2 Features

NOTE

Not all features listed here are available in all configurations.
Additional information about D and B family inter-operability is given in:
EB386 “HCS12 D-Family Compatibility Considerations” and
EB388 “Using the HCS12 D_Family as a development platform for the HCS12 B family”

- 16-bit CPU12
  - Upward compatible with M68HC11 instruction set
  - Interrupt stacking and programmer’s model identical to M68HC11
  - 20-bit ALU
  - Instruction queue
  - Enhanced indexed addressing
- Multiplexed bus
  - Single chip or expanded
  - 16 address/16 data wide or 16 address/8 data narrow modes
  - External address space 1MByte for Data and Program space (112 pin package only)
- Wake-up interrupt inputs depending on the package option
  - 8-bit port H
  - 4-bit port J
  - 8-bit port P shared with PWM
- Memory options
  - 64K, 128K, 256K Byte Flash EEPROM
  - 1K, 2K Byte EEPROM
  - 2K, 4K and 8K Byte RAM
- Analog-to-Digital Converter
  - 16-channels for 112 Pin Package, 8 channels for 80 Pin package options, 10-bit resolution
  - External conversion trigger capability
- 1M bit per second, CAN 2.0 A, B software compatible module
  - Five receive and three transmit buffers
  - Flexible identifier filter programmable as 2 x 32 bit, 4 x 16 bit or 8 x 8 bit
  - Four separate interrupt channels for Rx, Tx, error and wake-up
  - Low-pass filter wake-up function
  - Loop-back for self test operation
- Input Capture/Output Compare Timer (TIM)

  - 16-bit Counter with 7-bit Prescaler
  - 8 programmable input capture or output compare channels
  - Simple PWM Mode
  - Modulo Reset of Timer Counter
  - 16-bit Pulse Accumulator
  - External Event Counting
  - Gated Time Accumulation
- 8 PWM channels with programmable period and duty cycle (7 channels on 80 Pin Packages)
  - 8-bit 8-channel or 16-bit 4-channel
  - Separate control for each pulse width and duty cycle
  - Center- or left-aligned outputs
  - Programmable clock select logic with a wide range of frequencies
- Serial interfaces
  - Two asynchronous serial communications interfaces (SCI)
  - synchronous serial peripheral interface (SPI)
- Inter-IC Bus (IIC)
  - Compatible with I2C Bus standard
  - Multi-master operation
  - Software programmable for one of 256 different serial clock frequencies
- SIM (System Integration Module)
  - CRG (windowed COP watchdog, real time interrupt, clock monitor, clock generation and reset)
  - MEBI (multiplexed external bus interface)
  - MMC (memory map and interface)
  - INT (interrupt control)
  - BKP (breakpoints)
  - BDM (background debug mode)
- Clock generation
  - Phase-locked loop clock frequency multiplier
  - Limp home mode in absence of external clock
  - Clock Monitor
  - Low power 0.5 to 16 MHz crystal oscillator reference clock
- Operation frequency
  - 50MHz equivalent to 25MHz Bus Speed for single chip
  - 50MHz equivalent to 25MHz Bus Speed in expanded bus modes

- Internal 5V to 2.5V Regulator
- 112-Pin or 80-Pin LQFP package
  - I/O lines with 5V input and drive capability
  - 5VA/D converter inputs
  - Dual supply - 5V for I/O and A/D, 2.5V logic
- Development support
  - Single-wire background debug™ mode (BDM)
  - On-chip hardware breakpoints

Table 1. List of MC9S12B-Family members

Flash	RAM	EEPROM	Package	Device	CAN	SCI	SPI	IIC	A/D	PWM	TIM	I/O
256K	8K	2K	112LQFP	MC9S12B256	1	2	1	1	16ch	8ch	8ch	91
			80QFP	MC9S12B256	1	2	1	1	8ch	7ch	8ch	59
128K	4K	1K	112LQFP	MC9S12B128	1	2	1	1	16ch	8ch	8ch	91
			80QFP	MC9S12B128	1	2	1	1	8ch	7ch	8ch	59
64K	2K	1K	112LQFP	MC9S12B64	1	2	1	1	16ch	8ch	8ch	91
			80QFP	MC9S12B64	1	2	1	1	8ch	7ch	8ch	59

- Pin out explanations:
  - I/O is the sum of ports capable to act as digital input or output

    For 112 Pin Versions:

