

MOBILEDEMAND xTablet T1550

ECONOMICALLY PRICED RUGGED INTEL "CHERRY TRAIL" POWERED 10.1-INCH WINDOWS 10 TABLET FOR HEAVY-DUTY MOBILE WORKFORCE APPLICATIONS, INDOORS OR OUTDOORS

by Conrad H. Blickenstorfer; photography by Carol Cotton

Early 2017, MobileDemand announced the 10.1-inch T1550 and its smaller 8-inch T8550 sibling, adding two more members to its comprehensive family of thin and light rugged tablets. The two new xTablets fit between the company's low-cost xTablet Flex models and the fully rugged high-end xTablet T1200 and T1600 tablets. In this article we're reviewing the larger xTablet T1550 in detail.

Where does the xTablet T1550 fit in? Those familiar with MobileDemand know that after building a business based on fully rugged high end tablets, more recently the company introduced the economically priced "Flex" line — standard consumer/business Windows tablets prepackaged in a tough protective case with bumpers and a carry handle, and a scratch-proof screen protector. The xTablet T1550 again is a value price offering, but one that's more rugged, carries higher environmental sealing, and can be ordered with an optional industrial-grade barcode scanner.

The lineup below provides an idea of how the new tablet compares to some of the other MobileDemand products. The xTablet T1550 is about the same size as the higher-end T1600. The T8500/T8540 and the T1550 are very similar in performance and features, but the 10.1-inch T1550 is significantly larger than the 8-inch T8500/T8540. On the right is the older fully rugged T7200 with a wide-format 7-inch screen and keypad. Each product fills a specific purpose and need.

xTablet T1550 vs Flex 10A

When MobileDemand introduced the original price-conscious Flex 8 (starting at US\$595) and Flex 10 (starting at US\$695) tablets in 2014, the company entered new and untested territory. Apparently that worked quite well. But even so, why two additional low-cost tablets in the same size categories? To answer that requires another look at the market.

Rugged mobile computers have traditionally carried high price tags due to a combination of modest sales volume and the complexity of making those hardened products. After the success of the Apple iPad, rugged tablet vendors hoped to participate in the tablet bonanza. They found, however, that the low cost of consumer tablets eroded many enterprise customers' willingness to accept the price premium of rugged designs, even when shown that the total cost of ownership of rugged products could actually be lower.

With their Flex line, MobileDemand sourced generic tablets that met feature and performance goals while the custom-designed protective rubber boot with its thick bumpers and sturdy polycarbonate backplate



provided a degree of ruggedness. However, the Flex tablets are not sealed, they are not inherently rugged, and they can't accommodate an industrial-grade scanner. That rules them out for many customers.

Model	xTablet T1550	xTablet Flex 10A
Introduced	Early 2017	Early 2017
Display (inches/res)	10.1/1280 x 800	10.1/1280 x 800
Active pen	Optional	No
Size (inches)	10.8 x 7.1 x 0.87	10.5 x 7.14 x 1.22
Weight	2.75 lbs	2.4 lbs
Processor Type	Atom X5-Z8350	Atom X5-Z8350
Processor Codename	"Cherry Trail"	"Cherry Trail"
CPU Speed (base/burst)	1.44/1.92GHz	1.44/1.92GHz
Cores/threads	4/4	4/4
RAM	4GB DDR3L-RS	4GB DDR3L-RS
Storage	64GB	64GB eMMC
Sealing	IP65	not sealed
Operating temp.	-4° to 140°F	32° to 120°F
Scanner	Yes (opt.)	No
COM port	Yes	No
RJ45 LAN	Yes	No
GPS	Yes (uBlox)	No
Battery	37 whr	21.5 whr

The xTablet T8550 and T1550, while still affordable by rugged tablet standards — starting at US\$845 and US\$995, respectively — take a very different design approach. We'll get into that in detail farther down when we take a look inside the xTablet T1550.

The table to the left shows some of the relevant specs of MobileDemand's two economy-priced 10.1-inch tablets. As can be seen, they have the exact same screen size, weigh roughly the same, and have roughly the same dimensions.

Both use the same low-end quad-core chip from Intel's "Cherry Trail" lineup. The displays of both tablets are the same size and have the same resolution. Storage (64GB) and RAM (4GB) are the same.

