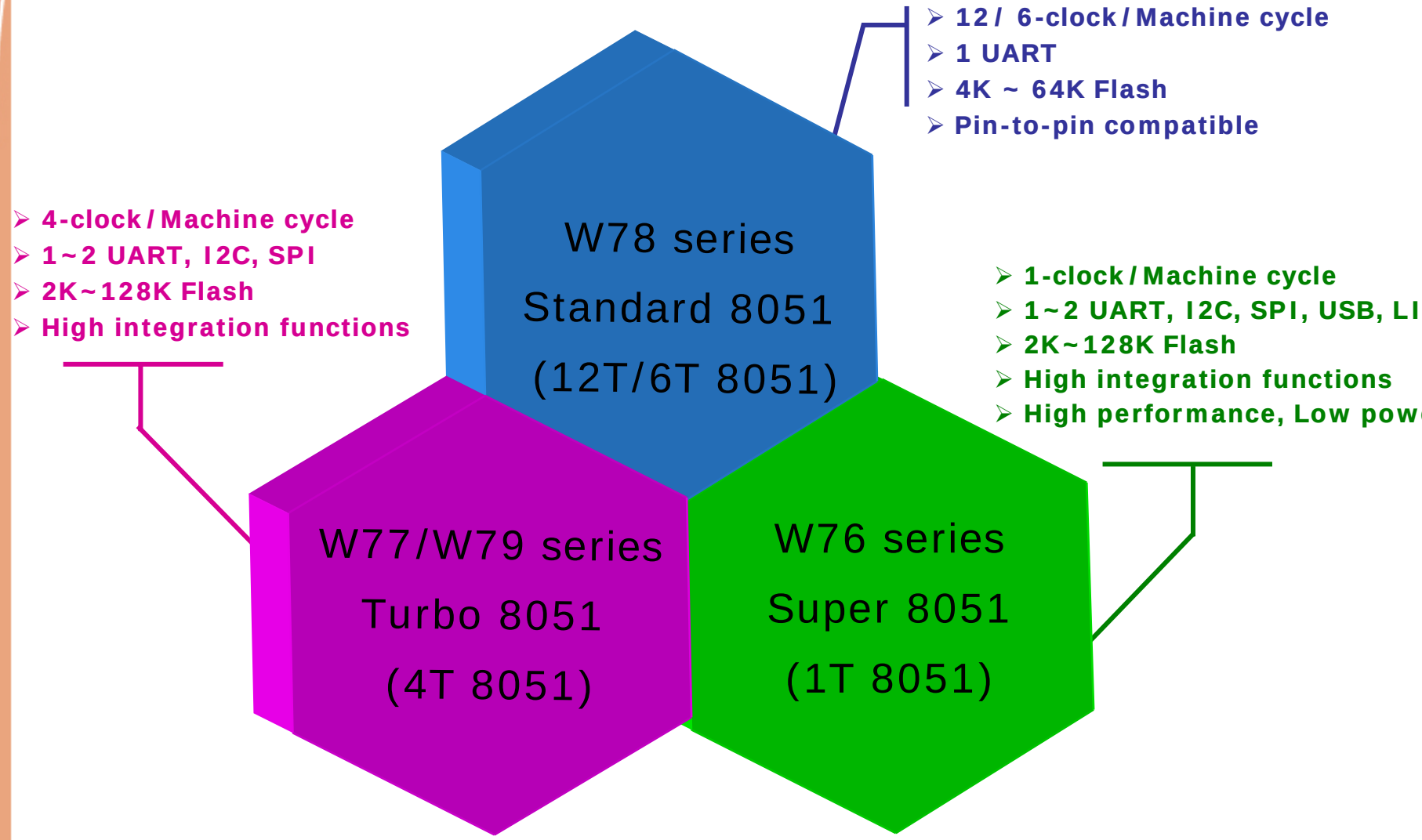
8-bit Microcontroller 80C51 series

2008. Sept.

Agenda

1. 8-bit MCU Profile
2. 8-bit MCU Product Selection Guide
   - W78/N78 series
   - W77 series
   - W79/N79 series
   - New 8-bit MCU launched on 2008
   - New 8-bit MCU will launch on 2008/Q4
3. 8-bit MCU Development Tool
4. Summary