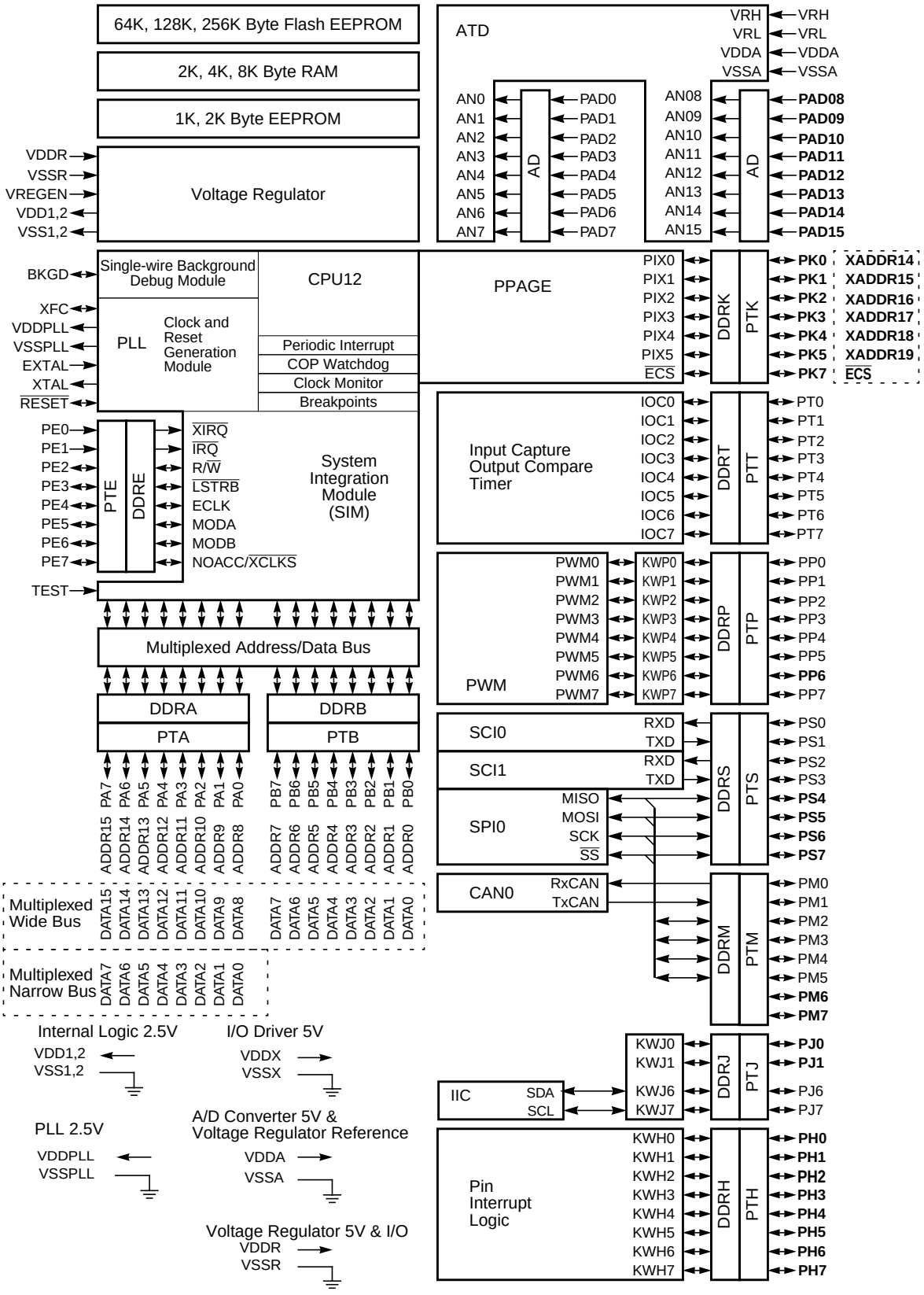
    Port A = 8, B = 8, E = 6 + 2 input only, H = 8, J = 4, K = 7, M = 8, P = 8, S = 8, T = 8, PAD = 16 input only.

