



Welcome to [E-XFL.COM](https://www.e-xfl.com)

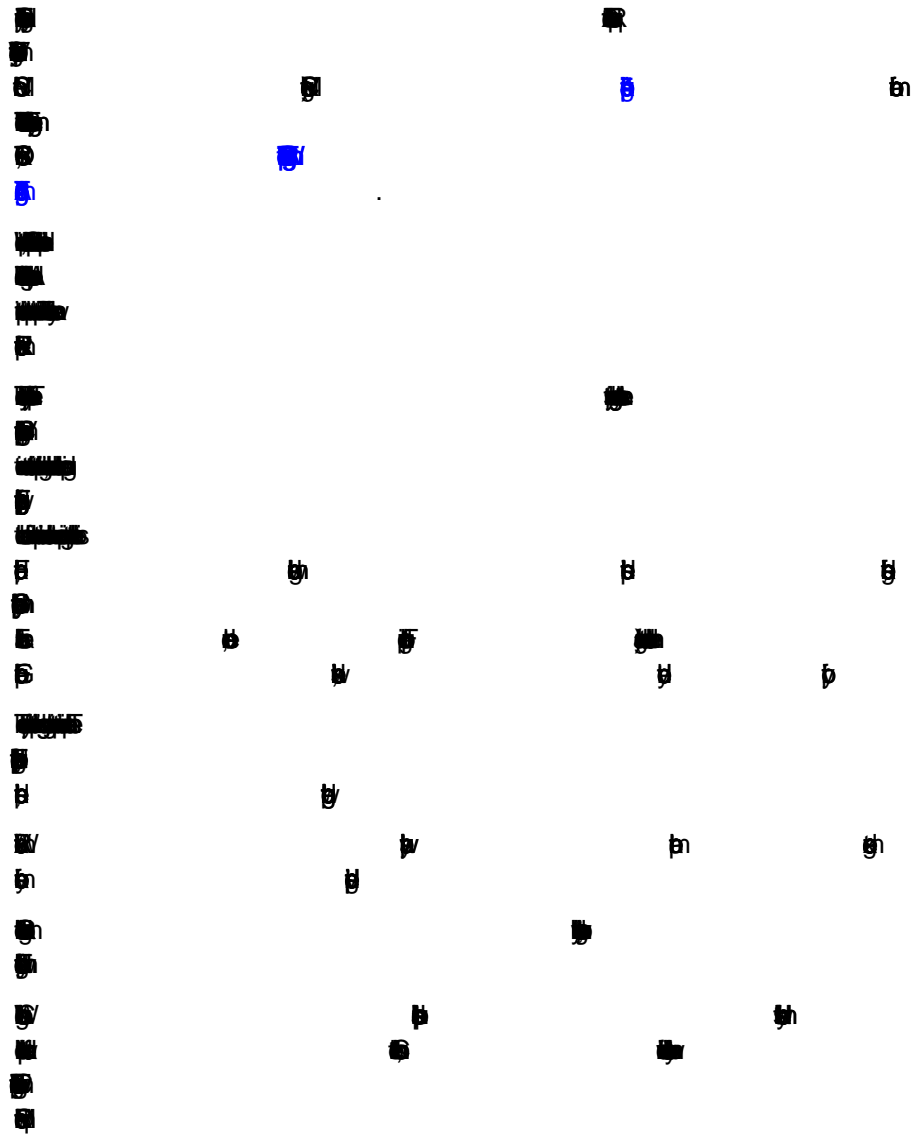
What is "[Embedded - Microcontrollers](#)"?

