

<b>CL-654 High Power White LED for General Purpose Lighting</b>								
<b>CL-654 Basic Electronic Characteristics for LED Circuit and Driver Calculations</b>								
<b>Forward Voltage</b>					<b>Forward Current</b>			
<b>Minimum</b>		<b>Typical</b>	<b>Maximum</b>		<b>Charted</b>		<b>Maximum</b>	
N/A		3.45VDC	4.1VDC		350mA		480mA	
LED Characteristics		LED Circuit Configuration			Driver Requirements			MAGTECH LED Driver Suggestion
Forward Voltage( <i>vF</i> )	Forward Current( <i>iF</i> )	# of LEDs in Series	# of Parallels	Total LEDs	Output Voltage	Output Current	Output Power	
3.45	0.35	1	1	1	3.45	0.35	1.2075	L03U
3.45	0.35	2	1	2	6.9	0.35	2.415	L03U
3.45	0.35	3	1	3	10.35	0.35	3.6225	L03U
3.45	0.35	4	1	4	13.8	0.35	4.83	L03U
3.45	0.35	5	1	5	17.25	0.35	6.0375	L03U
3.45	0.35	6	1	6	20.7	0.35	7.245	LA1012
3.45	0.35	7	1	7	24.15	0.35	8.4525	LA1012
3.45	0.35	8	1	8	27.6	0.35	9.66	LA1012
3.45	0.35	9	1	9	31.05	0.35	10.8675	LA1012
3.45	0.35	10	1	10	34.5	0.35	12.075	LA1012
3.45	0.35	1	2	2	3.45	0.7	2.415	L03U
3.45	0.35	2	2	4	6.9	0.7	4.83	L07U
3.45	0.35	3	2	6	10.35	0.7	7.245	L121U
3.45	0.35	4	2	8	13.8	0.7	9.66	L121U
3.45	0.35	5	2	10	17.25	0.7	12.075	L121U
3.45	0.35	6	2	12	20.7	0.7	14.49	LP1017
3.45	0.35	7	2	14	24.15	0.7	16.905	LP1025
3.45	0.35	8	2	16	27.6	0.7	19.32	LP1025
3.45	0.35	9	2	18	31.05	0.7	21.735	LP1025
3.45	0.35	10	2	20	34.5	0.7	24.15	LP1025
3.45	0.35	1	3	3	3.45	1.05	3.6225	L07U
3.45	0.35	2	3	6	6.9	1.05	7.245	L121U
3.45	0.35	3	3	9	10.35	1.05	10.8675	L121U

3.45	0.35	4	3	12	13.8	1.05	14.49	LP1017
3.45	0.35	5	3	15	17.25	1.05	18.1125	LP1020
3.45	0.35	6	3	18	20.7	1.05	21.735	LP1025
3.45	0.35	7	3	21	24.15	1.05	25.3575	LP1040
3.45	0.35	8	3	24	27.6	1.05	28.98	LP1040
3.45	0.35	9	3	27	31.05	1.05	32.6025	LP1040
3.45	0.35	10	3	30	34.5	1.05	36.225	LP1040
3.45	0.35	3	4	12	10.35	1.4	14.49	LP1017
3.45	0.35	4	4	16	13.8	1.4	19.32	LP1020
3.45	0.35	5	4	20	17.25	1.4	24.15	LP1025
3.45	0.35	6	4	24	20.7	1.4	28.98	LP1040
3.45	0.35	7	4	28	24.15	1.4	33.81	LP1040
3.45	0.35	8	4	32	27.6	1.4	38.64	LP1040
3.45	0.35	9	4	36	31.05	1.4	43.47	LP1060
3.45	0.35	10	4	40	34.5	1.4	48.3	LP1060
<b>VDC</b>	<b>mA</b>				<b>VDC</b>	<b>mA</b>	<b>Watts</b>	

**Note 1:** These characteristics, configurations, and suggestions are based on **Citizen's Electro-Optical Characteristic**

**Note 2:** The **Typical Voltage** was used in these calculations.

**Note 3:** These charts and suggestions are for **Reference Use Only**.

**Note 4:** For further details contact your **Magtech Account Manager** to ensure and verify the best **Magtech LED Driver Solution** for your application and circuit configuration.

