

Product datasheet

FastFlex LED module Gen 2

September 2013





Introduction to the FastFlex LED module Gen2



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Figure 1. FastFlex LED module 2x8 Gen2

Figure 2, FastFlex LED board 2x8 Gen2

Figure 3, FastFlex LED lens 2x8/IV-X Gen2

Applications

The Philips FastFlex LED module has been developed primarily for outdoor applications but can also be used indoors (providing the applicable IEC regulations are observed and all design-in requirements are met).

Product description

To operate a system you will need the following products, which are sold separately:

- One or more FastFlex LED modules. Each FastFlex LED module consists of:
- FastFlex LED board 2x8 Gen2 (any type, Table 1)
- FastFlex lens 2x8 Gen2 (any type, Table 1)
 - FastFlex module clips (3 pieces are necessary for 1 FastFlex LED board)
- Compatible Xitanium LED driver, Tables 2 to 7
- Specified cables, Tables 2 to 7

Classification

The FastFlex LED module Gen2 with Xitanium driver can be used in:

- Class I and Class II IEC isolation systems
- Non-Class 2 UL systems



IMPORTANT USAGE NOTES

- Minimum drive current = 100 mA. If dimmed below 100 mA, Philips does not guarantee the specified product performance
- Maximum drive current = 1,000 mA. This limit must be observed in all cases, including CLO
- T_{case} must not exceed 75 °C, regardless of drive current
- $\Delta T (T_{ambient} T_{case})$ must not exceed 50 °C, regardless of drive current
- Xitanium LED driver will dim the modules if total output power exceeds the driver's maximum output power
- Failure to comply with usage conditions will void product warranty

The FastFlex LED module system components

Table 1. FastFlex LED module components

Product	GPC	EOC
FastFlex LED board 2x8/740 Gen2	929000873706	871829170555000
FastFlex LED board 2x8/840 Gen2	929000873606	871829170553600
FastFlex lens 2x8/II-X Gen2	929000873806	871829170795000
FastFlex lens 2x8/III-X Gen2	929000873906	871829170797400
FastFlex lens 2x8/IV-X Gen2	929000874006	871829170799800
FastFlex lens 2x8/V Gen2	929000874106	871829170801800
FastFlex module clip	929000810003	871829122435800
Cable Fortimo 7PA to 6wire - 600 mm	929000803903	871829121412000





Figure 5. Cable Fortimo 7PA to 6wire - 60 mm



Assembling 1 FastFlex LED module requires 3 FastFlex module clips. Please multiply the quantity of modules by 3 when placing the order for clips.

FastFlex LED system with Xitanium LED drivers, Class II

FastFlex LED modules are advised to be used in combination with Xitanium LED Xtreme drivers. Approved Class II system combinations are shown in Tables 2-5.

FastFlex LED system with Xitanium Programmable LED drivers



IMPORTANT NOTE!

NB.

Maximum driver output current is defined at $T_{ambient} = 25$ °C and $\Delta T 50$ °C. Tolerances of ±5% can apply. At lower ambient temperatures the maximum current may need to be programmed to a lower value. The driver will automatically dim the modules if total output power exceeds the driver's maximum output power.

Table 2. FastFlex LED system with Xitanium Programmable LED drivers, Class II compliant

