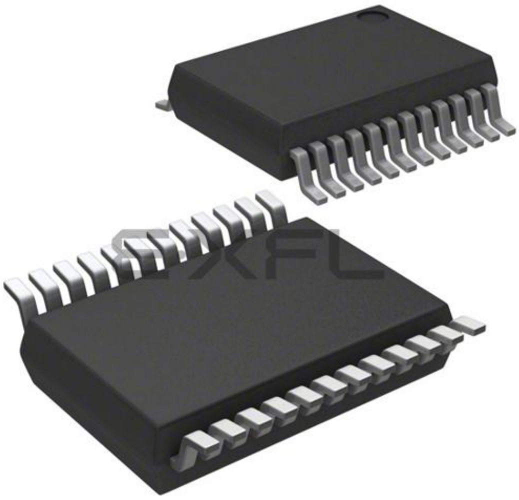

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What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	R8C
Core Size	16-Bit
Speed	20MHz
Connectivity	I²C, UART/USART
Peripherals	POR, PWM, Voltage Detect, WDT
Number of I/O	19
Program Memory Size	4KB (4K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	1K x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 5.5V
Data Converters	A/D 8x10b
Oscillator Type	Internal
Operating Temperature	-20°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	24-LSSOP (0.220", 5.60mm Width)
Supplier Device Package	24-LSSOP
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f213g1dnsp-u0

1.2 Product List

Table 1.3 lists Product List for R8C/3GD Group, and Figure 1.1 shows a Part Number, Memory Size, and Package of R8C/3GD Group.

Table 1.3 Product List for R8C/3GD Group Current of Feb. 2010

Part No.	ROM Capacity	RAM Capacity	Package Type	Remarks
R5F213G1DNSP	4 Kbytes	1 Kbyte	PLSP0024JB-A	N version
R5F213G2DNSP	8 Kbytes	1 Kbyte	PLSP0024JB-A	
R5F213G4DNSP	16 Kbytes	1 Kbyte	PLSP0024JB-A	
R5F213G5DNSP	24 Kbytes	1 Kbyte	PLSP0024JB-A	
R5F213G6DNSP	32 Kbytes	1 Kbyte	PLSP0024JB-A	
R5F213G1DDSP (D)	4 Kbytes	1 Kbyte	PLSP0024JB-A	D version
R5F213G2DDSP (D)	8 Kbytes	1 Kbyte	PLSP0024JB-A	
R5F213G4DDSP (D)	16 Kbytes	1 Kbyte	PLSP0024JB-A	
R5F213G5DDSP (D)	24 Kbytes	1 Kbyte	PLSP0024JB-A	
R5F213G6DDSP (D)	32 Kbytes	1 Kbyte	PLSP0024JB-A	

