



US201/US201A

Preliminary

CMOS IC

80mΩ, 500mA/1.1A HIGH-SIDE POWER SWITCHES WITH FLAG

DESCRIPTION

The UTC **US201/A** series are 80mΩ, 500mA for **US201** (1.1A for **US201A**) high-side power switches. There's internal single low voltage N-Channel MOSFET which makes it an ideal for all USB applications. This MOSFET should be driven by a charge pump circuitry inside. Its switch on resistance is as low as 80mΩ which we know specially meets the drop voltage for USB applications.

The flag pin can output an open-drain fault flag to next controller.

There're lots internal special ways for protecting the chip's operation.

When in hot-plug events, there's large current which can create the upstream voltage droop to match the USB's voltage droop requirements and soft-start for isolating the power source.

As soon as the die temperature is higher than 130°C, the internal shutdown circuit will work.

Only when there's a normal input voltage in the V_{IN} pin, the UVLO (under-voltage lockout, 1.7V typ.) can make sure the chip is till in the off state.

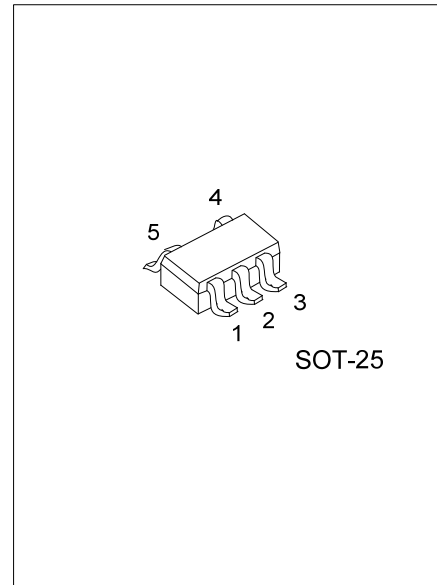
Because of the requirement of USB power the fault current should be ensured less than 800mA (UTC **US201**, single port) and 1.5A (UTC **US201A**, dual ports).

FEATURES

- * 80mΩ(typ) N-Channel MOSFET
- * Supply current:
 - Switch on :25μA(typ)
 - Switch off :1μA (typ)
- * Load current 500mA for US201 and 1.1A for US201A
- * Input voltage from 2V to 5.5V
- * In off-state: Output voltage can be higher than input

ORDERING INFORMATION

Ordering Number			Package	Packing
Normal	Lead Free	Halogen Free		
US201-AF5-R	US201L-AF5-R	US201G-AF5-R	SOT-25	Tape Reel
US201A-AF5-R	US201AL-AF5-R	US201AG-AF5-R	SOT-25	Tape Reel

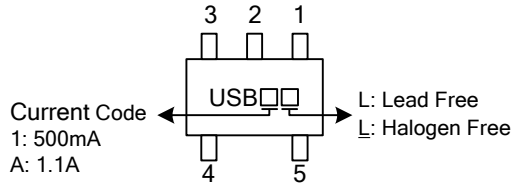


Lead-free: US201L/US201AL
Halogen-free:US201G/US201AG

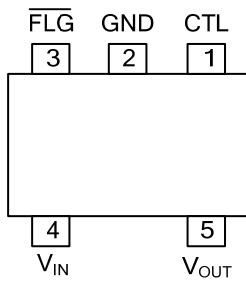
<p>US201AL-AF5-R</p> <ul style="list-style-type: none"> (1)Packing Type (2)Package Type (3)Lead Plating (4)Current Code 	<ul style="list-style-type: none"> (1) R: Tape Reel (2) AF5: SOT-25 (3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn (4) Blank: 500mA, A: 1.1A
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MARKING



