

PDM5 Pressure Sensor

User Manual

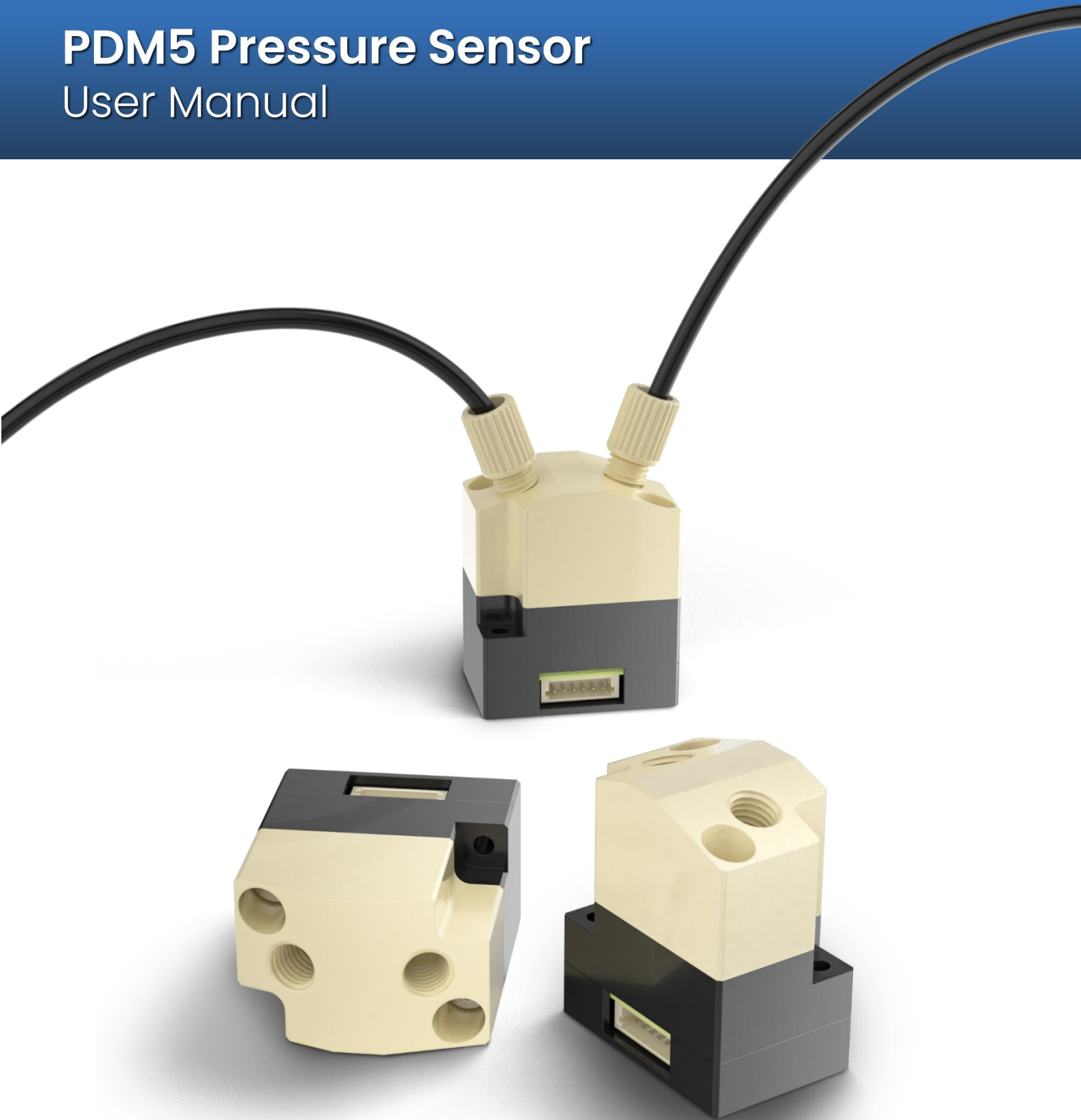


Table Of Contents

1 Safety Precautions and Hazards	3
1.1 General Precautions	3
1.2 Electrical Safety Precautions	3
1.3 Chemical Precautions	3
2 Appearance and Dimensions	4
3 Interface Description	5
4 Specifications	5
5 I2C Interface	7
5.1 Slave Address	7
5.2 Pull-up Resistor	7
5.3 Register Table	7
5.4 Timing specification	7
5.5 I2C Protocol	8
5.6 Read sequence	8
5.7 Application example	9
6 Appendices	10
6.1 Appendix A: ASCII	10
6.2 Appendix B: Tables and Figures	12

1 Safety Precautions and Hazards

!ATTENTION: Read the following safety notices carefully before installing and operating.

