Letter of Volatility – Intel® NUC Products

⚠ CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

Intel® NUC products contain both volatile and non-volatile (NV) components. Volatile components lose their data immediately after power is removed from the component. Non-volatile (NV) components continue to retain their data even after power is removed from the component.

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Commercial Intel® NUC Kits (Core)

Table 1. List of Memory Components on the Intel® NUC Kits (NUC7i7DNHE, NUC7i7DNKE, NUC7i5DNHE, NUC7i5DNKE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 128 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
TPM	TPM 2.0	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 2. List of Memory Components on the Intel® NUC Kits (NUC7i3DNHE and NUC7i3DNKE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (8 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
TPM	TPM 2.0	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 3. List of Memory Components on the Intel® NUC Kits (NUC5i5MYHE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 128 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
TPM	TPM 2.0	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 4. List of Memory Components on the Intel® NUC Kits (NUC5i3MYHE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (8 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
TPM	TPM 2.0	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 5. List of Memory Components on the Intel® NUC Kit (DC53427HYE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (8 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery backed CMOS memory 256	Yes	Removing the on board

		bytes. Stores CMOS information in Chipset		Coin Cell battery.
TPM	TPM 1.2	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
SOC CPU	Cache	Volatile memory Fast SRAM on CPU DIE	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory – Uses System RAM for Frame Buffer	Yes	Remove power to board

Table 6. List of Memory Components on the Intel® NUC Kit (DE3815TYKHE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (8 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	Removing the on board Coin Cell battery.
CMOS	RTC	Volatile battery backed CMOS memory 256 bytes. Stores CMOS information in Chipset	Yes	Removing the on board Coin Cell battery.
TPM	TPM 1.2	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
SOC CPU	Cache	Volatile memory Fast SRAM on CPU DIE	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory – Uses System RAM for Frame Buffer	Yes	Remove power to board

⚠ CAUTION: All other components on the motherboard will lose data once power is removed from the system. Primary power loss, unplugging the power cord and removing the battery, will destroy all user data on the memory (DDR3L or DDR4). Secondary power loss, by removing the on board coin-cell battery, will erase any counter values that are written to CMOS in addition to destroying system date and time-of-day information. AMT passwords can be reset using BIOS and jumpers on the motherboard

In addition, to clarify memory volatility and data retention in situations where the system is put in different ACPI power states the following is provided (those ACPI power states are S0, S1, S3, S4 and S5):

- S0 state is the working state where the dynamic RAM is maintained and is read/write by the processor.
- S1 state is a low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) and hardware maintains all system contexts.
- S3 is called "suspend to RAM" state or stand-by mode. In this state the dynamic RAM is maintained. Dell* systems will be able to go to S3 if the OS and the peripherals used in the system supports S3 state. Linux* and Windows* support S3 state.
- S4 is called "suspend to disk" state or "hibernate" mode. There is no power. In this state, the dynamic RAM is not maintained. If the system has been commanded to enter S4, the OS will write the system context to a non-volatile storage.
- File and leave appropriate context markers. When the system is coming back to the working state, a restore file from the non-volatile storage can occur. The restore file has to be valid. NUC systems will be able to go to S4 if the OS and the peripherals support S4 state. Windows supports S4 state.
- S5 is the "soft" off state. There is no power. The OS does not save any context to wake up the system. No data will remain in any component on the system board, i.e., cache or memory. The system will require a complete boot when awakened. Since S5 is the shut off state, coming out of S5 requires power on which clears all registers.

The following table shows all the states supported by Intel NUC commercial products:

Model Number	S0	S1	S3	S4	S5
NUC7i7DNHE / NUC7i7DNKE	X		X	X	X
NUC7i5DNHE / NUC7i5DNKE	X		X	X	X
NUC7i3DNHE / NUC7i3DNKE	X		X	X	X
NUC5i5MYHE / NUC5i3MYHE	X		X	X	X
DC3217IYE / D33217GKE	X		X	X	X
DE3815TYKHE	X		X	X	X

Intel® NUC Business Mini PC (Core)

Table 7. List of Memory Components on the Intel® NUC Kits (NUC7i5DNKPC)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 128 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
TPM	TPM 2.0	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
RAM	SODIMM	Volatile memory	Yes	Remove power to board
SSD	M.2 2280	Non-Volatile memory	Yes	Physically remove module or delete data via software