In terms of ruggedness spec, however, the xTablet T1550 has it all over the Flex 10A. IP65 sealing versus no sealing at all, and a much wider operating temperature range. And the xTablet T1550 has a true scanner and not just a camera that can run scanner apps. There's GPS. And there's a replaceable battery that makes full shift operation possible. The latter alone can tilt the scale in favor of the xTablet T1550, as today's customers expect full-shift operation and hot-swappable batteries.

Handy, tough and light

Right out of the box, the xTablet T1550 makes a convincing impression. It's an iPad-sized tablet with extra heft due to its protection, features and ruggedness. The display's 16:10 aspect ratio is pleasant, between the iPad's squarish 4:3 and the elongated 16:9 aspect ratio favored by many non-Apple tablets. The T1550



xTablet T8500

xTablet T1550

xTablet T1600

xTablet T7200

looks spacious, grown-up and comfortable to use.

Another immediate impression is that the xTablet T1550 is truly a rugged tablet. There is trust-inspiring protection all around the perimeter. On the backside a large number of visible screws make for an industrial look. There are flush-fitting protective door plugs. And there aren't any vents or openings of any kind.

Unlike the Flex 10A, which is a consumer tablet enclosed in a pre-installed case, the xTablet T1550 is a rugged design from the ground up. It merges a contemporary tablet look with standard rugged tablet components. The contoured perimeter protection is raised just a bit above the front glass for additional protection of the LCD. All protection is integrated into the overall design rather than tacked on, and there's discrete ribbing for a bit of extra grip. Branding is always a bit of a problem with on tablets with their all-glass front. On the T1550, MobileDemand solved that problem by prominently imprinting their orange brand name onto the pre-applied screen protector sheet.

To the right is a look at the xTablet T1550 from the front and all four sides, with its protective doors closed. The pictures show the tablet's simple, functional design with its slightly raised corner bumper areas. That's for extra protection as well as to facilitate cooling air flow when the tablet lays flat on a surface.

Along the top side of the display are five small physical pushbuttons (volume up, volume down, home, power, scan). Here, we miss the more readable white label on black background buttons along the right side of the display of the predecessor T1500 model. Above the display are the lens for the frontal camera and the ambient light sensor.

On the bottom is a surface mount docking connector, flanked by two holes for secure mounting on one of the docking options. I/O ports are on the left and right sides of the tablet, with each I/O block having its own protective door. The doors provide a good, tight seal, but they are not easy to pry open.

The close-up below shows the right side of the tablet with the (replaceable) protective doors open and rotated out of the way for better viewing of the xTablet T1550's ports on that side of the tablet. There's a standard DB9 serial port on the left, and a standard RJ45 LAN jack on the right.



Below, the close-up shows the left side of the tablet, here with the protective doors Photoshopped out for better viewing. The left I/O block contains the power jack and a Mini-HDMI port, the right I/O block a Micro USB and a standard USB 2.0 port.



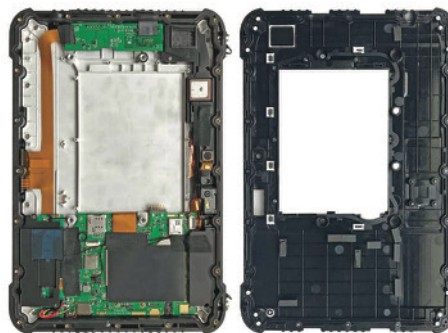
The T1500 doesn't have a fan and uses solid state storage instead of a rotating hard disk, so it operates silently. That's a big plus in an office setting. And not having a fan means not having to worry about a mechanical component that can get clogged up or fail.



A look inside

While some may wonder why MobileDemand offers two economy-priced tablets with the same screen size and in the same general performance class, it's because that's where the similarity ends. The low price of the xTablet Flex 10A is only possible because inside of its protective exoskeleton-like enclosure sits a generic white box tablet. The xTablet T1550, on the other hand, is designed and built from scratch as a rugged system. It's a sealed unit that does not require a case.

The different approach reveals itself upon separating the two halves of the T1550. That first requires undoing 16 Torx T5, four Torx T6, and eight Philips head screws. Once that's done, the front and back of the T1550 come apart easily. There aren't any wires or cables of any kind between the two.



