Force Sensor HSFPAR303A Data sheet

1. 弊社製品番号
Product No.

HSFPAR303A

2. 製品概要
General description

本製品は、シリコンダイアフラム上にピエゾ抵抗が形成されており、荷重が加わるとダイアフラムが撓むことでピエゾ抵抗に応力が発生し、抵抗率が変化するピエゾ抵抗効果を利用した荷重センサ。

・This product is a force sensor using effect of piezo resistive bridge circuit formed on silicon diaphragm.
・Piezo resistance is changed according to strain by applying force to the diaphragm.

3.製品の特徴
Feature

・小型低背です。
PKGサイズが小さくスペースを取らないため、様々な製品デザインに対応出来ます。
・感度が高く、直線性に優れます。
0.01Nレベルの小さな応力から検出可能です。
・信頼性に優れます。
100万回の荷重試験後で、特性の変化は有りません。

・Small Footprint and Low Profile
User design flexibility by small package.
・High Sensitivity and Good Linearity
Precisely detect micro force less than 0.01 N.
・High Durability
No characteristics change after 1 million cycles.

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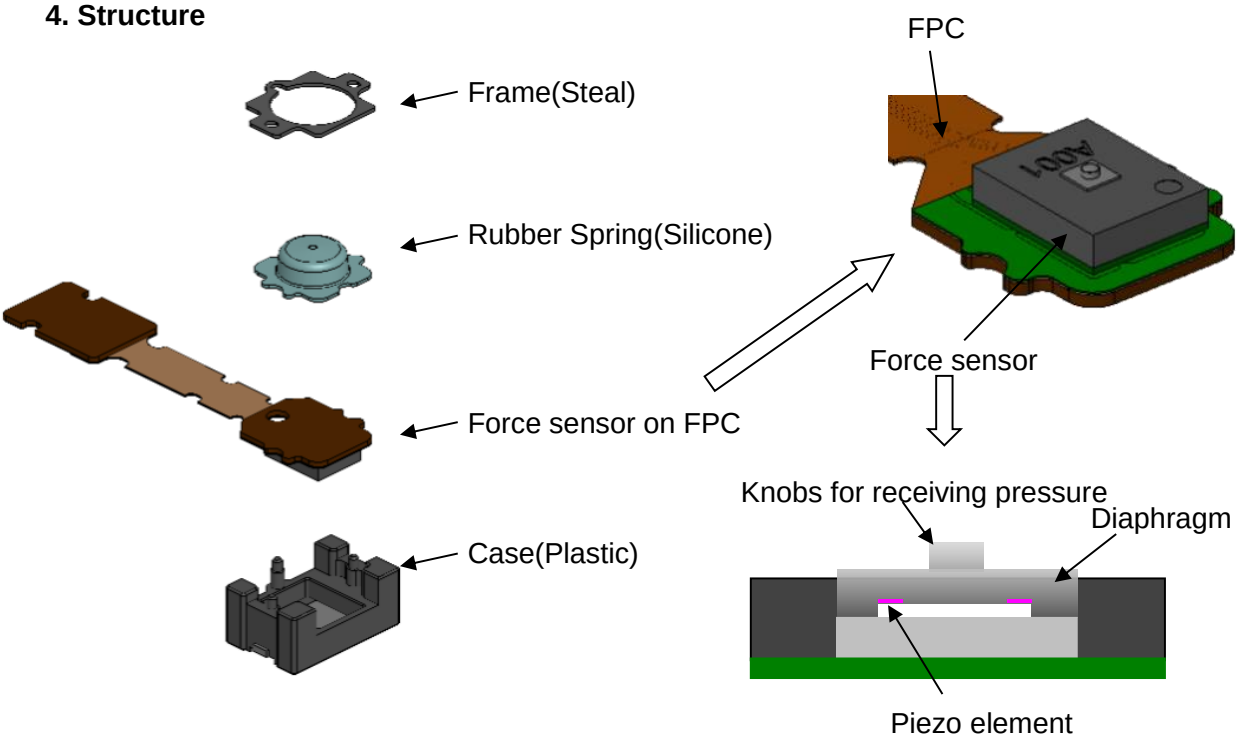
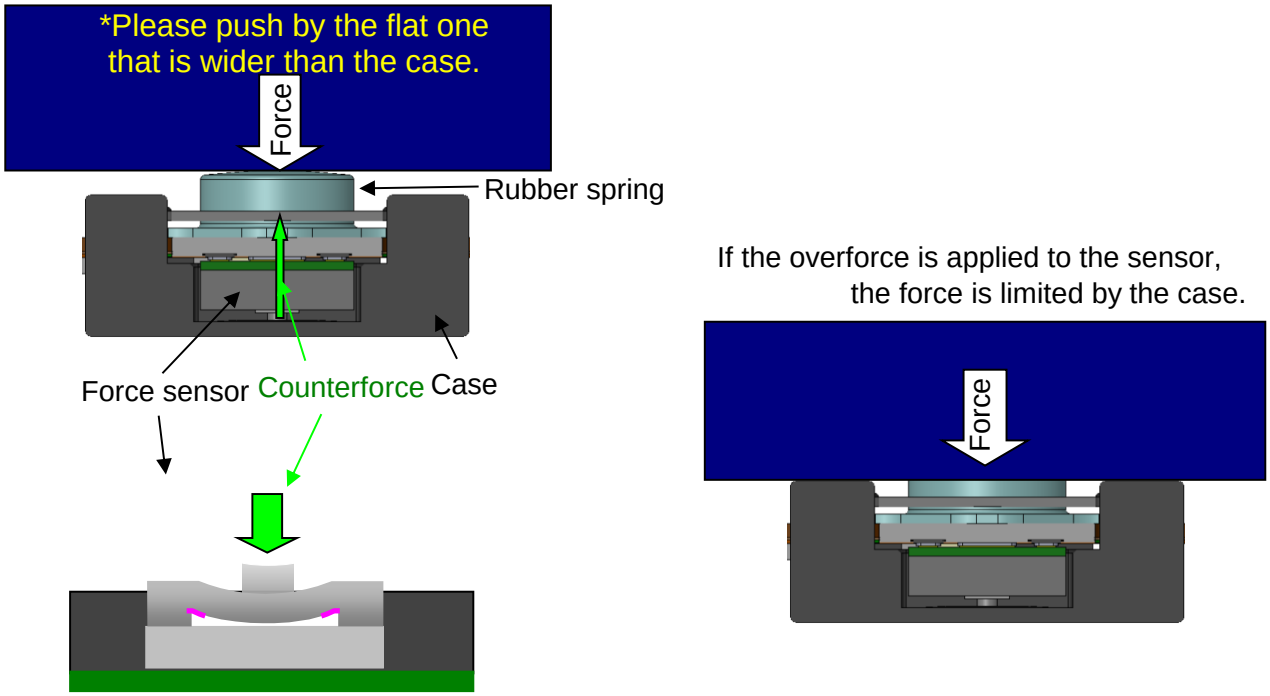
4. Structure

