SPECIFICATION
FOR
White LED Light Engine

CL-59D-C12WXXX

- CL-59D-C12WXXX
  where CL is CL(Converterless power); 59(diameter in mm); D(Down light); C(120V); 12(Watt); W(white); X(8:CRI80, 9:CRI90); XX(CCT)
- High brightness with long lifetime
- High power factor
- Low THD
- RoHS compliant

Vendor		Customer
Written	Approval	Approval

Lumens CO., LTD.
456 Gomae-Dong, Giheung-Gu, Yongin-Si, Gyeonggi-Do 449-901 Korea
http://www.lumens.co.kr

1. Product description

*** Description**

- The CL series module is designed for the high power operation to get the high flux output applications.
- It incorporates the state of the art SMD LEDs with high reliability and semiconductor AC direct drive ICs.
- It is ideal for the indoor or down light applications.

*** Features**

- High performance, High brightness over 50,000 hours of life
- No emission of harmful short wavelength light(No UV radiation)
- High power conversion efficiency(>0.85)
- High power factor (0.99)
- Low THD
- Low EMI
- Thermal shutdown function embedded(150C)
- RoHS compliant

*** Applications**

2. Absolute maximum ratings

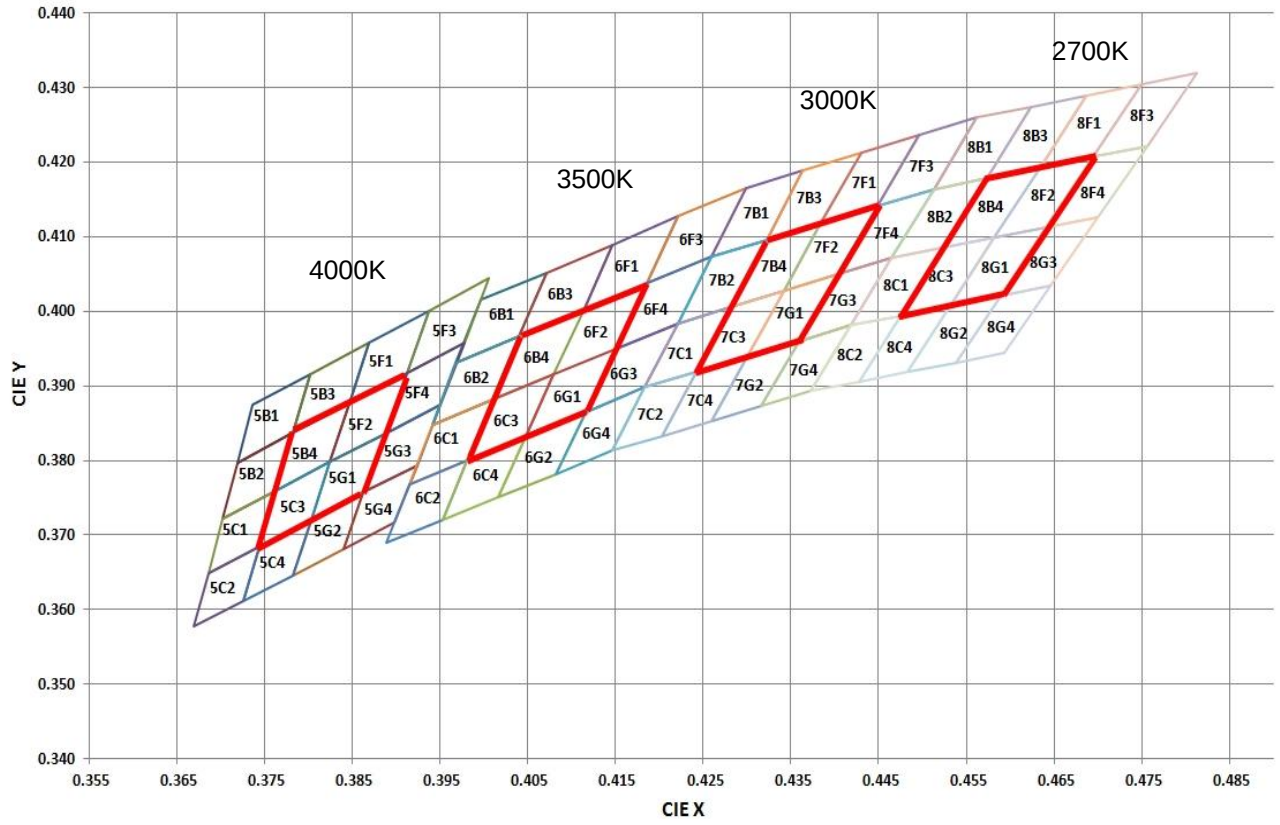
Parameters	Symbol	Min Value	Max Value	Unit
Maximum power dissipation	Pd	-	14	W
Maximum operation voltage	Vop	-	130	V
Operation temperature	Top	-40	+125	℃
Storage temperature	Tst	-40	+125	℃

