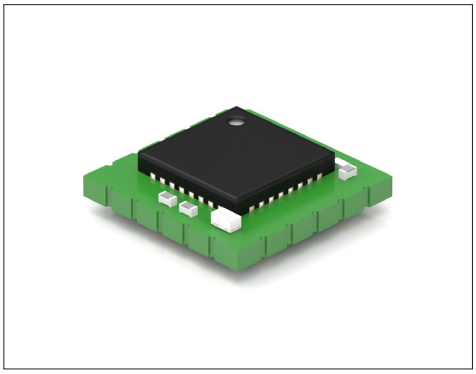
MODEL IEM100

Ultra-Low-Power Miniaturized Integrable Sampling System



FEATURES

- Ultra-miniaturized (8 × 8 mm)
- High-resolution digital strain-gauge measurement
- $\overline{\text{DRDY}}$ Pin for precise data-ready synchronization
- Flexible integration: UART or SPI
- Ultra-low power
- Reliable communication with integrated checksum and CRC-8/SMBUS[5]
- On-board temperature measurement
- On-board ESD protection

MATERIAL & MANUFACTURING

- High-Reliability PCB/Assembly (IPC CLASS III)
- High-Temperature Rated Material/BOM Items
- Strictly Controlled Inspection, Test, and Calibration Process
- Fully Controlled Handling/Packaging Process
- Extensive Test and Validation for 100% of Production Units
- Individual Calibration Report/Certification for Instruments and Systems (Available Upon Request)

APPLICATIONS

- Medical
- Aerospace
- Precision Industrial Automation
- Lab & Field Instrumentation
- Precision Manufacturing

SPECIFICATIONS	
GENERAL	
Item Number	FSH04941
Profile Storage	1 Profile
Internal Resolution	24 Bits
Stored Calibration	Up to 22 points per profile
Sampling Rate	4-1300 SPS (See NFR Table)
Weight	0.009 oz [0.25 g]
STRAIN GAUGE MV/V INPUT	
Input Range	Up to ±480 mV/V
Excitation Voltage	2.5 VDC
Min/Max Bridge Resistance	350 to 5000 Ω
Non-linearity (max)[1]	±0.01% of FSR
Resolution (Noise Free)	Up to 18.4 bits (See NFR Table)
DIGITAL OUTPUT (UART)	
Data Length (Bit)	8
Baud Rate (bps)	320,000
Parity	None
Stop (Bit)	1
Flow Control	None
Voltage Level	2.5 VDC (Compatible with 3.3 VDC)
Max Cable Length[2]	6 m [19.7 ft]
DIGITAL OUTPUT (SPI)	
Serial Word Length (Bit)	8
SPI Mode	Mode 0 (CPOL = 0, CPHA = 0)
SCLK Frequency	1 MHz – 2 MHz
Operating Mode	Client
Voltage Level[3]	1.8 VDC (Compatible with 3.3 VDC)
Max Cable Length[2]	20 cm [7.9 in]
CONNECTORS	
Mating Connector	BM23PF0.8-14DS-0.35V(51)

Ultra-Low-Power Miniaturized Integrable Sampling System

SPECIFICATIONS (CONTINUED)	
POWER	
Supply[4]	3 to 5 VDC
Power Consumption (no load)	45 mW (Max)
Power Consumption (350 Ω Bridge)	85 mW (Max)
Inrush Current	180 mA (Max)
ENVIRONMENT	
Operating Temperature	–40°F to 185°F [–40°C to 85°C]
Storage Temperature	–40°F to 185°F [–40°C to 85°C]
Temperature Stability/Drift	10 ppm/°C of FSR
CONFORMITY	
RoHS	2015/65/EU

NOISE-FREE RESOLUTION

RANGE (mV/V)	GAIN	4 SPS (Default)	20 SPS	50 SPS	100 SPS	200 SPS	500 SPS	850 SPS	1300 SPS
240-480	1	18.4	17.7	16.7	16.3	15.8	15.2	14.6	14.2
120-240	2	17.1	16.8	15.8	15.3	14.9	14.2	13.9	13.3
60-120	4	16.9	16.7	16.5	16.3	16.0	15.0	14.9	14.1
30-60	8	16.8	16.4	16.3	16.1	15.6	15.1	14.8	13.8
15-30	16	16.7	16.3	16.2	16.0	15.5	15.2	14.7	13.7
7.5-15	32	16.6	16.2	16.1	15.9	14.9	14.7	14.6	13.5
3.7-7.5	64	16.5	16.1	16.0	15.8	15.7	15.2	14.5	13.4
1.8-3.7	128 (Default)	16.1	15.6	15.5	15.1	14.7	14.0	13.8	13.2
0.9-1.8	256	15.1	14.7	14.1	13.5	13.3	13.1	12.6	12.2
0-0.9	512	14.0	13.6	13.5	13.1	12.8	12.1	11.8	11.4

