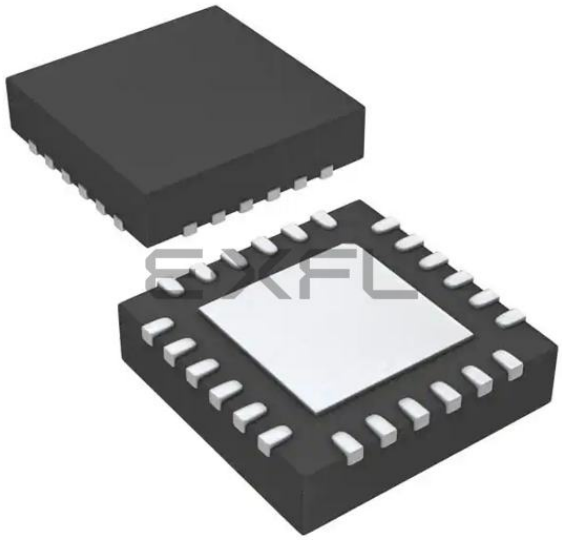
Renesas Electronics America Inc - R5F10277ANA#W5 Datasheet



Welcome to E-XFL.COM

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	RL78
Core Size	16-Bit
Speed	24MHz
Connectivity	CSI, I²C, UART/USART
Peripherals	DMA, LVD, POR, PWM, WDT
Number of I/O	18
Program Memory Size	4KB (4K x 8)
Program Memory Type	FLASH
EEPROM Size	2K x 8
RAM Size	512 x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 5.5V
Data Converters	A/D 11x8/10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	24-WFQFN Exposed Pad
Supplier Device Package	24-HWQFN (4x4)
Purchase URL	https://www.e-xfl.com/product-detail/renesas-electronics-america/r5f10277ana-w5

Notes 1. Excludes quantization error (±1/2 LSB).
2. This value is indicated as a ratio (%FSR) to the full-scale value.
3. When $AV_{REFP} < V_{DD}$, the MAX. values are as follows.
Overall error: Add ±1.0 LSB to the MAX. value when $AV_{REFP} = V_{DD}$.
Zero-scale error/Full-scale error: Add ±0.05%FSR to the MAX. value when $AV_{REFP} = V_{DD}$.
Integral linearity error/ Differential linearity error: Add ±0.5 LSB to the MAX. value when $AV_{REFP} = V_{DD}$.
4. Values when the conversion time is set to 57 μs (min.) and 95 μs (max.).
5. Refer to 28.6.2 Temperature sensor/internal reference voltage characteristics.

(2) When reference voltage (+) = AV_{REFP}/ANI0 (ADREFP1 = 0, ADREFP0 = 1), reference voltage (−) = AV_{REFM}/ANI1 (ADREFM = 1), target pin: ANI16 to ANI22

(T_A = −40 to +85°C, 1.8 V ≤ AV_{REFP} ≤ V_{DD} ≤ 5.5 V, V_{SS} = 0 V, Reference voltage (+) = AV_{REFP}, Reference voltage (−) = AV_{REFM} = 0 V)

Parameter	Symbol	Conditions		MIN.	TYP.	MAX.	Unit
Resolution	RES			8		10	bit
Overall error Note 1	AINL	10-bit resolution $AV_{REFP} = V_{DD}$ Note 3			1.2	±5.0	LSB
					1.2	±8.5 Note 4	LSB
Conversion time	tCONV	10-bit resolution Target ANI pin: ANI16 to ANI22	3.6 V ≤ V_{DD} ≤ 5.5 V	2.125		39	μs
			2.7 V ≤ V_{DD} ≤ 5.5 V	3.1875		39	μs
			1.8 V ≤ V_{DD} ≤ 5.5 V	17		39	μs
				57		95	μs
Zero-scale error Notes 1, 2	EZS	10-bit resolution $AV_{REFP} = V_{DD}$ Note 3				±0.35	%FSR
						±0.60 Note 4	%FSR
Full-scale error Notes 1, 2	EFS	10-bit resolution $AV_{REFP} = V_{DD}$ Note 3				±0.35	%FSR
						±0.60 Note 4	%FSR
Integral linearity error Note 1	ILE	10-bit resolution $AV_{REFP} = V_{DD}$ Note 3				±3.5	LSB
						±6.0 Note 4	LSB
Differential linearity error Note 1	DLE	10-bit resolution $AV_{REFP} = V_{DD}$ Note 3				±2.0	LSB
						±2.5 Note 4	LSB
Analog input voltage	VAIN	ANI16 to ANI22		0		AV_{REFP} and V_{DD}	V

