MIC-3716

250 KS/s, 16-bit, 16-ch High-resolution Multifunction Module

MIC-3716/6   MIC-3716/3

CE FCC
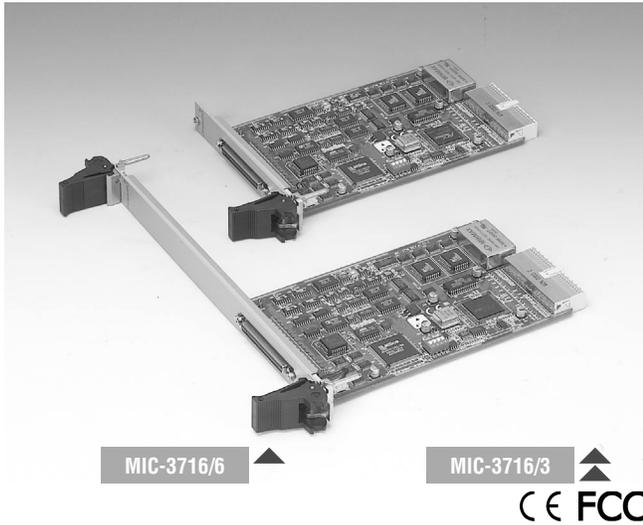
Features

- 16-bit high resolution
- 250 KS/s sampling rate
- Auto calibration function
- PCI-bus mastering for data transfer
- 16 analog input channels with 1K FIFO
- 16 S.E. or 8 Diff. AI, or a combination
- Unipolar/Bipolar input range
- 2 analog output channels
- 16 digital input channels
- 16 digital output channels
- One 10 MHz 16-bit resolution counter
- Board ID

Introduction

The MIC-3716 is a powerful high-resolution multifunction card for the PCI bus. It features a 250 KS/s 16-bit A/D converter, and an onboard 1K sample FIFO buffer for A/D. The MIC-3716 provides a total of 16 single-ended or eight differential A/D input channels or a mixed combination of these. There is also two 16-bit D/A output channels, 16 digital input/output channels, and one 10 MHz 16-bit counter channel. MIC-3716 provides specific functions for different user requirements.

Specifications

Analog Input

Channels		16 single-ended or 8 differential or combination				
Resolution		16-bit				
FIFO Size		1 K Samples/ch				
Sampling Rate*		250 KS/s max.				
Conversion Time		500 µs				
Input range and Gain List	Gain	0.5	1	2	4	8
	Unipolar	N/A	0 ~ 10	0 ~ 5	0 ~ 0.25	0 ~ 1.25
	Bipolar	±10	±5	±2.5	±1.25	±0.625
Small Signal Bandwidth for PGA	Gain	0.5	1	2	4	8
	Bandwidth	4.0 MHz	4.0 MHz	2.0 MHz	1.5 MHz	0.65 MHz
Common mode voltage		±11 V max. (operational)				
Max. Input Voltage		±20 V				
Input Protect		30 Vp-p				
Input Impedance		100 MΩ/10pF(Off); 100 MΩ/10pF(On)				
Trigger Mode		Software, on-board peogrammable pacer or external				
Accuracy	DC	DNLE: ±1LSB				
		INLE: ±1 LSB				
		Zero (Offset) error; Adjustable to ±1 LSB				
		Gain	0.5	1	2	4	8
		Gain error (% FSR)	0.15	0.03	0.03	0.05	0.1
	AC	SNR: 82 dB				
		ENOB: 13.5 bits				
		THD: -84 dB typical				
Clocking and Trigger Inputs	Trigger Mode	Software, onboard programmable pacer or external				
	A/D pacer clock	250 KHz (max.); 58 µHz (min.)				
	External A/D trigger clock	MIN. pulse width: 2 µs (high); 2 µs (low) Max. frequency: 250 KHz				

Digital Input /Output

Input Channels		16
Input Voltage	Low	0.4 V max.
	High	2.4 V min.
Input Load	Low	0.4 V max. @ -0.2 mA
	High	2.7 V min. @ 20 µA
Output Channels		16
Output Voltage	Low	0.4 V max. @ +8.0 mA (sink)
	High	2.4 V min. @ -0.4 mA (source)

Analog Output

Channels		2
Resolution		16-bit
Operation mode		Single output
Throughput*		200 KS/s max. per channel (FSR)
Output Range (Internal & External Reference)	Using Internal Reference	0 ~ +5 V, 0 ~ +10 V, -5 ~ +5 V, -10 ~ +10 V
	Using External Reference	0 ~ +x V @ +x v (-10 ≤ x ≤ 10) -x ~ +x V @ +x v (-10 ≤ x ≤ 10)
Accuracy	DC	DNLE: ±1 LSB (monotonic)
		INLE: ±1 LSB
		Zero (Offset) error: Adjustable to ±1 LSB
		Gain (Full-scale) error: Adjustable to ±1 LSB
Dynamic Performance	Setting Time	5 µs (to 4 LSB of FSR)
	Slew Rate	20 V/µs
Drift		10 ppm/°C
Driving Capability		±20 mA
Output Impedance		0.1 Ω max.

