THE POSSIBILITIES ARE INFINITE FUJITSU

WHITE PAPER

0-Watt PC
Frequently Asked Questions

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Pages 6

GREEN IT is not just a passing fad for Fujitsu Technology Solutions. The company has already been working on Green IT for more than 20 years. In addition to using environmentally-conscious materials, we have been reducing energy consumption, thus providing measurable benefits for our customers.

Even when not in use and the screen has long gone dark, PCs and monitors connected to the mains still use up 1 to 5 watts of power in off-mode or hibernating depending on the model. Innovative solutions from Fujitsu Technology Solutions now radically reduce - and indeed even avoid - power consumption in off-mode or hibernating.

Launched at last year's CeBIT, the 0-watt monitor has now become established in the market. The next step is the presentation by Fujitsu Technology Solutions of a world's first at the CeBIT 2009: a 0-Watt PC that consumes no power at all in off-mode or hibernating yet which can still be administered remotely. The first models to feature this new function, ESPRIMO Green PCs, will be available for ordering summer 2009.

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Why a 0-Watt PC?

The objective of the EU Directive 2005/32/EC Eco Design of Energy Using Products (EuP) is to reduce the energy consumption of electronic devices. Directive number 1275/2008 (Los 6) Standby and off mode consumption, dated 17th December 2008, which regulates the energy consumption in standby/off mode, demands a maximum of 1 Watt as of 05.01.2010 and only 0.5W by 05.01.2013 The so-called "0-Watt PC" avoids these permitted losses completely. This is an active contribution to a further reduction in standby losses. The meaning of “stand-by” in the documents from the EU Directive is more described in the following section.

What is a 0-Watt PC?

The 0-Watt PC still consumes power during its operation. The usual so-called standby losses can be completely eliminated. (patent pending)
This PC can be switched off in such a way that it consumes zero watts in off mode / hibernating. The PC can be switched on again at a preset time, either via the PC power-on switch or automatically.
The 0-Watt PC also has a convenient feature where the user can switch off both the PC and the monitor via just the power-on switch at the front of the 0-Watt PC – and all this without having to look for any mechanical on/off switch at the rear of the PC or operating an on/off switch of a power strip.

Which (ACPI) status is meant by 0-Watt standby?

In general terms so-called standby losses are when a product, for example a television or radio, appears to be switched off but is still using power. However, there are various definitions.
EuP Directive:

- *Off mode* refers to the status in which the device is connected to power but there is no function
- *Standby* refers to a status, in which the device is connected to the mains and is reliant on the mains for power in order to function correctly; it provides only the following functions for an unrestricted period:
  - Reactivation function…
  - Information or status display
  - ACPI - “Advanced Configuration and Power Interface” Specification

Energy saving modes according to the ACPI Standard

- *Standby (suspend to RAM) ACPI S3:* most of the motherboard hardware is switched off; the operating status is saved to a volatile memory
- *Hibernating (suspend to disk) ACPI S4:* The operating status is saved to a non-volatile memory
- *Soft-Off ACPI S5:* The system is basically switched off, but the power supply unit still supplies power to the system and can be reactivated via a mechanical button (power-on button) or via the network interface.

The 0-Watt PC can attain zero watt status in ACPI mode S4 (hibernating) as well as in S5-mode (soft-off), which corresponds to the EuP off-mode.

Does this 0-Watt PC cost more than a normal PC?

The 0-Watt function comes in conjunction with a highly efficient power supply unit with up to 89% efficiency. In addition to the 0-Watt function, this power supply unit saves more power in comparison to a power supply with only 80% efficiency. These highly efficient power supply units are more expensive to manufacture.

How much can be saved with a 0-Watt PC?

The savings provided by the 0-Watt function depend on the PC off-mode / hibernating losses described previously.
Sample calculation for
A) 14-hour off-mode / hibernating per day, 24h off-mode / hibernating for weekend/holidays, 220 working days/year, €0.17/kWh
B) Including 1 hour remote administration daily during off-mode time; optional setting

	Savings potential	
Off-mode / hibernating	5 year old PC	Current systems
Losses	3.1 W	1.7 W
Consumption / year for A (B)	20.34 kWh (19.2 kWh)	11.12 kWh (10.53 kWh)
Cost / year for A (B)	€3.46 (€3.26)	€1.89 (€1.7)

Which products are planned in conjunction with the 0-Watt function and when will they be available?