Table 8. List of Memory Components on the Intel® NUC Kits (NUC7i3DNKTC)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (8 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
RAM	SODIMM	Volatile memory	Yes	Remove power to board
SSD	M.2 2280	Non-Volatile memory	Yes	Physically remove module or delete data via software

Table 9. List of Memory Components on the Intel® NUC Kits (NUC7i3DNHNC)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A

SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
RAM	SODIMM	Volatile memory	Yes	Remove power to board
HDD	SATA	Non-Volatile memory	Yes	Physically remove drive or delete data via software

⚠ **CAUTION: All other components on the motherboard will lose data once power is removed from the system. Primary power loss, unplugging the power cord and removing the battery, will destroy all user data on the memory (DDR3L or DDR4). Secondary power loss, by removing the on board coin-cell battery, will erase any counter values that are written to CMOS in addition to destroying system date and time-of-day information. AMT passwords can be reset using BIOS and jumpers on the motherboard**

In addition, to clarify memory volatility and data retention in situations where the system is put in different ACPI power states the following is provided (those ACPI power states are S0, S1, S3, S4 and S5):

- S0 state is the working state where the dynamic RAM is maintained and is read/write by the processor.
- S1 state is a low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) and hardware maintains all system contexts.
- S3 is called "suspend to RAM" state or stand-by mode. In this state the dynamic RAM is maintained. Dell* systems will be able to go to S3 if the OS and the peripherals used in the system supports S3 state. Linux* and Windows* support S3 state.
- S4 is called "suspend to disk" state or "hibernate" mode. There is no power. In this state, the dynamic RAM is not maintained. If the system has been commanded to enter S4, the OS will write the system context to a non-volatile storage.
- File and leave appropriate context markers. When the system is coming back to the working state, a restore file from the non-volatile storage can occur. The restore file has to be valid. NUC systems will be able to go to S4 if the OS and the peripherals support S4 state. Windows supports S4 state.
- S5 is the "soft" off state. There is no power. The OS does not save any context to wake up the system. No data will remain in any component on the system board, i.e., cache or memory. The system will require a complete boot when awakened. Since S5 is the shut off state, coming out of S5 requires power on which clears all registers.

The following table shows all the states supported by Intel NUC commercial products:

Model Number	S0	S1	S3	S4	S5
NUC7i5DNKPC	X		X	X	X
NUC7i3DNKTC	X		X	X	X
NUC7i3DNHNC	X		X	X	X

Intel® NUC Mini PCs

Table 10. List of Memory Components on the Intel® NUC Kits (NUC8i7HVKVA and NUC8i7HNKQC)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)

System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
SSD	M.2 2280	Non-Volatile memory	Yes	Physically remove module or delete data via software

Table 11. List of Memory Components on the Intel® NUC Kits (NUC8i7BEHGA, NUC8i5BEHFA and NUC8i3BNHFA)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
Optane	M.2 2280	Non-Volatile memory	Yes	Physically remove module or delete data via software
HDD	SATA	Non-Volatile memory	Yes	Physically remove module or delete data via software

Table 12. List of Memory Components on the Intel® NUC Kits (NUC8i7BEKQA and NUC8i5BEKPA)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
SSD	M.2 2280	Non-Volatile memory	Yes	Physically remove module or delete data via software

Table 13. List of Memory Components on the Intel® NUC Kits (NUC8i3CYSM and BOXNUC8i3CYSN)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
SSD	M.2 2280	Non-Volatile memory	Yes	Physically remove module or delete data via software

Table 14. List of Memory Components on the Intel® NUC Kits (NUC7i7BNKQ and NUC7i5BNKP)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
SSD	M.2 2280	Non-Volatile memory	Yes	Physically remove module or delete data via software

Table 15. List of Memory Components on the Intel® NUC Kits (NUC7i7BNHXG, NUC7i5BNHXF and NUC7i3BNHXF)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
Optane	M.2 2280	Non-Volatile memory	Yes	Physically remove module or uninstall module via software
HDD	SATA	Non-Volatile memory	Yes	Physically remove HDD or use software to erase data

Table 16. List of Memory Components on the Intel® NUC Kits (NUC7i7BNHX1, NUC7i5BNHX1 and NUC7i3BNHX1) (Optane)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
Optane	M.2 2280	Non-Volatile memory	Yes	Physically remove module or uninstall data via software

Table 17. List of Memory Components on the Intel® NUC Kit (NUC5i3RYHSN)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
RAM	DDR3L	Volatile memory	Yes	Remove power to board
HDD	SATA	Non-Volatile memory	Yes	Physically remove module or uninstall data via software

