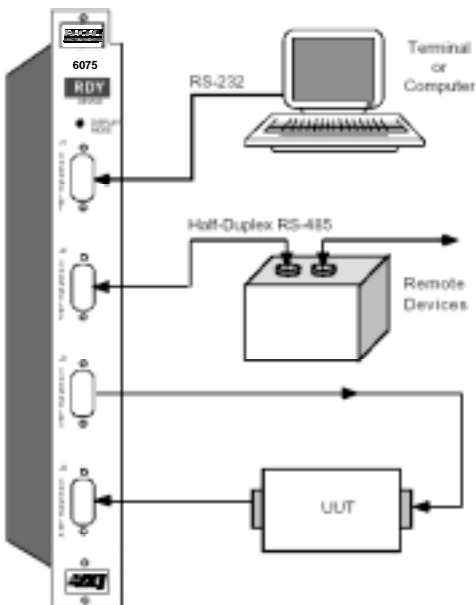
A working example using VISA and the 6075 driver that uses interrupts to make receiving data a background task is provided in the 6075 User Manual and with the driver install disk.
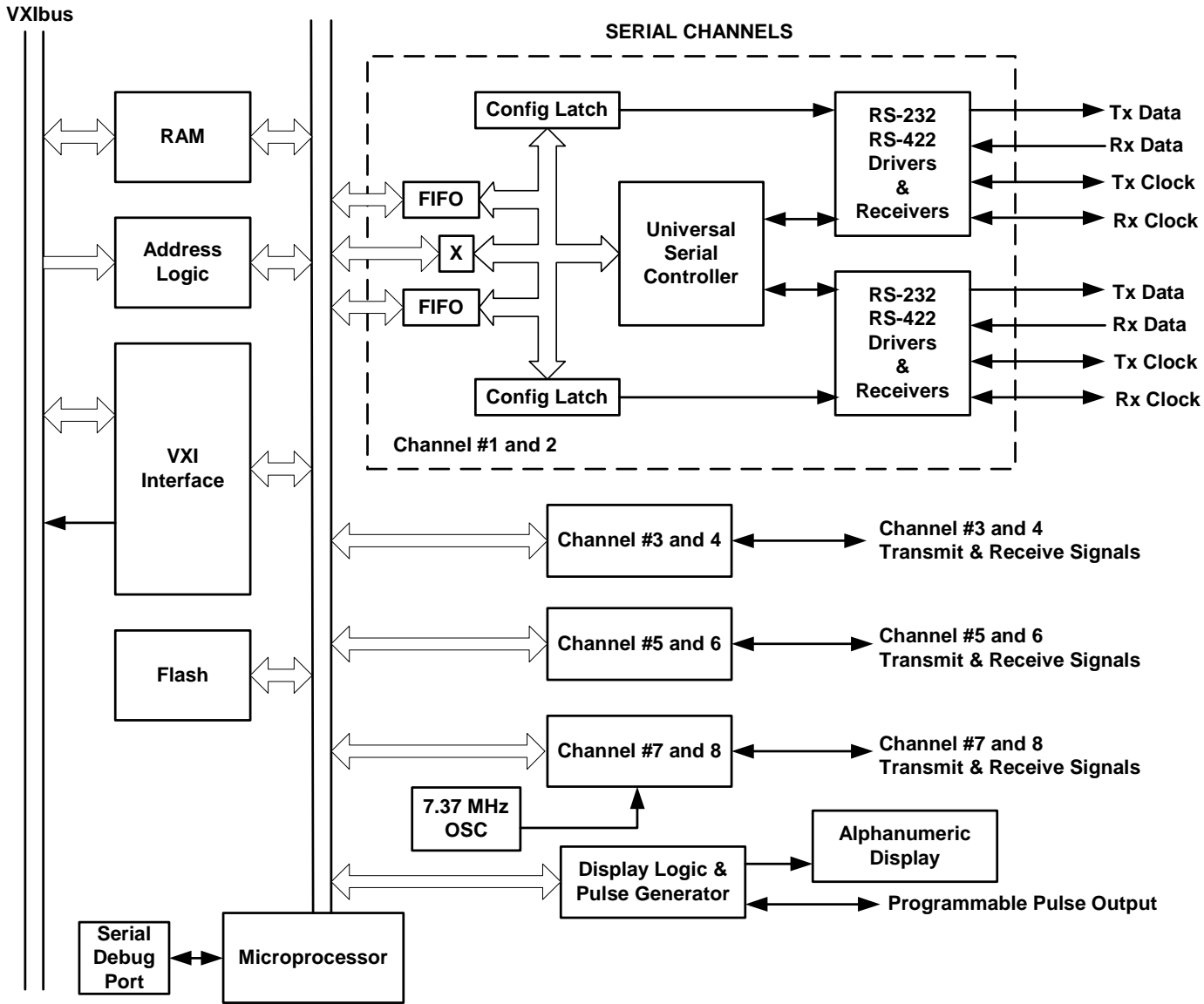
Block Diagram

The 6075's program memory and channel settings are stored in nonvolatile flash memory. The flash memory has a boot block with a flashloader program. One of the processor's internal serial channels is used to download new program code and save it in the flash program blocks.

