uPSD32xx

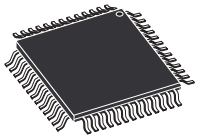
8032 MCU with USB and Programmable Logic

DATA BRIEFING

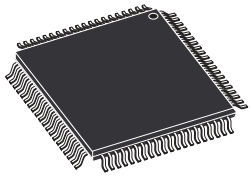
FEATURES SUMMARY

- FAST 8-BIT 8032 MCU
  - 40MHz at 5.0V, 24MHz at 3.3V
  - Core, 12-clocks per instruction
- DUAL FLASH MEMORIES WITH MEMORY MANAGEMENT
  - Place either memory into 8032 program address space or data address space
  - READ-while-WRITE operation for In-Application Programming and EEPROM emulation
  - Single voltage program and erase
  - 100K minimum erase cycles, 15-year retention
- CLOCK, RESET, AND SUPPLY MANAGEMENT
  - SRAM is Battery Backup capable
  - Normal, Idle, and Power Down Modes
  - Power-on and Low Voltage reset supervisor
  - Programmable Watchdog Timer
- PROGRAMMABLE LOGIC, GENERAL PURPOSE
  - 16 macrocells
  - Implements state machines, glue-logic, and so forth
- COMMUNICATION INTERFACES
  - USB v1.1, low-speed 1.5Mbps, 3 endpoints
  - I^2C Master/Slave bus controller
  - Two UARTs with independent baud rate
  - Six I/O ports with up to 46 I/O pins
  - 8032 Address/Data bus available on TQFP80 package
  - 5 PWM outputs, 8-bit resolution
- JTAG IN-SYSTEM PROGRAMMING
  - Program the entire device in as little as 10 seconds

Figure 1. Packages



TQFP52 (T)
52-lead, Thin,
Quad, Flat



TQFP80 (U)
80-lead, Thin,
Quad, Flat

- A/D CONVERTER
  - Four channels, 8-bit resolution, 10µs
- TIMERS AND INTERRUPTS
  - Three 8032 standard 16-bit timers
  - 10 Interrupt sources with two external interrupt pins
- Single Supply Voltage
  - 4.5 to 5.5V
  - 3.0 to 3.6V

Table 1. Device Summary

Part Number	Max Clock (MHz)	1st Flash (bytes)	2nd Flash (bytes)	SRAM (bytes)	GPIO	USB	8032 Bus	V_{CC} (V)	Pkg.	Temp.
uPSD3212C-40T6	40	64K	16K	2K	37	No	No	4.5-5.5	TQFP52	–40°C to 85°C
uPSD3212CV-24T6	24	64K	16K	2K	37	No	No	3.0-3.6	TQFP52	–40°C to 85°C
uPSD3212C-40U6	40	64K	16K	2K	46	No	Yes	4.5-5.5	TQFP80	–40°C to 85°C
uPSD3212CV-24U6	24	64K	16K	2K	46	No	Yes	3.0-3.6	TQFP80	–40°C to 85°C
uPSD3233B-40T6	40	128K	32K	8K	37	No	No	4.5-5.5	TQFP52	–40°C to 85°C
uPSD3233BV-24T6	24	128K	32K	8K	37	No	No	3.0-3.6	TQFP52	–40°C to 85°C
uPSD3233B-40U6	40	128K	32K	8K	46	No	Yes	4.5-5.5	TQFP80	–40°C to 85°C
uPSD3233BV-24U6	24	128K	32K	8K	46	No	Yes	3.0-3.6	TQFP80	–40°C to 85°C
uPSD3234A-40T6	40	256K	32K	8K	37	Yes	No	4.5-5.5	TQFP52	–40°C to 85°C
uPSD3234A-40U6	40	256K	32K	8K	46	Yes	Yes	4.5-5.5	TQFP80	–40°C to 85°C
uPSD3234BV-24U6	24	256K	32K	8K	46	No	Yes	3.0-3.6	TQFP80	–40°C to 85°C
uPSD3253B-40T6	40	128K	32K	32K	37	No	No	4.5-5.5	TQFP52	–40°C to 85°C
uPSD3253BV-24T6	24	128K	32K	32K	37	No	No	3.0-3.6	TQFP52	–40°C to 85°C
uPSD3254BV-24U6	24	256K	32K	32K	46	No	Yes	3.0-3.6	TQFP80	–40°C to 85°C
uPSD3254A-40T6	40	256K	32K	32K	37	Yes	No	4.5-5.5	TQFP52	–40°C to 85°C
uPSD3254A-40U6	40	256K	32K	32K	46	Yes	Yes	4.5-5.5	TQFP80	–40°C to 85°C

