Ongine 制 品 规 格 书

机 种 名：OPD60L　Series Ongine Projection

机种略号：OPD60LM

日　　期：2019/07/02

目录

Revision History

Rev	Date	Approved	Description	Notes
Ver1.0	2019.07.02	Yao	初版	

一. 主要参数

- 采用 DMD 显示器件, .2DMD 分辨率: 480P(854×480)
- LED光源寿命: 10, 000小时
- 尺寸: 74.2*85.6*24.4mm(仅供参考)
- DMD 正常工作温度: 0~65℃
- TI DMD Part No.: DLP2010

1.1 投影镜头参数

参数	规格	备注
投射比	1.35	33.5 寸@1m
畸变	<0.8%	
调焦扭力	0.5—3 N.m	
热失焦	光机在满足 LED 以及 DMD 散热的条件下，不存在热失焦问题.	
对焦范围	0.5-3(m)	

1.2 照明参数

参数		规格
投影亮度 *I*(ANSI 流明)	最小值	
	典型值	90 流明
色坐标（白屏中心）	x	0.29±0.02
	y	0.33±0.02
照度均匀性 *U*(9 点)	最小值	85%
对比度 *C*(FOFO)	最小值	200：1
	典型值	400：1

二. 参数定义与测量说明

☆ 环境温度 25℃±5℃, 环境湿度 40%RH±20%RH.

☆ 投影屏幕距离镜头 1.5m, 在屏幕上测量时画面调焦清晰, 投影镜头光轴与屏幕垂直, 确保画幅左右两边长度相等且上下两边长度相等(调焦范围与调焦旋转力度测试除外).

☆ 全黑环境, 确保未点光机时, 在投影屏幕测得的照度不高于 0.02lx.

☆表 1.给出符合上述条件的参考 LED 驱动电流与占空比设置.

表 1. 光机标准测试 LED 驱动设置

x/y	0.29/0.31		
LED	R	G	B/B2
工作温度（铜基板灯珠背面）	<45℃	<50℃	<50℃

注意事项:

a. LED 驱动电流一定的情况下, V_f的分布范围会导致总功耗的变化, 详情请参考 LED Datasheet.

b. 如果要对光机进行准确的白平衡校正, 需要对 LED 的驱动电流或占空比进行微调, 由此会导致 LED 总功耗的变化.

☆ 照度计, 亮度测量：Minolta T-10；色坐标测量: Minolta CL-200A。

☆ 其它: 扭力计, 卷尺, 电源, 台灯等酌情选择.

○ 测试 Pattern 以迅达的格式档为准,最终由双方确认达成意见一致为准.

2.1 投影分辨率

定义 1：如下图所示：

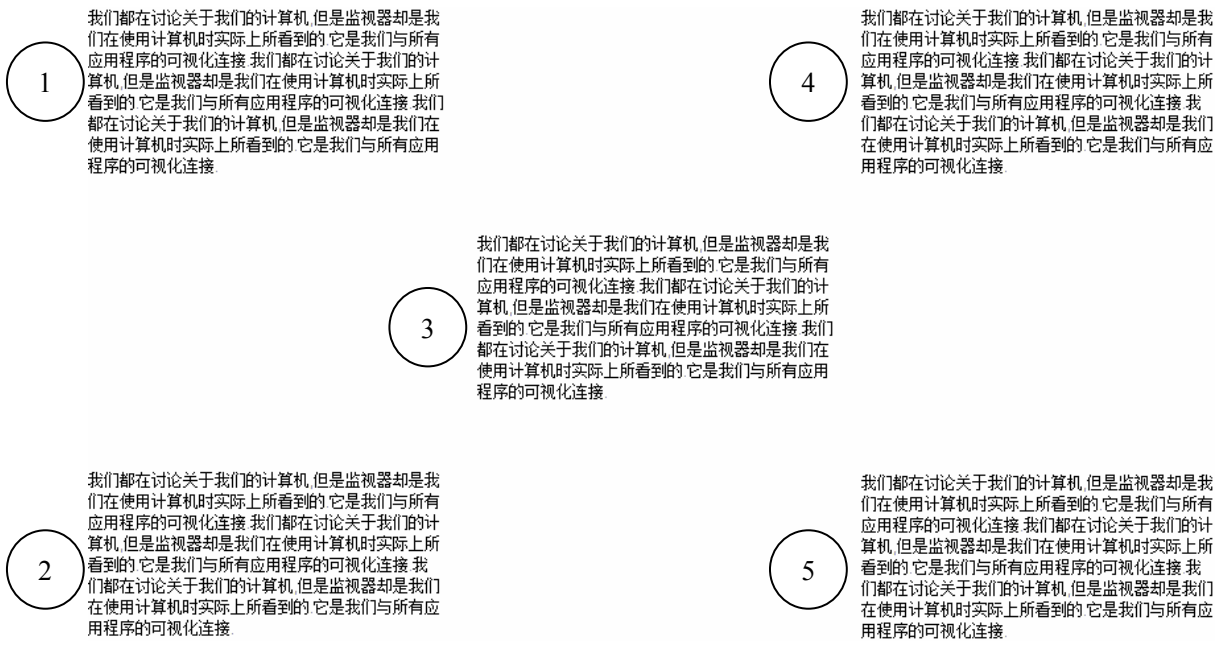


图 1

测量方法: 如图 Pattern(960*540), 调焦使画面均匀清晰, 判断字体的清晰可辨程序.

规格：5 个区域的字体中，最多一个区域的字体稍微偏白模糊,请参照限度样品.

2.2 RGB 中心照度

定义: 分别显示 RGB Pattern 时画面中心照度, 用 L_{CR}, L_{CG}, L_{CB} 分别表示红, 绿, 蓝画面中心照度.

测量方法: 分别显示如图 3，4，5 所示红, 绿, 蓝 Pattern, 用照度计测量各画面中心照度. 由于普通照度计测量误差约±3%, 由此可能造成测试结果超出规格.

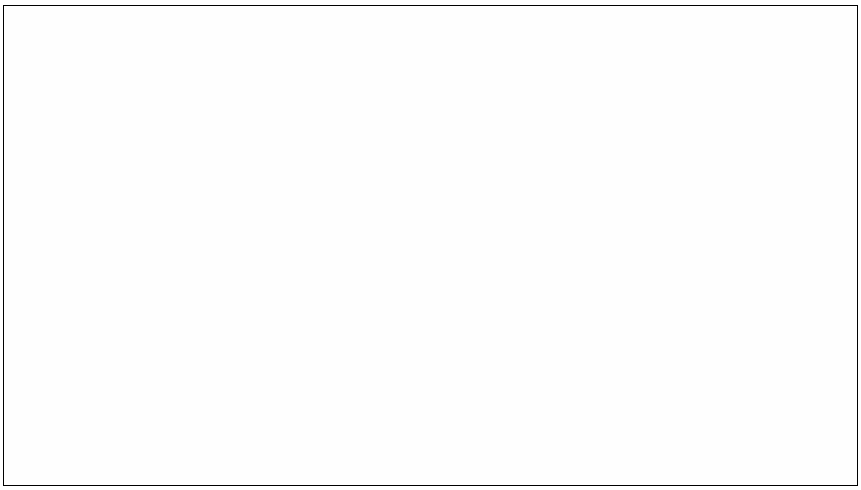


图 2 全白(100%灰阶)Pattern

图 3 全红(100%灰阶)Pattern

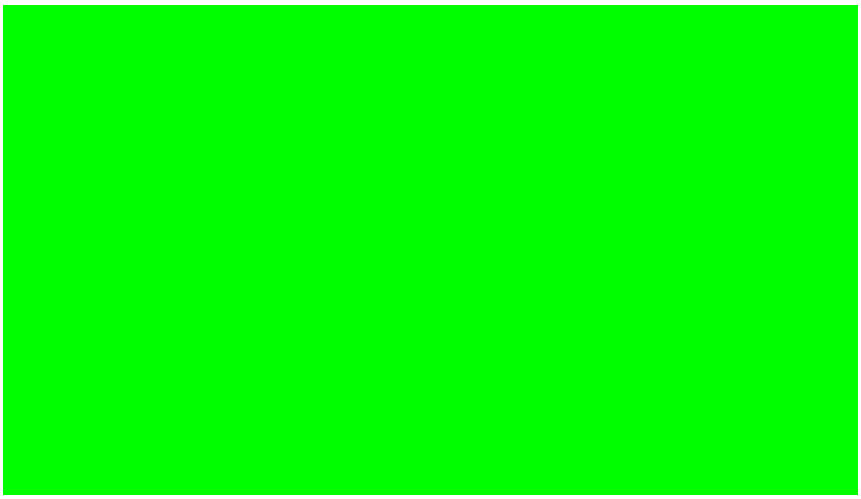


图 4 全绿(100%灰阶)Pattern

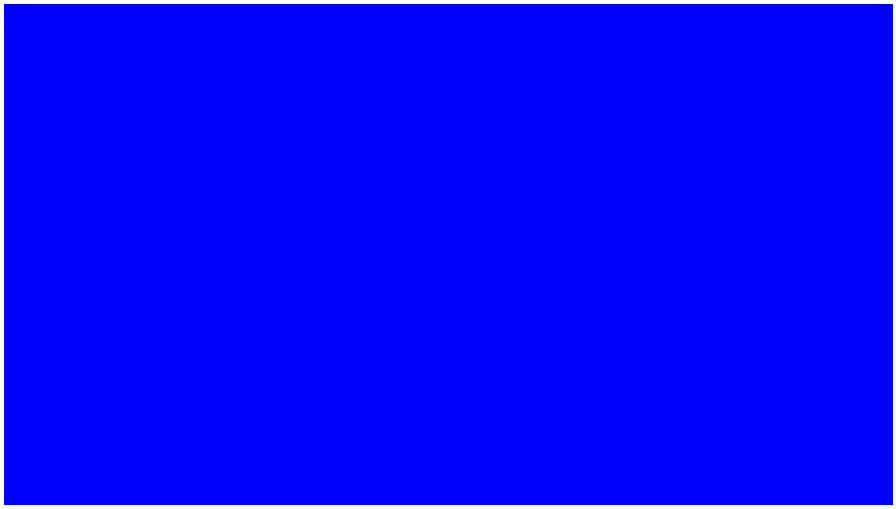


图 5 全蓝(100%灰阶)Pattern

2.3 亮度 *I*

定义:

$$I = Average(L_1, L_2, \Lambda\ , L_9) \cdot S$$

该定义遵循 ANSI 关于投影机亮度测试标准的规定，其中 L_1，L_2，…，L_9 表示投影屏幕到镜头前端距离为 1m 时用照度计在图 6 所示 9 个位置（对应将画面平均分成 9 个区域的中心点）所测得的照度值，S 表示此时投影画面的面积（以 m^2 为单位）.

