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Certificate of Calibration

Certificate Number: 8898

Calibration Date: 20Sep12

Model ADC-24

Serial Number: ZNR28/050

Invoice/Report No: 77185/22368

Calibration Reference: 34401A Agilent Multimeter s/n MY47022183

Accreditations & Procedure

The following measurements were carried out using working standards which are periodically verified, and are traceable to National Standards where these exist.

This calibration was conducted within the environmental range for accurate readings.

Results on receipt – no adjustment necessary ☐

Results on receipt prior to adjustment ☐

Results after adjustment ☒

ADC-24

Summary of Results

Channel	Worst Case (%)	Range	Limits
1	0.0060	±625mV	0.1%
3	0.0056	±625mV	0.1%
5	0.0058	±625mV	0.1%
7	0.0052	±1250mV	0.1%
9	0.0055	±1250mV	0.1%
11	0.0052	±1250mV	0.1%
13	0.0051	±1250mV	0.1%
15	0.0052	±1250mV	0.1%

Calibrated Signature:

Alan Tong ☒

Adrian Lawes ☐

Checked Signature:

Brian Fosh ☒

Differential Pair: Channel 1 and 2

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.8784	2250.4309	0.5525	0.0246	-2250.0825	-2250.8262	-0.7437	0.0331	0.2±500uV	2.3842	±500uV
±1250	1124.9711	1124.9088	-0.0623	0.0055	-1125.1713	-1125.1251	0.0461	0.0041	0.1±35uV	-0.7451	±36uV
±625	562.4905	562.4568	-0.0337	0.0060	-562.6699	-562.6464	0.0236	0.0042	0.1±19uV	-0.4470	±20uV
±303	281.2306	281.2174	-0.0131	0.0047	-281.4110	-281.4043	0.0067	0.0024	0.1±13uV	-0.0373	±13uV
±156	140.6761	140.6708	-0.0053	0.0038	-140.8590	-140.8582	0.0008	0.0006	0.1±8uV	0.1118	±9uV
±78	70.3097	70.3081	-0.0016	0.0023	-70.3166	-70.3140	0.0026	0.0038	0.1±7uV	0.2049	±7uV
±39	35.1484	35.1479	-0.0005	0.0015	-35.1623	-35.1609	0.0014	0.0039	0.1±6uV	0.1630	±6uV

Differential Pair: Channel 3 and 4

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.8784	2250.3430	0.4646	0.0206	-2250.0825	-2250.6609	-0.5784	0.0257	0.2±500uV	-0.5960	±500uV
±1250	1124.9711	1124.9098	-0.0613	0.0054	-1125.1713	-1125.1254	0.0459	0.0041	0.1±35uV	-0.8941	±36uV
±625	562.4905	562.4589	-0.0316	0.0056	-562.6699	-562.6514	0.0186	0.0033	0.1±19uV	-0.0745	±20uV
±303	281.2306	281.2184	-0.0121	0.0043	-281.4110	-281.4025	0.0085	0.0030	0.1±13uV	-0.0745	±13uV
±156	140.6761	140.6714	-0.0047	0.0034	-140.8590	-140.8557	0.0033	0.0024	0.1±8uV	0.1490	±9uV
±78	70.3097	70.3080	-0.0017	0.0024	-70.3166	-70.3140	0.0026	0.0037	0.1±7uV	0.1770	±7uV
±39	35.1484	35.1477	-0.0007	0.0019	-35.1623	-35.1611	0.0012	0.0034	0.1±6uV	0.1770	±6uV

Differential Pair: Channel 5 and 6

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.8784	2250.2800	0.4016	0.0179	-2250.0825	-2250.5542	-0.4717	0.0210	0.2±500uV	0.5960	±500uV
±1250	1124.9711	1124.9119	-0.0592	0.0053	-1125.1713	-1125.1241	0.0471	0.0042	0.1±35uV	-0.7451	±36uV
±625	562.4905	562.4576	-0.0329	0.0058	-562.6699	-562.6481	0.0218	0.0039	0.1±19uV	-0.4470	±20uV
±303	281.2306	281.2177	-0.0129	0.0046	-281.4110	-281.4023	0.0087	0.0031	0.1±13uV	-0.0745	±13uV
±156	140.6761	140.6714	-0.0048	0.0034	-140.8590	-140.8562	0.0029	0.0020	0.1±8uV	0.0931	±9uV
±78	70.3097	70.3080	-0.0017	0.0024	-70.3166	-70.3142	0.0024	0.0035	0.1±7uV	0.1397	±7uV
±39	35.1484	35.1477	-0.0007	0.0019	-35.1623	-35.1613	0.0010	0.0029	0.1±6uV	0.1770	±6uV

