ICE-11101 Datasheet

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TDK InvenSense

ICE-11101

Ultra-Low Power MEMS CO_2 Gas Sensor

ICE-11101 HIGHLIGHTS

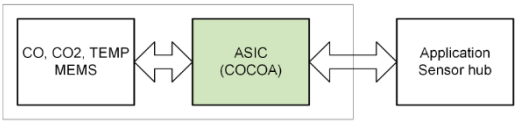
The ICE-11101 is a miniaturized, ultra-low power MEMS sensor for accurate detection of Carbon Dioxide (CO_2). It features integrated electronics that offers digital I^2C communication, along with an on-board processor to support background processing and user configurability. The ICE-11101 also features very wide range of sensing capability, from 400 ppm to 50,000 ppm of CO_2.

The ICE-11101 features state-of-the-art MEMS technology combined with advanced packaging and software support, all of which enable accuracy of detection while allowing a miniaturized form factor of 5x5x1.1 mm, with average power (under normal usage scenarios) of less than 1 mW.

Other industry-leading features include an embedded temperature sensor, software support available on the embedded micro-controller as well as on the host, automatic background calibration, and an easy-to-use design kit.

The device supports a VDD operating range of 2.7V to 3.3V.

BLOCK DIAGRAM



ICE-11101 FEATURES

- Baseline accuracy: ±75 ppm ±3% of Measured Value
  - Even better accuracy at CO_2 concentrations under 2000 ppm
- Industry-leading sensor response time: < 30s.
- Product variant offers very large sensing range: 400 to 50,000 ppm
- Lifetime: > 5 years
- Host interface: 400 KHz I^2C

APPLICATIONS

- Indoor Air Quality (IAQ) monitoring
- Outdoor Air Quality Monitoring (AQM)
- Demand Controlled Ventilation (DCV) for homes and buildings
- Automotive In-cabin monitoring
- IoT monitoring devices for home and personal use
- Breath monitoring
- Leakage detection

ORDERING INFORMATION

PART	TEMP RANGE	PACKAGE
ICE-11101†	0 to 60°C	5x5x1.1 mm 28 pin LGA

†Denotes RoHS and Green-Compliant Package

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This document is a product specification, providing a description, specifications, and design related information on the ICE-11101 Gas Sensor product. The device is housed in a 5x5x1.1 mm 28-pin LGA package.

Please note: “TCE-11101” is the previous number for “ICE-11101”.

1.2 PRODUCT OVERVIEW

The ICE-11101 is a MEMS sensor specifically built for carbon dioxide (CO_2) sensing in commercial and consumer indoor environments. It incorporates TDK’s proprietary materials-based gas sensing technology capable of direct CO2 sensing.

The ICE-11101 measures CO_2 concentration by a measurement of the thermal conductivity of the surrounding air.

1.3 APPLICATIONS

- Commercial Indoor Air Quality (IAQ) monitoring
- In-home IAQ, wall-mounted or portable equipment
- Automotive In-cabin monitoring
- IoT monitoring devices for home and personal use
- Breath monitoring
- Leakage detection

2 FEATURES

The ICE-11101 includes a wide range of features:

- Integrated micro-controller system
- Host interface: 400 kHz I^2C
- RoHS and Green compliant
- In-run automatic baseline correction algorithm running on the internal processor.

3 SENSOR CHARACTERISTICS

3.1 CO^2 SENSOR PERFORMANCE SPECIFICATIONS (MEASURED AT BOARD LEVEL)

Typical Operating Conditions: VDD = 3.3V, T_A=25°C, unless otherwise noted.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Performance Parameters						
Detection Range	25°C	400		5000	ppm	
Operating Temperature range		0		60	^{0}C	
Operating Relative Humidity range		10		90	% RH	4
Detection Accuracy	25°C		± 75 ± (3% of reading)		ppm	
Temperature Coefficient of output over range of operation	Humidity = 25%, CO_2 = 400 ppm		8		ppm/^{0}C	5
Humidity Coefficient of output	Temperature = 25°C, CO_2 = 400 ppm			16	%/%RH	4
Short term stability or Drift	Constant temperature, constant humidity, CO_2 = 400 ppm		10		ppm/Hr	
Sensor Stand-alone Power Consumption	25°C		0.17		mA	1
Long Term Drift	Constant CO_2 concentration					2
Operational Parameters						
Response Time			30		sec	
Warm-up/ Auto-calibration Time	After reset button is pushed		5		minutes	
Lifetime			5		years	Estimated
Other Sensor Characteristics						
Sensor size			5x5x1.1		mm	

