Product Specifications

Force Sensor: HFD−500S

1. Application

This specifications applies to the semiconductor piezoresistive force sensor HFD-500S.

2. Rated

2-1. Absolute Maximum Rated

Item	Rated			Unit	Remarks
	Min.	Typ.	Max.		
Drive Voltage	–	–	5.5	[V]	
Storage Temperature Range	-40	–	85	[℃]	
Storage Temperature Range	-20	–	60	[℃]	
Breaking Load	70	–	–	[N]	
Lifespan	1000k	–	–	[Cycles]	5 to 10 N, 60 Hz (Sine wave)
Reflow Temperature	–	–	250 10	[℃] [sec]	230° C or higher, 60 sec or less Max 2 times

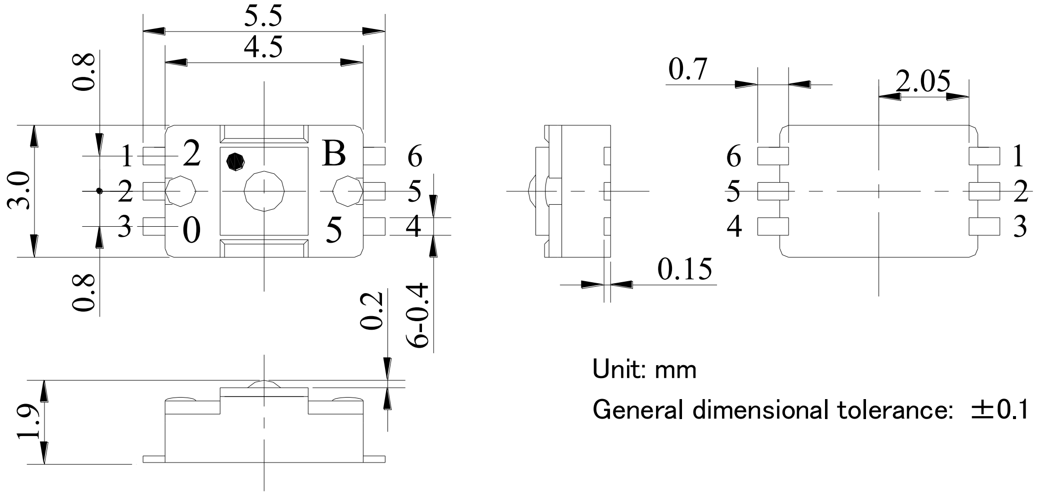
2-2. Rated (Vcc=2.8V, Ta=25℃)

Item	Rated			Unit	Remarks
	Min.	Typ.	Max.		
Measurement Load Range	0	–	10	[N]	
Drive Voltage	–	2.8	–	[V]	Operable below 5.5V ※1
Bridge resistor	18	25	32	[kΩ]	
offset voltage	-10	–	10	[mV]	Output voltage at 0[N] ※1
Full-scale span	120	130	140	[mV]	(Output voltage at 10[N] load) – (Output voltage at 0[N]) ※2
Sensitivity	–	13	–	[mV/N]	
Output Linearity	-3	–	3	[%FS]	FS=Full Scale Span
Offset Temperature Characteristics	-5	–	5	[mV]	Δ from +25° C at -20 to +60° C
Sensitivity Temperature Characteristics	-0.1	–	0	[mV/N/℃]	

※1 Sensor output (OUTPUT Voltage) is ratio metric with respect to the drive voltage.

