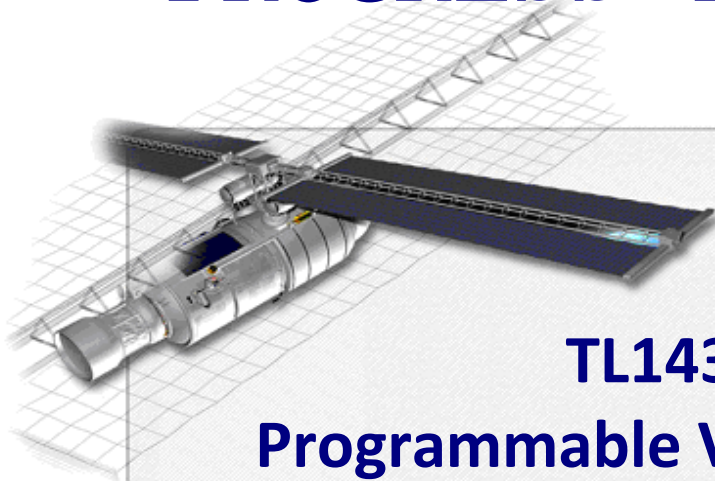




TOTAL IONIZING DOSE PROGRESS TEST REPORT



TL1431ACZT Programmable Voltage Reference GE337030 From STMicroelectronics

TRAD/TE/TL1431ACZT/337030/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	GE337030
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.