Number of FastFlex LED modules (any type)	Max output current ¹ (mA)	Driver	GPC	Cable
1x	530	Xitanium 40W 0.53A Prog+ GL-J sXt	929000710303	Cable Fortimo 7PA to 6wire - 600 mm
	700	Xitanium 40W 0.7A Prog+ GL-J sXt	929000708803	
	1000	Xitanium 75W 0.1 – 1.05A Prog+ sXt	929000708903	
2x	700	Xitanium 75W 0.70A Prog+ GL-Z sXt	929000710103	2x Cable Fortimo 7PA to 6wire - 600 mm
	700	Xitanium 75W 0.35-0.7A GL Prog sXt	929000702302	
	700	Xitanium 75W 0.35-0.7A GL Prog+ sXt	929000704903	
	1000	Xitanium 150W 0.1-1.05A Prog+ sXt	929000709003	
3x	530	Xitanium 75W 0.35-0.7A GL Prog sXt	929000702302	3x Cable Fortimo 7PA to 6wire - 600 mm
	530	Xitanium 75W 0.35-0.7A GL Prog+ sXt	929000704903	
	530	Xitanium 100W 0.53A Prog+ GL-Z sXt	929000710403	
	700	Xitanium 150W 0.7A Prog+ 230V-H sXt	929000710503	
4x	700	Xitanium 150W 0.7A Prog+ 230V-H sXt	929000710503	4x Cable Fortimo 7PA to 6wire - 600 mm
	700	Xitanium 150W 0.35-0.7A GL Prog sXt	929000702202	
	700	Xitanium 150W 0.35-0.7A GL Prog+ sXt	929000705103	
5x	610 ¹	Xitanium 150W 0.7A Prog+ 230V-H sXt	929000710503	5x Cable Fortimo 7PA to 6wire - 600 mm
	610 ¹	Xitanium 150W 0.35-0.7A GL Prog sXt	929000702202	
	610 ¹	Xitanium 150W 0.35-0.7A GL Prog+ sXt	929000705103	

¹Max output current is defined at $T_{ambient}$ = 25 °C and ΔT 50 °C. See IMPORTANT NOTE above.

FastFlex LED system with dimmable, adjustable-output-current Xitanium AOCM LED drivers

Number of FastFlex LED modules (any type)	Max output current (mA)	Driver	GPC	Cable
2x	530	Xitanium 75W 0.53A AOCM 1-10 230V-Y sXt	929000712403	2x Cable Fortimo 7PA to 6wire - 600 mm
	700	Xitanium 75W 0.70A AOCM 1-10 GL-Y sXt	929000708003	

Table 3. FastFlex LED system with Xitanium AOCM LED drivers, Class II compliant

FastFlex LED system with dimmable single-output-current Xitanium LED drivers

Table 4. FastFlex LED system with Xitanium dimmable single-output-current LED drivers, Class II compliant

Number of FastFlex LED modules (any type)	Max output current (mA)	Driver	GPC	Cable
1x	700	Xitanium 75W 0.70A 1-10V 230V sXt	929000705503	Cable Fortimo 7PA to 6wire - 600 mm
	1000	Xitanium 150W 1.05A 1-10V 230V sXt	929000704712	
2x	700	Xitanium 75W 0.70A 1-10V 230V sXt	929000705503	2x Cable Fortimo 7PA to 6wire - 600 mm
	1000	Xitanium 150W 1.05A 1-10V 230V sXt	929000704712	
	700	Xitanium 150W 0.70A 1-10V 230V sXt	913701211603	
3x	700	Xitanium 150W 0.70A 1-10V 230V sXt	913701211603	3x Cable Fortimo 7PA to 6wire - 600 mm
4x	700	Xitanium 150W 0.70A 1-10V 230V sXt	913701211603	4x Cable Fortimo 7PA to 6wire - 600 mm

FastFlex LED system with fixed Xitanium LED drivers

Table 5. FastFlex LED system with fixed Xitanium LED drivers, Class II compliant

Number of FastFlex LED modules (any type)	Max output current (mA)	Driver	GPC	Cable
2x	700	Xitanium 150W 0.70A 230V sXt	913710859002	2x Cable Fortimo 7PA to 6wire - 600 mm
3x	700	Xitanium 150W 0.70A 230V sXt	913710859002	3x Cable Fortimo 7PA to 6wire - 600 mm
4x	700	Xitanium 150W 0.70A 230V sXt	913710859002	4x Cable Fortimo 7PA to 6wire - 600 mm

FastFlex LED system with Xitanium LED drivers, Class I

FastFlex LED module combinations with certain Xitanium LED drivers may be operated Class I luminaires only.

Approved Class I system combinations are shown in Tables 6 and 7. To use these FastFlex LED systems in Class II luminaires, an additional isolation layer, e.g. kapton foil, must be added during luminaire assembly between the module and mounting surface.

