Universal Serial Bus Power Controller

FEATURES

- Fully USB Compliant

- Support Four 5V Peripherals and One USB 3.3V Controller

- Separate Power Enables

- 500mA Current Limiting per Channel

- Separate Open Drain Fault Indicator for Each Channel

- 3.3V Output for USB Controller

- Available in 20 Pin DIP

DESCRIPTION

The UCC38531 Power Controller is designed to provide a self powered USB hub with a local 3.3V regulated voltage and four 5V regulated voltages for USB ports. Each of the 5V output ports is individually enabled for optimal port control. Each port also provides an overcurrent fault signal indicating that the port has exceeded a 500mA current limit. The 3.3V linear regulator is used to power the local USB microcontroller. This regulator is protected with a 100mA current limit.

The UCC38531 is configured by connecting the VREG to a regulated 5.5V 2A source.

The 20-pin DIP package is protected by internal over-temperature shutdown mechanism, which disables the outputs should the internal junction temperature exceed 150°C.

APPLICATION AND BLOCK DIAGRAM
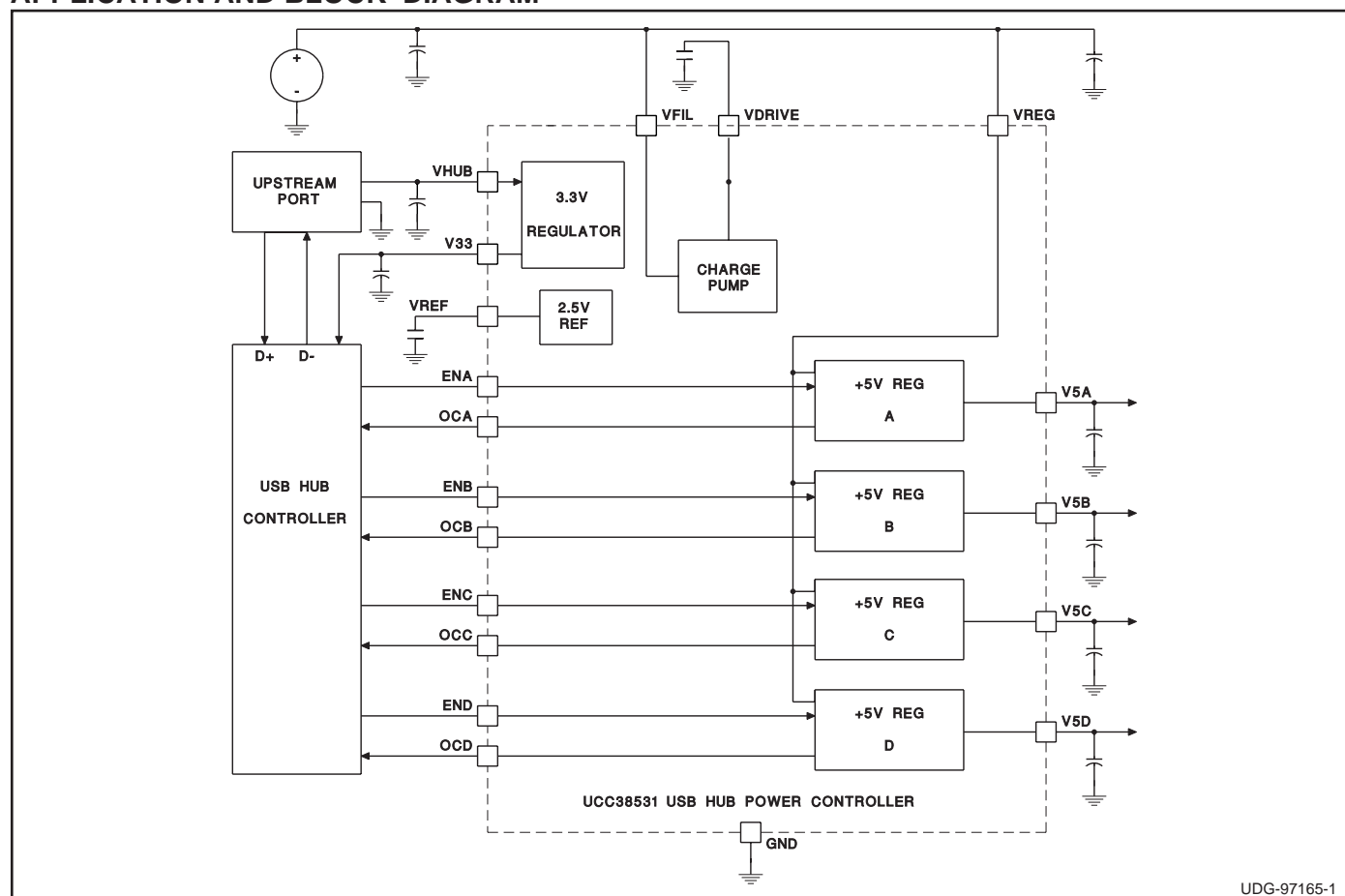
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ABSOLUTE MAXIMUM RATINGS

