

# USB Parameter Transmission Record

## Address 219: Hall Sensor Control Parameters (oHs\_Ctrl\_para)

FPGA Side (USB3\_Decoder.sv)

**Definition:** output reg [31:0] oHs\_Ctrl\_para[27:0]

Software Side (PT3DView.cpp - SendHsCtrlPara function)

**Parameter Transmission Structure:**

### Index 0-5: Feedforward Gain Values

- oHs\_Ctrl\_para[0] = 0.5715942857
- oHs\_Ctrl\_para[1] = 0.5831857143
- oHs\_Ctrl\_para[2] = 0.5945000000
- oHs\_Ctrl\_para[3] = 0.5389285714
- oHs\_Ctrl\_para[4] = 0.6081000000
- oHs\_Ctrl\_para[5] = 0.5622300000

### Index 6-11: Proportional Gain (P-Gain) Default: 8.0

- oHs\_Ctrl\_para[6] = m\_hs\_pgain0
- oHs\_Ctrl\_para[7] = m\_hs\_pgain1
- oHs\_Ctrl\_para[8] = m\_hs\_pgain2
- oHs\_Ctrl\_para[9] = m\_hs\_pgain3
- oHs\_Ctrl\_para[10] = m\_hs\_pgain4
- oHs\_Ctrl\_para[11] = m\_hs\_pgain5

### Index 12-17: Integral Gain (I-Gain) Default: 20000.0

- oHs\_Ctrl\_para[12] = m\_hs\_igain0
- oHs\_Ctrl\_para[13] = m\_hs\_igain1
- oHs\_Ctrl\_para[14] = m\_hs\_igain2
- oHs\_Ctrl\_para[15] = m\_hs\_igain3
- oHs\_Ctrl\_para[16] = m\_hs\_igain4
- oHs\_Ctrl\_para[17] = m\_hs\_igain5

### Index 18-23: Derivative Gain (D-Gain) Default: 0.0

- oHs\_Ctrl\_para[18] = m\_hs\_dgain0
- oHs\_Ctrl\_para[19] = m\_hs\_dgain1
- oHs\_Ctrl\_para[20] = m\_hs\_dgain2
- oHs\_Ctrl\_para[21] = m\_hs\_dgain3
- oHs\_Ctrl\_para[22] = m\_hs\_dgain4
- oHs\_Ctrl\_para[23] = m\_hs\_dgain5

### Index 24-26: Timing Parameters

- oHs\_Ctrl\_para[24] = HsCtrl\_SplIntv =  $1.0 / 100000.0$  (10  $\mu$ s sampling interval)
- oHs\_Ctrl\_para[25] = HsCtrl\_SplIntvO2 =  $HsCtrl\_SplIntv / 2.0$  (5  $\mu$ s)
- oHs\_Ctrl\_para[26] = HsVd\_LPF\_tau =  $1.0 / 10000$  (Low-pass filter time constant)

### Index 27: Control Rate

- oHs\_Ctrl\_para[27] = mHsCtrl\_Rate (sent via address 219 + 27×256)

## DC Matrix

### Long Fei diag norm 1

[0.4820	0.0398	0.0691	0.1061	0.0968	0.0638]
[0.0572	0.3142	0.1288	0.0722	0.0565	0.1342]
[0.0676	0.0916	0.4596	0.0468	0.0830	0.0714]
[0.1267	0.0607	0.0568	0.3803	0.0597	0.1233]
[0.1358	0.0568	0.1200	0.0711	0.3114	0.0559]
[0.0630	0.0955	0.0709	0.1025	0.0378	0.4648]

## Commented

### Long Fei

[0.7143	0.0590	0.1024	0.1572	0.1435	0.0945]
[0.0848	0.4656	0.1908	0.1069	0.0837	0.1989]
[0.1001	0.1357	0.6811	0.0694	0.1230	0.1057]
[0.1877	0.0900	0.0842	0.5635	0.0885	0.1827]
[0.2013	0.0842	0.1778	0.1054	0.4614	0.0828]
[0.0934	0.1416	0.1050	0.1519	0.0561	0.6888]

### Long Fei sqrt(6) diag

[1.1808	0.0975	0.1693	0.2599	0.2372	0.1563]
[0.1401	0.7697	0.3155	0.1768	0.1384	0.3288]
[0.1655	0.2243	1.1259	0.1147	0.2033	0.1748]
[0.3102	0.1488	0.1391	0.9315	0.1462	0.3020]
[0.3327	0.1392	0.2939	0.1743	0.7627	0.1369]
[0.1544	0.2340	0.1736	0.2510	0.0927	1.1386]

