muRata

Document No. JMZ05-0013-01E

RoHS-Y

Product Specification

Issued Date: Jan.16, 2020

Part Description: Barometric Pressure Sensor

MURATA Part No.: ZPA4756-0311A-R

Development & Marketing Sec.
Product Engineering Department
Functional Devices Division
Murata Manufacturing Co., Ltd.

(Y15)

⚠ Note:

1
Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.

2
You are requested not to use our product deviating from this product specification.

3
Please return one duplicate of this product specification to us with your signature to acknowledge your receipt. In case of no return within three months from submission date, or if we receive order before the duplicate is returned, this product specification will be deemed to have been received by you.

4
We consider it not appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.

Index of Contents

1. Scope

This product specification is applied to waterproof barometric pressure sensors for atmospheric pressure measurement.

1-1. Specific applications

Consumer Devices
Smartphones, smart watches, and devices whose functions are not directly related to the protection of human life and property

1-2. Unsuitable Application

Applications listed in “Limitation of Applications” in this product specification.

2. Part number

2-1. Murata Part Number

Waterproof type pressure sensor
Part No. ZPA4756-0311A-R

3. Technical description, Dimensions, Indication, and pin description

3-1. Key features and operation

Our product is capacitive type MEMS pressure sensor. It consists of a MEMS element, a Capacitor-to-Digital Conv erter (CDC) and a digital block with the digital correction, calibration non-volatile memory bits, SPI and I2C interfac es. A pressure value can be acquired by the product calculating using a capacitance value outputted from the ME MS element.
Our product has remarkable features.

- Wide range core supply VDD: 1.7 to 3.6V
- Low current consumption
- High Output Data Rate up to 256S/s
- Accurate pressure output by self-compensation from -20 to 65 degC
- Low noise pressure output
- Pressure range 300 to 1100 hPa
- High speed I2C and SPI interface
- Interrupt function: Data Ready, pressure thresholds
- Simple average function
- RoHS compliant, halogen-free

It has the following five kinds of basic operating mode.

- **DISABLED MODE:** the product is completely disabled. Communication via SPI/I2C interface is allowed to enable the product or start ONE-SHOT MODE.

- **CONFIGURATION MODE:** at disabled mode the product all register are accessible, and measurement configuration can be changed. Capacitance and temperature measurement s are not being run in this mode.

- **CONTINUOUS MEASUREMENT MODE:** after enabling this mode the temperature and capacitance measurement are running at their selected conversion time. It is useful for application of short-term detection. 1st cap conversion takes (CDC_order + 1) times of cap conversion time. Capacitance outputs synchronize with cap conversion time (CAP CONV) based on P_OSR setting

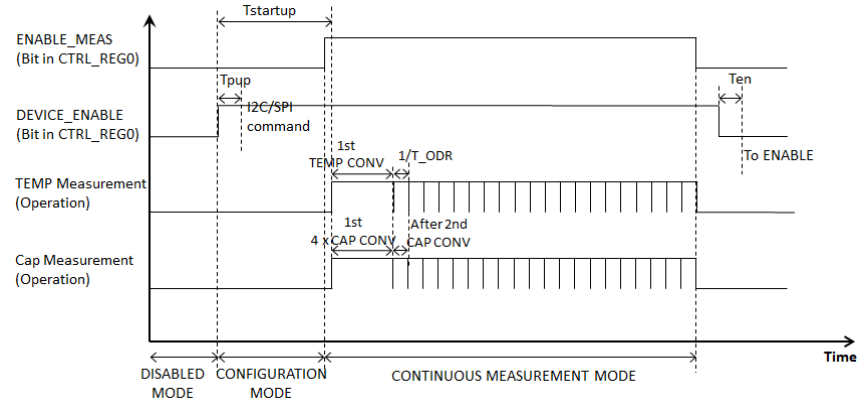
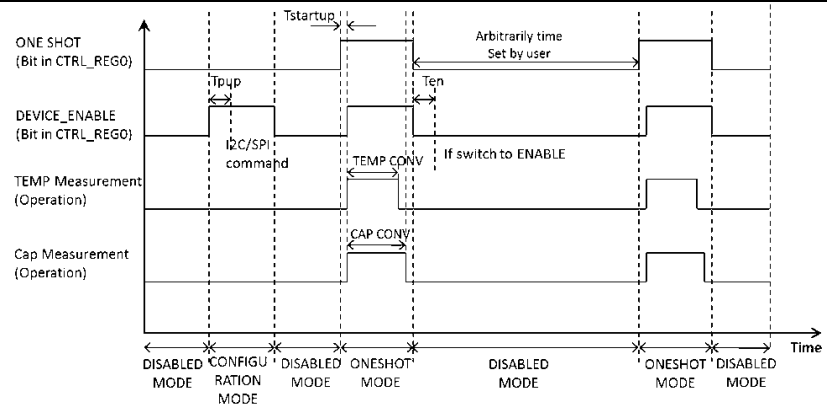
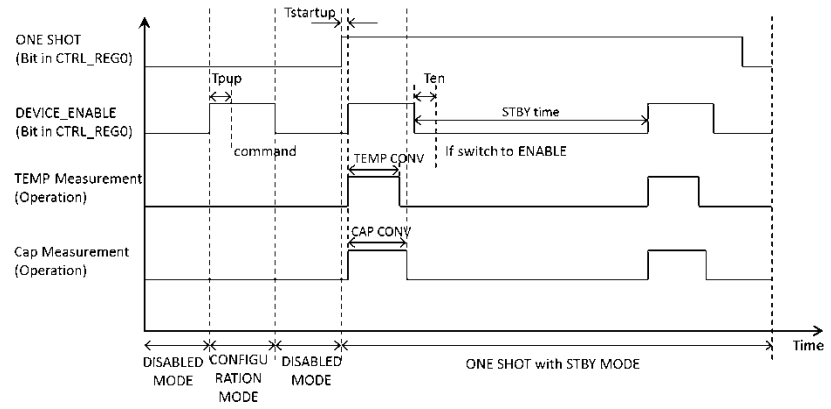
- **ONE-SHOT MODE:** this mode starts from the disabled mode, performs a temperature and capacitance measurement and returns automatically to disabled mode. The measurement configuration can be chan ged by entering into the configuration mode before starting the one-shot. By setting the STBY=0, this m ode is activated. User can arbitrarily set time interval between pressure measurements in this mode. Thi s mode is useful for application of the low sampling rate and low power consumption.

- **ONE-SHOT WITH STBY MODE:** this mode is a kind of One-shot mode. In this mode the product interleaves the STBY time by internal counter. By setting the STBY≠0, this mode is activated. The STBY time is set by STBY3-0 bits in STBY register. This mode is also useful for application of the low sampling rate and low power consumption.

3-2. Operation mode timing diagram

The following diagram describes our product operation when the Continuous measurement is enabled after device enabling the product.
There are some options of Over Sampling Ratio (OSR) up to 4096 and each setting corresponds to each capacitance conversion time (CAP CONV in chart). Finally whole capacitance conversion time is set by multiplying the number of simple averages.