※2 OUTPUT Voltage = (+OUTPUT Voltage) — (—OUTPUT Voltage)

3. Dimensions and Terminal Assignment



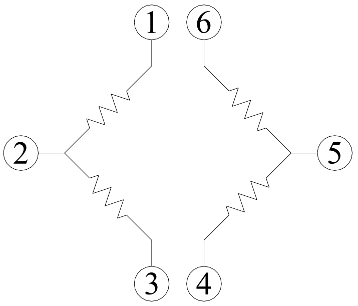
Unit: mm

General dimensional tolerance: ±0.1

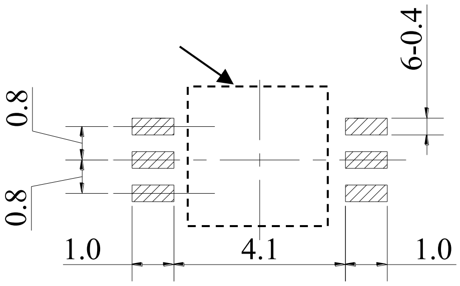
■ Terminal Arrangement

No	Name
1	Vcc
2	+OUTPUT
3	GND
4	GND
5	-OUTPUT
6	Vcc

■ Internal Circuit



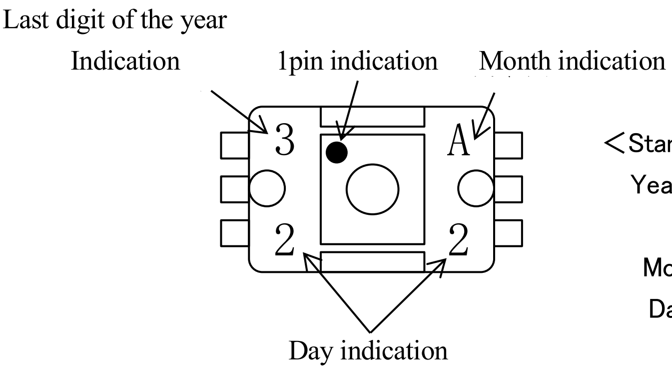
■ Soldering Electrode



A: 3.0 × 3.7 mm (vertical × horizontal)

※Design the area of part A to avoid any unevenness such as wiring patterns or holes (slits, etc.) in the substrate. Output failure may occur due to deflection of the package bottom surface. Furthermore, this shape does not guarantee soldering quality. Please verify this beforehand at your facility before use.

4. Stamp



＜Stamp Display＞

Year Indication　: Last digit of the year in the Gregorian calendar

Month Indicator　: 1 to C (October ⇒ A)

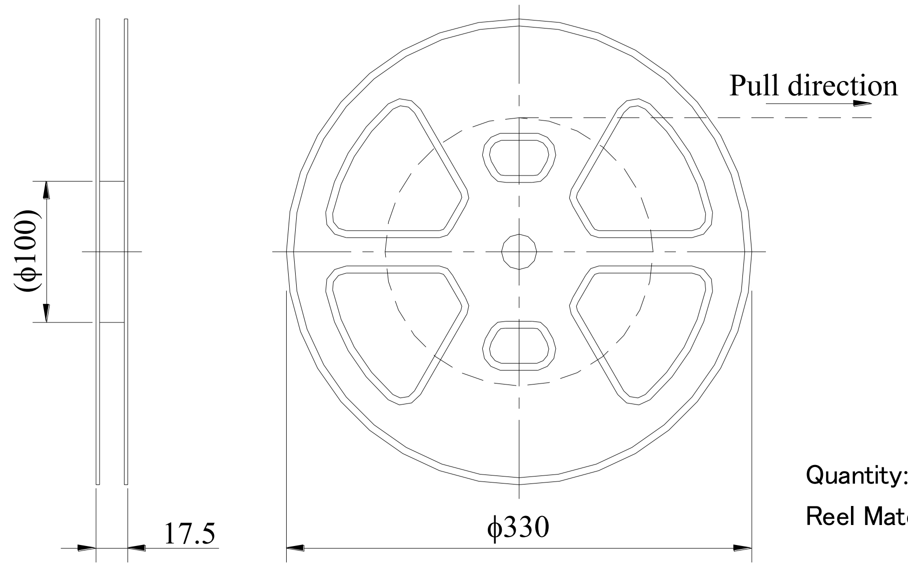
Day Indication: Date of Characteristics Inspection

