



# Technical Note

## SFDP for MT25Q Family

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### Introduction

The serial Flash discoverable parameter (SFDP) standard enables a consistent method to describe serial Flash device function and feature capabilities in internal parameter tables. Host system software can query the standard parameter tables and enable adjustments to accommodate features that vary from one vendor to another.

The SFDP standard defines a common parameter table that describes important device characteristics and serial access methods used to read the parameter table data.

Micron's SFDP table information aligns with JEDEC-standard JESD216 for serial Flash discoverable parameters. The latest JEDEC standard includes revision 1.6. Micron's MT25Q production parts, beginning week 42 (2014), will include SFDP data that aligns with revision 1.6.

Refer to JEDEC-standard JESD216B for a complete overview of the SFDP table definition. Refer to any MT25Q family data sheet for conditions not specified here.



## Serial Flash Data Parameter – Header Structure

The table below shows the MT25Q family SFDP data. Data in these tables is read by the READ SERIAL FLASH DISCOVERY PARAMETER operation (5Ah).

**Table 1: SFDP Header Structure**

| Description                 | Byte Address | Bits | Data  |       |       |     |     |     |
|-----------------------------|--------------|------|-------|-------|-------|-----|-----|-----|
|                             |              |      | 128Mb | 256Mb | 512Mb | 1Gb | 2Gb |     |
| SFDP signature              | 00h          | 7:0  | 53h   | 53h   | 53h   | 53h | 53h |     |
|                             | 01h          | 7:0  | 46h   | 46h   | 46h   | 46h | 46h |     |
|                             | 02h          | 7:0  | 44h   | 44h   | 44h   | 44h | 44h |     |
|                             | 03h          | 7:0  | 50h   | 50h   | 50h   | 50h | 50h |     |
| Parameter revision          | Minor        | 04h  | 7:0   | 06h   | 06h   | 06h | 06h | 06h |
|                             | Major        | 05h  | 7:0   | 01h   | 01h   | 01h | 01h | 01h |
| Number of parameter headers | 06h          | 7:0  | 01h   | 01h   | 01h   | 01h | 01h |     |
| Unused                      | 07h          | 7:0  | FFh   | FFh   | FFh   | FFh | FFh |     |
| Parameter ID(0)             | 08h          | 7:0  | 00h   | 00h   | 00h   | 00h | 00h |     |
| Parameter minor revision    | 09h          | 7:0  | 06h   | 06h   | 06h   | 06h | 06h |     |
| Parameter major revision    | 0Ah          | 7:0  | 01h   | 01h   | 01h   | 01h | 01h |     |
| Parameter length (in DW)    | 0Bh          | 7:0  | 10h   | 10h   | 10h   | 10h | 10h |     |
| Parameter table pointer     | 0Ch          | 7:0  | 30h   | 30h   | 30h   | 30h | 30h |     |
|                             | 0Dh          | 7:0  | 00h   | 00h   | 00h   | 00h | 00h |     |
|                             | 0Eh          | 7:0  | 00h   | 00h   | 00h   | 00h | 00h |     |
| Parameter 1 ID MSB          | 0Fh          | 7:0  | FFh   | FFh   | FFh   | FFh | FFh |     |
| Parameter 2 ID LSB          | 10h          | 7:0  | 84h   | 84h   | 84h   | 84h | 84h |     |
| Parameter revision          | Minor        | 11h  | 7:0   | 00h   | 00h   | 00h | 00h | 00h |
|                             | Major        | 12h  | 7:0   | 01h   | 01h   | 01h | 01h | 01h |
| Parameter length (in DW)    | 13h          | 7:0  | 02h   | 02h   | 02h   | 02h | 02h |     |
| Parameter table pointer     | 14h          | 7:0  | 80h   | 80h   | 80h   | 80h | 80h |     |
|                             | 15h          | 7:0  | 00h   | 00h   | 00h   | 00h | 00h |     |
|                             | 16h          | 7:0  | 00h   | 00h   | 00h   | 00h | 00h |     |
| Parameter 2 ID MSB          | 17h          | 7:0  | FFh   | FFh   | FFh   | FFh | FFh |     |
| Parameter 3 ID LSB          | 18h          | 7:0  | 03h   | 03h   | 03h   | FFh | FFh |     |
| Parameter revision          | Minor        | 19h  | 7:0   | 00h   | 00h   | 00h | FFh | FFh |
|                             | Major        | 1Ah  | 7:0   | 01h   | 01h   | 01h | FFh | FFh |
| Parameter length (in DW)    | 1Bh          | 7:0  | 02h   | 02h   | 02h   | FFh | FFh |     |
| Parameter table pointer     | 1Ch          | 7:0  | 00h   | 00h   | 00h   | FFh | FFh |     |
|                             | 1Dh          | 7:0  | 01h   | 01h   | 01h   | FFh | FFh |     |
|                             | 1Eh          | 7:0  | 00h   | 00h   | 00h   | FFh | FFh |     |
| Parameter 3 ID MSB          | 1Fh          | 7:0  | FFh   | FFh   | FFh   | FFh | FFh |     |

Note: 1. Others locations from 20h to 2Fh contain FFh.



