ORDER NUMBER(S):

USB2640i/USB2641i-HZH-XX for 48-PIN, QFN LEAD-FREE ROHS COMPLIANT PACKAGE

"XX" in the order number indicates the internal ROM firmware revision level.

Please contact your SMSC representative for more information.

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Overview

The SMSC USB2640i/USB2641i is an integrated USB 2.0 compliant, Hi-Speed hub for USB port expansion with an attached bulk only mass storage class peripheral controller. This multi-format flash media controller and USB Hub Combo features three downstream ports: one port is dedicated to an internally connected ultra fast flash media reader/writer and two exposed downstream ports are available for external peripheral expansion.

The SMSC USB2640i/USB2641i is an ultra fast, OEM-configurable, hub controller IC with three downstream ports for embedded USB solutions. The USB2640i/USB2641i will attach to an upstream port as a Full-Speed Hub or as a Full-/Hi-Speed Hub. The hub supports Low-Speed, Full-Speed, and Hi-Speed (if operating as a Hi-Speed Hub) downstream devices on all of the enabled downstream ports.

All required resistors on the USB ports are integrated into the hub. This includes all series termination resistors on D+ and D– pins and all required pull-down and pull-up resistors on D+ and D– pins. The over-current sense inputs for the downstream facing ports have internal pull-up resistors.

The USB2640i/USB2641i includes programmable features such as:

PortMap which provides flexible port mapping and disable sequences. The downstream ports of a USB2640i/USB2641i hub can be reordered or disabled in any sequence to support multiple platform designs with minimum effort. For any port that is disabled, the USB2640i/USB2641i automatically reorders the remaining ports to match the USB host controller's port numbering scheme.

PortSwap which adds per-port programmability to USB differential-pair pin locations. PortSwap allows direct alignment of USB signals (D+/D-) to connectors avoiding uneven trace length or crossing of the USB differential signals on the PCB.

PHYBoost which enables four programmable levels of USB signal drive strength in downstream port transceivers. PHYBoost attempts to restore USB signal integrity that has been compromised by system level variables such as poor PCB layout, long cables, etc.

Device Features

Hardware Features

- Single chip flash media controller
- The SMSC USB2640i/USB2641i supports the industrial temperature range of -40°C to 85°C
- Transaction translator (TT) in the hub supports operation of FS and LS peripherals
- Full power management with individual or ganged power control of each downstream port
- Optional support for external firmware access via SPI interface
  - 30 MHz or 60 MHz operation support
  - Single bit or dual bit mode support
  - Mode 0 or mode 3 SPI support

Compliant with the following flash media card specifications:

- Secure Digital 2.0 / MultiMediaCard 4.2
  - SD 2.0, HS-SD, HC-SD
  - TransFlash™ and reduced form factor media
  - 1/4/8 bit MMC 4.2
- SDIO and MMC streaming mode support
- Memory Stick 1.43
- Memory Stick Pro Format 1.02
- Memory Stick Pro-HG Duo Format 1.01
  - Memory Stick, MS Duo, HS-MS, MS Pro-HG, MS Pro
- Memory Stick Duo 1.10
- xD-Picture Card 1.2 (USB2640i only)
- On board 24 MHz crystal driver circuit
- Optional external 24 MHz clock input
  - Must be used with an external resistor divider to provide a 1.8 V signal
- Up to 9 GPIOs: Configuration and polarity for special function use such as LED indicators, button inputs, and power control to memory devices
  - The number of actual GPIOs depends on the implementation configuration used
  - One GPIO available with up to 200 mA drive and protected “fold-back” short circuit current
- 8051 8-bit microprocessor
  - 60 MHz - single cycle execution
  - 64 KB ROM; 9 KB RAM
- Internal regulator for 1.8 V core operation
- Optimized pinout improves signal flow, easing implementation and allowing for improved signal integrity treatment

Software Features

- Optimized for low latency interrupt handling
- Hub and flash media reader/writer configuration from a single source: External I^2C ROM or external SPI ROM
- EEPROM update via USB
- Please see the USB2640i/USB2641i Software Release Notes for additional software features

OEM Selectable Features

Hub

A default configuration is available in USB2640i/USB2641i following a reset. The USB2640i/USB2641i may also be configured by an external I^2C EEPROM or via external SPI ROM flash.

