

### 1 FEATURES

- Excellent performance in vibration and shock environments
- 1, 2 or 3 axes offered in same package
  - Electronically calibrated axis alignment
- Single-crystal silicon technology
- Low bias drift
- Low noise
- Standard high-level RS422 interface
- Fully configurable:
  - 5 different sampling rates available
  - 5 different bandwidths available
  - LP filter -3dB frequency can be set individually for each axis
  - RS422 protocol, bit rate and line termination
  - Selectable output unit: angular rate [deg/s] or incremental angle [deg]
- Excellent environmental robustness
- Miniature package
- Continuous self-diagnostics



(Actual size)

### 2 GENERAL DESCRIPTION

STIM202 is a cluster of 1, 2 or 3 high accuracy MEMS-based gyros in a miniature package. Any configuration of axes can be provided. Each axis is factory-calibrated for bias, sensitivity and compensated for temperature effects to provide high-accuracy measurements in the temperature range -40°C to +85°C. The unit runs off a single +5V supply.

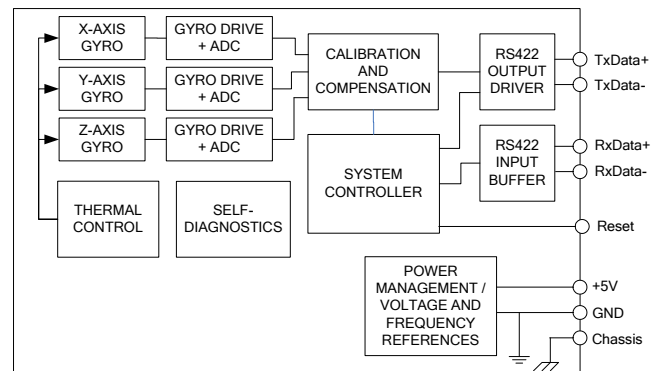


Figure 2-1: STIM202 FUNCTION BLOCK DIAGRAM

STIM202 communicates via a standard high-level RS422 interface. The use of a 32-bit RISC ARM microcontroller provides flexibility in the configuration, like choice of output unit, sampling frequency, LP filter -3dB frequency and RS422 bit-rate and protocol parameters. All configurable parameters can be defined when ordering or set by customer.

When STIM202 is powered up, it will perform an internal system check and synchronise the gyros. As an acknowledgement of the complete power-up sequence, it will provide special datagrams containing data, like part number, serial number, number of active axis and configuration parameters as mentioned above. STIM202 will then automatically proceed to provide measurement data. Hence the simplicity of use is high: just connect power and STIM202 will provide accurate gyro measurements over the RS422 interface.

The measurement data is transmitted as packages of data on a fixed format (datagram) at intervals given by the sampling frequency. The datagram is in binary coded format in order to have an efficient transfer of data. In addition to the measurement data itself, the datagram contains an identifier, a status byte and a CRC (Cyclic Redundancy Check) byte to provide high degree of fault detection in the transmissions. The status byte will flag any detected errors in the system.

For more advanced users, the gyro may be put in Service Mode. In this mode all the configuration parameters can be intermediately or permanently changed by overwriting the current settings in the flash memory. In Service Mode the commands and responses are in a human readable format; to enable the use of terminal-type software during typical product integration. Service Mode also provides the ability to perform single measurements, perform diagnostics and obtain a higher detail level of detected errors reported in the status byte.

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### 4 ABBREVIATIONS USED IN DOCUMENT

ABBREVIATION	FULL NAME
tbd	to be defined
LSB	Least Significant Byte
MSB	Most Significant Byte
lsb	Least significant bit
LP filter	Low-Pass filter
CIC-filter	Cascaded Integrator-Comb filter

### 5 SPECIFICATIONS

**Table 5-1: Operating conditions**

Parameter	Conditions	Min	Nom	Max	Unit	Note
<b>INPUT RANGE</b>			±400		°/s	
<b>POWER SUPPLY</b>		4.5	5.0	5.5	V	
<b>OPERATING TEMPERATURE</b>		-40		+85	°C	

**Table 5-2: Functional specifications**

Parameter	Conditions	Min	Nom	Max	Unit	Note
<b>GYRO</b>						
Full Scale (FS)			±400		°/s	1
Resolution			24 2 <sup>-14</sup>		bits °/s	
Scale Factor Accuracy			±0.2		%	
Non-Linearity over ±200°/s			200		ppm	2
Bandwidth (-3dB)				262	Hz	3
Group Delay			2		ms	4
Bias Accuracy		-250	0	+250	°/h	
Bias error over temperature (1σ)	ΔT ≤ ±1°C/min		30		°/h rms	
In-Run Bias Stability	Allan Variance @25°C		0.5		°/h	
Angular Random Walk	Allan Variance @25°C		0.2		°/√hr	
G Sensitivity				18	°/h /g	
G <sup>2</sup> Sensitivity				tbd		
<b>MISALIGNMENT</b>						
STIM202X,Y,Z (1-axis version)			5		mrad	
STIM202XY,XZ,YZ (2-axis version)			5		mrad	
STIM202 (3-axis version)			1		mrad	
<b>POWER CONSUMPTION</b>				1.5	W	
Power consumption						
<b>TIMING</b>						
Time to transmit after Power-On				1	s	5
Time to transmit after Reset				1	s	6
Start-Up Time				10	s	7
RS422 Bit-Rate			ref. Table 5-3			
RS422 Bit-Rate Accuracy				±1	%	
Sampling Rate				1000	samples/s	3
Sampling Rate Accuracy				±1	%	
<b>RS422 PROTOCOL</b>						
Start Bit			1		bit	
Data Length			8		bits	
Parity			ref. Table 5-3			
Stop Bits			ref. Table 5-3			
<b>RS422 LINE TERMINATION</b>						
Input resistance	Line termination = ON		120		Ω	3
Input resistance	Line termination = OFF	48	125		kΩ	3
<b>RESET (NRST PIN)</b>						
Logic levels			CMOS and TTL compatible			
Minimum hold time for reset			5		ms	
Pull-Up Resistor			80	100	kΩ	
<b>CHASSIS</b>						
Resistance pin 6 -> chassis				0.1	Ω	
Isolation chassis -> GND (pin1)		100			MΩ	

Note 1: Output is monotonous and will saturate at ±480°/s

Note 2: Largest deviation from BSL (Best Straight Line) over the range specified.

Note 3: Other values can be configured, ref. Table 5-3

Note 4: Group delay with 262Hz filter-setting

Note 5: Time from Power-On to start of datagram transmissions (starting with part-number datagram)

Note 6: Time from Reset release to start of datagram transmissions (starting with part-number datagram)

Note 7: Time from Power-On or Reset to the reset of the Start-Up bit (Bit 6 in the STATUS byte ref. Table 5-8). During this period the output data should be regarded as non-valid.