Differential Pair: Channel 7 and 8

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.8784	2250.2097	0.3313	0.0147	-2250.0825	-2250.4631	-0.3806	0.0169	0.2±500uV	-2.3842	±500uV
±1250	1124.9711	1124.9122	-0.0588	0.0052	-1125.1713	-1125.1287	0.0426	0.0038	0.1±35uV	-0.4470	±36uV
±625	562.4905	562.4620	-0.0284	0.0051	-562.6699	-562.6479	0.0220	0.0039	0.1±19uV	-0.2980	±20uV
±303	281.2306	281.2191	-0.0114	0.0041	-281.4110	-281.4012	0.0098	0.0035	0.1±13uV	-0.2608	±13uV
±156	140.6761	140.6723	-0.0039	0.0027	-140.8590	-140.8565	0.0025	0.0018	0.1±8uV	0.1863	±9uV
±78	70.3097	70.3076	-0.0020	0.0029	-70.3166	-70.3142	0.0025	0.0035	0.1±7uV	0.1770	±7uV
±39	35.1484	35.1475	-0.0009	0.0024	-35.1623	-35.1613	0.0010	0.0028	0.1±6uV	0.2608	±6uV

Differential Pair: Channel 9 and 10

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.8784	2250.1541	0.2756	0.0123	-2250.0825	-2250.3765	-0.2939	0.0131	0.2±500uV	1.1921	±500uV
±1250	1124.9711	1124.9093	-0.0618	0.0055	-1125.1713	-1125.1271	0.0442	0.0039	0.1±35uV	-0.2980	±36uV
±625	562.4905	562.4637	-0.0268	0.0048	-562.6699	-562.6483	0.0217	0.0039	0.1±19uV	-0.4470	±20uV
±303	281.2306	281.2197	-0.0108	0.0039	-281.4110	-281.4007	0.0103	0.0037	0.1±13uV	-0.1118	±13uV
±156	140.6761	140.6723	-0.0039	0.0027	-140.8590	-140.8550	0.0041	0.0029	0.1±8uV	0.1304	±9uV
±78	70.3097	70.3077	-0.0020	0.0028	-70.3166	-70.3144	0.0022	0.0031	0.1±7uV	0.1024	±7uV
±39	35.1484	35.1474	-0.0010	0.0028	-35.1623	-35.1617	0.0006	0.0018	0.1±6uV	0.1723	±6uV

Differential Pair: Channel 11 and 12

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.8784	2250.1125	0.2341	0.0104	-2250.0825	-2250.3196	-0.2371	0.0105	0.2±500uV	2.3842	±500uV
±1250	1124.9711	1124.9130	-0.0581	0.0052	-1125.1713	-1125.1293	0.0420	0.0037	0.1±35uV	-0.8941	±36uV
±625	562.4905	562.4655	-0.0250	0.0044	-562.6699	-562.6497	0.0202	0.0036	0.1±19uV	-0.1490	±20uV
±303	281.2306	281.2189	-0.0116	0.0041	-281.4110	-281.4038	0.0072	0.0026	0.1±13uV	-0.1118	±13uV
±156	140.6761	140.6719	-0.0042	0.0030	-140.8590	-140.8539	0.0051	0.0036	0.1±8uV	0.0186	±9uV
±78	70.3097	70.3074	-0.0023	0.0032	-70.3166	-70.3145	0.0022	0.0031	0.1±7uV	0.0931	±7uV
±39	35.1484	35.1472	-0.0012	0.0035	-35.1623	-35.1618	0.0005	0.0014	0.1±6uV	0.1164	±6uV

