Specification document of MPX5999D

Component manufacturer	NXP Semiconductors
Model number	MPX5999D
Datasheets	MPX5999D Integrated Silicon Pressure Sensor On-Chip Signal Conditioned, Temperature Compensated and Calibrated - Data sheet (nxp.com)
Specification Ver	01.00.00 Oct 18,2022 New release
Documentation provided	Rui Long Lab Inc. https://rui-long-lab.com/

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1. Component datasheet

Pressure range	0 to 1000[kPa]
Range of power supply voltage(Vdd)	4.75 to 5.25[V] 5.0[V]Typ.

Output voltage (Vout)	Vout = Vdd × (P × 0.000901 +0.04) ± Error
	Vdd =5.0[V]
	Temperature 0 to 85° C
	P = ((Vout / Vdd) – 0.04) / 0.000901

Vdd vs Vout	link

Applications	IoT etc ・ Ideally suited for microprocessor or microcontroller-based systems

2. Component Software IF specification

The software interface specifications based on the MPX5999D component specifications are as follows.

The voltage value-to-physical value conversion equation is a linear conversion equation as shown in the equation below.

ADC value to voltage value conversion formula

$$vi = (ai \times iADC\_vdd) / 2^{iADC\_bit} \quad [V]$$

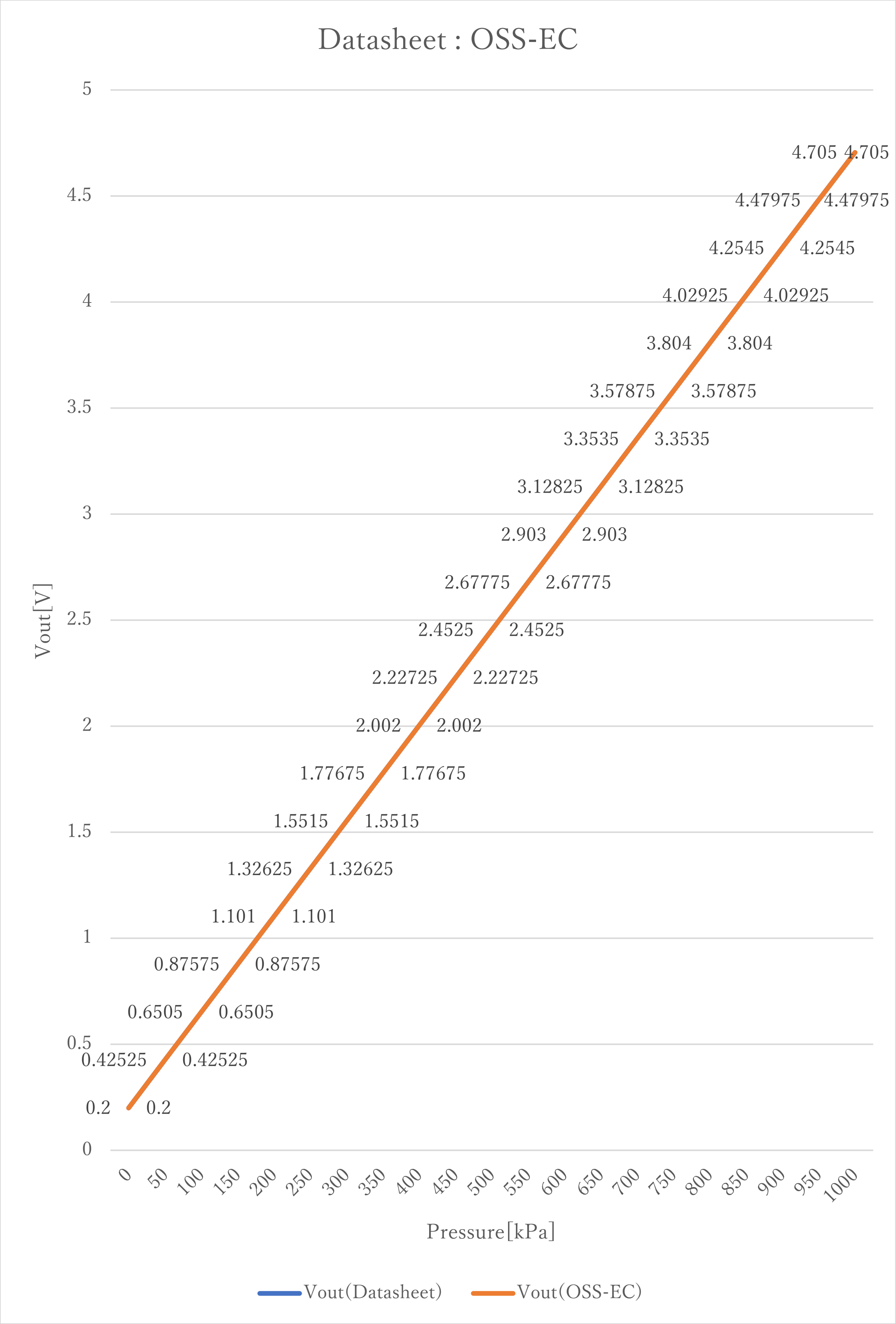
Voltage value to physical value conversion formula