5.1 TYPICAL PERFORMANCE CHARACTERISTICS

5.1.1 Allan-Variance

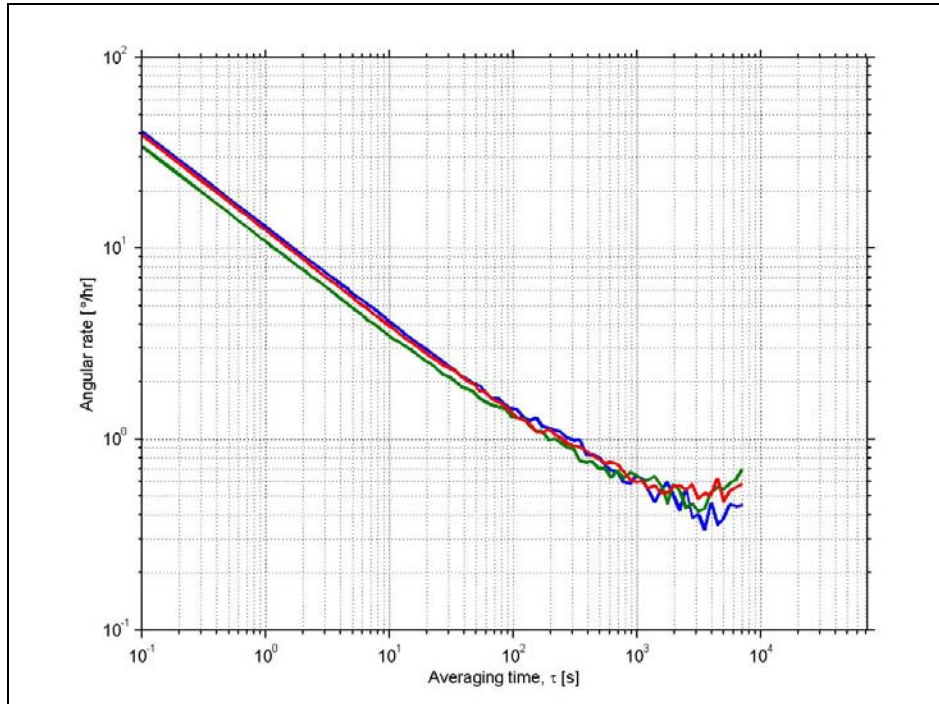


Figure 5-1: Typical Allan-Variance plot

5.1.2 Initial bias drift

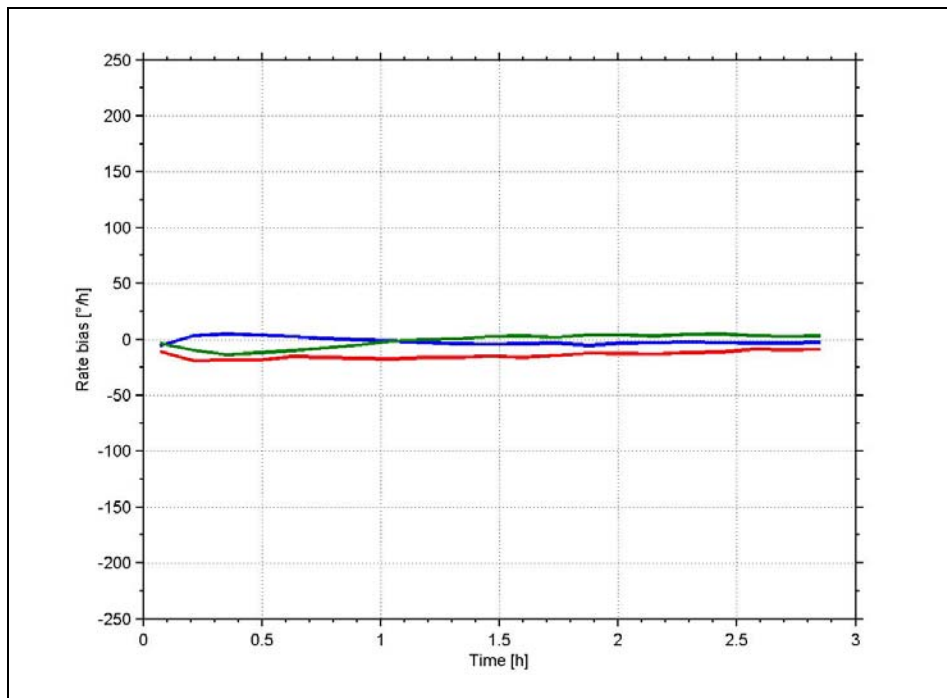


Figure 5-2: Typical initial bias drift

5.1.3 Non-Linearity

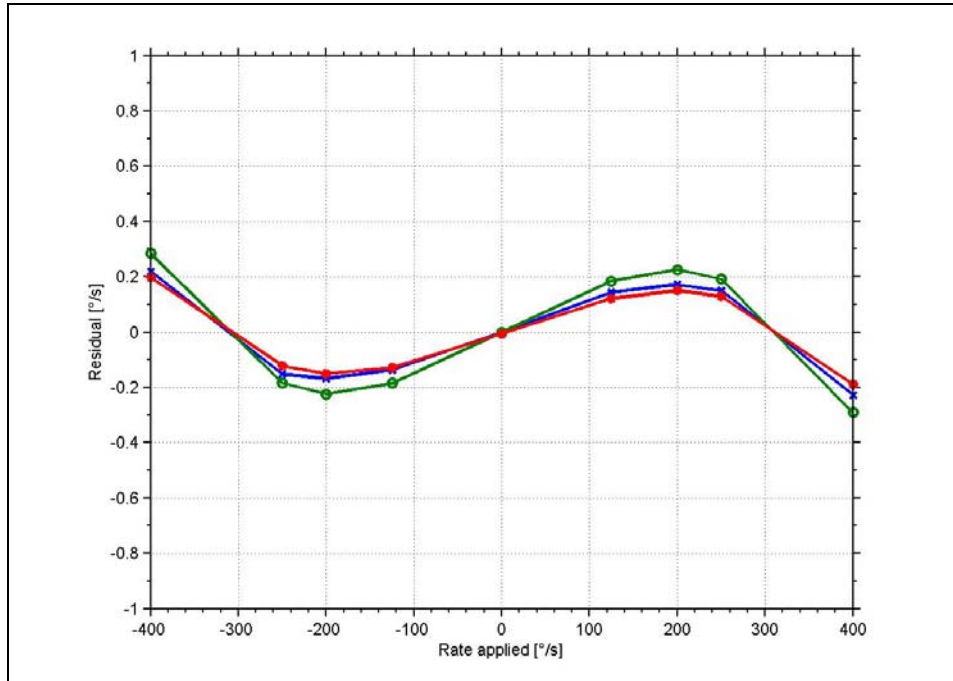
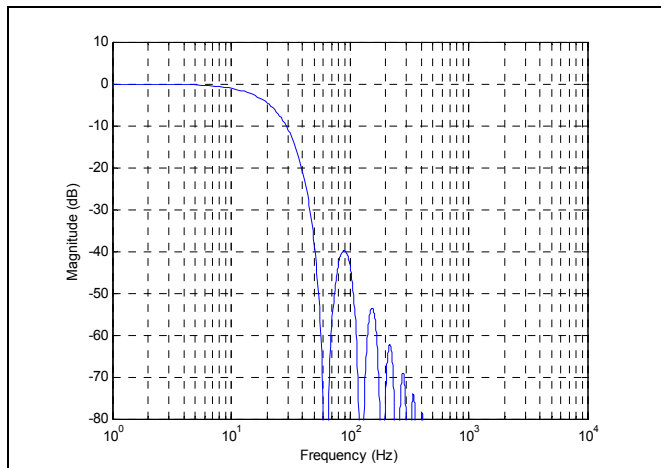
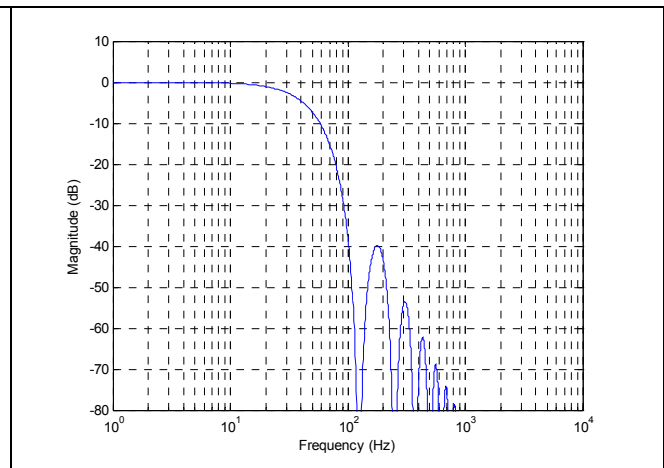


Figure 5-3: Typical Non-Linearity

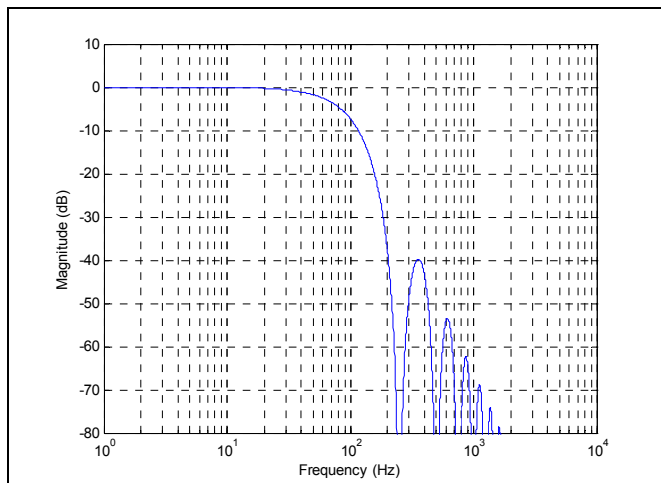
### 5.1.4 Low-pass filter characteristics



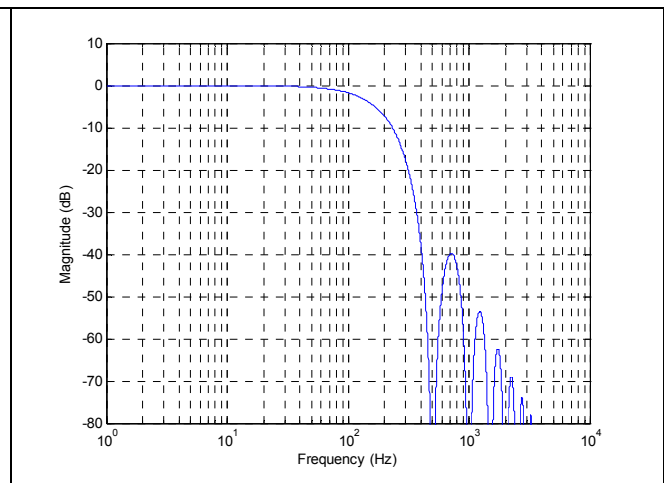
**Figure 5-4: Low-pass filter characteristics with -3dB frequency at 16Hz**



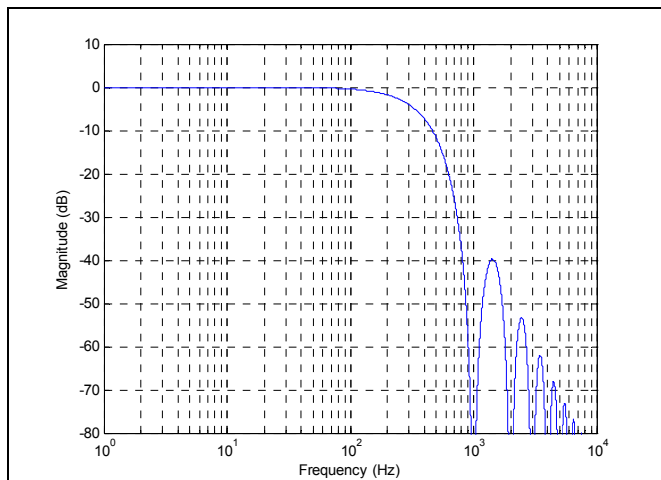
**Figure 5-5: Low-pass filter characteristics with -3dB frequency at 33Hz**



**Figure 5-6: Low-pass filter characteristics with -3dB frequency at 66Hz**



**Figure 5-7: Low-pass filter characteristics with -3dB frequency at 131Hz**



**Figure 5-8: Low-pass filter characteristics with -3dB frequency at 262Hz**

### 5.2 Configurable parameters

Table 5-3: Configurable parameters

Parameter	Configurations	Comments
<b>DATAGRAM FORMAT</b>	Standard Extended Standard w,CR+LF	Contains measurements and status byte For future use Has <CR><LF> added to standard datagram
<b>MEASUREMENT UNIT</b>	Angular rate [°/s] Incremental angle [°/sample]	
<b>SAMPLING RATE</b>	125 samples/s 250 samples/s 500 samples/s 1000 samples/s	
<b>LOW-PASS FILTER -3dB FREQUENCY</b>	16Hz 33Hz 66Hz 131Hz 262Hz	CIC-type filters. Filter settings can be set individually for each axis
<b>RS422 BIT RATE</b>	374400 bits/s 460800 bits/s 921600 bits/s	
<b>RS422 PARITY</b>	None Odd Even	
<b>RS422 STOP BITS</b>	1 stop bit 2 stop bits	
<b>RS422 120Ω LINE TERMINATION</b>	OFF ON	

Refer to section 12 for information on how to configure STIM202 when ordering.

### 5.3 Datagram specifications

**Table 5-4: Specification of the Part Number datagram**

Byte# Standard datagram	Byte# Extended datagram	Byte# Standard datagram w.CR+LF	Bit#								Specification	
			7	6	5	4	3	2	1	0		
0	0	0	0 0 0	1 1 1	0 0 0	1 1 1	0 0 0	1 1 1	0 0 0	0 0 0	0 1 0	Identification datagram identifier: 0x54 for standard datagrams 0x55 for extended datagrams 0x56 for standard datagrams w.CR+LF
1	1	1	0	0	0	0	P1 <sub>3</sub>	P1 <sub>2</sub>	P1 <sub>1</sub>	P1 <sub>0</sub>	P1 <sub>0</sub>	Low nibble: 1.digit (BCD) of part number
2	2	2	P2 <sub>3</sub>	P2 <sub>2</sub>	P2 <sub>1</sub>	P2 <sub>0</sub>	P3 <sub>3</sub>	P3 <sub>2</sub>	P3 <sub>1</sub>	P3 <sub>0</sub>	P3 <sub>0</sub>	High nibble: 2.digit (BCD) of part number Low nibble: 3.digit (BCD) of part number
3	3	3	P4 <sub>3</sub>	P4 <sub>2</sub>	P4 <sub>1</sub>	P4 <sub>0</sub>	P5 <sub>3</sub>	P5 <sub>2</sub>	P5 <sub>1</sub>	P5 <sub>0</sub>	P5 <sub>0</sub>	High nibble: 4.digit (BCD) of part number Low nibble: 5.digit (BCD) of part number
4	4	4	0	0	1	0	1	1	0	1	1	ASCII character "-" (0x2D)
5	5	5	P6 <sub>3</sub>	P6 <sub>2</sub>	P6 <sub>1</sub>	P6 <sub>0</sub>	P7 <sub>3</sub>	P7 <sub>2</sub>	P7 <sub>1</sub>	P7 <sub>0</sub>	P7 <sub>0</sub>	High nibble: 6.digit (BCD) of part number Low nibble: 7.digit (BCD) of part number
6	6	6	P8 <sub>3</sub>	P8 <sub>2</sub>	P8 <sub>1</sub>	P8 <sub>0</sub>	P9 <sub>3</sub>	P9 <sub>2</sub>	P9 <sub>1</sub>	P9 <sub>0</sub>	P9 <sub>0</sub>	High nibble: 8.digit (BCD) of part number Low nibble: 9.digit (BCD) of part number
7	7	7	0	0	1	0	1	1	0	1	1	ASCII character "-" (0x2D)
8	8	8	P10 <sub>3</sub>	P10 <sub>2</sub>	P10 <sub>1</sub>	P10 <sub>0</sub>	P11 <sub>3</sub>	P11 <sub>2</sub>	P11 <sub>1</sub>	P11 <sub>0</sub>	P11 <sub>0</sub>	High nibble: 10.digit (BCD) of part number Low nibble: 11.digit (BCD) of part number
9	9	9	P11 <sub>3</sub>	P11 <sub>2</sub>	P11 <sub>1</sub>	P11 <sub>0</sub>	P13 <sub>3</sub>	P13 <sub>2</sub>	P13 <sub>1</sub>	P13 <sub>0</sub>	P13 <sub>0</sub>	High nibble: 12.digit (BCD) of part number Low nibble: 13.digit (BCD) of part number
10	10	10	r <sub>7</sub>	r <sub>6</sub>	r <sub>5</sub>	r <sub>4</sub>	r <sub>3</sub>	r <sub>2</sub>	r <sub>1</sub>	r <sub>0</sub>	r <sub>0</sub>	Part number revision. Content of byte represents the ASCII-character of the revision. Numbering sequence: "-", "A", "B", ..., "Z"
N/A	11	N/A	x	x	x	x	x	x	x	x	x	For future use.
N/A	12	N/A	x	x	x	x	x	x	x	x	x	For future use.
N/A	13	N/A	x	x	x	x	x	x	x	x	x	For future use.
11	14	11	C <sub>7</sub>	C <sub>6</sub>	C <sub>5</sub>	C <sub>4</sub>	C <sub>3</sub>	C <sub>2</sub>	C <sub>1</sub>	C <sub>0</sub>	C <sub>0</sub>	Cyclic Redundancy Check is performed on all preceding bytes and is generated from the polynomial: $x^8 + x^2 + x + 1$ , seed = 0xFF
N/A	N/A	12	0	0	0	0	1	1	0	1	1	<CR>
N/A	N/A	13	0	0	0	0	1	0	1	0	0	<LF>

