About MT

MEMS Products

- Inertial Devices and Systems
- Test and Measurement Sensors
- Pressure Sensor Dies
- Automotive Sensors
- RF MEMS Devices
- MOEMS

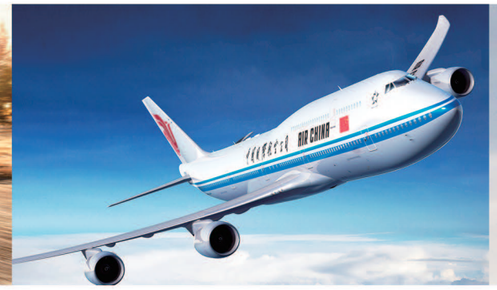
MT Microsystems Co., Ltd. is the leading MEMS technology and production company in China based on nearly 20 years R&D and innovation background. The first 6-inch pure MEMS Fab of China was established in MT Microsystems with MES and SPC quality control systems serving high yield MEMS fabrication.

MT Microsystems provides the customers total MEMS product solution including design, fabrication, packaging , module integration and testing. Experienced engineers, world-class technology and advanced manufacture competence assure the best product quality. MT Microsystems is certificated by ISO9001 and ISO/TS16949.

MT Microsystems support OEM and Foundry Services.

MEMS Products Total Solution





MEMS Inertial Devices and Systems

MEMS Test and Measurement Sensors

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01 MEMS Inertial Devices and Systems

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MEMS Inertial Devices and Systems

MSG9000D MEMS Gyros

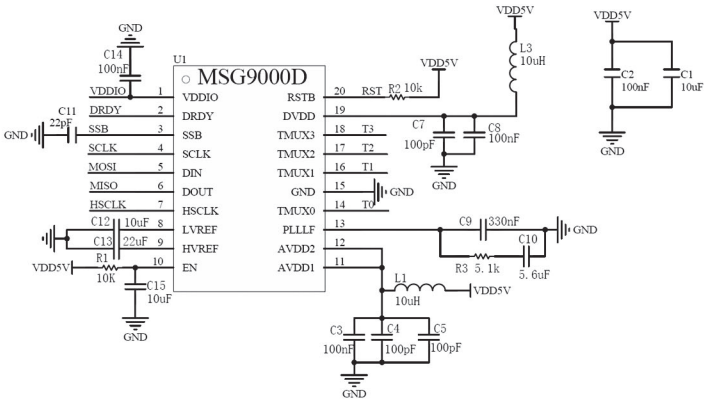
- ◇ Based on MEMS Process
- ◇ Ultra Small Size
- ◇ +5V Voltage Input
- ◇ Temp. Output
- ◇ Standard Ceramic Packaging
- ◇ Low Power
- ◇ SPI Interface
- ◇ Excellent Environmental Adaptability

Parameter	Unit	MSG9000D-300
Range	°/s	±300（±50~±7200 Adjustable）
Scale Factor Non-linearity	%FS	0.03
Scale Factor Repeatability	ppm	200
Scale Factor Temp. Coefficient	ppm/°C	40
Short-term Bias Stability（1σ）	°/h	10
Bias Repeatability	°/h	10
Bias Instability（Allan variance）	°/h	1
Random Walk	$°/\sqrt{h}$	0.15
Threshold/Resolution	**°/s**	0.005
Bias Temp. Coefficient	**°/s/°C**	0.001
Start Up Time	**s**	1
Bandwidth	**Hz**	62 （125, 250 Adjustable）
Power Consumption	**mW**	125
Shock Resistance	**g**	2000
Operating Temp.	**°C**	-40~85
Storaging Temp.	**°C**	-55~100
Output		SPI
Package		LCC20 Ceramic Packaging
Allvalues are typical at +25°C，+5Vdc, unless otherwise statement.		

◇ Applications

Inertial Navigation: Inertial Guidance, Integrated Navigation, Platform Stabilization
Short-term Navigation: Flight Control, Ballistic Correction, Telemetry
Posture Control:UAV(Unmanned Aerial vehicle), Antenna Orientation, North Finder
Automotive: Balance Measurement

◇ Structure（Unit： mm）



-SSB	SPI
SCLK	SPI
MOSI	SPI
MISO	SPI
VDDIO	Output Interface Level, compatible with 1.8 ~ 5V

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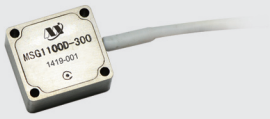
MEMS Inertial Devices and Systems



MSG 1100D MEMS Gyros

- ◇ Based on MEMS Process
- ◇ 2000g Shock Resistance
- ◇ SPI/RS422 Interface
- ◇ Angular Rate & Temp. Output
- ◇ Integrate Signal Conditioning
- ◇ Self Test

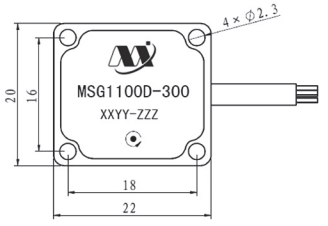
Parameter	Unit	MSG1100D-300	MSG1100D-500
Range	°/s	±300	±500
Scale Factor Nonlinearity	%FS	0.03	0.05
Scale Factor Repeatability	ppm	200	500
Scale Factor Temp. Coefficient	ppm/°C	40	60
Short-term Bias Stability(1σ)	°/h	10	20
Bias Repeatability	°/h	10	20
Bias Temp. Coefficient	°/s/°C	0.001	0.002
Threshold	°/s	0.005	0.01
Resolution	°/s	0.005	0.01
Random Walk	$°/\sqrt{h}$	0.15	0.30
Start up time	s	1	1
Bandwidth	Hz	Typical:62 Optional:125,250,500	Typical:62 Optional:125,250,500
Power Consumption	mW	125	125
Interface		SPI/RS422	SPI/RS422
Packaging		Titanium Alloy	Titanium Alloy
Operating Temp.	°C	-40~85	-40~85
Storaging Temp.	°C	-55~100	-55~100
Shock Resistance	g	2000	2000

All values are typical at +25°C，+5Vdc unless otherwise statement.

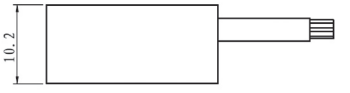
◇ Applications

Inertial Navigation: Inertial Guidance, Integrated Navigation, Platform Stabilization
Short-term Navigation: Flight Control, Ballistic Correction, Telemetry
Posture Control: UAV(Unmanned Aerial vehicle)，Antenna Orientation, North Finder
Automotive: Balance Measurement

◇ Structure (unit:mm)



Top view



Side view

SPI

Red	VCC	Power
Black	GND	GND
Yellow	MISO	Master Input/ Slave Output
Green	MOSI	Master Output/ Slave Input
Orange	SCLK	Clock
Gray	SSB	Chip Select

RS422

Red	VCC	Power
Black	GND	GND
Yellow	T+	+Slave Output
Green	T-	-Slave Output
White	R+	+Master Input
Gray	R-	-Master Input

MEMS Inertial Devices and Systems

美泰科技 MTMicrosystems

- ◇ Extra Small Size, LCC20 packaging
- ◇ ±2~±200g Range
- ◇ Low Noise
- ◇ Excellent Long-term Stability
- ◇ Harsh Environment(Shock, Vibration, Temperature)

MSA 6000 MEMS Accelerometers

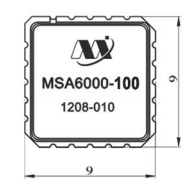
Parameter	Unit	MSA6000-02	-05	-10	-15	-30	-50	-100	-200
Range	g	±2	±5	±10	±15	±30	±50	±100	±200
Bias	mg	<10	<20	<50	<100	<150	<250	<500	<1000
Bias Stability	mg	<0.1	<0.3	<0.5	<0.75	<1	<2	<5	<10
Bias Repeatability	mg	<0.1	<0.3	<0.5	<0.75	<1.5	<2.5	<5.0	<10
Bias Temp. Coefficient	mg/°C	<0.1	<0.3	<0.5	<0.75	<1.2	<2.5	<5.0	<10
Scale Factor	mV/g	1000±8	400±2	200±2	133.3±1	66.6±1	40±1	20±1	10±1
1 year Scale Factor Stability	ppm	300	300	300	300	300	300	300	300
Scale Factor Temp. Coefficient	ppm/°C	100	100	100	100	100	100	100	100
Sensitive Axis Misalignment	mrad (max)	<10	<10	<10	<10	<10	<10	<10	<10
	% (max)	<1	<1	<1	<1	<1	<1	<1	<1
Resolution	mg	0.05	0.1	0.3	0.5	1.0	2.5	5.0	10
Non-linearity	% of FS	<0.2	<0.2	<0.3	<0.3	<0.3	<0.5	<0.5	<0.5
Bandwidth	Hz	0~250	0~250	0~500	0~500	0~500	0~500	0~-500	0~500
Resonant Frequency	kHz	1.3	2.7	2.7	3.8	5.5	5.5	9.8	9.8
Operating Temp.		-40°C~+85°C(default) ; -55°C~+125°C (as request)							
Shock		Up to 20, 000g(0.15ms half-sine, 3 time shocks in ecah direction)							
Recovery Time		<1ms(1000g, 1ms half-sine shock)							
Vibration		20g rms, 20~2000Hz(random noise, 30 minutes in each direction)							
Packaging		Hermetic							
ESD Sensitivity		Class 2 (requirements MIL-STD-833-G, 1 Method 3015.7) HBM 2kV							
Supply Voltage		3.0~7.0Vdc.(Typ. 5.0Vdc)							
Output Range		0.5~4.5Vdc@5.0Vdc Supply Voltage(2.5V±10mV@0g)							
Supply Current		<6mA @5.0Vdc							
Output Impedance/Load Drive		Max 50pF@Vout(pin 16) and Max. 100μF GND(pin 20)							
Weight		<1 grams							
Size		Typ 9.0×9.0×2.6mm (0.35×0.35×0.101inch)							

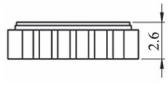
All values are typical at +25°C,+5Vdc unless otherwise statement.

◇ Applications

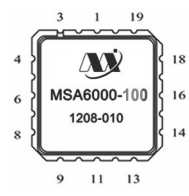
IMU/AHRS for MilAerospace　Land & Sea Inertial Navigation　Directional Drilling　Tilt & Inclination

◇ Structure (unit:mm)





Side view



Top view

2	VCC	+PWR
3	GND	Ground
15	SST	Self Test
16	V_{OUT}	Sensor Output
17	ORG-OUT	Filter Output (adjustable bandwidth)
18	ECAP	Voltage Reference(½Vcc)
20	GND	Ground

Postitive Acceleration

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MEMS Inertial Devices and Systems

MSA8000D MEMS Accelerometers

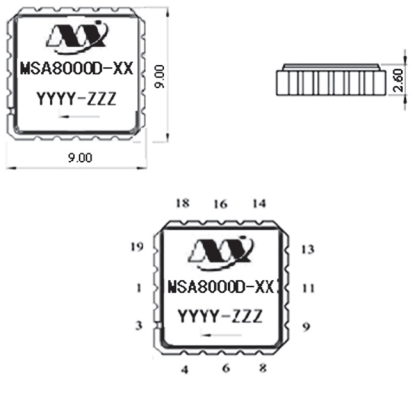
- ◇ Based on MEMS Process
- ◇ ±2 ～ ±200g Full Scale
- ◇ 20,000g Shock Resistance
- ◇ LCC20 Package
- ◇ Integrated Signal Conditioning
- ◇ Self-test, SPI Output

