KEYPOINT INTELLIGENCE

CUSTOM TEST REPORT

October 2021

Comparative Out-of-Box Photo Reliability Test: Canon PIXMA G650 vs. Rival Ink Tank Device

Objective

Everyone has a smartphone in their pocket with which they can take photos to record treasured moments with loved ones and friends, so it's no surprise that on-demand photo booths and service centres are becoming ever more popular. Fast, easy, and efficient printing of photos is now big business, not to mention a market that can be entered for little financial investment thanks to low-cost photo printers.

To investigate how reliable these entry-level photo printers can be, Canon Europe commissioned Keypoint Intelligence to run an intensive photo printing test using the Canon PIXMA G650* and a rival ink tank device (Device A) to see how many perfect photos they can print over the course of a 15,000-photo print run. Keypoint Intelligence printed 4in x 6in borderless photos on each device and studies each photo for image quality defects while keeping note of other reliability issues. As would be typical in a busy photo booth, not every photo was checked in real time. Instead, quality checks were undertaken after periods of unattended printing based on the expectation of reliable performance and generating photos for which a customer would be happy to pay. Testing was undertaken at Keypoint Intelligence's UK facility in Wokingham, England.

* The Canon PIXMA G650 is also sold as the Canon PIXMA G640. It also features same print engine as G540 and G550 models, so this report is applicable to those devices.

Executive Summary

The Canon G650 printed the full complement of 15,000 photos (125 batches comprised of 120 photos per batch), with only two batches showing any defects (the defects in one batch auto-corrected themselves during the print run, while the defects in the other required a manual cleaning intervention). Device A also performed well but not to the level of the Canon, as three batches experienced quality issues (two recovered automatically, and one required a manual cleaning intervention). However, Device A ground to a halt during Batch 78 at 9,263 impressions due to the waste ink absorption pad becoming fully saturated. The replacement of this pad is a service-only task so the device would effectively be at end of life for most users, who would simply buy a new device rather than go through the headache of organising a service event and the potential costs that this would incur, plus lost revenue.

While the primary aim of the test was to conduct a reliability analysis of the two devices, Keypoint Intelligence lab technicians also weighed in on the comparative design and ease of use. The techs found ink replenishment on Device A to be a messy affair. The nozzle must be removed and a foil seal peeled off the ink bottle before first use, an action that can result in the transfer of ink to fingers. The nozzle must be screwed back onto the bottle and then the bottle must be flipped upside down so that the nozzle can be inserted quickly into the tank. It is at this point that ink drops can easily be ejected from the bottle, resulting in spillage. Also, while there is a coloured label on the reservoir door, there is no keying of bottles, so a user could reload an ink into the wrong reservoir—which would destroy the device. In contrast, refilling the Canon PIXMA G650's ink tanks is a mess-free process, as each bottle is uniquely keyed so it can only be installed into the correct reservoir tank. Furthermore, the ink does not start flowing until the bottle is properly installed on the tank opening, reducing the risk of any ink spillage on the operator or the work area.

Both devices had the same failing: That ink could be fully exhausted from one or more colours without the device stopping. In fact, both vendors instruct the operator to replenish ink when the ink gets to a minimum line that is visible in the ink reservoir window. The Canon ink reservoir window is at the front of the device and easy to see. In contrast, Device A's ink tank windows are on the side of the device, making it much easier to miss when the minimum ink level has been exceeded. The reloading of the inks is also conducted from the front of the Canon device, with the clamshell body being lifted up to reveal the reservoir openings. Device A, meanwhile, has ink tanks on the side of the device, so the unit must be detached from the engine and laid flat, after which the ink tanks can be refilled. This means more space is required around the device compared to the Canon—a device that has a smaller overall working footprint.

In short, the Canon PIXMA G650 outperformed Device A in the areas of reliability and ease of use, and showed that the quantity of prints that can be generated from it can be achieved with only a small investment.