    22 inputs provide Interrupt capability (H =8, P= 8, J = 4, IRQ, XIRQ

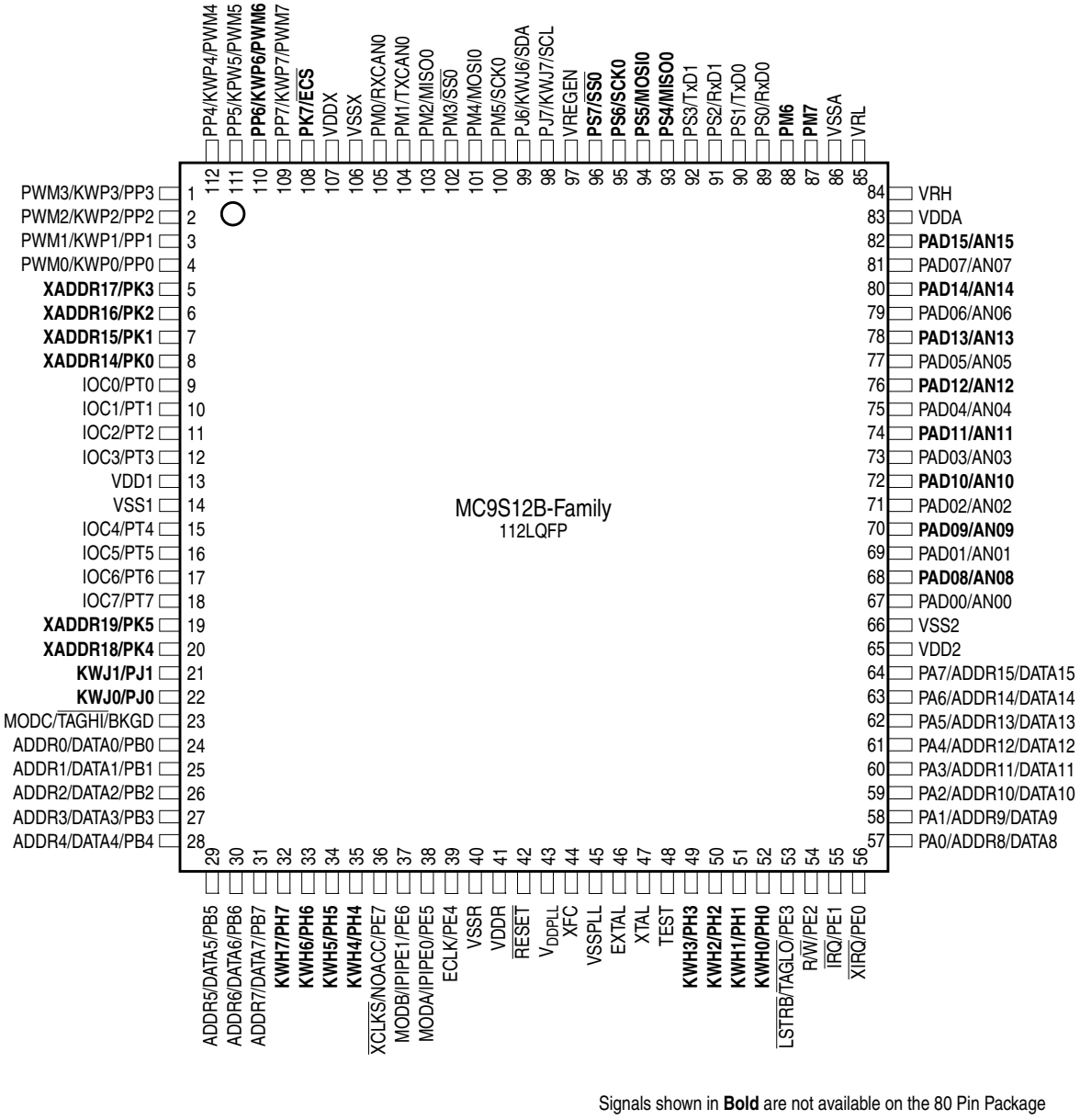
    For 80 Pin Versions:

    Port A = 8, B = 8, E = 6 + 2 input only, J = 2, M = 6, P = 7, S = 4, T = 8, PAD = 8 input only.

    11 inputs provide Interrupt capability (P= 7, J = 2, IRQ, XIRQ)



Not all functionality shown in this Block diagram is available in all Versions!



