371D

REV 1.0

LUX·RC
WWW.LUX-RC.COM

A 30 watts (up to 3500 lumen) fully integrated, wireless programmable boost driver for portable lighting applications such as tactical flashlights, diving lights, bicycle headlamps and so on

FEATURES

DRAFT

1. THE REGULATOR

- An integrated high-efficiency 30 watts boost (step-up) regulator

- Two build-in light sources: A high-power channel (30W) with three XP-form factor LEDs (such as CREE XP-L or Nichia NVSW219BT); A low-power channel (50mW) red, amber or yellow color LED (for moonlight mode).

- Flicker-free constant current (no-PWM) absolutely silent operation in the whole output range from 1.5mW to 30W

- Input voltage range from 2.5V to 8.8V

- Input current limit 5A

- Possible battery setups: 1S or 2S ICR/IMR (LiIon or LiPo), 1S or 2S CR123A (Primary Lithium Cells)

- Temperature compensation of the luminous flux drop

- Wide operating temperature range from -40°C to 120°C.

2. SAFETY FUNCTIONS

- Reverse polarity protection

- Under voltage (2.5V) and over voltage (8.8V) protection

- The battery current limit (5A)

- Programmable adaptive temperature control. The temperature threshold can be set to any value from 26°C to 120°C (or disabled). Adaptive control automatically and smoothly selects the mode which provides the highest possible output for current environment

- Programmable output limits per each battery setup

- Programmable LiIon battery protection

- Programmable light bounce switch-off that protects from skin burning and fire from a close distance in modes above 2000LM. This switch can also detect an occasional switching-on in a storage or pocket and block unintentional operation
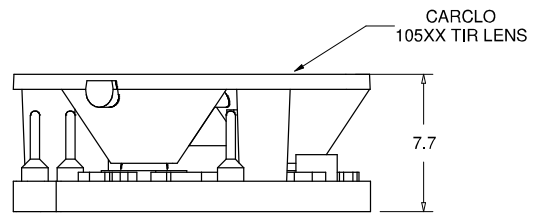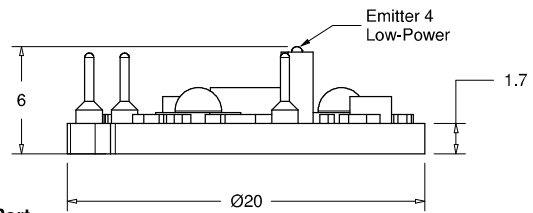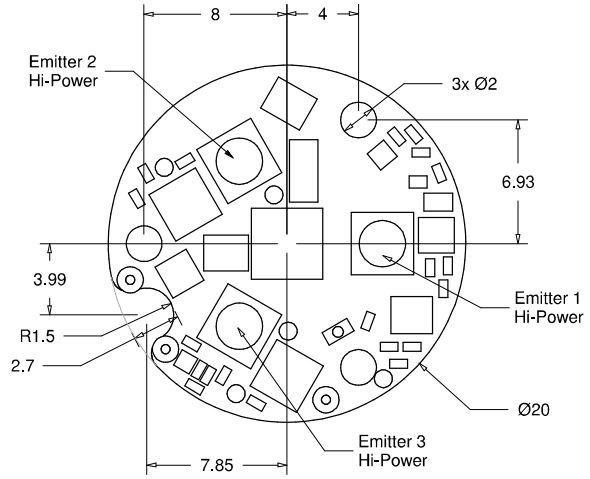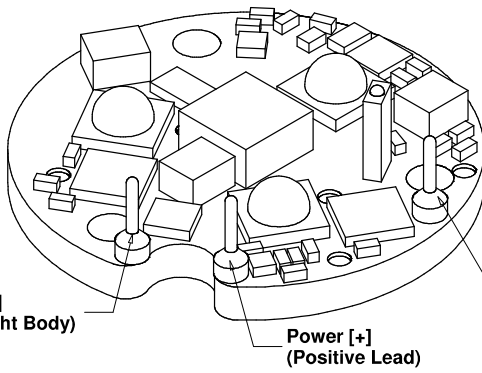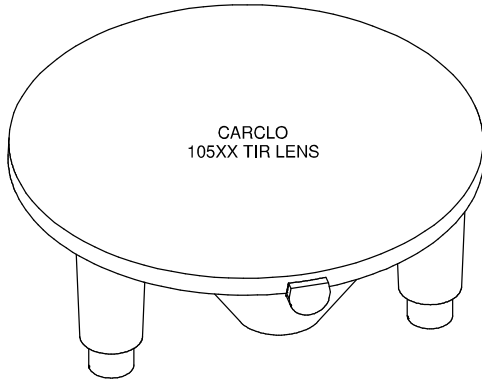
3. MODE PROGRAMMING

