

Features

- Low-power CMOS design
- Powered from USB port
- Single 12 MHz crystal
- IrDA data rates from 2.4 Kbps to 115.2 kbps in SIR mode
- Uses standard IrDA transceivers
- USB Specification 1.1 compliant
- Supports all USB standard commands
- Full compliance to IrDA 1.4
- On-Chip 5V to 3.3V Voltage Regulator
- I²C EEPROM Interface
- Re-configurable Vendor-Specific parameters (Vendor-ID, Product-ID, Release #)
- Support for 4 string descriptors (Language-ID, Manufacturer-ID, Product Name, Serial Number)
- Low-Profile 28-pin SSOP package

General Description

The MCS7784 controller provides bridging between the Universal Serial Bus (USB) and an IrDA wireless data communication port. This device contains all the necessary logic to communicate with the host computer via the USB bus.

MCS7784 contains an on-chip regulator & operates in bus-powered mode. MCS7784 has a reduced frequency (12 MHz) crystal oscillator. MCS7784 also has an optional EEPROM Interface.

This combination of features allows significant cost savings in system designs, along with straight forward implementation of IrDA port functionality into PC peripherals using the host's USB port.

Applications

- Add-on IrDA dongle
- Cell Phones
- Embedded Applications

Application Note

- AN-7784

Evaluation Board

- MCS7784-EVB

Certifications

- WHQL Certified



"IrReady Qualified"
in Demo Adapters

Customer boards require IrDA qualification

Ordering Information

Commercial Grade (0 °C to +70 °C)

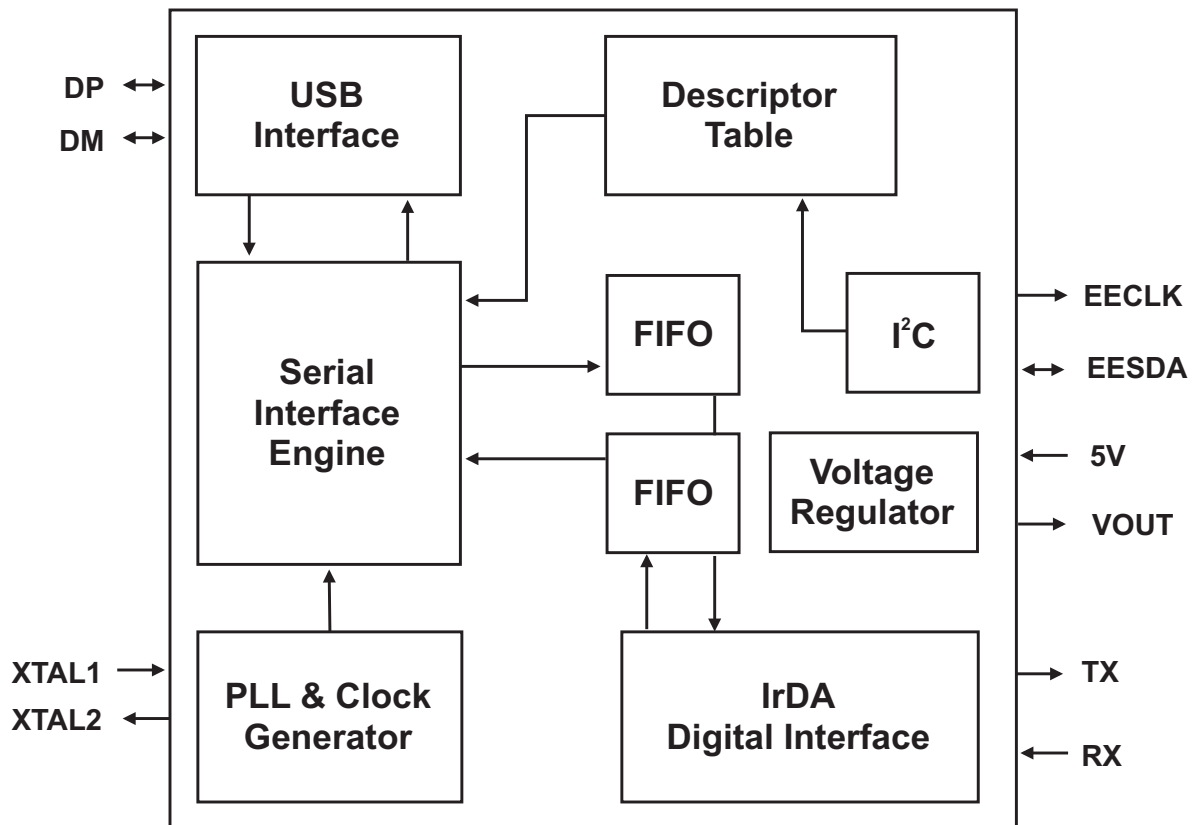
MCS7784CS-GR	28-SSOP	RoHS
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MCS7784

