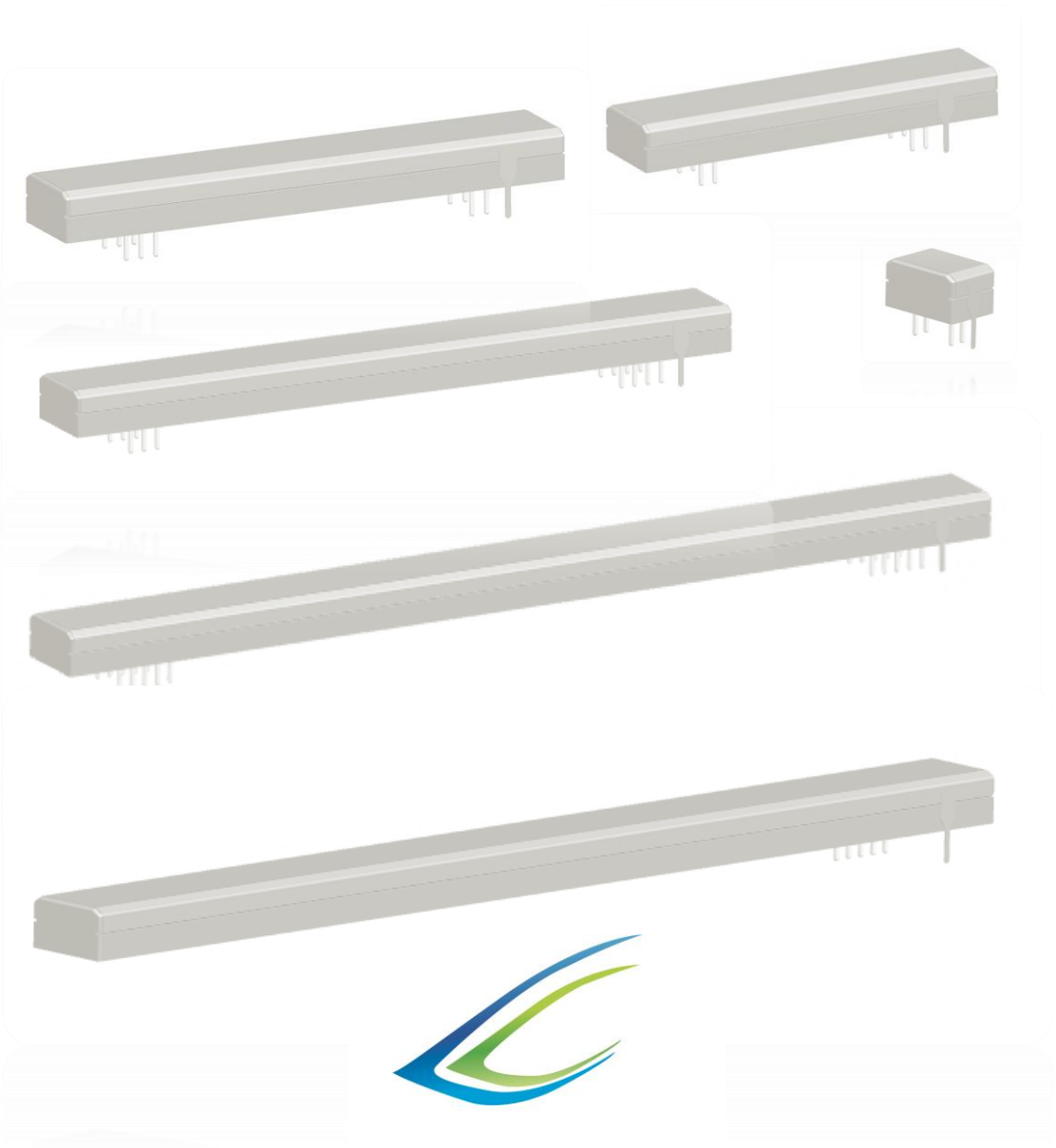
Magnetic Pattern Recognition Sensor Based on TMR technology

Version V1.3



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CONTENTS

Key Features

1. Tunneling Magneto-Resistance (TMR) technology
2. Compatible with Murata & Nikkonshi Products.
3. Customized products are available per request.
4. Ultra-High sensitivity comparing with InSb & GMR products.
5. Excellent CMRR performance due to differential design.

Part Numbering

(Part Number)

LTJ	XM	060A	YYMMDD000
①	②	③	④

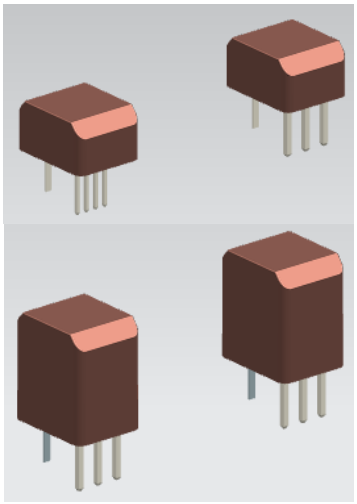
① Product ID
② Type
③ Characteristics
④ Individual Specification Code

* "(Part Number)" shows only an example which might be different from actual part number.
* Any other definitions than "Product ID" might have different digit number from actual part number.

Products List

Series	Channels	Channel Width	Detection Width	Remark
LTJ- XM-003	1	3	3	Single-Channel Version
LTJ- XM-006	1	6	6	
LTJ- XM-030	3	10	30	Multi-Channel Version
LTJ- XM-060	6	10	60	
LTJ- XM-120	12	10	120	
LTJ- XM-180	18	10	180	
LTM- XM-120	120	0.5	60	Magnetic Map Reader

LTJ-XM-003/006 Series



Features

1. High sensitivity and excellent gap characteristics.
2. Output voltage is independent of scanning speed.
3. Excellent CMRR performance due to differential design.
4. Sensor has detection width of 3 or 6 mm.