Table 1. Timing diagram

Timing diagram in each measurement mode	Note
 **Figure 1. Timing diagram for contentious mode**	Pressure is calculated from sensing capacitance (Cap). Cap is measured with a period of “CAP CONV time” sec. Pressure data is stored in output registers only after measuring Cap.
 **Figure 2. Timing diagram for One-shot mode(STBY=0)**	Pressure is calculated from sensing capacitance (Cap). Cap measured only one time per pressure measurement. It takes “CAP CONV time” per each measurement. User can arbitrarily set time interval between pressure measurements in one-shot mode. Minimum interval time between measurements is 2ms.
 **Figure 3. Timing diagram for One-shot with STBY mode(STBY≠0)**	In STBY mode the product interleaves one-shot with STBY time.

3.3. Typical application circuit

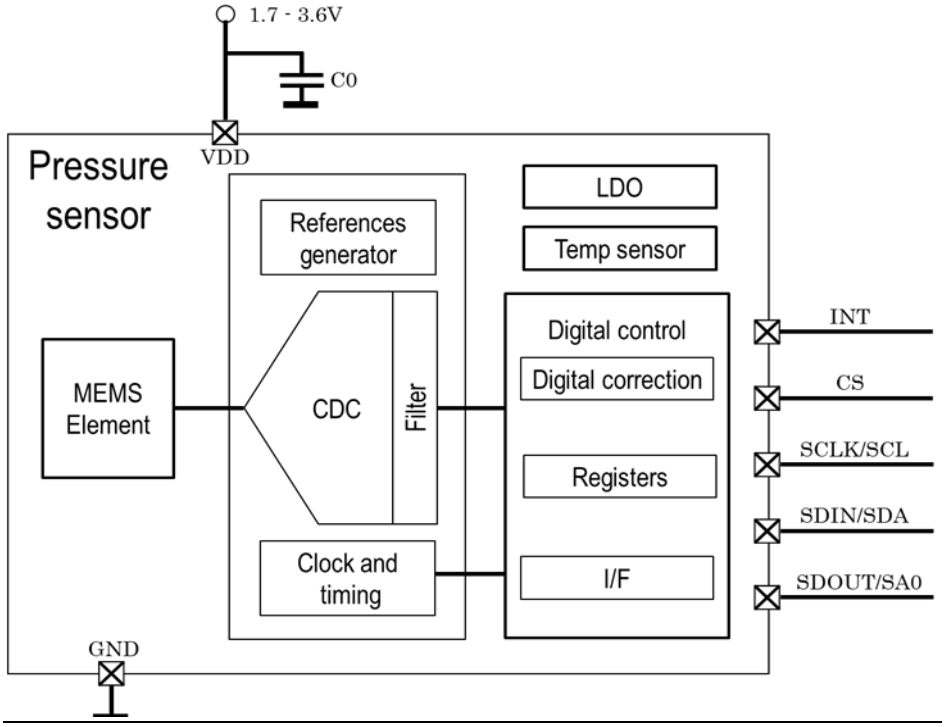


Figure 4. Typical application circuit

3.4. Connecting components information

Table 2.Connecting components list

Parameter	Symbol	Min	Max	Unit	Note
Supply decoupling capacitance	C0	100		nF	For noise elimination purpose to VDD. C0 should better be mounted as closely as possible to the Sensor. Recommended part number is GRM033R61A104ME84 (MURATA) or similar one.

3.5. Package outline

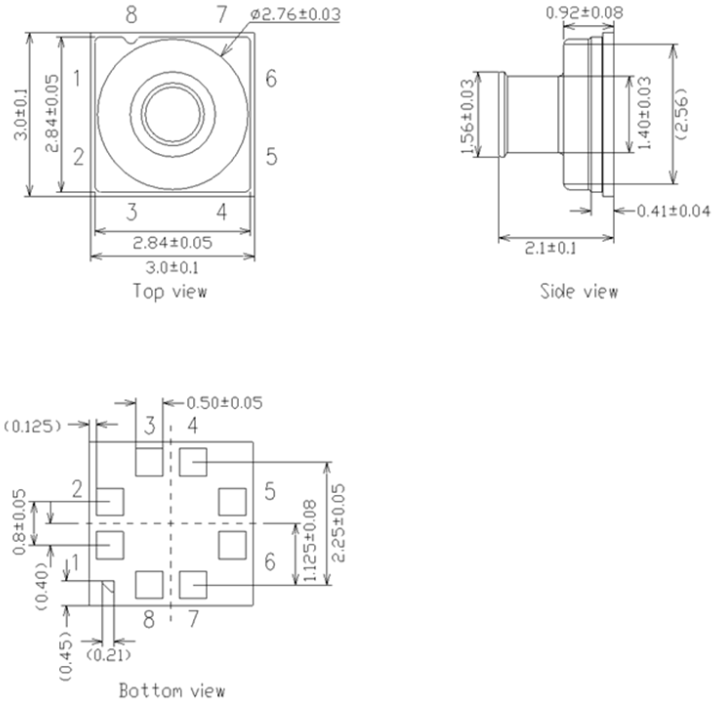


Figure 5. Package outline

3.6. Pin description

Table 3. Pin description

Pin NO.	Name	Function
1	GND	Ground
2	VDD	Power supply
3	INT	Interrupt digital output
4	SDOUT SA0	SPI MISO LSB of I2C address
5	CS	CS input
6	SCLK SCL	SPI serial port clock I2C serial clock
7	SDIN SDA	SPI MOSI SDA pin
8	NC	No connected

3.7. Recommended land pattern and Printed board

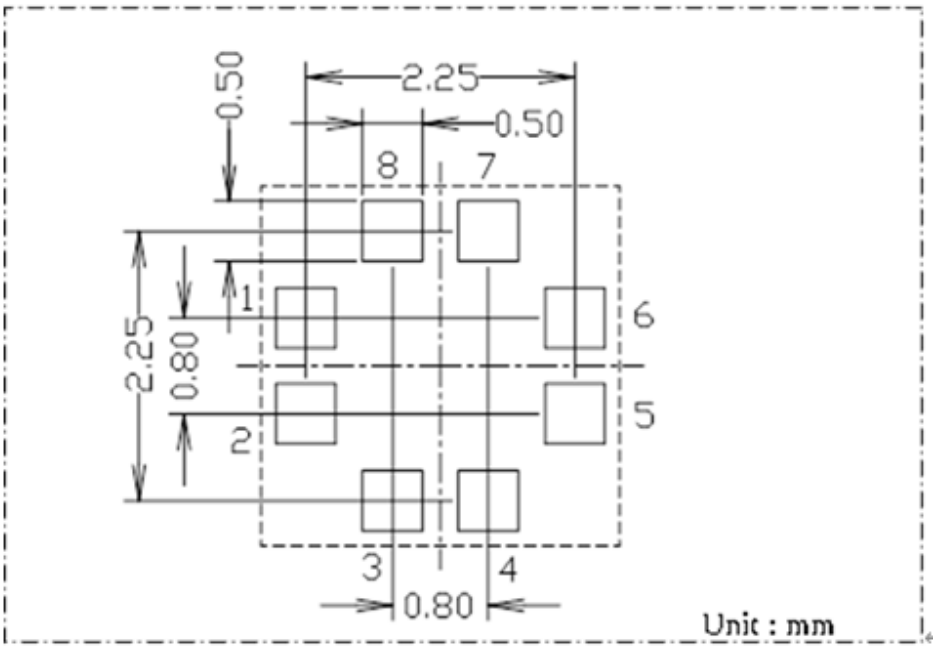


Figure 6. Recommended land pattern

Printed board ：FR-4 (thickness：1.00±0.15mm)

3.8. Recommended reflow-soldering profile

① Recommendable composition of solder ：Sn-3Ag-0.5Cu (lead-free solder)
② Thickness of a solder-print mask ：0.10mm
③ Reflow soldering profile (Sn-3Ag-0.5Cu lead-free solder is assumed.)

