Winmate is a Taiwanese company founded in 1994. Specializing in industrial display technologies and solutions, Winmate has branched out into Panel PCs, digital signage, marine grade displays and computers and, most recently, rugged Mobile PCs, panels, embedded automation controllers, and rugged Tablet PCs as the IA80 reviewed in this article. Winmate does not have the name recognition of some of the major players in the rugged field, but that is often the case with Taiwanese OEMs who either make products for name brands or work through resellers, system integrators and distributors.

The IA80 is a compact, rugged Tablet PC slate family that comes in a variety of configurations. This review covers the R08IA8M-RTU1 model that comes with an 8.4-inch SVGA (800 x 600 pixel) display with a 4-wire resistive touchscreen. The standard display has a reasonably strong 250 nits backlight (commercial notebooks usually have less than 200 nits), and a sunlight-viewable display with a more powerful backlight is optionally available. Onboard connectivity consists of three USB 2.0 ports, a RS232 connector, microphone and headphone jacks, and a docking connector. The dock features four more USB ports as well as analog video and RJ-45 LAN.

The machine measures 10.5 x 8.75 inches and weighs a bit over five pounds as tested. Our unit was powered by a 1.6GHz Atom N270 processor that was designed from the start for the lowest possible power consumption, and uses the complementary Intel 945GSE/ICH7-M chipset. The IA80 comes standard with half a gigabyte of DDR2 400/533 memory (commercial notebooks usually have less than 200 nits), and a minimum-magnesium housing consists of two halves, both of which are very sturdy. These days, some companies are so concerned about weight that they absolutely minimize the thickness of components to a bare minimum, and often to an extent that appears to make design excessively practical. Winmate doesn’t do that. The IA80’s housing may weigh a bit more than it could, but it most certainly won’t break, ever.

The two halves are held together by just four screws: one at each corner. A simple O-ring around the entire perimeter provides a low-tech, but highly effective seal. There are a number of openings cut into the sides and the back. Those are sealed with thick, soft rubber plugs that are attached to the inside of the machine with Philip screws. This makes them very easy to replace in case that they ever break. But those rubber plugs form the sole barrier between outside and inside, which means they must be firmly in place in order to protect the IA80.

On the next page you can see all four side views of the Winmate IA80. Note that the protective rubber plugs were left in place for product photography. Winmate designed the IA80 with a minimum of hardware controls and buttons in order to make it as simple as possible to operate. To the right of the display are a large power button and an equally large menu button with up and down buttons below it. When pressed, the menu button cycles through:

- Brightness (adjustable in eight steps)
- Volume (adjustable in eight steps)
- Remaining battery life in percent, and
- WiFi/Bluetooth (WiFi on/off, Bluetooth on/off, both on/off)
- Version info HotTab Utility, BIOS and EC

Brightness does not go down all the way to off, which some customers would probably want. As listed, the radios can either both be off, both on, or either WiFi or Bluetooth on. The up and down buttons are used both to select and adjust. Pressing the menu button for four seconds locks and unlocks the machine. There are also three programmable function buttons labeled F1, F2 and F3. Each responds to either a short or a long push so that you can assign a total of six functions. Programming is via the HotTab utility shown to the right. You can either select from the default functions and applications and assign them to the keys, or browse for any other function or application. For example, we assigned the onscreen keyboard to F1, the calculator to F2, and My Documents to F3.

A small indicator light plate below the power button on the left side of the display shows power, battery status (green for fully charged, red blinking for low battery, and orange for being charged), hard disk activity and WiFi.

Optionally available are a handstrap mounted to the back of the machine via four screws; a carry handle; a carry belt; a desktop dock/stand with battery charger; and a car power adapter.

Unlike some of the competition that uses various methods to seal plugs, Winmate uses just one. All
REVIEW: WINMATE RUGGED TABLET IA80

We've been seeing a lot of new Atom-based devices coming to market, and existing models becoming available with an Atom processor option. What is Atom and why is there so much hype around it? The short answer is that Intel's marketing with the Atom and why is there so much hype around it? The short answer is that Intel's marketing with the Atom processor as well as Intel's goals for the Atom processor were low power consumption in low light environments. Note that, of course, not all chipset features are implemented in every Atom device. The image above shows, from left to right, the IC7TH, the 945GSE, and the Atom N270 processor that you can also find when looking at the IA80's motherboard below.

Intel Atom power

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A look inside

The inside of a rugged system often tells as much, or more, than the outside of its suitability for use in demanding applications. We've seen machines that looked great outside but less so inside. As a result, we take a peek inside the computers we test, just to examine the engineers' design work and how well things are manufactured and finished.

The IA80 system board is a compact 6.5 x 9 inch rectangle that's about as neat and clean as it gets. There is simplicity and innovative design everywhere. Winmate, for example, doesn't use a complex heat pipe system inside this machine. Instead, there are metal heat sinks attached to the backside of the housing. On top of each of those heat sinks sits a soft piece of conductive material. When the machine is closed, the heat sink compresses press on top of the heat generating components and form an instant thermal management system.

