

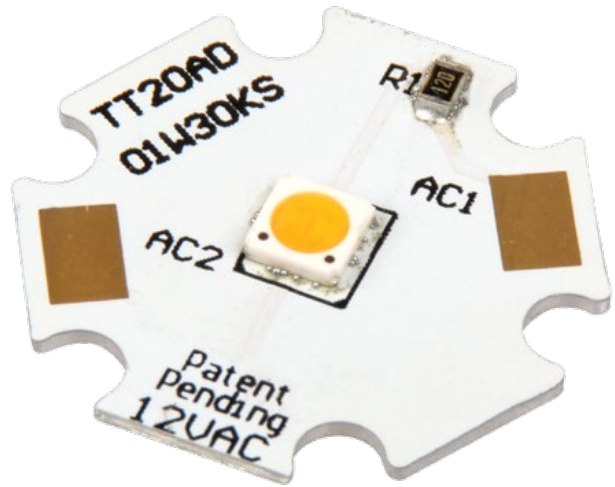


1W 21mm 12V AC Starboard
AC LED Technology by Lynk Labs
Compatible with Phase-cut Dimmers
5 yr. Warranty when used with TRP 12V AC power supply

Specifications

Drive Voltage: Power with TRP #99002, 99004, 99006, or suitable 12V magnetic transformer. Not to exceed 13V.
 AC Current: 100 mA @25°C typical; 150 mA max
 Power Dissipation: 1W typical; 1.5W max
 Life: 50,000 Hrs, if used as specified
 Luminous Flux: 74 lm @3000K
 Luminous Efficacy: 74 LPW ±10% @3000K
 Viewing Angle: 120 deg
 Operating Temp: -25°C to +100°C
 Storage Temp: -40°C to +100°C
 Soldering Temp: 370°C

Low voltage AC LED modules offer an effective replacement for incandescent, Xenon or Halogen lamps. Patented AC LED technology eliminates the need for an AC-DC driver. Compatible with existing magnetic or electronic 12V AC power supplies.



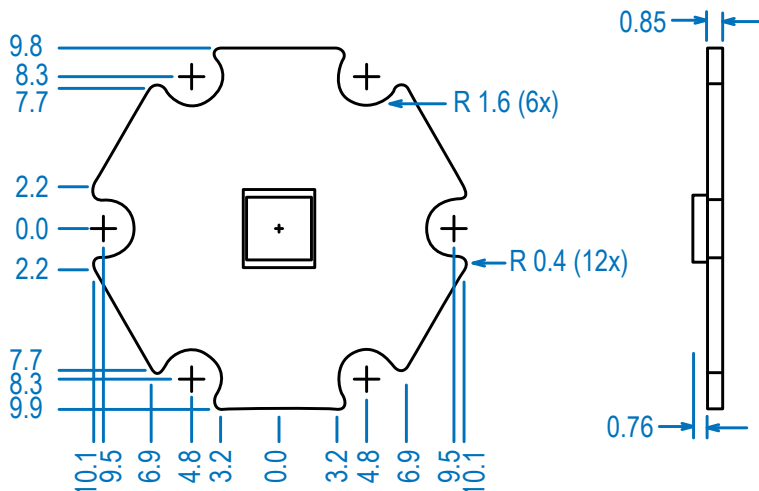
Features

- Compatible with existing 12V AC Power Supplies
- Polarity Independent
- Reliable, fast and easy - "Plug & Play"
- Compatible with most existing leading edge or trailing edge phase cut AC Dimmers
- High Power Efficiency
- High Power Factor
- Significant Energy Savings
- Durable Light Source
- Long Operating life

Applications

- Under Cabinet Lights
- Step Lights
- Accent Lights
- Garden Lights
- Display Lights

21mm 12V AC Starboard LED Module					
Model Number	Input Power (W)	Input Voltage (Vac)	Color Temp (K)	Lumens	LPW
99227	1	12	2200	56	56
99228	1	12	2700	63	63
99229	1	12	3000	66	66
99230	1	12	4000	75	75
99231	1	12	5000	82	82



Specifications subject to change without notice. Trademarks are property of their respective owners.