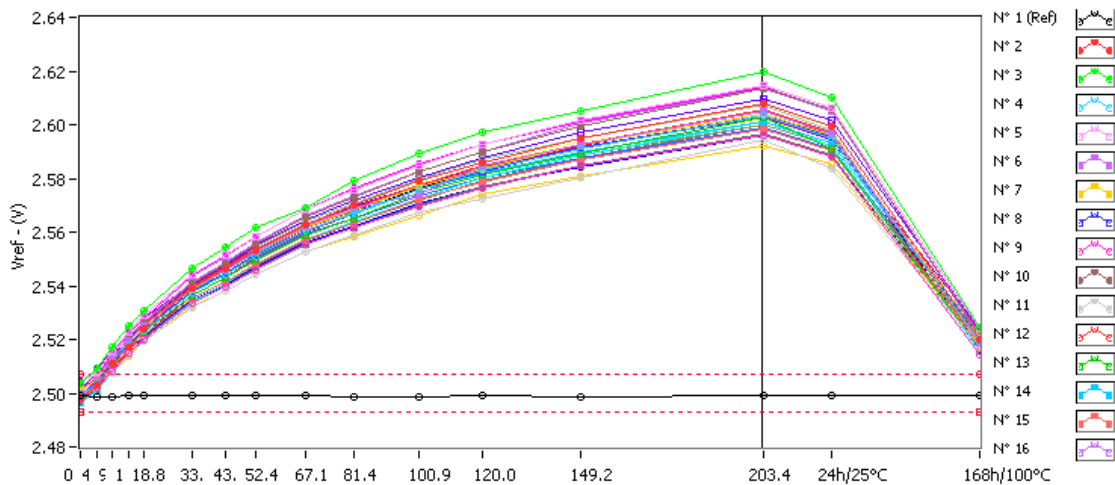
4. TEST PARAMETERS

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

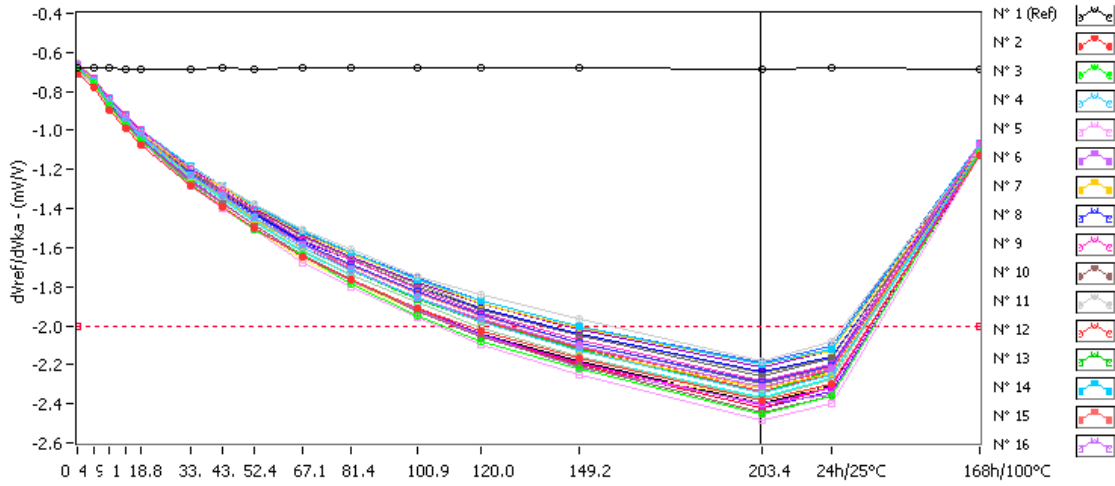


Vref. (V) Min = 2.493 Max = 2.507

	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)	2.4991	2.4988	2.4987	2.4990	2.4991	2.4991	2.4990	2.4991	2.4991	2.4986	2.4988	2.4990	2.4987	2.4989	2.4990	2.4992
N° 2	2.4981	2.5030	2.5107	2.5175	2.5241	2.5393	2.5466	2.5531	2.5628	2.5700	2.5794	2.5861	2.5949	2.6081	2.5996	2.5201
N° 3	2.5038	2.5092	2.5173	2.5249	2.5310	2.5467	2.5543	2.5619	2.5690	2.5794	2.5893	2.5970	2.6051	2.6194	2.6102	2.5248
N° 4	2.4992	2.5037	2.5108	2.5177	2.5231	2.5374	2.5443	2.5510	2.5604	2.5672	2.5758	2.5828	2.5912	2.6034	2.5950	2.5192
N° 5	2.5034	2.5082	2.5157	2.5230	2.5288	2.5440	2.5513	2.5584	2.5684	2.5757	2.5849	2.5925	2.6015	2.6149	2.6062	2.5238
N° 6	2.4996	2.5048	2.5124	2.5193	2.5249	2.5390	2.5458	2.5528	2.5620	2.5692	2.5739	2.5846	2.5927	2.6052	2.5965	2.5190
N° 7	2.5006	2.5054	2.5125	2.5195	2.5248	2.5388	2.5456	2.5524	2.5615	2.5685	2.5769	2.5839	2.5927	2.6040	2.5959	2.5203
N° 8	2.4992	2.5042	2.5114	2.5185	2.5240	2.5380	2.5447	2.5513	2.5605	2.5672	2.5758	2.5827	2.5916	2.6035	2.5953	2.5199
N° 9	2.4977	2.5017	2.5082	2.5148	2.5200	2.5333	2.5399	2.5461	2.5557	2.5614	2.5695	2.5765	2.5846	2.5963	2.5884	2.5145
N° 10	2.4998	2.5049	2.5127	2.5201	2.5260	2.5409	2.5481	2.5556	2.5655	2.5729	2.5827	2.5901	2.5994	2.6134	2.6054	2.5209
N° 11	2.4974	2.5018	2.5077	2.5142	2.5193	2.5319	2.5380	2.5443	2.5525	2.5588	2.5675	2.5726	2.5802	2.5944	2.5838	2.5173
N° 12	2.5011	2.5058	2.5128	2.5197	2.5255	2.5398	2.5468	2.5536	2.5629	2.5689	2.5777	2.5845	2.5925	2.6042	2.5958	2.5206
N° 13	2.4981	2.5029	2.5102	2.5170	2.5226	2.5364	2.5428	2.5497	2.5591	2.5653	2.5745	2.5814	2.5895	2.6028	2.5912	2.5166
N° 14	2.4996	2.5046	2.5118	2.5184	2.5239	2.5381	2.5460	2.5520	2.5608	2.5669	2.5756	2.5820	2.5901	2.6011	2.5934	2.5216
N° 15	2.4979	2.5026	2.5095	2.5168	2.5217	2.5353	2.5416	2.5483	2.5572	2.5636	2.5721	2.5788	2.5871	2.5983	2.5907	2.5175
N° 16	2.5009	2.5059	2.5138	2.5211	2.5270	2.5417	2.5488	2.5561	2.5661	2.5736	2.5826	2.5901	2.6008	2.6135	2.6050	2.5216
N° 17	2.4978	2.5018	2.5078	2.5140	2.5192	2.5322	2.5378	2.5440	2.5525	2.5586	2.5663	2.5739	2.5809	2.5921	2.5855	2.5182
N° 18	2.5011	2.5064	2.5147	2.5221	2.5280	2.5436	2.5510	2.5585	2.5687	2.5761	2.5851	2.5929	2.6012	2.6141	2.6051	2.5220
N° 19	2.5043	2.5089	2.5159	2.5225	2.5278	2.5410	2.5475	2.5539	2.5629	2.5698	2.5772	2.5838	2.5913	2.6026	2.5945	2.5238
N° 20	2.4991	2.5042	2.5121	2.5192	2.5251	2.5400	2.5469	2.5542	2.5639	2.5707	2.5796	2.5869	2.5951	2.6075	2.5979	2.5184
N° 21	2.4961	2.5007	2.5077	2.5146	2.5203	2.5341	2.5407	2.5479	2.5573	2.5641	2.5725	2.5800	2.5887	2.6009	2.5920	2.5157
N° 22	2.4980	2.5029	2.5104	2.5178	2.5235	2.5380	2.5446	2.5516	2.5615	2.5681	2.5772	2.5841	2.5929	2.6059	2.5972	2.5178
N° 23	2.4971	2.5014	2.5080	2.5144	2.5199	2.5333	2.5397	2.5464	2.5553	2.5615	2.5700	2.5767	2.5847	2.5967	2.5888	2.5167
N° 24	2.5009	2.5056	2.5119	2.5186	2.5239	2.5375	2.5448	2.5505	2.5593	2.5653	2.5735	2.5802	2.5879	2.5988	2.5908	2.5212
N° 25	2.4975	2.5019	2.5090	2.5160	2.5219	2.5364	2.5429	2.5504	2.5603	2.5669	2.5759	2.5838	2.5923	2.6058	2.5960	2.5158
N° 26	2.4976	2.5023	2.5090	2.5159	2.5214	2.5345	2.5405	2.5472	2.5563	2.5621	2.5707	2.5768	2.5844	2.5960	2.5884	2.5175
N° 27	2.4988	2.5036	2.5108	2.5177	2.5228	2.5364	2.5430	2.5495	2.5587	2.5649	2.5734	2.5804	2.5886	2.6000	2.5923	2.5185
N° 28	2.4976	2.5017	2.5084	2.5150	2.5203	2.5341	2.5408	2.5476	2.5569	2.5633	2.5717	2.5792	2.5877	2.6003	2.5922	2.5169
N° 29	2.5022	2.5068	2.5137	2.5205	2.5260	2.5404	2.5476	2.5548	2.5647	2.5718	2.5804	2.5878	2.5970	2.6098	2.6015	2.5234
N° 30	2.4981	2.5031	2.5106	2.5177	2.5247	2.5382	2.5449	2.5523	2.5623	2.5686	2.5771	2.5850	2.5940	2.6018	2.5956	2.5189
N° 31	2.4964	2.5013	2.5087	2.5159	2.5216	2.5361	2.5431	2.5505	2.5602	2.5675	2.5763	2.5840	2.5926	2.6054	2.5968	2.5161

