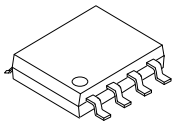
POWER MULTIPLEXER FOR USB HIGH SIDE SWITCH



SOP-8

■ DESCRIPTION

The UTC **US236H** is a power distribution switch. It is intended for USB applications where heavy capacitive loads and short-circuits are likely to be encountered. It switches output voltage to 5VSB at S3/S4/S5 states with 400mΩ switch and 200mA Continuous Load Current; to 5VCC at S0/S1/S2 states with 80mΩ switch and 1.5A Continuous Load Current.

The UTC **US236H** features an active-high enable control input. Quiescent Supply Current is only 50uA when enabled, but standby current down to less than 1uA when disabled.

Optimal switch logic according to S3# and 5VCC status ensures seamless output voltage transition.

The UTC **US236H** device limits the output current to a safe level by switching into a constant-current mode when the output load exceeds the current-limit threshold or a short is present. Soft start function limits the inrush current from supply input when enabled or during plug-in. Thermal shutdown function prevents catastrophic switch failure from high-current loads. Under-voltage lockout (UVLO) ensures that the device remains off unless there is a valid input voltage present. OC is open-drain output to report over-current and over-temperature event.

■ FEATURES

* Operating Range: 4.5V~5.5V
* Quiescent Supply Current: 50uA (TYP.)
* Standby Supply Current: 1μA (Max.)
* Output Voltage Switch to 5VSB at S3/S4/S5
  400mΩ High Side Switch
  200mA Continuous Load Current
* Output Voltage Switch to 5VCC at S0/S1/S2
  80mΩ High Side Switch
  1.5A Continuous Load Current
* Built-in Soft-Start
* Fast Turn Off
* Enable Active-High
* Meets USB Current-Limiting Requirements

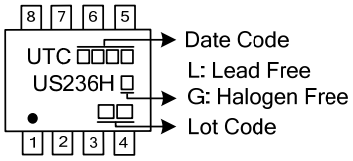
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■ ORDERING INFORMATION

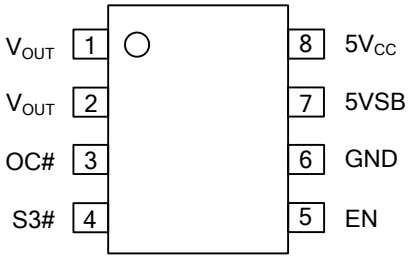
Ordering Number		Package	Packing
Lead Free	Halogen Free		
US236HL-S08-R	US236HG-S08-R	SOP-8	Tape Reel

US236HG-S08-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



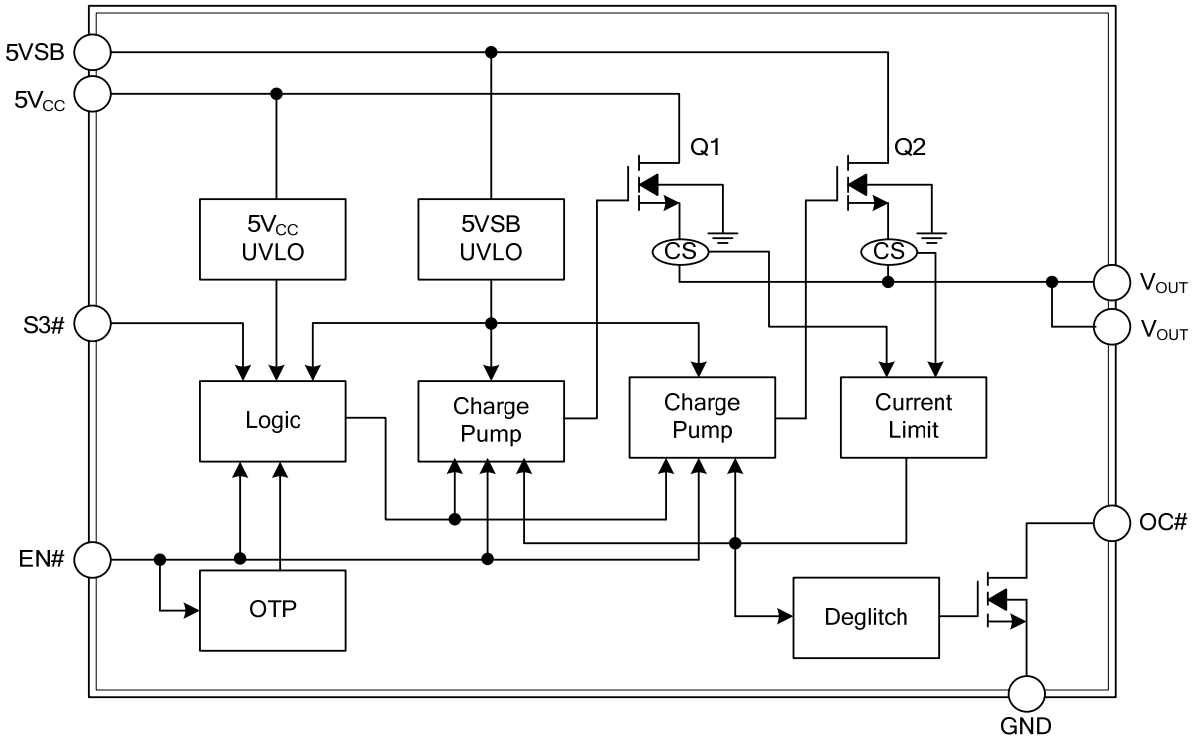
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1, 2	V_{OUT}	Output Voltage. These pins are Power-switch output.
3	OC#	Fault Flag. Open-drain output, to report overcurrent or over-temperature conditions..
4	S3#	Sleep State Control Pin. This pin along with the 5VCC status controls the switching configuration.
5	EN	Enable Input. Logic high turns on power switch.
6	GND	Ground.
7	5VSB	Supply Input. This pin is the N-Channel MOSFET Drain that supplies output current at S3/S4/S5 states and should be connected to 5VSB.
8	$5V_{CC}$	Supply Input from 5VCC. This pin is the N-Channel MOSFET Drain that supplies output current at S0/S1/S2 states and should be connected to 5VCC.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Input Voltage, 5VSB (Note 1)	V_{IN}	5.7	V
Other Pins	V_{OTH}	5.7	V
Power Dissipation (T_A=25°C)	P_D	0.625	W
Junction Temperature	T_J	+150	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Devices are ESD sensitive. Handling precaution recommended.

■ RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Input Voltage	V_{IN}	4.5 ~ 5.5	V
Operating Ambient Temperature Range	T_A	-40 ~ +85	°C
Operating Junction Temperature Range (Note)	T_J	-40 ~ +125	°C

Note: The device is not guaranteed to function outside its operating conditions.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	160	°C/W
Junction to Case	θ_{JC}	45	°C/W

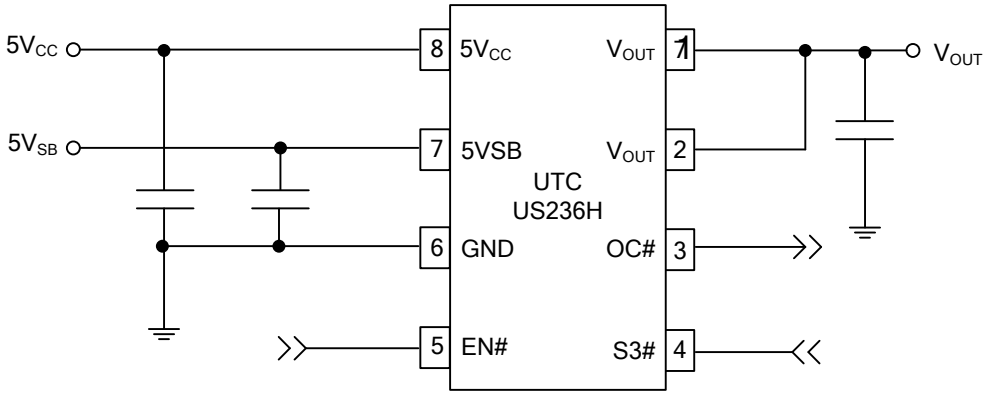
■ ELECTRICAL CHARACTERISTICS ($5V_{SB}$=5V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY INPUT 5VSB						
Supply Input Voltage Range			4.5		5.5	V
Under Voltage Lockout	V_{UVLO}	5VSB rising		4.3	4.5	V
UVLO Hysteresis				80		mV
Shutdown Current	I_{SD}	No load on V_{OUT}, Disabled		0.01	1	uA
Quiescent Current	I_Q	No load on V_{OUT}, Enabled, S3#=0, $5V_{CC}$=0V		50	70	uA
SUPPLY INPUT $5V_{CC}$						
Supply Input Voltage Range			4.5		5.5	V
Under Voltage Lockout	V_{UVLO}	$5V_{CC}$ rising		4.3	4.5	V
UVLO Hysteresis				80		mV
ENABLE CONTROL						
High Level Threshold			1.4			V
Low Level Threshold					0.4	V
Enable Pin Input Current			-1		1	uA
Enable Delay	T_{D_EN}	Enable threshold to V_{OUT} starting to ramp up		0.15	1	ms
POWER SWITCH FOR 5VSB (Q2)						
N-MOSFET ON Restiance	$R_{DS(ON)}$	I_{OUT}=100mA		400	500	mΩ
Leakage Current		V_{OUT} connected to GND, Disabled			1	uA
Reverse Leakge Current		V_{OUT}=5.5V, 5VSB=0V			1	uA
POWER SWITCH FOR $5V_{CC}$ (Q1)						
N-MOSFET ON Restiance	$R_{DS(ON)}$	I_{OUT}=1A @ 25°C		80	100	mΩ
Leakage Current		$5V_{CC}$=5.5V, V_{OUT}=0V, Disabled			1	uA
Reverse Leakge Current		V_{OUT}=5.5V, $5V_{CC}$=0V, Disabled			1	uA

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
CURRENT LIMIT						
Current Limit Threshold for Q2				750	1500	mA
Current Limit Threshold for Q1				2.3	4.6	A
OC# Ouptpt Low Voltage		$I_{CC\#}$=5mA			0.4	V
Off State Current		V_{CC}#=5.5V			1	uA
OC# Deglitch		OC# assertion		19		ms
		OC# de-assertion		850		us
SOFTSTART						
Output Voltage Ramp Up Time		S3#=0V, C_{OUT}=10uF, No Load		1.3		ms
		S3#=5V_{CC}=5V, C_{OUT}=10uF, No load		1.3		ms
OVER TEMPERATURE PROTECTION						
Thermal Shutdown Threshold Level		By Design		135		°C
Thermal Shutdown Hysteresis		By Design		30		°C

■ TYPICAL APPLICATION CIRCUIT



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