USB2504/USB2504A

Integrated USB2.0 Compatible 4-Port Hub

PRODUCT FEATURES

Data Brief

- Integrated USB2.0 Compatible 4-Port Hub
  - 4 Transaction Translators for highest performance
  - High-Speed (480Mbits/s), Full-Speed (12Mbits/s) and Low-Speed (1.5Mbits/s) compatible
  - Full power management with per port or ganged, selectable power control
  - Detects Bus-Power/Self-Power source and changes mode automatically
- Complete USB Specification 2.0 Compatibility
  - Includes USB2.0 Transceivers
- VID/PID/DID, and Port Configuration for Hub via:
  - Single Serial I^2C EEPROM
  - SMBus Slave Port
- Default VID/PID/DID, allows functionality when configuration EEPROM is absent
- Hardware Strapping options allow for configuration without an external EEPROM or SMBus Host
- On-Board 24MHz Crystal Driver Circuit or 24 MHz external clock driver
- Internal PLL for 480MHz USB2.0 Sampling
- Internal 1.8V Linear Voltage Regulator
- Integrated USB termination and Pull-up/Pull-down resistors
- Internal Short Circuit protection of USB differential signal pins
- 1.8 Volt Low Power Core Operation
- 3.3 Volt I/O with 5V Input Tolerance
- 64-Pin TQFP or 56 Pin QFN Package; green, lead-free package also available

ORDER NUMBER(S):

USB2504/USB2504A-JD FOR 64 PIN TQFP PACKAGE, USB2504/USB2504A-ABZJ FOR 56 PIN QFN PACKAGE AND USB2504/USB2504A-JT FOR 64 PIN TQFP PACKAGE (GREEN, LEAD-FREE)

80 Arkay Drive
Hauppauge, NY 11788
(631) 435-6000
FAX (631) 273-3123

General Description

The SMSC 4-Port Hub is fully compliant with the USB2.0 Specification and will attach to a USB host as a Full-Speed Hub or as a Full-/High-Speed Hub. The 4-Port Hub supports Low-Speed, Full-Speed, and High-Speed (if operating as a High-Speed Hub) downstream devices on all of the enabled downstream ports.

A dedicated Transaction Translator (TT) is available for each downstream facing port. This architecture ensures maximum USB throughput for each connected device when operating with mixed-speed peripherals.

The Hub works with an external USB power distribution switch device to control V_{BUS} switching to downstream ports, and to limit current and sense over-current conditions.

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.

Throughout this document the upstream facing port of the hub will be referred to as the upstream port, and the downstream facing ports will be called the downstream ports.

OEM Selectable Features

A default configuration is available in the USB2504/USB2504A following a reset. This configuration may be sufficient for some applications. Strapping option pins make it possible to modify a limited subset of the configuration options.

The USB2504/USB2504A may also be configured by an external EEPROM or a microcontroller. When using the microcontroller interface, the Hub appears as an SMBus slave device. If the Hub is pin-strapped for external EEPROM configuration but no external EEPROM is present, then a value of ‘0’ will be written to all configuration data bit fields (the hub will attach to the host with all ‘0’ values).

The 4-Port Hub supports several OEM selectable features:

- Operation as a Self-Powered USB Hub or as a Bus-Powered USB Hub.
- Operation as a Dynamic-Powered Hub (Hub operates as a Bus-Powered device if a local power source is not available and switches to Self-Powered operation when a local power source is available).
- Multiple Transaction Translator (Multi-TT) or Single-TT support.
- Optional OEM configuration via I2C EEPROM or via the industry standard SMBus interface from an external SMBus Host.
- Port power switching on an individual or ganged basis.
- Port over-current monitoring on an individual or ganged basis.
- LED indicator support.
- Compound device support (port is permanently hardwired to a downstream USB peripheral device).
- Hardware strapping options enable configuration of the following features.
  Non-Removable Ports
  Port Power Polarity (active high or active low logic)
  Port Disable
  LED support
  MTT enable
  Ganged Vs Port power switching and over-current sensing