When you look at the IA80's board, the very small rectangular chip in the center is the 1.6GHz Intel Atom N270 processor on its 22 x 22 mm package. Its Thermal Design Power is a minuscule 2.5 to 3.3 Watts. In the upper right is the Intel R8201 GRM/GHM (South Bridge ICH7-M) chip that handles the peripheral load (PCIe, PCI, USB 2.0, SPI, SATI etc.) and has a maximum TDP of 3.3 watts. Below that is the Intel 945GSE graphics and memory controller chip. The total Thermal Design Power of this Atom N270/945GSE/ICH7M trio combines to a maximum of under 12 watts.

The connectors themselves are standard issue and not sealed further against liquids or dust. This makes the rubber plugs on the outside of the computer the primary, and sole, protection against anything invading the inside of the machine. We'd prefer sealed connectors and a sealed connector plate.

Memory is via a single, easily accessible SO-DIMM slot sitting on the motherboard. Our machine came with a 512MB module, which is generally plenty enough for an XP Embedded system.

The disk in our review unit (see upper left in the picture) was a 2.5-inch 80GB Western Digital WD800BEVT "Scorpio Blue." It sits in a metal sub-frame and plugs directly into a connector on the motherboard. The subframe is held in place with a screw. We'd like to see shock absorption there.

There's a 802.11g PCI-Express mini WiFi card with external antenna (below the hard disk). It's made by Taiwanese wireless specialist QCOM. The module is backwards compatible with 802.11b and connects to the system via a USB 2.0 interface.

Operating System

The key to understanding a PC like the Winmate IA80 and what it can offer is in understanding the difference between a general purpose operating system and an embedded operating system.

A general purpose OS, like Windows XP Professional or Windows Vista, is just that, general purpose. You can do anything you want with it, and run anything you want on it. With that in mind, Microsoft equipped Windows XP and Vista with all the drivers and software and utilities anyone could possibly need. The result is very large operating systems with numerous processes and services running all the time, all consuming memory and power. That's why you need a fast and powerful processor and lots of memory to run those OSs.

An embedded operating system is completely dif-
**REVIEW: WINMATE RUGGED TABLET IA80**

The concept behind an embedded OS is to only use what the system actually needs to perform a certain task and nothing more. This dramatically reduces the space and resource requirements of the operating system, which means it can do its job without a hot-running, battery-draining processor and tons of memory. XP Embedded is therefore ideal for commercial and industrial devices that do not need all of the full-featured consumer or business OS, yet can still run thousands of existing Windows applications. An embedded OS can be as small as 40MB and it’s even possible to cut it all down to around 8MB with a bootable kernel.

Unlike Vista or XP Professional, XP Embedded is not one-size-fits all. A company will determine what a machine is for and what it should be able to do. Then they include as many components (hence the term “componentized” operating system) as they need. There are over 10,000 available and it’s easy to create lean, nimble embedded OS platforms that can still do sophisticated high level tasks like advanced multimedia, browsing, communications or whatever a task requires. An embedded OS can even run as a real-time OS via third party plug-ins.

Essentially you get the power of the basic Windows XP engine, but without any overhead you don’t need.

Which means that in an embedded systems machine, benchmarks do not necessarily tell the true story. Benchmarks simply measure raw power, but not how efficiently that power is put to use. What this means is that the Winmate IA80 is much quicker than you’d think it is based on its hardware specs. In fact, in most instances it feels a lot quicker than my Acer Aspire One notebook, which has the same CPU architecture. That said, it still becomes obvious just how much punch per watt the Atom solutions deliver.

**How fast is it?**

One of the frequent questions about the Atom platform is its performance. You may come across the term “targeted” as a description of the kind of performance offered by low power processors. That’s a marketing term for “fast enough for the intended purpose, given that the primary objective is to extend battery life.”

Performance is always tied to power consumption. When you look at common notebook processors, they generally have thermal design powers of 17 (example: 1.6GHz Core 2 Duo T9400) to 35 watts (example: 2.5GHz Core 2 Duo T9400). Ultra low power processors range from 5.5 watts (example: 1.2GHz Core Solo U1400) to 10 watts (example: 1.2GHz Core Duo U2500). The Atom processors, on the other hand, use only about two to three watts. In terms of benchmark performance, Atom chips are about 50% better than that of a 1GHz Celeron M 375, about the same as a 1.2GHz Intel Core Solo U1400, about 30% less than that of a 1.2GHz Core Duo U2500, and roughly a third of that of a notebook CPU like the 2.5GHz Core 2 Duo T9400.

“Speed,” of course, is relative in computers. Operating systems, systems configurations and the number of processes and utilities running in the background can have a greater impact on perceived performance than processors. A fully loaded Windows Vista computer, for example, can feel slow to users even when it runs on very fast processors. Conversely, an optimized machine with an embedded operating system can feel very quick even on minimal hardware. We installed Passmark Software’s Performance-Test 6.1 on the IA80 to objectively measure performance. Passmark’s benchmark suite runs about 30 tests covering CPU, 2D graphics, 3D graphics, memory, and disk and then computes scores for each category and an overall PassMark score. For comparison, we’re showing the benchmark numbers of similar machines are based on different processor and chipset architectures.