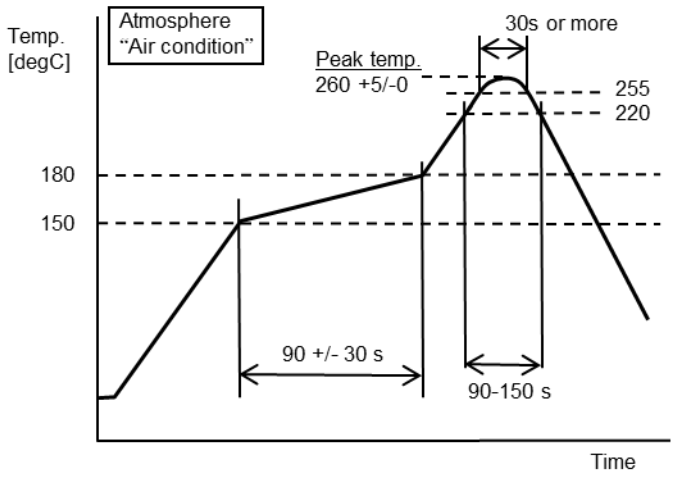


Figure 7. Recommended reflow profile for mounting

4. Characteristics

4.1. Mechanical and electrical characteristics

Table 4. Characteristics list

Parameter		Condition	Min.	Typ.	Max.	Units
Package size	Area			3.0x3.0		mm
	Height			2.1		mm
Temperature range	Operating		-40		+85	degC
	Full accuracy		-20		+65	degC
Supply voltage (*1)		VDD	1.7	1.8	3.6	V
Negative supply voltage		VSS	0.0		0.0	V
Interface			SPI / I2C			
SPI frequency					15	MHz
I2C frequency					3.4	MHz
Operation range			300		1100	hPa
Pressure resolution				1/64		Pa
Pressure ADC Resolution				24		bits
Pressure ODR		Contentious Mode (CM)	32		256	S/s
Cap conversion time setting		Contentious Mode (CM)	1/256		1/32	s
Current Consumption		Device disabled		0.8		µA
		Contentious Mode (CM)		46		µA
		One-shot Mode ODR=1S/s Cap conversion time=1/128s		2.2		µA
Relative accuracy		T= -20~65degC Pressure= 700~1100hPa ⊿P= 25hPa		0.02		hPa
Absolute accuracy		T= -20 to 65degC, P range= 300hpa to1100hPa		0.4		hPa
Pressure RMS noise		Contentious Mode (CM) ODR= 32S/s T=25dC P=1000hPa		0.6		Pa_{rms}
Temperature resolution				0.01		degC
Temperature ODR (*2)		Contentious Mode (CM)	32		256	S/s
Temperature conversion time				8		ms
Temperature absolute accuracy		T= -20 to 65degC		1.0		degC
Temperature noise		T= -20 to 65degC		0.05		degCrms

Note:
*1. The rise time for this supply must be greater than 10us and less than 10ms.
*2. Temperature ODR at Continuous mode (CM) synchronizes with Pressure ODR.

5. Register map

The device contains a set of registers which are used for control its behavoir and retrieve pressure and temperatur e data. The register address is used to identify them and to read/write the data through the serial interface.

Table 5. Register Map

Register Name	Type	Address (Hex)	description	Default
Reserved	N/A	0x00 to 0x03	Reserved, Do not modify	0000 0000
WHO_AM_I_3	R	0x04	Device (module) identifier for tracking	OTP value
WHO_AM_I_2	R	0x05	Device (module) identifier for tracking	OTP value
WHO_AM_I_1	R	0x06	Device (module) identifier for tracking	OTP value
WHO_AM_I_0	R	0x07	Device (module) identifier for tracking	OTP value
REF_P_XL	R/W	0x08	Reference pressure XL that is subtracted to the sensor output pressure	0000 0000
REF_P_L	R/W	0x09	Reference pressure L that is subtracted to the sensor output pressure	0000 0000
REF_P_H	R/W	0x0A	Reference pressure H that is subtracted to the sensor output pressure	0000 0000
ARB_CTRL	R/W	0x0B	Arbitration setting	0000 0000
Reserved	N/A	0x0C to 0x0E	Reserved, Do not modify	0000 0000
I2C_DEVICE_ID	R	0x0F	I2C device ID number, Read only	1011 10‘SA0’1
RES_CONF	R/W	0x10	Configuring the resolution of the pressure and temperature measurements	0000 0000
BUFF_CTRL	R/W	0x11	Read buffer control	0000 0000
STBY	R/W	0x12	Control the standby time	0000 0000
OPTN_REG	R/W	0x13	Pressure conversion time, Pressure conversion enable in Continuous mode	1000 0111
Reserved	N/A	0x14 to 0x1E	Reserved, Do not modify	0000 0000
ITF_CTRL	R/W	0x1F	Interface control register	0000 0011
CTRL_REG0	R/W	0x20	Measurement mode setting	0000 0000
CTRL_REG1	R/W	0x21	Interrupt mask setting	1111 1111
CTRL_REG2	R/W	0x22	Interrupt Pin driver, Software reset setting	0000 0000
CTRL_REG3	R/W	0x23	Controls SPI serial interface mode.	1000 0000
INT_SOURCEREG	R/C	0x24	Interrupt status, Read only	0000 0000
THS_P_LOW_REG	R/W	0x25	Pressure thresholds interrupt	1000 0000
THS_P_HIGH_REG	R/W	0x26	Pressure thresholds interrupt	0111 1111
STATUS_REG	R	0x27	Provides information on the data availability and the read buffer status, Read only	0000 0000
PRESS_OUT_XL	R	0x28	Pressure value XL, Read only	Last output*1
PRESS_OUT_L	R	0x29	Pressure value L, Read only	Last output*1
PRESS_OUT_H	R	0x2A	Pressure value H, Read only	Last output*1
TEMP_OUT_L	R	0x2B	Temperature value L, Read only	Last output*1
TEMP_OUT_H	R	0x2C	Temperature value H, Read only	Last output*1
Reserved	N/A	0x2D to 0x2F	Reserved, Do not modify	0000 0000

6. Register description

REF_P_XL (0x08)
Default value: 0x00
This reference pressure register contains the lower part of the reference pressure that is subtracted to the sensor output pressure. The full value is REF_P_XL & REF_P_H & REF_P_L and is represented as 2's complement.

7	6	5	4	3	2	1	0
REFL7	REFL6	REFL5	REFL4	REFL3	REFL2	REFL1	REFL0

REF_P_L (0x09)
Default value: 0x00
This reference pressure register contains the middle part of the reference pressure that is subtracted to the sensor output pressure. The full value is REF_P_XL & REF_P_H & REF_P_L and is represented as 2's complement.