1.1 General Precautions

Be sure to read this instruction manual carefully before use, and have it operated by a professional to avoid damage to the product.

1.2 Electrical Safety Precautions

Please connect the pressure detection module to a power supply within the range specified in the technical specifications and make sure that the cable is not damaged and plugged correctly to avoid short circuits.

Pay attention to static electricity in the environment and avoid high-voltage electrostatic contact interfaces.

When disassembling and assembling the connectors, avoid short circuits caused by liquid contact with the electrical interface.

1.3 Chemical Precautions

If the module is applied under conditions with corrosive liquids, there is a risk that the liquid inside the module may spill when loosening the fluid connection, so be sure to use protective gloves to avoid chemical injury.

Foreach Warranty

Please refer to our General Terms of Sale (GTS)

2 Appearance and Dimensions

Unit:mm

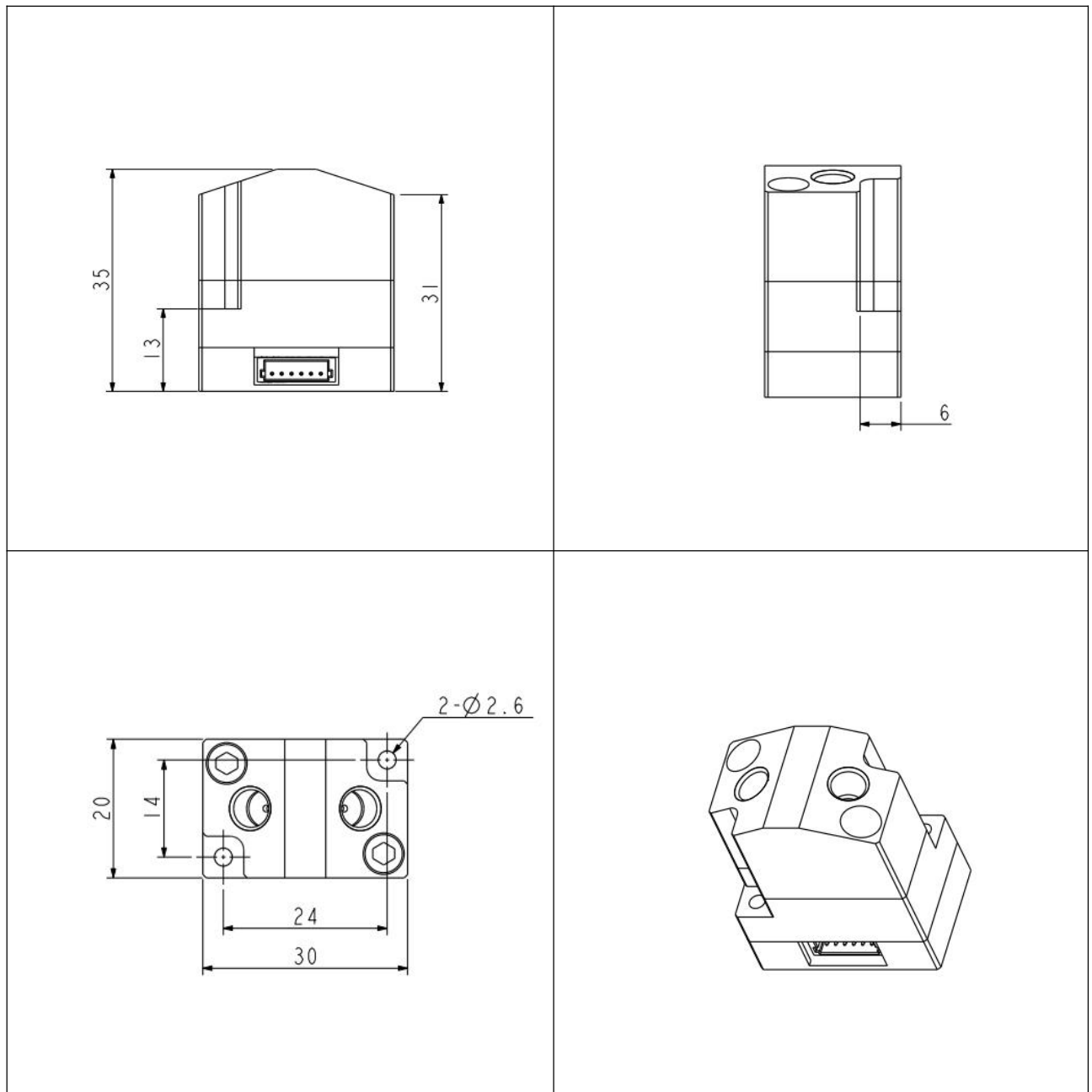


Figure 1 Outline Dimensions

3 Interface Description

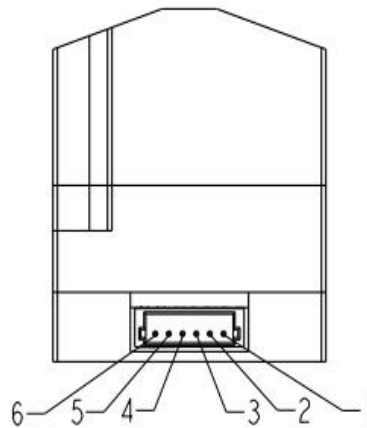


Figure 2 Interface Pin Sequence Diagram

Table 1 Interface Pin Description

Interface Pin Description			
No.	Color	Definition	Description
1	Red	VCC	Positive Power Supply
2	Black	GND	Negative Power Supply/Ground
3	Green	GND	Negative Power Supply/Ground
4	Yellow	SCLK	Clock Line
5	Blue	SDA	Data Line
6	White	/	Open Circuit

Note:

The plug corresponding to the interface is JST and the model is ZHR-6.

4 Specifications

Table 2 Specifications

Specifications		
Specification		Parameter
Fluid	Housing Material	PEEK
	Threaded Connection	1/4-28UNF-2B Internal Thread
	Thread Depth	7.5mm
	Internal Volume	≤55uL
	O-Ring Material	FKM
	Core Contact Material	Stainless Steel 316L