Applications

1. Bank note validator
2. Magnetic ink document reader

Absolute parameters

Item		Value	Unit
Max. Supply Voltage	V_a max	6	V
Isolation Voltage	V_I	200	V
Working Temperature	T_{opg}	-40~+85	℃
Storage Temperature	T_{stg}	-50~+95	℃
Working Humanity	H_{Rh}	10% ~ 90%	
ESD Level (HBM)		2	kV

Electrical specifications（Ta = 25℃）

Item		Condition	Min	Typ	Max	Unit
Supply Voltage	V_{cc}		1	5	5.5	V
Resistance	R			2		kOhm
Offset	V_d	V_a = 5 V		2.5		V
Sensitivity ①	V_{P-P}	V_a = 5 V (XM-006-3P)		2		mV
		V_a = 5 V (XM-006-4P)		4		mV
Noise	V_{nw}	V_a = 5 V, R_l=10k			50	uV

① The sensitivity can be calculated by using the testing method described below.

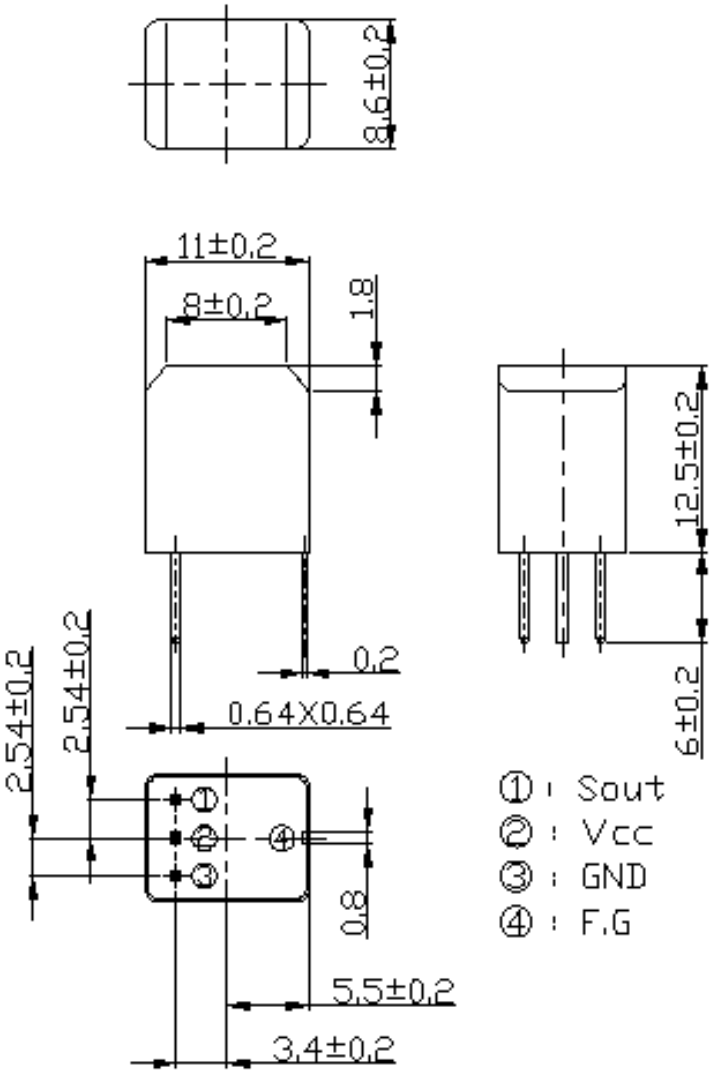
Physical parameters

Item		Part Number	Min	Typ	Max	Unit
Detection Width	Wd	LTJ-XM-003		3		mm
		LTJ-XM-006		6		mm
Surface Field①	H	LTJ-XM-003/006		400		Gs
Channel width	Wc	LTJ-XM-003		3		mm
		LTJ-XM-006		6		mm

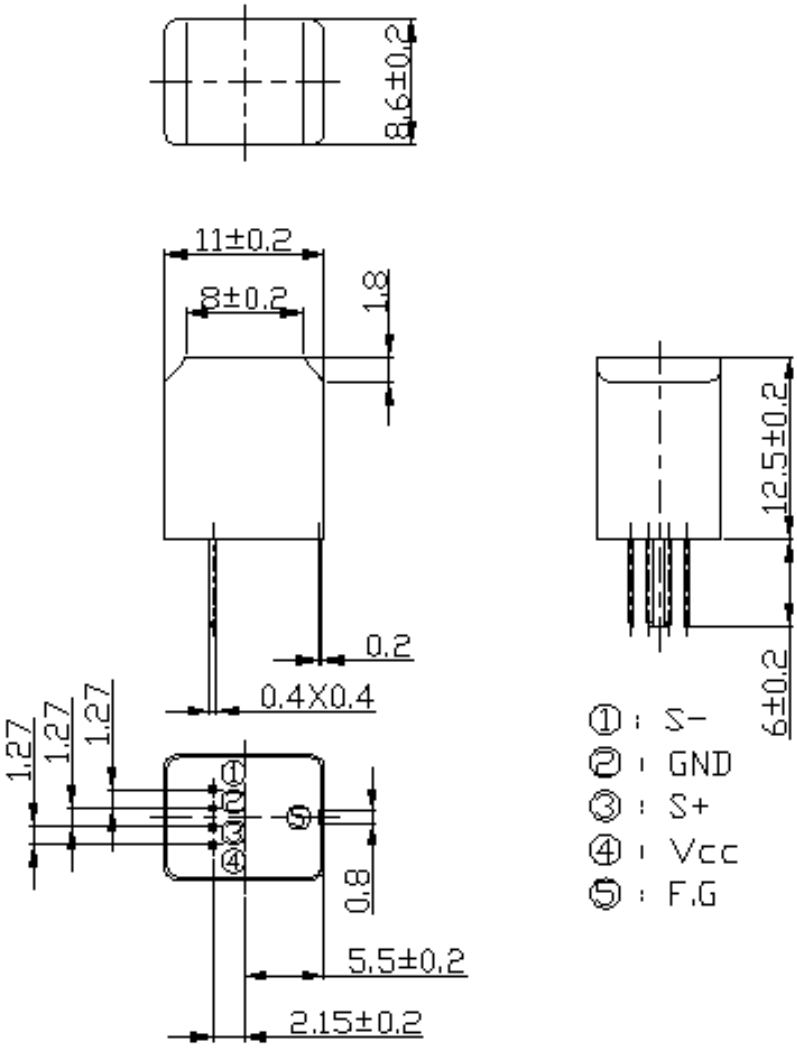
① The magnetic field on the surface of the sensor along the width direction.

