

Willkommen in der Mikrocontroller.net Artikelsammlung. Alle Artikel hier können nach dem Wiki-Prinzip von jedem bearbeitet werden. Zur Hauptseite der Artikelsammlung

AVR Typen

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AT90S

Die "Basic Line" der Atmel AVR-Reihe. Sie beinhaltet die ersten AVR's die produziert wurden und deren Bezeichnung mit "AT90S" beginnt. Alle Typen wurden mit der Zeit von den beiden Nachfolgereihen ersetzt: ATmega bzw. ATtiny.

Einige neue AVR-Controller tragen eine mit AT90-*ohne* S beginnende Bezeichnung, haben aber einen "moderneren" Kern. Z.B. sind die Typen AT90PWM2/3 und AT90CAN128 vom Funktionsumfang (interner RC, USART etc.) den ATmegas zuzuordnen.

ATmega

Die ATmega-Mikrocontroller sind ein Teil der AVR-Controllerfamilie. Zusammen mit den ATtiny lösen die ATmega die AT90S-Serie schrittweise ab, wobei es in den meisten Fällen weitgehend pin- und funktionskompatiblen Ersatz für abgekündigte Controller gibt (ATmega8 bzw. ATmega8A statt AT90S4433, ATmega8515 statt AT90S8515 usw.).

Atmel ATmega AVR's werden mit aktiviertem internem Taktgeber ausgeliefert. Schließt man eine andere externe Taktquelle an (Quarz, Quarzoszillator o.ä), wird diese nicht automatisch genutzt. Zum Aktivieren müssen die Fuse-Bits des Controllers entsprechend eingestellt werden (siehe Datenblatt).

ATmegas mit integriertem JTAG-Interface (z.Zt. solche ab 16kB Flash-Speicher und mehr als 28 Pins) werden ab Werk mit aktiviertem JTAG-Interface ausgeliefert. Dieses Interface belegt vier Port-Pins (z. B. am PORTC bei ATmega16/32), die nicht für eigene Anwendungen genutzt werden können, solange das JTAG-Interface aktiviert ist. Das Interface lässt sich über ein Fuse-Bit (JTAGEN) dauerhaft und über ein Bit (JTD) in dem (oder einem

der) MC-Kontroll-Register (Datenblatt nach JTD durchsuchen) per Software zur Laufzeit an- und abschalten. Weiteres im Datenblatt des jeweiligen Controllers in den Abschnitten Memory-Programming (Fuse) und JTAG/ICE (JTD).

Beim ATmega128 ist ab Werk die Mega103-Kompatibilitäts-fuse gesetzt. Um alle Erweiterungen des Mega128 gegenüber dem Mega103 zu nutzen muss diese deaktiviert werden. Diese Fuse sorgt außerdem dafür, dass das SRAM in einem anderen Adressbereich liegt. Dadurch funktionieren C-Programme nur bis zum ersten Funktionsaufruf. Siehe auch AVR Checkliste: Besonderheiten bei ATmega64 / ATmega128

ATtiny

Die ATtiny stellen das untere Ende der neuen AVR-Linie von Atmel dar und waren zunächst durch das Fehlen von internem SRAM gekennzeichnet. Darüber hinaus fehlt es, im Gegensatz zu den ATmegas, der überwiegenden Mehrzahl an einem Hardwaremultiplizierer. Jede Multiplikation muss dann also in Software ausgeführt werden. Die Speicherausstattung der ATtinys ist im Allgemeinen geringer als in der ATmega-Familie, sodass es die kleinen Typen nur mit 1 KByte Flash gibt. Auch die größeren Controller sind oft nicht über 8 KByte Flash zu bekommen. SRAM-lose ATtinys können nur mit dem Z-Register indirekt adressieren, nicht wie die Größeren auch mit X und Y.

Mittlerweile gibt es aber so bemerkenswerte Controller wie den ATtiny4313, deren Möglichkeiten und Funktionen den ATmegas in nichts nachstehen. Ende 2016 wurde eine neue ATtiny-Familie (817/816/814/417) vorgestellt, die neben einem Hardwaremultiplizierer auch viele Ausstattungmerkmale der Xmega-Reihe hat. Dabei macht Atmel die Zugehörigkeit zur ATtiny-Familie an einer Gehäusegröße mit maximal 24 Anschlüssen fest. Eine Übersicht über die Verfügbarkeit verschiedener Befehle bietet die AVR-Assembler Befehlsvergleichstabelle.

ATxmega

Neueste Generation von AVR-Controllern mit neuem internen Aufbau, hoher Taktrate (32 MHz), niedriger Spannung (1,6 - 3,6V), vielen Schnittstellen, in 44 - 100 poligen SMD-Gehäusen. Besonderheiten: ADC mit 2 Megasample/12 Bit, vierpoliges Programm- und Debug- Interface PDI (VTref, CLK, DATA, GND) erfordert z.B. einen AVR_JTAGICE-mkII Programmer. PDI (Flash und Debug) funktioniert mit C-Code z.B. mit AVR Studio 4.19.

Leider ist die Xmega-Reihe zu den AVR-Prozessoren der Mega- oder Tiny-Serien nicht kompatibel (viel komplizierter, anderer Aufbau der IO-Baugruppen, der Interrupts, der C-Funktionen etc.). Prozessor-Manuals zeigen weder Assembler noch C-Beispiele für Ansteuerung der IO-Baugruppen. C-Programmbeispiele (geeignet für AVR-Studio) findet man erst in Xmega Application Notes. Einen Überblick gibt es von Florian Grotz oder in dem jtronics Xmega Tutorial .

Sonstiges

Die AT89-Familie gehört nicht zu den AVR-Typen mit dem AVR-RISC-Befehlssatz, sondern ist eine Intel-8051-kompatible 8-Bit µC-Serie.

Tiny vs Mega

Die modernen Typen sind die Tiny (=winzig) und die Mega (=riesig). Die ATtiny haben kleinere Gehäuse als die ATmega, mit weniger Pins. Dies führt bei ähnlicher Funktionalität wie die Megas zu Mehrfachbelegungen der Pins. Die Tiny sind eher für kleine Aufgaben geeignet, wo die Einsparung über den Preis und den geringeren Aufwand beim Datenblattstudium kommt. Anfänger und Bastler sind mit den ATmega besser bedient, da es weniger Limitierungen gibt. Für ATmega gibt es zahlreiche Entwicklungsboards und Lernsysteme, wie die Arduino-Familie.

Nomenklatur

ATmega

Auch wenn die Namensgebung auf den ersten Blick bedingt durch die vielen verfügbaren Modelle kompliziert aussieht, so folgt sie doch immer (von wenigen Ausnahmen abgesehen) einem einfachen Schema.

Nehmen wir einen aktuellen Baustein als Beispiel: *ATmega48PA-AU*. Der Name besteht aus 5 Teilen:

1. Der Baureihe (hier: "ATmega")
2. Einer Nummer, immer eine Zweierpotenz (hier: 4). Diese Zahl gibt die Größe des Flashspeichers in Kibibyte an.
3. Bis zu zwei weiteren Ziffern (hier: 8). Sie definieren die Zusatzfunktionen sowie Zahl der I/O-Ports.
4. Bis zu zwei Buchstaben (hier: PA), die für die Revision sowie spezielle stromsparende Architekturen stehen.
5. Einem Bindestrich und zwei weiteren Buchstaben, die die Bauform angeben (hier: AU).

Baureihe

Hier gibt es nur zwei Reihen: Den kleinen ATtiny mit reduziertem Funktionsumfang und den großen ATmega.

Speichergröße

Während die Größe des Flashspeichers (Programmspeicher) direkt im Namen angegeben ist, ergibt sich die Größe von RAM und EEPROM nur indirekt aus dieser Nummer, wobei natürlich die Bausteine mit großem Flash auch mehr RAM und EEPROM haben als kleinere. Grob gilt diese Zuordnung:

| Flash (kB) | EEPROM (B) | RAM (B) |
|------------|-----------------------|-----------------------|
| 2 | tiny: 128 | tiny: 128 |
| 4 | tiny: var., mega: 256 | tiny: 256, mega: 512 |
| 8 | tiny: var., mega: 512 | tiny: 512, mega: 1024 |
| 16 | 512 | 1024 |
| 32 | 1024 | 2048 |
| 64 | 2048*) | 4096*) |
| 128 - 256 | 4096 | 4K - 16K |

*)Atmega640 verfügt über den doppelten Speicher

Zusatzfunktionen / Größe

Die Ziffer(n) nach der Flashgröße geben die Ausstattungsmerkmale des Bausteins an. Die folgende Tabelle gilt für die Atmega-Reihe:

| Ziffer | Beschreibung |
|--------|---|
| - | Keine Ziffer markiert die Bausteine der ersten Generation. Sie verfügen in der Regel über eine niedrigere maximale Taktrate (8/16 MHz anstatt 10/20 MHz), eine höhere Minimal-Spannung (2,7 anstatt 1,8 Volt), weniger Interrupt-Quellen und PWM-Kanäle |
| 0 | Reihe von 32 - 256 kB in einem größeren Gehäuse mit höherer Anzahl an I/O-Pins. Etwas älter als die aktuellen Reihen 4 und 8. |
| 1 | Kennzeichnet eine verbesserte Version des Atmega128 / 256, aber älter als aktuelle 4er Reihe |
| 4 | Reihe von 16 bis 128 kB Flash, alle pin-kompatibel in 40-44 poligem Gehäuse. Neueste Baureihe, alle in pico-power-Technologie mit vielen verbesserten Funktionen wie externen Interrupts, Timern, USART... |
| 5 | Reihe von 16 bis 64 kB |
| 8 | Reihe von 4 bis 32 kB, alle pin-kompatibel in 28-32 poligem Gehäuse. Neueste Baureihe, alle in pico-power-Technologie mit vielen verbesserten Funktionen wie externen Interrupts, Timern, USART.... (auch in der Attiny-Reihe vorhanden) |
| 9 | Reihe von 16 bis 64 kB mit integriertem Controller für LC-Displays, folglich in großen Gehäusen (64-/100-polig) |

Aus dieser Liste stechen einige Bausteine als Außenseiter hervor:

- Atmega8515 / Atmega8535
- Atmega640: Im Prinzip ein Atmega64 mit deutlich mehr Hardware-Ressourcen (4 UARTs, 16 ADC-Kanäle...) und doppelt soviel EEPROM / SRAM.

