Specification document of AD22100S

Component manufacturer	Analog Devices		
Model number	AD22100S		
Datasheets	AD22100 (REV. D) (analog.com)		
Specification Ver	01.00.00	Oct 03,2022	New release
	01.00.01	Oct 18,2022	Corrected license content Application item add
Documentation provided	Rui Long Lab Inc. https://rui-long-lab.com/		

1. Component datasheet

Temperature accuracy	±3.0° C (–50° C to +150° C)
Range of power supply voltage (Vdd)	4.0 to 6.5[V]
Output voltage (Vout)	Linear 22.5×Vdd/5 [mV/° C] Typ.
	Vdd = 5.0 [V]
	-50 [° C] 0.250[V] Typ.
	150 [° C] 4.750 [V] Typ.
Calculation	Vout = (Vdd/5 V) × (1.375 V + 22.5 mV/° C × Ta)
	Ta = (Vout / (Vdd/5V)) - 1.375V) / 22.5 mV/° C
Applications	IoT etc

- HVAC systems
- System temperature compensation
- Board level temperature sensing
- Electronic thermostats

Automotive

2. Component Software IF specification

The software interface specifications based on the AD22100S 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

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

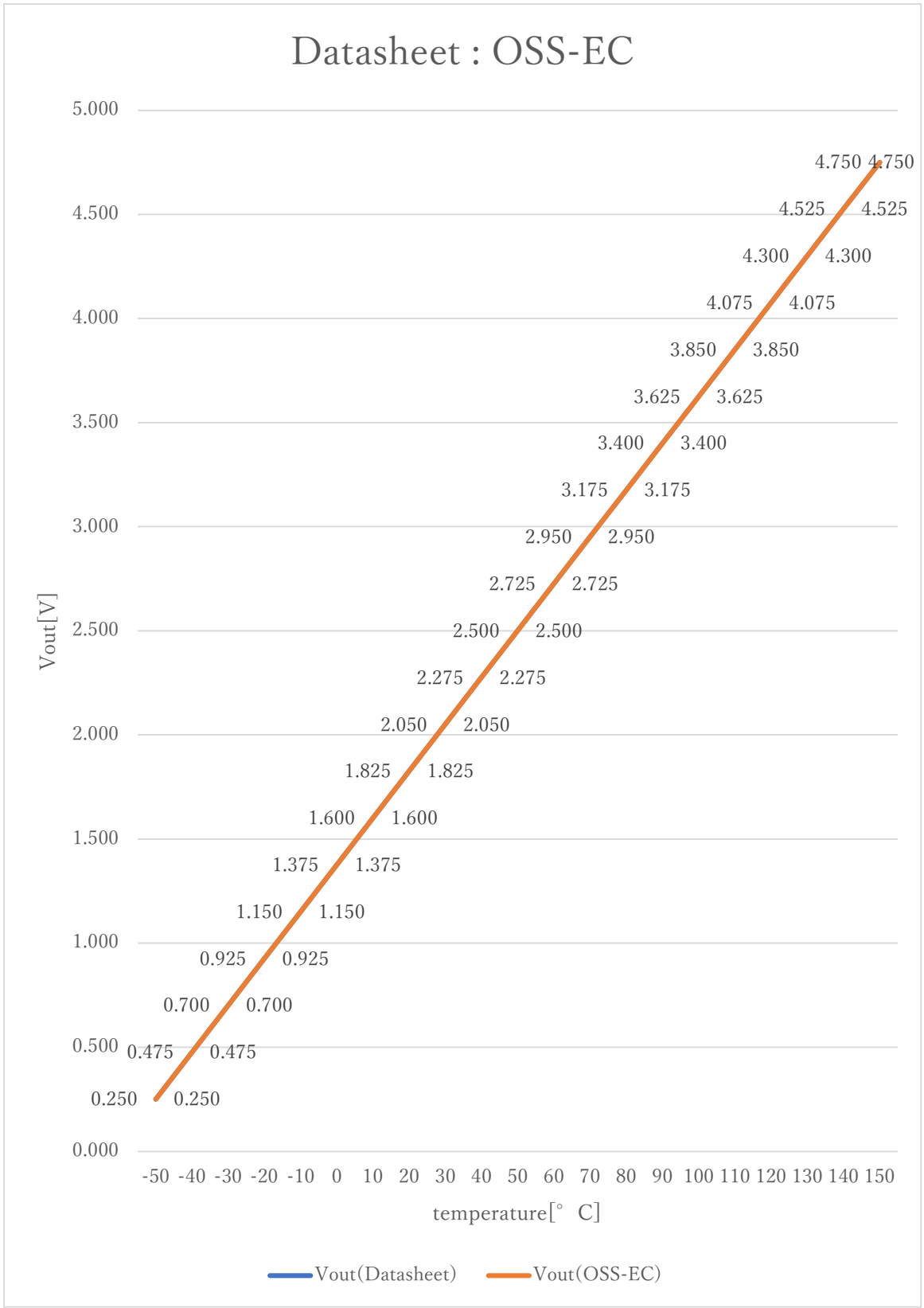
Voltage value to physical value conversion formula