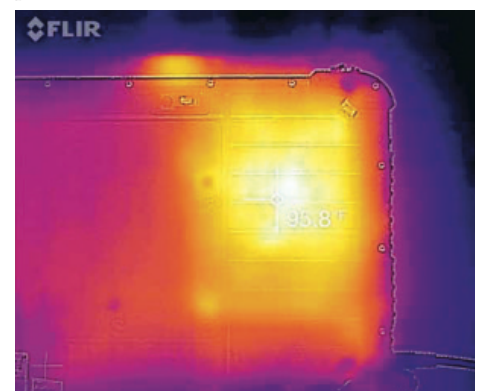
The halves consist of tough PC+ABS plastic. Between the two housing parts is a square-diameter precision-cut rubbery pressure seal that sits in an elaborate groove around the perimeter of the front plate. The rubber seal is replaceable and, unlike some complex seals, firmly sits in its groove. That makes harming it almost impossible.

While the xTablet T1550's predecessor (the xTablet T1500) had a simple aluminum plate as the basis for the LCD on the front side and circuit boards on its back, the T1550 has a genuine magnesium or alloy chassis/frame like most high end rugged tablets. That not only looks impressive, but also gives the new unit higher strength and much better torsional rigidity.

One big difference the T1550 offers over the low-end xTablet Flex 10A is its externally accessible, user-replaceable battery. Being able to pop in a new battery when out there in the field and on the job can be invaluable. The T1550's 3.7 Volt, 10,000mAH battery is both externally accessible and replaceable. It's a conventional Li-Ion pack that sits beneath a separate PC+ABS battery compartment cover held in place with six large and easy-to-open flat-blade screws. A thin, replaceable rubber pressure-seal keeps liquids out. We prefer this solution over a non-replaceable battery.

The motherboard itself measures a compact 3.5 x 4.5 inches. There's not much to be seen on it as a good half of its surface is covered by a black shield or heat spreader. Black fabric tape is liberally used to protect connectors and other small details and keep them in place. White silicone glue seals any potential openings to the outside, as well as glueing and sealing the small speaker.

The colorful picture below was taken with our Flir One infrared camera. It shows the thermal situation inside the xTablet T1550, with darker areas the coolest and bright yellow the hottest. Since the xTablet T1550 doesn't have a fan to remove heat, good thermal management is essential. As can be seen, the area where the processor resides is hottest. In our performance benchmark testing, we measured a maximum surface temperature of about 96F, not even human body temperature.

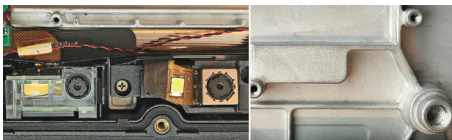


Part of the T1550's I/O is edge-mounted on the motherboard (USB host and client, mini-HDMI), and part is sitting on a separate daughterboard on the other side of the tablet (RJ45 LAN and DB9 serial). Separating I/O offers flexibility as customers may be able to specify optional or custom I/O configurations.

As is usually the case even in rugged devices, the protective plastic/rubber doors are the sole guard against liquids entering the interior of the case. We don't like to see that, but it's a standard solution. So always keep an eye on those protective doors before using the tablet in the field.

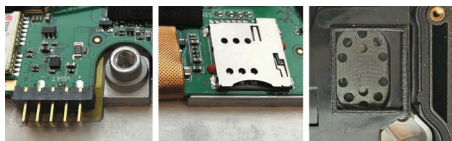
And speaking of protective features, while the contoured corner guards look like they are screwed on and replaceable, they're really fused onto the front and rear halves of the tablet.

Shown below are a couple of interesting details of the T1550. On the left the tablet's tiny scanner and camera. This kind of functionality would have meant separate devices weighing pounds not too very long ago. On the right a closeup of the T1550's impeccably



crafted magnesium chassis. We're talking quality here.

The details below: On the left the battery connector inside the battery compartment. Since this compartment is fully sealed to the outside, it doesn't require an easily dislodged rubber gasket around the connectors. In the center the micro-SD card slot. And



on the right a closeup of the tablet's speaker.