2. dVref/dVka

Ta=25°C; Ik=10mA, 3V<Vka<36V



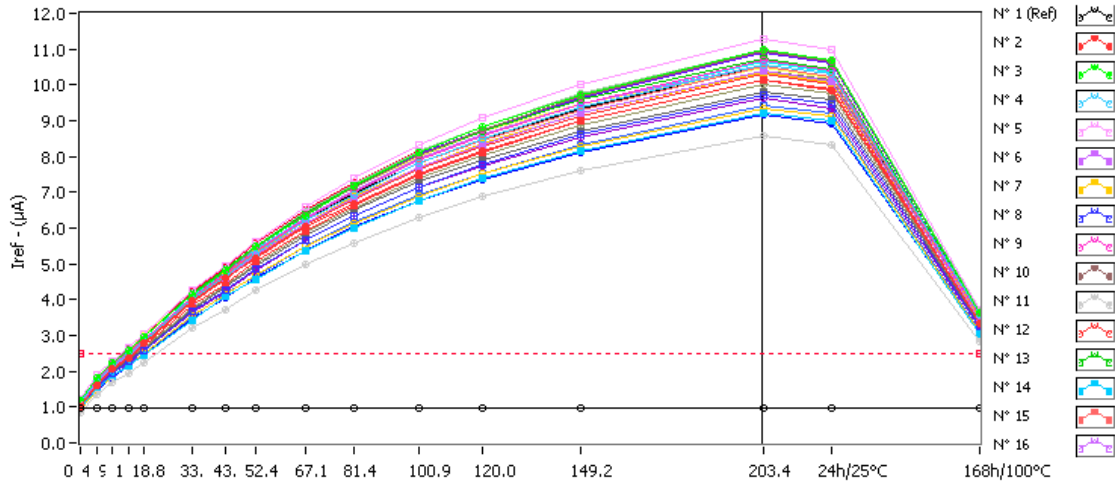
dVref/dVka . (mV/V)

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)	-0.679	-0.675	-0.681	-0.683	-0.684	-0.685	-0.681	-0.683	-0.683	-0.677	-0.678	-0.682	-0.678	-0.683	-0.682	-0.684
N° 2	-0.706	-0.782	-0.894	-0.986	-1.070	-1.284	-1.391	-1.500	-1.644	-1.763	-1.912	-2.028	-2.165	-2.384	-2.298	-1.130
N° 3	-0.676	-0.759	-0.876	-0.972	-1.054	-1.274	-1.390	-1.509	-1.639	-1.788	-1.947	-2.078	-2.220	-2.456	-2.364	-1.112
N° 4	-0.676	-0.749	-0.856	-0.947	-1.024	-1.232	-1.336	-1.447	-1.597	-1.714	-1.856	-1.981	-2.124	-2.342	-2.251	-1.104
N° 5	-0.686	-0.767	-0.882	-0.977	-1.059	-1.281	-1.395	-1.511	-1.676	-1.802	-1.959	-2.097	-2.250	-2.482	-2.396	-1.127
N° 6	-0.665	-0.743	-0.854	-0.945	-1.021	-1.227	-1.331	-1.443	-1.588	-1.708	-1.853	-1.965	-2.103	-2.314	-2.223	-1.075
N° 7	-0.673	-0.748	-0.856	-0.950	-1.026	-1.235	-1.341	-1.453	-1.598	-1.715	-1.857	-1.979	-2.125	-2.323	-2.242	-1.099
N° 8	-0.683	-0.756	-0.861	-0.952	-1.026	-1.225	-1.328	-1.430	-1.576	-1.685	-1.822	-1.942	-2.088	-2.291	-2.206	-1.095
N° 9	-0.663	-0.732	-0.833	-0.923	-0.999	-1.200	-1.304	-1.409	-1.562	-1.666	-1.809	-1.937	-2.074	-2.283	-2.200	-1.063
N° 10	-0.676	-0.757	-0.873	-0.967	-1.048	-1.259	-1.370	-1.486	-1.642	-1.767	-1.923	-2.054	-2.207	-2.443	-2.359	-1.115
N° 11	-0.700	-0.762	-0.852	-0.937	-1.012	-1.190	-1.280	-1.378	-1.507	-1.608	-1.746	-1.842	-1.963	-2.186	-2.077	-1.092
N° 12	-0.675	-0.751	-0.858	-0.949	-1.029	-1.233	-1.340	-1.449	-1.600	-1.707	-1.853	-1.974	-2.109	-2.317	-2.229	-1.086
N° 13	-0.661	-0.740	-0.849	-0.942	-1.022	-1.231	-1.338	-1.450	-1.604	-1.715	-1.864	-1.983	-2.122	-2.348	-2.225	-1.084
N° 14	-0.663	-0.732	-0.836	-0.920	-0.994	-1.183	-1.285	-1.383	-1.519	-1.623	-1.762	-1.872	-2.005	-2.201	-2.118	-1.066
N° 15	-0.676	-0.748	-0.854	-0.947	-1.022	-1.224	-1.324	-1.433	-1.582	-1.690	-1.833	-1.951	-2.090	-2.293	-2.209	-1.090
N° 16	-0.684	-0.763	-0.878	-0.973	-1.053	-1.267	-1.375	-1.488	-1.649	-1.773	-1.920	-2.050	-2.216	-2.400	-2.355	-1.114
N° 17	-0.695	-0.758	-0.853	-0.935	-1.012	-1.202	-1.292	-1.392	-1.531	-1.632	-1.761	-1.886	-2.010	-2.199	-2.131	-1.100
N° 18	-0.666	-0.748	-0.866	-0.961	-1.040	-1.254	-1.365	-1.482	-1.639	-1.764	-1.916	-2.047	-2.188	-2.408	-2.317	-1.101
N° 19	-0.676	-0.745	-0.848	-0.934	-1.008	-1.196	-1.293	-1.397	-1.536	-1.649	-1.776	-1.888	-2.017	-2.212	-2.126	-1.068
N° 20	-0.659	-0.740	-0.853	-0.945	-1.024	-1.237	-1.343	-1.460	-1.618	-1.737	-1.883	-2.013	-2.157	-2.374	-2.278	-1.082
N° 21	-0.678	-0.753	-0.861	-0.955	-1.036	-1.246	-1.352	-1.468	-1.624	-1.739	-1.883	-2.015	-2.156	-2.365	-2.268	-1.110
N° 22	-0.678	-0.754	-0.862	-0.953	-1.032	-1.234	-1.335	-1.447	-1.601	-1.711	-1.856	-1.978	-2.119	-2.337	-2.242	-1.097
N° 23	-0.684	-0.753	-0.854	-0.941	-1.019	-1.213	-1.309	-1.417	-1.558	-1.664	-1.801	-1.918	-2.052	-2.255	-2.169	-1.090
N° 24	-0.678	-0.746	-0.842	-0.928	-1.001	-1.191	-1.285	-1.384	-1.524	-1.622	-1.752	-1.870	-2.000	-2.193	-2.102	-1.069
N° 25	-0.681	-0.758	-0.867	-0.963	-1.045	-1.262	-1.368	-1.485	-1.650	-1.764	-1.914	-2.051	-2.197	-2.420	-2.316	-1.117
N° 26	-0.697	-0.767	-0.868	-0.958	-1.033	-1.225	-1.318	-1.421	-1.567	-1.664	-1.803	-1.911	-2.040	-2.237	-2.157	-1.104
N° 27	-0.659	-0.733	-0.837	-0.927	-1.000	-1.193	-1.293	-1.398	-1.544	-1.651	-1.790	-1.909	-2.043	-2.245	-2.164	-1.068
N° 28	-0.669	-0.741	-0.843	-0.932	-1.011	-1.212	-1.312	-1.423	-1.574	-1.683	-1.824	-1.949	-2.090	-2.300	-2.216	-1.083
N° 29	-0.691	-0.766	-0.875	-0.968	-1.050	-1.264	-1.371	-1.487	-1.648	-1.767	-1.912	-2.045	-2.201	-2.424	-2.340	-1.125
N° 30	-0.693	-0.774	-0.885	-0.982	-1.072	-1.280	-1.387	-1.508	-1.664	-1.776	-1.926	-2.053	-2.209	-2.374	-2.313	-1.131
N° 31	-0.686	-0.765	-0.876	-0.972	-1.053	-1.263	-1.372	-1.488	-1.645	-1.767	-1.908	-2.042	-2.182	-2.396	-2.309	-1.115

