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LAMPIRAN

Lampiran 1 Hasil *Datalogger* Tegangan

Hari Kedua (30/11/2020)				
No.	Pukul	Lux Matahari	Tegangan Sel Surya	Tegangan Baterai
1.	7:5:14	4139	4,71	3,2
2.	7:15:14	4230	4,73	3,2
3.	7:25:14	4805	4,87	3,21
4.	7:35:14	4674,17	4,71	3,2
5.	7:45:14	4725	4,69	3,21
6.	7:55:14	4785,83	4,72	3,21
7.	8:5:14	7048,33	4,82	3,22
8.	8:15:14	12780	4,64	3,22
9.	8:25:14	7788,33	5,1	3,23
10.	8:35:14	5233,33	5,1	3,23
11.	8:45:14	10958,33	5,1	3,24
12.	8:55:15	15356,67	5,1	3,24
13.	9:5:15	13447,5	5,1	3,25
14.	9:15:15	9630	4,92	3,25
15.	9:25:15	14452,5	5,1	3,25
16.	9:35:15	16407,5	5,1	3,26
17.	9:45:15	11788,33	5,1	3,26
18.	9:55:15	18415,83	5,1	3,27
19.	10:5:15	12487,5	5,01	3,28
20.	10:15:15	18330	5,1	3,27
21.	10:25:15	21445	5,1	3,28
22.	10:35:15	19643,33	5,1	3,29
23.	10:45:15	17183,33	5,1	3,31
24.	10:55:16	10932,5	5,1	3,3
25.	11:5:16	54612,5	5,1	3,31

26.	11:15:16	54612,5	5,1	3,32
27.	11:25:16	41210,83	5,1	3,32
28.	11:35:16	54612,5	5,1	3,34
29.	11:45:16	54612,5	5,1	3,35
30.	11:55:16	54612,5	5,1	3,36
31.	12:5:16	54612,5	5,1	3,38
32.	12:15:16	20310,83	5,1	3,4
33.	12:25:16	31603,33	5,05	3,43
34.	12:35:17	20263,33	5,1	3,44
35.	12:45:17	28091,67	5,1	3,46
36.	12:55:17	54612,5	5,1	3,49
37.	1:5:17	54612,5	5,1	3,51
38.	1:15:17	54612,5	5,1	3,51
39.	1:25:17	54612,5	5,1	3,52
40.	1:35:17	20172,5	4,77	3,53
41.	1:45:17	54612,5	5,1	3,53
42.	1:55:17	54612,5	5,1	3,55
43.	2:5:17	54612,5	5,1	3,56
44.	2:15:17	54612,5	5,1	3,56
45.	2:25:18	51244,16	5,1	3,57
46.	2:35:18	54612,5	5,1	3,58
47.	2:45:18	43787,5	5,1	3,58
48.	2:55:18	34737,5	5,1	3,59
49.	3:5:18	30527,5	5,1	3,6
50.	3:15:18	23889,17	5,1	3,6
51.	3:25:18	15199,17	5,1	3,61
52.	3:35:18	14661,67	5,06	3,62
53.	3:45:18	22178,33	5,1	3,61
54.	3:55:18	14368,33	5,1	3,62
55.	4:5:18	11864,17	5,1	3,63

56.	4:15:18	11812,5	5,1	3,63
57.	4:25:18	11302,5	5,1	3,64
58.	4:35:19	10064,17	4,98	3,64
59.	4:45:19	9910	4,92	3,65
60.	4:55:19	8845	4,89	3,65
61.	5:5:19	7147,5	4,83	3,66
62.	5:15:19	4030	4,77	3,66
63.	5:25:19	3389,17	4,66	3,67
64.	5:35:19	2421,67	4,29	3,67
65.	5:45:19	1552,5	4	3,67
66.	5:55:19	680	3,23	3,68
67.	6:5:19	285,83	1,23	3,66
68.	6:15:19	168,33	0,7	3,66