$$y = (vi - iMPX5999D\_xoff) / iMPX5999D\_gain + iMPX5999D\_yoff \quad [kPa]$$

$$iMPX5999D\_min \leqq y \leqq iMPX5999D\_max$$

ai	A/D conversion value
vi	Sensor output voltage value [V]
iADC_vdd	Sensor supply voltage value [V]
iADC_bit	A/D conversion bit length
y	Pressure value [kPa]

```
#define iMPX5999D_xoff          ( 0.04F*iADC_vdd )      // X offset [V]
#define iMPX5999D_yoff          0.0F                    // Y offset [kPa]
#define iMPX5999D_gain          ( 0.000901F*iADC_vdd )  // Gain [V/kPa]
#define iMPX5999D_max           1000.0F                 // Pressure Max [kPa]
#define iMPX5999D_min           0.0F                    // Pressure Min [kPa]
```


Datasheet : OSS-EC
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Vout[V]
0.2 0.2
0.42525 0.42525
0.6505 0.6505
0.87575 0.87575
1.101 1.101
1.32625 1.32625
1.5515 1.5515
1.77675 1.77675
2.002 2.002
2.22725 2.22725
2.4525 2.4525
2.67775 2.67775
2.903 2.903
3.12825 3.12825
3.3535 3.3535
3.57875 3.57875
3.804 3.804
4.02925 4.02925
4.2545 4.2545
4.47975 4.47975
4.705 4.705
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000
Pressure[kPa]
Vout(Datasheet)
Vout(OSS-EC)

3. File Structure and Definitions

MPX5999D.h

```
#include "user_define.h"

// Components number
#define iMPX5999D               118U                    // NXP MPX5999D

// MPX5999D System Parts definitions
#define iMPX5999D_xoff          ( 0.04F*iADC_vdd )      // X offset [V]
#define iMPX5999D_yoff          0.0F                    // Y offset [kPa]
#define iMPX5999D_gain          ( 0.000901F*iADC_vdd )  // Gain [V/kPa]
#define iMPX5999D_max           1000.0F                 // Pressure Max [kPa]
#define iMPX5999D_min           0.0F                    // Pressure Min [kPa]

extern const tbl_adc_t tbl_MPX5999D;
```

MPX5999D.cpp

```
#include        "MPX5999D.h"
#if     iMPX5999D_ma == iSMA                        // Simple moving average filter
static float32 MPX5999D_sma_buf[iMPX5999D_SMA_num];
static const sma_f32_t MPX5999D_Phy_SMA =
{
        iInitial ,                                  // Initial state
        iMPX5999D_SMA_num ,                       // Simple moving average number & buf size
        0U ,                                        // buffer position
        0.0F ,                                      // sum
        &MPX5999D_sma_buf[0]                        // buffer
};
#elif   iMPX5999D_ma == iEMA                        // Exponential moving average filter
static const ema_f32_t MPX5999D_Phy_EMA =
{
        iInitial ,                                  // Initial state
        0.0F ,                                      // Xn-1
        iMPX5999D_EMA_K                             // Exponential smoothing factor
};
#elif   iMPX5999D_ma == iWMA                        // Weighted moving average filter
static float32 MPX5999D_wma_buf[iMPX5999D_WMA_num];
static const wma_f32_t MPX5999D_Phy_WMA =
{
        iInitial ,                                  // Initial state
        iMPX5999D_WMA_num ,                       // Weighted moving average number & buf size
        0U ,                                        // buffer poition
        iMPX5999D_WMA_num * (iMPX5999D_WMA_num + 1)/2 , // kn sum
        &MPX5999D_wma_buf[0]                        // Xn buffer
};
#else                                               // Non-moving average filter
#endif

#define iDummy_adr      0xffffffff                  // Dummy address
```

```
const tbl_adc_t tbl_MPX5999D =
{
        iMPX5999D                   ,
        iMPX5999D_pin               ,
        iMPX5999D_xoff              ,
        iMPX5999D_yoff              ,
        iMPX5999D_gain              ,
        iMPX5999D_max               ,
        iMPX5999D_min               ,
        iMPX5999D_ma                ,

#if     iMPX5999D_ma == iSMA                            // Simple moving average filter
        &MPX5999D_Phy_SMA           ,
        (ema_f32_t*)iDummy_adr      ,
        (wma_f32_t*)iDummy_adr
#elif   iMPX5999D_ma == iEMA                            // Exponential moving average filter
        (sma_f32_t*)iDummy_adr      ,
        &MPX5999D_Phy_EMA           ,
        (wma_f32_t*)iDummy_adr
#elif   iMPX5999D_ma == iWMA                            // Weighted moving average filter
        (sma_f32_t*)iDummy_adr      ,
        (ema_f32_t*)iDummy_adr      ,
        &MPX5999D_Phy_WMA
#else                                                    // Non-moving average filter
        (sma_f32_t*)iDummy_adr      ,
        (ema_f32_t*)iDummy_adr      ,
        (wma_f32_t*)iDummy_adr
#endif

};
```