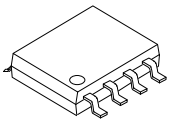
UR5516B

LINEAR INTEGRATED CIRCUIT

3A BUS TERMINATION REGULATOR



SOP-8

■ DESCRIPTION

The UTC UR5516B is a low cost linear regulator designed to provide a desired output voltage or termination voltage for various applications by converting voltage supplies ranging from 1V to 6.0V. The desired output voltage could be programmable by two external voltage divider resistors.

The UR5516B is capable of sourcing or sinking up to 2A of current while regulating an output VOUT voltage to within 2% (DDR-I), 3% (DDR-II) or less.

The UR5516B provides low profile 8-pin SOIC package to save system space.

■ FEATURES

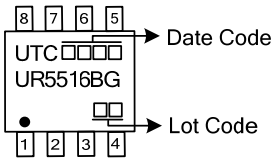
* Provide bi-direction current
  - Sourcing or sinking current up to 3A
* 1.25V/0.9V output for DDR I/II applications
* Fast transient response
* High output accuracy
  - ±20mv over load, V_{OUT} offset and temperature
* Adjustable output voltage by external resistors
* Current-limit protection
* On-chip thermal shutdown
* Shutdown for standby or suspend mode

■ ORDERING INFORMATION

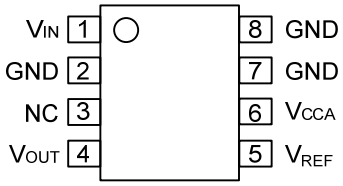
Ordering Number	Package	Packing
UR5516BG-S08-R	SOP-8	Tape Reel

UR5516BG-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

■ MARKING



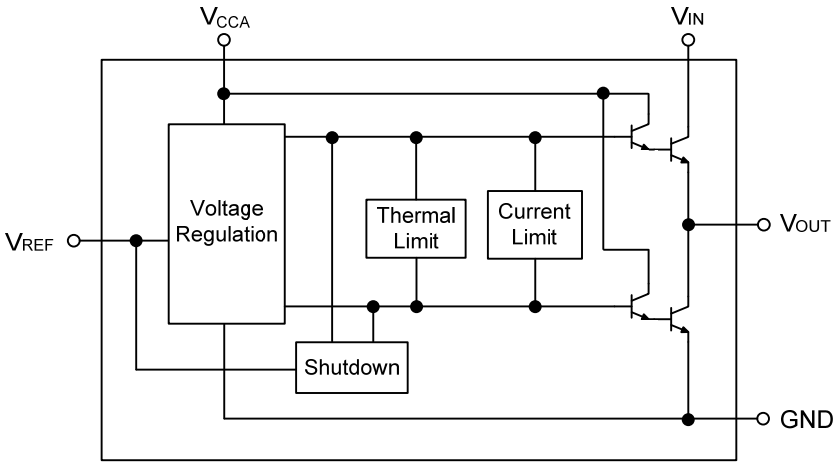
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V_{IN}	Input Power
3	NC	No Connection
4	V_{OUT}	Output Voltage
5	V_{REF}	Reference Voltage Input and Chip Enable
6	V_{CCA}	Voltage supply for internal circuits
2,7,8	GND	Ground

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
V_{CCA} Supply Voltage, V_{CCA} to GND	V_{CCA}	-0.2 ~ 7	V
V_{IN} Supply Voltage, V_{IN} to GND	V_{IN}	-0.2 ~ 3.9	V
Power Dissipation	P_D	Internally Limited	W
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-40 ~ +150	°C

Note 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.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RANGES	UNIT
V_{CCA} Supply Voltage (Note 1)	V_{CCA}	3.1 ~ 6	V
V_{IN} Supply Voltage (Note 2)	V_{IN}	1.2 ~ 3.5	V
V_{REF} Input Voltage	V_{REF}	0.85 ~ 1.75	V
V_{OUT} Output Voltage (Note 3)	V_{OUT}	V_{REF} ± 0.02	V
V_{OUT} Output Current (Note 4,5)	I_{OUT}	-3 ~ +3	A
Junction Temperature	T_J	0 ~ +125	°C

Note: 1. Please always keep V_{CCA} -V_{OUT}>1.9V for good regulation.