Hari Ketiga (1/12/2020)				
No.	Pukul	Lux Matahari	Tegangan Sel Surya	Tegangan Baterai
1.	7:2:46	4026	4,71	3,19
2.	7:12:46	4117	4,73	3,19
3.	7:22:46	4692	4,87	3,2
4.	7:32:46	4561,17	4,71	3,19
5.	7:42:46	4612	4,69	3,2
6.	7:52:46	4672,83	4,72	3,2
7.	8:2:46	6935,33	4,82	3,21
8.	8:12:46	12667	4,64	3,21
9.	8:22:46	7675,33	5,1	3,22
10.	8:32:46	5120,33	5,1	3,22
11.	8:42:46	10845,33	5,1	3,23
12.	8:52:47	15243,67	5,1	3,23
13.	9:2:47	13334,5	5,1	3,24

14.	9:12:47	9517	4,92	3,24
15.	9:22:47	14339,5	5,1	3,24
16.	9:32:47	16294,5	5,1	3,25
17.	9:42:47	11675,33	5,1	3,25
18.	9:52:47	18302,83	5,1	3,26
19.	10:2:47	12374,5	5,01	3,27
20.	10:12:47	18217	5,1	3,26
21.	10:22:47	21332	5,1	3,27
22.	10:32:47	19530,33	5,1	3,28
23.	10:42:47	17070,33	5,1	3,3
24.	10:52:48	10819,5	5,1	3,29
25.	11:2:48	54517,5	5,1	3,3
26.	11:12:48	54517,5	5,1	3,31
27.	11:22:48	41097,83	5,1	3,31
28.	11:32:48	54517,5	5,1	3,33
29.	11:42:48	54517,5	5,1	3,34
30.	11:52:48	54517,5	5,1	3,35
31.	12:2:48	54517,5	5,1	3,37
32.	12:12:48	20197,83	5,1	3,39
33.	12:22:48	31490,33	5,05	3,42
34.	12:32:49	20150,33	5,1	3,43
35.	12:42:49	27978,67	5,1	3,45
36.	12:52:49	54517,5	5,1	3,48
37.	1:2:49	54517,5	5,1	3,5
38.	1:12:49	54517,5	5,1	3,5
39.	1:22:49	54517,5	5,1	3,51
40.	1:32:49	20059,5	4,77	3,52
41.	1:42:49	54517,5	5,1	3,52
42.	1:52:49	54517,5	5,1	3,54
43.	2:2:49	54517,5	5,1	3,55

44.	2:12:49	54517,5	5,1	3,55
45.	2:22:50	51131,16	5,1	3,56
46.	2:32:50	54517,5	5,1	3,57
47.	2:42:50	43674,5	5,1	3,57
48.	2:52:50	34624,5	5,1	3,58
49.	3:2:50	30414,5	5,1	3,59
50.	3:12:50	23776,17	5,1	3,59
51.	3:22:50	15086,17	5,1	3,6
52.	3:32:50	14548,67	5,06	3,61
53.	3:42:50	22065,33	5,1	3,6
54.	3:52:50	14255,33	5,1	3,61
55.	4:2:50	11751,17	5,1	3,62
56.	4:12:50	11699,5	5,1	3,62
57.	4:22:50	11189,5	5,1	3,63
58.	4:32:51	9951,17	4,98	3,63
59.	4:42:51	9797	4,92	3,64
60.	4:52:51	8732	4,89	3,64
61.	5:2:51	7034,5	4,83	3,63
62.	5:12:51	3917	4,77	3,62
63.	5:22:51	3276,17	4,66	3,63
64.	5:32:51	2308,67	4,29	3,62
65.	5:42:51	1439,5	4	3,62
66.	5:52:51	567	3,23	3,61
67.	6:2:51	172,83	1,23	3,61
68.	6:12:51	55,33	0,7	3,61

Hari Keempat (2/12/2020)				
No.	Pukul	Lux Matahari	Tegangan Sel Surya	Tegangan Baterai
1.	7:9:38	4212	4,7	3,2

