



SMSC[™]
SUCCESS BY DESIGN

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 (480Mbps/s), Full-Speed (12Mbps/s) and Low-Speed (1.5Mbps/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 I²C 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)**

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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

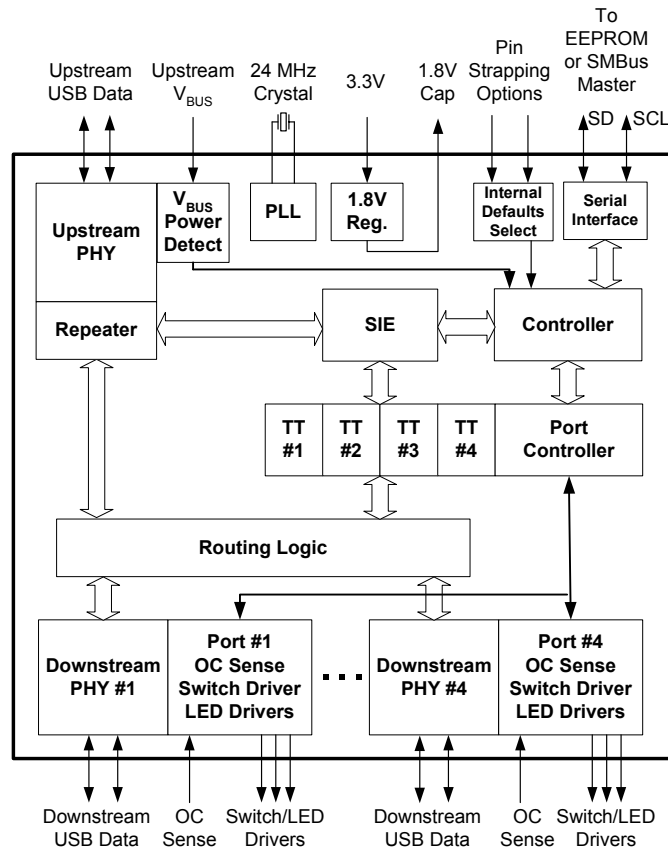


Figure 1 4-Port Block Diagram

Package Outlines

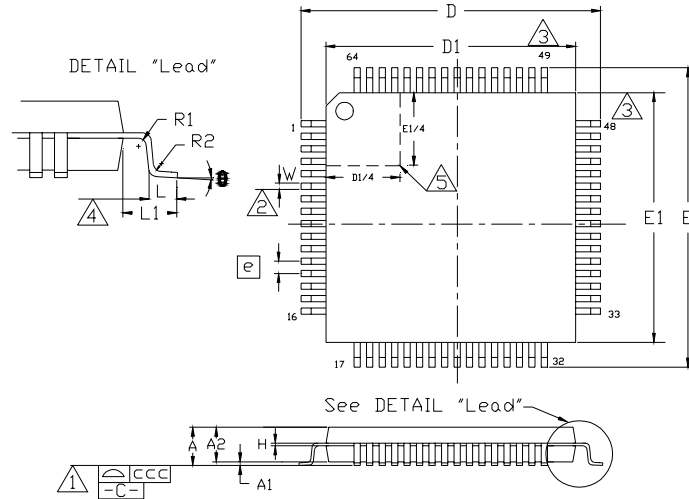


Figure 2 64 Pin TQFP Package Outline (10x10x1.4 mm body - 2 mm footprint)

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°	~	7°	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:

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

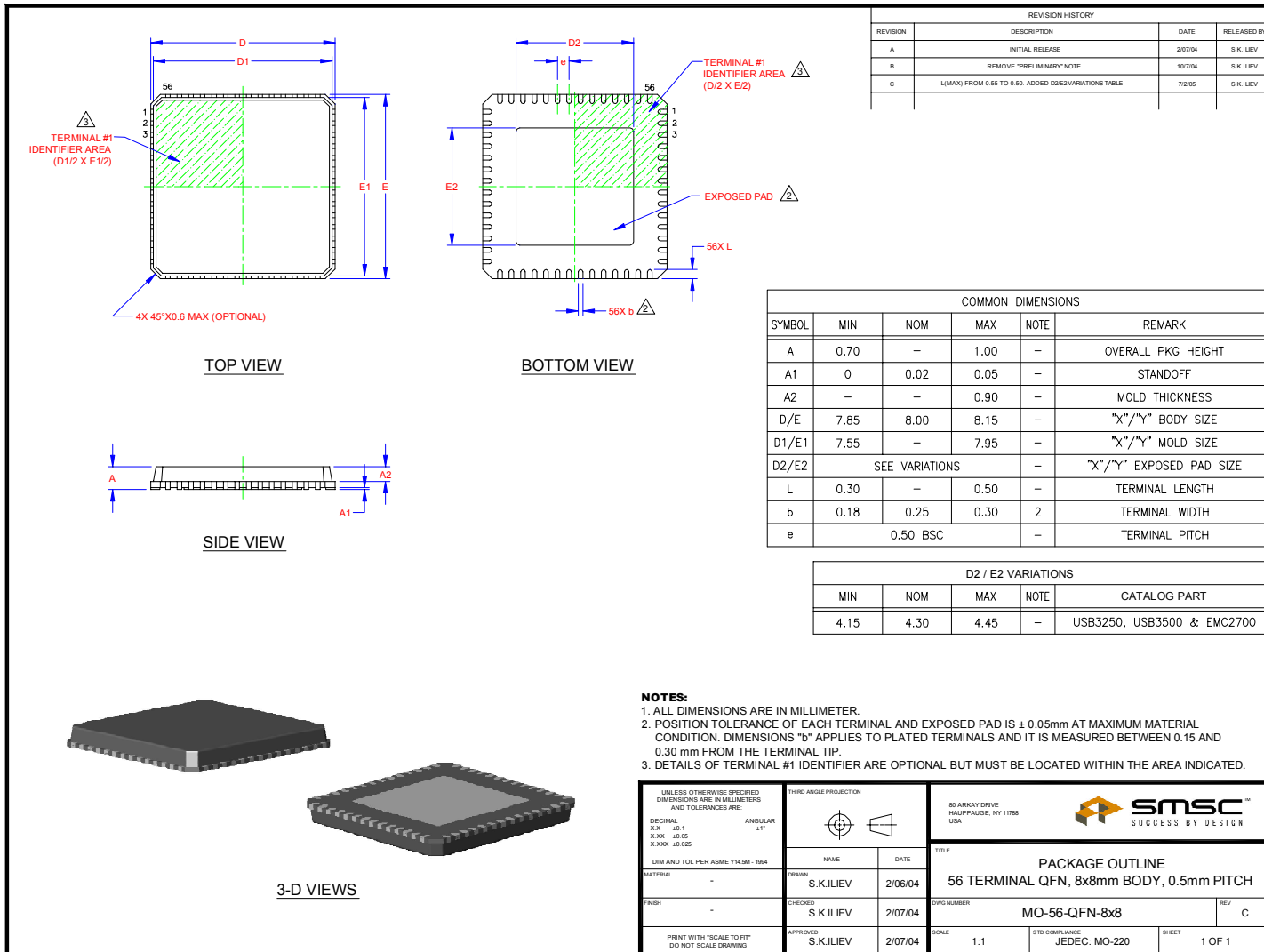


Figure 3 56 Pin QFN Package and Parameters