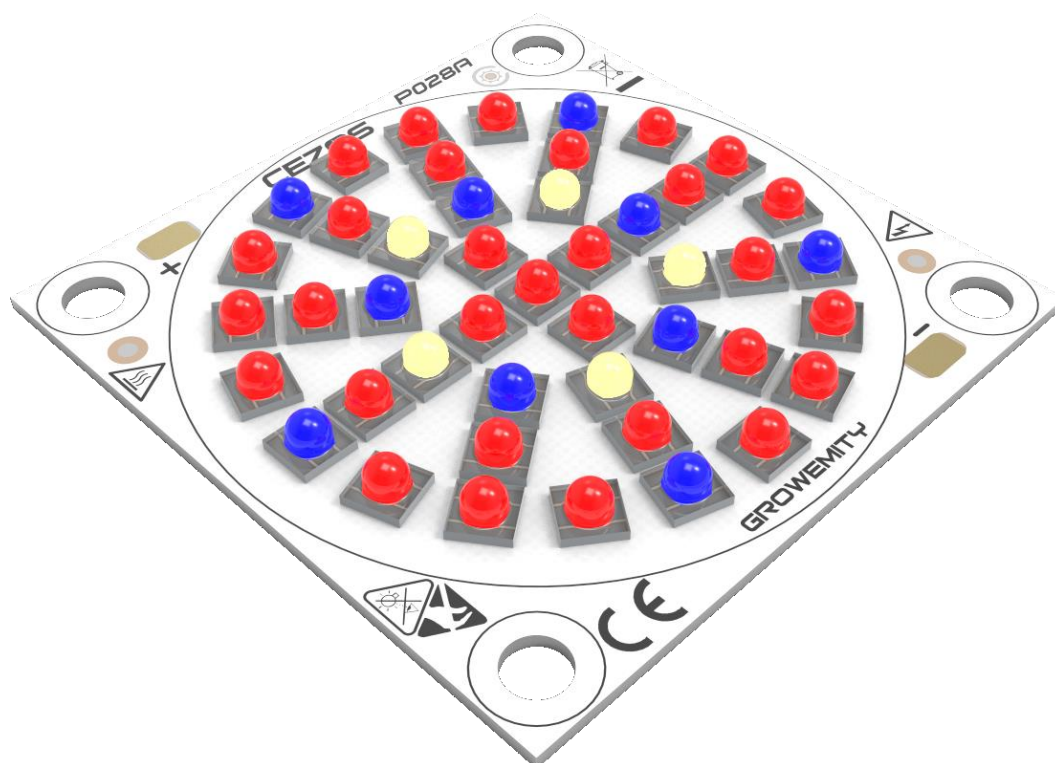


CEZOS

GrowEmity LOB 38x38 - P028



The GrowEmity LED light source allows to accelerate plant growth and increase harvest. It is even possible to regulate plant growth and blooming time. Unlike an artificial light sources, LED light sources have specially matched spectrum for specific plants. Additionally, LEDs generate more light and less heat than sodium lamp, allow for lighting from side of plants. LED light sources are used in artificial plantation without daylight.

Possibility to choose up to four colors from the following (one set of 5 or a multiple LEDs, total 45 LEDs).

Colour	λ [nm] / CCT [K]	Input Current [mA]	Forward Voltage [V]	Power [W]	Radiant Power [mW] / Luminous Flux [lm]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]
RED	625	1750	2,1	3,7	412	9,40	2,56
		2500	2,2	5,5	582	13,30	2,41
		3500	2,3	8,2	806	18,40	2,25
		4000	2,4	9,6	909	20,77	2,17
		5000	2,5	12,6	1117	25,50	2,02
HYPER RED	657	1750	2,2	3,8	2125	11,53	3,06
		2500	2,3	5,6	2996	16,25	2,89
		3500	2,4	8,4	4059	22,01	2,62
		4000	2,5	9,9	4633	25,12	2,53
		5000	2,6	12,9	5578	30,25	2,35
FAR RED	727	1750	2,2	3,8	2125	11,53	3,06
		2500	2,0	4,9	1868	1,13	0,23
		3500	2,1	7,2	2531	1,53	0,21
		4000	2,1	8,4	2889	1,74	0,21
		5000	2,2	11,1	3478	2,10	0,19
DEEP BLUE	455	1750	2,9	5,0	3175	11,75	2,36
		2500	2,9	7,3	4413	16,33	2,25
		3500	3,0	10,4	5461	20,21	1,94
		4000	3,0	12,0	6033	22,33	1,87
		5000	3,1	15,3	7620	28,20	1,84
BLUE	470	1750	2,9	5,0	140	8,10	1,62
		2500	2,9	7,3	185	10,70	1,46
		3500	3,0	10,7	239	13,85	1,30
		4000	3,1	12,2	263	15,23	1,25
		5000	3,2	15,8	311	18,00	1,14
TRUE GREEN	528	1750	3,4	5,9	605	5,60	0,95
		2500	3,4	8,6	789	7,30	0,85
		3500	3,5	12,4	1005	9,30	0,75
		4000	3,6	14,2	1100	10,18	0,72
		5000	3,7	18,4	1291	11,95	0,65
AMBER	617	1750	2,1	3,7	446	9,85	2,68
		2500	2,2	5,5	627	13,85	2,51
		3500	2,3	8,2	856	18,90	2,31
		4000	2,4	9,6	961	21,23	2,22
		5000	2,5	12,6	1173	25,90	2,05
YELLOW	590	1750	2,2	3,9	410	4,35	1,13
		2500	2,3	5,8	561	5,95	1,03
		3500	2,4	8,5	716	7,60	0,89
		4000	2,5	9,8	768	8,15	0,83
		5000	2,6	13,0	872	9,25	0,71
WHITE	5000	1750	2,8	4,8	740	9,80	2,04
		2500	2,9	7,1	1013	13,10	1,84
		3500	3,0	10,3	1331	17,00	1,65
		4000	3,0	11,9	1464	18,70	1,57
		5000	3,3	16,6	1697	21,67	1,35

Radiant Power for Hyper Red, Far Red, Deep Blue. Luminous flux for rest of colour.