### merge V

[6.1443	3.1508	2.1931	4.2687	3.9656	2.8689]
[1.6102	4.3544	2.0024	2.7619	3.0089	1.8570]
[1.6713	2.6581	3.9047	2.3873	2.8106	1.9231]
[2.2566	3.2604	1.7581	5.8801	3.9727	2.3370]
[1.6065	2.2319	1.2178	2.5866	4.1330	1.4273]
[1.3310	1.7212	1.2701	1.6959	1.6841	3.8716]

### merge V normalized

[0.5219	0.2676	0.1863	0.3626	0.3368	0.2437]
[0.1368	0.3699	0.1701	0.2346	0.2556	0.1577]
[0.1420	0.2258	0.3317	0.2028	0.2387	0.1633]
[0.1917	0.2769	0.1493	0.4995	0.3374	0.1985]
[0.1365	0.1896	0.1034	0.2197	0.3511	0.1212]
[0.1131	0.1462	0.1079	0.1441	0.1430	0.3289]

### merge V normalized sqrt(6)

[1.2784	0.6556	0.4563	0.8881	0.8251	0.5969]
[0.3350	0.9060	0.4166	0.5746	0.6260	0.3864]
[0.3477	0.5530	0.8124	0.4967	0.5848	0.4001]
[0.4695	0.6784	0.3658	1.2234	0.8266	0.4862]
[0.3342	0.4644	0.2534	0.5382	0.8599	0.2970]
[0.2769	0.3581	0.2643	0.3529	0.3504	0.8055]

**pulse V positive 333 normalized**

[0.3655	0.1003	0.0868	0.1846	0.1858	0.1562]
[0.0671	0.2665	0.0719	0.1040	0.1321	0.0985]
[0.3534	0.5417	0.5800	0.4935	0.5597	0.4037]
[0.1077	0.1514	0.1094	0.3045	0.1289	0.0963]
[0.1529	0.2152	0.1349	0.2299	0.3910	0.0721]
[0.2462	0.3461	0.2433	0.3566	0.3538	0.4620]

**pulse V positive 333 normalized sqrt(6)**

[0.8952	0.2456	0.2125	0.4522	0.4551	0.3827]
[0.1644	0.6527	0.1760	0.2547	0.3236	0.2414]
[0.8656	1.3268	1.4206	1.2088	1.3709	0.9888]
[0.2637	0.3708	0.2679	0.7459	0.3158	0.2360]
[0.3745	0.5272	0.3305	0.5631	0.9577	0.1767]
[0.6031	0.8478	0.5959	0.8734	0.8666	1.1317]

**pulse V positive 333 negative 111 normalized**

[0.3618	-0.015	0.0099	0.0396	0.0542	0.0567]
[0.0315	0.3464	0.0426	0.0998	0.1226	0.0534]
[0.1115	0.1454	0.4318	0.0866	0.1250	0.1290]
[0.1175	0.1872	0.0826	0.4525	0.1882	0.0834]
[0.1147	0.1697	0.0842	0.1859	0.4133	0.0347]
[0.1101	0.1234	0.0960	0.1302	0.1018	0.4326]

**pulse V positive 333 negative 111 normalized sqrt(6)**

[0.8862	-0.037	0.0243	0.0969	0.1329	0.1388]
[0.0771	0.8485	0.1042	0.2444	0.3002	0.1309]
[0.2732	0.3561	1.0577	0.2120	0.3063	0.3160]
[0.2877	0.4586	0.2024	1.1084	0.4609	0.2044]
[0.2809	0.4156	0.2062	0.4554	1.0124	0.0851]
[0.2698	0.3022	0.2350	0.3188	0.2494	1.0596]

**pulse V positive 111 negative 333 normalized**

[0.3669	-0.044	-0.025	0.0717	0.0539	0.0662]
[0.0423	0.4385	0.0422	0.1443	0.1714	0.0926]
[0.0006	-0.006	0.3162	-0.125	-0.046	0.0282]
[0.0991	0.1659	0.0501	0.4623	0.1461	0.0854]
[0.0542	0.1006	0.0177	0.1124	0.3488	-0.067]
[0.1161	0.1371	0.1107	0.1450	0.1106	0.4875]

**pulse V positive 111 negative 333 normalized sqrt(6)**

[0.8987	-0.108	-0.062	0.1756	0.1320	0.1621]
[0.1037	1.0741	0.1033	0.3533	0.4199	0.2268]
[0.0015	-0.015	0.7746	-0.306	-0.113	0.0692]
[0.2428	0.4064	0.1227	1.1324	0.3578	0.2091]
[0.1328	0.2464	0.0433	0.2753	0.8545	-0.163]
[0.2845	0.3359	0.2712	0.3551	0.2709	1.1941]