**Table 5-5: Specification of the Serial Number datagram**

Byte# Standard datagram	Byte# Extended datagram	Byte# Standard datagram w.CR+LF	Bit#								Specification	
			7	6	5	4	3	2	1	0		
0	0	0	0 0 0	1 1 1	0 0 0	1 1 1	1 1 1	0 0 0	1 0 0	1 1 0	0 1 0	Identification datagram identifier 0x5A for standard datagrams 0x5B for extended datagrams 0x5C for standard datagrams w.CR+LF
1	1	1	0	1	0	0	1	1	1	1	0	ASCII-character for letter "N"
2	2	2	S1 <sub>3</sub>	S1 <sub>2</sub>	S1 <sub>1</sub>	S1 <sub>0</sub>	S2 <sub>3</sub>	S2 <sub>2</sub>	S2 <sub>1</sub>	S2 <sub>0</sub>	S2 <sub>0</sub>	High nibble: 1.digit (BCD) of serial number Low nibble: 2.digit (BCD) of serial number
3	3	3	S3 <sub>3</sub>	S3 <sub>2</sub>	S3 <sub>1</sub>	S3 <sub>0</sub>	S4 <sub>3</sub>	S4 <sub>2</sub>	S4 <sub>1</sub>	S4 <sub>0</sub>	S4 <sub>0</sub>	High nibble: 3.digit (BCD) of serial number Low nibble: 4.digit (BCD) of serial number
4	4	4	S5 <sub>3</sub>	S5 <sub>2</sub>	S5 <sub>1</sub>	S5 <sub>0</sub>	S6 <sub>3</sub>	S6 <sub>2</sub>	S6 <sub>1</sub>	S6 <sub>0</sub>	S6 <sub>0</sub>	High nibble: 5.digit (BCD) of serial number Low nibble: 6.digit (BCD) of serial number
5	5	5	S7 <sub>3</sub>	S7 <sub>2</sub>	S7 <sub>1</sub>	S7 <sub>0</sub>	S8 <sub>3</sub>	S8 <sub>2</sub>	S8 <sub>1</sub>	S8 <sub>0</sub>	S8 <sub>0</sub>	High nibble: 7.digit (BCD) of serial number Low nibble: 8.digit (BCD) of serial number
6	6	6	S9 <sub>3</sub>	S9 <sub>2</sub>	S9 <sub>1</sub>	S9 <sub>0</sub>	S10 <sub>3</sub>	S10 <sub>2</sub>	S10 <sub>1</sub>	S10 <sub>0</sub>	S10 <sub>0</sub>	High nibble: 9.digit (BCD) of serial number Low nibble: 10.digit (BCD) of serial number
7	7	7	S11 <sub>3</sub>	S11 <sub>2</sub>	S11 <sub>1</sub>	S11 <sub>0</sub>	S11 <sub>3</sub>	S11 <sub>2</sub>	S11 <sub>1</sub>	S11 <sub>0</sub>	S11 <sub>0</sub>	High nibble: 11.digit (BCD) of serial number Low nibble: 12.digit (BCD) of serial number
8	8	8	S13 <sub>3</sub>	S13 <sub>2</sub>	S13 <sub>1</sub>	S13 <sub>0</sub>	S14 <sub>3</sub>	S14 <sub>2</sub>	S14 <sub>1</sub>	S14 <sub>0</sub>	S14 <sub>0</sub>	High nibble: 13.digit (BCD) of serial number Low nibble: 14.digit (BCD) of serial number
9	9	9	x	x	x	x	x	x	x	x	x	For future use.
10	10	10	x	x	x	x	x	x	x	x	x	For future use.
N/A	11	N/A	x	x	x	x	x	x	x	x	x	For future use.
N/A	12	N/A	x	x	x	x	x	x	x	x	x	For future use.
N/A	13	N/A	x	x	x	x	x	x	x	x	x	For future use.
11	14	11	C <sub>7</sub>	C <sub>6</sub>	C <sub>5</sub>	C <sub>4</sub>	C <sub>3</sub>	C <sub>2</sub>	C <sub>1</sub>	C <sub>0</sub>	C <sub>0</sub>	Cyclic Redundancy Check is performed on all preceding bytes and is generated from the polynomial: $x^8 + x^2 + x + 1$ , seed = 0xFF
N/A	N/A	12	0	0	0	0	1	1	0	1	1	<CR>
N/A	N/A	13	0	0	0	0	1	0	1	0	0	<LF>

**Table 5-6: Specification of the Configuration datagram**

Byte# Standard datagram	Byte# Extended datagram	Byte# Standard datagram w.CR+LF	Bit#								Specification		
			7	6	5	4	3	2	1	0			
0	0	0	0 0 0	0 0 0	1 1 1	0 0 0	1 1 1	0 1 0	0 1 0	0 1 1	0 0 1	Configuration datagram identifier 0x28 for standard datagrams 0x2A for extended datagrams 0x2B for standard datagrams w.CR+LF	
1	1	1	r <sub>7</sub>	r <sub>6</sub>	r <sub>5</sub>	r <sub>4</sub>	r <sub>3</sub>	r <sub>2</sub>	r <sub>1</sub>	r <sub>0</sub>		Part number revision. Content of byte represents the ASCII-character of the revision. Numbering sequence: “-”, “A”, “B”, ..., “Z”	
2	2	2	f <sub>7</sub>	f <sub>6</sub>	f <sub>5</sub>	f <sub>4</sub>	f <sub>3</sub>	f <sub>2</sub>	f <sub>1</sub>	f <sub>0</sub>		Firmware revision. Numbering sequence: 0, 1, ..., 255	
3	3	3	h <sub>7</sub>	h <sub>6</sub>	h <sub>5</sub>	h <sub>4</sub>	h <sub>3</sub>	h <sub>2</sub>	h <sub>1</sub>	h <sub>0</sub>		Hardware revision. Numbering sequence: 0, 1, ..., 255	
4	4	4	0	x	x	x	x	x	x	x	x	<b>System configuration, Byte 1:</b> Z-axis is inactive	
			1	x	x	x	x	x	x	x	x	x	Z-axis is active
			x	1	0	0	x	x	x	x	x	x	LP filter -3dB frequency for Z-axis = 262Hz
			x	0	1	1	x	x	x	x	x	x	LP filter -3dB frequency for Z-axis = 121Hz
			x	0	1	0	x	x	x	x	x	x	LP filter -3dB frequency for Z-axis = 66Hz
			x	0	0	1	x	x	x	x	x	x	LP filter -3dB frequency for Z-axis = 33Hz
			x	0	0	0	x	x	x	x	x	x	LP filter -3dB frequency for Z-axis = 16Hz
			x	x	x	x	0	x	x	x	x	x	Y-axis is inactive
			x	x	x	x	1	x	x	x	x	x	Y-axis is active
			x	x	x	x	x	1	0	0	0	0	LP filter -3dB frequency for Y-axis = 262Hz
			x	x	x	x	x	x	0	1	1	1	LP filter -3dB frequency for Y-axis = 121Hz
			x	x	x	x	x	x	0	1	0	0	LP filter -3dB frequency for Y-axis = 66Hz
			x	x	x	x	x	x	0	0	0	1	LP filter -3dB frequency for Y-axis = 33Hz
x	x	x	x	x	x	0	0	0	0	LP filter -3dB frequency for Y-axis = 16Hz			
5	5	5	0	x	x	x	x	x	x	x	x	<b>System configuration, Byte 2:</b> X-axis is inactive	
			1	x	x	x	x	x	x	x	x	x	X-axis is active
			x	1	0	0	x	x	x	x	x	x	LP filter -3dB frequency for X-axis = 262Hz
			x	0	1	1	x	x	x	x	x	x	LP filter -3dB frequency for X-axis = 121Hz
			x	0	1	0	x	x	x	x	x	x	LP filter -3dB frequency for X-axis = 66Hz
			x	0	0	1	x	x	x	x	x	x	LP filter -3dB frequency for X-axis = 33Hz
			x	0	0	0	x	x	x	x	x	x	LP filter -3dB frequency for X-axis = 16Hz
			x	x	x	x	0	1	1	1	x	x	Sampling frequency = 1000 samples/s
			x	x	x	x	0	1	0	0	x	x	Sampling frequency = 500 samples/s
			x	x	x	x	0	0	1	x	x	x	Sampling frequency = 250 samples/s
			x	x	x	x	0	0	0	0	x	x	Sampling frequency = 125 samples/s
			x	x	x	x	x	x	x	x	0	0	Output unit = ANGULAR RATE
			x	x	x	x	x	x	x	x	x	1	Output unit = INCREMENTAL ANGLE
6	6	6	0	x	x	x	x	x	x	x	x	<b>System configuration, Byte3:</b> Datagram format = STANDARD+STANDARD w.CR+LF	
			1	x	x	x	x	x	x	x	x	x	Datagram format = EXTENDED
			x	0	0	0	x	x	x	x	x	x	Bit rate = 374400 bits/s
			x	0	0	1	x	x	x	x	x	x	Bit rate = 460800 bits/s
			x	0	1	0	x	x	x	x	x	x	Bit rate = 921600 bits/s
			x	x	x	x	0	x	x	x	x	x	Stop bit = 1
			x	x	x	x	1	x	x	x	x	x	Stop bits = 2
			x	x	x	x	x	0	0	0	x	x	Parity = none
			x	x	x	x	x	0	1	1	x	x	Parity = even
			x	x	x	x	x	1	0	0	x	x	Parity = odd
			x	x	x	x	x	x	x	x	0	0	Line termination = OFF
			x	x	x	x	x	x	x	x	x	1	Line termination = ON
			7	7	7	s <sub>7</sub>	s <sub>6</sub>	s <sub>5</sub>	s <sub>4</sub>	s <sub>3</sub>	s <sub>2</sub>	s <sub>1</sub>	s <sub>0</sub>
8	8	8	x	x	x	x	x	x	x	x	For future use.		
9	9	9	x	x	x	x	x	x	x	x	For future use.		
10	10	10	x	x	x	x	x	x	x	x	For future use.		
N/A	11	N/A	x	x	x	x	x	x	x	x	For future use.		
N/A	12	N/A	x	x	x	x	x	x	x	x	For future use.		
N/A	13	N/A	x	x	x	x	x	x	x	x	For future use.		
11	14	11	c <sub>7</sub>	c <sub>6</sub>	c <sub>5</sub>	c <sub>4</sub>	c <sub>3</sub>	c <sub>2</sub>	c <sub>1</sub>	c <sub>0</sub>	Cyclic Redundancy Check is performed on all preceding bytes and is generated from the polynomial: $x^8 + x^2 + x + 1$ , seed = 0xFF		
N/A	N/A	12	0	0	0	0	1	1	0	1	<CR>		
N/A	N/A	13	0	0	0	0	1	0	1	0	<LF>		

**Table 5-7: Specification of the Normal Mode datagram**

Byte# Standard datagram	Byte# Extended datagram	Byte# Standard datagram w.CR+LF	Bit#								Specification
			7	6	5	4	3	2	1	0	
0	0	0	1 1 1	0 0 0	0 0 0	1 1 0	0 0 0	0 0 0	0 1 1	0 0 1	Normal Mode datagram identifier 0x90 standard datagram 0x92 extended datagram 0x93 standard datagram w. CR+LF
1	1	1	X <sub>23</sub>	X <sub>22</sub>	X <sub>21</sub>	X <sub>20</sub>	X <sub>19</sub>	X <sub>18</sub>	X <sub>17</sub>	X <sub>16</sub>	X-axis gyro output. Ref. Chapter 8.2.2.1 for conversion to units
2	2	2	X <sub>15</sub>	X <sub>14</sub>	X <sub>13</sub>	X <sub>12</sub>	X <sub>11</sub>	X <sub>10</sub>	X <sub>9</sub>	X <sub>8</sub>	
3	3	3	X <sub>7</sub>	X <sub>6</sub>	X <sub>5</sub>	X <sub>4</sub>	X <sub>3</sub>	X <sub>2</sub>	X <sub>1</sub>	X <sub>0</sub>	
4	4	4	Y <sub>23</sub>	Y <sub>22</sub>	Y <sub>21</sub>	Y <sub>20</sub>	Y <sub>19</sub>	Y <sub>18</sub>	Y <sub>17</sub>	Y <sub>16</sub>	Y-axis gyro output. Ref. Chapter 8.2.2.1 for conversion to units
5	5	5	Y <sub>15</sub>	Y <sub>14</sub>	Y <sub>13</sub>	Y <sub>12</sub>	Y <sub>11</sub>	Y <sub>10</sub>	Y <sub>9</sub>	Y <sub>8</sub>	
6	6	6	Y <sub>7</sub>	Y <sub>6</sub>	Y <sub>5</sub>	Y <sub>4</sub>	Y <sub>3</sub>	Y <sub>2</sub>	Y <sub>1</sub>	Y <sub>0</sub>	
7	7	7	Z <sub>23</sub>	Z <sub>22</sub>	Z <sub>21</sub>	Z <sub>20</sub>	Z <sub>19</sub>	Z <sub>18</sub>	Z <sub>17</sub>	Z <sub>16</sub>	Z-axis gyro output. Ref. Chapter 8.2.2.1 for conversion to units
8	8	8	Z <sub>15</sub>	Z <sub>14</sub>	Z <sub>13</sub>	Z <sub>12</sub>	Z <sub>11</sub>	Z <sub>10</sub>	Z <sub>9</sub>	Z <sub>8</sub>	
9	9	9	Z <sub>7</sub>	Z <sub>6</sub>	Z <sub>5</sub>	Z <sub>4</sub>	Z <sub>3</sub>	Z <sub>2</sub>	Z <sub>1</sub>	Z <sub>0</sub>	
10	10	10	S <sub>7</sub>	S <sub>6</sub>	S <sub>5</sub>	S <sub>4</sub>	S <sub>3</sub>	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>	STATUS byte. Ref. Table 5-8 for specification of this byte.
N/A	11	N/A	x	x	x	x	x	x	x	x	For future use.
N/A	12	N/A	x	x	x	x	x	x	x	x	For future use.
N/A	13	N/A	x	x	x	x	x	x	x	x	For future use.
11	14	11	C <sub>7</sub>	C <sub>6</sub>	C <sub>5</sub>	C <sub>4</sub>	C <sub>3</sub>	C <sub>2</sub>	C <sub>1</sub>	C <sub>0</sub>	Cyclic Redundancy Check is performed on all preceding bytes and is generated from the polynomial: $x^8 + x^2 + x + 1$ , seed = 0xFF
N/A	N/A	12	0	0	0	0	1	1	0	1	<CR>
N/A	N/A	13	0	0	0	0	1	0	1	0	<LF>