Overall, the insides of the xTablet T1550 are remarkably elegant and refined, and certainly well protected. While the predecessor T1500 showed that with some thought and good design even economically priced designs can provide good stability and sealing, the new xTablet T1550 goes significantly beyond that.

Intel Cherry Trail processor

The xTablet T1550 runs Windows 10 Professional on an Intel Atom X5-8350 processor. This is a quad-core "system-on-chip" processor of Intel's 14nm "Cherry Trail" lineup that succeeds the popular 22nm "Bay Trail" roster. Integrated graphics are of the Intel Gen 8 variety, the same generation as Intel's high-end "Broadwell" chips.



Where does the X5 prefix come from? That's because having used the i3/i5/i7 prefixes in their more expensive Core processors to indicate good/better/best, Intel wanted to apply that system to their Atom processors as well. So the X5-8550 chip in this xTablet would be a mid-range offering with more capabilities and features than an X3 CPU, but not quite as much as an X7-class processor.

A somewhat irritating development is that Intel has

started using SDP (Scenario Design Power) sometimes instead of and sometimes in addition to the more common TDP (Thermal Design Power). TDP indicates the maximum amount of heat in watts a system's cooling must be able to remove, giving a pretty good indication of the chip's overall performance, whereas SDP is the amount of heat to be removed under benign conditions, i.e. standard tablet apps and no temperature extremes.

"Burst speed," likewise, is just the speed the processor may reach under ideal conditions. We take this as meaning that if things get hot, the chip slows down.

Model	T1550	Flex 10A	T1600
OS	Win 10	Win 10	Win 8.1
Processor Type	Intel Atom	Intel Atom	Intel Core
Processor Model	X5-8350	X5-8350	i5-4200U
CPU Speed	1.44GHz	1.44GHz	1.60GHz
Max Burst Speed	1.92GHz	1.92GHz	2.60GHz
Scenario Design Power	2 watts	2 watts	NA
CPU Mark	1,642.2	1,599.7	2,488.7
2D Graphics Mark	99.8	96.3	365.1
Memory Mark	345.5	324.4	830.6
Disk Mark	642.9	615.9	2,985.5
3D Graphics Mark	142.4	109.7	387.9
Overall PassMark	665.2	640.1	1,516.2
ALU	21,488	22,251	37,045
FPU	17,643	18,487	36,633
MEM	19,394	19,711	28,295
HDD	18,785	21,304	35,336
GDI	3,569	3,680	13,563
D2D	2,616	2,540	6,427
OGL	2,997	3,015	9,996
Overall CrystalMark	86,492	90,988	167,295

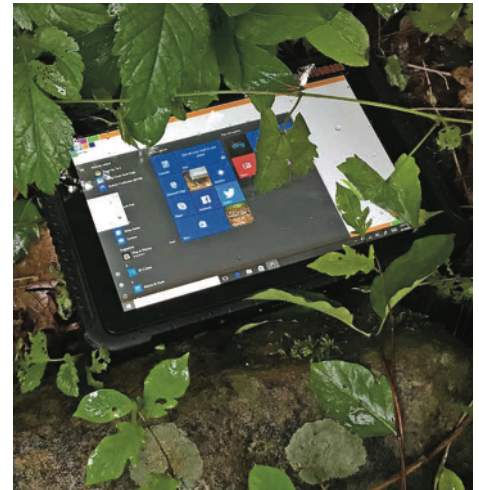
As is, the table above shows our benchmark results for the X5-Z8350-based xTablet T1550, the xTablet Flex 10A with the same processor, and the higher-end Intel Core-based xTablet T1600. The results are no big surprise. Despite targeting two different markets, the xTablet T1550 and the xTablet Flex 10A have virtually identical performance. That performance level is much higher than what early Intel Atom-based systems were capable of delivering.

As also expected, there is a considerable performance difference between even the latest Intel Atom chips and the far more complex and far more expensive Core processors. Even though the last xTablet T1600 we tested came with the older Intel 4th generation Core i5-4200U instead of the 5th gen i5-5200U, it's still in a much higher performance league. That's in part due to the Core processor, but in part also by the higher mass storage performance of the T1600. Both the T1550 and the Flex 10A use comparatively slow eMMC onboard memory whereas the T1600 uses much quicker solid state mass storage technology.