2. Please supply enough voltage to V_{IN} for sourcing desired maximum output current. Please refer to the V_{IN} Dropout Voltage vs. Output Current in the Typical Characteristics.
3. The V_{OUT} is regulated to the V_{REF} with additional voltage offset and load regulation except over-load conditions.
4. The symbol “+” means the V_{OUT} sources current to load; the symbol “-“ means the V_{OUT} sinks current to GND.
5. The max. I_{OUT} varies with the T_J and the voltages of V_{IN}-V_{OUT} and V_{OUT}. Please refer to the Typical Characteristics.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance	θ_{JC}	14	°C/W

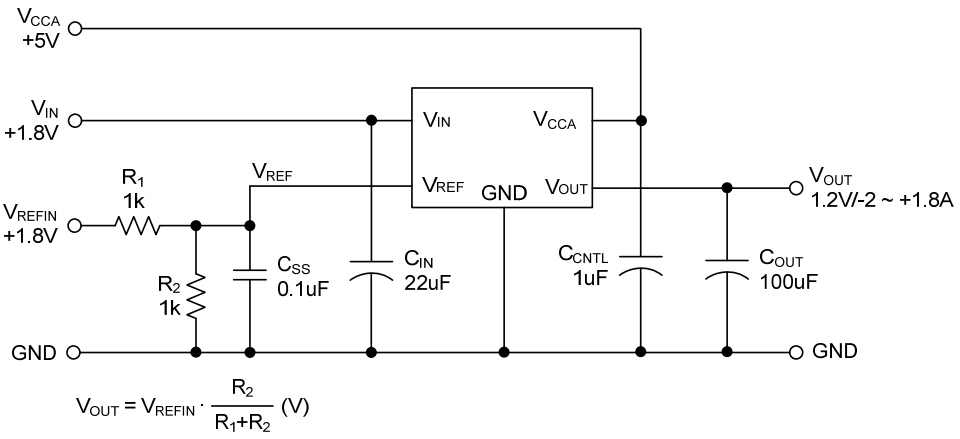
■ ELECTRICAL CHARACTERISTICS

(T_J=25°C, V_{CCA} =3.3V,V_{IN}=2.5V/1.8V,V_{REF}=0.5V_{IN},unless otherwise specified)

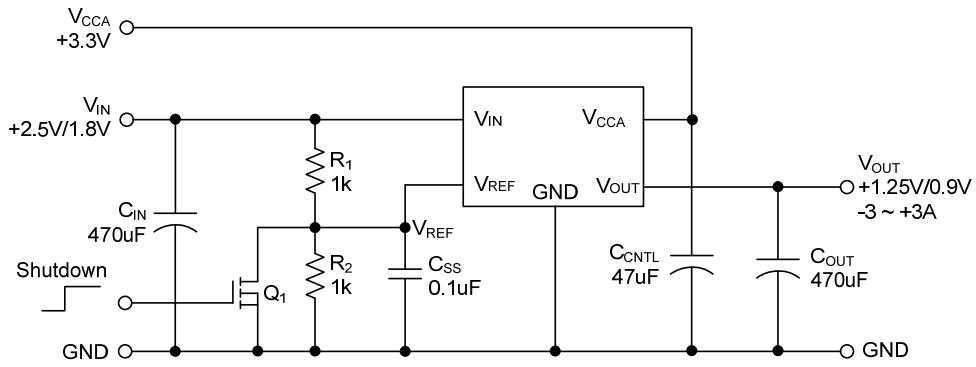
PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT}=0A			V_{REF}		V
System Accuracy		Over temperature, V_{OUT} offset, and load regulation		-20		20	mV
Offset Voltage (V_{OUT}–V_{REF})	$V_{O(OFF)}$	I_{OUT}=+10mA		-20			mV
		I_{OUT}=-10mA				20	
Load Regulation	ΔV_{OUT}	I_{OUT}=+10mA ~ +3A				2	%
		I_{OUT}= -10mA ~ -3A				2	
Current Limit	I_{LIMIT}	Sourcing Current (V_{IN}=2.5V)	T_J=25°C	+3	+3.6		A
			T_J=125°C		+3.1		
		Sinking Current (V_{IN}=2.5V)	T_J=25°C	-3	-3.6		
			T_J=125°C		-3.1		
		Sourcing Current (V_{IN}=1.8V)	T_J=25°C	+2.9	+3.2		
			T_J=125°C		+2.6		
		Sinking Current (V_{IN}=1.8V)	T_J=25°C	-2.9	-3.2		
			T_J=125°C		-2.6		
Thermal Shutdown Temperature	T_{SHDN}	Rising T_J			183		°C
Thermal Shutdown Hysteresis	T_{HYS}				42		°C
V_{CCA} Supply Current	I_{CCA}	I_{OUT}=0A		1	2	3	mA
		I_{OUT}=±3A (Normal Operation)			50	110	
		V_{REF}=GND (Shutdown)			2.0		
V_{REF} Bias Current (The current flows out of V_{REF})	I_{BIAS}	V_{REF}=1.25V/0.9V (Normal Operation)			200	500	nA
		V_{REF}=GND (Shutdown)			20	40	μA
Shutdown Threshold Voltage	V_{SHDN}			0.2	0.35	0.65	V