3. Electro-optical characteristics (Ta=25℃.)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Condition
Luminous Flux	Φv	920	1,040		lm	Vop=120V 2700K CRI 80
		960	1,100		lm	Vop=120V 3000K CRI 80
		990	1,130		lm	Vop=120V 3500K CRI 80
		1,010	1,150		lm	Vop=120V 4000K CRI 80
		850	960		lm	Vop=120V 2700K CRI 90
		890	1,020		lm	Vop=120V 3000K CRI 90
		920	1,050		lm	Vop=120V 3500K CRI 90
		930	1,070		lm	Vop=120V 4000K CRI 90
Effieiency	lm/W	73.6	83.2		lm/W	Vop=120V 2700K CRI 80
		76.8	88.0		lm/W	Vop=120V 3000K CRI 80
		79.2	90.4		lm/W	Vop=120V 3500K CRI 80
		80.8	92.0		lm/W	Vop=120V 4000K CRI 80
		68.0	76.8		lm/W	Vop=120V 2700K CRI 90
		71.2	81.6		lm/W	Vop=120V 3000K CRI 90
		73.6	84.0		lm/W	Vop=120V 3500K CRI 90
		74.4	85.6		lm/W	Vop=120V 4000K CRI 90
Correlated Color Temperature	CCT	2700 (MacAdam 3Step)			K	Vop=120V
		3000 (MacAdam 3Step)			K	Vop=120V
		3500 (MacAdam 3Step)			K	Vop=120V
		4000 (MacAdam 3Step)			K	Vop=120V
Color Rendering Index	CRI	78	80	-	-	Vop=120V
		88	90	-		
Viewing Angle FWHM	2θ1/2	120	130	140	deg	Vop=120V
Operation Voltage	Vop	110	120	130	V	
Power Dissipation	Pd	11	12.5	14	W	Vop=120V
Operation Frequency	Fop	50 / 60			Hz	Vop=120V
Power Factor	PF	Over 0.99			V	Vop=120V
Current THD	ATHD	Less than 20%				Vop=120V

(1) Parameters are measured by CAS-140 of Instrument System CO.,LTD.
(2) Measurement accuracy : **CRI**(±3), **Φv**(±10%), **Vf**(±0.05V), **Chromaticity coordinate**((±0.01).
(3) CRI : depends on Customer Requirements