Signals shown in **Bold** are not available on the 80 Pin Package

Figure 1. Pin assignments 112 QFP for MC9S12B-Family

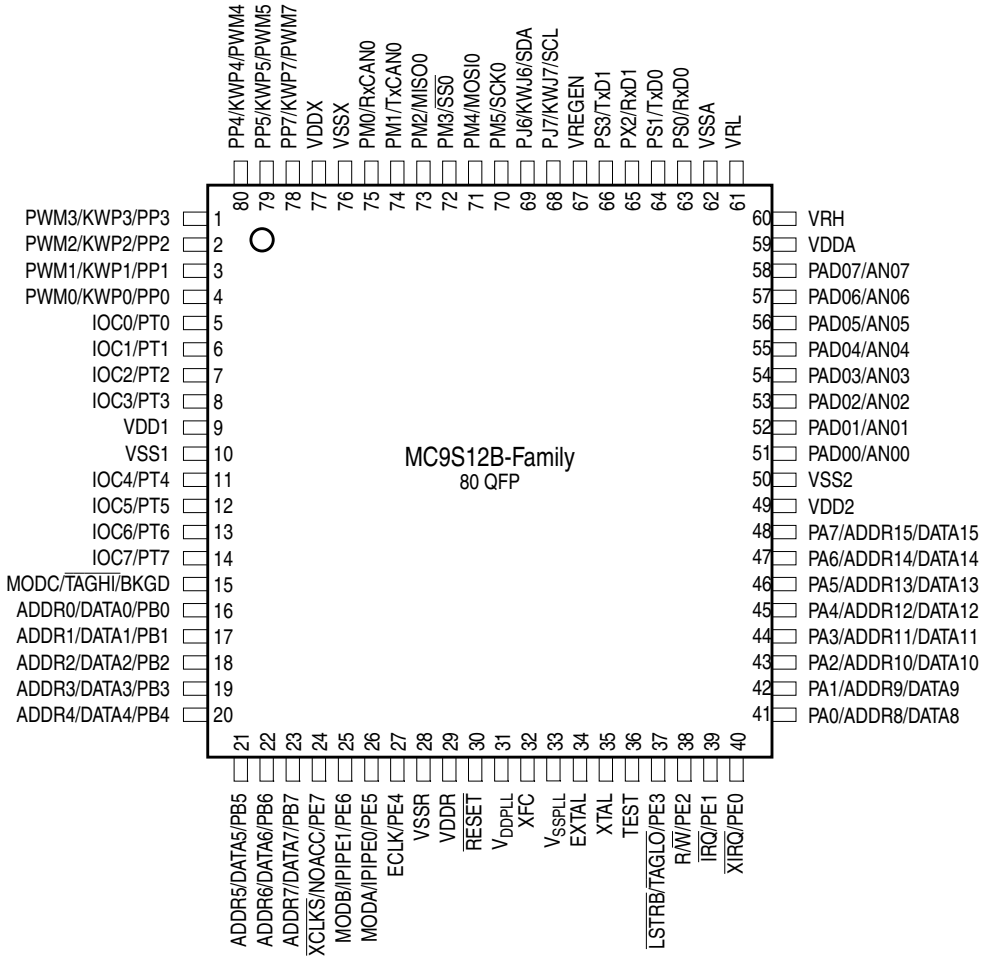
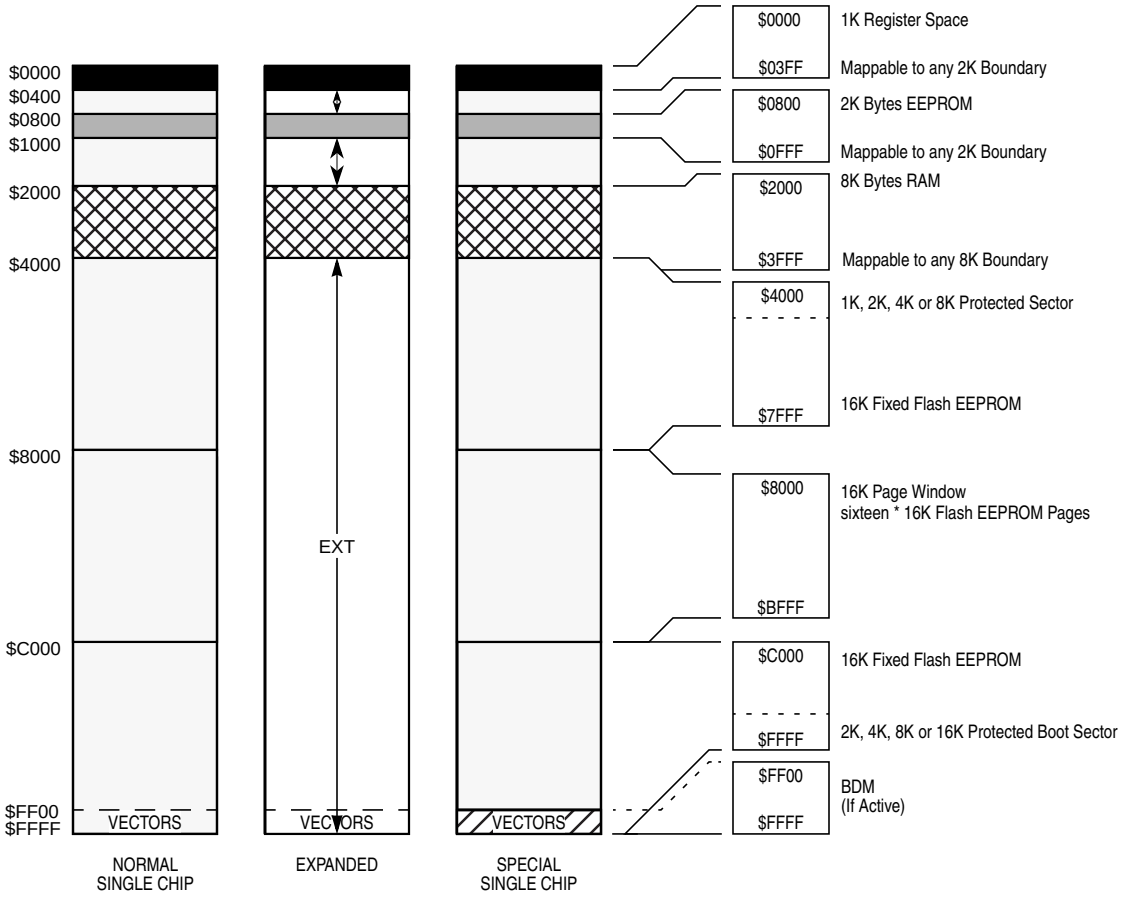