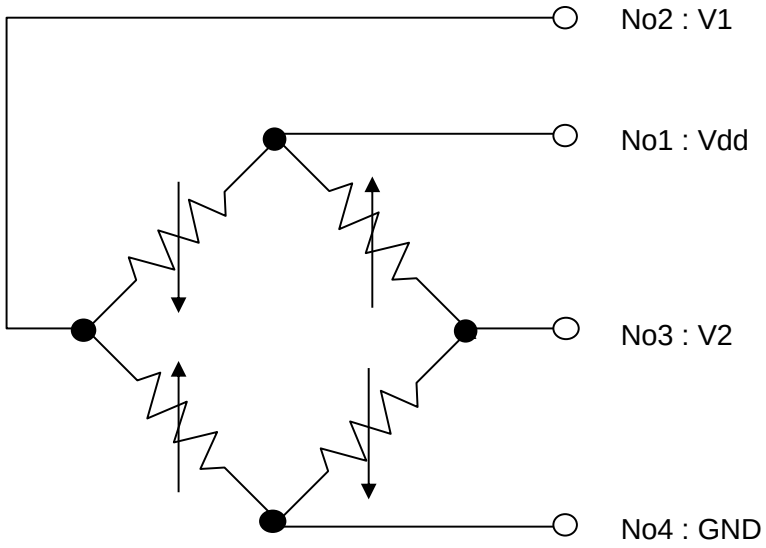


5. Operating principle



(1) Diaphragm is strained by counterfore.
(2) Resistance of Piezo element on the diaphragm is changed
(3) Differential voltage is outputted in response to the force change.