Notes 1. Excludes quantization error (±1/2 LSB).
2. This value is indicated as a ratio (%FSR) to the full-scale value.
3. When $AV_{REFP} ≤ V_{DD}$, the MAX. values are as follows.
Overall error: Add ±4.0 LSB to the MAX. value when $AV_{REFP} = V_{DD}$.
Zero-scale error/Full-scale error: Add ±0.20%FSR to the MAX. value when $AV_{REFP} = V_{DD}$.
Integral linearity error/ Differential linearity error: Add ±2.0 LSB to the MAX. value when $AV_{REFP} = V_{DD}$.
4. When the conversion time is set to 57 μs (min.) and 95 μs (max.).

(2) 30-pin products

(T_A = 40 to +105 qC, 2.4 V d V_{DD} d 5.5 V, V_{SS} = 0 V) (2/2)

Parameter	Symbol	Conditions				MIN.	TYP.	MAX.	Unit
Supply current Note 1	I_{DD2} Note 2	HALT mode	HS (High-speed main) mode Note 6	f_{IH} = 24 MHz Note 4	V_{DD} = 5.0 V		440	2300	#A
					V_{DD} = 3.0 V		440	2300	
				f_{IH} = 16 MHz Note 4	V_{DD} = 5.0 V		400	1700	#A
					V_{DD} = 3.0 V		400	1700	
				f_{MX} = 20 MHz Note 3, V_{DD} = 5.0 V	Square wave input		280	1900	#A
					Resonator connection		450	2000	
				f_{MX} = 20 MHz Note 3, V_{DD} = 3.0 V	Square wave input		280	1900	#A
					Resonator connection		450	2000	
				f_{MX} = 10 MHz Note 3, V_{DD} = 5.0 V	Square wave input		190	1020	#A
					Resonator connection		260	1100	
				f_{MX} = 10 MHz Note 3, V_{DD} = 3.0 V	Square wave input		190	1020	#A
					Resonator connection		260	1100	
	I_{DD3} Note 5	STOP mode	T_A = 40 qC				0.18	0.50	#A
			T_A = +25 qC				0.23	0.50	
			T_A = +50 qC				0.30	1.10	
			T_A = +70 qC				0.46	1.90	
			T_A = +85 qC				0.75	3.30	
			T_A = +105 qC				2.94	15.30	

Notes 1. Total current flowing into V_{DD}, including the input leakage current flowing when the level of the input pin is fixed to V_{DD} or V_{SS}. The values below the MAX. column include the peripheral operation current. However, not including the current flowing into the A/D converter, LVD circuit, I/O port, and on-chip pull-up/pull-down resistors and the current flowing during data flash rewrite.

2. During HALT instruction execution by flash memory.
3. When high-speed on-chip oscillator clock is stopped.
4. When high-speed system clock is stopped.
5. Not including the current flowing into the 12-bit interval timer and watchdog timer.
6. Relationship between operation voltage width, operation frequency of CPU and operation mode is as follows.

   HS (High speed main) mode: V_{DD} = 2.7 V to 5.5 V @1 MHz to 24 MHz
   V_{DD} = 2.4 V to 5.5 V @1 MHz to 16 MHz

Remarks 1. f_{MX}: High-speed system clock frequency (X1 clock oscillation frequency or external main system clock frequency)

2. f_{IH}: high-speed on-chip oscillator clock frequency
3. Except STOP mode, temperature condition of the TYP. value is T_A = 25 qC.