The 0-Watt PC will be available for ordering as of June 2009 in the following product models:

- Small-form factor ESPRIMO E7935 0-Watt
- Microtower ESPRIMO P7935 0-Watt

Will this 0-Watt function also be offered in other product models?

A step-by-step introduction into further product models is planned.

Which additional environmentally conscious functions does the 0-Watt PC offer?

ESPRIMO E7935 0-Watt and ESPRIMO P7935 0-Watt provide an active contribution to environmental protection. Additional "green" functions:

- Highly efficient power supply unit with up to 89% efficiency; thus exceeds the ENERGY STAR® 5.0 criteria (approval as of 01.07.2009)
- Halogen-free boards for the mainboard, power supply unit and riser card
- Use of environmentally-conscious material (Blue Angel and Nordic Swan certified)
- Use of energy-saving chipset and processors from Intel®
- Switched monitor outlet on the power supply unit permitting complete removal of a standard monitor from the mains
- Energy saving options

What are the technical functions offered by the 0-Watt PC?

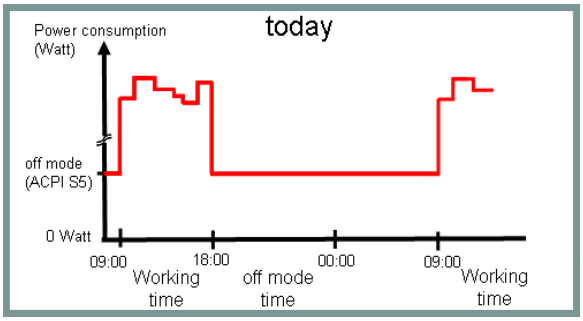
The ESPRIMO E/P7935 product line offers the following technical functions (more technical details are in the respective data sheet)

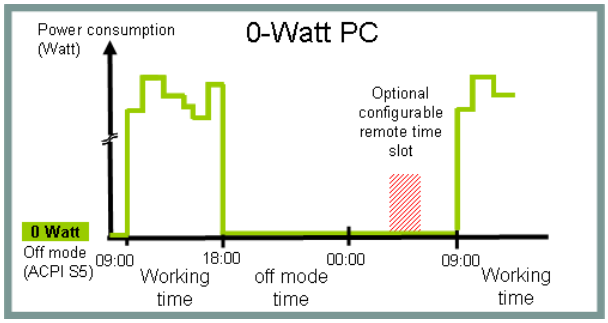
- Intel® Q45 chipset
- Intel® vPro™ technology
- Intel® LAN
- Intel® Active Management (iAMT 5.0)
- Intel® Graphic PCIe x16 gen2
- ASF and DASH support
- DX10/ HDCP
- TPM 1.2
- Raid 0/1

Will the same technology be used in the 0-Watt PC as in the 0-Watt monitor?

Different technologies are used for the 0-Watt PC (patent pending) and the 0-Watt monitor.

How does the 0-Watt PC function?





The graphics explain the principle theory of operation. The 0-Watt PC can automatically switch the PC to zero watt without using a mechanical power switch or switchable power strip. The power supply of the PC disengages its internal circuits from the power plug upon the entrance of the 0-Watt mode
The user can switch the PC on again at any time via the standard power-on button located at its front panel.
If the 0-Watt PC is to be updated with software, for example outside normal working hours, the administrator can optionally configure a time period, in which the PC can be woken up, wait for possible updates and then automatically switch off by itself.

Can the 0-Watt function be switched on and off?

Delivery status: the 0-Watt function is activated. Changing the BIOS settings ensures that this function for the smooth implementation of system management tasks, such as roll-outs, can be modified

- ex factory
- manually or
- remotely using the supplied management software DeskView.

How is the 0-Watt PC woken up again?

