

# Performance Evaluation Report

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## VUQUEST3310g Area Imager with 2DTG's DPM Decoder: Performance Evaluation

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### 1. Objective

The objective of this study was to evaluate performance of the **Honeywell VUQUEST3310g Area Imager**, upgraded with **icEveryCode™ DPM Decoder**, including its comparison with **Honeywell Xenon 1900 Scanner**.

3 devices were selected for this study:

- 1.1 **VUQUEST3310g Area Imager by Honeywell Corp.**, upgraded with the **icEveryCode™ DPM Decoder** (DPM decoding software) by 2DTG.
- 1.2 **VUQUEST3310g Area Imager by Honeywell Corp.** with the original (“system”) decoding software.
- 1.3 **Xenon 1900 HD by Honeywell Corp.**, upgraded with the **icEveryCode™ DPM Decoder** (DPM decoding software) by 2DTG.

Note: Device 1.3 was used for reference purpose only.

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## 2. Test Scope

Three performance parameters were measured on the representative sets of DPM marks:

**Decode Rate or Success Rate** - defined as a ratio equal to the percentage of the successful decoding within the given set of samples.

**Operating Range** - one of the most challenging performance parameters for any DPM reader along with

Decode Rate. Industries require DPM readers to be capable to decode DPM marks at the distance up to 2 inches from the exit window for the small DataMatrix symbols, having module size in the range of 5-7 mils, and up to 8 inches for the 20-40 mils symbols.

**Decode time** - defined as the full time required for successful decoding: from starting to aim at the symbol until it is decoded.

## 3. Test Procedure

### 3.1. Samples

The set of DPM samples, comprising “typical” materials (steel, cooper, duralumin, plastic, etc.), surfaces (cast, polished, etc.) and type of DPM marks (Dot Peen, Laser etching) were selected for the test. Some of the samples have been chosen intentionally challenging.

Set contains 23 Data Matrix DPM samples: laser etched - 8, Dot penned - 15. Module size is ranging from 4.4 to 31 mil; average module size – 19.8 mil. Sample images - as captured by regular camera - are shown in the Exhibit 1. Dot Peen samples, depicted on the pictures as having “red dots” (and marked with letter “F”), were not considered in this analysis (except image # HF12).

Some of the “undecodable” samples were excluded from the ulterior analysis, as follows:

- Sample #H11 – below the resolution limit for both VUQUEST3310g and Xenon 1900
- Samples ## HF6, HF9 and HF10 – not decodable by any studied scanners

Reading technique is described in the [“DPM Multi-Platform Plugin”](#) User’s Guide.

### 3.2. Definitions

All decode results fall under the 3 categories:

- **“Stable Decoding”** – meaning that decoding was successful from the first try – no lighting

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or distance adjustment, or aiming angle optimization was required.

