

MultiMediaCard™



- Smallest non-volatile (Flash) memory card (32 x 24 x 1.4 mm³)
- Standardized by the MultiMediaCard™ Association where Hitachi is a board member
- Over 100 member companies including hardware, software and card manufacturers, including consumer electronics and semiconductor leaders (Infineon, Nokia, Ericsson)
- Simple serial interface (7 pads); the serial bus structure supports both the MultiMediaCard™ and SPI protocols.
- Low-voltage operation (2.7 - 3.6V) with a migration path to (1.8V)

Comparison of MMC and SPI Modes

		MMC I/F Mode			SPI I/F Mode		
Comparison of system specification	Interface	3 pins serial bus (CLK,CMD,DAT)			3 pins serial bus (CLK,DI,DO & CS)		
	Frequency	Variable clock frequency: 0-20MHz			Variable clock frequency: 0-20MHz		
	Card Selection	Card is selected by MMC bus protocol. Host send the relative card address to select the card that has same one.			Card is selected by the CS signal.		
	Access mode	Single block access, multiple block access, stream access			Single block access, multiple block access		
Pin Arrangement	Pin No.	Name	Type	Description	Name	Type	Description
	1	RSV	NC	Reserved	CS	Input	Chip select
	2	CMD	I/O push-pull/open drain	Command/Response	DI	Input push-pull	Data in
	3	VSS1	—	GND	VSS	—	GND
	4	VDD1	—	VCC	VDD	—	VCC
	5	CLK	Input	Clock	SCLK	Input	Clock
	6	VSS2	—	GND	VSS2	—	GND
	7	DAT	I/O push-pull	Data	DO	Output push-pull	Data out