CCT only for White colour.

CALCULATED PARAMETERS AT $T_J = 25^{\circ}\text{C}$

Name	GrowEmity LOB 38x38 RBW – P028
Size	38x38 mm
Power Supply Type	Constant Current (CC)
Number Of Channels	1
Power Supply Current	Max. 1000 mA
Red LED	OSRAM - GH CSSPM1.24
Deep Blue LED	OSRAM - GD CSSPM1.14
White LED	OSRAM - GW CSHPM1.PM
Ambient Temperature	0 - 40°C
Material Type / Thickness	MCPCB / 0,8 mm

GROWEMITY LOB 38x38 RBW - P028

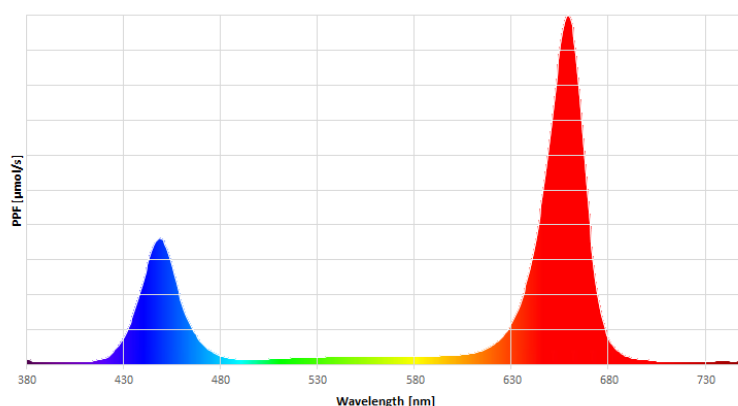
	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	λ [nm] / CCT [K]	Radiant Power [mW] / Luminous Flux [lm]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]	Total PPF [$\mu\text{mol/s}$]	Total PPF/W [$\mu\text{mol/J}$]	Article Number
GrowEmity LOB 38x38 RBW – P028	1750	21,4	37,4	RED	657	12750	69,15	3,06	102,45	2,74	Q0-038038-RBW-C5000-P028
				DEEP BLUE	455	6350	23,50	2,36			
				WHITE	5000	740	9,80	2,04			
	2500	22,2	55,4	RED	657	17978	97,50	2,89	143,27	2,59	Q0-038038-RBW-C5000-P028
				DEEP BLUE	455	8827	32,67	2,25			
				WHITE	5000	1013	13,10	1,84			
	3500	23,3	81,5	RED	657	24353	132,08	2,62	189,50	2,32	Q0-038038-RBW-C5000-P028
				DEEP BLUE	455	10922	40,42	1,94			
				WHITE	5000	1331	17,0	1,65			
	4000	23,8	95,4	RED	657	27795	150,7	2,53	214,10	2,25	Q0-038038-RBW-C5000-P028
				DEEP BLUE	455	12065	44,65	1,87			
				WHITE	5000	1464	18,70	1,57			

Parameters were calculated for temperatures $T_J = 25^{\circ}\text{C}$

Radiant power and wavelength for color LEDs; Luminous flux and color temperature for white LEDs.

Values of these parameters were calculated for default bin and with tolerances of 15%.

Different type of plants have different requirements for the best growth, so to maximized effect, GrowEmity light sources have many sets of LEDs configuration. Most commands LED types are: red, far red, hyper red, blue, deep blue and white with different colour temperature. Some examples are below.

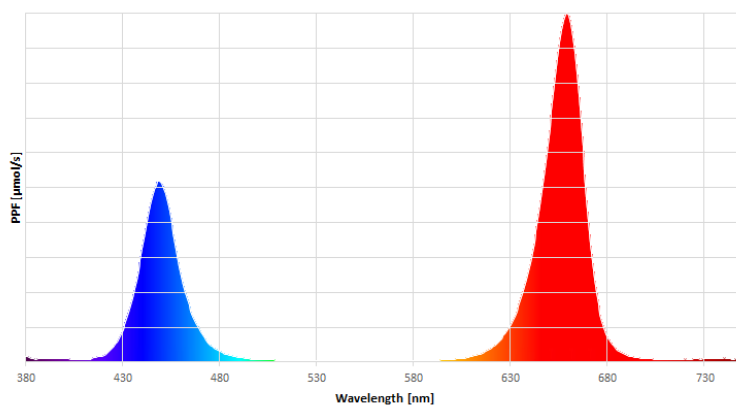
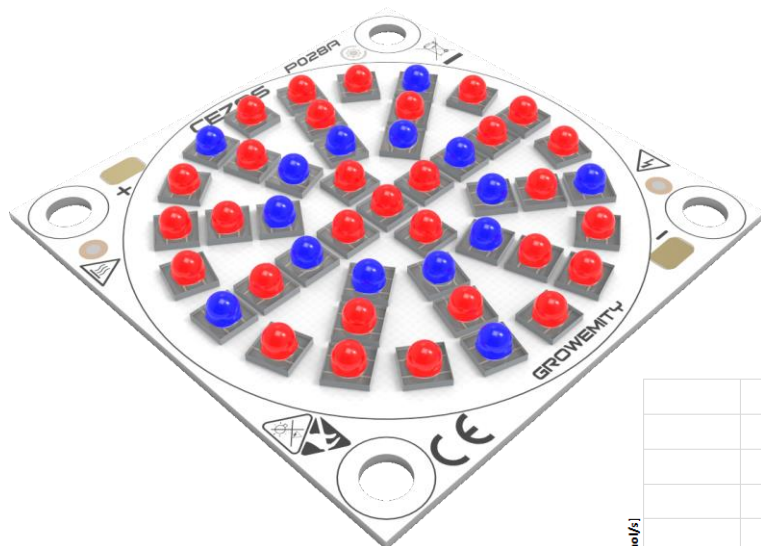


GROWEMITY LOB 38x38 RRB - P028

	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	λ [nm]	Radiant Power [mW]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]	Total PPF [$\mu\text{mol/s}$]	Total PPF/W [$\mu\text{mol/J}$]	Article Number
GrowEmity LOB 38x38 RRB - P028	1750	21,5	37,5	RED	657	12750	69,15	3,06	104,40	2,78	Q0-038038-RRB-C5000-P028
				DEEP BLUE	455	9525	35,25	2,36			
	2500	22,2	55,5	RED	657	17978	97,50	2,89	146,50	2,64	Q0-038038-RRB-C5000-P028
				DEEP BLUE	455	13240	49,00	2,25			
	3500	23,3	81,6	RED	657	24353	132,08	2,62	192,71	2,36	Q0-038038-RRB-C5000-P028
				DEEP BLUE	455	16383	60,63	1,94			
	4000	23,9	95,4	RED	657	27795	150,7	2,53	217,72	2,28	Q0-038038-RRB-C5000-P028
				DEEP BLUE	455	18098	66,98	1,87			

Parameters were calculated for temperatures $T_J = 25^\circ\text{C}$

Values of these parameters were calculated for default bin and with tolerances of 15%.