Dimensions

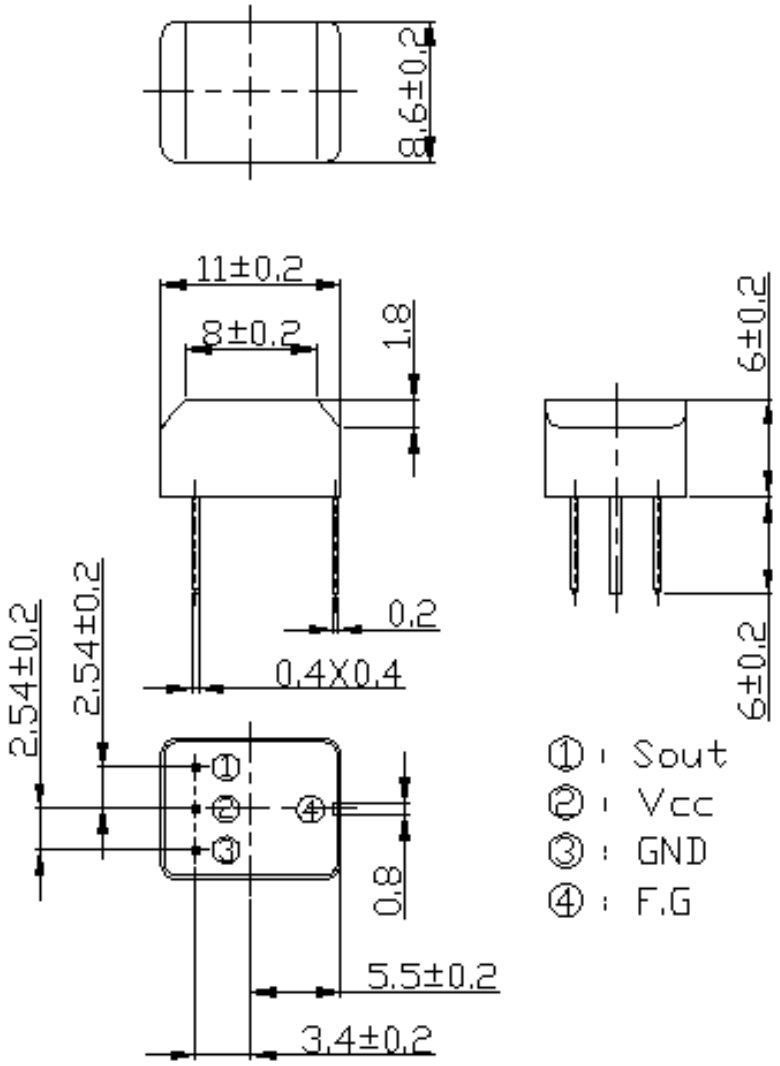
LMJ-XM-003A/006A-3P



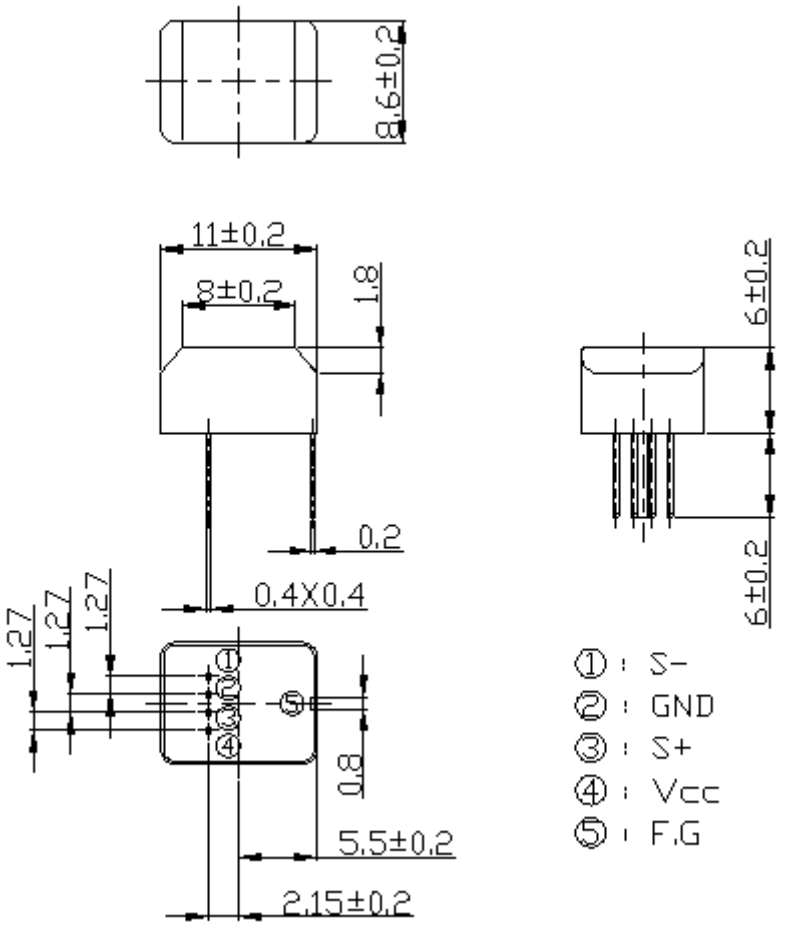
LMJ-XM-003A/006A-4P



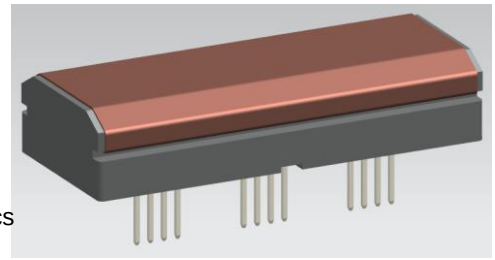
LMJ-XM-003B/006B-3P



LMJ-XM-003B/006B-4P



LTJ-XM-030 Series



Features

1 High sensitivity and excellent gap characteristics
2 Uniform sensitivity for all channels.
3 Output voltage is independent of scanning speed.
4 Excellent CMRR performance due to differential design.
5 Each Sensor has detection width of 30mm, without non-detection area.
6 LTJ-XM-030 has 3x channels and channel width of 10 mm.

