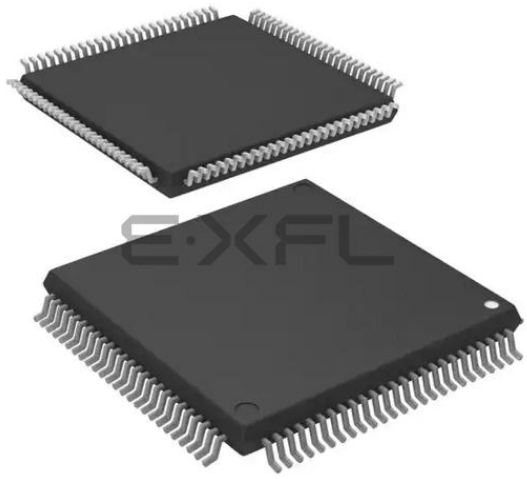
Renesas Electronics America Inc - M30833FJGP#U5 Datasheet



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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	Active
Core Processor	M32C/80
Core Size	16/32-Bit
Speed	32MHz
Connectivity	CANbus, I²C, IEBus, SIO, UART/USART
Peripherals	DMA, WDT
Number of I/O	85
Program Memory Size	512KB (512K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	31K x 8
Voltage - Supply (Vcc/Vdd)	3V ~ 5.5V
Data Converters	A/D 26x10b; D/A 2x8b
Oscillator Type	Internal
Operating Temperature	-20°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	100-LQFP
Supplier Device Package	100-LFQFP (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/m30833fjgp-u5

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Rev.1.41
Jan. 31, 2006

1. Overview

The M32C/83 Group (M32C/83, M32C/83T) microcomputer is a single-chip control unit that utilizes high-performance silicon gate CMOS technology with the M32C/80 Series CPU core. The M32C/83 Group (M32C/83, M32C/83T) is available in 144-pin and 100-pin plastic molded LQFP/QFP packages.

With a 16-Mbyte address space, this microcomputer combines advanced instruction manipulation capabilities to process complex instructions by less bytes and execute instructions at higher speed.

It includes a multiplier and DMAC adequate for office automation, communication devices and industrial equipments, and other high-speed processing applications.

1.1 Applications

Automobiles, audio, cameras, office equipment, communications equipment, portable equipment, etc.

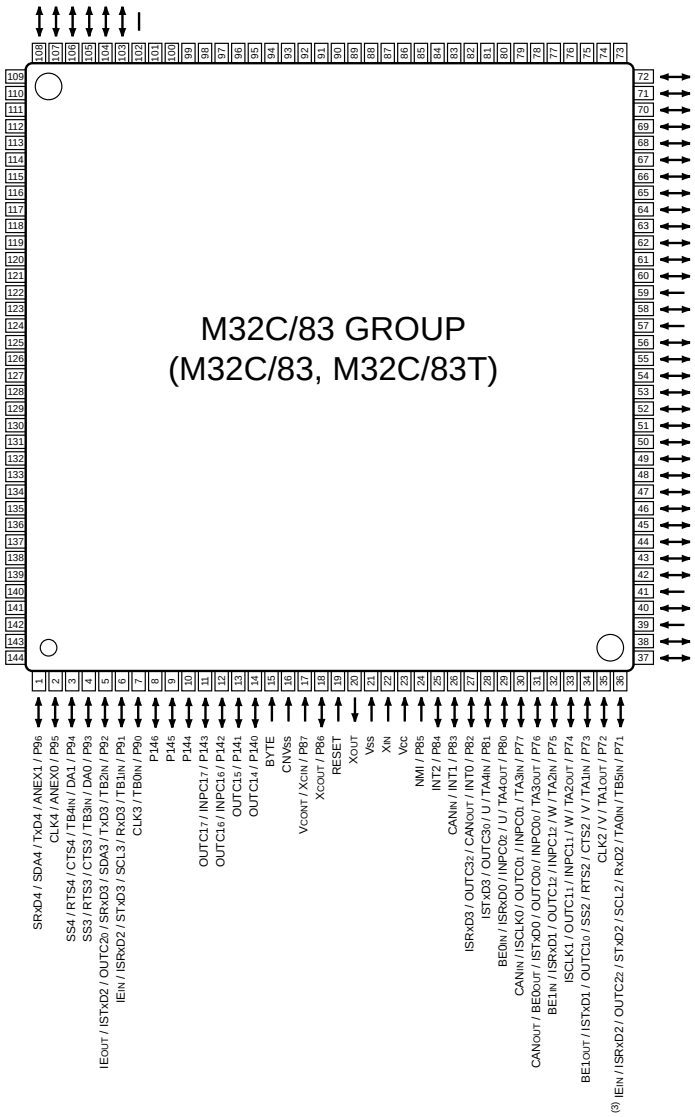
Table 1.2 M32C/83 Group (M32C/83, M32C/83T) Performance (100-Pin Package)