## CL-L102-x3 High Power White LED for General Purpose Lighting

### CLL-102x3 Basic Electronic Characteristics for LED Circuit and Driver Calculations

<b>Forward Voltage</b>			<b>Forward Current</b>	
Minimum	Typical	Maximum	Charted	Maximum
9.0VDC	10.4VDC	12.0VDC	350mA	500mA

LED Characteristics		LED Circuit Configuration			Driver Requirements			MAGTECH LED
Forward Voltage( <i>vF</i> )	Forward Current( <i>iF</i> )	# of LEDs in Series	# of Parallels	Total LEDs	Output Voltage	Output Current	Output Power	LED Driver Suggestion
10.4	0.35	1	1	1	10.4	0.35	3.64	L03U
10.4	0.35	2	1	2	20.8	0.35	7.28	LA1012
10.4	0.35	3	1	3	31.2	0.35	10.92	LA1012
10.4	0.35	1	2	2	10.4	0.7	7.28	LA1012
10.4	0.35	2	2	4	20.8	0.7	14.56	LP1017
10.4	0.35	3	2	6	31.2	0.7	21.84	LP1025
10.4	0.35	1	3	3	10.4	1.05	10.92	LA1012
10.4	0.35	2	3	6	20.8	1.05	21.84	LP1025
10.4	0.35	3	3	9	31.2	1.05	32.76	LP1040
10.4	0.35	1	4	4	10.4	1.4	14.56	LP1017
10.4	0.35	2	4	8	20.8	1.4	29.12	LP1040
10.4	0.35	3	4	12	31.2	1.4	43.68	LP1090
10.4	0.35	1	5	5	10.4	1.75	18.2	LP1020
10.4	0.35	2	5	10	20.8	1.75	36.4	LP1040
10.4	0.35	3	5	15	31.2	1.75	54.6	LP1090
10.4	0.35	1	6	6	10.4	2.1	21.84	LP1025
10.4	0.35	2	6	12	20.8	2.1	43.68	LP1060
10.4	0.35	3	6	18	31.2	2.1	65.52	LP1090
10.4	0.35	1	7	7	10.4	2.45	25.48	LP1040
10.4	0.35	2	7	14	20.8	2.45	50.96	LP1060
10.4	0.35	3	7	21	31.2	2.45	76.44	LP1090
10.4	0.35	1	8	8	10.4	2.8	29.12	LP1040
10.4	0.35	2	8	16	20.8	2.8	58.24	LP1060

10.4	0.35	3	8	24	31.2	2.8	87.36	LP1090
10.4	0.35	1	9	9	10.4	3.15	32.76	LP1040
10.4	0.35	2	9	18	20.8	3.15	65.52	LP1090
10.4	0.35	1	10	10	10.4	3.5	36.4	LP1040
10.4	0.35	2	10	20	20.8	3.5	72.8	LP1090
10.4	0.35	1	11	11	10.4	3.85	40.04	LP1060
10.4	0.35	2	11	22	20.8	3.85	80.08	LP1090
10.4	0.35	1	12	12	10.4	4.2	43.68	LP1060
10.4	0.35	2	12	24	20.8	4.2	87.36	LP1090
10.4	0.35	1	13	13	10.4	4.55	47.32	LP1060
10.4	0.35	1	14	14	10.4	4.9	50.96	LP1060
<b>VDC</b>	<b>mA</b>				<b>VDC</b>	<b>mA</b>	<b>Watts</b>	

**Note 1:** These characteristics, configurations, and suggestions are based on **Citizen's Electro-Optical Characteristic**

**Note 2:** The **Typical Voltage** was used in these calculations.

**Note 3:** These charts and suggestions are for **Reference Use Only**.

**Note 4:** For further details contact your **Magtech Account Manager** to ensure and verify the best **Magtech LED Driver Solution** for your application and circuit configuration.