	Recommended Fitting Torque	≤0.5N·m
	Nominal Diameter	1mm
	Proof Pressure	2X FS (Note1)
	Burst Pressure	3X FS (Note2)
Installation Dimensions	Overall Dimensions	Length×Width×Height: 30×20×35mm
	Diameter of Installation Hole	2.6mm

	Length of Installation Hole	13mm
	Recommended Screw	Hexagon Socket Head Screw M2.5×16
	Installation Direction	Avoid liquid port above the circuit
	Weight	35g
Power Supply	Min. Operating Voltage	4.7V
	Max. Operating Voltage	5.3V
	Recommended Voltage	5V
	Operating Current	30mA (Peak)
Communication	Communication Interface	IIC
	Pull-up Resistor	4.7k
	Baud Rate	100kbps
	Output Signal	Digital
	Bus Structure	Slave
	IIC Address Type	7bit
	Default IIC Address	0x6D
Signal	Power-on Response Time	<50ms
	Absolute Accuracy (TEB)	Better than 1%FS (Note3)
	Absolute Total Error	Better than 7kPa (Note4)
	Effective Sampling Rate	Default 37.5Hz, up to 100Hz adjustable
	Pressure Resolution	Better than 5Pa
	Long-term Stability	≤±0.15%FS/year
	Range	10kPa~700kPa
Environment	Operating Temperature	0°C to 80°C
	Operating Humidity	0-95%RH at 40°C, non-condensing
	Storage Temperature	-30°C~100°C
	Storage Humidity	0-95%RH at 40°C, non-condensing
Lifespan	Pressure Cycles	>1.5 million pressure cycles @2-5Hz, 0~full scale pressure~0, 15~35°C

Notes:

1: Proof Pressure: The maximum pressure that can be applied without altering sensor performance or accuracy, expressed as multiples of Full Scale (FS).

2: Burst Pressure: The maximum pressure that can be applied without causing rupture of the sensing element or sensor, expressed as multiples of FS.

3: Absolute Accuracy: In this document, equivalent to Total Error Band (TEB). It encompasses all potential error sources in pressure measurement (including non-linearity, pressure hysteresis, noise, thermal effects), expressed as %FS.