Parameter	Unit	MSA8000D-02	MSA8000D-10	MSA8000D-15	MSA8000D-30	MSA8000D-50	MSA8000D-100	MSA8000D-150	MSA8000D-200
Full Scale	g	±2	±10	±15	±30	±50	±100	±150	±200
Bias	mg	±100	±100	±100	±100	±100	±100	±100	±100
Bias Stability	mg	≤0.1	≤0.2	≤0.3	≤0.5	≤1	≤3	≤3.5	≤6
Bias Repeatability	mg	≤0.06	≤0.2	≤0.3	≤0.45	≤0.5	≤0.5	≤1	≤5
Bias Temp. Coefficient	mg/°C	≤0.1	≤0.5	≤0.75	≤1.5	≤2	≤5	≤7.5	≤10
Scale Factor Stability	ppm	≤200	≤200	≤200	≤300	≤300	≤500	≤500	≤500
Scale Factor Repeatibility	ppm	≤200	≤200	≤200	≤300	≤300	≤500	≤500	≤500
Scale Factor Temp.Coefficient	ppm/°C	≤100	≤100	≤100	≤150	≤150	≤200	≤200	≤200
Resolution	mg	0.05	0.25	0.5	1.0	2.5	5.0	7.5	10
Bandwidth	Hz	250	400	400	400	400	400	400	400
Input axis Mis-alignment	mrad	＜10	＜10	＜10	＜10	＜10	＜10	＜10	＜10
	%	＜1	＜1	＜1	＜1	＜1	＜1	＜1	＜1
Non Linearity	%FS(max)	≤±0.1	≤±0.3	≤±0.3	≤±0.3	≤±0.3	≤±0.3	≤±0.5	≤±0.5
Resonant Frequency	kHz	1.3	2.7	3.8	4.5	5.8	8.1	10.1	11.4
Start Up Time	s	1	1	1	1	1	1	1	1
Power Consumption	mW	100							
Size	mm^3	9.0×9.0×2.6							
Package		Ceramic LCC20							
Interface		SPI							
Operating Temp.	℃	-40°C~+85°C(default) ; -55°C~+125°C (as request)							
Storaging Temp.	℃	-55~125							
Shock Resistance	g	10000							

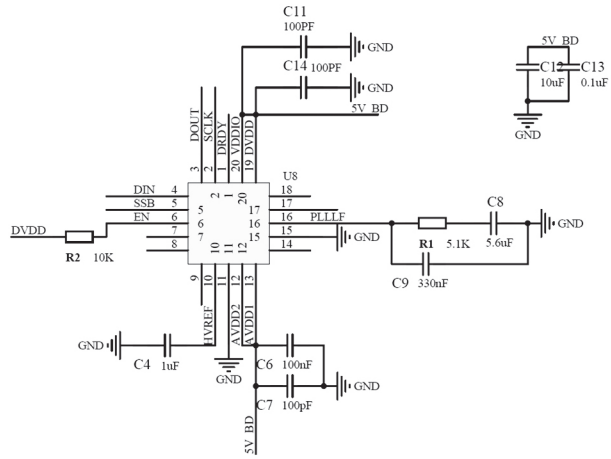
◇ Applications

Inertial Navigation: Inertial Guidance, Integrated Navigation, Platform Stabilization
Short-term Navigation: Flight Control, Ballistic Correction, Telemetry
Posture Control: UAV(Unmanned Aerial Vehicle), Antenna Orientation, North Finder
Automotive: ESP, Balance Measurement

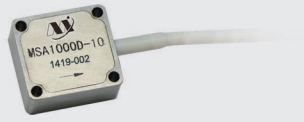
◇ Structure （Unit： mm）



Top view　　Side view



MEMS Inertial Devices and Systems



MSAIOOOD

Variable Capacitance Accelerometers

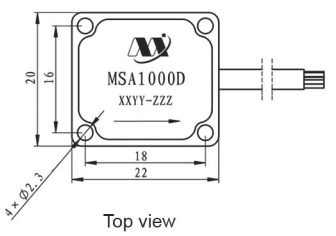
- ◇ Based on MEMS Process
- ◇ ±2~±200g Range
- ◇ Excellent Long-term Stability
- ◇ Self Test, SPI/RS422 Interface
- ◇ Low Noise
- ◇ Harsh Environment

Parameter	Unit	MSA1000D-02	-10	-15	-30	-50	-100	-150	-200
Range	g	±2	±10	±15	±30	±50	±100	±150	±200
Bias	mg	±10	±50	±50	±100	±100	±200	±300	±300
Bias Stability	mg	≤0.1	≤0.5	≤0.5	≤1	≤2	≤5	≤7.5	≤10
Bias Repeatability	mg	≤0.1	≤0.5	≤0.5	≤1	≤2	≤.5	≤7.5	≤10
Bias Temp. Coefficient	mg/°C	≤0.1	≤0.5	≤0.6	≤1.2	≤2.5	≤5.0	≤7.5	≤10
Scale Factor Stability	ppm	≤300	≤300	≤300	≤300	≤300	≤500	≤500	≤500
Scale Factor Repeatability	ppm	≤300	≤300	≤300	≤300	≤300	≤500	≤500	≤500
Scale Factor Temp. Coefficient	ppm/°C	≤50	≤50	≤100	≤150	≤150	≤200	≤200	≤200
Resolution	mg	0.05	0.3	0.5	1.0	2.5	5.0	7.5	10
Bandwidth	Hz	125	125	125	125	125	125	125	125
Sensitive Axis Misalignment	mrad	<10	<10	<10	<10	<10	<10	<10	<10
	%	<1	<1	<1	<1	<1	<1	<1	<1
Non-linearity	%FS Max	≤0.05	≤0.05	≤0.05	≤0.05	≤0.1	≤0.3	≤0.3	≤0.5
Resonant Frequency	kHz	1.3	2.7	3.8	4.5	5.8	8.1	10.1	11.4
Start-up Time	s	1	1	1	1	1	1	1	1
Excitation	Vdc	4.9~5.1Vdc							
Current(@5V)	mA	25							
Size	mm^3	22×20×10.2							
Packaging		Stainless Steel							
Interface		SPI/RS422							
Operating Temp.	°C	-40°C~+85°C(default) ; -55°C~+125°C (as request)							
Storaging Temp.	°C	-55~125°C							
Shock Resistance	g	20,000g							
All values are typical at +25°C,+5Vdc unless otherwise statement.									

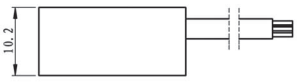
◇ Applications

Integrated Navigation Systems & Inertial Guidance Systems
Flight Control & Guidance Systems
Attitude Heading Reference Systems (AHRS)
Stabilization of Antennas, Cameras & Platforms

◇ Structure (unit:mm)



Top view



Side view

SPI

Red	VCC	Power
Black	GND	GND
Yellow	MISO	Master Input/ Slave Output
Green	MOSI	Master Output/ Slave Input
Brown	SCLK	Clock
White	SSB	Chip Select

RS422

Red	VCC	Power
Black	GND	GND
Yellow	T+	RS422 TX+
Green	T-	RS422 TX-
White	R+	RS422 RX+
Brown	R-	RS422 RX-

MEMS Inertial Devices and Systems

- ◇ Based on MEMS Process
- ◇ Standard Ceramic Packaging
- ◇ Temp. Output
- ◇ Ultra Small Size
- ◇ Lower Power
- ◇ 2000g Shock Resistance

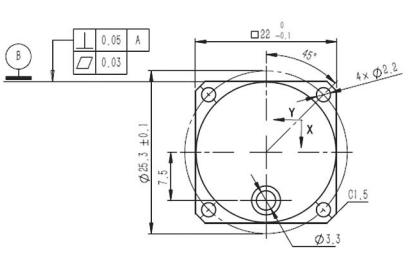
MSG2004 Dual-axis MEMS Gyros

Parameter	Unit	MSG2004
Range	°/s	±250
Bias（Full Temp.）	°/s	≤0.05
Bias Stability	°/h	≤25
Bias Repeatability	°/h	≤25
Nonorthogonality	‘	≤3
Bias Temp. Coefficient	°/s/°C	≤0.0005
Bandwidth	Hz	100（2~400Hz Adjustable）
Scale Factor Sensivity	ppm	≤200
Non-linearity		
Resolution	°/s	0.005
Scale Factor Sensivity Temp. Coefficient	ppm/°C	≤10

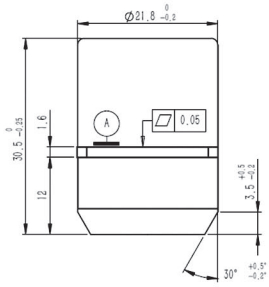
◇ Applications

Inertial Navigation: Inertial Guidance, Integrated Navigation, Platform Stabilization
Short-term Navigation: Flight Control, Ballistic Correction, Telemetry
Posture Control:UAV(Unmanned Aerial vehicle), Antenna Orientation, North Finder
Automotive: Balance Measurement

◇ Structure（Unit： mm）



Top view



Side view

RS422

Red	VDD
Black/Gray	GND
White	RX+
Yellow	TX+
Green	TX-
Orange	RX-
Blue/Brown	Blank

MEMS Inertial Devices and Systems

MSG 3000D Tri-axis MEMS Gyros

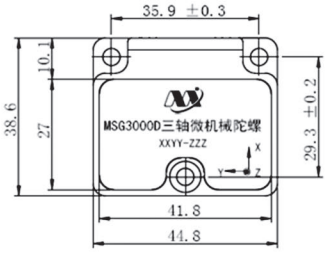
- ◇ Based on MEMS Process
- ◇ 2000g Shock Resistance
- ◇ RS422 Interface
- ◇ Angular Rate, Temp. Output
- ◇ High-density, 3 Axis Integration
- ◇ Compact, Higher Reliability

Parameter	Unit	MSG3000D		
Range	°/s	X ±250	Y ±250	Z ±250
Scale Factor Non-linearity	ppm	500	500	500
Scale Factor Repeatability	ppm			
Scale Factor Temp. Coefficient	ppm/°C			
Short-term Bias Stability（1σ）	°/h	35	35	35
Bias Repeatability	°/h	35	35	35
Bias Temp. Coefficient	°/s/°C			
Threshold	°/s	0.01	0.01	0.01
Resolution	°/s	0.01	0.01	0.01
Random Walk	$°/\sqrt{h}$			
Start Up Time	s	2	2	2
Bandwidth	Hz	250		
Power Consumption	mW	≤500		
Output		RS422		
Package		Metal Package		
Operating Temp.	°C	-40~85		
Storaging Temp.	°C	-55~100		
Shock Resistance	g	2000		
All values are typical at +25°,+5VDC unless otherwise statement.				

◇ Applications

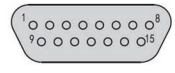
Inertial Navigation: Inertial Guidance, Integrated Navigation, Platform Stabilization
Short-term Navigation: Flight Control, Ballistic Correction, Telemetry
Posture Control:UAV(Unmanned Aerial vehicle), Antenna Orientation, North Finder
Automotive: Balance Measurement

◇ Structure（Unit： mm）



Top view

Side view



1	2	3	4	5	6	7	8
TX-	RX-	Blank	Blank	Blank	Reserved	Reserved	+5V
9	10	11	12	13	14	15	-
TX+	RX+	Blank	GND	GND	Blank	GND	-

Notes:
1）RX+,RX- are differential receiver, should be connected to upper monitor:TX+,TX-
2) RX+,RX- are differential receiver, should be connected to upper monitor:RX+,RX-
3) Input Voltage：5V±0.1V

MEMS Inertial Devices and Systems

- ◇ Based on MEMS Process
- ◇ 0 ~ 100Hz Output Frequency
- ◇ Excellent Vib. & Shock Behavior
- ◇ Optional RS232/422/485
- ◇ Develop as per Customer Demand
- ◇ IP68 Protection Level
- ◇ Built-in Temperature Sensor
- ◇ 0.01° High Accuracy
- ◇ Baud Rate 2400 ~ 115200
- ◇ Applied in Different Situation