2.	7:19:38	4787	4,73	3,2
3.	7:29:38	4656,17	4,8	3,21
4.	7:39:38	4707	4,74	3,2
5.	7:49:38	4767,83	4,68	3,21
6.	7:59:38	7030,33	4,7	3,21
7.	8:9:38	12762	4,8	3,22
8.	8:19:38	7770,33	4,62	3,22
9.	8:29:38	5215,33	5,1	3,23
10.	8:39:38	10940,33	5,1	3,23
11.	8:49:38	15338,67	5,1	3,24
12.	8:59:39	13429,5	5,1	3,24
13.	9:9:39	9612	5,1	3,25
14.	9:19:39	14434,5	4,96	3,25
15.	9:29:39	16389,5	5,1	3,25
16.	9:39:39	11770,33	5,1	3,26
17.	9:49:39	18397,83	5,1	3,26
18.	9:59:39	12469,5	5,1	3,27
19.	10:9:39	18312	5,03	3,28
20.	10:19:39	21427	5,1	3,27
21.	10:29:39	19625,33	5,1	3,28
22.	10:39:39	17165,33	5,1	3,29
23.	10:49:39	10914,5	5,1	3,31
24.	10:59:40	54612,5	5,1	3,3
25.	11:9:40	54612,5	5,1	3,31
26.	11:19:40	41192,83	5,1	3,32
27.	11:29:40	54612,5	5,1	3,32
28.	11:39:40	54612,5	5,1	3,34
29.	11:49:40	54612,5	5,1	3,35
30.	11:59:40	54612,5	5,1	3,36
31.	12:9:40	20292,83	5,1	3,38

32.	12:19:40	31585,33	5,1	3,4
33.	12:29:40	20245,33	5,04	3,43
34.	12:39:41	28073,67	5,1	3,44
35.	12:49:41	54612,5	5,1	3,46
36.	12:59:41	54612,5	5,1	3,49
37.	1:9:41	54612,5	5,1	3,51
38.	1:19:41	54612,5	5,1	3,51
39.	1:29:41	20154,5	5,1	3,52
40.	1:39:41	54612,5	4,76	3,53
41.	1:49:41	54612,5	5,1	3,53
42.	1:59:41	54612,5	5,1	3,55
43.	2:9:41	54612,5	5,1	3,56
44.	2:19:41	51226,16	5,1	3,56
45.	2:29:42	54612,5	5,1	3,57
46.	2:39:42	43769,5	5,1	3,58
47.	2:49:42	34719,5	5,1	3,58
48.	2:59:42	30509,5	5,1	3,59
49.	3:9:42	23871,17	5,1	3,6
50.	3:19:42	15181,17	5,1	3,6
51.	3:29:42	14643,67	5,09	3,61
52.	3:39:42	22160,33	5,06	3,62
53.	3:49:42	14350,33	5,1	3,61
54.	3:59:42	11846,17	5,1	3,62
55.	4:9:42	11794,5	5,1	3,63
56.	4:19:42	11284,5	5,1	3,63
57.	4:29:42	10046,17	5,1	3,64
58.	4:39:43	9892	4,96	3,64
59.	4:49:43	8827	4,9	3,65
60.	4:59:43	7129,5	4,89	3,65
61.	5:9:43	4012	4,86	3,66

62.	5:19:43	3371,17	4,72	3,66
63.	5:29:43	2403,67	4,64	3,67
64.	5:39:43	1534,5	4,32	3,67
65.	5:49:43	662	4,02	3,67
66.	5:59:43	267,83	3,31	3,68
67.	6:9:43	150,33	1,2	3,66
68.	6:19:43	4212	0,6	3,66

Hari Kelima (3/12/2020)				
No.	Pukul	Lux Matahari	Tegangan Sel Surya	Tegangan Baterai
1.	7:6:45	4053	4,68	3,4
2.	7:16:45	4144	4,71	3,4
3.	7:26:45	4719	4,83	3,41
4.	7:36:45	4588,17	4,73	3,4
5.	7:46:45	4639	4,68	3,41
6.	7:56:45	4699,83	4,69	3,41
7.	8:6:45	6962,33	4,79	3,42
8.	8:16:45	12694	4,71	3,42
9.	8:26:45	7702,33	5,1	3,43
10.	8:36:45	5147,33	5,1	3,43
11.	8:46:45	10872,33	5,1	3,44
12.	8:56:46	15270,67	5,1	3,44
13.	9:6:46	13361,5	5,1	3,45
14.	9:16:46	9544	4,92	3,45
15.	9:26:46	14366,5	5,1	3,45
16.	9:36:46	16321,5	5,1	3,46
17.	9:46:46	11702,33	5,1	3,46
18.	9:56:46	18329,83	5,1	3,47
19.	10:6:46	12401,5	5,05	3,48

