

DAP-04-S01 features

Preface:

The standard DAP-04 is a nice device to upgrade the existing Mean Well LED driver with 3-in-1 dimming function to DALI driver. Another feature of using DAP-04 is to have push dimming function which could be very useful for home lighting application.

The standard DAP-04 has designed to have four channel outputs. Each channel represents one DALI address. Therefore 4 DALI address in total can be found on the DALI environment. Only channel 1 has possibility to use relay for which it is used to AC switch On/Off the corresponding LED driver. Other three channels have unfortunately not equipped with such relay due to limited space. For this reason, some applications only connect the channel 1 and leave other channels open. However, the DALI controller still can search four addresses out of the single unit of DAP-04. It means three unused addresses are occupied by the DAP-04 and therefore the DALI system is not used efficiently.

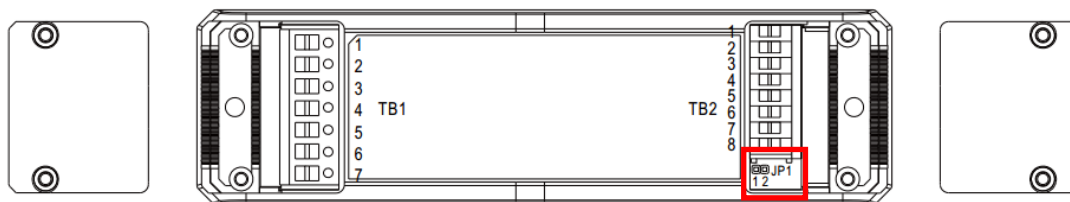
The min dimming level of DAP-04 is set to 0.8% by default. In case it is used with Mean Well LED driver with 3-in-1 dimming function, user may find the dimming response is slow especially in low dimming level.

The DAP-04-S01 is designed to solve two issues described above.

New features:

1) 4 or 1 DALI address selectable by jumper JP1. Default is set at 4 addresses.

The standard DAP can select the output PWM dimming signal high/low by JP1. However such function is not very practical and it is better to use same JP1 for other function. The new firmware is designed to have 4 DALI address by default. In case JP1 jumper (red rectangle in the figure) is removed, the DALI address is reduced to 1 address and also only channel 1 has output PWM dimming signal.



2) Programmable minimum push dim level via DALI. Default min push dim level is set at 10%.

Slow push dim response of standard DAP-04 is due to following reasons:

- The min. push dim level of DAP-04 is 0.8%.



- b) The fade rate of push dim is set at 29.16 step/sec.
- c) The generic min dim level of MW LED driver without any problem is 10% while the min dim level of new MW LED driver (e.g. NPF, PWM, LCM series) is 6%.
- d) The push dim response is logarithmic. In the 8 bit dimming system (e.g. DALI system), the 0.8% light output is corresponding to 77 steps (shown in appendix) while the 6% is at 151 steps and 10% is at 170 steps.
- e) In case the user would like to dim up from 0.8 to 6%, it means that the step is going up from 77 to 170 and the fade rate is 29.16 step/sec depicting that the time is $(151-77)/29=2.5$ seconds.
- f) It means the user has to wait for 2.5 seconds and see nothing change due to the characteristic of LED driver. In case the dimmed level is higher than the physical dim level of LED driver e.g. 6% for NPF series, then the user can see the difference in light.

The solution is to set the push dimming minimum dimming level to at least the physical dimming level of LED driver. Therefore, the new firmware set the default min. push dim level set at 10% which will improve the dimming experience using push dim. Furthermore, minimum push dimming level is linked with DALI minimum dimming level. It means the minimum dimming level of DAP-04-S01 is set at 10% as well. In case the user would like to get back to 0.8%, it can be changed via DALI command.

Summary:

DAP-04-S01 with new firmware helps to enhance user experience and dimming performance with following features.

- 1) 4 or 1 DALI address selectable by jumper JP1. Default is 4 address.**
- 2) Better push dimming performance by setting both push diming and DALI minimum dimming level at 10%. The parameter is programmable via DALI command.**

Please contact your sales representative at MEAN WELL for further information.

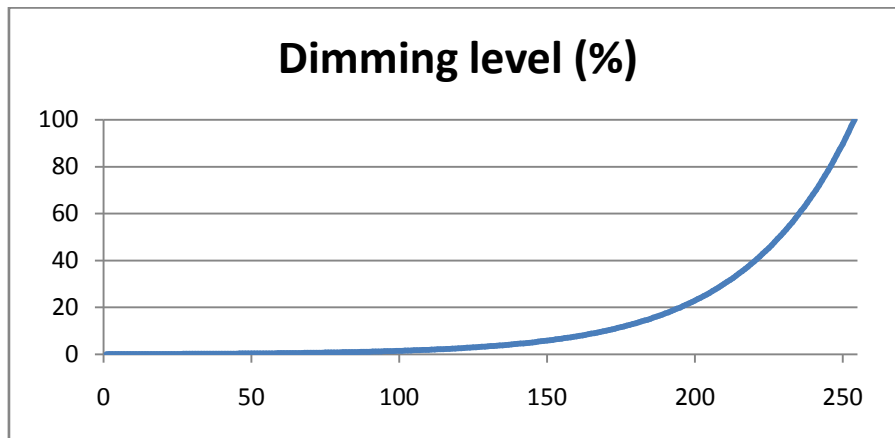
Appendix:

A logarithmic dimming curve from 0.1% to 100% shall be defined according to the formula:

$$X(n) = 10^{\frac{n-1}{253/3}-1}$$

$$\left| \frac{X(n) - X(n + 1)}{X(n)} \right| = \text{constant} = 2.8\%$$

where $X(n)$ represents dimming level and n represents the step.