### 5.4 Status byte

**Table 5-8: Interpretation of bits in STATUS byte**

Bit	STATUS bit information	Comment
7	0=OK, 1=System integrity error	Bits 0-2 will flag the overload channel(s) Bits 0-2 will flag the error channel(s)
6	0=OK, 1=Start-Up	
5	0=OK, 1=Outside operating conditions	
4	0=OK, 1=Overload	
3	0=OK, 1=Error in gyro-channel	
2	0=OK, 1=Z-channel	
1	0=OK, 1=Y-channel	
0	0=OK, 1=X-channel	

## 6 ABSOLUTE MAXIMUM RATINGS

Stresses beyond those listed in Table 6-1 may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

**Table 6-1: Absolute maximum ratings**

Parameter	Rating	Comment
Dynamic overload	5000°/s	Any direction
Mechanical shock	1500g/0.5ms half-sine	Any direction
ESD human body model	±15kV	On RS422 pins (pins 4,5,9 and 10)
ESD human body model	±2kV	Other pins
ESD charge device model	±500V	
Storage temperature	-50°C to +90°C	
VSUP to GND	-0.5 to +7V	
RxD+ or RxD- to GND	-0.3V to +7V	
RxD+ to RxD-	±6V	with 120Ω Line Termination = ON
TxD+ or TxD- to GND	VCC-15V to +15V	
NRST to GND	-0.3V to +7V	
Chassis to GND	tbd	

### 7 MECHANICAL

Table 7-1: Mechanical specifications

Parameter	Conditions	Min	Nom	Max	Unit	Note
<b>WEIGHT</b>			55		grams	
<b>DUST AND HUMIDITY CLASSIFICATION</b>			IP56			
<b>CONNECTOR</b> Type Number of pins Contact type			Nicomatic CMM220 series male 10 LF			
<b>PLUG</b> Proposed plug to fit connector Proposed cover to fit plug			Nicomatic CMM-222-S-10-M18 Nicomatic CMM-C2-15			
<b>FIXATION BOLTS</b>	2.5mm tool 3mm tool		M4 DIN 7991-A2 M4 DIN 912-A2			

#### 7.1 Mechanical dimensions

All dimensions are in mm.

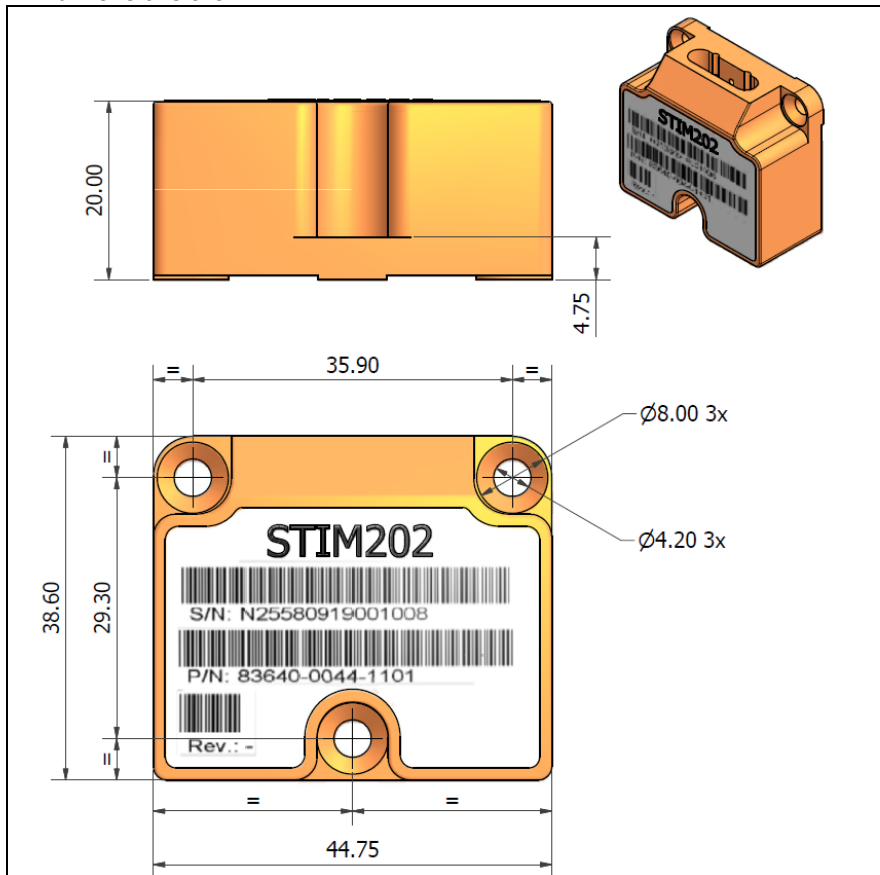


Figure 7-1: Mechanical dimensions

### 7.2 Pin configuration

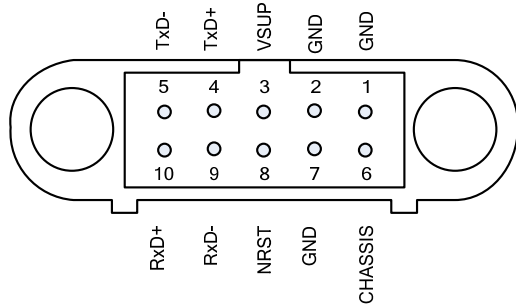


Figure 7-2: Pin configuration as seen from front of STIM202

Table 7-2: Pin descriptions

Pin#	Label	Type	Description
1	GND	SUPPLY	Power ground (0V)
2,7	GND	INPUT	Test pins: Connect to ground (0V)
3	VSUP	SUPPLY	Power supply (+5V)
4	TxD+	OUTPUT	RS422 positive output
5	TxD-	OUTPUT	RS422 negative output
6	CHASSIS	CHASSIS	Chassis connection (galvanic isolation from power ground)
8	NRST	INPUT	Reset (if not in use, connect to VSUP or leave floating)
9	RxD-	INPUT	RS422 negative input
10	RxD+	INPUT	RS422 positive input

### 7.3 Definition of axes

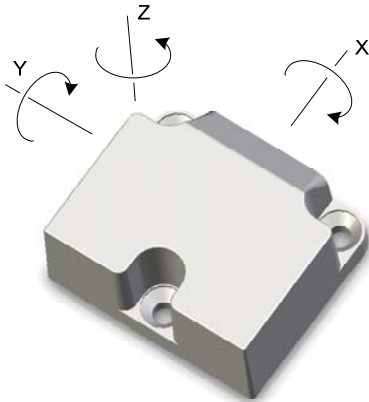
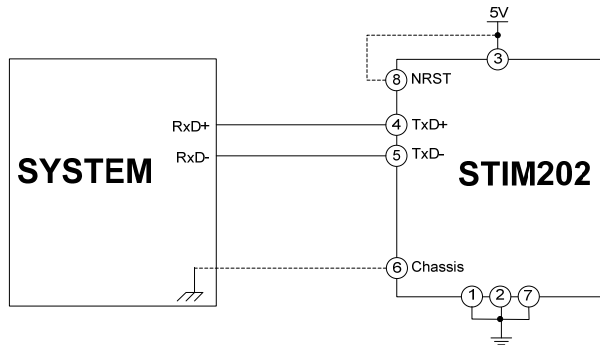


Figure 7-3: Definition of axes

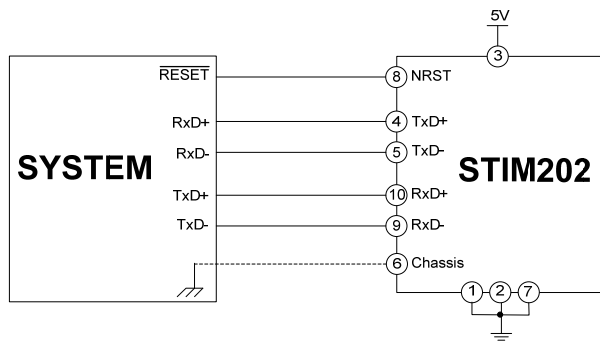
### 8 BASIC OPERATION

STIM202 is very simple to use. After having connected power, the unit will start performing measurements and transmit the results over the RS422 interface without any need for additional signalling or set-up. Figure 8-1 shows the simplest connection set-up for STIM202.



**Figure 8-1: Transmit-Only Electrical Connection Diagram**

In order to take full advantage of all features of STIM202 the unit needs to be connected as shown in Figure 8-2. In this set-up the system can reset the unit without having to toggle power, configuration parameters can be changed and extended information like diagnostic information can be read from the device.



**Figure 8-2: Full Function Electrical Connection Diagram**

#### 8.1 Reset

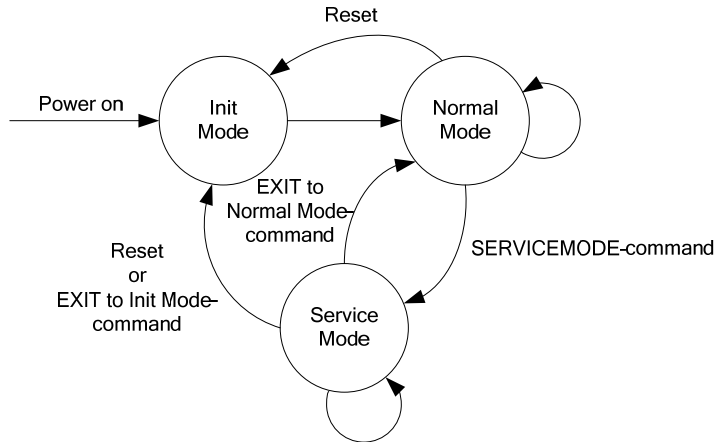
STIM202 has a separate reset pin (NRST) in order for the application to reset the unit without having to toggle power.

The reset is active low and has an internal pull-up. Hence the input could be left floating if not in use.

The reset signal is routed to the reset of the microcontroller and effectively forces STIM202 into Init Mode (ref. Figure 8-3 and chapter 8.2.1).

### 8.2 Operating modes

The operating modes of STIM202 are shown in Figure 8-3:



**Figure 8-3: Operating modes**

#### 8.2.1 Init Mode

Init Mode is entered after power on, after an external reset, when receiving a reset-command in Normal Mode or when exiting to Init Mode from Service Mode. In Init Mode the system waits for internal references to settle, resets and synchronizes the gyro measurements channels and transmits three special datagrams containing part number, serial number and configuration data of 12 or 15 bytes (dependent on the chosen datagram format in Normal Mode).