SUMMARY DESCRIPTION

The uPSD32xx Series combines a fast 8051-based microcontroller with a flexible memory structure, programmable logic, and a rich peripheral mix including USB, to form an ideal embedded controller. At its core is an industry-standard 8032 MCU operating up to 40MHz.

A JTAG serial interface is used for In-System Programming (ISP) in as little as 10 seconds, perfect for manufacturing and lab development.

The USB 1.1 low-speed interface has one Control endpoint and two Interrupt endpoints suitable for HID class drivers.

The 8032 core is coupled to Programmable System Device (PSD) architecture to optimize the 8032 memory structure, offering two independent banks of Flash memory that can be placed at virtually any address within 8032 program or data address space, and easily paged beyond 64K bytes using on-chip programmable decode logic.

Dual Flash memory banks provide a robust solution for remote product updates in the field through In-Application Programming (IAP). Dual Flash banks also support EEPROM emulation, eliminating the need for external EEPROM chips.

General purpose programmable logic (PLD) is included to build an endless variety of glue-logic, saving external logic devices. The PLD is configured using the software development tool, PSDsoft Express, available from the web at **www.st.com/psm**, at no charge.

The uPSD32xx also includes supervisor functions such as a programmable watchdog timer and low-voltage reset.

Figure 2. Block Diagram

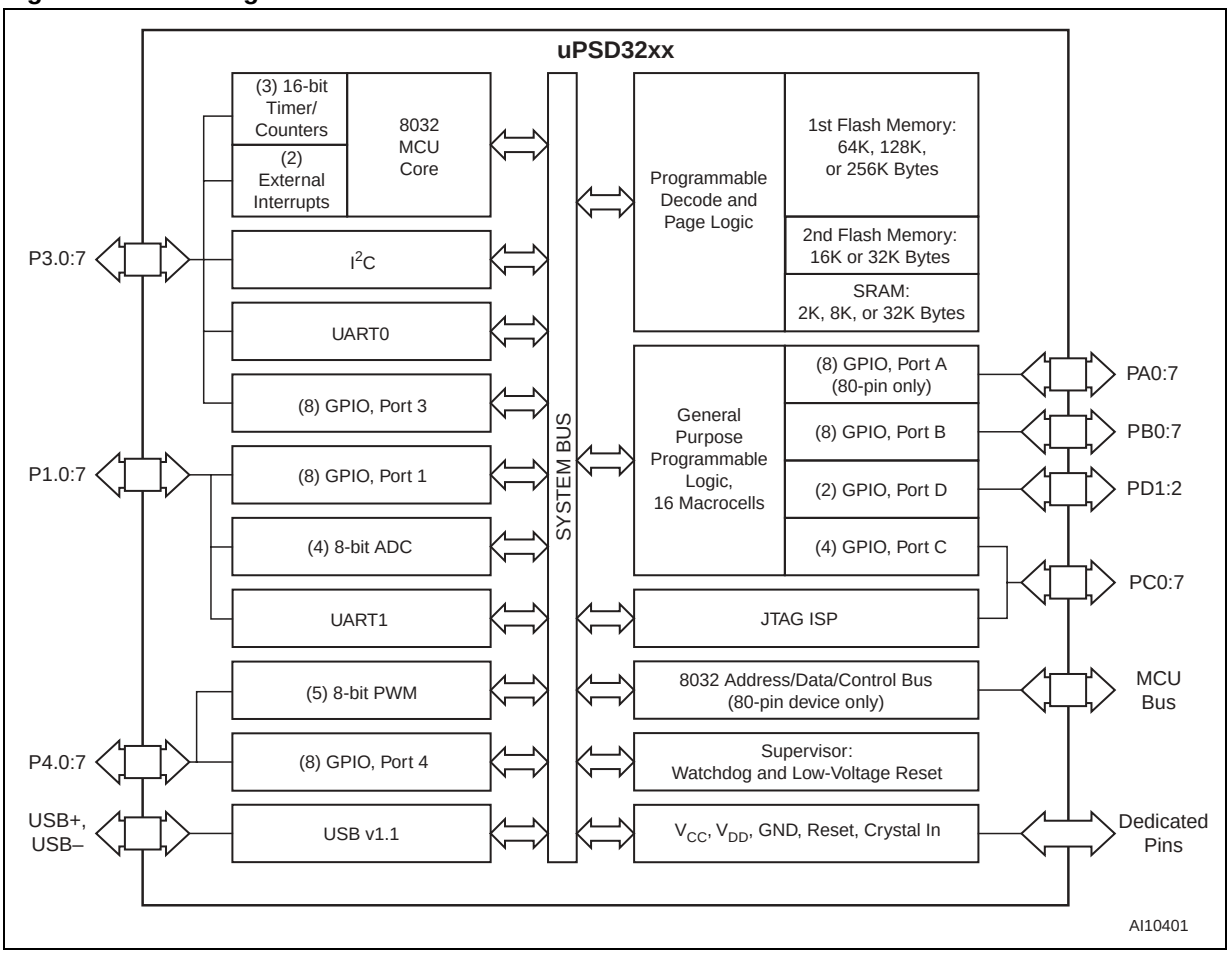
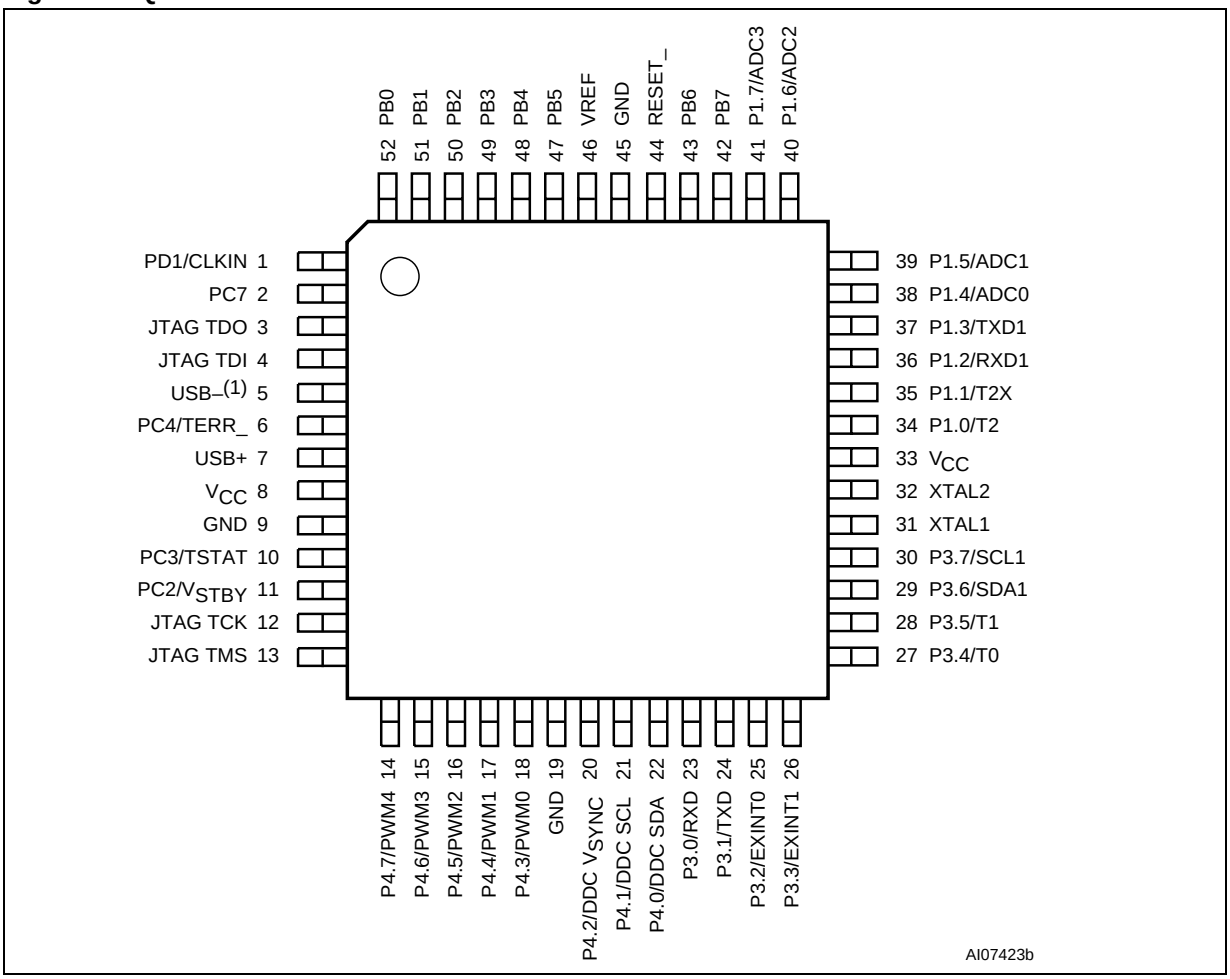
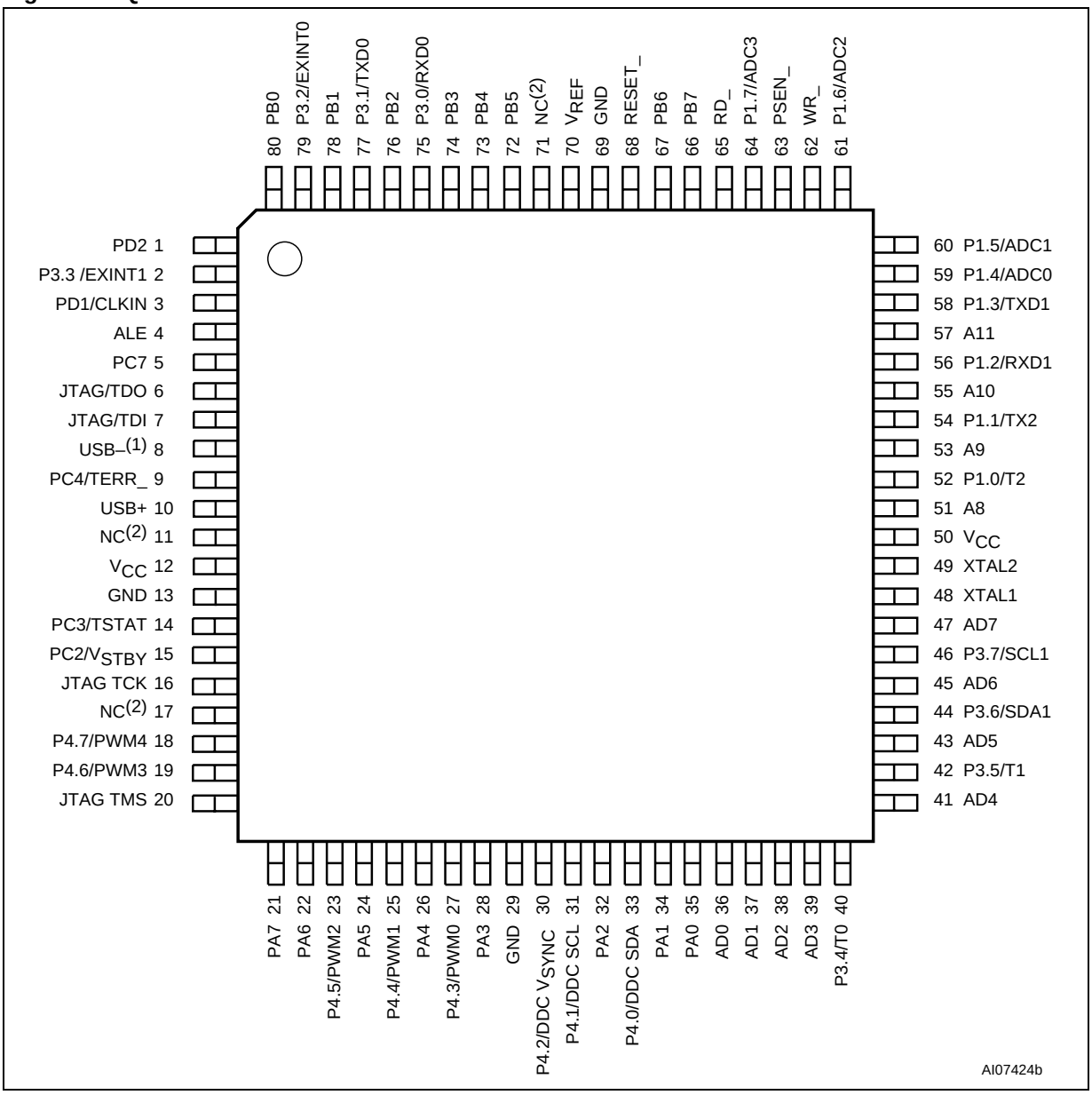