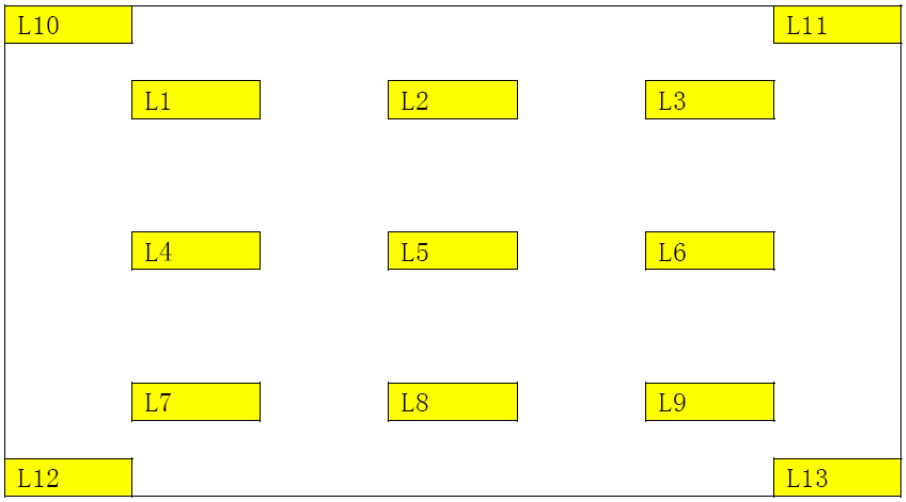


图 6 ANSI 十三点 Pattern

2.4 照度均匀性 *U*

定义:

9 点均匀性

$$U = \frac{Average(L_1, L_2, L_3, L_4, L_5, L_6, L_7, L_8, L_9)}{L_5} \times 100\%$$

L_1，L_2，…，L_{13} 表示用照度计在图 6 所示相应位置所测得的照度值.

测量方法: 如定义所述.

图 7 全黑(0%灰阶)Pattern

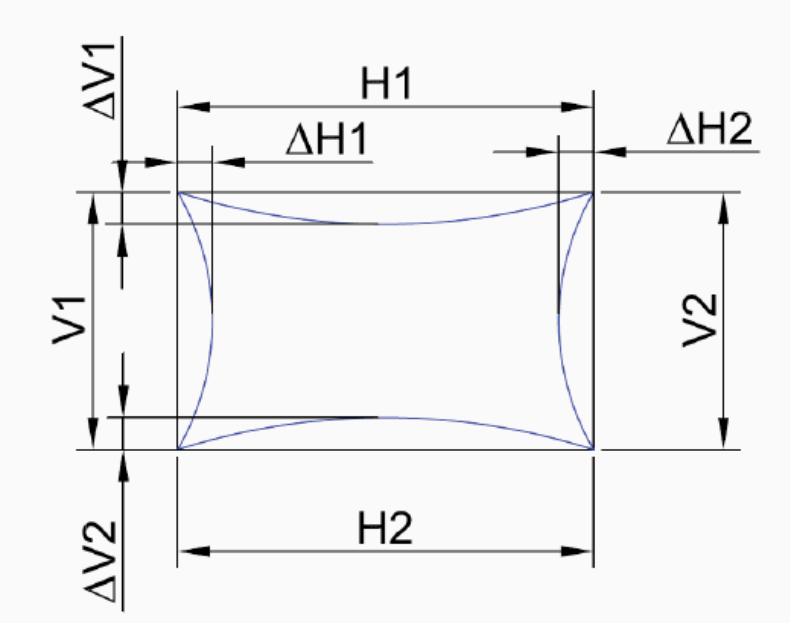
2.5 对比度 C

定义: 光机显示“全白(100%灰阶)Pattern”（如图 2）与“全黑(0%灰阶)Pattern”(如图 7)时相应中心照度 L_{CW}, L_{CB} 照度之比（关闭动态调光功能）

$$C=\frac{L_{CW}}{L_{CB}}$$

测量方法: 如定义所述

2.6 画面畸变（边线弧形）



水平畸变：CH=(Max(ΔV1, ΔV2)/(Min(V1,V2)*100%

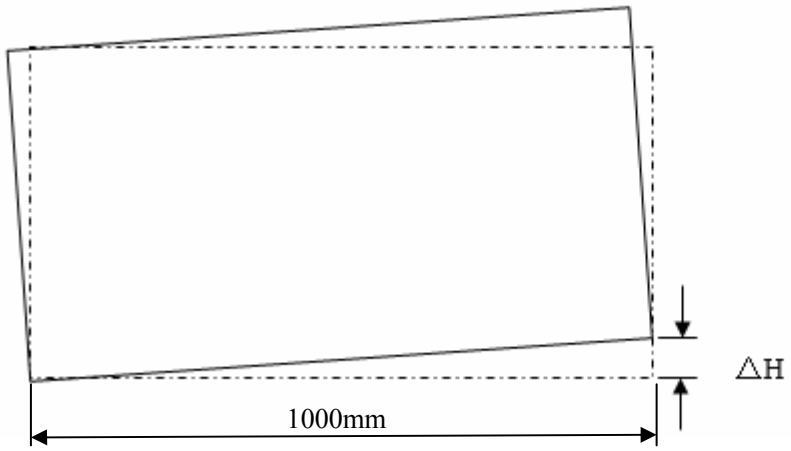
垂直畸变：CV=(Max(ΔH1, ΔH2)/(Min(H1,H2)*100%

光机在测试间投影长度为 100cm，;Max(ΔV1, ΔV2) ≤5mm，Max(ΔH1, ΔH2) ≤4mm

2.7 倾斜

画面倾斜角度值：允许倾斜角度不大于±1.2°。

画面倾斜



如上图所示，虚线框为正常投影的框线，实线框为实际发生倾斜时投影的框线。

允许倾斜角度不大于±1.2°，如：投影最下边长为1000mm，△H 允许偏差为20.95mm.

2.8 杂散光

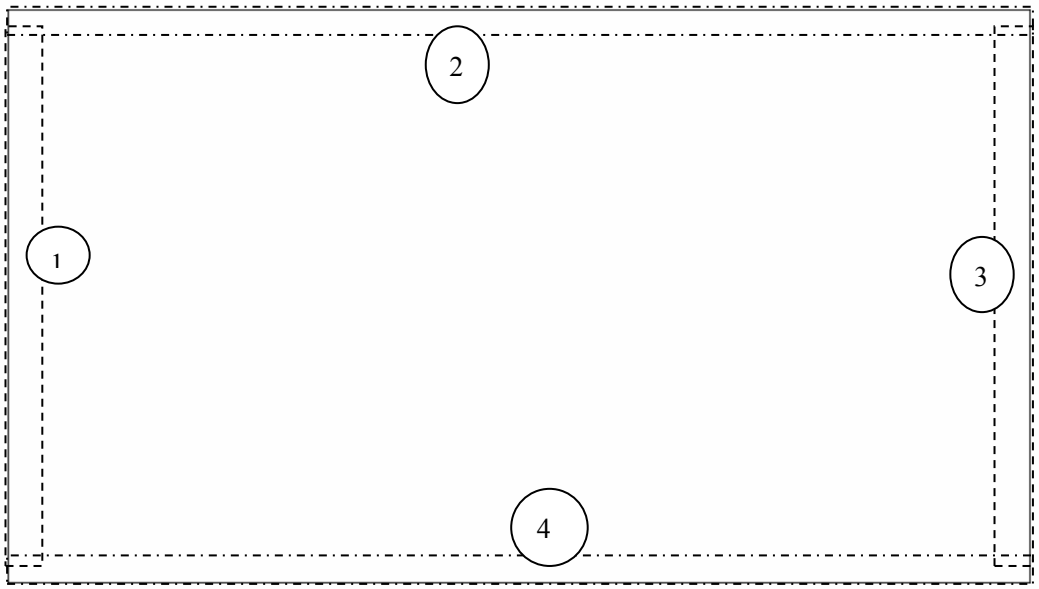
定义： 光机显示“全黑(0%灰阶)Pattern”(如图)时相应场外杂光 L_{CS} （有效区以外的均为杂光）

规格：60 ‘’ 画面下，光机显示“全黑(0%灰阶)Pattern”(如图)时相应场外杂光 L_{CS} 小于 0.35Lux

2.9 黑边（异常杂色边）

定义： 光机投影画面有效区域周边 4 个边有较浓的色彩异常，常常带有偏黑、偏紫等……。

规格：依限度样品。



全白(100%灰阶)Pattern

三．典型不良定义

典型不良定义

参数	不良规格	类别	备注
分辨率	超出限度样品		同客户制定限度样品比对
亮度	45Lm以下		
对比度C	200：1以下		
调焦范围	小于规格范围		**0.5m~3m**
外观	非点亮状态最外层镜片划伤		镜头刮伤外观 60/40 标准执行:
亮斑	灰10可见为不良		按照 TI 标准执行.
亮点	按照TI标准执行.		
色边	黑场画面的边缘有颜色区域，超出限度样品则为不良。		

光机镜片缺陷

按《MIL-PRE-13830B》第3.7.9.1条中描述，规格依承认书/规格书来判断。

规格	刮伤		点伤	
	刮伤	线长允许	点伤	点伤允许
40/20	W≤0.01mm	D*4	∮<0.1mm	忽略不计
	0.01mm<W≤0.02mm	D*2	∮=0.1mm	2个
	0.02mm<W≤0.03mm	D*1.33	0.1mm<∮≤0.2mm	1个
	0.03mm<W≤0.04mm	D/4 N≤2	/	/
60/40	W≤0.01mm	D*6	∮<0.1mm	忽略不计
	0.01mm<W≤0.02mm	D*3	∮=0.1mm	8个
	0.02mm<W≤0.03mm	D*2	0.1mm<∮≤0.2mm	4个
	0.03mm<W≤0.04mm	D*1.5	0.2mm<∮≤0.3mm	2个
	0.04mm<W≤0.05mm	D*1.2	0.3mm<∮≤0.4mm	1个
	0.05mm<W≤0.06mm	D/4 N≤2	/	

说明：

1. *刮伤参考以上条件判定*
2. *若以上未界定清楚，有限度样品，按限度样执行*
3. *D为镜片直径，W为线条宽度，∮为点伤直径,N为数量*

四．抽样标准

对于抽样中发现的缺陷, AQL定义如下:

MA = 0.65%, MI = 1.5%

五. Image Quality Specification

1. SCOPE

This document specifies the image quality requirements applicable to the DLP® .45 WXGA-800 S241 Component Sets. The Component Set provides the DLP® .45 WXGA-800 S241 Projector with digital imaging functionality based on Digital Micromirror Device (DMD) technology.

