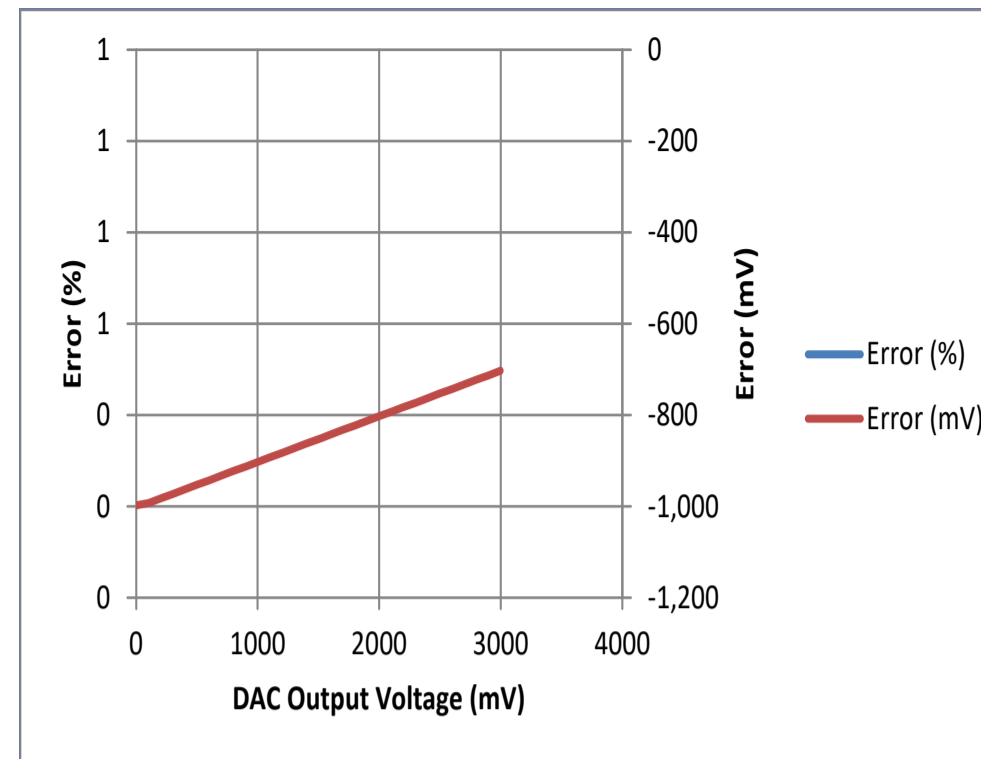
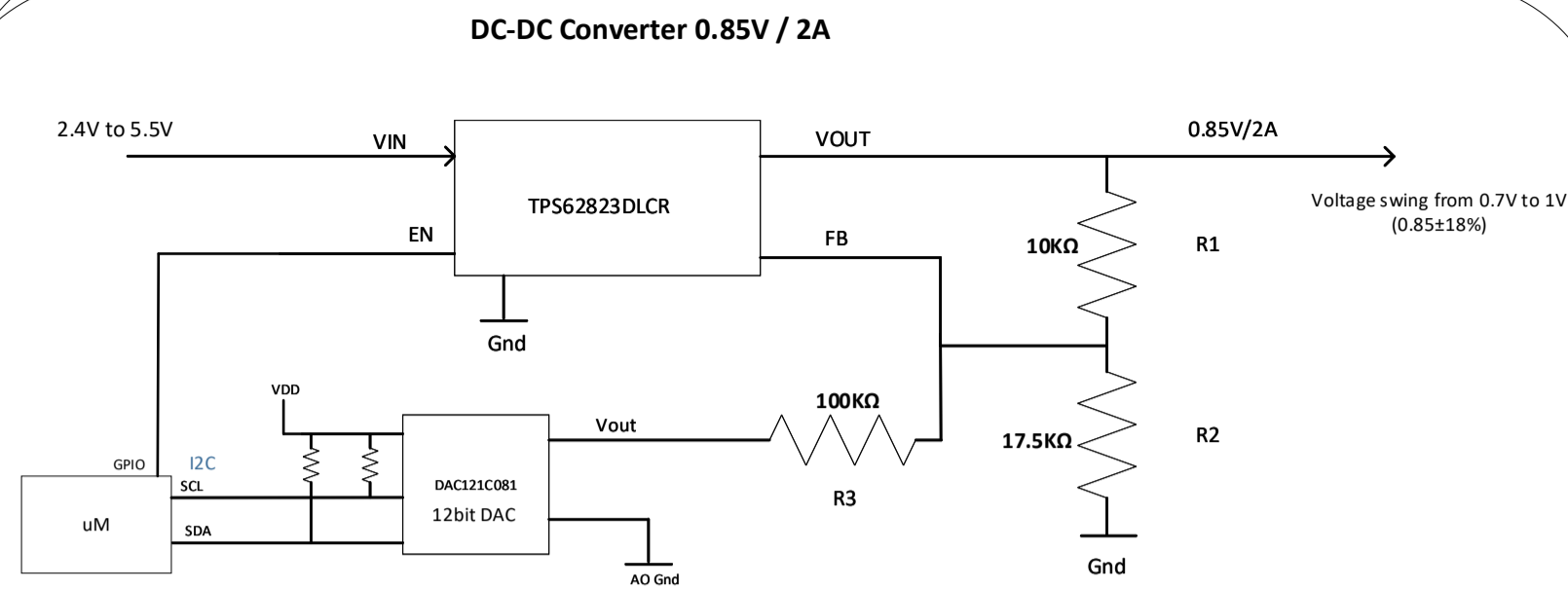