Table 6. FastFlex LED system with Xitanium dimmable single-output-current LED drivers, Class I compliant

Number of FastFlex LED modules (any type)	Max output current (mA)	Driver	GPC	Cable
4x	350	Xitanium 150W 0.35A 1-10V 230V sXt	913701218202	4x Cable Fortimo 7PA to 6wire - 600 mm
5x	350	Xitanium 150W 0.35A 1-10V 230V sXt	913701218202	5x Cable Fortimo 7PA to 6wire - 600 mm

Table 7. FastFlex LED system with fixed Xitanium LED drivers, Class I compliant

Number of FastFlex LED modules (any type)	Max output current (mA)	Driver	GPC	Cable
4x	350	Xitanium 150W 0.35A 230V sXt	913710850002	4x Cable Fortimo 7PA to 6wire - 600 mm
5x	350	Xitanium 150W 0.35A 230V sXt	913710850002	5x Cable Fortimo 7PA to 6wire - 600 mm

As the Xitanium LED driver portfolio is always expanding to include new products, please visit <u>www.philips.com/fastflex</u> or contact your Philips sales representatives for the latest system combinations.

Performance specification

The following paragraphs contain the performance specifications of the FastFlex LED module Gen2.

Typical operating conditions

Table 8. Typical operating conditions						
ltem	Symbol	Unit	Value	Description		
Default output current	lf	mA	530	Current setting via Rset1 or Rset2 connection		
Case temperature	Tcase	°C	75	Case temperature: typical temperature at which the module operates within specs		
Ambient temperature	Tamb	°C	25	Ambient temperature outside luminaire		
Driver current	Idriver	mA	530	Driver current used to operate the LED module for typical performance specification		

Note:

- ±10% tolerance applies to module flux specifications
- Philips maintains a tolerance of $\pm 6.5\%$ on luminous flux measurements, ± 0.06 V on forward voltage measurements, ± 2 on CRI measurements and $\pm 5\%$ on CCT measurements

Performance specifications FastFlex LED board 2x8/740 Gen2

All of the following lumen output specifications include optical losses due to the lens (approximately 4%).

FastFlex LED board 2x8 /740 Gen2 performance at Rset (530mA) and T_{case} = 75 °C

Table 9. Performance specification of the Philips FastFlex LED board 2x8 /740 Gen2 under typical operating conditions (If = 530 mA and Tcase = 75 $^{\circ}$ C).

ltem	Min	Тур	Max	Unit
Initial lumen output	2732	3036	3339	lm
Initial efficacy	109	129		lm/W
Forward voltage	-	44.4	47.2	۷
Initial power consumption	21	23.5	25	W
Correlated Color Temperature (CCT)	-	4000	-	К
Color Rendering Index (CRI)	70		-	R _a
Initial color accuracy	-	5	7	SDCM
Lumen maintenance B50L70	-	>50,000	-	hrs
Product lifetime, 90% survivals	-	50,000	-	hrs



FastFlex LED board 2x8 /740 Gen2 performance at different drive currents

Figure 6. Typical lumen output and efficiency of FastFlex LED board 2x8/740 Gen2; T_{case} = 75 °C, including lens-related optical losses of 4%. (This curve is based on an extrapolation; actual measurements in Table 8 are leading.)

Table 10. Predicted performance specification of the Philips FastFlex LED board 2x8/740 Gen2 at various current settings including 4% optical losses.

Drive current (mA)	Luminous flux, min (lm)	Luminous flux, typical (lm)	Efficacy, min (Im/W)	Efficacy, typical (lm/W)	Thermal power, typical (W)	Power, typical (W)	Power, max (W)
350	1911	2124	117	139	9.2	15.3	16.4
410	2195	2439	114	135	10.9	18	19.3
530	2732	3036	109	129	14.6	23.5	25.1
700	3432	3814	102	122	20.1	31.3	33.5
1000	4535	5039	94	111	30.9	45.4	48.5

Performance specifications FastFlex LED board 2x8/840 Gen2

All of the following lumen output specifications include optical losses due to the lens (approximately 4%).

