AVR® Microcontrollers Peripheral Integration

Quick Reference Guide

											Per	riphe	eral	Func	tion Fo	cus																					
						tion: MHz		In	itelliį	gent /	Analo	og		Wave	eform	Cont	rol			g and emer	1	Logi Cryp and Mat	to d	Safe Mon			Co	mmu	nicati	ons		User terfa		Syste	em F	lexil	oility
Product Family	Pin Count	Program Flash Memory (KB)	SRAM (KB)	EEPROM (B)	Supply Voltage	Speed (MHz) Single Cycle Instruction: MHz = MIPS	ADC (# of bits)	ADC (# of channels)	Comparators ADC Gain Stage	DAC (# of bits)		Temperature Sensor Internal Voltage Reference	Zero Cross Detector (ZCD)	8-bit PWM	16-bit PWM	e Decoder		Keal-IIMe Counter	8-bit Timer/Counters	12-bit ilmer Counter	16-bit Timer/Counter	CCL	Crypto (AES/DES)	POR	BOD	Funcional Safety Ready	USART	USB I ² C	IdS	IRCOM Social Number	Serial Number QTouch® Technology	QTouch Technology with PTC (2)	ГСР	External Bus Interface DMA Channels	Event System	Multi-Voltage I/O SleepWalking	Sleep Modes picoPower® Technology
ATtiny102/104	8/14	1	0.032		1.8-5.5	12	10	5/8	√			✓			2						2			✓	~		1										4
ATtiny20x/40x/80x/160x	8-24	2–16	Up to 1		1.8-5.5	20	10	12	✓			√ ✓			2		,	/			1	√ ✓	,	/ /	√ ✓		1(1)	1	1	·	/			\perp	✓	√	3 🗸
ATtiny21x/41x/81x/161x /321x	8-24	2-32	Up to 2		1.8-5.5	20	10	12	✓	8	,	< <			2		,		1	1	1	< <	,		✓ ✓		1(1)	1	1	,	/	√ (3)			V	✓	3 🗸
ATtiny42x																																					
ATmega48PB/88PB/168PB /328PB	32	4-32	0.5-2		1.8-5.5	20	10	8	✓			< <		4	2/6 ⁽⁵⁾		,	/ :	2	1,	/3 ⁽⁵⁾	✓		1	< <		1/2(5)	1/2	5) 1/2	(5)	✓	√ (3)					6
ATmega80x/160x/320x /480x	28-48	8-48	1-6		1.8-5.5	20	10	16	✓			< <		4	3		,				5	< <	١,	/ /	< <		4	1	1	,					~	~	3 🗸
ATmega324PB	44	32	2		1.8-5.5	20	10	8	✓			✓		2	2			/ :	2		1	✓		1	√ ✓		1	1	1		✓	✓					5
AVR-DB Family	28-64	32-128	4–16	512	1.8-5.5	24	12	22	✓	10	2-3	< <	1-4	9–18	3–7		٧	/	1	1 1	-5	< <	,	/ /	√ ✓		3–6	1-3	2 2	✓ v		✓			V V	1	3 🗸
ATtiny42x/82x/162x/322x	14-24	4-32	0.5-3	128	1.8-5.5	20	12	15	√ 16	K		√ ✓		12	8		,				6	< <	,	/ /	√ ✓	/	2	1	1	✓ v	/				✓	✓	3 🗸
AVR-DA Family	28-64	32-128	4–16	512	1.8-5.5	24	12	22	✓	10		< <	1-3	16	16		٧		1	1	5	√	,	/ /	√ ✓	/	3–6	1-1	2 2	✓ v		✓			✓	✓	3 🗸
AVR-DD Family	14-32	16-64	2-8	256	1.8-5.5	24	12	23	✓	10		< <	1	16	9		,	/	1	1	3	< <	,	1	< <	1	2	1	1	✓ v	/				✓	✓	3 🗸
AVR-EA Family	28-48	16-64	2-6	512	1.8-5.5	20	12	28	√ 16	×		✓		12	10		,				6	< <			√ ✓		3	1	1	✓ v	/				✓	✓	3 ✓
Speciality Families																																					
ATmega8U2/16U2/32U2	32	8–32	0.5-1		2.7-5.5	16	-	-	✓			< <		4	6		,	/ :	2		3	✓		✓	√ ✓		2	√ 2	2								6
ATmega16U4/32U4	32	16/32	1/2		2.7-5.5	16	10	12	✓			< <		5					1		1	✓		✓	√ ✓		1	✓	1								6
ATmega3290PA/6490P	100	32-64	2-4	1K	1.8-5.5	20	10	8	√ ✓			✓		2	2			/ :	2		1	✓		✓	√ ✓		1	1	1		✓		✓				5