4: Absolute Total Error: Identical in meaning to Absolute Accuracy, expressed in kPa.

5 I2C Interface

5.1 Slave Address

Default device address: **0x6D**, including the read bit is **0xDB** and the write bit is **0xDA**.

Table 3 Bitmap of the Slave Address

Bitmap of the Slave Address							
A7	A6	A5	A4	A3	A2	A1	W/R
1	1	0	1	1	0	1	0/1

Notes:

1. A7~A1 represent the device address, and the least significant bit is the read/write bit, with 0 for write and 1 for read.
2. The slave address can be customized for customers.

5.2 Pull-up Resistor

The module has integrated 4.7K Ω pull-up resistors on both SCL and SDA lines, users do not need to add external pull-up resistors on the bus.

5.3 Register Table

Table 4 Register Table

Register Table							
Address	Description	Byte_0	Byte_1	Byte_2	Byte_3	Byte_4	Byte_5
		MSB			LSB		MSB LSB
0xF8	Detect result	Pressure Unit: Pascal (Pa)				Temperature Unit: Celsius (°C)	

5.4 Timing specification

Table 5 I2C Timing Parameter

I2C Timing Parameter					
Symbol	Parameter	Condition	Min	Max	Unit
f_{SCL}	Clock frequency			100	kHz
t_{LOW}	SCL low pulse		1.3		μs
t_{HIGH}	SCL high pulse		0.6		μs
t_{SUDAT}	SDA setup time		0.1		μs
t_{HDDAT}	SDA hold time		0.0		μs
t_{SUSTA}	Setup time for a repeated start condition		0.6		μs
t_{HDSTA}	Hold time for a start condition		0.6		μs
t_{SUSTO}	Setup time for a stop condition		0.6		μs
t_{BUF}	Time before a new transmission can start		1.3		μs

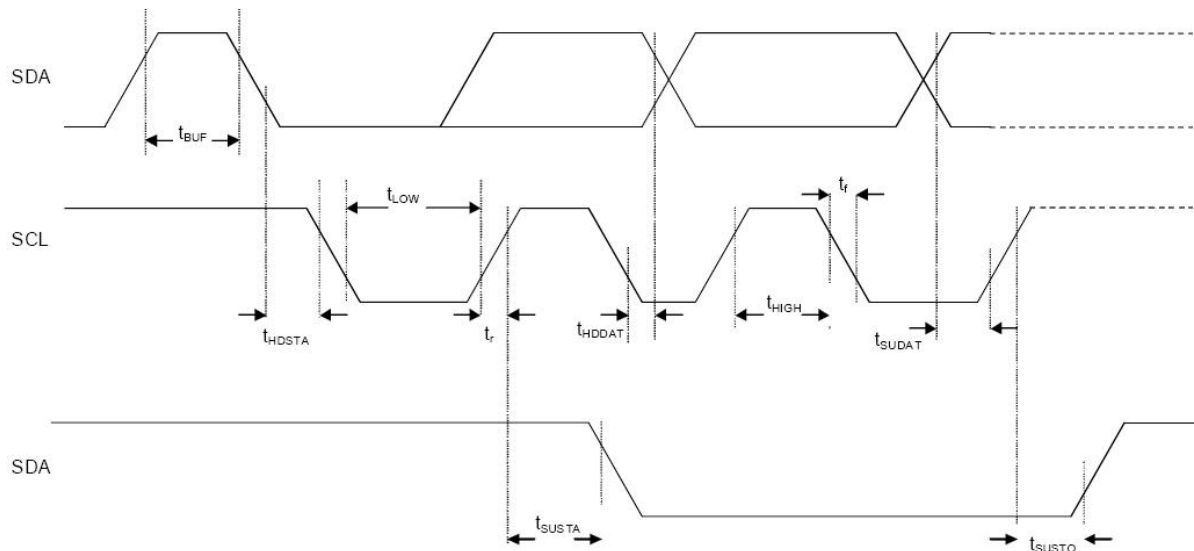


Figure 3 Timing Diagram

5.5 I2C Protocol

The I2C interface protocol has special bus signal conditions. Start (S), stop (P) and binary data conditions are shown below.