3. Iref

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



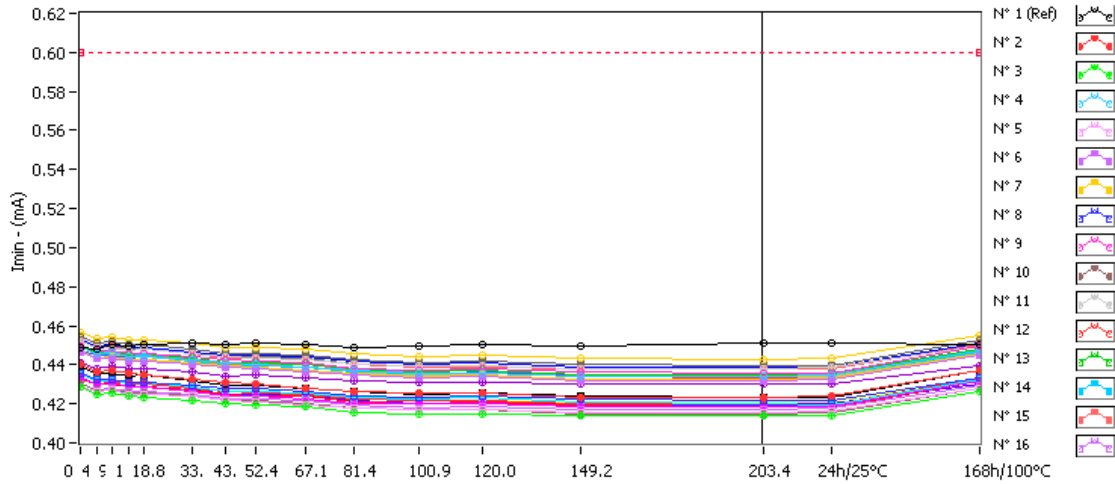
Iref . (µA)

