

Renesas 2-Mbit Products Overview

This document describes 2-Mbit products available from Renesas Serial Flash Memory family.

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1. Renesas 2-Mbit Products Overview

The AT25EU0021A is a low power low energy memory. It incorporates features geared towards energy savings such as page erase, low power read, low power erase and low power program. Additionally, it has very fast page, block, and full chip erase times of 8 ms typical.

The AT25EU0021A is ideal for battery powered systems, because batteries have finite energy stored in them. The fast erase times, as well as low erase and program power enables the lowest energy usage.

This document compares the differences between the 2-Mbit products in more detail.

Table 1: 2-Mbit Products Overview

Family	Part Number	Product Status	Nominal System Voltage	SPI Support
DF	AT25DF021A	Mass Production	1.65 V to 3.6 V	Single/Dual
XE	AT25XE021A	Mass Production	1.65 V to 3.6 V	Single/Dual
XV	AT25XV021A	Mass Production	1.65 V to 4.4 V	Single/Dual
EU	AT25EU0021A	Mass Production	1.65 V to 3.6 V	Single/Dual/Quad

2. Feature Comparison

Table 2 describes major feature differences between the 2-Mbit products.

Table 2: 2-Mbit Products Feature Comparison

	AT25DF021A	AT25XE021A	AT25XV021A	AT25EU0021A
Total Memory (Bits)	2-Mbit	2-Mbit	2-Mbit	2-Mbit
Total Memory (Bytes)	256 kB	256 kB	256 kB	256 kB
Total 64 kB block #	4	4	4	4
Total 32 kB block #	8	8	8	8
Total 4 kB block #	64	64	64	64
Page Size (Bytes)	256	256	256	256
Total Page #	1024	1024	1024	1024
Erase Block Size	64 kB / 32 kB / 4 kB	64 kB / 32 kB / 4 kB	64 kB / 32 kB / 4 kB	64 kB / 32 kB / 4 kB
Erase Page Size	256 byte	256 byte	256 byte	256 byte
OTP Organization	2 x 64 byte	2 x 64 byte	2 x 64 byte	3 x 512 byte
UID Register Size	No	No	No	128 bit
SFDP Table	No	No	No	Yes
Active Interrupt	Yes	Yes	Yes	Yes
Single SPI (1-1-1) 03/0B	Yes	Yes	Yes	Yes
Dual Read (1-1-2) 3B	Yes	Yes	Yes	Yes
Dual I/O (1-2-2) BB	No	No	No	Yes
Quad Read (1-1-4) 6B	No	No	No	Yes
Quad I/O (1-4-4, 0-4-4) EB [XiP]	No	No	No	Yes
JEDEC Hardware Reset	No	No	No	Yes
Operating Voltage Range (V)	1.65 – 3.6	1.65 – 3.6	1.65 – 4.4	1.65 – 3.6
Operating Temperature (°C)	-40 to 85	-40 to 85	-40 to 85	-40 to 85
Endurance (1)	100 K	100 K	100 K	10 K
Data Retention	20 yr	20 yr	20 yr	20 yr

1. Tested per JEDEC47 Non-Volatile Memory Cycling Endurance Standard

3. Command Set (Opcode) Comparison

Table 3 shows the comparisons in Command Set or Opcode for all 2-Mbit products.

Table 3: 2-Mbit Products Command Set Comparison

	AT25DF021A	AT25XE021A	AT25XV021A	AT25EU0021A
System Commands				
Enable Reset				66h
Reset Device	F0h	F0h	F0h	99h
Deep Power-down	B9h	B9h	B9h	B9h
Release/Resume from Deep Power-down	ABh	ABh	ABh	ABh
Ultra-Deep Power-down	79h	79h	79h	
Active Status Interrupt	25h	25h	25h	25h
Read Commands				
Normal Read Data	03h	03h	03h	03h
Fast Read	0Bh	0Bh	0Bh	0Bh
Dual Output Fast Read	3Bh	3Bh	3Bh	3Bh
Dual I/O Fast Read				BBh
Quad Output Fast Read				6Bh
Quad I/O Fast Read				EBh
Quad I/O Fast Read (Continuous Mode)				EBh
Set Burst with Wrap				77h
Write Commands				
Write Enable	06h	06h	06h	06h
Volatile Status Reg Write Enable				50h
Write Disable	04h	04h	04h	04h
Program Commands				
Page Program	02h	02h	02h	02h
Sequential Program Mode	ADh/AFh	ADh/AFh	ADh/AFh	
Dual Page Program	A2h	A2h	A2h	A2h
Quad Page Program (1-1-4)				32h
Erase Commands				
Page Erase (256 B)	81h	81h	81h	81h/DBh
Block Erase (4 kB)	20h	20h	20h	20h
Block Erase (32 kB)	52h	52h	52h	52h
Block Erase (64 kB)	D8h	D8h	D8h	D8h
Chip Erase	C7h/60h	C7h/60h	C7h/60h	C7h/60h
Protection Commands				
Protect Block (4 kB)	36h	36h	36h	
Unprotect Block (4 kB)	39h	39h	39h	
Read 4 kB Block Protection Registers	3Ch	3Ch	3Ch	
Security Commands				
Program OTP Security Register	9Bh	9Bh	9Bh	42h
Erase OTP Security Register				44h
Read OTP Security Register	77h	77h	77h	48h
Suspend/Resume Commands				
Program/Erase Suspend				75h
Program/Erase Resume				7Ah
Status Register Commands				

