ADI APPLIED DYNAMICS INTERNATIONAL

Solutions in Real Time

ADvantage Framework

6V-IPμc336 Microcontroller/TPU

Multi-Function Timer & Signal Generator

RTS - High-Performance Real-Time Simulator

Description

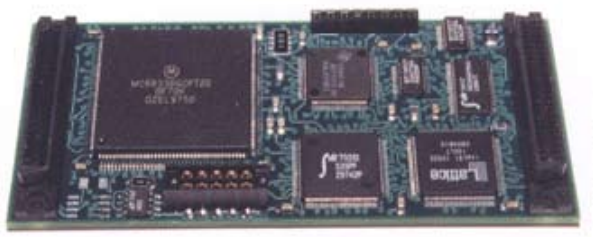
The IPμc336 Module provides a complete Motorola 68336 microcontroller and a TPU on a single-site IP module that conforms to the IP Type 1 specifications. This module has been designed to meet a variety of very demanding simulation/emulation timing and signal generation requirements without placing demands upon the primary computational power of the SIMsystem. The 68336 was originally targeted by Motorola for timing-intensive motion and engine control applications. Specifically, the unit integrates a TPU and a Configurable Timer Module (CTM) with an MC68020-based core microprocessor.

The TPU is an intelligent on-chip co-processor with a microengine dedicated to complex timing tasks. The TPU functionality includes sixteen lines which may be used for a variety of purposes. Standard software routines are provided to support the following functionality:

- Programmable Time Accumulator (PTA) - measures high time, low time, or period of an input signal over a programmable number of periods or pulses as detected by channel hardware.
- Input Transition Counter (NITC) - counts and timestamps pre-defined input transitions detected by channel hardware.
- Fast Quadrature Decode (FQD) - provides a position feedback function for motor control by decoding signals from an external encoder.

Features

- Fully programmable Motorola 68336 microprocessor
- Single-site IP Module
- Sixteen independent Time Processor Unit (TPU) input/output channels
- Measures incoming pulses (high, low, period)
- Counts and timestamps input transitions
- Four dedicated Pulse Width Modulation (PWM) output channels
- RS422 and SPI communication ports



Specifications

68336 Processor

Clock rate:	20MHz

Memory

Dual Port RAM	32KB
Bi-directional FIFO	2KB

IP Bus Interface

0 wait state for all accesses
Mailbox and FIFO status interrupts
DMA support

TPU Operation (based on one channel enabled)

PTA Range:	14 μsec to 858 sec
NITC Range:	2.3 μsec to 858 sec (with ADI supplied code)
PTA and NITC Resolution:	200nsec
FQD Resolution:	Dependent upon the encoder

(Note: Standard ADI Software does not support mixing the FQD functionality with the PTA or NITC functions)

CTM Operation

Minimum pulse width:	100nsec
Maximum frequency:	39 KHz @ 8 bits 152 Hz @ 16 bits

Supported Model Types

Additional TPU functionality available, but not currently supported by ADI software includes:

- Queued Output Match (QSM) - used to generate complex pulse trains
- Table Stepper Motor (TSM) - used to control acceleration and deceleration of a stepper motor
- Frequency Measurement (FQM) - counts the number of input pulses during a user-defined window
- Universal Asynchronous Receiver/Transmitter (UART) - provides asynchronous serial communication with word lengths up to 14 bits (use of this function will reduce NITC functionality to 16 bits)
- Multiphase Motor Commutation (COMM) - generates phase commutation signals for brushless motors
- Hall Effect Decode (HALLD) - decodes sensor signals from brushless motors
- Multichannel Pulse - Width Modulation (MCPWM) - generates multiple synchronized PWM outputs (requires two TPU channels plus external gate per PWM channel)

The CTM that provides the four additional PWM outputs also has two 16-bit modulus counters, a 16-bit free running counter, and four double-action capture/compare channels.

The additional TPU and CTM functionality may be accessed by contracting with ADI's System Integration Services group or through direct user programming. (Note: User programming of TPU or CTM functions beyond those defined in this document requires the appropriate compiler that is not included with the 6V-IPμc336.

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