## Serial Flash Data Parameter – Basic Properties

**Table 2: Parameter Table – Flash Basic Properties**

| Description  | Byte Address | Bits | Data   |        |        |        |        |
|--|--------------|------|--------|--------|--------|--------|--------|
|  |              |      | 128Mb  | 256Mb  | 512Mb  | 1Gb    | 2Gb    |
| Minimum sector erase sizes   | 30h          | 1:0  | 01b    | 01b    | 01b    | 01b    | 01b    |
| Write granularity  |              | 2    | 1      | 1      | 1      | 1      | 1      |
| WRITE ENABLE command required for writing to volatile status registers |              | 3    | 0      | 0      | 0      | 0      | 0      |
| WRITE ENABLE command selected for writing to volatile status registers |              | 4    | 0      | 0      | 0      | 0      | 0      |
| Not used   |              | 7:5  | 111b   | 111b   | 111b   | 111b   | 111b   |
| 4KB ERASE command  | 31h          | 7:0  | 20h    | 20h    | 20h    | 20h    | 20h    |
| Supports 1-1-2 FAST READ   | 32h          | 0    | 1      | 1      | 1      | 1      | 1      |
| Address bytes  |              | 2:1  | 00b    | 01b    | 01b    | 01b    | 01b    |
| Supports double transfer rate clocking                                 |              | 3    | 1      | 1      | 1      | 1      | 1      |
| Supports 1-2-2 FAST READ   |              | 4    | 1      | 1      | 1      | 1      | 1      |
| Supports 1-4-4 FAST READ   |              | 5    | 1      | 1      | 1      | 1      | 1      |
| Supports 1-1-4 FAST READ   |              | 6    | 1      | 1      | 1      | 1      | 1      |
| Not used   |              | 7    | 1      | 1      | 1      | 1      | 1      |
| Reserved   | 33h          | 7:0  | FFh    | FFh    | FFh    | FFh    | FFh    |
| Flash size (bits)  | 34h          | 7:0  | FFh    | FFh    | FFh    | FFh    | FFh    |
|  | 35h          | 7:0  | FFh    | FFh    | FFh    | FFh    | FFh    |
|  | 36h          | 7:0  | FFh    | FFh    | FFh    | FFh    | FFh    |
|  | 37h          | 7:0  | 07h    | 0Fh    | 1Fh    | 3Fh    | 7Fh    |
| 1-4-4 FAST READ dummy cycle count                                      | 38h          | 4:0  | 01001b | 01001b | 01001b | 01001b | 01001b |
| 1-4-4 FAST READ number of mode bits                                    |              | 7:5  | 001b   | 001b   | 001b   | 001b   | 001b   |
| 1-4-4 FAST READ command code   | 39h          | 7:0  | EBh    | EBh    | EBh    | EBh    | EBh    |
| 1-1-4 FAST READ dummy cycle count                                      | 3Ah          | 4:0  | 00111b | 00111b | 00111b | 00111b | 00111b |
| 1-1-4 FAST READ number of mode bits                                    |              | 7:5  | 001b   | 001b   | 001b   | 001b   | 001b   |
| 1-1-4 FAST READ command code   | 3Bh          | 7:0  | 6Bh    | 6Bh    | 6Bh    | 6Bh    | 6Bh    |
| 1-1-2 FAST READ dummy cycle count                                      | 3Ch          | 4:0  | 00111b | 00111b | 00111b | 00111b | 00111b |
| 1-1-2 FAST READ number of mode bits                                    |              | 7:5  | 001b   | 001b   | 001b   | 001b   | 001b   |
| 1-1-2 FAST READ command  | 3Dh          | 7:0  | 3Bh    | 3Bh    | 3Bh    | 3Bh    | 3Bh    |