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)	0.984	0.987	0.983	0.983	0.981	0.980	0.981	0.983	0.982	0.986	0.985	0.981	0.984	0.980	0.980	0.980
N° 2	1.019	1.619	2.073	2.385	2.805	3.961	4.589	5.146	6.027	6.688	7.523	8.157	8.989	10.123	9.858	3.355
N° 3	1.192	1.809	2.221	2.592	2.948	4.153	4.830	5.497	6.347	7.191	8.112	8.840	9.731	10.996	10.700	3.632
N° 4	1.150	1.751	2.143	2.497	2.839	4.008	4.653	5.282	6.196	6.947	7.810	8.488	9.370	10.583	10.301	3.576
N° 5	1.241	1.883	2.303	2.681	3.036	4.271	4.958	5.641	6.607	7.407	8.344	9.077	10.015	11.302	10.993	3.724
N° 6	1.108	1.708	2.103	2.457	2.807	3.961	4.602	5.234	6.115	6.837	7.677	8.331	9.198	10.375	10.095	3.433
N° 7	1.108	1.719	2.118	2.481	2.823	3.988	4.636	5.262	6.141	6.871	7.694	8.362	9.194	10.341	10.071	3.485
N° 8	1.031	1.594	1.958	2.285	2.595	3.673	4.266	4.840	5.668	6.359	7.157	7.787	8.600	9.725	9.465	3.255
N° 9	1.164	1.776	2.177	2.539	2.883	4.060	4.711	5.345	6.255	7.016	7.888	8.583	9.454	10.678	10.406	3.456
N° 10	1.202	1.826	2.239	2.606	2.960	4.130	4.785	5.432	6.363	7.140	8.048	8.760	9.678	10.934	10.638	3.622
N° 11	0.852	1.353	1.676	1.964	2.244	3.198	3.732	4.250	4.987	5.598	6.308	6.880	7.601	8.590	8.341	2.819
N° 12	1.080	1.682	2.070	2.421	2.763	3.925	4.568	5.192	6.074	6.806	7.647	8.301	9.140	10.306	10.022	3.350
N° 13	1.145	1.778	2.197	2.577	2.947	4.182	4.865	5.513	6.421	7.168	8.033	8.721	9.577	10.746	10.429	3.611
N° 14	0.956	1.513	1.871	2.148	2.443	3.438	4.086	4.560	5.349	6.008	6.779	7.390	8.167	9.219	8.980	3.048
N° 15	1.128	1.734	2.136	2.577	2.865	4.032	4.689	5.319	6.207	6.948	7.797	8.471	9.317	10.502	10.228	3.510
N° 16	1.158	1.760	2.164	2.529	2.877	4.056	4.718	5.359	6.282	7.047	7.928	8.625	9.474	10.573	10.323	3.523
N° 17	0.947	1.499	1.848	2.173	2.485	3.545	4.126	4.678	5.475	6.138	6.908	7.514	8.279	9.337	9.109	3.093
N° 18	1.147	1.748	2.146	2.509	2.854	4.030	4.696	5.350	6.271	7.039	7.916	8.610	9.483	10.703	10.419	3.561
N° 19	1.008	1.562	1.929	2.254	2.571	3.637	4.240	4.821	5.661	6.334	7.124	7.745	8.539	9.626	9.357	3.193
N° 20	1.196	1.813	2.223	2.597	2.951	4.169	4.848	5.513	6.456	7.241	8.138	8.850	9.749	10.994	10.687	3.669
N° 21	1.144	1.760	2.168	2.538	2.892	4.099	4.769	5.418	6.314	7.055	7.929	8.599	9.459	10.656	10.355	3.577
N° 22	1.081	1.656	2.032	2.379	2.706	3.826	4.449	5.062	5.928	6.645	7.486	8.123	8.988	10.149	9.867	3.379
N° 23	1.019	1.593	1.969	2.306	2.632	3.729	4.347	4.944	5.784	6.486	7.296	7.906	8.720	9.824	9.585	3.280
N° 24	0.991	1.551	1.875	2.185	2.483	3.508	4.190	4.660	5.474	6.153	6.945	7.533	8.338	9.441	9.193	3.125
N° 25	1.177	1.810	2.231	2.604	2.965	4.208	4.898	5.568	6.494	7.263	8.153	8.844	9.737	10.962	10.662	3.630
N° 26	0.949	1.486	1.831	2.146	2.449	3.474	4.045	4.589	5.373	6.024	6.772	7.364	8.122	9.173	8.933	3.088
N° 27	1.072	1.637	2.015	2.352	2.681	3.777	4.401	5.003	5.856	6.565	7.397	8.049	8.878	10.014	9.749	3.308
N° 28	1.088	1.685	2.080	2.437	2.775	3.943	4.593	5.227	6.116	6.848	7.691	8.376	9.215	10.397	10.122	3.455
N° 29	1.188	1.817	2.225	2.591	2.940	4.141	4.806	5.466	6.392	7.153	8.054	8.754	9.648	10.902	10.619	3.634
N° 30	1.149	1.771	2.184	2.561	3.027	4.150	4.827	5.482	6.401	7.132	7.976	8.686	9.465	10.472	10.203	3.583
N° 31	1.077	1.697	2.105	2.470	2.831	4.033	4.695	5.336	6.231	6.966	7.808	8.478	9.320	10.501	10.209	3.434

4. Imin

Ta=25°C; Vka=Vref



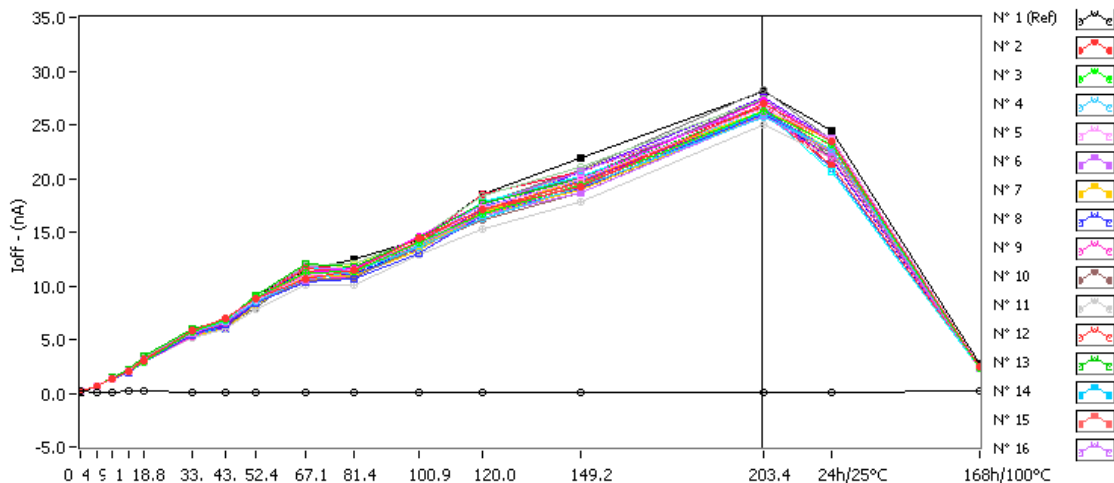
Imin . (mA)