FastFlex LED board 2x8 /840 Gen2 performance at Rset (530mA) and T_{case} = 75 °C

Table 11. Performance specification of the Philips FastFlex LED board 2x8 /840 Gen2 under typical operating conditions (If = 530 mA and Tcase = 75 °C).

ltem	Min	Тур	Max	Unit
Initial lumen output	2583	2870	3157	lm
Initial efficacy	103	122		lm/W
Forward voltage	-	44.4	47.2	V
Initial power consumption	21	23.5	25	W
Correlated color temperature (CCT)	-	4000	-	К
Color Rendering Index (CRI)	80		-	R _a
Initial color accuracy	-	5	7	SDCM
Lumen maintenance B50L70	-	>50,000	-	hrs
Product lifetime, 90% survivals	-	50,000	-	hrs



FastFlex LED board 2x8/840 Gen2 performance at different drive currents

Figure 7. Typical lumen output and efficiency FastFlex LED board 2x8/840 Gen2; T_{case} = 75 °C, including lens-related optical losses of 4%. (This curve is based on an extrapolation, actual measurements in Table 10 are leading)

Table 12. Predicted performance specification of the Philips FastFlex LED board 2x8/840 Gen2 at various current settings including 4% optical losses.

Drive current (mA)	Luminous flux, min (Im)	Luminous flux, typical (lm)	Efficacy, min (Im/W)	Efficacy, typical (lm/W)	Thermal power, typical (W)	Power, typical (W)	Power, max (W)
350	1806	2006	110	132	9.4	15.2	16.4
410	2075	2305	107	128	11.3	18.0	19.3
530	2583	2870	103	122	15.0	23.4	25.1
700	3246	3606	97	115	20.7	31.4	33.5
1000	4287	4763	88	104	32.0	45.7	48.5

Optical distributions



Figure 8. FastFlex LED board 2x8/740 Gen2

Optical performance of FastFlex LED board 2x8 Gen2



N.B.

Optical efficiency of the complete FastFlex LED module Gen2, preassembled with the FastFlex lens Gen2 (any type) is specified as $96\% \pm 1\%$.

FastFlex lens 2x8 Gen2 (any type) is optically backwards compatible with Gen1 board.



Figure 9. FastFlex LED board polar intensity diagram (no lens)

Optical performance of FastFlex lens 2x8 Gen2

FastFlex lens 2x8 Gen2 (any type) is optical backwards compatible with Gen1 board.



FastFlex lens 2x8/II-X

FastFlex lens 2x8/III-X

FastFlex lens 2x8/IV-X

FastFlex lens 2x8/V

FastFlex lens 2x8/II-X Gen2







Figure 12. Polar intensity diagram, FastFlex LED module with FastFlex lens 2x8/II-X Gen2

Figure 11. Isolux diagram, FastFlex LED module with FastFlex lens 2x8/II-X Gen2



Figure 13. Application rendering, FastFlex LED module with FastFlex lens 2x8/II-X Gen2

FastFlex lens 2x8/III-X Gen2

FastFlex lens 2x8/III-X is designed for roads of medium width and urban street lighting.





Figure 15. Polar intensity diagram, FastFlex LED module with FastFlex lens 2x8/III-X Gen2

Figure 14. Isolux diagram, FastFlex LED module with FastFlex lens 2x8/III-X Gen2



Figure 16. Application rendering, FastFlex LED module with FastFlex lens 2x8/III-X Gen2

FastFlex lens 2x8/IV-X Gen2



Figure 17. Isolux diagram, FastFlex LED module with FastFlex lens $2 \times 8/IV\text{-}X$ Gen2







Figure 19. Application rendering, FastFlex LED module with FastFlex lens 2x8/IV-X Gen2

FastFlex lens 2x8/V Gen2

FastFlex lens 2x8/V is designed for symmetrical lighting, e.g. high bays, parking lots, petrol stations.





Figure 20. Isolux diagram, FastFlex LED module with FastFlex lens 2x8/V Gen2

Figure 21. Polar intensity diagram, FastFlex LED module with FastFlex lens 2x8/V Gen2



Figure 22. Application rendering, FastFlex LED module with FastFlex lens 2x8/V Gen2



N.B.

- Component and process tolerances can result in imperfectly symmetrical light distributions. Maximum acceptable tolerances will have minimal impact on optical distributions and optical performance in the final application for a variety of reasons (e.g. light from neighboring poles, flux differences < 20% not visible for the human eye).
- All polar intensity diagram illustrations are just an indication of the beam shape. We suggest making use of the IES files available on the FastFlex LED module website.

Lighting characteristics

Light distribution

FastFlex LED module is suitable for a variety of applications, including urban street, road and industrial lighting.