## CL-L190 High Power White LED for General Purpose Lighting

### CL-L190 Basic Electronic Characteristics for LED Circuit and Driver Calculations

<b>Forward Voltage</b>			<b>Forward Current</b>	
Minimum	Typical	Maximum	Charted	Maximum
10.5VDC	11.8VDC	12.9VDC	480mA	560mA

LED Characteristics		LED Circuit Configuration			Driver Requirements			MAGTECH LED
Forward Voltage( <i>vF</i> )	Forward Current( <i>iF</i> )	# of LEDs in Series	# of Parallels	Total LEDs	Output Voltage	Output Current	Output Power	LED Driver Suggestion
11.8	0.48	1	1	1	11.8	0.48	5.664	L07U
11.8	0.48	2	1	2	23.6	0.48	11.328	LA1012
11.8	0.48	3	1	3	35.4	0.48	16.992	LP1020
11.8	0.48	1	2	2	11.8	0.96	11.328	LA1012
11.8	0.48	2	2	4	23.6	0.96	22.656	LP1025
11.8	0.48	3	2	6	35.4	0.96	33.984	LP1040
11.8	0.48	1	3	3	11.8	1.44	16.992	LP1020
11.8	0.48	2	3	6	23.6	1.44	33.984	LP1040
11.8	0.48	3	3	9	35.4	1.44	50.976	LP1090
11.8	0.48	1	4	4	11.8	1.92	22.656	LP1025
11.8	0.48	2	4	8	23.6	1.92	45.312	LP1060
11.8	0.48	3	4	12	35.4	1.92	67.968	LP1090
11.8	0.48	1	5	5	11.8	2.4	28.32	LP1040
11.8	0.48	2	5	10	23.6	2.4	56.64	LP1060
11.8	0.48	3	5	15	35.4	2.4	84.96	LP1060
11.8	0.48	1	6	6	11.8	2.88	33.984	LP1040
11.8	0.48	2	6	12	23.6	2.88	67.968	LP1090
11.8	0.48	1	7	7	11.8	3.36	39.648	LP1040
11.8	0.48	2	7	14	23.6	3.36	79.296	LP1090
11.8	0.48	1	8	8	11.8	3.84	45.312	LP1060
11.8	0.48	2	8	16	23.6	3.84	90.624	LP1090
11.8	0.48	1	9	9	11.8	4.32	50.976	LP1060

11.8	0.48	1	10	10	11.8	4.8	56.64	LP1060
VDC	mA				VDC	mA	Watts	

**Note 1:** These characteristics, configurations, and suggestions are based on **Citizen's Electro-Optical Characteristic**

**Note 2:** The **Typical Voltage** was used in these calculations.

**Note 3:** These charts and suggestions are for **Reference Use Only**.

**Note 4:** For further details contact your **Magtech Account Manager** to ensure and verify the best **Magtech LED Driver Solution** for your application and circuit configuration.

## CL-L102-x7 High Power White LED for General Purpose Lighting

### CL-L102x7 Basic Electronic Characteristics for LED Circuit and Driver Calculations

<b>Forward Voltage</b>			<b>Forward Current</b>	
Minimum	Typical	Maximum	Charted	Maximum
9.0VDC	11.0VDC	12.6VDC	700mA	1000mA

LED Characteristics		LED Circuit Configuration			Driver Requirements			MAGTECH LED
Forward Voltage( <i>vF</i> )	Forward Current( <i>iF</i> )	# of LEDs in Series	# of Parallels	Total LEDs	Output Voltage	Output Current	Output Power	LED Driver Suggestion
11	0.7	1	1	1	11	0.7	7.7	LA1012
11	0.7	2	1	2	22	0.7	15.4	LP1017
11	0.7	3	1	3	33	0.7	23.1	LP1025
11	0.7	1	2	2	11	1.4	15.4	LP1017
11	0.7	2	2	4	22	1.4	30.8	LP1040
11	0.7	3	2	6	33	1.4	46.2	LP1090
11	0.7	1	3	3	11	2.1	23.1	LP1025
11	0.7	2	3	6	22	2.1	46.2	LP1060
11	0.7	3	3	9	33	2.1	69.3	LP1090
11	0.7	1	4	4	11	2.8	30.8	LP1040
11	0.7	2	4	8	22	2.8	61.6	LP1090
11	0.7	3	4	12	33	2.8	92.4	LP1090
11	0.7	1	5	5	11	3.5	38.5	LP1040
11	0.7	2	5	10	22	3.5	77	LP1090
11	0.7	1	6	6	11	4.2	46.2	LP1060
11	0.7	2	6	12	22	4.2	92.4	LP1090
11	0.7	1	7	7	11	4.9	53.9	LP1060
VDC	mA				VDC	mA	Watts	

**Note 1:** These characteristics, configurations, and suggestions are based on **Citizen's Electro-Optical Characteristic**

**Note 2:** The **Typical Voltage** was used in these calculations.

**Note 3:** These charts and suggestions are for **Reference Use Only**.

**Note 4:** For further details contact your **Magtech Account Manager** to ensure and verify the best **Magtech LED Driver Solution** for your application and circuit configuration.