At start condition, SCL is high and SDA has a falling edge. Then the slave address is sent. After the 7 address bits, the direction control bit R/W selects the read or write operation. When a slave device recognizes that it is being addressed, it should acknowledge by pulling SDA low in the ninth SCL (ACK) cycle.

At stop condition, SCL is also high, but SDA has a rising edge. Data must be held stable at SDA when SCL is high. Data can change value at SDA only when SCL is low.

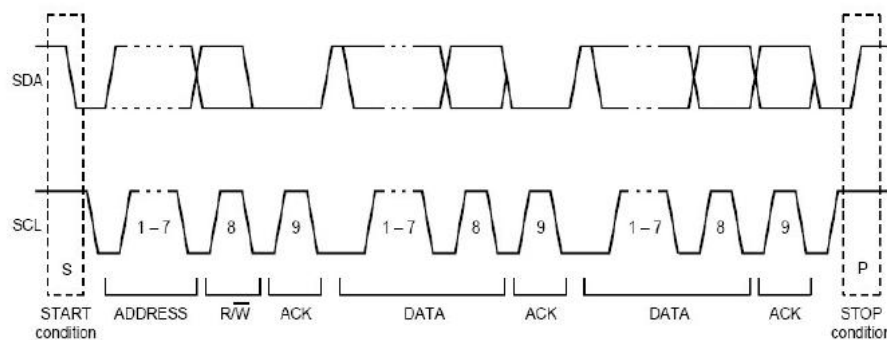
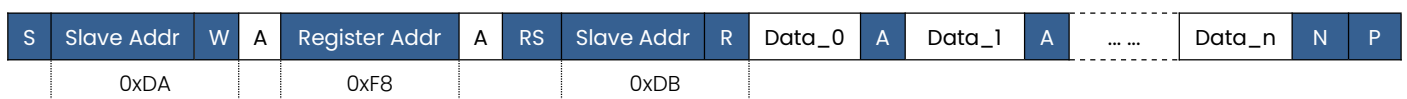


Figure 4 I2C standard sequence

5.6 Read sequence

Users can read pressure and temperature data at once by reading multiple byte timings.

I2C read N bytes data



Master to slave
 S = START RS = Repeated START P = STOP A = ACK N = NACK
 Slave to Master
 W = Write bit(0) R = Read bit(1)

5.7 Application example

The PDM5 pressure module self-initializes after 50ms of power-up and automatically performs continuous pressure and temperature sampling and digitization at the highest sampling rate within the module.

The master only needs to read the result registers 0xF8 to get the conversion results, with no other action is required.

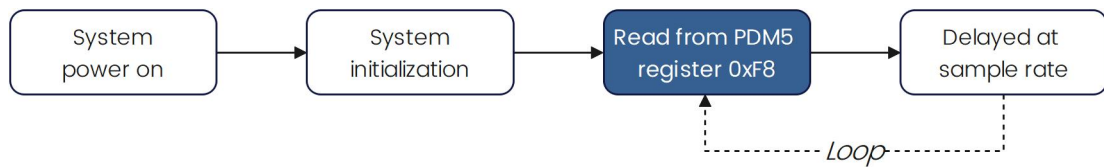


Figure 5 Master Operation Flow Chart

6 Appendices

6.1 Appendix A: ASCII

ASCII			
Bin	Dec	Hex	ASCII
0000 0000	0	0x00	NUL
0000 0001	1	0x01	SOH
0000 0010	2	0x02	STX
0000 0011	3	0x03	ETX
0000 0100	4	0x04	EOT
0000 0101	5	0x05	ENQ
0000 0110	6	0x06	ACK
0000 0111	7	0x07	BEL
0000 1000	8	0x08	BS
0000 1001	9	0x09	HT
0000 1010	10	0x0A	LF
0000 1011	11	0x0B	VT
0000 1100	12	0x0C	FF
0000 1101	13	0x0D	CR
0000 1110	14	0x0E	SO
0000 1111	15	0x0F	SI
0001 0000	16	0x10	DLE
0001 0001	17	0x11	DC1
0001 0010	18	0x12	DC2
0001 0011	19	0x13	DC3
0001 0100	20	0x14	DC4
0001 0101	21	0x15	NAK
0001 0110	22	0x16	SYN
0001 0111	23	0x17	ETB
0001 1000	24	0x18	CAN
0001 1001	25	0x19	EM
0001 1010	26	0x1A	SUB
0001 1011	27	0x1B	ESC
0001 1100	28	0x1C	FS
0001 1101	29	0x1D	GS
0001 1110	30	0x1E	RS
0001 1111	31	0x1F	US
0010 0000	32	0x20	(space)
0010 0001	33	0x21	!
0010 0010	34	0x22	"
0010 0011	35	0x23	#
0010 0100	36	0x24	\$
0010 0101	37	0x25	%
0010 0110	38	0x26	&
0010 0111	39	0x27	'
0010 1000	40	0x28	(
0010 1001	41	0x29	)
0010 1010	42	0x2A	*
0010 1011	43	0x2B	+
0010 1100	44	0x2C	,