20.	10:16:46	18244	5,1	3,47
21.	10:26:46	21359	5,1	3,48
22.	10:36:46	19557,33	5,1	3,49
23.	10:46:46	17097,33	5,1	3,51
24.	10:56:47	10846,5	5,1	3,5
25.	11:6:47	54526,5	5,1	3,51
26.	11:16:47	54526,5	5,1	3,52
27.	11:26:47	41124,83	5,09	3,52
28.	11:36:47	54526,5	5,1	3,54
29.	11:46:47	54526,5	5,1	3,55
30.	11:56:47	54526,5	5,1	3,56
31.	12:6:47	54526,5	5,1	3,58
32.	12:16:47	20224,83	5,1	3,6
33.	12:26:47	31517,33	5,03	3,63
34.	12:36:48	20177,33	5,1	3,64
35.	12:46:48	28005,67	5,1	3,66
36.	12:56:48	54526,5	5,1	3,69
37.	1:6:48	54526,5	5,1	3,71
38.	1:16:48	54526,5	5,1	3,71
39.	1:26:48	54526,5	5,1	3,72
40.	1:36:48	20086,5	4,78	3,73
41.	1:46:48	54526,5	5,1	3,73
42.	1:56:48	54526,5	5,1	3,75
43.	2:6:48	54526,5	5,1	3,76
44.	2:16:48	54526,5	5,1	3,76
45.	2:26:49	51158,16	5,1	3,77
46.	2:36:49	54526,5	5,1	3,78
47.	2:46:49	43701,5	5,1	3,78
48.	2:56:49	34651,5	5,1	3,79
49.	3:6:49	30441,5	5,1	3,8

50.	3:16:49	23803,17	5,1	3,8
51.	3:26:49	15113,17	5,1	3,81
52.	3:36:49	14575,67	5,05	3,82
53.	3:46:49	22092,33	5,1	3,81
54.	3:56:49	14282,33	5,1	3,82
55.	4:6:49	11778,17	5,1	3,83
56.	4:16:49	11726,5	5,1	3,83
57.	4:26:49	11216,5	5,1	3,84
58.	4:36:50	9978,17	4,96	3,84
59.	4:46:50	9824	4,89	3,85
60.	4:56:50	8759	4,89	3,85
61.	5:6:50	7061,5	4,81	3,84
62.	5:16:50	3944	4,79	3,83
63.	5:26:50	3303,17	4,51	3,84
64.	5:36:50	2335,67	4,28	3,83
65.	5:46:50	1466,5	4,1	3,83
66.	5:56:50	594	3,19	3,82
67.	6:6:50	199,83	1,26	3,82
68.	6:16:50	82,33	0,6	3,82

Hari Keenam (4/12/2020)				
No.	Pukul	Lux Matahari	Tegangan Sel Surya	Tegangan Baterai
1.	7:0:28	4112	4,68	3,5
2.	7:10:28	4203	4,73	3,5
3.	7:20:28	4778	4,81	3,51
4.	7:30:28	4647,17	4,77	3,5
5.	7:40:28	4698	4,69	3,51
6.	7:50:28	4758,83	4,69	3,51
7.	8:0:28	7021,33	4,79	3,52