"[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

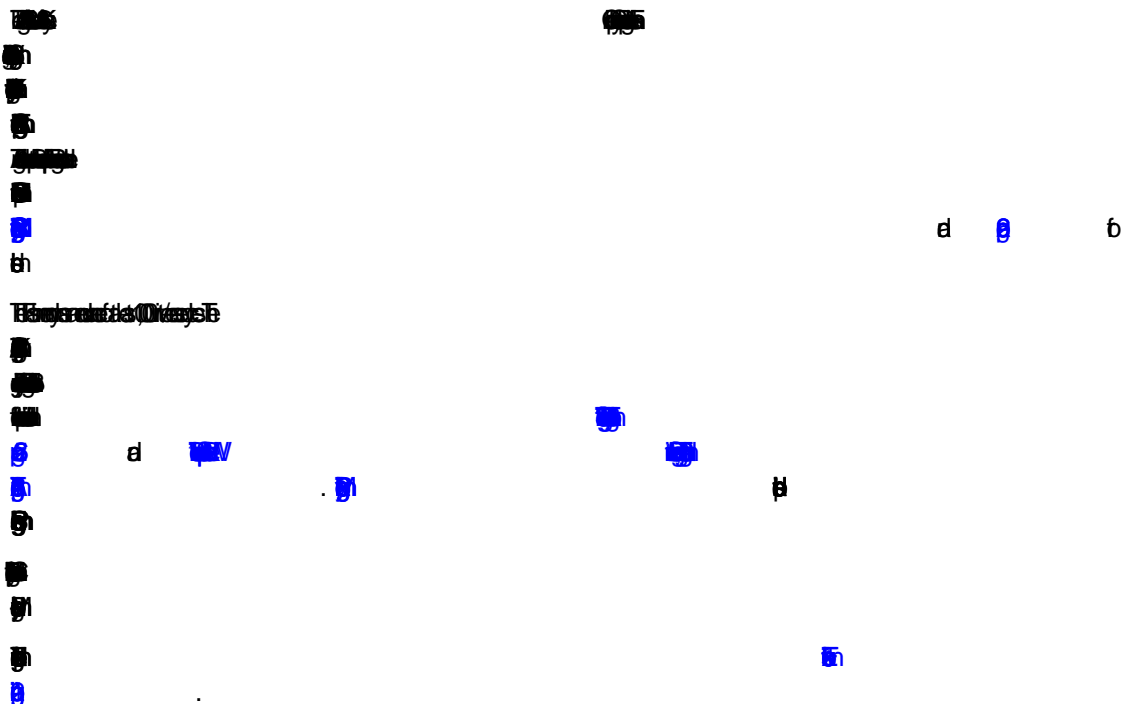
Product Status	Obsolete
Core Processor	AVR
Core Size	8-Bit
Speed	10MHz
Connectivity	I ² C, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, POR, PWM, WDT
Number of I/O	23
Program Memory Size	16KB (8K x 16)
Program Memory Type	FLASH
EEPROM Size	512 x 8
RAM Size	1K x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 5.5V
Data Converters	A/D 8x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	32-VFQFN Exposed Pad
Supplier Device Package	32-VQFN (5x5)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/atmega168v-10mi

