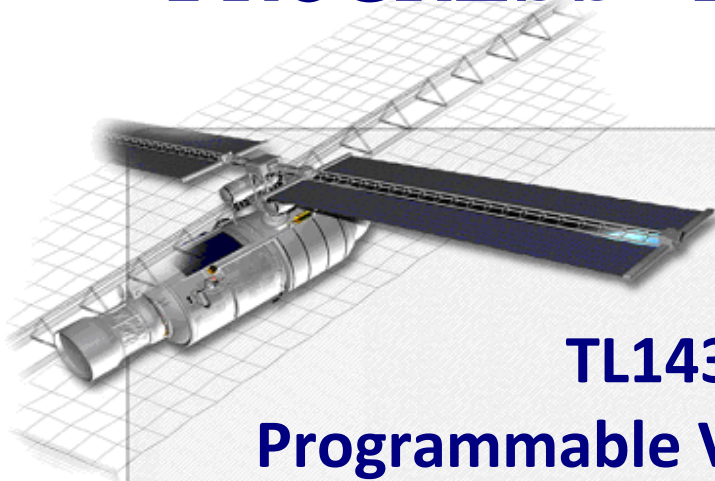




TOTAL IONIZING DOSE PROGRESS TEST REPORT



TL1431ACZT Programmable Voltage Reference GE245074 From STMicroelectronics

TRAD/TE/TL1431ACZT/245074/ESA/MV/1410		Labège, May 22 nd , 2015
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Revision: 0	Creation of the document	
Revision: 1	Addition of table of test parameters	
To: ESA Mr Christian POIVEY	Project/Program: Ref:	

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1. INTRODUCTION

This progress report describes the testing and characterization of the **TL1431ACZT** manufactured by **STMicroelectronics**. Testing began on January 05th, 2015 and ended on February 24th, 2015.

2. PART INFORMATION

2.1. Identification

Part designation	TL1431ACZT
Manufacturer	STMicroelectronics
Part function	Programmable Voltage Reference

2.2. Procurement information

Package	TO-92
Bulk No	GE245074
Number of tested parts	30 irradiated samples (Biased OFF) + 1 reference sample

3. COMMENTS

The irradiation test on **30 TL1431ACZT**, a **Programmable Voltage Reference** from **STMicroelectronics** is using gamma rays from Cobalt 60 source, at low dose rate (210 rad(Si)/h).

For an easier result visualisation, measurements and graphs have been separated per lot.

The black curve with no drift is the DUT reference (not irradiated).

All parts became out of specification during irradiation but remain functional.

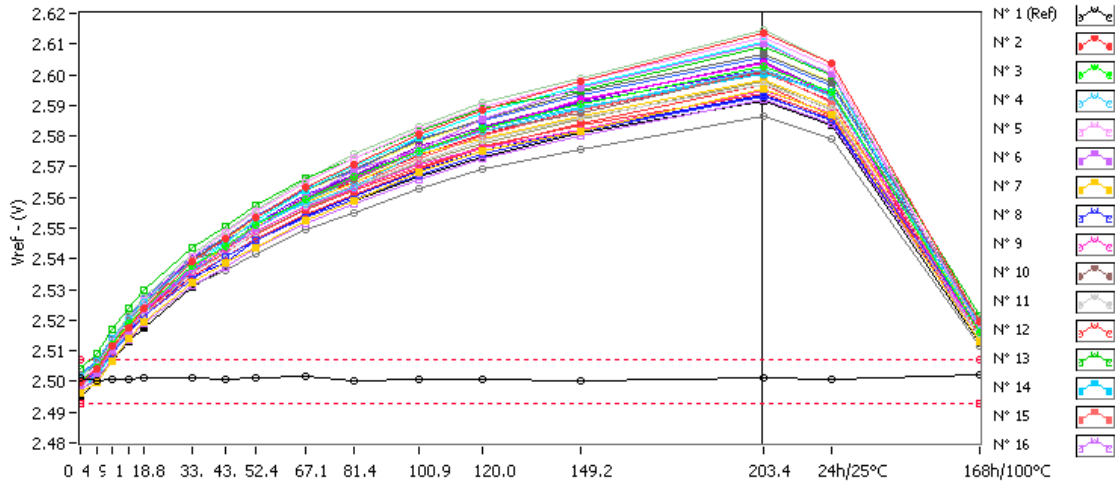
4. TEST PARAMETERS

Parameters	Symbols	Test conditions
Ta=25°C, unless otherwise specified		
Reference Voltage	Vref	Vka=Vref; Ik=10mA
	dVref/dVka	Ik=10mA; 3V<Vka<36V
Reference Input Current	Iref	Ik=10mA; R1=10kΩ; R2=infinite
Minimum Cathode Current	Imin	Vka=Vref
Off State Cathode Current	Ioff	
Dynamic Impedance	Zka	Vka=Vref; 1mA<Ik<100mA