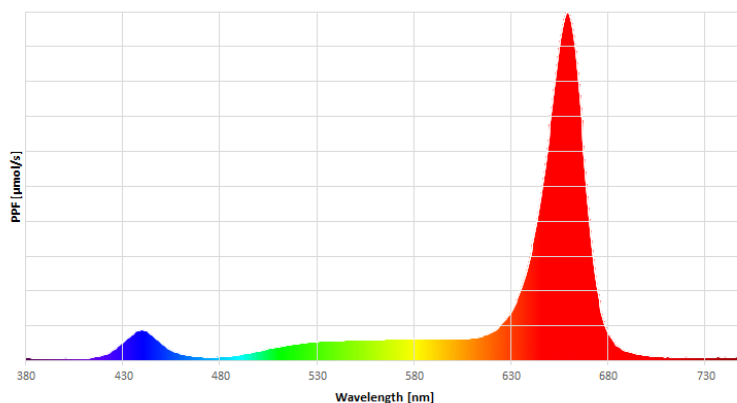
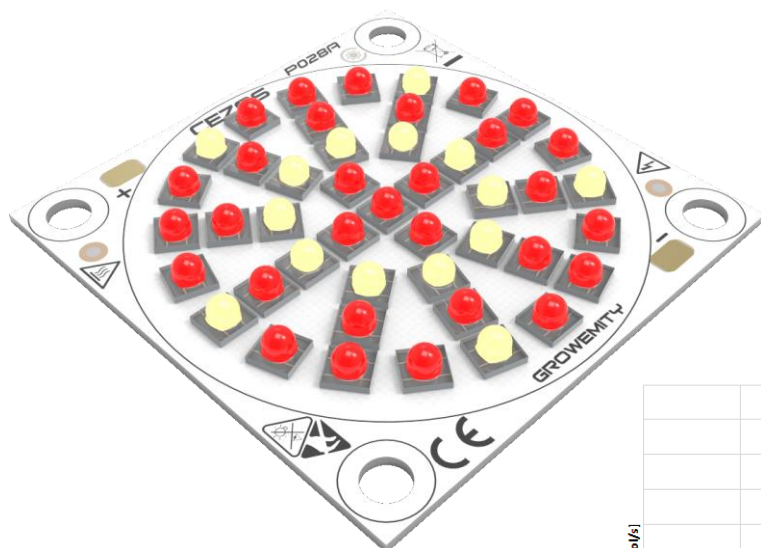
GROWEMITY LOB 38x38 RRW - P028

	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	λ [nm] / CCT [K]	Radiant Power [mW] / Luminous Flux [lm]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]	Total PPF [$\mu\text{mol/s}$]	Total PPF/W [$\mu\text{mol/J}$]	Article Number
GrowEmity LOB 38x38 RRW - P028	1750	21,2	37,0	RED	657	12750	69,15	3,06	98,55	2,66	Q0-038038-RRW-C5000-P028
				WHITE	5000	2219	29,40	2,04			
	2500	22,1	55,1	RED	657	17978	97,50	2,89	136,80	2,48	Q0-038038-RRW-C5000-P028
				WHITE	5000	3039	39,30	1,84			
	3500	23,3	81,4	RED	657	24353	132,08	2,62	183,08	2,25	Q0-038038-RRW-C5000-P028
				WHITE	5000	3993	51,0	1,65			
	4000	23,8	95,3	RED	657	27795	150,7	2,53	206,85	2,17	Q0-038038-RRW-C5000-P028
				WHITE	5000	4393	56,10	1,57			

Parameters were calculated for temperatures $T_j = 25^\circ\text{C}$

Radiant power and wavelength for color LEDs; Luminous flux and color temperature for white LEDs.

Values of these parameters were calculated for default bin and with tolerances of 15%.

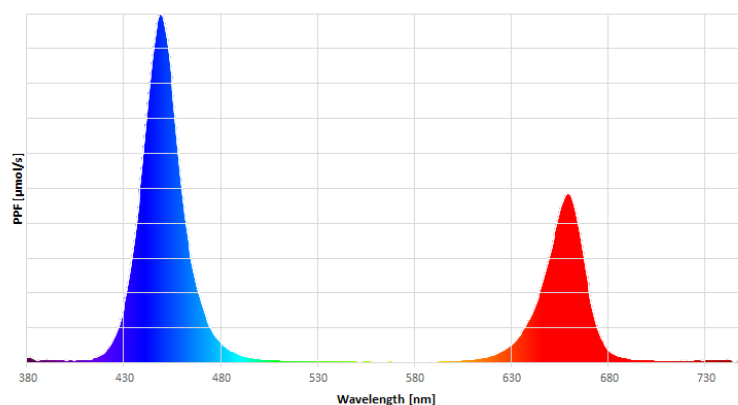
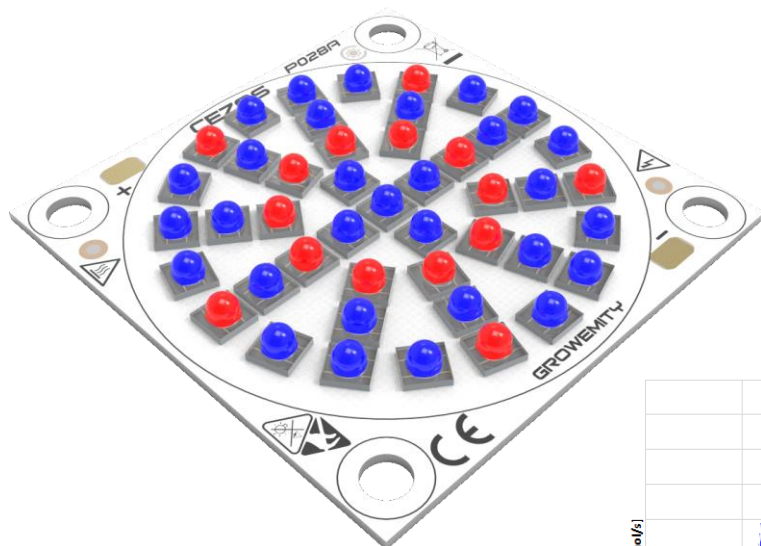