The calculated result based on above formula is listed in below for reference.

Step	Dimming level (%)
1	0,1
2	0,102767953
3	0,105612522
4	0,108535828
5	0,111540049
6	0,114627425
7	0,117800259
8	0,121060915
9	0,124411825
10	0,127855486
11	0,131394466
12	0,135031404
13	0,13876901
14	0,142610072
15	0,146557452

16	0,150614094
17	0,154783021
18	0,159067343
19	0,163470253
20	0,167995033
21	0,172645058
22	0,177423792
23	0,1823348
24	0,187381742
25	0,192568381
26	0,197898584
27	0,203376325
28	0,209005687
29	0,214790867
30	0,220736178
31	0,226846052
32	0,233125045
33	0,239577837
34	0,24620924
35	0,253024197
36	0,260027789
37	0,267225237
38	0,274621907
39	0,282223313
40	0,290035122
41	0,298063159
42	0,306313408
43	0,314792021
44	0,323505317
45	0,332459793
46	0,341662125
47	0,351119173
48	0,360837988
49	0,370825815
50	0,381090101
51	0,391638497
52	0,402478868
53	0,413619295
54	0,425068085
55	0,436833771

56	0,448925126
57	0,461351164
58	0,474121149
59	0,487244601
60	0,500731304
61	0,514591313
62	0,528834961
63	0,543472866
64	0,558515941
65	0,573975402
66	0,589862773
67	0,606189899
68	0,622968953
69	0,640212443
70	0,657933225
71	0,676144509
72	0,694859874
73	0,714093271
74	0,73385904
75	0,754171915
76	0,775047042
77	0,796499983
78	0,818546731
79	0,841203722
80	0,864487849
81	0,888416469
82	0,913007423
83	0,938279042
84	0,964250168
85	0,990940163
86	1,018368924
87	1,046556901
88	1,075525108
89	1,105295141
90	1,135889195
91	1,167330078
92	1,19964123
93	1,232846739
94	1,266971362
95	1,302040538



96	1,338080413
97	1,375117854
98	1,413180475
99	1,452296651
100	1,492495545
101	1,533807125
102	1,576262191
103	1,619892393
104	1,664730259
105	1,710809216
106	1,758163617
107	1,806828765
108	1,856840943
109	1,908237434
110	1,961056555
111	2,015337686
112	2,071121293
113	2,128448964
114	2,187363438
115	2,247908638
116	2,3101297
117	2,374073012
118	2,439786246
119	2,507318391
120	2,576719794
121	2,648042196
122	2,721338768
123	2,796664156
124	2,874074515
125	2,953627557
126	3,035382589
127	3,119400563
128	3,205744116
129	3,294477617
130	3,38566722
131	3,47938091
132	3,57568855
133	3,674661941
134	3,776374869
135	3,880903163

136	3,988324752
137	4,098719721
138	4,21217037
139	4,328761281
140	4,448579374
141	4,571713975
142	4,698256885
143	4,828302444
144	4,961947603
145	5,099291998
146	5,240438021
147	5,385490901
148	5,534558776
149	5,687752781
150	5,845187124
151	6,006979177
152	6,173249558
153	6,344122226
154	6,519724569
155	6,700187504
156	6,885645568
157	7,076237025
158	7,272103964
159	7,473392409
160	7,680252424
161	7,892838228
162	8,111308308
163	8,335825538
164	8,566557299
165	8,803675609
166	9,047357242
167	9,29778387
168	9,55514219
169	9,819624067
170	10,09142668
171	10,37075266
172	10,65781026
173	10,95281347
174	11,25598224
175	11,56754258



176	11,88772676
177	12,21677349
178	12,55492808
179	12,90244263
180	13,25957622
181	13,62659511
182	14,0037729
183	14,3913908
184	14,78973779
185	15,19911083
186	15,61981513
187	16,05216432
188	16,49648074
189	16,95309563
190	17,42234941
191	17,90459191
192	18,40018266
193	18,90949114
194	19,43289703
195	19,97079055
196	20,52357272
197	21,09165563
198	21,67546282
199	22,27542952
200	22,89200302
201	23,52564298
202	24,1768218
203	24,84602495
204	25,53375133
205	26,24051365
206	26,96683883
207	27,71326835
208	28,48035868
209	29,26868173
210	30,07882518
211	30,91139303
212	31,76700597
213	32,64630187
214	33,54993628
215	34,47858286

216	35,43293395
217	36,41370103
218	37,42161528
219	38,45742814
220	39,52191118
221	40,61585988
222	41,74008794
223	42,8954341
224	44,0827597
225	45,30294992
226	46,55691444
227	47,84558811
228	49,16993167
229	50,53093244
230	51,92960507
231	53,36699231
232	54,84416576
233	56,36222668
234	57,92230682
235	59,52556925
236	61,17320924
237	62,86645513
238	64,60656928
239	66,39484897
240	68,23262742
241	70,12127471
242	72,06219888
243	74,05684692
244	76,10670589
245	78,21330401
246	80,37821177
247	82,60304317
248	84,88945687
249	87,23915743
250	89,65389661
251	92,13547464
252	94,68574159
253	97,30659874
254	100