	AT25DF021A	AT25XE021A	AT25XV021A	AT25EU0021A
Read Status Register 1	05h (1)	05h (1)	05h (1)	05h
Read Status Register 2				35h
Read Status Register 3				15h
Write Status Register 1	01h	01h	01h	01h
Write Status Register 2	31h	31h	31h	31h
Write Status Register 3				11h
Device ID Information				
Resume from DPD and read ID				ABh
Manuf/Device ID				90h
Manuf/Device ID Dual I/O				92h
Manuf/Device ID Quad I/O				94h
Read JEDEC ID	9Fh	9Fh	9Fh	9Fh
Read Serial Flash Discoverable Parameter				5Ah
OTP Commands				
Erase Security Registers				44h
Program Security Registers				42h
Read Security Registers/Unique ID				48h
Read Unique ID number				4Bh

1. A single 05h command will sequentially read both Status Register 1 and Status Register 2.

4. Device ID Comparison

All 2-Mbit products have a different device ID to allow identification by the host system.

Table 4: 2-Mbit Products Device ID Comparison

	AT25DF021A	AT25XE021A	AT25XV021A	AT25EU0021A
Device ID commands				
Release Power-down / Read ID [ABh]				11h
Manufacturer and Device ID Single I/O [90h]				1Fh, 11h
Manufacturer and Device ID Dual I/O [92h]				1Fh, 11h
Manufacturer and Device ID Quad I/O [94h]				1Fh, 11h
Read JEDEC ID [9Fh]	1Fh, 43h, 01h	1Fh, 43h, 01h	1Fh, 43h, 01h	1Fh, 11h, 01h
Read SFDP [5Ah]	No	No	No	Yes

5. Status Register Comparison

Table 5: 2-Mbit Products Status Register Read/Write Comparison

	AT25DF021A	AT25XE021A	AT25XV021A	AT25EU0021A
Read Status Register 1	05h	05h	05h	05h
Read Status Register 2	05h	05h	05h	35h
Read Status Register 3				15h
Write Status Register 1	01h	01h	01h	01h
Write Status Register 2	31h	31h	31h	31h
Write Status Register 3				11h

Table 6: 2-Mbit Products Status Register Bit Level Comparison

		AT25DF021A	AT25XE021A	AT25XV021A	AT25EU0021A
Status Register 1	0	RDY/BSY	RDY/BSY	RDY/BSY	RDY/BSY
	1	WEL	WEL	WEL	WEL
	2	SWP0	SWP0	SWP0	BP0
	3	SWP1	SWP1	SWP1	BP1
	4	WPP	WPP	WPP	BP2
	5	EPE	EPE	EPE	BP3
	6	SPM	SPM	SPM	BP4
	7	SRPL	SRPL	SRPL	SRP0
Status Register 2	0	RDY/BSY	RDY/BSY	RDY/BSY	SRP1
	1	Reserved	Reserved	Reserved	QE
	2	Reserved	Reserved	Reserved	Reserved
	3	Reserved	Reserved	Reserved	LB1
	4	RSTE	RSTE	RSTE	LB2
	5	Reserved	Reserved	Reserved	LB3
	6	Reserved	Reserved	Reserved	CMP
	7	Reserved	Reserved	Reserved	SUS
Status Register 3	0				Reserved
	1				Reserved
	2				Reserved
	3				Reserved
	4				Reserved
	5				Reserved
	6				Reserved
	7				HOLD/RST

6. SFDP Table Comparison

The AT25EU0021A contains an SFDP (Serial Flash Discoverable Parameters) table. Contact Renesas for detailed SFDP table documents.

7. Packaging Options

Table 7 provides the current packaging options available for all 2-Mbit products. Contact Renesas for questions regarding packaging options.

Table 7: 2-Mbit Products Packaging Options

	AT25DF021A	AT25XE021A	AT25XV021A	AT25EU0021A
8-pin SOIC (0.150" narrow body)	Yes	Yes	Yes	Yes
8-pad 5 x 6 mm DFN	Yes	Yes	Yes	
8-pad 2 x 3 mm DFN	Yes	Yes	Yes	Yes
8-pin TSSOP	Yes	Yes	Yes	
8-ball WLCSP		Yes	Yes	

8. Revision History

Revision	Date	Description
A1	5 / 2021	Initial release.
A2	3 / 2025	Applied latest corporate template to document. Changed 'UDFN' to 'DFN.' Changed 'Sector' to 'Block.' Updated wording in Section 1 'Renesas 2-Mbit Products Overview.' Updated EU family product status from "Sampling" to "Mass Production" in Table 1 '2-Mbit Products Overview.' Updated Table 2 '2-Mbit Products Feature Comparison.' Added footnote to Table 3 '2-Mbit Products Command Set Comparison.' Removed text under Section 5 and updated heading of Table 5 to '2-Mbit Products Status Register Read/Write Comparison.'

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