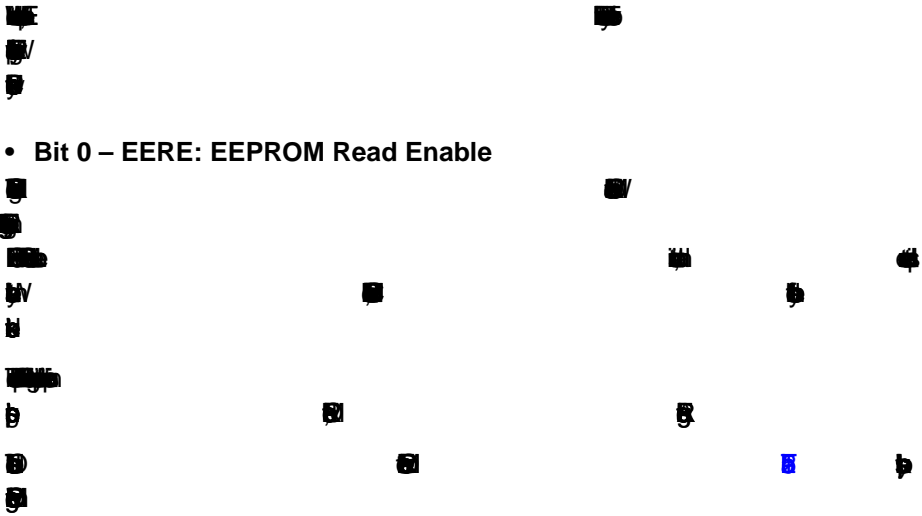


5. AVR ATmega48/88/168 Memories





5.1 In-System Reprogrammable Flash Program Memory






- Bit 0 – EERE: EEPROM Read Enable

Table 5-2. 

Symbol	Number of Calibrated RC Oscillator Cycles	Typ Programming Time
	8	8h

Typical Programming Time
The typical programming time is the time required to program the device. It is the time from the start of the programming sequence to the end of the programming sequence. The typical programming time is 8h.





AVR

168

6



	<pre> EEPROM_read: ; Wait for completion of previous write sbic EECR,EEPE rjmp EEPROM_read ; Set up address (r18:r17) in address register out EEARH, r18 out EEARL, r17 ; Start eeprom read by writing EERE sbi EECR,EERE ; Read data from Data Register in r16,EEDR ret </pre>
	<pre> unsigned char EEPROM_read(unsigned int uiAddress) { /* Wait for completion of previous write */ while(EECR & (1<<EEPE)) ; /* Set up address register */ EEAR = uiAddress; /* Start eeprom read by writing EERE */ EECR = (1<<EERE); /* Return data from Data Register */ return EEDR; } </pre>

5.3.5 Preventing EEPROM Corruption



























AVR





















AVR

6.1.4 Asynchronous Timer Clock – clk_{ASY}



6.1.5 ADC Clock – clk_{ADC}



6.2 Clock Sources

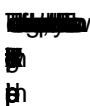
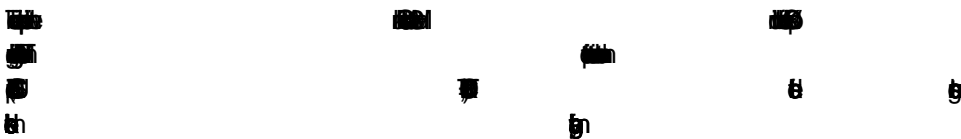


Table 6-1.

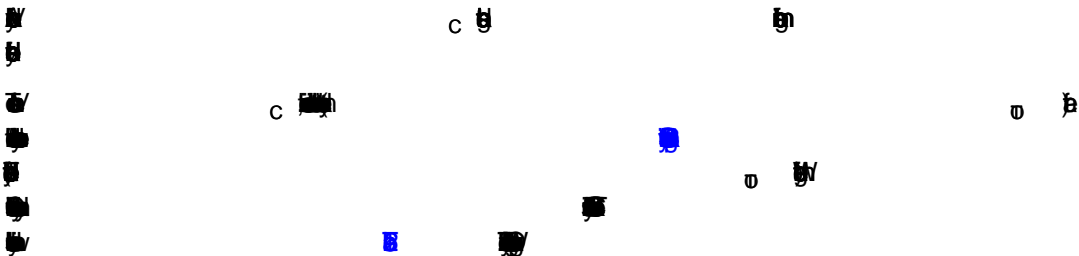
Device Clocking Option	CKSEL3..0
0	
0	
0	
0	
0	
0	0
0	0

0 1

6.2.1 Default Clock Source



6.2.2 Clock Startup Sequence



2

43

12



- Training**



Table 9-5.

