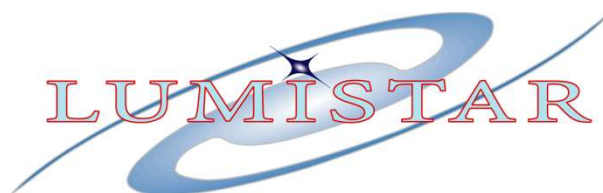


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## VOLATILE & NON-VOLATILE MEMORY USED IN LUMISTAR PRODUCTS

Lumistar products utilize memory components of various families. These devices vary in their use and volatility. Memory is used in the transfer of data to host computing functions as well as to store configuration, calibration, licensing and set up information. This document contains product information pertaining to memory formats, data stored within, volatility of memory types, and storage sizes. For memory that can contain sensitive data, sanitization processes are described.

Memory Family	Volatile / Non-volatile	Data Content	User Access	Sanitization Method
<b>SRAM</b>	Volatile	Temporary storage of run-time data within the system. Telemetry data is temporarily stored in this memory while being processed.	Yes	All memory content is lost when power is removed.
<b>DRAM</b>	Volatile	Temporary storage of run-time data configured in pages for larger data storage amounts like those required by the Windows operating system. Telemetry data is also temporarily stored in this memory while being processed.	Yes	All memory content is lost when power is removed.
<b>EEPROM</b>	Non-volatile	Primarily used in legacy PC based products. This memory contains two types of information: data used by the application software to display to users the capabilities of the device, and analog calibration data for a specific device. The only operational run-time data stored in this memory are maintenance parameters. Users have no access to this memory.	No	If this memory were to be sanitized, the device functionality and licensing would be eliminated, and the device would become non-functional.

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Memory Family	Volatile / Non-volatile	Data Content	User Access	Sanitization Method
<b>FRAM</b>	Non-volatile	primarily used in modular generation products to replace the functionalities of EEPROM devices of legacy generations. This memory contains two types of information: data used by the application software to display capabilities of the device, and analog calibration data for a specific device. The only operational run-time data stored in this memory are maintenance parameters.	No	If this memory were to be sanitized, the device functionality and licensing would be eliminated, and the device would become non-functional.
<b>CPLD</b>	Non-volatile	Not traditional memory but a programmable logic device that provides gate logic functions. It is mapped in such a way to make hardware logic functions at high speed. It does not store data at any time.	No	If this memory were to be sanitized, the device would become non-functional.
<b>NOR FLASH</b>	Non-volatile	The memory contains hardware logic maps used to perform required processing functions for FPGAs. Unlike CPLDs which contain non-volatile logic maps, FPGAs contain SRAM based logic interconnect maps. Thus, when the power is removed the FPGA reverts to its original unprogrammed state and all functionality is removed. FPGAs contain very large amounts of programmable hardware logic, much more than CPLDs and they operate at much higher processing speeds.	No	If the NOR flash is sanitized, the device would become non-functional.
<b>NAND FLASH</b>	Non-volatile	This memory is used to store real-time telemetry data.	Yes	<b>This memory is factory installed in the device ONLY when ordered. For most sensitive security operations, customers elect to omit this type of memory.</b>

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Memory Family	Volatile / Non-volatile	Data Content	User Access	Sanitization Method
<b>HDD /SDD</b>	Non-volatile	These are spinning hard drives or solid-state drives	Yes	Systems which require these devices are offered with drive removal to allow these devices to be securely stored.
<b>VIDEO FLASH</b>	Non-volatile	Devices store video overlays, fonts, and special characters for display generation	No	If this memory were to be sanitized, the device would become non-functional.

If there are additional questions concerning memory sources on Lumistar products, please contact customer support for further assistance.

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## Memory Usage by Product

Base Model Number:	Function:	SRAM (KB)	DRAM (MB)	EEPROM (KB)	FRAM (KB)	CPLD (KB)	NOR FLASH (KB)	Optional NAND FLASH (MB)	HDD/SSD (TB)	VIDEO FLASH (MB)	SEE NOTE
LS-11	Portable Test Transmitter	13,929		512			9			4	6
LS-18M	Modular RF Test Modulator	41,786			1,132		32,768	6,553			
LS-19M	Modular RF Test Transmitter	13,929			384		16,384				
LS-25P2	RF Receivers	1,062		33			64				
LS27P3/B	RF Receivers	2,068		33			512				
LS-27M	Modular Multi Channel Receiver	13,929			768		16,384				
LS-28M	Modular Multi Channel Receiver	27,857			768		384,000	196,608			
LS-35	Digital IF Receiver	13,400	1	1		32					
LS-40	PCM Bit Synchronizer	550		1			320				
LS-45	Dual Channel PCM Bit Synchronizer	2,068		32			16,384				
LS-48	Multi-channel PCM Bit Synchronizer	25,887			768		384,000				
LS-50/55	Decommutator/Simulator	4,000		3			512				
LS-68M	Modular Data Processing Engine	25,887			768		384,000	196,608			
LS-70/77	PCM Simulator	4,000		3			256				
LS-71	Multi-Channel DAC	2,000		1			512				
LS-71U	USB Single Channel DAC	13,929			384						
LS-18-R1	12" 1U Chassis w/ LS18M	27,857			1,536		384,000	196,608			
LS-28-R1	12" 1U Chassis w/ LS28M	27,857			768		384,000	196,608			
LS-68-R1	12" 1U Chassis w/ LS68M	25,857			768		384,000	196,608			
LS-28-R1	22" 1U Chassis w/ LS28M		<=32,768						<=2		1
LS-18-P	Portable RF Test Modulator										2
LS-28-P	Portable Receiver System w/ LS-28M										2
LS-68-P	Portable Data Processing Engine w/ LS-68M										2
LS-44QBS	22" 1U Chassis with LS40 Bit Synchronizer(s)		<= 32,768						<=2		2
LS-84-R1	22" 1U Chassis Generic Processor		<= 32,768						<=2		3
LS-84-R2	22" 2U Chassis with PCI/PCIe Suite		<=32,768						<=2		4
LS-84-R4	22" 4U Chassis with PCI/PCIe Suite		<=32,768						<=2		5

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**Notes:**

- 1.) Unit will also include additional memory provisions of one LS-18M, LS-28M or LS-68M unit as list in the table above.
- 2.) Unit will also include additional memory provisions of one to four LS-40 units, depending on configuration order, as listed in the table above.
- 3.) Total memory provisions are dependent upon ordered configuration. This unit has three expansion slots which may contain any combination of the following: LS25, LS27, LS35, LS40, LS45, LS50/55, LS70, or LS71. Consult detailed configuration for additional memory provisions installed.
- 4.) Total memory provisions are dependent upon ordered configuration. This unit has up to five expansion slots which may contain any combination of the following: LS25, LS27, LS35, LS40, LS45, LS50/55, LS70, or LS71. Consult detailed configuration for additional memory provisions installed.
- 5.) Total memory provisions are dependent upon ordered configuration. This unit has up to eleven expansion slots which may contain any combination of the following: LS25, LS27, LS35, LS40, LS45, LS50/55, LS70, or LS71. Consult detailed configuration for additional memory provisions installed.
- 6.) Only required for LS-11-M version 3+ hardware with touchscreen LCD.

If there are additional questions concerning memory sources on Lumistar products, please contact customer support for further assistance.