Revision / Architektur

Die (optionalen) Buchstaben vor dem Bindestrich geben Auskunft über den Stromverbrauch und Spannungsbereich

| Buchstabe | Beschreibung |
|-----------|--|
| A | Zweite Revision - meist nur eine Umstellung der internen Strukturen ohne Auswirkung für den Benutzer |
| L / V | "Low-Voltage": Speziell für niedrigere Taktraten (8 bzw. 10 MHz) sowie niedrigere Eingangsspannungen (1,8 bzw. 2,7V) selektierte Bausteine |
| P/PA | "Pico-Power": Reduzierter Stromaufnahme, besonders in tiefen Sleep-Modes (< 1uA); Manche Bausteine (z.B. Mega48) gibt es als P und PA |

Bauform

Die beiden Buchstaben nach dem Bindestrich geben Auskunft über die Bauform. Die Zahl der Pins des jeweiligen Gehäusetyps hängt vom Baustein ab.

| Buchstaben | Beschreibung |
|------------|------------------------------------|
| A | TQFP-Gehäuse |
| C | BGA-Gehäuse |
| I | Bleihaltig - nicht mehr erhältlich |
| J | PLCC-Gehäuse |
| M | (V)QFN- / MLF- Gehäuse |
| P | DIP-Gehäuse (bastlerfreundlich!) |
| S | SOIC-Gehäuse |
| U | Bleifrei, RoHS-kompatibel |
| X | TSSOP-Gehäuse |

ATtiny

Bei den ATtiny-Bausteinen ist die Nummerierung deutlich unübersichtlicher als in der ATmega-Reihe. Die erste Ziffer gibt wie auch bei ATmega die Größe des Flash-Speichers an. Die obenstehenden Tabellen für Baureihe, Bauform, Revision und Speichergröße gelten ebenfalls (Ausnahmen: ATtiny5 mit 0,5 Kilobytes Flash sowie ATtiny4 und ATtiny9 mit 0,5 bzw. 1 kB Flash). Die Zusatzfunktionen und Baugröße sind aber nicht deutlich

Vergleichstabelle(n) / Ausstattung

AT90S - Reihe

| Typ | Flash (Kbytes) | EEPROM (Bytes) | SRAM (Bytes) | Max I/O Pins | Fmax (MHz) | Vcc (V) | Analog Comparator | 16-bit Timer | 8-bit Timer | Brown Out Detector | On-Chip Oscillator | PWM Channels | RTC | Self-Programmable Memory | Boot Code | SPI | TWI (I2C) | UART | Watchdog | Bauform |
|--------------------------|----------------|----------------|--------------|--------------|------------|---------|-------------------|--------------|-------------|--------------------|--------------------|--------------|------|--------------------------|-----------|-----|-----------|------|----------|-------------------------------|
| AT90S231 ^{3[1]} | 2 | 128 | 128 | 15 | 10 | 2.7-6.0 | Ja | 1 | 1 | Nein | Nein | 1 | Nein | Nein | Nein | Ja | Nein | Ja | Ja | PDIP 20 SOIC 20 |
| AT90S232 ^{3[2]} | 2 | 128 | 128 | 3 | 10 | 2.7-6.0 | Nein | 0 | 1 | Nein | Nein | 0 | Nein | Nein | Nein | Ja | Nein | Nein | Ja | PDIP 8 SOIC 8 |
| AT90S234 ^{3[3]} | 2 | 128 | 128 | 5 | 10 | 2.7-6.0 | Nein | 0 | 1 | Nein | Ja | 0 | Nein | Nein | Nein | Ja | Nein | Nein | Ja | PDIP 8 SOIC 8 |
| AT90S851 ^{5[4]} | 8 | 512 | 512 | 32 | 8 | 2.7-6.0 | Ja | 1 | 1 | Nein | Nein | 1 (16-Bit) | Nein | Nein | Nein | Ja | Nein | Ja | Ja | PDIP 40 PLCC 44 TQFP 44 |

ATtiny - Reihe

| Typ | Flash (Kbytes) | EEPROM (Bytes) | SRAM (Bytes) | Max I/O Pins | Fmax (MHz) | Vcc (V) | A/D Channels | Analog Comparator | 16-bit Timer | 8-bit Timer | Brownout Detector | On-Chip Oscillator | PWM Channels | RTC | Self-Program Memory | Boot Code | SPI | TWI (I2C) | UART | Watchdog | Build Form (en) | Preis |
|----------------------|----------------|-------------------|-------------------|--------------|------------|---------|--------------|-------------------|--------------|-------------|-------------------|--------------------|------------------|------|---------------------|-----------|-------------------|-------------------|-------------------|----------|--|-----------|
| ATtiny10 | 1 | -- | 32 | 4 | 12 | 1.8-5.5 | 4 8-bit | Ja | 1 | -- | Nein | Ja | 2 | Nein | Nein | Nein | Ja | Nein | Nein | Ja | SOT 23 | 0.50-0.99 |
| ATtiny11 | 1 | -- | -- | 6 | 6 | 2.7-5.5 | -- | Ja | -- | 1 | Nein | Nein | -- | Nein | Nein | Nein | Nein | Nein | Nein | Ja | PDIP 8 SOIC 8 | 0.58-0.87 |
| ATtiny12 | 1 | 64 | -- | 6 | 8 | 1.8-5.5 | -- | Ja | -- | 1 | Ja | Ja | -- | Nein | Nein | Nein | Ja | Nein | Nein | Ja | PDIP 8 SOIC 8 | 1.00-1.20 |
| ATtiny13A | 1 | 64 | 64 | 6 | 20 | 1.8-5.5 | 4 10bit | Ja | -- | 1 | Ja | Ja | 1 ^[5] | Nein | Ja | Ja | Ja | Nein | Nein | Ja | PDIP 8 SOIC 8 | 0.60-1.20 |
| ATtiny15 | 1 | 64 | -- | 6 | 1.6 | 2.7-5.5 | 4 10bit | Ja | -- | 2 | Ja | ONLY | 1 ^[6] | Nein | Nein | Nein | Ja | Nein | Nein | Ja | PDIP 8 SOIC 8 | 1.15 |
| ATtiny25 45 85 | 2 4 8 | 128 256 512 | 128 256 512 | 6 | 20 | 1.8-5.5 | 4 | Ja | -- | 2 | Ja | Ja | 2 | Nein | Ja | Nein | Ja | Nein | Nein | Ja | PDIP 8 SOIC 8 MLF 20 | 0.80-2.00 |
| ATtiny2313 | 2 | 128 | 128 | 18 | 20 | 2.7-5.5 | -- | Ja | 1 | 1 | Ja | Ja | 4 | Nein | Ja | Ja | Ja ^[7] | Ja ^[8] | Ja ^[9] | Ja | PDIP 20 SOIC 20 QFN 20 MLF 20 | 1.30 |
| ATtiny4313 | 4 | 256 | 256 | 18 | 20 | 1.8-5.5 | -- | Ja | 1 | 1 | Ja | Ja | 4 | Nein | Ja | Ja | Ja ^[7] | Ja ^[8] | Ja ^[9] | Ja | PDIP 20 SOIC 20 QFN 20 MLF 20 | 1.00-2.00 |
| ATtiny24 | 2 | 128 | 128 | 12 | 20 | 2.7-5.5 | 8 10bit | Ja | Ja | Ja | Ja | Ja | 4 | Nein | Ja | Ja | Ja ^[7] | Ja ^[8] | Nein | Ja | PDIP 14 SOIC 14 QFN 20/M LF20 | 0.85 |

| Typ | Flash (Kbytes) | EEPROM (Bytes) | SRAM (Bytes) | Max I/O Pins | Fmax (MHz) | Vcc (V) | A/D Channels | Analog Comparator | 16-bit Timer | 8-bit Timer | Brown Out Detector | On-Chip Oscillator | PWM Channels | RTC | Self-Program Memory | Boot Code | SPI | TWI (I2C) | UART | Watchdog | Buildform (en) | Preis |
|------------|----------------|----------------|--------------|--------------|------------|---------|--------------|-------------------|--------------|-------------|--------------------|--------------------|--------------|------|---------------------|-----------|-------------------|-------------------|------|----------|---|-----------|
| ATtiny84A | 8 | 512 | 512 | 12 | 20 | 1.8-5.5 | 8 10bit | Ja | Ja | Ja | Ja | Ja | 4 | Nein | Ja | Ja | Ja ^[7] | Ja ^[8] | Nein | Ja | PDIP 14 SOIC 14 QFN 20/MLF20 | 1,00-4,00 |
| ATtiny261 | 2 | 128 | 128 | 16 | 20 | 1.8-5,5 | 11 | 1 | 1 | 1 | Ja | Ja | 2 | Nein | Ja | Ja | Ja ^[7] | Ja ^[8] | Nein | Ja | PDIP 20 SOIC 20 MLF 20 (TSSOP20 bei Tiny261A) | 1,15 |
| ATtiny861A | 8 | 512 | 512 | 16 | 20 | 1.8-5,5 | 11 | Ja | 1 | 1 | Ja | Ja | 2 | Nein | Ja | Ja | Ja ^[7] | Ja ^[8] | Nein | Ja | PDIP 20 SOIC 20 MLF 32 TSSOP20 | 1,50 |
| ATtiny814 | 8 | 128 | 512 | 14 | 20 | 1.8-5.5 | 10 10-bit | Ja | 3 | 1 12-bit | Ja | Ja | 8 | Ja | Ja | Ja | Nein | Ja | Ja | Ja | SOIC 14 | 0,78 |
| ATtiny816 | 8 | 128 | 512 | 18 | 20 | 1.8-5.5 | 12 10-bit | Ja | 3 | 1 12-bit | Ja | Ja | 8 | Ja | Ja | Ja | Nein | Ja | Ja | Ja | SOIC 20 QFN 20 | 0,93 |

ATmega - Reihe

| Typ | Flash (Kbytes) | EEPROM (Bytes) | SRAM (Bytes) | Max I/O Pins | Fmax (MHz) | Vcc (V) | A/D Channels | Analog Comparator | 16-bit Timer | 8-bit Timer | Brown-Out Detector | On-Chip Oscillator | PWM Channels | RTC | Self-Program Memory | Boot Code | SPI | TWI (I2C) | UART | Watchdog | Package | Preis |
|---------------------|----------------|----------------|--------------|--------------|------------|---------|--|-------------------|--------------|-------------|--------------------|--------------------|--------------|-----|---------------------|-----------|--------------------|-----------|------------------|----------|------------------------------------|-----------|
| ATmega8 ATmega8A | 8 | 512 | 1K | 23 | 16 | 2.7-5.5 | 6 10bit PDIP 8 10bit TQFP P QFN/ MLF | Ja | 1 | 2 | Ja | Ja | 3 | Ja | Ja | Ja | Ja | Ja | Ja USART | Ja | PDIP 28 TQFP32 QFN/ MLF32 | 1.50-4.00 |
| ATmega16 | 16 | 512 | 1K | 32 | 16 | 2.7-5.5 | 8 10bit | Ja | 1 | 2 | Ja | Ja | 4 | Ja | Ja | Ja | Ja ^[10] | Ja | 1 ^[9] | Ja | PDIP 40 TQFP44 QFN/ MLF44 | 2.60-2.85 |
| ATmega162 | 16 | 512 | 1K | 35 | 16 | 2.7-5.5 | Keine | Ja | 2 | 2 | Ja | Ja | 6 | Ja | Ja | Ja | Ja ^[10] | Nein | 2 ^[9] | Ja | PDIP 40 TQFP44 QFN/ MLF44 | 2.70-3.80 |
| ATmega32 | 32 | 1K | 2K | 32 | 16 | 2.7-5.5 | 8 10bit | Ja | 1 | 2 | Ja | Ja | 4 | Ja | Ja | Ja | Ja ^[10] | Ja | 1 ^[9] | Ja | PDIP 40 TQFP44 QFN/ MLF44 | 3.20-4.60 |
| ATmega48A | 4 | 256 | 512 | 23 | 20 | 1.8-5.5 | 6 10bit PDIP 8 10bit TQFP P QFN/ MLF | Ja | 1 | 2 | Ja | Ja | 6 | Ja | Ja | Ja | Ja ^[10] | Ja | 1 ^[9] | Ja | PDIP 28 TQFP32 QFN/ MLF32 | 2.00-4.50 |
| ATmega88A | 8 | 512 | 1K | 23 | 20 | 1.8-5.5 | 6 10bit PDIP 8 10bit TQFP P QFN/ MLF | Ja | 1 | 2 | Ja | Ja | 6 | Ja | Ja | Ja | Ja ^[10] | Ja | 1 ^[9] | Ja | PDIP 28 TQFP32 QFN/ MLF32 | 2.00-4.50 |