Figure 8-4, Figure 8-5 and Figure 8-6 show the sequence of the Part Number datagram, Table 5-4 specifies its contents.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
0x54	0,P1	P2,P3	P4,P5	"."	P6,P7	P8,P9	"."	P10,P11	P12,P13	Rev	CRC

**Figure 8-4: Part number datagram with standard datagrams in Normal Mode**

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14
0x55	0,P1	P2,P3	P4,P5	"."	P6,P7	P8,P9	"."	P10,P11	P12,P13	Rev	EXT1	EXT2	EXT3	CRC

**Figure 8-5: Part Number datagram with extended datagrams in Normal Mode**

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13
0x56	0,P1	P2,P3	P4,P5	"."	P6,P7	P8,P9	"."	P10,P11	P12,P13	Rev	CRC	<CR>	<LF>

**Figure 8-6: Part number datagram with standard datagrams w.CR+LF in Normal Mode**

Figure 8-7, Figure 8-8 and Figure 8-9 show the sequence of the Serial Number datagram, Table 5-5 specifies its contents.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
0x5A	"N"	S1,S2	S3,S4	S5,S6	S7,S8	S9,S10	S11,S12	S13,S14	XX	XX	CRC

**Figure 8-7: Serial Number datagram with standard datagrams in Normal Mode**

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14
0x5B	"N"	S1,S2	S3,S4	S5,S6	S7,S8	S9,S10	S11,S12	S13,S14	XX	XX	EXT1	EXT2	EXT3	CRC

**Figure 8-8: Serial Number datagram with extended datagrams in Normal Mode**

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13
0x5C	"N"	S1,S2	S3,S4	S5,S6	S7,S8	S9,S10	S11,S12	S13,S14	XX	XX	CRC	<CR>	<LF>

**Figure 8-9: Serial Number datagram with standard datagrams w.CR+LF in Normal Mode**

Figure 8-10, Figure 8-11 and Figure 8-12 show the sequence of the Configuration datagram, Table 5-6 specifies its contents.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
0x28	Rev	FW rev	HW rev	System Conf1	System Conf2	System Conf3	STATUS	XX	XX	XX	CRC

**Figure 8-10: Configuration datagram with standard datagrams in Normal Mode**

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14
0x2A	Rev	FW rev	HW rev	System Conf1	System Conf2	System Conf3	STATUS	XX	XX	XX	EXT1	EXT2	EXT3	CRC

**Figure 8-11: Configuration datagram with extended datagrams in Normal Mode**

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13
0x28	Rev	FW rev	HW rev	System Conf1	System Conf2	System Conf3	STATUS	XX	XX	XX	CRC	<CR>	<LF>

**Figure 8-12: Configuration datagram with standard datagrams w.CR+LF in Normal Mode**

After having transmitted the special Part Number, Serial Number and Configuration datagrams, STIM202 enters Normal Mode.

All these special datagrams can also be requested by commands in Normal Mode, ref. Chapter: 9.

## 8.2.2 Normal Mode

In Normal Mode STIM202 will constantly measure the gyro channels and transmit at the chosen sample rate. A datagram with extended content is prepared for future use. STIM202 will continue to transmit data regardless of any errors reported in the STATUS-byte (ref. Table 5-8). Hence the content of the STATUS-byte should continuously be examined.

Figure 8-13, Figure 8-14 and show the sequence of the transmitted datagrams in Normal Mode, Table 5-7 specifies its contents.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
0x90	CH X <sub>2(MSB)</sub>	CH X <sub>1</sub>	CH X <sub>0(LSB)</sub>	CH Y <sub>2(MSB)</sub>	CH Y <sub>1</sub>	CH Y <sub>0(LSB)</sub>	CH Z <sub>2(MSB)</sub>	CH Z <sub>1</sub>	CH Z <sub>0(LSB)</sub>	STATUS	CRC

**Figure 8-13: Datagram in Normal Mode with standard content**

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14
0x92	CH X <sub>2(MSB)</sub>	CH X <sub>1</sub>	CH X <sub>0(LSB)</sub>	CH Y <sub>2(MSB)</sub>	CH Y <sub>1</sub>	CH Y <sub>0(LSB)</sub>	CH Z <sub>2(MSB)</sub>	CH Z <sub>1</sub>	CH Z <sub>0(LSB)</sub>	STATUS	EXT1	EXT2	EXT3	CRC

**Figure 8-14: Datagram in Normal Mode with extended content**

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13
0x93	CH X <sub>2(MSB)</sub>	CH X <sub>1</sub>	CH X <sub>0(LSB)</sub>	CH Y <sub>2(MSB)</sub>	CH Y <sub>1</sub>	CH Y <sub>0(LSB)</sub>	CH Z <sub>2(MSB)</sub>	CH Z <sub>1</sub>	CH Z <sub>0(LSB)</sub>	STATUS	CRC	<CR>	<LF>

**Figure 8-15: Datagram in Normal Mode with standard content w.CR+LF termination**

### 8.2.2.1 Start-Up

When STIM202 enters Normal Mode from Init Mode, there will be a start-up period where STIM202 is stabilizing the gyros. During this period bit 6 is set in the STATUS-byte (ref. Table 5-8) to communicate its condition. Once stabilized, bit 6 will be cleared. During this period the output data should be regarded as non-valid.

There will not be any start-up period when STIM202 is exiting from Service Mode directly to Normal Mode.

### 8.2.2.2 Converting output to units

The following equations show how to convert the output to units. Please note that the output data is represented as two's complement (most significant bit is the sign-bit).

In the case of STIM202 being configured to output angular rate, Equation 1 and Figure 8-16 show how to convert to [°/s]:

### Equation 1: Converting output to [°/s]:

$$Output[^\circ/s] = \frac{(AR_1) \cdot 2^{16} + (AR_2) \cdot 2^8 + (AR_3)}{2^{14}}$$

where  $AR_1$  is the most significant byte of the 24bit output  
 $AR_2$  is the middle byte of the 24bit output  
 $AR_3$  is the least significant byte of the 24bit output

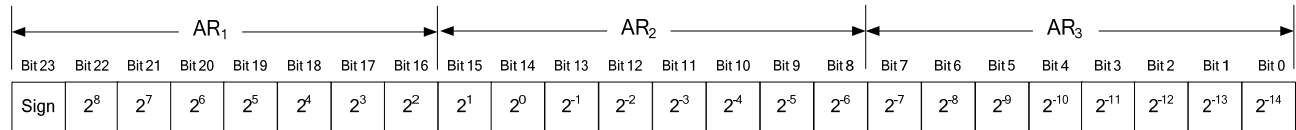


Figure 8-16: Converting output bytes to [°/s]

In the case of STIM202 being configured to output incremental angle per sample, the equations for conversion to [°] can be found in Equation 2:

### Equation 2: Converting output to [°/sample]

$$Output[^\circ/sample] = \frac{(IA_1) \cdot 2^{16} + (IA_2) \cdot 2^8 + (IA_3)}{2^{14}} \cdot \frac{1}{samplingrate[samples/s]}$$

where  $IA_1$  is the most significant byte of the 24bit output  
 $IA_2$  is the middle byte of the 24bit output  
 $IA_3$  is the least significant byte of the 24bit output

Considering Equation 1 and Equation 2 one may draw the conclusion that the output from STIM202 is the same regardless of the output unit being [°/s] or [°/sample]. This is not correct. In the case of having selected [°/sample], the output will also take into account any deviation between the actual sampling rate and the nominal sampling rate. Figure 8-17 through to Figure 8-20 below show the bit values of the output at different sampling rates.

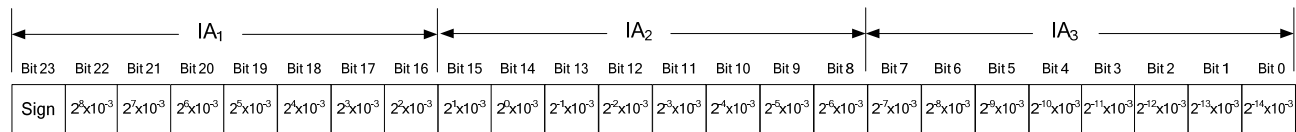


Figure 8-17: Converting output bytes to [°] with sampling rate = 1000 samples/s

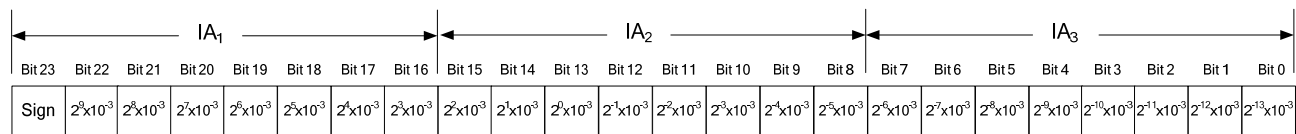


Figure 8-18: Converting output bytes to [°] with sampling rate = 500 samples/s

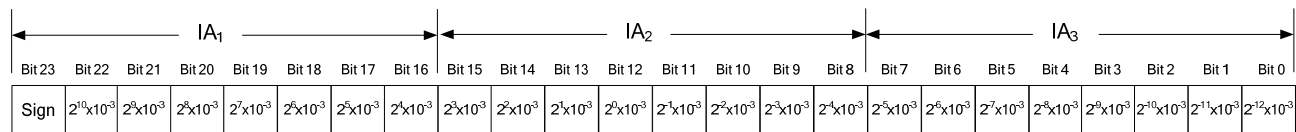


Figure 8-19: Converting output bytes to [°] with sampling rate = 250 samples/s

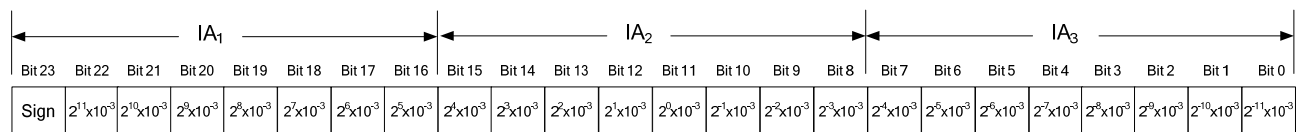


Figure 8-20: Converting output bytes to [°] with sampling rate = 125 samples/s

### 8.2.3 Service Mode

In Service Mode the communication interface is human readable and hence the communication format supports well the use of terminal-based software during the development phase, when the configuration of a device needs to be changed or during investigations into an observed problem.

When Service Mode is entered, STIM202 will respond with its configuration information (same as the response to the `i` (INFORMATION) command, ref: Figure 10-1).

A set of commands are available, ref. Chapter 10, enabling the user to change intermediately or permanently the configuration parameters, display latest measurement results, display higher details on error information and perform a full diagnostic of the unit.

In Service Mode the gyro measurements will still be running in the background, enabling to switch directly back to Normal Mode without the need for any stabilisation time of filters, etc. However the measurement data itself, when STIM202 is in Service Mode are not transmitted and therefore lost. By using the `a` (SINGLE-SHOT MEASUREMENT) command (ref. Chapter 10.2) it is possible to display single measurement results.

Exiting Service Mode can be done in several ways:

1. Using the external reset. This will force STIM202 into Init Mode. Please be advised that during Init Mode, all the configuration parameters are loaded from flash. If any of the configuration parameters have been changed during the Service Mode session but not saved to flash, these changes will be overwritten by the content already stored in flash.
2. Using the `x` (EXIT) command. When using this command a parameter is required to decide whether the device should go to Init Mode or to Normal Mode. When exiting to Normal Mode, any of the changes made to the configuration parameters will still be valid. However, if not saved, the configuration parameters will be overwritten by the content already stored in flash at the next power-up or reset.

### 8.3 Self diagnostics

STIM202 is constantly checking its internal status. The checks include:

- o Check of internal references
- o Check of gyros (error and overload)
- o Check of internal temperatures
- o Check of RAM and flash
- o Check of supply voltage

When an error situation is detected, the corresponding bit in the STATUS byte (ref. Table 5-8) will be set.

The bits in the STATUS are valid for the data in a single transmission. Hence any error condition is not latched.

In Service Mode it is possible to see the last detected error by using the `i_e` (INFORMATION on LAST ERROR IN NORMAL MODE) command, ref. Chapter 10.1 or run a full diagnostic and see the result of the individual checks by using the `c` (DIAGNOSTIC) command, ref. Chapter 10.3.

### 9 COMMANDS IN NORMAL MODE

Several commands are available in Normal Mode, as listed in Table 9-1. Please note that all commands in Normal Mode must be transmitted in upper case letters.

**Table 9-1 Available commands in Normal Mode**

Command	Short description
N	Transmits one Part Number datagram
I	Transmits one Serial Number datagram
C	Transmits one Configuration datagram
R	Resets the unit
SERVICEMODE	Enters Service Mode

**Table 9-2 List of special ASCII characters used in Normal Mode**

Char	Hex	Dec	Short description
<CR>	0x0D	13	“Carriage Return”: used as execution character for commands

No echo of received command characters nor error messages will appear for these commands. Only at the receipt of the complete correct command, STIM202 executes accordingly.

NB: if OUTPUT-UNIT is set to INCREMENTAL ANGLE (ref. Chapter 10.7), the transmitted incremented angle in the datagram following any of the requested special datagrams will NOT contain the incremental angle since the last transmitted measurement. Hence the incremented angle occurring during the transmission of a special requested datagram will be lost.

#### 9.1 N (PART NUMBER DATAGRAM) command

General description: Requests transmission of a Part Number datagram (ref. Figure 8-4 and Figure 8-5).

**Table 9-3 : Available I (PART NUMBER DATAGRAM) command**

Syntax	Response
N<CR>	Transmits one Part Number datagram

The Part Number datagram will replace the next transmitted Normal Mode datagram.

#### 9.2 I (SERIAL NUMBER DATAGRAM) command

General description: Requests transmission of a Serial number datagram (ref. Figure 8-7 and Figure 8-8).

**Table 9-4 : Available I (SERIAL NUMBER DATAGRAM) command**

Syntax	Response
I<CR>	Transmits one Serial Number datagram

The Serial Number datagram will replace the next transmitted Normal Mode datagram.