Table 1. CO^2 Sensor Specifications

3.2 ELECTRICAL SPECIFICATIONS

3.2.1 D.C. Electrical Characteristics

Typical Operating Conditions: VDD = 3.3V, T_A=25°C, unless otherwise noted.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
SUPPLY VOLTAGES						
VDD		2.97	3.3	3.63	V	3
SUPPLY CURRENTS						
TBD			TBD		TBD	
TEMPERATURE RANGE						
Operating Temperature Range	Performance parameters are not applicable beyond Operating Temperature Range	10	+25	+60	°C	3
HUMIDITY RANGE						
Operating Humidity Range		10	40	90	%	4

Table 2. D.C. Electrical Characteristics

Notes:

1. A 5-minute (300 sec) measurement cycle is assumed. Deep sleep enabled.
2. Automatic baseline correction works in the background and sets the base value every 24 hours.
3. Guaranteed by design.
4. Please see “AN-000250 ICE-11101 Errata” item 001 for more detailed explanation.
5. Please see “AN-000250 ICE-11101 Errata” item 005 for more detailed explanation.

3.2.2 A.C. Electrical Characteristics

Typical Operating Conditions: VDD = 3.3V, T_A=25°C, unless otherwise noted.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
SUPPLIES						
Main Supply Voltage (VDD)		2.97	3.3	3.63	V	
Supply current consumption Operational Standby			 0.17 7		 mA uA	2
Supply Ramp Time	Monotonic ramp. Ramp rate is 10% to 90% of the final value	0.01		TBD	ms	
Power Supply Noise	Up to 10kHz			10	mV peak-peak	
RECOMMENDED OPERATING CONDITIONS						
Junction temperature		10	25	60	°C	
Storage temperature		-30		70		
ABSOLUTE MAXIMUM RATINGS						
Main Supply Voltage (VDD)		-0.3		3.63	V	
ESD/LATCHUP						
ESD robustness	According to the AEC-Q100-002 standard			2	kV	
Latch-up	According to the EIA/JESD 78 standard			100	mA	
DIGITAL OUTPUT (CSB, INT)						
V_{OH}, High Level Output Voltage		0.63*1.8			V	2
V_{OL}, Low Level Output Voltage				0.33*1.8	V	
Drive Strength				1	mA	
I^2C ADDRESS						
I^2C Address			0x34			
I^2C I/O (SCL, SDA)						
V_{IH}, High Level Input Voltage		0.77*1.8			V	2
V_{IL}, Low Level Input Voltage				0.27*1.8	V	
V_{hys}, Hysteresis of Schmitt trigger inputs		0.04*1.8			V	
V_{OL}, Low Level Output Voltage	At 2 mA sink current	0		0.18*1.8	V	
I_{OL}, Low-Level Output Current	V_{OL}=0.4V V_{OL}=0.6V	3 6			mA mA	
t_{of}, Output Fall Time from V_{IHmin} to V_{ILmax}		6.5		250	ns	
INTERNAL CLOCK SOURCE						
Clock Frequency Tolerance	Main clock frequency 16 MHz; 10°C to 60°C	-8		+8	%	1
	Low clock frequency 25 kHz; 10°C to 60°C	-44		+65	%	

Table 3. A.C. Electrical Characteristics

Notes:

1. Tested in production.
2. Guaranteed by design. (Target spec).

3.3 I²C TIMING CHARACTERIZATION

Typical Operating Conditions: VDD = 3.3V, T_A=25°C, unless otherwise noted.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
f_{SCL}, SCL Clock Frequency				400	kHz	1
$t_{HD;STA}$, (Repeated) START Condition Hold Time		0.6			µs	
t_{LOW}, SCL Low Period		1.3			µs	
t_{HIGH}, SCL High Period		0.6			µs	
$t_{SU;STA}$, Repeated START Condition Setup Time		0.6			µs	
$t_{HD;DAT}$, SDA Data Hold Time		0			ns	
$t_{SU;DAT}$, SDA Data Setup Time		100		300	ns	
t_r, SDA and SCL Rise Time		20		300	ns	
t_f, SDA and SCL Fall Time		20*(VDDIO/5.5V)		300	ns	
$t_{SU;STO}$, STOP Condition Setup Time		0.6			µs	
t_{BUF}, Bus Fre Time Between STOP and START Condition		1.3			µs	
Cb, Capacitve Load for each Bus Line				400	pF	
$t_{VD;DAT}$, Data Valid time				0.9	µs	
$t_{VD;ACK}$, Data Valid Acknowledge Time				0.9	µs	