2. Definitions

2.1 Blemish

A blemish is an obstruction, reflection, or refraction of light that is visible, but out of focus in the projected image under specified conditions of inspection (see Table 1). It is caused by a particle, scratch, or other artifact located in the image illumination path.

2.2. Dark pixel

A single pixel or mirror that is stuck in the OFF position and is visibly darker than the surrounding pixels.

2.3. Bright pixel

A single pixel or mirror that is stuck in the ON position and is visibly brighter than the surrounding pixels.

2.4. Unstable pixel

A single pixel or mirror that does not operate in sequence with parameters loaded into memory. The unstable pixel appears to be flickering asynchronously with the image.

2.5. Adjacent pixel

Two or more stuck pixels sharing a common border or common point, also referred to as a cluster.

2.6. Row or Column Defect

Dark or Light column(s) or row(s) are groups of pixels that are not operating or are not operating in sequence with the parameters loaded into memory.

2.7. Pond of Mirrors (POM)

POM is a rectangular array of off-state mirrors surrounding the active area.

2.8. Eyecatcher

Eyecatcher's are blemishes appearing in the area outside of the Active Area. These are due to particles and various DMD window or window aperture "defects" including: digs, voids, and scratches.

2.9. Border Artifacts

Border artifacts are a general category of image artifacts that may show up on screen in the area outside of the active array. Border artifacts include: Exposed Bond Wires, Exposed Metal 2, and Reflective Edge.

2.9.1. Bond Wires

Bond Wires are the electrical connections between the die and the DMD ceramic package. If visible, they will appear as short light parallel lines outside of the Pond of Mirrors (POM).

2.9.2. Exposed Metal 2

Exposed Metal 2 is due to a shift in positioning of either the die or the window aperture, which may allow light to be reflected off of the layer of metal 2 that is below the super structure (mirrors). This defect is located outside of the POM.

2.9.3. Reflective Edge

Reflective Edge is light that may reflect from the edge of the DMD window aperture onto the projection screen. It will appear as a thin diffuse line outside of the POM.

2.10. Gray 10 Screen

All areas of the screen are colored a Microsoft Paintbrush gray 10 (green, red, and blue set at 10).
NOTE: If linear degamma is not used then the Microsoft Paintbrush values must be adjusted to match the degamma table being used in order to generate an equivalent gray level on the test screen image. An equivalent Gray level would be any Gray screen with a lux level $\geq$ 4% of the projectors White screen lux level.

3. ACCEPTANCE REQUIREMENTS

3.1. Conditions of Acceptance

All DMD image quality returns will be evaluated using the following projected image test conditions:

a. Test Set degamma shall be linear.
b. Test Set brightness and contrast settings shall be set to nominal.
c. The diagonal size of the projected image shall be a minimum of 30 inches.
d. The projection screen shall be 1X gain.
e. The projected image shall be inspected from a 48 inch minimum viewing distance.
f. The image shall be in focus during all Table 1 tests.
g. Maximun screen lumens is 100.

TABLE 1. Image Quality Specification

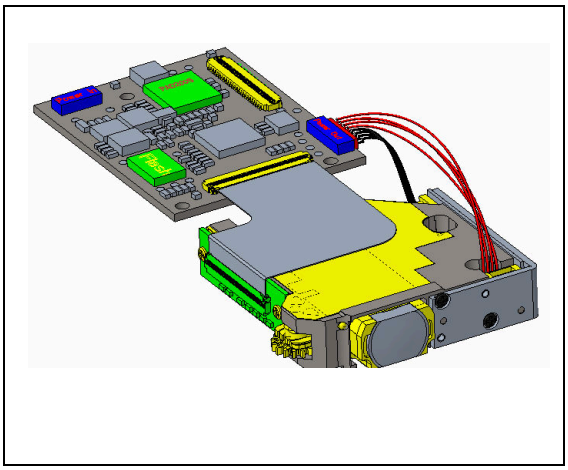
SCREEN	ACCEPTANCE CRITERIA
Gray 10	1. No Bright Pixels in Active Area 2. ≤ 1 Bright Pixels in the POM
White	1. ≤ 4 Dark Pixels in the Active Area
Any screen	1. No Adjacent Pixels/Clusters 2. No Unstable Pixels in Active Area 3. No DMD window aperture shadowing on the Active Area 4. No Row or Column defects 5. Blemishes are allowed 6. Eyecatcher and Border Artifacts are allowed

Notes:

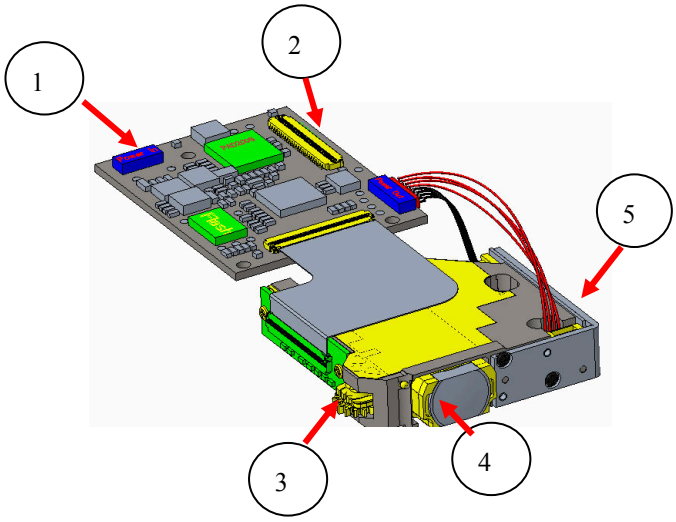
1. Projected blemish numbers include the count for the shadow of the window artifact in addition to the artifact itself.
2. During all Table 1 tests, projected images shall be inspected in accordance with the conditions of inspection specified in Section 3.
3. The rejection basis for all cosmetic DMD defects (scratches, nicks, particles) will be the projected image tests referenced in Table 1.
4. Devices that meet this image quality specification but are deemed undesirable by the customer may not be returned to TI without prior approval by TI.
5. Screens < Gray10 shall not be used as a basis for rejecting a DMD for image quality.

六 . Appearance

	Manual Focusing	Motor Focusing	DMD Heatsink	LED Heatsink	Motor Driver	DMD Driver	LED Driver
OPD60LM	●					●	●

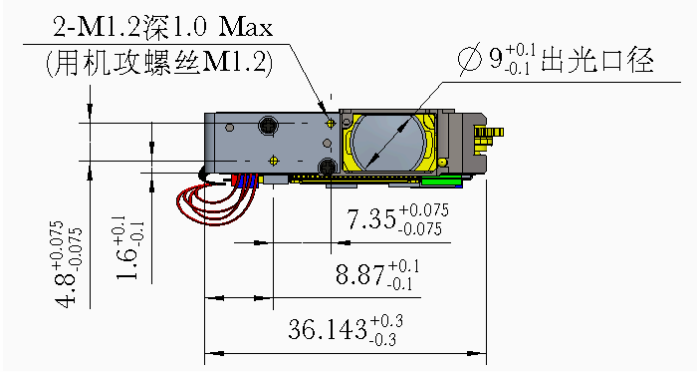


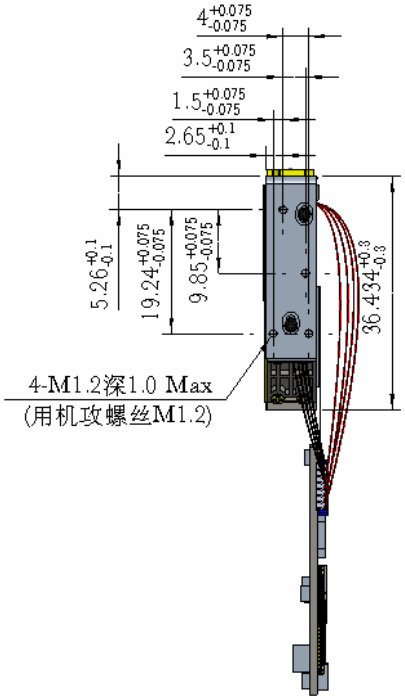
6.1 Appearance

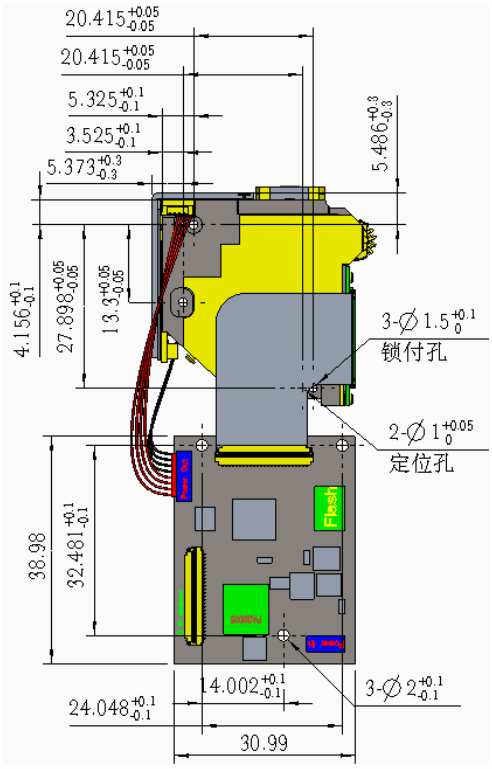


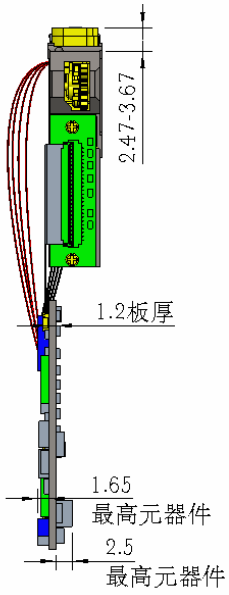
Item	Description
1	power in
2	51pin Connector (To mainboard)
3	Focus Wheel
4	Lens
5	Heatsink