And what about battery draw? Unfortunately, our standard BatteryMon power drawdown benchmark utility was not compatible with the T1550's power system. The Li-Polymer battery packs 37 watt-hours, which MobileDemand says is good for 6-8 hours. Interestingly, MobileDemand claims 10 hours for the xTablet Flex 10A that has very similar electronics.

Excellent display

While the xTablet T1550's processor and memory make concessions to affordable pricing, the tablet's display definitely does not. Measuring a roomy 10.1 inches diagonally — it's very noticeably larger than the 8-inch screen of the smaller xTablet T8540 — it offers WXGA resolution. That's 1280 x 800 pixel in 16:10 wide-format — 30% more pixel than the 1024 x 768 XGA format that was commonly used in rugged tablets (even



ones with larger screen sizes) for many years, and is still being used today.

On a 10.1-inch tablet screen, that translates into 149 dots per inch (dpi), which is not very high by today's standards, but still more than adequate. The T1550 uses 10-point projected capacitive multi-touch for effortless tapping, panning, pinching and zooming. We can't think of many crucial operations that require more than just a couple of fingers, but Microsoft wants ten, and so ten it is.

The display is of the IPS (in-plane switching) variety that makes for perfect viewing from all angles. A wide viewing angle is for a satisfying, non-disruptive viewing experience. Older and lesser display technologies are prone to color and contrast shifts when viewed from different angles, something that we don't consider acceptable anymore. The T1550's IPS display is immune to such shifts. Outdoors the display feels brighter than its listed 320 nits luminance rating.

MobileDemand supplies a passive capacitive pen with a foot-long lanyard. It has the broad tip that works well for tapping and panning, but not for precision work. To MobileDemand's credit, they replaced the rubber tip with a metal mesh tip that is more durable and works somewhat better. And they also used their standard and very durable tether and stylus holder to store the pen when it's not in use.

Until recently, capacitive touch was considered unsuitable for rugged tablets, in part because of the technology's initial inability to work with gloves and in part because Microsoft Windows, unlike iOS or Android, wasn't designed for finger touch. Today, most new rugged tablets use capacitive touch, mostly because customers demand it. Add to that Microsoft's efforts to make Windows more touch-friendly and the increasing use of capacitive touch-enabled gloves, and it made sense for MobileDemand to go this route.

MobileDemand certainly didn't cut corners with the T1550 display. While we've never been fans of capacitive touch on small screen Windows tablets, that's much less of an issue on a larger display like the T1550's, and Windows 10 is significantly better suited to capacitive touch than its predecessors.

Another advantage the T1550 has over the old T1500: the flush frontal surface of the new tablet offers a good half inch perimeter space beyond the perimeter of the actual LCD whereas the older T1500 had no such perimeter space. That is important as it keeps fingers from bumping into the raised protective bezel when operating the tablet

Dual cameras

The xTablet T1550 has two integrated cameras. The user-facing 2mp camera is for video conferencing, whereas the rear-facing 5mp camera with LED flash can be used for documentation purposes.

As has already been the case during several recent tablet reviews, we couldn't fully examine the capabilities of the xTablet T1550 cameras. That's because the Windows 10 default imaging app only offers the most basic functionality, and so we couldn't test all the usual settings integrated cameras are doubtlessly capable of. System integrators and most customers will likely want more comprehensive software with all the usual settings.



In our testing, still images defaulted to 2560 x 1440 pixel, and video to 1920 x 1080 pixel. In still photography, auto-focus worked fine, images were surprisingly crisp and sharp, and the camera does not over-compress images. Video was sharp enough for almost all purposes and did not lag behind. It pays to take time shooting pictures as there's a slight lag between pressing the shutter and the image being taken.

The front camera, though capable of 2-megapixel images, defaulted to 1280 x 720 pixel (720p). It worked fine for conferencing.

Overall, the integrated documentation camera of the xTablet T1550 exceeded our expectations. It's perfectly suitable for most documentation tasks, both in still shots and in video. Whether that still matters in this era of ubiquitous smartphones with their superior apps is up for discussion.