MTS 2006

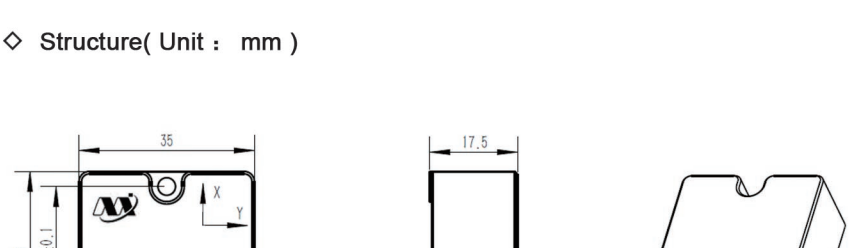
Dual-axis Inclinometers

Parameter	Unit	MTS2006-05	MTS2006-15	MTS2006-30	MTS2006-75
Range	°	±5	±15	±30	±75
Axial		Dual-axial	Dual-axial	Dual-axial	Dual-axial
Resolution	°	0.001	0.001	0.001	0.001 ~ 0.003
Accuracy	°	0.01	0.01	0.01	0.01
Zero Shift(-40°C ~ 85°C)	°/°C	±0.0006	±0.0006	±0.0006	≤0.0006
Nonlinearity Error	%	≤0.03	≤0.03	≤0.03	≤0.03
Frequency Response	Hz	Can be configurated			
Data Transfer Rate (bps)		Can be configurated			
Interface		RS232/422			
Operating Temp.	°C	-40~85			
Operating Voltage	VDC	5~12			
Operating Current	mA				
Output	mm³	Connector			
Protection Level	g	IP68			

◇ Applications

- Radar Antenna Angle Alignment
- Bridge & Dam Monitor
- Engineering Vehicle Leveling
- Geological Equipment Tilt Monitor
- Gun barrel Muzzle Angle Measurement
- Satellite Communication Vehicle Attitude Test
- Antenna Angle Measurement
- High Precision Pan-tilt Angle Control
- High-speed Rail Gauge Meter Leveling

◇ Structure(Unit： mm)



美泰科技 MTMicrosystems

MEMS Inertial Devices and Systems

MSI 370A MIMU

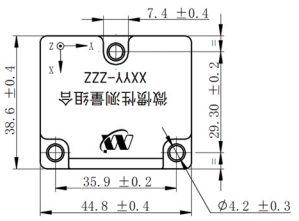
- ◇Based on MEMS process
- ◇Digital Gyros & Accelerometers
- ◇High Speed Processor Embedded
- ◇Compensation & Calibration
- ◇Low power, Small Size
- ◇High Tolerance

	Parameter	MSI370A
Gyro Performance	Range	±300 °/s
	Bias in Full temperature(1σ,10s on average)	≤50 °/h
	Bias in Full temperature(peak-to-peak)	≤0.05 °/s
	Bias Stability(1σ,10s on average)	≤8 °/h
	Bias Repeatability(1σ)	≤8 °/h
	Angular Random Walk	≤0.15 °/√Hr
	Scale Factor Non-linearity	≤150 ppm
	Scale Factor Repeatability	≤150 ppm
	Sensitive Axis Misalignment	10 ‘
	Threshold/Resolution	0.005°/s
	-3 dB Bandwidth	≥150 Hz
	G-Sensitivity	0.005 °/s/g
Accelerometer Performance	Range	±30g (Extendable to ±50g)
	Bias in Full temperature(peak-to-peak)	≤5 mg
	Bias Stability(1σ, 10s on average)	≤ 1 mg
	Bias Repeatability	≤ 1 mg
	Scale Factor Non-linearity(<1g)	≤ 500 ppm
	Scale Factor Non-linearity(full scale)	≤ 3000 ppm
	Scale Factor Stability	≤ 500 ppm
	Scale Factor Repeatability	≤ 500 ppm
	Threshold/Resolution	1 mg
	Sensitive Axis Misalignment	10 ’
	-3 dB Bandwidth	150 Hz(Extendable, 10~250 Hz)
System Performance	Data Rate	1000 Hz
	Weight	≤80 g
	Size	44.8 mm×38.6 mm×21.5 mm
	Supply Voltage	5±0.5 V
	Power Consumption	≤1.5 W
	Interface	RS422
	Vibration Level	≥20 g rms
	Operating Temp.	-45 °C~85 °C
	Storaging Temp.	-55 °C~105 °C

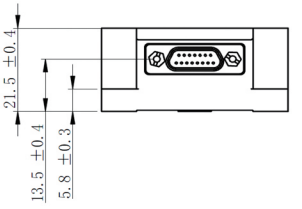
◇ Applications

Integrated Navigation Systems & Inertial Guidance Systems
Flight Control & Guidance Systems
Attitude Heading Reference Systems (AHRS)
Stabilization of Antennas, Cameras & Platforms

◇ Structure (unit:mm)



Top view



Side view

1	TX-	Negative Output
2	RX-	Negative Input
3	NC	
4	NC	
5	NC	
6	NC	
7	NC	
8	VCC	Power (+5V)
9	TX+	Positive Output
10	RX+	Positive Input
11	NC	
12	GND	
13	GND	
14	NC	
15	GND	

Definition

美泰科技 MTMicrosystems

MEMS Inertial Devices and Systems

MSI 360 MIMU

- ◇Based on MEMS process
- ◇Digital Gyros & Accelerometers
- ◇High Speed Processor Embedded
- ◇Compensation & Calibration
- ◇Low power, Small Size
- ◇High Tolerance

	Parameter	MSI360
Gyro Performance	Range	±450 °/s
	Bias in Full temperature	≤180 °/h
	Bias Stability(1σ,10s on average)	≤8 °/h
	Bias Repeatability(1σ)	≤8 °/h
	Angular Random Walk	≤0.15 °/√Hr
	Scale Factor Non-linearity	≤100 ppm
	Sensitive Axis Misalignment	≤10 ‘
	Threshold/Resolution	0.005°/s
	G-Sensitivity	0.01 °/s/g
	-3 dB Bandwidth	150 Hz (Extendable, 10~250Hz)
Accelerometer Performance	Range	±10g
	Bias in Full temperature	≤6 mg
	Bias Stability(1σ, 10s on average)	≤0.2 mg
	Bias Repeatability(1σ)	≤0.2 mg
	Scale Factor Non-linearity(<1g)	≤ 300 ppm
	Threshold/Resolution	≤ 0.2 mg
	Sensitive Axis Misalignment	10 ’
	-3 dB Bandwidth	150 Hz (Extendable, 10~250Hz)
System Performance	Refresh Rate	1000 Hz
	Weight	≤20 g
	Size	23 mm×23 mm×10 mm
	Supply Voltage	5±0.5 V
	Interface	RS422
	Vibration Level	≥20 g rms
	Shock Resistance	≥2000 g
	Operating Temp.	-40 °C~85 °C
	Storaging Temp.	-55 °C~105 °C

◇ Applications

Integrated Navigation Systems & Inertial Guidance Systems
Flight Control & Guidance Systems
Attitude Heading Reference Systems (AHRS)
Stabilization of Antennas, Cameras & Platforms

◇ Structure (unit:mm)

Top view Side view Definition

美泰科技 MTMicrosystems

MEMS Inertial Devices and Systems

MSI 313B MIMU

- ◇Based on MEMS process
- ◇Digital Gyros & Accelerometers
- ◇High Speed Processor Embedded
- ◇Compensation & Calibration
- ◇Low power, Small Size
- ◇High Tolerance

	Parameter	MSI313B
Gyro Performance	Range	±450 °/s
	Bias in Full temperature	≤180 °/h
	Bias Stability(1σ,10s on average)	≤8 °/h
	Bias Repeatability(1σ)	≤8 °/h
	Angular Random Walk	≤0.15 °/√Hr
	Scale Factor Non-linearity	≤100 ppm
	Sensitive Axis Misalignment	≤10 ‘
	Threshold/Resolution	0.005°/s
	G-Sensitivity	0.01 °/s/g
	-3 dB Bandwidth	150 Hz (Extendable, 10~250Hz)
Accelerometer Performance	Range	±10g
	Bias in Full temperature	≤6 mg
	Bias Stability(1σ, 10s on average)	≤0.2 mg
	Bias Repeatability(1σ)	≤0.2 mg
	Scale Factor Non-linearity(<1g)	≤ 300 ppm
	Threshold/Resolution	≤ 0.2 mg
	Sensitive Axis Misalignment	10 ’
	-3 dB Bandwidth	150 Hz (Extendable, 10~250Hz)
System Performance	Refresh Rate	1000 Hz
	Weight	≤20 g
	Size	22.4 mm×22.4 mm×9 mm
	Supply Voltage	5±0.5 V
	Interface	RS422
	Vibration Level	≥20 g rms
	Shock Resistance	≥2000 g
	Operating Temp.	-40 °C~85 °C
	Storaging Temp.	-55 °C~105 °C

◇ Applications

Integrated Navigation Systems & Inertial Guidance Systems
Flight Control & Guidance Systems
Attitude Heading Reference Systems (AHRS)
Stabilization of Antennas, Cameras & Platforms

◇ Structure (unit:mm)

Top view Side view Definition

MEMS Inertial Devices and Systems

美泰科技 MTMicrosystems

- ◇ Based on MEMS Process
- ◇ Digital Gyros & Accelerometers
- ◇ High Speed Processor Embedded
- ◇ Compensation & Calibration
- ◇ Low Power, Extra-small Size
- ◇ Robust for Vibration & Shock

MSI 310 MIMU

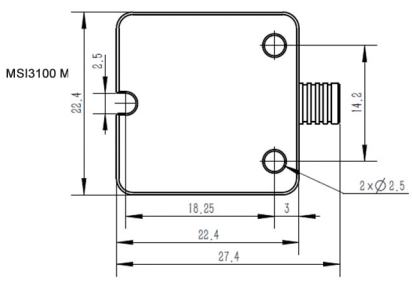
	Parameter	MSI310
Gyro Performance	Range	±450 °/s
	Bias Stability(1σ, 10s on average)	≤40 °/h
	In-Run Bias Stability(1σ, Allan Variance@25°C)	≤10 °/h
	Bias Repeatability	≤18 °/h
	Bias Error over Temperature(-40°C≤Tc≤85°C, 1σ)	±0.2 °/s
	Angular Random Walk(1σ, Allan Variance@25°C)	≤0.4 °/√h
	Nonlinearity(Full Scale)	0.04 %FS
	Scale Factor Error over Temperature(-40°C≤Tc≤85°C, 1σ)	±0.1 %
	Misalignment Error Axis to Axis, 1σ	±0.05°
	Linear Acceleration Effect Any direction, 1σ	0.005°/s/g
	-3 dB Bandwidth	≥100 Hz
Accelerometer Performance	Dynamic Range	±15 g
	Bias Stability(1σ, 10s on average)	0.2 mg
	In-Run Bias Stability(1σ, Allan Variance @ 25°C)	70 μg
	Bias Error over Temperature(-40°C≤Tc≤85°C, 1σ)	±3 mg
	Nonlinearity	0.03% FS
	Scale Factor Error over Temperature(-40°C≤Tc≤85°C, 1σ)	±0.1%
	Velocity Random Walk (1σ, Allan Variance@25°C)	0.07 m/s/√h
	-3 dB Bandwidth	≥100 Hz
System Performance	Output Data Rate	200±2 Hz
	Weight	≤30 g
	Size	27.4 mm × 22.4 mm × 9 mm
	Supply Voltage	5±0.5 V
	Power Consumption	0.15 W
	Vibration Level	≥20 g rms
	Operating Temp.	-45°C~85°C
	Storaging Temp.	-55°C~105°C

All values are typical at +25°C,+5.2Vdc unless otherwise statement.

