

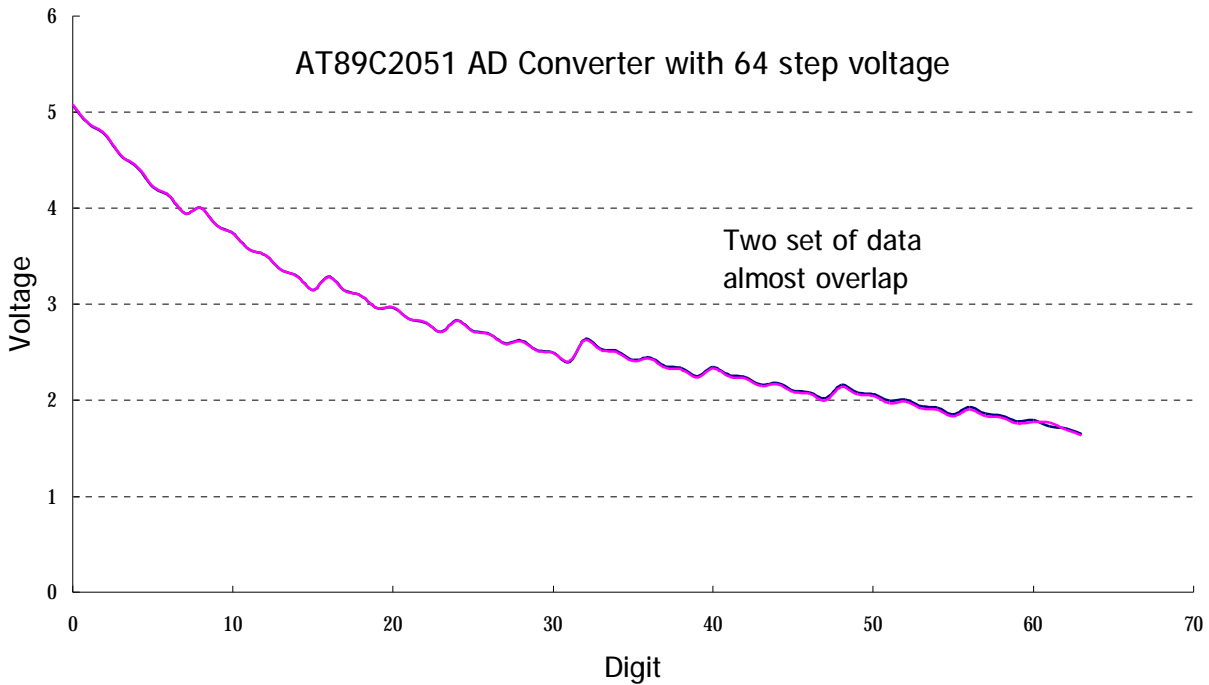
To find the right digital output to create the right voltage to match the voltage at P1.1(V1), the program start at 000000 and count up until the comparator output at p3.6 switches to 1. Then notice the user that the generated voltage is higher than the voltage source. That is a ramp type AD conversation. For faster conversation, the successive approximation conversation should be used.

EXPERIMENT

Increase the digital voltage step, measure the reference voltage that generated by the ladder circuit and potential divider. No analogy input signal is applied.

MEASUREMENT

Digit Step	Analog Voltage (V)		Digit Step	Analog Voltage (V)	
	Set1	Set2		Set1	Set2
0	5.073	5.078	34	2.512	2.499
1	4.88	4.883	35	2.418	2.404
2	4.769	4.774	36	2.447	2.434
3	4.547	4.551	37	2.355	2.341
4	4.429	4.434	38	2.336	2.321
5	4.222	4.227	39	2.251	2.236
6	4.131	4.135	40	2.348	2.334
7	3.944	3.945	41	2.261	2.246
8	4.002	4.002	42	2.242	2.227
9	3.817	3.817	43	2.16	2.146
10	3.74	3.739	44	2.182	2.168
11	3.572	3.571	45	2.103	2.089
12	3.515	3.513	46	2.085	2.072
13	3.359	3.357	47	2.019	1.998
14	3.295	3.293	48	2.159	2.141
15	3.152	3.15	49	2.08	2.06
16	3.287	3.285	50	2.065	2.044
17	3.141	3.139	51	1.992	1.97
18	3.09	3.088	52	2.01	1.988
19	2.958	2.959	53	1.938	1.916
20	2.967	2.969	54	1.923	1.901
21	2.846	2.849	55	1.855	1.834
22	2.809	2.818	56	1.928	1.907
23	2.714	2.71	57	1.859	1.838
24	2.834	2.829	58	1.844	1.823
25	2.723	2.717	59	1.779	1.759
26	2.695	2.69	60	1.792	1.772
27	2.594	2.587	61	1.728	1.77
28	2.622	2.614	62	1.712	1.695
29	2.522	2.515	63	1.65	1.636
30	2.497	2.492			
31	2.397	2.406			
32	2.635	2.625			
33	2.533	2.521			



RESULTS

The results show that the digital output corresponding the generation of the voltage reference V_0 is not perfect linear. 1) Fluctuation at some digit values, and this will restrict the tracking of the AD conservation. The lower digit may have voltage lesser the higher digit. 2) The falling rate of voltage at higher digit side is less than that at lower digit side; the weight of each voltage step is not equal. The non-linear problem towards the voltage step is due to the mismatch of the ladder circuit resistance that is used to generate a reference voltage.

CONCLUSION

For low accurate AD-converter, 2051 is simple and less expensive. When using 2051 as an AD converter using ladder circuit method, the number of voltage step should be minimize. Fluctuation and difference voltage step will limit the number of voltage step, or make the many voltage steps meaningless. The application using 2051 analog comparator is better to measure the time interval when the voltage source from one starting voltage to one particular reference voltage. In this case several voltage step only used.