Remarkable ruggedness

Unlike the Flex 10A where a consumer-grade tablet sits inside a customized rugged case, the xTablet T1550 is a rugged tablet from the ground up. What can it do that the already quite impressive Flex 10A can't do?

The drop spec is the same. MIL-STD 810G, 516.6 IV, which mandates 26 repeated drops to one operating unit onto plywood over concrete from 48 inches. That's the gold standard of the industry because if a tablet is dropped while in use in a standing or walking position, it'll drop about four feet.

The operating temperature range is -4° to 140°F, much wider than the restrictive 32° to 120°F range of the Flex 10A. That covers virtually any application, even freezers or outdoor use in nordic climates.

The biggest difference between the T1550 and the Flex 10A is in sealing against the elements. Despite its protective casing and nicely implemented protective rubber plug for all I/O ports, the Flex 10A isn't considered a sealed unit and does not have an ingress protection rating. That means no working in the rain. The xTablet T1550, on the other hand, carries a respectable IP65 rating. That means it's totally dustproof and can also handle low pressure water jets from all directions.

So while the xTablet Flex 10 looks like a fully rugged device but really is a consumer tablet inside a case, the xTablet T1550 is a rugged tablet. We would like to see more detailed ruggedness specs. Most customers will want that, as ruggedness is the reason for a device like the T1550. Test results should be readily available.

Mounting and docking

Most tablets used in business or on the job come with some kind of docking and mounting options, and the xTablet T1550 is no different. While MobileDemand does not (yet?) offer the vehicle docks available for most of its higher end tablets, the company provides a nice office dock, reasonably priced at US\$195.

A big advantage here is that the office dock can actually be used for both the small 8-inch xTablet T8500/T8540 as well as for the older xTablet T1500 and the new xTablet T1550. It's designed to accommodate an external monitor, keyboard and mouse via three USB ports, and it also



has an RJ45 LAN port for wired Ethernet connectivity. Given its compact size and rugged design, the xTablet T1550 would also be a natural for use in vehicles with a quick-release mount, or as a fixed mount in all sorts of deployments. So we hope to see those as well.

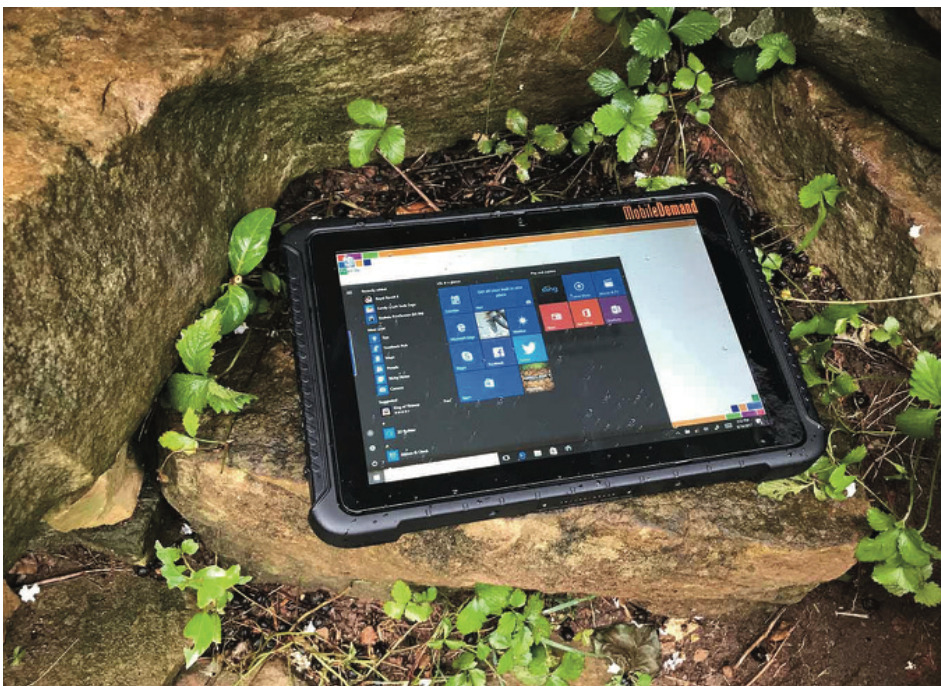
As is, the tablet has two screw holes on its backside that are 95 mm apart, whereas VESA 75 and 100mm patterns, so we'll have to report on this as we find out.