| Typ | Flash (Kbytes) | EEPROM (Bytes) | SRAM (Bytes) | Max I/O Pins | Fmax (MHz) | Vcc (V) | A/D Channels | Analog Comparator | 16-bit Timer | 8-bit Timer | Brown Out Detector | On-Chip Oscillator | PWM Channels | RTC | Self-Program Memory | Boot Code | SPI | TWI (I2C) | UART | Watchdog | Package | Preis |
|--------------------------|----------------|----------------|--------------|--------------|------------|---------|--|-------------------|--------------|-------------|--------------------|--------------------|--------------------|-----|---------------------|-----------|--------------------|-----------|---------------------------------------|----------|---|-----------|
| ATmega164 | | | | | | | | | | | | | | | | | | | | | PDIP 40 TQFP44 QFN/MLF 44 | 2.00-4.50 |
| ATmega168A | 16 | 512 | 1K | 23 | 20 | 1.8-5.5 | 6 10bit PDIP 8 10bit TQFP P QFN/MLF | Ja | 1 | 2 | Ja | Ja | 6 | Ja | Ja | Ja | Ja ^[10] | Ja | 1 ^[9] | Ja | PDIP 28 TQFP32 QFN/MLF 32 | 2.00-4.50 |
| ATmega328 | 32 | 1K | 2K | 23 | 20 | 1.8-5.5 | 6 10bit PDIP 8 10bit TQFP P QFN/MLF | Ja | 1 | 2 | Ja | Ja | 6 | Ja | Ja | Ja | Ja ^[10] | Ja | 1 ^[9] | Ja | PDIP 28 TQFP32 QFN/MLF 32 | 1.80-4.50 |
| ATmega324A | 32 | 1K | 2K | 32 | 20 | 1.8-5.5 | 8 10bit | Ja | 1 | 2 | Ja | Ja | 6 | Ja | Ja | Ja | Ja ^[10] | Ja | 2 | Ja | PDIP 40 TQFP44 VQFN44 QFN/MLF 44 DRQFN44 VFBGA49 | 3.50-4.50 |
| ATmega64 ^[11] | 64 | 2K | 4K | 53 | 16 | 2.7-5.5 | 8 10bit | Ja | 2 | 2 | Ja | Ja | 2 8bit, 6-16bit | Ja | Ja | Ja | Ja ^[10] | Ja | 1 ^[9] | Ja | TQFP64 QFN/MLF 64 | 7.50-9.50 |
| ATmega644 | 64 | 2K | 4K | 32 | 20 | 1.8-5.5 | 8 10bit | Ja | 1 | 2 | Ja | Ja | 6 | Ja | Ja | Ja | Ja ^[10] | Ja | 1 ^[9] 2 ^[12] | Ja | PDIP 40 TQFP44 QFN/MLF 44 | 6.80-7.50 |

| T y p | F l a s h (K b y t e s) | E E P R O M (B y t e s) | S R A M (B y t e s) | M a x i / O P i n s | F . m a x (M H z) | V c c (V) | A / D C h a n n e l s | A n a l o g C o m p a r a t o r | 1 6 - b i t T i m e r | 8 - b i t T i m e r | B r o w n O u t D e t e c t o r | O n C h i p O s c i l l a t o r | P W M C h a n n e l s | R T C | S e l f P r o g r a m M e m o r y | B o o t C o d e | S P I | T W I (I 2 C) | U A R T | W a t c h d o g | B a u f o r m | P r e i s |
|-------------|------------------------------|------------------------------|--------------------------|---------------------|------------------------|----------------|-----------------------|---------------------------------|-----------------------|---------------------|---------------------------------|---------------------------------|-----------------------|-------|-----------------------------------|-----------------|--------------------|--------------------|------------------|-----------------|--|------------|
| ATmega128 | 128 | 4K | 4K | 53 | 16 | 2.7-5.5 | 8 10bit | Ja | 2 | 2 | Ja | Ja | 2 8bit 6 2-16bit | Ja | Ja | Ja | Ja ^[10] | Ja | 2 ^[9] | Ja | TQFP64 QFN/MLF64 | 8.05-8.40 |
| ATmega1284P | 128 | 4K | 16K | 32 | 20 | 1.8-5.5 | 8 10bit | Ja | 2 | 2 | Ja | Ja | 6 | Ja | Ja | Ja | Ja ^[10] | Ja | 2 ^[9] | Ja | PDIP40 TQFP44 QFN/MLF44 | 5.00-7.00 |
| ATmega2560 | 256 | 4K | 8K | 86 | 16 | 2.7-5.5 | 16 10bit | Ja | 4 | 2 | Ja | Ja | 16 | Ja | Ja | Ja | Ja ^[10] | Ja | 4 ^[9] | Ja | TQFP100 | 8.00-15.00 |
| ATmega8515 | 8 | 512 | 512 | 35 | 16 | 2.7-5.5 | Keine | Ja | 1 | 1 | Ja | Ja | 1 8-bit, 1 16-bit | Nein | Ja | Ja | Ja ^[10] | Nein | 1 ^[9] | Ja | PDIP40 TQFP44 PLC C44 QFN/MLF44 | 3.20-3.90 |
| ATmega8535 | 8 | 512 | 512 | 32 | 16 | 2.7-5.5 | 8 10bit | Ja | 1 | 2 | Ja | Ja | 2 8-bit, 2 16-bit | Ja | Ja | Ja | Ja ^[10] | Ja | 1 ^[9] | Ja | PDIP44 PLC C44 QFN/MLF44 | 3.15-3.75 |

Hinweis: Die angegebenen Preise sind Richtwerte. Es empfiehlt sich die Verwendung einer Preissuchmaschine, z.B. [google.de/shopping](https://www.google.de/shopping).

ATXMega - Reihe

| Typ | Flash (Kbytes) | EEPROM (Kbytes) | SRAM (Kbytes) | Boot (Kbytes) | Max I/O Pins | Fmax (MHz) | Vcc (V) | ADC | DAC | PWMC channels | 16-Bit Timer | SPI | TWI (I2C) | UART | Buttons |
|--------------|----------------|-----------------|---------------|---------------|--------------|------------|-----------|------------------|------------------|---------------|--------------|-----|-----------|------|---------|
| ATxmega16a4 | 16 | 1 | 2 | 4 | 34 | 32 | 1,6 - 3,6 | 12-CH @ 12-Bit | 2-CH @ 12-Bit | 16 | 5 | 2 | 2 | 5 | TQFP44 |
| ATxmega32a4 | 32 | 1 | 4 | 4 | 34 | 32 | 1,6 - 3,6 | 12-CH @ 12-Bit | 2-CH @ 12-Bit | 16 | 5 | 2 | 2 | 5 | TQFP44 |
| ATxmega64a4 | 64 | 2 | 4 | 4 | 34 | 32 | 1,6 - 3,6 | 12-CH @ 12-Bit | 2-CH @ 12-Bit | 16 | 5 | 2 | 2 | 5 | TQFP44 |
| ATxmega128a4 | 128 | 2 | 8 | 8 | 34 | 32 | 1,6 - 3,6 | 12-CH @ 12-Bit | 2-CH @ 12-Bit | 16 | 5 | 2 | 2 | 5 | TQFP44 |
| ATxmega64a3 | 64 | 2 | 4 | 4 | 50 | 32 | 1,6 - 3,6 | 2x 8-CH @ 12-Bit | 2-CH @ 12-Bit | 22 | 7 | 3 | 2 | 7 | TQFP64 |
| ATxmega128a3 | 128 | 2 | 8 | 8 | 50 | 32 | 1,6 - 3,6 | 2x 8-CH @ 12-Bit | 2-CH @ 12-Bit | 22 | 7 | 3 | 2 | 7 | TQFP64 |
| ATxmega192a3 | 192 | 2 | 16 | 8 | 50 | 32 | 1,6 - 3,6 | 2x 8-CH @ 12-Bit | 2-CH @ 12-Bit | 22 | 7 | 3 | 2 | 7 | TQFP64 |
| ATxmega256a3 | 256 | 4 | 16 | 8 | 50 | 32 | 1,6 - 3,6 | 2x 8-CH @ 12-Bit | 2-CH @ 12-Bit | 22 | 7 | 3 | 2 | 7 | TQFP64 |
| ATxmega64a1 | 64 | 2 | 4 | 4 | 78 | 32 | 1,6 - 3,6 | 2x 8-CH @ 12-Bit | 2x 2-CH @ 12-Bit | 24 | 8 | 4 | 4 | 8 | TQFP100 |
| ATxmega128a1 | 128 | 2 | 8 | 8 | 78 | 32 | 1,6 - 3,6 | 2x 8-CH @ 12-Bit | 2x 2-CH @ 12-Bit | 24 | 8 | 4 | 4 | 8 | TQFP100 |
| ATxmega192a1 | 192 | 2 | 16 | 8 | 78 | 32 | 1,6 - 3,6 | 2x 8-CH @ 12-Bit | 2x 2-CH @ 12-Bit | 24 | 8 | 4 | 4 | 8 | TQFP100 |
| ATxmega256a1 | 256 | 4 | 16 | 8 | 78 | 32 | 1,6 - 3,6 | 2x 8-CH @ 12-Bit | 2x 2-CH @ 12-Bit | 24 | 8 | 4 | 4 | 8 | TQFP100 |
| ATxmega384a1 | 384 | 4 | 32 | 8 | 78 | 32 | 1,6 - 3,6 | 2x 8-CH @ 12-Bit | 2x 2-CH @ 12-Bit | 24 | 8 | 4 | 4 | 8 | TQFP100 |
| ATxmega16d4 | 16 | 1 | 2 | 4 | 34 | 32 | 1,6 - 3,6 | 12-CH @ 12-Bit | 0 | 16 | 4 | 2 | 2 | 2 | TQFP44 |
| ATxmega32d4 | 32 | 1 | 4 | 4 | 34 | 32 | 1,6 - 3,6 | 12-CH @ 12-Bit | 0 | 16 | 4 | 2 | 2 | 2 | TQFP44 |
| ATxmega64d4 | 64 | 2 | 4 | 4 | 34 | 32 | 1,6 - 3,6 | 12-CH @ 12-Bit | 0 | 16 | 4 | 2 | 2 | 2 | TQFP44 |
| ATxmega128d4 | 128 | 2 | 8 | 8 | 34 | 32 | 1,6 - 3,6 | 12-CH @ 12-Bit | 0 | 16 | 4 | 2 | 2 | 2 | TQFP44 |
| ATxmega64d3 | 64 | 2 | 4 | 4 | 50 | 32 | 1,6 - 3,6 | 16-CH @ 12-Bit | 0 | 18 | 5 | 2 | 2 | 3 | TQFP64 |

| Typ | Flash (Kbytes) | EEPROM (Kbytes) | SRAM (Kbytes) | Boot (Kbytes) | Max I/O Pins | F. max (MHz) | Vcc (V) | ADC | DAC | PWM Channels | 16-Bit Timer | SPI | TWI (I2C) | UART | Bauformen |
|--------------|----------------|-----------------|---------------|---------------|--------------|--------------|-----------|----------------|-----|--------------|--------------|-----|-----------|------|-----------|
| ATxmega128d3 | 128 | 2 | 8 | 8 | 50 | 32 | 1,6 - 3,6 | 16-CH @ 12-Bit | 0 | 18 | 5 | 2 | 2 | 3 | TQFP64 |
| ATxmega192d3 | 192 | 2 | 16 | 8 | 50 | 32 | 1,6 - 3,6 | 16-CH @ 12-Bit | 0 | 18 | 5 | 2 | 2 | 3 | TQFP64 |
| ATxmega256d3 | 256 | 4 | 16 | 8 | 50 | 32 | 1,6 - 3,6 | 16-CH @ 12-Bit | 0 | 18 | 5 | 2 | 2 | 3 | TQFP64 |

Weitere Vergleichstabellen

Vergleichstabellen zum Downloaden gibt es unter Anderem

- von Andreas, Stand 19.12.2011; vollständig,
- von Sven, Stand 22.09.2011; weiter eingedampft.