## Armstrong - DC-DC converter with DAC solution

Created By : Arumugam  
Date : 12-Aug-2020  
Ver: 1.0



### MAX OUTPUT VOLTAGE

For DAC code	0	0	V
IR2	$v_{fb}/R2$	0.0000343	0.034286 mA
IRB	$(dac\ code\ V - v_{fb})/r_b$	-0.000006	-0.006 mA
IR1	$IR2 - IRB$	0.0000403	0.040286 mA
VR2	$IR2 * R2$	0.402857143	V
Vout max	$VR2 + v_{fb}$	<b>1.002857143</b>	V

### TYP OUTPUT VOLTAGE

For DAC code	2087	1.528564453	V
IR2	$v_{fb}/R2$	0.0000343	0.034286 mA
IRB	$(dac\ code\ V - v_{fb})/r_b$	9.28564E-06	0.009286 mA
IR1	$IR2 - IRB$	0.0000250	0.025 mA
VR1	$IR1 * R1$	0.250000698	V
Vout Nominal	$VR2 + v_{fb}$	<b>0.850000698</b>	V

### MIN OUTPUT VOLTAGE

For DAC code	4096	3	V
IR2	$v_{fb}/R2$	0.0000343	0.034286 mA
IRB	$(dac\ code\ V - v_{fb})/r_b$	0.000024	0.024 mA
IR1	$IR2 - IRB$	0.0000103	0.010286 mA
VR1	$IR1 * R1$	0.102857143	V
Vout min	$VR2 + v_{fb}$	<b>0.702857143</b>	V

#### 12bit-DAC

12bit DAC =  $2^{12} = 4096$   
Vref = 3V  
=  $V_{ref} / 4095 = 0.000733$  V

#### 10bit-DAC

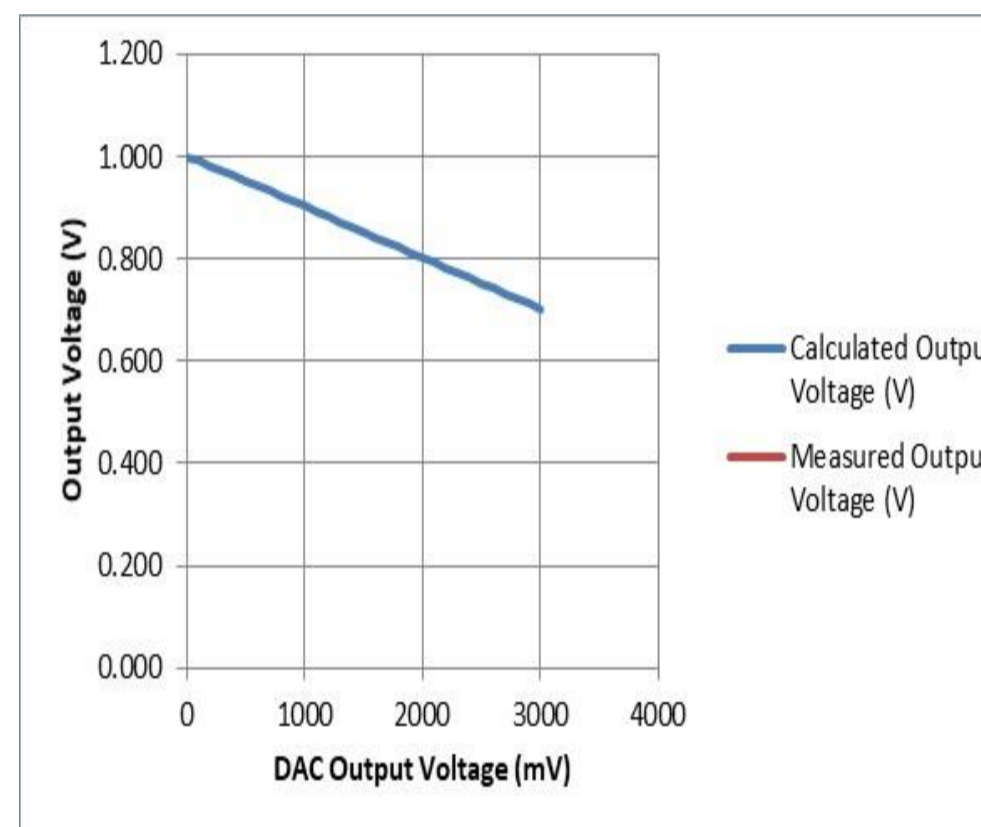
12bit DAC =  $2^{10} = 1024$   
Vref = 3V  
=  $V_{ref} / 1023 = 0.002933$  V