**Table 2: Parameter Table – Flash Basic Properties (Continued)**

| Description                         | Byte Address | Bits | Data    |         |         |         |         |
|-------------------------------------|--------------|------|---------|---------|---------|---------|---------|
|                                     |              |      | 128Mb   | 256Mb   | 512Mb   | 1Gb     | 2Gb     |
| 1-2-2 FAST READ dummy cycle count   | 3Eh          | 4:0  | 00111b  | 00111b  | 00111b  | 00111b  | 00111b  |
| 1-2-2 FAST READ number of mode bits |              | 7:5  | 001b    | 001b    | 001b    | 001b    | 001b    |
| 1-2-2 Command code                  | 3Fh          | 7:0  | BBh     | BBh     | BBh     | BBh     | BBh     |
| Supports 2-2-2 FAST READ            | 40h          | 0    | 1       | 1       | 1       | 1       | 1       |
| Reserved                            |              | 3:1  | 111b    | 111b    | 111b    | 111b    | 111b    |
| Supports 4-4-4 FAST READ            |              | 4    | 1       | 1       | 1       | 1       | 1       |
| Reserved                            |              | 7:5  | 111b    | 111b    | 111b    | 111b    | 111b    |
| Reserved                            | 43:41h       | 31:8 | FFFFFFh | FFFFFFh | FFFFFFh | FFFFFFh | FFFFFFh |
| Reserved                            | 45:44h       | 15:0 | FFFFh   | FFFFh   | FFFFh   | FFFFh   | FFFFh   |
| 2-2-2 FAST READ dummy cycle count   | 46h          | 4:0  | 00111b  | 00111b  | 00111b  | 00111b  | 00111b  |
| 2-2-2 FAST READ number of mode bits |              | 7:5  | 001b    | 001b    | 001b    | 001b    | 001b    |
| 2-2-2 FAST READ command code        | 47h          | 7:0  | BBh     | BBh     | BBh     | BBh     | BBh     |
| Reserved                            | 49:48h       | 15:0 | FFFFh   | FFFFh   | FFFFh   | FFFFh   | FFFFh   |
| 4-4-4 FAST READ dummy cycle count   | 4Ah          | 4:0  | 01001b  | 01001b  | 01001b  | 01001b  | 01001b  |
| 4-4-4 FAST READ number of mode bits |              | 7:5  | 001b    | 001b    | 001b    | 001b    | 001b    |
| 4-4-4 FAST READ command code        | 4Bh          | 7:0  | EBh     | EBh     | EBh     | EBh     | EBh     |
| Sector Type 1 size                  | 4Ch          | 7:0  | 0Ch     | 0Ch     | 0Ch     | 0Ch     | 0Ch     |
| Sector Type 1 command code          | 4Dh          | 7:0  | 20h     | 20h     | 20h     | 20h     | 20h     |
| Sector Type 2 size                  | 4Eh          | 7:0  | 10h     | 10h     | 10h     | 10h     | 10h     |
| Sector Type 2 code                  | 4Fh          | 7:0  | D8h     | D8h     | D8h     | D8h     | D8h     |
| Sector Type 3 size                  | 50h          | 7:0  | 0Fh     | 0Fh     | 0Fh     | 0Fh     | 0Fh     |
| Sector Type 3 code                  | 51h          | 7:0  | 52h     | 52h     | 52h     | 52h     | 52h     |
| Sector Type 4 size                  | 52h          | 7:0  | 00h     | 00h     | 00h     | 00h     | 00h     |
| Sector Type 4 code                  | 53h          | 7:0  | 00h     | 00h     | 00h     | 00h     | 00h     |