Noise Free Resolution is calculated using upper limit of “Range (mV/V)” or “maximum dynamic range”

General Notes:

[1] Non-linearity calculated at Full Scale Range (FSR) of 2 mV/V and gain of 128

[2] The stated maximum cable lengths are the recommended configurations under which device performance has been validated. These values are based on testing conducted using shielded, properly terminated cables under controlled operating conditions. Customers may use cable lengths exceeding the recommended values at their own discretion; however, system performance, signal integrity, and communication reliability beyond the specified lengths are not guaranteed and remain the responsibility of the user. In addition, the stated limits may not apply in environments with strong magnetic or electrical interference

[3] The QIA128/IDC150/IEM100 (client device) operates on a 1.8 VDC logic level and is compatible with logic levels up to 3.3 VDC, allowing for direct connection. If the host device’s input threshold for logic high (VIH) supports 1.8 VDC, no additional hardware or considerations are required. Otherwise, a level shifter may be necessary to ensure proper communication.

[4] 20 – 40mV peak-to-peak ripple in passband and 20MHz bandwidth (cutoff 40dB @ 20MHz)

[5] Refer to the QIA128/IDC150/IEM100 UART and SPI communication guides

Active low $\overline{\text{DRDY}}$ pin is used to keep all communication synchronized

All Grounds are internally connected.

19 Morgan, Irvine, CA 92618 USA
futek@futek.com

www.futek.com

CE RoHS ANSI Z540-1 ISO 17025 ISO 9001 ISO 13485 U.S. Manufacturer

WIRING CODE FSH04941

	CASTELLATED HOLE PIN NUMBER	PIN FUNCTION	INPUT/OUTPUT CONNECTOR PIN NUMBER	DESCRIPTION
JTAG	1	$\overline{\text{RESET}}$	N/A	Active low reset input.
	2	TMS	N/A	JTAG Test Mode Select input for debug and firmware download.
UART	3	RX	7	UART receive data input.
	4	TX	6	UART transmit data output.
SENSOR	5	GND	1	Ground. All ground pins are internally connected.
	6	– EXCITATION	2	Sensor excitation return, internally connected to GND.
	7	– SIGNAL	5	Sensor negative input.
	8	+ EXCITATION	3	Sensor excitation output.
	9	+ SIGNAL	4	Sensor positive input.
	10	VIN	9	Supply input, 3 to 5 VDC.
SPI	11	$\overline{\text{CS}}$	14	Active low chip select input. Do not assert $\overline{\text{CS}}$ low until the device has completed boot. Do not assert $\overline{\text{CS}}$ low unless $\overline{\text{DRDY}}$ is low.
	12	SCLK	13	SPI serial clock input from host.
	13	HICO	12	SPI Host In Client Out data line.
	14	HOCI	11	SPI Host Out Client In data line.
	15	$\overline{\text{DRDY}}$	10	Active low data ready output.[6]
JTAG	16	VDD	N/A	Digital supply rail, 2.5 V
	17	NTRST	N/A	JTAG NTRST and boot mode control input for debug and firmware download only.
	18	TDO	N/A	JTAG Test Data Out.
	19	TDI	N/A	JTAG Test Data In.
	20	TCK	N/A	JTAG test clock input for debug and firmware download.

[6] Indicates new sampled data is available and keeps host communication synchronized. $\overline{\text{DRDY}}$ goes low when data is ready to be clocked out and may be used as a host interrupt. $\overline{\text{DRDY}}$ is high during conversion and returns low when new data is available. Note: $\overline{\text{DRDY}}$ does not return high after data is read. It returns high only when the system enters a conversion state.