The USB2640i/USB2641i supports several OEM selectable features:

- Compound Device support (port is permanently hardwired to a downstream USB peripheral device), on a port-by-port basis.
- Select over-current sensing and port power control on an individual (port-by-port) or ganged (all ports together) basis to match the OEM's choice of circuit board component selection.
- Port power control and over-current detection/delay features
- Configure the delay time for filtering the over-current sense inputs.
- Configure the delay time for turning on downstream port power.
- Bus- or self-powered selection
- Hub port disable or non-removable configurations
- Flexible port mapping and disable sequence. Ports can be disabled/reordered in any sequence to support multiple platforms with a single design. The hub will automatically reorder the remaining ports to match the host controller's numbering scheme.
- Programmable USB differential-pair pin location.
  - Eases PCB layout by aligning USB signal lines directly to connectors
- Programmable USB signal drive strength. Recover USB signal integrity due to compromised system environments using 4 levels of signal drive strength.
- Indicate the maximum current that the 2-port hub consumes from the USB upstream port.
- Indicate the maximum current required for the hub controller.

Flash Media Controller

- Customize vendor ID, product ID, and device ID.
- 12-hex digit (max) serial number string
- Customizable vendor specific data by optional use of external serial EEPROM
- 28-character manufacturer ID and product string for flash media reader/writer
- LED blink interval or duration