Figure 3. TQFP52 Connections



Note: 1. Pull-up resistor required on pin 5 (2kΩ for 3V devices, 7.5kΩ for 5V devices).

Figure 4. TQFP80 Connections



Note: 1. Pull-up resistor required on pin 8 (2kΩ for 3V devices, 7.5kΩ for 5V devices).
2. NC = Not Connected.

Table 2. Major Parameters

Parameters/Conditions/ Comments	5V Test Conditions	5.0V Value	3.3V Test Conditions	3.3V Value	Unit
Operating Voltage	–	4.5 to 5.5	–	3.0 to 3.6	V
Operating Temperature	–	–40 to 85	–	–40 to 85	°C
MCU Frequency 12MHz (min) for USB; 8MHz (min) for I^2C	–	1 Min, 40 Max	–	1 Min, 24 Max	MHz
Active Current, Typical (25°C operation; 80% Flash and 15% SRAM accesses, 45 PLD product terms used; PLD Turbo mode Off)	24MHz MCU clock, 12MHz PLD input frequency, 4MHz ALE	72	12MHz MCU clock, 6MHz PLD input frequency, 2MHz ALE	21	mA
Idle Current, Typical (CPU halted but some peripherals active; 25°C operation; 45 PLD product terms used; PLD Turbo mode Off)	24MHz MCU clock, 12MHz PLD input frequency	25	12MHz MCU clock, 1MHz PLD input frequency	7	mA
Standby Current, Typical (Power-down Mode, requires reset to exit mode; without Low-Voltage Detect (LVD) Supervisor)	180µA with LVD	110	100µA with LVD	60	µA
SRAM Backup Current, Typical (If external battery is attached.)	–	0.5	–	0.5	µA
I/O Sink/Source Current Ports A, B, C, and D	V_{OL} = 0.25V (max); V_{OH} = 3.9V (min)	I_{OL} = 8 (max); I_{OH} = –2 (min)	V_{OL} = 0.15V (max); V_{OH} = 2.6V (min)	I_{OL} = 4 (max); I_{OH} = –1 (min)	mA
PLD Macrocells (For registered or combinatorial logic)	–	16	–	16	–
PLD Inputs (Inputs from pins, macrocell feedback, or MCU addresses)	–	69	–	69	–
PLD Outputs (Output to pins or internal feedback)	–	16	–	16	–
PLD Propagation Delay, Typical (PLD input to output, Turbo Mode)	–	15	–	22	ns

PART NUMBERING

Table 3. Ordering Information Scheme

Example: uPSD 3 2 1 2 C V – 24 U 6 T

Device Type
uPSD = Microcontroller PSD

Family
3 = 8032 core

PLD Size
2 = 16 Macrocells

SRAM Size
1 = 2K bytes
3 = 8K bytes
5 = 32K bytes

Main Flash Memory Size
2 = 64K bytes
3 = 128K bytes
4 = 256K bytes

IP Mix
A = USB, I^2C, PWM, DDC, ADC, (2) UARTs, Supervisor (Reset Out, Reset In, LVD, WD)
B = I^2C, PWM, DDC, ADC, (2) UARTs, Supervisor (Reset Out, Reset In, LVD, WD)
C = I^2C, PWM, ADC, (2) UARTs, Supervisor (Reset Out, Reset In, LVD, WD)

Operating Voltage
blank = V_{CC} = 4.5 to 5.5V
V = V_{CC} = 3.0 to 3.6V

Speed
–24 = 24MHz
–40 = 40MHz

Package
T = 52-pin TQFP
U = 80-pin TQFP

Temperature Range
6 = –40 to 85°C

Shipping Option
T = Tape and Reel Packing

For other options, or for more information on any aspect of this device, please contact the ST Sales Office nearest you.