7	6	5	4	3	2	1	0
REFL15	REFL14	REFL13	REFL12	REFL11	REFL10	REFL9	REFL8

REF_P_H (0x0A)
Default value: 0x00
This reference pressure register contains the higher part of the reference pressure that is subtracted to the sensor output pressure. The full value is REF_P_XL & REF_P_H & REF_P_L and is represented as 2's complement.

7	6	5	4	3	2	1	0
REFL23	REFL22	REFL21	REFL20	REFL19	REFL18	REFL17	REFL16

ARB_CTRL (0x0B)
Default value: 0x00
This register controls the functionality the arbitration of timing of internal measurement and external interface acce ss.

7	6	5	4	3	2	1	0
0	0	ARB_RDBUFF	0	0	0	0	0

Bit5: ARB_RDBUFF: When set to 1, allows the read buffer to be updated even during reads of lower bytes of Pre ssure and Temp during. In case of multiple byte read, it needs to set ARB_RDBUFF = 1 for arbitration of sensor o utput register(0x28 – 0x2C) update and reading from interface. In case of single byte reading, needs to set ARB_R DBUFF = 0 (default).

I2C_DEVICE_ID (0x0F)
This register contains the device identifier number. For our product the device number is set to 0xBB or 0xB9.

7	6	5	4	3	2	1	0
1	0	1	1	1	0	SA0	1

RES_CONF (0x10)
Default value: 0x00
This register configures the resolution of the pressure and temperature measurements.

7	6	5	4	3	2	1	0
0	AVGT2	AVGT1	AVGT0	0	*AVGP2*	*AVGP1*	*AVGP0*

Bit 2-0: AVGP2-AVGP0 configure the number of averages of the pressure measurements. AVGT2-AVGT0 configu re the number of averages of the temperature measurements. The pressure or temperature meassurement final d ata rate is the selected conversion time divided by the selected number of averages (AVGP2-AVGP0 or AVGT2-A VGT0).
The default setting of this register is 0 after powering up the device. The current consumption does not change by changing the number of internal averages. Averaging can be also applied during oneshot operation. In this case, t he oneshot operation ends once the averages are finished.
Bits can be configured as described in the following tables.

Table 6. Internal averages of pressure measurements

AVGP2	AVGP1	AVGP0	Nr. Internal averages
0	0	0	1
0	0	1	2
0	1	0	4
0	1	1	8
1	0	0	16

AVGP2	AVGP1	AVGP0	Nr. Internal averages
1	0	1	32

Bit 6-4: AVGT2-AVGT0 bits can be configured as described in the following table.

Table 7. Internal averages of temperature measurements

AVGT2	AVGT1	AVGT0	Nr. Internal averages
0	0	0	1
0	0	1	2
0	1	0	4

BUFF_CTRL (0x11)
Default value: 0x00
This regiter controls the read buffer operation.

7	6	5	4	3	2	1	0
0	BUFF_ENABLE	0	0	0	0	0	0

Bit 6: BUFF_ENABLE: when set to ‘1’, the new measurement result is available to be read from read buffer.

STBY (0x12)
Default value: 0x00
This register controls the stanby time of The device when ONESHOT operation mode is selected.

7	6	5	4	3	2	1	0
0	0	0	0	STBY3	STBY2	STBY1	STBY0

Bit 3-0: STBY3-STBYG0: Controls the standby of The device when discrete operation mode is selected.

Table 8. Standby time setting

STBY3	STBY2	STBY1	STBY0	STBY time (ms)
0	0	0	0	0
0	0	0	1	10
0	0	1	0	50
0	0	1	1	100
0	1	0	0	250
0	1	0	1	500
0	1	1	0	750
0	1	1	1	1000
1	0	0	0	1500
1	0	0	1	2000
1	0	1	0	2500
1	0	1	1	3000
1	1	0	0	3500
1	1	0	1	4000
1	1	1	0	4500
1	1	1	1	5000

OPTN_REG (0x13)
Default value: 0x87
This register controls advanced options for pressure measurements.

7	6	5	4	3	2	1	0
P_CONTMODE	0	0	0	P_OSR_3	P_OSR_2	P_OSR_1	P_OSR_0

Bit 7: P_CONTMODE, when set to ‘1’ Continuous mode (CM) is enabled for pressure measure
"0": Continuous mode (CM) is disabled
"1": Continuous mode (CM) is enabled (Default)

Bit 3-0: P_OSR_3-P_OSR_0: Controls internal CDC OSR for pressure

Table 9. Pressure measurement conversion time in Continuous mode (CM)

P_OSR[3:0]	Internal CDC OSR	Tcap_conv [s]
0101	512	1/256
0110	640	1/204.8
0111	1024	1/128
1000	2048	1/64
1001	4096	1/32

ITF_CTRL (0x1F)
Default value: 0x03

This register controls the functionality the interface control.

7	6	5	4	3	2	1	0
0	0	0	0	0	ITF_TIMEOUT_DIS	SPY_TYPE1	SPI_TYPE0

Bit2: ITF_TIMEOUT_DIS: When set to 1, disables the I2C Interface Timeout feature.

Bit 1-0: SPI Mode select.

"11": SPI Mode 3 (Default), "10": SPI Mode 2 , "01": SPI Mode 1, "00": SPI Mode 0

CTRL_REG0 (0x20)
Default value: 0x00

This register controls the functionality of several blocks.

7	6	5	4	3	2	1	0
0	0	0	0	0	ENABLE/ DISABLEb	ENABLE_ MEAS	ONE-SHOT

Bit 2: ENABLE/DISABLEb is the chip enable of the device. When set to ‘1’ the device is enabled, we can read and write the complete register map via the SPI/I2C. The device should also be enabled for continuous measurement operating mode. The device will be disabled when ENABLE = ‘0’ (default value after boot) and enabled when ENABLE is set to ‘1’.

Between enabling the device and the next SPI/I2C access there should be a time of Tpup (Max 1ms).

Bit 1: ENABLE_MEAS. When set to ‘1’ the device measures continuously the pressure and temperature with the selected conversion times.

Bit 0: ONE_SHOT bit is used to start a new conversion. In this situation a single acquisition of temperature and pressure is started when ONE_SHOT bit is set to ‘1’. At the end of conversion the new data are available in the output registers, the ONE_SHOT bit is automatically reset to ‘0’.

If STBY≠0, oneshot measurements will be perfom continuously interleaving standby periods. ONESHOT bit is not reset after the measurement.

Table 10. Bits setting of CTRL_REG0 and mode transition

DEVICE_ENABLE	ENABLE_MEAS	ONE-SHOT	mode transition destination
0	0	0	Disabled mode / Configuration mode
0	0	1	One-shot mode / One-shot STBY
1	1	0	Continuous mode

CTRL_REG1 (0x21)
Default value: 0xFF

This register controls the functionality of several blocks.

The device features one fully-programmable interrupt sources (INT) which may be configured to triggerdifferent pr essure events.

7	6	5	4	3	2	1	0
Mask_OTP_FAIL	1	Mask_shortcut	1	1	Mask_data_ready	Mask_dpl_event	Mask_dph_event

Bit 7: when set to ‘1’ masks the INT_OTP_FAIL event to produce an interrupt. Default value is ‘1’.