8-bit MCU Family Mix

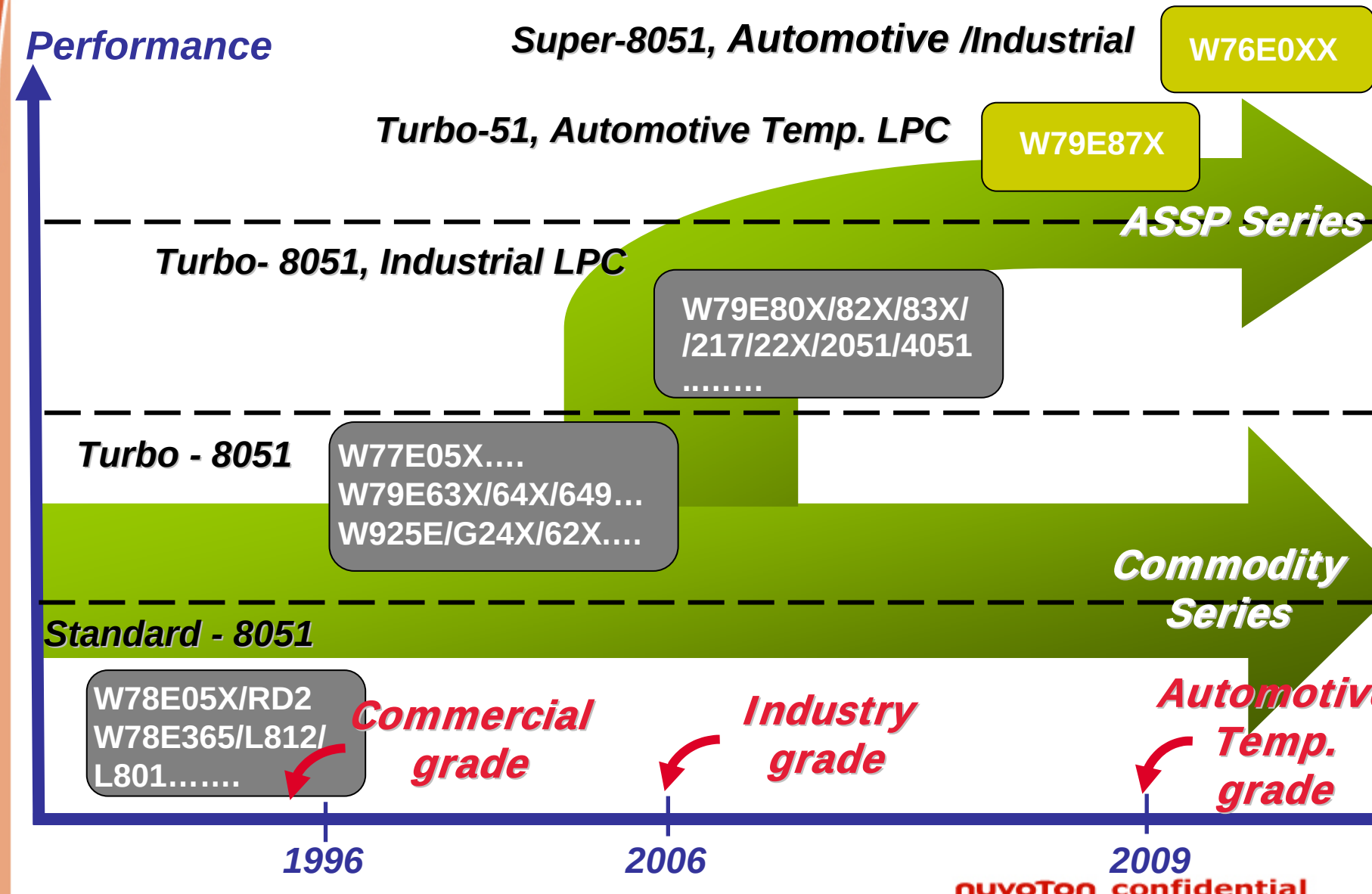


- 12/ 6-clock/Machine cycle
- 1 UART
- 4K ~ 64K Flash
- Pin-to-pin compatible

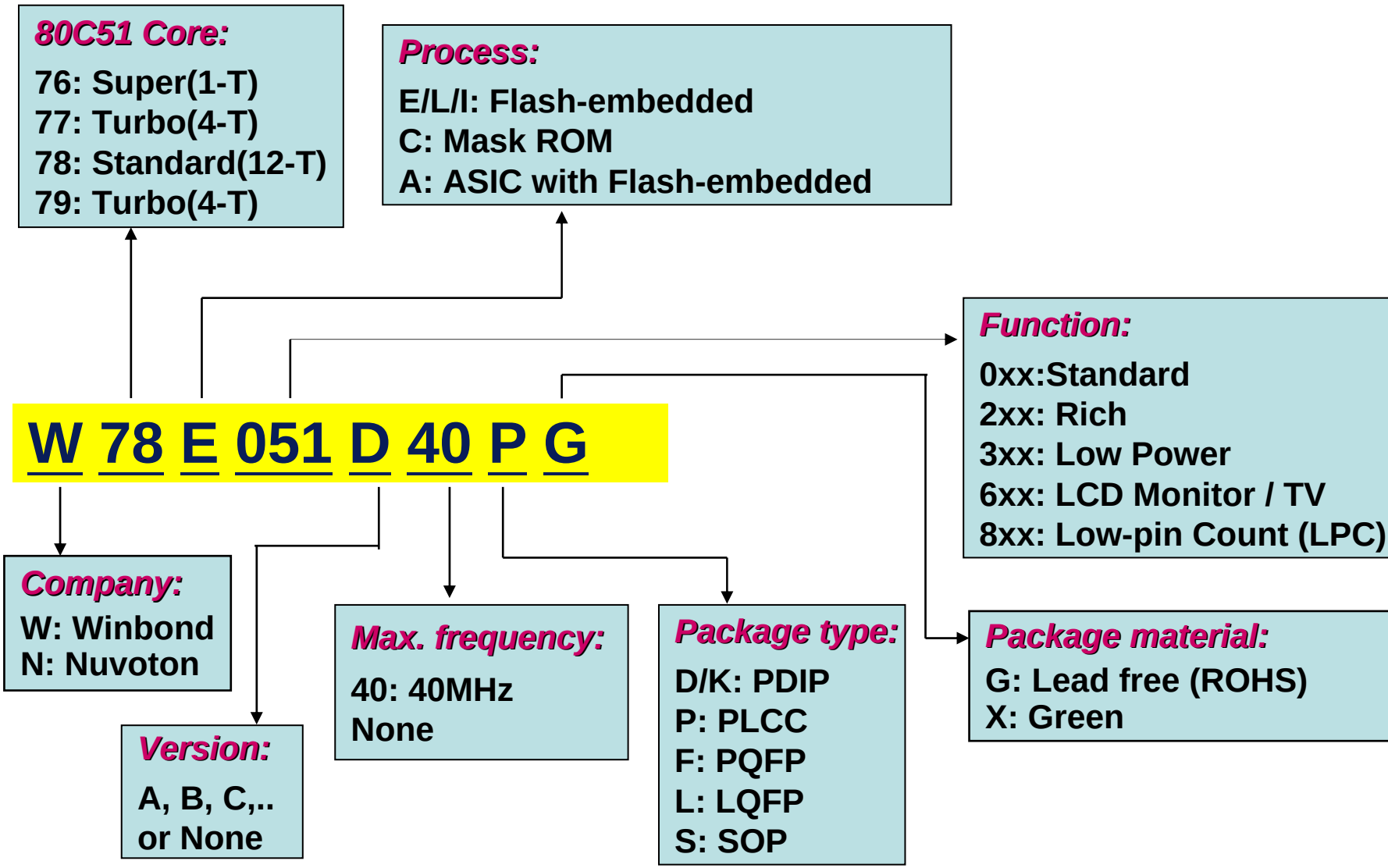
- 4-clock/Machine cycle
- 1~2 UART, I2C, SPI
- 2K~128K Flash
- High integration functions

- 1-clock/Machine cycle
- 1~2 UART, I2C, SPI, USB, LI
- 2K~128K Flash
- High integration functions
- High performance, Low pow