5. APPENDIX 1 MEASURED PARAMETERS

1. Vref

Ta=25°C; Vka=Vref; Ik=10mA

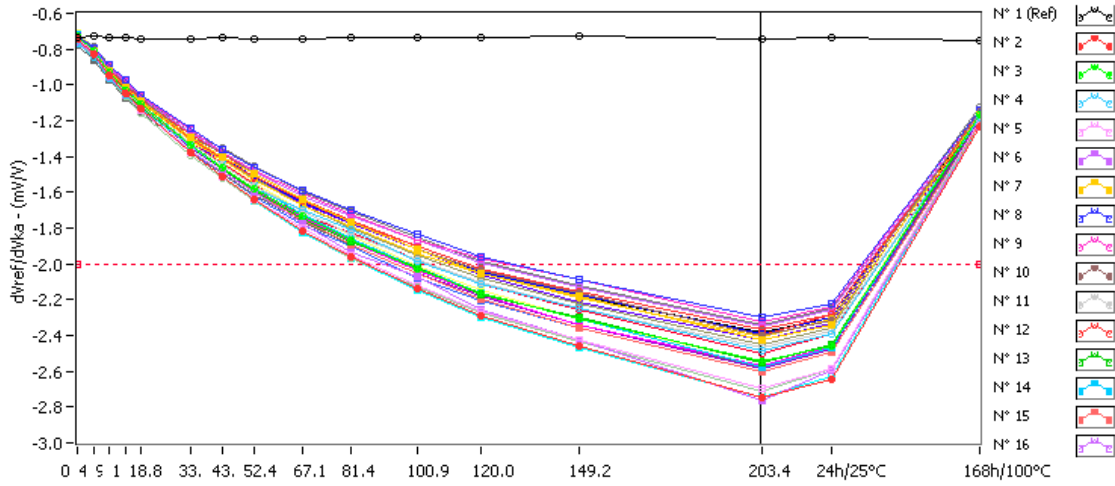


Vref. (V) Min = 2.493 Max = 2.507

	0.0 krad(Si)	4.9 krad(Si)	9.6 krad(Si)	14.2 krad(Si)	18.8 krad(Si)	33.5 krad(Si)	43.2 krad(Si)	52.4 krad(Si)	67.1 krad(Si)	81.4 krad(Si)	100.9 krad(Si)	120.0 krad(Si)	149.2 krad(Si)	203.4 krad(Si)	24h 25°C	168h 100°C
N° 1 (Ref)	2.5010	2.5004	2.5006	2.5008	2.5010	2.5010	2.5009	2.5012	2.5017	2.5004	2.5007	2.5006	2.5001	2.5010	2.5008	2.5023
N° 2	2.4996	2.5042	2.5116	2.5174	2.5241	2.5389	2.5464	2.5533	2.5633	2.5708	2.5804	2.5884	2.5978	2.6138	2.6039	2.5194
N° 3	2.4998	2.5046	2.5119	2.5189	2.5241	2.5376	2.5442	2.5509	2.5595	2.5665	2.5753	2.5825	2.5903	2.6029	2.5942	2.5160
N° 4	2.5018	2.5067	2.5139	2.5206	2.5258	2.5389	2.5458	2.5519	2.5580	2.5635	2.5748	2.5816	2.5888	2.6016	2.5929	2.5186
N° 5	2.5000	2.5049	2.5129	2.5203	2.5262	2.5408	2.5484	2.5555	2.5647	2.5725	2.5819	2.5894	2.5980	2.6123	2.6023	2.5169
N° 6	2.4987	2.5027	2.5101	2.5163	2.5235	2.5372	2.5440	2.5499	2.5600	2.5687	2.5755	2.5855	2.5960	2.6102	2.6003	2.5179
N° 7	2.4962	2.5000	2.5068	2.5138	2.5193	2.5323	2.5386	2.5438	2.5524	2.5590	2.5680	2.5750	2.5815	2.5953	2.5871	2.5132
N° 8	2.4997	2.5032	2.5093	2.5153	2.5216	2.5334	2.5408	2.5460	2.5535	2.5594	2.5673	2.5741	2.5814	2.5931	2.5855	2.5176
N° 9	2.5004	2.5036	2.5113	2.5174	2.5234	2.5358	2.5429	2.5492	2.5567	2.5626	2.5708	2.5759	2.5819	2.5951	2.5873	2.5165
N° 10	2.5021	2.5060	2.5125	2.5198	2.5248	2.5398	2.5431	2.5509	2.5594	2.5657	2.5750	2.5813	2.5877	2.6013	2.5934	2.5201
N° 11	2.4981	2.5025	2.5102	2.5169	2.5221	2.5353	2.5418	2.5486	2.5574	2.5635	2.5718	2.5784	2.5857	2.5969	2.5888	2.5145
N° 12	2.4986	2.5027	2.5101	2.5169	2.5223	2.5354	2.5423	2.5481	2.5559	2.5621	2.5698	2.5764	2.5834	2.5940	2.5861	2.5152
N° 13	2.5041	2.5090	2.5169	2.5238	2.5296	2.5435	2.5507	2.5573	2.5661	2.5728	2.5814	2.5892	2.5951	2.6094	2.5998	2.5214
N° 14	2.4978	2.5027	2.5103	2.5171	2.5234	2.5363	2.5432	2.5498	2.5588	2.5657	2.5752	2.5827	2.5896	2.6003	2.5945	2.5166
N° 15	2.4998	2.5036	2.5104	2.5168	2.5220	2.5354	2.5418	2.5486	2.5573	2.5640	2.5729	2.5799	2.5885	2.6011	2.5910	2.5164
N° 16	2.4971	2.5010	2.5072	2.5136	2.5187	2.5315	2.5373	2.5434	2.5516	2.5577	2.5657	2.5726	2.5801	2.5919	2.5840	2.5146
N° 17	2.5001	2.5046	2.5119	2.5186	2.5240	2.5374	2.5436	2.5503	2.5583	2.5650	2.5742	2.5793	2.5866	2.5982	2.5893	2.5180
N° 18	2.4984	2.5032	2.5109	2.5180	2.5227	2.5366	2.5439	2.5510	2.5591	2.5664	2.5755	2.5820	2.5921	2.6037	2.5936	2.5144
N° 19	2.4977	2.5028	2.5108	2.5181	2.5227	2.5372	2.5440	2.5511	2.5600	2.5674	2.5765	2.5831	2.5912	2.6044	2.5941	2.5141
N° 20	2.5013	2.5064	2.5143	2.5214	2.5272	2.5418	2.5491	2.5560	2.5659	2.5740	2.5829	2.5907	2.5989	2.6144	2.6036	2.5190
N° 21	2.4971	2.5016	2.5093	2.5166	2.5223	2.5375	2.5449	2.5523	2.5623	2.5700	2.5797	2.5876	2.5965	2.6108	2.5999	2.5140
N° 22	2.4990	2.5033	2.5097	2.5162	2.5212	2.5340	2.5404	2.5465	2.5546	2.5610	2.5693	2.5763	2.5839	2.5969	2.5863	2.5160
N° 23	2.5013	2.5063	2.5137	2.5208	2.5261	2.5395	2.5472	2.5536	2.5625	2.5691	2.5784	2.5853	2.5945	2.6066	2.5971	2.5200
N° 24	2.5021	2.5069	2.5142	2.5211	2.5266	2.5405	2.5471	2.5540	2.5627	2.5689	2.5789	2.5848	2.5934	2.6059	2.5963	2.5185
N° 25	2.4967	2.5017	2.5094	2.5165	2.5223	2.5363	2.5429	2.5499	2.5606	2.5650	2.5738	2.5806	2.5885	2.6008	2.5914	2.5140
N° 26	2.4986	2.5029	2.5089	2.5160	2.5222	2.5340	2.5387	2.5459	2.5539	2.5602	2.5687	2.5749	2.5822	2.5932	2.5848	2.5143
N° 27	2.4985	2.5032	2.5096	2.5173	2.5228	2.5357	2.5419	2.5481	2.5566	2.5627	2.5712	2.5777	2.5856	2.5979	2.5887	2.5146
N° 28	2.4972	2.5005	2.5072	2.5136	2.5191	2.5313	2.5361	2.5414	2.5495	2.5548	2.5626	2.5693	2.5756	2.5867	2.5791	2.5118
N° 29	2.5019	2.5059	2.5134	2.5206	2.5264	2.5404	2.5460	2.5515	2.5610	2.5671	2.5753	2.5827	2.5908	2.6019	2.5933	2.5196
N° 30	2.5000	2.5051	2.5125	2.5198	2.5251	2.5395	2.5468	2.5526	2.5621	2.5687	2.5780	2.5851	2.5941	2.6068	2.5976	2.5166
N° 31	2.4953	2.4999	2.5064	2.5129	2.5176	2.5308	2.5374	2.5438	2.5523	2.5587	2.5667	2.5732	2.5811	2.5915	2.5837	2.5128