Characteristic		Performance	
		M32C/83	M32C/83T
CPU	Basic Instructions	108 instructions	
	Minimum Instruction Execution Time	31.3 ns (f(BCLK) = 32 MHz, VCC = 4.2 to 5.5 V) 50 ns (f(BCLK) = 20 MHz, VCC = 3.0 to 5.5 V)	31.3 ns (f(BCLK) = 32 MHz, VCC=4.2 to 5.5 V)
	Operating Mode	Single-chip mode, Memory expansion mode and Microprocessor mode	Single-chip mode
	Address Space	16 Mbytes	
	Memory Capacity	See Table 1.3	
Peripheral Function	I/O Port	87 I/O pins and 1 input pin	
	Multifunction Timer	Timer A: 16 bits x 5 channels, Timer B: 16 bits x 6 channels Three-phase motor control circuit	
	Intelligent I/O	Time measurement function: 16 bits x 5 channels Waveform generating function: 16 bits x 10 channels Communication function (Clock synchronous serial I/O, Clock asynchronous serial I/O, HDLC data processing, Clock synchronous variable length serial I/O, IEBus(1))	
	Serial I/O	5 Channels Clock synchronous serial I/O, Clock asynchronous serial I/O, IEBus(1), I2C bus(2)	
	CAN Module	1 channel Supporting CAN 2.0B specification	
	A/D Converter	10-bit A/D converter: 2 circuits, 26 channels	
	D/A Converter	8 bits x 2 channels	
	DMAC	4 channels	
	DMAC II	Can be activated by all peripheral function interrupt sources Immediate transfer, Calculation transfer and Chain transfer functions	
	CRC Calculation Circuit	CRC-CCITT	
	X/Y Converter	16 bits x 16 bits	
	Watchdog Timer	15 bits x 1 channel (with prescaler)	
	Interrupt	42 internal and 8 external sources, 5 software sources Interrupt priority level: 7	
	Clock Generation Circuit	4 circuits Main clock oscillation circuit(*), Sub clock oscillation circuit(*), On-chip oscillator, PLL frequency synthesizer (*)Equipped with a built-in feedback resistor. Ceramic resonator or crystal oscillator must be connected externally	
	Oscillation Stop Detect Function	Main clock oscillation stop detect function	
Electrical Characteristics	Supply Voltage	4.2 to 5.5 V (f(BCLK)=32 MHz) 3.0 to 5.5 V (f(BCLK)=20 MHz, through VDC) 3.0 to 3.6 V (f(BCLK)=20 MHz, not through VDC)	4.2 to 5.5 V (f(BCLK)=32 MHz)
	Power Consumption	41 mA (VCC=5 V, f(BCLK)=32 MHz) 38 mA (VCC=5 V, f(BCLK)=30 MHz) 26 mA (VCC=3.3 V, f(BCLK)=20 MHz) 470 µA (VCC=5 V, f(XCIN)=32 kHz, in wait mode) 340 µA (VCC=3.3 V, f(XCIN)=32 kHz, through VDC, in wait mode) 5.0 µA (VCC=3.3 V, f(XCIN)=32 kHz, not through VDC, in wait mode) 0.4 µA (VCC=5 V, stop mode) 0.4 µA (VCC=3.3 V, stop mode)	41 mA (VCC=5 V, f(BCLK)=32 MHz) 38 mA (VCC=5 V, Vf(BCLK)=30 MHz) 470 µA (VCC=5 V, f(XCIN)=32 kHz, in wait mode) 0.4 µA (VCC=5 V, stop mode)
Flash Memory	Program/Erase Supply Voltage	3.3 ± 0.3 V or 5.0 ± 0.5 V	5.0 ± 0.5 V
	Program and Erase Endurance	100 times	
Operating Ambient Temperature		–20 to 85°C, –40 to 85°C (optional)	–40 to 85°C (T version)
Package		100-pin plastic molded LQFP/QFP	