80C51 Series Roadmap



Nomenclature



Voltage, Frequency, Temperature

1. Operating voltage type:

- **Normal voltage type (E) :**
  - ✓ V_{DD}=4.5 ~ 5.5 V, Speed $_{max}$ =40MHz
- **Wide voltage type (L or E):**
  - ✓ W78 series: V_{DD}= 2.4V/2.7V (Speed $_{max}$ = 20MHz) ~ 5.5V (Speed $_{max}$ = 40MHz)
  - ✓ W77/W79 series: V_{DD}= 2.7V/3.0V (Speed $_{max}$ = 20MHz) ~ 5.5V (Speed $_{max}$ = 40MHz)
  - ✓ W79 LPC series : V_{DD}= 2.7V (Speed $_{max}$ = 12MHz) ~ 5.5V (Speed $_{max}$ = 20MHz)
  - ✓ W78 series (Mask ROM): V_{DD}= 1.8V (Speed $_{max}$ = 24MHz) ~ 5.5V (Speed $_{max}$ = 40MHz)

2. Commercial grade:

- Operating temperature: 0℃ ~ + 70 ℃

Industrial grade:

- Operating temperature: - 40℃ ~ + 85 ℃

Automotive grade:

- Operating temperature: - 40℃ ~ + 125 ℃

1. W78/N78 series

W78 Flash-MCU Series-1

E	W78E051C	W78E052C	W78E054C	W78E051D	W78E052D	W78E054D
L	W78L051C	W78L052C	W78L054C			
I				W78I051D	W78I052D	W78I054D
Flash EPROM (B)	4K	8K	16K	4K	8K	16K
RAM (B)	128	256	256	256	256	256
I/O	32/36*	32/36*	32/36*	32/36*	32/36*	32/36*
INT	5/7*	6/8*	6/8*	6/8*	6/8*	6/8*
PWM	No	No	No	No	No	No
ISP	No	No	No	Yes	Yes	Yes
Special Function				1. 12T/6T mode 2. Watch-dog timer 3. Sink current for driving LED 4. 48-LQFP	1. 12T/6T mode 2. Watch-dog timer 3. Sink current for driving LED 4. 48-LQFP	1. 12T/6T mode 2. Watch-dog timer 3. Sink current for driving LED 4. 48-LQFP

Note: 1. 7*/8*/9* are showed that INT-source are available on 44-PLCC/44-QFP packages.
2. 36* is showed that I/O-pin is available on 44-PLCC/44-QFP packages
3. "L" is wide-operating voltage grade.
4. "I" is industry and wide-operating voltage grade.

W78 Flash-MCU Series-2

E	W78E058B	W78E516B	W78E058D	W78E516D
L	W78L058A	W78L516A		
I			W78I058D	W78I516D
Flash EPROM (B)	32K	64K	32K	64K
RAM (B)	256+256	256+256	256+256	256+256
I/O	32/36*	32/36*	32/36*	32/36*
INT	6/8*	6/8*	6/8*	6/8*
PWM	No	No	No	No
ISP	Yes	Yes	Yes	Yes
Special Function			1. 12T/6T mode 2. Watch-dog timer 3. Sink current for driving LED 4. 48-LQFP	1. 12T/6T mode 2. Watch-dog timer 3. Sink current for driving LED 4. 48-LQFP

Note: 1. 7*/8*/9* are showed that INT-source are available on 44-PLCC/44-QFP packages.
2. 36* is showed that I/O-pin is available on 44-PLCC/44-QFP packages
3. "L" is wide-operating voltage grade.
4. "I" is industry grade and wide-operating voltage grade.

W78 Flash-MCU Series-3

E	W78E365A	W78E858A	W78ERD2A			
L	W78L365A			W78L812A	W78L801B	N78L802A
I			W78IRD2A			
Flash EPROM (B)	64K	32K	64K	8K		
Mask ROM(B)					4K	8K
RAM (B)	256+1K	256+512	256+1K	256	256	256
I/O	32/36*	32/36*	32/36*	32/36*	32/36*	32/36*
INT	6/8*	14	7/9*	14	12	12
UART	Yes	Yes	Yes	Yes	No	No
PWM	8-bit x 5	8-bit x 4	8-bit x 4	No	No	No
ISP	Yes	Yes	Yes	No	No	No
Special Function		128bytes EEPROM (100K R/W cycles)	1. PCA, 2. 12T/6T mode	1. 3 Timers 2. 48-LQFP	1. 2 Timers 2. 48-LQFP	1. 2 Timers 2. 48-LQFP

Note: 1. 7*/8*/9* are showed that INT-source are available on 44-PLCC/44-QFP packages.
2. 36* is showed that I/O-pin is available on 44-PLCC/44-QFP packages
3. "L" is wide-operating voltage grade.
4. "I" is industry grade and wide-operating voltage grade.

W78L812A/W78L801B/N78L802A Features

- Standard-51 core (12-clock/Machine cycle)
- Wide-voltage range : 2.4V (***1.8V for W78L801/N78L802***) ~ 5.5V
- Working frequency up to 40M Hz
- Flash EPROM: 8K bytes (***Mask 4K/8K bytes for W78L801/N78L802***)
- RAM: 256 bytes
- I/O pins:32/36 (only on 44PLCC/44QFP/48LQFP)
- *One UART for W78L812 only (**No UART for W78L801/N78L802**)*
- *3 Timers for W78L812 only, and 2 Timers for W78L801/N78L802*
- *8 Extra-interrupts at Port1 for waking up the power-down mode*
- Working temperature: 0~70ºC
- Package: 40DIP/44PLCC/44QFP/48LQFP
- Application: Wireless Keyboard, Portable device,…..
- N78L802 MP schedule: 2008. Dec.

W78E858 Features

- Standard-51 core (12-clock/Machine cycle)
- Normal-voltage range : 4.5V ~ 5.5V
- Working frequency up to 40MHz
- Flash EPROM: 32K bytes with ISP
- RAM: 256 + 512k bytes
- *EEPROM: 128 bytes for 100k R/W cycles*
- I/O pins:32/36(only on 44PLCC/44QFP)
- *8 Extra-interrupts at Port1 for waking up the power-down mode*
- *4 channels 8-bit PWMs*
- Working temperature: 0~70ºC
- Package: 40DIP/44PLCC/44QFP
- Application: Satellite Box, Setup Box,…….