$$y = (vi - iAD22100S\_xoff) / iAD22100S\_gain + iAD22100S\_yoff \quad [℃]$$

$$iAD22100S\_min \leqq y \leqq iAD22100S\_max$$

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	Temperature value [℃]

```
#define iAD22100S_xoff    (1.375F*(iADC_vdd/5.0))  // X offset [V]
#define iAD22100S_yoff    0.0F                     // Y offset [℃]
#define iAD22100S_gain    (0.0225F*(iADC_vdd/5.0)) // Gain [V/℃]
#define iAD22100S_max     150.0F                   // Temperature Max [℃]
#define iAD22100S_min     -50.0F                   // Temperature Min [℃]
```


Datasheet : OSS-EC
5.000
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Vout[V]
4.750 4.750
4.525 4.525
4.300 4.300
4.075 4.075
3.850 3.850
3.625 3.625
3.400 3.400
3.175 3.175
2.950 2.950
2.725 2.725
2.500 2.500
2.275 2.275
2.050 2.050
1.825 1.825
1.600 1.600
1.375 1.375
1.150 1.150
0.925 0.925
0.700 0.700
0.475 0.475
0.250 0.250
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
temperature[° C]
Vout(Datasheet)
Vout(OSS-EC)

3. File Structure and Definitions

AD22100S.h

```
#include "user_define.h"

// Components number
#define iAD22100S              108U                    // Analog devices AD22100S

// AD22100S System Parts definitions
#define iAD22100S_xoff         (1.375F*(iADC_vdd/5.0))  // X offset [V]
#define iAD22100S_yoff         0.0F                     // Y offset [℃]
#define iAD22100S_gain         (0.0225F*(iADC_vdd/5.0)) // Gain [V/℃]
#define iAD22100S_max          150.0F                   // Temperature Max [℃]
#define iAD22100S_min          -50.0F                   // Temperature Min [℃]

extern const tbl_adc_t tbl_AD22100S;
```

AD22100S.cpp

```
#include        "AD22100S.h"
#if     iAD22100S_ma == iSMA                            // Simple moving average filter
static float32 AD22100S_sma_buf[iAD22100S_SMA_num];
static const sma_f32_t AD22100S_Phy_SMA =
{
        iInitial ,                                      // Initial state
        iAD22100S_SMA_num ,                             // Simple moving average number & buf size
        0U ,                                            // buffer position
        0.0F ,                                          // sum
        &AD22100S_sma_buf[0]                            // buffer
};
#elif   iAD22100S_ma == iEMA                            // Exponential moving average filter
static const ema_f32_t AD22100S_Phy_EMA =
{
        iInitial ,                                      // Initial state
        0.0F ,                                          // Xn-1
        iAD22100S_EMA_K                                 // Exponential smoothing factor
};
#elif   iAD22100S_ma == iWMA                            // Weighted moving average filter
static float32 AD22100S_wma_buf[iAD22100S_WMA_num];
static const wma_f32_t AD22100S_Phy_WMA =
{
        iInitial ,                                      // Initial state
        iAD22100S_WMA_num ,                             // Weighted moving average number & buf size
        0U ,                                            // buffer poition
        iAD22100S_WMA_num * (iAD22100S_WMA_num + 1)/2 , // kn sum
        &AD22100S_wma_buf[0]                            // Xn buffer
};
#else                                                   // Non-moving average filter
#endif

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

```
const tbl_adc_t tbl_AD22100S =
{
        iAD22100S               ,
        iAD22100S_pin           ,
        iAD22100S_xoff          ,
        iAD22100S_yoff          ,
        iAD22100S_gain          ,
        iAD22100S_max           ,
        iAD22100S_min           ,
        iAD22100S_ma            ,

#if     iAD22100S_ma == iSMA                    // Simple moving average filter
        &AD22100S_Phy_SMA       ,
        (ema_f32_t*)iDummy_adr  ,
        (wma_f32_t*)iDummy_adr
#elif   iAD22100S_ma == iEMA                    // Exponential moving average filter
        (sma_f32_t*)iDummy_adr  ,
        &AD22100S_Phy_EMA       ,
        (wma_f32_t*)iDummy_adr
#elif   iAD22100S_ma == iWMA                    // Weighted moving average filter
        (sma_f32_t*)iDummy_adr  ,
        (ema_f32_t*)iDummy_adr  ,
        &AD22100S_Phy_WMA
#else                                           // Non-moving average filter
        (sma_f32_t*)iDummy_adr  ,
        (ema_f32_t*)iDummy_adr  ,
        (wma_f32_t*)iDummy_adr
#endif

};
```