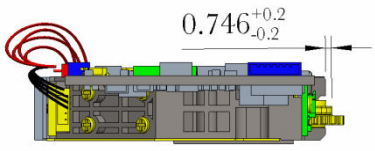
6.2 Module Dimension





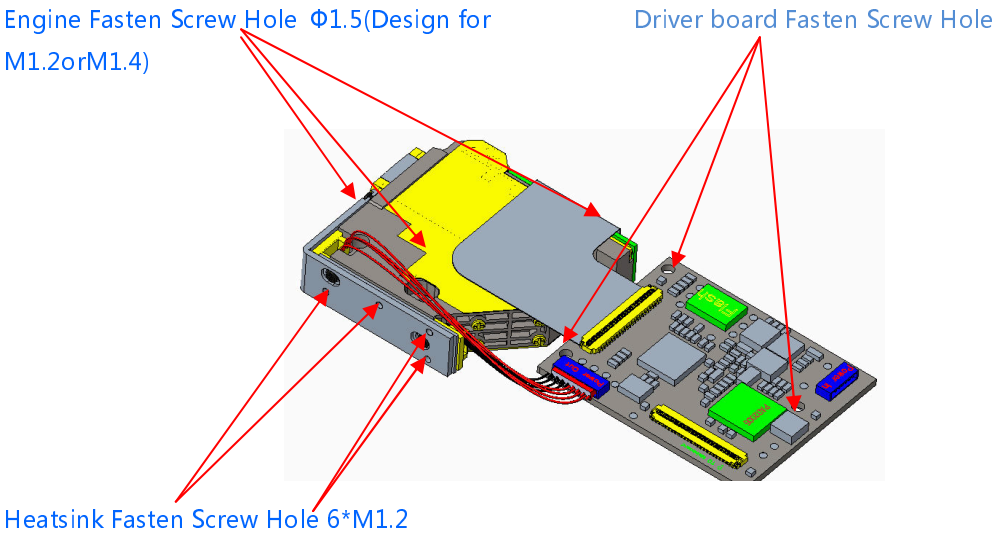






4				GENERALLY TOLERANCE		3RD ANGLE PROJN	MATERIAL	SURFACE	SCALE 1:1	UNIT MM	TITLE	OPD60LM 2D图
3				DIMENSION RANGE	TOTERANCE	BORDER A4	NAME	DATE	TYPE		PART NO.	REV. 1
2				ANGLE	±0.5°	DRAWING BY	朱耀春	09.06.11	OPD60LM		LOCATION	
1	新 规 作 成	朱耀春	09.06.24	X.XX	±0.05	CHECKED BY			迅达光电（深圳）有限公司			
NO.	DESCRIPTION	NAME	DATE	X.X	±0.1	APPROVED BY			Ongine technologe (SHENZHEN) co., ltd			

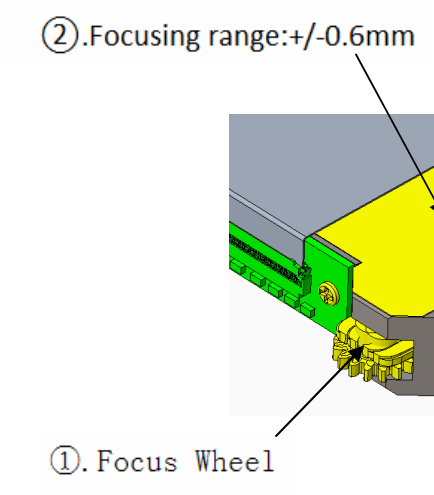
6.3 Module Fasten Screw

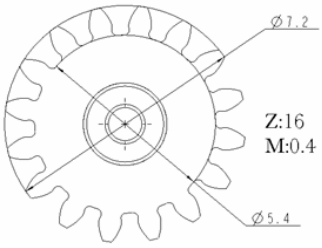


6.4 Focusing

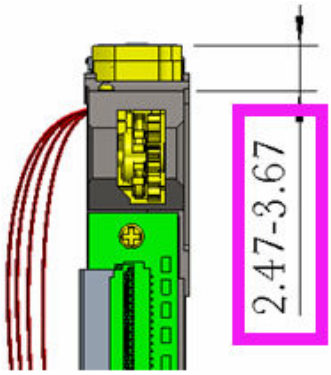
位置图：

角度：360°





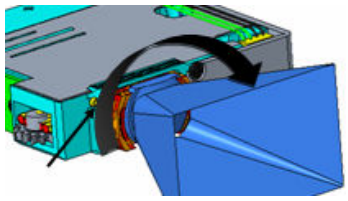
近焦时，注意镜头与壳体的距离关系：



6.5 The Rays Cup Design

1. Range Of Effective Rays（Refer to 3D Model）

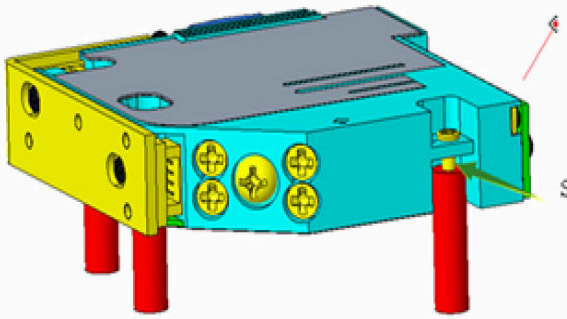
2. Requirement



This is the range of effective rays. The rays cup should be to avoid interference the cup internal should use extinction processing

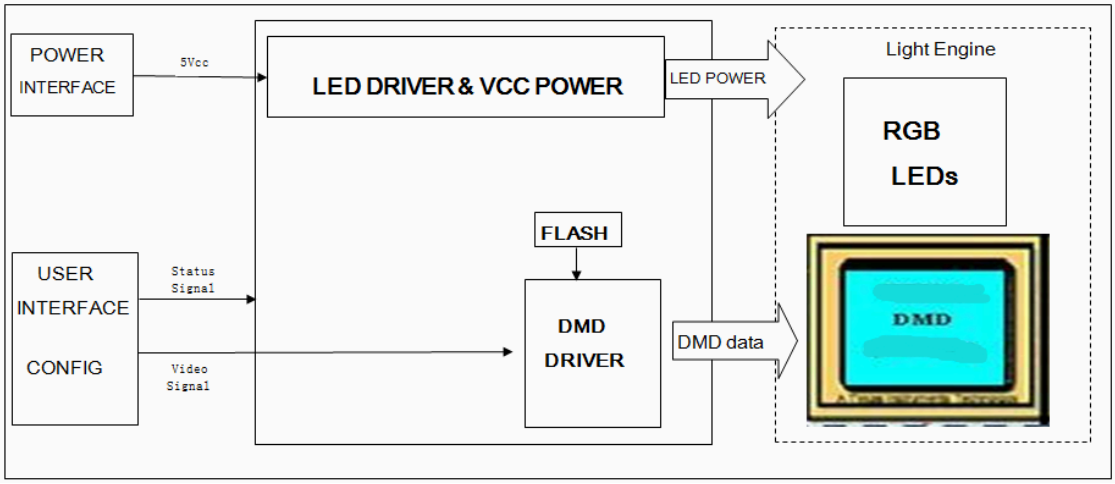
6.5 Model assembly

Because of the tolerance and something can't control, the Engine's screen may have an angle(< ± 1.2°) shift, so, please let the Engine can be adjust,like this:



七．Electronic Function

7.1 Block diagram



7.2 Interfaces features

1.Display image resolution: WVGA (854x480)

2.Input image bus mode: Parallel bus(RGB888/RGB666)

3.Input image sizes of WVGA (854x480)

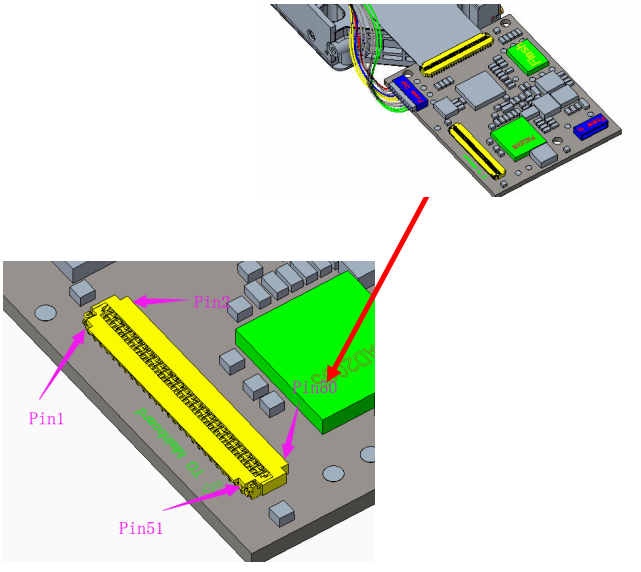
4.Current Adjustment

5.Support image horizontal and vertical flip

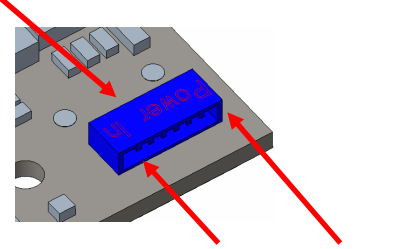
6.Frame rate choice(60Hz/50Hz)