GROWEMITY LOB 38X38 RBB - P028

	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	λ [nm]	Radiant Power [mW]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]	Total PPF [$\mu\text{mol/s}$]	Total PPF/W [$\mu\text{mol/J}$]	Article Number
GrowEmity LOB 38X38 RBB - P028	1750	23,6	41,2	RED	657	6375	34,58	3,06	105,08	2,55	Q0-038038-RBB-C5000-P028
				DEEP BLUE	455	19050	70,50	2,36			
	2500	24,2	60,4	RED	657	8989	48,75	2,89	146,75	2,43	Q0-038038-RBB-C5000-P028
				DEEP BLUE	455	26480	98,00	2,25			
	3500	25,0	87,6	RED	657	12176	66,04	2,62	187,30	2,14	Q0-038038-RBB-C5000-P028
				DEEP BLUE	455	32766	121,26	1,94			
	4000	25,4	101,5	RED	657	13898	75,4	2,53	209,32	2,06	Q0-038038-RBB-C5000-P028
				DEEP BLUE	455	36195	133,95	1,87			

Parameters were calculated for temperatures $T_J = 25^\circ\text{C}$

Values of these parameters were calculated for default bin and with tolerances of 15%.



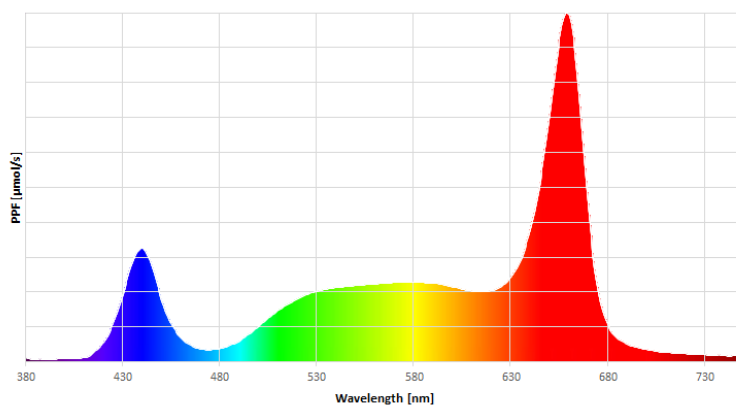
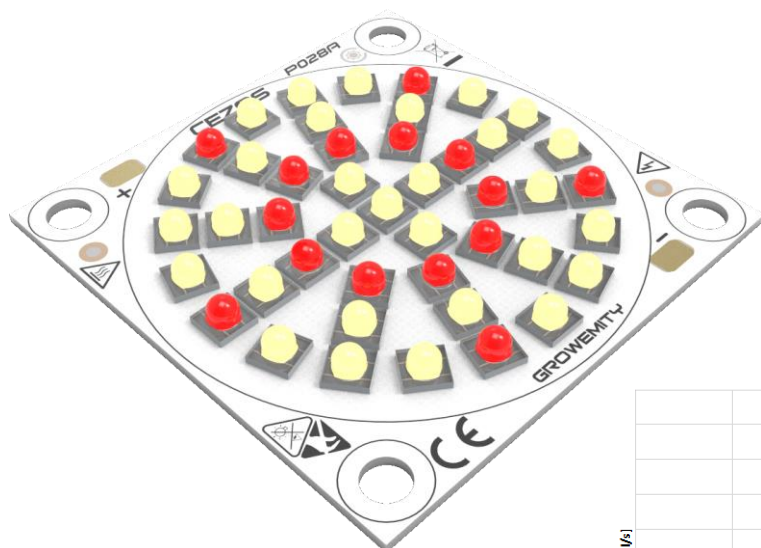
GROWEMITY LOB 38x38 RWW - P028

	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	λ [nm] / CCT [K]	Radiant Power [mW] / Luminous Flux [lm]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]	Total PPF [$\mu\text{mol/s}$]	Total PPF/W [$\mu\text{mol/J}$]	Article Number
GrowEmity LOB 38x38 RWW - P028	1750	31,2	54,6	RED	657	6375	34,58	3,06	93,38	1,71	Q0-038038-RWW-C5000-P028
				WHITE	5000	4437	58,80	2,04			
	2500	32,4	81,0	RED	657	8989	48,75	2,89	127,35	1,57	Q0-038038-RWW-C5000-P028
				WHITE	5000	6079	78,60	1,84			
	3500	33,8	118,1	RED	657	12176	66,04	2,62	168,04	1,42	Q0-038038-RWW-C5000-P028
				WHITE	5000	7987	102,0	1,65			
	4000	34,3	137,0	RED	657	13898	75,4	2,53	187,57	1,37	Q0-038038-RWW-C5000-P028
				WHITE	5000	8785	112,20	1,57			

Parameters were calculated for temperatures $T_J = 25^\circ\text{C}$

Radiant power and wavelength for color LEDs; Luminous flux and color temperature for white LEDs.

Values of these parameters were calculated for default bin and with tolerances of 15%.