Table 4. I²C Timing Characteristics

Notes:

1. Guaranteed by design (Target Spec).

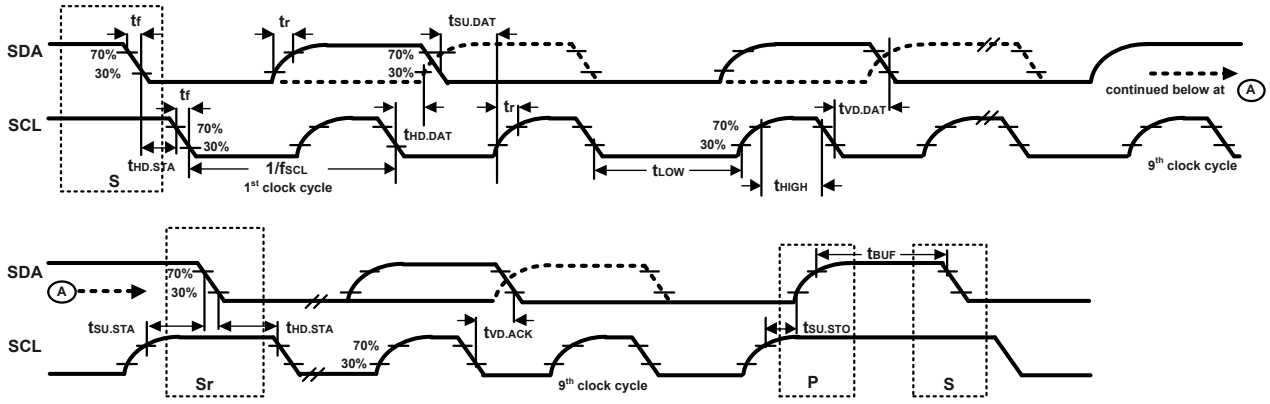

Figure 1. I²C Bus Timing Diagram

3.4 ABSOLUTE MAXIMUM RATINGS

Stress above those listed as “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these conditions is not implied. Exposure to the absolute maximum ratings conditions for extended periods may affect device reliability.

Parameter	Rating
Supply Voltage, VDD	TBD
Input Voltage Level (FSYNC, SCL, SDA)	TBD
Operating Temperature Range	+10°C to +60°C
Storage Temperature Range	-30°C to +70°C
Electrostatic Discharge (ESD) Protection	TBD
Latch-up	TBD

Table 5. Absolute Maximum Ratings

4 APPLICATIONS INFORMATION

4.1 PIN OUT DIAGRAM AND SIGNAL DESCRIPTION

Pin Number	Pin Name	Pin Description
1	NC	No Connect
2	NC	No Connect
3	NC	No Connect
4	SDA	SDA: I2C Serial Data
5	NC	No Connect
6	NC	No Connect
7	INT	Interrupt output
8	NC	No Connect
9	NC	No Connect
10	NC	No Connect
11	NC	No Connect
12	SCL	SCL: I2C Serial Clock
13	NC	No Connect
14	NC	No Connect
15	GND	Connect to Ground
16	GND	Connect to Ground
17	NC	No Connect
18	NC	No Connect
19	GND	Connect to Ground
20	GND	Connect to Ground
21	NC	No Connect
22	NC	No Connect
23	FILT3	Place 1 µF capacitor between FILT3 and GND
24	REF	Connect a 39 kΩ resistor between pin 24 and GND
25	VDD	3.3V Analog Supply; Place TBD µF capacitor between VDD and GND
26	FILT1	Place 0-400 pF capacitor between FILT1 and FILT2
27	FILT2	Place 0-400 pF capacitor between FILT1 and FILT2
28	GND	Connect to Ground