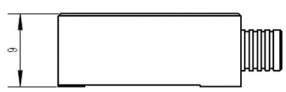
◇ Applications

Integrated Navigation Systems & Inertial Guidance Systems
Flight Control & Guidance Systems
Attitude Heading Reference Systems (AHRS)
Stabilization of Antennas, Cameras & Platforms

◇ Structure (unit:mm)



Top view



Side view

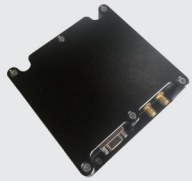
Color	Definition	Note
Red	VCC(+5V)	Power
Black	VGND	Power Ground
White	Rx+	Receive Positive
Brown	Rx-	Receive Negative
Green	Tx-	Transmit Negative
Yellow	Tx+	Transmit Positive

Definition

美泰科技 MTMicrosystems

MEMS Inertial Devices and Systems

MNV550D



GNSS INS Integrated Navigation System

- ◇ Based on MEMS Process
- ◇ Compensated for over temperature
- ◇ Fully calibrated for parameters of each axis of sensors
- ◇ High accuracy gyros 1°/h (Allan variance)
- ◇ Low power, small size
- ◇ Robust for vibration & shock

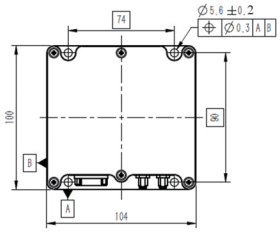
	Parameter	MNV550D
Heading	Range	-180 ° ~ + 180 °
	Accuracy	<0.2 °
Attitude	Range : Roll, Pitch	-180 ° ~ + 180 ° , -90 ° ~ + 90 °
	Dynamic Accuracy	<0.2 °
GPS Outage	Position Drift (1km or 2min)	0.2% (with odometer)
	Heading Drift (1min)	0.15°
Gyroscope	Range : X,Y,Z	±200 °/s
	Angular Random Walk	0.25 °/√h
	Bias Instability (Allan variance)	8 °/h (optional 1°/h)
	Bias Stability (1s smoothing)	≤20 °/h
	Scale Factor Non-linearity	≤200 ppm
	Scale Factor Repeatability	≤200 ppm
	Sensitive Axis Misalignment	0.05%
Accelerometer	Range : X,Y,Z	±15g
	Bias Stability (1σ)	0.2 mg
	Bias Repeatability	0.2 mg
	Scale Factor Non-linearity	500 ppm
	Scale Factor Repeatability	200 ppm
	Sensitive Axis Misalignment	0.05%
GNSS Receiver	Position	1.5 m (SPP), 2cm+1 ppm (RTK)
	Velocity (1σ)	0.03 m/s
	Attitude (1σ)	≤0.2 ° (Baseline 2 m)
	Heading (1σ)	0.08 ° (Baseline 2 m)
	Signal Frequency	GPS L1, L2, L2C, Beidou B1, B2
System Performance	Input Voltage	12 V
	Current	0.35 A
	Interface	RS422, RS232
	Data Rate	100 Hz
	Size	105 mm×100 mm×40 mm
	Weight	450 g

◇ Applications

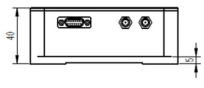
Integrated Navigation Systems & Inertial Guidance Systems Flight Control & Guidance Systems

Attitude Heading Reference Systems (AHRS) Stabilization of Antennas, Cameras & Platforms

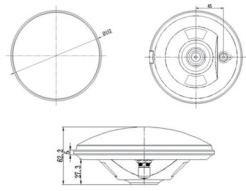
◇ Structure (unit:mm)



Top view



Side view



Note : Cable length 5 m

Antenna view

1	+12V	Power
2	GND	Power ground
3	RS422_TX_P	RS422 Transmit Positive
4	RS422_TX_N	RS422 Transmit Negative
5	RS422_RX_P	RS422 Receive Positive
6	RS422_RX_N	RS422 Receive Negative
7	TX_A	Extened serial port output A
8	RX_A	Extened serial port input A
9	SGND	Signal ground
10~15		Reserved

Definition

02 MEMS Test and Measurement Sensors

美泰科技 MTMicrosystems

MEMS Test and Measurement Sensors

MSV 3100

Variable Capacitance, Triaxial Accelerometers

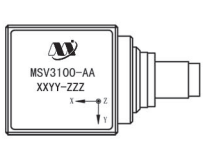
- ±2~±20, 000g Range
- Low Noise
- 20, 000g Shock Resistance
- Large Bandwidth(DC~5000Hz@5%)
- Excellent Thermal Stability
- -55~+125°C Operating Temp.

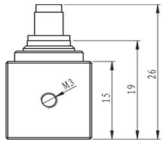
Parameter	Unit	MSV3100-02	-10	-30	-50	-100	-200	-500	-1000	-10000	-20000
Range	g	±2	±10	±30	±50	±100	±200	±500	±1000	±10000	±20000
Frequency Response ±5%	Hz	0~250	0~1000	0~1000	0~1000	0~1500	0~1500	0~2500	0~2500	0~5000	0~5000
Damping Coefficient		0.7	0.7	0.7	0.7	1	1	1	1	1	1
Sensitivity(@100Hz)	mV/g	1000±8	200±2	66.6±1	40±1	20±1	10±1	4±0.3	2±0.3	0.2±0.03	0.1±0.01
Resonant Frequency	kHz	1.3	2.7	5.5	5.5	9.8	9.8	12.7	12.7	12.7	12.7
Transverse Sensitivity,Typ Max	%	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sensitive Axis Misalignment,Typ Max	mrad	10	10	10	10	10	10	10	10	10	10
Non-linearity	% FSO	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<4	<6
Phase Shift (Max@100Hz)	Degrees	20	10	10	10	10	10	10	10	5	5
Noise Density	mgrms/√Hz	0.0002	0.001	0.005	0.01	0.5	0.75	1.5	2	20	40
Resolution	mg	0.002	0.01	0.05	0.1	5	7.5	15	20	200	400
Sensitivity Temp.Coefficient	ppm/°C	50	50	50	50	50	50	50	50	50	50
Bias Temp.Coefficient	mg/°C	0.05	0.5	1.5	2.5	5.0	10	25	50	500	1000
0g Output	mV	2500±10									
Capacitive Load Drive	μF	0.05									
Resistance Load Drive	kΩ	10									
Output Impedance	Ω	10									
Supply Current	mA	16									
Excitation	Vdc	7~40									
Error Proofing Design		Yes									
Shock(half-sine, 200μsec)	g	20000									
Random Vibration(20~2000Hz)	grms	20									
Storaging Temp.	°C	-40°C~+85°C(default) ; -55°C~+125°C (as request)									
Operating Temp.	°C	-55~+125									
Housing Material	Material	Stainless Steel									
Size	mm^3	15×15×13mm									
Connector	Type	4 pin, 1/4"-28UNF									
Mounting Thread		Holes for M3 Mounting Screws / Adhesive									
Packaging		Hermetic									
Gound Isolated		Yes									
Weight	grams	26									
All values are typical at +25°C, 100Hz, +15Vdc unless otherwise statement. Calibration data, traceable to the National Institute of Metrology(NIM) is supplied.											

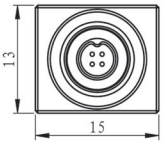
◇ Applications

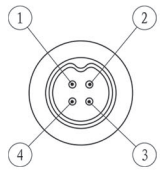
Aviation & Aerospace
Helicopter & Aircraft Testing
Automotive Testing & Crash Testing
Civil Engineering Structural Testing
Railway Technology
Industrial Testing

◇ Structure (unit:mm)









1	2	3	4	Shield
VCC	X	Y	Z	GND

MEMS Test and Measurement Sensors

- ◇ ±2~±20,000g Range
- ◇ Low Noise
- ◇ -55~+125°C Operating Temp.
- ◇ Large Bandwidth(DC~5000Hz@5%)
- ◇ 20,000g Shock Resistance
- ◇ Differential / Single-ended Output

MSV 1000

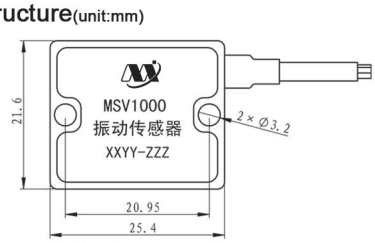
Variable Capacitance Accelerometers

Parameter	Unit	MSV1000-02	-10	-30	-50	-100	-150	-500	-1000	-10000	-20000
Range	g pk	±2	±10	±30	±50	±100	±150	±500	±1000	±10000	±20000
Sensitivity(@100Hz)	mV/g	1000±20	200±10	66±4	40±2	20±1	13.3±0.6	4±0.3	2±0.3	0.2±0.03	0.1±0.01
Frequency Response(@±5%)	Hz	0-250	0-1000	0-1000	0-1000	0-2000	0-2000	0-5000	0-5000	0-5000	0-5000
Resonant Frequency	Hz	1100	3000	5500	5500	9800	9800	18000	25.8K	37K	37K
Non-linearity	%FSO Typ	±0.2	±0.2	±0.2	±0.2	±0.2	±0.2	±2	±2	±3	±6
	%FSO Max	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±3	±3	±4	±8
Transverse Sensitivity	% Max	2	2	2	2	2	2	2	2	3	3
0g Output	mV Max	±50	±50	±50	±50	±50	±50	±50	±50	±50	±50
Thermal Zero Shift											
(0°C~+50°C)		±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
(-25°C~+75°C)	%FSO Max	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0
Thermal Sensitivity Shift	%FSO Max										
(0°C~+50°C)		±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0
(-25°C~+75°C)	% Max	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0
Electrical Clipping Distorition	% Max	±2.5	±12.5	±37.5	±62.5	±125	±185	±625	±1250	±12500	±25000
Mechanical Stop	g	±4	±30	±90	±90	±150	±220	±750	±1500	±30000	±30000
Recovery Time	ms	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Resolution	mg	0.002	0.01	0.05	0.1	5	7.5	15	20	200	400
Start-up Time(within 1%)	ms	10	10	10	10	10	10	10	10	10	10
Excitation		8~36Vdc									
Supply Current		7mA									
Output Current		1mA Typ									
Output Impedance		＜20Ω (Load Resistance≥10KΩ, Load Capacitance≤50pF)									
		2.5V									
Housing Material		Stainless Steel									
Connector		Integral Cable, Four Conductor No.34 AWG									
Identification		Manufacturer's Logo, Model Number, Serial Number									
Mounting Thread		Holes for Two M3 Mounting Screws/0.68 Nm									
Weight		10grams(cable weighs 12.1grams/meter)									
Acceleration Limit		20000g									
Sinusoidal/Random Vibration		100g pk, 20～2000 Hz/40g rms, 20～2000 Hz									
Shock(Half-sine)		20000g pk, 80 μsec									
0g Shift		0.1% FSO Typical at 20000g									
Operating Temp.		-40°C~+85°C(default) ; -55°C~+125°C (as request)									
Storaging Temp.		-55°C～125°C									
Humidity/Altitude		Unaffected(Unit and sensor are hermetically sealed)									
ESD Sensitivity		Class 2,HBM 2kV									
All values are typical at +25°C, 100Hz, +15Vdc unless otherwise statement. Calibration data, traceable to the National Institute of Metrology(NIM) is supplied.											

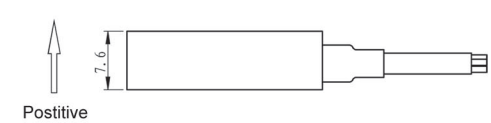
◇ Applications

Structural Vibration Testing　Multi-channel Modal Analysis　Product Testing　Vibration Control　Analytical Model Correlation　Design Studies

◇ Structure(unit:mm)



Top view



Side view

Red Line	VCC	+PWR
Black Line	GND	Ground
Green Line	OUT+	Positive Output
White Line*	OUT-	Negative Output

*Electrical Connection is Signal Ground when Differential Output.