ATtiny

Device-specific Features

| Device | Flash [KiB] | Pin Anzahl | Max. fCPU [MHz] | of Touch Kanäle | Hardware Qtouch | Max I/O Pins | Ext Interrupts | SPI | TWI | UART | LIN | ADCKanäle | ADCAuflösung [bits] | ADCSpeed [ksp/s] | Temp. Sensor | SRAM [KiB] | EEPROM [Bytes] | Self Program Memory | picopower | Temp. Berreich [°C] | I/O Supply Class [V] | Operating Voltage [VCC] | Timers | Output Compare Kanäle | Input Capture Kanäle | PWM Kanäle | 32kHz RTC | Device |
|------------|-------------|------------|-----------------|-----------------|-----------------|--------------|----------------|-----|-----|------|-----|-----------|---------------------|------------------|--------------|------------|----------------|---------------------|-----------|---------------------|----------------------|-------------------------|--------|-----------------------|----------------------|------------|-----------|------------|
| ATtiny28L | 2 | 28 | 4 | — | — | 11 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | 0.03 | 0 | — | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 1 | 0 | 0 | 0 | — | ATtiny28L |
| ATtiny26 | 2 | 20 | 16 | — | — | 16 | 11 | 1 | 1 | 0 | 0 | 11 | 10 | 15 | — | 0.12 | 128 | — | — | —40 – 85 | 2.7 – 5.5 | 2.7 – 5.5 | 2 | 3 | 0 | 4 | — | ATtiny26 |
| ATtiny13 | 1 | 8 | 20 | — | — | 6 | 6 | 0 | 0 | 0 | 0 | 4 | 10 | 15 | — | 0.06 | 64 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 1 | 2 | 0 | 2 | — | ATtiny13 |
| ATtiny2313 | 2 | 20 | 20 | 4 | — | 18 | 18 | 2 | 1 | 1 | 0 | 0 | 0 | 15 | — | 0.12 | 128 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 4 | — | ATtiny2313 |
| ATtiny25 | 2 | 8 | 20 | 4 | — | 6 | 6 | 1 | 1 | 0 | 0 | 4 | 10 | 15 | ✓ | 0.12 | 128 | ✓ | — | —40 – 105 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 5 | 0 | 6 | — | ATtiny25 |
| ATtiny85 | 8 | 8 | 20 | 3 | — | 6 | 6 | 1 | 1 | 0 | 0 | 4 | 10 | 15 | ✓ | 0.5 | 512 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 5 | 0 | 6 | — | ATtiny85 |
| ATtiny45 | 4 | 8 | 20 | 3 | — | 6 | 6 | 1 | 1 | 0 | 0 | 4 | 10 | 15 | ✓ | 0.25 | 256 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 5 | 0 | 6 | — | ATtiny45 |
| ATtiny24 | 2 | 14 | 20 | 4 | — | 12 | 12 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | ✓ | 0.12 | 128 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 4 | — | ATtiny24 |
| ATtiny44 | 4 | 14 | 20 | 6 | — | 12 | 12 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | ✓ | 0.25 | 256 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 4 | — | ATtiny44 |
| ATtiny84 | 8 | 14 | 20 | 6 | — | 12 | 12 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | ✓ | 0.5 | 512 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 4 | — | ATtiny84 |
| ATtiny261 | 2 | 20 | 20 | 4 | — | 16 | 16 | 1 | 1 | 0 | 0 | 11 | 10 | 15 | ✓ | 0.12 | 128 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 6 | 1 | 6 | — | ATtiny261 |
| ATtiny461 | 4 | 20 | 20 | 8 | — | 16 | 16 | 1 | 1 | 0 | 0 | 11 | 10 | 15 | ✓ | 0.25 | 256 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 6 | 1 | 6 | — | ATtiny461 |
| ATtiny861 | 8 | 20 | 20 | 8 | — | 16 | 16 | 1 | 1 | 0 | 0 | 11 | 10 | 15 | ✓ | 0.5 | 512 | ✓ | — | —40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 6 | 1 | 6 | — | ATtiny861 |

| Device | Flash [KiB] | Pin Anzahl | Max. fCPU [MHz] | of Touch Kanäle | Hardware Qtouch | Max I / OPins | Ext Interrupts | SPi | Twi | UART | Lin | ADC Kanäle | ADC Auflösung [bits] | ADC Speed [ksp/s] | Temp. Sensor | SRAM [KiB] | EEPROM [Bytes] | Self Program Memory | pic Power | Temp. Berreich [°C] | I / O Supply Class [V] | Operating Volt age [VCC] | Timers | Output Compare Kanäle | Input Capture Kanäle | PWM Kanäle | 32 kHz RTC | Device |
|------------|-------------|------------|-----------------|-----------------|-----------------|---------------|----------------|-----|-----|------|-----|------------|----------------------|-------------------|--------------|------------|----------------|---------------------|-----------|---------------------|------------------------|--------------------------|--------|-----------------------|----------------------|------------|------------|------------|
| ATtiny13A | 1 | 8 | 20 | — | — | 6 | 6 | 0 | 0 | 0 | 0 | 4 | 10 | 15 | — | 0.06 | 64 | ✓ | ✓ | -40 – 125 | 1.8 – 5.5 | 1.8 – 5.5 | 1 | 2 | 0 | 2 | — | ATtiny13A |
| ATtiny48 | 4 | 32 | 12 | 12 | — | 28 | 28 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | ✓ | 0.25 | 64 | ✓ | ✓ | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 2 | — | ATtiny48 |
| ATtiny88 | 8 | 32 | 12 | 12 | — | 28 | 28 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | ✓ | 0.5 | 64 | ✓ | ✓ | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 2 | — | ATtiny88 |
| ATtiny24A | 2 | 14 | 20 | 4 | — | 12 | 12 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | ✓ | 0.12 | 128 | ✓ | ✓ | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 4 | — | ATtiny24A |
| ATtiny44A | 4 | 14 | 20 | 6 | — | 12 | 12 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | ✓ | 0.25 | 256 | ✓ | ✓ | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 4 | — | ATtiny44A |
| ATtiny43U | 4 | 20 | 8 | 8 | — | 16 | 16 | 1 | 1 | 0 | 0 | 4 | 10 | 15 | ✓ | 0.25 | 64 | ✓ | ✓ | -40 – 85 | 0.7 – 5.5 | 0.7 – 5.5 | 2 | 4 | 0 | 4 | — | ATtiny43U |
| ATtiny10 | 1 | 6 | 12 | 1 | — | 4 | 4 | 0 | 0 | 0 | 0 | 4 | 8 | 15 | — | 0.03 | 0 | — | — | -40 – 125 | 1.8 – 5.5 | 1.8 – 5.5 | 1 | 2 | 1 | 2 | — | ATtiny10 |
| ATtiny4 | 0.5 | 6 | 12 | 1 | — | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | 0.03 | 0 | — | — | -40 – 125 | 1.8 – 5.5 | 1.8 – 5.5 | 1 | 2 | 1 | 2 | — | ATtiny4 |
| ATtiny5 | 0.5 | 6 | 12 | 1 | — | 4 | 4 | 0 | 0 | 0 | 0 | 4 | 8 | 15 | — | 0.03 | 0 | — | — | -40 – 125 | 1.8 – 5.5 | 1.8 – 5.5 | 1 | 2 | 1 | 2 | — | ATtiny5 |
| ATtiny9 | 1 | 6 | 12 | 1 | — | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | 0.03 | 0 | — | — | -40 – 125 | 1.8 – 5.5 | 1.8 – 5.5 | 1 | 2 | 1 | 2 | — | ATtiny9 |
| ATtiny261A | 2 | 20 | 20 | 4 | — | 16 | 16 | 1 | 1 | 0 | 0 | 11 | 10 | 15 | ✓ | 0.12 | 128 | ✓ | ✓ | -40 – 105 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 6 | 1 | 6 | — | ATtiny261A |
| ATtiny461A | 4 | 20 | 20 | 8 | — | 16 | 16 | 1 | 1 | 0 | 0 | 11 | 10 | 15 | ✓ | 0.25 | 256 | ✓ | ✓ | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 6 | 1 | 6 | — | ATtiny461A |
| ATtiny861A | 8 | 20 | 20 | 8 | — | 16 | 16 | 1 | 1 | 0 | 0 | 11 | 10 | 15 | ✓ | 0.5 | 512 | ✓ | ✓ | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 6 | 1 | 6 | — | ATtiny861A |

| Device | Flash [KiB] | Pin Anzahl | Max. fCPU [MHz] | of Touch Kanäle | Hardware Qtouch | Max I / OPins | Ext Interrupts | SPi | Twi | UART | Lin | ADCKanäle | ADCAuflösung [bits] | ADCSpeed [ksp/s] | Temp. Sensor | SRAM [KiB] | EEPROM [Bytes] | Self Programm Memory | picPower | Temp. Berreich [°C] | I / O Supply Classes [V] | Operating Voltage [VCC] | Timers | Output Compare Kanäle | Input Capture Kanäle | PWM Kanäle | 32kHz RTC | Device |
|-------------|-------------|------------|-----------------|-----------------|-----------------|---------------|----------------|-----|-----|------|-----|-----------|---------------------|------------------|--------------|------------|----------------|----------------------|----------|---------------------|--------------------------|-------------------------|--------|-----------------------|----------------------|------------|-----------|-------------|
| ATtiny2313A | 2 | 20 | 20 | — | — | 18 | 18 | 2 | 1 | 1 | 0 | 0 | 0 | 15 | — | 0.12 | 128 | √ | √ | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 4 | — | ATtiny2313A |
| ATtiny4313 | 4 | 20 | 20 | — | — | 18 | 18 | 2 | 1 | 1 | 0 | 0 | 0 | 15 | — | 0.25 | 256 | √ | √ | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 4 | — | ATtiny4313 |
| ATtiny167 | 16 | 20 | 16 | 8 | — | 16 | 16 | 2 | 1 | 1 | 1 | 11 | 10 | 15 | √ | 0.5 | 512 | √ | — | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 3 | 1 | 9 | √ | ATtiny167 |
| ATtiny87 | 8 | 20 | 16 | — | — | 16 | 16 | 2 | 1 | 1 | 1 | 11 | 10 | 15 | √ | 0.5 | 512 | √ | — | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 3 | 1 | 9 | √ | ATtiny87 |
| ATtiny20 | 2 | 14 | 12 | 5 | √ | 12 | 12 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | √ | 0.12 | 0 | — | — | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 3 | — | ATtiny20 |
| ATtiny40 | 4 | 20 | 12 | 12 | √ | 18 | 18 | 1 | 1 | 0 | 0 | 12 | 10 | 15 | √ | 0.25 | 0 | — | — | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 2 | — | ATtiny40 |
| ATtiny84A | 8 | 14 | 20 | 6 | — | 12 | 12 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | √ | 0.5 | 512 | √ | — | -40 – 85 | 1.8 – 5.5 | 1.8 – 5.5 | 2 | 4 | 1 | 4 | — | ATtiny84A |