■ APPLICATIONS CIRCUIT

1. General Application



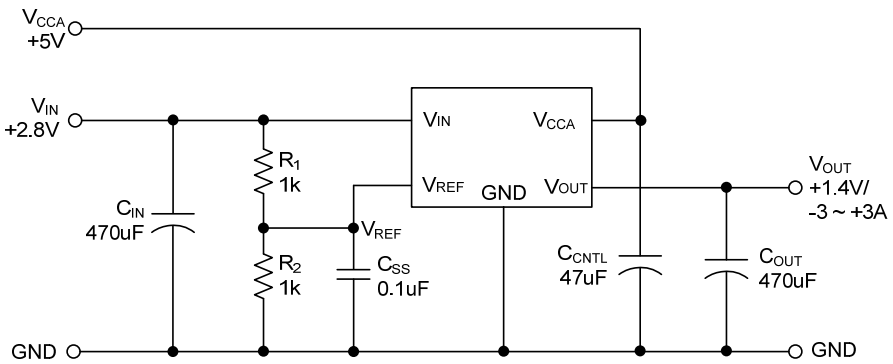
2. For V_{OUT}=1.25V/0.9V



C_{OUT} : 470μF, ESR=25mΩ
R_1, R_2 : 1kΩ, 1%
Q1 : APM2300 AC

Note : Since R1 and R2 are very small, the voltage offset caused by the bias current of V_{REF} can be ignore.

3. For V_{OUT}=1.4V

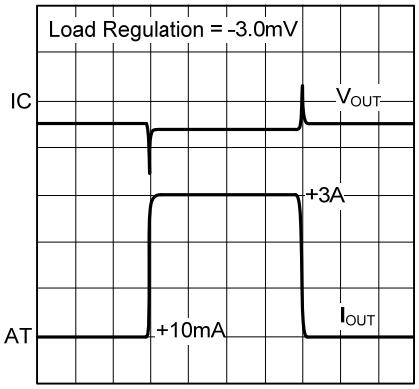


■ OPERATING WAVEFORMS

1. Load Transient Response: I_{OUT} = +10mA -> +3A -> +10mA

- V_{IN} = 2.5V, V_{CNTL} = 3.3V
- V_{REF} is 1.250V supplied by a regulator
- C_{OUT} = 470μF/10V, ESR = 30mΩ
- I_{OUT} slew rate = ±3A/μS

I_{OUT} = +10mA -> +3A -> +10mA

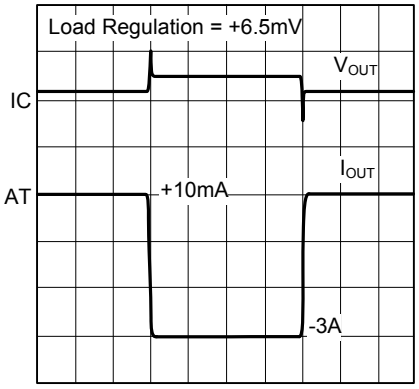


Ch1 : V_{OUT}, 20mV/Div, DC,
Offset = 1.250V
Ax1 : I_{OUT}, 1A/Div
Time : 20 μ S/Div

2. Load Transient Response: I_{OUT} = -10mA -> -3A -> -10mA

- V_{IN} = 2.5V, VCCA = 3.3V
- V_{REF} is 1.250V supplied by a regulator
- C_{OUT} = 470μF/10V, ESR = 30mΩ
- I_{OUT} slew rate = ±3A/μS

I_{OUT} = -10mA -> -3A -> -10mA



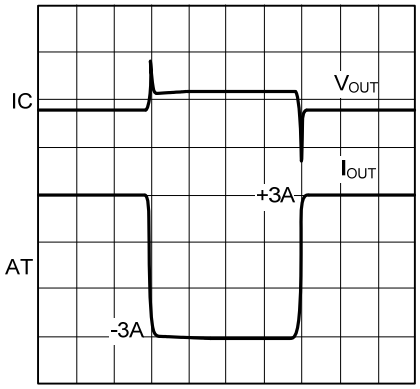
Ch1 : V_{OUT}, 20mV/Div, DC,
Offset = 1.250V
Ax1 : I_{OUT}, 1A/Div
Time : 20 μ S/Div

■ OPERATNG WAVEFORMS(Cont.)

