

## 80C51 microcontroller family features guide

## Memory from 12K to 64K

| Prefix           | Part Number<br>ROM/ROMless/<br>OTP/Flash | Memory     |                 |             | New and<br>Improved<br>(Note 6) | Counter  |          |          |          | I/O<br>Pins | Serial<br>Interfaces       | Comments/<br>Special Features   |
|------------------|--|------------|-----------------|-------------|---------------------------------|----------|----------|----------|----------|-------------|----------------------------|---|
|                  |  | ROM        | EPROM/<br>FLASH | RAM         |                                 | #        | PWM      | PCA      | WD       |             |                            |   |
| P                | 83C145                                   | 12K        |                 | 256         |                                 | 2        | Y        | N        | N        | 28          | -                          | On-Screen Display, 9 PWM outputs,<br>3 software A/D inputs                |
| P                | 83CL887/87CL887                          | 12K        | 12K             | 256         |                                 | 3        | N        | N        | Y        | 18          | UART                       | 1.8V-3.6V operation,<br>low voltage detection                             |
| P                | 83C055                                   | 16K        |                 | 256         |                                 | 2        | Y        | N        | N        | 28          | -                          | On-Screen Display, 9 PWM outputs<br>3 software A/D inputs                 |
| P                | 87C055                                   |            | 16K             | 256         |                                 | 2        | Y        | N        | N        | 28          | -                          | (see above)   |
| P                | 83C180                                   | 16K        | 16K             | 512         |                                 |          |          |          |          |             |                            | DDC interface for monitors,<br>auto sync detection and sync processor     |
| <i>P</i>         | <i>80C54</i>                             | <i>16K</i> |                 | <i>256</i>  | <i>Y</i>                        | <i>3</i> | <i>N</i> | <i>N</i> | <i>N</i> | <i>32</i>   | <i>UART</i>                | <i>Standard; 80C51 compatible</i>   |
| <i>P</i>         | <i>87C54</i>                             |            | <i>16K</i>      | <i>256</i>  | <i>Y</i>                        | <i>3</i> | <i>N</i> | <i>N</i> | <i>N</i> | <i>32</i>   | <i>UART</i>                | <i>Standard; 87C51 compatible</i>   |
| P                | 89C138                                   |            | 16K             | 256         |                                 | 3        | N        | N        | N        | 32          | UART                       | Reduced EMI, Hdw. Watchdog timer  |
| P                | 83C654/80C654                            | 16K        |                 | 256         |                                 | 2        | N        | N        | N        | 32          | UART, I <sup>2</sup> C     | 80C51 pin-compatible  |
| S                | 87C654                                   |            | 16K             | 256         |                                 | 2        | N        | N        | N        | 32          | UART, I <sup>2</sup> C     | 80C51 pin-compatible  |
| P                | 83CL791                                  | 16K        |                 | 256         |                                 | 3        | N        | N        | N        | 32          | UART, I <sup>2</sup> C     | Low voltage (1.8V-6V), low power  |
| P                | 83CL782                                  | 16K        |                 | 256         |                                 | 3        | N        | N        | N        | 32          | UART, I <sup>2</sup> C     | 83CL781 optimized 12MHz @ 3.1V  |
| <i>P</i>         | <i>83C51FB</i>                           | <i>16K</i> |                 | <i>256</i>  | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>Enhanced UART, 3 timers + PCA</i>                                      |
| <i>P</i>         | <i>87C51FB</i>                           |            | <i>16K</i>      | <i>256</i>  | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>Enhanced UART, 3 timers + PCA</i>                                      |
| P                | 83C524                                   | 16K        |                 | 512         |                                 | 3        | N        | N        | Y        | 32          | UART, I <sup>2</sup> C-bit | 512 RAM   |
| P                | 87C52                                    |            | 16K             | 512         |                                 | 3        | N        | N        | Y        | 32          | UART, I <sup>2</sup> C-bit | 512 RAM   |
| <i>P</i>         | <i>83C51RB+</i>                          | <i>16K</i> |                 | <i>512</i>  | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>Extended RAM (512 bytes),<br/>2.7V-5.5V versions</i>                   |
| <i>P</i>         | <i>89C51RB+/87C51RB+</i>                 |            | <i>16K</i>      | <i>512</i>  | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>(see above) (FLASH-5V only)</i>  |
| P                | 83CL886/87CL886                          | 16K        | 16K             | 512         |                                 | 3        | N        | N        | Y        | 18          | UART                       | 1.8V-3.6V operation,<br>low voltage detection                             |