Block Diagrams

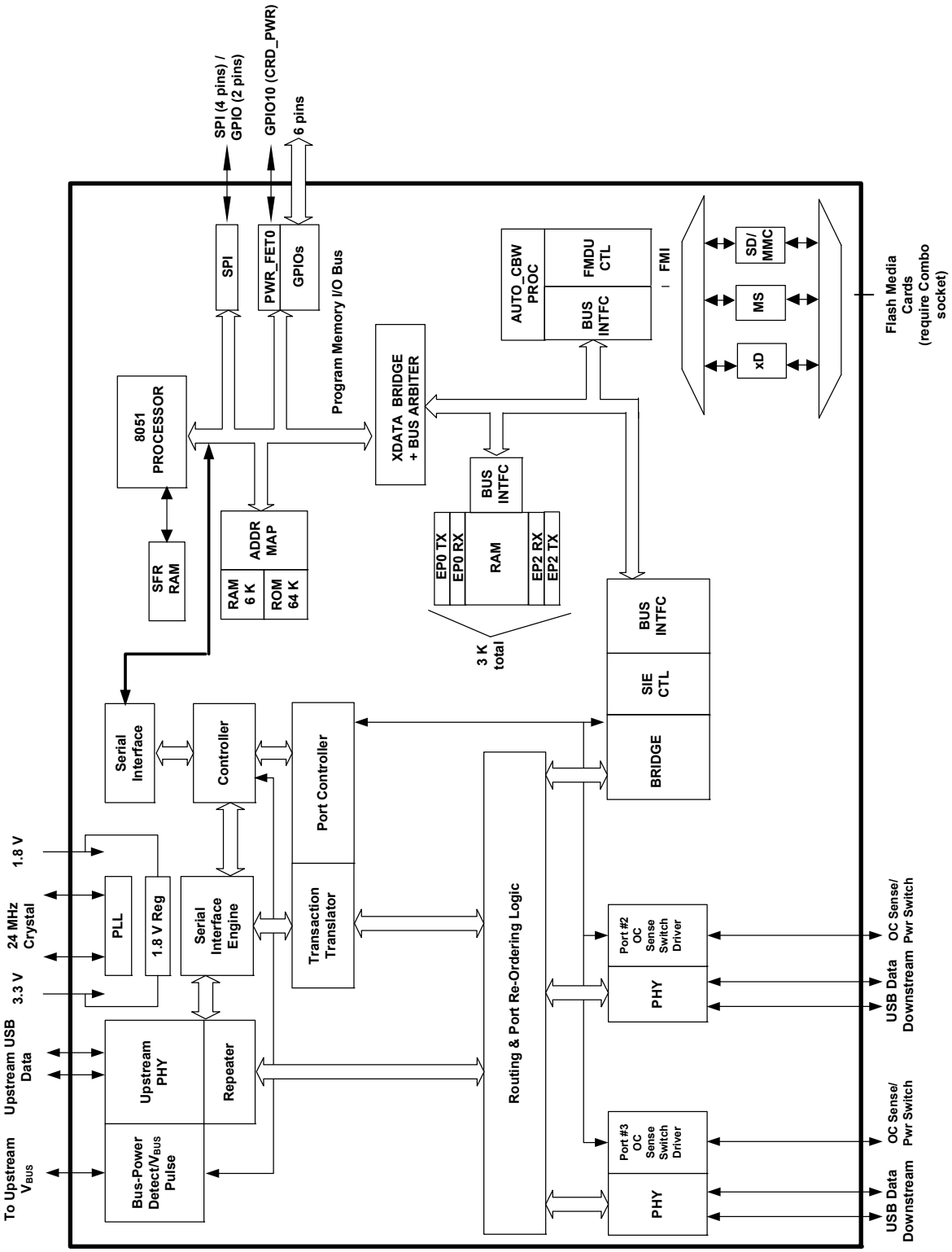


Figure 1 USB2640i Block Diagram

PRODUCT PREVIEW

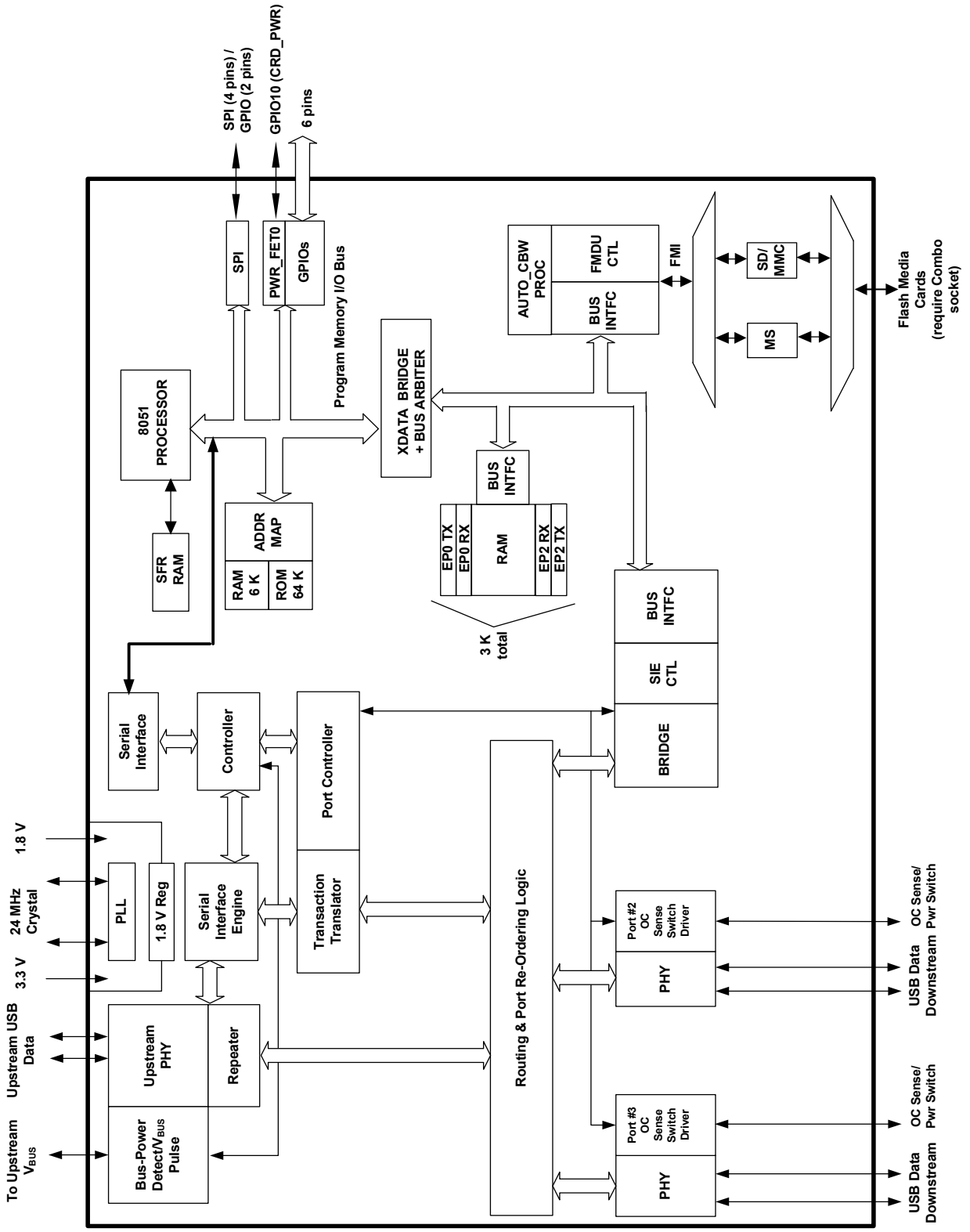
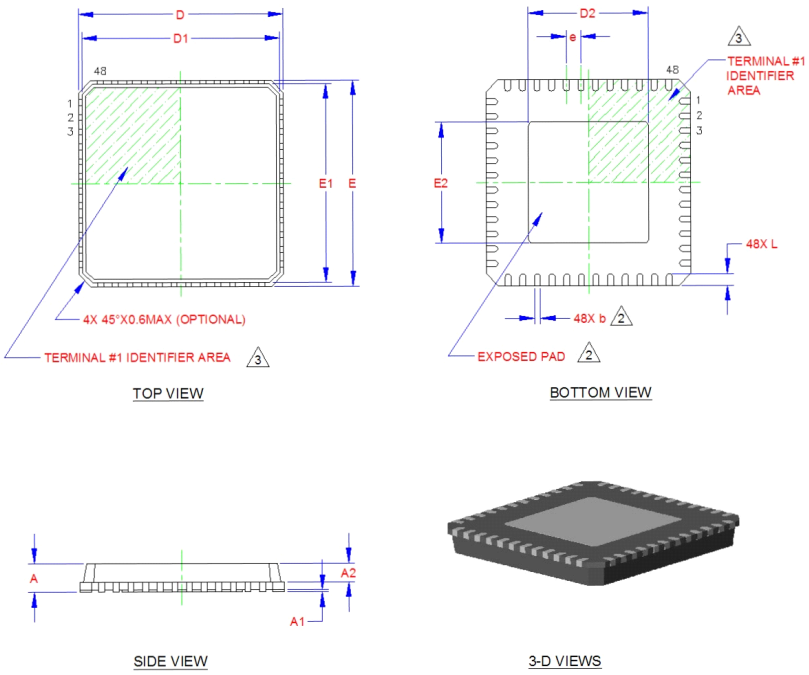
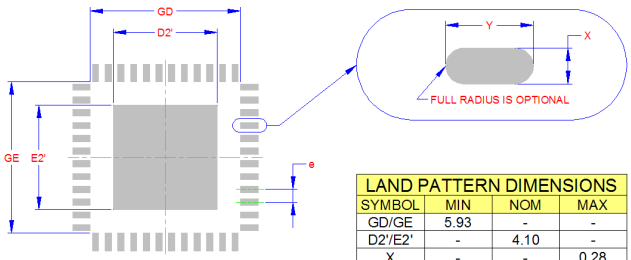