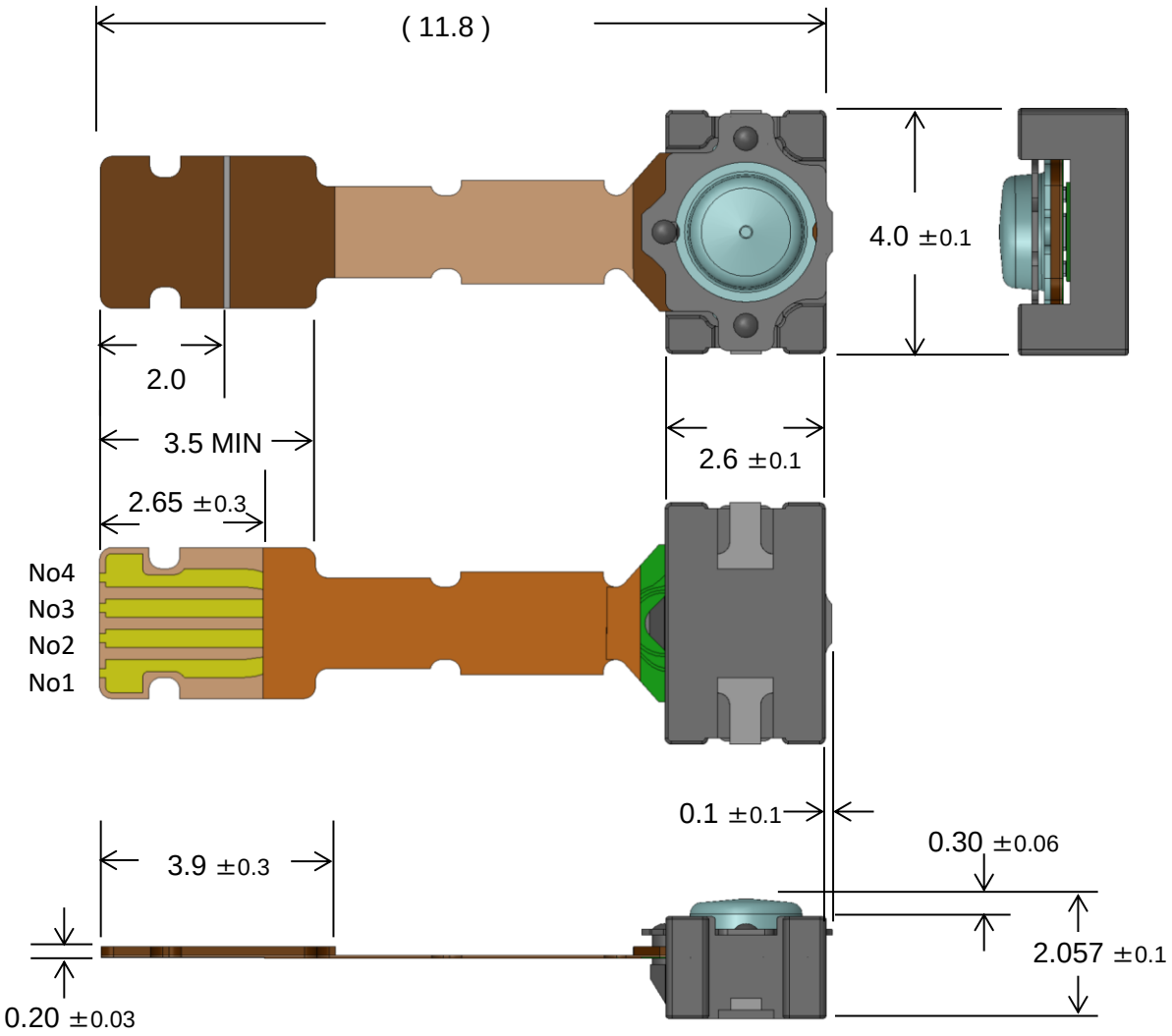
6. Block diagram



端子番号/Pin No.	記号/Name	機能/Function
No1	Vdd	電源/Supply Voltage
No2	V1	+出力信号/Output(+)
No3	V2	-出力信号/Output(-)
No4	GND	GND