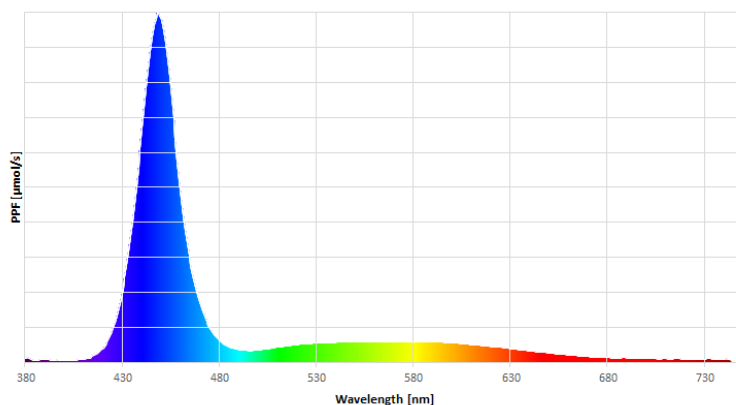
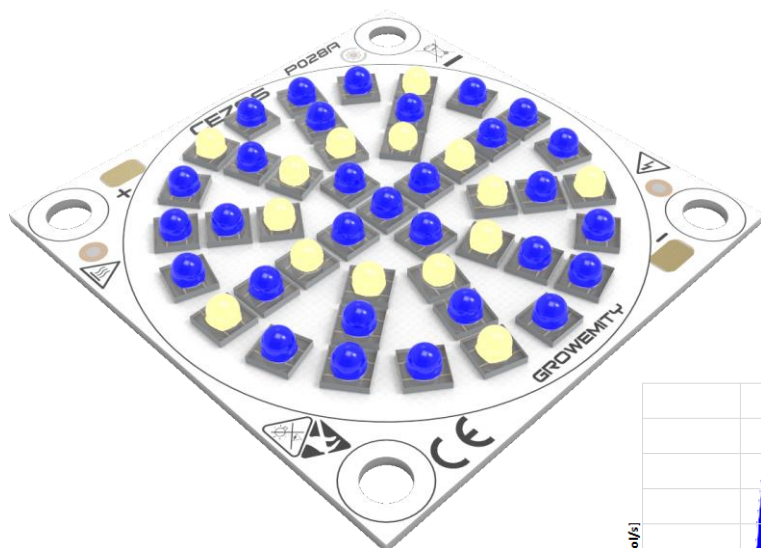
GROWEMITY LOB 38x38 BBW - P028

	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	λ [nm] / CCT [K]	Radiant Power [mW] / Luminous Flux [lm]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]	Total PPF [$\mu\text{mol/s}$]	Total PPF/W [$\mu\text{mol/J}$]	Article Number
GrowEmity LOB 38x38 BBW - P028	1750	25,4	44,4	DEEP BLUE	455	19050	70,50	2,36	99,90	2,25	Q0-038038-BBW-C5000-P028
				WHITE	5000	2219	29,40	2,04			
	2500	26,0	64,9	DEEP BLUE	455	26480	98,00	2,25	137,30	2,12	Q0-038038-BBW-C5000-P028
				WHITE	5000	3039	39,30	1,84			
	3500	26,7	93,3	DEEP BLUE	455	32766	121,26	1,94	172,26	1,85	Q0-038038-BBW-C5000-P028
				WHITE	5000	3993	51,0	1,65			
	4000	26,9	107,5	DEEP BLUE	455	36195	134,0	1,87	190,05	1,77	Q0-038038-BBW-C5000-P028
				WHITE	5000	4393	56,10	1,57			

Parameters were calculated for temperatures $T_J = 25^\circ\text{C}$

Radiant power and wavelength for color LEDs; Luminous flux and color temperature for white LEDs.

Values of these parameters were calculated for default bin and with tolerances of 15%.



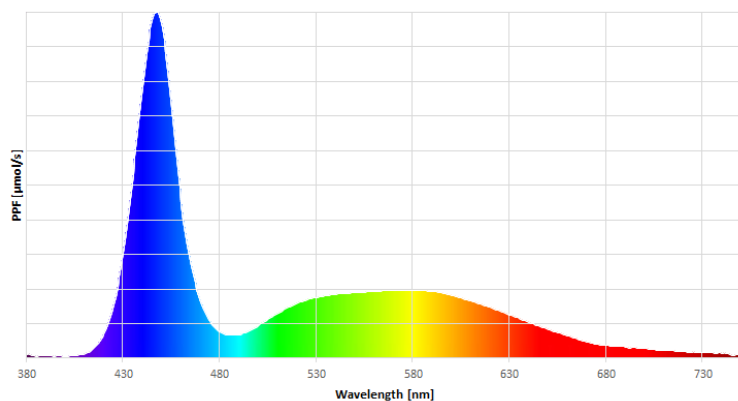
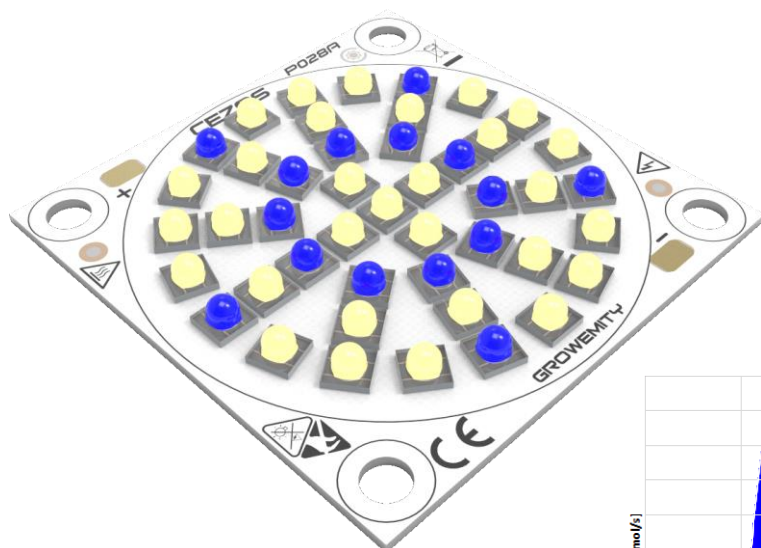
GROWEMITY LOB 38X38 BWB - P028