- This light engine supports NXS® wireless programming using a web application at http://lux-rc.com

- Up to four modes can be defined in any combination in up to two lines. The line is selected automatically based on the battery type/count used.

- The high-power channel supports 33 output levels from very low 1.5mW (about 0.15LM) to fully regulated "afterburning" mode (30W, which is about 3500LM with 3UP CREE XP-L)

- The low-power channel provides a fully-regulated output of 50mW to a auxiliary color LED (linear circuitry).

- Three memory modes are available: no memory, standard memory and hybrid memory

- The programmable arbitrary signal generator can be used for many standard signals like SOS, strobe, locator, beacon etc. The generator supports both white and red channels

4. BATTERY MONITORING

- Programmable LiIon battery protection. When active protects the battery from over-discharge (2.8V per cell)

- Programmable adaptive battery stretch function. When active smoothly reduces the output of a nearly discharged battery. The battery stretch supports both rechargeable and primary cells

5. TUNING AND PRODUCTION

- Replaceable PIN code that is used to access the programming mode

- Configurable mode switch timing

- In programming mode the batch serial number is displayed. Use this number to check and verify the build date, ordering details, detailed configuration and LED makeup/bins.

CARCLO
105XX TIR LENS

8   4

Emitter 2
Hi-Power

3x Ø2

6.93

3.99

R1.5

2.7

Emitter 1
Hi-Power

Ø20

7.85

Emitter 3
Hi-Power

Emitter 4
Low-Power

6

1.7

Ø20

CARCLO
105XX TIR LENS

7.7

**Power [-]
(Flashlight Body)**

**Power [+]
(Positive Lead)**

**Button Port
(not used)**

Drawings metric units (millimeters)

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371 Maximum Output / Worst Efficiency

Vinp (V)	Iinp (A)	Vsense (mV)	Iout (A)	Vout (3xXPL) *	Pin (W)	Pout (W)	Eff	Lumens *	Afterburning mode
				One cell					
2.5	2.9	14	**0.70**	8.55	7.25	**5.99**	83%	**1086**	No
3.3	4.86	26.8	**1.34**	9.03	16.04	**12.10**	75%	**1908**	No
3.7	4.83	31.2	**1.56**	9.15	17.87	**14.27**	80%	**2157**	No
4.2	4.73	35.3	**1.77**	9.36	19.87	**16.52**	83%	**2388**	No
				Two Cells					
6.6	4.55	54.9	**2.75**	9.96	30.03	**27.34**	91%	**3309**	**Yes**
7.4	4.41	59.5	**2.98**	10.08	32.63	**29.99**	92%	**3483**	**Yes**
8.4	3.8	60	**3.00**	10.11	31.92	**30.33**	95%	**3498**	**Yes**

* Based on datasheet ratings of CREE XP-L V5 @25C

371 Mid Output / Best Efficiency

Vinp (V)	Iinp (A)	Vsense (mV)	Iout (A)	Vout (3xXPL) *	Pin (W)	Pout (W)	Eff	Lumens *	Afterburning mode
				One cell					
2.5	1	5.6	0.28	8.16	2.50	2.28	**91%**	450	No
3.3	2.38	16.2	0.81	8.64	7.85	7.00	**89%**	1242	No
3.7	2.07	16.2	0.81	8.64	7.66	7.00	**91%**	1242	No
4.2	1.81	16.2	0.81	8.64	7.60	7.00	**92%**	1242	No
				Two Cells					
6.6	2.52	33.5	1.68	9.30	16.63	15.58	**94%**	2289	No
7.4	2.22	33.6	1.68	9.30	16.43	15.62	**95%**	2289	No
8.4	1.94	33.6	1.68	9.30	16.30	15.62	**96%**	2289	No