Differential Pair: Channel 13 and 14

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.8784	2250.0652	0.1868	0.0083	-2250.0825	-2250.2686	-0.1860	0.0083	0.2±500uV	-0.8941	±500uV
±1250	1124.9711	1124.9136	-0.0575	0.0051	-1125.1713	-1125.1289	0.0424	0.0038	0.1±35uV	-0.7451	±36uV
±625	562.4905	562.4625	-0.0280	0.0050	-562.6699	-562.6504	0.0195	0.0035	0.1±19uV	-0.2235	±20uV
±303	281.2306	281.2207	-0.0098	0.0035	-281.4110	-281.4035	0.0075	0.0027	0.1±13uV	-0.0745	±13uV
±156	140.6761	140.6719	-0.0042	0.0030	-140.8590	-140.8533	0.0058	0.0041	0.1±8uV	0.0745	±9uV
±78	70.3097	70.3074	-0.0022	0.0032	-70.3166	-70.3147	0.0020	0.0028	0.1±7uV	0.0466	±7uV
±39	35.1484	35.1470	-0.0014	0.0039	-35.1623	-35.1620	0.0003	0.0009	0.1±6uV	0.1863	±6uV

Differential Pair: Channel 15 and 16

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.8784	2250.0322	0.1538	0.0068	-2250.0825	-2250.2200	-0.1375	0.0061	0.2±500uV	-0.2980	±500uV
±1250	1124.9711	1124.9131	-0.0580	0.0052	-1125.1713	-1125.1260	0.0453	0.0040	0.1±35uV	-0.8941	±36uV
±625	562.4905	562.4646	-0.0259	0.0046	-562.6699	-562.6503	0.0196	0.0035	0.1±19uV	-0.3725	±20uV
±303	281.2306	281.2195	-0.0110	0.0039	-281.4110	-281.4025	0.0085	0.0030	0.1±13uV	-0.1863	±13uV
±156	140.6761	140.6734	-0.0027	0.0019	-140.8590	-140.8546	0.0044	0.0031	0.1±8uV	0.0559	±9uV
±78	70.3097	70.3073	-0.0024	0.0034	-70.3166	-70.3148	0.0018	0.0026	0.1±7uV	0.0466	±7uV
±39	35.1484	35.1469	-0.0014	0.0041	-35.1623	-35.1621	0.0003	0.0007	0.1±6uV	0.1118	±6uV

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Certificate of Calibration

Certificate Number: 8897

Calibration Date: 20Sep12

Model ADC-24

Serial Number: ZNR28/050

Invoice/Report No: 77185/22368

Calibration Reference: Keithley 2100 Multimeter s/n MY4702218

Accreditations & Procedure

The following measurements were carried out using working standards which are periodically verified, and are traceable to National Standards where these exist.

This calibration was conducted within the environmental range for accurate readings.

- ☐ Results on receipt – no adjustment necessary
- ☒ Results on receipt prior to adjustment
- ☐ Results after adjustment

ADC-24 Summary of Results

Channel	Worst Case (%)	Range	Limits
1	0.0161	±1250mV	0.1%
3	0.0162	±1250mV	0.1%
5	0.0161	±1250mV	0.1%
7	0.0161	±1250mV	0.1%
9	0.0161	±1250mV	0.1%
11	0.0162	±1250mV	0.1%
13	0.0160	±1250mV	0.1%
15	0.0161	±1250mV	0.1%

Calibrated Signature: Edwards ☐ Alan Tong ☐ Adrian Lawes ☐ Checked Signature: Brian Fosh ☒ Brian Fosh

Differential Pair: Channel 1 and 2

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.9724	2251.3188	1.3464	0.0598	-2249.9954	-2251.5122	-1.5168	0.0674	0.2±500uV	14.9012	±500uV
±1250	1125.0840	1125.1938	0.1099	0.0098	-1125.1024	-1125.2831	-0.1807	0.0161	0.1±35uV	-14.0071	±36uV
±625	562.5867	562.6484	0.0616	0.0110	-562.6181	-562.7008	-0.0827	0.0147	0.1±19uV	-4.9919	±20uV
±303	281.3249	281.3575	0.0326	0.0116	-281.3607	-281.4048	-0.0442	0.0157	0.1±13uV	-2.9802	±13uV
±156	140.7684	140.7840	0.0156	0.0111	-140.8039	-140.8202	-0.0163	0.0116	0.1±8uV	0.1118	±9uV
±78	70.3060	70.3149	0.0089	0.0127	-70.3253	-70.3306	-0.0053	0.0076	0.1±7uV	0.8661	±7uV
±39	35.1431	35.1487	0.0056	0.0160	-35.1701	-35.1708	-0.0007	0.0019	0.1±6uV	1.5367	±6uV