Applications

1 Bank note validator
2 Magnetic ink document reader

Absolute parameters

Item		Value	Unit
Max. Supply Voltage	V_a max	6	V
Isolation Voltage	V_I	200	V
Working Temperature	T_{opg}	-40~+85	℃
Storage Temperature	T_{stg}	-50~+95	℃
Working Humanity	H_{Rh}	10% ~ 90%	
ESD Level (HBM)		2	kV

Electrical specifications（Ta = 25℃）

Item		Condition	Min	Typ	Max	Unit
Supply Voltage	V_{cc}		1	5	5.5	V
Resistance	R			*2*		kOhm
Offset	V_d	V_a = 5 V		2.5		V
Sensitivity ①	V_{P-P}	V_a = 5 V		4		mV
Noise	V_{nw}	V_a = 5 V, R_l=10k			50	uV

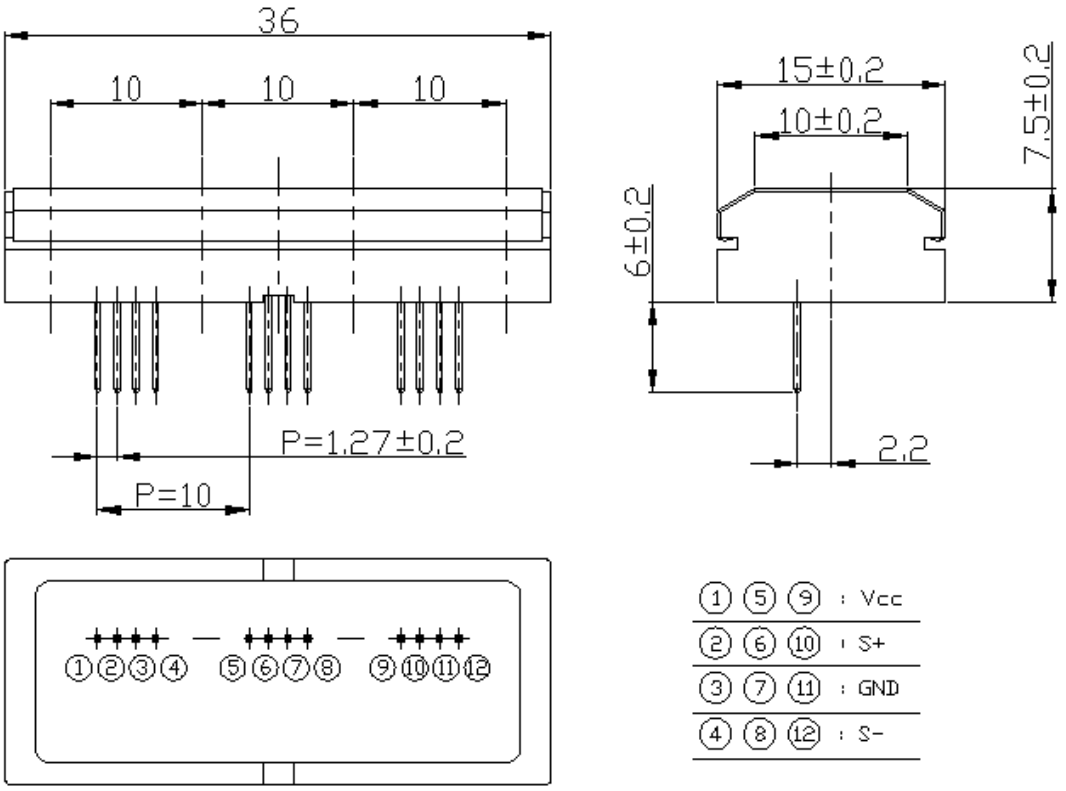
① The sensitivity can be calculated by using the testing method described below.

Physical parameters

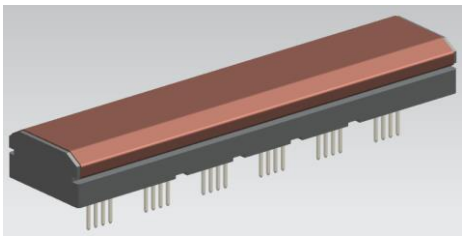
Item		Part Number	Min	Typ	Max	Unit
Detection Width	Wd	LTJ-XM-030		30		mm
Surface Field①	H	LTJ-XM-030		400		Gs
Channel width	Wc	LTJ-XM-030		10		mm

① The magnetic field on the surface of the sensor along the width direction.

Dimensions


36
10
10
10
P=1.27±0.2
P=10
15±0.2
10±0.2
7.5±0.2
6±0.2
2.2
①②③④ ⑤⑥⑦⑧ ⑨⑩⑪⑫
① ⑤ ⑨ : Vcc
② ⑥ ⑩ : S+
③ ⑦ ⑪ : GND
④ ⑧ ⑫ : S-

LTJ-XM-060 Series



Features

7 High sensitivity and excellent gap characteristics
8 Uniform sensitivity for all channels.
9 Output voltage is independent of scanning speed.
10 Excellent CMRR performance due to differential design.
11 Each Sensor has detection width of 60mm, without non-detection area.
12 LTJ-XM-060 has 6x channels and channel width of 10 mm.