4. Chromaticity diagram



Chromaticity coordinate groups are measured with an accuracy of ±0.01

5. Chromaticity coordinates

5-1. 2700K

Region	x	y	Region	x	y	Region	x	y	Region	x	y
	0.4513	0.4164		0.4465	0.4071		0.4573	0.4178		0.4523	0.4085
	0.4562	0.4260		0.4513	0.4164		0.4624	0.4274		0.4573	0.4178
8B1	0.4624	0.4274	8B2	0.4573	0.4178	8B3	0.4687	0.4289	8B4	0.4634	0.4193
	0.4573	0.4178		0.4523	0.4085		0.4634	0.4193		0.4582	0.4099
	0.4513	0.4164		0.4465	0.4071		0.4573	0.4178		0.4523	0.4085
	0.4418	0.3981		0.4373	0.3893		0.4475	0.3994		0.4428	0.3906
	0.4465	0.4071		0.4418	0.3981		0.4523	0.4085		0.4475	0.3994
8C1	0.4523	0.4085	8C2	0.4475	0.3994	8C3	0.4582	0.4099	8C4	0.4532	0.4008
	0.4475	0.3994		0.4428	0.3906		0.4532	0.4008		0.4483	0.3919
	0.4418	0.3981		0.4373	0.3893		0.4475	0.3994		0.4428	0.3906
	0.4634	0.4193		0.4582	0.4099		0.4695	0.4207		0.4641	0.4112
	0.4687	0.4289		0.4634	0.4193		0.4750	0.4304		0.4695	0.4207
8F1	0.4750	0.4304	8F2	0.4695	0.4207	8F3	0.4813	0.4319	8F4	0.4756	0.4221
	0.4695	0.4207		0.4641	0.4112		0.4756	0.4221		0.4700	0.4126
	0.4634	0.4193		0.4582	0.4099		0.4695	0.4207		0.4641	0.4112
	0.4532	0.4008		0.4483	0.3919		0.4589	0.4021		0.4538	0.3931
	0.4582	0.4099		0.4532	0.4008		0.4641	0.4112		0.4589	0.4021
8G1	0.4641	0.4112	8G2	0.4589	0.4021	8G3	0.4700	0.4126	8G4	0.4646	0.4034
	0.4589	0.4021		0.4538	0.3931		0.4646	0.4034		0.4593	0.3944
	0.4532	0.4008		0.4483	0.3919		0.4589	0.4021		0.4538	0.3931

5-2. 3000K

Region	x	y	Region	x	y	Region	x	y	Region	x	y
	0.4259	0.4073		0.4221	0.3984		0.4322	0.4096		0.42810	0.40060
	0.4299	0.4165		0.4259	0.4073		0.4364	0.4188		0.43220	0.40960
7B1	0.4364	0.4188	7B2	0.4322	0.4096	7B3	0.4430	0.4212	7B4	0.43850	0.41190
	0.4322	0.4096		0.4281	0.4006		0.4385	0.4119		0.43420	0.40280
	0.4259	0.4073		0.4221	0.3984		0.4322	0.4096		0.42810	0.40060
	0.4183	0.3898		0.4147	0.3814		0.4242	0.3919		0.42030	0.38330
	0.4221	0.3984		0.4183	0.3898		0.4281	0.4006		0.42420	0.39190
7C1	0.4281	0.4006	7C2	0.4242	0.3919	7C3	0.4342	0.4028	7C4	0.43000	0.39390
	0.4242	0.3919		0.4203	0.3833		0.4300	0.3939		0.42590	0.38530
	0.4183	0.3898		0.4147	0.3814		0.4242	0.3919		0.42030	0.38330
	0.4385	0.4119		0.4342	0.4028		0.4449	0.4141		0.44030	0.40490
	0.4430	0.4212		0.4385	0.4119		0.4496	0.4236		0.44490	0.41410
7F1	0.4496	0.4236	7F2	0.4449	0.4141	7F3	0.4562	0.4260	7F4	0.45130	0.41640
	0.4449	0.4141		0.4403	0.4049		0.4513	0.4164		0.44650	0.40710
	0.4385	0.4119		0.4342	0.4028		0.4449	0.4141		0.44030	0.40490
	0.4300	0.3939		0.4259	0.3853		0.4359	0.3960		0.43160	0.38730
	0.4342	0.4028		0.4300	0.3939		0.4403	0.4049		0.43590	0.39600
7G1	0.4403	0.4049	7G2	0.4359	0.3960	7G3	0.4465	0.4071	7G4	0.44180	0.39810
	0.4359	0.3960		0.4316	0.3873		0.4418	0.3981		0.43730	0.38930
	0.4300	0.3939		0.4259	0.3853		0.4359	0.3960		0.43160	0.38730