NOTES:

1. IEBus is a trademark of NEC Electronics Corporation.
2. I2C bus is a trademark of Koninklijke Philips Electronics N. V.
3. Contact our sales office if 30-MHz or higher frequency is required.

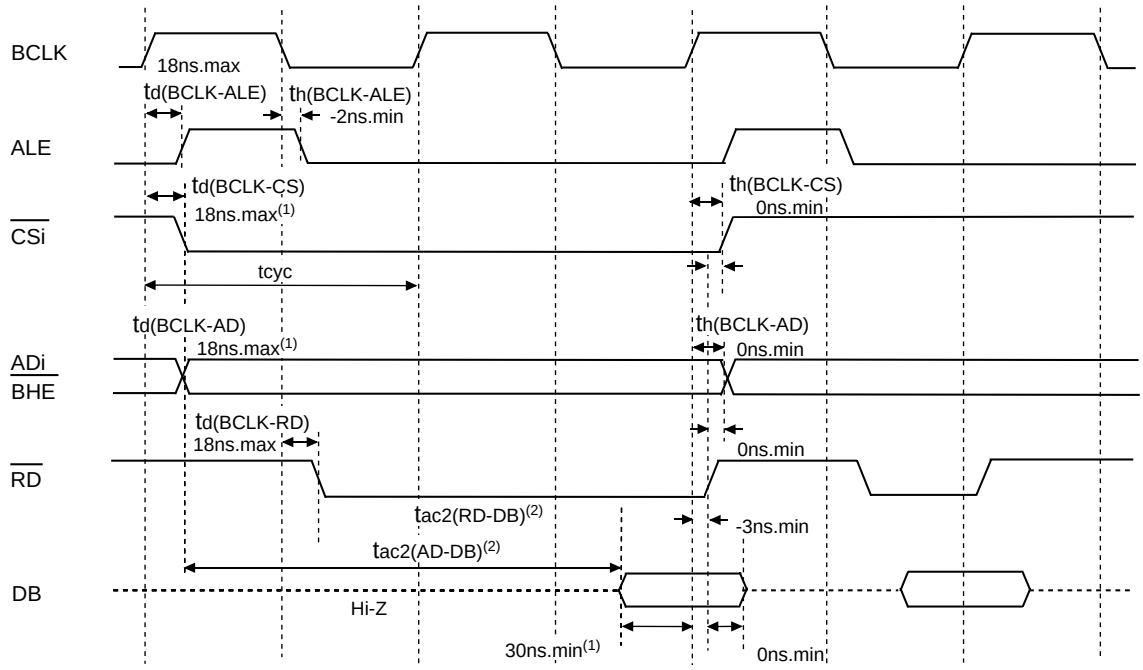
All options are on a request basis.

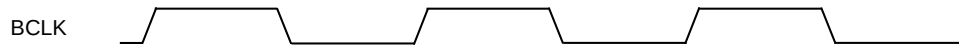


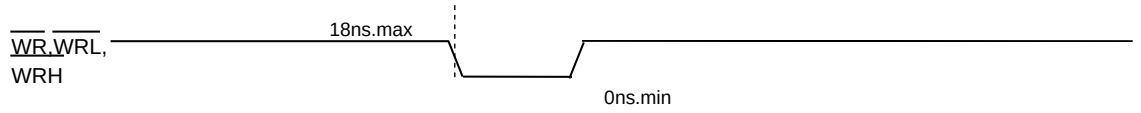
PLQP0144KA-A
(144P6Q-A)