(D): Under development

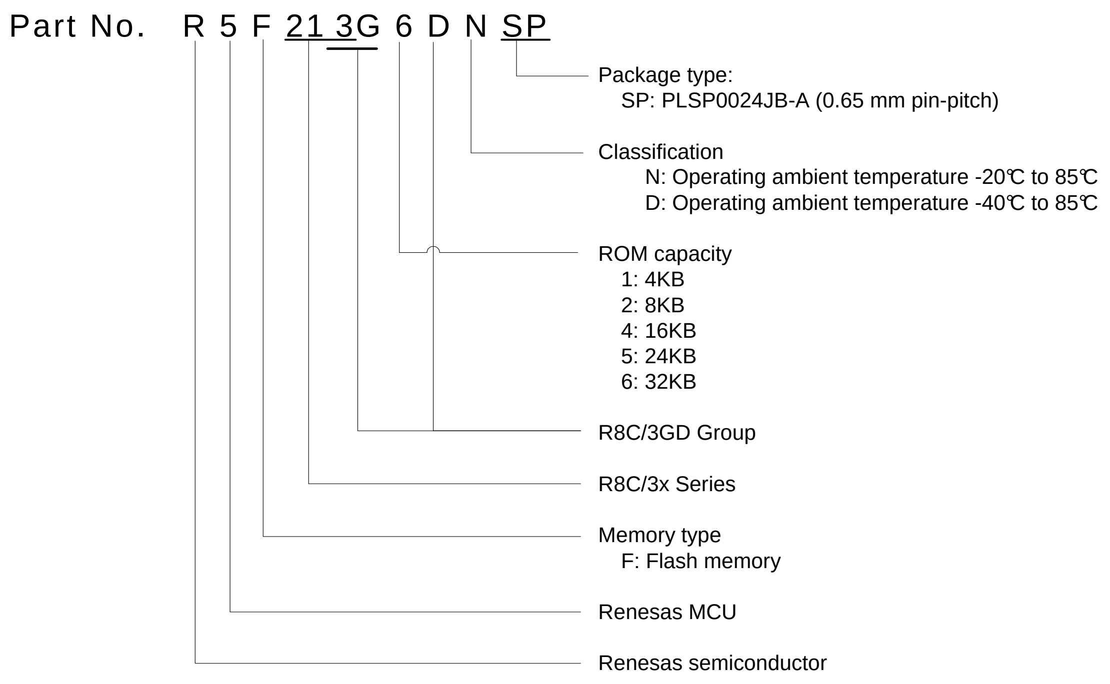


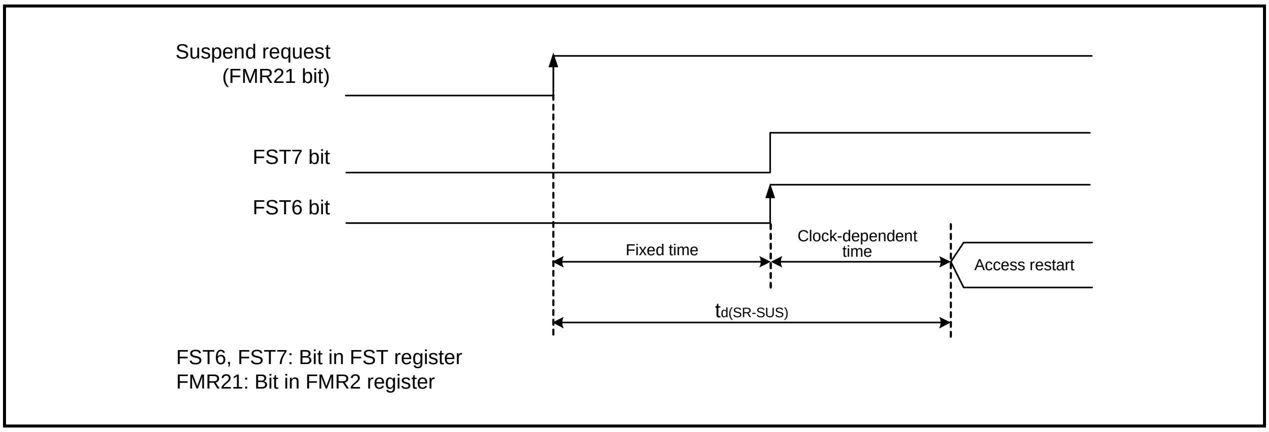
Figure 1.1 Part Number, Memory Size, and Package of R8C/3GD Group

Table 5.5 Flash Memory (Program ROM) Electrical Characteristics

Symbol	Parameter	Conditions	Standard			Unit
			Min.	Typ.	Max.	
–	Program/erase endurance (2)		1,000 (3)	–	–	times
–	Byte program time		–	80	500	µs
–	Block erase time		–	0.3	–	s
$t_{d(SR-SUS)}$	Time delay from suspend request until suspend		–	–	5+CPU clock × 3 cycles	ms
–	Interval from erase start/restart until following suspend request		0	–	–	µs
–	Time from suspend until erase restart		–	–	30+CPU clock × 1 cycle	µs
$t_{d(CMDRST-READY)}$	Time from when command is forcibly stopped until reading is enabled		–	–	30+CPU clock × 1 cycle	µs
–	Program, erase voltage		2.7	–	5.5	V
–	Read voltage		1.8	–	5.5	V
–	Program, erase temperature		0	–	60	°C
–	Data hold time (7)	Ambient temperature = 55°C	20	–	–	year

Notes:

1. V_{CC} = 2.7 to 5.5 V at T_{opr} = 0 to 60°C, unless otherwise specified.
2. Definition of programming/erasure endurance
   The programming and erasure endurance is defined on a per-block basis.
   If the programming and erasure endurance is n (n = 1,000), each block can be erased n times. For example, if 1,024 1-byte writes are performed to different addresses in block A, a 1 Kbyte block, and then the block is erased, the programming/erasure endurance still stands at one.
   However, the same address must not be programmed more than once per erase operation (overwriting prohibited).
3. Endurance to guarantee all electrical characteristics after program and erase. (1 to Min. value can be guaranteed).
4. In a system that executes multiple programming operations, the actual erasure count can be reduced by writing to sequential addresses in turn so that as much of the block as possible is used up before performing an erase operation. For example, when programming groups of 16 bytes, the effective number of rewrites can be minimized by programming up to 128 groups before erasing them all in one operation. It is also advisable to retain data on the erasure endurance of each block and limit the number of erase operations to a certain number.
5. If an error occurs during block erase, attempt to execute the clear status register command, then execute the block erase command at least three times until the erase error does not occur.
6. Customers desiring program/erase failure rate information should contact their Renesas technical support representative.
7. The data hold time includes time that the power supply is off or the clock is not supplied.



FST6, FST7: Bit in FST register
FMR21: Bit in FMR2 register

Figure 5.2 Time delay until Suspend