5-3. 3500K

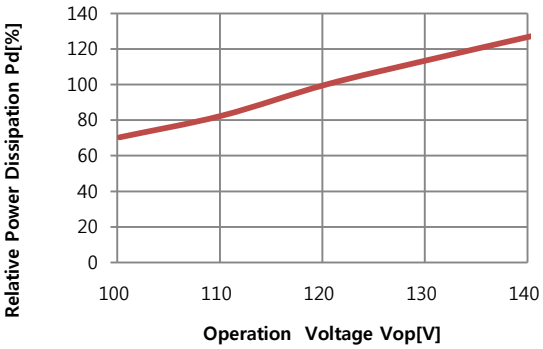
Region	x	y	Region	x	y	Region	x	y	Region	x	y
	0.3968	0.3930		0.3941	0.3848		0.4040	0.3966		0.40100	0.38820
	0.3996	0.4015		0.3968	0.3930		0.4071	0.4052		0.40400	0.39660
6B1	0.4071	0.4052	6B2	0.4040	0.3966	6B3	0.4146	0.4089	6B4	0.41130	0.40010
	0.4040	0.3966		0.4010	0.3882		0.4113	0.4001		0.40800	0.39160
	0.3968	0.3930		0.3941	0.3848		0.4040	0.3966		0.40100	0.38820
	0.3915	0.3768		0.3889	0.3690		0.3981	0.3800		0.39810	0.38000
	0.3941	0.3848		0.3915	0.3768		0.4010	0.3882		0.39530	0.37200
6C1	0.4010	0.3882	6C2	0.3981	0.3800	6C3	0.4080	0.3916	6C4	0.40170	0.37510
	0.3981	0.3800		0.3953	0.3720		0.4048	0.3832		0.40480	0.38320
	0.3915	0.3768		0.3889	0.3690		0.3981	0.3800		0.39810	0.38000
	0.4113	0.4001		0.4080	0.3916		0.4186	0.4037		0.41500	0.39500
	0.4146	0.4089		0.4113	0.4001		0.4222	0.4127		0.41860	0.40370
6F1	0.4222	0.4127	6F2	0.4186	0.4037	6F3	0.4299	0.4165	6F4	0.42590	0.40730
	0.4186	0.4037		0.4150	0.3950		0.4259	0.4073		0.42210	0.39840
	0.4113	0.4001		0.4080	0.3916		0.4186	0.4037		0.41500	0.39500
	0.4048	0.3832		0.4017	0.3751		0.4116	0.3865		0.40820	0.37820
	0.4080	0.3916		0.4048	0.3832		0.4150	0.3950		0.41160	0.38650
6G1	0.4150	0.3950	6G2	0.4116	0.3865	6G3	0.4221	0.3984	6G4	0.41830	0.38980
	0.4116	0.3865		0.4082	0.3782		0.4183	0.3898		0.41470	0.38140
	0.4048	0.3832		0.4017	0.3751		0.4116	0.3865		0.40820	0.37820