BOOTRST	IVSEL	Reset Address	Interrupt Vectors Start Address
1	0	0	
1	1	0	
0	0	0	
0	1	0	

1

1

Address	Labels	Code	Comments
0x0000	jmp	RESET	; Reset Handler
0x0002	jmp	EXT_INT0	; IRQ0 Handler
0x0004	jmp	EXT_INT1	; IRQ1 Handler
0x0006	jmp	PCINT0	; PCINT0 Handler
0x0008	jmp	PCINT1	; PCINT1 Handler
0x000A	jmp	PCINT2	; PCINT2 Handler
0x000C	jmp	WDT	; Watchdog Timer Handler
0x000E	jmp	TIM2_COMPA	; Timer2 Compare A Handler
0x0010	jmp	TIM2_COMPB	; Timer2 Compare B Handler
0x0012	jmp	TIM2_OVF	; Timer2 Overflow Handler
0x0014	jmp	TIM1_CAPT	; Timer1 Capture Handler
0x0016	jmp	TIM1_COMPA	; Timer1 Compare A Handler
0x0018	jmp	TIM1_COMPB	; Timer1 Compare B Handler
0x001A	jmp	TIM1_OVF	; Timer1 Overflow Handler
0x001C	jmp	TIM0_COMPA	; Timer0 Compare A Handler
0x001E	jmp	TIM0_COMPB	; Timer0 Compare B Handler
0x0020	jmp	TIM0_OVF	; Timer0 Overflow Handler
0x0022	jmp	SPI_STC	; SPI Transfer Complete Handler
0x0024	jmp	USART_RXC	; USART, RX Complete Handler
0x0026	jmp	USART_UDRE	; USART, UDR Empty Handler
0x0028	jmp	USART_TXC	; USART, TX Complete Handler
0x002A	jmp	ADC	; ADC Conversion Complete Handler
0x002C	jmp	EE_RDY	; EEPROM Ready Handler
0x002E	jmp	ANA_COMP	; Analog Comparator Handler
0x0030	jmp	TWI	; 2-wire Serial Interface Handler
0x0032	jmp	SPM_RDY	; Store Program Memory Ready Handler

ॐ



1

YFOT

O

1



f

4

0 =

10

12

TABLE 1



Figure 3

11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847

1



10-11-2014

10

1



100

| Address | Name | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | Page |
|---------|----------|-------|----------|----------|----------|----------|----------|----------|----------|------|
| 0000 | | — | — | — | — | — | 0000 | 0000 | | |
| 0001 | | — | — | — | — | — | — | — | — | |
| 0002 | | — | — | — | — | — | — | — | — | |
| 0003 | | — | — | — | — | — | — | — | — | |
| 0004 | | — | — | — | — | — | 0000 | 0000 | 0000 | 0000 |
| 0005 | | — | — | — | — | — | 0000 | 0000 | 0000 | 0000 |
| 0006 | | — | — | — | — | — | 0000 | 0000 | | |
| 0007 | | — | — | — | — | — | — | — | — | |
| 0008 | | — | — | — | — | — | — | — | — | |
| 0009 | | — | — | — | — | — | — | — | — | |
| 000A | | — | — | — | — | — | — | — | — | |
| 000B | | — | — | — | — | — | — | — | — | |
| 000C | | — | — | — | — | — | — | — | — | |
| 000D | | — | — | — | — | — | — | — | — | |
| 000E | | — | — | — | — | — | — | — | — | |
| 000F | | — | — | — | — | — | — | — | — | |
| 0010 | | — | — | — | — | — | — | — | — | |
| 0011 | | — | — | — | — | — | — | — | — | |
| 0012 | 00120000 | 0000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | |
| 0013 | 00130000 | 0000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | |
| 0014 | 00140000 | P | | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | |
| 0015 | | — | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | |
| 0016 | | — | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | |
| 0017 | | — | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | |
| 0018 | 00180000 | 0000 | | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | |
| 0019 | 00190000 | 0000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | |
| 001A | | — | — | — | — | — | — | — | — | |
| 001B | | — | — | — | — | — | — | — | — | |
| 001C | | — | — | — | — | — | — | — | — | |

1. 1.

S

2 3 4 5



29. Instruction Set Summary

[illegible]