Ordering Information

- **MIC-3716/3** — 3U, 250 KS/s, 16-bit, 16-ch High-Resolution Multifunction Module, user's manual and driver CD-ROM. (cable not included)
- **MIC-3716/6** — 6U, 250 KS/s, 16-bit, 16-ch High-Resolution Multifunction Module, user's manual and driver CD-ROM. (cable not included)
- **PCLD-8710** — Industrial Wiring Terminal Board with CJC circuit for DIN-rail Mounting. (cable not included)
- **PCL-10168** — 68-pin SCSI-II cable with male connectors on both ends and special shielding for noise reduction, 1 and 2 m
- **ADAM-3968** — 68-pin SCSI-II Wiring Terminal Board for DIN-rail Mounting

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Feature Details

PCI-Bus Mastering Data Transfer

The MIC-3716 supports PCI-Bus mastering DMA for high-speed data transfer and gap-free analog input as well as analog output. By setting aside a block of memory in the PC, the MIC-3716 performs bus-mastering data transfers without CPU intervention, setting the CPU free to perform more urgent tasks such as data analysis and graphic manipulation. This function allows users to run all I/O functions simultaneously at full speed without losing data.

Auto-calibration Function

The MIC-3716 provides an auto-calibration function by using a calibration utility. The built-in calibration circuitry of the MIC-3716 corrects gain and offset errors in analog input and analog output channels, thereby eliminating the need for external equipment and user adjustments.

Board ID

The MIC-3716 has a built-in DIP switch that helps define each card's ID when multiple MIC-3716 cards have been installed on the same PC chassis. The board ID setting function is very useful when users build their system with multiple MIC-3716 cards. With the correct Board ID settings, the user can easily identify and access each card during hardware configuration and software programming.

Plug-and-Play Function

The MIC-3716 is a Plug-and-Play device that fully complies with the PCI Specification Rev 2.2. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug-and-Play function.

Automatic Channel/Gain/SD*/BU* Scanning

The MIC-3716 features an automatic channel/gain/SD/BU scanning circuit. This circuit controls the multiplexer switching during sampling in a way that is more efficient than what can be achieved by software implementation. Onboard SRAM stores different gain, SD and BU values for each channel. This combination lets users perform multi-channel high speed sampling with different gain, SD and BU values for each channel.

SD: Single-Ended/Differential; BU: Bipolar/Unipolar

On-board FIFO Memory

The MIC-3716 provides a 1K samples onboard FIFO (First In First Out) memory buffer for AD. This is an important feature for faster data transfer and more predictable performance under the Windows® system.

On Board Programmable Timer/Counter

The MIC-3716 provides a programmable timer counter for generating a pacer trigger for the A/D conversion. The timer/counter chip is 82C54, which includes three 16-bit counter 10 MHz clocks. One counter is used as an event counter for counting events coming from the input channel. The other two are cascaded together to make a 32-bit timer for pacer trigger time base.

Counter/Timer

Channels	3 channels, 2 channels are permanently configured as programmable pacers; 1 channel is free for user application	
Resolution	16-bit	
Compatibility	TTL level	
Base Clock	Channel 2: Takes input from output of channel 1 Channel 1: 10 MHz Channel 0: Internal 1 MHz or external clock (10 MHz) max Selected by software	
Max. Input Frequency	1 MHz	
Clock Input	Low	0.8 V max.
	High	2.0 V min.
Gate Input	Low	0.8 V max.
	High	2.0 V min.
Counter Output	Low	0.5 V max. @ +24 mA
	High	2.4 V min. @ -15 mA

General

I/O Connector Type	68-pin SCSI-II female	
Dimensions	160 mm (L) x 100 mm (H) (6.9" x 3.9") with 3U/6U Bracket	
Power Consumption	Typical	+5 V @ 850 mA, +12 V @ 600 mA
	Max.	+5 V @ 1 A, +12 V @ 700 mA
Temperature	Operating	0 ~ +60° C (32 ~ 158° F) (refer to IEC 68-2-1, 2)
	Storage	-20 ~ 85° C (-4 ~ 158° F)
Relative Humidity	Operating	5 ~ 85% RH non-condensing (refer to IEC 68-1, -2, -3)
	Storage	5 ~ 95% RH non-condensing (refer to IEC 68-1, -2, -3)
Certification	CE certified	

Note:

The sampling rate and throughput depends on the computer hardware architecture and software environment. The rates may vary due to programming language, code efficiency, CPU utilization and other factors.

Pin Assignment

AI0	68	34	AI1	
AI2	67	33	AI3	
AI4	66	32	AI5	
AI6	65	31	AI7	
AI8	64	30	AI9	
AI10	63	29	AI11	
AI12	62	28	AI13	
AI14	61	27	AI15	
AIGND	60	26	AIGND	
*AO0_REF	59	25	AO1_REF*	
*AO0_OUT	58	24	AO1_OUT*	
*AOGND	57	23	AOGND*	
DI0	56	22	DI1	
DI2	55	21	DI3	
DI4	54	20	DI5	
DI6	53	19	DI7	
DI8	52	18	DI9	
DI10	51	17	DI11	
DI12	50	16	DI13	
DI14	49	15	DI15	
DGND	48	14	DGND	
DO0	47	13	DO1	
DO2	46	12	DO3	
DO4	45	11	DO5	
DO6	44	10	DO7	
DO8	43	9	DO9	
DO10	42	8	DO11	
DO12	41	7	DO13	
DO14	40	6	DO15	
DGND	39	5	DGND	
CNT0_CLK	38	4	PACER_OUT	
CNT0_OUT	37	3	TRG_GATE	
CNT0_GATE	36	2	EXT_TRG	
+12V	35	1	+5V	

1 IPPC & AWS
2 TPC
3 FPM
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8 eConnectivity
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10 Software
11 UNO-2000/3000
12 VBOX
13 ADAM-4000
14 ADAM-5000
15 ADAM-6000
16 ADAM-8000