Bit 5: when set to ‘1’ masks the shortcut event to produce an interrupt. Default value is ‘1’.

Bit 2: when set to ‘1’ masks the DATA READY event to produce an interrupt. Default value is ‘1’.

Bit 1: when set to ‘1’ masks the pressure low event to produce an interrupt. Default value is ‘1’.

Bit 0: when set to ‘1’ masks the pressure high event to produce an interrupt. Default value is ‘1’.

CTRL_REG2 (0x22)
Default value: 0x00
This register controls the functionality of several blocks.

7	6	5	4	3	2	1	0
Tri-state	INT_H_L	PP_OD	0		SWRESET	0	

Bit 7: when set to ‘1’, the interrupt (INT) pin is set in high impedance mode. Default value is ‘0’

Bit 6: INT_H_L: Interrupt active high, low. Default value: 0. (0: active high; 1: active low)

Bit 5: PP_OD: Push-pull/open drain selection on interrupt pads. Default value: 0. (0: push-pull; 1: open drain)

Bit 2: SWRESET is the software reset bit. The device is reset to the power on configuration if the SWRESET bit is set to ‘1’. It's self-cleared.

CTRL_REG3 (0x23)
Default value: 0x00
This register controls SPI serial interface mode.

7	6	5	4	3	2	1	0
							SIM

Bit 0: SIM bit selects the SPI serial interface mode. When SIM is ‘0’ (default value) the 4-wire interface mode is sel ected and data coming from the device are sent to pin SDOUT. In 3-wire interface mode, output data are sent to pi n SDIN/SDOUT.

INT_SOURCE_REG (0x24)
Default value: 0x00
This register informs on the status of the interrupts and cleared when this register is read. Reading this register als o clears interrupt pin.

7	6	5	4	3	2	1	0
INT_OTP_F AIL	0	SHORTCU T	INIT_RDBU FF	0	DATA_READ Y	PL	PH

Bit 7:INT_OTP_FAIL: when set 1 indicates that OTP has not been read successfully. OTP may not be programme d or critical error has happened. SOFTWARE reset command can be used to re-start OTP reading

Bit 5: SHORTCUT: when set to 1 indicates if a shortcut between the sensor terminals has occurred during the last measurement. Detected when PRESS_OUT [23: 0] = 0x7F0000 is exceeded.

Bit 4: INIT_RDBUFF: when set 1 indicates that read buffer has been initialized.

Bit 2: DATA_READY event: one pressure measurement is completed and available in the read buffer.

Bit 1: PL: Differential pressure Low. (0: no interrupt has been generated; 1: Low differential pressure event has oc curred, the digital word of the bits [23:16] of the pressure measurement are smaller than the bits of the THS_P_L r egister)

Bit 0: PH: Differential pressure High. (0: no interrupt has been generated; 1: High differential pressure event has o ccurred the digital word of bits [23:16] of the pressure measurement are bigger than the bits of the THS_P_H regis ter).

THS_P_L (0x25)
Default value: 0x80
This register is the pressure threshold for the interrut alerts. It corresponds to the 8 MBS’s of the pressure measur ements. The regiter format is 2’s complement allowing negative pressure thresholds.

7	6	5	4	3	2	1	0
THS_P_L[7]	THS_P_L[6]	THS_P_L[5]	THS_P_L[4]	THS_P_L[3]	THS_P_L[2]	THS_P_L[1]	THS_P_L[0]

This register contains the low threshold to compare with the 8 MSB of the pressure register. The default value of th is register is 0x80.

THS_P_H (0x26)
Default value: 0x7F
This register is the pressure threshold for the interrut alerts. It corresponds to the 8 MBS’s of the pressure measur ements. The regiter format is 2’s complement allowing positive pressure thresholds.

7	6	5	4	3	2	1	0

THS_P_H [7]	THS_P_H [6]	THS_P_H [5]	THS_P_H [4]	THS_P_H [3]	THS_P_H [2]	THS_P_H [1]	THS_P_H [0]

This register contains the high threshold to compare with the 8 MSB of the pressure register. The default value of t his register is 0x7F.

STATUS_REG (0x27)
Default value: 0x00

This register provides information on the data availability and the read buffer status.

The content of this register is updated every ODR cycle, regardless of BDU value in CTRL_REG1.

7	6	5	4	3	2	1	0
STS_OTP_ FAIL	0	0	0	0	STS_RDBU FF	P_DA	T_DA

Bit 7: STS_OTP_FAIL is set to 1 when OTP is not read at latest power-up or wake-up

Bit 2: STS_RDBUFF is set to 1 whenever the read buffer is initialized.

Bit 1: P_DA is set to 1 whenever a new pressure sample is available. P_DA is cleared anytime PRESS_OUT_H re gister is read.

Bit 0: T_DA is set to 1 whenever a new temperature sample is available. T_DA is cleared anytime TEMP_OUT_H register is read.

PRESS_OUT_XL (0x28)
Default value: 0x00

This register provides information on the pressure measurements. if single byte reading (ARB_RDBUFF=0) from PRESS_OUT_XL to TEMP_OUT_H, Pressure and temperature value is automatically updated. It's important to re ad pressure and temperature with given order because actual update happens at read of PRESS_OUT_H byte re ad. Therefore, TEMP_OUT_L and TEMP_OUT_H need to be read before PRESS_OUT_H, if temperature value is needed.

While, if multi byte reading (ARB_RDBUFF=1) from PRESS_OUT_XL to TEMP_OUT_H, the pressure and temper eature value can be read from PRESS_OUT_XL to TEMP_OUT_H without automatical update at read of PRESS _OUT_H byte read.

7	6	5	4	3	2	1	0
POUT7	POUT6	POUT5	POUT4	POUT3	POUT2	POUT1	POUT0

PRESS_OUT_L (0x29)
Default value: 0x00

This register provides information on the pressure measurements.

7	6	5	4	3	2	1	0
POUT15	POUT14	POUT13	POUT12	POUT11	POUT10	POUT9	POUT8

PRESS_OUT_H (0x2A)
Default value: 0x00

This register provides information on the pressure measurements. The 24 bits from the registers PRESS_OUT_H, PRESS_OUT_L and PRESS_OUT_XL provides the value of the pressure(in 2's complement format). The 18 MSBs correspond directly to a value in Pa. In other words the output value has an LSB of 1/64 Pa.

7	6	5	4	3	2	1	0
POUT23	POUT22	POUT21	POUT20	POUT19	POUT18	POUT17	POUT16

TEMP_OUT_L (0x2B)
Default value: 0x00

This register provides information on the temperature measurements.

if single byte reading (ARB_RDBUFF=0) from PRESS_OUT_XL to TEMP_OUT_H, Pressure and temperature val ue is automatically updated. It's important to read pressure and temperature with given order because actual updat e happens at read of PRESS_OUT_H byte read. Therefore, TEMP_OUT_L and TEMP_OUT_H need to be read b

efore PRESS_OUT_H, if temperature value is needed.

