



## UT10XX

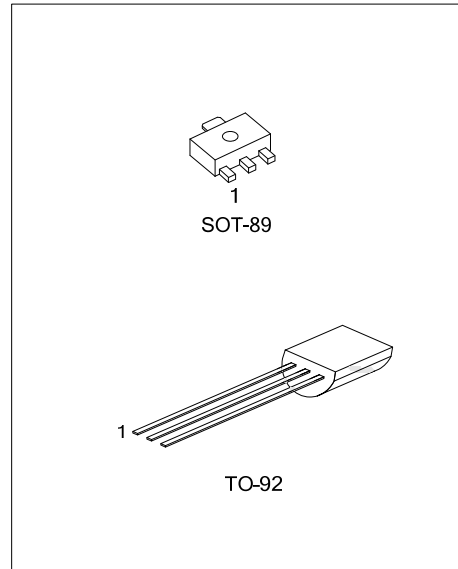
CMOS IC

### THREE-TERMINAL LOW POWER VOLTAGE REGULATORS

#### DESCRIPTION

The UTC **UT10XX** series is a set of three-Terminal low power voltage regulators implemented in CMOS technology. They are available with several fixed output voltages ranging from 1.5V~7.0V. The advantage of CMOS technology is low voltage dropout and low quiescent current.

Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.



#### FEATURES

- \* Low power consumption
- \* Low voltage dropout
- \* Low temperature coefficient
- \* Wide operating voltage (12V Max.)

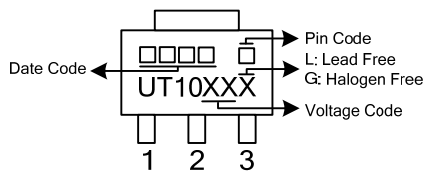
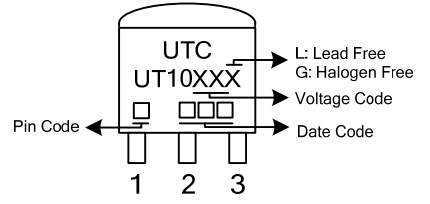
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assign.			Packing
Lead Free	Halogen Free		1	2	3	
UT10XXL-AB3-C-R	UT10XXG-AB3-C-R	SOT-89	G	I	O	Tape Reel
UT10XXL-T92-B-B	UT10XXG-T92-B-B	TO-92	O	G	I	Tape Box
UT10XXL-T92-B-K	UT10XXG-T92-B-K	TO-92	O	G	I	Bulk
UT10XXL-T92-C-B	UT10XXG-T92-C-B	TO-92	G	I	O	Tape Box
UT10XXL-T92-C-K	UT10XXG-T92-C-K	TO-92	G	I	O	Bulk

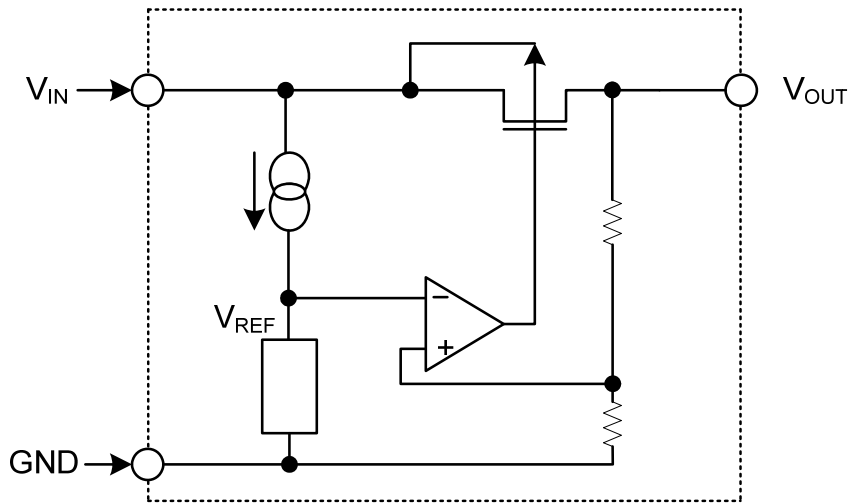
Note: Pin assignment: I:  $V_{IN}$  O:  $V_{OUT}$  G:Ground