Total MMC System Development Solution

Development Platform

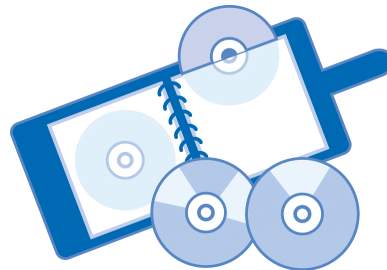
- MMC Development Platform



Nissei Sangyo

Software Support

- Device Driver
- File Manager



US Software

Test&Conformance

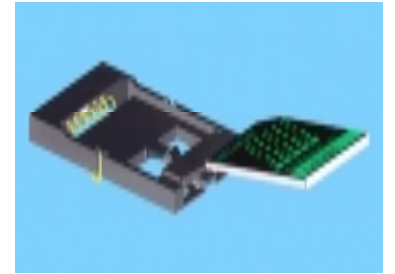
- MMC Protocol Analyzer



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Sockets&Accessories

- MMC Socket



- MMC Carrying Case

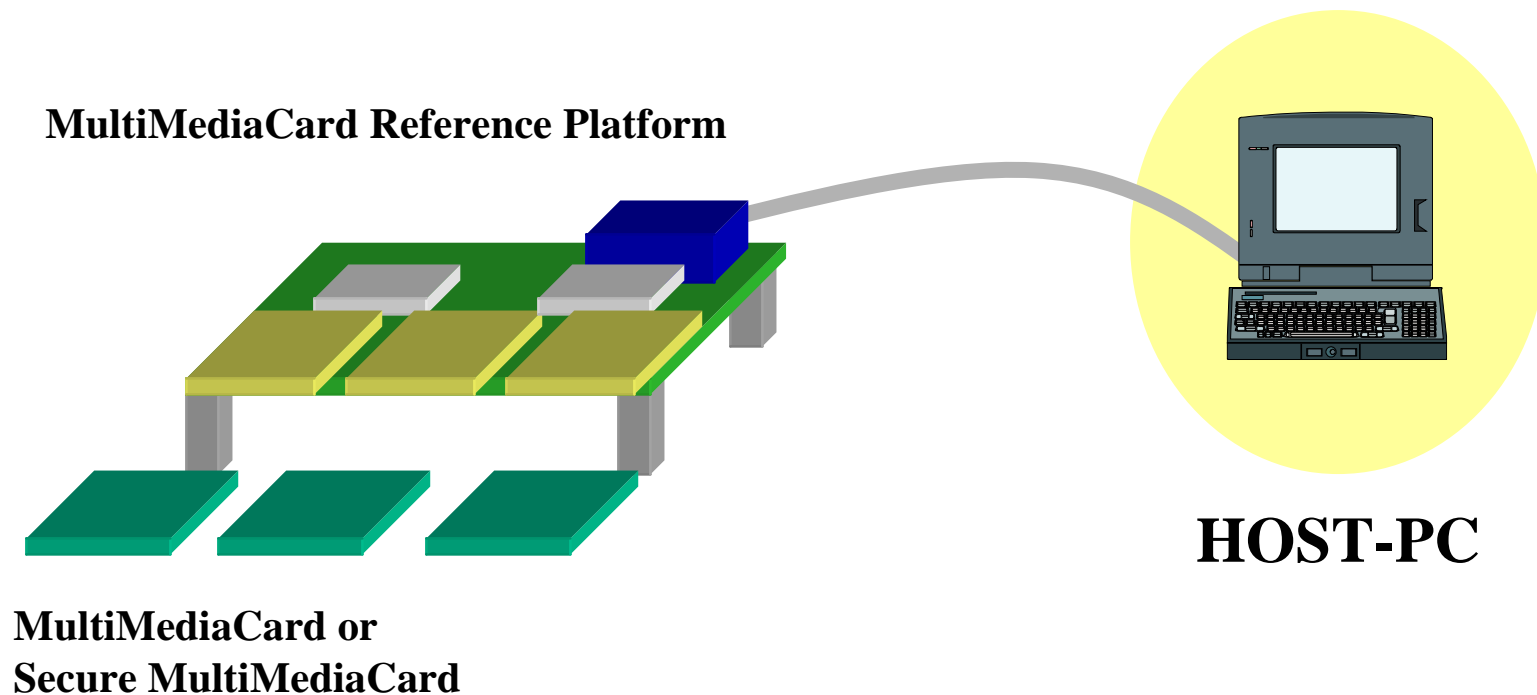


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MultiMediaCard Reference Platform

Suitable for MultiMediaCard system evaluation

- (1) Supports up to 3 cards
- (2) Supports both MMC and SPI mode operations
- (3) Supports SPI Multiple block transfer
- (4) Supports SecureMMC application specific commands