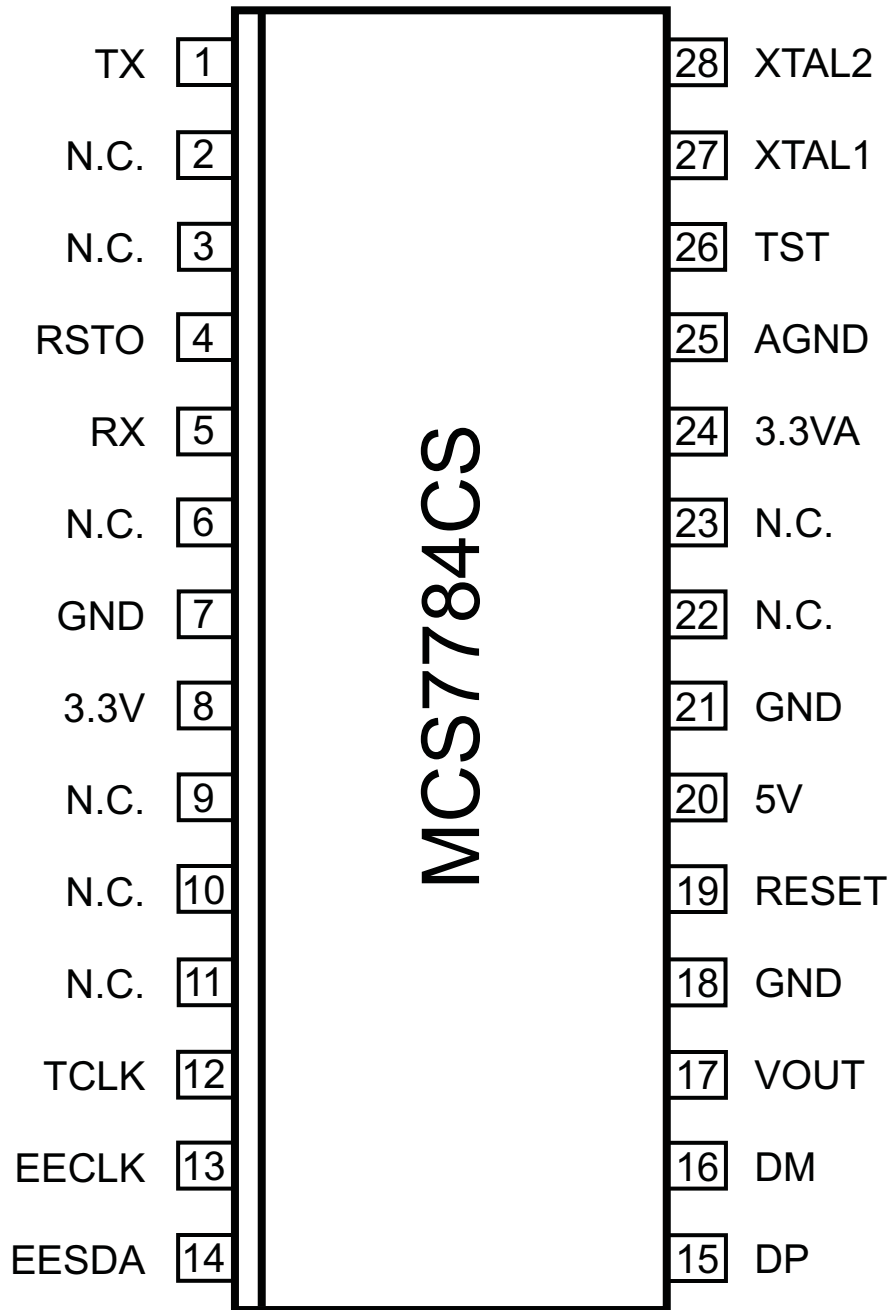
USB to IrDA Port



Block Diagram



Pinout Diagram



MCS7784

USB to IrDA Port



Pin Assignments

Name	Pin	Type	Description
TX	1	O	Serial Data Output.
TRST	4	O	Power-On Reset Output. The internal Power-On Reset signal is routed to this pin.
RX	5	I	Serial Data Input.
TCLK	12	O	Test Clock Output in test mode.
EECLK	13	I/O	2-Wire EEPROM Clock.
EESDA	14	I/O	2-Wire EEPROM Data IN/OUT. Tri State.
DP	15	I/O	Upstream USB port differential Data Plus (D+), analog.
DM	16	I/O	Upstream USB port differential Data Minus (D-), analog.
VOUT	17	PWR	+3.3V Voltage Regulator Output.
RESET	19	I	System Reset. Resets all internal registers, sequencers, and signals to a consistent state. Active high.
5V	20	PWR	Main Power Input. Connect to USB VBUS or local VDD.
AGND	25	PWR	PLL Analog Ground.
TST	26	I	Internal Test Mode (internal pull-up). When this pin is tied to 3.3V, the internal test mode is enabled. Low for normal operation.
XTAL1	27	I	Crystal oscillator or external clock input
XTAL2	28	O	Crystal oscillator output. See XTAL1 description.
GND	7, 18, 21	PWR	Power and signal ground.
3.3VA	24	PWR	Analog 3.3V Power Supply
3.3V	8	PWR	Device Supply Input Connect to VOUT pin when 5V supply is used.

Functional Description

The MCS7784 consists of two major functional blocks, the USB controller and the IrDA interface. The USB controller provides Control, Bulk-In, and Bulk-Out endpoints to the USB host. The serial interface consists of transmit and receive blocks that connect to an external IrDA transceiver.

USB Interface