W78ERD2/W78IRD2 Features

- *Enhanced standard-51 core*
  - *Option for 12T or 6-T*
    - ✓ **12-T: Max. speed= 40 MHz**
    - ✓ **6-T : Max. speed= 20 MHz**
- Wide-voltage range : 2.7V ~ 5.5V
- Flash EPROM: 64K bytes with ISP
- RAM: 256 + 1k bytes
- 2 Data pointers (DPTR)
- *Support PCA (**Programmable Counter Array**) with 8-bit PWM, 16-bit capture/compare,16-bit timer and watchdog-timer function*
- I/O pins:32/36(only on 44PLCC/44QFP)
- Working temperature: 0~70ºC(**W78ERD2**), -40~85ºC(**W78IRD2**)
- *High noise immunity: 4KV ESD and 4KV EFT*
- Package: 40DIP/44PLCC/44QFP
- Application: Compatible with NXP P89C51RD2

W78ERD2 vs. P89C51RD2

Function list	W78ERD2	P89C51RD2
ISP	ISP(LD flash EPROM)	ISP (APROM)
RAM (Bytes)	1K+256	768+256
I/O pins	32/36(44-PLCC/44-QFP)	32
12/6 clock	Hardware	Hardware/Software
Port 0 poll-up resister	Yes (POPT-register; 86H)	No
INT2,INT3 interrupt	INT2, INT3 (P4.3,P4.2)	No

Note: 1. Nuvoton's ISP is used a extra 4K bytes LD flash EPROM.
2. NXPs's ISP APROM is included into 64K flash memory.

W78E051D/W78E052D/W78E054D/W78E058D/W78E516D Features

- ***Enhanced standard-51 core***
  - *Option for 12-T or 6-T*
    - ✓ **12-T: Max. speed= 40 MHz**
    - ✓ **6-T : Max. speed= 20 MHz**
- Wide-voltage range : 2.4V ~ 5.5V
- ***Flash EPROM with ISP*** : 4KB/W78E051, 8KB/W78E052, 16KB/W78E054, 32KB/W78E058, 64KB/W78E516
- RAM: 256 bytes for W78E051/052/054, 512 bytes for W78E058/516
- I/O pins:32/36(only on 44PLCC/44PQFP/48LQFP), and can sink LED directly
- One UART, 3 Timers, and Watch dog timer
- ***Working temperature: 0~70ºC(W78E), -40~85ºC(W78I)***
- ***High noise immunity: 4KV ESD and 4KV EFT***
- Package: 40DIP/44PLCC/44QFP/48LQFP
- MP schedule: Now

W78E05xD vs. W78E05xC

Function list	W78E05xD	W78E05xC
ISP (In-system programming)	All parts	W78E058C and W78E516C only
Operating voltage	2.4V ~ 5.5V	4.5V~5.5V
Watch dog timer	Yes	No
I/O port for sinking LED (20mA) directly	Yes	No
12-T / 6-T mode	Yes	No
Code Security	Good	Poor
ESD and EFT	Good	Poor
Industrial grade	Yes	No

Note: W78E05x for commercial grade, W78I05x for industrial grade.

2. W77 series

W77 Flash-MCU Series

E	W77E032A	W77E058A	W77E516A	W77E532A
L	W77L032A	W77L058A	W77L516A	W77L532A
Flash EPROM (B)	ROMless	32K	64K	128K
RAM (B)	256+1K	256+1K	256+1K	256+1K
I/O	32/36*	32/36*	32/36*	32/36*
UART	2	2	2	2
INT	12	12	12	12
PWM	No	No	No	No
ISP	No	No	Yes	Yes

Note: 1. W77 series has no industry grade.

2. 36* is showed that I/O-pin is available on 44-PLCC/44-QFP packages

W77L532 Features

- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.7V ~ 5.5V
- *Flash EPROM: 128K bytes with ISP*
- RAM: 256 + 1k bytes
- *2 Data pointers (DPTR)*
- 3 Timers
- *2 enhanced UARTs*
  - ✓ **Framing error detection**
  - ✓ **Automatic address recognition**
- *8 Extra-interrupts at Port1 for waking up the power-down mode*
- I/O pins:32/36(only on 44PLCC/44QFP)
- Working temperature: 0~70ºC
- Package: 40DIP/44PLCC/44QFP
- Application: Communication equipment,…….

3. W79 series

W79 Flash-MCU Series

E	W79E201	W79E632	W79E648	W79E649	W79E633	W79E658	W79E659
L		W79L632	W79L648	W79L649	W79L633	W79L658	W79L659
Flash EPROM(B)	16K	128K	128K	32K	128K	128K	32K
RAM (B)	256	256+1K	256+1K	256+1K	256+1K	256+1K	256+1K
I/O	25 I/O + 8 input only	32/36*	60	60	36	60	60
Serial Port	UART	UART	UART	UART	UART & 2 x I^2C	UART & 2x I^2C	UART & 2 x I^2C
PWM	8-bit x 6	8-bit x 6	8-bit x 6	8-bit x 6	8-bit x 6	8-bit x 6	8-bit x 6
ISP	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ADC	10-bit x 8	No	No	No	10-bit x 4	10-bit x 8	10-bit x 8
PKG	44PLCC/ 44QFP/ 48LQFP	44PLCC	PLCC68/ QFP100	PLCC68/ QFP100	44PLCC	QFP100	QFP100

Note: 1. 36* is showed that I/O-pin is available on 44-PLCC/44-QFP packages.

W79E633/658/659 Features

- Turbo-51 core (4-clock/Machine cycle)
- Working voltage range :

  4.5 ~ 5.5V (W79E633/658/659) / 3.0~5.5V (W79L633/658/659)
- Working frequency up to 40MHz at 5 V
- *Flash EPROM: 128K bytes (W79E633/658), 32K bytes (W79E659) with ISP*
- RAM: 256+1K bytes
- Three Timers
- *One enhanced UART & Two I²C*
- 6 channels 8-bit PWMs
- 4 channels (W79E633), 8 channels (W79E658/659) 10-bit ADC
- *I/O pins: 38 (W79E633) / 60 (W79E658/659)*
- Working temperature: 0~70ºC
- Package: 44PLCC (W79E633) / 100PQFP (W79E658/659)
- Application: LCD TV, Multi-function LCD monitor, Test equipment,……..