General Features

| | |
|----------------------------------|-------------|
| CPU | 8-bit AVR |
| Quadrature Decoder Kanäle | 0 |
| USB Transceiver | 0 |
| USB Speed | nein |
| USB Interface | nein |
| CAN | 0 |
| SSC | 0 |
| Ethernet | 0 |
| SD / eMMC | 0 |
| Segment LCD | 0 |
| Grafik LCD | nein |
| Video Decoder | nein |
| Kamera Interface | nein |
| Analog Comparators | 1 |
| Resistive Touch Screen | nein |
| DAC Kanäle | 0 |
| DAC Auflösung [bits] | 0 |
| External Bus Interface | 0 |
| DRAM Memory | nein |
| NAND Interface | nein |
| FPU | nein |
| MPU / MMU | nein / nein |
| Crypto Engine | nein |
| Calibrated RC Oscillator | ja |

ATmega

Device-specific Features

| Device | Flash [KiB] | Program Memory [KiB] | Max. CPU [MHz] | Max. I/O Pins | Ext. Interrupts | USB Transceiver | USB Speed | USB Interface | SPI | TWI | UART | CAN | LIN | Segment LCD | ADC Kanäle | ADC Auflösung [bits] | ADC Speicher [ksp] | ADC Komparatoren | DAC Kanäle | DAC Auflösung [bits] | Temp. Sensor | SRAM [KiB] | EEPROM [Bytes] | Self-Programm. Memory | PicoPower | Temp. Berreich [°C] | I/O Supply Voltage [VCC] | Operating Voltage [VCC] | Timers | Output Compare Kanäle | Input Capture Kanäle | PWM Kanäle | 32 kHz RTC | Device | |
|------------|-------------|----------------------|----------------|---------------|-----------------|-----------------|-----------|---------------|-----|-----|------|-----|-----|-------------|------------|----------------------|--------------------|------------------|------------|----------------------|--------------|------------|----------------|-----------------------|-----------|---------------------|--------------------------|-------------------------|---------|-----------------------|----------------------|------------|------------|------------|------------|
| ATmega8 | 8 | 32 | 16 | 12 | 23 | 2 | 0 | — | — | 1 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 512 | √ | — | −40–85 | 2.7–5.5 | 2.7–5.5 | 3 | 3 | 1 | 3 | √ | ATmega8 |
| ATmega8515 | 8 | 44 | 16 | 16 | 35 | 3 | 0 | — | — | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | 0.5 | 512 | √ | — | −40–85 | 2.7–5.5 | 2.7–5.5 | 2 | 3 | 1 | 3 | — | ATmega8515 | |
| ATmega8535 | 8 | 44 | 16 | 16 | 32 | 3 | 0 | — | — | 1 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 0.5 | 512 | √ | — | −40–85 | 2.7–5.5 | 2.7–5.5 | 3 | 4 | 1 | 4 | √ | ATmega8535 |
| ATmega16 | 16 | 44 | 16 | 16 | 32 | 3 | 0 | — | — | 1 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 512 | √ | — | −40–85 | 2.7–5.5 | 2.7–5.5 | 3 | 4 | 1 | 4 | √ | ATmega16 |
| ATmega32 | 32 | 44 | 16 | 16 | 32 | 3 | 0 | — | — | 1 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 1024 | √ | — | −40–85 | 2.7–5.5 | 2.7–5.5 | 3 | 4 | 1 | 4 | √ | ATmega32 |
| ATmega64 | 64 | 64 | 16 | 16 | 53 | 8 | 0 | — | — | 1 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 2048 | √ | — | −40–85 | 2.7–5.5 | 2.7–5.5 | 4 | 8 | 2 | 7 | √ | ATmega64 |
| ATmega128 | 128 | 64 | 16 | 16 | 53 | 8 | 0 | — | — | 1 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 4096 | √ | — | −40–85 | 2.7–5.5 | 2.7–5.5 | 4 | 8 | 2 | 7 | √ | ATmega128 |
| ATmega162 | 16 | 44 | 16 | 16 | 35 | 3 | 0 | — | — | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | — | 1 | 512 | √ | — | −40–85 | 1.8–5.5 | 1.8–5.5 | 4 | 6 | 2 | 6 | √ | ATmega162 |
| ATmega48 | 4 | 32 | 20 | 12 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 0.5 | 256 | — | — | −40–85 | 1.8–5.5 | 1.8–5.5 | 3 | 6 | 1 | 6 | √ | ATmega48 |
| ATmega88 | 8 | 32 | 20 | 12 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 512 | √ | — | −40–85 | 1.8–5.5 | 1.8–5.5 | 3 | 6 | 1 | 6 | √ | ATmega88 |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | M a x . f C P U [M H z] | M a x I n t e r f a c e | E x t e r n a l I n t e r f a c e | U S B T r a n s c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | C A N | L I N | S e g m e n t L C D | A D C K a n ä l e | A D C A u f l ö s u n g [b i t s] | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l ö s u n g [b i t s] | T e m p . S e n s o r | S R A M [K i B] | E P R O M [B y t e s] | S e l f P r o g r a m M e m o r y | P i c o P o w e r | T e m p . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | O p e r a t i n g V o l t a g e [V C C] | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | 3 2 k H z R T C | D e v i c e | |
|----------------------------|--|---|---|--|---|--|--------------------------------------|--|-------------|-------------|------------------|-------------|-------------|--|---|--|--|---|---|--|---|---|--|---|---|--|---|---|----------------------------|---|--|---|--------------------------------------|----------------------------|----------------------------|
| AT me ga 16 8 | 16 | 32 | 20 | 16 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 51 2 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 16 8 |
| AT 90 CA N1 28 | 12 8 | 64 | 16 | 16 | 53 | 8 | 0 | — | — | 1 | 1 | 2 | 1 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 40 96 | √ | — | —4 0— 85 | 2.7 — 5.5 | 2.7 — 5.5 | 4 | 8 | 2 | 7 | √ | AT 90 CA N1 28 |
| AT me ga 32 5 | 32 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 5 |
| AT me ga 32 50 | 32 | 10 0 | 16 | 16 | 69 | 25 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 50 |
| AT me ga 64 50 | 64 | 10 0 | 16 | — | 69 | 25 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 50 |
| AT me ga 64 5 | 64 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 5 |
| AT me ga 32 9 | 32 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 10 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 9 |
| AT me ga 32 90 | 32 | 10 0 | 16 | 16 | 69 | 32 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 16 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 90 |
| AT me ga 64 9 | 64 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 10 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 9 |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | M a x . f C P U [M H z] | M a x I n t e r f a c e | E x t e r n a l I n t e r f a c e | U S B T r a n s c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | C A N | L I N | S e g m e n t L C D | A D C K a n ä l e | A D C A u f l - ö s u n g [b i t s] | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l - ö s u n g [b i t s] | T e m p . S e n s o r | S R A M [K i B] | E E P R O M [B y t e s] | S e l f P r o g r a m M e m o r y | p i c o P o w e r | T e m p . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | O p e r a t i n g V o l t a g e [V C C] | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | 3 2 k H z R T C | D e v i c e | |
|----------------------------|--|---|---|--|---|--|--------------------------------------|--|-------------|-------------|------------------|-------------|-------------|--|---|---|--|---|---|---|---|---|---|---|---|--|---|---|----------------------------|---|--|---|--------------------------------------|----------------------------|----------------------------|
| AT me ga 64 90 | 64 | 10 0 | 16 | 16 | 69 | 32 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 16 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 90 |
| AT me ga 64 0 | 64 | 10 0 | 16 | 16 | 86 | 32 | 0 | — | — | 5 | 1 | 4 | 0 | 0 | 0 | 16 | 10 | 15 | 1 | 0 | 0 | — | 8 | 40 96 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 6 | 16 | 4 | 15 | √ | AT me ga 64 0 |
| AT me ga 12 81 | 12 8 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 8 | 40 96 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 6 | 16 | 2 | 8 | √ | AT me ga 12 81 |
| AT me ga 25 61 | 25 6 | 64 | 16 | — | 54 | 17 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 8 | 40 96 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 6 | 16 | 2 | 8 | √ | AT me ga 25 61 |
| AT me ga 25 60 | 25 6 | 10 0 | 16 | — | 86 | 32 | 0 | — | — | 5 | 1 | 4 | 0 | 0 | 0 | 16 | 10 | 15 | 1 | 0 | 0 | — | 8 | 40 96 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 6 | 16 | 4 | 15 | √ | AT me ga 25 60 |
| AT me ga 12 80 | 12 8 | 10 0 | 16 | 16 | 86 | 32 | 0 | — | — | 5 | 1 | 4 | 0 | 0 | 0 | 16 | 10 | 15 | 1 | 0 | 0 | — | 8 | 40 96 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 6 | 16 | 4 | 15 | √ | AT me ga 12 80 |
| AT me ga 64 4 | 64 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 64 4 |
| AT 90 CA N3 2 | 32 | 64 | 16 | 16 | 53 | 8 | 0 | — | — | 1 | 1 | 2 | 1 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | — | —4 0— 85 | 2.7 — 5.5 | 2.7 — 5.5 | 4 | 8 | 2 | 7 | √ | AT 90 CA N3 2 |
| AT 90 CA N6 4 | 64 | 64 | 16 | 16 | 53 | 8 | 0 | — | — | 1 | 1 | 2 | 1 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 2.7 — 5.5 | 2.7 — 5.5 | 4 | 8 | 2 | 7 | √ | AT 90 CA N6 4 |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | M a x . f C P U [M H z] | M a x I n t e r f a c e | E x t I n t e r r u p t s | U S B T r a n s c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | C A N | L I N | S e g m e n t L C D | A D C K a n ä l e | A D C A u f l - ö s u n g [b i t s] | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l - ö s u n g [b i t s] | T e m p . S e n s o r | S R A M [K i B] | E E P R O M [B y t e s] | S e l f P r o g r a m M e m o r y | p i c o P o w e r | T e m p . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | O p e r a t i n g V o l t a g e [V C C] | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | 3 2 k H z R T C | D e v i c e | |
|---------------------------------|--|---|---|--|---|--|--------------------------------------|--|--------------------|-------------|------------------|-------------|-------------|--|---|---|--|---|---|---|---|---|---|---|---|--|---|---|----------------------------|---|--|---|--------------------------------------|---------------------------------|----------------------------|
| AT 90 US B1 28 6 | 128 | 64 | 16 | 16 | 48 | 16 | 1 | ja ^[13] | ja ^[14] | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 8 | 4096 | √ | — | —40—85 | 2.7—5.5 | 2.7—5.5 | 4 | 10 | 1 | 9 | √ | AT 90 US B1 28 6 | |
| AT 90 US B1 28 7 | 128 | 64 | 16 | 16 | 48 | 16 | 1 | ja ^[13] | ja ^[15] | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 8 | 4096 | √ | — | —40—85 | 2.7—5.5 | 2.7—5.5 | 4 | 10 | 1 | 9 | √ | AT 90 US B1 28 7 | |
| AT 90 US B6 47 | 64 | 64 | 16 | 16 | 48 | 16 | 1 | ja ^[13] | ja ^[15] | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 2048 | √ | — | —40—85 | 2.7—5.5 | 2.7—5.5 | 4 | 10 | 1 | 9 | √ | AT 90 US B6 47 | |
| AT 90 US B6 46 | 64 | 64 | 16 | 16 | 48 | 16 | 1 | ja ^[13] | ja ^[14] | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 2048 | √ | — | —40—85 | 2.7—5.5 | 2.7—5.5 | 4 | 10 | 1 | 9 | √ | AT 90 US B6 46 | |
| AT me ga 16 4P | 16 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 512 | √ | √ | —40—85 | 1.8—5.5 | 1.8—5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 16 4P | |
| AT me ga 32 4P | 32 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 1024 | √ | √ | —40—85 | 1.8—5.5 | 1.8—5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 32 4P | |
| AT me ga 16 5P | 16 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 512 | √ | √ | —40—85 | 1.8—5.5 | 1.8—5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 16 5P | |
| AT me ga 16 9P | 16 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 100 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 512 | √ | √ | —40—85 | 1.8—5.5 | 1.8—5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 16 9P |
| AT me ga 64 4P | 64 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 2048 | √ | √ | —40—85 | 1.8—5.5 | 1.8—5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 64 4P | |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | M a x . f C P U [M H z] | M a x I n t e r f a c e s | E x t e r n a l I n t e r f a c e s | U S B T r a n s - c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | C A N | L I N | S e g m e n t L C D | A D C K a n ä l e | A D C A u f l - ö s u n g [b i t s] | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l - ö s u n g [b i t s] | T e m p . S e n s o r | S R A M [K i B] | E E P R O M [B y t e s] | S e l f P r o g r a m M e m o r y | p i c o P o w e r | T e m p . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | O p e r a t i n g V o l t a g e [V C C] | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | 3 2 k H z R T C | D e v i c e | |
|---------------------------------|--|---|---|---|--|---|--------------------------------------|--|--------------------|-------------|------------------|-------------|-------------|--|---|---|--|---|---|---|---|---|---|---|---|--|---|---|----------------------------|---|--|---|--------------------------------------|----------------------------|---------------------------------|
| AT 90 P W M1 | 8 | 24 | 16 | 8 | 19 | 4 | 0 | — | — | 1 | 0 | 0 | 0 | 0 | 8 | 10 | 12 5 | 2 | 0 | 0 | — | 0.5 | 51 2 | √ | — | —4 0— 10 5 | 2.7 — 5. 5 | 2.7 — 5. 5 | 4 | 12 | 1 | 7 | — | AT 90 P W M1 | |
| AT me ga 32 9P | 32 | 64 | 20 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 10 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | √ | —4 0— 85 | 1.8 — 5. 5 | 1.8 — 5. 5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 9P |
| AT me ga 32 90 P | 32 | 10 0 | 20 | 16 | 69 | 32 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 16 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | √ | —4 0— 85 | 1.8 — 5. 5 | 1.8 — 5. 5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 90 P |
| AT me ga 32 5P | 32 | 64 | 20 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | √ | —4 0— 85 | 1.8 — 5. 5 | 1.8 — 5. 5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 5P |
| AT me ga 32 50 P | 32 | 10 0 | 20 | 16 | 69 | 25 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | √ | —4 0— 85 | 1.8 — 5. 5 | 1.8 — 5. 5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 50 P |
| AT 90 US B8 2 | 8 | 32 | 16 | 12 | 22 | 21 | 1 | ja ^[13] | ja ^[14] | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | — | 0.5 | 51 2 | √ | — | —4 0— 85 | 2.7 — 5. 5 | 2.7 — 5. 5 | 2 | 5 | 1 | 4 | — | AT 90 US B8 2 |
| AT 90 US B1 62 | 16 | 32 | 16 | — | 22 | 21 | 1 | ja ^[13] | ja ^[14] | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | — | 0.5 | 51 2 | √ | — | —4 0— 85 | 2.7 — 5. 5 | 2.7 — 5. 5 | 2 | 5 | 1 | 4 | — | AT 90 US B1 62 |
| AT 90 P W M2 16 | 16 | 24 | 16 | 12 | 19 | 4 | 0 | — | — | 1 | 0 | 1 | 0 | 0 | 0 | 8 | 10 | 12 5 | 2 | 1 | 10 | — | 1 | 51 2 | √ | — | —4 0— 10 5 | 2.7 — 5. 5 | 2.7 — 5. 5 | 4 | 12 | 1 | 7 | — | AT 90 P W M2 16 |