Block Diagram

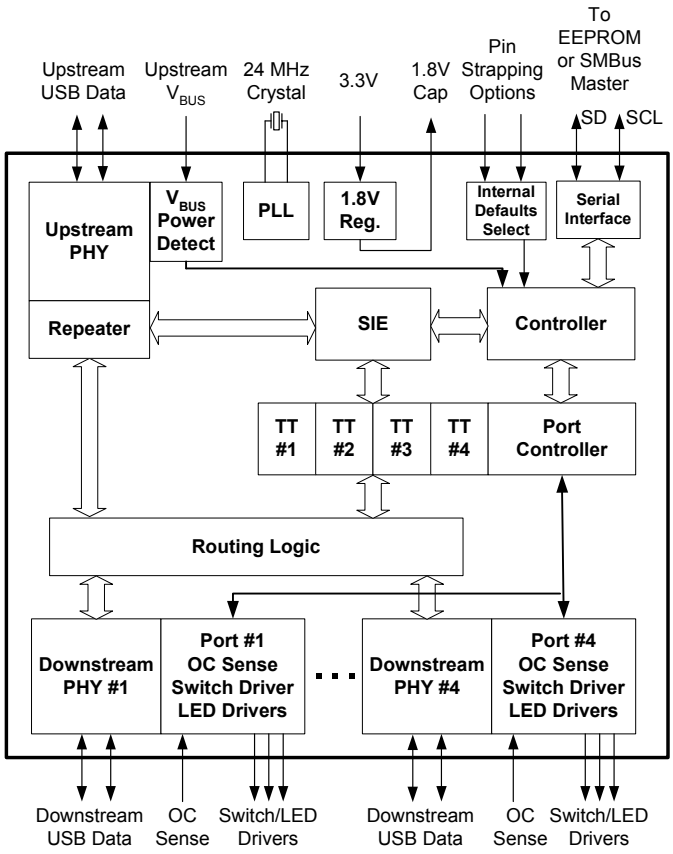


Figure 1 4-Port Block Diagram

PRODUCT PREVIEW

Package Outlines

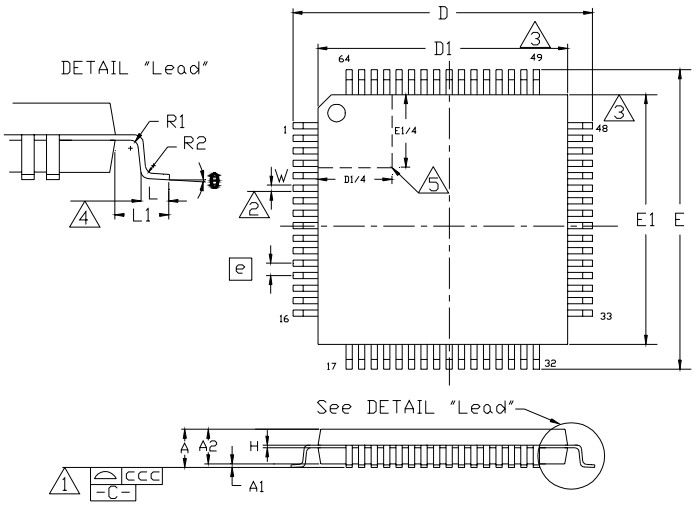


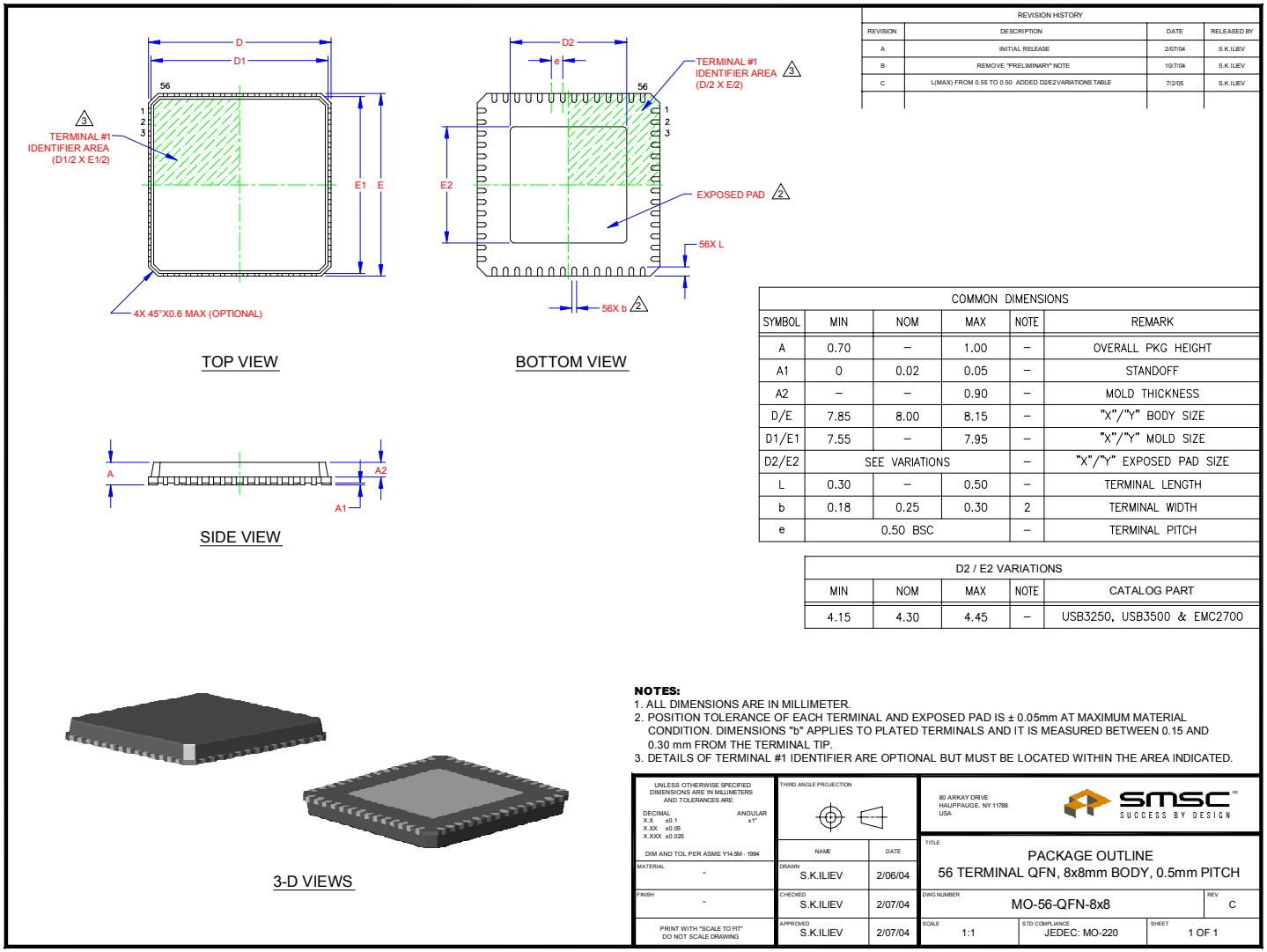
Figure 2 64 Pin TQFP Package Outline (10x10x1.4 mm body - 2 mm footprint)