Table 6. Signal Descriptions

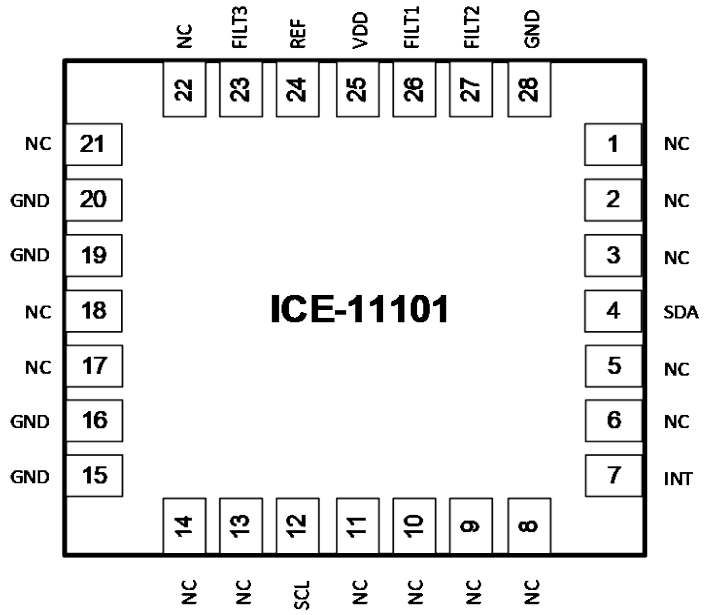

Figure 2. Pin Out Diagram for ICE-11101 5x5x1.5mm LGA

4.2 TYPICAL OPERATING CIRCUIT

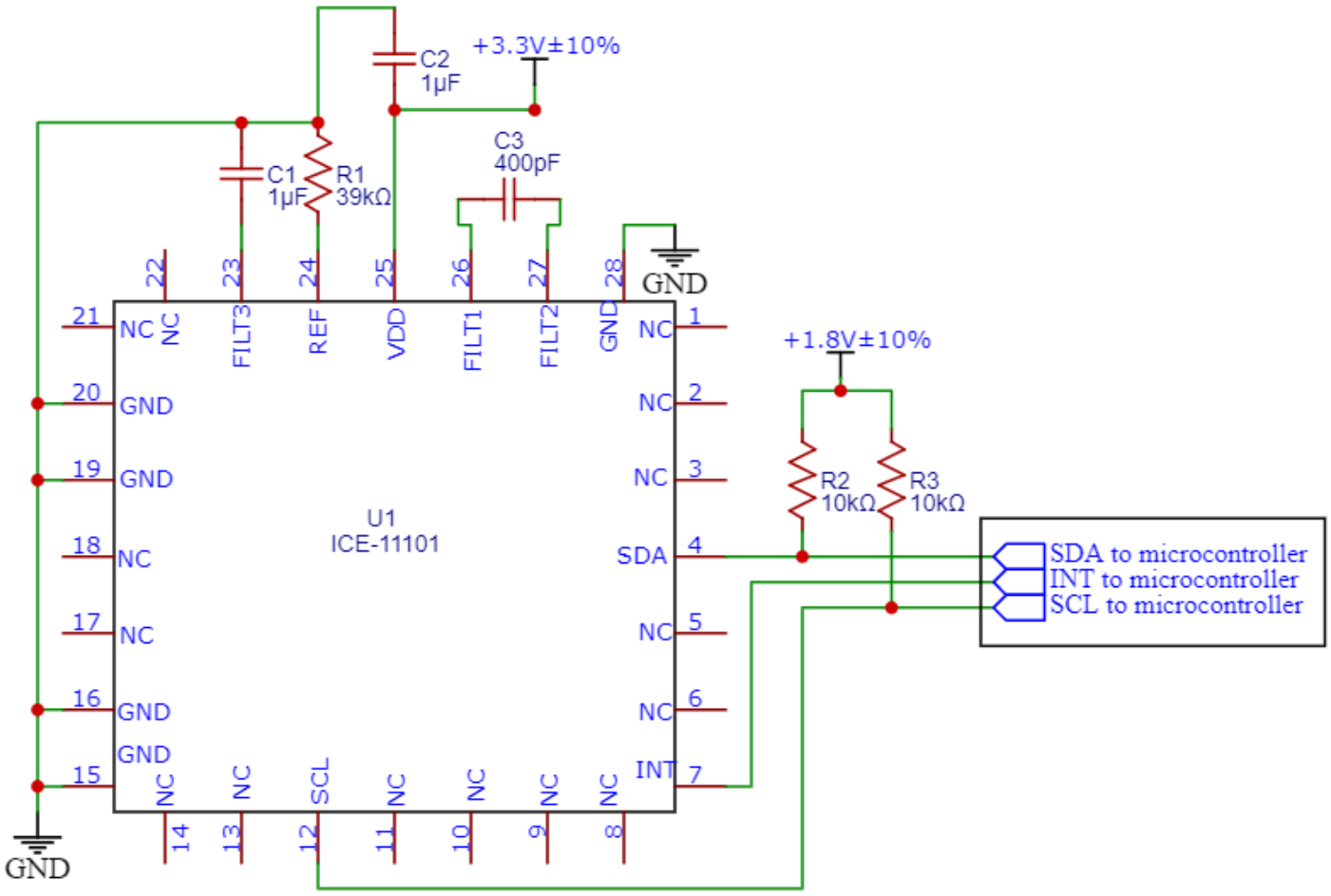

Figure 3. Typical operating circuit

4.3 BILL OF MATERIALS FOR EXTERNAL COMPONENTS

Component	Label	Specification	Quantity
Reference resistor	R1	39 kΩ ± 1%	1
Pull-up resistor	R2, R3	10 kΩ	2
Filter capacitor 1	C1	Minimum Y4P 1 µF ± 10% ESR 0.1 – 2Ω / 10V rating	1
VDD Bypass capacitor	C2	Minimum Y4P 1 µF ± 10% ESR 0.1 – 2Ω / 10V rating	1
Filter capacitor 2	C3	400 pF	1

4.4 MEASUREMENT SYSTEM

The measurement system of the ICE-11101 consists of:

- A measurement sequencer, implementing a CO2 measurement.
- 2nd order Delta-Sigma modulator driving the heater DACs current sources
- Data correction: offset compensation, gain calibration and short-term (<1s) averaging of the ADC data
- Interrupt signaling that the sequencer is finished

Details TBD

4.5 MICROCONTROLLER SYSTEM

The ICE-11101 includes a microcontroller system consisting of:

- Interrupt controller
- Power saving modes and DEEP SLEEP mode counter, minimizing power consumption when no sensors are active
- SRAM
- ROM

Details TBD

4.6 DIGITAL INTERFACE

The ICE-11101 includes an I^2C host interface. Details of the interface are descried in the following section.

5 INTERFACE SPECIFICATIONS

The ICE-11101 supports an I²C host interface. The ICE-11101 always operates as a slave when connected to the host.

5.1 I²C INTERFACE

The I²C interface has access on all register and memory locations of the device. The ICE-11101 always operates as a slave device when communicating to the system processor, which thus acts as the master. The maximum bus speed is 400kHz.

The slave address of the ICE-11101 is TBD.

For detailed information on the I²C protocol, refer to the latest NXP I²C-bus specification and user manual UM10204: http://www.nxp.com/documents/user_manual/UM10204.pdf

The register to read/write data should be selected by a register address pointer. This address pointer must be set during I²C write operation. After transmission the address pointer shall automatically be incremented, when it reaches address 0xFF it should start again at 0x00.

7 ICE-11101 EXAMPLE SOFTWARE

Example software is provided here that illustrates the following:

1. Initialization of device
    a. Firmware Reset
    b. Configure Interrupt
2. Enable sensor
    a. Set ODR 5 seconds interval
3. Wait for interrupt
4. Read data when interrupt comes in
    a. Read Temperature data register
    b. Read CO_2 data register

Note: A dummy I^2C access is required to wake up the device when there is around 100 ms gap from the previous access, also around 5 ms wait is required between the dummy access and the next access.