	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	λ [nm] / CCT [K]	Radiant Power [mW] / Luminous Flux [lm]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]	Total PPF [$\mu\text{mol/s}$]	Total PPF/W [$\mu\text{mol/J}$]	Article Number
GrowEmity LOB 38X38 BWB - P028	1750	25,1	43,8	DEEP BLUE	455	9525	35,25	2,36	94,05	2,15	Q0-038038-BWB-C5000-P028
				WHITE	5000	4437	58,80	2,04			
	2500	25,8	64,5	DEEP BLUE	455	13240	49,00	2,25	127,60	1,98	Q0-038038-BWB-C5000-P028
				WHITE	5000	6079	78,60	1,84			
	3500	26,6	93,1	DEEP BLUE	455	16383	60,63	1,94	162,63	1,75	Q0-038038-BWB-C5000-P028
				WHITE	5000	7987	102,0	1,65			
	4000	26,9	107,4	DEEP BLUE	455	18098	67,0	1,87	179,18	1,67	Q0-038038-BWB-C5000-P028
				WHITE	5000	8785	112,20	1,57			

Parameters were calculated for temperatures $T_J = 25^\circ\text{C}$

Radiant power and wavelength for color LEDs; Luminous flux and color temperature for white LEDs.

Values of these parameters were calculated for default bin and with tolerances of 15%.

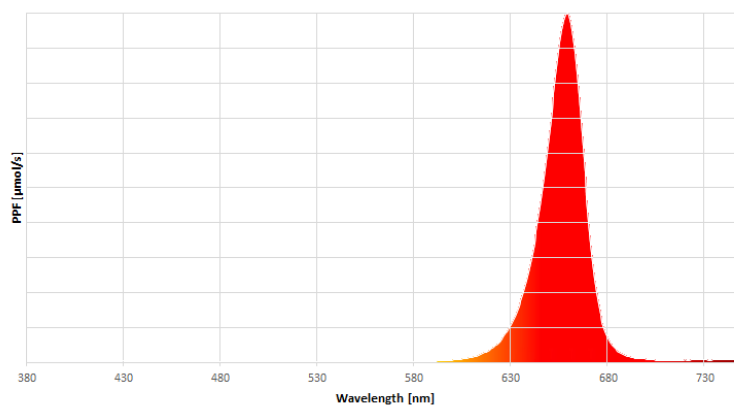
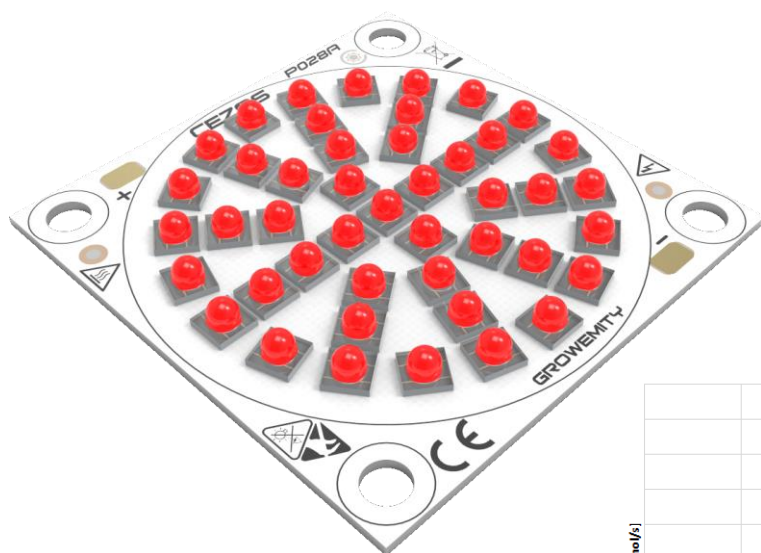


GROWEMITY LOB 38X38 RRR - P028

	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	λ [nm]	Radiant Power [mW]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]	Article Number
GrowEmity LOB 38X38 RRR - P028	1750	19,4	33,9	RED	657	19125	103,73	3,06	Q0-038038-RRR-C5000-P028
	2500	20,3	50,6	RED	657	26966	146,25	2,89	Q0-038038-RRR-C5000-P028
	3500	21,6	75,6	RED	657	36529	198,11	2,62	Q0-038038-RRR-C5000-P028
	4000	22,3	89,3	RED	657	41693	226,1	2,53	Q0-038038-RRR-C5000-P028

Parameters were calculated for temperatures $T_j = 25^\circ\text{C}$

Values of these parameters were calculated for default bin and with tolerances of 15%.

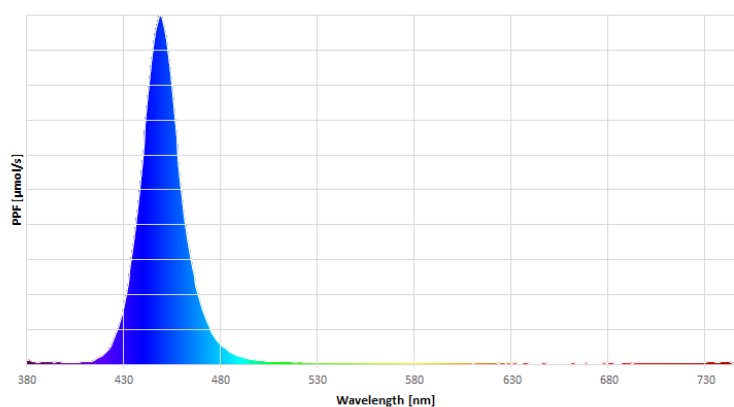
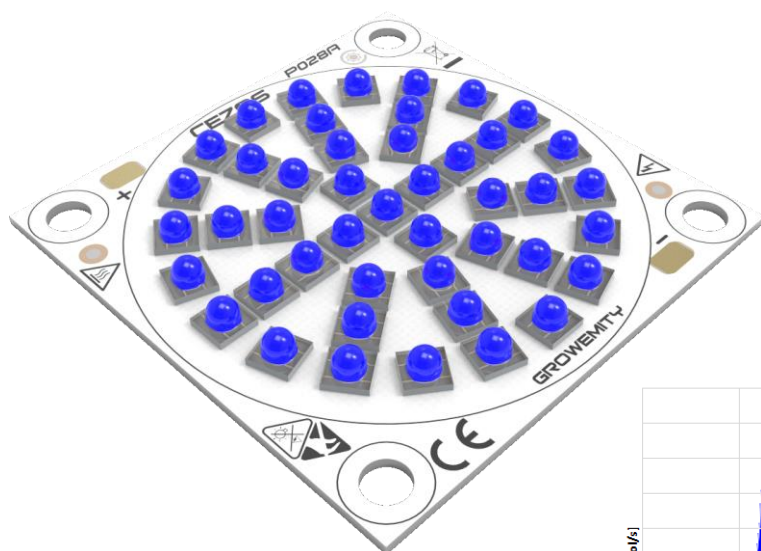