Table 1 64 Pin TQFP Package Parameters

	MIN	NOMINAL	MAX	REMARKS
A	~	~	1.60	Overall Package Height
A1	0.05	~	0.15	Standoff
A2	1.35	~	1.45	Body Thickness
D	11.80	~	12.20	X Span
D1	9.80	~	10.20	X body Size
E	11.80	~	12.20	Y Span
E1	9.80	~	10.20	Y body Size
H	0.09	~	0.20	Lead Frame Thickness
L	0.45	0.60	0.75	Lead Foot Length
L1	~	1.00	~	Lead Length
e	0.50 Basic			Lead Pitch
q	0^o	~	7^o	Lead Foot Angle
W	0.17	0.22	0.27	Lead Width
R1	0.08	~	~	Lead Shoulder Radius
R2	0.08	~	0.20	Lead Foot Radius
ccc	~	~	0.08	Coplanarity

Notes:

1. Controlling Unit: millimeter.
2. Tolerance on the true position of the leads is ± 0.04 mm maximum.
3. Package body dimensions D1 and E1 do not include the mold protrusion. Maximum mold protrusion is 0.25 mm per side.
4. Dimension for foot length L measured at the gauge plane 0.25 mm above the seating plane.
5. Details of pin 1 identifier are optional but must be located within the zone indicated.



REVISION HISTORY			
REVISION	DESCRIPTION	DATE	RELEASED BY
A	INITIAL RELEASE	2/07/04	S.K.ILIEV
B	REMOVE "PRELIMINARY" NOTE	10/7/04	S.K.ILIEV
C	L(MAX) FROM 0.55 TO 0.50. ADDED D2/E2 VARIATIONS TABLE	7/2/05	S.K.ILIEV

COMMON DIMENSIONS					
SYMBOL	MIN	NOM	MAX	NOTE	REMARK
A	0.70	–	1.00	–	OVERALL PKG HEIGHT
A1	0	0.02	0.05	–	STANDOFF
A2	–	–	0.90	–	MOLD THICKNESS
D/E	7.85	8.00	8.15	–	"X"/"Y" BODY SIZE
D1/E1	7.55	–	7.95	–	"X"/"Y" MOLD SIZE
D2/E2	SEE VARIATIONS			–	"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

D2 / E2 VARIATIONS				
MIN	NOM	MAX	NOTE	CATALOG PART
4.15	4.30	4.45	–	USB3250, USB3500 & EMC2700

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.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS AND TOLERANCES ARE:
DECIMAL X.X ±0.1, X.XX ±0.05, X.XXX ±0.025
ANGULAR ±1°
DIM AND TOL PER ASME Y14.5M - 1994
MATERIAL -
FINISH -
PRINT WITH "SCALE TO FIT" DO NOT SCALE DRAWING

THIRD ANGLE PROJECTION

	NAME	DATE
DRAWN	S.K.ILIEV	2/06/04
CHECKED	S.K.ILIEV	2/07/04
APPROVED	S.K.ILIEV	2/07/04

80 ARKAY DRIVE
HAUPPAUGE, NY 11788
USA

SMSC SUCCESS BY DESIGN

TITLE: PACKAGE OUTLINE
56 TERMINAL QFN, 8x8mm BODY, 0.5mm PITCH

DWG NUMBER: MO-56-QFN-8x8 REV: C

SCALE: 1:1 STD COMPLIANCE: JEDEC: MO-220 SHEET: 1 OF 1

Figure 3 56 Pin QFN Package and Parameters