#### 9.3 C (CONFIGURATION DATAGRAM) command

General description: Requests transmission of a configuration datagram (ref. Figure 8-10 and Figure 8-11).

**Table 9-5: Available C (CONFIGURATION DATAGRAM) command**

Syntax	Response
C<CR>	Transmits one Configuration datagram

The Configuration datagram will replace the next transmitted Normal Mode datagram.

### 9.4 R (RESET) command

General description: Force a Reset

**Table 9-6: Available R (RESET) command**

Syntax	Response
R<CR>	Resets the unit

### 9.5 SERVICEMODE command

General description : Enters Service Mode (ref. chapter 8.2.3).

**Table 9-7: Available SERVICEMODE command**

Syntax	Response
SERVICEMODE<CR>	Enters Service Mode

If the command is received during the transmission of a datagram, it will complete the transmission before entering Service Mode.

When entering Service Mode, the configuration and identification data of the device will be listed, as shown in Figure 9-1:

```

SERIAL NUMBER = N25580846002002
PRODUCT = STIM202XZ
PART NUMBER = 83642-1034-0121 REV -
HW CONFIG = M5432 REV 0
FW CONFIG = SWD11691 REV 0
OUTPUT UNIT = [°/SAMPLE] – INCREMENTAL ANGLE
SAMPLING FREQUENCY [Hz] = 1000
LP FILTER -3DB FREQUENCY, X-AXIS [Hz] = 256
LP FILTER -3DB FREQUENCY, Y-AXIS [Hz] = NA
LP FILTER -3DB FREQUENCY, Z-AXIS [Hz] = 256
DATAGRAM FORMAT = STANDARD
BIT RATE [BPS] = 374400
DATA LENGTH = 8
STOP BITS = 1
PARITY = EVEN
LINE TERMINATION = ON

>
    
```

**Figure 9-1: Example of response from SERVICEMODE command**

### 10 COMMANDS IN SERVICE MODE

Several commands are available in Service Mode, as listed in Table 10-1. Please note that all commands in Service Mode must be transmitted in lower case letters.

**Table 10-1 Available commands in Service Mode**

Command	Short description
i	Lists specific information (e.g. serial number, configuration, error information)
a	Performs a single-shot measurement
c	Performs a diagnostic of the unit
d	Changes datagram format (standard, extended or standard with CR+LF-termination)
t	Changes transmission parameters (e.g. bit rate, data-length, stop-bits)
r	Turns line termination ON or OFF
u	Changes measurement output unit (e.g. angular rate or incremental angle)
f	Changes LP filter -3dB frequency
m	Changes sampling frequency
s	Saves configuration data
x	Exits Service Mode and returns to Normal Mode or Init Mode
z	Restore to factory settings
?	Help function on the available commands in Service Mode

**Table 10-2 List of special ASCII characters used in Service Mode**

Char	Hex	Dec	Short description
<BS>	0x08	8	"Back Space": deletes last received character (received since last <CR>)
<CR>	0x0D	13	"Carriage Return": typically used as execution character for commands
<SP>	0x20	32	"Space": used to separate command and first parameter
','	0x2C	44	"Comma": used to separate parameters in a command
'>'	0x3E	62	Used together with <CR> as: "Ready to receive new command"-prompt

When STIM202 is in Service Mode and ready to receive a new command, it will issue the special ASCII character <CR> followed by '>'. As some commands (e.g. SINGLE-SHOT MEASUREMENT-command) may respond with a varying number of lines, automated set-ups should look for the special prompt-sequence (<CR>+>') before issuing a new command.

Received characters will be echoed. A command is decoded and executed when receiving the special ASCII character <CR>. <BS> is also recognised and will delete the last received character in the input buffer. The size of the input buffer is 80 characters. <BS> is valid for the characters received since last <CR>.

The command-character and first parameter (when applicable) are separated by a space (character 0x20). When there are more than one parameter to a command (e.g. TRANSMISSION PARAMETER-command), these must be separated by a comma (character 0x2C).

In the event of an unknown command, inconsistent syntax or incorrect value of parameter(s), STIM202 will respond with an error message. Error messages are on the format:

E<nnn><SP><Error description><CR>  
 where nnn is an error number

### 10.1 i (INFORMATION) command

General description: Lists various requested information about the device

**Table 10-3 : Available i (INFORMATION) commands**

Syntax	Response
i<CR>	Lists the product configuration and identification data
i<SP><cmd><CR>	Gives information about the specific parameter

**Table 10-4 : Allowed values for <cmd> parameter for i (INFORMATION) commands**

<cmd>	Result
s	Returns the serial number of the device
n	Returns the product name of the device
x	Returns the part number of the device
h	Returns the HW configuration and revision of the device
p	Returns the FW configuration and revision of the device
m	Returns the sampling frequency of the device
f	Returns the LP filter -3dB frequency for each axis
d	Returns the datagram format
t	Returns the transmission parameters of the device
r	Returns the line termination (ON or OFF)
u	Returns the output unit of the device
e	Prints the extended error information from the last detected error in Normal Mode

**Table 10-5: Error messages for i (INFORMATION) commands**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command or parameter is not recognised
E002	INCORRECT NUMBER OF PARAMETERS	Too many or too few parameters, use of comma between command and first parameter

```

>i
SERIAL NUMBER = N25580846002002
PRODUCT = STIM202XZ
PART NUMBER = 83642-1034-0121 REV -
HW CONFIG = M5432 REV 0
FW CONFIG = SWD11691 REV 0
OUTPUT UNIT = [°/SAMPLE] – INCREMENTAL ANGLE
SAMPLING FREQUENCY [Hz] = 1000
LP FILTER -3DB FREQUENCY, X-AXIS [Hz] = 256
LP FILTER -3DB FREQUENCY, Y-AXIS [Hz] = NA
LP FILTER -3DB FREQUENCY, Z-AXIS [Hz] = 256
DATAGRAM FORMAT = STANDARD
BIT RATE [BPS] = 374400
DATA LENGTH = 8
STOP BITS = 1
PARITY = EVEN
LINE TERMINATION = ON
>

```

**Figure 10-1: Example of response from i (INFORMATION) command**

```

>i s
SERIAL NUMBER = N25580846002002
>

```

**Figure 10-2: Example of response from i s (INFORMATION on SERIAL NUMBER) command**

```
>i n  
PRODUCT = STIM202XZ  
  
>
```

**Figure 10-3: Example of response from i n (INFORMATION on PRODUCT NAME) command**

```
>i x  
PART NUMBER = 83642-1034-0121 REV -  
  
>
```

**Figure 10-4: Example of response from i x (INFORMATION on PART NUMBER) command**

```
>i h  
HW CONFIG = M5432 REV 0  
  
>
```

**Figure 10-5: Example of response from i h (INFORMATION on HW CONFIGURATION) command**

```
>i p  
FW CONFIG = SWD11691 REV 0  
  
>
```

**Figure 10-6: Example of response from i p (INFORMATION on FW CONFIGURATION) command**

```
>i m  
SAMPLING FREQUENCY [Hz] = 1000  
  
>
```

**Figure 10-7: Example of response from i m (INFORMATION on SAMPLING FREQUENCY) command**

```
>i f  
LP FILTER -3DB FREQUENCY, X-AXIS [Hz] = 256  
LP FILTER -3DB FREQUENCY, Y-AXIS [Hz] = NA  
LP FILTER -3DB FREQUENCY, Z-AXIS [Hz] = 256  
  
>
```

**Figure 10-8: Example of response from i f (INFORMATION on LP FILTER -3dB FREQUENCY) command**

```
>i d  
DATAGRAM FORMAT = STANDARD  
  
>
```

**Figure 10-9: Example of response from i d (INFORMATION on DATAGRAM CONTENT) command**

```
>i t  
BIT RATE [BPS] = 374400  
DATA LENGTH = 8  
STOP BITS = 1  
PARITY = EVEN  
  
>
```

**Figure 10-10: Example of response from i t (INFORMATION on TRANSMISSION PARAMETERS) command**

```
>i r  
LINE TERMINATION = ON  
>
```

**Figure 10-11: Example of response from i r (INFORMATION) command**

```
>i u  
OUTPUT UNIT = [°/SAMPLE] – INCREMENTAL ANGLE  
>
```

**Figure 10-12: Example of response from i u (INFORMATION on OUTPUT UNIT) command**

```
>i e  
GYRO X-AXIS I-CH OVERFLOW = FAILED  
>
```

**Figure 10-13: Example of response from i e (INFORMATION on LAST ERROR IN NORMAL MODE) command**

### 10.2 a (SINGLE-SHOT MEASUREMENT) command

General description: Displays the result of latest measurement (measurement process running constantly in the background).

**Table 10-6: Available a (SINGLE-SHOT MEASUREMENT) command**

Syntax	Response
a<CR>	Displays the result of the latest measurement sample

**Table 10-7: Error messages for a (SINGLE-SHOT MEASUREMENT) command**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Any characters between command and <CR>

```
>a
X-AXIS = 1.43255°/S
Y-AXIS = NA
Z-AXIS = 243.33667°/S
STATUS = 00000000 = OK
>
```

**Figure 10-14: Example of response from a (SINGLE-SHOT MEASUREMENT) command**

```
>a
X-AXIS = 0.000716275°
Y-AXIS = NA
Z-AXIS = 0.121668335°
STATUS = 00100101 = NOT OK
BIT 5: ABNORMAL INTERNAL TEMPERATURE
BIT 2: ERROR IN Z-CHANNEL
BIT 0: ERROR IN X-CHANNEL
>
```

**Figure 10-15: Example of response from a (SINGLE-SHOT MEASUREMENT) command with error flagging**

### 10.3 c (DIAGNOSTIC) command

General description: Performs a diagnostic of the unit.

**Table 10-8: Available c (DIAGNOSTIC) command**

Syntax	Response
c<CR>	Performs a diagnostic check

**Table 10-9: Error messages for c (DIAGNOSTIC) command**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Any characters between command and <CR>

```
>c
SERIAL NUMBER = N25580846002002
PRODUCT = STIM202XZ
PART NUMBER = 83642-1034-0121 REV -
HW CONFIG = M5432 REV 0
FW CONFIG = SWD11691 REV 0
SYSTEM STATUS:
  RAM CHECK = OK
  FLASH CHECK = OK
  STACK STATUS MONITOR = OK
  STACK TEMPERATURE CONTROL = OK
  STACK COMMAND HANDLER = OK
  STACK SAMPLE = OK
  STACK FLASH = OK
  MICRO CONTROLLER TEMPERATURE = OK
VOLTAGE SUPPLIES:
  REFERENCE VOLTAGE 5.0V = OK
  REFERENCE VOLTAGE 2.5V = OK
  REFERENCE VOLTAGE 2.048V = OK
  REGULATED VOLTAGE 5.0V = OK
  REGULATED VOLTAGE 1.8V = OK
  INPUT VOLTAGE 5.0V = OK
  VOLTAGE BOOST = OK
GYRO X-AXIS:
  GYRO X-AXIS EXC.FREQ = OK
  GYRO X-AXIS ASIC TEMP = OK
  GYRO X-AXIS CONTROLLER SETPOINT DIFF = OK
  GYRO X-AXIS SENSOR TEMP = OK
  GYRO X-AXIS COMPENSATED RATE SIGNAL = OK
  GYRO X-AXIS PWM = OK
  GYRO X-AXIS CALCULATION OVERFLOW = OK
  GYRO X-AXIS Q-CH RANGE = OK
  GYRO X-AXIS I-CH RANGE = OK
  GYRO X-AXIS DET.DC = OK
  GYRO X-AXIS EXC.DC = OK
  GYRO X-AXIS SPI = OK
  GYRO X-AXIS EXC.AMPL = OK
  GYRO X-AXIS OVERRUN = OK
GYRO Z-AXIS:
  GYRO Z-AXIS EXC.FREQ = OK
  GYRO Z-AXIS ASIC TEMP = OK
  GYRO Z-AXIS CONTROLLER SETPOINT DIFF = NOK
  GYRO Z-AXIS SENSOR TEMP = NOK
  GYRO Z-AXIS COMPENSATED RATE SIGNAL = OK
  GYRO Z-AXIS PWM = OK
  GYRO Z-AXIS CALCULATION OVERFLOW = OK
  GYRO Z-AXIS Q-CH RANGE = OK
  GYRO Z-AXIS I-CH RANGE = OK
  GYRO Z-AXIS DET.DC = OK
  GYRO Z-AXIS EXC.DC = OK
  GYRO Z-AXIS SPI = OK
  GYRO Z-AXIS EXC.AMPL = OK
  GYRO Z-AXIS OVERRUN = OK
>
```

Figure 10-16: Example of response from c (DIAGNOSTIC) command

### 10.4 d (DATAGRAM FORMAT) command

General description: Sets the datagram format in Normal Mode to either standard format, extended format or standard format w.CR+LF termination (ref.Figure 8-13, Figure 8-14 and Figure 8-15 respectively).