* Based on datasheet ratings of CREE XP-L V5 @25C

371D Minimum Output / Longest Runtime

Vinp (V)	Iinp (mA)	Lumens *	Runtime **			Pin (mW)
			Hours	Nights (8h)	Full Days 24h	
			One cell			
2.5	6.02	0.18	565	71	24	15.1
3.3	4.73	0.18	719	90	30	15.6
3.7	**4.34**	**0.18**	**783**	**98**	**33**	**16.1**
4.2	3.9	0.18	872	109	36	16.4
			Two Cells			
6.6	2.32	0.18	1466	183	61	15.3
7.4	**2.02**	**0.18**	**1683**	**210**	**70**	**14.9**
8.4	1.64	0.18	2073	259	86	13.8

* Based on datasheet ratings of CREE XP-L V5 @25C
** Using a 3400mAh ICR 18650 Battery

| Mode	Lumens		K
	Measured	Calibrated	
Off	0	0.00	
1	0.17	0.18	1.38
2	0.235	0.25	1.39
3	0.326	0.34	1.40
4	0.457	0.48	1.42
5	0.649	0.68	1.42
6	0.923	0.97	1.43
7	1.319	1.39	1.43
8	1.882	1.98	1.45
9	2.735	2.88	1.45
10	3.954	4.17	1.48
11	5.857	6.17	1.49
12	8.756	9.23	1.49
13	13.01	13.71	1.51
14	19.63	20.68	1.51
15	29.6	31.19	1.50
16	44.28	46.65	1.52
17	67.29	70.90	1.51
18	101.8	107.26	1.50
19	153	161.20	1.48
20	226.6	238.75	1.45
21	328.4	346.01	1.39
22	456.9	481.40	1.31
23	599	631.12	1.20
24	720.2	758.81	1.33
25	959.1	1010.52	1.30
26	1248	1314.91	1.24
27	1548	1631.00	1.19
28	1835	1933.38	1.14
29	2093	2205.22	1.10
30	2312	2435.96	1.07
31	2465	2597.16	1.05
32	2581	2719.38	1.29
Afterburning	3320	**3498**	

Modes - All Range

Modes - From 1 to 10
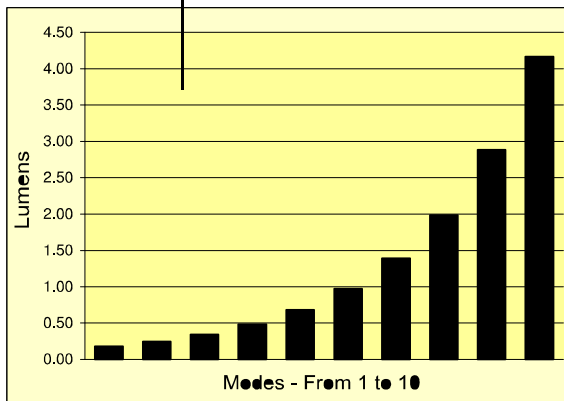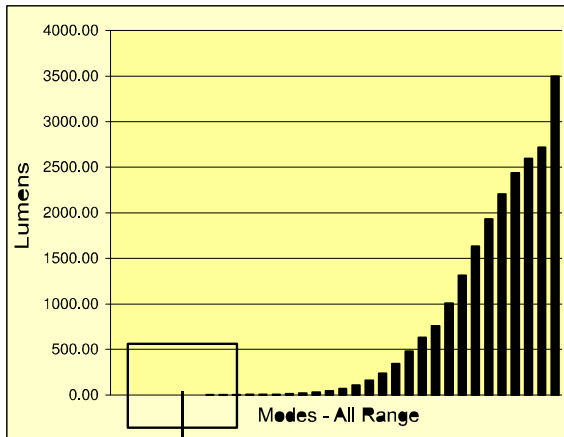
Temperature compensation of the luminous flux drop

Test sample (R10=0.02, CREE XP-L V5 redomed)

Mode / ºC	Watts	I input, A											Condition
		-30	-20	-5	10	25	40	55	70	85	100	120	
#10	0.07	0.004	0.005	0.006	0.009	0.01	0.01	0.02	0.02	0.03	0.04	---	requires external heating
#15	0.35	0.017	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.14	0.16	---	
#20	2.31	0.163	0.192	0.19	0.25	0.33	0.39	0.46	0.52	0.59	0.65	~0.70	
#23	6.16	0.52	0.57	0.68	0.75	0.88	0.95	1.03	1.12	1.18	1.26	1.33	self heated (no sink)
#25	10.29	1.08	1.17	1.29	1.4	1.47	1.53	1.59	1.65	1.69	1.74	1.78	
#30	23.1	3.62	3.55	3.5	3.38	3.3	3.25	3.16	3.12	3	2.9	2.85	