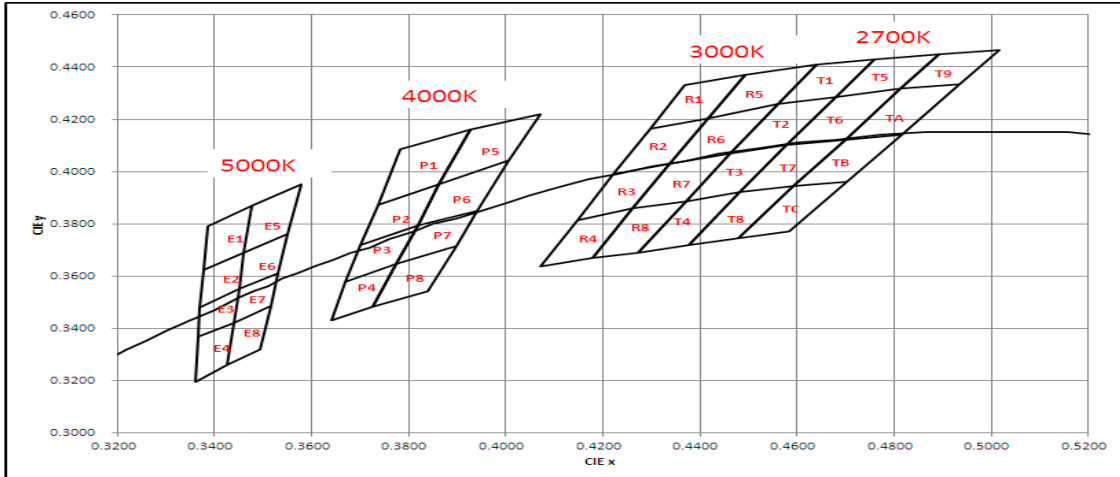


1W 21mm 12V Starboard AC LED Light Engine

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CIE Chromaticity Coordinates:

(VF=12Vrms, Ta=25°C, pulsed measurement)



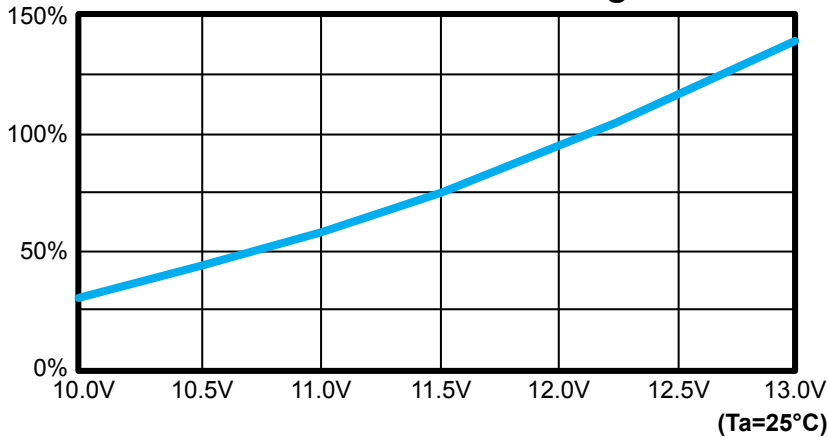
Energy Star ANSI	Rank	x1	y1	x2	y2	x3	y3	x4	y4	Center CCT(K)	
TY	T2	0.4562	0.426	0.4463	0.407	0.4578	0.4101	0.468	0.4285	2700	
	T3	0.4463	0.407	0.4371	0.3885	0.4482	0.392	0.4578	0.4101		
	T6	0.468	0.4285	0.4578	0.4101	0.47	0.412	0.4813	0.4319		
	T7	0.4578	0.4101	0.4482	0.392	0.4593	0.3944	0.47	0.412		
	T1	0.464	0.441	0.4562	0.426	0.468	0.4285	0.476	0.443		
	T4	0.4371	0.3885	0.4273	0.369	0.4376	0.372	0.4482	0.392		
	T5	0.476	0.443	0.468	0.4285	0.4813	0.4319	0.4892	0.445		
	T8	0.4482	0.392	0.4376	0.372	0.448	0.3745	0.4593	0.3944		
	T9	0.4892	0.445	0.4813	0.4319	0.4935	0.4335	0.5017	0.4465		
	TA	0.4813	0.4319	0.47	0.412	0.4815	0.414	0.4935	0.4335		
	TB	0.47	0.412	0.4593	0.3944	0.4702	0.396	0.4815	0.414		
	TC	0.4593	0.3944	0.448	0.3745	0.4585	0.377	0.4702	0.396		
RY	R2	0.4299	0.4165	0.422	0.399	0.4338	0.403	0.4416	0.4205	3000	
	R3	0.422	0.399	0.4147	0.3814	0.4262	0.386	0.4338	0.403		
	R6	0.4416	0.4205	0.4338	0.403	0.4463	0.407	0.4562	0.426		