15K Reliability Test Procedures

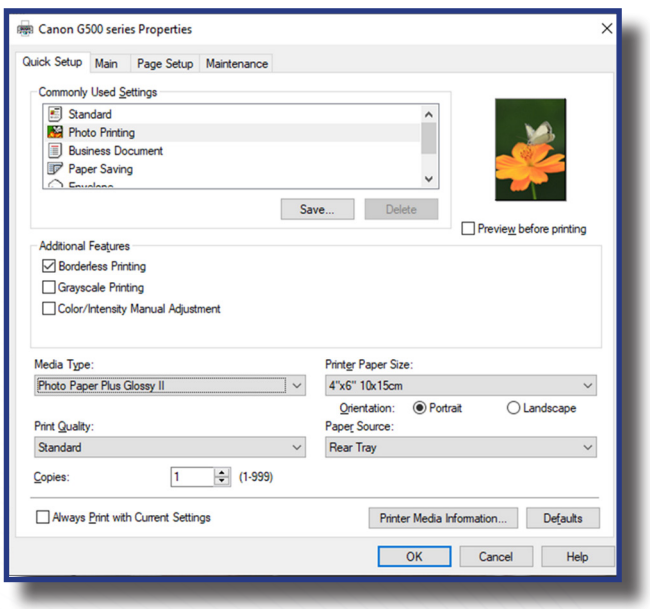
Keypoint Intelligence lab technicians printed 10 photographic test targets on glossy 4in x 6in photo paper (Canon Photo Paper Glossy II for the Canon PIXMA G650 and Device A's recommended premium glossy paper for Device A) in batches of 12 so that 120 photos are printed in total per job. Photos were printed in Standard mode.

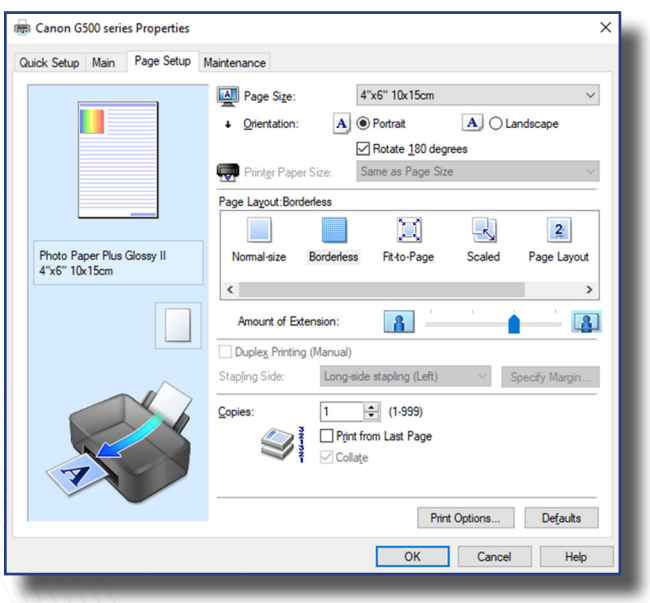
At the end of each batch of 120 prints, the Keypoint Intelligence lab technician would follow this standard process:

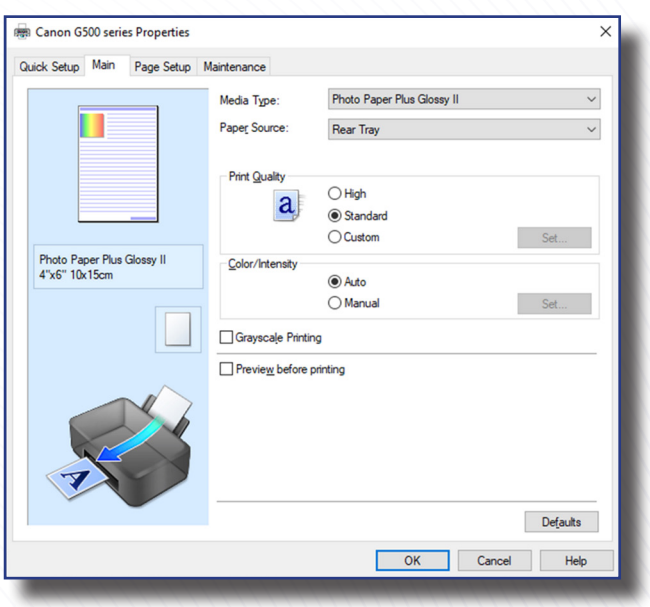
1. Check the final photo for any printhead failure.
2. If a printhead failure was detected, the technician would follow the vendor-recommended cleaning protocols to get the device back to a ready-to-print state and conduct a print nozzle check before and after each cleaning routine required. Instructions for clearing printhead blockages were the same for each vendor. Both devices recommended up to three cleaning routines until the check showed that the nozzle was unblocked. If the head cleanings didn't rectify the issue, then the devices were to be left for 12 hours before up to two further cleaning routines were attempted. A head flush would be conducted if the previous actions had failed to resolve the problem, and if the head flush failed, then the device would be deemed in need of a service visit.
3. The next batch of 120 photos would be released when the device was deemed ready to print.
4. While the next batch was printing, the technician would check the entire previous batch looking for any printhead failures that had occurred and had consequently been auto-cleaned by the device during the print run.
5. Each batch was then recorded as:
    a. 100% successful print run with no defects.
    b. Print defect in batch, but auto-cleared by device.
    c. Print defect at end of batch requiring manual cleaning intervention.