Table 18. List of Memory Components on the Intel® NUC Kits (NUC6CAYS and NUC5PGYH)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board
Optane	M.2 2280	Non-Volatile memory	Yes	Physically remove module or uninstall module via software

⚠ CAUTION: All other components on the motherboard will lose data once power is removed from the system. Primary power loss, unplugging the power cord and removing the battery, will destroy all user data on the memory (DDR3L or DDR4). Secondary power loss, by removing the on board coin-cell battery, will erase any counter values that are written to CMOS in addition to destroying

system date and time-of-day information. AMT passwords can be reset using BIOS and jumpers on the motherboard

In addition, to clarify memory volatility and data retention in situations where the system is put in different ACPI power states the following is provided (those ACPI power states are S0, S1, S3, S4 and S5):

- S0 state is the working state where the dynamic RAM is maintained and is read/write by the processor.
- S1 state is a low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) and hardware maintains all system contexts.
- S3 is called "suspend to RAM" state or stand-by mode. In this state the dynamic RAM is maintained. Dell* systems will be able to go to S3 if the OS and the peripherals used in the system supports S3 state. Linux* and Windows* support S3 state.
- S4 is called "suspend to disk" state or "hibernate" mode. There is no power. In this state, the dynamic RAM is not maintained. If the system has been commanded to enter S4, the OS will write the system context to a non-volatile storage.
- File and leave appropriate context markers. When the system is coming back to the working state, a restore file from the non-volatile storage can occur. The restore file has to be valid. NUC systems will be able to go to S4 if the OS and the peripherals support S4 state. Windows supports S4 state.
- S5 is the "soft" off state. There is no power. The OS does not save any context to wake up the system. No data will remain in any component on the system board, i.e., cache or memory. The system will require a complete boot when awakened. Since S5 is the shut off state, coming out of S5 requires power on which clears all registers.

The following table shows all the states supported by Intel NUC consumer products:

Model Number	S0	S1	S3	S4	S5
NUC8i7HVKVA / NUC8i7HNKQC	X		X	X	X
NUC8i7BEHGA / NUC8i5BEHFA / NUC8i3BNHFA	X		X	X	X
NUC8i7BEKQA / NUC8i5BEKPA	X		X	X	X
NUC8i3CYSM / BOXNUC8i3CYSN	X		X	X	X
NUC7i7BNQ / NUC7i5BNK / NUC7i3BNXG	X		X	X	X
NUC7i7BNHXG / NUC7i5BNHXF / NUC7i3BNHXF	X		X	X	X
NUC7i7BNHX1 / NUC7i5BNHX1 / NUC7i3BNHX1	X		X	X	X
NUC5i3RYHSN	X		X	X	X
NUC6CAYS	X		X	X	X
NUC5CPYH	X		X	X	X

Consumer Intel® NUC Kits (Core)

Table 19. List of Memory Components on the Intel® NUC Kits (NUC8i7BEH, NUC8i5BEH, NUC8i5BEK, NUC8i3BEH and NUC8i3BEK)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board

| SOC GPU | Frame Buffer | Volatile memory | Yes | Remove power to board |

Table 20. List of Memory Components on the Intel® NUC Kits (NUC8i7HVK and NUC8i7HNK)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 21. List of Memory Components on the Intel® NUC Kits (NUC7i7BNH, NUC7i5BNH, NUC7i5BNK, NUC7i3BNH and NUC7i3BNK)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 22. List of Memory Components on the Intel® NUC Kits NUC6i7KYK

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 23. List of Memory Components on the Intel® NUC Kits (NUC6i5SYH, NUC6i5SYK, NUC6i3SYH and NUC6i3SYK)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A

SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 24. List of Memory Components on the Intel® NUC Kits (NUC5i7RYH, NUC5i5RYH, NUC5i5RYK, NUC5i3RYH, NUC5i3RYK and NUC5i3RYHS)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 25. List of Memory Components on the Intel® NUC Kits (D54250WYKH, D54250WYK, D34010WYKH and D34010WYK)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

⚠ **CAUTION: All other components on the motherboard will lose data once power is removed from the system. Primary power loss, unplugging the power cord and removing the battery, will destroy all user data on the memory (DDR3L or DDR4). Secondary power loss, by removing the on board coin-cell battery, will erase any counter values that are written to CMOS in addition to destroying system date and time-of-day information. AMT passwords can be reset using BIOS and jumpers on the motherboard**

In addition, to clarify memory volatility and data retention in situations where the system is put in different ACPI power states the following is provided (those ACPI power states are S0, S1, S3, S4 and S5):

- S0 state is the working state where the dynamic RAM is maintained and is read/write by the processor.
- S1 state is a low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) and hardware maintains all system contexts.
- S3 is called "suspend to RAM" state or stand-by mode. In this state the dynamic RAM is maintained. Dell* systems will be able to go to S3 if the OS and the peripherals used in the system supports S3 state. Linux* and Windows* support S3 state.