***Output = V1-V2**

7. Full view



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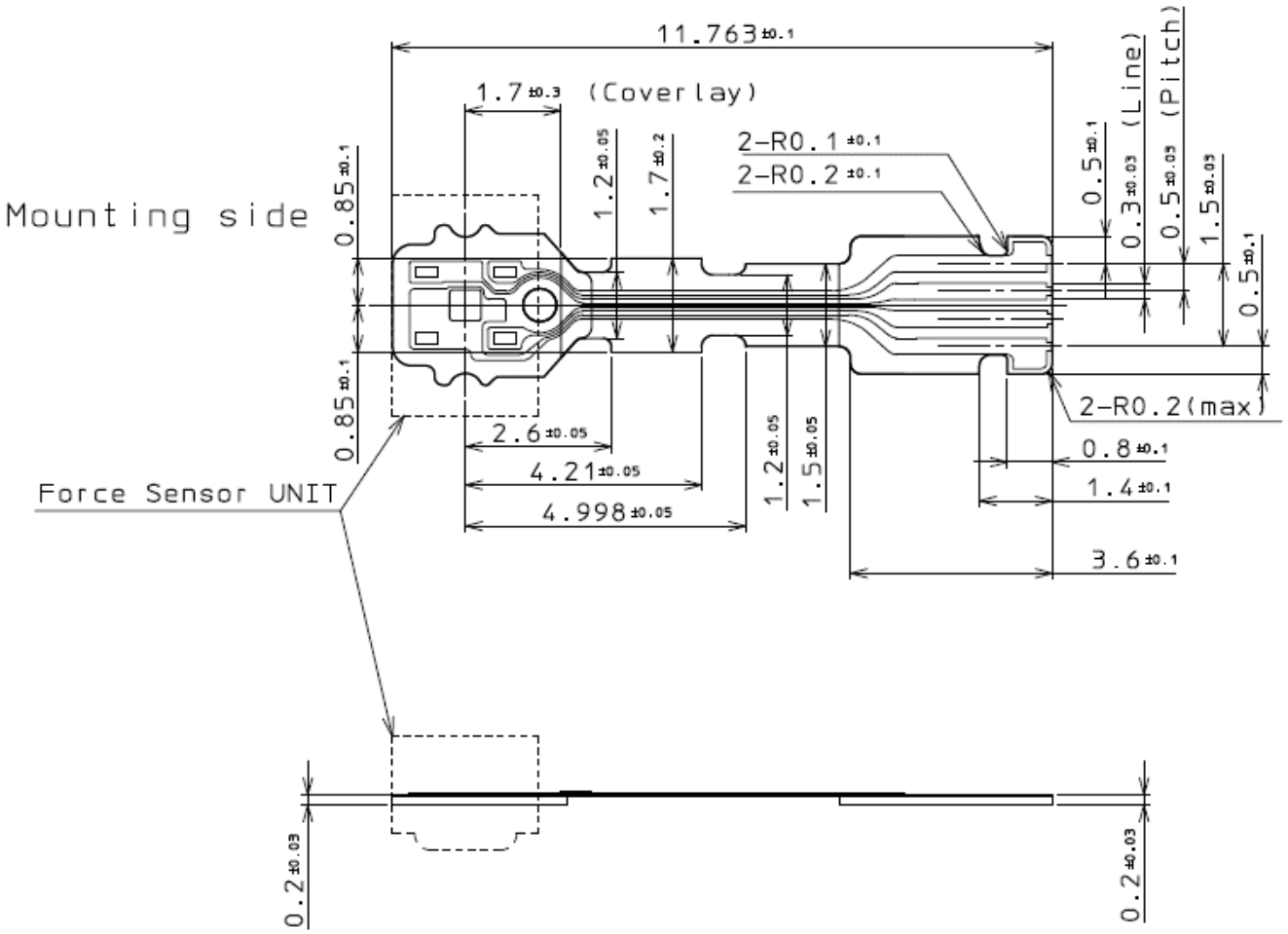
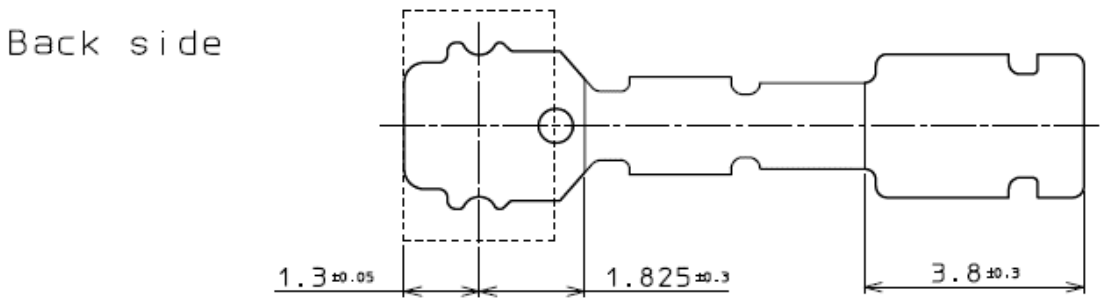
Recommended connector
Company：KYOCERA Connector Products Corporation
(http://www.kyocera-connector.com/en/prdct/list/fpcffc/6277-series/)
Product No：6277 series(4pad)、0.5mmPitch

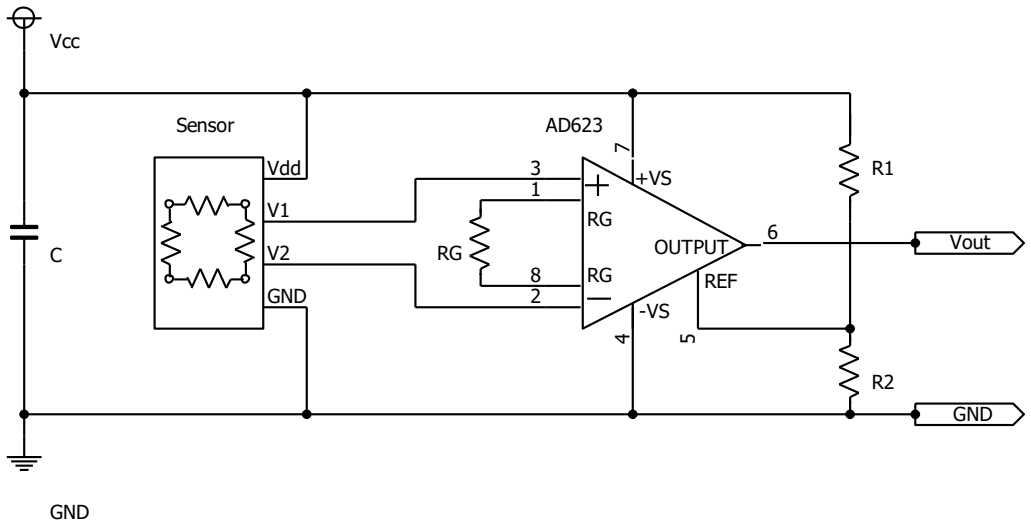
8. Flex specification





9. 推奨回路
Recommended circuit

9-1. アナログ回路例
Example circuit for analog output.