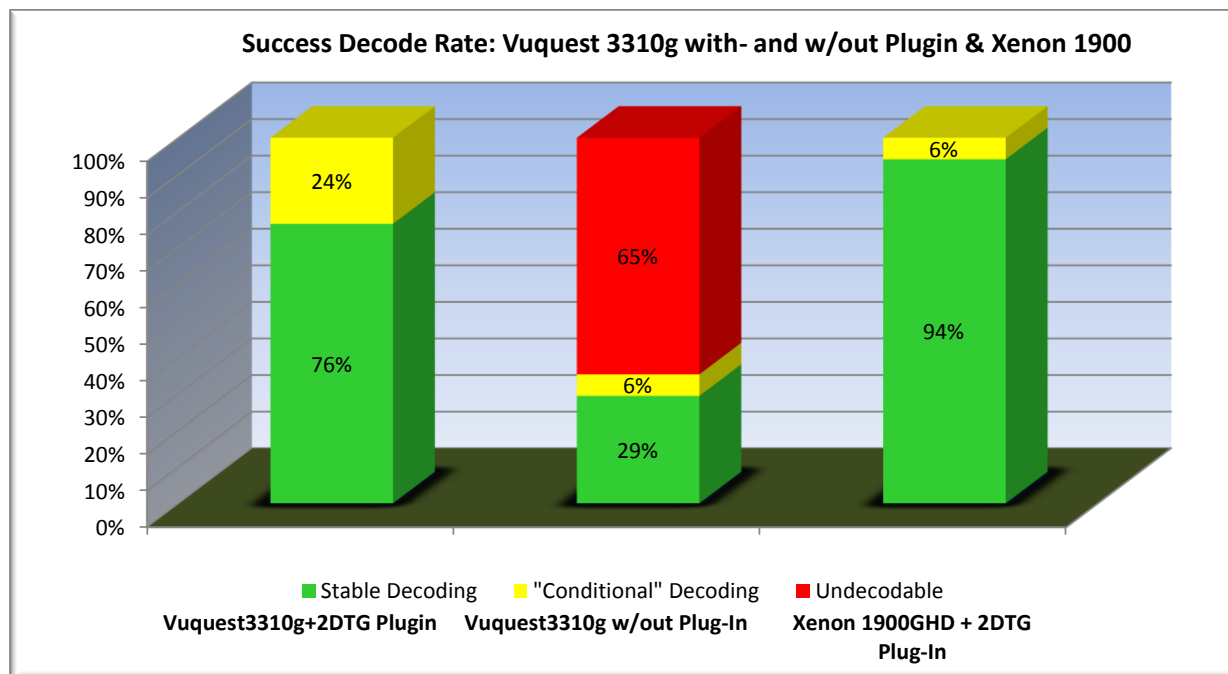
- **“Conditional Decoding”** - decoding was successful, but some adjustments had to be made during the image capturing process: image capture has to be performed under the certain angle to the surface to avoid direct light reflection from the substrate. “Optimal” value of this angle as well as distance from the target depends both on surface condition and ambient light. Accordingly, this “optimal” angle and distance has to be worked out by operator experimentally and capture time depends on operator experience.
- **“Undecodable”**

The time stamp for the **“Stable Decoding”** we considered to be up to 2 sec; for the **“Conditional Decoding”** – up to 5 sec; and for **“Undecodable”** – more than 10 sec.

**Operating Range** was calculated as the difference between the maximum and minimum **Reading Distance**.

### 4. Test Results

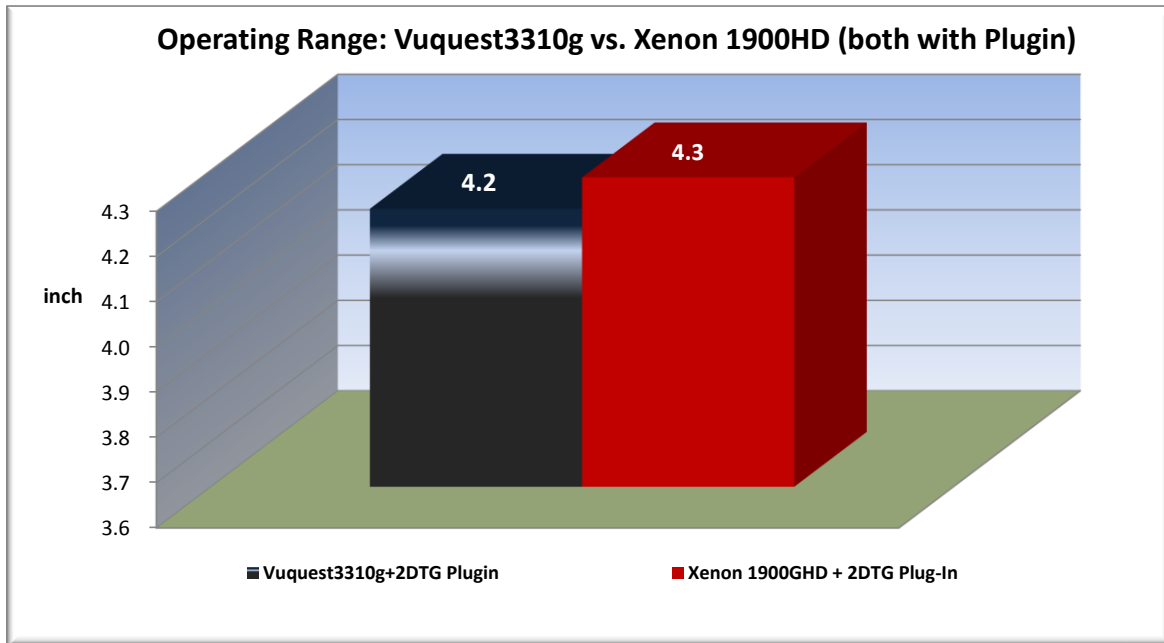
Side-by-side comparison of the Success Decode Rate for **VUQUEST3310g** with- and without 2DTG’s Plugin is demonstrated by the diagram below (Xenon 1900HD results are shown as a reference):