Canon PIXMA G650 Print Driver Settings

The Canon PIXMA G650's print driver settings are shown below. The same settings were used to print all 15,000 photos.

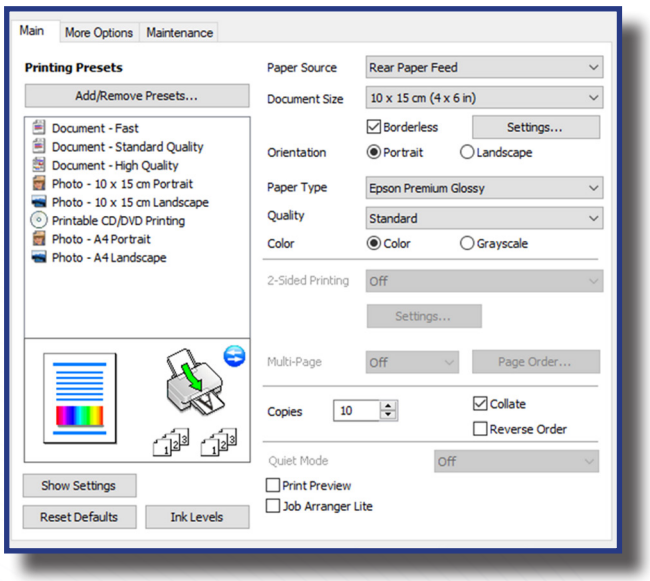






Device A Print Driver Settings

Device A's print driver settings are shown below. The same settings were used to print the 9,263 photos.