| Device | Flash [KiB] | PinA nza hI | Max .fCPU [MHz] | ofT ouc hK an älle | Max I / O P i n s | Ext I n t e r r u p t s | USBT r a n s c e i v e r | USBS p e e d | USBI n t e r f a c e | SPI | TWI | UART | CAN | LIN | Segment L C D | ADC K a n ä l l e | ADCA u f l - ö s u n g [b i t s] | ADCS p e e d [k s p s] | Ana l o g C o m p a r a t o r s | DACK a n ä l l e | DACA u f l - ö s u n g [b i t s] | Temp . S e n s o r | SRAM [KiB] | EEPROM [Bytes] | SelfP r o g r a m M e m o r y | pic o P o w e r | Temp . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | Opera t i n g V o l t a g e [V C C] | Timers | Output C o m p a r e K a n ä l l e | Input C a p t u r e K a n ä l l e | PWM K a n ä l l e | 32 kHz RTC | Device |
|-------------|-------------|-------------|-----------------|--------------------|-------------------|-------------------------|--------------------------|--------------------|----------------------|-----|-----|------|-----|-----|---------------|-------------------|------------------------------------|--------------------------|---------------------------------|------------------|------------------------------------|--------------------|------------|----------------|-------------------------------|-----------------|------------------------------|-----------------------------------|---------------------------------------|--------|------------------------------------|-----------------------------------|-------------------|------------|-------------|
| AT90PW M316 | 16 | 32 | 16 | 12 | 27 | 4 | 0 | — | — | 1 | 0 | 1 | 0 | 0 | 0 | 11 | 10 | 125 | 3 | 1 | 10 | — | 1 | 512 | √ | — | −40–105 | 2.7–5.5 | 2.7–5.5 | 5 | 16 | 1 | 12 | — | AT90PW M316 |
| Atmega48P | 4 | 32 | 20 | 12 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | √ | 0.5 | 256 | — | √ | −40–85 | 1.8–5.5 | 1.8–5.5 | 3 | 6 | 1 | 6 | √ | Atmega48P |
| Atmega88P | 8 | 32 | 20 | 12 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | √ | 1 | 512 | √ | √ | −40–85 | 1.8–5.5 | 1.8–5.5 | 3 | 6 | 1 | 6 | √ | Atmega88P |
| Atmega168P | 16 | 32 | 20 | 16 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | √ | 1 | 512 | √ | √ | −40–85 | 1.8–5.5 | 1.8–5.5 | 3 | 6 | 1 | 6 | √ | Atmega168P |
| Atmega328P | 32 | 32 | 20 | 16 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | √ | 2 | 1024 | √ | √ | −40–85 | 1.8–5.5 | 1.8–5.5 | 3 | 6 | 1 | 6 | √ | Atmega328P |
| AT90PW M3B | 8 | 32 | 16 | 8 | 27 | 4 | 0 | — | — | 1 | 0 | 1 | 0 | 0 | 0 | 11 | 10 | 125 | 3 | 1 | 10 | — | 0.5 | 512 | √ | — | −40–105 | 2.7–5.5 | 2.7–5.5 | 5 | 16 | 1 | 12 | — | AT90PW M3B |
| AT90PW M2B | 8 | 24 | 16 | 8 | 19 | 4 | 0 | — | — | 1 | 0 | 1 | 0 | 0 | 0 | 8 | 10 | 125 | 2 | 1 | 10 | — | 0.5 | 512 | √ | — | −40–105 | 2.7–5.5 | 2.7–5.5 | 4 | 12 | 1 | 7 | — | AT90PW M2B |
| Atmega32U4 | 32 | 44 | 16 | 14 | 26 | 13 | 1 | ja ^[13] | ja ^[14] | 2 | 1 | 1 | 0 | 0 | 0 | 12 | 10 | 15 | 1 | 0 | 0 | √ | 2.5 | 1024 | √ | — | −40–85 | 2.7–5.5 | 2.7–5.5 | 4 | 12 | 2 | 8 | — | Atmega32U4 |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | M a x . f C P U [M H z] | M a x I n t e r f a c e s | E x t e r n a l I n t e r f a c e s | U S B T r a n s - c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | C A N | L I N | S e g m e n t L C D | A D C K a n ä l e | A D C A u f l - ö s u n g [b i t s] | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l - ö s u n g [b i t s] | T e m p . S e n s o r | S R A M [K i B] | E E P R O M [B y t e s] | S e l f P r o g r a m M e m o r y | p i c o P o w e r | T e m p . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | O p e r a t i n g V o l t a g e [V C C] | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | 3 2 k H z R T C | D e v i c e | |
|---------------------------------|--|---|---|---|--|---|--------------------------------------|--|--------------------|-------------|------------------|-------------|-------------|--|---|---|--|---|---|---|---|---|---|---|---|--|---|---|----------------------------|---|--|---|--------------------------------------|----------------------------|---------------------------------|
| AT me ga 12 84 P | 128 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 16 | 4096 | √ | √ | -40-85 | 1.8-5.5 | 1.8-5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 12 84 P |
| AT me ga 16 U4 | 16 | 44 | 16 | 14 | 26 | 13 | 1 | ja ^[13] | ja ^[14] | 1 | 1 | 0 | 0 | 0 | 12 | 10 | 15 | 1 | 0 | 0 | √ | 1.25 | 512 | √ | — | -40-85 | 2.7-5.5 | 2.7-5.5 | 4 | 12 | 2 | 8 | — | AT me ga 16 U4 | |
| AT me ga 16 A | 16 | 44 | 16 | 16 | 32 | 3 | 0 | — | — | 1 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 512 | √ | — | -40-85 | 2.7-5.5 | 2.7-5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 16 A |
| AT me ga 32 A | 32 | 44 | 16 | 16 | 32 | 3 | 0 | — | — | 1 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 1024 | √ | — | -40-85 | 2.7-5.5 | 2.7-5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 A |
| AT me ga 88 PA | 8 | 32 | 20 | 12 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | √ | 1 | 512 | √ | √ | -40-85 | 1.8-5.5 | 1.8-5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 88 PA |
| AT me ga 32 4P A | 32 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 1024 | √ | √ | -40-85 | 1.8-5.5 | 1.8-5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 32 4P A |
| AT me ga 48 PA | 4 | 32 | 20 | 12 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | √ | 0.5 | 256 | — | √ | -40-85 | 1.8-5.5 | 1.8-5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 48 PA |
| AT me ga 16 4P A | 16 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 512 | √ | √ | -40-85 | 1.8-5.5 | 1.8-5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 16 4P A |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | M a x . f C P U [M H z] | M a x I n t e r f a c e s | E x t e r n a l I n t e r f a c e s | U S B I n t e r f a c e | U S B S p e e d | S P I | T W I | U A R T | C A N | L I N | S e g m e n t L C D | A D C K a n ä l e | A D C A u f l ö s u n g [b i t s] | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l ö s u n g [b i t s] | T e m p . S e n s o r | S R A M [K i B] | E E P R O M [B y t e s] | S e l f P r o g r a m M e m o r y | P i c o P o w e r | T e m p . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | O p e r a t i n g V o l t a g e [V C C] | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | 3 2 k H z R T C | D e v i c e | | |
|---------------------------------|--|---|---|---|--|--|--------------------------------------|--------------------|--------------------|------------------|-------------|-------------|--|---|--|--|---|---|--|---|---|---|---|---|--|---|---|----------------------------|---|--|---|--------------------------------------|----------------------------|---|---------------------------------|
| AT me ga 64 A | 64 | 64 | 16 | 16 | 53 | 8 | 0 | — | — | 1 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | −4 0− 85 | 2.7 − 5.5 | 2.7 − 5.5 | 4 | 8 | 2 | 7 | √ | AT me ga 64 A |
| AT me ga 12 8A | 12 8 | 64 | 16 | 16 | 53 | 8 | 0 | — | — | 1 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 40 96 | √ | — | −4 0− 85 | 2.7 − 5.5 | 2.7 − 5.5 | 4 | 8 | 2 | 7 | √ | AT me ga 12 8A |
| AT me ga 8A | 8 | 32 | 16 | 12 | 23 | 2 | 0 | — | — | 1 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 51 2 | √ | — | −4 0− 85 | 2.7 − 5.5 | 2.7 − 5.5 | 3 | — | — | 3 | √ | AT me ga 8A |
| AT me ga 16 8P A | 16 | 32 | 20 | 16 | 23 | 24 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | √ | 1 | 51 2 | √ | √ | −4 0− 85 | 1.8 − 5.5 | 1.8 − 5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 16 8P A |
| AT me ga 8U 2 | 8 | 32 | 16 | — | 22 | 20 | 1 | ja ^[13] | ja ^[14] | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | — | 0.5 | 51 2 | √ | — | −4 0− 85 | 2.7 − 5.5 | 2.7 − 5.5 | 2 | 5 | 1 | 4 | — | AT me ga 8U 2 |
| AT me ga 16 U2 | 16 | 32 | 16 | 12 | 22 | 21 | 1 | ja ^[13] | ja ^[14] | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | — | 0.5 | 51 2 | √ | — | −4 0− 85 | 2.7 − 5.5 | 2.7 − 5.5 | 2 | 5 | 1 | 4 | — | AT me ga 16 U2 |
| AT me ga 32 U2 | 32 | 32 | 16 | 12 | 22 | 20 | 1 | ja ^[13] | ja ^[14] | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | — | 1 | 10 24 | √ | — | −4 0− 85 | 2.7 − 5.5 | 2.7 − 5.5 | 2 | 5 | 1 | 4 | — | AT me ga 32 U2 |
| AT me ga 64 4P A | 64 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | √ | −4 0− 85 | 1.8 − 5.5 | 1.8 − 5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 64 4P A |
| AT me ga 16 M1 | 16 | 32 | 16 | 12 | 27 | 27 | 0 | — | — | 1 | 0 | 1 | 1 | 1 | 0 | 11 | 10 | 12 5 | 4 | 1 | 10 | √ | 1 | 51 2 | √ | — | −4 0− 85 | 2.7 − 5.5 | 2.7 − 5.5 | 2 | 14 | 1 | 10 | — | AT me ga 16 M1 |