8.	8:10:28	12753	4,71	3,52
9.	8:20:28	7761,33	5,1	3,53
10.	8:30:28	5206,33	5,1	3,53
11.	8:40:28	10931,33	5,1	3,54
12.	8:50:29	15329,67	5,1	3,54
13.	9:0:29	13420,5	5,1	3,55
14.	9:10:29	9603	4,98	3,55
15.	9:20:29	14425,5	5,1	3,55
16.	9:30:29	16380,5	5,1	3,56
17.	9:40:29	11761,33	5,1	3,56
18.	9:50:29	18388,83	5,1	3,57
19.	10:0:29	12460,5	5,05	3,58
20.	10:10:29	18303	5,1	3,57
21.	10:20:29	21418	5,1	3,58
22.	10:30:29	19616,33	5,1	3,59
23.	10:40:29	17156,33	5,1	3,61
24.	10:50:30	10905,5	5,1	3,6
25.	11:0:30	54585,5	5,1	3,61
26.	11:10:30	54585,5	5,1	3,62
27.	11:20:30	41183,83	5,1	3,62
28.	11:30:30	54585,5	5,1	3,64
29.	11:40:30	54585,5	5,1	3,65
30.	11:50:30	54585,5	5,1	3,66
31.	12:0:30	54585,5	5,1	3,68
32.	12:10:30	20283,83	5,1	3,7
33.	12:20:30	31576,33	5,03	3,73
34.	12:30:31	20236,33	5,1	3,74
35.	12:40:31	28064,67	5,1	3,76
36.	12:50:31	54585,5	5,1	3,79
37.	1:0:31	54585,5	5,1	3,81

38.	1:10:31	54585,5	5,1	3,81
39.	1:20:31	54585,5	5,1	3,82
40.	1:30:31	20145,5	4,77	3,83
41.	1:40:31	54585,5	5,1	3,83
42.	1:50:31	54585,5	5,1	3,85
43.	2:0:31	54585,5	5,1	3,86
44.	2:10:31	54585,5	5,1	3,86
45.	2:20:32	51217,16	5,1	3,87
46.	2:30:32	54585,5	5,1	3,88
47.	2:40:32	43760,5	5,1	3,88
48.	2:50:32	34710,5	5,1	3,89
49.	3:0:32	30500,5	5,1	3,9
50.	3:10:32	23862,17	5,1	3,9
51.	3:20:32	15172,17	5,1	3,91
52.	3:30:32	14634,67	5,1	3,92
53.	3:40:32	22151,33	5,1	3,91
54.	3:50:32	14341,33	5,1	3,92
55.	4:0:32	11837,17	5,1	3,93
56.	4:10:32	11785,5	5,1	3,93
57.	4:20:32	11275,5	5,1	3,94
58.	4:30:33	10037,17	4,91	3,94
59.	4:40:33	9883	4,78	3,95
60.	4:50:33	8818	4,8	3,95
61.	5:0:33	7120,5	4,8	3,94
62.	5:10:33	4003	4,76	3,93
63.	5:20:33	3362,17	4,61	3,94
64.	5:30:33	2394,67	4,3	3,93
65.	5:40:33	1525,5	4,19	3,93
66.	5:50:33	653	3,21	3,92
67.	6:0:33	258,83	1,26	3,92

68.	6:10:33	141,33	0,59	3,92

Hari Ketujuh (5/12/2020)				
No.	Pukul	Lux Matahari	Tegangan Sel Surya	Tegangan Baterai
1.	7:8:44	4082	4,68	3,34
2.	7:18:44	4173	4,71	3,34
3.	7:28:44	4748	4,79	3,35
4.	7:38:44	4617,17	4,78	3,34
5.	7:48:44	4668	4,67	3,35
6.	7:58:44	4728,83	4,69	3,35
7.	8:8:44	6991,33	4,78	3,36
8.	8:18:44	12723	4,71	3,36
9.	8:28:44	7731,33	5,1	3,37
10.	8:38:44	5176,33	5,1	3,37
11.	8:48:44	10901,33	5,1	3,38
12.	8:58:45	15299,67	5,1	3,38
13.	9:8:45	13390,5	5,1	3,39
14.	9:18:45	9573	4,98	3,39
15.	9:28:45	14395,5	5,1	3,39
16.	9:38:45	16350,5	5,1	3,4
17.	9:48:45	11731,33	5,1	3,4
18.	9:58:45	18358,83	5,1	3,41
19.	10:8:45	12430,5	5,05	3,42
20.	10:18:45	18273	5,1	3,41
21.	10:28:45	21388	5,1	3,42
22.	10:38:45	19586,33	5,1	3,43
23.	10:48:45	17126,33	5,1	3,45
24.	10:58:46	10875,5	5,1	3,44
25.	11:8:46	54555,5	5,1	3,45