W79E8xx LPC Series

	Flash EPROM	RAM	Data Flash	Serial Interfaces	I/O	PWM	ADC	Timer	Package
W79E83J	8KB	512B	No	SPI,UART	23	4 x 10-bit	8 x 10-bit	3	LQFP48
W79E834	8KB	512B	No	SPI,UART	23	4 x 10-bit	8 x 10-bit	3	SOP28
W79E833	4KB	256B	No	SPI,UART	23	4 x 10-bit	4 x 10-bit	3	SOP28
W79E832	2KB	256B	No	SPI,UART	23	4 x 10-bit	4 x 10-bit	3	SOP28
W79E82J	16KB	256B	256B	I2C,UART	15	4 x 10-bit	4 x 10-bit	2	SOP24
W79E825	16KB	256B	256B	I2C,UART	15	4 x 10-bit	4 x 10-bit	2	SOP20/DIP20
W79E824	8KB	256B	256B	I2C,UART	15	4 x 10-bit	4 x 10-bit	2	SOP20/DIP20
W79E823	4KB	128B	128B	I2C,UART	15	4 x 10-bit	4 x 10-bit	2	SOP20/DIP20
W79E822	2KB	128B	128B	I2C,UART	15	4 x 10-bit	4 x 10-bit	2	SOP20/DIP20
W79E804	8KB	256B	256B	I2C,UART	15	4 x 10-bit	No	2	SOP20/DIP20
W79E803	4KB	256B	256B	I2C,UART	15	4 x 10-bit	No	2	SOP20/DIP20
W79E802	2KB	256B	256B	I2C,UART	15	4 x 10-bit	No	2	SOP20/DIP20

Note: 1. Data Flash is 64-bytes block-erased.
2. ICP on W79E83X, W79E82x and W79E80x series
3. W79E82J can support JTAG to emulate W79E82x and W79E80x series.
4. W79E83J can support JTAG to emulate W79E83x series.

W79E83x Features

- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.7 ~ 5.5V
- Working frequency up to 20MHz at 5V
- Flash EPROM: 8K/4K/2K (W79E834/833/832) bytes
- RAM: 512 (W79E834) /256 (W79E833/832) bytes
- *Support SPI and UART*
- *8 (W79E834) /4 (W79E833/832) channels 10-bit A/D converter*
- 4 channels 10-bit PWMs
- Three 16-bit timers
- *23 I/O pins, and can sink LED(20mA) directly*
- *Working temperature: -40~85ºC*
- Package: 28-SOP
- Application: Small home appliance, Motor controller, e-bike, Security system, …..

W79E82x Features

- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.7 ~ 5.5V
- Working frequency up to 20MHz at 5V
- Flash EPROM: 16K/8K/4K/2K (W79E825/824/823/822) bytes
- RAM: 256 (W79E825/824) /128 (W79E823/822) bytes
- *Data Flash: 256 (W79E825/824) /128 (W79E823/822) bytes for 10k R/W cycles*
- *Support I^2C and UART*
- Two 16-bit timers
- *4 channels 10-bit A/D converter*
- 4 channels 10-bit PWMs
- *15 I/O pins, and can sink LED(20mA) directly*
- *Working temperature: -40~85ºC*
- Package: 20DIP/20SOP
- Application: Pin-compatible to NXP 87LPC778/768/767

W79E80x Features

- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.7 ~ 5.5V
- Working frequency up to 20MHz at 5V
- Flash EPROM: 8K/4K/2K (W79E804/803/802) bytes
- RAM: 256 (W79E804) /128 (W79E803/802) bytes
- Data Flash : 256 (W79E804) /128 (W79E803/802) bytes for 10k R/W cycles
- Support I^2C and UART
- 4 channels 10-bit PWMs
- Two 16-bit timers
- *NO 10-bit ADC*
- *15 I/O pins, and can sink LED(20mA) directly*
- Working temperature: -40~85ºC
- Package: 20DIP/20SOP
- Application: Pin-compatible to NXP 87LPC764/762

Advantage of W79E82x/80x vs. NXP LPC700

	W79E82x/80X	LPC700 series
8051 Core	4-T	12T/6T
ROM	Flash EPROM	OTP
Data Flash	Yes (128B/256B)	No or 32B
ADC	10-bit	8-bit
Performance/ Price	Good	Bad

Application: Home security, Lighting system controller, Car HID system, HDMI splitter, Thermo-controller, Motor controller, Small home appliance, E-balance, ……..

4. New 8-bit MCU launched on 2008

New Family in 2008/H1

➢ W79E21X/22X Rich series

	Flash EPROM	RAM	Data Flash	Serial Interfaces	I/O	PWM	ADC	LCD	ISP	Package
W79E21J	64KB	256+2KB	2KB	2*UART, SPI, I2C	60	8 x 12-bit	8 x 10-bit	32*4	Yes	100-QFP
W79E217	64KB	256+2KB	2KB	2*UART, SPI, I2C	60	8 x 12-bit	8 x 10-bit	32*4	Yes	100-QFP
W79E227	64KB	256+2KB	2KB	2*UART ,SPI, I2C	38	8 x 12-bit	8 x 10-bit	-	Yes	48-LQFP/ 44-PLCC
W79E226	32KB	256+2KB	2KB	2*UART, SPI, I2C	38	8 x 12-bit	8 x 10-bit	-	Yes	48-LQFP/ 44-PLCC
W79E225	16KB	256+1KB	1KB	2*UART, SPI, I2C	38	8 x 12-bit	8 x 10-bit	-	Yes	48-LQFP/ 44-PLCC

Note: 1. Data Flash is 64-bytes block-erased.

2. W79E21J can support JTAG to emulate W79E21x/22x series

3. They all are in the M.P.

W79E217 Features

- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.7 ~ 5.5V(Speed up to 33MHz at 5V)
- Flash EPROM: 64K bytes with ISP
- RAM: 256+2K bytes
- *Data Flash: 2K bytes, 64 bytes block-erased*
- *Serial Interfaces: Two UARTs, one I^2C, and one SPI*
- *8 channels 10-bit A/D converter*
- *8 channels 12-bit PWMs*
- *I/O pins: 60*
- *LCD driver: 32-segment x 4-Common*
  - *1/4 duty(or 1/3 duty), 1/3 bias.*
  - *22 output pins*
- Working temperature: -40~85ºC
- Package: 100-PQFP
- Application: Motor controller, Multi-Serial interface bridge, ……