| P                | 83C592/80C592/<br>87C592                 | 16K        | 16K             | 512         |                                 | 3        | N        | N        | Y        | 48          | UART, CAN                  | CAN bus controller, 8-10-bit A/D,<br>2 PWM outputs, Capture/Compare timer |
| P                | 83C280                                   | 24K        |                 | 512         |                                 |          |          |          |          |             |                            | DDC interface for monitors,<br>auto sync detection and sync processor     |
| P                | 83C380                                   | 32K        |                 | 512         |                                 |          | Y        |          |          |             |                            | DDC interface for monitors,<br>auto sync detection and sync processor     |
| <i>P</i>         | <i>80C58</i>                             | <i>32K</i> |                 | <i>256</i>  | <i>Y</i>                        | <i>3</i> | <i>N</i> | <i>N</i> | <i>N</i> | <i>32</i>   | <i>UART</i>                | <i>Standard; 80C51 compatible</i>   |
| <i>P</i>         | <i>87C58</i>                             |            | <i>32K</i>      | <i>256</i>  | <i>Y</i>                        | <i>3</i> | <i>N</i> | <i>N</i> | <i>N</i> | <i>32</i>   | <i>UART</i>                | <i>Standard; 87C51 compatible</i>   |
| <i>P</i>         | <i>83C51FC</i>                           | <i>32K</i> |                 | <i>256</i>  | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>Enhanced UART, 3 timers + PCA</i>                                      |
| <i>P</i>         | <i>87C51FC</i>                           |            | <i>32K</i>      | <i>256</i>  | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>Enhanced UART, 3 timers + PCA</i>                                      |
| P                | 83C528/80C528                            | 32K        |                 | 512         |                                 | 3        | N        | N        | Y        | 32          | UART, I <sup>2</sup> C-bit | Large memory for high level languages                                     |
| P                | 87C528                                   |            | 32K             | 512         |                                 | 3        | N        | N        | Y        | 32          | UART, I <sup>2</sup> C-bit | Large memory for high level languages                                     |
| P                | 83CE528                                  | 32K        |                 | 512         |                                 | 3        | N        | N        | Y        | 32          | UART, I <sup>2</sup> C-bit | 8XC528 with Reduced EMI   |
| <i>P</i>         | <i>83C51RC+</i>                          | <i>32K</i> |                 | <i>512</i>  | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>Extended RAM (512 bytes),<br/>2.7V-5.5V versions</i>                   |
| <i>P</i>         | <i>89C51RC+/87C51RC+</i>                 |            | <i>32K</i>      | <i>512</i>  | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>(see above) (FLASH-5V only)</i>  |
| P                | 89C238                                   |            | 32K             | 256         |                                 | 3        | N        | N        | Y        | 32          | UART                       | Reduced EMI, Hdw. Watchdog timer  |
| P                | 83CE598/80CE598/<br>89CE598              | 32K        | 32K             | 512         |                                 | 3        | Y        | N        | Y        | 48          | UART, CAN                  | CAN bus controller, 8-10-bit A/D,<br>2 PWM outputs, WD, T2, Reduced EMI   |
| P                | 83CE558/80CE558/<br>89CE558              | 32K        | 32K             | 1024        |                                 | 3        | Y        | N        | Y        | 48          | UART, I <sup>2</sup> C     | Low EMI, 8 Channel 10-bit A/D,<br>2 PWM outputs, Capture/Compare Timer    |
| P                | 89C738                                   | 64K        |                 | 512         |                                 | 3        | N        | N        | N        | 32          | UART                       | Open Collector outputs  |
| <i>P</i>         | <i>83C51RD+</i>                          |            | <i>64K</i>      | <i>1024</i> | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>Extended RAM (1K), 2.7V-5.5V versions</i>                              |
| <i>P</i>         | <i>89C51RD+/87C51RD+</i>                 |            | <i>64K</i>      | <i>1024</i> | <i>Y</i>                        | <i>4</i> | <i>Y</i> | <i>Y</i> | <i>Y</i> | <i>32</i>   | <i>UART</i>                | <i>(see above) (FLASH-5V only)</i>  |
| P                | 87CL881                                  |            | 64K             | 2048        |                                 | 3        | Y        | N        | Y        | 32          | UART                       | 1.8V-3.6V operation,<br>low voltage detection                             |
| <b>XA Family</b> |  |            |                 |             |                                 |          |          |          |          |             |                            |   |
| P                | 51XAG30/G37/G33                          | 32K        | 32K             | 512         |                                 | 3        | N        | N        | Y        | 32          | 2 UARTs                    | 2.7V-5.5V operation, 16-bit XA core,<br>compatible with 80C51             |
| P                | 51XAS3                                   |            | 32K             | 1024        |                                 | 4        | Y        | Y        | Y        | 50          | 2 UARTs, I <sup>2</sup> C  | 16M byte address range,<br>2.7V-5.5V operation, 8-bit DAC                 |