## CL-L230 High Power White LED for General Purpose Lighting

### CL-L230 Basic Electronic Characteristics for LED Circuit and Driver Calculations

<b>Forward Voltage</b>			<b>Forward Current</b>	
Minimum	Typical	Maximum	Charted	Maximum
10.5VDC	11.8VDC	12.9VDC	900mA	1050mA

LED Characteristics		LED Circuit Configuration			Driver Requirements			MAGTECH LED
Forward Voltage( <i>vF</i> )	Forward Current( <i>iF</i> )	# of LEDs in Series	# of Parallels	Total LEDs	Output Voltage	Output Current	Output Power	LED Driver Suggestion
11.8	0.9	1	1	1	11.8	0.9	10.62	LA1012
11.8	0.9	2	1	2	23.6	0.9	21.24	LP1025
11.8	0.9	3	1	3	35.4	0.9	31.86	LP1040
11.8	0.9	1	2	2	11.8	1.8	21.24	LP1025
11.8	0.9	2	2	4	23.6	1.8	42.48	LP1060
11.8	0.9	3	2	6	35.4	1.8	63.72	LP1090
11.8	0.9	1	3	3	11.8	2.7	31.86	LP1040
11.8	0.9	2	3	6	23.6	2.7	63.72	LP1090
11.8	0.9	3	3	9	35.4	2.7	95.58	LP1090
11.8	0.9	1	4	4	11.8	3.6	42.48	LP1060
11.8	0.9	2	4	8	23.6	3.6	84.96	LP1090
11.8	0.9	1	5	5	11.8	4.5	53.1	LP1060
VDC	mA				VDC	mA	Watts	

**Note 1:** These characteristics, configurations, and suggestions are based on **Citizen's Electro-Optical Characteristics**.

**Note 2:** The **Typical Voltage** was used in these calculations.

**Note 3:** These charts and suggestions are for **Reference Use Only**.

**Note 4:** For further details contact your **Magtech Account Manager** to ensure and verify the best **Magtech LED Driver Solution** for your application and circuit configuration.

## CL-L220 High Power White LED for General Purpose Lighting

### CL-L220 Basic Electronic Characteristics for LED Circuit and Driver Calculations

Forward Voltage			Forward Current	
Minimum	Typical	Maximum	Charted	Maximum
10.5VDC	11.8VDC	12.9VDC	1440mA	1680mA

LED Characteristics		LED Circuit Configuration			Driver Requirements			MAGTECH LED
Forward Voltage( <i>vF</i> )	Forward Current( <i>iF</i> )	# of LEDs in Series	# of Parallels	Total LEDs	Output Voltage	Output Current	Output Power	LED Driver Suggestion
11.8	1.44	1	1	1	11.8	1.44	16.992	LP1020
11.8	1.44	2	1	2	23.6	1.44	33.984	LP1040
11.8	1.44	3	1	3	35.4	1.44	50.976	LP1090
11.8	1.44	1	2	2	11.8	2.88	33.984	LP1040
11.8	1.44	2	2	4	23.6	2.88	67.968	LP1090
11.8	1.44	1	3	3	11.8	4.32	50.976	LP1060
VDC	mA				VDC	mA	Watts	

**Note 1:** These characteristics, configurations, and suggestions are based on **Citizen's Electro-Optical Characteristics**.

**Note 2:** The **Typical Voltage** was used in these calculations.

**Note 3:** These charts and suggestions are for **Reference Use Only**.

**Note 4:** For further details contact your **Magtech Account Manager** to ensure and verify the best **Magtech LED Driver Solution** for your application and circuit configuration.