W79E227/226/225 Features

- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.7V ~ 5.5V
- Working frequency up to 40MHz at 5V
- Flash EPROM: 64K/32K/16K bytes with ISP
- RAM: 256+2K/ 256+2K/ 256+1K bytes
- *Data Flash: 2K/2K/1K bytes, 64 bytes block-erased*
- *Serial Interfaces: Two UARTs, one I^2C, and one SPI*
- *Three 16-bit timers & one 16-bit Timer3 for motion feed-back module*
- *8 channels 10-bit A/D converter*
- *8 channels 12-bit PWMs*
  - *Complementary pair output with programmable dead-time*
  - *Edge/center aligned & one-shot*
  - *Output override control for BLDC motor*
- *I/O pins: 34/38*
- Working temperature: -40~85ºC
- Package: PLCC44,LQFP48
- Application: Motor controller, Powerful e-bike, BLDC air conditioner, Multi-Serial interface bridge, ……

New Family in 2008/H1

➢ W79 LPC series

	Flash EPROM	RAM	Data Flash	Serial Port	I/O	OP	Buzzer	PWM	ADC	Int. RC	ICP	Package
W79E8213/ W79E8213R	4KB	128B	128B	-	15/ 18	-	1	4 x 10-bit	8 x 10-bit	Yes	Yes	20DIP/ 20SOP
W79E4051/ W79E4051R	4KB	256B	128B	UART	15/ 17	1	-	1 x 10-bit	-	Yes	Yes	20DIP/ 20SOP
W79E2051/ W79E2051R	2KB	256B	128B	UART	15/ 17	1	-	1 x 10-bit	-	Yes	Yes	20DIP/ 20SOP
N79E342/ N79E342R	2KB	128B	128B	-	12/ 14	-	1	-	4 x 10-bit	Yes	Yes	16DIP/ 16SOP

Note: 1. W79E2051/4051 is fully pin-to-pin compatible with Atmel AT89C2051/4051

2. For W79E4051R/2051R/W79E8213R only, their int. Oscillator can provide ±7% accuracy for -20℃~ +85 ℃

3. Data Flash is 16-bytes block-erased.

4. No ICE can do the whole emulation, but W79E82J-ICE can emulate over 90% of W79E8213 and N79E342.

W79E8213R Features

- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.7V ~ 5.5V
- Working frequency up to 20MHz at 5V
- Flash EPROM: 4K bytes, RAM: 128 bytes
- *Data Flash: 128 bytes, 16 bytes block-erased*
- *No any serial interfaces*
- *20MHz/10MHz Int. RC oscillator with ± 7% accuracy at -20℃ ~ +85 ℃*
- *8 channels 10-bit A/D converter*
- *15/18(Max.) I/O pins, and can sink LED(20mA) directly*
- *Port 1 provides high sink capability(40mA)*
- *One Buzzer output*
- 4 channels 10-bit PWMs
- Working temperature: -40~85ºC
- Package: 20-DIP, 20-SOP
- Application: Small home appliance, fast charger, e-tool,…….

W79E4051R/2051R Features

- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.4V ~ 5.5V
- Working frequency up to 24MHz at 5V
- Flash EPROM: 4K (W79E4051R) /2K (W79E2051R) bytes
- RAM: 256 bytes
- *Data Flash: 128 bytes, 16 bytes block-erased*
- One enhanced UART
- Two 16-bit timers
- *1 channel 10-bit PWM*
- *15/17(Max.) I/O pins, and can sink LED(20mA) directly*
- One comparator
- *Provide WDT & BOR*
- *22/11MHz Int. RC oscillator with ± 7% accuracy at -20℃~ +85℃*
- Package: 20-SOP, 20-PDIP
- MP Schedule/Application: MP/ Pin-to-pin compatible with AT89C2051

Advantage of W79E2051R vs. Atmel and Hichip

	W79E2051R	AT89C2051	LS2051
8051 Core	4-T	12T	12T
ROM	Flash EPROM	Flash EPROM	Like Flash
Data Flash	Yes (128B)	No	No
Operating/ Power-down Current	Best	Good	Worst
WDT & BOR	Yes	No	No
Int. OSC	± 7%	No	No
ESD/EMI	Best	Good	Worst
System cost	Lowest	Highest	Middle

Application: Home security, System security, Charger, Smoke detector, Small home appliance, E-balance, UPS, Industry controller, GPS, Health system controller, Power management controller, ……..

N79E342R Features

- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.4V ~ 5.5V
- *Dual clock with S/W for working frequency*
  - ✓ *Option for external clock source: 4MHz ~ 12MHz, or 32KHz ~1MHz*
  - ✓ *Internal 455KHz RC oscillator with ± 9% accuracy at -20℃ ~ +85 ℃*
- Flash EPROM: 2K bytes, RAM: 128 bytes
- *Data Flash: 128 bytes, 16 bytes block-erased*
- *4 channels 10-bit A/D converter triggered by S/W and H/W*
- *5 KBI (keyboard interrupt) can wake up the power-down mode*
- *Internal 20KHz Watch-dog timer can wake up the power-down mode*
- *12/14(Max.) I/O pins, and can sink LED(20mA) directly*
- *Very low operating current*
  - ✓ *12MHZ: 6.4mA(Typ.) at 5V, 3.3mA(Typ.) at 3.3V*
  - ✓ *455KHz: 540uA(Typ.) at 5V, 170uA(Typ.) at 3.3V*
- Package: 16SOP, 16PDIP
- Application: Low-power manager, Smoke detector, Portable UI,……

Advantage of Nuvoton LPC-series

- Hi Noise Immunity
- Industrial Temp
- Data Flash
- 10-bit ADCs
- Int. RC Oscillator