美泰科技 MTMicrosystems

MEMS Test and Measurement Sensors

MSV1000D

Variable Capacitance Accelerometers

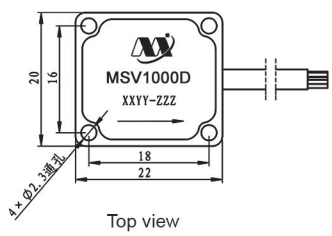
- ◇ Based on MEMS Process
- ◇ ±2~±200g Range
- ◇ Excellent Long-term Stability
- ◇ SPI/RS422 Interface
- ◇ Low Noise
- ◇ Harsh Environment

Parameter	Unit	MSV1000D-02	-10	-15	-30	-50	-100	-150	-200
Range	g	±2	±10	±15	±30	±50	±100	±150	±200
Sensitivity	LSB/g	1500,000±30,000	300,000±6000	200,000±4000	100,000±2000	60,000±1200	30,000±600	20,000±400	15,000±300
Frequency Response(@±5%)	Hz	0~250	0~1000	0~1000	0~1000	0~1000	0~2000	0~2000	0~2000
Resonant Frequency	Hz	1300	1300	3800	3800	4500	5800	8100	101000
Non-linearity	%FS Max	≤0.05	≤0.05	≤0.05	≤0.05	≤0.1	≤0.3	≤0.3	≤0.5
Transverse Sensitivity	% Max	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1
Bias	mg Max	±50	±50	±50	±100	±100	±200	±300	±300
Thermal Zero Shift	mg/°C	≤0.1	≤0.1	≤0.1	≤0.1	≤0.1	≤0.2	≤0.2	≤0.2
Thermal Sensitivity Shift	ppm/°C	≤10	≤10	≤10	≤10	≤10	≤10	≤10	≤10
Electrical Clipping Distorition	g	±2.5	±2.5	±18.75	±37.5	±62.5	±125	±185	±250
Mechanical Stop	g	±4	±30	±30	±90	±90	±150	±220	±500
Recovery Time	s	1	1	1	1	1	1	1	1
Resolution	mg	0.002	0.01	0.015	0.03	0.05	0.1	0.15	0.2
Excitation	4~5.2Vdc								
Supply Current	25mA @+5V								
Interface	SPI/RS422								
Housing Material	Stainless Steel/Titanium Alloy								
Connector	Integral Cable, Six Conductor								
Identification	Manufacturer's Logo, Model Number and Serial Number								
Mounting Thread	Holes for Two M2 Mounting Screws/0.68Nm								
Acceleration Limit	20, 000g								
Sinusoidal/Random Vibration	100g pk, 20~2000 Hz/40g rms, 20~2000Hz								
Shock(Half-sine)	20,000g pk, 80 μsec								
Operating Temp.	-40°C~+85°C(default) ; -55°C~+125°C (as request)								
Storaging Temp.	-55°C~125°C								
Humidity/Altitude	Unaffected(Unit and sensor are hermetically sealed)								
ESD Sensitivity	Class 2,HBM 2kV								
All values are typical at +25°C, 100Hz, +15Vdc unless otherwise statement. Calibration data, traceable to the National Institute of Metrology(NIM) is supplied.									

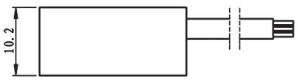
◇ Applications

Structural Vibration Testing	Multi-channel Modal Analysis	Product Testing
Vibration Control	Analytical Model Correlation	Design Studies

◇ Structure (unit:mm)



Top view



Side view

SPI

Red	VCC	Power
Black	GND	GND
Gray	SSB	Chip Select
Orange	SCLK	Clock
Green	MOSI	Master Output/Slave Input
Yellow	MISO	Master Input/Slave Output

RS422

Red	VCC	Power
Black	GND	GND
Yellow	T+	Slave Output +
Green	T-	Slave Input -
White	R+	Master Input +
Brown	R-	Master Output -

MEMS Test and Measurement Sensors

◇ ±2~±20,000g Range
◇ Low Noise
◇ Extra-small Size, Light Weight
◇ Large Bandwidth(DC~5000Hz@5%)
◇ 20,000g Shock Resistance
◇ -40~+125°C Operating Temp.

MSA 1000

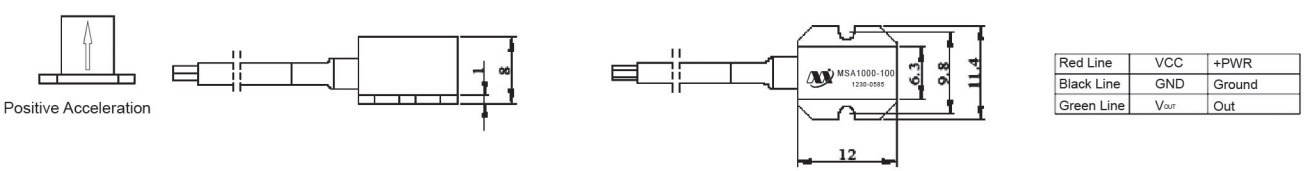
Variable Capacitance Accelerometers

Parameter	Unit	MSA1000-02	-10	-30	-50	-100	-150	-500	-1000	-10000	-20000
Range	g pk	±2	±10	±30	±50	±100	±150	±500	±1000	±10000	±20000
Sensitivity(@100Hz)	mV/g	1000±20	200±10	66±4	40±2	20±1	13.3±0.6	4±0.3	2±0.3	0.2±0.03	0.1±0.01
Frequency Response(@±5%)	Hz	0~250	0~1000	0~1000	0~1000	0~1500	0~1500	0~2500	0~2500	0~5000	0~5000
Resonant Frequency	Hz	1100	3000	5500	5500	9800	9800	18000	25.8K	33.4K	33.4K
Non-linearity	%FSO Typ	±0.2	±0.2	±0.2	±0.2	±0.2	±0.2	±2	±2	±3	±6
	%FSO Max	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±3	±3	±4	±8
Transverse Sensitivity	% Max	2	2	2	2	2	2	2	2	3	3
0g Output	mV Max	2500±50	2500±50	2500±50	2500±50	2500±50	2500±50	2500±50	2500±50	2500±50	2500±50
Thermal Zero Shift											
(0°C~+50°C)	%FSO Max	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
(-25°C~+75°C)	%FSO Max	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0
Thermal Sensitivity Shift											
(0°C~+50°C)	% Max	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0
(-25°C~+75°C)	% Max	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0
Electrical Clipping Distorition	g	±2.5	±12.5	±37.5	±62.5	±125	±185	±625	±1250	±12500	±25000
Mechanical Stop	g	±4	±30	±90	±90	±150	±220	±750	±1500	±30000	±30000
Recovery Time	μs	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Resolution	mg	0.002	0.01	0.05	0.1	5	7.5	15	20	200	400
Start-up Time(within 1%)	ms	10	10	10	10	10	10	10	10	10	10
Excitation		3~7Vdc									
Supply Current		6mA									
Output Current		1mA Typ									
Output Impedance		＜20Ω (Load Resistance≥10KΩ, Load Capacitance≤50pF)									
Residual Noise		10μV rms Typ,0.5 to 100 Hz, 50μV rms Typ,0.5 to 10K Hz									
Housing Material		Aluminum Alloy									
Connector		Integral Cable, Four Conductor No.34 AWG									
Identification		Manufacturer's Logo, Model Number, Serial Number									
Mounting Thread		Holes for Two M1.2 Mounting Screws/0.68 Nm									
Weight		1.2grams(cable weighs 12.1grams/meter)									
Acceleration Limit		20,000g									
Sinusoidal/Random Vibration		100g pk, 20~2000 Hz/40g rms, 20~2000 Hz									
Shock(Half-sine)		20000g pk, 80 μsec									
0g Shift		0.1% FSO Typical at 20000g									
Operating Temp.		-40°C~+85°C(default) ; -55°C~+125°C (as request)									
Storaging Temp.		-55°C~125°C									
Humidity/Altitude		Unaffected(Unit and sensor are hermetically sealed)									
ESD Sensitivity		Class 2,HBM 2kV									
All values are typical at +25°C, 100Hz, +5Vdc unless otherwise statement. Calibration data, traceable to the National Institute of Metrology(NIM) is supplied.											

◇ Applications

Structural Vibration Testing　Multi-channel Modal Analysis　Product Testing　Vibration Control　Analytical Model Correlation　Design Studies

◇ Structure (unit:mm)



Red Line	VCC	+PWR
Black Line	GND	Ground
Green Line	V_{OUT}	Out

美泰科技 MTMicrosystems

MEMS Test and Measurement Sensors

MSV 1100

Variable Capacitance Accelerometers

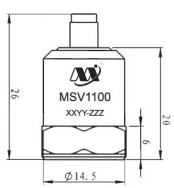
- ◇ ±2~±1000g Range
- ◇ Low Noise
- ◇ Differential Output
- ◇ Large Bandwidth(DC~5000Hz@ 5%)
- ◇ 20,000g Shock Resistance
- ◇ -55~+125℃ Operating Temp.

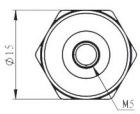
Parameter	Unit	MSV1100-02	-10	-30	-50	-100	-150	-500	-1000
Range	g pk	±2	±10	±30	±50	±100	±150	±500	±1000
Sensitivity(@100Hz)	mV/g	1000±20	200±10	66±4	40±2	20±1	13.3±0.6	4±0.3	2±0.3
Frequency Response(@±5%)	Hz	0~250	0~1000	0~1000	0~1000	0~1500	0~1500	0~2500	0~2500
Resonant Frequency	Hz	1100	3000	5500	5500	9800	9800	11.4K	11.4K
Non-linearity	%FSO Typ	±0.2	±0.2	±0.2	±0.2	±0.2	±0.2	±2	±2
	%FSO Max	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±3	±3
Transverse Sensitivity	% Max	2	2	2	2	2	2	2	2
0g Output	mV Max	2500±50	2500±50	2500±50	2500±50	2500±50	2500±50	2500±50	2500±50
Thermal Zero Shift									
(0°C~+50°C)	%FSO Max	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
(-25°C~+75°C)	%FSO Max	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0
Thermal Sensitivity Shift									
(0°C~+50°C)	% Max	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0
(-25°C~+75°C)	% Max	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0	±3.0
Electrical Clipping Distortion	g	±2.5	±12.5	±37.5	±62.5	±125	±185	±625	±1250
Mechanical Stop	g	±4	±30	±90	±90	±150	±220	±750	±1500
Recovery Time	μs	<10	<10	<10	<10	<10	<10	<10	<10
Resolution	mg	0.002	0.01	0.05	0.1	5	7.5	15	20
Start-up Time(within 1%)	ms	10	10	10	10	10	10	10	10
Excitation		7~36Vdc							
Supply Current		7mA							
Output Current		1mA Typ							
Output Impedance		＜20Ω (Load Resistance≥10KΩ, Load Capacitance≤50pF)							
Residual Noise		10μV rms Typ,0.5 to 100 Hz, 50μV rms Typ,0.5 to 10K Hz							
Housing Material		Stainless Steel							
Connector		4 pin, 1/4"-28UNF							
Identification		Manufacturer's Logo, Model Number and Serial Number							
Mounting Thread		M5 Mounting Screws, 0.68 Nm							
Weight		20grams(cable weighs 12.1grams/meter)							
Acceleration Limit		20000g							
Sinusoidal/Random Vibration		100g pk, 20~2000 Hz/40g rms, 20~2000 Hz							
Shock(Half-sine)		20000g pk, 80 μsec							
0g Shift		0.1% FSO Typical at 20000g							
Operating Temp.		-40°C~+85°C(default) ; -55°C~+125°C (as request)							
Storaging Temp.		-55°C~125°C							
Humidity/Altitude		Unaffected. Unit and sensor are hermetically sealed							
ESD Sensitivity		Class 2, HBM 2kV							
All values are typical at +25°C, 100Hz, +15Vdc unless otherwise statement. Calibration data, traceable to the National Institute of Metrology(NIM) is supplied.									