	R7	0.4338	0.403	0.4262	0.386	0.4371	0.3885	0.4463	0.407		
	R1	0.437	0.4332	0.4299	0.4165	0.4416	0.4205	0.4493	0.437		
	R4	0.4147	0.3814	0.407	0.3636	0.4178	0.367	0.4262	0.386		
	R5	0.4493	0.437	0.4416	0.4205	0.4562	0.426	0.464	0.441		
	R8	0.4262	0.386	0.4178	0.367	0.4273	0.369	0.4371	0.3885		
PY	P2	0.374	0.3888	0.37	0.372	0.3818	0.3795	0.3863	0.395		4000
	P3	0.37	0.372	0.367	0.3568	0.377	0.363	0.3818	0.3795		
	P6	0.3863	0.395	0.3818	0.3795	0.3941	0.385	0.3996	0.4015		
	P7	0.3818	0.3795	0.377	0.363	0.3889	0.369	0.3941	0.385		
	P1	0.3783	0.4085	0.374	0.3888	0.3863	0.395	0.3926	0.416		
	P4	0.367	0.3568	0.364	0.343	0.3727	0.3482	0.377	0.363		
	P5	0.3926	0.416	0.3863	0.395	0.3996	0.4015	0.407	0.422		
	P8	0.377	0.363	0.3727	0.3482	0.384	0.354	0.3889	0.369		
EY	E2	0.3377	0.3625	0.3368	0.348	0.345	0.355	0.3461	0.369	5000	
	E3	0.3368	0.348	0.3366	0.3369	0.344	0.342	0.345	0.355		
	E6	0.3461	0.369	0.345	0.355	0.353	0.361	0.3551	0.376		
	E7	0.345	0.355	0.344	0.342	0.3515	0.3487	0.353	0.361		
	E1	0.3385	0.379	0.3377	0.3625	0.3461	0.369	0.3477	0.387		
	E4	0.3366	0.3369	0.336	0.3195	0.3425	0.326	0.344	0.342		
	E5	0.3477	0.387	0.3461	0.369	0.3551	0.376	0.358	0.395		
	E8	0.344	0.342	0.3425	0.326	0.3495	0.332	0.3515	0.3487		