7.Vsync, Hsync, Pixel clock and DATEN polarity control

7.3 Connection Port



Part NO: FH26-51S-0.3SHW(05)



Power Interface(6pin pitch:0.8mm)

Pin脚	1	2	3	4	5	6
接线	GND	GND	GND	+5V	+5V	+5V

Part NO: TU0805HNO-06

Black font indicates the default input data

User Interface Connector Signal Definitions								
PIN#	PIN NAME	I/O	Description	**RGB888**	RGB666	BT656	CPU I/F	NOTE
PIN1	CPUVSYNC	I/O	CPU SYNC(CPU I/F)	**PullDown**	PullDown			note1
PIN2	DATEN_CMD	I	Active data	**DAT_EN**	DAT_EN			note2
PIN3	PCLK	I	Pixel Clock	**CLK**	CLK			note2
PIN4	VSYNC_WE	I	Vertical sync. Clk	**VSYNC**	VSYNC			note2
PIN5	HSYNC_CS	I	Horizontal sync.Clk	**HSYNC**	HSYNC			note2
PIN6	GND	GND	Ground	**GND**	GND			
PIN7	PDATA0	I	RGB DATA	**Blue_D0**	Blue_D0			note3
PIN8	PDATA1	I	RGB DATA	**Blue_D1**	Blue_D1			
PIN9	PDATA2	I	RGB DATA	**Blue_D2**	Blue_D2			
PIN10	PDATA3	I	RGB DATA	**Blue_D3**	Blue_D3			
PIN11	PDATA4	I	RGB DATA	**Blue_D4**	Blue_D4			
PIN12	PDATA5	I	RGB DATA	**Blue_D5**	Blue_D5			
PIN13	PDATA6	I	RGB DATA	**Blue_D6**	GREEN_D0			
PIN14	PDATA7	I	RGB DATA	**Blue_D7**	GREEN_D1			
PIN15	GND	GND	Ground	**GND**	GND			
PIN16	PDATA8	I	RGB DATA	**GREEN_D0**	GREEN_D2			
PIN17	PDATA9	I	RGB DATA	**GREEN_D1**	GREEN_D3			
PIN18	PDATA10	I	RGB DATA	**GREEN_D2**	GREEN_D4			
PIN19	PDATA11	I	RGB DATA	**GREEN_D3**	GREEN_D5			
PIN20	PDATA12	I	RGB DATA	**GREEN_D4**	RED_D0			
PIN21	PDATA13	I	RGB DATA	**GREEN_D5**	RED_D1			
PIN22	PDATA14	I	RGB DATA	**GREEN_D6**	RED_D2			
PIN23	PDATA15	I	RGB DATA	**GREEN_D7**	RED_D3			
PIN24	GND	GND	Ground	**GND**	GND			
PIN25	PDATA16	I	RGB DATA	**RED_D0**	RED_D4			
PIN26	PDATA17	I	RGB DATA	**RED_D1**	RED_D5			
PIN27	PDATA18	I	RGB DATA	**RED_D2**	NC			
PIN28	PDATA19	I	RGB DATA	**RED_D3**	NC			
PIN29	PDATA20	I	RGB DATA	**RED_D4**	NC			
PIN30	PDATA21	I	RGB DATA	**RED_D5**	NC			
PIN31	PDATA22	I	RGB DATA	**RED_D6**	NC			
PIN32	PDATA23	I	RGB DATA	**RED_D7**	NC			
PIN33	GND	GND	Ground	GND				
PIN34	NC	-	NC	NC				
PIN35	NC	-	NC	NC				
PIN36	NC	-	NC	NC				
PIN37	PROJ_ON	I	Standby Enable	**1: Enable** 0: Desable				
PIN38	NC	-	NC	**NC**				
PIN39	NC	-	NC	NC				
PIN40	NC	-	NC	NC				
PIN41	NC	-	NC	NC				
PIN42	IIC_SDA	I	IIC SDA	iic				note4
PIN43	IIC_SCL	I	IIC_SCL	iic				note4
PIN44	GND	GND	Ground	GND				
PIN45	NC	-	NC	NC				
PIN46	NC	-	NC	**NC**				
PIN47	NC	-	NC	NC				
PIN48	NC	-	NC	**NC**				
PIN49	NC	-	NC	NC				
PIN50	GND	GND	Ground	GND				
PIN51	GND	GND	Ground	GND				

7.3 Notes:

(1) CPUVSYNC : the signal be used in CPU I/F mode ,other mode please pull down.

(2) Video control signals, please pay special attention to the polarity, and see the default settings.

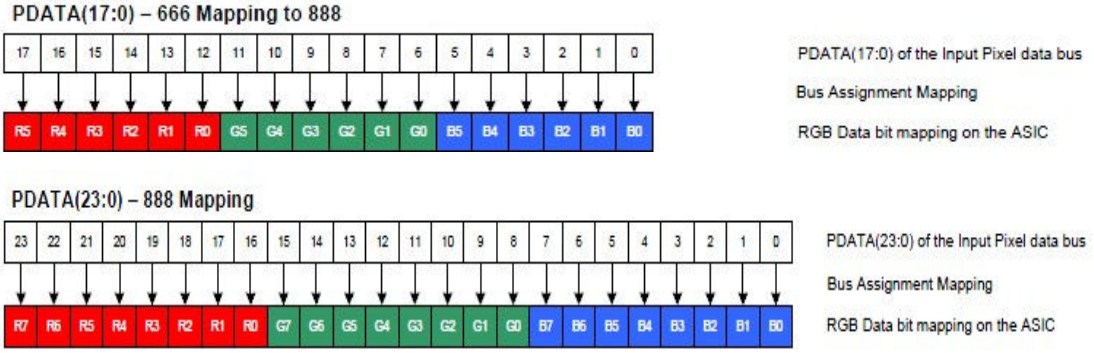
(3) PDATA(23:0) bus mapping is pixel format and source mode dependent.

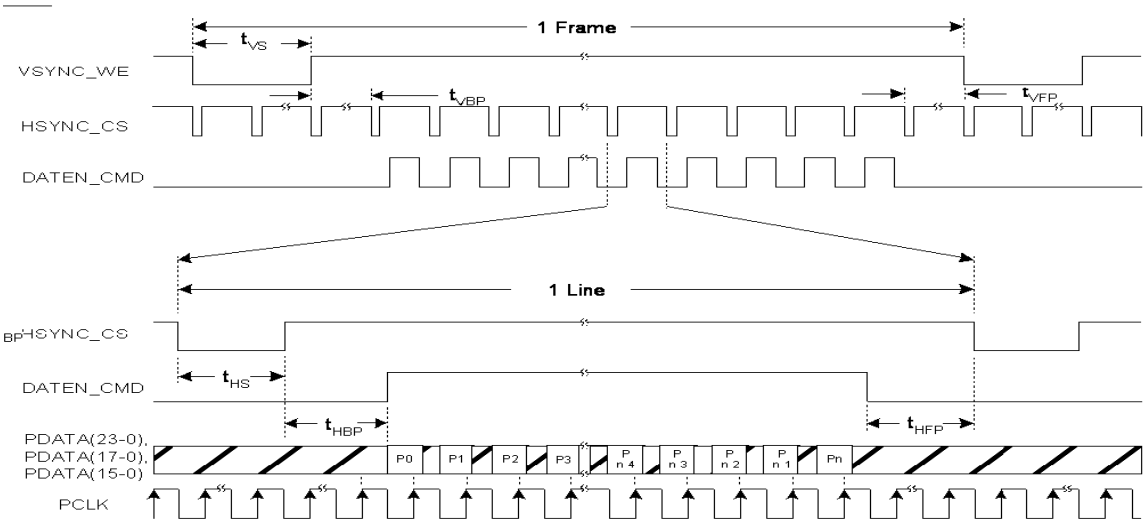
(4) External control functions can be achieved by the IIC, such as image flips, resolution changes the interface mode, current adjustment.

(5) Default VCC_INTF is 3.3V

7.4 Input features of RGB888 RGB666

7.4.1 Parallel Bus Mode





7.4 Note:

The description of parameters is according to following signal polarity setting.

(1) Defines the pixel clock edge is sampled on rising edge.

(2) Defines the polarity of the incoming VSYNC signal is Active-low.

(3) Defines the polarity of the incoming HSYNC signal is Active-low.

(4) Defines the polarity of the incoming DATEN_CMD signal is Active-high

Parallel Bus Source:WVGA 854*480

Resolution (WVGA):854 x 480

7.5 Power and Initialization

Absolute maximum ratings over recommended operating free-air temperature range (unless otherwise noted)†

Supply voltage range (see Note 1, 2):
- V_{DD} (Core) ..... -0.3 V to 1.21 V
- V_{DDLP12} (DSI-DHY LP I/O) ..... -0.3 V to 1.32 V
- VCC18 (All 1.8 V Power + sub-LVDS) ..... -0.3 V to 1.96 V
- VCC_INTF (Host I/O Power) ..... -0.3 V to 3.60 V
  - VCC_INTF (if 1.8V Power used) ..... -0.3 V to 1.99 V
  - VCC_INTF (if 2.5V Power used) ..... -0.3 V to 2.75 V
  - VCC_INTF (if 3.3V Power used) ..... -0.3 V to 3.60 V
- VCC_FLSH (Flash I/O Power) ..... -0.3 V to 3.60 V
  - VCC_FLSH (if 1.8V Power used) ..... -0.3 V to 1.96 V
  - VCC_FLSH (if 2.5V Power used) ..... -0.3 V to 2.72 V
  - VCC_FLSH (if 3.3V Power used) ..... -0.3 V to 3.58 V
- VDD_PLLM (MCG PLL) ..... -0.3 V to 1.21 V
- VDD_PLLD (1DCG PLL) ..... -0.3 V to 1.21 V

Operating junction temperature range, T_J ..... -30°C to 125°C

Storage temperature range, T_{stg} ..... –40°C to 125°C

Electrostatic discharge voltage using the: Human Body Model ..... +/- 2000 V (3)
Electrostatic discharge voltage using the: Charged Device Model..... +/- 500 V (3)

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES:
(1) All voltage values are with respect to GND.
(2) Overlap currents, if allowed to continue flowing unchecked, not only increase total power dissipation in a circuit but degrade the circuit reliability thus shortening its usual operating life.