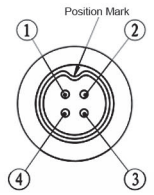
◇ Applications

Structural Vibration Testing　Multi-channel Modal Analysis　Product Testing　Vibration Control　Analytical Model Correlation　Design Studies

◇ Structure (unit:mm)







No.	①	②	③	④
Defination	PWR	GND	OUT-	OUT+

MEMS Test and Measurement Sensors

- ◇ Unipolar Power Supply
- ◇ Excellent Extra-low Frequency
- ◇ Long-term Stability
- ◇ ±1~±10g Range
- ◇ Single-ended/ Differential Output
- ◇ Harsh Enviroment of Bridge

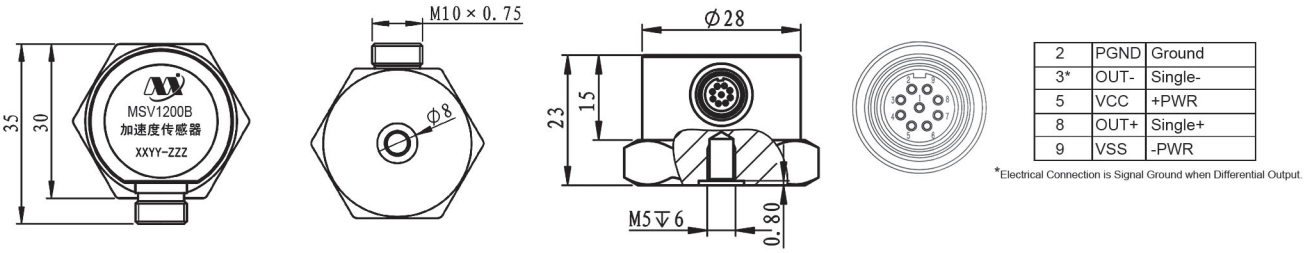
MSV1200B BHMS Accelerometers

Parameter	Unit	MSV1200B-01	MSV1200B-05	MSV1200B-10
Range	g pk	±1	±5	±10
Sensitivity(@100Hz)	mV/g	5000±50	1000±20	500±10
Frequency Response(@±5%)	Hz	0~100	0~250	0~1000
Resonant Frequency	KHz	≥22	≥22	≥22
Non-linearity	%FSO Typ	±0.2	±0.2	±0.2
	%FSO Max	±0.5	±0.5	±0.5
Transverse Sensitivity	% Max	1	1	1
0g Output	mv	±100	±100	±100
Common Mode	mv	±100	±100	±100
Thermal Zero Shift				
(0°C~+50°C)	%FSO Max	±1.0	±1.0	±1.0
(-25°C~+75°C)	%FSO Max	±2.0	±2.0	±2.0
Thermal Sensitivity Shift				
(0°C~+50°C)	% Max	±2.0	±2.0	±2.0
(-25°C~+75°C)	% Max	±3.0	±3.0	±3.0
Electrical Clipping Distorition	g	±2	±6.25	±12.5
Mechanical Stop	g	±4	±10	±30
Recovery Time	μs	<10	<10	<10
Resolution	mg	0.002	0.005	0.01
Start-up Time(within 1%)	ms	10	10	10
Excitation	±10~±18Vdc			
Supply Current	≤8mA			
Output Current	4mA Typ			
Output Impedance	≤100Ω			
Housing Material	Stainless Steel			
Connector	Miniature 9-pin hermetic-male (pins)			
Identification	Manufacturer's Logo, Model Number and Serial Number			
Mounting Thread	M5 Mounting Screw / Adhesive			
Weight	≤100 grams			
Acceleration Limit	20,000g			
Sinusoidal/Random Vibration	100g pk, 20~2000Hz/40g rms, 20~2000Hz			
Shock(Half-sine)	20,000g pk, 80 μsec or longer			
0g Shift	0.1% FSO Typical at 20,000g			
Operating Temp.	-40°C~+85°C(default) ; -55°C~+125°C (as request)			
Storaging Temp.	-55°C~125°C			
Protection Level	IP67			
ESD Sensitivity	Class 2,HBM 2kV			
All values are typical at +25°C, 100Hz, +12Vdc unless otherwise statement. Calibration data, traceable to the National Institute of Metrology(NIM) is supplied.				

◇ Applications

Bridge Vibration Testing Health Status Checkup

◇ Structure (unit:mm)



2	PGND	Ground
3*	OUT-	Single-
5	VCC	+PWR
8	OUT+	Single+
9	VSS	-PWR

*Electrical Connection is Signal Ground when Differential Output.

MEMS Test and Measurement Sensors

MSV1210B BHMS Accelerometers

- ◇ Bipolar Power Supply
- ◇ Excellent Extra-low Frequency
- ◇ Long-term Stability
- ◇ ±1~±10g Range
- ◇ Single-ended / Differential Output
- ◇ Harsh Enviroment of Bridge

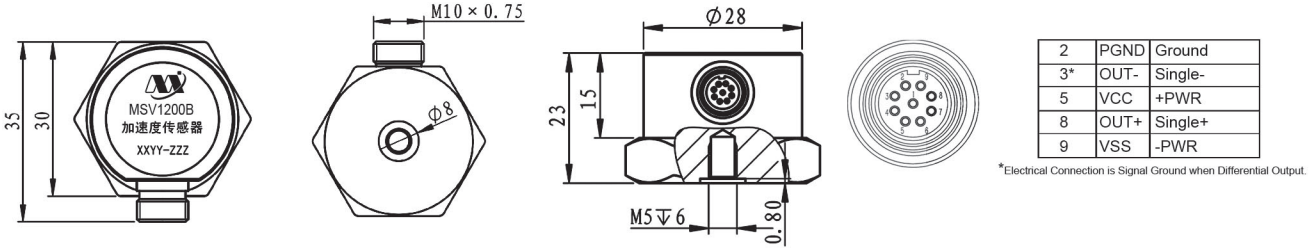
Parameter	Unit	MSV1210B-01	MSV1210B-05	MSV1210B-10
Range	g pk	±1	±5	±10
Sensitivity(@100Hz)	mV/g	5000±50	1000±20	500±10
Frequency Response(@±5%)	Hz	0~100	0~250	0~1000
Resonant Frequency	KHz	≥22	≥22	≥22
Non-linearity	%FSO Typ	±0.2	±0.2	±0.2
	%FSO Max	±0.5	±0.5	±0.5
Transverse sensitivity	% Max	1	1	1
0g Output	mv	±100	±100	±100
Common Mode	mv	5000±50	5000±50	5000±50
Thermal Zero Shift				
(0°C~+50°C)	%FSO Max	±1.0	±1.0	±1.0
(-25°C~+75°C)	%FSO Max	±2.0	±2.0	±2.0
Thermal Sensitivity Shift				
(0°C~+50°C)	% Max	±2.0	±2.0	±2.0
(-25°C~+75°C)	% Max	±3.0	±3.0	±3.0
Electrical Clipping Distortion	g	±2	±6.25	±12.5
Mechanical Stop	g	±4	±10	±30
Recovery Time	μs	<10	<10	<10
Resolution	mg	0.002	0.005	0.01
Start-up Time(within 1%)	ms	10	10	10
Excitation	10~16Vdc			
Supply Current	≤8mA			
Output Current	30mA Typ			
Output Impedance	≤100Ω			
Housing Material	Stainless Steel			
Connector	Miniature 9-pin hermetic-male (pins)			
Identification	Manufacturer's Logo, Model Number and Serial Number			
Mounting Thread	M5 Mounting Screw / Adhesive			
Weight	≤100 grams			
Acceleration Limit	20,000g			
Sinusoidal/Random Vibration	100g pk, 20~2000Hz/40g rms, 20~2000Hz			
Shock(Half-sine)	20,000g pk, 80 μsec or longer			
0g Shift	0.1% FSO Typical at 20,000g			
Operating Temp.	-40°C~+85°C(default) ; -55°C~+125°C (as request)			
Storaging Temp.	-55°C~125°C			
Protection Level	IP67			
ESD Sensitivity	Class 2,HBM 2kV			

All values are typical at +25°C, 100Hz, +12Vdc unless otherwise statement. Calibration data, traceable to the National Institute of Metrology(NIM) is supplied.

◇ Applications

Bridge Vibration Testing Health Status Checkup

◇ Structure (unit:mm)



2	PGND	Ground
3*	OUT-	Single-
5	VCC	+PWR
8	OUT+	Single+
9	VSS	-PWR

*Electrical Connection is Signal Ground when Differential Output.

MEMS Test and Measurement Sensors

美泰科技 MTMicrosystems

- ◇ Extra Small Size, LCC20 Packaging
- ◇ ±2~±20, 000g Range
- ◇ Low Noise
- ◇ Large Bandwidth(DC~5000Hz@5%)
- ◇ Excellent Long-term Stability
- ◇ Harsh Environment(Shock, Vibration, Temperature)

MSV 6000

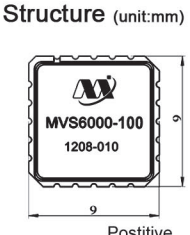
Variable Capacitance Accelerometers

Parameter	Unit	MSV6000-02	-10	-30	-50	-100	-200	- 500	-1000	-10000	-20000
Range	g	±2	±10	±30	±50	±100	±200	±500	±1000	±10000	±20000
Bandwidth(±5%)	Hz	0-250	0-1000	0-1000	0-1000	0-1500	0-1500	0-2500	0-2500	0-5000	0-5000
Resonant Frequency	kHz	1.3	2.7	5.5	5.5	9.8	9.8	18.0	25.8	50.0	50.0
Noise Density	μV/√Hz	10	10	10	10	10	10	10	10	10	10
Bias	mg	＜10	＜50	＜150	＜250	＜500	＜1000	＜2500	＜5000	＜50000	＜100000
Bias Stability	mg	＜0.1	＜0.5	＜1.5	＜2.5	＜5.0	＜10	＜25	＜50	＜500	＜1000
Bias Repeatability	mg	＜0.1	＜0.5	＜1.5	＜2.5	＜5.0	＜10	＜25	＜50	＜500	＜1000
Bias Temp. Coefficient	mg/°C	＜0.2	＜0.8	＜2.0	＜3.0	＜5.0	＜10	＜25	＜50	＜500	＜1000
Sensitivity	mV/g	1000±8	200±2	66.6±1	40±1	20±1	10±1	4±0.3	2±0.3	0.2±0.03	0.1±0.01
1 year Sensitivity Stability	ppm	300	300	300	300	300	300	1500	3000	5000	5000
Sensitivity Temp. Coefficient	ppm/°C	100	100	100	100	100	100	100	100	100	100
Transverse Sensitivity	mrad Max	＜10	＜10	＜10	＜10	＜10	＜10	＜10	＜10	＜10	＜10
	% Max	＜1	＜1	＜1	＜1	＜1	＜1	＜1	＜1	＜1	＜1
Resolution/Threshold(@1Hz)	mg	0.002	0.01	0.05	0.1	5	7.5	15	20	200	400
Non-linearity	% of FS	＜0.5	＜0.5	＜0.5	＜0.5	＜0.5	＜0.5	＜1	＜1	＜4	＜6
Operating Temp.		-40°C~+85°C(default) ; -55°C~+125°C (as request)									
Shock		Up to 20, 000g(0.15ms half-sine, 3 time shocks in ecah direction)									
Recovery Time		＜1ms(1000g, 1ms half-sine shock)									
Vibration		20g rms, 20~2000Hz(random noise, 30 minutes in each direction)									
Packaging		Hermetic									
ESD Sensitivity		Class 2(requirements MIL-STD-833-G, 1 Method 3015.7),HBM 2kV									
Supply Voltage		3.0~7.0Vdc.(Typ. 5.0Vdc)									
Output Range		0.5~4.5Vdc@5.0Vdc Supply Voltage(2.5V±10mV@0g)									
Supply Current		＜6mA @5.0Vdc									
Output Impedance/Load Drive		Max 50pF, Min 10KΩ									
Weight		＜1 grams									
Size		Typ 9.0×9.0×2.6mm (0.35×0.35×0.101inch)									
All values are typical at +25°C, +5Vdc unless otherwise statement.											

