# Avionics Reference Document

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- ${\bf 1.3}\quad {\bf Definitions}\ {\bf and}\ {\bf Acronyms}$

## 2 Hardware

## 2.1 Pressure

Measurement	HE Tank Pressure
Extension board #	2
Model #	MLH05KPSB01G
Link	Mouser Page
Range	0 psig to 5000 psig
Accuracy	$\pm 0.25\%$
Temperature range	-40°C to +125°C
Input Voltage	8VDC to 30VDC
Output	1VDC to 5VDC
Data Rate	50Hz

## 2.2 Temperature

## 2.3 Electrical

## 2.4 Mechanical

# 3 EEPROM Layouts

# 3.1 Layout Version IDs

VersionID	Version Name
1	Sensor Board Layout Rev 1
2	Power Distro Board Layout Rev 1

## 3.2 Sensor Board Layout Rev 1

		Sensor Bo	ard Layout Rev 1 Page #0	)	
Byte #	Usage	Byte #	Usage	Byte #	Usage
0 1 2 3	Layout Rev Number	48 49 50 51	PT0 Polyfit p2	96 97 98 99	PT1 Current CanID
4 5 6 7	EEPROM Layout Compile Time	52 53 54 55	PT0 Polyfit p3	100 101 102 103	PT1 Max Voltage
8 9 10 11	Board Status	56 57 58 59	PT0 Polyfit p4	104 105 106 107	PT1 Min Voltage
12 13 14 15	Board VIN Voltage CanID	60 61 62 63	PT0 Polyfit p5	108 109 110 111	PT1 Max Value
16 17 18 19	Board current CanID	64 65 66 67	PT0 Polyfit p6	112 113 114 115	PT1 Min Value
20 21 22 23	PT0 Data CanID	68 69 70 71	PT0 Polyfit p7	116 117 118 119	PT1 Polyfit p1
24 25 26 27	PT0 Current CanID	72 73 74 75	PT0 Biquad Filter b0	120 121 122 123	PT1 Polyfit p2
28 29 30 31	PT0 Max Voltage	76 77 78 79	PT0 Biquad Filter b1	124 125 126 127	PT1 Polyfit p3
32 33 34 35	PT0 Min Voltage	80 81 82 83	PT0 Biquad Filter b2		
36 37 38 39	PT0 Max Value	84 85 86 87	PT0 Biquad Filter a1		
40 41 42 43	PT0 Min Value	88 89 90 91	PT0 Biquad Filter a2		
44 45 46 47	PT0 Polyfit p1	92 93 94 95	PT1 Data CanID		

		Sensor Bo	ard Layout Rev 1 Page #1		
Byte #	Usage	Byte #	Usage	Byte #	Usage
128 129 130 131	PT1 Polyfit p4	176 177 178 179	PT1 Min Voltage	224 225 226 227	PT1 Biquad Filter b2
132 133 134 135	PT1 Polyfit p5	180 181 182 183	PT1 Max Value	228 229 230 231	PT1 Biquad Filter a1
136 137 138 139	PT1 Polyfit p6	184 185 186 187	PT1 Min Value	232 233 234 235	PT1 Biquad Filter a2
140 141 142 143	PT1 Polyfit p7	188 189 190 191	PT1 Polyfit p1	236 237 238 239	Hall Effect 0 Data CanID
144 145 146 147	PT1 Biquad Filter b0	192 193 194 195	PT1 Polyfit p2	240 241 242 243	Hall Effect 0 Current CanID
148 149 150 151	PT1 Biquad Filter b1	196 197 198 199	PT1 Polyfit p3	244 245 246 247	Hall Effect 1 Data CanID
152 153 154 155	PT1 Biquad Filter b2	200 201 202 203	PT1 Polyfit p4	248 249 250 251	Hall Effect 1 Current CanID
156 157 158 159	PT1 Biquad Filter a1	204 205 206 207	PT1 Polyfit p5	252 253 254 255	Hall Effect 2 Data CanID
160 161 162 163	PT1 Biquad Filter a2	208 209 210 211	PT1 Polyfit p6		
164 165 166 167	PT2 Data CanID	212 213 214 215	PT1 Polyfit p7		
168 169 170 171	PT2 Current CanID	216 217 218 219	PT1 Biquad Filter b0		
172 173 174 175	PT1 Max Voltage	220 221 222 223	PT1 Biquad Filter b1		

	Sensor Board Layout Rev 1 Page #2									
Byte #	Usage	Byte #	Usage	Byte #	Usage					
256 257 258 259	Hall Effect 2 Current CanID	304 305 306 307	TC1 Biquad Filter a2	352 353 354 355	RTD1 Biquad Filter a2					
260 261 262 263	TC0 Data CanID	308 309 310 311	RTD0 Data CanID	356 357 358 359						
264 265 266 267	TC0 Biquad Filter b0	312 313 314 315	RTD0 Biquad Filter b0	360 361 362 363						
268 269 270 271	TC0 Biquad Filter b1	316 317 318 319	RTD0 Biquad Filter b1	364 365 366 367						
272 273 274 275	TC0 Biquad Filter b2	320 321 322 323	RTD0 Biquad Filter b2	368 369 370 371						
276 277 278 279	TC0 Biquad Filter	324 325 326 327	RTD0 Biquad Filter a1	372 373 374 375						
280 281 282 283	TC0 Biquad Filter a2	328 329 330 331	RTD0 Biquad Filter a2	376 377 378 379						
284 285 286 287	TC1 Data CanID	332 333 334 335	RTD1 Data CanID	380 381 382 383						
288 289 290 291	TC1 Biquad Filter b0	336 337 338 339	RTD1 Biquad Filter b0							
292 293 294 295	TC1 Biquad Filter b1	340 341 342 343	RTD1 Biquad Filter b1							
296 297 298 299	TC1 Biquad Filter b2	344 345 346 347	RTD1 Biquad Filter b2							
300 301 302 303	TC1 Biquad Filter a1	348 349 350 351	RTD1 Biquad Filter a1							