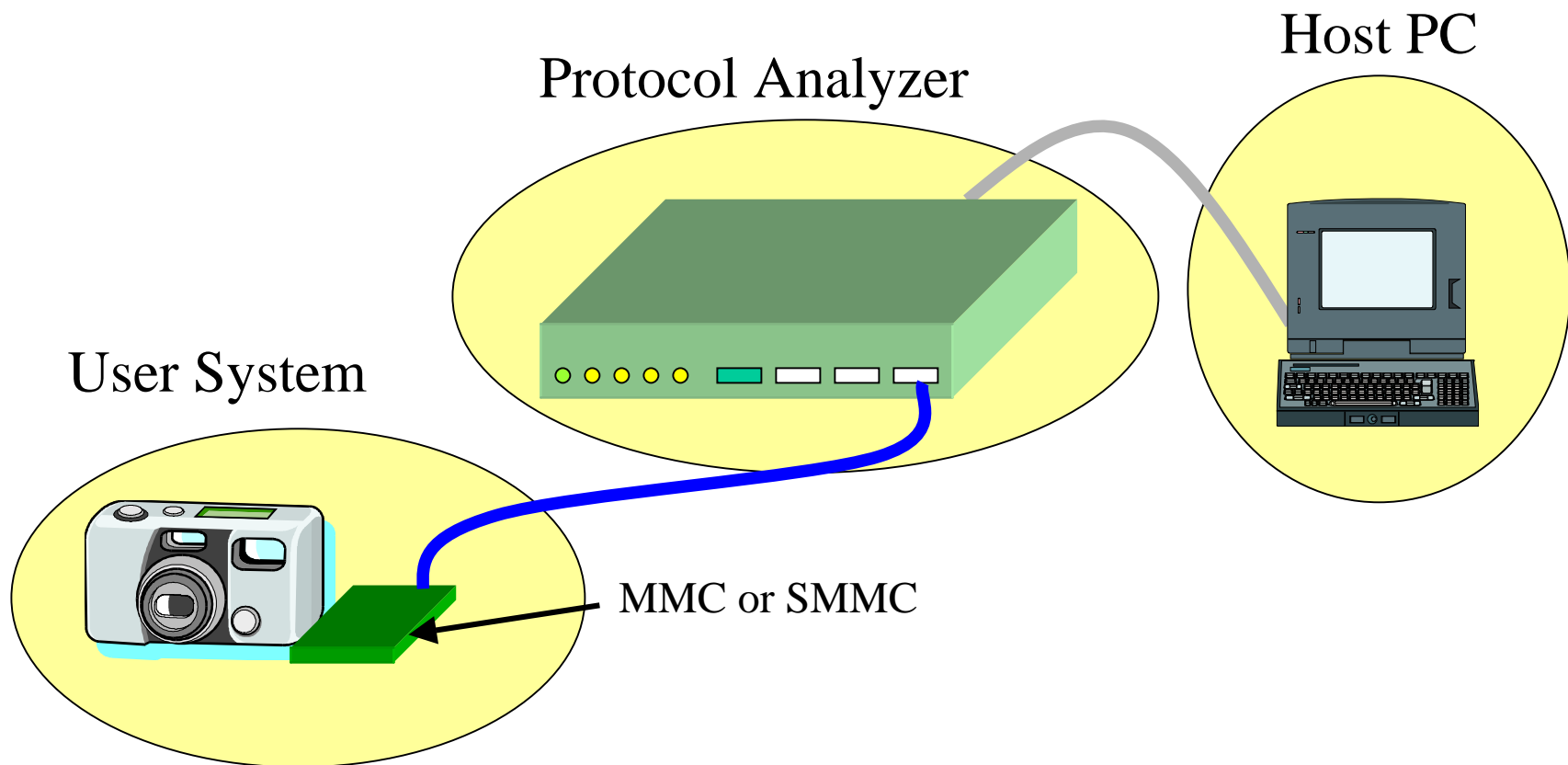


MMC Reference Platform Function

- **Monitor Mode**
 - User can access to MMC using monitor command
 - (1) **Display CID/CSD register value**
 - (2) **Edit contents of MMC using editing buffer**
 - (3) **Treatment of MMC as Disk Drive**
(e.g. format, dir, mkdir, rmdir, copy, diskcopy, etc.)
- **Debug Mode**
 - User can emulate MMC/SPI detailed command protocol
 - (1) **Edit contents of MMC using editing buffer**
 - (2) **Execute all the MMC/SPI command with user parameter settings**
 - (3) **User can check detail MMC command protocol**
(e.g. single read/write, multiple read/write, etc.)

MultiMediaCard Protocol Analyzer

Easy debugging support for MMC/SMMC system



MMC Protocol Analyzer Features

- **Trace Mode**
 - (1) **Trace Function**

Trace and display signals between MMC and host system
 - (2) **Trigger Function**