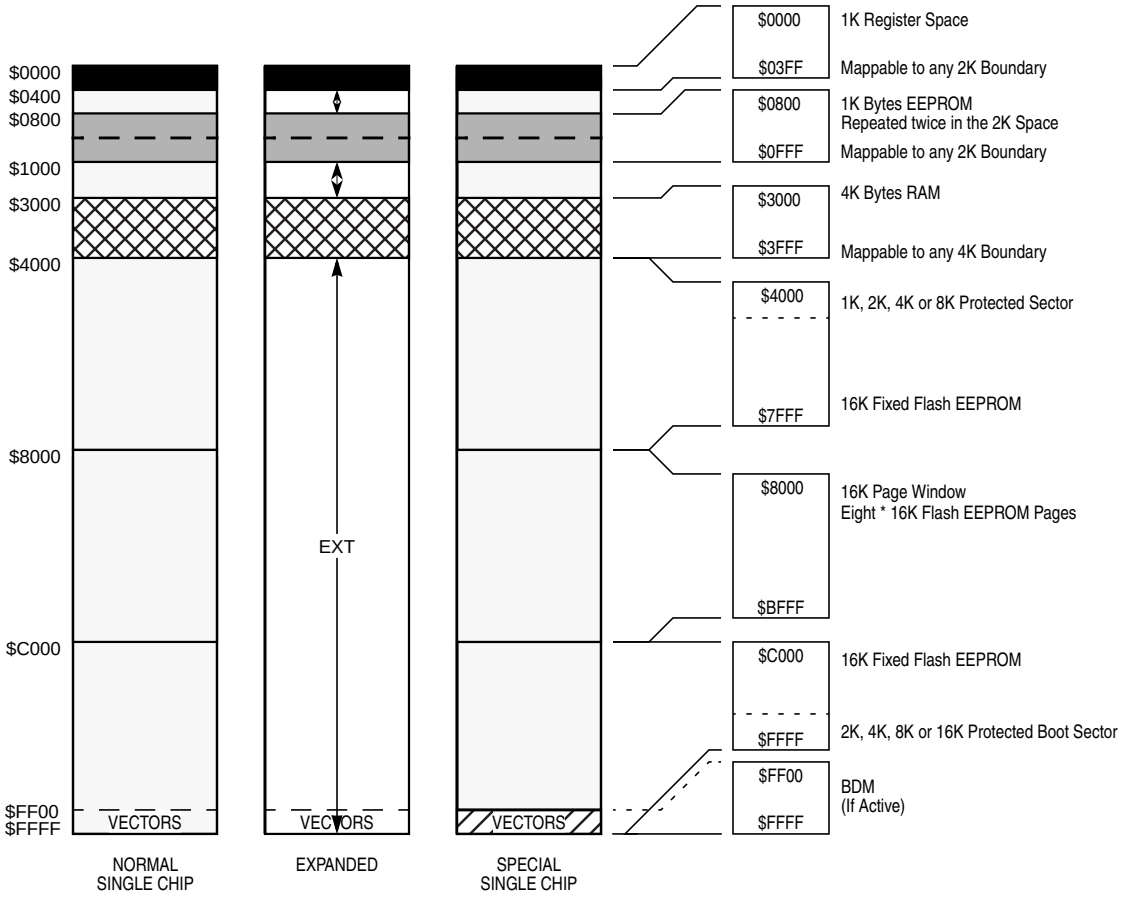
Figure 2. Pin Assignments in 80 QFP for MC9S12B-Family



The figure shows a useful map, which is not the map out of reset. After reset the map is:

$0000 - $03FF: Register Space
$0000 - $1FFF: 8K RAM (only 7K visible $0400 - $1FFF)
$0000 - $07FF: 2K EEPROM (not visible)
$2000 - $3FFF: 8K Flash