<p>UT10xxL-AB3-C-R</p>	<p>(1) Packing Type (2) Pin Assignment (3) Package Type (4) Lead Plating (5) Output Voltage Code</p>	<p>(1) B: Tape Box, K: Bulk, R: Tape Reel (2) refer to Pin Assignment (3) AB3: SOT-89, T92: TO-92 (4) L: Lead Free, G: Halogen Free (5) xx: refer to Marking Information</p>
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■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-89	18:1.8V	 <p>Pin Code L: Lead Free G: Halogen Free Voltage Code</p>
	20:2.0V	
	25:2.5V	
	27:2.7V	
	28:2.8V	
	30:3.0V	
TO-92	33:3.3V	 <p>L: Lead Free G: Halogen Free Voltage Code Date Code</p>
	36:3.6V	
	44:4.4V	
	45:4.5V	
	50:5.0V	
	70:7.0V	

## ■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.3 ~ +13	V
Power Dissipation	SOT-89	200	mW
	TO-92	200	
Operating Temperature	$T_{OPR}$	-40 ~ +85	°C
Storage Temperature	$T_{STG}$	-40 ~ +125	°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.

## ■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

### FOR UT1018

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=3.8V, I_{OUT}=10mA$	±2.4%	1.757	1.8	1.843	V
			±5%	1.71	1.8	1.89	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=3.8V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$2.8V \leq V_{IN} \leq 12V, I_{OUT}=0.5mA$		0.2		%/V	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=3.8V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=3.8V, \text{No load}$		2.2	6.0	µA	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=3.8V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		±0.25		mV/°C	

### FOR UT1020

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=4V, I_{OUT}=10mA$	±2.4%	1.952	2.0	2.048	V
			±5%	1.9	2.0	2.1	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=4V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$3V \leq V_{IN} \leq 12V, I_{OUT}=0.5mA$		0.2		%/V	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=4V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=4V, \text{No load}$		2.2	6.0	µA	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=4V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		±0.3		mV/°C	

### FOR UT1025

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=4.5V, I_{OUT}=10mA$	±2.4%	2.440	2.5	2.560	V
			±5%	2.375	2.5	2.625	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=4.5V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$3.5V \leq V_{IN} \leq 12V, I_{OUT}=0.5mA$		0.2		%/V	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=4.5V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=4.5V, \text{No load}$		2.2	6.0	µA	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=4.5V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		±0.35		mV/°C	

## ■ ELECTRICAL CHARACTERISTICS(Cont.)

FOR UT1027

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=4.7V, I_{OUT}=10mA$	$\pm 2.4\%$	2.635	2.7	2.765	V
			$\pm 5\%$	2.565	2.7	2.835	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=4.7V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$3.7V \leq V_{IN} \leq 12V, I_{OUT}=0.5mA$		0.2		%/V	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=4.7V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=4.7V, \text{No load}$		2.5	6.0	$\mu A$	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=4.7V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		$\pm 0.4$		$mV/^\circ C$	

FOR UT1028

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=4.8V, I_{OUT}=10mA$	$\pm 2.4\%$	2.732	2.8	2.867	V
			$\pm 5\%$	2.660	2.8	2.940	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=4.8V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=4.8V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=4.8V, \text{No load}$		2.5	6.0	$\mu A$	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$3.8V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=4.8V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		$\pm 0.4$		$mV/^\circ C$	

FOR UT1030

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=5V, I_{OUT}=10mA$	$\pm 2.4\%$	2.928	3.0	3.072	V
			$\pm 5\%$	2.850	3.0	3.150	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=5V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=5V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=5V, \text{No load}$		2.5	6.0	$\mu A$	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$4V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=5V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		$\pm 0.45$		$mV/^\circ C$	

## ■ ELECTRICAL CHARACTERISTICS(Cont.)

FOR UT1033

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=5.5V, I_{OUT}=10mA$	$\pm 2.4\%$	3.220	3.3	3.379	V
			$\pm 5\%$	3.135	3.3	3.465	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=5.5V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=5.5V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=5.5V, \text{No load}$		2.5	6.0	$\mu A$	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$4.5V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=5.5V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		$\pm 0.5$		mV/ $^\circ C$	

FOR UT1036

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=5.6V, I_{OUT}=10mA$	$\pm 2.4\%$	3.513	3.6	3.686	V
			$\pm 5\%$	3.420	3.6	3.780	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=5.6V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=5.6V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=5.6V, \text{No load}$		3.0	7.0	$\mu A$	
Line Regulation	$\frac{\Delta V_{OUT}}{V_{IN} \times V_{OUT}}$	$4.6V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=5.6V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		$\pm 0.6$		mV/ $^\circ C$	