Applications

3 Bank note validator
4 Magnetic ink document reader

Absolute parameters

Item		Value	Unit
Max. Supply Voltage	V_a max	6	V
Isolation Voltage	V_I	200	V
Working Temperature	T_{opg}	-40~+85	℃
Storage Temperature	T_{stg}	-50~+95	℃
Working Humanity	H_{Rh}	10% ~ 90%	
ESD Level (HBM)		2	kV

Electrical specifications（Ta = 25℃）

Item		Condition	Min	Typ	Max	Unit
Supply Voltage	V_{cc}		1	5	5.5	V
Resistance	R			*2*		kOhm
Offset	V_d	V_a = 5 V		2.5		V
Sensitivity ①	V_{P-P}	V_a = 5 V		4		mV
Noise	V_{nw}	V_a = 5 V, R_l=10k			50	uV

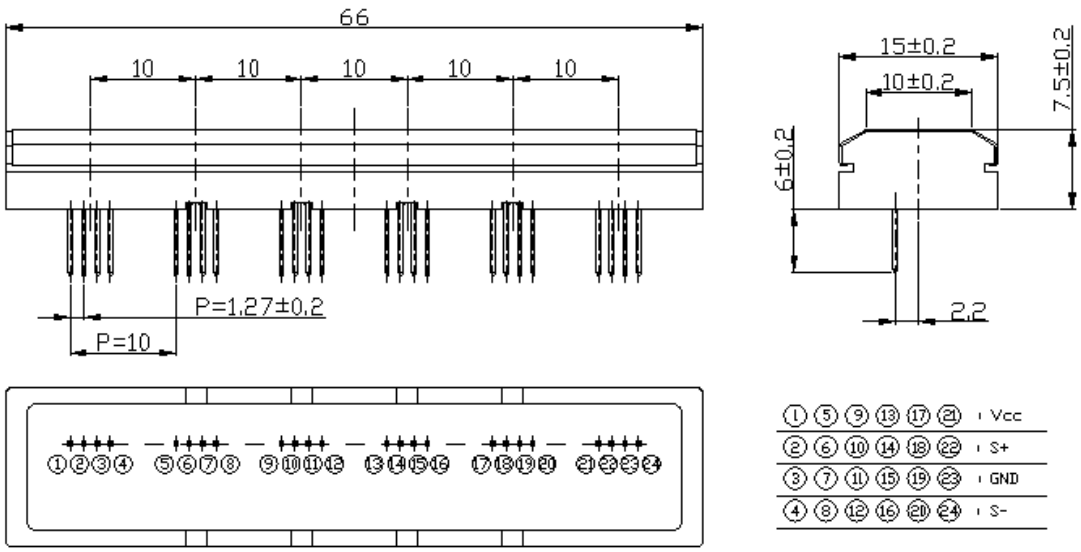
① The sensitivity can be calculated by using the testing method described below.

Physical parameters

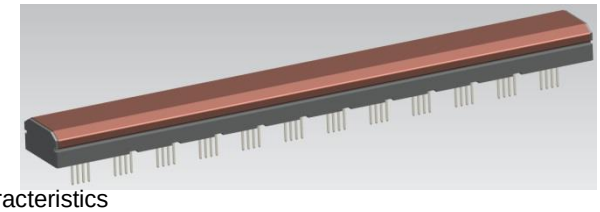
Item		Part Number	Min	Typ	Max	Unit
Detection Width	Wd	LTJ-XM-060		60		mm
Surface Field①	H	LTJ-XM-060		400		Gs
Channel width	Wc	LTJ-XM-060		10		mm

① The magnetic field on the surface of the sensor along the width direction.

Dimensions


66
10
10
10
10
10
P=1.27±0.2
P=10
15±0.2
10±0.2
7.5±0.2
6±0.2
2.2
① ⑤ ⑨ ⑬ ⑰ ㉑ : Vcc
② ⑥ ⑩ ⑭ ⑱ ㉒ : S+
③ ⑦ ⑪ ⑮ ⑲ ㉓ : GND
④ ⑧ ⑫ ⑯ ⑳ ㉔ : S-

LTJ-XM-120 Series



Features

1 High sensitivity and excellent gap characteristics
2 Uniform sensitivity for all channels.
3 Output voltage is independent of scanning speed.
4 Excellent CMRR performance due to differential design.
5 Each Sensor has detection width of 120mm, without non-detection area.
6 LTJ-XM-120 has 12x channels and channel width of 10 mm.

Applications

1 Bank note validator
2 Magnetic ink document reader

Absolute parameters

Item		Value	Unit
Max. Supply Voltage	V_a max	6	V
Isolation Voltage	V_I	200	V
Working Temperature	T_{opg}	-40~+85	℃
Storage Temperature	T_{stg}	-50~+95	℃
Working Humanity	H_{Rh}	10% ~ 90%	
ESD Level (HBM)		2	kV

Electrical specifications（Ta = 25℃）

Item		Condition	Min	Typ	Max	Unit
Supply Voltage	V_{cc}		1	5	5.5	V
Resistance	R			*2*		kOhm
Offset	V_d	V_a = 5 V		2.5		V
Sensitivity ①	V_{P-P}	V_a = 5 V		4		mV
Noise	V_{nw}	V_a = 5 V, R_l=10k			50	uV