2. dVref/dVka

Ta=25°C; Ik=10mA, 3V<Vka<36V



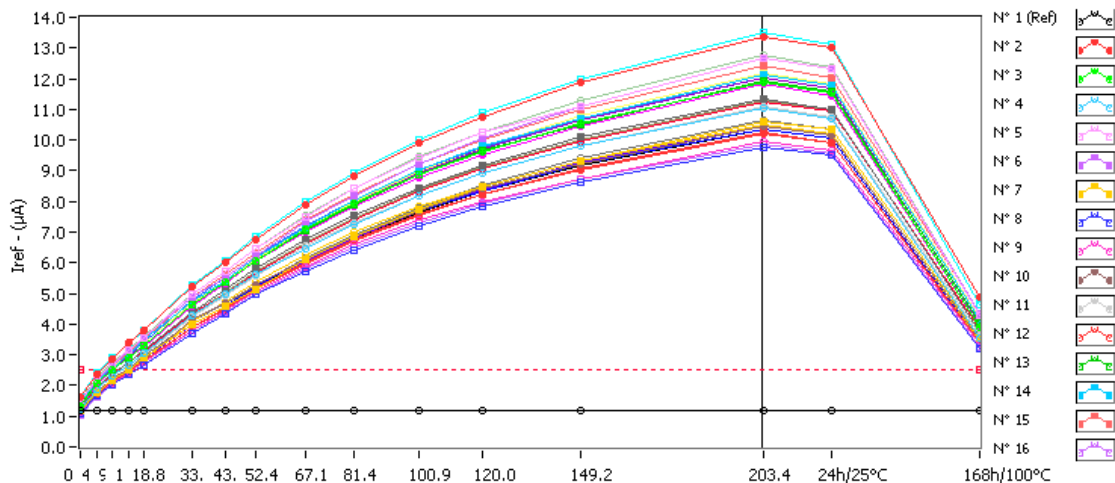
dVref/dVka . (mV/V)

Min = -2.0

	0.0 krad(Si)	4.9 krad(Si)	9.6 krad(Si)	14.2 krad(Si)	18.8 krad(Si)	33.5 krad(Si)	43.2 krad(Si)	52.4 krad(Si)	67.1 krad(Si)	81.4 krad(Si)	100.9 krad(Si)	120.0 krad(Si)	149.2 krad(Si)	203.4 krad(Si)	24h 25°C	168h 100°C
N° 1 (Ref)	-0.736	-0.727	-0.736	-0.735	-0.739	-0.741	-0.738	-0.744	-0.745	-0.732	-0.732	-0.734	-0.725	-0.741	-0.739	-0.752
N° 2	-0.740	-0.826	-0.948	-1.045	-1.132	-1.379	-1.517	-1.643	-1.814	-1.964	-2.138	-2.289	-2.457	-2.744	-2.647	-1.237
N° 3	-0.730	-0.811	-0.930	-1.028	-1.108	-1.336	-1.458	-1.582	-1.733	-1.870	-2.026	-2.162	-2.307	-2.544	-2.457	-1.167
N° 4	-0.772	-0.848	-0.963	-1.054	-1.133	-1.344	-1.463	-1.578	-1.700	-1.811	-1.983	-2.116	-2.245	-2.486	-2.395	-1.186
N° 5	-0.736	-0.821	-0.947	-1.050	-1.138	-1.375	-1.509	-1.639	-1.799	-1.949	-2.117	-2.265	-2.427	-2.694	-2.585	-1.200
N° 6	-0.761	-0.831	-0.951	-1.060	-1.142	-1.370	-1.491	-1.599	-1.779	-1.932	-2.073	-2.258	-2.428	-2.762	-2.597	-1.236
N° 7	-0.754	-0.812	-0.920	-1.015	-1.093	-1.294	-1.401	-1.492	-1.641	-1.764	-1.917	-2.054	-2.178	-2.429	-2.342	-1.170
N° 8	-0.731	-0.791	-0.885	-0.970	-1.059	-1.244	-1.364	-1.460	-1.586	-1.698	-1.833	-1.957	-2.084	-2.300	-2.220	-1.143
N° 9	-0.727	-0.793	-0.897	-0.981	-1.064	-1.255	-1.375	-1.483	-1.609	-1.723	-1.864	-1.972	-2.088	-2.324	-2.239	-1.138
N° 10	-0.733	-0.794	-0.898	-0.997	-1.073	-1.293	-1.378	-1.499	-1.643	-1.765	-1.917	-2.038	-2.161	-2.400	-2.313	-1.149
N° 11	-0.760	-0.831	-0.948	-1.038	-1.114	-1.325	-1.441	-1.562	-1.709	-1.833	-1.979	-2.107	-2.248	-2.467	-2.378	-1.184
N° 12	-0.751	-0.816	-0.926	-1.016	-1.094	-1.299	-1.415	-1.514	-1.651	-1.764	-1.901	-2.027	-2.157	-2.366	-2.281	-1.162
N° 13	-0.747	-0.824	-0.944	-1.038	-1.125	-1.347	-1.471	-1.588	-1.746	-1.873	-2.024	-2.169	-2.297	-2.555	-2.451	-1.187
N° 14	-0.720	-0.799	-0.918	-1.014	-1.103	-1.323	-1.447	-1.567	-1.726	-1.861	-2.023	-2.166	-2.308	-2.577	-2.464	-1.177
N° 15	-0.744	-0.820	-0.934	-1.031	-1.116	-1.346	-1.466	-1.594	-1.754	-1.892	-2.053	-2.195	-2.359	-2.601	-2.493	-1.220
N° 16	-0.740	-0.802	-0.902	-0.992	-1.071	-1.272	-1.374	-1.484	-1.621	-1.732	-1.870	-1.995	-2.128	-2.346	-2.255	-1.159
N° 17	-0.743	-0.814	-0.925	-1.018	-1.097	-1.306	-1.417	-1.530	-1.669	-1.791	-1.942	-2.055	-2.187	-2.405	-2.307	-1.161
N° 18	-0.736	-0.819	-0.939	-1.038	-1.112	-1.337	-1.465	-1.587	-1.743	-1.879	-2.039	-2.170	-2.341	-2.573	-2.460	-1.176
N° 19	-0.749	-0.832	-0.953	-1.053	-1.121	-1.351	-1.469	-1.597	-1.755	-1.892	-2.051	-2.184	-2.338	-2.588	-2.476	-1.188
N° 20	-0.760	-0.845	-0.966	-1.067	-1.154	-1.392	-1.519	-1.646	-1.820	-1.968	-2.129	-2.274	-2.432	-2.711	-2.590	-1.218
N° 21	-0.732	-0.816	-0.941	-1.044	-1.133	-1.382	-1.515	-1.650	-1.827	-1.973	-2.148	-2.297	-2.463	-2.748	-2.627	-1.215
N° 22	-0.738	-0.807	-0.910	-1.003	-1.078	-1.280	-1.390	-1.499	-1.637	-1.758	-1.899	-2.028	-2.162	-2.400	-2.284	-1.148
N° 23	-0.779	-0.858	-0.973	-1.070	-1.151	-1.370	-1.498	-1.617	-1.770	-1.893	-2.053	-2.184	-2.338	-2.577	-2.466	-1.210
N° 24	-0.755	-0.838	-0.956	-1.057	-1.141	-1.376	-1.495	-1.620	-1.784	-1.905	-2.077	-2.204	-2.361	-2.605	-2.492	-1.201
N° 25	-0.735	-0.811	-0.930	-1.024	-1.107	-1.323	-1.436	-1.557	-1.730	-1.826	-1.980	-2.115	-2.258	-2.498	-2.393	-1.167
N° 26	-0.751	-0.820	-0.917	-1.016	-1.100	-1.296	-1.401	-1.511	-1.652	-1.770	-1.918	-2.041	-2.172	-2.390	-2.295	-1.160
N° 27	-0.722	-0.799	-0.902	-1.004	-1.085	-1.296	-1.408	-1.523	-1.675	-1.797	-1.949	-2.083	-2.225	-2.455	-2.354	-1.143
N° 28	-0.724	-0.782	-0.890	-0.980	-1.061	-1.264	-1.355	-1.452	-1.601	-1.708	-1.851	-1.983	-2.117	-2.337	-2.250	-1.128
N° 29	-0.760	-0.822	-0.935	-1.030	-1.110	-1.323	-1.416	-1.512	-1.668	-1.778	-1.920	-2.062	-2.211	-2.422	-2.330	-1.175
N° 30	-0.708	-0.796	-0.911	-1.009	-1.087	-1.313	-1.435	-1.548	-1.710	-1.842	-2.008	-2.145	-2.309	-2.550	-2.452	-1.166
N° 31	-0.756	-0.826	-0.931	-1.019	-1.088	-1.292	-1.401	-1.513	-1.655	-1.771	-1.914	-2.038	-2.180	-2.387	-2.301	-1.167

