

Future Trends of LEDs in Screenless TV Overview

Marcus Wong

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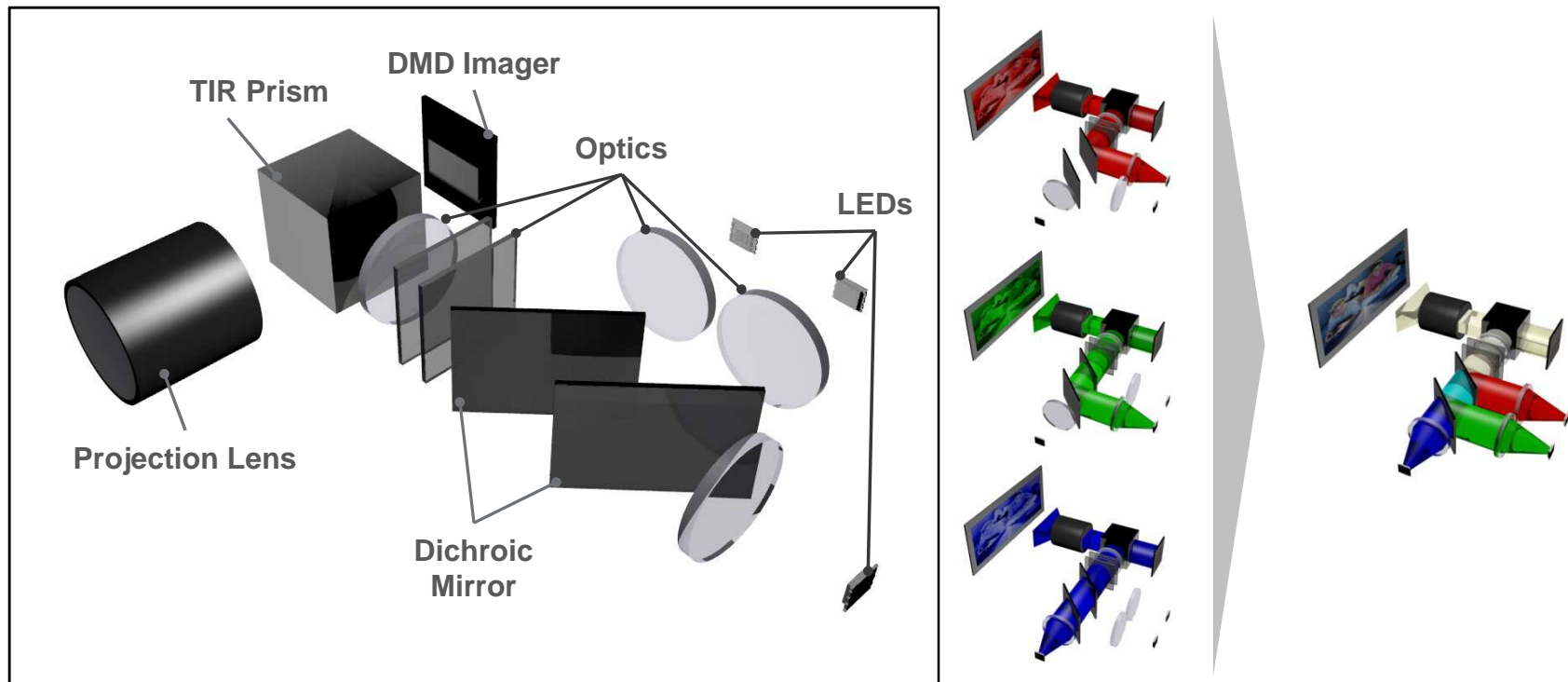
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LEDs for Projection Applications

1-chip DMD projection system

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Typical setup and function (sequential color mode)



LEDs for Projection Applications

Comparison of Optical Configuration



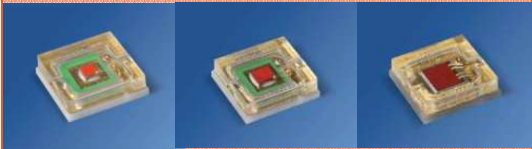
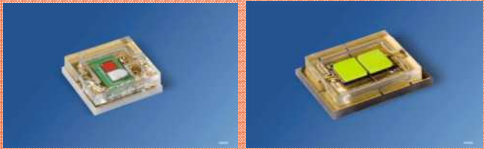
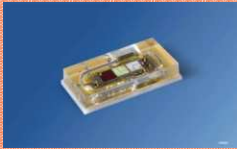
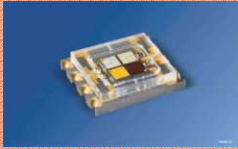
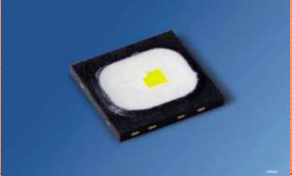
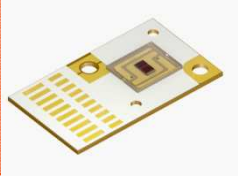
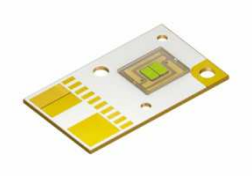