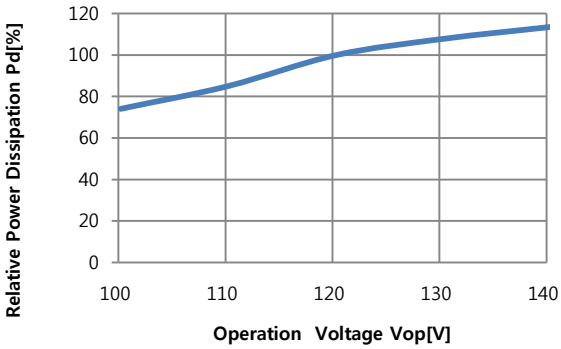
5-4. 4000K

Region	x	y	Region	x	y	Region	x	y	Region	x	y
	0.3719	0.3797		0.3702	0.3722		0.3782	0.3837		0.37630	0.37600
	0.3736	0.3874		0.3719	0.3797		0.3802	0.3916		0.37820	0.38370
5B1	0.3802	0.3916	5B2	0.3782	0.3837	5B3	0.3869	0.3958	5B4	0.38470	0.38770
	0.3782	0.3837		0.3763	0.3760		0.3847	0.3877		0.38250	0.37980
	0.3719	0.3797		0.3702	0.3722		0.3782	0.3837		0.37630	0.37600
	0.3686	0.3649		0.3670	0.3578		0.3744	0.3685		0.37260	0.36120
	0.3702	0.3722		0.3686	0.3649		0.3763	0.3760		0.37440	0.36850
5C1	0.3763	0.3760	5C2	0.3744	0.3685	5C3	0.3825	0.3798	5C4	0.38040	0.37210
	0.3744	0.3685		0.3726	0.3612		0.3804	0.3721		0.37830	0.36460
	0.3686	0.3649		0.3670	0.3578		0.3744	0.3685		0.37260	0.36120
	0.3847	0.3877		0.3825	0.3798		0.3912	0.3917		0.38870	0.38360
	0.3869	0.3958		0.3847	0.3877		0.3937	0.4001		0.39120	0.39170
5F1	0.3937	0.4001	5F2	0.3912	0.3917	5F3	0.4006	0.4044	5F4	0.39780	0.39580
	0.3912	0.3917		0.3887	0.3836		0.3978	0.3958		0.39500	0.38750
	0.3847	0.3877		0.3825	0.3798		0.3912	0.3917		0.38870	0.38360
	0.3804	0.3721		0.3783	0.3646		0.3863	0.3758		0.38400	0.36810
	0.3825	0.3798		0.3804	0.3721		0.3887	0.3836		0.38630	0.37580
5G1	0.3887	0.3836	5G2	0.3863	0.3758	5G3	0.3950	0.3875	5G4	0.39240	0.37940
	0.3863	0.3758		0.3840	0.3681		0.3924	0.3794		0.38980	0.37160
	0.3804	0.3721		0.3783	0.3646		0.3863	0.3758		0.38400	0.36810

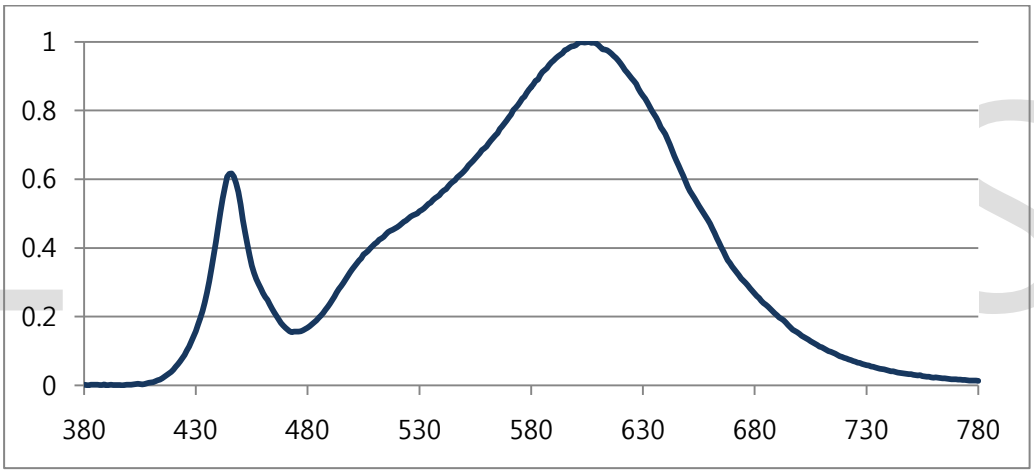
6. Characteristic Graphs

6-1 Voltage Characteristics(Ta=25℃)