推奨値　Recommended value

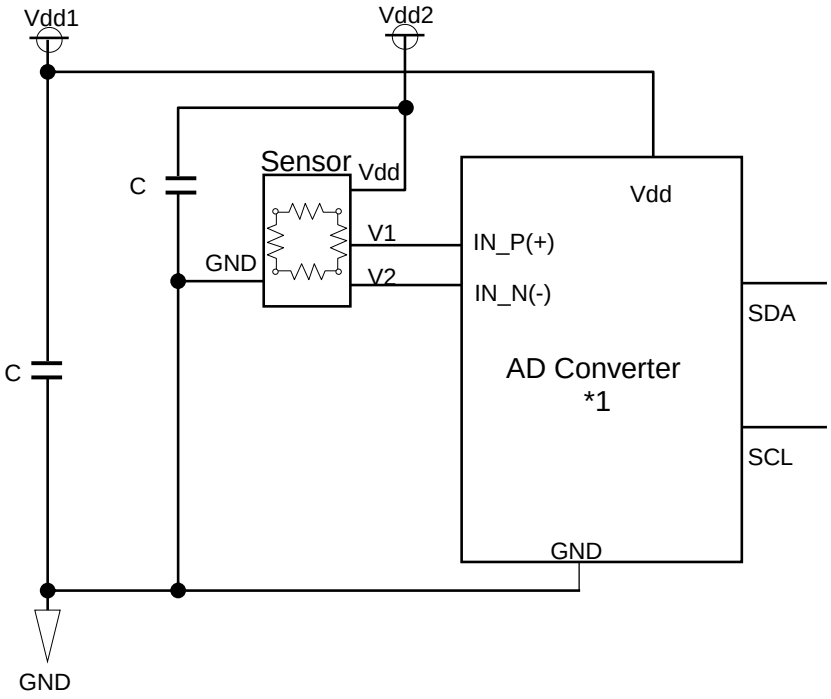
電源電圧 Source Voltage	Vcc	[V]	3.3
計装アンプ Instrumentation amplifier	-		AD623 *1 AD8237 *1 AD8420 *1 INA317 *1 INA333 *1
増幅率調整抵抗 Gain adjustment Resistance	RG	[kΩ]	1.3
オフセット調整抵抗 Offset adjustment Resistance	R1	[kΩ]	10.0
	R2	[kΩ]	3.0
コンデンサ Capasitance	C	[uF]	0.1
感度 Sensitivity	Sens	[mV/N]	(952)

*1　記載アンプは一例です。
上記リストの製品は当社にて動作を保証するものではございません。
動作は回路設計に依存しますので事前に確認をお願いします。
The listed amplifier is an example.
Our company does not guarantee the operation for the products listed above.
These are depend on the circuit design, please check in advance.

参考 Reference

増幅率　Gain = (1 + 100kΩ / RG)
オフセット　Offset voltage = R2 / (R1+R2) * Vcc
出力　OUTPUT = Gain*Vin + Offset voltage

9-2. デジタル回路例
Example circuit for digital output.



*1 システムの要求に合致するように適切なADコンバータを選択下さい。
Please select the appropriate AD converter to meet the requirements of the system.

*2 必要により計装アンプ及びその他の部品を追加下さい。
Please add the Instrumentation amplifier or some components as needed.

10. 評価方法例
Evaluation example

Notes
- When the gauge is touched to the sensor, it does slowly.
- The gauge is vertically touched to the sensor.
- Force more than the maximum ratings is not added.

Force gauge
(IMADA Co., Ltd.)