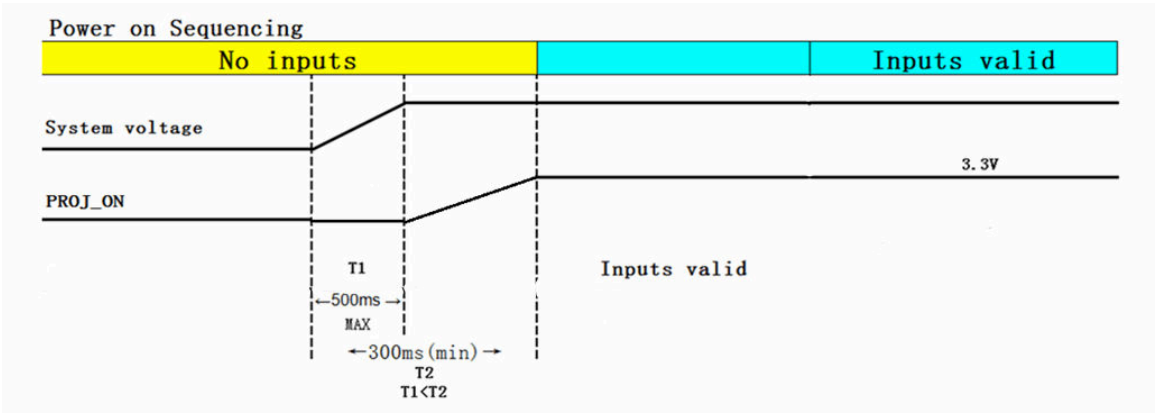
7.6 Recommended operating conditions

	PARAMETER	NOTE	MIN	TYP	MAX	UNIT
VDD	Core Power 1.1V (Main 1.1V)	+/- 5% tolerance	1.045	1.10	1.155	V
VDDLP12	DSI PHY Low Power mode driver supply (1.1V) or (1.2V)	+/- 5% tolerance See Note 2,4,5	1.02 1.12	1.1 1.2	1.18 1.28	V
VCC18	All 1.8V I/O Power: (1.8V power supply for all I/O other than the Host/ Parallel I/F & the SPI Flash I/F. This includes RESETZ, PARKZ LED_SEL, CMP, GPIO, IIC1, TSTPT & JTAG pins)	+/- 8.5% tolerance	1.64	1.8	1.96	V
VCC_INTF	Host / Parallel Interface I/O Power: 1.8 to 3.3V (Includes IIC0, PDATA, Video Syncs & HOST_IRQ pins)	+/- 8.5% tolerance See Note 2	1.64 2.28 3.02	1.8 2.5 3.3	1.96 2.72 3.58	V
VCC_FLSH	Flash Interface I/O Power:1.8 to 3.3V	+/- 8.5% tolerance See Note 2	1.64 2.28 3.02	1.8 2.5 3.3	1.96 2.72 3.58	V
VDD_PLLM	MCG PLL 1.1V power	+/- 9.1% tolerance See Note 3	1.025	1.1	1.155	V
VDD_PLLD	DCG PLL 1.1V power	+/- 9.1% tolerance See Note 3	1.025	1.1	1.155	V
T_A	Operating ambient temperature range		-30		85	°C
T_C	Operating top center case temperature					°C
T_J	Operating junction temperature		-30		105	°C

Notes:

(1) The number inside each parenthesis for the I/O refers to the type defined in the I/O type subscript definition section.
(2) These supplies have multiple valid ranges.
(3) These I/O supply ranges are wider to facilitate additional filtering.
(4) If DSI is not needed, then DSI LP supply (VDDLP12) should be tied to 1.1V core supply. If DSI is needed, then the OEM has the option to run VDDLP12 at 1.1V nominal (and tie it to the VDD supply) or 1.2 V nominal. If 1.1V VDDLP12 is used, then this will meet all MIPI specifications at the host but this is not as explicitly defined by MIPI.
(5) When DSI-PHY LP supply (VDDLP12) is fed from a 1.2V supply, the 1.2V power must sequence ON before the 1.1V core supply
(6) The Operating Ambient temperature range assumes zero forced air flow, a JEDEC JESD51 Junction to Ambient Thermal Resistance value at zero forced air flow (RthetaJA at 0 m/s), a JEDEC JESD51 standard test card and environment, along with min and max estimated power dissipation across process, voltage and temperature. Thermal conditions will vary by application which will impact RthetaJA. Thus maximum operating ambient temperature will vary by application.
- Ta_min = Tj_min - (Pd_min * RthetaJA) = -30C - (0.0W * 30.3 C/W) = -30 C
- Ta_max = Tj_max - (Pd_max * RthetaJA) = +105C - (0.348W * 30.3 C/W) = +94.4 C

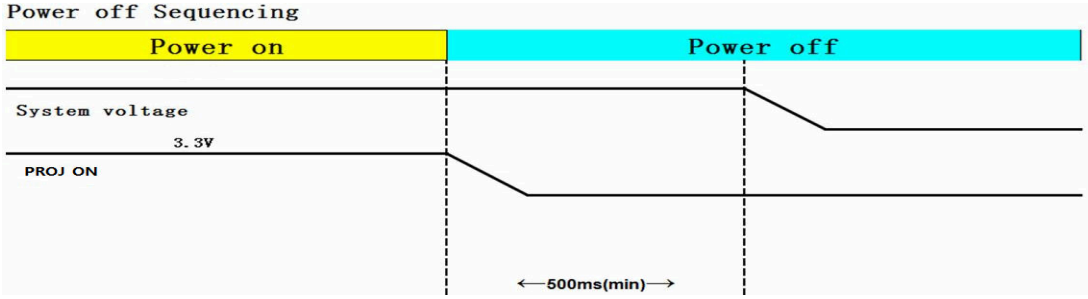
7.7 Power On Sequencing



Power Off Sequencing

1:Must enter PROJ_ON PIN37 ==> 0

2:Turn off System voltage ==> 0



八．Heat Dissipation

8.1 Heat Dissipation, follow the rules as the below:

1、LED and DMD chip's temperature must be low than the spec. as follow.

R/B：45° Max

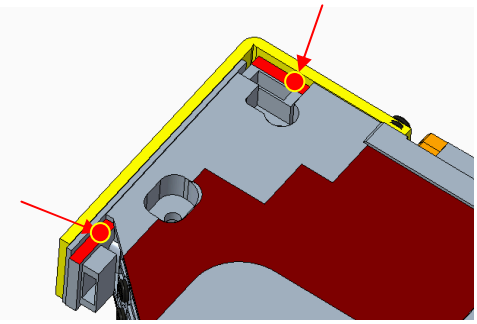
G：50° Max

LED Current(Max):

R:1.5A 1.35W

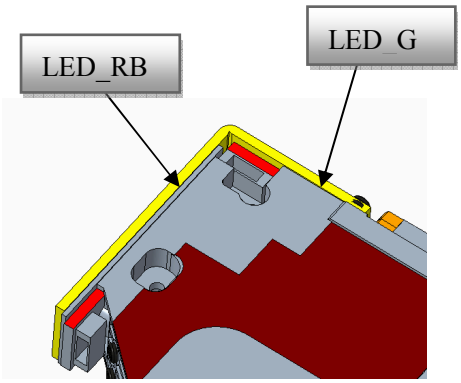
G: 2A 3.5W

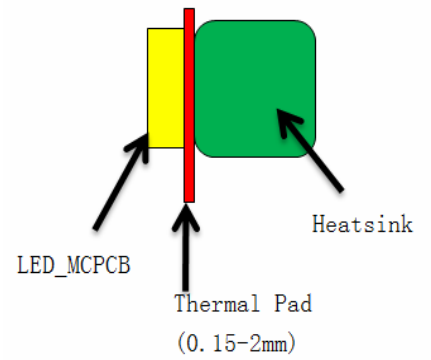
B:1.5A 1.2W



8.2 Heatsink And Wind Flow

1. Within the acceptable of fan noise and finished product dimension,increase air flow rate and product volume to reduce the temperature and maximum optical engine life.
2. Between tha gap of LED&Heatsink,makesure use the thermal pad,do not use fluidity material,in case shorted because the three LEDMCPCB has difference electrical polar



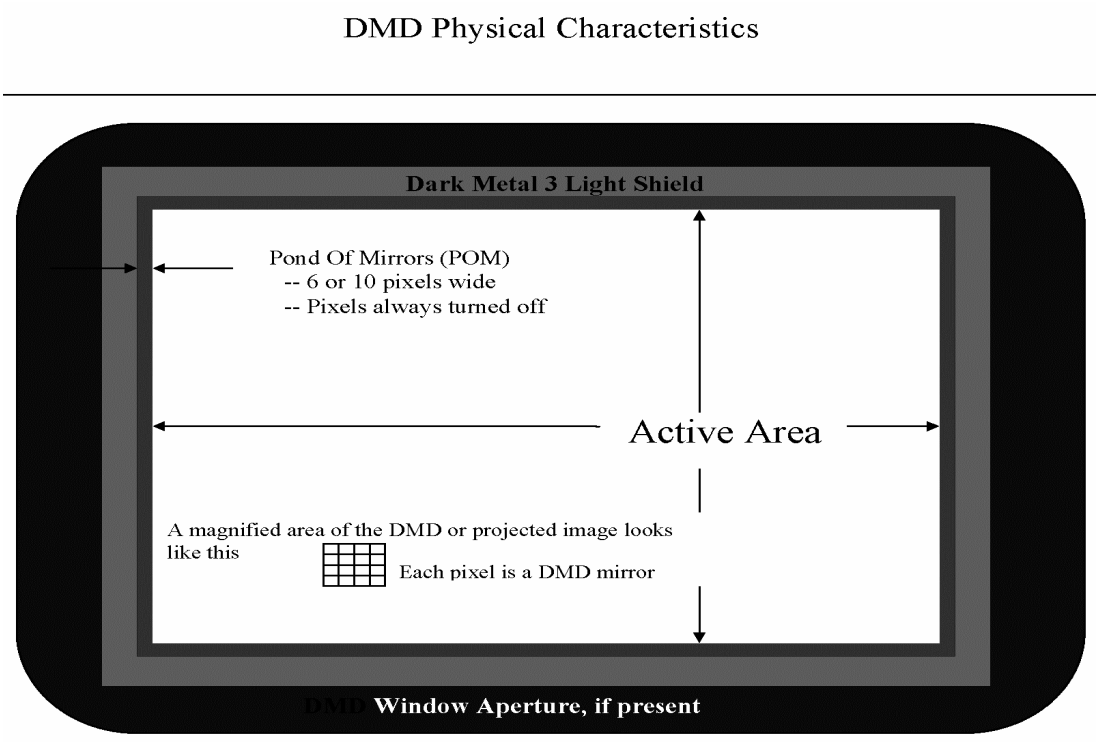


九、Electrostatic Discharge Immunity

All external signals on the Engine module are protected from damage by electrostatic discharge,and are tested inaccordance with JESD22-A114-B Electrostatic Discharge (ESD) Sensitivity Testing Human Body Model(HBM).Add attached file "DMD Artifact Illustration& ESD"for reference.