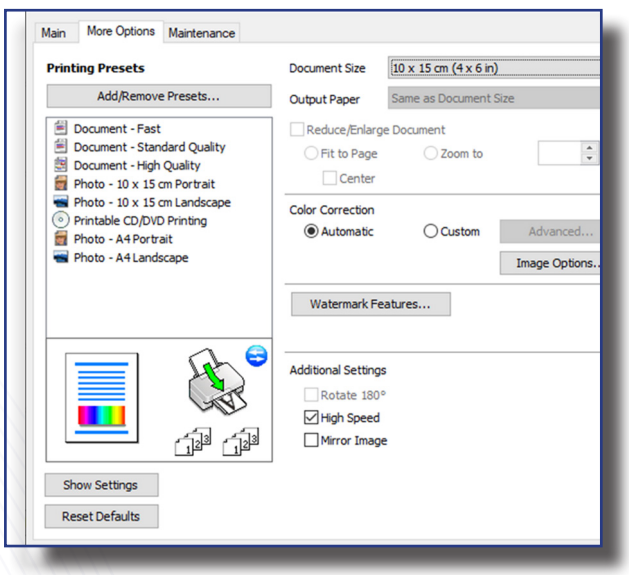
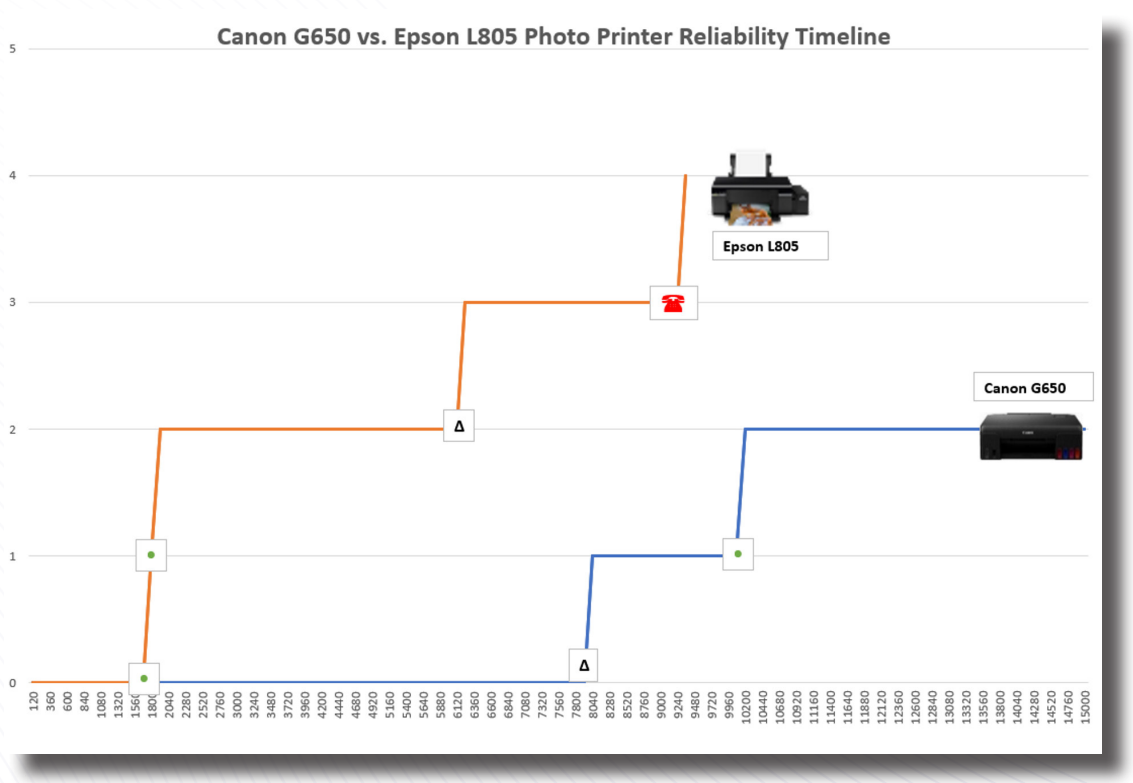


Image Quality Defects

The Canon PIXMA G650 printed the full target yield of 15,000 photos, and just two batches exhibited image defects. The defect seen in one batch resolved itself without attention from the operator, while the other required a single head clean to resolve the issue.

Device A had defects in two batches that were cleared without operator intervention. A further batch had a printhead blockage that was cleared after one head clean.

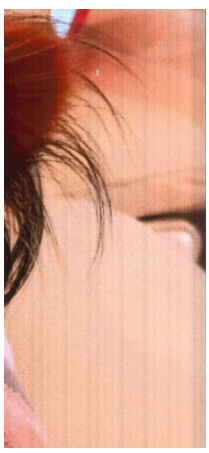
	Canon PIXMA G650	Device A
Percentage of 15,000 photos printed	100%	61.8%
Total number of batches printed	125	78
Number of batches printed without defects	123	74
Image defects cleared during print run	1	2
Image defects cleared after one head clean	1	1
End of device life due to other failure	0	1



This chart tracks the incidence of image defects for each device and shows the point at which a device stopped testing. The green circle icons denote the points at which an ink ejection defect occurred but subsequently resolved itself before the end of the batch. The triangle icons denote the points at which an ink ejection defect occurred that required a head clean to resolve the issue.