The USB interface to the host controller includes a Control endpoint, a Bulk-In endpoint, and a Bulk-Out endpoint. The USB controller supports the USB 1.1 specification. Hence, it supports all standard functionality associated with device enumeration, standard USB device requests, etc. In addition, there is a set of vendor specific commands provided to allow a USB driver to access registers and ROM in the USB controller.

EEPROM Interface

The MCS7784 uses an optional external EEPROM to load vendor specific parameters. The EEPROM is connected through a convenient 2-Wire I²C interface.

After Power-On Reset, the MCS7784 reads two Bytes from the EEPROM. If the two Bytes are equal to 0x9710 it recognizes an EEPROM as being present, and additional 8 Bytes are read.

When the EEPROM is present, the following data will be loaded into the MCS7784 registers.

Byte	Length	Name	Description
1-0	2	EE Check	EEPROM Present Check, (9710.)
3-2	2	VID	Vendor ID (9710)
5-4	2	PID	Product ID (7784)
7-6	2	RN	Release Number in BCD format (0001)
10-8	3	DCR	Device Configuration Register (DCR)
12-11	2	Language ID	Language ID in Hex format (0409)
60-13	48	Manufacture ID	"MosChip Semiconductor" in UNICODE
102-61	42	Product Name	"USB-Serial controller" in UNICODE
118-103	16	Serial Number	"XXXXXXXX" in UNICODE

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USB to IrDA Port



Electrical Characteristics

Absolute Maximum Ratings

Supply Voltage	6.0 V
Voltage at any pin	GND – 0.3V to VCC + 0.3V
Operating Temperature	0 °C to +70 °C
Storage Temperature	-65 °C to +150 °C
Package Dissipation	500 mW
ESD	±2000 V
Latch up	220 mA