**Table 2: Parameter Table – Flash Basic Properties (Continued)**

| Description   | Byte Address | Bits  | Data   |        |        |        |        |
|---|--------------|-------|--------|--------|--------|--------|--------|
|   |              |       | 128Mb  | 256Mb  | 512Mb  | 1Gb    | 2Gb    |
| Multiplier from typical erase time to maximum erase time              | 57h:54h      | 3:0   | 0100b  | 0100b  | 0100b  | 0100b  | 0100b  |
| Sector Type 1 Erase, Typical time                                     |              | 8:4   | 00010b | 00010b | 00010b | 00010b | 00010b |
|   |              | 10:9  | 01b    | 01b    | 01b    | 01b    | 01b    |
| Sector Type 2 Erase, Typical time                                     |              | 15:11 | 01001b | 01001b | 01001b | 01001b | 01001b |
|   |              | 17:16 | 01b    | 01b    | 01b    | 01b    | 01b    |
| Sector Type 3 Erase, Typical time                                     |              | 22:18 | 00110b | 00110b | 00110b | 00110b | 00110b |
|   |              | 24:23 | 01b    | 01b    | 01b    | 01b    | 01b    |
| Sector Type 4 Erase, Typical time                                     |              | 29:25 | 00000b | 00000b | 00000b | 00000b | 00000b |
|   | 31:30        | 00b   | 00b    | 00b    | 00b    | 00b    |        |
| Multiplier from typical time to maximum time for page or byte PROGRAM | 5Bh:58h      | 3:0   | 1011b  | 1011b  | 1011b  | 1011b  | 1011b  |
| Page size   |              | 7:4   | 1000b  | 1000b  | 1000b  | 1000b  | 1000b  |
| Page Progr Typical time   |              | 12:8  | 01110b | 01110b | 01110b | 01110b | 01110b |
|   |              | 13    | 0b     | 0b     | 0b     | 0b     | 0b     |
| Byte Program Typical time, first byte)                                |              | 17:14 | 1110b  | 1110b  | 1110b  | 1110b  | 1110b  |
|   |              | 18    | 0b     | 0b     | 0b     | 0b     | 0b     |
| Byte Program Typical time, additional byte (1)                        |              | 22:19 | 0000b  | 0000b  | 0000b  | 0000b  | 0000b  |
|   |              | 23    | 0b     | 0b     | 0b     | 0b     | 0b     |
| Chip Erase, Typical time  |              | 28:24 | 01001b | 10100b | 00001b | 00001b | 00001b |
| Reserved  |              | 30:29 | 10b    | 10b    | 11b    | 11b    | 11b    |
|   | 31           | 1b    | 1b     | 1b     | 1b     | 1b     |        |
| Prohibited operations during PROGRAM SUSPEND                          | 5Fh:5Ch      | 3:0   | 1100b  | 1100b  | 1100b  | 1100b  | 1100b  |
| Prohibited operations during ERASE SUSPEND                            |              | 7:4   | 1010b  | 1010b  | 1010b  | 1010b  | 1010b  |
| Reserved  |              | 8     | 1b     | 1b     | 1b     | 1b     | 1b     |
| PROGRAM RESUME to SUSPEND interval (2)                                |              | 12:9  | 0000b  | 0000b  | 0000b  | 0000b  | 0000b  |
| SUSPEND in progress program maximum latency                           |              | 17:13 | 11000b | 11000b | 11000b | 11000b | 11000b |
|   |              | 19:18 | 01b    | 01b    | 01b    | 01b    | 01b    |
| ERASE RESUME to SUSPEND interval                                      |              | 23:20 | 0010b  | 0010b  | 0010b  | 0010b  | 0010b  |
| SUSPEND in progress erase maximum latency                             |              | 28:24 | 11000b | 11000b | 11000b | 11000b | 11000b |
|   |              | 30:29 | 01b    | 01b    | 01b    | 01b    | 01b    |
| SUSPEND RESUME supported  |              | 31    | 0b     | 0b     | 0b     | 0b     | 0b     |
| PROGRAM RESUME command  | 60h          | 7:0   | 7Ah    | 7Ah    | 7Ah    | 7Ah    | 7Ah    |
| PROGRAM SUSPEND command   | 61h          | 7:0   | 75h    | 75h    | 75h    | 75h    | 75h    |