GROWEMITY LOB 38x38 BBB - P028

	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	λ [nm]	Radiant Power [mW]	PPF [$\mu\text{mol/s}$]	PPF/W [$\mu\text{mol/J}$]	Article Number
GrowEmity LOB 38x38 BBB - P028	1750	25,7	44,9	DEEP BLUE	455	28575	105,75	2,36	Q0-038038-BBB-C5000-P028
	2500	26,1	65,3	DEEP BLUE	455	39719	146,99	2,25	Q0-038038-BBB-C5000-P028
	3500	26,7	93,6	DEEP BLUE	455	49149	181,89	1,94	Q0-038038-BBB-C5000-P028
	4000	26,9	107,6	DEEP BLUE	455	54293	200,9	1,87	Q0-038038-BBB-C5000-P028

Parameters were calculated for temperatures $T_j = 25^\circ\text{C}$

Values of these parameters were calculated for default bin and with tolerances of 15%.

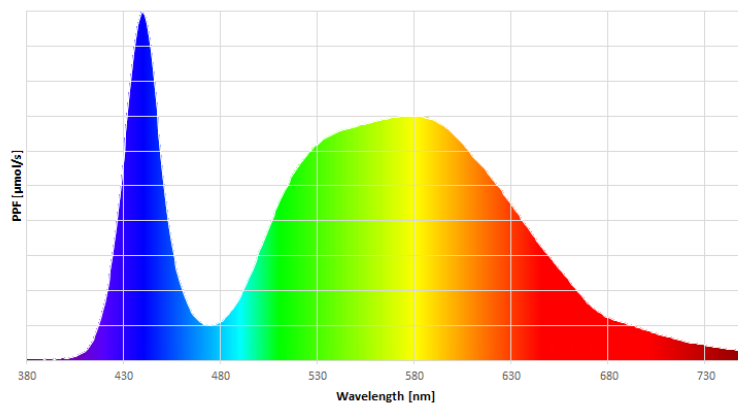
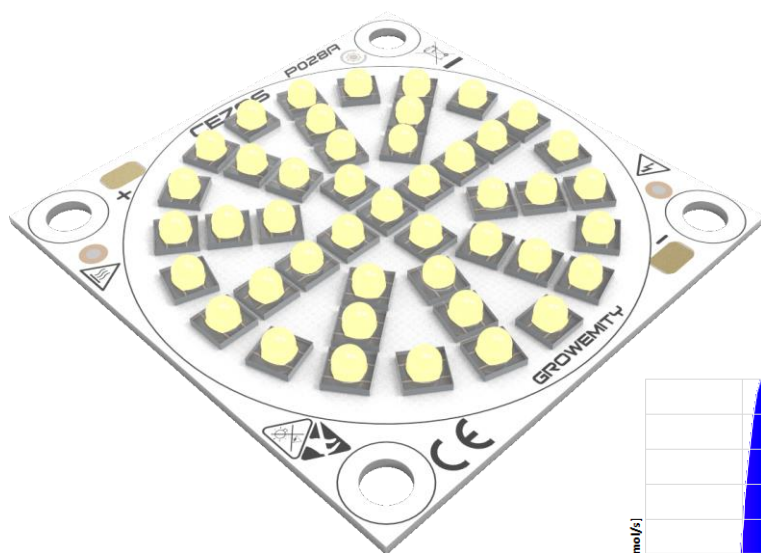