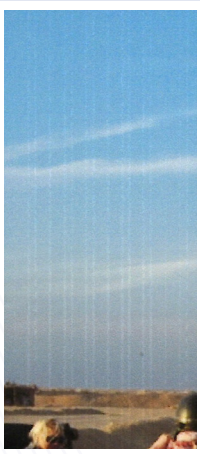
Example of Image Defects

Canon PIXMA G650 Batch 67



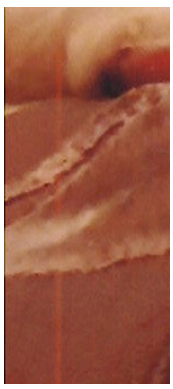
Banding was noticeable in this photo, as can be more clearly seen in the zoomed-in version on the right. The issue required a printhead clean to resolve it.

Canon PIXMA G650 Batch 85



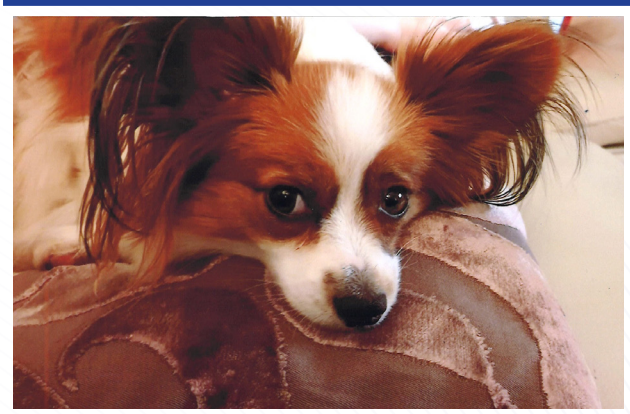
Banding was noticeable in this photo, as can be more clearly seen in the zoomed-in version on the right. The issue resolved itself without any user intervention.

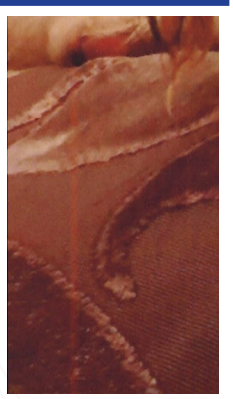
Device A Batch 15



A vertical band appeared on the left, as can be more clearly seen in the zoomed-in version on the right. This was due to a nozzle blockage, but the issue resolved itself without any user intervention.

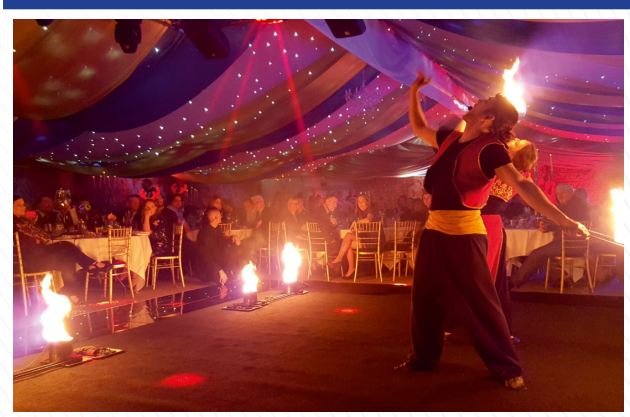
Device A Batch 16

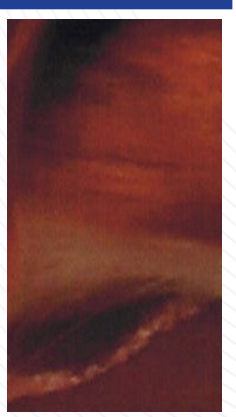




A vertical band appeared on the left, as can be more clearly seen in the zoomed-in version on the right. This was due to a nozzle blockage, but the issue resolved itself without any user intervention.

Device A Batch 52





Banding due to an ink ejection failure was noticeable in this photo, as can be more clearly seen in the zoomed-in version on the right. The issue required a printhead clean to resolve it.