#### 8bit-DAC

12bit DAC =  $2^8 = 256$   
Vref = 3V  
=  $V_{ref} / 255 = 0.0118$  V

### Summary :

The 5mV step change possible through 12 & 10 bit DAC; 8 bit does't not possible since minimum voltage can control only 11.8mV



10bit DAC Count	12bit DAC Count	DAC Output Voltage (mV)	Calculated Output Voltage (V)		
10	0.0293	40	0.0292	29	1.000
27	0.07911	108	0.07884	79	0.995
44	0.12892	176	0.129008	129	0.990
61	0.17873	244	0.178852	179	0.985
78	0.22854	312	0.228696	229	0.980
95	0.27835	380	0.27854	279	0.975
112	0.32816	448	0.328384	329	0.970
129	0.37797	516	0.378228	379	0.965
146	0.42778	584	0.428072	429	0.960
163	0.47759	652	0.477916	479	0.955
180	0.5274	720	0.52776	529	0.950
197	0.57721	788	0.577604	579	0.945
214	0.62702	856	0.627448	629	0.940
231	0.67683	924	0.677292	679	0.935
248	0.72664	992	0.727136	729	0.930
265	0.77645	1060	0.77698	779	0.925
282	0.82626	1128	0.826824	829	0.920
299	0.87607	1196	0.876668	879	0.915
316	0.92588	1264	0.926512	929	0.910
333	0.97569	1332	0.976356	979	0.905
350	1.0255	1400	1.0262	1029	0.900
367	1.07531	1468	1.076044	1079	0.895
384	1.12512	1536	1.125888	1129	0.890
401	1.17493	1604	1.175732	1179	0.885
418	1.22474	1672	1.225576	1229	0.880
435	1.27455	1740	1.27542	1279	0.875
452	1.32436	1808	1.325264	1329	0.870
469	1.37417	1876	1.375108	1379	0.865
486	1.42398	1944	1.424952	1429	0.860
503	1.47379	2012	1.474796	1479	0.855
520	1.5236	2080	1.52464	1529	0.84996
537	1.57341	2148	1.574484	1579	0.8440
554	1.62322	2216	1.624328	1629	0.8400
571	1.67303	2284	1.674172	1679	0.8350
588	1.72284	2352	1.724016	1729	0.8300
605	1.77265	2420	1.77386	1779	0.8250
622	1.82246	2488	1.823704	1829	0.8200
639	1.87227	2556	1.873548	1879	0.815
656	1.92208	2624	1.923392	1929	0.8100
673	1.97189	2692	1.973236	1979	0.8050
690	2.0217	2760	2.02308	2029	0.800
707	2.07151	2828	2.072924	2079	0.795
724	2.12132	2896	2.122768	2129	0.790
741	2.17113	2964	2.172612	2179	0.785
758	2.22094	3032	2.222456	2229	0.780
775	2.27075	3100	2.2723	2279	0.775
792	2.32056	3168	2.322144	2329	0.770
809	2.37037	3236	2.371988	2379	0.765
826	2.42018	3304	2.421832	2429	0.760
843	2.46999	3372	2.471676	2479	0.755
860	2.5198	3440	2.52152	2529	0.750
877	2.56961	3508	2.571364	2579	0.745
894	2.61942	3576	2.621208	2629	0.740
911	2.66923	3644	2.671052	2679	0.735
928	2.71904	3712	2.720896	2729	0.730
945	2.76885	3780	2.77074	2779	0.725
962	2.81866	3848	2.820584	2829	0.720
979	2.86847	3916	2.870428	2879	0.715
996	2.91828	3984	2.920272	2929	0.710
1013	2.96809	4052	2.970116	2979	0.705