26.	11:18:46	54555,5	5,1	3,46
27.	11:28:46	41153,83	5,1	3,46
28.	11:38:46	54555,5	5,1	3,48
29.	11:48:46	54555,5	5,1	3,49
30.	11:58:46	54555,5	5,1	3,5
31.	12:8:46	54555,5	5,1	3,52
32.	12:18:46	20253,83	5,1	3,54
33.	12:28:46	31546,33	5,03	3,57
34.	12:38:47	20206,33	5,1	3,58
35.	12:48:47	28034,67	5,1	3,6
36.	12:58:47	54555,5	5,1	3,63
37.	1:8:47	54555,5	5,1	3,65
38.	1:18:47	54555,5	5,1	3,65
39.	1:28:47	54555,5	5,1	3,66
40.	1:38:47	20115,5	4,77	3,67
41.	1:48:47	54555,5	5,1	3,67
42.	1:58:47	54555,5	5,1	3,69
43.	2:8:47	54555,5	5,1	3,7
44.	2:18:47	54555,5	5,1	3,7
45.	2:28:48	51187,16	5,1	3,71
46.	2:38:48	54555,5	5,1	3,72
47.	2:48:48	43730,5	5,1	3,72
48.	2:58:48	34680,5	5,1	3,73
49.	3:8:48	30470,5	5,1	3,74
50.	3:18:48	23832,17	5,1	3,74
51.	3:28:48	15142,17	5,1	3,75
52.	3:38:48	14604,67	5,1	3,76
53.	3:48:48	22121,33	5,1	3,75
54.	3:58:48	14311,33	5,1	3,76
55.	4:8:48	11807,17	5,1	3,77

56.	4:18:48	11755,5	5,1	3,77
57.	4:28:48	11245,5	5,1	3,78
58.	4:38:49	10007,17	4,91	3,78
59.	4:48:49	9853	4,78	3,79
60.	4:58:49	8788	4,8	3,79
61.	5:8:49	7090,5	4,8	3,78
62.	5:18:49	3973	4,74	3,77
63.	5:28:49	3332,17	4,56	3,78
64.	5:38:49	2364,67	4,28	3,77
65.	5:48:49	1495,5	4,16	3,77
66.	5:58:49	623	3,21	3,76
67.	6:8:49	228,83	1,26	3,76
68.	6:18:49	111,33	0,6	3,76

Lampiran 2 Tegangan Piezoelektrik

Lampiran 3 Datasheet TP4056

TP4056 1A Standalone Linear Li-Ion Battery Charger with Thermal Regulation in SOP-8

DESCRIPTION

The TP4056 is a complete constant-current/constant-voltage linear charger for single cell lithium-ion batteries. Its SOP package and low external component count make the TP4056 ideally suited for portable applications. Furthermore, the TP4056 can work within USB and wall adapter.

No blocking diode is required due to the internal PMOSFET architecture and have prevent to negative Charge Current Circuit. Thermal feedback regulates the charge current to limit the die temperature during high power operation or high ambient temperature. The charge voltage is fixed at 4.2V, and the charge current can be programmed externally with a single resistor. The TP4056 automatically terminates the charge cycle when the charge current drops to 1/10th the programmed value after the final float voltage is reached.

TP4056 Other features include current monitor, under voltage lockout, automatic recharge and two status pin to indicate charge termination and the presence of an input voltage.