26/34

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | M a x . f C P U [M H z] | M a x I n t e r f a c e s | E x t e r n a l I n t e r f a c e s | U S B T r a n s c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | C A N | L I N | S e g m e n t L C D | A D C K a n ä l e | A D C A u f l - ö s u n g [b i t s] | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l - ö s u n g [b i t s] | T e m p . S e n s o r | S R A M [K i B] | E E P R O M [B y t e s] | S e l f P r o g r a m M e m o r y | p i c o P o w e r | T e m p . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | O p e r a t i n g V o l t a g e [V C C] | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | 3 2 k H z R T C | D e v i c e | |
|---------------------------------|--|---|---|---|--|--|--------------------------------------|--|-------------|-------------|------------------|-------------|-------------|--|---|---|--|---|---|---|---|---|---|---|---|--|---|---|----------------------------|---|--|---|--------------------------------------|----------------------------|---------------------------------|
| AT me ga 64 4A | 64 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 64 4A |
| AT me ga 12 84 | 12 8 | 44 | 20 | 16 | 32 | 32 | 0 | — | — | 3 | 1 | 2 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 16 | 40 96 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 6 | 1 | 6 | √ | AT me ga 12 84 |
| AT 90 P W M8 1 | 8 | 20 | 16 | — | 20 | 3 | 0 | — | — | 1 | 0 | 0 | 0 | 0 | 0 | 11 | 10 | 12 5 | 3 | 1 | 10 | √ | 0.2 5 | 51 2 | √ | — | —4 0— 125 | 2.7 — 5.5 | 2.7 — 5.5 | 1 | 8 | 1 | 6 | — | AT 90 P W M8 1 |
| AT me ga 16 5P A | 16 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 51 2 | √ | √ | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 16 5P A |
| AT me ga 32 5A | 32 | 64 | 20 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 5A |
| AT me ga 32 50 A | 32 | 10 0 | 20 | 16 | 69 | 25 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 50 A |
| AT me ga 64 5A | 64 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 5A |
| AT me ga 64 5P | 64 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | √ | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 5P |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | M a x . f C P U [M H z] | M a x I / O P i n s | E x t I n t e r r u p t s | U S B T r a n s c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | C A N | L I N | S e g m e n t L C D | A D C K a n ä l e | A D C A u f l - ö s u n g [b i t s] | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l - ö s u n g [b i t s] | T e m p . S e n s o r | S R A M [K i B] | E E P R O M [B y t e s] | S e l f P r o g r a m M e m o r y | p i c o P o w e r | T e m p . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | O p e r a t i n g V o l t a g e [V C C] | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | 3 2 k H z R T C | D e v i c e | |
|---------------------------------|--|---|---|--|---|--|--------------------------------------|--|-------------|-------------|------------------|-------------|-------------|--|---|---|--|---|---|---|---|---|---|---|---|--|---|---|----------------------------|---|--|---|--------------------------------------|----------------------------|---------------------------------|
| AT me ga 64 50 P | 64 | 10 0 | 20 | — | 69 | 25 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | √ | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 50 P |
| AT me ga 64 50 A | 64 | 10 0 | 20 | — | 69 | 25 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 50 A |
| AT me ga 16 9A | 16 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 10 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 1 | 51 2 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 16 9A |
| AT me ga 32 9A | 32 | 64 | 20 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 10 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 9A |
| AT me ga 64 9A | 64 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 10 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 9A |
| AT me ga 32 90 A | 32 | 10 0 | 20 | 16 | 69 | 32 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 16 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 90 A |
| AT me ga 64 9P | 64 | 64 | 16 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 10 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | √ | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 9P |
| AT me ga 64 90 A | 64 | 10 0 | 20 | 16 | 69 | 32 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 16 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | — | —4 0— 85 | 1.8 — 5.5 | 1.8 — 5.5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 90 A |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | M a x . f C P U [M H z] | o f T o u c h K a n ä l e | M a x I / O P i n s | E x t I n t e r r u p t s | U S B T r a n s - c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | C A N | L I N | S e g m e n t L C D | A D C K a n ä l e | A D C A u f - l ö s u n g [b i t s] | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f - l ö s u n g [b i t s] | T e m p . S e n s o r | S R A M [K i B] | E P R O M [B y t e s] | S e l f P r o g r a m M e m o r y | p i c o P o w e r | T e m p . B e r e i c h [° C] | I / O S u p p l y C l a s s [V] | O p e r a t i n g V o l t a g e [V C C] | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | 3 2 k H z R T C | D e v i c e |
|---------------------------------|--|---|---|---|--|---|---|--------------------------------------|--|-------------|-------------|------------------|-------------|-------------|--|---|---|--|---|---|---|---|---|--|---|---|--|---|---|----------------------------|---|--|---|--------------------------------------|---------------------------------|
| AT me ga 64 90 P | 64 | 10 0 | 20 | 16 | 69 | 32 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 16 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 4 | 20 48 | √ | √ | -4 0- 85 | 1.8 - 5. 5 | 1.8 - 5. 5 | 3 | 4 | 1 | 4 | √ | AT me ga 64 90 P |
| AT me ga 32 9P A | 32 | 64 | 20 | 16 | 54 | 17 | 0 | — | — | 2 | 1 | 1 | 0 | 0 | 10 0 | 8 | 10 | 15 | 1 | 0 | 0 | — | 2 | 10 24 | √ | √ | -4 0- 85 | 1.8 - 5. 5 | 1.8 - 5. 5 | 3 | 4 | 1 | 4 | √ | AT me ga 32 9P A |

General Features

| | |
|---------------------------|-------------|
| CPU | 8-bit AVR |
| Hardware Qtouch | nein |
| Quadrature Decoder Kanäle | 0 |
| SSC | 0 |
| Ethernet | 0 |
| SD / eMMC | 0 |
| Grafik LCD | nein |
| Video Decoder | nein |
| Kamera Interface | nein |
| Resistive Touch Screen | nein |
| External Bus Interface | 0 |
| DRAM Memory | nein |
| NAND Interface | nein |
| FPU | nein |
| MPU / MMU | nein / nein |
| Crypto Engine | nein |
| Calibrated RC Oscillator | ja |