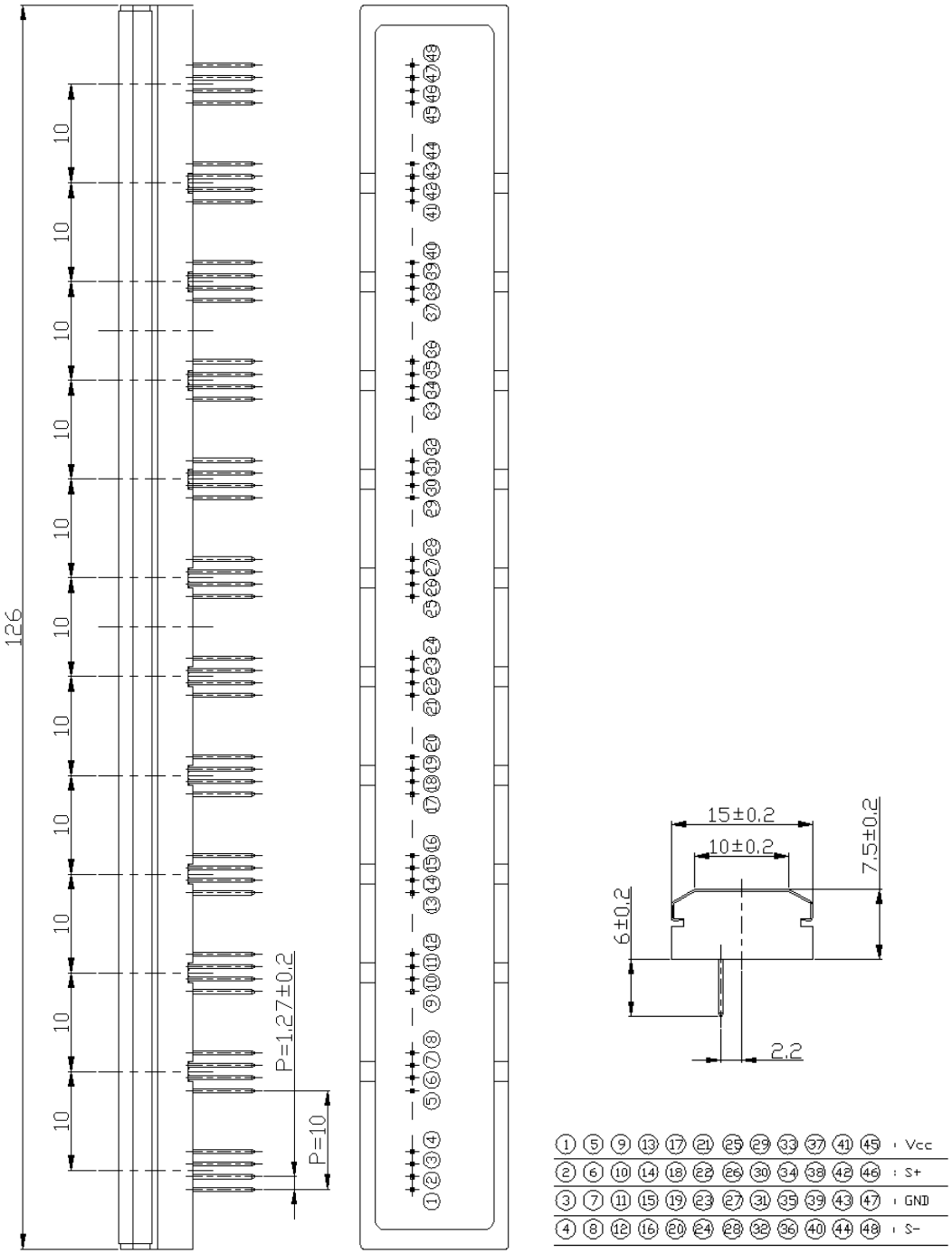
① The sensitivity can be calculated by using the testing method described below.

Physical parameters

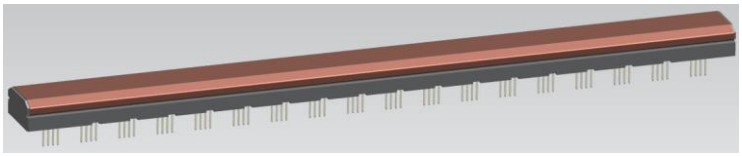
Item		Part Number	Min	Typ	Max	Unit
Detection Width	Wd	LTJ-XM-120		120		mm
Surface Field①	H	LTJ-XM-120		400		Gs
Channel width	Wc	LTJ-XM-120		10		mm

① The magnetic field on the surface of the sensor along the width direction.

Dimensions



LTJ-XM-180 Series



Features

1 High sensitivity and excellent gap characteristics
2 Uniform sensitivity for all channels.
3 Output voltage is independent of scanning speed.
4 Excellent CMRR performance due to differential design.
5 Each Sensor has detection width of 180mm, without non-detection area.
6 LTJ-XM-180 has 18x channels and channel width of 10 mm.

Applications

1 Bank note validator
2 Magnetic ink document reader

Absolute parameters

Item		Value	Unit
Max. Supply Voltage	V_a max	6	V
Isolation Voltage	V_I	200	V
Working Temperature	T_{opg}	-40~+85	℃
Storage Temperature	T_{stg}	-50~+95	℃
Working Humanity	H_{Rh}	10% ~ 90%	
ESD Level (HBM)		2	kV

Electrical specifications（Ta = 25℃）

Item		Condition	Min	Typ	Max	Unit
Supply Voltage	V_{cc}		1	5	5.5	V
Resistance	R			*2*		kOhm
Offset	V_d	V_a = 5 V		2.5		V
Sensitivity ①	V_{P-P}	V_a = 5 V		4		mV
Noise	V_{nw}	V_a = 5 V, R_l=10k			50	uV