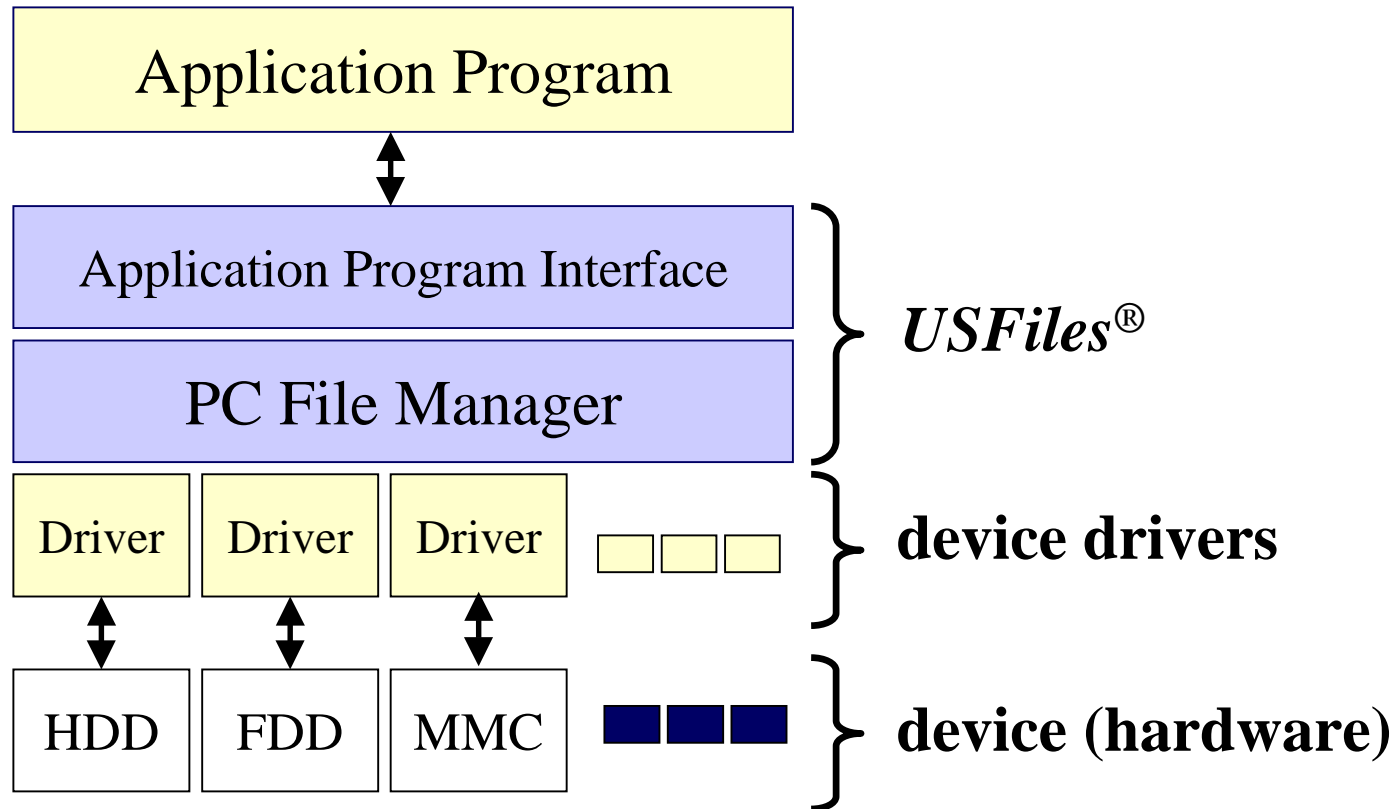
User can use many kinds of trigger such as command, response, and data pattern
- **Pseude Mode**
 - (1) **Pseude Host Mode**