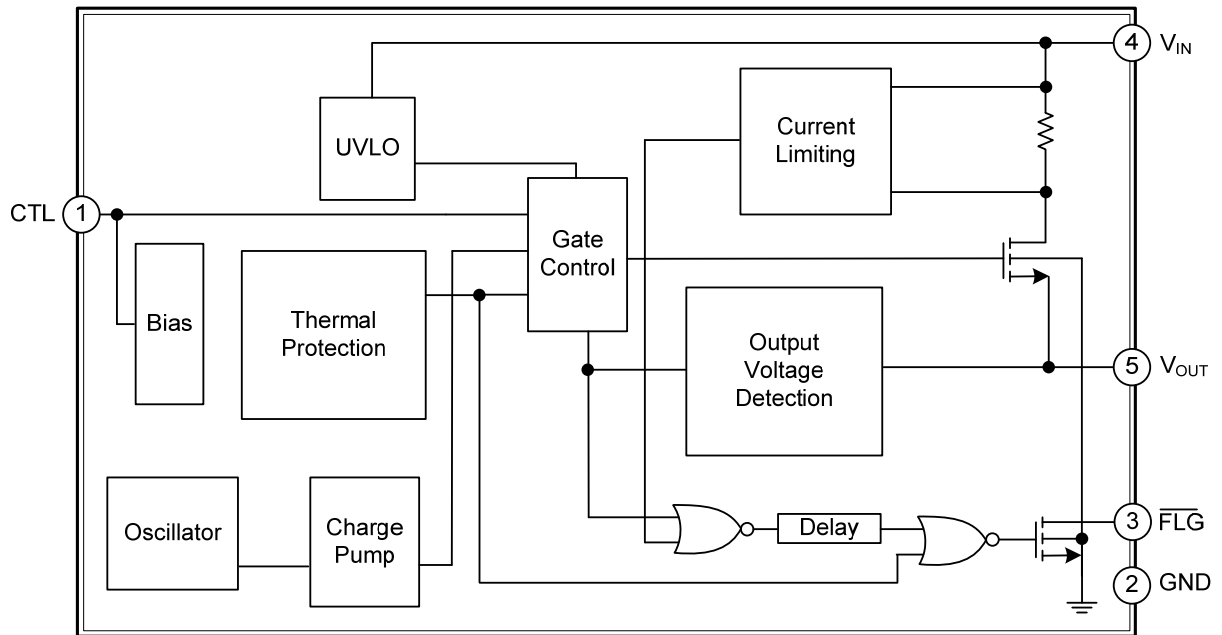
PIN CONFIGURATION



PIN DESCRIPTION

PIN NO	PIN NAME	DESCRIPTION
1	CTL	High active
2	GND	Ground
3	FLG	Open-drain fault flag output
4	V _{IN}	Power input voltage
5	V _{OUT}	Output voltage

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER		SYMBOL	RATINGS	UNIT	
Supply Voltage		V_{CC}	6.5	V	
			+2~ +5.5 (Note 3)	V	
Input/Output Pins		CTL	V_{CTL}	-0.3~ +6.5	V
				0~ +5.5 (Note 3)	V
		FLG	$V_{\overline{FLG}}$	6.5	V
Power Dissipation ($T_a=25^\circ\text{C}$)		P_D	0.25	W	
Junction Temperature		T_J	150	$^\circ\text{C}$	
			-20~ +100 (Note 3)	$^\circ\text{C}$	
Storage Temperature		T_{STG}	-65~ +150	$^\circ\text{C}$	

Note: 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. Stresses listed as the "Absolute Maximum Ratings" will cause permanent damage to the device.

3. The device is not guaranteed to function when it's beyond its operating conditions.

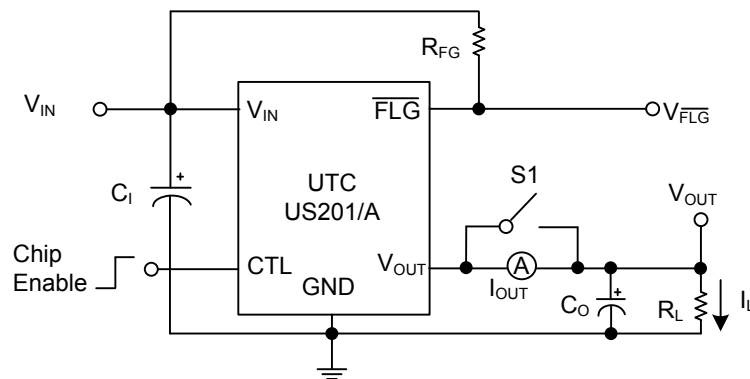
■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction-to-Ambient	θ_{JA}	250	$^\circ\text{C}/\text{W}$