Please refer to the *Product Datasheet* section for the specific optical performance of the FastFlex LED board and FastFlex lenses.

Optical files

Optical files can be downloaded from the FastFlex LED module website at www.philips.com/fastflex in the IES format.

Photometric files such as IES and LDT can be used to check the far-field intensity distribution of the FastFlex LED module. The final design could be verified using a simulation performed with a ray set for the FastFlex LED module with the appropriate lens.





Figure 23. Spectral light distribution for the FastFlex board 2x8 Gen2 4000 K CRI 70 and CRI 80

Color consistency (SDCM)

The color consistency of FastFlex LED boards is specified as <7 SDCM over the product's lifetime. Typical color consistency is specified as <5 SDCM. SDCM stands for Standard Deviation of Color Matching and the value 5 refers to the size of an ellipse around the specified target point.

Figure 24 shows the color target for both CRI 70 and CRI 80 FastFlex 2x8 board Gen2. The color target is specified for the operating conditions $T_{case} = 75$ °C, $T_{ambient} = 25$ °C and at 530 mA.



Figure 24. Color consistency FastFlex LED board Gen2

Starting characteristics

After the driver has been started or re-started, the module will produce the intended amount of light immediately

Lifetime characteristics

FastFlex LED module has an expected lifetime of 50,000 burning hours with 90% survivals (critical failures)

Specified lifetime performance

Figures 25-28 show the expected lumen maintenance over a typical product lifetime when FastFlex LED modules are used in a system without the CLO feature.



Figure 25. FastFlex LED module B50 lumen maintenance; 530 mA drive current and different $\mathsf{T}_{\mathsf{case}}$ values



Figure 26. FastFlex LED module B50 lumen maintenance; 1,000 mA drive current and different $\mathsf{T}_{\mathsf{case}}$ values



Figure 27. FastFlex LED module B10 lumen maintenance; T_{case} = 75 °C and different drive currents



Figure 28. FastFlex LED module B50 lumen maintenance; T_{case} = 75 °C and different drive currents

Product dimensions

FastFlex LED module 2x8 Gen2

FastFlex LED module dimensions are given for reference (mechanical model leading).



Table 13. FastFlex LED module 2x8 dimensions





Figure 30. FastFlex lens 2x8 (any type)

Outer dimension step files for the assembled FastFlex LED module are available at www.philips.com/fastflex.

Electrical characteristics

Connection between module and driver

The FastFlex LED module is compatible with both Rset1 and Rset2 Xitanium LED drivers. Using the Rset on the module with these drives, will provide an output current of 530 mA, and result in the performance and power consumption specified for that current.

We advised to use the FastFlex LED modules in combination with the Xitanium LED drivers mentioned in Tables 2 to 7 (approved combinations).

Cable

FastFlex LED module can be connected to the driver using the cables specified in Tables 2 to 4.



Figure 32. Cable Fortimo 7PA to 6wire - 600 mm (929000803903)

Table 14. Fortimo 7PA to 6wire cable color coding

Connector pin	Function	Color coding driver/cable
Pin 1	LED+	Red
Pin 2	-	No wire
Pin 3	LED -	Blue
Pin 4	RNTC	Black/White
Pin 5	Rset2	Yellow/Black
Pin 6	Rset1	Yellow
Pin 7	Common	Blue /White

Note:

The Rset2 wire should be left unconnected when Rset1 drivers are used, and vice versa.



Figure 31. Cable Fortimo 7PA to 6wire - 600 mm



Figure 33. Cable wiring to driver

FastFlex LED board connector pins

Table 15. FastFlex LED board connector pins

Connector	Signal	Description
Pin 1	IDC	LED driver current input
Pin 2	(HV spacer)	Not connected
Pin 3	PGND	Power ground
Pin 4	NTC	Temperature sensor (RNTC) resistor in series
Pin 5	Rset2	Resistor for current setting of LED driver type Rset2
Pin 6	Rset1	Resistor for current setting of LED driver type Rset1
Pin 7	SGND	Signal ground



N.B.

It is possible to connect two or more modules in series to one Xitanium driver by using multiple cables. It is important to note that the driver can only communicate with one of the modules (master/slave), see *Installation instructions*.



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