The user can switch the PC on again at any time using the standard power-on button located on its front panel.
If the 0-Watt PC is to be updated with software, for example outside normal working hours, the administrator can optionally configure a time period, in which the PC can be woken up, wait for possible updates and then automatically switch off by itself.

How quickly will the PC wake up from the 0-Watt mode?

The 0-Watt PC acts like a standard PC that is reactivated from its hibernating mode (ACPI S4) or from the off mode (ACPI S5).

What is the difference between "low-power soft off" and 0-Watt PC?

The systems of the product models ESPRIMO C/E/P5730 and ESPRIMO E/P7935 have met and undercut as early as September 2008 the standby/off mode values of under one watt as demanded by the EuP. This was achieved by implementing an additional circuit on the mainboard (system board).
This circuit means that only the power needed for activating this circuit is required and all the other unnecessary devices are switched off. This function can be activated via the BIOS and is marketed under the name "low-power soft off". In comparison to the 0-Watt PC, it does not provide zero watt in off-mode/hibernating. With an activated low-power soft off function, the PC can only be woken up via the button on the front. With the 0-Watt PC it can also be automatically woken at an optional predefined time.

	Low-power soft off (deep sleep)	0-Watt PC
Soft off-mode	<1.0 Watt	0.0 watt
Administration in off mode (ACPI S5) possible	No, wake-up only via the on switch at the front	x

Which energy consumption values does the 0-Watt PC have in other operating states, like idle mode?

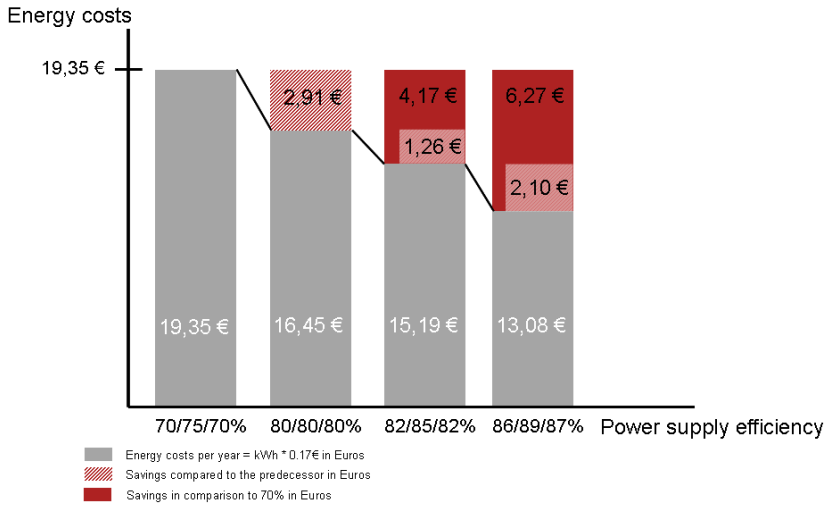
The energy consumption values will be published in a separate energy consumption white paper on the Internet page for the respective product. This document explains the test method, the calculation and the configuration.
The following values have been defined for the ESPRIMO E7935 0-Watt using a sample configuration:
(Intel® Core™2 Duo E8600, 2GB DDR2, 500GB HDD, DVD-Supermulti)

- Idle mode 32 W
- Sleep (ACPI S3) 1.6 W
- Soft Off mode (ACPI S5) 0.0 W

In comparison to inferior power supplies, what other savings can be made with a power supply unit with up to 89% efficiency?

The following overview clearly shows the savings potential generated when using highly efficient power supply units.
The measurements were made with the same configuration in order to show only the affect of the PSU.

Power supply unit efficiency at 20%, 50% and 100% loads	70/75/70%	80/80/80%	82/85/82%	86/89/87% with 0-Watt function
Soft off mode (ACPI S5) in watts	1.7	1.7	1.3	0.0
Sleep mode (ACPI S3) in watts	2	1.9	1.6	1.6
Idle mode in watts	44	36	34	32
Peak in watts	96	86	81	78
On mode = 90% idle + 10% peak in watts	49.2	41	38.7	36.6
Annual consumption = 260day (8h*on mode+2h*sleep mode+14h*off mode) + 105day*24h*off mode in kWh/year	113.85	96.74	89.34	76.96
Energy costs per year = kWh * 0.17€ in Euros	19.35	16.45	15.19	13.08
Savings compared to the predecessor in Euros		2.91	1.26	2.10
Savings in comparison to 70% in Euros		2.91	4.17	6.27