Figure 2 USB2641i Block Diagram

PRODUCT PREVIEW

Package Outline





RECOMMENDED PCB LAND PATTERN

LAND PATTERN DIMENSIONS			
SYMBOL	MIN	NOM	MAX
GD/GE	5.93	-	-
D2'/E2'	-	4.10	-
X	-	-	0.28
Y	-	-	0.69
e		0.50	

COMMON DIMENSIONS					
SYMBOL	MIN	NOM	MAX	NOTE	REMARK
A	0.70	-	1.00	-	OVERALL PACKAGE HEIGHT
A1	0	0.02	0.05	-	STANDOFF
A2	-	-	0.90	-	MOLD CAP THICKNESS
D/E	6.85	7.00	7.15	-	X/Y BODY SIZE
D1/E1	6.55	-	6.95	-	X/Y MOLD CAP SIZE
D2/E2	4.00	4.10	4.20	2	X/Y EXPOSED PAD SIZE
L	0.30	-	0.50	-	TERMINAL LENGTH
b	0.18	0.25	0.30	2	TERMINAL WIDTH
e	0.50 BSC			-	TERMINAL PITCH

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETER.
2. POSITION TOLERANCE OF EACH TERMINAL AND EXPOSED PAD IS ± 0.05mm AT MAXIMUM MATERIAL CONDITION. DIMENSIONS "b" APPLIES TO PLATED TERMINALS AND IT IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
3. DETAILS OF TERMINAL #1 IDENTIFIER ARE OPTIONAL BUT MUST BE LOCATED WITHIN THE AREA INDICATED.

Figure 3 48-Pin QFN Package

PRODUCT PREVIEW