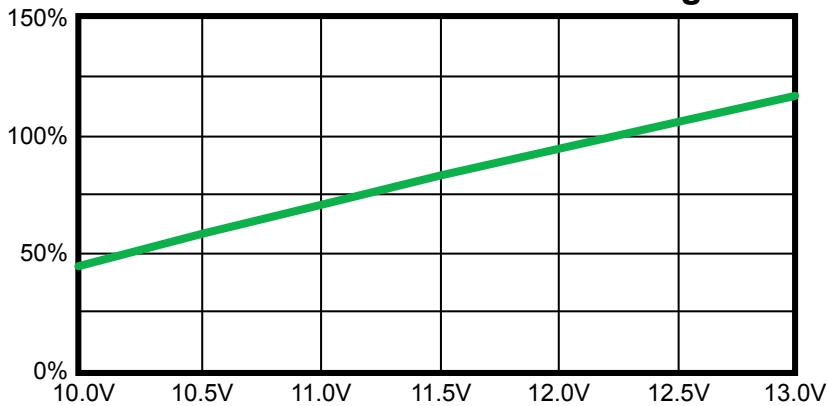


Typical Electrical & Optical Characteristic Curves:

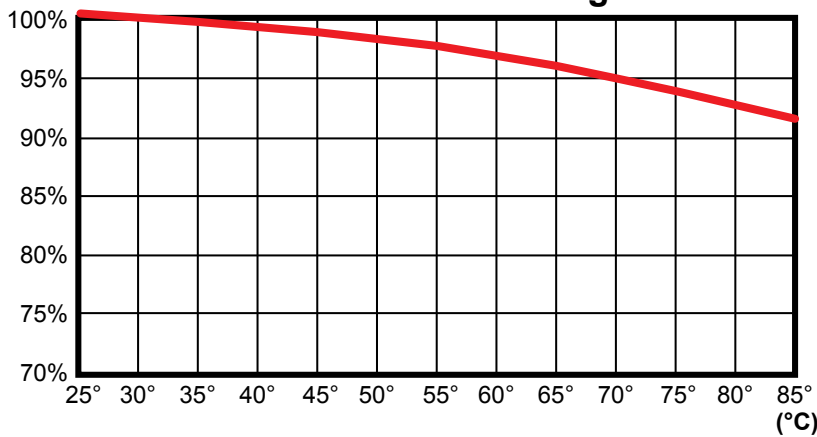
Relative Power / Voltage



Relative Luminous Flux / Voltage



Lumen Thermal De-Rating Curve



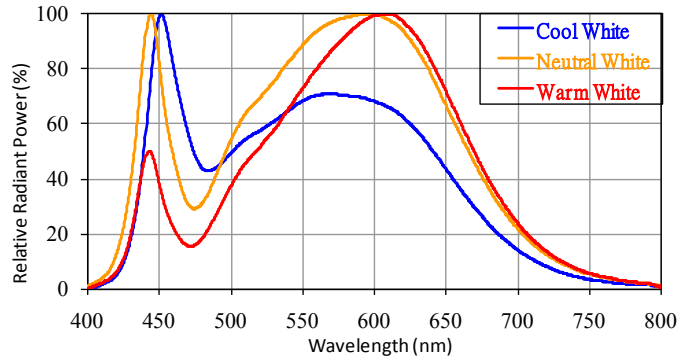


1W 21mm 12V Starboard AC LED Light Engine

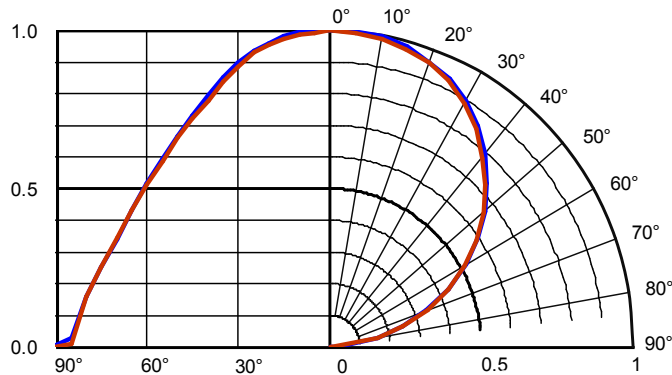
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Typical Electrical & Optical Characteristic Curves:

Spectrum (VF=12Vrms, Ta=25°C, pulsed measurement)



Radiant Angle & Pattern (VF=12Vrms, Ta=25°C, pulsed measurement)



Emitting Color	Center CCT (K)	Flux Code	Min	Max
Warm White	2700	F28	45	50
		F29	50	55
		F30	55	60
		F31	60	68
		F32	68	75
		F33	75	85
Warm White	3000	F34	85	95
		F28	45	50
		F29	50	55
		F30	55	60
		F31	60	68
		F32	68	75
Neutral White	4000	F33	75	85
		F34	85	95
		F35	95	110
		F29	50	55
		F30	55	60
		F31	60	68
Cool White	5000	F32	68	75
		F33	75	85
		F34	85	95
		F35	95	110
		F30	55	60
		F31	60	68
		F36	110	125

Packaging

- LED Modules will be packaged in trays for primary protection.
- According to the total delivery amount, cardboard boxes will be used to protect the trays of LED Modules from mechanical shocks during transportation.
- The boxes are not water resistant and therefore must be kept away from water and moisture.

Reliability and Average Lumen Maintenance

Before releasing new products the manufacturer puts a representative product sample set through an entire suite of qualification tests, including the most stressful test for high power LEDs, the Wet High-Temperature Operating Life (WHTOL) test at 85°C/85%RH for 1000 hours at the specified operating current.

LED lifetime has been extrapolated based on the accumulated operating and accelerated aging data. Based on this data, the manufacturer projects that the LED products will deliver, on average, 70% lumen maintenance at 50,000 hours of operation at the specified operating current, provided that the case temperature is maintained at or below 80°C.

Design Considerations/Specifications

Thermal Management Requirements

- Heat Sink Required (22 square cm/watt surface area)
- Thermal epoxy – No mechanical mounting required
- Thermal tape – No mechanical mounting required
- Thermal grease – Mechanical mounting required

Mechanical Mounting

- Use nylon washers for all mounting holes when using screws.
- Do not put force on LEDs.
- Do not bend PCB.

Electrical Interface

- Solder Pads