3. Iref

Ta=25°C; Ik=10mA; R1=10kOhms; R2=infinite



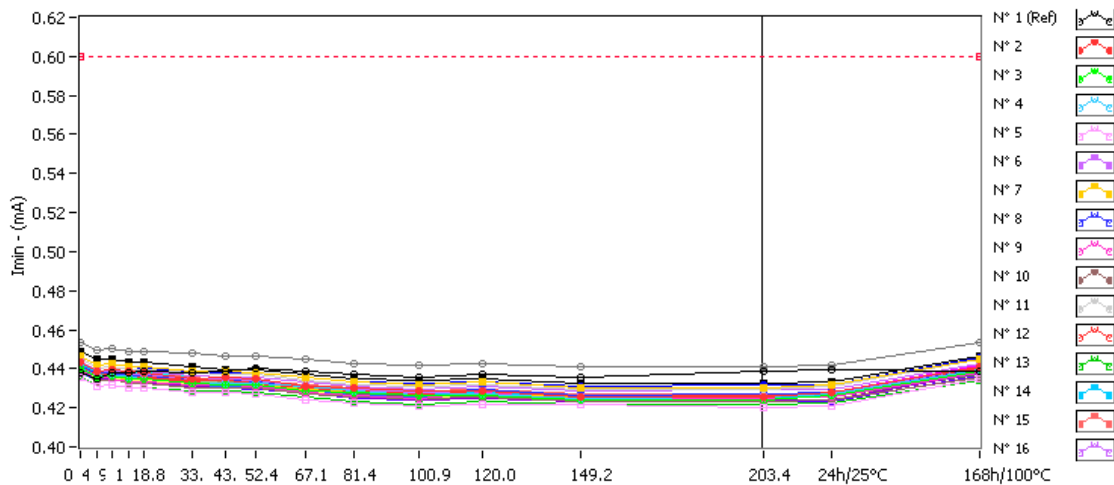
Iref . (µA)