**Table 2: Parameter Table – Flash Basic Properties (Continued)**

| Description  | Byte Address | Bits  | Data       |             |             |             |             |
|--|--------------|-------|------------|-------------|-------------|-------------|-------------|
|  |              |       | 128Mb      | 256Mb       | 512Mb       | 1Gb         | 2Gb         |
| RESUME command                                     | 62h          | 7:0   | 7Ah        | 7Ah         | 7Ah         | 7Ah         | 7Ah         |
| SUSPEND command                                    | 63h          | 7:0   | 75h        | 75h         | 75h         | 75h         | 75h         |
| Reserved   | 67h:64h      | 1:0   | 11b        | 11b         | 11b         | 11b         | 11b         |
| Status register polling device busy                |              | 2     | 0b         | 0b          | 0b          | 0b          | 0b          |
|  |              | 3     | 1b         | 1b          | 1b          | 1b          | 1b          |
|  |              | 7:4   | 1111b      | 1111b       | 1111b       | 1111b       | 1111b       |
| EXIT DEEP POWER-DOWN to next operation delay       |              | 12:8  | 11101b     | 11101b      | 11101b      | 11101b      | 11101b      |
|  |              | 14:13 | 01b        | 01b         | 01b         | 01b         | 01b         |
| EXIT DEEP POWER-DOWN command                       |              | 22:15 | ABh        | ABh         | ABh         | ABh         | ABh         |
| ENTER DEEP POWER-DOWN command                      |              | 30:23 | B9h        | B9h         | B9h         | B9h         | B9h         |
| Deep power-down supported                          |              |       | 31         | 0b          | 0b          | 0b          | 0b          |
| 4-4-4 mode disable sequence                        | 6Bh:68h      | 3:0   | 1010b      | 1010b       | 1010b       | 1010b       | 1010b       |
| 4-4-4 mode enable sequence                         |              | 8:4   | 10100b     | 10100b      | 10100b      | 10100b      | 10100b      |
| 0-4-4 mode supported                               |              | 9     | 1b         | 1b          | 1b          | 1b          | 1b          |
| 0-4-4 mode exit method                             |              | 15:10 | 000011b    | 000011b     | 000011b     | 000011b     | 000011b     |
| 0-4-4 mode entry method                            |              | 19:16 | 0010b      | 0010b       | 0010b       | 0010b       | 0010b       |
| Quad enable requirements                           |              | 22:20 | 000b       | 000b        | 000b        | 000b        | 000b        |
| HOLD and WP disable                                |              | 23    | 1b         | 1b          | 1b          | 1b          | 1b          |
| Reserved   |              | 31:24 | FFh        | FFh         | FFh         | FFh         | FFh         |
| Reserved   |              |       |            |             |             |             |             |
| Volatile and nonvolatile register and WRITE ENABLE | 6Fh: 6Ch     | 6:0   | 0000001b   | 0000001b    | 0000001b    | 0000001b    | 0000001b    |
| Reserved   |              | 7     | 1b         | 1b          | 1b          | 1b          | 1b          |
| Soft reset and rescue sequence support             |              | 13:8  | 111101b    | 111101b     | 111101b     | 111101b     | 111101b     |
| EXIT 4-BYTE ADDRESS                                |              | 23:14 | 000000000b | 0011110110b | 0011110110b | 0011110110b | 0011110110b |
| ENTER 4-BYTE ADDRESS                               |              | 31:24 | 00000000b  | 00110110b   | 00110110b   | 00110110b   | 00110110b   |

- Notes:
1. MT25Q 3V and 1.8V devices require only 0.4μs.
  2. MT25Q 3V and 1.8V devices require only 5μs; 64μs is declared here as minimum allowed in the standard Serial Flash Discovery Parameter table.
  3. Others locations from 70h to 7Fh contain FFh.



## Serial Flash Data Parameter – 4-Byte Address Command

Table 3: Parameter Table – 4-Byte Address Command

| Description                             | Byte Address                            | Bits | Data  |       |       |       |       |     |
|---|---|------|-------|-------|-------|-------|-------|-----|
|   |   |      | 128Mb | 256Mb | 512Mb | 1Gb   | 2Gb   |     |
| 4-Byte Address Instruction Table<br>DW1 | 80h                                     | 0    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 1    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 2    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 3    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 4    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 5    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 6    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 7    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   | 81h                                     | 0    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 1    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 2    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 3    | 0b    | 0b    | 0b    | 0b    | 0b    |     |
|   |   | 4    | 0b    | 0b    | 0b    | 0b    | 0b    |     |
|   |   | 5    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 6    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 7    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   | 82h                                     | 0    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 1    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 2    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 3    | 0b    | 1b    | 1b    | 1b    | 1b    |     |
|   |   | 7:4  | 1111b | 1111b | 1111b | 1111b | 1111b |     |
|   | 83h                                     | 7:0  | FFh   | FFh   | FFh   | FFh   | FFh   |     |
|   | 4-Byte Address Instruction Table<br>DW2 | 84h  | 7:0   | FFh   | 21h   | 21h   | 21h   | 21h |
|   |   | 85h  | 7:0   | FFh   | DCh   | DCh   | DCh   | DCh |
|   |   | 86h  | 7:0   | FFh   | 5Ch   | FFh   | FFh   | FFh |
|   |   | 87h  | 7:0   | FFh   | FFh   | FFh   | FFh   | FFh |

Note: 1. Others locations from 88h to FFh contain FFh.



## **Revision History**

### **Rev. B – 08/15**

- Added 4-Byte address command information

### **Rev. A – 10/14**

- Initial release

8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006, Tel: 208-368-4000  
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