ASCII			
Bin	Dec	Hex	ASCII
0010 1110	46	0x2E	.
0010 1111	47	0x2F	/
0011 0000	48	0x30	0
0011 0001	49	0x31	1
0011 0010	50	0x32	2
0011 0011	51	0x33	3
0011 0100	52	0x34	4
0011 0101	53	0x35	5
0011 0110	54	0x36	6
0011 0111	55	0x37	7
0011 1000	56	0x38	8
0011 1001	57	0x39	9
0011 1010	58	0x3A	:
0011 1011	59	0x3B	;
0011 1100	60	0x3C	<
0011 1101	61	0x3D	=
0011 1110	62	0x3E	>
0011 1111	63	0x3F	?
0100 0000	64	0x40	@
0100 0001	65	0x41	A
0100 0010	66	0x42	B
0100 0011	67	0x43	C
0100 0100	68	0x44	D
0100 0101	69	0x45	E
0100 0110	70	0x46	F
0100 0111	71	0x47	G
0100 1000	72	0x48	H
0100 1001	73	0x49	I
0100 1010	74	0x4A	J
0100 1011	75	0x4B	K
0100 1100	76	0x4C	L
0100 1101	77	0x4D	M
0100 1110	78	0x4E	N
0100 1111	79	0x4F	O
0101 0000	80	0x50	P
0101 0001	81	0x51	Q
0101 0010	82	0x52	R
0101 0011	83	0x53	S
0101 0100	84	0x54	T
0101 0101	85	0x55	U
0101 0110	86	0x56	V
0101 0111	87	0x57	W
0101 1000	88	0x58	X
0101 1001	89	0x59	Y
0101 1010	90	0x5A	Z

0010 1101	45	0x2D	-
0101 1100	92	0x5C	\
0101 1101	93	0x5D	]
0101 1110	94	0x5E	^
0101 1111	95	0x5F	_
0110 0000	96	0x60	`
0110 0001	97	0x61	a
0110 0010	98	0x62	b
0110 0011	99	0x63	c
0110 0100	100	0x64	d
0110 0101	101	0x65	e
0110 0110	102	0x66	f
0110 0111	103	0x67	g
0110 1000	104	0x68	h
0110 1001	105	0x69	i
0110 1010	106	0x6A	j
0110 1011	107	0x6B	k
0110 1100	108	0x6C	l
0110 1101	109	0x6D	m

0101 1011	91	0x5B	[
0110 1110	110	0x6E	n
0110 1111	111	0x6F	o
0111 0000	112	0x70	p
0111 0001	113	0x71	q
0111 0010	114	0x72	r
0111 0011	115	0x73	s
0111 0100	116	0x74	t
0111 0101	117	0x75	u
0111 0110	118	0x76	v
0111 0111	119	0x77	w
0111 1000	120	0x78	x
0111 1001	121	0x79	y
0111 1010	122	0x7A	z
0111 1011	123	0x7B	{
0111 1100	124	0x7C	
0111 1101	125	0x7D	}
0111 1110	126	0x7E	~
0111 1111	127	0x7F	DEL

6.2 Appendix B: Tables and Figures

Table 1	Interface Pin Description.....	5
Table 2	Specifications.....	5
Table 3	Bitmap of the Slave Address.....	7
Table 4	Register Table.....	7
Table 5	I2C Timing Parameter.....	7
Figure 1	Outline Dimensions.....	4
Figure 2	Interface Pin Sequence Diagram.....	5
Figure 3	Timing Diagram.....	8
Figure 4	I2C standard sequence.....	8
Figure 5	Master Operation Flow Chart.....	9

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