The results are inconclusive and primarily show that it is very difficult to compare different processor architectures. Even the two different Atom families deliver oddly inconsistent benchmark results. You could probably argue that benchmarks are best used to compare only among the exact same CPU architectures. That said, it still becomes obvious just how much punch per watt the Atom solutions deliver.

Overall, the IA80 feels very quick, with the snappiness we’ve come to expect from well-executed Windows XP Embedded systems.

**Touch screen and Touchkit utility**

Our IA80 came with a resistive touch screen that can be operated either with a plastic stylus or with a finger: The resistive touch panel controller talks to the processor via a serial connection and is very fast. There is a special Touchkit control panel that allows adjustment and optimization for accurate touch performance and ease of use. The panel is quite elaborate:

- **Edge Compensation** Edge Compensation is important for precise calibration. With touch screens and digitizers it can be difficult to touch or select items at the edge of the panel, especially when the display runs all the way to a thick protective bezel. The IA80 touch panel allows you to precisely define edge compensation for all four sides, i.e., so the cursor thinks the edge is either farther away or closer in. Precise configuration can make for optimal usability and responsiveness in touch applications.

**WINMATE RUGGED TABLET IA80**

**Type:** Rugged Tablet PC

**Chassis:** Aluminum-magnesium alloy with protective rubber bumpers

**Processor:** 1.6GHz Atom N270

**Display Chipset:** Intel 945GSE/ICH7-M

**OS:** Windows XP Embedded

**Memory:** 512MB to 2048MB DDR2 400/533MHz via one SODIMM slot

**Display:** 8.4” SVGA (800 x 600) TFT, 250 nits backlight

**Digitizer/Pens:** 4x resistive touch screen

**Keyboard:** Optional external USB keyboard

**Storage:** Western Digital WD800BEVT Scorpio Blue 5400 rpm SATA 80GB 2.5-inch hard disk or industrial Compact Flash or SSD

**Expansions slots:** 1 PCI Express 34 slot, externally accessible

**Size:** 10.5 x 8.75 x 1.8 (including rubber bumpers)

**Weight:** 5.25 lbs. as tested (with battery, bumpers and handle)

**Ruggedness:** Drop: MIL-STD-810F M516.5 4 feet to concrete (with SSD or CF Flash); Vibration: MIL-STD-810F 514.5 (with SSD or CF Flash); Ingress Protection: IP54 whole unit; Operating Temperature: -4 to 140 degrees Fahrenheit

**Power:** Rechargeable Li-Ion, 11.1V, 4,800mAh AS 53.3Whr

**Communication:** 802.11b/g, Bluetooth; optional PCI Express Card-based GSM/GPRS/EDGE CDMA/UMTS and GPS

**Interface:** 2 USB 2.0, audio in/out, docking (LAN, VGA, 4 USB)

**Price:** depends on configuration (sample starting around US$2,000)

**Contact:** Winmate Communication INC

www.winmate.com.tw

Phone: +886-2-85110288
Winmate IA80’s BIOS includes a Battery Calibration function useful to keep the battery in optimal shape.

Wireless and expansion

Integrated wireless communication is standard in almost all current computers, and the Winmate IA80 is no different. It comes with an internal PCI-Express QCOM 802.11g module. The WiFi module can either be controlled by the standard Windows Zero Configuration utility or via a substantially more comprehensive and powerful Ralink RaConfig utility from Ralink, RaConfig.

RaConfig is a tool for advanced users who want to have precise control over their wireless setup. The statistics section of RaConfig can be used to detect network problems. A special WMM panel controls wireless multimedia. Another one handles WPS (Wi-Fi Protected Setup) configurations.

If you want to stay with the standard Microsoft setup, RaConfig can still provide a variety of monitoring functions without interfering with the Windows Zero configuration or profiles. Bluetooth Version 2.0 with EDR (Enhanced Data Rate) is available as an internal USB module, as is optional PCI Express Card-based GSM/GPRS/EDGE CDMA/UMTS and GPS. Our review unit did not have the WAN function and so we could not test it.

Different models

Winmate prides itself in making available a variety of versions and models in a certain product category. Winmate further differentiates between VIA and Intel-based models.

The I680 series is based on the Celeron M processor and comes with various display sizes (8.4, 10.4, 12.1 inches), resolutions (800 x 600, 1024 x 768), and brightnesses (170 to 450 nits).

The I80 series uses an 800MHz Core Duo processor and also offers various display sizes (8.4, 10.4, 12.1 inches), resolutions (800 x 600, 1024 x 768), and brightnesses (170 to 450 nits).

The V280 series is available both in an 10-inch screen) and an 12-inch screen version. Each model is available either the 1.2GHz version of the VIA C7-M processor or the 1.6GHz version.