## NOTES:

Part number prefixes are noted in the first column.

All combinations of part type, speed, temperature and package may not be available.

Parts in *italics bold* are 51plus microcontrollers.

# 80C51 microcontroller family features guide

## Memory from 12K to 64K (continued)

| Part Number<br>ROM/ROMless/<br>OTP/Flash | A/D<br>Bits | Channels | External<br>Interrupt | Program<br>Security? | Clock<br>Freq.<br>(MHz) | Temperature Range ( °C) |            |             | Package                          |            |                |
|--|-------------|----------|-----------------------|----------------------|-------------------------|-------------------------|------------|-------------|----------------------------------|------------|----------------|
|  |             |          |                       |                      |                         | 0 to +70                | -40 to +85 | -55 to +125 | PDIP                             | PLCC       | PQFP/<br>Other |
| 83C145                                   | T           |          | 2                     | N                    | 3.5 to 20               | X                       |            |             | NB42                             |            |                |
| 83CL887/<br>87CL887                      | T           |          | 8                     | N                    | 3.58                    | -25 to +70              |            |             |                                  |            | SO28           |
| 83C055                                   | T           |          | 2                     | N                    | 3.5 to 20               | X                       |            |             | NB42                             |            |                |
| 87C055                                   | T           |          | 2                     | N                    | 3.5 to 20               | X                       |            |             | NB42                             |            |                |
| 83C180                                   | T           |          |                       |                      | 16                      |                         | -25 to +85 |             | NB42                             |            |                |
| <b>80C54</b>                             | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| <b>87C54</b>                             | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| 89C138                                   | T           |          | 3                     | Y                    | 3.5 to 40               | X                       |            |             | NB42                             | A44        | B44            |
| 83C654/80C654                            | H           |          | 2                     | Y                    | 3.5 to 24               | X                       | X          | -40 to +125 | R42, N40                         | A44        | B44            |
| 87C654                                   | S           |          | 2                     | Y                    | 3.5 to 20               | X                       | X          |             | N40                              | A44        | B44            |
| 83CL781                                  | Z           |          | 10                    | N                    | 0 to 12 (1)             |                         | X          |             | N40                              |            | B44            |
| 83CL782                                  | Z           |          | 10                    | N                    | 0 to 12 (1)             |                         |            | -25 to +55  | N40                              |            | B44            |
| <b>83C51FB</b>                           | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| <b>87C51FB</b>                           | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| 83C524                                   | H           |          | 2                     | Y                    | 3.5 to 24               | X                       | X          |             | N40                              | A44        | B44            |
| 87C524                                   | S           |          | 2                     | Y                    | 3.5 to 16               | X                       | X          |             | N40                              | A44        | B44            |
| <b>83C51RB+</b>                          | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| <b>89C51RB+87C51RB+</b>                  | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| 83CL886/87CL886                          | Z           |          | 8                     |                      |                         |                         |            |             |                                  |            |                |