Comparison of the average operating ranges for the devices 1.1 and 1.2 is not meaningful since only few samples were decoded by Vuquest3310g without Plugin.

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Average Operating Range for the Vuquest3310g and Xenon 1900HD (both with Plugin) is basically the same, demonstrating that it's more dependant on the samples quality than a type of imager (for DPM samples):



## 5. Conclusion

As expected, **Vuquest3310g**, upgraded with DPM PlugIn, demonstrates very good DPM performance – **Success Decode Rate** – the same as Xenon 1900 with DPM Plugin, which is in turn on par with the DPM industry leaders: DS3508-DP20185R (Motorola Solutions, Inc.) and DataMan 7500 (Cognex Corp.).













“High Density” type of imager is preferable for DPM applications since it provides higher resolution. Imager’s operating range is more dependant on the samples quality than a type of imager.

Scanning technique for Vuquest3310g is slightly different than for Xenon 1900: for Vuquest3310g the best result can be achieved when holding imager at ~ 10-15 degree off the perpendicular to the surface; for Xenon 1900 this angle is ~ 45 degrees.





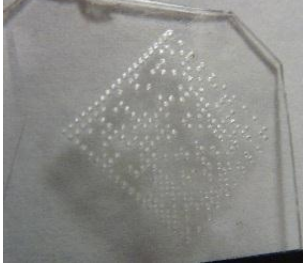





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## 6. Exhibit 1. DPM Samples

<b>H1</b> Cast Duralumin 26x26; 24 mil	<b>H2</b> Cast Duralumin 18x18; 20 mil	<b>H3</b> Polished Steel 18x18; 10 mil	<b>H4</b> Chrome-plated Steel 18x18; 11 mil
			
<b>H5</b> Painted Al 26x26; 21 mil	<b>H6</b> Painted Plastic 12x12; 23 mil	<b>H7</b> Polished Al 12x12; 23 mil	<b>H8</b> Black Plastic 12x12; 20 mil
			
<b>H9</b> Polished Al 26x26; 12 mil	<b>H10</b> Polished Al 14x14; 11 mil	<b>H11</b> AMD chip 18x18; 4.4 mil	<b>H12</b> Black Plastic 12x12; 21 mil
			

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<p><b>H13 + H13F</b> Milled Steel 20x20; 26 mil</p>	<p><b>H14 + H14F</b> Milled Brass 20x20; 22 mil</p>	<p><b>H15 + H15F</b> Milled Cooper 20x20; 16 mil</p>	<p><b>H16 + H16F</b> Polished Duralumin 20x20; 24 mil</p>
			
<p><b>H17 + H17F</b> Organic Glass 20x20; 30 mil</p>	<p><b>H18 + H18F</b> Teflon 20x20; 30 mil</p>	<p><b>H19 + H19F</b> Colored Organic Glass 20x20; 30 mil</p>	<p><b>H20 + H20F</b> Textolite 20x20; 16 mil</p>
			
<p><b>H21 + H21F</b> Duralumin, distressed 20x20; 16 mil</p>	<p><b>H22 + H22F</b> Curved polished steel 16x16; 17 mil</p>	<p><b>H23F</b> Duralumin 20x20; 18 mil</p>	<p><b>H24F</b> Duralumin 20x20; 28 mil</p>
		<p style="text-align: center;">Not Available for this Test</p>	