FOR UT1044

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=6.4V, I_{OUT}=10mA$	$\pm 2.4\%$	4.294	4.4	4.505	V
			$\pm 5\%$	4.180	4.4	4.620	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=6.4V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=6.4V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=6.4V, \text{No load}$		3.0	7.5	$\mu A$	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$5.4V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=6.4V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		$\pm 0.7$		mV/ $^\circ C$	

## ■ ELECTRICAL CHARACTERISTICS(Cont.)

FOR UT1050

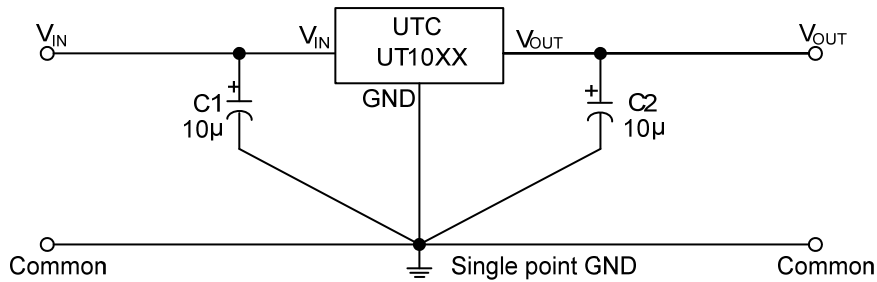
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=7V, I_{OUT}=10mA$	$\pm 2.4\%$	4.88	5.0	5.12	V
			$\pm 5\%$	4.75	5.0	5.25	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=7V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=7V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=7V, \text{No load}$		3.5	9.0	$\mu A$	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$6V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=7V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		$\pm 0.75$		mV/ $^\circ C$	

FOR UT1070

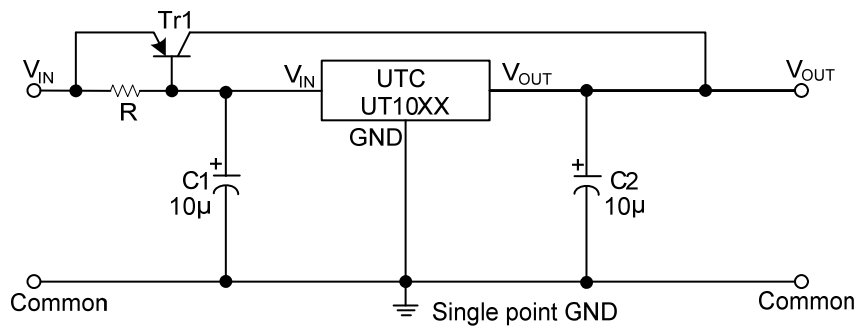
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	$V_{OUT}$	$V_{IN}=9V, I_{OUT}=10mA$	$\pm 2.4\%$	6.832	7.0	7.168	V
			$\pm 5\%$	6.65	7.0	7.35	V
Input Voltage	$V_{IN}$				12	V	
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=9V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV	
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV	
Output Current	$I_{OUT}$	$V_{IN}=9V$	20	30		mA	
Current Consumption	$I_{SS}$	$V_{IN}=9V, \text{No load}$		5.0	12.5	$\mu A$	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$8V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=9V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		$\pm 1.05$		mV/ $^\circ C$	

## APPLICATION CIRCUIT

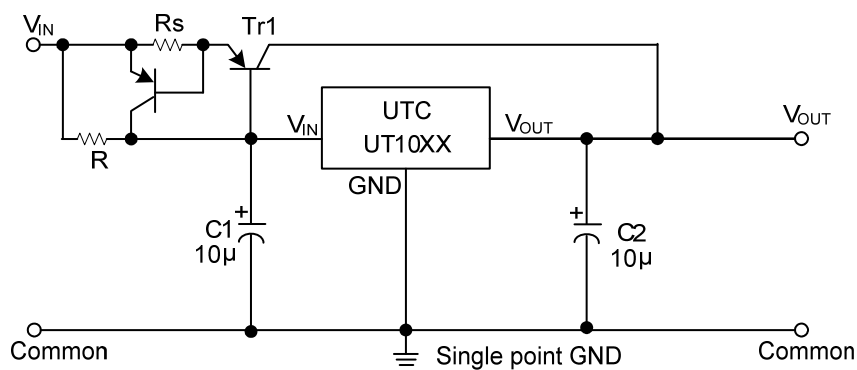
The basic circuits using the UTC **UT10XX** series