| 83C592/80C592/<br>87C592                 | H           | 10       | 8                     | 6                    | Y                       | 1.2 to 16               |            | X           | -40 to +125                      |            | A68            |
| 83C280                                   | T           |          |                       |                      | 16                      |                         | -25 to +85 |             | NB42                             |            |                |
| 83C380                                   | T           |          |                       |                      | 16                      |                         | -25 to +85 |             | NB42                             |            |                |
| <b>80C58</b>                             | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| <b>87C58</b>                             | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| <b>83C51FC</b>                           | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| <b>87C51FC</b>                           | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| 83C528/80C528                            | H           |          | 2                     | Y                    | 3.5 to 16               | X                       | X          | -40 to +125 | N40, R42                         | A14        | B44            |
| 87C528                                   | S           |          | 2                     | Y                    | 3.5 to 16               | X                       | X          |             | N40                              | A14        | B44            |
| 83CE528                                  | H           |          | 2                     | Y                    | 3.5 to 16               |                         | X          |             |                                  | A14        | B44            |
| <b>83C51RC+</b>                          | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| <b>89C51RC+87C51RC+</b>                  | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| 89C238                                   | T           |          | 3                     | Y                    | 3.5 to 40               | X                       |            |             | NB42                             | A44        | B44            |
| 83CE598/80CE598<br>89CE598               | H           | 10       | 8                     | 6                    | Y                       | 1.2 to 16               |            | X           | -40 to +125                      |            | B80            |
| 83CE558/80CE558<br>89CE558               | T           | 10       | 8                     | 2                    | Y                       | 1.2 to 16               | X          | X           | -40 to +125<br>Except<br>89CE558 |            | B80            |
| 89C738                                   | T           |          | 3                     | N                    | 3.5 to 16               | X                       |            |             | N40                              | A44        | B44            |
| <b>83C51RD+</b>                          | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| <b>89C51RD+87C51RD+</b>                  | <b>S</b>    |          | <b>2</b>              | <b>Y</b>             | <b>0 to 33</b>          | <b>X</b>                | <b>X</b>   |             | <b>N40</b>                       | <b>A44</b> | <b>B44</b>     |
| 87CL881                                  | T           |          | 8                     |                      | 1 to 10                 | -25 to +70              |            |             |                                  |            | BD44           |
| <b>XA Family</b>                         |             |          |                       |                      |                         |                         |            |             |                                  |            |                |
| 51XAG30/G37/G33                          | S           |          | 2                     | Y                    | 30                      | X                       | X          |             |                                  | A44        | BD44           |
| 51XAS3                                   | S           | 8        | 8                     | 2                    | Y                       | 30                      | X          | X           |                                  | A68        | B80            |

NOTES:  
 1 Production Centers are indicated in the second column.  
 H = Hamburg; S = Sunnyvale, T = Taiwan, Z = Zuch  
 All combinations of part type, speed, temperature and package may not be available.  
**Parts in italics bold are 51plus microcontrollers.**

- Oscillator options start from 32kHz
- Also available in VSO40 package
- Also available in VSO56 package.
- Not recommended for new design.
- Package available up to 16MHz only
- New and Improved devices operate from 2.7V-5.5V @ 16MHz Static Core, 33MHz operation, Dual Data Pointers, and more