While, if multi byte reading (ARB_RDBUFF=1) from PRESS_OUT_XL to TEMP_OUT_H, the pressure and temper eature value can be read from PRESS_OUT_XL to TEMP_OUT_H without automatical update at read of PRESS _OUT_H byte read.

The measured temperature follows the equation: *Temp*[degC] = $Temp_{code}$* 2^-7 – 273 where $Temp_{code}$ is the d igital 16bits code which can be read from the registers TEMP_OUT_H and TEMP_OUT_L.

7	6	5	4	3	2	1	0
TOUT7	TOUT6	TOUT5	TOUT4	TOUT3	TOUT2	TOUT1	TOUT0

TEMP_OUT_H (0x2C)
Default value: 0x00

This register provides information on the temperature measurements.

The 16 bits from the registers TEMP_OUT_H and TEMP_OUT_L provide the digital code of the temperature in un signed format. The pressure and temperature must be read in order of PRESS_OUT_XL, PRESS_OUT_L, PRES S_OUT_H, TEMP_OUT_L, and TEMP_OUT_H for proper operation if temperature data is needed.

7	6	5	4	3	2	1	0
TOUT15	TOUT14	TOUT13	TOUT12	TOUT11	TOUT10	TOUT9	TOUT8

7. Measurement setting

7.1. Continuous mode setting

Using continuous mode to realize high ODR, continuously pressure measurement.
Longer waiting time is required for the 1st measurement time.From the 2nd measurement, the ODR comply with c onstant rate. Basically all command can be set at Disabled mode.

Table 11. Continuous mode ODR setting

OPTN_REG0	OPTN_REG1	CTRL_REG3	OSR	Simple Average		1st Meas. Time [ms]	Meas. Time [ms]	ODR [S/s]
				AVGP	AVGT			
0x85	0x02	0xCX	512	1	1	16	4	256
0x86	0x02	0xCX	640	1	1	20	5	204.8
0x87	0x02	0xCX	1024	1	1	32	7.8	128
0x88	0x02	0xCX	2048	1	1	63	15.6	64
0x89	0x02	0xCX	4096	1	1	125.5	31.2	32
0x89	0x02	0xCX	4096	2	1	187.5	62.4	16
0x89	0x02	0xCX	4096	4	1	218.8	124.8	8
0x89	0x02	0xCX	4096	8	1	375	249.6	4
0x89	0x02	0xCX	4096	16	1	625	499.2	2
0x89	0x02	0xCX	4096	32	1	1125	998.4	1

7.2. One-shot mode setting

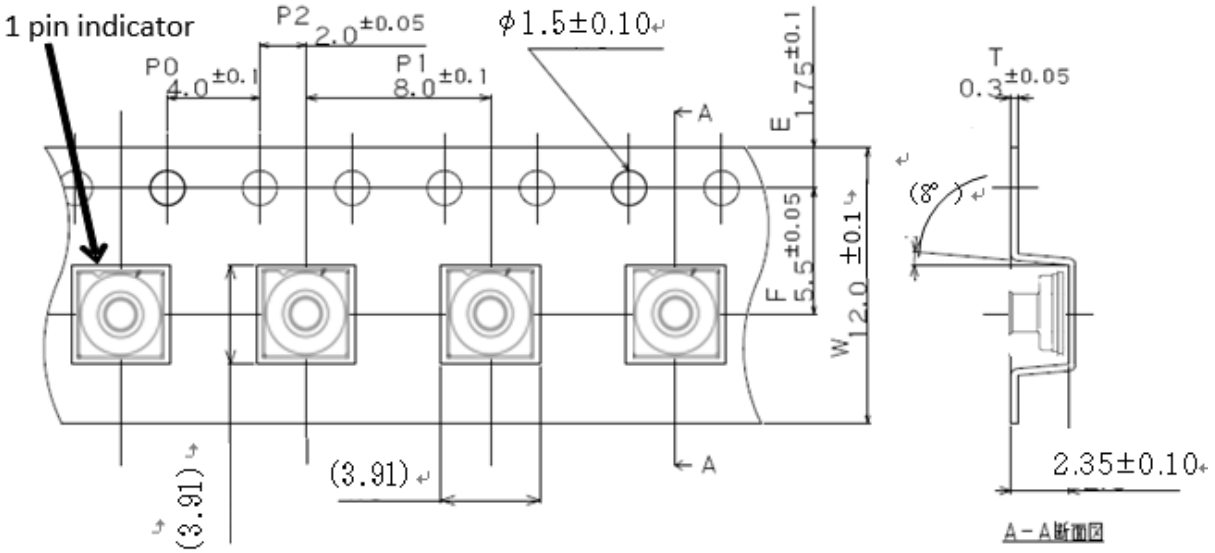
Using One-shot mode to realize low current consumption. Short Meas.Time and long STBY Time contribute to sav e the current consumption.
ODR is calculated from formula. ODR = 1 / (Meas.Time + STBY Time)
Basically all command can be set at Disabled mode.
STBY Time can be set by STBY register setting.

Table 12. One-shot Standby mode ODR setting

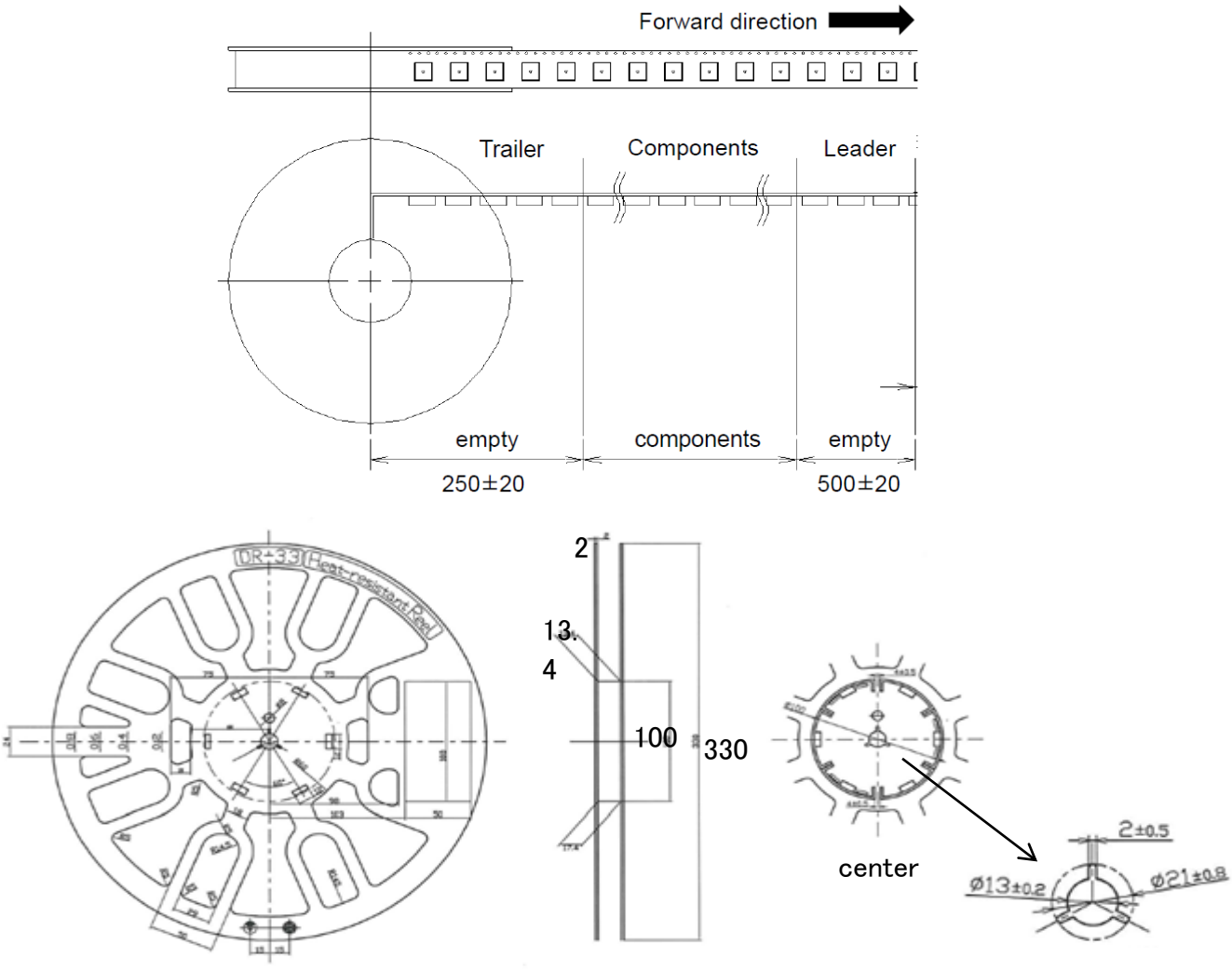
OPTN_REG0	OPTN_REG1	CTRL_REG3	OSR	Simple Average		Meas. Time [ms]	STBY_REG	STBY Time[ms]	ODR [S/s]
				AVGP	AVGT				
0x87	0x02	0xCX	1024	1	1	32	0x03	100	7.58
0x88	0x02	0xCX	2048	1	1	63	0x03	100	6.13
0x89	0x02	0xCX	4096	1	1	125.5	0x03	100	4.43
0x87	0x02	0xCX	1024	1	1	32	0x07	1000	0.97
0x88	0x02	0xCX	2048	1	1	63	0x07	1000	0.94
0x89	0x02	0xCX	4096	1	1	125.5	0x07	1000	0.89