ATxmega

Device-specific Features

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | A n z a h l T o u c h K a n ä l e | M a x i l / O P i n s | E x t e r n a l I n t e r r u p t s | U S B T r a n s c - e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | S e g m e n t L C D | A D C K a n ä l e | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f - l ö s u n g [b i t s] | S R A M [K i B] | E E P R O M [B y t e s] | E x t e r n a l B u s I n t e r f a c e | D R A M M e m o r y | C r y p t o E n g i n e | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | D e v i c e |
|------------------------------|--|---|---|---|--|---|--------------------------------------|--|-------------|-------------|------------------|--|---|--|---|---|---|---|---|--|--|--|----------------------------|---|--|---|----------------------------|
| ATx me ga6 4A1 | 64 | 100 | 16 | 78 | 78 | 0 | — | — | 12 | 4 | 8 | 0 | 16 | 200 0 | 4 | 4 | 12 | 4 | 204 8 | 1 | ja ^[16] | ja ^[17] | 8 | 24 | 24 | 24 | ATx meg a64 A1 |
| ATx me ga1 28A 1 | 128 | 100 | 16 | 78 | 78 | 0 | — | — | 12 | 4 | 8 | 0 | 16 | 200 0 | 4 | 4 | 12 | 8 | 204 8 | 1 | ja ^[16] | ja ^[17] | 8 | 24 | 24 | 24 | ATx meg a12 8A1 |
| ATx me ga6 4A3 | 64 | 64 | 16 | 50 | 50 | 0 | — | — | 10 | 2 | 7 | 0 | 16 | 200 0 | 4 | 2 | 12 | 4 | 204 8 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a64 A3 |
| ATx me ga1 28A 3 | 128 | 64 | 16 | 50 | 50 | 0 | — | — | 10 | 2 | 7 | 0 | 16 | 200 0 | 4 | 2 | 12 | 8 | 204 8 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a12 8A3 |
| ATx me ga1 92A 3 | 192 | 64 | 16 | 50 | 50 | 0 | — | — | 10 | 2 | 7 | 0 | 16 | 200 0 | 4 | 2 | 12 | 16 | 204 8 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a19 2A3 |
| ATx me ga2 56A 3 | 256 | 64 | 16 | 50 | 50 | 0 | — | — | 10 | 2 | 7 | 0 | 16 | 200 0 | 4 | 2 | 12 | 16 | 409 6 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a25 6A3 |
| ATx me ga1 6A4 | 16 | 44 | 16 | 34 | 34 | 0 | — | — | 7 | 2 | 5 | 0 | 12 | 200 0 | 2 | 2 | 12 | 3.3 | 102 4 | 0 | — | ja ^[17] | 5 | 16 | 16 | 16 | ATx meg a16 A4 |
| ATx me ga3 2A4 | 32 | 44 | 16 | 34 | 34 | 0 | — | — | 7 | 2 | 5 | 0 | 12 | 200 0 | 2 | 2 | 12 | 4 | 102 4 | 0 | — | ja ^[17] | 5 | 16 | 16 | 16 | ATx meg a32 A4 |
| ATx me ga6 4A4 | 64 | 44 | — | 34 | 34 | 0 | — | — | 7 | 2 | 5 | 0 | 12 | 200 0 | 2 | 2 | 12 | 4 | 204 8 | 0 | — | ja ^[17] | 5 | 16 | 16 | 16 | ATx meg a64 A4 |
| ATx me ga1 28A 4 | 128 | 44 | — | 34 | 34 | 0 | — | — | 7 | 2 | 5 | 0 | 12 | 200 0 | 2 | 2 | 12 | 8 | 204 8 | 0 | — | ja ^[17] | 5 | 16 | 16 | 16 | ATx meg a12 8A4 |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | A n z a h l T o u c h K a n ä l e | M a x i l / O P i n s | E x t e r n e r u p t s | U S B T r a n s c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P i | T W l | U A R T | S e g m e n t L C D | A D C K a n ä l e | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l ö s u n g [b i t s] | S R A M [K i B] | E E P R O M [B y t e s] | E x t e r n a l B u s I n t e r f a c e | D R A M M e m o r y | C r y p t o E n g i n e | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | D e v i c e |
|-------------------------------|--|---|---|---|--|--|--------------------------------------|--|-------------|-------------|------------------|--|---|--|---|---|--|---|---|--|--|--|----------------------------|---|--|---|-------------------------------|
| ATx me ga2 56A 3B | 256 | 64 | 16 | 47 | 49 | 0 | — | — | 8 | 2 | 6 | 0 | 16 | 200 0 | 4 | 2 | 12 | 16 | 409 6 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a25 6A3 B |
| ATx me ga2 56D 3 | 256 | 64 | 16 | 50 | 50 | 0 | — | — | 5 | 2 | 3 | 0 | 16 | 200 | 2 | 0 | 0 | 16 | 409 6 | 0 | — | — | 5 | 18 | 18 | 18 | ATx meg a25 6D3 |
| ATx me ga1 92D 3 | 192 | 64 | 16 | 50 | 50 | 0 | — | — | 5 | 2 | 3 | 0 | 16 | 200 | 2 | 0 | 0 | 16 | 204 8 | 0 | — | — | 5 | 18 | 18 | 18 | ATx meg a19 2D3 |
| ATx me ga1 28D 3 | 128 | 64 | 16 | 50 | 50 | 0 | — | — | 5 | 2 | 3 | 0 | 16 | 200 | 2 | 0 | 0 | 8 | 204 8 | 0 | — | — | 5 | 18 | 18 | 18 | ATx meg a12 8D3 |
| ATx me ga6 4D3 | 64 | 64 | 16 | 50 | 50 | 0 | — | — | 5 | 2 | 3 | 0 | 16 | 200 | 2 | 0 | 0 | 4 | 204 8 | 0 | — | — | 5 | 18 | 18 | 18 | ATx meg a64 D3 |
| ATx me ga1 28D 4 | 128 | 44 | — | 34 | 34 | 0 | — | — | 4 | 2 | 2 | 0 | 12 | 200 | 2 | 0 | 0 | 8 | 204 8 | 0 | — | — | 4 | 14 | 14 | 14 | ATx meg a12 8D4 |
| ATx me ga6 4D4 | 64 | 44 | — | 34 | 34 | 0 | — | — | 4 | 2 | 2 | 0 | 12 | 200 | 2 | 0 | 0 | 4 | 204 8 | 0 | — | — | 4 | 14 | 14 | 14 | ATx meg a64 D4 |
| ATx me ga3 2D4 | 32 | 44 | 16 | 34 | 34 | 0 | — | — | 4 | 2 | 2 | 0 | 12 | 200 | 2 | 0 | 0 | 4 | 102 4 | 0 | — | — | 4 | 14 | 14 | 14 | ATx meg a32 D4 |
| ATx me ga1 6D4 | 16 | 44 | 16 | 34 | 34 | 0 | — | — | 4 | 2 | 2 | 0 | 12 | 200 | 2 | 0 | 0 | 2 | 102 4 | 0 | — | — | 4 | 14 | 14 | 14 | ATx meg a16 D4 |
| ATx me ga1 6A4 U | 16 | 44 | 16 | 34 | 34 | 1 | ja ^[13] | ja ^[14] | 7 | 2 | 5 | 0 | 12 | 200 0 | 2 | 2 | 12 | 3.3 | 102 4 | 0 | — | ja ^[17] | 5 | 16 | 16 | 16 | ATx meg a16 A4U |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | A n z a h l T o u c h K a n ä l e | M a x i l / O P i n s | E x t e r n e r r u p t s | U S B T r a n s c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P i | T W l | U A R T | S e g m e n t L C D | A D C K a n ä l e | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l ö s u n g [b i t s] | S R A M [K i B] | E E P R O M [B y t e s] | E x t e r n a l B u s I n t e r f a c e | D R A M M e m o r y | C r y p t o E n g i n e | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | D e v i c e |
|------------------------------------|--|---|---|---|---|--|--------------------------------------|--|-------------|-------------|------------------|--|---|--|---|---|--|---|---|--|--|--|----------------------------|---|--|---|--------------------------------|
| ATx me ga3 2A4 U | 32 | 44 | 16 | 34 | 34 | 1 | ja ^[13] | ja ^[14] | 7 | 2 | 5 | 0 | 12 | 200 0 | 2 | 2 | 12 | 4 | 102 4 | 0 | — | ja ^[17] | 5 | 16 | 16 | 16 | ATx meg a32 A4U |
| ATx me ga6 4A3 U | 64 | 64 | 16 | 50 | 50 | 1 | ja ^[13] | ja ^[14] | 10 | 2 | 7 | 0 | 16 | 200 0 | 4 | 2 | 12 | 4 | 204 8 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a64 A3U |
| ATx me ga1 28A 3U | 128 | 64 | 16 | 50 | 50 | 1 | ja ^[13] | ja ^[14] | 10 | 2 | 7 | 0 | 16 | 200 0 | 4 | 2 | 12 | 8 | 204 8 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a12 8A3 U |
| ATx me ga1 92A 3U | 192 | 64 | 16 | 50 | 50 | 1 | ja ^[13] | ja ^[14] | 10 | 2 | 7 | 0 | 16 | 200 0 | 4 | 2 | 12 | 16 | 204 8 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a19 2A3 U |
| ATx me ga2 56A 3U | 256 | 64 | 16 | 50 | 50 | 1 | ja ^[13] | ja ^[14] | 10 | 2 | 7 | 0 | 16 | 200 0 | 4 | 2 | 12 | 16 | 409 6 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a25 6A3 U |
| ATx me ga2 56A 3B U | 256 | 64 | 16 | 47 | 49 | 1 | ja ^[13] | ja ^[14] | 8 | 2 | 6 | 0 | 16 | 200 0 | 4 | 2 | 12 | 16 | 409 6 | 0 | — | ja ^[17] | 7 | 22 | 22 | 22 | ATx meg a25 6A3 BU |
| ATx me ga6 4B3 | 64 | 64 | 16 | 36 | 36 | 1 | ja ^[13] | ja ^[14] | 2 | 1 | 1 | 100 | 8 | 200 0 | 2 | 0 | 0 | 4 | 204 8 | 0 | — | ja ^[17] | 2 | 6 | 6 | 6 | ATx meg a64 B3 |
| ATx me ga1 28B 3 | 128 | 64 | 16 | 36 | 36 | 1 | ja ^[13] | ja ^[14] | 2 | 1 | 1 | 100 | 8 | 200 0 | 2 | 0 | 0 | 4 | 204 8 | 0 | — | ja ^[17] | 2 | 6 | 6 | 6 | ATx meg a12 8B3 |
| ATx me ga1 28B 1 | 128 | 100 | 16 | 53 | 53 | 1 | ja ^[13] | ja ^[14] | 3 | 1 | 2 | 160 | 16 | 200 0 | 4 | 0 | 0 | 8 | 204 8 | 0 | — | ja ^[17] | 3 | 10 | 10 | 10 | ATx meg a12 8B1 |

| D e v i c e | F l a s h [K i B] | P i n A n z a h l | A n z a h l T o u c h K a n ä l e | M a x i / O P i n s | E x t e r n e r u p t s | U S B T r a n s c e i v e r | U S B S p e e d | U S B I n t e r f a c e | S P I | T W I | U A R T | S e g m e n t L C D | A D C K a n ä l e | A D C S p e e d [k s p s] | A n a l o g C o m p a r a t o r s | D A C K a n ä l e | D A C A u f l ö s u n g [b i t s] | S R A M [K i B] | E E P R O M [B y t e s] | E x t e r n a l B u s I n t e r f a c e | D R A M M e m o r y | C r y p t o E n g i n e | T i m e r s | O u t p u t C o m p a r e K a n ä l e | I n p u t C a p t u r e K a n ä l e | P W M K a n ä l e | D e v i c e |
|----------------------------|--|---|---|--|--|--|--------------------------------------|--|-------------|-------------|------------------|--|---|--|---|---|--|---|---|--|--|--|----------------------------|---|--|---|----------------------------|
| ATx me ga6 4B1 | 64 | 100 | 16 | 53 | 53 | 1 | ja ^[13] | ja ^[14] | 3 | 1 | 2 | 160 | 16 | 200 0 | 4 | 0 | 0 | 8 | 204 8 | 0 | — | ja ^[17] | 3 | 10 | 10 | 10 | ATx meg a64 B1 |

General Features

| | |
|---|-------------|
| Max. f_{CPU} [MHz] | 32 |
| CPU | 8-bit AVR |
| Hardware Qtouch | nein |
| Quadrature Decoder Kanäle | 0 |
| CAN | 0 |
| LIN | 0 |
| SSC | 0 |
| Ethernet | 0 |
| SD / eMMC | 0 |
| Grafik LCD | nein |
| Video Decoder | nein |
| Kamera Interface | nein |
| ADC Auflösung [bits] | 12 |
| Resistive Touch Screen | nein |
| Temp. Sensor | ja |
| Self Program Memory | ja |
| NAND Interface | nein |
| picoPower | ja |
| Temp. Bereich [°C] | −40 – 85 |
| I/O Supply Class [V] | 1.6 – 3.6 |
| Operating Voltage [V_{CC}] | 1.6 – 3.6 |
| FPU | nein |
| MPU / MMU | nein / nein |
| 32kHz RTC | ja |
| Calibrated RC Oscillator | ja |

Referenzen

1. veraltet → ATtiny2313
2. veraltet → ATtiny25/45/85
3. veraltet → ATtiny25/45/85
4. veraltet → ATmega16/162/32/644
5. Timer-PWM
6. 150kHz 8bit
7. +USI
8. USI
9. USART
10. Master/Slave
11. Geliefert im ATmega103-Modus. Fuse ändern!
12. beim 644P
13. Full Speed
14. Device
15. Device + OTG
16. SDRAM
17. AES/DES

Weblinks

- Vergleichstabelle von AVRFreaks
- Parametrische Suche bei Atmel

Kategorien: [AVR](#) | [Liste mit Bauteilen](#)