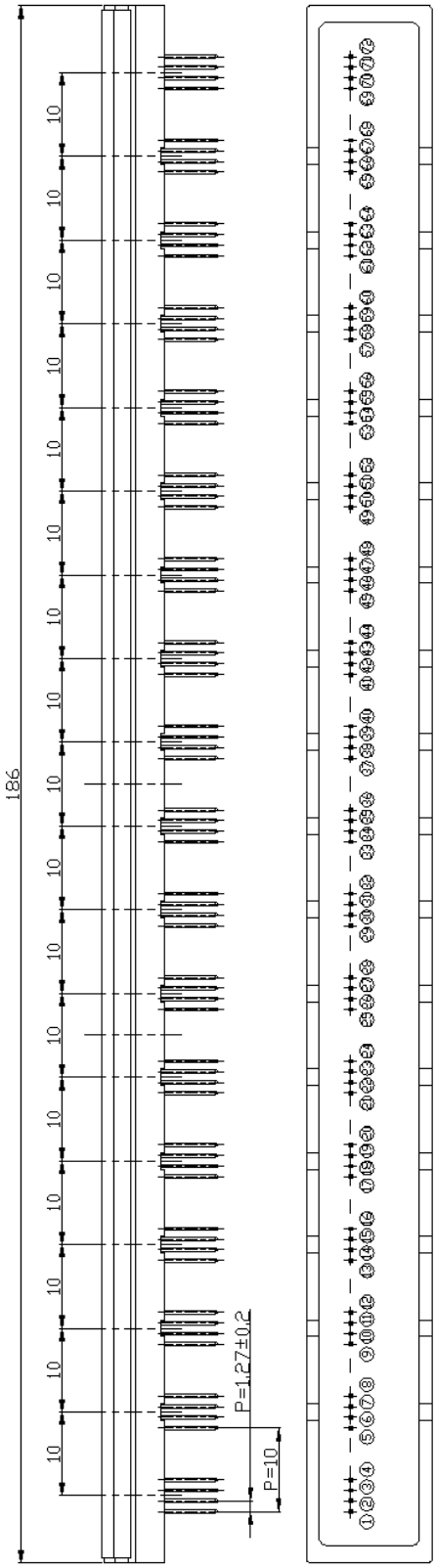
① The sensitivity can be calculated by using the testing method described below.

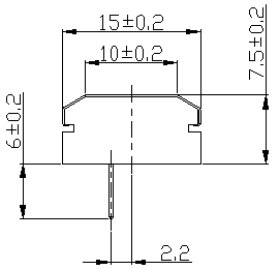
Physical parameters

Item		Part Number	Min	Typ	Max	Unit
Detection Width	Wd	LTJ-XM-180		180		mm
Surface Field①	H	LTJ-XM-180		400		Gs
Channel width	Wc	LTJ-XM-180		10		mm

① The magnetic field on the surface of the sensor along the width direction.