This mode emulate host for debugging MMC
 - (2) **Pseude Card Mode**

This mode emulate MMC for debugging host system

USFiles® File System

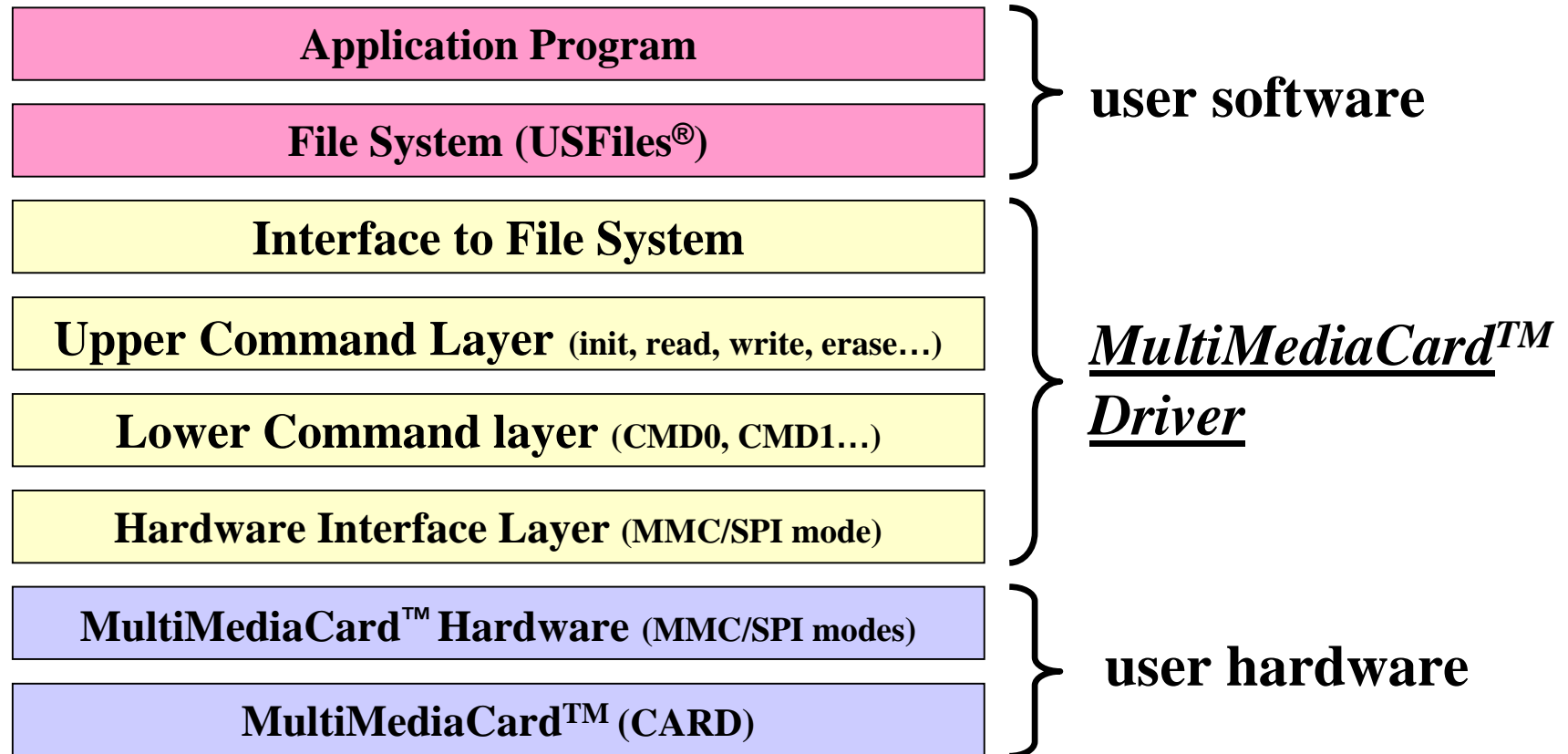
- Basic Structure -



MultiMediaCard™ Driver



- Basic Structure -



Secure MultiMediaCard™



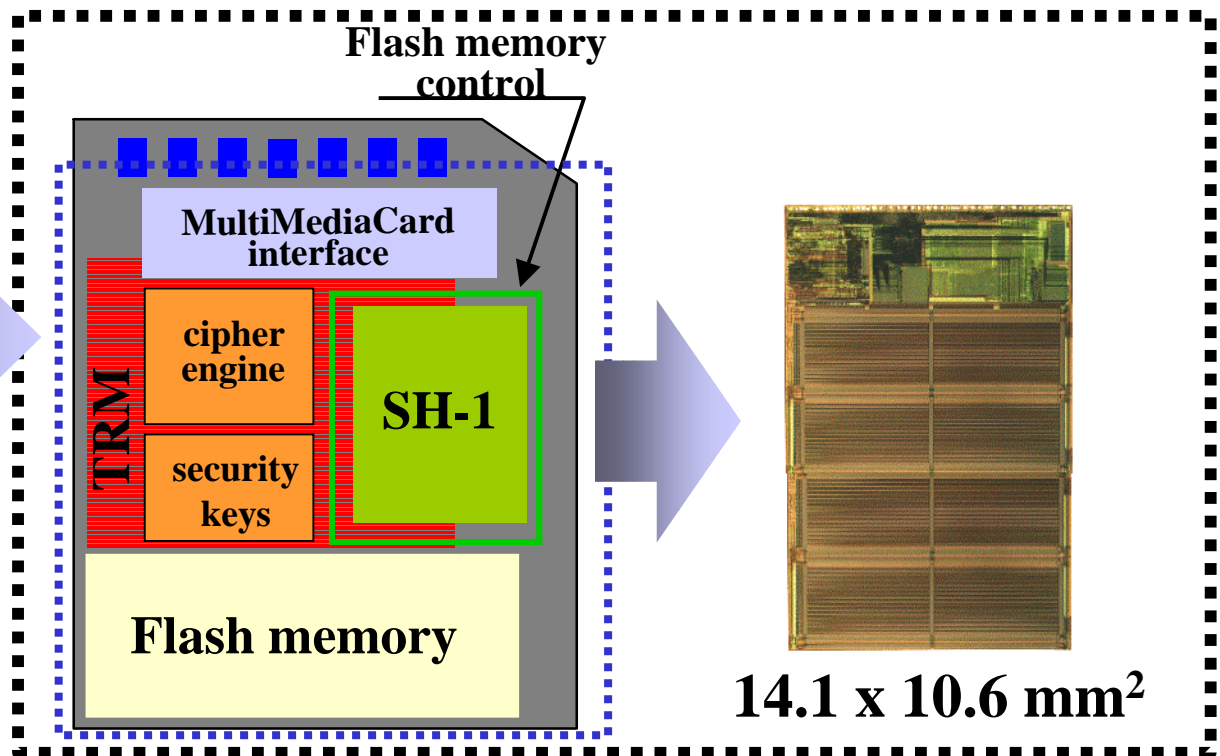
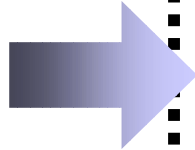
- SecureMMC is fully compliant with the standard MMC system specification with the same form factor and interface, with the addition of security command set based on chip card commands
- SecureMMC is designed for the highest level of security by employing public key infrastructure (PKI) as well as chip card technology such as tamper resistant module (TRM)
- Content Protection: On-chip cipher engine enables secured transmission and storage of protected content.
- Enterprise Data Security Solution: Confidential company data can be distributed to authorized employees to be used on handheld PDA.
- Private Content Security: Personal information can be securely stored on SecureMMC.
- User Authentication: Secured content cannot be accessed by unauthorized users. This feature gives the content owner, enterprise or private users, the assurance that their valuable content will be protected against theft or tampering.

Secure MultiMediaCard™

- Standard MMC function + security function
- On chip hardware Tamper Resistant Module (TRM)
- Single chip (SH-1 core + cipher engine + 256Mb Flash)

SecureMMC

Size : 32 x 24 x 1.4mm³



Secured Memory Card Comparison

	Standard MMC	SecureMMC	Secure Digital	MagicGate MemoryStick
Security	limited	high-level (H/W TRM and PKI)	mid-level (shared key)	mid-level (shared key)
Super Distribution	N/A	Available	N/A	N/A
E-Commerce Capability	N/A	Available*	N/A	N/A
Cryptographic Capable Download Terminal	required	not required	required	required
Licensing and Royalty Fee	NO	NO**	YES	YES
Dimensions (mm)	32.0 x 24.0 x 1.4 smallest form factor available	32.0 x 24.0 x 1.4 smallest form factor available	32.0 x 24.0 x 2.1 1.5 times of MMC	50.0 x 21.5 x 2.8 3 times of MMC
Interface	7-pin serial	7-pin serial	9-pin serial	10-pin serial
Others	SD slot compatible	SD slot compatible		proprietary host interface logics required

* Available with E-Commerce SMMC

** Free for Content Protection SMMC

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