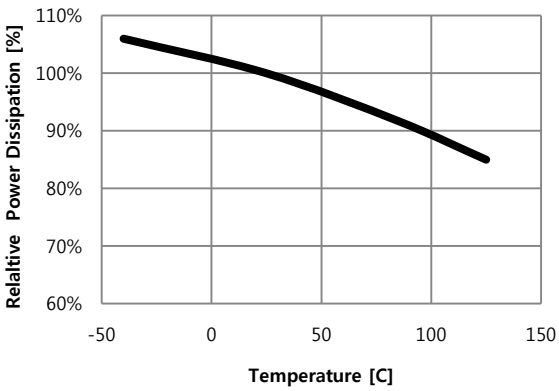


6-2 Spectrum Characteristics(Ta=25℃)

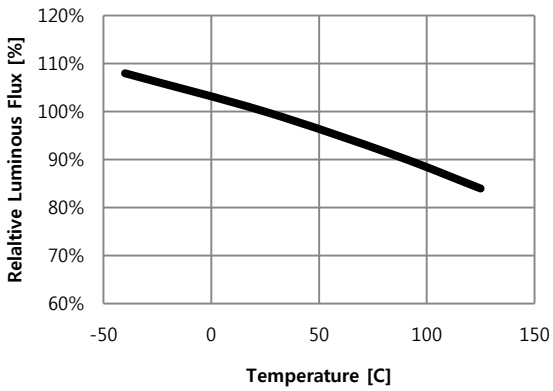


6-3 Temperature Characteristics

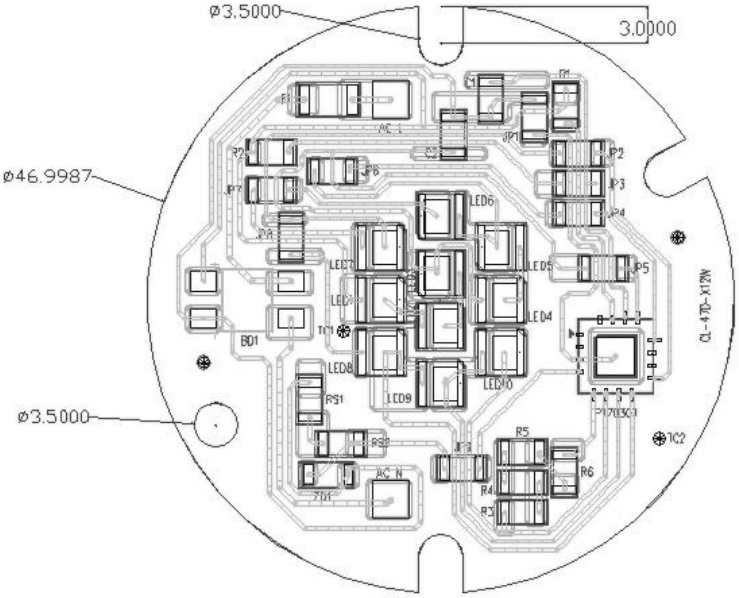
Power-Temperature characteristics



Luminous Flux-Temperature characteristics

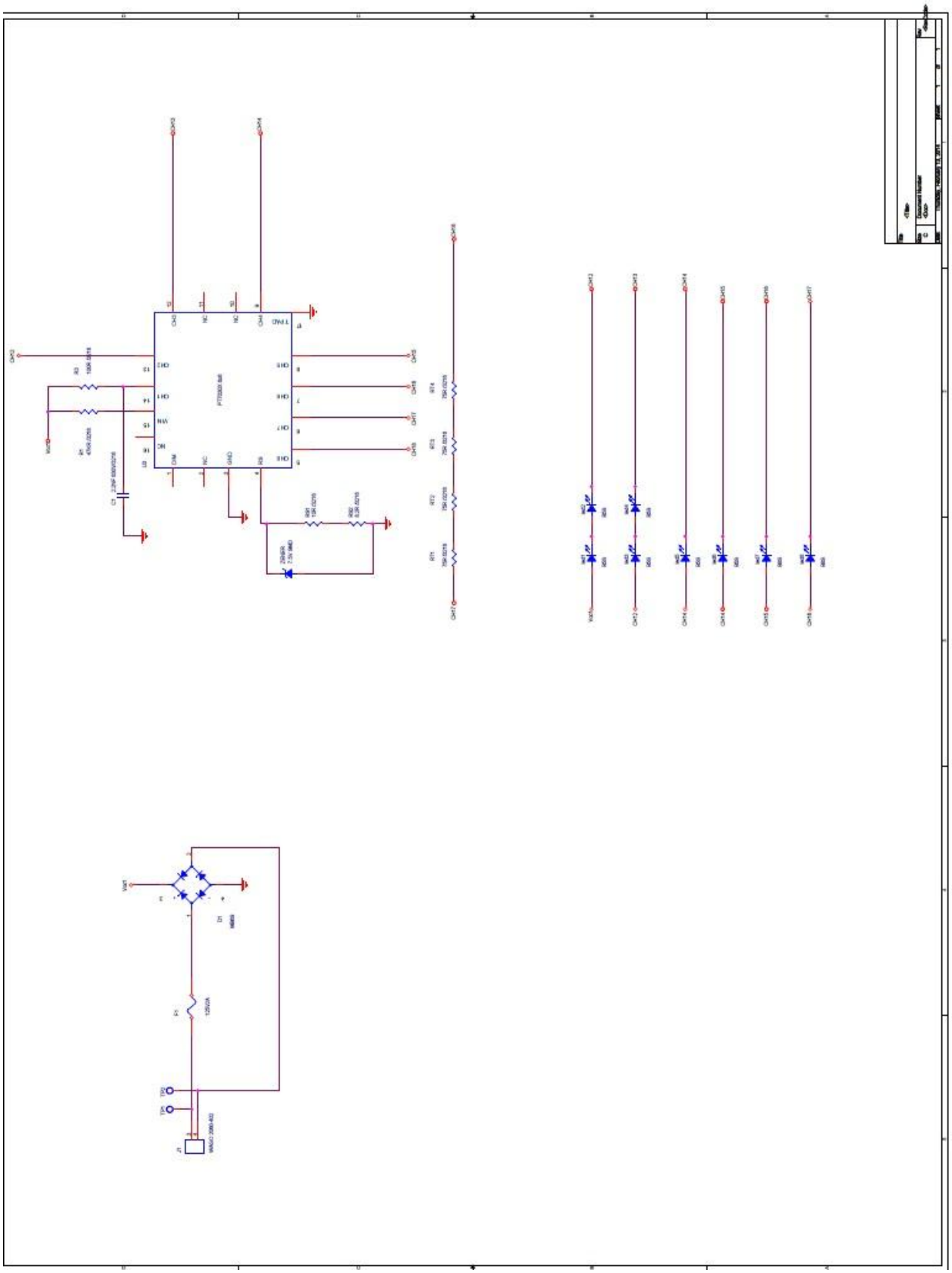


7. Outline Dimensions



Unit : mm
1) Outline diameter : 59Φ
2) Tolerance - All measurements are ± 0.3 mm unless otherwise indicated.

8. Schematic (Module Circuit)



9. Part List

No.	Part	Location No.	Specification	Quantity
1	PCB	N/A	MCPCB 1.6T, 1oz Copper Layer	1
2	LED	LED 1~10	3535 Convex	10
3	IC	U1	PT7030X 6x6	1
4	Zener Diode	ZENER	BZT52C7V5	1
5	Bridge Diode	BD1	MB6S	1
6	Fuse	F1	2A AC 125V	1
7	Resister	R1	3216 _ 47K Ohm	1
8	Resister	R2	3216 _ 12K Ohm	1
9	Resister	R3~6	3216 _ 200 Ohm	4
10	Resister	RS1	3216 _10 Ohm	1
11	Resister	RS2	3216 _9.1 Ohm	1
12	Resister	JP1~9	3216 _0 Ohm	9