8. Packing and Indication

8.1. External Dimensions of Career Tape



8.2. External Dimensions of Reel

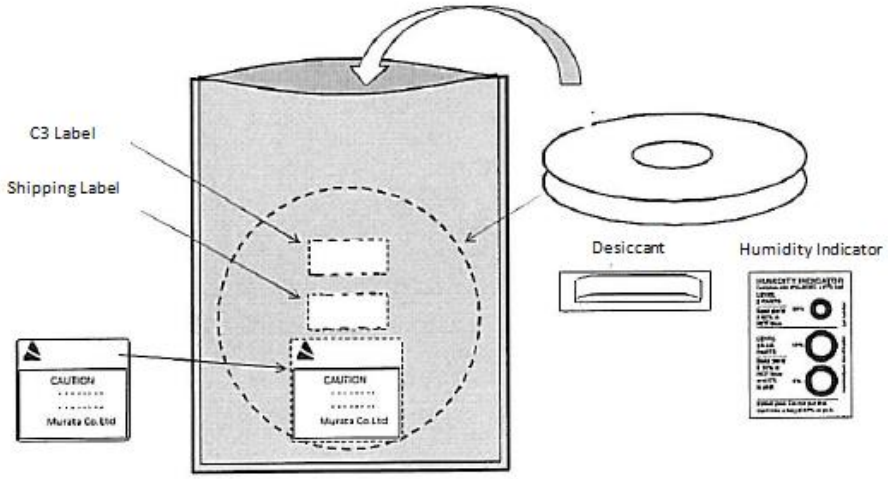


8.3. Shipping Label

PN:	******
Qty:	******
Lot No:	******

8.4. Packing

1) Inner Packing - Moisture-proof packing



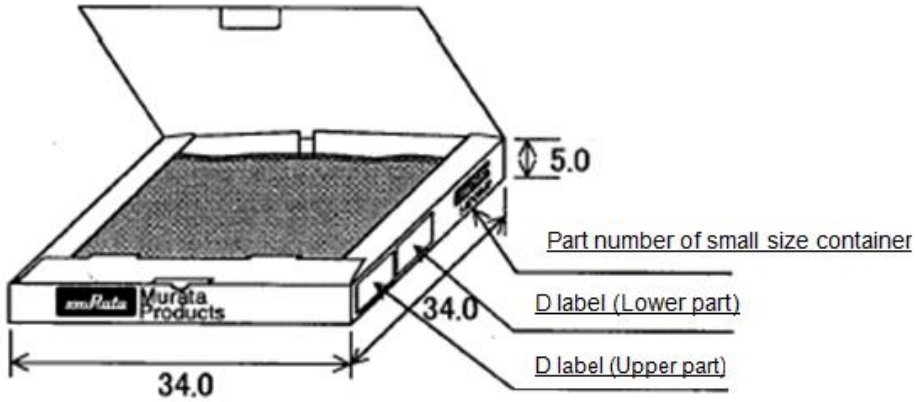
2) Outer Packing

Shipping style is 3 types, and the type is selected by qty. of carrier.

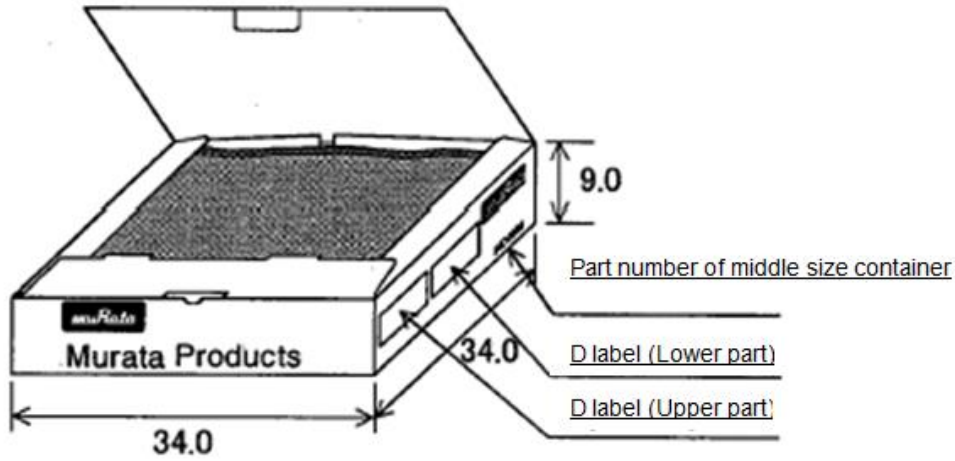
Shipping container type

Carrier	Container type	Carrier qty.
φ330mm	1	1
Same as above	2	2-3
Same as above	3	4-5