## ${\bf 3.3} \quad {\bf Power~Distro~Board~Layout~Rev~1}$

	Power Distro Board Layout Rev 1 Page #0							
Byte #	Usage	Byte #	Usage	Byte #	Usage			
0		48		96				
1	Board Status	49		97				
2	Board Status	50		98				
3		51		99				
4		52		100				
5	Offboard Battery	53		101				
6	Voltage CANID	54		102				
7	_	55		103				
8		56		104				
9	Offboard Battery	57		105				
10	Current CANID	58		106				
11		59		107				
12		60		108				
13	Onboard Battery	61		109				
14	Voltage CANID	62		110				
15		63		111				
16		64		112				
17	Onboard Battery	65		113				
18	Current CANID	66		114				
19		67		115				
20		†† 68		116				
21	Helix Loop CW	69		117				
22	Voltage CANID	70		118				
23		71		119				
24		$\dagger$ 72		120				
25	Helix Loop CW	73		121				
26	Current CANID	74		122				
27	0 3311 3311 0 1 1 1 1 1	75		123				
28		†† 76		124				
29	Helix Loop CCW	77		125				
30	Voltage CANID	78		126				
31		79		127				
32		H 80						
33	Helix Loop CCW	81						
34	Current CANID	82						
35		83						
36		84						
37		85						
38		86						
39		87						
40		88						
41		89						
42		90						
43		91						
44		92						
45		93						
46		94						
47		95						
		11 00		1	I			

## 4 CAN IDs

## 4.1 ID 0 - Clock Sync

Frequency: 50Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False	0 to 4294967295	Milliseconds	UTC time

## 4.2 ID 1 - Emergency Signal

Frequency: 50Hz

Byte	Bit	Signed	Range	Units	Description
0		False			Status
	0-1				System Status

#### 4.3 ID 100 - Helium Pressure

Frequency: 50Hz

	Byte	Bit	Signed	Range	Units	Description
ſ	0-3		False		Milliseconds	UTC time
	4-5		False		PSIG	Helium Pressure

#### 4.4 ID 101 - Lox Pressure

Frequency: 50Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		False		PSIG	LOX Pressure

### 4.5 ID 102 - Methane Pressure

Frequency: 50Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		False		PSIG	Methane Pressure

#### 4.6 ID 103 - Chamber Pressure

Frequency:  $50 \mathrm{Hz}$ 

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		False		PSIG	Chamber Pressure

### 4.7 ID 200 - Helium Fill Valve

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4		False		Open/Closed	Helium Fill Valve State

#### 4.8 ID 201 - LOX Fill Valve

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4		False		Open/Closed	LOX Fill Valve State

### 4.9 ID 202 - Methane Fill Valve

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4		False		Open/Closed	Methane Fill Valve State

## 4.10 ID 300 - Helium Tank Temperature

Frequency: 10Hz

	Byte	Bit	Signed	Range	Units	Description
ĺ	0-3		False		Milliseconds	UTC time
ĺ	4-5		True		Celcius	Helium Tank Temperature

### 4.11 ID 301 - LOX Tank Temperature

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		Celcius	LOX Tank Temperature

## 4.12 ID 302 - Methane Tank Temperature

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		Celcius	Methane Tank Temperature

### 4.13 ID 303 - Nozzle Temperature

Frequency: 10Hz

1					
Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		Celcius	Nozzle Temperature

#### 4.14 ID 304 - Upper Air Frame Temperature

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		Celcius	Upper Air Frame Temperature

#### 4.15 ID 400 - Helium PT Current

Frequency: 10Hz

By	yte	Bit	Signed	Range	Units	Description
0-	3		False		Milliseconds	UTC time
4-	5		True		milliamps	Helium PT Current

#### 4.16 ID 401 - LOX PT Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	LOX PT Current

### 4.17 ID 402 - Methane PT Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	Methane PT Current

### 4.18 ID 403 - Chamber PT Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	Chamber PT Current

#### 4.19 ID 404 - Helium Fill Hall Effect Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	Helium Fill Hall Effect Current

#### 4.20 ID 405 - LOX Fill Hall Effect Current

Frequency: 10Hz

Byte	Bit	Signed	Range	Units	Description
0-3		False		Milliseconds	UTC time
4-5		True		milliamps	LOX Fill Hall Effect Current

#### 4.21 ID 406 - Methane Fill Hall Effect Current

Frequency: 10Hz

_ =	1·						
	Byte	Bit	Signed	Range	Units	Description	
ſ	0-3		False		Milliseconds	UTC time	
ſ	4-5		True		milliamps	Methane Fill Hall Effect Current	