Max = 2.5

	0.0 krad(Si)	4.9 krad(Si)	9.6 krad(Si)	14.2 krad(Si)	18.8 krad(Si)	33.5 krad(Si)	43.2 krad(Si)	52.4 krad(Si)	67.1 krad(Si)	81.4 krad(Si)	100.9 krad(Si)	120.0 krad(Si)	149.2 krad(Si)	203.4 krad(Si)	24h 25°C	168h 100°C
N° 1 (Ref)	1.193	1.202	1.195	1.196	1.191	1.195	1.192	1.187	1.191	1.197	1.201	1.195	1.203	1.193	1.189	1.193
N° 2	1.606	2.379	2.880	3.396	3.772	5.221	6.013	6.764	7.894	8.823	9.896	10.747	11.863	13.365	13.015	4.891
N° 3	1.346	2.048	2.508	2.922	3.320	4.652	5.376	6.078	7.090	7.921	8.871	9.611	10.558	11.885	11.544	3.911
N° 4	1.216	1.875	2.299	2.680	3.046	4.280	4.958	5.622	6.471	7.266	8.187	8.909	9.804	11.024	10.719	3.572
N° 5	1.498	2.239	2.717	3.152	3.566	4.957	5.711	6.453	7.512	8.407	9.432	10.244	11.077	12.684	12.323	4.301
N° 6	1.525	2.191	2.675	3.115	3.526	4.863	5.539	6.212	7.335	8.204	9.200	10.060	11.102	12.690	12.341	4.339
N° 7	1.205	1.761	2.172	2.532	2.884	4.014	4.582	5.141	6.092	6.852	7.756	8.478	9.314	10.616	10.332	3.555
N° 8	1.098	1.672	2.025	2.342	2.678	3.719	4.344	4.958	5.722	6.420	7.219	7.829	8.637	9.782	9.517	3.226
N° 9	1.133	1.693	2.092	2.404	2.762	3.817	4.444	5.077	5.868	6.583	7.376	7.962	8.722	9.939	9.671	3.371
N° 10	1.152	1.798	2.200	2.559	2.880	4.132	4.696	5.271	6.112	6.842	7.697	8.416	9.213	10.450	10.169	3.506
N° 11	1.237	1.884	2.303	2.680	3.006	4.232	4.914	5.588	6.569	7.285	8.201	8.910	9.814	11.067	10.767	3.662
N° 12	1.110	1.705	2.088	2.434	2.768	3.892	4.510	5.104	5.986	6.720	7.543	8.211	9.039	10.195	9.914	3.386
N° 13	1.373	2.062	2.519	2.920	3.312	4.634	5.359	6.057	7.072	7.908	8.876	9.640	10.505	11.924	11.597	4.025
N° 14	1.424	2.148	2.586	2.996	3.480	4.720	5.437	6.150	7.170	8.020	9.015	9.788	10.697	12.148	11.795	4.128
N° 15	1.449	2.183	2.647	3.079	3.489	4.856	5.608	6.333	7.377	8.234	9.236	10.020	11.015	12.403	12.039	4.348
N° 16	1.055	1.641	2.016	2.353	2.681	3.792	4.403	4.988	5.821	6.509	7.305	7.944	8.742	9.847	9.569	3.271
N° 17	1.131	1.759	2.164	2.529	2.883	4.074	4.727	5.353	6.244	6.981	7.830	8.480	9.316	10.488	10.196	3.468
N° 18	1.331	2.041	2.497	2.909	3.244	4.586	5.309	6.081	7.002	7.835	8.799	9.502	10.474	11.807	11.445	3.884
N° 19	1.385	2.081	2.539	2.953	3.290	4.624	5.355	6.075	7.087	7.941	8.931	9.693	10.663	12.025	11.667	3.991
N° 20	1.522	2.258	2.738	3.176	3.592	4.977	5.728	6.463	7.530	8.410	9.443	10.264	11.288	12.748	12.383	4.336
N° 21	1.611	2.396	2.897	3.358	3.802	5.278	6.086	6.861	7.996	8.921	10.017	10.874	11.972	13.490	13.106	4.616
N° 22	1.132	1.735	2.121	2.463	2.788	3.913	4.541	5.155	6.023	6.739	7.577	8.239	9.089	10.249	9.933	3.349
N° 23	1.280	1.951	2.386	2.775	3.148	4.410	5.139	5.796	6.747	7.532	8.445	9.157	10.085	11.355	11.013	3.736
N° 24	1.368	2.100	2.572	2.993	3.402	4.770	5.503	6.215	7.221	8.054	9.010	9.760	10.716	12.023	11.679	4.013
N° 25	1.300	1.947	2.368	2.751	3.111	4.333	5.003	5.660	6.618	7.393	8.328	9.058	9.980	11.257	10.953	3.851
N° 26	1.153	1.777	2.184	2.522	2.919	3.986	4.604	5.217	6.107	6.846	7.692	8.355	9.195	10.357	10.053	3.393
N° 27	1.281	1.939	2.358	2.740	3.104	4.347	5.032	5.704	6.652	7.461	8.383	9.110	10.030	11.308	10.978	3.727
N° 28	1.219	1.778	2.208	2.578	2.935	4.110	4.675	5.235	6.168	6.925	7.810	8.546	9.395	10.650	10.360	3.531
N° 29	1.176	1.723	2.137	2.503	2.851	4.015	4.576	5.131	6.062	6.812	7.666	8.364	9.283	10.508	10.213	3.462
N° 30	1.423	2.131	2.593	3.018	3.379	4.695	5.410	6.125	7.146	7.989	8.994	9.782	10.801	12.177	11.847	4.179
N° 31	1.134	1.734	2.118	2.461	2.760	3.897	4.554	5.183	6.070	6.810	7.649	8.319	9.179	10.362	10.068	3.426