5. Reliability Specifications

Item	Condition	Test Duration	Criteria
High Temperature Storage	85° C	250 hours	・The change rate of the offset voltage shall be within ±10% FS. ・No visual abnormalities such as cracks, chips, or deformation.
Low-temperature storage	-40° C	250 hours	
High Temperature and High Humidity storage	85° C, 85% RH	250 hours	
Thermal cycling	1 cycle for -40/85° C, 30 min each	100 cycles	
Repetitive Durability	0/10N, 16.7ms/cycle	1,000,000 times	

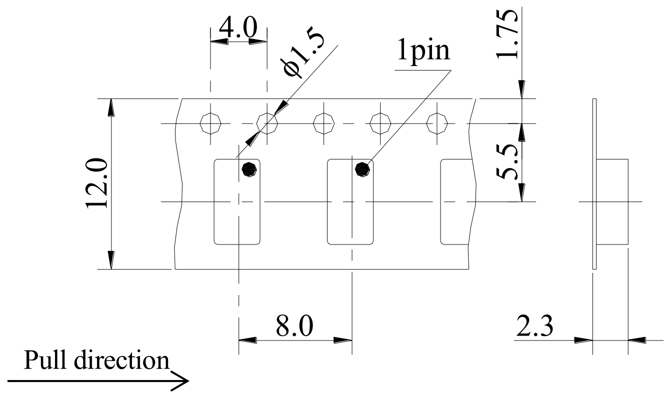
6. Packaging Specifications

- ■ Reel Size



Quantity: 3,000 pieces / Reel
Reel Material: Conductive PS

- ■ Carrier Tappe



Cavity Size: 3.3 x 5.9mm
Tape Material: Conductive PS
Surface Resistance Value =$^{10^6}$ Ω

7. Storage conditions

Product Condition	Storage conditions	Storage Period
Unopened Packaging	Room temperature and humidity (Reference: Temperature 10-40° C, Relative Humidity 25-75% RH)	1 year ※1
After opening packaging	In a dry nitrogen or dry air atmosphere (Reference: Temperature 15-35° C, Relative Humidity 40-60% RH)	6 months ※1

※1 If the period has passed, baking is not required, but please verify the solder wettability of the Terminal Electrode.

8. Note

- This sensor is not splash-proof. If water or condensation occurs, Performance may not be satisfied
  Therefore, structural considerations are required when using it in equipment.

- This sensor is compatible only with Reflow soldering. When soldering, please check and set the conditions for soldering at your company.

- Do not clean the sensor (e.g., immersion or ultrasonic cleaning) after soldering it to the printed circuit board.

- The pressure-receiving part (sphere) of this sensor is made of metal (SUS material) and is hard. Therefore, please use a similarly hard material (e.g., metal). Using soft materials may compromise accuracy.

- When mounting this sensor on a board, ensure there is no clearance between the sensor and the board.

- The pressure-receiving part (sphere) of this sensor is made of metal (SUS material), making it susceptible to static electricity.
  When using the sensor, please ensure that the pressure-applying part of your equipment that contacts the sensor's pressure-receiving part is grounded.

- Do not intentionally rotate the pressure receiving part (sphere) of this sensor, as this may cause the adhesive between the pressure receiving part and the sensor element to come off, impairing the characteristics of the sensor.

- This sensor is not designed to withstand radiation.
  Excessive radiation exposure may adversely affect Performance.

- If this product comes into contact with corrosive gases (organic solvents, sulfur dioxide gas, hydrogen sulfide gas, etc.), it may adversely affect Performance.

- Do not subject the pressure-receiving part (sphere) of this sensor to excessive impact. This may cause the sensor to break.

- RoHS compliant
  This sensor complies with the European RoHS Directive.
  It also complies with the Hokuriku Electric Industry Co., Ltd. Green Procurement Regulations.

- This sensor is intended for use in general electrical equipment.
  If you are using this product in applications that require extremely high reliability, such as medical equipment, safety devices, aviation and space equipment, nuclear control equipment, or fuel control equipment, where failure or malfunction may directly or indirectly cause serious damage to life, body, or property, please contact our sales representative in advance.