- S4 is called "suspend to disk" state or "hibernate" mode. There is no power. In this state, the dynamic RAM is not maintained. If the system has been commanded to enter S4, the OS will write the system context to a non-volatile storage.
- File and leave appropriate context markers. When the system is coming back to the working state, a restore file from the non-volatile storage can occur. The restore file has to be valid. NUC systems will be able to go to S4 if the OS and the peripherals support S4 state. Windows supports S4 state.
- S5 is the "soft" off state. There is no power. The OS does not save any context to wake up the system. No data will remain in any component on the system board, i.e., cache or memory. The system will require a complete boot when awakened. Since S5 is the shut off state, coming out of S5 requires power on which clears all registers.

The following table shows all the states supported by Intel NUC consumer products:

Model Number	S0	S1	S3	S4	S5
NUC8i7BEH	X		X	X	X
NUC8i5BEH / NUC8i5BEK	X		X	X	X
NUC8i3BEH / NUC8i3BEK	X		X	X	X
NUC8i7HVK / NUC8i7HNK	X		X	X	X
NUC7i7BNH	X		X	X	X
NUC7i5BNH / NUC7i5BNK	X		X	X	X
NUC7i3BNH / NUC7i3BNK	X		X	X	X
NUC7i7BNH / NUC7i5BNH /NUC7i3BN (Optane)	X		X	X	X
NUC6i7KYK	X		X	X	X
NUC6i5SYH / NUC6i5SYYK	X		X	X	X
NUC6i3SYH / NUC6i3SYYK	X		X	X	X
NUC5i7RYH	X		X	X	X
NUC5i5RYH / NUC5i5RYK	X		X	X	X
NUC5i3RYH / NUC5i3RYK	X		X	X	X
NUC5i3RYHSN	X		X	X	X
D54250WYKH / D54250WYK	X		X	X	X
D34010WYKH / D34010WYK	X		X	X	X

Consumer Intel® NUC Kits (Pentium, Celeron, or Atom)

Table 26. List of Memory Components on the Intel® NUC Kits (NUC7PJYH and NUC7CJYH)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 27. List of Memory Components on the Intel® NUC Kits (NUC6CAYH and NUC6CAYS)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)

System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 28. List of Memory Components on the Intel® NUC Kits (NUC5PPYH, NUC5CPYH and NUC5PGYH)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 29. List of Memory Components on the Intel® NUC Kit (DN2820FYKH)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 30. List of Memory Components on the Intel® NUC Kit (DCCP847DYE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

⚠ **CAUTION: All other components on the motherboard will lose data once power is removed from the system. Primary power loss, unplugging the power cord and removing the battery, will destroy all user data on the memory (DDR3L or DDR4). Secondary power loss, by removing the on board coin-cell battery, will erase any counter values that are written to CMOS in addition to destroying**

system date and time-of-day information. AMT passwords can be reset using BIOS and jumpers on the motherboard

In addition, to clarify memory volatility and data retention in situations where the system is put in different ACPI power states the following is provided (those ACPI power states are S0, S1, S3, S4 and S5):

- S0 state is the working state where the dynamic RAM is maintained and is read/write by the processor.
- S1 state is a low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) and hardware maintains all system contexts.
- S3 is called "suspend to RAM" state or stand-by mode. In this state the dynamic RAM is maintained. Dell* systems will be able to go to S3 if the OS and the peripherals used in the system supports S3 state. Linux* and Windows* support S3 state.
- S4 is called "suspend to disk" state or "hibernate" mode. There is no power. In this state, the dynamic RAM is not maintained. If the system has been commanded to enter S4, the OS will write the system context to a non-volatile storage.
- File and leave appropriate context markers. When the system is coming back to the working state, a restore file from the non-volatile storage can occur. The restore file has to be valid. NUC systems will be able to go to S4 if the OS and the peripherals support S4 state. Windows supports S4 state.
- S5 is the "soft" off state. There is no power. The OS does not save any context to wake up the system. No data will remain in any component on the system board, i.e., cache or memory. The system will require a complete boot when awakened. Since S5 is the shut off state, coming out of S5 requires power on which clears all registers.