4. Imin

Ta=25°C; Vka=Vref

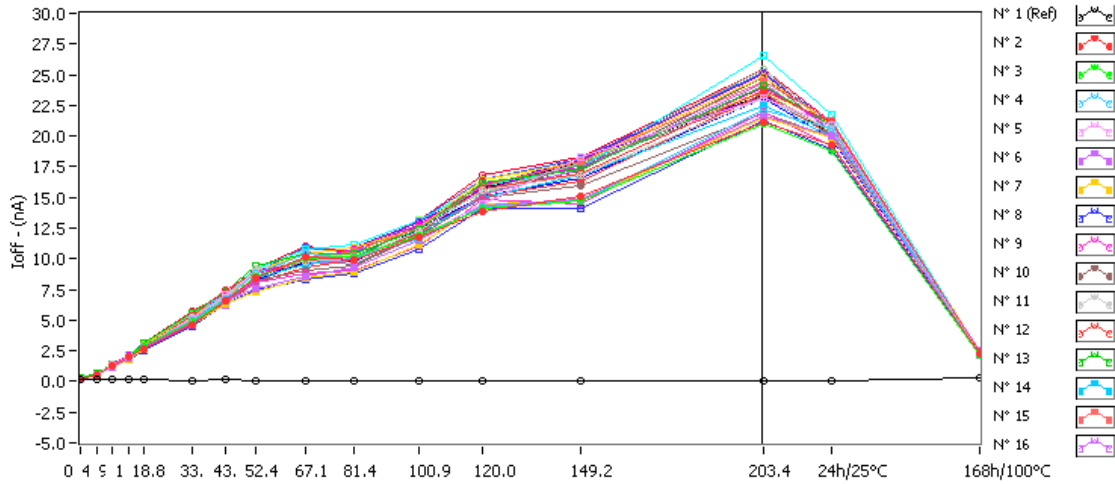


Imin . (mA) Max = 0.6

	0.0 krad(Si)	4.9 krad(Si)	9.6 krad(Si)	14.2 krad(Si)	18.8 krad(Si)	33.5 krad(Si)	43.2 krad(Si)	52.4 krad(Si)	67.1 krad(Si)	81.4 krad(Si)	100.9 krad(Si)	120.0 krad(Si)	149.2 krad(Si)	203.4 krad(Si)	24h 25°C	168h 100°C
N° 1 (Ref)	0.4376	0.4350	0.4380	0.4377	0.4384	0.4381	0.4384	0.4399	0.4384	0.4375	0.4358	0.4374	0.4356	0.4388	0.4397	0.4384
N° 2	0.4434	0.4391	0.4398	0.4385	0.4377	0.4352	0.4353	0.4349	0.4309	0.4302	0.4284	0.4285	0.4259	0.4259	0.4282	0.4410
N° 3	0.4403	0.4357	0.4366	0.4349	0.4345	0.4323	0.4321	0.4320	0.4286	0.4277	0.4262	0.4265	0.4239	0.4243	0.4263	0.4389
N° 4	0.4407	0.4358	0.4368	0.4353	0.4351	0.4328	0.4328	0.4328	0.4311	0.4285	0.4264	0.4273	0.4246	0.4258	0.4271	0.4393
N° 5	0.4358	0.4309	0.4318	0.4302	0.4300	0.4279	0.4280	0.4272	0.4239	0.4227	0.4210	0.4219	0.4215	0.4203	0.4213	0.4345
N° 6	0.4430	0.4386	0.4391	0.4373	0.4370	0.4346	0.4349	0.4337	0.4306	0.4291	0.4279	0.4285	0.4253	0.4255	0.4270	0.4407
N° 7	0.4468	0.4421	0.4429	0.4410	0.4409	0.4387	0.4389	0.4377	0.4353	0.4335	0.4320	0.4332	0.4302	0.4304	0.4316	0.4448
N° 8	0.4412	0.4376	0.4380	0.4362	0.4361	0.4346	0.4345	0.4332	0.4310	0.4292	0.4282	0.4296	0.4266	0.4275	0.4280	0.4398
N° 9	0.4388	0.4365	0.4352	0.4335	0.4333	0.4314	0.4315	0.4306	0.4277	0.4261	0.4251	0.4277	0.4241	0.4250	0.4254	0.4383
N° 10	0.4392	0.4333	0.4346	0.4327	0.4328	0.4305	0.4303	0.4299	0.4274	0.4256	0.4247	0.4256	0.4234	0.4233	0.4241	0.4360
N° 11	0.4460	0.4404	0.4414	0.4393	0.4394	0.4378	0.4370	0.4370	0.4339	0.4319	0.4309	0.4318	0.4297	0.4298	0.4306	0.4448
N° 12	0.4416	0.4363	0.4374	0.4352	0.4354	0.4340	0.4339	0.4329	0.4306	0.4283	0.4272	0.4285	0.4263	0.4267	0.4274	0.4399
N° 13	0.4363	0.4310	0.4320	0.4299	0.4304	0.4289	0.4283	0.4280	0.4257	0.4233	0.4219	0.4233	0.4216	0.4217	0.4223	0.4344
N° 14	0.4427	0.4376	0.4383	0.4366	0.4363	0.4347	0.4340	0.4333	0.4307	0.4290	0.4273	0.4281	0.4262	0.4256	0.4266	0.4398
N° 15	0.4420	0.4377	0.4385	0.4370	0.4373	0.4353	0.4342	0.4339	0.4316	0.4299	0.4283	0.4293	0.4274	0.4274	0.4281	0.4409
N° 16	0.4439	0.4391	0.4398	0.4382	0.4384	0.4363	0.4353	0.4357	0.4331	0.4312	0.4297	0.4308	0.4290	0.4292	0.4291	0.4424
N° 17	0.4401	0.4355	0.4360	0.4345	0.4347	0.4327	0.4319	0.4319	0.4298	0.4279	0.4263	0.4279	0.4259	0.4262	0.4264	0.4383
N° 18	0.4424	0.4381	0.4385	0.4369	0.4371	0.4348	0.4340	0.4336	0.4315	0.4298	0.4283	0.4293	0.4269	0.4270	0.4277	0.4418
N° 19	0.4390	0.4346	0.4348	0.4333	0.4331	0.4311	0.4299	0.4300	0.4278	0.4258	0.4244	0.4251	0.4236	0.4239	0.4240	0.4377
N° 20	0.4419	0.4376	0.4378	0.4362	0.4361	0.4341	0.4329	0.4328	0.4306	0.4286	0.4270	0.4274	0.4259	0.4263	0.4262	0.4406
N° 21	0.4433	0.4389	0.4392	0.4378	0.4376	0.4355	0.4341	0.4336	0.4313	0.4290	0.4273	0.4278	0.4256	0.4269	0.4269	0.4419
N° 22	0.4400	0.4358	0.4365	0.4353	0.4351	0.4335	0.4327	0.4324	0.4304	0.4285	0.4274	0.4282	0.4257	0.4265	0.4270	0.4389
N° 23	0.4400	0.4358	0.4362	0.4347	0.4346	0.4329	0.4318	0.4315	0.4297	0.4270	0.4261	0.4267	0.4244	0.4253	0.4252	0.4375
N° 24	0.4383	0.4340	0.4347	0.4333	0.4336	0.4321	0.4311	0.4308	0.4293	0.4265	0.4259	0.4269	0.4248	0.4253	0.4252	0.4374
N° 25	0.4434	0.4387	0.4391	0.4374	0.4377	0.4356	0.4343	0.4339	0.4319	0.4290	0.4280	0.4293	0.4271	0.4274	0.4274	0.4410
N° 26	0.4465	0.4420	0.4428	0.4408	0.4406	0.4390	0.4382	0.4380	0.4359	0.4335	0.4328	0.4336	0.4313	0.4315	0.4319	0.4454
N° 27	0.4412	0.4372	0.4379	0.4359	0.4359	0.4343	0.4331	0.4331	0.4314	0.4291	0.4283	0.4291	0.4274	0.4271	0.4275	0.4401
N° 28	0.4536	0.4499	0.4505	0.4486	0.4489	0.4477	0.4466	0.4467	0.4452	0.4425	0.4418	0.4428	0.4414	0.4414	0.4416	0.4538
N° 29	0.4379	0.4344	0.4348	0.4325	0.4324	0.4309	0.4300	0.4294	0.4277	0.4249	0.4239	0.4252	0.4234	0.4230	0.4236	0.4365
N° 30	0.4392	0.4353	0.4359	0.4339	0.4338	0.4319	0.4304	0.4302	0.4285	0.4261	0.4256	0.4261	0.4241	0.4238	0.4244	0.4388
N° 31	0.4490	0.4446	0.4451	0.4432	0.4432	0.4411	0.4396	0.4393	0.4370	0.4347	0.4341	0.4346	0.4328	0.4324	0.4330	0.4468

5. Ioff

Ta=25°C



Ioff . (nA)

