REVISIONS			
REV	**DESCRIPTION**	**DATE**	**APPROVED**
A	Initial Drawing Release	8/13/2012	Mark Kacko
B	Update dark pixel in table 1	8/17/2012	Mark Kacko
C	Update Table 1 and Figure 1 from critical/non-critical Zone to Zone A and Zone B; added active area description to Figure 1 title	8/19/2012	Mark Kacko

DMD Customer
Image Quality Specification
For S600 1910-xxx2E

		DWN/CHK Mark Kacko	DATE 8/14/12	TITLE .DMD Customer Image Quality Specification for S600 1910-xxx2E		
		ENGR Mark Kacko	DATE 8/14/12			
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NHA	**USED ON**	OPERATIONS Bill Vanderbilt	DATE 8/14/12	SIZE **A**	DRAWING NO 2512642	REV C
APPLICATION		APVD Laura Knight	DATE 8/14/12	SCALE NONE	SHEET 1 OF 6	

1. SCOPE

This document specifies the image quality requirements applicable to the DLP® .65 1080p Series 600 (S600) 2xLVDS Component Set. The Component Set provides the DLP® .65 1080p S600 2xLVDS 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 Reset boundary artifact

The reset boundary artifact is a single row of pixels on the reset group boundaries that are visibly darker or lighter than the neighboring rows of pixels.

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 Two Zone Blue 60 Screen

The Two Zone Blue 60 screen is used to test for major dark blemishes. Refer to Figure 1 for configuration. All areas of the screen are colored a Microsoft Paintbrush blue 60 (green and red set at 0, blue set at 60).

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 blue level on the test screen image.

2.11 Two Zone Gray 10 Screen

The Two Zone Gray 10 screen is used to test for major light blemishes. Refer to Figure 1 for configuration. 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.

2.12 Gray 30 Screen

The Gray 30 screen is used to test for the reset boundary artifact. All areas of the screen are colored a Microsoft Paintbrush gray 30 (green, red, and blue set at 30).

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.

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 60 inches.
d. The projection screen shall be 1X gain.
e. The projected image shall be inspected from an 8 feet minimum viewing distance.
f. The image shall be in focus during all Table 1 tests.

3.2 Test Sequence

Tests shall be run in the sequence listed in Table 1.

TABLE 1. Image Quality Specification

SEQ #	TEST	SCREEN	ACCEPTANCE CRITERIA
1	Major Dark Blemish	Two Zone Blue 60	1. 0 dark blemishes in the Zone A 2. ≤ 2 dark blemishes in thel Zone B 3. No dark blemish will be > ½" long/diameter in the Zone B
2	Major Light Blemish	Two Zone Gray 10	1. 0 light blemishes in the Zone A 2. ≤ 2 light blemishes in the Zone B 3. No light blemish will be > ½" long/diameter in the Zone B 4. No blemish shall be brighter that Microsoft Gray 60 in the Zone B
3	Reset Boundary Artifact	Gray 30	1. No reset boundary artifacts allowed
4	Eyecatchers / Border Artifacts	Gray 10	1. No Eyecatcher or border artifact will be lighter than Microsoft Gray 10 2. All Eyecatcher's and border artifacts ≥ 5 inches from the POM are acceptable 3. ≤ 6 minor eyecatchers are allowed. A minor eyecatcher is defined as lighter that Gray 7 but not lighter than Gray 10
5	Streaks	Blue 60 Gray 10 White	1. No streaks
6	Minor Blemishes	Any Screen	1. ≤ 6 total minor blemishes allowed 2. No blemish shall be > 5 inches long /diameter
7	Pixel	1. Any Screen 2. Gray 10 3. Any Screen 4. Gray 10 5. White	1. No adjacent pixels 2. No bright pixels in Active Area 3. No unstable pixels in Active Area 4. ≤ 1 bright pixel in the POM 5. 0 dark pixels in Zone A, ≤ 2 dark pixels in Zone B

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 < Gray 7 shall not be used as a basis for rejecting a DMD for image quality.

Figure 1. Two Zone Screen
(Active Area 1920 x 1080)