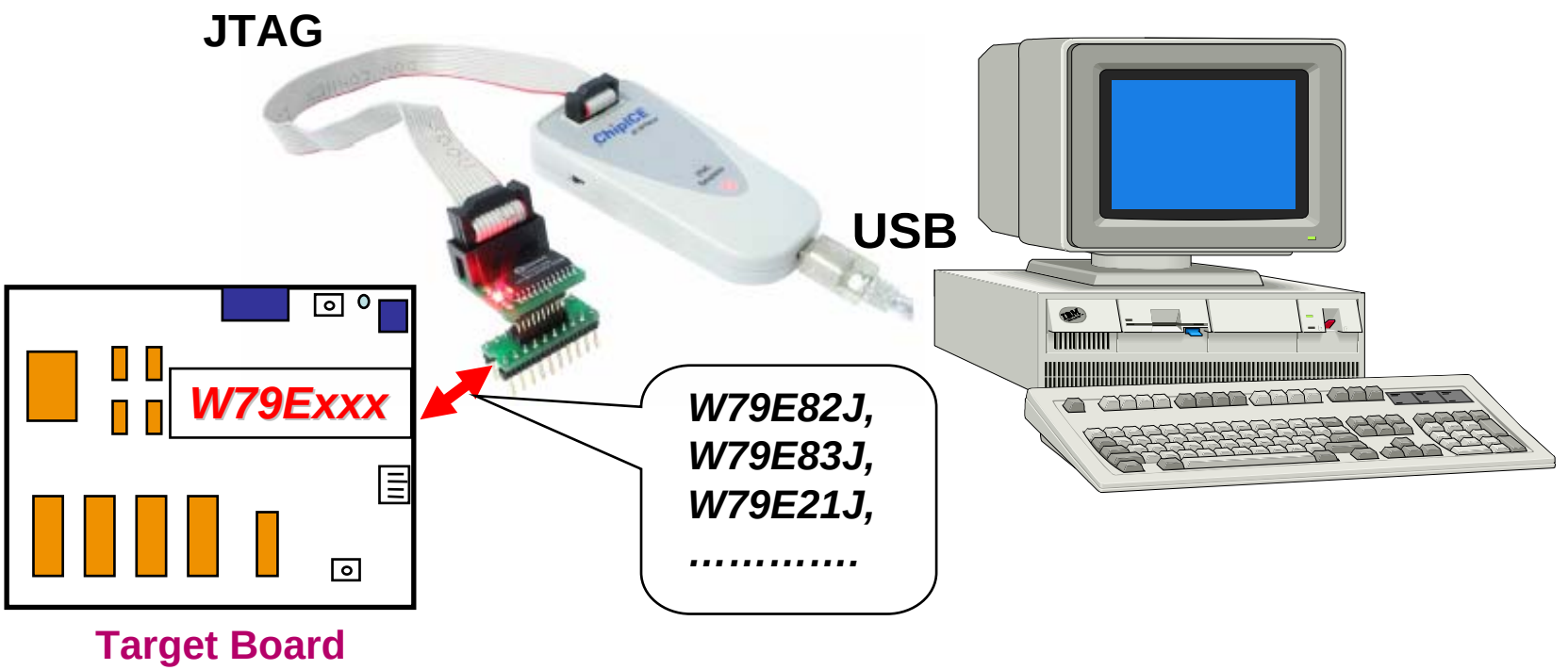
5. New 8-bit MCU will launch on 2008/Q4

N79E352 Features

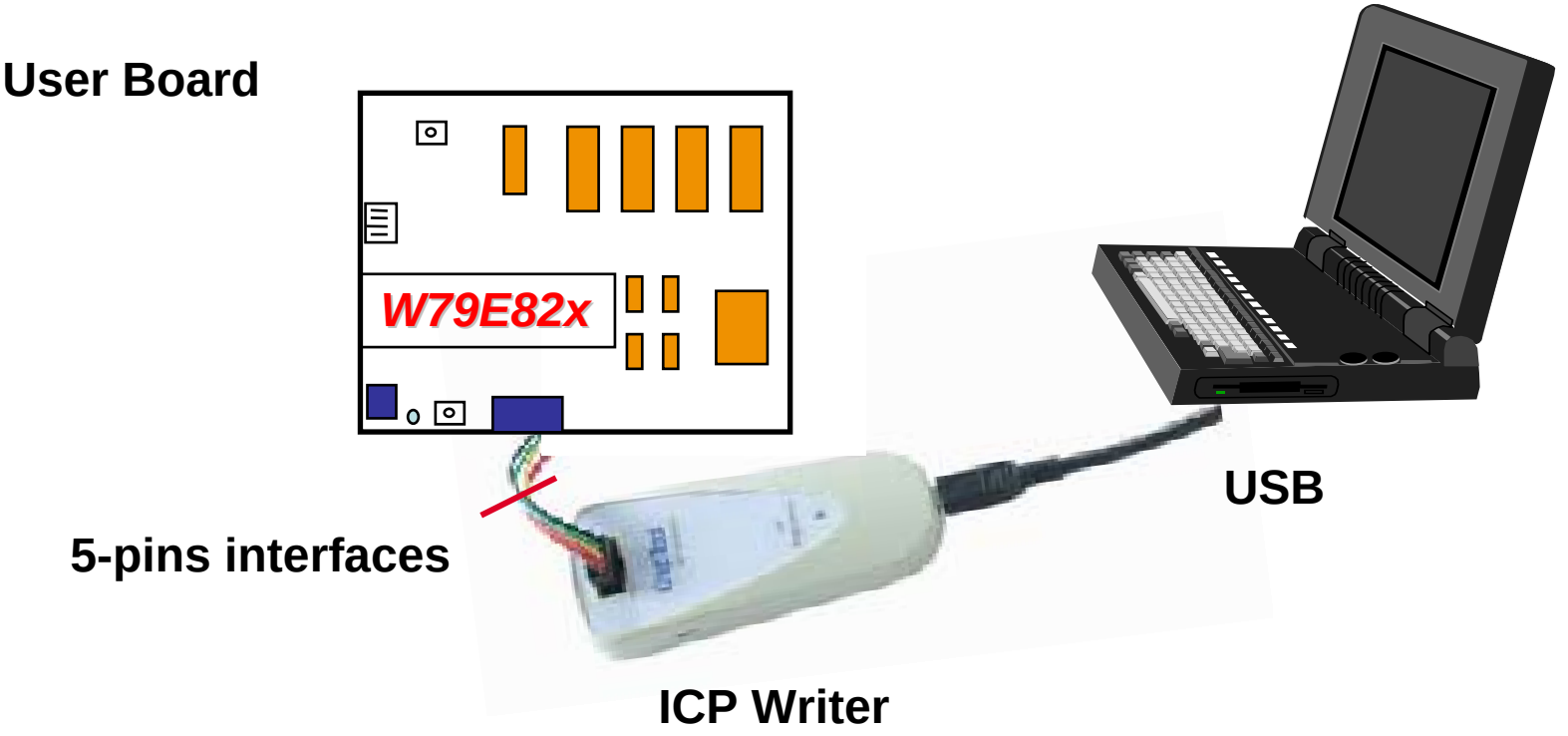
- Turbo-51 core (4-clock/Machine cycle)
- Wide-voltage range : 2.4V ~ 5.5V
- Working frequency up to 24MHz at 5V
- Flash EPROM with ICP: 8K bytes, RAM: 256 bytes, Data Flash: 128 bytes
- I/O pins:32/36(only on 44PLCC/44QFP/48LQFP)
- *Built-in internal 22MHz/11MHz RC oscillator*
- *One UART, and One I2C*
- *2 channels 8-bit PWM*
- *Eight inputs(P0) with one interrupt vector can wake up the power-down mode*
- *Internal 20KHz Watch-dog timer can wake up the power-down mode*
- Working temperature: -40~85ºC
- Package: 40DIP/44PLCC/44QFP/48LQFP
- Application: Pin-to-pin compatible with Standard 80C51, PC/Consumer peripheral controller, Low power controller,…….