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)	0.4490	0.4478	0.4501	0.4498	0.4504	0.4512	0.4505	0.4510	0.4502	0.4491	0.4493	0.4503	0.4494	0.4510	0.4508	0.4505
N° 2	0.4404	0.4367	0.4370	0.4354	0.4347	0.4328	0.4308	0.4302	0.4280	0.4264	0.4253	0.4254	0.4234	0.4234	0.4239	0.4374
N° 3	0.4283	0.4249	0.4255	0.4237	0.4235	0.4219	0.4199	0.4195	0.4185	0.4158	0.4149	0.4149	0.4136	0.4136	0.4142	0.4265
N° 4	0.4489	0.4456	0.4462	0.4445	0.4445	0.4429	0.4409	0.4404	0.4387	0.4369	0.4356	0.4359	0.4344	0.4343	0.4349	0.4472
N° 5	0.4289	0.4261	0.4268	0.4250	0.4251	0.4238	0.4217	0.4212	0.4197	0.4179	0.4167	0.4173	0.4157	0.4154	0.4161	0.4277
N° 6	0.4467	0.4432	0.4437	0.4421	0.4419	0.4403	0.4387	0.4383	0.4363	0.4349	0.4336	0.4339	0.4320	0.4320	0.4325	0.4451
N° 7	0.4469	0.4436	0.4439	0.4424	0.4423	0.4408	0.4392	0.4388	0.4370	0.4353	0.4342	0.4345	0.4329	0.4328	0.4333	0.4456
N° 8	0.4355	0.4323	0.4325	0.4311	0.4309	0.4297	0.4280	0.4278	0.4262	0.4241	0.4230	0.4239	0.4222	0.4218	0.4220	0.4333
N° 9	0.4498	0.4470	0.4472	0.4457	0.4460	0.4440	0.4424	0.4419	0.4408	0.4381	0.4371	0.4380	0.4362	0.4359	0.4360	0.4492
N° 10	0.4299	0.4273	0.4273	0.4258	0.4259	0.4238	0.4220	0.4215	0.4198	0.4176	0.4168	0.4167	0.4151	0.4151	0.4152	0.4279
N° 11	0.4519	0.4488	0.4489	0.4475	0.4478	0.4457	0.4439	0.4437	0.4423	0.4402	0.4395	0.4396	0.4379	0.4379	0.4386	0.4499
N° 12	0.4466	0.4437	0.4439	0.4426	0.4429	0.4405	0.4387	0.4384	0.4374	0.4349	0.4342	0.4345	0.4329	0.4331	0.4333	0.4449
N° 13	0.4495	0.4464	0.4465	0.4450	0.4456	0.4432	0.4412	0.4410	0.4400	0.4376	0.4364	0.4368	0.4351	0.4351	0.4357	0.4484
N° 14	0.4491	0.4456	0.4460	0.4446	0.4447	0.4422	0.4397	0.4397	0.4384	0.4363	0.4355	0.4356	0.4342	0.4346	0.4346	0.4464
N° 15	0.4520	0.4486	0.4492	0.4473	0.4478	0.4456	0.4434	0.4433	0.4424	0.4399	0.4389	0.4390	0.4376	0.4376	0.4378	0.4502
N° 16	0.4302	0.4272	0.4278	0.4262	0.4265	0.4247	0.4224	0.4223	0.4215	0.4190	0.4180	0.4186	0.4173	0.4174	0.4178	0.4292
N° 17	0.4568	0.4534	0.4545	0.4528	0.4529	0.4510	0.4488	0.4489	0.4482	0.4456	0.4444	0.4450	0.4436	0.4429	0.4434	0.4549
N° 18	0.4330	0.4299	0.4306	0.4290	0.4290	0.4264	0.4242	0.4239	0.4224	0.4205	0.4199	0.4202	0.4185	0.4186	0.4188	0.4314
N° 19	0.4413	0.4381	0.4392	0.4378	0.4379	0.4362	0.4342	0.4345	0.4333	0.4314	0.4308	0.4313	0.4299	0.4299	0.4303	0.4397
N° 20	0.4487	0.4455	0.4459	0.4445	0.4445	0.4420	0.4397	0.4396	0.4388	0.4364	0.4352	0.4360	0.4344	0.4340	0.4344	0.4468
N° 21	0.4348	0.4316	0.4321	0.4307	0.4309	0.4288	0.4266	0.4266	0.4257	0.4233	0.4221	0.4229	0.4212	0.4205	0.4195	0.4329
N° 22	0.4347	0.4316	0.4319	0.4302	0.4303	0.4280	0.4260	0.4258	0.4251	0.4227	0.4217	0.4220	0.4204	0.4200	0.4197	0.4334
N° 23	0.4543	0.4513	0.4516	0.4503	0.4505	0.4480	0.4459	0.4459	0.4449	0.4424	0.4414	0.4419	0.4402	0.4398	0.4393	0.4525
N° 24	0.4475	0.4446	0.4448	0.4435	0.4439	0.4420	0.4389	0.4395	0.4391	0.4364	0.4351	0.4364	0.4346	0.4347	0.4338	0.4449
N° 25	0.4324	0.4299	0.4299	0.4288	0.4290	0.4270	0.4245	0.4243	0.4237	0.4210	0.4200	0.4210	0.4191	0.4183	0.4176	0.4319
N° 26	0.4530	0.4499	0.4500	0.4488	0.4489	0.4467	0.4448	0.4446	0.4445	0.4415	0.4406	0.4409	0.4391	0.4390	0.4389	0.4514
N° 27	0.4489	0.4460	0.4461	0.4448	0.4450	0.4429	0.4406	0.4405	0.4402	0.4375	0.4362	0.4368	0.4351	0.4349	0.4350	0.4478
N° 28	0.4519	0.4495	0.4498	0.4484	0.4489	0.4465	0.4440	0.4438	0.4432	0.4406	0.4392	0.4397	0.4382	0.4378	0.4378	0.4510
N° 29	0.4325	0.4300	0.4305	0.4294	0.4299	0.4277	0.4249	0.4249	0.4241	0.4217	0.4203	0.4209	0.4198	0.4195	0.4198	0.4305
N° 30	0.4348	0.4319	0.4319	0.4307	0.4305	0.4285	0.4261	0.4260	0.4246	0.4230	0.4218	0.4217	0.4211	0.4207	0.4209	0.4326
N° 31	0.4385	0.4357	0.4358	0.4344	0.4346	0.4319	0.4297	0.4294	0.4281	0.4263	0.4245	0.4254	0.4242	0.4230	0.4235	0.4375

5. Ioff

Ta=25°C



Ioff . (nA)