DC Electrical Specification

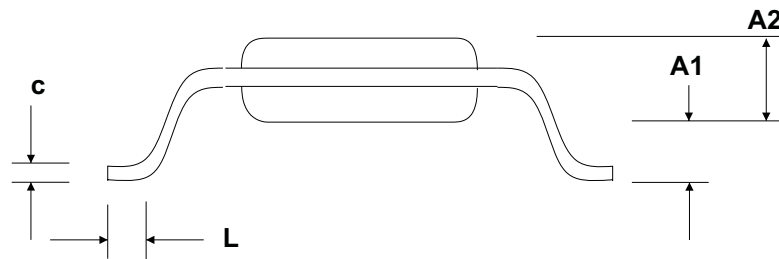
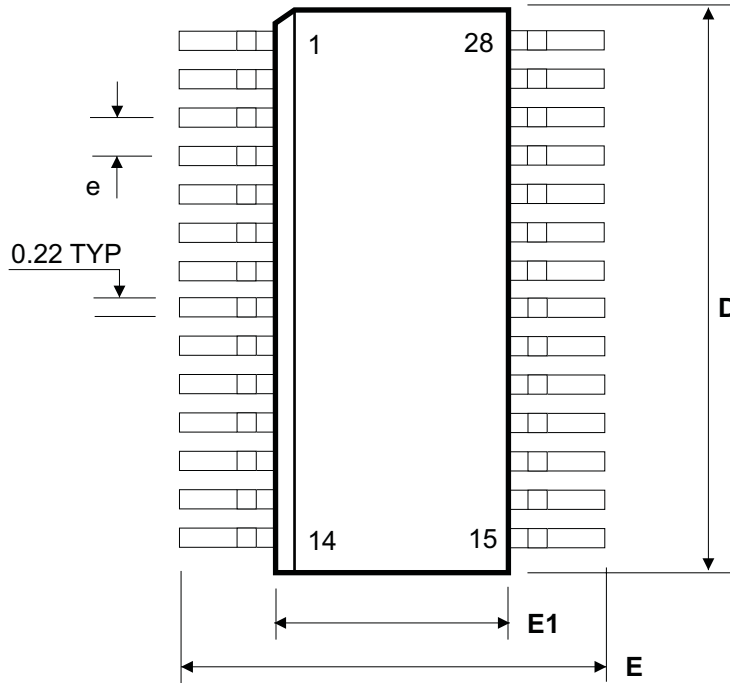
Temp = 0 °C to +70 °C, Vcc = 3.3 – 5.0 V ± 10% unless otherwise specified.

Symbol	Parameter	Min	Max	Unit	Condition
5V	5V Supply	4.5	5.5	V	Voltage Regulator Input
3.3V	Supply Voltage	3.0	3.6	V	
V _{clk_L}	Clock Input (low level)	-0.5	0.6	V	External
V _{clk_H}	Clock Input (high level)	2.4	V _{cc}	V	External
V _{i_L}	Input (low level)		1.08	V	CMOS
V _{i_H}	Input (high level)	2.1		V	CMOS
V _{o_L}	Output (low level)		0.4	V	I _{o_L} = 6 mA
V _{o_H}	Output (high level)	1.85		V	I _{o_H} = 6 mA
I _{i_L}	Input Leakage Current	-10	+10	µA	
I _{cc}	Operating Current	7.5	14	mA	From 3.3V Supply
I _{cc}	Operating Current		22	mA	From 5V Supply
C _p	Input Pin Capacitance	5	7	pF	

AC Electrical Specification

Temp = 0 °C to +70 °C, Vcc = 3.3V ± 10% unless otherwise specified.

Symbol	Parameter	Min	Max	Unit	Condition
F _{CLKA}	USB Clock Frequency	12	12	MHz	±50 PPM



**28-Pin SSOP
Package Dimensions**

SYMBOL	MILLIMETERS			INCHES		
	MIN	TYP	MAX	MIN	TYP	MAX
A1	0.05		0.21	0.020		0.08
A2	1.65		1.80	0.650		0.708
C			0.25			
e		0.65			0.026	
D	10.00		10.4	3.93		4.09
E	7.4	7.8	8.2			
E1	5.2		5.4	2.05		2.12
L	0.55	0.75	0.95			

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Revision History

Revision	Changes	Date
1.0	Initial Release	Feb-2004
2.0	Updated to new Layout Format	26-May-2006
2.1	Corrected Operating Temperature Specs.	31-May-2006