DC power supply unit

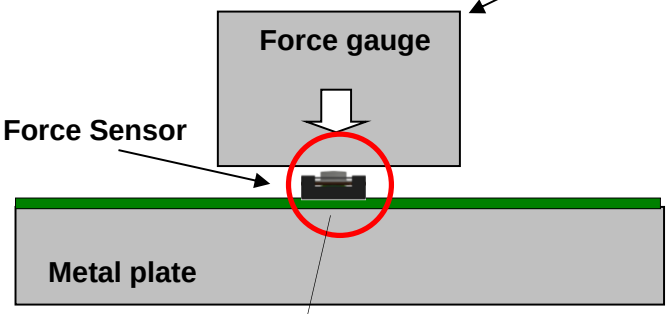
Multi-meter

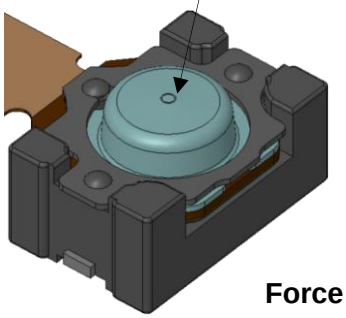
V1

V2

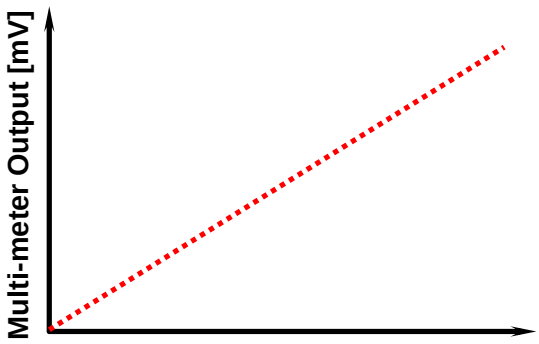
GND

Vdd



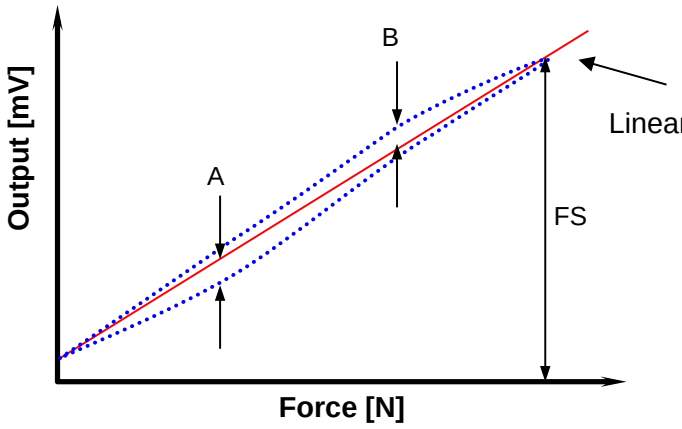


Force sensor UNIT



11.電気特性
Electrical specifications

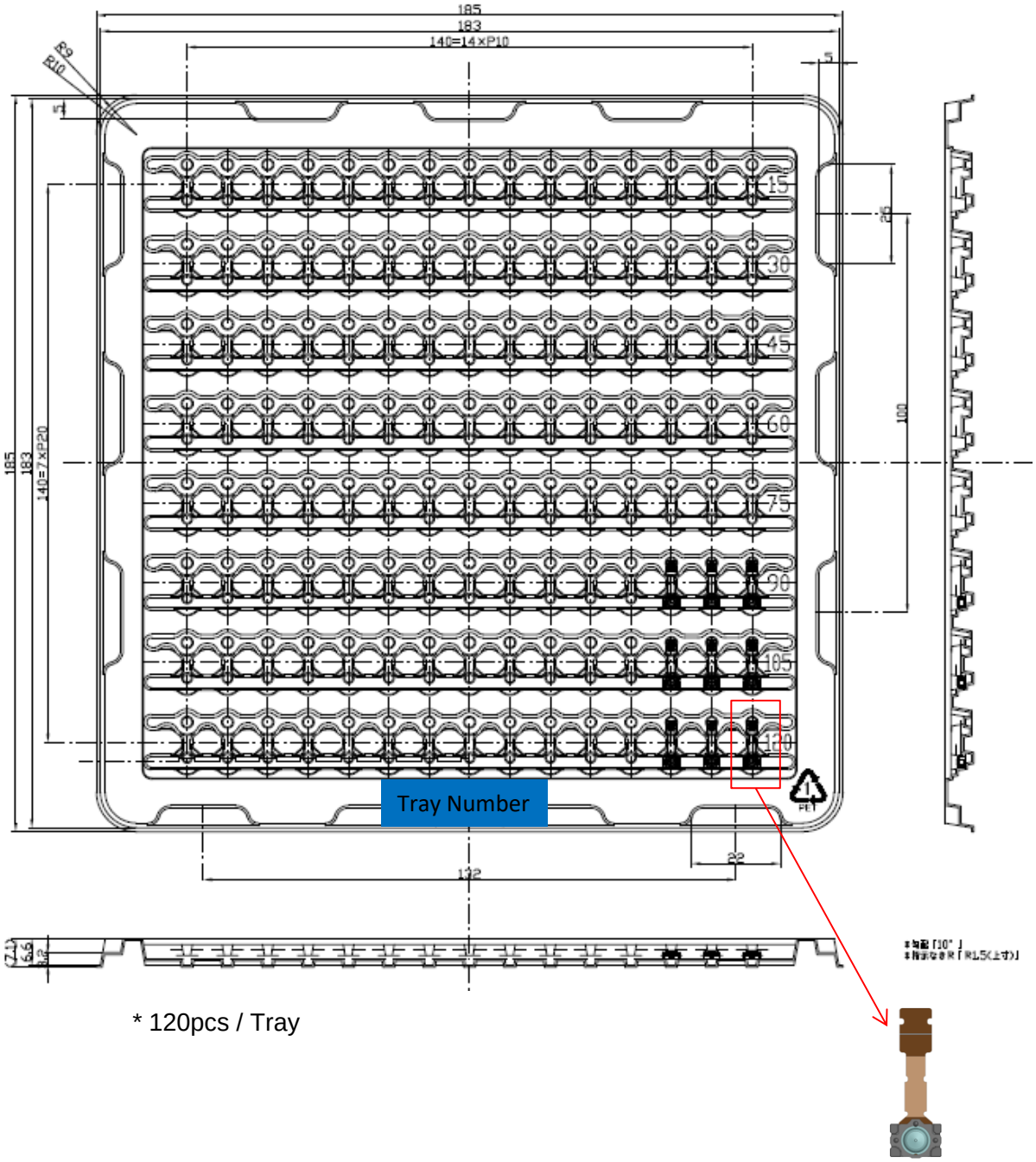
Item	Symbol	Unit.	Specification			Notes
			min.	Typ.	max.	
最大定格 Absolute Maximum Ratings						
定格電源電圧 Absolute limits supply voltage	Vlim	[V]	-4.0	-	4.0	
最大定格荷重 Max Load Rating	Flim	[N]	-	-	200	200N, 0.8msec
保存温度範囲 Storage temperature	Tstr	[ºC]	-40	-	+85	
ESD耐圧 ESD	HBM	[V]	-1000	-	+1000	
寿命 Durability	Drbl	[Cycles]	1000k	-	-	1-5N,5Hz, sine curve
使用条件 Operating conditions						
動作荷重範囲 Force range	Frng	[N]	0	-	7	
電源電圧 Supply voltage	Vdd	[V]	1.5	-	3.6	
動作温度範囲 Operating temperature	Topr	[ºC]	-20	-	+70	
電気的仕様 Electrical specifications (T=25ºC)						
感度 Sensitivity	Sens	[mV/V/N]	2.7	3.7	4.7	
リニアリティー Linearity	Lin	[%FS]	-	-	(2.0)	*FS:Full Span
オフセット電圧 Null Offset	V0	[mV/V]	-8	-4	0	
ブリッジ抵抗 Bridge Resistance	Rbrg	[kΩ]	4.5	5.5	6.5	