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 (1)	±2000	V

十、DMD Artifact Illustration



Example of a Dark Pixel

(When projected image in focus)

On any colored screen, except Black, a magnified area of the projected image for Dark Pixel looks like this. The pixel must be tested and judged using the DMD IQ spec.

It is possible for pixel to appear gray, but working. In this case it is not classified as a Dark Pixel. The pixel must be tested and judged using the IQ spec.

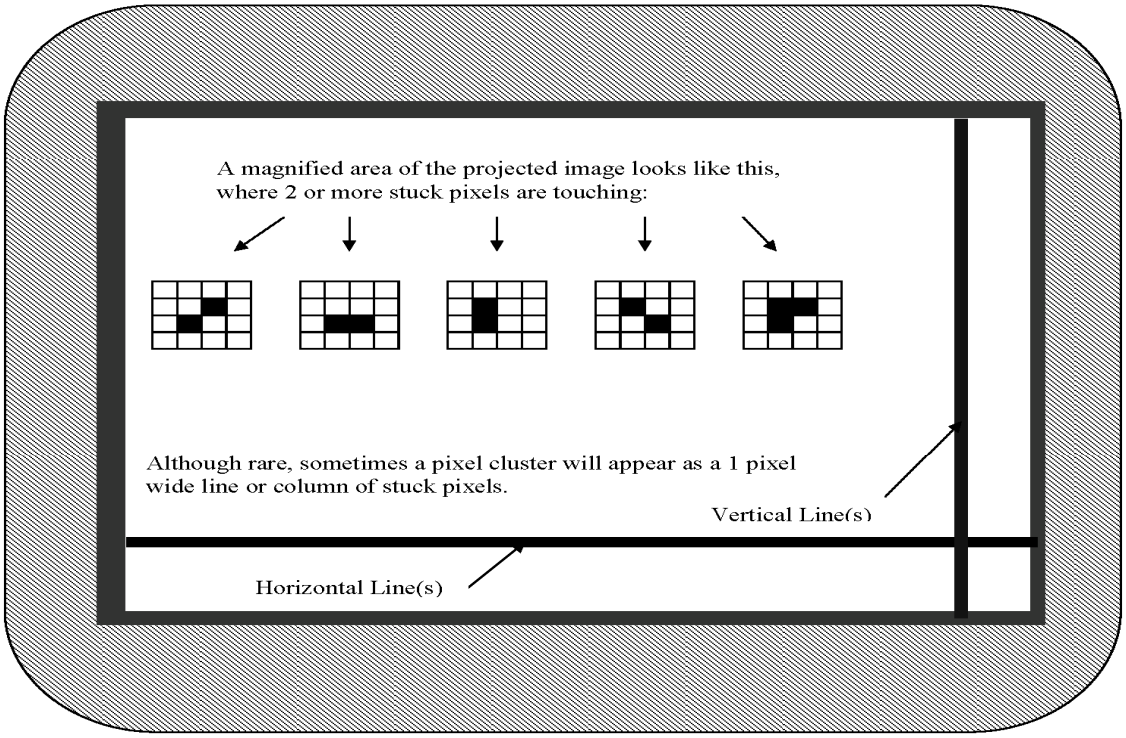
Example of a Bright Pixel

(When projected image in focus)

On any colored screen, except White, a magnified area of the projected image looks like this

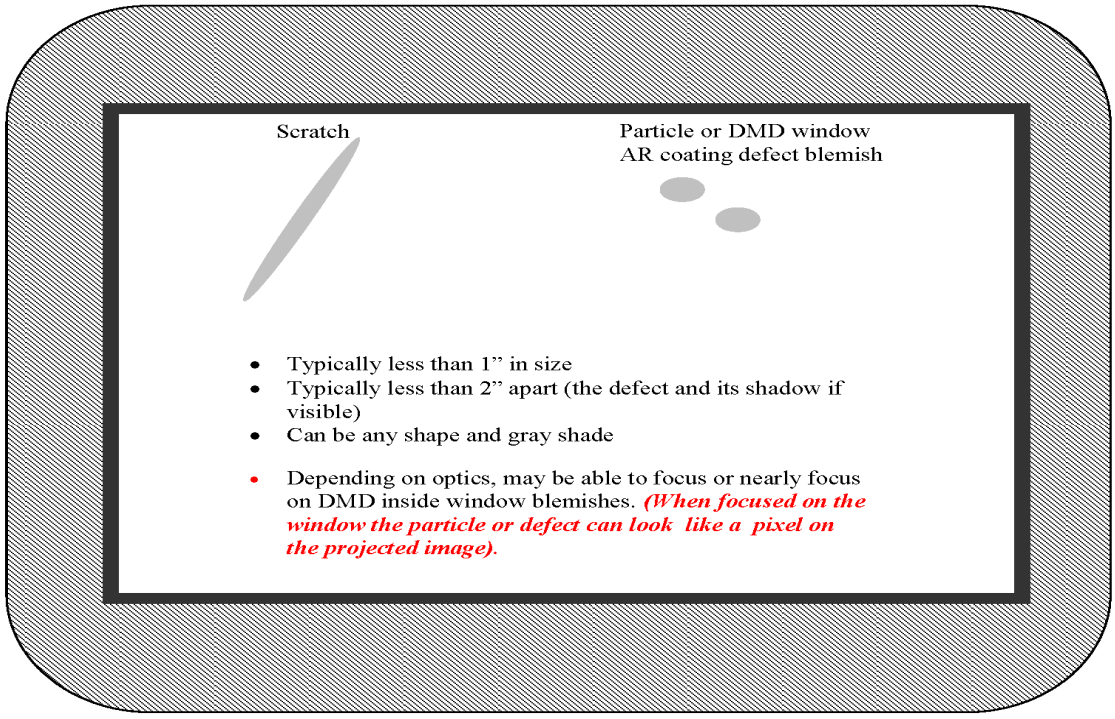
It is possible for pixel to appear gray, but working. In this case it is not classified as a Bright Pixel. The pixel must be tested and judged using the IQ spec.

Examples of Adjacent Stuck Pixels
(Also called Clusters)