Dimensions

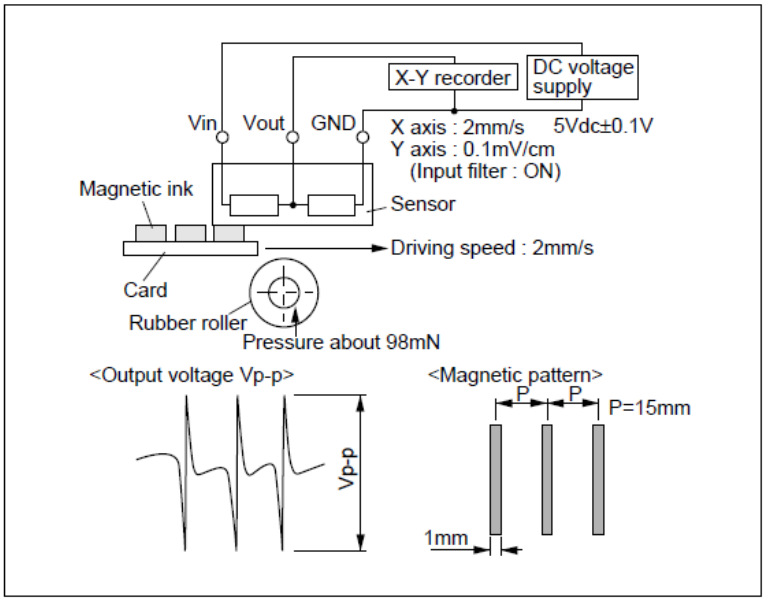




Appendix

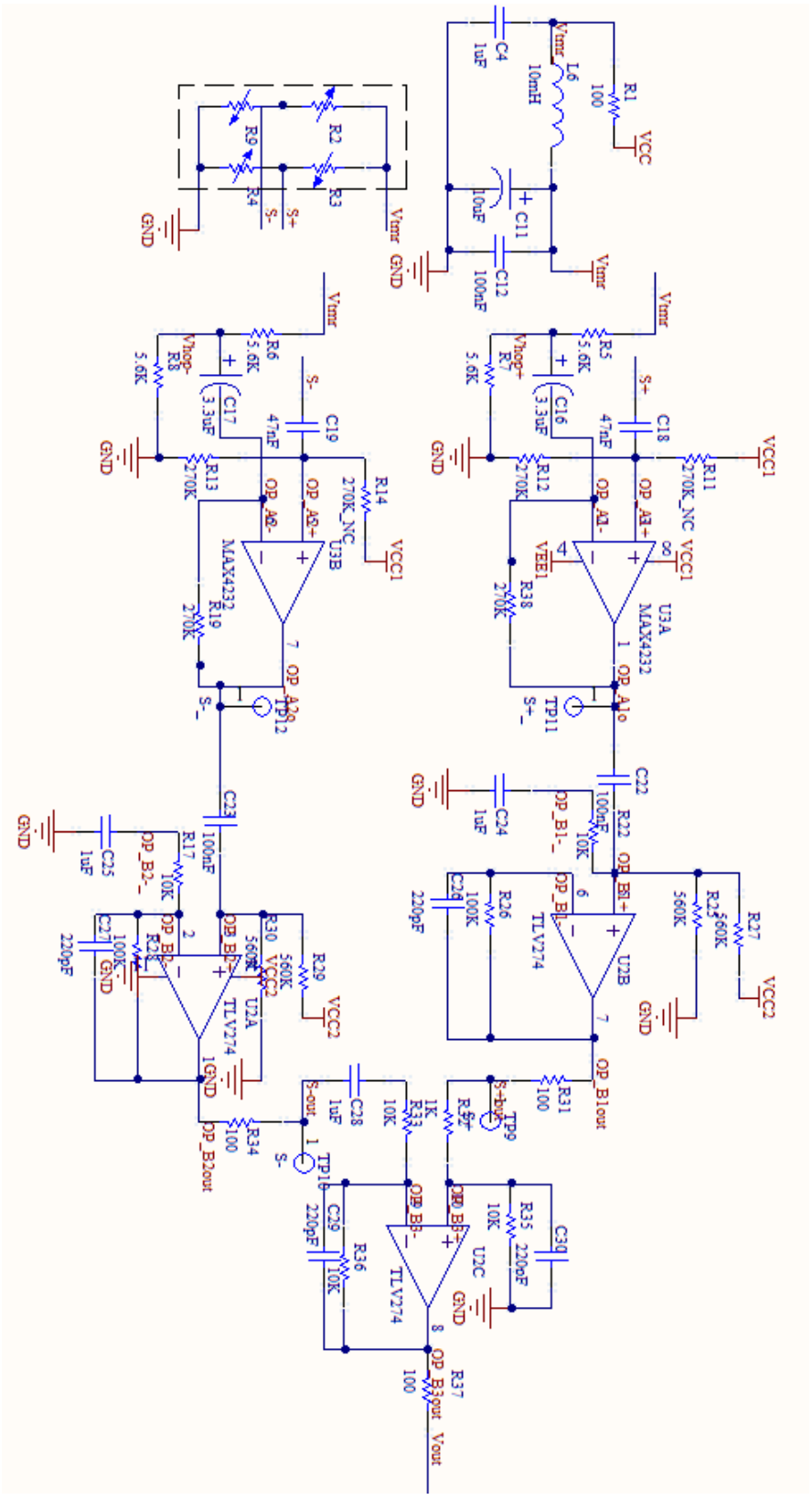
Testing Method

1. Output voltage is measured by using the magnetic pattern tape. The magnetic pattern tape has the same magnetic density of magnetic stripe on 100 RMB Yuan bank notes.
2. Drive the magnetic pattern tape and record output voltage Vp-p with X-Y recorder.

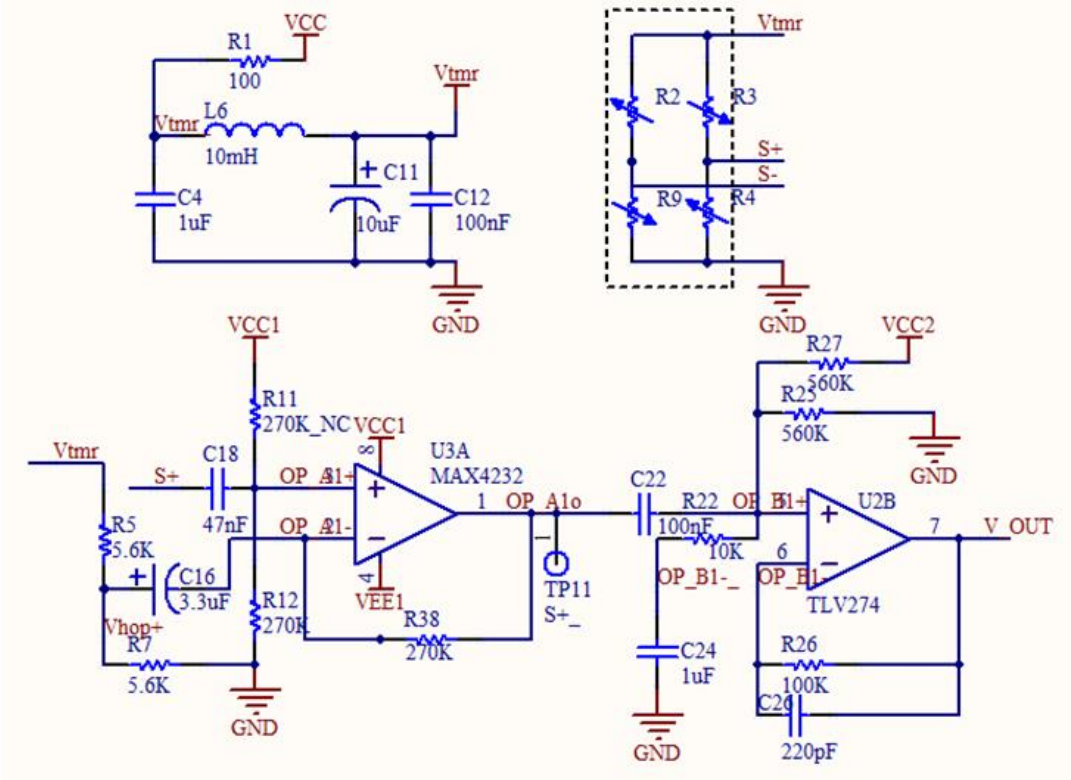


Typical Application

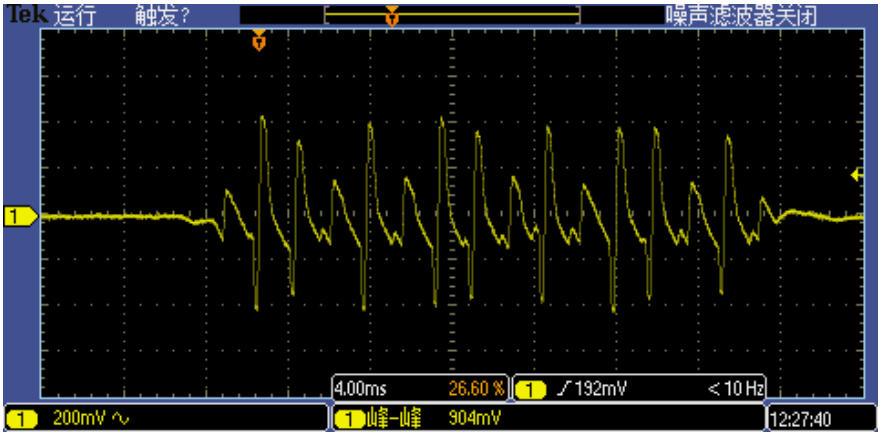
For products with full bridge structures.



For products with half bridge structures.



Typical signal



Signal of metal stripe on 100 Yuan RMB paper bill after 200x times amplification.