VFIL. 9V
VCON Supply Votage 9V
Logic Inputs (ENA-D)
    Maximum Forced Voltage . . . . –0.3V to 7V
    Maximum Forced Current . . . . ±1mA
V33
    Maximum Forced Voltage. 5V
    Maximum Current 200mA
V5A-D
    Maximum Voltage. 9V
    Maximum Current 750mA
Storage Temperature . . . . –65°C to +150°C
Junction Temperature. . . . . –55°C to +150°C
Lead Temperature (Soldering, 10 sec.) . . . . +300°C
Unless otherwise indicated, voltages are reference to ground. Pulsed is defined as a less than 10% duty cycle with a maximum duration of 500μS. Currents are positive into, negative out of the specified terminal. All voltages are with respect to ground. Consult Packaging Section of Databook for thermal limitations and considerations of packages.

CONNECTION DIAGRAM

DIP-20 (Top View)
N Package

Left pin	#		#	Right pin
V5B	1		20	VREG
GND	2		19	VSA
OCB	3		18	ENA
ENB	4		17	OCA
V33	5		16	VDRIVE
VHUB	6		15	OCC
VFIL	7		14	ENC
VREF	8		13	VC5
END	9		12	VREG
OCD	10		11	V5D
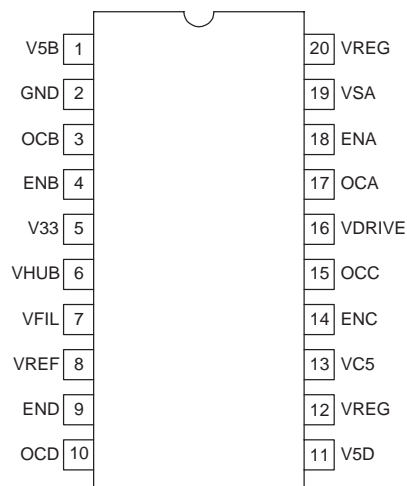
ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_J = 0°C to 125°C for the UCC38531. VFIL = 6.5V, VHUB = 5V. T_A = T_J.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Input Supply Currents					
VHUB Supply Current	No External Load on V33		1	3	mA
VFIL Supply Current			1	3	mA
Reference					
VREF Voltage	Over Temperature	2.35	2.5	2.65	V
Line Regulation	VHUB = 4.5V to 9V		3	10	mV
3.3V Regulator					
V33 Voltage	T_J = 25°C, I_{LOAD} = 10mA	3.2	3.3	3.4	V
	0mA to 100mA, 0°C to 125°C, VHUB = 4.5V to 9V	3.165	3.3	3.435	V
Short Circuit Current Limit	VHUB = 6V, Output shorted to Ground	100	120	150	mA
5V Regulator					
V5A-D Voltage	T_J = 25°C, I_{LOAD} = 250mA, V_{REG} = 5.5V	4.85	5	5.15	V
	0mA to 500mA, 0°C to 125°C	4.8	5	5.2	V
Short Circuit Current Limit	VREG = 5.5V, Output Shorted to Ground	500	600	750	mA
Charge Pump					
Quiescent Output Voltage	T_J = 25°C, VFIL = 6V, ENA-D = 5V, ENHUB = 5V	11	11.45	12	V
	0°C to 125°C, VFIL = 6V	10.5	11.45	12	V
Output Impedance			9	15	kΩ
Enable Inputs					
ENA-D Inputs - Guaranteed Low				0.7	V
ENA-D Inputs - Guaranteed High		3			V
Overcurrent Signals					
Active Sink Current	I_{OCX} =100μA		140	500	mV

PIN DESCRIPTIONS

ENA-D: Separate enables pins for each of the four 5V supplies.

GND: All voltages are measured with respect to this pin. Bypass capacitors should be connected to GND as close to this pin as possible.

OCA-D: Open drain overcurrent indicator. OCA-D can be wire OR'ed by the user to create a single overcurrent indicator.

V5A-D: 5V regulated output with enable, 500mA (minimum) current limit, and overcurrent indicator.

V33: 3.3V regulator output. Current limit is 100mA minimum.

VDRIVE: Internal charge pump voltage is brought out

for external decoupling. Nominal voltage is between 11V and 13V. No external loading permitting. Decouple with at least 0.001μF capacitor.

VFIL: Bias supply for all four of the 5V regulators. VFIL voltage must be between 6V and 9V.

VHUB: Supply for the 3.3V USB controller power supply and bandgap reference.

VREF: Internal 2.5V reference is brought out for external decoupling only. Decouple with 0.01μF capacitor.

VREG: Input supply for all four 5V regulators. 2 pins supply up to a total of 2.5A to the four 5V bus voltages (V5A, V5B, V5C, V5D). Can be tied directly to VFIL.

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