Differential Pair: Channel 3 and 4

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.9724	2251.2273	1.2549	0.0558	-2249.9954	-2251.3564	-1.3611	0.0605	0.2±500uV	13.1130	±500uV
±1250	1125.0840	1125.1940	0.1100	0.0098	-1125.1024	-1125.2849	-0.1825	0.0162	0.1±35uV	-13.5601	±36uV
±625	562.5867	562.6499	0.0632	0.0112	-562.6181	-562.7000	-0.0818	0.0145	0.1±19uV	-4.8429	±20uV
±303	281.3249	281.3578	0.0329	0.0117	-281.3607	-281.4026	-0.0420	0.0149	0.1±13uV	-2.9057	±13uV
±156	140.7684	140.7857	0.0173	0.0123	-140.8039	-140.8217	-0.0178	0.0126	0.1±8uV	0.0373	±9uV
±78	70.3060	70.3148	0.0088	0.0125	-70.3253	-70.3307	-0.0053	0.0076	0.1±7uV	0.9313	±7uV
±39	35.1431	35.1487	0.0056	0.0160	-35.1701	-35.1709	-0.0008	0.0022	0.1±6uV	1.5600	±6uV

Differential Pair: Channel 5 and 6

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.9724	2251.1714	1.1990	0.0533	-2249.9954	-2251.2576	-1.2622	0.0561	0.2±500uV	14.9012	±500uV
±1250	1125.0840	1125.1964	0.1124	0.0100	-1125.1024	-1125.2837	-0.1813	0.0161	0.1±35uV	-14.1561	±36uV
±625	562.5867	562.6467	0.0600	0.0107	-562.6181	-562.6989	-0.0808	0.0144	0.1±19uV	-5.0664	±20uV
±303	281.3249	281.3578	0.0330	0.0117	-281.3607	-281.4009	-0.0403	0.0143	0.1±13uV	-2.8685	±13uV
±156	140.7684	140.7881	0.0196	0.0140	-140.8039	-140.8210	-0.0171	0.0122	0.1±8uV	0.0000	±9uV
±78	70.3060	70.3151	0.0090	0.0128	-70.3253	-70.3308	-0.0055	0.0078	0.1±7uV	0.9034	±7uV
±39	35.1431	35.1483	0.0052	0.0148	-35.1701	-35.1711	-0.0009	0.0026	0.1±6uV	1.5134	±6uV

Differential Pair: Channel 7 and 8

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.9724	2251.1021	1.1296	0.0502	-2249.9954	-2251.1689	-1.1736	0.0522	0.2±500uV	11.9209	±500uV
±1250	1125.0840	1125.1968	0.1128	0.0100	-1125.1024	-1125.2836	-0.1812	0.0161	0.1±35uV	-13.5601	±36uV
±625	562.5867	562.6494	0.0627	0.0111	-562.6181	-562.7026	-0.0845	0.0150	0.1±19uV	-5.0664	±20uV
±303	281.3249	281.3579	0.0331	0.0118	-281.3607	-281.4018	-0.0411	0.0146	0.1±13uV	-2.9430	±13uV
±156	140.7684	140.7858	0.0174	0.0123	-140.8039	-140.8208	-0.0169	0.0120	0.1±8uV	0.0373	±9uV
±78	70.3060	70.3148	0.0088	0.0125	-70.3253	-70.3307	-0.0054	0.0077	0.1±7uV	0.9127	±7uV
±39	35.1431	35.1481	0.0051	0.0144	-35.1701	-35.1713	-0.0012	0.0033	0.1±6uV	1.5553	±6uV

Differential Pair: Channel 9 and 10

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.9724	2251.0427	1.0703	0.0476	-2249.9954	-2251.0872	-1.0918	0.0485	0.2±500uV	14.0071	±500uV
±1250	1125.0840	1125.1979	0.1139	0.0101	-1125.1024	-1125.2832	-0.1808	0.0161	0.1±35uV	-13.8581	±36uV
±625	562.5867	562.6516	0.0648	0.0115	-562.6181	-562.6985	-0.0804	0.0143	0.1±19uV	-5.0664	±20uV
±303	281.3249	281.3572	0.0323	0.0115	-281.3607	-281.4011	-0.0404	0.0143	0.1±13uV	-2.9430	±13uV
±156	140.7684	140.7855	0.0170	0.0121	-140.8039	-140.8232	-0.0193	0.0137	0.1±8uV	-0.0373	±9uV
±78	70.3060	70.3148	0.0087	0.0124	-70.3253	-70.3309	-0.0056	0.0080	0.1±7uV	0.9034	±7uV
±39	35.1431	35.1481	0.0050	0.0141	-35.1701	-35.1715	-0.0013	0.0038	0.1±6uV	1.5227	±6uV