Example Source Code for Arduino

```
//
// ICE11101 CO2 Sensor Example
//
#include <Wire.h>

// ICE11101 I2C Address
#define ICE11101_I2C_ADDR     0x34

// Registers Addresses
#define REG_USR_WHO_AM_I      0x0800
#define REG_USR_FIRMWARE_VER  0x0801
#define REG_USR_ODR           0x0802
#define REG_USR_TEMP_AVG_NB   0x0803
#define REG_USR_CO2_AVG_NB    0x0805
#define REG_USR_INT_CONFIG    0x0806
#define REG_USR_STATUS        0x0807
#define REG_USR_CONTROL       0x0808
#define REG_USR_TEMP_DEGC     0x0809
#define REG_USR_CO2_PPM       0x080B
#define REG_USR_CO2_INI_PPM   0x080D

// Values for REG_USR_ODR
#define USR_ODR_DISABLE       0
#define USR_ODR_5SEC          1
#define USR_ODR_30SEC         2
#define USR_ODR_300SEC        3

// Values for REG_USR_INT_CONFIG
#define USR_INT_ACTIVE_LOW    0x0000
#define USR_INT_ACTIVE_HIGH   0x0001
#define USR_INT_DRIVE_OD      0x0000
#define USR_INT_DRIVE_PP      0x0002
#define USR_INT_ENABLE        0x8000
#define USR_INT_DISABLE       0x0000

// Values for REG_USR_STATUS
#define USR_STATUS_DRDY       0x0008
#define USR_STATUS_DRDY_COUNT 0x0007
```

```
#define USR_STATUS_TRIM_FAIL  0x8000

// Values for REG_USR_CONTROL
#define USR_FIRMWARE_RESET    0x8000

// Register Write
void i2c_reg16_write(int slave_addr, int reg_addr, unsigned short *data)
{
  unsigned char d[4];

  d[0] = (reg_addr >> 8) & 0xff;
  d[1] = reg_addr & 0xff;
  d[2] = (*data >> 8) & 0xff;
  d[3] = *data & 0xff;

  Wire.beginTransmission(slave_addr);
  Wire.write(d, 4);
  Wire.endTransmission();
}

// Register Read
void i2c_reg16_read(int slave_addr, int reg_addr, unsigned short *data)
{
  unsigned char d[2];

  d[0] = (reg_addr >> 8) & 0xff;
  d[1] = reg_addr & 0xff;

  Wire.beginTransmission(slave_addr);
  Wire.write(d, 2);
  Wire.endTransmission();
  Wire.requestFrom(slave_addr, 2);
  d[0] = Wire.read();
  d[1] = Wire.read();
  *data = (d[0] << 8) & 0xff00;
  *data |= d[1] & 0xff;
}

// Interrupt flag
volatile int int_flag = 0;

// Callback function for interrupt
void int_cb()
{
  int_flag = 1;
}

void setup() {
  unsigned short d;

  Serial.println("=== System Setup ===");

  Serial.begin(115200);

  Serial.println("> I2C: 400kHz");
  Wire.begin();
  Wire.setClock(400000);
```

```
  Serial.println("> Int: Rising Edge on D6");
  pinMode(6, INPUT_PULLDOWN);
  attachInterrupt(digitalPinToInterrupt(6), int_cb, RISING);

  Serial.println("--- Sensor Setup ---");

  i2c_reg16_read(ICE11101_I2C_ADDR, REG_USR_WHO_AM_I, &d); // dummy for wake up
  delay(5); // 5ms

  Serial.print("> W CONTROL: 0x");
  d = USR_FIRMWARE_RESET;
  i2c_reg16_write(ICE11101_I2C_ADDR, REG_USR_CONTROL, &d);
  Serial.println(d, HEX);

  delay(100); // 100ms

  i2c_reg16_read(ICE11101_I2C_ADDR, REG_USR_WHO_AM_I, &d); // dummy for wake up
  delay(5); // 5ms

  Serial.print("> R WHO_AM_I: 0x");
  i2c_reg16_read(ICE11101_I2C_ADDR, REG_USR_WHO_AM_I, &d);
  Serial.println(d, HEX);

  Serial.print("> R FIRMWARE_VER: 0x");
  i2c_reg16_read(ICE11101_I2C_ADDR, REG_USR_FIRMWARE_VER, &d);
  Serial.println(d, HEX);

  Serial.print("> W INT_CONFIG: 0x");
  d = USR_INT_ACTIVE_HIGH | USR_INT_DRIVE_PP | USR_INT_ENABLE;
  i2c_reg16_write(ICE11101_I2C_ADDR, REG_USR_INT_CONFIG, &d);
  Serial.println(d, HEX);

  Serial.print("> W CO2_INI_PPM: 0x");
  d = 400; // 400ppm
  i2c_reg16_write(ICE11101_I2C_ADDR, REG_USR_CO2_INI_PPM, &d);
  Serial.print(d, HEX); Serial.print(" ("); Serial.print(d); Serial.println(")");

  Serial.print("> W ODR: 0x");
  d = USR_ODR_5SEC; // 5sec
  i2c_reg16_write(ICE11101_I2C_ADDR, REG_USR_ODR, &d);
  Serial.println(d, HEX);
}

int data_count;

void loop() {
  unsigned short d;
  unsigned short status_reg;
  float temp;
  float co2;

  // Wait for interrupt
  if (int_flag) {
    int_flag = 0;

    i2c_reg16_read(ICE11101_I2C_ADDR, REG_USR_WHO_AM_I, &d); // dummy for wake up

    // Read Status
```

```
    i2c_reg16_read(ICE11101_I2C_ADDR, REG_USR_STATUS, &d);

    // Check if Data Ready and Data Count is updated
    if ((d & USR_STATUS_DRDY) && ((d & USR_STATUS_DRDY_COUNT) != data_count)) {
      status_reg = d;
      data_count = status_reg & USR_STATUS_DRDY_COUNT;

      // Read Data
      i2c_reg16_read(ICE11101_I2C_ADDR, REG_USR_TEMP_DEGC, &d);
      temp = (short)d / 100.f;
      i2c_reg16_read(ICE11101_I2C_ADDR, REG_USR_CO2_PPM, &d);
      co2 = (short)d;

      // Print Data
      Serial.println();
      Serial.print("> System Time (sec)  : "); Serial.println(millis() / 1000);
      Serial.print("> STATUS             : "); Serial.println(status_reg, HEX);
      Serial.print("> Temperature (degC) : "); Serial.println(temp);
      Serial.print("> CO2 (ppm)          : "); Serial.println(co2);
    }
  }
}
```