10. Reliability test items and conditions

Item	Reference	Test Conditions	Duration / Cycle	Number of Damaged
Thermal Shock	EIAJ ED-4701	Ta =-40℃ (30min) ~ 100℃ (30min)	150 Cycle	0/4
Operating Endurance Test	Internal Reference	Ta =25℃, Vop = 120 V	1000 Hours	0/4
High Temperature High Humidity Life Test	Internal Reference	Ta =60℃, RH=90%, Vop = 120 V	500 Hours	0/4
High Temperature Life Test	Internal Reference	Ta = 60℃, Vop = 120 V	500 Hours	0/4
ESD		Air : 8kV Contect:4kV In the complete luminaire	20 Time	0/2

◆ CRITERIA FOR JUDGING THE DAMAGE

Item	Symbol	Criteria for Judgment		Condition
		MIN	MAX	
Power Dissipation	Pd	-	USL (1) × 1.1	Vop = 120 V
Luminous Flux	Φv	LSL (2) × 0.7	-	Vop = 120 V

(1) USL : Upper Standard Level
(2) LSL : Lower Standard Level

11. Cautions

- The LED Module itself and all its components may not be mechanically stressed.
- Make sure proper discharge prior to starting work.
- DO NOT touch any of the circuit board, components or terminals with body or metal while circuit is active.
- Installation of LED Module needs to be made with regard to all applicable electrical and safety standards. Only qualified personnel should be allowed to perform installation.
- DO NOT add or change wires while circuit is active.
- DO NOT make any modification on module.
- DO NOT use adhesives to attach the LED that outgas organic vapor.
- DO NOT use together with the materials containing Sulfur.
- The LED Module needs to be mounted on a heat sink providing adequate thermal dissipation.
- DO NOT exceed the values given in this specification
- Be cautious when soldering to board so as not to create a short between different trace patterns.
- Keep cautions not to apply higher voltage above the maximum rating. Otherwise damage may occur.
- Pay attention not to exceed the maximum operation temperature of 90℃ at the Tc Point when the modules are used in an enclosed environment.
- Maximum operating temperature for warranty coverage is 70℃.
- DO NOT assemble in conditions of high moisture and/or oxidizing gas such as CI, H2S, NH3, SO2, NOx, etc.
- The module should also not be installed in end equipment without ESD (Electrical Static Discharge) protection.
- Damage by corrosion will not be allowed as defect claim. Lumens LED Module is recommended for Indoor use only.
- Great care should be taken not to see directly the operated lighting LED. If not the intense light should cause the damage to eye. Use proper goggles to protect your eyes during operation.
- Long time exposure to sunlight or UV can cause the lens to discolor.
- Moisture-Proof package
  1. When moisture is absorbed into the LED light engine it may vaporize and expand products during manufacturing. There is a possibility that this may cause exfoliation of the contacts and damage to the optical characteristics of the LEDs. For this reason, the moisture-proof pack is used to keep moisture to a minimum in the package.
  2. A pack of a moisture-absorbent material (silica gel) is inserted into the shielding bag. The silica gel changes its color from blue to pink as it absorbs moisture.
- Storage Conditions
  1. Before opening the package: The LED light engines should be kept at 30℃ or less and 90% RH or less. The LED light engines should be used within a year. When storing the LED light engines, moisture-proof packaging with moisture-absorbent material (silica gel) is recommended.
  2. After opening the package: The LED light engines should be kept at 30℃ or less and 70% RH or less. The LEDs should be soldered within 168 hours (7 days) after opening the package. If unused LED light engines remain, they should be stored in moisture-proof packages, such as sealed containers with packages of moisture -absorbent material (silica gel). It is also recommended to return the LED light engines to the original moisture-proof bag and to reseal the moisture-proof bag again.
  3. Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condens ation can occur.

NOTE :

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