GROWEMITY LOB 38X38 MONO - P028

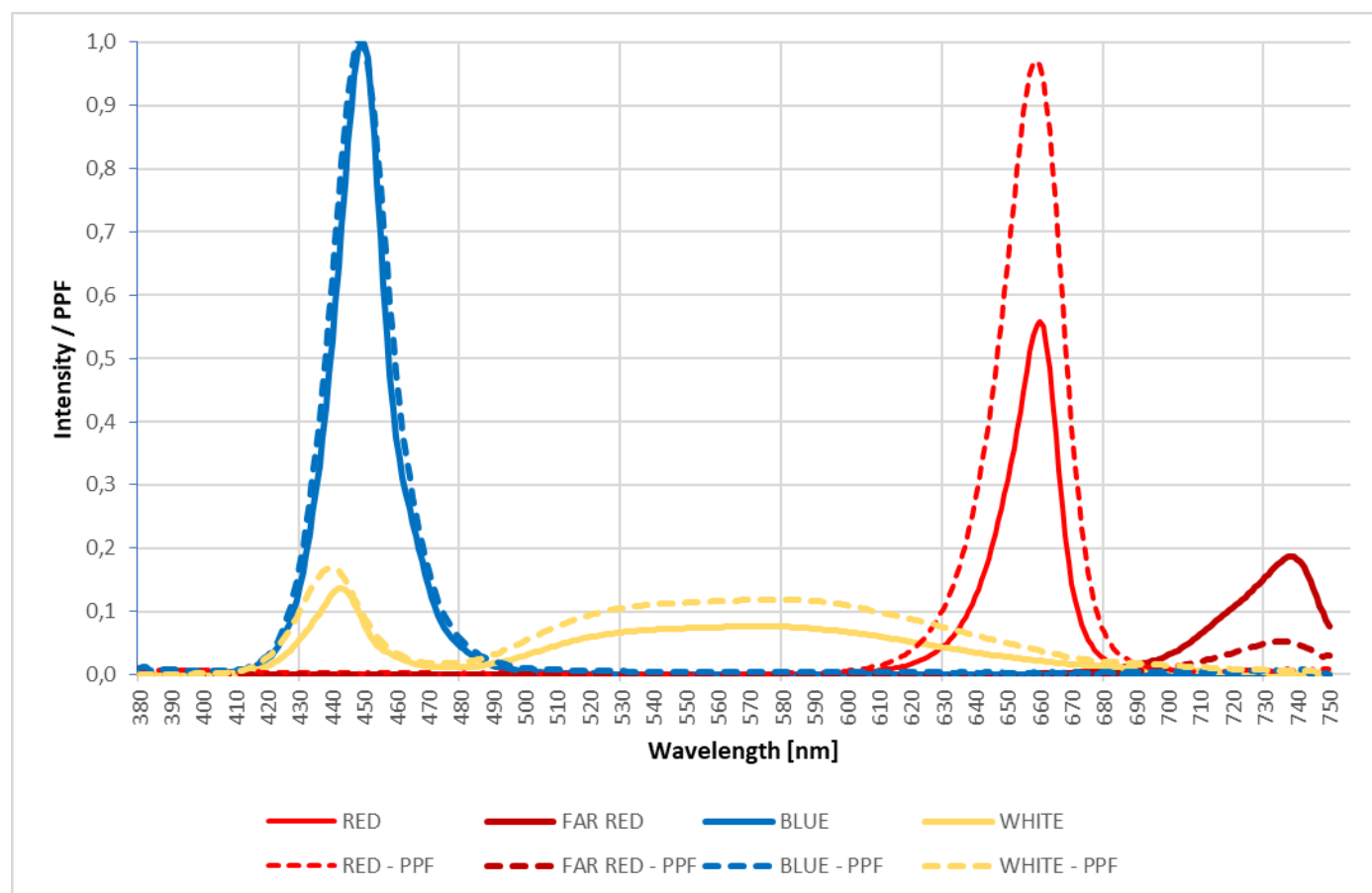
	Input Current [mA]	Forward Voltage [V]	Power [W]	Colour	CCT [K]	Luminous Flux [lm]	PPF [μmol/s]	PPF/W [μmol/J]	Article Number
GrowEmity LOB 38X38 MONO - P028	1750	24,8	43,3	WHITE	5000	6656	88,20	2,04	Q0-038038-MONO-C5000-P028
	2500	25,7	64,1	WHITE	5000	9118	117,90	1,84	Q0-038038-MONO-C5000-P028
	3500	26,6	92,9	WHITE	5000	11980	153,00	1,65	Q0-038038-MONO-C5000-P028
	4000	26,8	107,3	WHITE	5000	13178	168,3	1,57	Q0-038038-MONO-C5000-P028

Parameters were calculated for temperatures $T_j = 25^{\circ}\text{C}$

Values of these parameters were calculated for default bin and with tolerances of 15%.



SPECTRUM OF LEDs



Spectrum graph of the red, far red, blue and white LEDs at 350 mA current. Spectrum can be changed by choosing LEDs and power output.

COOLING

GrowEmity light source isn't self-cooling and additional heat-sink is required. The lifetime of the light source depends on the operating temperature and used LEDs. The temperature should be measured in the middle of the board. The temperature can be measured with thermocouple or simple temperature probe. Lifetime of LEDs decreases with the rise of temperature and luminous intensity in higher temperatures may be lower than nominal. Construction of the lamp or any place of installation should ensure correct heat dissipation from LED light sources. Overheat can damage or destroy some elements or entire LED light source. Never use overheated light source again as it may be damaged and can cause losses or even fire. We are not responsible for any loss, or damage resulting from overheating! Guarantee become void in such cases.

SAFETY

LED light source can change light intensity, but even dimmed LEDs generate high-intensity light. Looking into LEDs beam is unhealthy and may cause irreversible injury to eye's retina. Never look into the beam without protection glasses with an appropriate filter. Additionally, they may change LEDs light intensity almost immediately. If people are photosensitive, LEDs light may be a trigger to epileptic seizures and alter the perception, especially when light change very fast.

LED light source can work on high power supply current, so never touch components and wires of LED light source when power supply is on.

PROTECTION MEASURES AGAINST DAMAGE

LED light sources are delicate, even small mechanical stress may damage them. Such stresses should be avoided. If it is impossible, it should be kept to the minimum. Mechanical stresses such as pressure, bending, breaking, drilling, etc. may cause irreversible damage. Damaged LED light source aren't suitable for use.

Electrostatic Discharge (ESD) is a serious threat to electronics devices. The human body can accumulate very high electrostatic charge which can decrease the lifetime of electronics significantly and in worst cases may destroy electronic components. To avoid damages use of electrostatic protection is required. It is needed to follow ESD precautions during manipulation of these devices. Do not touch electronic components directly to avoid damages. Observe the official regulations for electrical devices (like DIN, VDE, EN). It is necessary to isolate components like controllers, LED light sources, power supply, wires etc. from any metal parts which can conduct electrostatic charges or cause a short circuit. LED light source aren't equipped with short circuit protection. During a short circuit, very high current is flowing from a power supply and can destroy it, causing risk of fire. Electronics must not be modified. Any modification causes loss of guarantee. The electric wiring/connection must comply with all current and valid national requirements, be constructed by a certified electrical tradesman, and comply with all the requirements set forth in this manual. We are not responsible for any loss, or damage resulting from electrostatic voltage discharge and a short circuit caused by inappropriate handling or wrong construction of the lamp! Guarantee become void in such cases.

Additionally LED light source can be damaged by some chemical substances. Depends on elements the damage may be different. It is important not to use chemical substances like acids, organic acids, sulphur, alkalis, organic solvents, mineral oils, vegetable oils and synthetic oils, etc. We are not responsible for any loss, or damage resulting from improper use of LED light source! Guarantee become void in such cases.

Do not operate LED light source when they aren't working properly. If LED light source are working incorrectly, turn off a power supply. Damaged LED light source may cause electric shock or short circuit.

CONTACT

CEZOS

81-534 Gdynia POLAND,

Olgiarda 88/b

tel. +48 58 664 88 61

cezos@cezos.com

www.cezos.com

Subject to errors and technical changes.