3-channel Setup	2-channel Setup	1-channel Setup
<p>3 discrete LED devices</p>	<p>2 discrete LED devices</p>	<p>1 LED device only</p>
<p>PROs:</p>	<p>PROs:</p>	<p>PROs:</p>
<ul style="list-style-type: none"> ➤ Maximum etendue/lumen per color ➤ Good color uniformity ➤ Good cooling possible -> enables higher LED power 	<ul style="list-style-type: none"> ➤ Reduced engine size ➤ Reduced BOM ➤ Only 1 dichroic filter element 	<ul style="list-style-type: none"> ➤ Reduced engine factor ➤ Reduced BOM ➤ No dichroic filter needed
<p>CONs:</p>	<p>CONs:</p>	<p>CONs:</p>
<ul style="list-style-type: none"> ➤ Larger engine size ➤ High BOM ➤ Many components needed 	<ul style="list-style-type: none"> ➤ Colors in 2in1 pkg have limited etendue ➤ Color homogenization needed 	<ul style="list-style-type: none"> ➤ Low etendue/lumen for each color ➤ Color homogenization needed

LEDs for Projection Applications

Product portfolio of OSRAM Opto Semiconductors



Brand name and type designation

OSRAM OSTAR PROJECTION						
						
COMPACT (1-CHIP) (LE x Q9WM / Q9WN / Q8WP)			COMPACT (2-CHIP) (LE x Q6WM / Q7WP)		COMPACT (3-CHIP) (LE ATB N7WM)	SMT (L E x S2W)
						
CUBE LCG H9RN / LCG H9RM			POWER (2-CHIP) (LE x P1W)		POWER (4-CHIP) (LE x P2W)	POWER (6-CHIP) (LE x P3W)

LEDs for Projection Applications

Product Selection according to Application



Application Segment		OSRAM Projection Cube	OSTAR Projection Cube	OSRAM Projection Compact	OSTAR Projection Compact	OSRAM Projection Power	OSTAR Projection Power
Embedded solutions	Camera (still/video)	✓		✓			
	Smartphones	✓		✓			
	Tablets	✓		✓			
Compact solutions	Screenless TV			✓		✓	
	Gaming			✓			
	Notebook accessory			✓			
	Control room			✓		✓	
	Head-up display			✓			
Business solutions	Office					✓	
	Education					✓	
	Professional					✓	

LEDs for Projection Applications

Classification to Imager Size



Imager		LE x Q9WN	LE x Q9WM	LE x Q8WP	LE x Q6WM	LE x Q7WP	LE x N7WM	LCG H9RN	LCG H9RM	LE x P1W	LE x P2W	LE x P3W
DLP (Texas Instruments)	0.2" nHD DMD		X		X		X		X			
	0.2 WVGA EM/SA	X	X		X		X	X	X			
	0.24" VGA	X	X		X		X	X	X			
	0.3" WVGA EM/SA/STP	X		X								
	0.3" 720p			X								
	0.45" WXGA STP/TP/TPB					X				X	X	
	0.47" 1080p					X				X	X	
	0.65" 1080p										X	X
	0.7" XGA										X	X
	0.95" 1080p											X