Max = 500.0

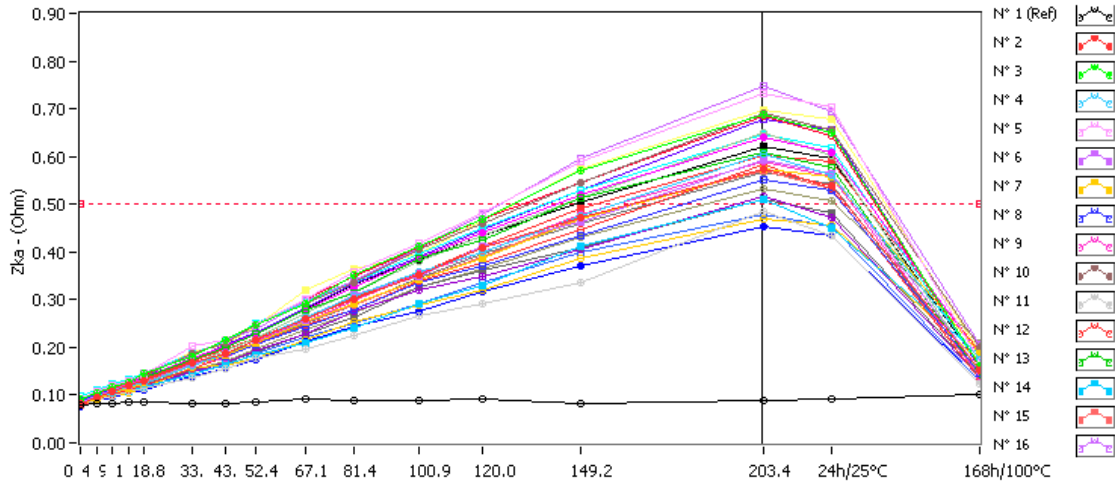
	0.0 krad(Si)	4.9 krad(Si)	9.6 krad(Si)	14.2 krad(Si)	18.8 krad(Si)	33.5 krad(Si)	43.2 krad(Si)	52.4 krad(Si)	67.1 krad(Si)	81.4 krad(Si)	100.9 krad(Si)	120.0 krad(Si)	149.2 krad(Si)	203.4 krad(Si)	24h 25°C	168h 100°C
N° 1 (Ref)	0.146	0.096	0.131	0.149	0.164	0.124	0.127	0.053	0.097	0.000	0.041	0.082	0.062	0.083	0.074	0.201
N° 2	0.146	0.606	1.380	2.040	2.983	5.775	6.913	8.803	10.665	11.488	14.441	17.114	19.174	27.003	23.481	2.431
N° 3	0.155	0.605	1.387	2.025	2.948	5.735	6.788	8.907	11.143	11.394	14.084	16.663	19.328	26.266	23.176	2.380
N° 4	0.155	0.593	1.374	2.010	2.954	5.665	6.701	8.591	10.598	11.326	13.578	16.321	19.158	25.688	22.704	2.433
N° 5	0.149	0.599	1.364	1.982	2.912	5.732	6.724	8.632	10.897	11.508	13.819	17.236	19.907	26.510	23.620	2.410
N° 6	0.148	0.622	1.389	2.065	2.963	5.583	6.743	8.787	10.451	11.420	13.921	16.590	18.690	25.848	22.467	2.335
N° 7	0.162	0.626	1.383	2.073	2.975	5.594	6.764	8.759	10.551	11.293	13.622	16.504	19.005	25.793	22.575	2.417
N° 8	0.149	0.598	1.304	1.957	2.818	5.429	6.448	8.378	10.345	10.640	13.081	16.508	19.072	25.985	22.401	2.412
N° 9	0.149	0.608	1.326	1.960	2.921	5.339	6.512	8.367	11.056	10.676	13.017	16.707	19.099	25.810	21.834	2.336
N° 10	0.151	0.621	1.342	2.034	2.992	5.375	6.432	8.365	10.452	10.751	13.650	16.138	18.690	26.037	22.387	2.312
N° 11	0.151	0.597	1.268	1.947	2.904	5.114	5.993	7.851	10.016	10.074	12.867	15.349	17.855	25.065	21.854	2.391
N° 12	0.149	0.656	1.397	2.112	3.184	5.703	6.787	8.814	11.564	11.260	14.134	17.170	19.628	26.680	23.027	2.392
N° 13	0.152	0.654	1.468	2.193	3.383	5.960	6.857	9.067	12.009	11.790	14.447	17.745	19.938	26.634	23.074	2.437
N° 14	0.155	0.609	1.352	2.016	2.967	5.336	6.360	8.333	10.599	10.761	13.670	16.213	19.051	26.166	22.567	2.415
N° 15	0.153	0.616	1.424	2.122	3.172	5.682	6.499	8.718	11.217	11.327	13.895	16.564	19.447	25.957	22.603	2.397
N° 16	0.144	0.606	1.404	2.101	3.172	5.788	6.557	8.793	11.718	11.448	14.141	17.577	20.593	26.884	23.730	2.395
N° 17	0.153	0.571	1.335	1.965	2.935	5.329	6.019	8.211	10.899	10.921	13.271	16.882	19.966	26.336	23.602	2.515
N° 18	0.151	0.615	1.430	2.142	3.162	5.718	6.577	8.843	11.132	11.678	14.579	17.717	19.975	27.226	23.448	2.339
N° 19	0.152	0.610	1.409	2.093	3.047	5.498	6.288	8.519	10.748	11.168	13.855	17.048	19.616	26.280	22.537	2.361
N° 20	0.148	0.634	1.444	2.169	3.250	5.825	6.740	9.047	11.928	12.056	14.382	18.388	21.082	27.336	23.362	2.379
N° 21	0.147	0.625	1.418	2.144	3.224	5.795	6.530	8.869	11.585	11.563	13.758	17.767	20.251	26.298	20.675	2.362
N° 22	0.151	0.613	1.386	2.073	3.087	5.494	6.351	8.468	11.317	11.216	13.809	16.895	19.363	26.079	21.229	2.306
N° 23	0.157	0.613	1.373	2.063	3.102	5.450	6.285	7.933	11.380	11.286	13.907	17.686	20.049	27.428	21.879	2.441
N° 24	0.159	0.636	1.330	2.001	2.898	5.469	6.033	8.304	11.366	11.092	13.316	17.351	19.830	26.662	20.970	2.500
N° 25	0.153	0.640	1.395	2.147	3.157	5.928	6.502	8.772	11.966	11.491	13.970	18.461	20.595	26.752	21.229	2.368
N° 26	0.149	0.628	1.357	2.100	3.008	5.460	6.248	8.320	11.715	11.058	13.589	16.754	19.314	26.265	21.773	2.387
N° 27	0.150	0.638	1.385	2.110	3.020	5.542	6.275	8.400	11.564	11.415	13.545	16.955	19.674	26.226	21.911	2.369
N° 28	0.150	0.623	1.389	2.091	3.065	5.689	6.342	8.663	11.641	11.686	13.855	17.631	20.764	28.176	23.635	2.495
N° 29	0.142	0.615	1.375	2.084	3.028	5.623	6.185	8.439	11.181	11.524	13.431	16.846	20.604	27.493	23.618	2.511
N° 30	0.147	0.652	1.448	2.228	3.238	5.878	6.565	8.425	11.088	12.032	13.987	16.956	20.827	26.714	22.627	2.420
N° 31	0.138	0.655	1.448	2.220	3.184	5.802	6.652	9.021	11.537	12.474	14.333	18.576	21.937	28.167	24.401	2.740

