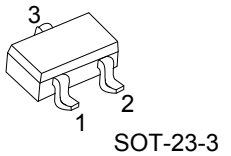
0.2A SINGLE CHANNEL CURRENT-LIMITED LOAD SWITCH



SOT-23-3
(JEDEC TO-236)

■ DESCRIPTION

The UTC **US301** is single channel current-limited integrated high-side power switches, optimized for hot-swap applications.

The **US301** provides a complete protection solution for application subject to heavy capacitive loads and the prospect of short circuit. The devices have fast short-circuit response time for improving overall system robustness, and offer reverse-current blocking, over-current and over-temperature protection, as well as under-voltage lockout functionality. It also has controlled built-in soft-start time, typically 0.7 ms.

■ FEATURES

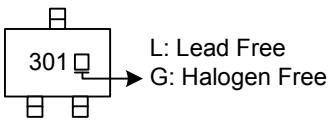
* Input voltage range: 2.7V~5.2V
* Short-circuit protection and fast response time
* Accurate current limiting: 0.4A
* On-resistance:250 mΩ
* Reverse-current blocking
* Soft-start with 0.7ms typical turn-on time
* Over-current and over-voltage protection
* Thermal protection
* Ambient temperature range: -40°C~+85°C

■ ORDERING INFORMATION

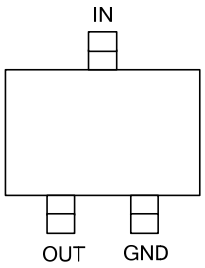
Ordering Number		Package	Packing
Lead Free	Halogen Free		
US301L-AE2-R	US301G-AE2-R	SOT-23-3	Tape Reel

US301G-AE2-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AE2: SOT-23-3 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUT	Switch output pin
2	GND	GND
3	IN	Voltage input pin

■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage Relative to GND	V_{IN}	6.5	V
Output Voltage Relative to GND	V_{OUT}	V_{IN}+0.3	V
Maximum Continuous Load Current	I_{LOAD}	Internal Limited	A
Maximum Junction Temperature	T_J	+150	°C
Storage Temperature Range (Note 4)	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. UL Recognized Rating from -30°C~70°C (Diodes qualified T_{ST} from -65°C~150°C)

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage relative to GND	V_{IN}		2.7		5.2	V
Output Current	I_{OUT}		0		0.2	A
Operating Ambient Temperature	T_A		-40		+85	°C

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, V_{IN}=+5.0V, unless otherwise stated)

PARAMETER	SYMBOL	TEST CONDITIONS (Note 1)	MIN	TYP	MAX	UNIT
Input UVLO	V_{UVLO}	V_{IN} rising	2.35		2.90	V
Input Quiescent Current	I_Q	Above UVLO, I_{OUT}=0		85	125	μA
Reverse Leakage Current	I_{REV}	V_{IN}=0V, V_{OUT}=5V, I_{REV} at V_{IN}		0.01	0.10	μA
Switch On-Resistance	$R_{DS(ON)}$	V_{IN}=5V, I_{OUT}=0.2A	100	250	350	mΩ
Over-Load Current Limit	I_{LIMIT}	V_{IN}=5V, V_{OUT}=4V	0.2	0.4	0.5	A
Short-Circuit Current	I_{OS}	OUT shorted to ground	0.2	0.4	0.5	A
Reverse-Current Trigger Point	I_{ROCP}	V_{IN}=5.0V, V_{OUT}=5.2V		0.20	0.25	A
Deglitch Time from Reverse Current Trigger to MOSFET Turn Off	T_{TRIG}	(Note 2)	0.5	0.7	1.0	ms
Output Over-Voltage Trip Point	V_{OVP}	(Note 3)	5.2		5.6	V
Debounce Time From Output Over-Voltage to MOSFET Turn Off	T_{OVP}			15		μs
Recovery After Turn-Off from ROCP and OVP	V_{REC}			101%		V_{IN}
Output turn-on time (Note 4)	T_{ON}	C_L=0.1μF, R_{LOAD}=20Ω (UVLO to 90% $V_{OUT-NOM}$)		0.7		ms
Thermal Shutdown Threshold	T_{SHDN}	V_{IN}=2.7V~5.2V		150		°C
Thermal Shutdown Hysteresis	T_{HYS}			20		°C
Thermal Resistance Junction-to-Ambient (Note 5)	θ_{JA}			215		°C/W

Notes: 1. Pulse-testing techniques maintain junction temperature close to ambient temperature; thermal effects must be taken into account separately.
2. When reverse current triggers at I_{ROCP}=0.20A, the reverse current is continuously clamped at I_{ROCP} for 0.7ms deglitch time until MOSFET is turned off.
3. During output over-voltage protection, the output draws approximately 60μA current.
4. Since the output turn-on slew rate is dependent on input supply slew rate, this limit is only applicable for input supply slew rate between V_{IN}/0.2ms to V_{IN}/1ms.
5. Device mounted on FR-4 substrate PCB, 2oz copper, with minimum recommended pad layout.

■ TYPICAL APPLICATION CIRCUIT