High output current positive voltage regulator



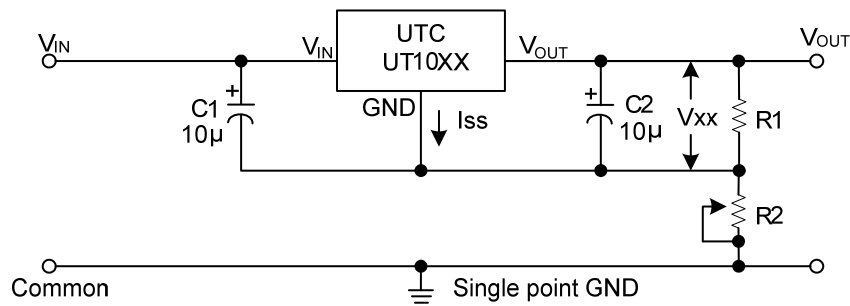
Short-circuit protection for Tr1





## ■ APPLICATION CIRCUITS(Cont.)

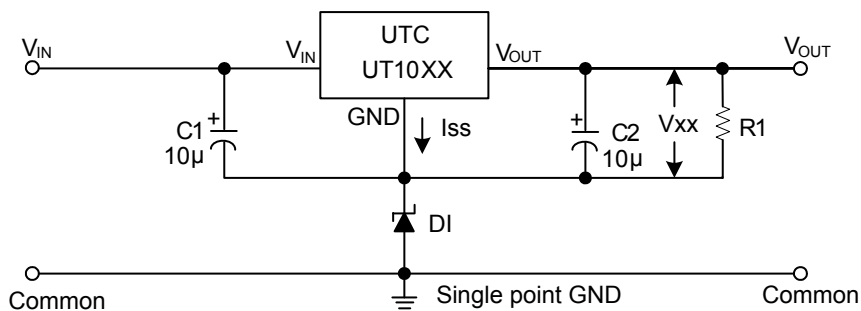
Circuit for increasing output voltage



$$V_{OUT} = V_{XX} \left(1 + \frac{R_2}{R_1}\right) + I_{SS} R_2$$

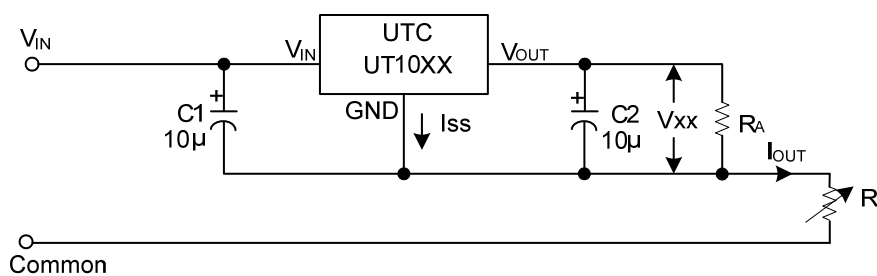
$$\approx V_{XX} \left(1 + \frac{R_2}{R_1}\right)$$

Circuit for increasing output voltage



$$V_{OUT} = V_{XX} + V_{D1}$$

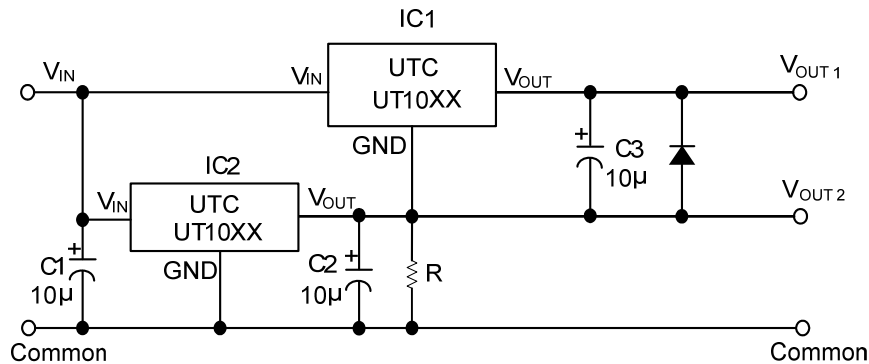
Constant current regulator



$$I_{OUT} = \frac{V_{XX}}{R_A} + I_{SS}$$

■ APPLICATION CIRCUIT(Cont.)

Dual supply



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