3. Load Transient Response: I_{OUT} = +3A -> -3A -> +3A

- V_{IN} = 2.5V, V_{CCA} = 3.3V
- V_{REF} is 1.250V supplied by a regulator
- C_{OUT} = 470μF/10V, ESR = 30mΩ
- I_{OUT} slew rate = ±3A/μS

I_{OUT} = +3A -> -3A -> +3A

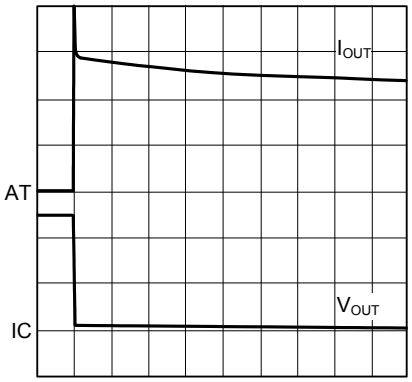


Ch1 : V_{OUT}, 50mV/Div, DC,
Offset = 1.250V
Ax1 : I_{OUT}, 2A/Div
Time : 20 μ S/Div

4. Short-Circuit Test

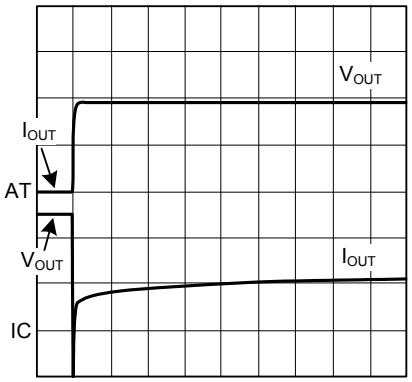
- V_{IN} = 2.5V, V_{CCA} = 3.3V

V_{OUT} is Shorted to GND



Ch1 : V_{OUT}, 500mV/Div, DC,
Offset = 1.250V
Ax1 : I_{OUT}, 2A/Div
Time : 5mS/Div

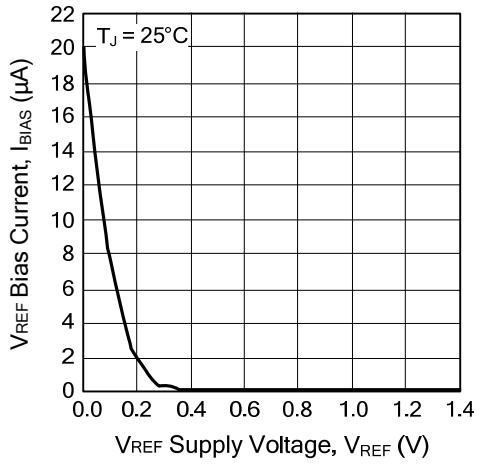
V_{OUT} is Shorted to V_{IN} (2.5V)



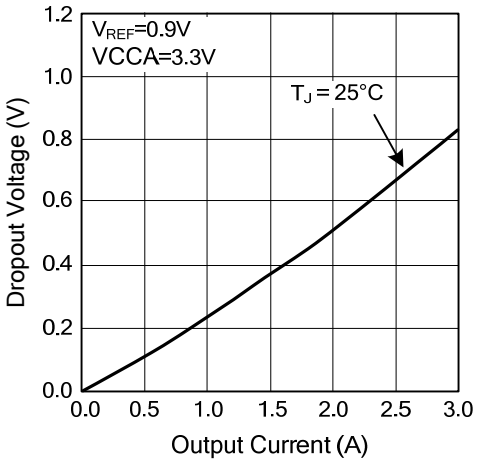
Ch1 : V_{OUT}, 500mV/Div, DC,
Offset = 1.250V
Ax1 : I_{OUT}, 2A/Div
Time : 5mS/Div

■ TYPICAL CHARACTERISTICS

V_{REF} Bias Current
Vs. V_{REF} Supply Voltage



V_{IN} Dropout Voltage vs. Output Current



V_{IN} Dropout Voltage vs. Output Current