FEATURES

- Programmable Charge Current Up to 1000mA
- No MOSFET, Sense Resistor or Blocking Diode Required
- Complete Linear Charger in SOP-8 Package for Single Cell Lithium-Ion Batteries
- Constant-Current/Constant-Voltage
- Charges Single Cell Li-Ion Batteries Directly from USB Port
- Preset 4.2V Charge Voltage with 1.5% Accuracy
- Automatic Recharge
- two Charge Status Output Pins
- C/10 Charge Termination
- 2.9V Trickle Charge Threshold (TP4056)
- Soft-Start Limits Inrush Current
- Available **Radiator** in 8-Lead SOP Package, **the Radiator need** connect GND or impending

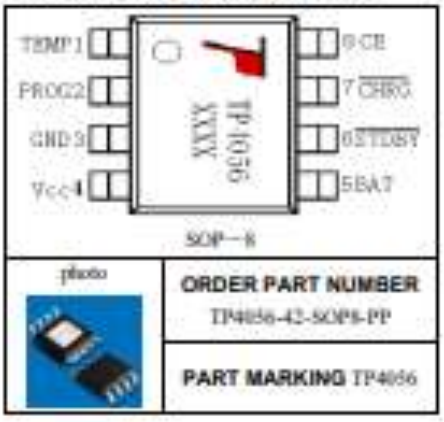
ABSOLUTE MAXIMUM RATINGS

- Input Supply Voltage(V_{CC}): -0.3V~8V
- TEMP: -0.3V~10V
- CE: -0.3V~10V
- BAT Short-Circuit Duration: Continuous
- BAT Pin Current: 1200mA
- PROG Pin Current: 1200uA
- Maximum Junction Temperature: 145℃
- Operating Ambient Temperature Range: -40℃~85℃
- Lead Temp.(Soldering, 10sec): 260℃

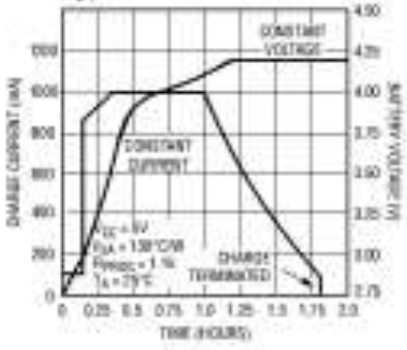
APPLICATIONS

- Cellular Telephones, PDAs, GPS
- Charging Docks and Cradles
- Digital Still Cameras, Portable Devices
- USB Bus-Powered Chargers, Chargers

PACKAGE/ORDER INFORMATION



Complete Charge Cycle (1000mAh Battery)



Lampiran 4 Datasheet Led *Strawhat*

Electrical and Flux Characteristics:

Table 1: Flux Characteristics

Code	Size(mm)	Case	Color	Wavelenght	Angle
2718	4.8	Dip LED	Red	620-625 nm	120°
2780	4.8	Dip LED	Red	620-630 nm	120°
2725	4.8	Dip LED	Yellow	585-595 nm	120°
2707	4.8	Dip LED	Blue	464-473 nm	120°
2701	4.8	Dip LED	Green	515-521 nm	120°
2700	4.8	Dip LED	Warm White	3500 K	120°
2729	4.8	Dip LED	Cold White	7800 K	120°

Notes for Table 1:

1. Parts are tested in pulsed conditions, Tj = 25°C. Pulse width is 10 ms at rated test current.
2. İlker Elektronik maintains a ± 10% tolerance on flux measurements.
3. Typical R9 value for 80CRI can be change with 90CRi.
4. Center beam candle power is a calculated value based on Lambertian radiation pattern at nominal test current.

Table 2: Electrical Characteristics

Code	Color	Typical Forward Current (mA)	Min Input Voltage (CV)	Max Input Voltage (CV)	Typical Lm	Max Lm
2718	Red	20mA	1.8V	2V	350 mcd	500 mcd
2780	Red	20mA	1.9V	2.4V	800 mcd	1000 mcd
2725	Yellow	20mA	1.8V	3.4V	500 mcd	800 mcd
2707	Blue	20mA	3V	3.4V	500 mcd	800 mcd
2701	Green	20mA	3V	3.4V	200 mcd	5000 mcd
2700	Warm White	20mA	3V	3.4V	1500 mcd	2000 mcd
2729	Cold White	20mA	3V	3.4V	1500 mcd	2000 mcd

Notes for Table 2:

1. Parts are tested in pulsed conditions, Tj = 25°C. Pulse width is 10 ms at rated test current.
2. İlker Elektronik maintains a ± 10% tolerance on Current values.
3. Typical stabilized DC performance values are provided as reference only and are not a guarantee of performance.