xTablet T1550

- Type:** Rugged tablet computer
- Processor:** 1.44GHz Quad-core Intel "Cherry Trail" Z8350
- Graphics:** Intel HD 400, 200-500MHz
- OS:** Windows 10 Professional or Home (64-bit)
- Memory:** 2GB DDR3L-RS-1333
- Display:** 10.1" WXGA (1280 x 800 pixel) TFT LCD
- Digitizer:** 10-point capacitive multi-touch, optional digitizer
- Keyboard:** Onscreen + optional external
- Storage:** 64GB SSD
- Slots:** 1 x micro SD
- Housing:** Polycarbonate with integrated protective rubber bumpers, aluminum internal frame
- Operating temperature:** -4°F to 140°F (-20°C to 60°C)
- Ingress protection:** IP65
- Drop:** 4-foot drop per MIL-STD-810G
- Regulatory:** FCC, CE, and IC
- Size:** 10.8 x 7.1 x 0.87 inches (275 x 180 x 22 mm)
- Weight:** 2.75 lbs. as tested (1.25kg)
- Power:** Rechargeable, replaceable 3.7V 10,000mAh 37 watt-hour Li-Polymer ("6-8 hrs")
- Sensors:** Ambient light, G-sensor
- Data capture:** Zebra SE4710 1D/2D imager, MSR, RFID/NFC
- Cameras:** 2mp camera front, 5mp AF camera with LED flash rear (up to 2592 x 1944 pixel)
- Communication:** 802.11 a/b/g/n/ac WiFi, Bluetooth 4.0, discrete uBlox GPS, optional: NFC, 1D (Zebra SE655) or 1D/2D (Honeywell N3680) scanner
- Interface:** 1 x USB 2.0, 1 x Micro USB, 1 x Mini HDMI, 1 x RS232 serial, 1 x RJ45 LAN, headphone jack, power, docking
- Price:** Starting at US\$995, US\$1,495 fully loaded

Contact:

MobileDemand
www.mobiledemand.com
 319-363-4121



MOBILEDEMAND **xTablet T1550**

With the xTablet T1550, MobileDemand complements their existing and similarly sized Flex 10A with a tablet device that offers a significantly higher degree of ruggedness, while still keeping costs remarkably low.

Unlike the Flex 10A where MobileDemand prepackaged a generic tablet with a reinforced custom case, the xTablet T1550 is a rugged tablet from the ground up. And it can also be equipped with an integrated industrial-grade scanner, something which is mandatory in deployments that rely on quick and accurate scanning.

Weighing in at a reasonable 2.75 pounds as tested, MobileDemand's xTablet T1550 provides another alternative for customers who want the convenience and ease of use of a 10-inch class consumer media tablet in package that's much better protected but still only costs a bit more than a premium, non-rugged consumer tablet.

Making this possible required some, but remarkably few, concessions. The xTablet T1550's quad-core Intel "Cherry Trail" processor is basic (but still provides about twice the performance of MobileDemand's flagship T8700 tablet of just a few years ago).

The xTablet T1550 impresses with an crisp, bright and vibrant display that offers 1280 x 800 pixel resolution, a perfect viewing angle from all directions, and no color or contrast shifts. Its 10-point capacitive multi-touch screen is quick and very responsive, and works very well with Windows 10 and touch-optimized applications. The included capacitive stylus has the usual broad tip, but it's of the metal mesh variety and works quite well.

For an inexpensive thin-and-light tablet the xTablet T1550 has more than adequate onboard connectivity, including USB host and client ports, micro-HDMI, and even a legacy serial port. The 2mp and 5mp cameras are suitable for conferencing and documentation. And we very much appreciated the user-accessible and replaceable battery (which the Flex 10A doesn't have).

The tablet's rubber and polycarbonate casing is simple and well designed, protecting the innards of the xTablet T1550 from damage and leakage. It is well sealed, and the operating temperature range of the tablet is wide enough for virtually any application.

All of this makes the fanless xTablet T1550 a compelling and very competitively priced package for anyone who needs Windows on tough jobs, even those that require high-level sealing, GPS, and industrial-grade scanning.