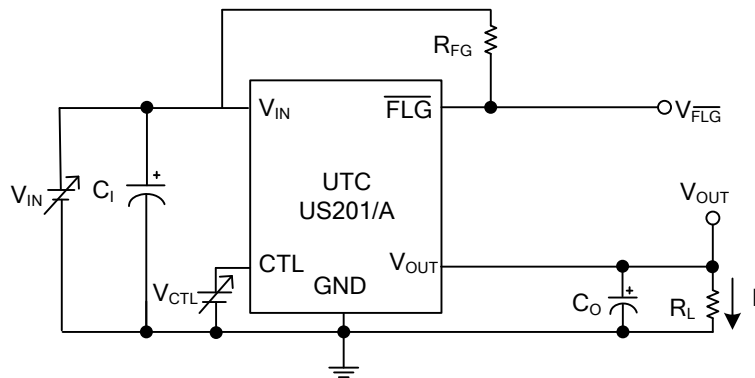
■ ELECTRICAL CHARACTERISTICS

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
CTL Threshold	Logic-Low Voltage	V_{IL}	$V_{IN}=2\text{V}\sim 5.5\text{V}$, Switch OFF			0.8	V	
	Logic-High Voltage	V_{IH}	$V_{IN}=2\text{V}\sim 5.5\text{V}$, Switch ON	2.0			V	
Under-Voltage Lockout		V_{UVLO}	V_{IN} increasing	1.3	1.7		V	
Under-Voltage Hysteresis		ΔV_{UVLO}	V_{IN} decreasing		0.1		V	
Supply Current		$I_{SW(ON)}$	switch on, $V_{OUT}=\text{OPEN}$		25	45	μA	
		$I_{SW(OFF)}$	switch off, $V_{OUT}=\text{OPEN}$		0.1	1	μA	
CTL Input Current		$I_{I(CTL)}$	$V_{CTL}=0\text{V}\sim 5.5\text{V}$		0.01		μA	
Output Leakage Current		$I_{O(LEAK)}$	$V_{CTL}=0\text{V}$, $R_{LOAD}=0\Omega$		0.5	10	μA	
Current Limit		I_{LIMIT}	$R_{LOAD}=1\Omega$	US201	0.5	0.8	1.1	A
				US201A	1.1	1.5	2.0	A
Short Circuit Fold-Back Current		$I_{SC(FB)}$	$V_{OUT}=0\text{V}$, measured prior to thermal shutdown	US201		0.8		A
				US201A		1.0		A
Switch ON Resistance		$R_{DS(ON)}$	$I_{OUT}=500\text{mA}$	US201		80	100	m Ω
			$I_{OUT}=1.1\text{A}$	US201A		80	100	m Ω
FLAG OFF Current		$I_{\overline{FLG}(OFF)}$	$V_{\overline{FLG}}=5\text{V}$		0.01	1	μA	
FLAG Output Resistance		$R_{\overline{FLG}}$	$I_{SINK}=1\text{mA}$		20	400	Ω	
FLAG Delay Time		t_D	From fault condition to \overline{FLG} assertion	2	10	15	ms	
Output Turn-ON Rise Time		$t_{ON(RISE)}$	10% ~ 90% of V_{OUT} rising		400		μs	
Thermal Shutdown Protection		T_{SD}			130		$^\circ\text{C}$	
Thermal Shutdown Hysteresis		ΔT_{SD}			20		$^\circ\text{C}$	

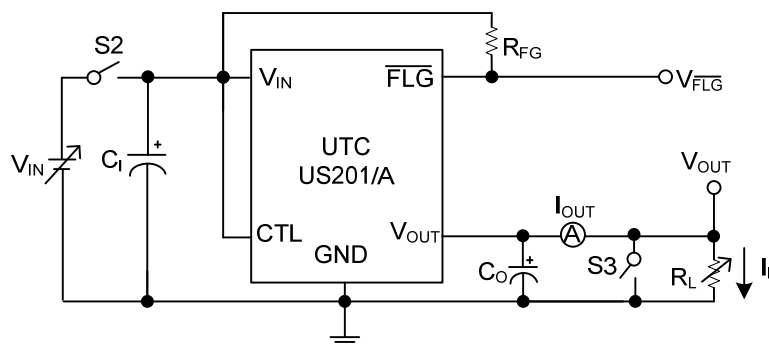
■ TEST CIRCUITS



Turn-On & Off Response, Flag Response

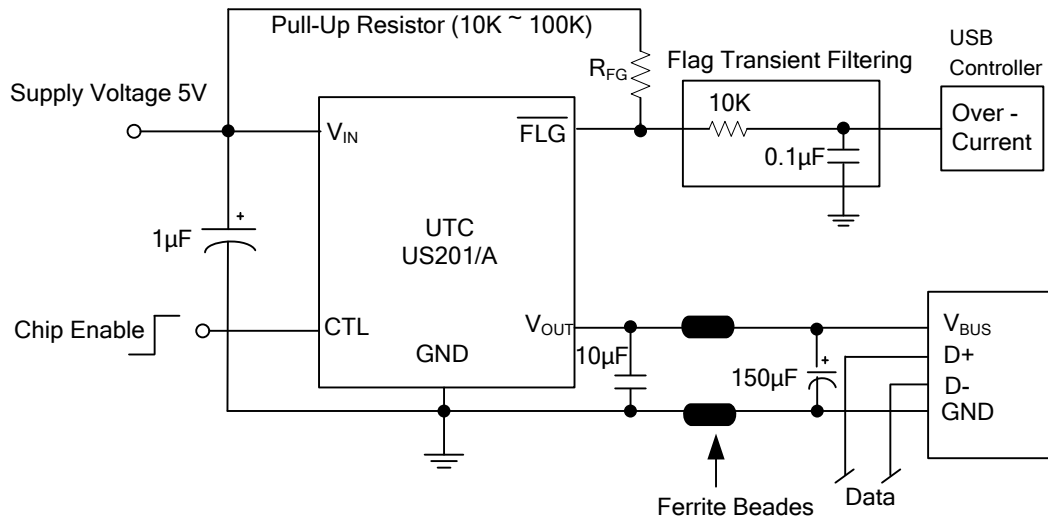


UVLO at Rising & Falling



Current Limit vs. Input Voltage, Inrush Current Response, Current Limit Transient Response

■ TYPICAL APPLICATION CIRCUIT



Note. A low-ESR 150µF aluminum electrolytic or tantalum between V_{OUT} and GND is strongly recommended to meet the 330mV maximum droop requirement in the hub V_{BUS}.

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