8 ASSEMBLY

This section provides general guidelines for assembling TDK InvenSense Micro Electro-Mechanical Systems (MEMS) Gas Sensors.

8.1 PACKAGE DIMENSIONS

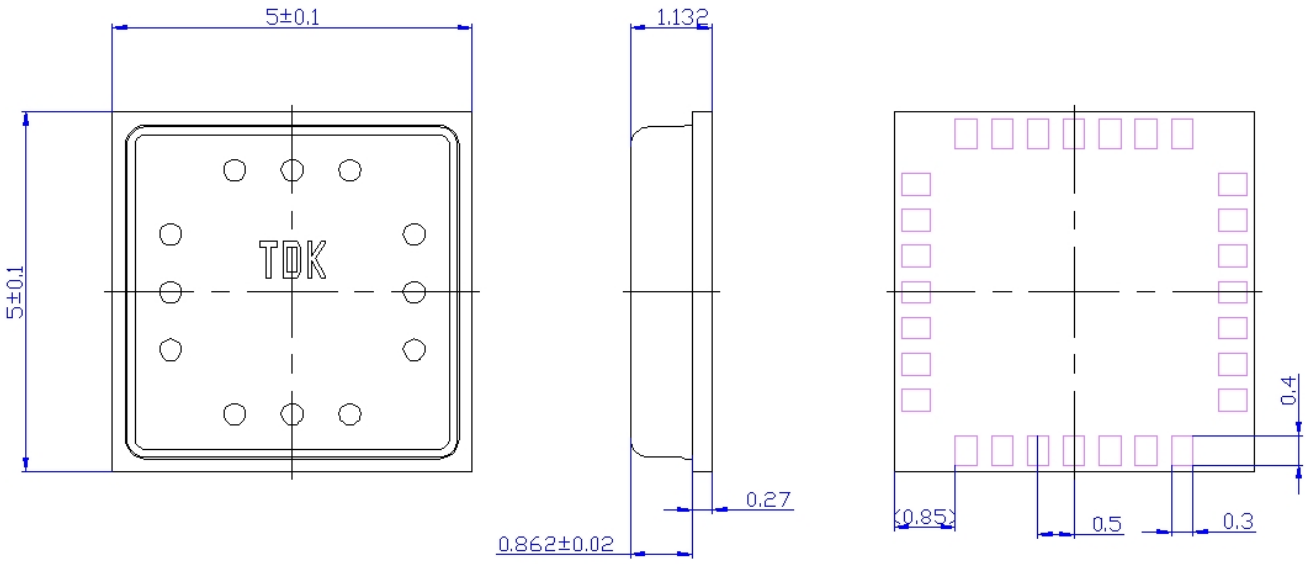

Figure 4. Package dimensions

9 PART NUMBER PACKAGE MARKING

The part number package marking for ICE-11101 devices is summarized below:

Part Number	Part Number Package Marking
ICE-11101	TBD

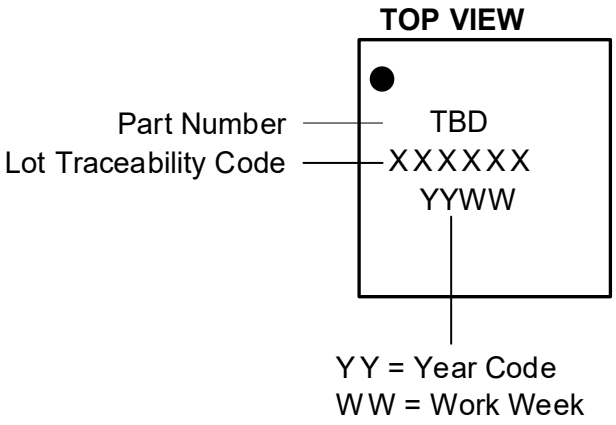

Figure 5. Part number package marking

10 REGISTER MAP

This section describes the function and contents of each register in the user register map.