◇ Applications

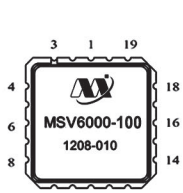
Aviation & Aerospace
Helicopter & Aircraft Testing
Automotive Testing & Crash Testing
Civil Engineering Structures
Railway Technology
Industrial Testing

◇ Structure (unit:mm)



Postitive Acceleration

Side view



Top view

2	VCC	+PWR
3	GND	Ground
15	SST	Self Test
16	V_{OUT}	Sensor Output
17	ORG-OUT	Sensor Inverted Output
18	ECAP	Voltage Reference(½Vcc)
20	GND	Ground

美泰科技 MTMicrosystems

MEMS Test and Measurement Sensors

MSV1300 Variable Capacitance Accelerometers

- ◇ Standard Sensor
- ◇ Low Frequency
- ◇ Differential Output
- ◇ MEMS Capacitance Sensor
- ◇ Large Bandwidth (DC-10000Hz)
- ◇ Excellent Long-term Stability

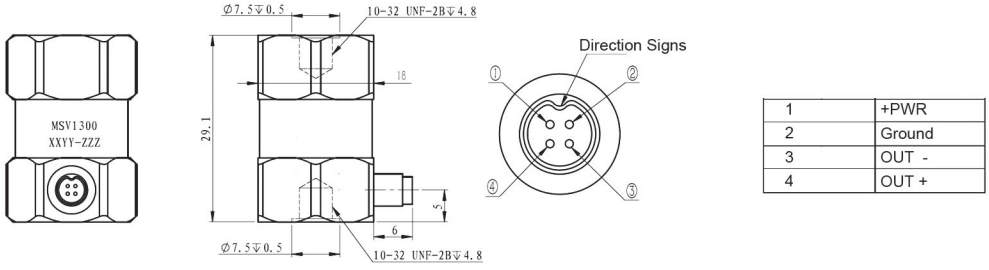
Parameter	Unit	MSV1300-50	MSV1300-100	MSV1300-200
Range	g pk	±50	±100	±200
Sensitivity(@160Hz)	mV/g	80±8	40±4	20±2
Frequency Response				
±2%	Hz	DC~2000	DC~2000	DC~2000
±5%	Hz	DC~3400	DC~3400	DC~3400
±10%	Hz	DC~9000	DC~9000	DC~9000
Resonant Frequency	KHz	36	36	36
Non-linearity	%FSO（max）	2	2	2
Transverse Sensitivity	%（max）	2	2	2
0g Output	mV (max)	100	100	100
Thermal Zero Shift （0°C~+50°C）	%FSO（max）	±1.0	±1.0	±1.0
（-25°C~+75°C）	%FSO（max）	±2.0	±2.0	±2.0
Thermal Sensitivity Shift （0°C~+50°C）	%（max）	±2.0	±2.0	±2.0
（-25°C~+75°C）	%（max）	±3.0	±3.0	±3.0
Sensitivity Stability	%（max）per year	±0.2	±0.2	±0.2
Electrical Clipping Distoration	g	±62.5	±125	±250
Mechanical Stop	g	±90	±150	±300
Recovery Time	μs	<10	<10	<10
Resolution	mg	1.25	5	10
Start-up Time（Within 1%）	ms	10	10	10
Excitation	±7 to ±36Vdc			
Supply current/Output current	7 mA / 1 mA Typ			
Output Impedance	Output Impedance ≤10Ω（Load Resistance ≥10kΩ，Load Capacitance ≤50pF）			
Residual Noise	10μV rms Typ, 0.5~100Hz; 50μV rms Typ, 0.5~ 10kHz			
Housing Material	Stainless Steel（304）			
Connector	4 pin,1/4"~28UNF			
Identification	Model Number, Serial Number			
Mounting Torque	0.68Nm recommended			
Weight	45gram Typ			
Sinusoidal/Random Vibration	20000g / 100g pk, 20～2000 Hz/40g rms, 20～2000 Hz			
Shock（Half-sine）	20000g pk, 80 μs			
0g Shift	0.1% FSO Typical at 20000g			
Operating Temp.	-40°C～85°C			
Storaging Temp.	-55°C～125°C			
Humidity/Altitude	Unaffected (Unit and Sensor are hermetically Sealed)			
ESD Sensitivity	Class 2,HBM 2kV			

All values are typical at +25°,160 Hz, +15 Vdc, unless otherwise statement.

◇ Applications

Standard Vibration Sensor for Test, Vibration Control

◇ Structure (Unit： mm)



1	+PWR
2	Ground
3	OUT -
4	OUT +

MEMS Test and Measurement Sensors

- ◇ 100,700,1000 kPa Range
- ◇ 200 mV Full Scale
- ◇ Leadless Package
- ◇ Absolute Reference
- ◇ Self-contained Hybrid Temp. Compensation
- ◇ High Frequency Response

MSP 1030

Piezoresistive Pressure Transducers

Parameter	Unit	MSP1030-100	MSP1030-700	MSP1030-1000
Range	kPa	0~100	0~700	0~1000
Sensitivity	mV/kPa Typ	2	0.28	0.2
Combined: Non-linearity, Repeatability, Pressure Hysteresis	% FSO RSS Max	0.4	0.4	0.4
Non-linearity	% FSO Typ	0.15	0.1	0.1
Pressure Hysteresis	% FSO Typ	0.1	0.1	0.1
Repeatability	% FSO Typ	0.1	0.1	0.1
Zero Output	mV	±20	±20	±20
Zero Shift after 2X Range	±% 2X FSO Max	0.2	0.2	0.2
Thermal Zero Shift (-20°C~+85°C)	%FSO Max	±3	±3	±3
Thermal Sensitivity Shift(-20°C~+85°C)	%FSO Max	±3	±3	±3
Resonance Frequency	KHz	200	500	750
Non-linearity at 2X Range	% 2X FSO	0.5	0.5	0.5
Warm-up Time	ms	1	1	1
Acceleration Sensitivity	equiv. kPa/g	0.001	0.001	0.001
Burst Pressure (Diaphragm)	kPa Min	500	3000	3000
Bridge Resistance	Ω	5000±500	5000±500	5000±500
Supply Voltage	Vdc	10 / 5	10 / 5	10 / 5
Operating Temp.	˚C	-40~+125	-40~+125	-40~+125
Storaging Temp.		-55~+150	-55~+150	-55~+150
All values are typical at +25°C, +10Vdc unless otherwise statement.				

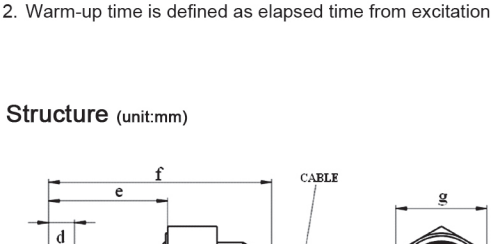
◇ Applications

Wind Tunnel Testing
Aerodynamic Pressure Measurements during Flight Testing
Engine Control Systems
High-speed Railways
Aerospace, Automotive, Marine & Industrial Process

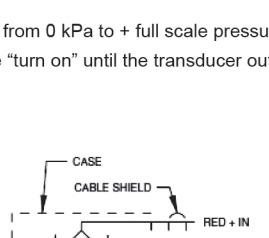
◇ Notes

1. FSO (Full Scale Output) is defined as transducer output change from 0 kPa to + full scale pressure.
2. Warm-up time is defined as elapsed time from excitation voltage “turn on” until the transducer output is within ±1% of reading accuracy.

◇ Structure (unit:mm)



Side view



a	b	c	d	e	f	g
Φ3.86	M5	5.47	2.45	11.13	18.85	7.92

MEMS Test and Measurement Sensors

MSP 1015

Piezoresistive Pressure Transducers

- ◇ 100~350kPa Range
- ◇ 200mV Full Scale
- ◇ Low Profile＜1mm
- ◇ Absolute Reference
- ◇ Leadless Packaging
- ◇ High Frequency Response
- ◇ Self-contained Hybrid Temperature Compensation

Parameter	Unit	MSP1015 -100	MSP1015 -350
Range	kPa	0~100	0~350
Sensitivity	mV/kPa Typ	2	0.67
Combined: Non-linearity, Repeatability, Pressure Hysteresis	% FSO RSS Max	0.5	0.5
Non-linearity	% FSO Typ	0.15	0.15
Pressure Hysteresis	% FSO Typ	0.1	0.1
Repeatability	% FSO Typ	0.1	0.1
Zero Output	mV	±20	±20
Zero Shift after 3X Range	±% 3X FSO Max	0.5	0.5
Thermal Zero Shift (-20°C~+85°C)	%FSO Max	±2	±2
Thermal Sensitivity Shift (-20°C~+85°C)	%FSO Max	±2	±2
Resonance Frequency	KHz	200	350
Non-linearity at 3X Range	% 3X FSO	1.0	1.0
Warm-up Time	ms	1	1
Acceleration Sensitivity	equiv. kPa/g	0.0014	0.0014
Burst Pressure (Diaphragm)	kPa Min	500	1750
Bridge Resistance	Ω	5000±500	5000±500
Supply Voltage	Vdc	10 / 5	10 / 5
Operating Temp.	°C	-40～+125	-40～+125
Storaging Temp.	°C	-55～+150	-55～+150
All values are typical at +25°C, +10Vdc unless otherwise statement.			

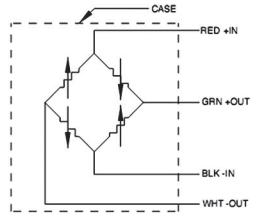
◇ Application

Wind Tunnel Testing
Aerodynamic Surfaces Pressure Measurements during Flight Testing
Helicopter or Turbine Blade Surface Pressure Measurement
High-speed Railways Surfaces Pressure Measurement

◇ Notes

1. FSO (Full Scale Output) is defined as transducer output change from 0 kPa to + full scale pressure.
2. Warm-up time is defined as elapsed time from excitation voltage “turn on” until the transducer output is within ±1% of reading accuracy.

◇ Structure



MEMS Test and Measurement Sensors

- ◇ Wide Full Scale
- ◇ Chip Airtight Protect
- ◇ Modular Design
- ◇ Based on MEMS Process
- ◇ Precise Temp. Compensation
- ◇ Customizable

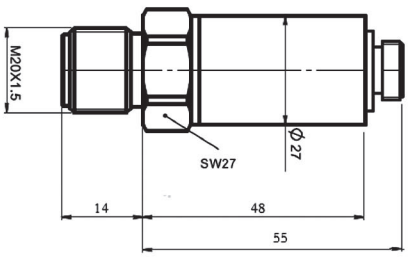
MSP 1131 Pressure Transducers

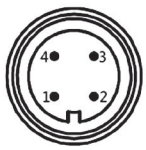
Parameter	unit	MSP1131-100	MSP1131-700	MSP1131-1000
Range	kPa	100	700	1000
Sensitivity	mV/ kPa	50	7	5
Over Pressure	kPa	200	1400	2000
Operational Mode		Absolute		
Accuracy	%	0.5(0.1/0.25 Optional)		
Non-linearity	% FS	0.25(0.05/0.10 Optional)		
Hysteresis	% FS	0.25(0.05/0.10 Optional)		
Repeatability	% FS	0.25(0.05/0.10 Optional)		
Thermal Zero Shift	% FS/°C	0.02		
Thermal Sensitivity Shift	% FS/°C	0.02		
Supply Power	V	10~15(Customizable)		
Signal Output		0~5V(0~10V / 4~20mA Optional)		
Pressure Connector	mm	M20*1.5(M12*1 Optional)		
Electrical Connection		Y4 Aviation Connector(Customizable)		
Operating Temp.	°C	-40~85(Customizable)		
Storaging Temp.	°C	-40~125		

◇ Applicitions

Pressure Measurement & Control for Aircraft, Automotive, Petroleum, Chemicals, Metallurgy, Electric Power, Machinery, Hydrology.

◇ structure(unit:mm)





1	excitation
2	/
3	output
4	ground

MEMS Test and Measurement Sensors

MSP1136

High Temperature Dynamic Pressure Transducers

- ◇ -55℃~300℃
- ◇ Small Size
- ◇ Standard Threaded Connection
- ◇ SOI Process
- ◇ Harsh Environmental
- ◇ Adaptability

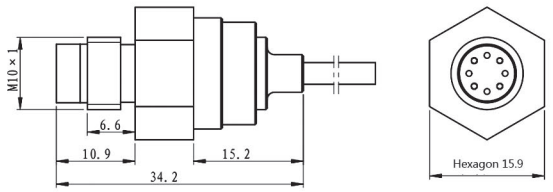
Parameter	Unit	MSP1136
Range	Mpa	0.1 ~ 40
Type		Absolute / Gauge
Overload Pressure	kPa	4 Times
Accuracy	%	0.5
Non Linearity	%F.S	0.2
Hysteresis	%F.S	0.2
Repeatability	%F.S	0.2
Thermal Zero Coefficient	%F.S/˚C	0.05
Thermal Sensitivity Coefficient	%F.S/˚C	0.2
Supply Power	V	2 ~ 10
Signal Output	mV	100
Pressure connector		M10 x 1
Electrical connection		Quad High Temperature Cable
Operating Temp.	˚C	-55 ~ 300
Storaging Temp.	˚C	-55 ~ 300

All values are typical at +25℃ , 10Vdc excitation otherwise statement.