Linear fitting curve :
[Output] = [Force] x [Vdd] x **α** + [Vdd] x **β**

***Sensitivity : α**
***Null Offset : β**
***Linearity : (A+B)/FS x 100**

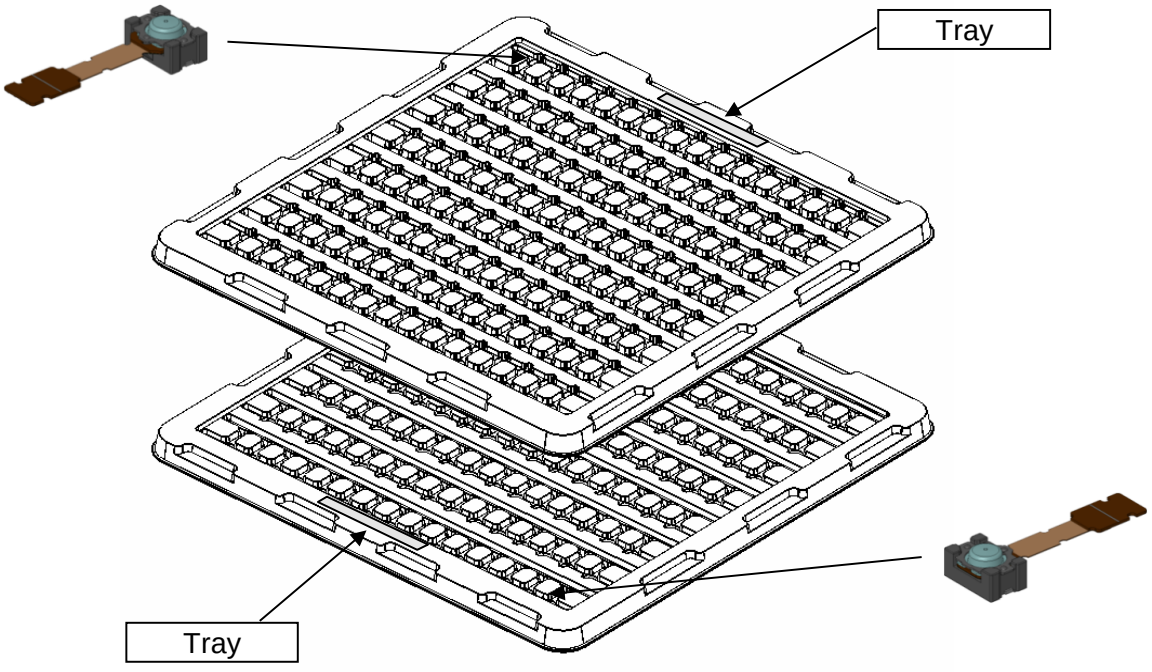
12. 梱包仕様
Packing specification
12-1. トレイ仕様
Tray specification



* 120pcs / Tray

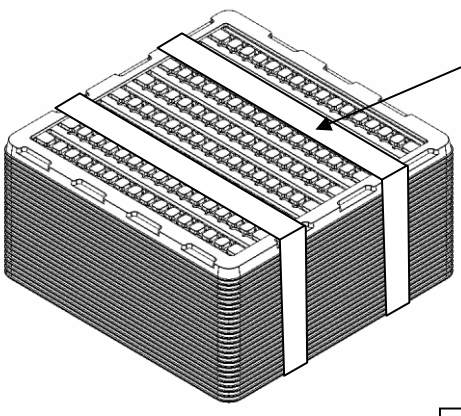
12-2. トレイの積み重ね
Stacking of the tray

<Fig.1>

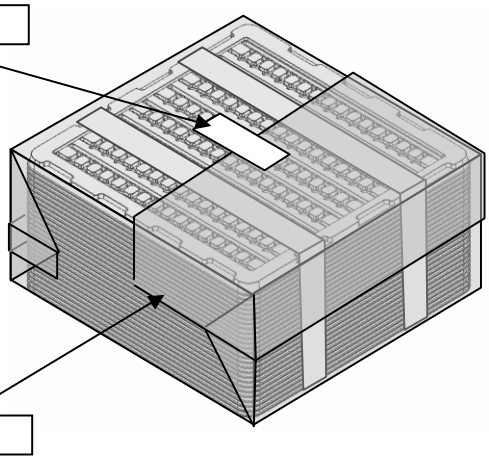


・Tray is stacked in upside down alternately.<Fig.1>
・Stacking of the tray is up to 26 trays (25trays + Cover) and taped it. (3000pcs Max) <Fig.2>
・It is placed in ESD bag. <Fig.3>