**Table 10-10 : Available d (DATAGRAM FORMAT) command**

Syntax	Response
d<SP><d_format><CR>	Changes the datagram format in Normal Mode

**Table 10-11 : Allowed values for d (DATAGRAM FORMAT) command**

<d_format>	Result
s	Changes the datagram format in Normal Mode to standard format
e	Changes the datagram format in Normal Mode to extended format
r	Changes the datagram format in Normal Mode to standard format with CR+LF termination

**Table 10-12: Error messages for d (DATAGRAM FORMAT) command**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Too many or too few parameters, use of comma between command and first parameter
E003	INVALID PARAMETER	Value of parameter outside valid range

```
>d s
DATAGRAM FORMAT = STANDARD

>
```

**Figure 10-17: Example of response from d s (DATAGRAM FORMAT) command**

```
>d e
DATAGRAM FORMAT = EXTENDED

>
```

**Figure 10-18: Example of response from d e (DATATGRAM FORMAT) command**

```
>d r
DATAGRAM FORMAT = STANDARD WITH <CR><LF> TERMINATION

>
```

**Figure 10-19: Example of response from d t (DATATGRAM FORMAT) command**

### 10.5 t (TRANSMISSION PARAMETERS) command

General description: Changes the transmission parameters for the RS422 interface.

**Table 10-13 : Available t (TRANSMISSION PARAMETERS) commands**

Syntax	Response
t<SP><bit rate><CR>	Changes the transmission bit rate and leaves number of stop-bits and parity unchanged
t<SP><bit rate>','<stop bits>','<parity><CR>	Changes the transmission bit rate, number of stop-bits and parity

**Table 10-14: Allowed values for <bit rate> parameter for t (TRANSMISSION PARAMETERS) commands**

<bit rate>	Result
374400	Will set the bit rate to 374400 bits/s
460800	Will set the bit rate to 460800 bits/s
921600	Will set the bit rate to 921600 bits/s

**Table 10-15: Allowed values for <stop bits> parameter for t (TRANSMISSION PARAMETERS) commands**

<stop bits>	Result
1	Will set number of stop bits to 1
2	Will set number of stop bits to 2

**Table 10-16: Allowed values for <parity> parameter for t (TRANSMISSION PARAMETERS) commands**

<stop bits>	Result
n	Will set no parity
e	Will set even parity
o	Will set odd parity

**Table 10-17: Error messages for t (TRANSMISSION PARAMETERS) commands**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Too many or too few parameters, use of comma between command and first parameter
E003	INVALID PARAMETER	Value of parameter outside valid range

```
>t 460800,2,e
TRANSMISSION PROTOCOL = 460800 BITS/S, 2 STOP BIT(S), EVEN PARITY
>
```

**Figure 10-20: Example of response from t (TRANSMISSION PARAMETERS) command**

Transmission parameters will change after the response as shown in Figure 10-20 has been given.

### 10.6 r (LINE TERMINATION) command

General description: Turns the line termination ON or OFF. Line termination should be ON when communicating point-point (single master – single slave).

**Table 10-18: Available r (LINE TERMINATION) command**

Syntax	Response
r<SP><lineterm><CR>	Changes the line termination

**Table 10-19: Allowed values for r (LINE TERMINATION) command**

<lineterm>	Result
0	Turns line termination OFF
1	Turns line termination ON

**Table 10-20: Error messages for r (LINE TERMINATION) command**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Too many or too few parameters, use of comma between command and first parameter
E003	INVALID PARAMETER	Value of parameter outside valid range

```
>r 0
LINE TERMINATION = OFF
>
```

**Figure 10-21: Example of response from r 0 (LINE TERMINATION) command**

```
>r 1
LINE TERMINATION = ON
>
```

**Figure 10-22: Example of response from r 1 (LINE TERMINATION) command**

### 10.7 u (OUTPUT UNIT) command

General description: Sets the unit of the transmission in Normal Mode to angular rate or incremental angle.

**Table 10-21: Available u (OUTPUT UNIT) command**

Syntax	Response
u<SP><outunit><CR>	Changes the unit of the transmission in Normal Mode

**Table 10-22: Allowed values for <outunit> for u (OUTPUT UNIT) command**

<outunit>	Result
a	Changes the unit of the transmission in Normal Mode to angular rate [°/s]
i	Changes the unit of the transmission in Normal Mode to incremental angle [°/sample]

**Table 10-23: Error messages for u (OUTPUT UNIT) command**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Too many or too few parameters, use of comma between command and first parameter
E003	INVALID PARAMETER	Value of parameter outside valid range

```
>u a
OUTPUT UNIT = [°/S] – ANGULAR RATE
>
```

**Figure 10-23: Example of response from u a (OUTPUT UNIT) command**

```
>u i
OUTPUT UNIT = [°/SAMPLE] – INCREMENTAL ANGLE
>
```

**Figure 10-24: Example of response from u i (OUTPUT UNIT) command**

### 10.8 f (LP FILTER -3dB FREQUENCY) command

**Table 10-24: Available f (LP FILTER -3dB FREQUENCY) commands**

Syntax	Response
<b>f&lt;SP&gt;&lt;-3dBfreq&gt;&lt;CR&gt;</b>	Changes the LP filter -3dB frequency for all axes
<b>f&lt;SP&gt;&lt;-3dBfreq&gt;',&lt;axis&gt;&lt;CR&gt;</b>	Changes the LP filter -3dB frequency for a specified axis

**Table 10-25: Allowed values for <-3dBfreq> parameter for f (LP FILTER -3dB FREQUENCY) commands**

<-3dBfreq>	Result
<b>16</b>	Will change LP filter -3dB frequency to 16Hz
<b>33</b>	Will change LP filter -3dB frequency to 33Hz
<b>66</b>	Will change LP filter -3dB frequency to 66Hz
<b>131</b>	Will change LP filter -3dB frequency to 131Hz
<b>262</b>	Will change LP filter -3dB frequency to 262Hz

**Table 10-26: Allowed values for <axis> parameter for f (LP FILTER -3dB FREQUENCY) commands**

<axis>	Result
<b>x</b>	Will change LP filter -3dB frequency for X-axis only
<b>y</b>	Will change LP filter -3dB frequency for Y-axis only
<b>z</b>	Will change LP filter -3dB frequency for Z-axis only

**Table 10-27: Error messages for f (LP FILTER -3dB FREQUENCY) commands**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Too many or too few parameters, use of comma between command and first parameter
E003	INVALID PARAMETER	Value of parameter outside valid range

```
>f 66,x
LP FILTER -3DB FREQUENCY = 66 HZ FOR X-AXIS
>
```

**Figure 10-25: Example of response from f (LP FILTER -3dB FREQUENCY) command**

```
>f 131
LP FILTER -3DB FREQUENCY = 131 HZ FOR ALL AXES
>
```

**Figure 10-26: Example of response from f (LP FILTER -3dB FREQUENCY) command**

### 10.9 m (SAMPLING FREQUENCY) command

General description: Changes the sampling frequency in Normal Mode. The sampling frequency is the same for all gyro channels.

**Table 10-28: Available m (SAMPLING FREQUENCY) command**

Syntax	Response
m<SP><sampl.freq><CR>	Changes the sampling frequency in Normal Mode

**Table 10-29: Allowed values for <sampl.freq> parameter for m (SAMPLING FREQUENCY) command**

<sampl.freq>	Result
125	Will set sampling frequency to 125 samples /second
250	Will set sampling frequency to 250 samples /second
500	Will set sampling frequency to 500 samples /second
1000	Will set sampling frequency to 1000 samples /second

**Table 10-30: Error messages for m (SAMPLING FREQUENCY) command**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Too many or too few parameters, use of comma between command and first parameter
E003	INVALID PARAMETER	Value of parameter outside valid range

```
>m 500
SAMPLING FREQUENCY = 500 SAMPLES/S
>
```

**Figure 10-27: Example of response from m (SAMPLING FREQUENCY) command**

### 10.10 s (SAVE) command

General description: Saves configuration parameters to flash. This will permanently change the configuration parameters and hence be valid after an initialisation or power-off.

**Table 10-31: Available s (SAVE) command**

Syntax	Response
s<CR>	Saves system parameters to flash. This command will require a confirmation prior to execution. Confirmation to be responded in upper case letter.

**Table 10-32: Error messages for s (SAVE) command**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Any characters between command and <CR>
E003	INVALID PARAMETER	Value of parameter outside valid range
E004	EXCEEDED MAXIMUM NUMBER OF SAVES	Warning appears when maximum number of saves has been exceeded (1000 saves). STIM202 will always attempt to save the configuration when receiving the s (SAVE)-command.
E005	ERROR DURING SAVE	System parameters not successfully transferred to flash

```
>s
SYSTEM PARAMETERS WILL BE PERMANENTLY CHANGED. CONFIRM SAVE(Y/N): Y
SYSTEM PARAMETERS SUCCESSFULLY STORED IN FLASH.
NUMBER OF SAVES = 26
>
```

**Figure 10-28: Example of response from s (SAVE) command when confirming save**

```
>s
SYSTEM PARAMETERS WILL BE PERMANENTLY CHANGED. CONFIRM SAVE(Y/N): N
SAVE COMMAND ABORTED.
>
```

**Figure 10-29: Example of response from s (SAVE) command when not confirming save**

```
>s
SYSTEM PARAMETERS WILL BE PERMANENTLY CHANGED. CONFIRM SAVE(Y/N): y
SAVE COMMAND ABORTED.

E003 INVALID PARAMETER
>
```

**Figure 10-30: Example of response from s (SAVE) command when not correctly responding to confirmation**

### 10.11 x (EXIT) command

General description: Terminates Service Mode and returns to Normal Mode directly or via Init Mode (ref. Figure 8-3).

**Table 10-33 : Available x (EXIT) command**

Syntax	Response
x<SP><exit_to><CR>	Terminates Service Mode

**Table 10-34 : Allowed values for <exit\_to> for x (EXIT) command**

<exit_to>	Result
n	Terminates Service Mode and return to Normal Mode. If system parameters have been changed compared to flash content, a confirmation is requested before exiting to Normal Mode ("Y" in upper case letter). There will be a 3 seconds hold-time between the transmitted command response and execution of the EXIT-command.
i	Terminates Service Mode and return to Init Mode. If system parameters have been changed compared to flash content, a confirmation is requested before exiting to Normal Mode ("Y" in upper case letter). There will be a 3 seconds hold-time between the transmitted command response and execution of the EXIT-command. <b>NB: Changes made to system parameters, but not saved, will be overwritten by the data already stored in flash when entering Init Mode.</b>
N	Terminates Service Mode and return immediately to Normal Mode (without confirmation if system parameters have been changed compared to flash and without any hold-time)
I	Terminates Service Mode and return immediately to Init Mode (without confirmation if system parameters have been changed compared to flash and without any hold-time). <b>NB: Changes made to system parameters, but not saved, will be overwritten by the data already stored in flash when entering Init Mode.</b>

**Table 10-35: Error messages for x (EXIT) command**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Too many or too few parameters, use of comma between command and first parameter
E003	INVALID PARAMETER	Value of parameter outside valid range

```
>x n
SYSTEM RETURNING TO NORMAL MODE.
```

**Figure 10-31: Example of response from x n (EXIT) command when system parameters match contents of flash**

```
>x i
SYSTEM RETURNING TO INIT MODE.
```

**Figure 10-32: Example of response from x i (EXIT) command when system parameters match contents of flash**

```
>x n
CURRENT SYSTEM PARAMETERS DO NOT MATCH FLASH CONTENT. CONFIRM EXIT(Y/N): Y
SYSTEM RETURNING TO NORMAL MODE.
```

**Figure 10-33: Example of response from x n (EXIT) command after system parameters have been changed but not saved with confirmed EXIT.**

```
>x i
CURRENT SYSTEM PARAMETERS DO NOT MATCH FLASH CONTENT. CONFIRM EXIT(Y/N): N
>
```

**Figure 10-34: Example of response from x i (EXIT) command after system parameters have been changed but not saved with confirmed not to EXIT.**

```
>x n
CURRENT SYSTEM PARAMETERS DOES NOT MATCH FLASH CONTENT. CONFIRM EXIT(Y/N): n

E003 INVALID PARAMETER
>
```

**Figure 10-35: Example of response from x n (EXIT) command after system parameters have been changed but not saved with incorrect response to confirmation.**

### 10.12 z (RESTORE TO FACTORY SETTINGS) command

General description: Restores the configuration of the unit to its factory settings.