X – Screenless TV focus LEDs

OSRAM Laser for Projection - Overview

Alex Wang

December 2014

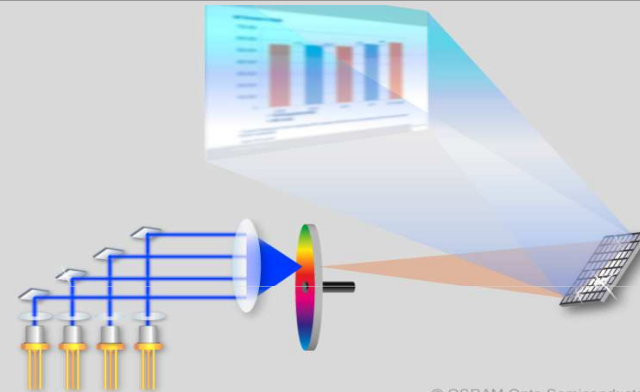
可见半导体激光 投影领域的应用

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传统光源像固态照明的转化



激光激活远程荧光粉技术



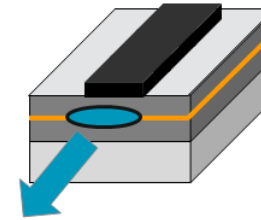
技术实现

- 蓝色大功率激光矩阵和远程荧光粉配合为高流明 >4000lm 应用而生
 - 激光矩阵通过透镜聚合后激活荧光粉产生白光
 - 产生绿色, 红色或者白色的光

优势

- 绿色节能：更长的寿命和更低的功耗
 - 模块化可以自由扩容扩充亮度
 - 光的利用率更高
 - 高流明大尺寸应用

多模蓝色激光 PL TB450B



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特性 – PL TB450B



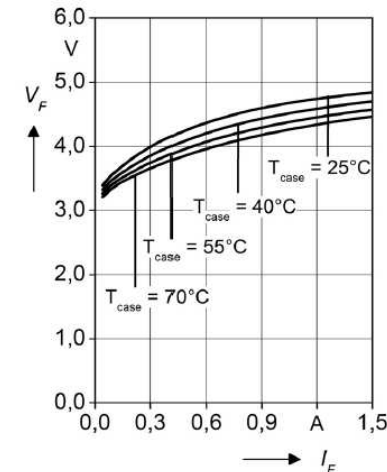
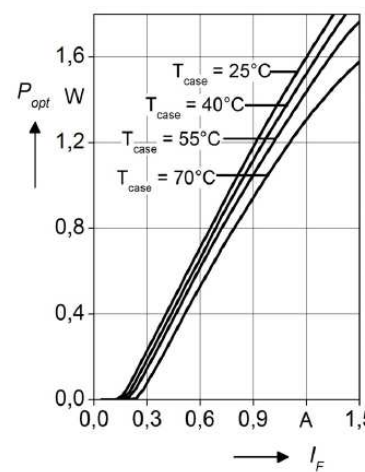
TO56-improved

- 出光功率: **1.6 W** @ typical **450 nm**
 - 高效的转换效率 **typ. 30 %**
- 典型寿命: 20khours @ 40 °C (L50, B50)
 - 工作温度: **-20 °C – 70 °C**
 - **集成ESD 保护二极管**

产品状态

- 1.4 W PL TB450 停产
- **1.6 W PL TB450B** 于2013年6月量产
- 计划于2015年升级到2.5W

➤ 典型参数

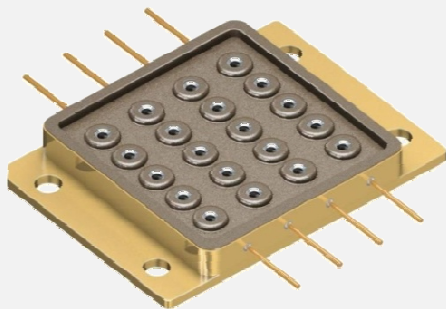


多芯片封装 (MDP) 激光 PLPM4 450

初步技术规格

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目标规格

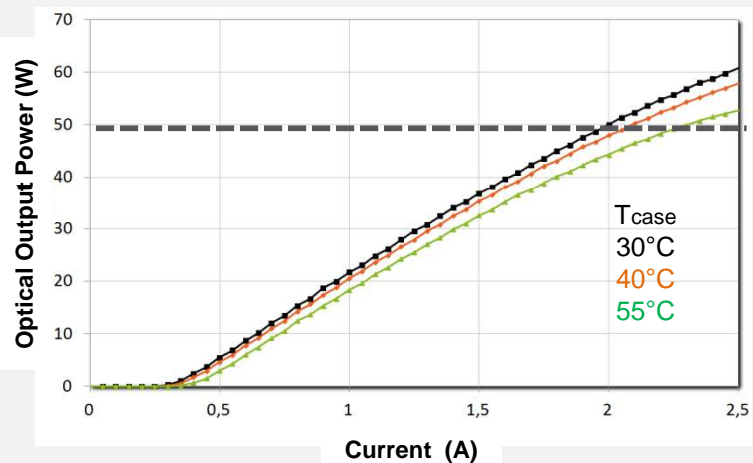


- 蝶状封装 出光高达 50 W $T_{Case} = 50\text{ }^{\circ}\text{C}$
 - 目标寿命: 20kh (L50 (EOL50%))*
 - 波长: 450 nm +/-10nm
 - 每个激光点出光高达 3.2 W
- 典型光电效率: >30% @ $T_{case}=50\text{ }^{\circ}\text{C}$
 - 工作温度: 0°C - 70 °C*

*(Derating of output power for $T_{case} > 50\text{ }^{\circ}\text{C}$ necessary to maintain lifetime.)

产品状态

- 样品将于2014年Q4开始选择性的提供给核心客户。



量产计划定于2015年中



多芯片封装 (MDP) 激光 PLPM4 450

拟定参数 (T_{case} 50° C in cw-operation)

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Target Specification Multi Die Package (PLPM4 450) at T_{case} 50° C in cw-operation*

	Symbol	PLPM4 450		
	(Unit)	min.	typ.	max.
Emission Wavelength	λ (nm)	440		460
Optical Output Power Package	$P_{op, package}$ (W)	50	-	-
Threshold Current per channel	$I_{th, channel}$ (W)		0.35	
Operation current per channel	$I_{op, channel}$ (A)	-	2.1	-
Operating voltage per channel	U_{op} (V)	14	23	27.5
Emission Area	mm		16 x 16.5	
Channel quantity		4 isolated channels		
Laser diodes per channel		4-5		
Thermal resistance	R_{chip} (K/W)	11		

*derived from pulsed measurements at T_{case} 25° C

Many Thanks.