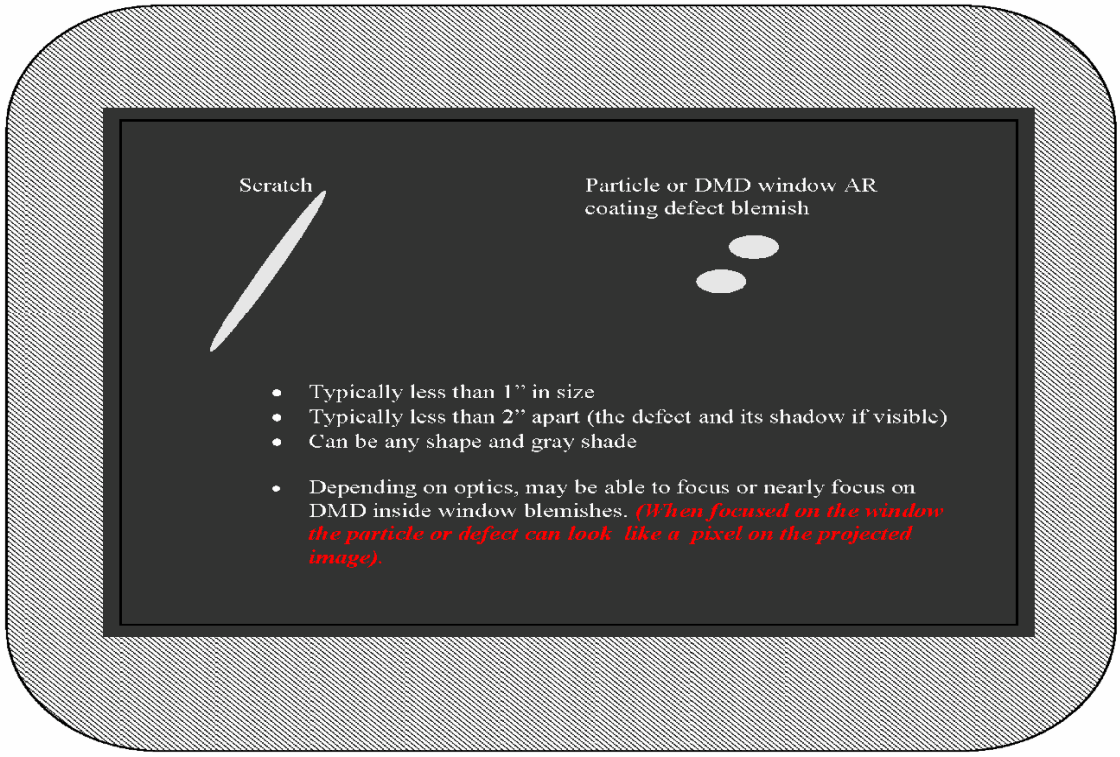


Example of Dark Blemish **Inside the DMD**

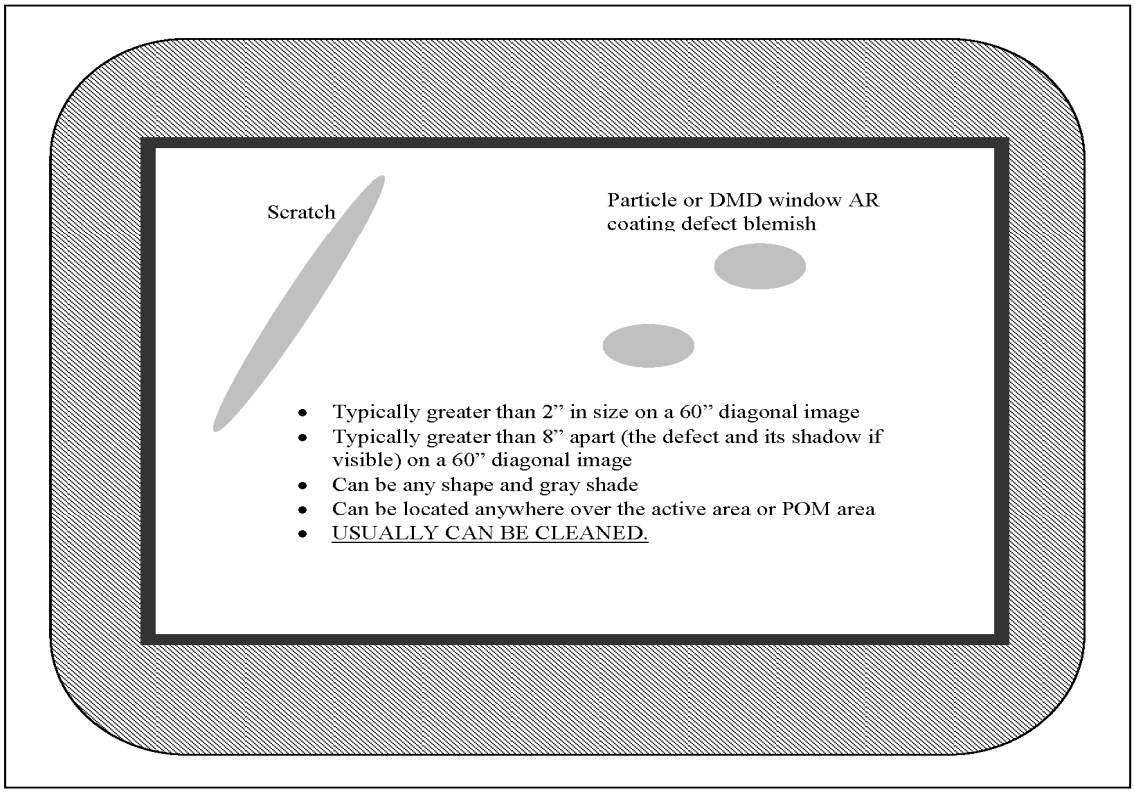
Blemishes can be caused by defects on the DMD window or other surfaces in the optical path to the DMD. Reference the applicable Image Quality spec for the intensity, size, and quantity, for of allowable DMD blemishes.



Example of Light Blemish **Inside the DMD**



Examples of Dark Blemish **Outside the DMD**



If any of the example artifacts are seen,we ask you please do the following:

► **Reference IQ spec for PASS/FAIL**

1. SCOPE

This document specifies the image quality requirements applicable to the DLP® .3 WVGA Component Sets. The Component Set provides the DLP® .3 WVGA Projector with digital imaging functionality based on Digital Micromirror Device (DMD) technology.

2. Definitions

2.1 Blemish

A blemish is an obstruction, reflection, or refraction of light that is visible, but out of focus in the projected image under specified conditions of inspection (see Table 1). It is caused by a particle, scratch, or other artifact located in the image illumination path.

2.2. Dark pixel

A single pixel or mirror that is stuck in the OFF position and is visibly darker than the surrounding pixels.

2.3. Bright pixel

A single pixel or mirror that is stuck in the ON position and is visibly brighter than the surrounding pixels.

2.4. Unstable pixel

A single pixel or mirror that does not operate in sequence with parameters loaded into memory. The unstable pixel appears to be flickering asynchronously with the image.

2.5. Adjacent pixel

Two or more stuck pixels sharing a common border or common point, also referred to as a cluster.

2.6. Row or Column Defect

Dark or Light column(s) or row(s) are groups of pixels that are not operating or are not operating in sequence with the parameters loaded into memory.

2.7. Pond of Mirrors (POM)

POM is a rectangular array of off-state mirrors surrounding the active area.

3. ACCEPTANCE REQUIREMENTS

3.1. Conditions of Acceptance

All DMD image quality returns will be evaluated using the following projected image test conditions:

a. Test Set degamma shall be linear.
b. Test Set brightness and contrast settings shall be set to nominal.
c. The diagonal size of the projected image shall be a minimum of 20 inches.
d. The projection screen shall be 1X gain.
e. The projected image shall be inspected from a 38 inch minimum viewing distance.
f. The image shall be in focus during all Table 1 tests.
g. Maximun Lumens on Active Array (mirrors) is 100.

TABLE 1. Image Quality Specification

SCREEN	ACCEPTANCE CRITERIA
Gray 10	1. No Bright Pixels in Active Area 2. ≤ 1 Bright Pixels in the POM
White	1. ≤ 4 Dark Pixels in the Active Area
Any screen	1. No Adjacent Pixels/Clusters 2. No Unstable Pixels in Active Area 3. No DMD window aperture shadowing on the Active Area 4. No Row or Column defects 5. Blemishes are allowed 6. Eyecatcher and Border Artifacts are allowed

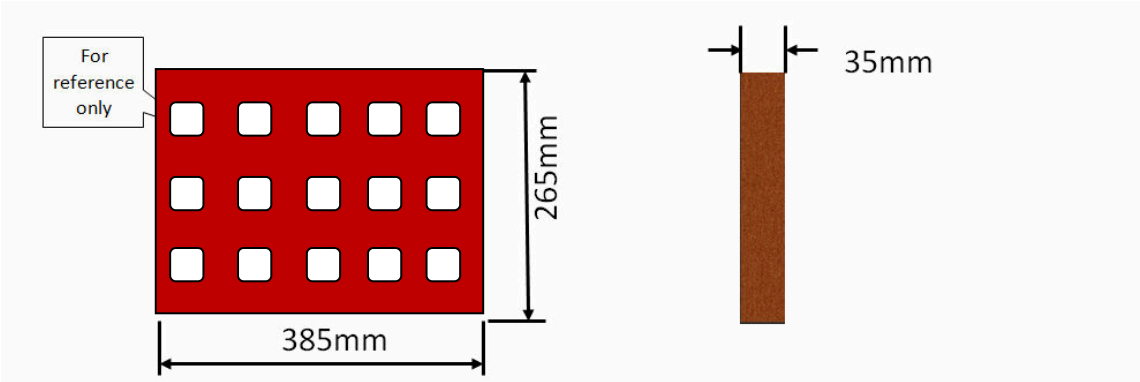
Notes:

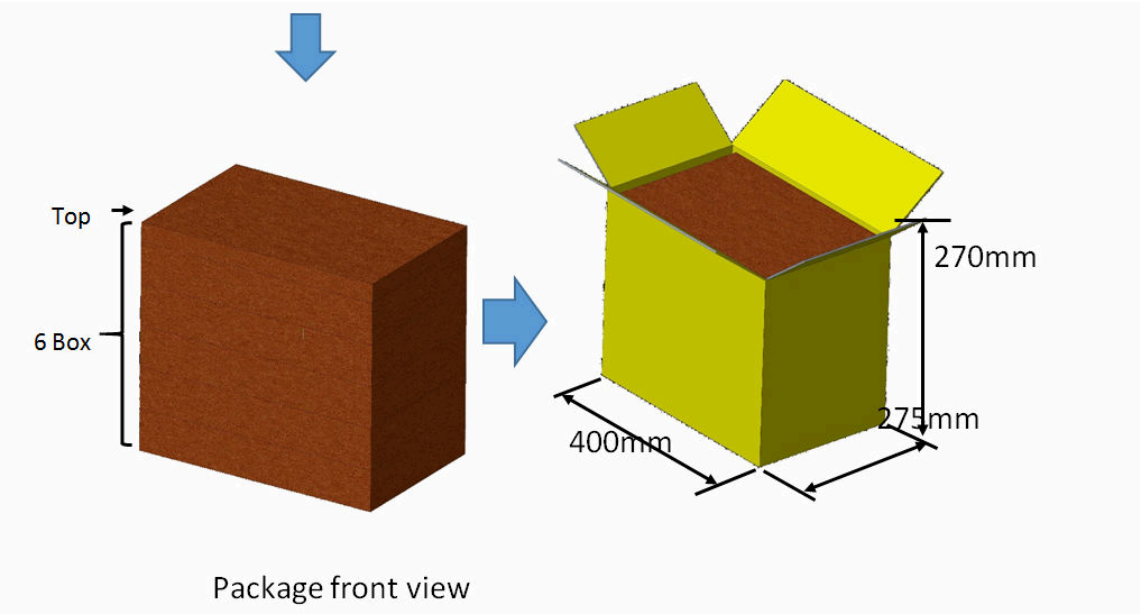
1. Projected blemish numbers include the count for the shadow of the window artifact in addition to the artifact itself.
2. During all Table 1 tests, projected images shall be inspected in accordance with the conditions of inspection specified in Section 3.
3. The rejection basis for all cosmetic DMD defects (scratches, nicks, particles) will be the projected image tests referenced in Table 1.
4. Devices that meet this image quality specification but are deemed undesirable by the customer may not be returned to TI without prior approval by TI.

十一.Package

Package: 15PCS/BOX (385*265*35)

90PCS/BIN(400*275*270)





Package front view