Mode / ºC	Rel. Lum. Flux											Condition
	-25	-20	-5	10	25	40	55	70	85	100	120	
#10	---	---	---	0.01	0.02	0.03	0.04	0.07	0.1	0.13	0.18	requires external heating
#15	0.035	0.04	0.07	0.11	0.15	0.21	0.29	0.36	0.44	0.52	0.65	
#20 (~2.3W)	0.45	0.49	0.66	0.82	1	1.22	1.41	1.57	1.74	1.82	1.95	
#23 (~6W)	1.55	1.65	1.95	2.21	2.44	2.73	2.88	2.98	3.05	3.06	3.04	self heated (no sink)
#25 (~10W)	3.01	3.04	3.4	3.61	3.75	3.94	3.98	4.03	3.96	3.87	3.7	
#27 (~15.5W)	---	4.83	5.03	5.06	5.18	5.1	5	4.81	4.67	4.5	4.02	
#30 (~23W)	---	7.11	6.99	6.77	6.59	6.4	6.05	5.86	5.57	5.22	4.75	

Luminous Flux Temperature Compensation
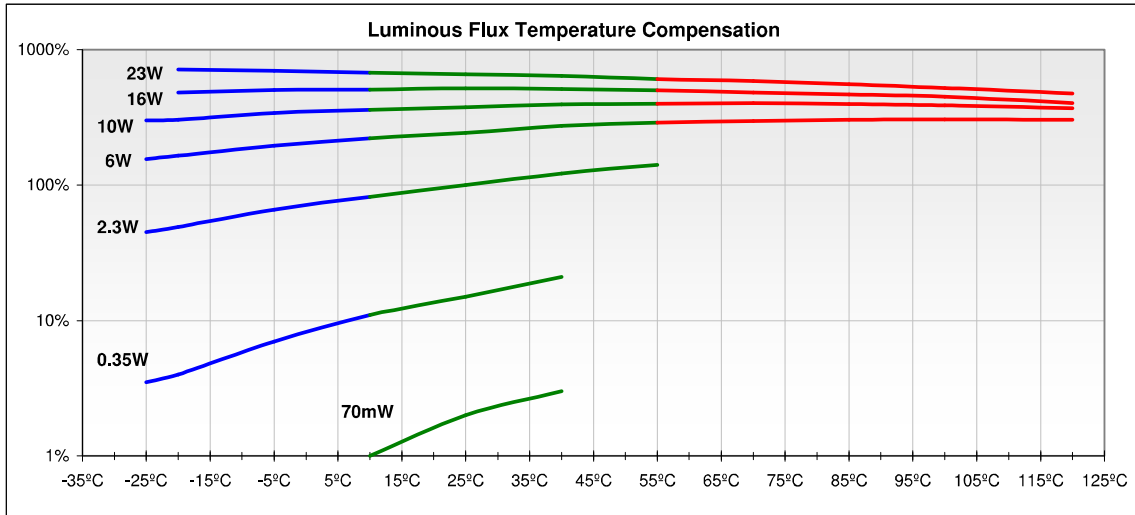
Temperature threshold chart after calibration (prog_temp_limit parameter in the program)

t, C	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Dev board. TSRNG=1. Vin=4V. RA2 clear (digital mode). 16ms acqisition (slow ADC)
26	31	30	17	30	32	20	20
50	40	40	25	39	40	28	29
60	46	45	29	44	45	32	33
70	52	51	35	49	51	37	39
80	62	59	44	57	58	45	48
90	73	69	59	68	68	56	61
100	88	84	69	82	81	74	82

Normalized							AVG
26	0	0	0	0	0	0	0
50	9	10	8	9	8	8	9
60	15	15	12	14	13	12	13
70	21	21	18	19	19	17	19
80	31	29	27	27	26	25	28
90	42	39	42	38	36	36	39
100	57	54	52	52	49	54	54