^{1:} LIN port also 2: Peripheral Touch Controller 3: Not on the ATtiny212/214/412/414/416 4: Only on the ATmega1281/2561 5: Only on the ATmega328PB 6: Only on the C3 and C4 7: UART only LIN Port also



INTELLIGENT ANALOG: Sensor Interfa	cing and Signal Conditioning
ADC: Analog-to-Digital Converter	General purpose 10-/12-bit ADC
ADC Gain Stage: Analog-to-Digital Converter Gain Stage	Programmable gain stage, providing amplification steps on the differential input voltage
Comp: Comparator	General purpose rail-to-rail comparator
DAC: Digital-to-Analog Converter	Programmable voltage reference with multiple internal and external connections
VREF: Voltage Reference	Stable fixed voltage reference for use with integrated analog peripherals
ZCD: Zero Cross Detect	AC high-voltage zero-crossing detection for simplifying TRIAC control, synchronised switching control and timing
WAVEFORM CONTROL: PWM Drive an	d Waveform Generation
PWM: Pulse Width Modulation	General purpose 10-bit PWM control
16-bit PWM: Standalone 16-bit PWM and 16-bit Timer/Counter	High-resolution 16-bit PWM with edge- and centeraligned modes General purpose 16-bit timer/counter
WeX: Waveform Extension	Module for more customised and advanced waveform generation Optimised for various types of motor, ballast and power stage control
TIMING AND MEASUREMENTS: Signal	Measurement with Timing and Counter Control
8-/12-/16-bit Timer	General purpose 8-/12-/16-bit timer/counter
LOGIC, CRYPTO AND MATH: Customiz	able Logic and Math Functions
CCL: Configurable Custom Logic	Integrated combinational and sequential logic Customer interconnection and re-routing of digital peripherals
MULT: Hardware Multiplier	MULTIPLY function of two 8-bit values with 16-bit result
Crypto (AES/DES)	Data encryption and decryption can be easily performed for both internally stored data or for small external data packets
SAFETY AND MONITORING: Hardware	Monitoring and Fault Detection
CRC/SCAN: Cyclical Redundancy Check with Memory Scan	Automatically calculates CRC checksum of Program/ DataEE memory for NVM integrity
POR: Power-On Reset	Keeps the device in reset until the voltage is high enough. Ensures a safe start-up of logic and memories
BOD: Brownout Detector	Prevents code execution if voltage drops below a set threshold
WDT: Watchdog Timer	Monitors correct program operation. Constantly running timer with a configurable time-out

COMMUNICATIONS: General, Industrial, Lighting and Automotive									
UART: Universal Asynchronous Receiver Transmitter	General purpose serial communications Support for LIN								
USB: Universal Serial Bus	Support for Full-Speed USB 2.0 device profiles								
I ² C: Inter-Integrated Circuit	General purpose 2-wire serial communications								
SPI: Serial Peripheral Interface	General purpose 4-wire serial communications								
IRCOM: Infrared Communication Module	Encodes and decodes data according to the IrDA communication protocol								
Serial Number	Factory programmed unique ID useful in wired and wireless communications								
USER INTERFACE: Capacitive Touch Sensing and LCD Control									
LCD: Liquid Crystal Display	Highly integrated segmented LCD controller								
QTouch®: Microchip Proprietary Touch Technology	Provides a simple-to-use solution to realize touch- sensitive interfaces								
QTouch with PTC: QTouch with Peripheral Touch Controller	Provides a simple-to-use solution to realize touch- sensitive interfaces with a Peripheral Touch Controller								
LOW POWER AND SYSTEM FLEXIBILITY: Low-Power Technology, Peripheral and Interconnects									
DMA: Direct Memory Access	Moves data between memories and peripherals without CPU overhead, improving overall system performance and efficiency								
Event System	Flexible routing of peripheral events, ability to control peripheral independent from the CPU								
External Bus Interface	Highly flexible module for interfacing external memories and memory- addressable peripherals								
picoPower® Technology	Low-power technology								
Sleep Modes	Low-power saving modes, IDLE, power-down, power-save, standby and extended standby								
SleepWalking	Ability to put the CPU core to sleep until a relevant event occurs								