Note: The device powers up in sleep mode.

10.1 WHO_AM_I

Name: WHO_AM_I
Address: 2048 (0x0800)
Serial IF: R
Reset value: 0xC000

BIT	NAME	FUNCTION
15:0	WHO_AM_I	Register to indicate to user which device is being accessed. This is a Read only register. User must not attempt to write to it.

Description:

This register is used to verify the identity of the device. The default value of the register is 0xC000. This is different from the I^2C address of the device as seen on the slave I^2C controller by the applications processor.

10.2 FIRMWARE_VER

Name: FIRMWARE_VER
Address: 2049 (0x0801)
Serial IF: R
Reset value: 0xXXXX (factory trimmed based on firmware)

BIT	NAME	FUNCTION
15:0	FIRMWARE_VER	Register to indicate device firmware version. This is a Read only register. User must not attempt to write to it.

10.3 ODR

Name: ODR
Address: 2050 (0x0802)
Serial IF: R/W
Reset value: 0x0000

BIT	NAME	FUNCTION
15:0	ODR	Sample Interval in seconds. 0: Disable 1: 5sec 2: 30sec 3: 300sec Other: Disable

10.4 TEMP_AVG_NB

Name: TEMP_AVG_NB
Address: 2051 (0x0803)
Serial IF: R/W
Reset value: 0x0000

BIT	NAME	FUNCTION
15:4	-	Reserved
3:0	TEMP_AVG_NB	Moving average filter applied to temperature sensor data. Number of samples to be averaged is TEM_AVG_NB + 1.

10.5 CO2_AVG_NB

Name: CO2_AVG_NB
Address: 2053 (0x0805)
Serial IF: R/W
Reset value: 0x0000

BIT	NAME	FUNCTION
15:4	-	Reserved
3:0	CO2_AVG_NB	Moving average filter applied to CO_2 sensor data. Number of samples to be averaged is CO2_AVG_NB + 1.

10.6 INT_CONFIG

Name: INT_CONFIG
Address: 2054 (0x0806)
Serial IF: R/W
Reset value: 0x0000

BIT	NAME	FUNCTION
15	INT_ENABLE	Data Ready Interrupt Enable 0: Disable 1: Enable
14:2	-	Reserved
1	INT_DRIVE	Data Ready Interrupt Drive mode 0: Open Drain 1: Push-Pull
0	INT_POL	Data Ready Interrupt Polarity 0: Active Low 1: Active High

Note: Data Ready Interrupt is a 500 µs wide pulse.

10.7 STATUS

Name: STATUS
Address: 2055 (0x0807)
Serial IF: R
Reset value: 0x0000

BIT	NAME	FUNCTION
15	TRIM_CPY_STATUS	Trim value copy from flash memory 0: Success 1: Failure
14:4	-	Reserved
3	READY	New Data Status 0: Not Ready 1: Ready
2:0	DATA_COUNT	Sample Counter. Increments at every new sample.

Note: This is a Read only register. User must not attempt to write to it.

10.8 CONTROL

Name: CONTROL Address: 2056 (0x0808) Serial IF: R/W Reset value: 0x0000		
BIT	**NAME**	**FUNCTION**
15	FW_RESET	Control Firmware. 0: Do nothing 1: Perform reset (bit will be cleared automatically)
14:0	-	Reserved

10.9 TEMP_DEGC

Name: TEMP_DEGC Address: 2057 (0x0809) Serial IF: R Reset value: 0x0000		
BIT	**NAME**	**FUNCTION**
15:0	TEMP_DEGC	Temperature Data in degC scaled by 100

Note: This is a Read only register. User must not attempt to write to it.

10.10 CO2_PPM

Name: CO2_PPM Address: 2059 (0x080B) Serial IF: R Reset value: 0x0000		
BIT	**NAME**	**FUNCTION**
15:0	CO2_PPM	CO_2 data in ppm

Note: This is a Read only register. User must not attempt to write to it.

10.11 CO2_INI_PPM

Name: CO2_INI_PPM Address: 2061 (0x080D) Serial IF: R/W Reset value: 0x0000		
BIT	**NAME**	**FUNCTION**
15:0	CO2_INI_PPM	CO_2 initial ppm When sensor is enabled by ODR register, the value of this register will be taken as the expected current ppm by the algorithm if the value is not zero.

11 DOCUMENT INFORMATION

11.1 REVISION HISTORY

Revision Date	Revision	Description
10/30/2020	1.0	Initial release
11/09/2021	1.1	Product name update

TDK InvenSense