19 Morgan, Irvine, CA 92618 USA
futek@futek.com

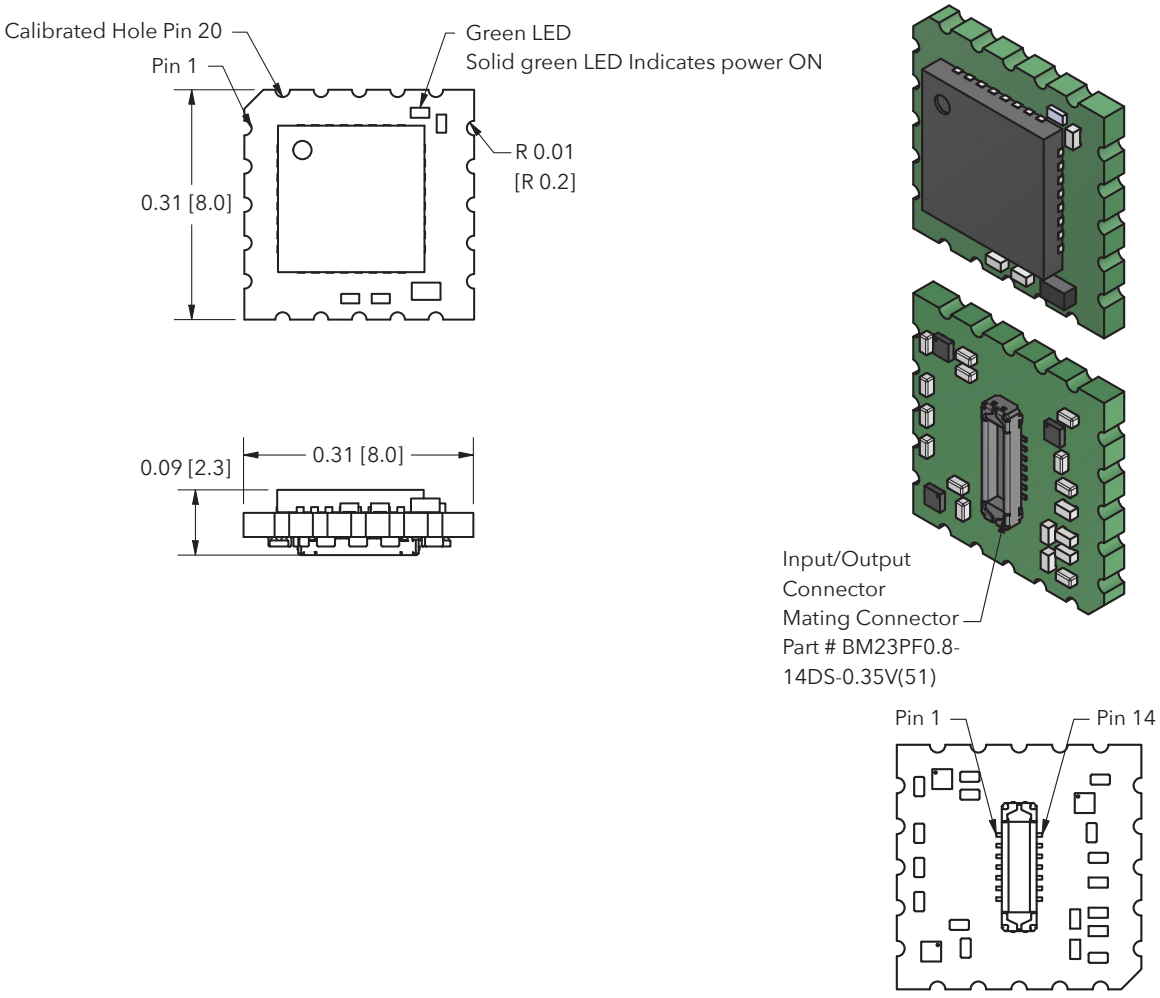
www.futek.com

CE RoHS ANSI Z540-1 ISO 17025 ISO 9001 ISO 13485 U.S. Manufacturer

Ultra-Low-Power Miniaturized Integrable Sampling System

DIMENSIONS inches [mm]

FSH04941



Drawing Number: FI1586

FUTEK reserves the right to modify its design and specifications without notice. Please visit http://www.futek.com/salesterms for complete terms and conditions.

The information provided herein was developed using FEA analysis, empirical data and multiple testing simulations. FUTEK presents the information in good faith and believes it is correct but makes no representations or warranties as to the completeness or accuracy of the information provided. User's application may produce different data and/or results. By using this information, you agree that you have read and understand this disclosure. Please contact us to discuss your particular application and needs.

19 Morgan, Irvine, CA 92618 USA
futek@futek.com

www.futek.com

CE RoHS ANSI Z540-1 ISO 17025 ISO 9001 ISO 13485 U.S. Manufacturer