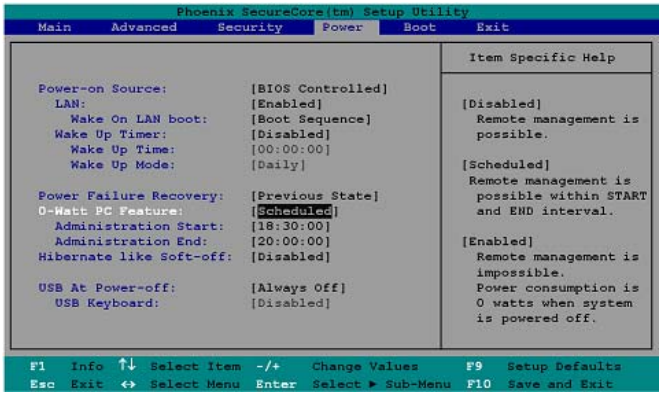
What are the possible BIOS settings?

Three different states can be set in the BIOS.

Disabled Remote management is possible.

Scheduled Remote management is possible within START and END interval.

Enabled Remote management is impossible. Power consumption is 0 watts when system is powered off.



How can I administer the 0-Watt PC? How do manageability standards work, such as Dash and Intel® Active Management Technology (iAMT)?

Standard PCs can be remotely managed and woken via the function Wake on LAN (WOL) if the latter has been activated. When in operation, the 0-Watt PC can be managed at any time just like a standard PC. Administration in soft off / hibernating mode is possible in an optionally definable time slot. In this time slot, the 0-Watt PC behaves like a standard PC.

Which time intervals can be set for administration purposes and how variable are they?

The intervals can be set and changed in the BIOS menu at any time. This can be modified manually or remotely using the supplied DeskView management software.
The installed time intervals are valid each day until they are modified.
Sample setting in the BIOS menu:
Administration start : 18:30:00
Administration end : 20:00:00
These settings mean that the 0-Watt PC wakes itself daily between 18.30 and 20.00 thus enabling administration during this period (1.5 hours). In the remaining hours, the PC is in 0-Watt mode in where it can only be woken manually via the PC power-on switch.

Will WOL (Wake on LAN) function with the 0-Watt PC?

In off / hibernating mode WOL only functions in the optional preset time slot.

Have components been specially developed for this 0-Watt PC?

In order to completely reduce off mode losses in a PC, adjustments must be made in the power supply and system board. These two components are responsible for the behavior in the various modes and must be aligned with each other accordingly. (patent pending)

Is an additional battery used?

Only a small amount of energy is required to wake the power supply unit via the PC power-on button or - when there is an optionally set time - from its 0-Watt mode. The energy required is so minimal that it can be provided by the battery on the mainboard (system board). No additional battery is required.

How long does the battery last?

Standard systems hardly affect the motherboard battery - the battery lifespan is thus scarcely affected at all by the additional 0-Watt mode load.

What happens when the battery is empty? How can I switch on the PC again?

An emergency ON button at the rear of the PC power supply unit can be manually operated at anytime to wake the PC from 0-Watt mode, for example having replaced the battery or the mainboard.

What happens when there is a power failure?
How can the PC differentiate between a power failure and a normal switch-off?

When there is a power failure, the 0-Watt PC behaves like a standard PC according to the BIOS settings (power fail recovery). The PC stays switched off in 0-Watt standby mode.

How does the PC behave when it is woken at the defined time?

The PC boots to activate the administration functions and goes immediately to ACPI status S5.

How does the PC react after the administration interval?

The PC switches itself automatically out of ACPI S5 mode to the 0-Watt standby mode.

How does the PC behave if the update takes longer than the set time?

The 0-Watt PC waits for commands/updates from the administrator/server in the preset time interval. The defined time interval has no affect on the updates that have been started and are still running at this time. Having processed the actions the 0-Watt switches to the 0-Watt standby mode.

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