Ink Tank Design Issues

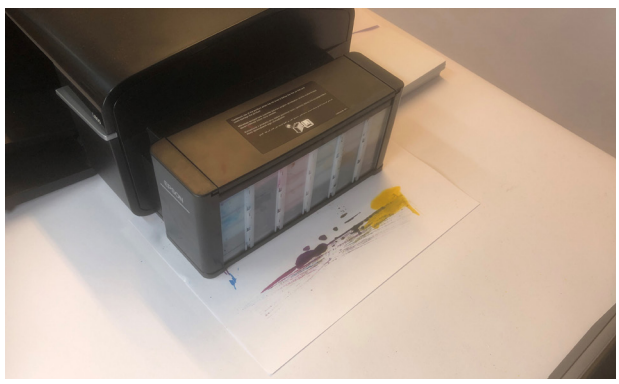
Keypoint Intelligence lab technicians noted some design differences that resulted in a better user experience for the Canon PIXMA G650 than Device A.

Ink Bottle Design and Leakage

The Canon PIXMA G650 bottles are keyed so they can only fit in the correct ink tank, and no ink can come out of the bottle unless it is inserted in an ink tank. In contrast, Device A's bottles are not keyed and can be placed in any ink tank, so the user refilling ink tanks must be careful to put ink in the correct tank. Device A's ink bottles release ink even if they aren't inserted in an ink tank, which meant that refilling Device A's ink tanks was a messy affair. The image on the right below shows a lab technician holding the Canon and Device A ink bottles upside down, and it can be seen that the Canon bottle does not leak ink while the Device A one does.

Ink Tank Positioning

The position of the ink tanks in a device has a direct bearing on the ease of use and accessibility of the device. A poorly placed ink tank will prevent users from accurately seeing the remaining capacity of the ink tanks, refilling the ink tanks easily and placing the device in a more convenient spot. Device A's ink tank is located on the right side of the device, which means users won't be able to see the remaining ink capacity easily unless they view the device from the right side, and it could prevent users frorm placing the device in a more convenient location because they'll have to leave space in which they can refill the tanks. The tanks are not colour- coded, which means users will have to be careful to put ink in the correct tanks. Users must open the tank bay and then pull the tanks down to put them in the correct position for refill, which means more room is needed than Device A's normal footprint. The images below show Device A with its ink tank bay opened and closed.



In contrast, the Canon PIXMA G650 has its ink tanks facing the front of the device so users can easily see the tanks' remaining capacity. The ink tanks are colour-coded, making it obvious which colour goes where, and that the tanks are easily accessible.

Supporting Test Data

Test Files

Keypoint Intelligence used the 10 test targets shown below during the test, with each batch printed consisting of 12 10-photo print jobs.

Test Image One

Test Image Two

Test Image Three

Test Image Four

Test Image Five

Test Image Six

Test Image Seven

Test Image Eight

Test Image Nine

Test Image 10

Test Environment/Conditioning

Testing was conducted in Keypoint Intelligence's UK test facility (Unit 11, The Business Centre, Molly Millars Lane, Wokingham, RG41 2QZ) under ambient conditions of 22.0ºC (+/-2.7ºC) and 45% relative humidity (+/- 10%), monitored daily by an Extech RH 520 Humidity and Temperature Digital Recorder.

Printers, paper, and ink were acclimatized to the above conditions for a minimum of eight hours prior to testing. Prior to acclimatization, packaging and shipping materials were opened in a manner that prevented damage from occurring to the cartridges during conditioning. Paper was acclimatized in ream wrappers. Printers, printer components, paper, and ink bottles were handled in a manner that prevented exposure to condensation.

Test equipment included Windows 10 workstations, 10/100/1000BaseTX network switches, and CAT5e/6 cabling. Devices were connected to the test PC via USB.

About Keypoint Intelligence

For 60 years, clients in the digital imaging industry have relied on Keypoint Intelligence for independent hands-on testing, lab data, and extensive market research to drive their product and sales success. Keypoint Intelligence has been recognized as the industry's most trusted resource for unbiased information, analysis, and awards due to decades of analyst experience. Customers have harnessed this mission-critical knowledge for strategic decision-making, daily sales enablement, and operational excellence to improve business goals and increase bottom lines. With a central focus on clients, Keypoint Intelligence continues to evolve as the industry changes by expanding offerings and updating methods, while intimately understanding and serving manufacturers', channels', and their customers' transformation in the digital printing and imaging sector.

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