Max = 500.0

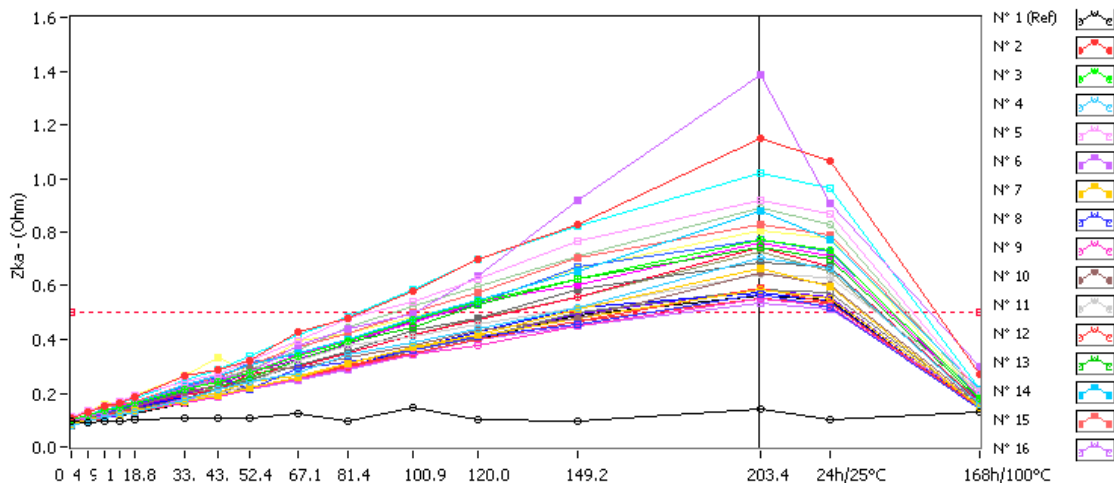
	0.0 krad(Si)	4.9 krad(Si)	9.6 krad(Si)	14.2 krad(Si)	18.8 krad(Si)	33.5 krad(Si)	43.2 krad(Si)	52.4 krad(Si)	67.1 krad(Si)	81.4 krad(Si)	100.9 krad(Si)	120.0 krad(Si)	149.2 krad(Si)	203.4 krad(Si)	24h 25°C	168h 100°C
N° 1 (Ref)	0.207	0.124	0.122	0.131	0.193	0.043	0.118	0.032	0.002	0.002	0.020	0.006	0.074	0.002	0.045	0.269
N° 2	0.196	0.557	1.242	2.003	2.678	4.620	6.584	8.435	10.120	9.971	11.739	13.832	15.084	21.122	19.298	2.224
N° 3	0.200	0.590	1.332	2.040	2.852	4.876	6.590	8.566	10.088	10.154	11.857	14.130	14.752	20.982	18.746	2.150
N° 4	0.198	0.598	1.324	2.053	2.883	4.931	6.758	8.756	10.420	10.041	11.589	14.260	14.691	22.156	20.623	2.169
N° 5	0.176	0.565	1.295	1.996	2.879	5.067	7.067	8.804	10.447	10.139	11.778	14.479	18.289	23.053	20.848	2.210
N° 6	0.195	0.530	1.196	1.872	2.703	4.645	6.548	7.571	8.513	9.256	11.472	14.304	14.813	21.639	19.962	2.181
N° 7	0.200	0.520	1.173	1.800	2.617	4.607	6.388	7.315	8.451	8.953	11.149	14.493	14.747	21.460	19.914	2.261
N° 8	0.179	0.602	1.196	1.739	2.562	4.460	6.370	7.474	8.295	8.789	10.742	14.063	14.148	21.284	18.884	2.248
N° 9	0.188	0.546	1.239	1.822	2.713	4.677	6.650	8.115	8.806	8.992	10.972	14.846	14.456	22.006	19.196	2.274
N° 10	0.178	0.549	1.313	1.889	2.716	4.870	6.463	8.141	9.005	9.452	11.829	14.941	15.964	21.905	19.879	2.254
N° 11	0.185	0.578	1.357	1.977	2.843	5.288	6.806	9.149	9.803	9.975	12.279	15.542	16.843	23.104	20.468	2.277
N° 12	0.208	0.585	1.370	1.968	2.936	5.358	7.392	8.953	9.926	10.012	12.111	15.755	16.943	23.738	21.081	2.339
N° 13	0.246	0.627	1.415	2.046	3.104	5.648	7.353	9.430	10.438	10.417	12.332	16.144	17.289	24.024	20.924	2.340
N° 14	0.181	0.598	1.331	1.995	2.914	5.196	6.731	8.373	9.536	10.154	12.142	14.974	16.818	22.479	20.030	2.365
N° 15	0.174	0.580	1.318	1.991	2.926	5.215	6.522	8.600	9.866	10.604	12.523	15.969	17.888	24.434	21.192	2.444
N° 16	0.228	0.591	1.293	1.957	2.849	5.012	6.223	8.486	9.502	9.906	11.812	15.214	17.327	24.292	20.377	2.480
N° 17	0.178	0.620	1.359	2.078	3.045	5.398	6.721	9.066	10.381	10.916	12.515	16.431	17.888	24.840	20.912	2.457
N° 18	0.205	0.654	1.414	2.138	2.998	5.279	6.727	8.821	9.928	10.762	12.783	16.032	17.460	23.974	20.714	2.264
N° 19	0.202	0.637	1.394	2.130	2.921	5.306	6.614	8.914	10.348	10.918	13.011	15.613	18.008	25.116	20.797	2.325
N° 20	0.189	0.631	1.359	2.090	3.003	5.462	6.862	9.020	10.400	10.896	12.741	15.324	17.738	25.391	20.666	2.346
N° 21	0.183	0.610	1.354	2.107	3.037	5.610	7.058	9.135	10.754	11.202	13.146	16.001	17.379	26.490	21.695	2.428
N° 22	0.197	0.589	1.272	1.942	2.721	4.925	6.323	8.047	9.353	9.857	12.071	15.073	16.319	23.411	20.064	2.273
N° 23	0.175	0.618	1.339	2.082	2.952	5.318	6.903	8.798	10.477	10.060	12.723	15.520	17.170	24.841	20.419	2.232
N° 24	0.187	0.637	1.398	2.106	3.080	5.581	6.935	8.958	10.939	10.382	13.073	16.469	18.131	25.231	20.951	2.311
N° 25	0.216	0.631	1.399	2.119	3.157	5.683	7.157	9.177	11.030	10.574	13.121	16.832	18.345	25.434	21.177	2.311
N° 26	0.185	0.620	1.366	1.965	2.916	5.064	6.410	8.361	9.709	9.802	12.418	15.128	16.552	23.083	19.753	2.246
N° 27	0.177	0.626	1.387	2.034	2.980	5.330	6.564	8.526	10.206	10.129	12.743	15.621	17.840	23.648	20.285	2.226
N° 28	0.197	0.573	1.321	1.960	2.957	5.349	6.315	8.057	9.972	9.581	12.036	15.247	17.734	23.221	20.112	2.298
N° 29	0.203	0.599	1.369	1.986	2.936	5.507	6.783	8.220	10.205	9.804	12.304	15.883	18.169	23.196	20.481	2.379
N° 30	0.184	0.631	1.416	2.080	2.970	5.361	6.538	8.499	10.186	10.226	13.208	16.166	17.939	23.695	20.892	2.389
N° 31	0.187	0.639	1.344	1.979	2.807	5.108	6.374	8.351	9.816	10.013	12.748	15.741	17.947	23.340	20.318	2.351

The Scale has been adapted to observe the low drift of this parameter.