VCC=5V

Symbol	Parameter	Measurement Condition	Standard


BCLK
18ns.max
td(BCLK-ALE)
th(BCLK-ALE)
-2ns.min
ALE
td(BCLK-CS)
18ns.max(1)
th(BCLK-CS)
0ns.min
CSi
tcyc
td(BCLK-AD)
18ns.max(1)
th(BCLK-AD)
0ns.min
ADi
BHE
td(BCLK-RD)
18ns.max
0ns.min
RD
tac2(RD-DB)(2)
-3ns.min
tac2(AD-DB)(2)
DB
Hi-Z
30ns.min(1)
0ns.min


BCLK


WR,WRL,
WRH
18ns.max
0ns.min

V_{CC}=5V

Table 5.48 A/D Conversion Characteristics (V_{CC} = AV_{CC} = V_{REF} = 4.2 to 5.5V, Vss = AV_{SS} = 0V at Topr = –40 to 85°C (T version), f(X_{IN}) = 32MHz unless otherwise specified)

Symbol	Parameter	Measurement Condition		Standard			Unit
				Min	Typ	Max	
-	Resolution	V_{REF}=V_{CC}				10	Bits
INL	Integral Nonlinearity Error	V_{REF}=V_{CC}=5V	AN_0 to AN_7 AN_{EX0}, AN_{EX1}			±3	LSB LSB
			External op-amp connection mode			±7	LSB LSB
DNL	Differential Nonlinearity Error					±1	LSB
-	Offset Error					±3	LSB
-	Gain Error					±3	LSB
R_{LADDER}	Resistor Ladder	V_{REF}=V_{CC}		8		40	kΩ
t_{CONV}	10-bit Conversion Time			2.1			µs
t_{CONV}	8-bit Conversion Time			1.8			µs
t_{SAMP}	Sample Time			0.2			µs
V_{REF}	Reference Voltage			2		V_{CC}	V
V_{IA}	Analog Input Voltage			0		V_{REF}	V

NOTES:
1. Divide f(X_{IN}), if exceeding 16 MHz, to keep ϕAD frequency at 16 MHz or less.

Table 5.49 D/A Conversion Characteristics (V_{CC} = V_{REF} = 4.2 to 5.5V, V_{SS} = AV_{SS} = 0V at Topr = –40 to 85°C (T version), f(X_{IN}) = 32MHz unless otherwise specified)

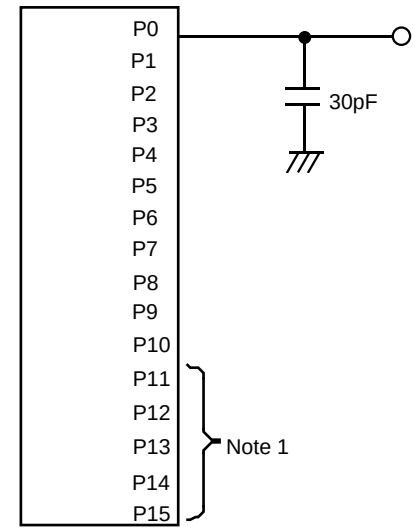
Symbol	Parameter	Measurement Condition	Standard			Unit
			Min	Typ	Max	
-	Resolution				8	Bits
-	Absolute Accuracy				1.0	%
t_{SU}	Setup Time				3	µs
R_O	Output Resistance		4	10	20	kΩ
I_{VREF}	Reference Power Supply Input Current	(Note 1)			1.5	mA

NOTES:
1. Measurement results when using one D/A converter. The DAi register (i=0, 1) of the D/A converter not being used is set to "00_{16}". The resistor ladder in the A/D converter is exclued. I_{VREF} flows even if the VCUT bit in the ADiCON1 register is set to "0" (no V_{REF} connection).

Table 5.50 Flash Memory Version Electrical Characteristics

Parameter	Standard			Unit
	Min	Typ	Max	
Program Time (per page)		8	120	ms
Block Erase Time (per block)		50	600	ms

NOTES:
1. V_{CC}= 4.2 to 5.5V at Topr= 0 to 60° C, unless otherwise specified



NOTES:
1. P11 to P15 are provided in the 144-pin package only.

Figure 5.18 P0 to P15 Measurement Circuit

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