FRONTGRADE

APPLICATION NOTE

3 vs 4 Byte Addressing

Serial MRAM

8/7/2025

Version #1.0.0

Table 1: Cross Reference of Applicable Products

Product Name	UT Part #	SMD #
1/2/4/8 Gb RH DQSPI MRAM	UT8MRQRHxG	N/A
2Gb DQSPI MRAM	UT8MRQ2G	N/A
128Mb DQSPI MRAM	UT8MRQ128M	N/A

Overview

SPI (Serial Peripheral Interface) flash memory devices follow a structured command sequence to perform read, write, erase, and configuration operations. Each SPI transaction typically involves a series of ordered bytes transmitted over the MOSI (Master Out, Slave In) line, and data responses (if applicable) returned over MISO (Master In, Slave Out). This application note covers the addressing bytes in Gb vs Mb FG offerings.

General Command Format

Most SPI flash command sequences follow this structure:

[Command Byte] + [Address Bytes] + [Optional Dummy Bytes] + [Data Bytes]

Field	Description
Command Byte	8-bit opcode that specifies the desired operation (e.g., Read, Write, Erase)
Address Bytes	3 or 4 bytes depending on addressing mode and command variant
Dummy Bytes	Used in high-speed read operations to allow internal latency
Data Bytes	Input data (for programming) or output data (for reads)

The UT8MRQ128M 128Mb MRAM supports 3 byte addressing in the general command format. The UT8MRQRHxG 1Gb-8Gb and UT8MRQ2G use 4 byte addressing for the command sequence. Some command op codes that traditionally use 3 byte addressing are actually 4 byte addresses in these parts. Frontgrade recommends customers to review the command table in the MRAM datasheet and confirm that the address byte size matches the processing device default boot op codes.

Example: Op code 0x03 is typically associated with 3 byte addressing. The 1 to 8 Gb RH DQSPI MRAM requires 4 bytes of addressing.

This is only a **boot** issue since default op codes are usually used. After boot, there are several read op codes that can be used depending on whether 3 or 4 byte addressing is needed.

Revision History

Date	Revision #	Author	Change Description	Page #
8/07/2025	1.0.0	PBN	Initial Release	