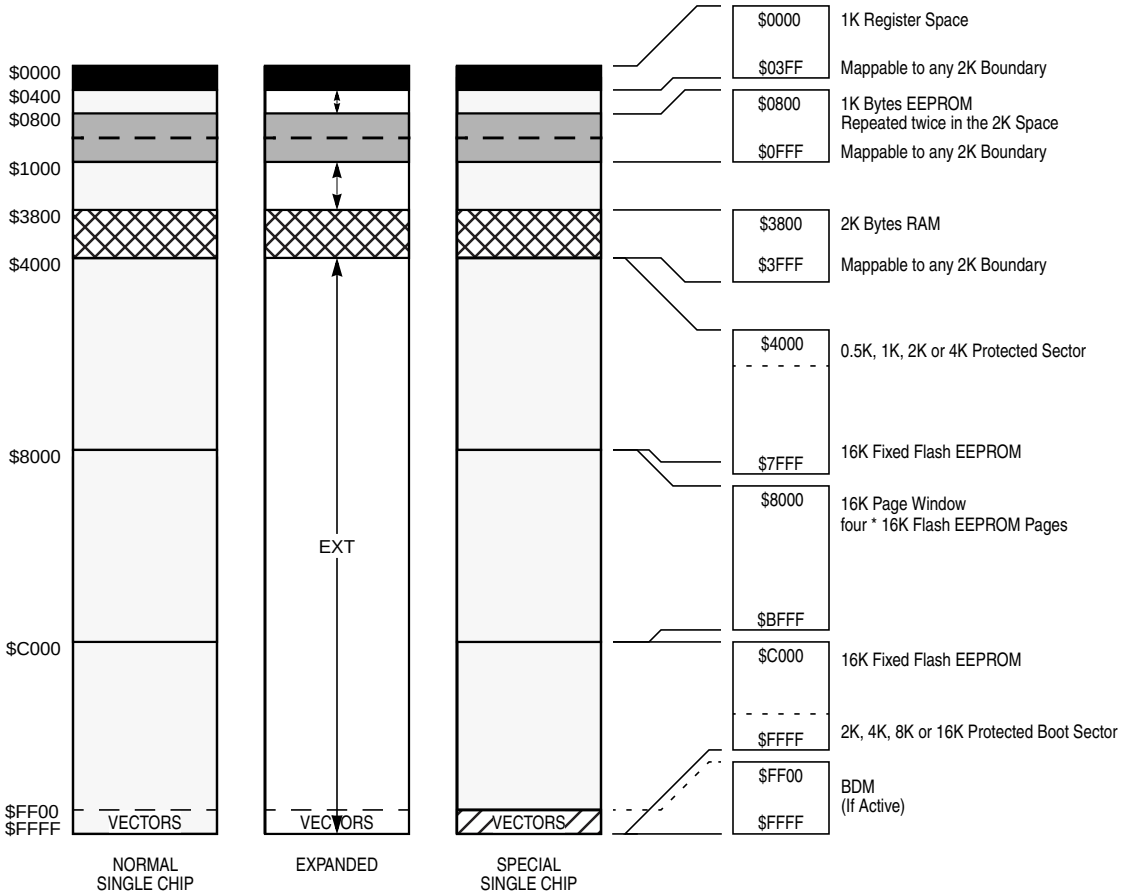
Figure 3. MC9S12Bx256 User Configurable Memory Map



The figure shows a useful map, which is not the map out of reset. After reset the map is:

$0000 - $03FF: Register Space
$0000 - $0FFF: 4K RAM (only 3K visible $0400 - $0FFF)
$0000 - $07FF: 1K EEPROM (not visible)
$2000 - $3FFF: 12K Flash