◇ Applications

pressure measurement and control for aircraft , automotive , petroleum , chemicals , metallurgy , electric power , machinery , hydrology

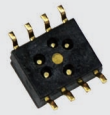
◇ Structure (Unit : mm)



1	2	3	4
PWR+	Ground	OUT+	OUT-
Red	Black	Yellow	Green

MEMS Test and Measurement Sensors

◇ Based on MEMS Process ◇ Si-Si Bonding, High Stability
◇ Small Size, Low Cost ◇ Absolute Pressure Measuring
◇ Typical Non-linearity 0.1% FSO



MSP4001

SOP8 Pressure Transducers

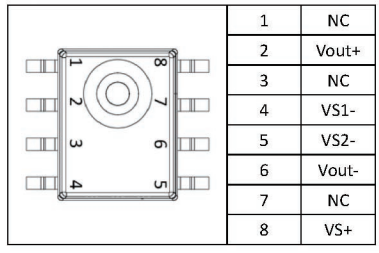
Parameter	Units	-100	-200	-350	-700	-2M
Range	kPa	100	200	350	700	2000
Full Scale Output [1,2]	mV Typ	100±30	100±30	100±30	100±30	100±30
Non-linearity [1,2]	% FSO Typ	0.15	0.15	0.15	0.15	0.15
Pressure Hysteresis [1,2]	% FSO Typ	0.1	0.1	0.1	0.1	0.1
Repeatability [1,2]	% FSO Typ	0.1	0.1	0.1	0.1	0.1
Zero Output [1,2]	mV	±30	±30	±30	±30	±30
TCO(Temperature Coefficient of Zero Offset) [3]	% FSO/°C	±0.05	±0.05	±0.05	±0.05	±0.05
TCS(Temperature Coefficient of Thermal Sensitivity) [3]	% FSO/°C	-0.19±0.04	-0.19±0.04	-0.19±0.04	-0.19±0.04	-0.19±0.04
TCR(Temperature Coefficient of Bridge Resistance) [3]	% RS/°C	0.15±0.04	0.23±0.04	0.23±0.04	0.23±0.04	0.23±0.04
Over Pressure	FS	3X	3X	3X	3X	3X
Burst Pressure	FS	5X	5X	5X	5X	5X
Bridge Resistance [1,2]	Ω	5000±500	5000±500	5000±500	5000±500	5000±500
Exciting Current	mA	1	1	1	1	1
Supply Voltage	Vdc	5	5	5	5	5
Bridge Resistance	KΩ	4±1	5±1	5±1	5±1	5±1
Long Stability	%FSO/Year	0.2	0.2	0.2	0.2	0.2
Operating Temp.	°C	-40~+125	-40~+125	40~+125	-40～+125	40~+125
Storaging Temp.	°C	-40~+150	-40~+150	-40~+150	-40～+150	-40~+150

◇ Applications

Automobile Pressure Sensor: MAP, TPMS, BAP
Altimeter
Blood Pressure Monitor
Medical Pressure Gage
Holding Pressure Gage
Smart Wear Equipment

◇ Notes

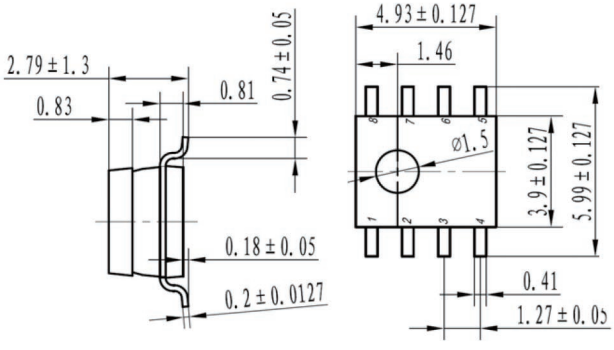
1. All values are typical at ±25°C, 5VDC excitation otherwise statement.
2. Best fit straight line determined by the least squares method.
3. Measurement temperature range of 25°C~85°C.



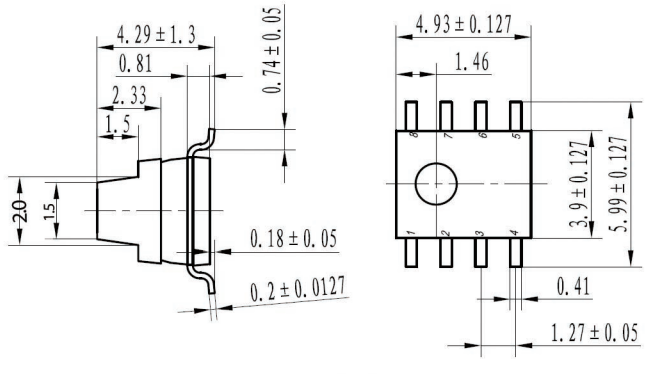
1	NC
2	Vout+
3	NC
4	VS1-
5	VS2-
6	Vout-
7	NC
8	VS+

Cable Definition

◇ Structure(unit:mm)



MSP4001-H



MSP4001-T

MEMS Test and Measurement Sensors

◇ Based on MEMS Process ◇ Si-Si Bonding, High Stability
◇ Small Size, Low Cost ◇ High accuracy <1% F.S.

MST

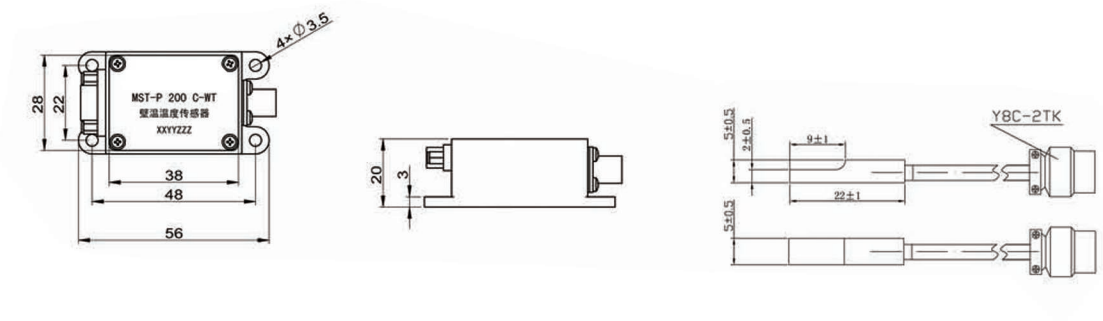
Wall Temperature Sensor

Parameter	Units	P200C-WT	P400C-WT	T400C-WT	T600C-WT	T800C-WT
Full Scale	°C	-55~200	-55~400	-55~400	-55~600	-55~800
Accuracy	% F.S.	≤1	≤1	≤2	≤2	≤2
Probe Type		Film Platinum Resistance		K-type Thermoelectric coupling		
Signal Output	V	0~5	0~5	0~5	0~5	0~5
Connector	-	J30J-9ZKP	J30J-9ZKP	J30J-9ZKP	J30J-9ZKP	J30J-9ZKP
Weight	gram	≤75	≤75	≤75	≤75	≤75
Operating Voltage	V	±10~±24	±10~±24	±10~±24	±10~±24	±10~±24
Operating Current	mA	≤10	≤10	≤10	≤10	≤10
Output Impedance	Ω	≤200	≤200	≤200	≤200	≤200
Insulation Resistance @ 100 VDC	MΩ	≥100	≥100	≥100	≥100	≥100
Working Temperature Range	°C	-40~+125	-40~+125	-40~+125	-40~+125	-40~+125
Storage Temperature Range	°C	-40~+125	-40~+125	-40~+125	-40~+125	-40~+125

◇ Notes

1. The Wall Temperature Sensor include Sensor Probe, Sensor Transmitter and the cable, the default length is 1.0m, but all of them can be customized.such as the length of the cable, the full scale, the operating voltage, the probe type, and so on.
2. The Temperature Sensor Probe form can be customized.

◇ Structure(unit:mm)



Cable Definition

ID	1	2	3	4	5	6	7	8	9
Name	Power+	Power Ground	Power-	Output	NC	NC	Blank	Shield Ground	Blank

美泰科技 MTMicrosystems

MEMS Temperature Sensor

MST Air Temperature Sensor

- ◇ Based on MEMS Process
- ◇ High Accuracy
- ◇ Small Volume
- ◇ Light weight
- ◇ Integrate Signal Conditioning
- ◇ Can be customized

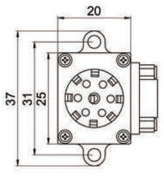
Parameter	Unit	MST-P200C-AT	MST-P400C-AT
Full Scale	°C	-55~200	-55~400
Accuracy	%FS	≤1	≤1
Probe Type		Film Platinum Resistance	Film Platinum Resistance
Signal Output	V	0~5(0.1±0.1~4.9±0.1)	0~5(0.1±0.1~4.9±0.1)
Connector	-	J30J-9ZKP	J30J-9ZKP
Weight	gram	≤50	≤50
Operating Voltage	V	10~24	10~24
Operating Current	mA	≤10	≤10
Output Impedance	Ω	≤200	≤200
Insulation Resistance @ 100 VDC	MΩ	≥100	≥100
Operating Temp.	°C	-40~+125	-40~+125
Storaging Temp.	°C	-40~+125	-40~+125

All values are typical at +25°C，+5Vdc unless otherwise statement.

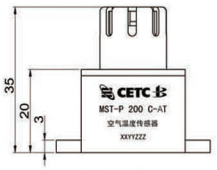
◇ Notes

1. The Temperature Sensor Probe form can be customized as requirement.

◇ Structure (unit:mm)



Top view



Side view

ID	1	2	3	4	5	6	7	8	9
Name	Power GND	Power	NC	Output	NC	NC	NC	Shield GND	NC

Definition of Cable

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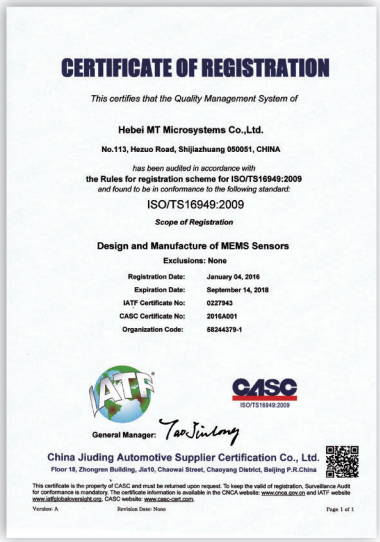
MTMicrosystems

Sensing the World,
Leading the Future.

ISO9001:2008 & ISO/TS16949:2009 Certification.



CERTIFICATE OF REGISTRATION

This certifies that the Quality Management System of

Hebei MT Microsystems Co.,Ltd.

No.113, Hezuo Road, Shijiazhuang 050051, CHINA

has been audited in accordance with
the Rules for registration scheme for ISO/TS16949:2009
and found to be in conformance to the following standard:

ISO/TS16949:2009

Scope of Registration

Design and Manufacture of MEMS Sensors

Exclusions: None

Registration Date:	**January 04, 2016**
Expiration Date:	**September 14, 2018**
IATF Certificate No:	**0227943**
CASC Certificate No:	**2016A001**
Organization Code:	**58244379-1**

General Manager:

China Jiuding Automotive Supplier Certification Co., Ltd.
Floor 18, Zhongren Building, Jia10, Chaowai Street, Chaoyang District, Beijing P.R.China

This certificate is the property of CASC and must be returned upon request. To keep the valid of registration, Surveillance Audit for conformance is mandatory. The certificate information is available in the CNCA website: www.cnca.gov.cn and IATF website www.iatfglobaloversight.org, CASC website: www.casc-cert.com.

Version: A Revision Date: None Page 1 of 1

CEPREI

Quality Management System Certificate

(Original)
This is to certify that

HEBEI MT MICROSYSTEMS CO., LTD.

Organization Code: 58244379-1

Registration Address: 113, HEZUO ROAD, SHIJIAZHUANG, HEBEI, CHINA

Has implemented and maintains a Quality Management System in compliance with

GB/T 19001-2008 idt ISO 9001:2008

The Quality Management System is applicable to:

DESIGN, MANUFACTURE AND SERVICING OF MEMS SENSORS (VIBRATION, ACCELERATION AND FLOW), MEMS INERTIAL DEVICES, RF MEMS DEVICE

(113, HEZUO ROAD, XINHUA DISTRICT, SHIJIAZHUANG, HEBEI, CHINA)

Registration Number: 01215Q20639R1M
Issue Date: September 09, 2015
Expiry Date: September 08, 2018

Zhao Guoxiang
General Manager
CEPREI CERTIFICATION BODY

IAF CNAS