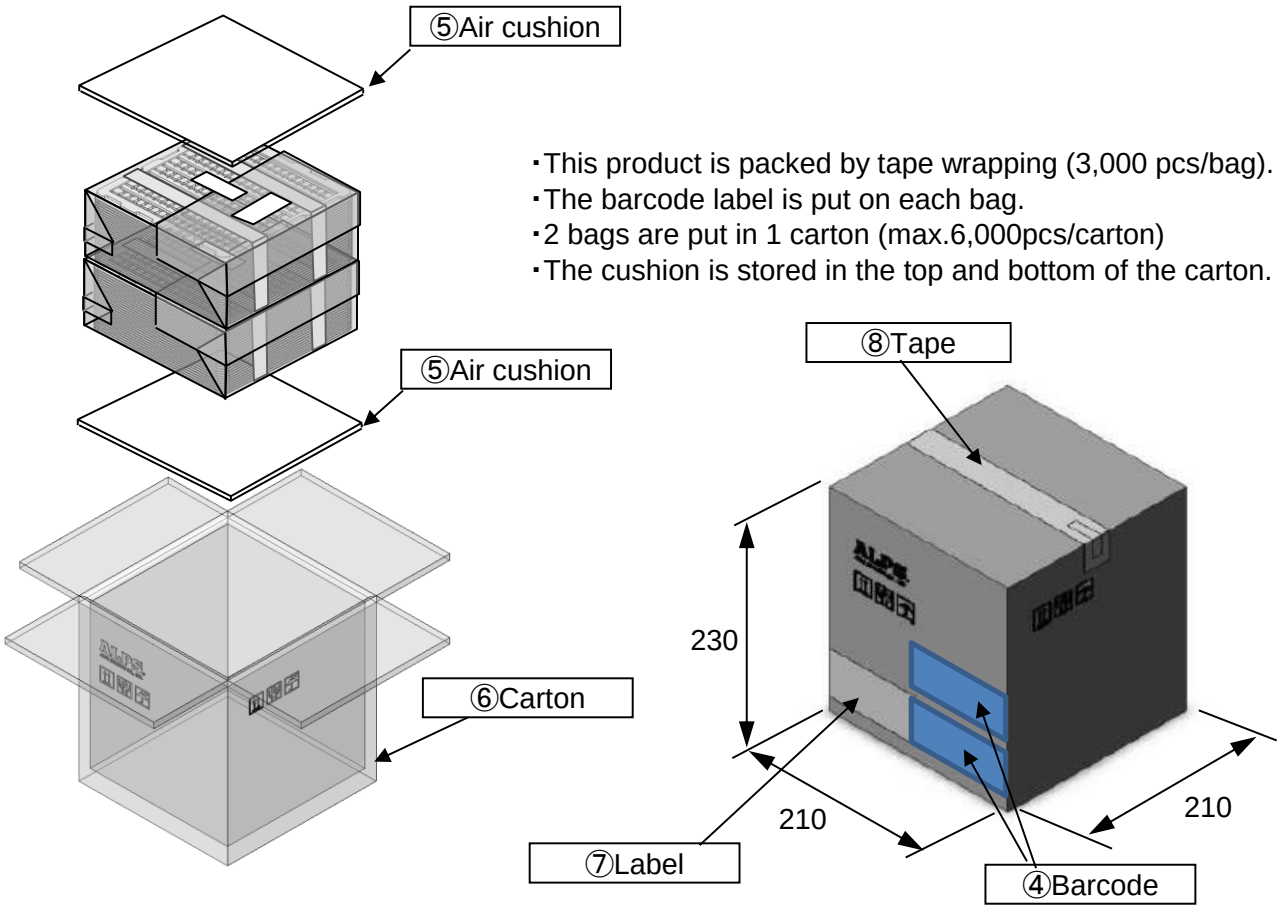
<Fig.2>



<Fig.3>



12-3. 梱包箱
Packing box



・This product is packed by tape wrapping (3,000 pcs/bag).
・The barcode label is put on each bag.
・2 bags are put in 1 carton (max.6,000pcs/carton)
・The cushion is stored in the top and bottom of the carton.

●**Recommended storage condition**
MSL1

●**Damp-proof packing**
None

●**Stacking height of carton**
Maximum 5cartons

●**Minimum Order Quantity、**
Standard Packing Quantity
3,000 pcs

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