Differential Pair: Channel 11 and 12

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.9724	2251.0049	1.0325	0.0459	-2249.9954	-2251.0303	-1.0349	0.0460	0.2±500uV	15.4972	±500uV
±1250	1125.0840	1125.1973	0.1133	0.0101	-1125.1024	-1125.2844	-0.1820	0.0162	0.1±35uV	-13.7091	±36uV
±625	562.5867	562.6532	0.0665	0.0118	-562.6181	-562.6970	-0.0789	0.0140	0.1±19uV	-5.1409	±20uV
±303	281.3249	281.3601	0.0353	0.0125	-281.3607	-281.4028	-0.0421	0.0150	0.1±13uV	-3.0920	±13uV
±156	140.7684	140.7846	0.0162	0.0115	-140.8039	-140.8247	-0.0208	0.0148	0.1±8uV	-0.0186	±9uV
±78	70.3060	70.3147	0.0086	0.0123	-70.3253	-70.3311	-0.0058	0.0082	0.1±7uV	0.8661	±7uV
±39	35.1431	35.1482	0.0051	0.0145	-35.1701	-35.1716	-0.0014	0.0041	0.1±6uV	1.4622	±6uV

Differential Pair: Channel 13 and 14

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.9724	2250.9536	0.9812	0.0436	-2249.9954	-2250.9714	-0.9761	0.0434	0.2±500uV	14.3051	±500uV
±1250	1125.0840	1125.1945	0.1105	0.0098	-1125.1024	-1125.2822	-0.1798	0.0160	0.1±35uV	-13.8581	±36uV
±625	562.5867	562.6526	0.0659	0.0117	-562.6181	-562.6992	-0.0811	0.0144	0.1±19uV	-5.0664	±20uV
±303	281.3249	281.3603	0.0354	0.0126	-281.3607	-281.4032	-0.0425	0.0151	0.1±13uV	-3.0175	±13uV
±156	140.7684	140.7873	0.0189	0.0134	-140.8039	-140.8239	-0.0200	0.0142	0.1±8uV	-0.0745	±9uV
±78	70.3060	70.3142	0.0081	0.0116	-70.3253	-70.3312	-0.0059	0.0083	0.1±7uV	0.7730	±7uV
±39	35.1431	35.1479	0.0049	0.0138	-35.1701	-35.1718	-0.0016	0.0046	0.1±6uV	1.4668	±6uV

Differential Pair: Channel 15 and 16

Range (mV)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Source (mV)	Measured (mV)	Error (mV)	Error (%)	Limits %±Offset	Shorted	
										Measured (uV)	Limit (uV)
±2500	2249.9724	2250.9175	0.9451	0.0420	-2249.9954	-2250.9258	-0.9304	0.0414	0.2±500uV	13.7091	±500uV
±1250	1125.0840	1125.1985	0.1145	0.0102	-1125.1024	-1125.2837	-0.1813	0.0161	0.1±35uV	-14.0071	±36uV
±625	562.5867	562.6516	0.0649	0.0115	-562.6181	-562.6996	-0.0815	0.0145	0.1±19uV	-5.0664	±20uV
±303	281.3249	281.3611	0.0363	0.0129	-281.3607	-281.4026	-0.0419	0.0149	0.1±13uV	-3.0920	±13uV
±156	140.7684	140.7867	0.0182	0.0130	-140.8039	-140.8228	-0.0189	0.0134	0.1±8uV	-0.0373	±9uV
±78	70.3060	70.3143	0.0083	0.0118	-70.3253	-70.3313	-0.0060	0.0086	0.1±7uV	0.8196	±7uV
±39	35.1431	35.1478	0.0047	0.0133	-35.1701	-35.1719	-0.0017	0.0049	0.1±6uV	1.4249	±6uV