The maximum specification defined in the datasheet (500nA) is not visible on this graph.

6. Zka

Ta=25°C; Vka=Vref; 1mA<Ik<100mA



Zka . (Ohm)

Max = 0.5

	0.0 krad(Si)	4.9 krad(Si)	9.6 krad(Si)	14.2 krad(Si)	18.8 krad(Si)	33.5 krad(Si)	43.2 krad(Si)	52.4 krad(Si)	67.1 krad(Si)	81.4 krad(Si)	100.9 krad(Si)	120.0 krad(Si)	149.2 krad(Si)	203.4 krad(Si)	24h 25°C	168h 100°C
N° 1 (Ref)	0.093	0.092	0.097	0.095	0.102	0.104	0.109	0.109	0.126	0.098	0.146	0.103	0.094	0.141	0.101	0.129
N° 2	0.108	0.131	0.150	0.163	0.185	0.264	0.286	0.321	0.426	0.482	0.580	0.699	0.830	1.151	1.065	0.272
N° 3	0.103	0.120	0.136	0.149	0.161	0.212	0.244	0.279	0.338	0.395	0.471	0.543	0.624	0.770	0.730	0.178
N° 4	0.080	0.095	0.114	0.121	0.130	0.173	0.213	0.243	0.274	0.344	0.390	0.442	0.516	0.704	0.662	0.160
N° 5	0.112	0.134	0.150	0.167	0.191	0.244	0.273	0.322	0.395	0.479	0.543	0.624	0.764	0.921	0.867	0.201
N° 6	0.094	0.112	0.129	0.145	0.161	0.222	0.255	0.279	0.377	0.440	0.496	0.637	0.919	1.389	0.906	0.297
N° 7	0.085	0.100	0.111	0.120	0.133	0.171	0.189	0.219	0.261	0.310	0.374	0.419	0.515	0.664	0.596	0.148
N° 8	0.096	0.111	0.125	0.140	0.156	0.214	0.261	0.215	0.293	0.313	0.362	0.410	0.455	0.569	0.520	0.141
N° 9	0.087	0.109	0.113	0.120	0.134	0.164	0.188	0.214	0.253	0.293	0.341	0.379	0.449	0.550	0.525	0.143
N° 10	0.094	0.107	0.132	0.132	0.150	0.205	0.230	0.294	0.296	0.330	0.376	0.432	0.480	0.648	0.606	0.159
N° 11	0.082	0.099	0.109	0.126	0.135	0.170	0.199	0.233	0.320	0.376	0.414	0.455	0.521	0.641	0.631	0.209
N° 12	0.084	0.096	0.108	0.122	0.129	0.163	0.186	0.219	0.259	0.300	0.347	0.400	0.466	0.552	0.533	0.143
N° 13	0.092	0.108	0.122	0.134	0.152	0.206	0.226	0.259	0.321	0.387	0.444	0.530	0.624	0.741	0.700	0.172
N° 14	0.101	0.120	0.139	0.148	0.161	0.229	0.264	0.305	0.349	0.402	0.479	0.549	0.654	0.878	0.771	0.215
N° 15	0.110	0.133	0.145	0.156	0.171	0.234	0.257	0.305	0.372	0.420	0.500	0.573	0.704	0.830	0.786	0.210
N° 16	0.089	0.102	0.113	0.124	0.130	0.182	0.187	0.211	0.249	0.288	0.344	0.400	0.451	0.538	0.515	0.167
N° 17	0.088	0.101	0.114	0.124	0.136	0.172	0.203	0.243	0.266	0.308	0.366	0.412	0.480	0.586	0.553	0.151
N° 18	0.102	0.119	0.136	0.150	0.162	0.206	0.246	0.276	0.341	0.397	0.462	0.540	0.602	0.762	0.710	0.186
N° 19	0.091	0.108	0.122	0.137	0.146	0.198	0.232	0.277	0.327	0.384	0.466	0.528	0.624	0.774	0.732	0.169
N° 20	0.091	0.111	0.129	0.143	0.159	0.213	0.253	0.289	0.360	0.445	0.523	0.597	0.710	0.889	0.829	0.190
N° 21	0.110	0.132	0.150	0.165	0.181	0.250	0.289	0.339	0.416	0.487	0.589	0.698	0.824	1.022	0.961	0.214
N° 22	0.090	0.104	0.115	0.133	0.136	0.170	0.194	0.217	0.260	0.302	0.352	0.400	0.468	0.591	0.536	0.148
N° 23	0.082	0.097	0.113	0.129	0.139	0.182	0.212	0.247	0.307	0.352	0.433	0.481	0.587	0.687	0.671	0.158
N° 24	0.097	0.115	0.130	0.144	0.161	0.228	0.253	0.313	0.344	0.392	0.470	0.536	0.671	0.774	0.729	0.188
N° 25	0.093	0.110	0.123	0.138	0.150	0.193	0.215	0.272	0.300	0.351	0.415	0.475	0.559	0.741	0.669	0.163
N° 26	0.083	0.114	0.107	0.123	0.144	0.186	0.199	0.212	0.259	0.299	0.366	0.431	0.517	0.573	0.543	0.147
N° 27	0.099	0.118	0.129	0.139	0.162	0.195	0.220	0.253	0.303	0.352	0.419	0.477	0.558	0.727	0.652	0.167
N° 28	0.091	0.107	0.117	0.127	0.137	0.197	0.211	0.221	0.259	0.298	0.358	0.407	0.501	0.584	0.572	0.153
N° 29	0.086	0.097	0.110	0.120	0.133	0.171	0.189	0.212	0.256	0.298	0.366	0.406	0.494	0.587	0.559	0.145
N° 30	0.106	0.136	0.156	0.169	0.194	0.267	0.331	0.278	0.393	0.420	0.483	0.542	0.664	0.806	0.776	0.188
N° 31	0.083	0.099	0.111	0.118	0.126	0.161	0.184	0.214	0.254	0.304	0.345	0.398	0.488	0.563	0.549	0.140

We can observe that few parts have not the same drift than the others.

This is due to the great sensibility of the measurement:

It's difficult to reach a better repeatability than 0.05 Ohms (corresponding to 5mV with the parameter condition) with the DUT contact in the test card carrier.