This feature lets the module be updated in the field if the user needs to customize its functions or update the module's firmware. Each pair of serial channels uses a Zilog dual channel, Universal Serial Controller that is connected to the processor's expansion bus.

Separate receive FIFOs provide added storage of received data to ensure uninterrupted high-speed data reception. Each serial interface has its own selectable RS-232 and RS-485 drivers, receivers and termination networks. Data is transferred through the Fast Data Channel buffers which are in DRAM memory. Separate memory bus transceivers provide a 32-bit wide data path to the VXIbus during a Fast Data Channel transfer

VXIbus

SERIAL CHANNELS

RAM

Address Logic

VXI Interface

Flash

Serial Debug Port

Microprocessor

Config Latch

FIFO

X

FIFO

Config Latch

Channel #1 and 2

Universal Serial Controller

RS-232 RS-422 Drivers & Receivers

RS-232 RS-422 Drivers & Receivers

Tx Data
Rx Data
Tx Clock
Rx Clock

Tx Data
Rx Data
Tx Clock
Rx Clock

Channel #3 and 4

Channel #3 and 4 Transmit & Receive Signals

Channel #5 and 6

Channel #5 and 6 Transmit & Receive Signals

Channel #7 and 8

Channel #7 and 8 Transmit & Receive Signals

7.37 MHz OSC

Display Logic & Pulse Generator

Alphanumeric Display

Programmable Pulse Output

MODEL 6075 SPECIFICATIONS

TRANSMIT AND RECEIVE BUFFER

Size
Transmit: 128 k (-4), 256 k (-8)
Receive: 128 k (-4), 256 k (-8)

Data Formats
ASCII and Hexadecimal

SERIAL PORT PARAMETERS

Baud Rate
Asynchronous: 50 baud to 460.8 k baud
Isosynchronous: up to 10 Mb/s with external clock

Data Length
5, 6, 7 or 8 bits

Parity
None, odd, or even

Stop Bits
1 or 2

Handshaking
Hardware: DSR and CTS for output pacing

RS-232 Levels
Transmit: ±8 V typ.
Receive: ±3 V max.

RS-485 Levels
Transmit: ±2 V min.
Receive: ±0.2 V min.

Termination Resistors
(program enabled in RS-422/485 modes)
150 Ω load
1.2 kΩ bias to GND and +5 V

MODES OF DATA TRANSMISSION

Hardware Modes
RS-232
RS-485 Half-Duplex
RS-485 Full-Duplex
Loopback and echo

Protocols
Asynchronous mode
SDLC mode

Pulse Output (6075-8 only)
Period: 0.0001 to 3 s
Width: 0.0001 to 3 s

FRONT PANEL I/O

LED Indicator (4 characters)
Errors
SYSFAIL
Diagnostics
Device Activity

Front Panel Connectors

6075-4: 4xDE-9P
6075-8: 2xDC-37P

Front Panel Controls
Reset Button
Display Control Button

VXIbus INTERFACE DATA
(Single-slot, C-sized, VXIbus Rev. 1.4)

Peak Current & Power Consumption

	+24 V	+12 V	+5 V	−12 V	−24 V
I_{Pm}(A)	0.0	0.2	2.0	0.2	0.0
I_{Dm}(mA)	0.0	0.1	1.8	0.1	0.0

Total Power: 12.4 Watts

Weight
8 lbs. (3.7 kg)

Software Control
SCPI, IEEE-488.2

Drivers
LabVIEW, LabWindows/CVI, VXI plug&play (WIN95/NT Frameworks)

EMC (Council Directive 89/336/EEC)
EN55011, EN50082-1

Safety (Low Voltage Directive 73/23/EEC)
EN6010-1, EC1010-1, UL3111-1, CSA 22.2 #1018

Model	Description	Part Number
6075-4	Quad Channel Real-Time Serial Interface	407840-004
6075-8	Eight Channel Real-Time Serial Interface	407840-008
980870	6075 Spare User Manual	980870

The CE Mark indicates that the product has completed and passed rigorous testing in the area of RF Emissions, Immunity to Electromagnetic Disturbances and complies with European electrical safety standards.