The following table shows all the states supported by Intel NUC products:

Model Number	S0	S1	S3	S4	S5
NUC7PJYH / NUC7CJYH	X		X	X	X
NUC5PPYH / NUC5CPYH	X		X	X	X
DN2820FYKH	X		X	X	X
DCCP847DYE	X		X	X	X

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Table 31. List of Memory Components on the Intel® NUC boards (NUC7i7DNBE and NUC7i5DNBE) NUC7i3DNBE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 128 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
TPM	TPM 2.0	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
TPM (China)	TPM 2.0	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
SOC CPU	Cache	Volatile memory	Yes	Remove power to board

Table 32. List of Memory Components on the Intel® NUC boards (NUC7i3DNBE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action(action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (8 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile – Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board

Table 33. List of Memory Components on the Intel® NUC boards (NUC5i5MYBE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 128 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
TPM	TPM 2.0	Non-volatile security information used with vPro AMT implementation	Yes	BIOS option and Jumper to clear
SOC CPU	Cache	Volatile memory	Yes	Remove power to board

Table 34. List of Memory Components on the Intel® NUC boards (NUC5i3MYBE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (8 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board

Table 35. List of Memory Components on the Intel® NUC boards (D54250WYB and D34010WYB)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A

CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 36. List of Memory Components on the Intel® NUC boards (D53427RKE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 37. List of Memory Components on the Intel® NUC boards (DCP847SKE, D33217GKE and D33217CK)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

Table 38. List of Memory Components on the Intel® NUC boards (DE3815TYBE)

Description	Reference Designator	Volatility Description	User Accessible for external data	Remedial Action (action necessary to lose data)
System BIOS	SPI	Non-volatile memory, 64 Mbits (16 MB) System BIOS, Video BIOS and Ethernet Controller configuration data for basic boot	No	N/A
SMBIOS	SPI	Non-Volatile - Stored in the SPI in the NVRAM area. User accessible via software tools	Yes	N/A
CMOS	RTC	Volatile battery back-backed CMOS memory 256 bytes. Stores CMOS information.in Chipset	Yes	Removing the on board Coin Cell battery.
SOC CPU	Cache	Volatile memory	Yes	Remove power to board
SOC GPU	Frame Buffer	Volatile memory	Yes	Remove power to board

CAUTION: All other components on the motherboard will lose data once power is removed from the system. Primary power loss, unplugging the power cord and removing the battery, will destroy all user data on the memory (DDR3L or DDR4). Secondary power loss, by removing the on board coin-cell battery, will erase any counter values that are written to CMOS in addition to destroying system date and time-of-day information. AMT passwords can be reset using BIOS and jumpers on the motherboard

In addition, to clarify memory volatility and data retention in situations where the system is put in different ACPI power states the following is provided (those ACPI power states are S0, S1, S3, S4 and S5):

- S0 state is the working state where the dynamic RAM is maintained and is read/write by the processor.
- S1 state is a low wake-up latency sleeping state. In this state, no system context is lost (CPU or chip set) and hardware maintains all system contexts.
- S3 is called "suspend to RAM" state or stand-by mode. In this state the dynamic RAM is maintained. Dell* systems will be able to go to S3 if the OS and the peripherals used in the system supports S3 state. Linux* and Windows* support S3 state.
- S4 is called "suspend to disk" state or "hibernate" mode. There is no power. In this state, the dynamic RAM is not maintained. If the system has been commanded to enter S4, the OS will write the system context to a non-volatile storage.
- File and leave appropriate context markers. When the system is coming back to the working state, a restore file from the non-volatile storage can occur. The restore file has to be valid. NUC systems will be able to go to S4 if the OS and the peripherals support S4 state. Windows supports S4 state.
- S5 is the "soft" off state. There is no power. The OS does not save any context to wake up the system. No data will remain in any component on the system board, i.e., cache or memory. The system will require a complete boot when awakened. Since S5 is the shut off state, coming out of S5 requires power on which clears all registers.

The following table shows all the states supported by Intel NUC board products:

Model Number	S0	S1	S3	S4	S5
NUC7i7DNBE / NUC7i5DNBE / NUC7i3DNBE	X		X	X	X
NUC5i5MYBE / NUC5i3MYBE	X		X	X	X
D53427RKE	X		X	X	X
D33217GKE / D33217CK	X		X	X	X
DCCP847DYE	X		X	X	X
DE3815TYBE	X		X	X	X