**Table 10-36: Available z (RESTORE TO FACTORY SETTINGS) commands**

Syntax	Response
<b>z&lt;CR&gt;</b>	Restores the configuration of the unit to its factory settings. <b>NB: The restored configuration will not be permanent unless it is SAVED to flash before EXITing Service Mode, resetting the unit or turning off power.</b>

**Table 10-37: Error messages for z (RESTOR TO FACTORY SETTINGS) command**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Any characters between command and <CR>
E003	INVALID PARAMETER	Value of parameter outside valid range

```
>z
RESTORE TO FACTORY SETTINGS.
CONFIRM CHANGE TO FACTORY SETTINGS (Y/N): Y

APPLYING FACTORY SETTINGS
FACTORY SETTINGS APPLIED. TO PERMANENTLY STORE THE SETTINGS, USE THE SAVE COMMAND.
>
```

**Figure 10-36: Example of response from z (RESTORE TO FACTORY SETTINGS) command with no change in transmission parameters.**

```
>z
RESTORE TO FACTORY SETTINGS.
CONFIRM CHANGE TO FACTORY SETTINGS(Y/N): Y

TRANSMISSION PARAMETERS WILL BE CHANGED. PLEASE CONFIRM (Y/N): Y
THE TRANSMISSION CONFIGURATION WILL BE CHANGED TO:
TRANSMISSION PROTOCOL = 460800 BITS/S, 2 STOP BIT(S), EVEN PARITY

APPLYING FACTORY SETTINGS
FACTORY SETTINGS APPLIED. TO PERMANENTLY STORE THE SETTINGS, USE THE SAVE COMMAND.
>
```

**Figure 10-37: Example of response from z (RESTORE TO FACTORY SETTINGS) command with change in transmission parameters.**

### 10.13 ? (HELP) command

General description: Help function on the available commands in Service Mode.

**Table 10-38: Available ? (HELP) commands**

Syntax	Response
?<CR>	Lists the available parameters for this command
?<SP><hlp><CR>	Responds with information on the specified command

**Table 10-39: Allowed values for <hlp> for ? (HELP) command**

<hlp>	Result
i	Responds with information on the INFORMATION-command
a	Responds with information on the SINGLE-SHOT MEASUREMENT-command
c	Responds with information on the DIAGNOSTIC-command
d	Responds with information on the DATAGRAM FORMAT-command
t	Responds with information on the TRANSMISSION PARAMETERS-command
r	Responds with information on the LINE TERMINATION-command
u	Responds with information on the OUTPUT UNIT-command
f	Responds with information on the LP FILTER -3dB FREQUENCY-command
m	Responds with information on the SAMPLING FREQUENCY-command
s	Responds with information on the SAVE-command
x	Responds with information on the EXIT-command
z	Responds with information on the RESTORE TO FACTORY SETTINGS-command

**Table 10-40: Error messages for ? (HELP) commands**

Error	Message	Possible reason
E001	UNKOWN COMMAND	Command is incorrectly entered
E002	INCORRECT NUMBER OF PARAMETERS	Too many or too few parameters, use of comma between command and first parameter
E003	INVALID PARAMETER	Value of parameter outside valid range

```

>?
AVAILABLE PARAMETERS:
i: LISTS SPECIFIC INFORMATION
a: PERFORMS A SINGLE-SHOT MEASUREMENT
c: PERFORMS A DIAGNOSTIC OF THE UNIT
d: CHANGES DATAGRAM FORMAT
t : CHANGES TRANSMISSION PARAMETERS
r: CHANGES THE LINE TERMINATION
u : CHANGES OUTPUT UNIT
f: CHANGES LP FILTER -3DB FREQUENCY
m: CHANGES SAMPLING FREQUENCY
s: SAVES CONFIGURATION DATA
x: EXITS SERVICE MODE
z: RESTORES FACTORY SETTINGS

>

```

**Figure 10-38: Example of response from ? (HELP) command**

```
>? i
i: LISTS THE PRODUCT CONFIGURATION DATA
i s: RETURNS THE SERIAL NUMBER
i n: RETURNS THE PRODUCT NAME
i x: RETURNS THE PART NUMBER
i h: RETURNS THE HW CONFIGURATION AND REVISION
i p: RETURNS THE FW CONFIGURATION AND REVISION
i m: RETURNS THE SAMPLING FREQUENCY
i f: RETURNS THE LP FILTER -3DB FREQUENCY
i d: RETURNS THE DATAGRAM FORMAT
i t: RETURNS THE TRANSMISSION PARAMETERS
i r: RETURNS THE LINE TERMINATION SETTING
i u: RETURNS THE OUTPUT UNIT
i e: PRINTS THE EXTENDED ERROR INFORMATION FROM THE LAST DETECTED ERROR IN NORMAL MODE

>
```

**Figure 10-39: Example of response from ? i (HELP on INFORMATION) command**

```
>? a
a: PERFORMS A SINGLE-SHOT MEASUREMENT

>
```

**Figure 10-40: Example of response from ? a (HELP ON SINGLE-SHOT MEASUREMENT) command**

```
>? c
c: PERFORMS A DIAGNOSTIC OF THE UNIT

>
```

**Figure 10-41: Example of response from ? c (HELP on DIAGNOSTIC) command**

```
>? d
d s: CHANGES THE CONTENT OF THE DATAGRAMS IN NORMAL MODE TO NORMAL CONTENT
d e: CHANGES THE CONTENT OF THE DATAGRAMS IN NORMAL MODE TO EXTENDED CONTENT
d r: CHANGES THE CONTENT OF THE DATAGRAMS IN NORMAL MODE TO NORMAL CONTENT W.CR+LF TERMINATION

>
```

**Figure 10-42: Example of response from ? d (HELP on OUTPUT UNIT) command**

```
>? t
t <bit rate>: Changes THE BIT RATE [BITS/S]
t <bit rate>,'<stop bits>','<parity>: Changes THE BIT RATE [BITS/S], NUMBER OF STOP BITS AND PARITY
  ALLOWED VALUES FOR <bit rate> = 374400 AND 460800
  ALLOWED VALUES FOR <stop bits> = 1 AND 2
  ALLOWED VALUES FOR <parity> = n (=NONE), e (=EVEN) AND o (=ODD)

>
```

**Figure 10-43: Example of response from ? t (HELP on TRANSMISSION PARAMETERS) command**

```
>? r
r 0: Sets LINE TERMINATION TO OFF
r 1: Sets LINE TERMINATION TO ON

>
```

**Figure 10-44: Example of response from ? r (HELP on LINE TERMINATION) command**

```
>? u
u a: CHANGES OUTPUT UNIT TO ANGULAR RATE [°/S]
u i: CHANGES OUTPUT UNIT TO INCREMENTAL ANGLE [°/SAMPLE]

>
```

**Figure 10-45: Example of response from ? u (HELP on OUTPUT UNIT) command**

```
>? f
f <-3dBfreq>: CHANGES THE LP FILTER -3DB FREQUENCY [HZ] FOR ALL AXES
f <-3dBfreq>',<axis>: CHANGES THE LP FILTER -3DB FREQUENCY [HZ] FOR A SPECIFIC AXIS
  ALLOWED VALUES FOR <-3dBfreq> = 16, 33, 66, 131 AND 262
  ALLOWED VALUES FOR <axis> = x, y AND z
>
```

Figure 10-46: Example of response from ? f (HELP on LP FILTER -3dB FREQUENCY) command

```
>? m
m <sampl.freq>: Changes THE SAMPLING FREQUENCY [SAMPLES/S]
  ALLOWED VALUES FOR <sampl.freq> = 125, 250, 500, AND 1000
>
```

Figure 10-47: Example of response from ? m (HELP on SAMPLING FREQUENCY) command

```
>? s
s: SAVES SYSTEM PARAMETERS TO FLASH
>
```

Figure 10-48: Example of response from ? s (HELP on SAVE) command

```
>? x
x n: EXITS SERVICE MODE AND RETURNS TO NORMAL MODE
x i: EXITS SERVICE MODE AND RETURNS TO INIT MODE
x N: EXITS SERVICE MODE AND RETURNS IMMEDIATELY TO NORMAL MODE
x I: EXITS SERVICE MODE AND RETURNS IMMEDIATELY TO INIT MODE
NB: NON-MAVED SYSTEM PARAMETERS WILL BE OVERWRITTEN BY STORED CONTENT IN FLASH
  WHEN EXITING TO INIT MODE
>
```

Figure 10-49: Example of response from ? x (HELP on EXIT) command

### 11 MARKING

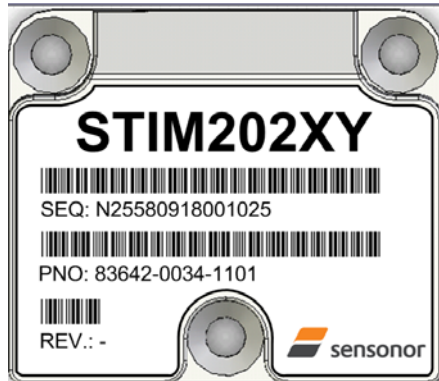
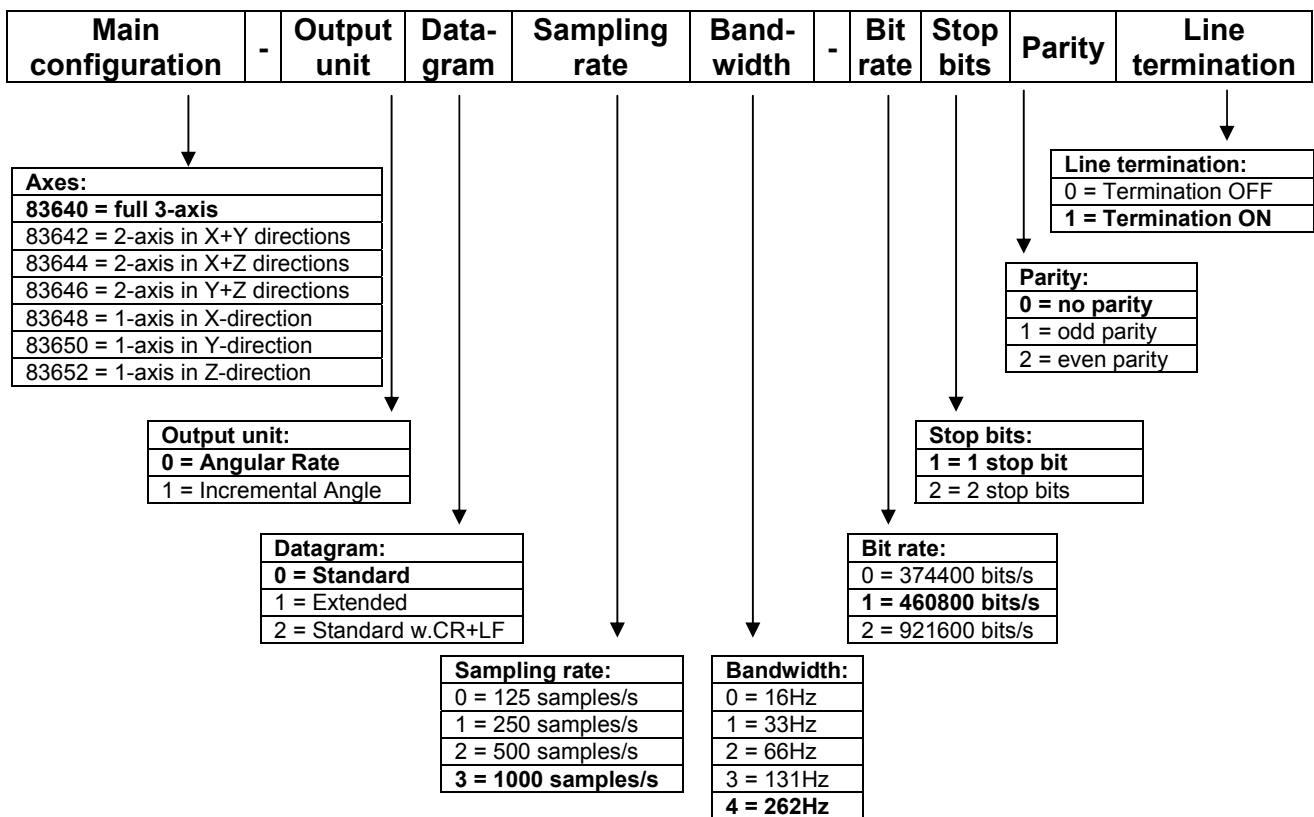


Figure 11-1: Example of marking of STIM202

### 12 PART NUMBER / ORDERING INFORMATION

Configuration options in **bold** letters are the standard option.



Example: part number 83640-0032-1211 has the following configuration:

- X, Y and Z-axis
- Angular Rate Output [°/s]
- Standard Datagram
- 1000 samples/s
- -3dB bandwidth = 66Hz
- Bit rate = 460800 bits/s
- 2 stop bits
- Odd parity
- Line termination ON

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