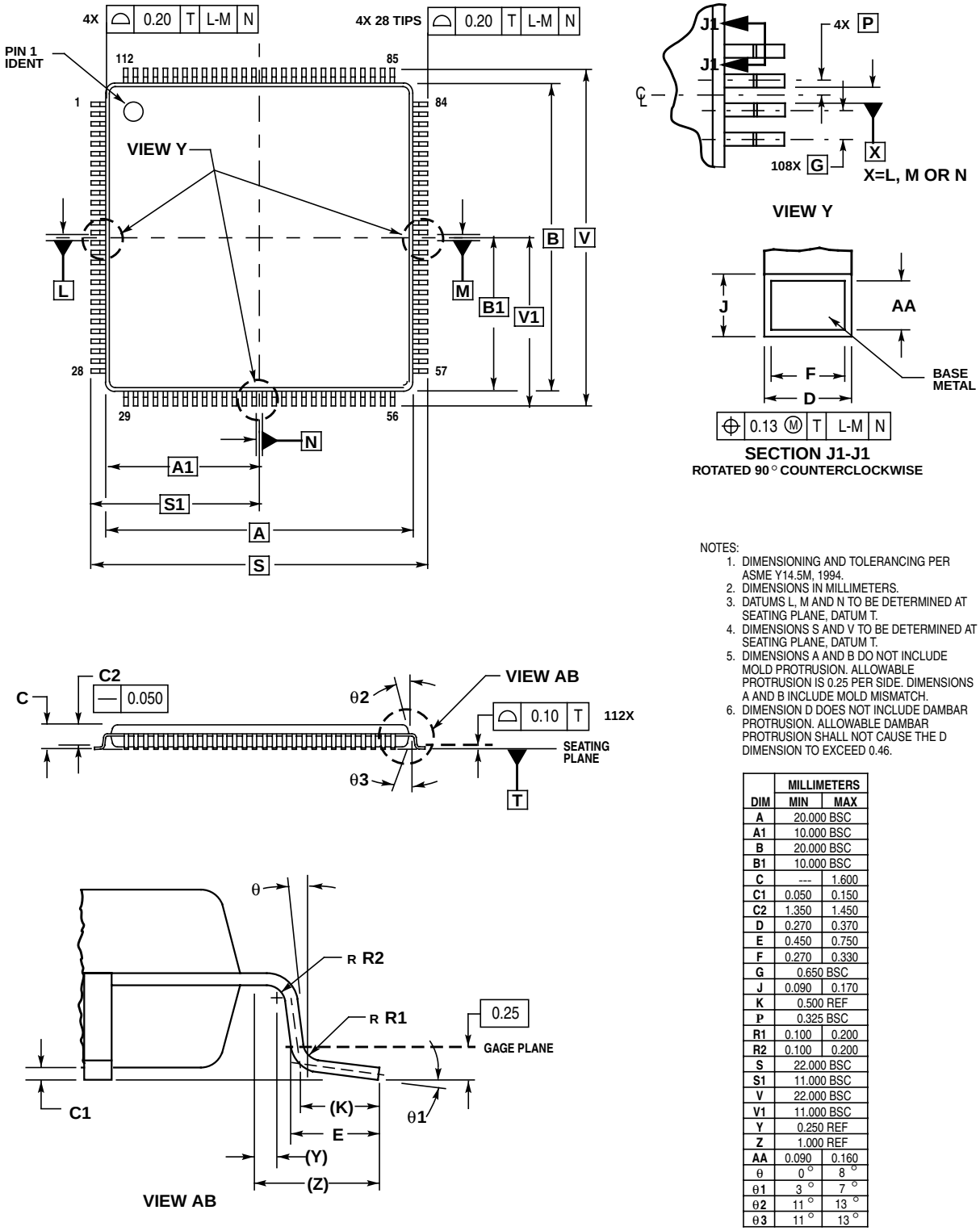
Figure 4. MC9S12Bx128 User Configurable Memory Map



The figure shows a useful map, which is not the map out of reset. After reset the map is:

$0000 - $03FF: Register Space
$0800 - $0FFF: 2K RAM
$0400 - $07FF: 1K EEPROM
$2000 - $3FFF: 12K Flash