8-bit MCU Development Tools

ICE with JTAG



ICP writer of W79 LPC series



Note: ICP= In Circuit Program

ICE and Writer Makers

1. ICE maker :

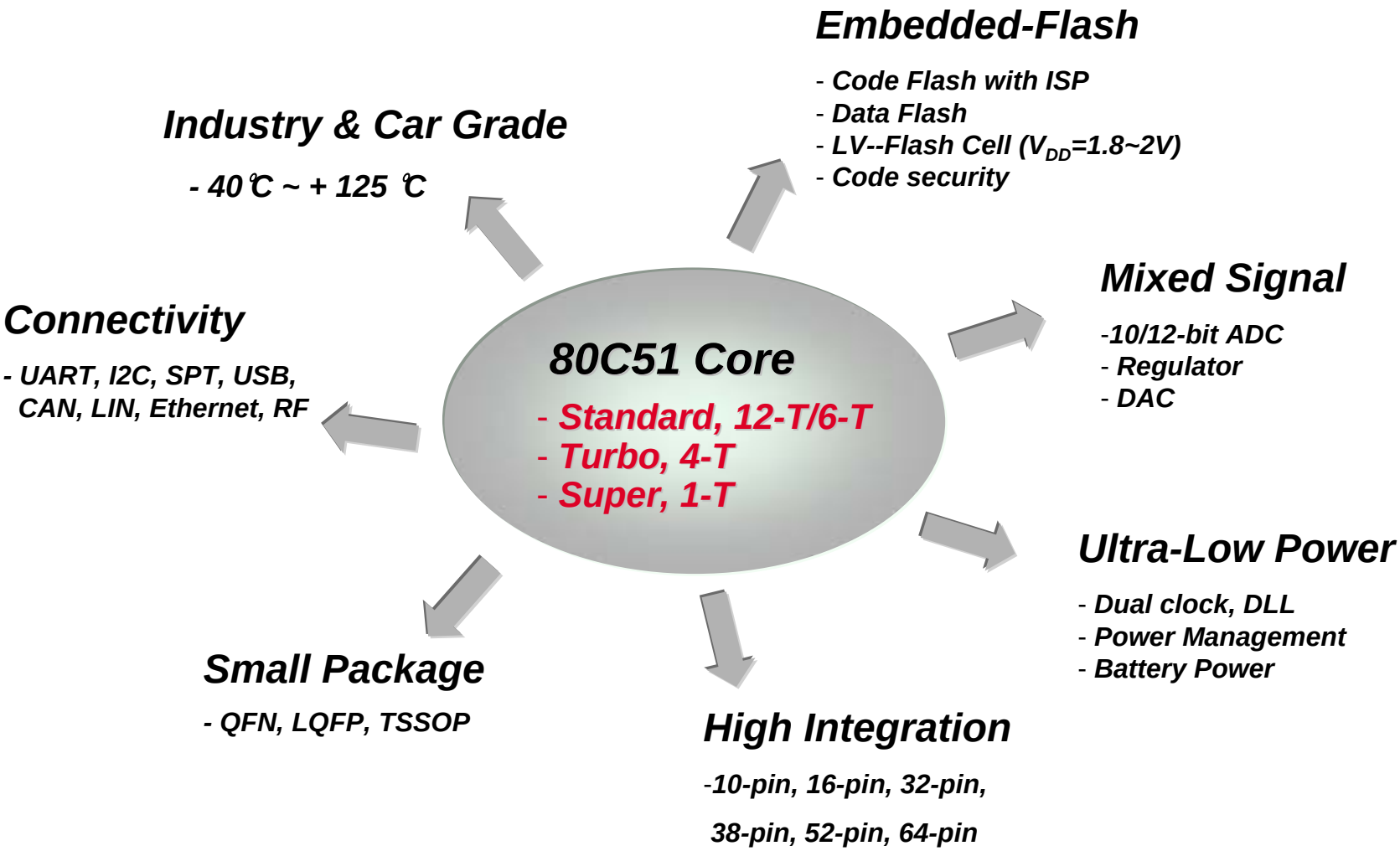
Name	WEB Link	Supported Parts
Manley	www.manley.com.cn	W79E201; W79E80X; W79E82X; W79E83X;
Micetek	www.micetek.com	W79E201; W79E80X; W79E82X; W79E83X; W79E6XX;

2. Writer maker :

Name	WEB Link
HI-LO Systems	www.hilosystems.com.tw
Advantech Equipment	www.aec.com.tw
System General	www.sg.com.tw
LEAP	www.leap.com.tw
Runfei	www.runfei.com.cn
ZLG	www.zlgmcu.com
Xeltek	www.xeltek.com.cn

Summary

Texture of 80C51-based MCU



Nuvoton 8-Bit MCU Product Strategy

- Deep-going on two main product axes
  - ✓ ***Commodity MCU (pin-to-pin compatible)***
  - ✓ ***Application Specific Standard Product (ASSP) MCU***
- Strengthen the competitiveness on 80C51 family
  - ✓ ***Advanced process***
  - ✓ ***Super core, 1-clock / machine cycle***
- Flash-embedded (NOT OTP) for all series
  - ✓ ***Easy development, and Time to market***
  - ✓ ***No any stock in the customer site***
- Seamless package types with high integration functions
  - ✓ ***Plentiful functions, such as Data flash, ADC, PWM, SPI, I²C, LCD, KBI, USB, LIN, FSK / CAS / DTMF decoder / generator, ...***
  - ✓ ***Packages: Low / Middle / High pin count and tiny size***
- High reliable quality with low cost
  - ✓ ***Industrial and Automotive temperature grade***
  - ✓ ***ESD / EFT- Enhanced***