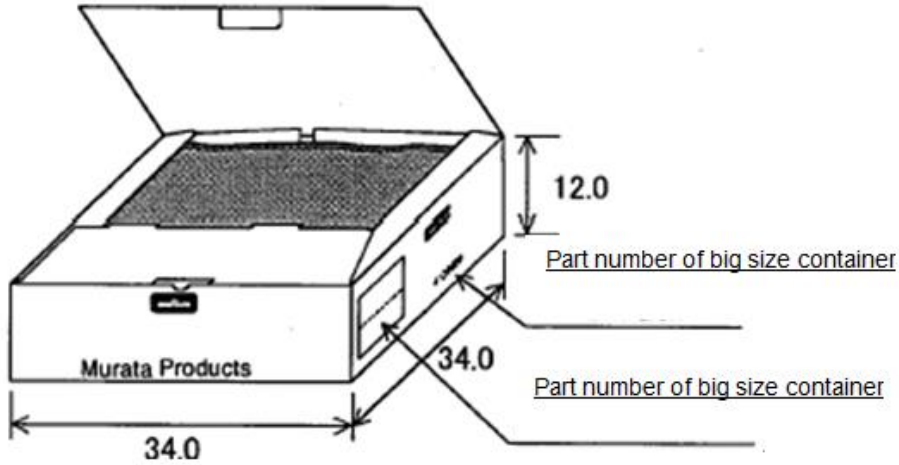
(Type1)



(Type2)



(Type3)



9. Caution in use

9.1. Notice in handling

1) Strong shock should be avoided when transporting and handling. Inner device might be broken and cause characteristics defect. Transport with packing materials is recommended.
2) Wear antistatic wristband when handling to implement countermeasure against static electricity. Otherwis e, internal circuit might be broken.
3) Do not break down our device since characteristics might be changed.
4) Do not touch terminals by hand. It may worsen solder mounting and break down internal circuit by static.
5) Do not wash our device. It may break down inner device and cause characteristics defect.
6) Do not use silicone oil in a process line since the device may be damaged.

9.2. Notice in storage

1) Please avoid storing our device in the following conditions because it may cause characteristics change.
   a) In a place near the machine that it generates vibration.
   b) In a place where product is easy to fall or fall over.
   c) In a place exposed to water.
   d) In a place exposed to salt water and corrosive gas.
2) Please use within 6 months of delivery. Store our product at temperature of -10 to 40 degrees centigrade and at humidity of 15 to 90%, and avoid condensation, shock, corruptive gas, sunlight, and dust etc. Store it with moisture-proof packing. If 6 months passed, it might decrease the solderability. Please verify the solderability before use, and put it through the baking process as follow:
   a) Once open moisture-poof packing, please mounting within 168h of factor conditions ≦5 to 30degC/60%RH.
   b) Desiccant and indicator card are enclosed in moisture-proof packing. In case 10% of sensing statio n color is changed from blue to lavender (pink) when unsealing, or in case it passed 168h of factor c onditions ≦5 to 30degC/60%RH, please bake at 120degC for 2h then mounting.
   c) Do not sting, throw, and drop moisture-proof packing to avoid breaking it.
   d) Do not expose such low molecular gas, hydrogen and helium gas. It may cause characteristic defec t.
   e) Do not pour in fluorinated inert liquid. It may break inside and cause characteristics defect, Fluorinat ed inert liquid is such as Galden and Fluorinert which are generically used in cistern thermal shock t est.

9.3. Limitation of Applications

The products listed in the document (hereinafter the product(s) is called as the “Product(s)”) are designed and ma nufactured for applications specified in the document. (hereinafter called as the “Specific Application”).
We shall not warrant anything in connection with the Products including fitness, performance, adequateness, saf ety, or quality, in the case of applications listed in from (1) to (11) written at the end of this precautions, which may generally require high performance, function, quality, management of production or safety. Therefore, the Product shall be applied in compliance with the specific application.
WE DISCLAIM ANY LOSS AND DAMAGES ARISING FROM OR IN CONNECTION WITH THE PRODUCTS INC LUDING BUT NOT LIMITED TO THE CASE SUCH LOSS AND DAMAGES CAUSED BY THE UNEXPECTED AC CIDENT, IN EVENT THAT (i) THE PRODUCT IS APPLIED FOR THE PURPOSE WHICH IS NOT SPECIFIED AS THE SPECIFIC APPLICATION FOR THE PRODUCT, AND/OR (ii) THE PRODUCT IS APPLIED FOR ANY FOLL OWING APPLICATION PURPOSES FROM (1) TO (11) (EXCEPT THAT SUCH APPLICATION PURPOSE IS UN AMBIGUOUSLY SPECIFIED AS SPECIFIC APPLICATION FOR THE PRODUCT IN OUR CATALOG SPECIFIC ATION FORMS, DATASHEETS, OR OTHER DOCUMENTS OFFICIALLY ISSUED BY US*).

(1) Aircraft equipment
(2) Aerospace equipment
(3) Undersea equipment
(4) Power plant control equipment
(5) Medical equipment
(6) Transportation equipment
(7) Traffic control equipment
(8) Disaster prevention/security equipment
(9) Industrial data-processing equipment
(10) Combustion/explosion control equipment
(11) Equipment with complexity and/or required reliability equivalent to the applications listed in the above.

For exploring information of the Products which will be compatible with the particular purpose other than those specified in the document, please contact our sales offices, distribution agents, or trading companies with which you make a deal, or via our web contact form.
Contact form: https://www.murata.com/contactform

*We may design and manufacture particular Products for applications listed in (1) to (11). Provided that, in such case we shall unambiguously specify such Specific Application in the document without any exception. Therefore, any other documents and/or performances, whether exist or non-exist, shall not be deemed as the evidence to imply that we accept the applications
listed in (1) to (11).

Addition of a Fail-safe function
Be sure to add an appropriate fail-safe function to your finished product to prevent secondary damage in the unlikely event of an abnormality function or malfunction in our product.

10. Notice

1) Please make sure that your product has been evaluated in view of your specifications with our device being mounted to your product.
2) Do not use our product against this product specification.

11. Specification Changed Record

Rev No.	Date	Description of change
New(E)	Jan.16, 2020	Issued, rev E is latest documentation.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Board Mount Pressure Sensors ***category:***

Click to view products by Murata ***manufacturer:***

Other Similar products are found below :

6407-249V-17343P 6407-250V-09273P 6407-250V-09343P 80527-25.0H2-05 80541-B00000150-01 80541-B00000200-05 80554-00700100-05 80568-00300050-01 93.631.4253.0 93.731.4353.0 93.932.4553.0 136PC15A1 142PC95AW71 142PC05DW70 15PSI-G-4V 1805-01A-L0N-B 26PCBKT 26PCCFA6D26 26PCCFS2G 26PCCVA6D 93.632.7353.0 93.731.3653.0 93.931.4853.0 93.932.4853.0 SDP510-500PA 185PC30DH 20INCH-G-MV-MINI 26PCAFJ3G 26PCCEP5G24 26PCCFJ3G 26PCDFA3G 26PCJEU5G19 30INCH-D1-MV-MINI ASCX15AN-90 ASCX15AN/SZ76114 4426-015G 4525-DS5A030DP DCAL401DN DCAL401GN 4515-DS5A020DP XZ202798SSC XZ203676HSC 6407-249V-09273P 6407-249V-09343P 6407-249V-17273P 6407-250V-17273P 6407-250V-17343P 81717-00000050-05 81794-B00001200-01 82681-B00000100-01