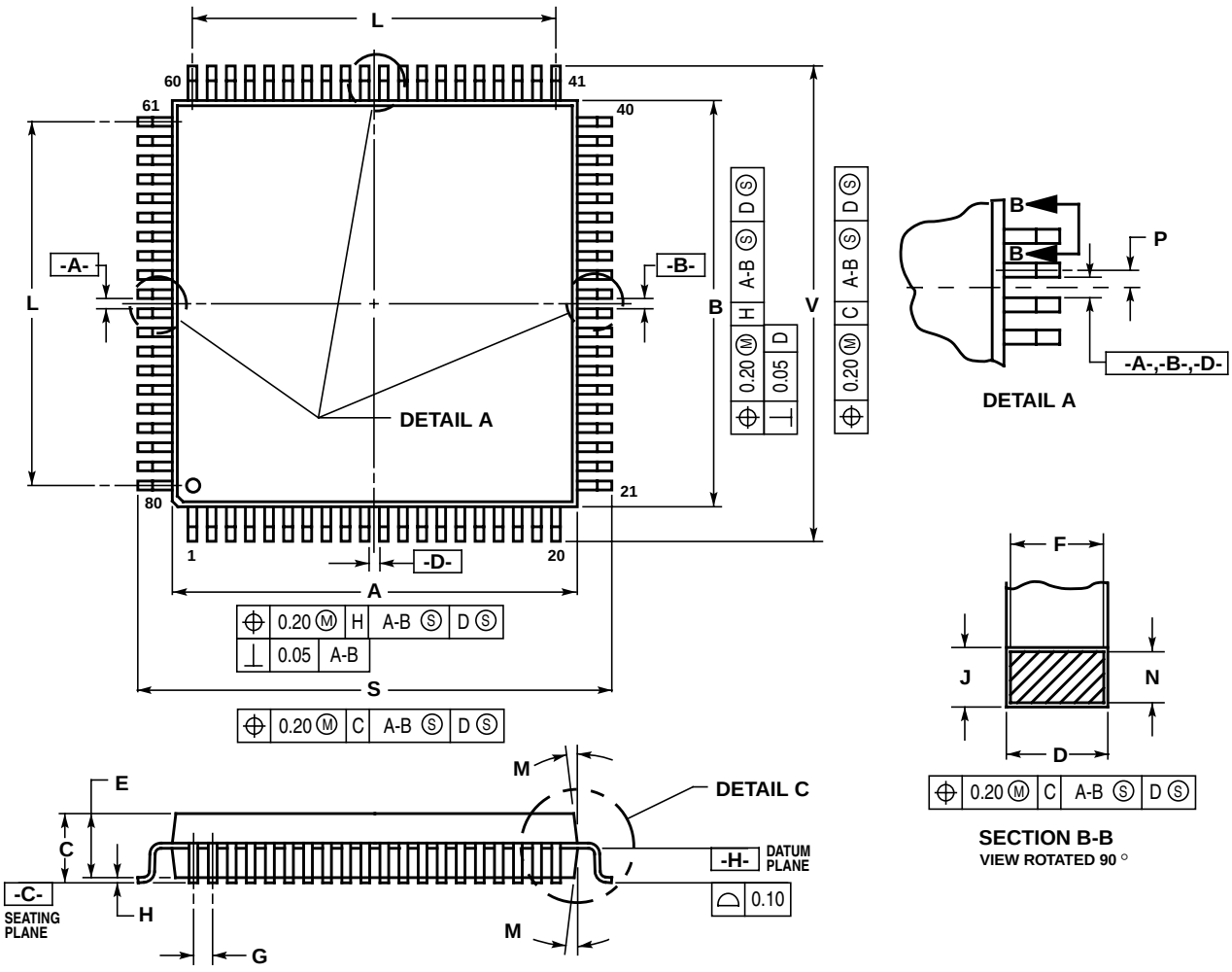
Figure 5. MC9S12Bx64 User Configurable Memory Map

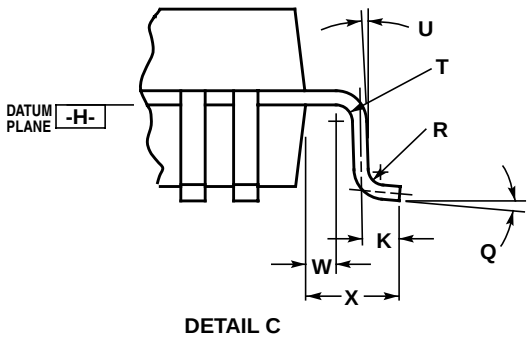


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS IN MILLIMETERS.
3. DATUMS L, M AND N TO BE DETERMINED AT SEATING PLANE, DATUM T.
4. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE, DATUM T.
5. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 PER SIDE. DIMENSIONS A AND B INCLUDE MOLD MISMATCH.
6. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL NOT CAUSE THE D DIMENSION TO EXCEED 0.46.

	MILLIMETERS	
DIM	MIN	MAX
A	20.000 BSC	
A1	10.000 BSC	
B	20.000 BSC	
B1	10.000 BSC	
C	---	1.600
C1	0.050	0.150
C2	1.350	1.450
D	0.270	0.370
E	0.450	0.750
F	0.270	0.330
G	0.650 BSC	
J	0.090	0.170
K	0.500 REF	
P	0.325 BSC	
R1	0.100	0.200
R2	0.100	0.200
S	22.000 BSC	
S1	11.000 BSC	
V	22.000 BSC	
V1	11.000 BSC	
Y	0.250 REF	
Z	1.000 REF	
AA	0.090	0.160
θ	0°	8°
θ1	3°	7°
θ2	11°	13°
θ3	11°	13°

Figure 6. 112-pin LQFP Mechanical Dimensions (case no. 987)





NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS -A-, -B- AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

	MILLIMETERS	
DIM	MIN	MAX
A	13.90	14.10
B	13.90	14.10
C	2.15	2.45
D	0.22	0.38
E	2.00	2.40
F	0.22	0.33
G	0.65 BSC	
H	---	0.25
J	0.13	0.23
K	0.65	0.95
L	12.35 REF	
M	5°	10°
N	0.13	0.17
P	0.325 BSC	
Q	0°	7°
R	0.13	0.30
S	16.95	17.45
T	0.13	---
U	0°	---
V	16.95	17.45
W	0.35	0.45
X	1.6 REF	

Figure 7. 80-pin QFP Mechanical Dimensions (case no. 841B)

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