Lampiran 5 Datasheet Mosfet IRF 3205

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.057	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	8.0	mΩ	V_{GS} = 10V, I_D = 62A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	44	—	—	S	V_{DS} = 25V, I_D = 62A④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	µA	V_{DS} = 55V, V_{GS} = 0V
		—	—	250		V_{DS} = 44V, V_{GS} = 0V, T_J = 150°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS} = -20V
Q_g	Total Gate Charge	—	—	146	nC	I_D = 62A
Q_{gs}	Gate-to-Source Charge	—	—	35		V_{DS} = 44V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	54		V_{GS} = 10V, See Fig. 6 and 13
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	V_{DD} = 28V
t_r	Rise Time	—	101	—		I_D = 62A
$t_{d(off)}$	Turn-Off Delay Time	—	50	—		R_G = 4.5Ω
t_f	Fall Time	—	65	—		V_{GS} = 10V, See Fig. 10 ④
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	7.5	—		
C_{iss}	Input Capacitance	—	3247	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	781	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	211	—		f = 1.0MHz, See Fig. 5
E_{AS}	Single Pulse Avalanche Energy②	—	1050⑥	264⑦	mJ	I_{AS} = 62A, L = 138µH

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	110	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode)①	—	—	390		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C, I_S = 62A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	69	104	ns	T_J = 25°C, I_F = 62A
Q_{rr}	Reverse Recovery Charge	—	143	215	nC	di/dt = 100A/µs ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② Starting T_J = 25°C, L = 138µH R_G = 25Ω, I_{AS} = 62A. (See Figure 12)

③ I_{SD} ≤ 62A, di/dt ≤ 207A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C

④ Pulse width ≤ 400µs; duty cycle ≤ 2%.

⑤ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

⑥ This is a typical value at device destruction and represents operation outside rated limits.

⑦ This is a calculated value limited to T_J = 175°C.

Lampiran 6 Parameter Standar Material Piezoelektrik (PZT-PIC151)

			Soft PZT materials			
		Unit	PIC151	PIC255/ PIC252[1]	PIC155	PIC153
Physical and dielectric properties						
Density	ρ	g/cm³	7.80	7.80	7.80	7.60
Curie temperature	T_c	°C	250	350	345	185
Relative permittivity in the polarization direction	$\varepsilon_{33}^T/\varepsilon_0$		2400	1750	1450	4200
⊥ to polarity	$\varepsilon_{11}^T/\varepsilon_0$		1980	1650	1400	
Dielectric loss factor	$\tan\delta$	10^{-3}	20	20	20	30
Electromechanical properties						
Coupling factor	k_p		0.62	0.62	0.62	0.62
	k_{31}		0.53	0.47	0.48	
	k_{33}		0.38	0.35	0.35	
	k_{15}		0.69	0.69	0.69	
	k_t			0.66		
Piezoelectric charge coefficient	d_{31}		-210	-180	-165	
	d_{33}	10^{-12} C/N	500	400	360	600
	d_{15}			550		
Piezoelectric voltage coefficient	g_{31}	10^{-3} Vm/N	-11.5	-11.3	-12.9	
	g_{33}		22	25	27	16
Acousto-mechanical properties						
Frequency coefficients	N_p		1950	2000	1960	1960
	N_{31}		1500	1420	1500	
	N_{33}	Hz · m	1750		1780	
	N_t		1950	2000	1990	1960
Elastic compliance coefficient	S_{11}^E		15.0	16.1	15.6	
	S_{33}^E	10^{-12} m²/N	19.0	20.7	19.7	
Elastic stiffness coefficient	C_{33}^D	10^{10} N/m²	10.0		11.1	
Mechanical quality factor	Q_m		100	80	80	50
Temperature stability						
Temperature coefficient of ε_{33}^T (in the range -20 °C to +125 °C)	$TK\varepsilon_{33}$	10^{-6}/K	6	4	6	5
Time stability (relative change of the parameter per decade of time in %)						
Relative permittivity	C_ε			-1.0	-2.0	
Coupling factor	C_k			-1.0	-2.0	