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)	0.080	0.082	0.083	0.084	0.086	0.084	0.083	0.085	0.092	0.088	0.089	0.093	0.084	0.088	0.092	0.101
N° 2	0.084	0.095	0.107	0.119	0.129	0.167	0.187	0.215	0.260	0.301	0.353	0.408	0.473	0.574	0.539	0.151
N° 3	0.091	0.106	0.117	0.127	0.145	0.181	0.216	0.247	0.290	0.353	0.412	0.469	0.569	0.688	0.650	0.161
N° 4	0.080	0.099	0.104	0.119	0.122	0.163	0.186	0.215	0.262	0.308	0.357	0.398	0.476	0.606	0.562	0.173
N° 5	0.093	0.107	0.120	0.131	0.142	0.202	0.215	0.246	0.302	0.358	0.419	0.482	0.588	0.731	0.702	0.172
N° 6	0.086	0.098	0.112	0.120	0.131	0.166	0.188	0.215	0.256	0.310	0.347	0.411	0.464	0.593	0.564	0.153
N° 7	0.083	0.093	0.105	0.113	0.124	0.160	0.183	0.208	0.254	0.293	0.343	0.388	0.470	0.575	0.558	0.186
N° 8	0.090	0.101	0.111	0.122	0.129	0.165	0.182	0.205	0.244	0.279	0.335	0.370	0.435	0.552	0.531	0.145
N° 9	0.085	0.097	0.108	0.126	0.130	0.165	0.179	0.211	0.254	0.298	0.354	0.399	0.478	0.589	0.557	0.140
N° 10	0.093	0.107	0.120	0.131	0.141	0.187	0.208	0.247	0.291	0.337	0.406	0.459	0.545	0.690	0.655	0.200
N° 11	0.081	0.090	0.098	0.107	0.113	0.135	0.155	0.178	0.195	0.224	0.267	0.293	0.334	0.484	0.433	0.123
N° 12	0.079	0.090	0.101	0.110	0.121	0.156	0.180	0.205	0.247	0.280	0.341	0.378	0.448	0.583	0.534	0.133
N° 13	0.085	0.098	0.110	0.123	0.135	0.174	0.200	0.227	0.279	0.314	0.385	0.423	0.513	0.608	0.576	0.143
N° 14	0.083	0.096	0.102	0.108	0.117	0.143	0.164	0.184	0.209	0.240	0.292	0.329	0.411	0.509	0.450	0.183
N° 15	0.078	0.090	0.103	0.110	0.120	0.169	0.181	0.209	0.254	0.288	0.342	0.390	0.474	0.570	0.533	0.139
N° 16	0.091	0.105	0.117	0.128	0.146	0.183	0.215	0.238	0.298	0.339	0.408	0.478	0.597	0.749	0.696	0.206
N° 17	0.078	0.088	0.098	0.105	0.114	0.159	0.161	0.179	0.215	0.255	0.290	0.321	0.388	0.470	0.455	0.171
N° 18	0.092	0.104	0.116	0.126	0.137	0.176	0.201	0.229	0.279	0.325	0.386	0.440	0.521	0.639	0.610	0.185
N° 19	0.081	0.092	0.102	0.110	0.120	0.148	0.167	0.192	0.227	0.277	0.320	0.350	0.405	0.518	0.473	0.137
N° 20	0.082	0.095	0.106	0.116	0.126	0.165	0.192	0.220	0.272	0.315	0.381	0.433	0.515	0.651	0.603	0.145
N° 21	0.097	0.112	0.123	0.134	0.145	0.186	0.213	0.252	0.294	0.337	0.396	0.451	0.530	0.647	0.617	0.162
N° 22	0.088	0.100	0.113	0.126	0.133	0.172	0.196	0.220	0.261	0.303	0.356	0.411	0.492	0.602	0.589	0.189
N° 23	0.078	0.090	0.101	0.108	0.124	0.153	0.167	0.190	0.227	0.264	0.325	0.360	0.409	0.510	0.480	0.139
N° 24	0.080	0.092	0.100	0.107	0.115	0.150	0.160	0.188	0.221	0.249	0.291	0.335	0.400	0.478	0.454	0.129
N° 25	0.092	0.106	0.119	0.129	0.142	0.188	0.212	0.247	0.301	0.348	0.408	0.469	0.545	0.685	0.643	0.157
N° 26	0.077	0.087	0.096	0.106	0.112	0.141	0.157	0.175	0.213	0.244	0.276	0.317	0.370	0.452	0.433	0.130
N° 27	0.081	0.091	0.108	0.123	0.129	0.152	0.171	0.198	0.239	0.271	0.326	0.365	0.429	0.532	0.506	0.210
N° 28	0.084	0.095	0.106	0.115	0.125	0.165	0.187	0.209	0.252	0.287	0.345	0.396	0.459	0.566	0.543	0.142
N° 29	0.089	0.102	0.120	0.127	0.139	0.175	0.207	0.233	0.281	0.334	0.390	0.446	0.530	0.677	0.656	0.156
N° 30	0.088	0.102	0.115	0.132	0.141	0.190	0.206	0.244	0.321	0.365	0.396	0.467	0.574	0.696	0.679	0.190
N° 31	0.091	0.104	0.115	0.127	0.136	0.177	0.201	0.232	0.278	0.334	0.382	0.434	0.505	0.622	0.595	0.162

We can observe that few parts (part plotted in black for example) 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 0.04 Ohms (corresponding to 4mV with the parameter condition) with the DUT contact in the test card carrier.