



UT10XX

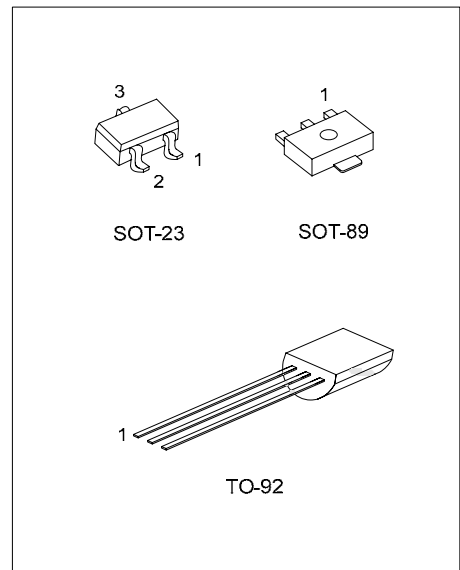
CMOS IC

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.



*Pb-free plating product number: UT10XXL

FEATURES

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

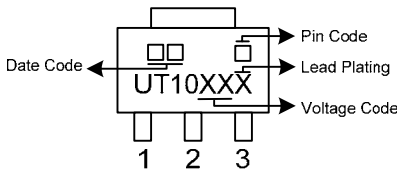
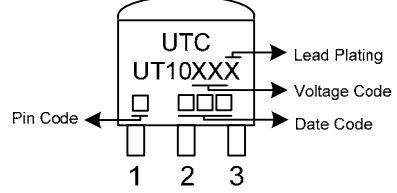
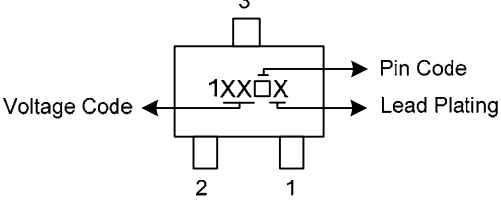
ORDERING INFORMATION

Ordering Number		Package	Pin Assign.			Packing
Normal	Lead free plating		1	2	3	
UT10XX-AB3-C-R	UT10XXL-AB3-C-R	SOT-89	G	I	O	Tape Reel
UT10XX-AE3-5-R	UT10XXL-AE3-5-R	SOT-23	G	O	I	Tape Reel
UT10XX-T92-B-B	UT10XXL-T92-B-B	TO-92	O	G	I	Tape Box
UT10XX-T92-B-K	UT10XXL-T92-B-K	TO-92	O	G	I	Bulk
UT10XX-T92-C-B	UT10XXL-T92-C-B	TO-92	G	I	O	Tape Box
UT10XX-T92-C-K	UT10XXL-T92-C-K	TO-92	G	I	O	Bulk

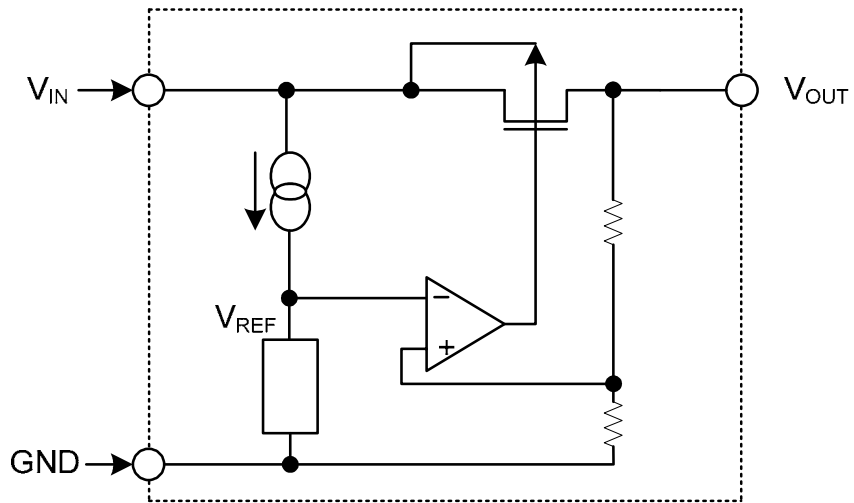
Note: Pin assignment: I: V_{IN} O: V_{OUT} G:Ground

<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, AE3: SOT-23, T92: TO-92 (4) L: Lead Free Plating, Blank: Pb/Sn (5) xx: refer to Marking Information</p>
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■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-89	18:1.8V 20:2.0V 25:2.5V 27:2.7V 28:2.8V 30:3.0V 33:3.3V 36:3.6V 44:4.4V 45:4.5V 50:5.0V 70:7.0V	 <p>Diagram of SOT-89 package marking. The top surface is marked with 'UT10XXX'. Arrows point to the following features: Pin Code (top right), Lead Plating (middle right), Voltage Code (bottom right), and Date Code (left side). The package has three pins labeled 1, 2, and 3.</p>
TO-92		 <p>Diagram of TO-92 package marking. The top surface is marked with 'UTC' and 'UT10XXX'. Arrows point to the following features: Lead Plating (top right), Voltage Code (middle right), Date Code (bottom right), and Pin Code (left side). The package has three pins labeled 1, 2, and 3.</p>
SOT-23		 <p>Diagram of SOT-23 package marking. The top surface is marked with '1XX□X'. Arrows point to the following features: Pin Code (top right), Lead Plating (middle right), and Voltage Code (left side). The package has three pins labeled 2, 1, and 3.</p>

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.3 ~ +13	V
Power Dissipation	SOT-23	150	mW
	SOT-89/TO-92	200	
Operating Temperature	T_{OPR}	0 ~ +70	
Storage Temperature	T_{STG}	-40 ~ +125	

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	V_{OUT}	$V_{IN}=3.8V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$2.8V \leq V_{IN} \leq 12V, I_{OUT}=0.5mA$		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	$\frac{V_{OUT}}{Ta}$	$V_{IN}=3.8V, I_{OUT}=10mA$ $0^\circ C < Ta < 70^\circ C$		±0.25		mV/	

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	V_{OUT}	$V_{IN}=4V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$3V \leq V_{IN} \leq 12V, I_{OUT}=0.5mA$		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	$\frac{V_{OUT}}{Ta}$	$V_{IN}=4V, I_{OUT}=10mA$ $0^\circ C < Ta < 70^\circ C$		±0.3		mV/	

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	V_{OUT}	$V_{IN}=4.5V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$3.5V \leq V_{IN} \leq 12V, I_{OUT}=0.5mA$		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	$\frac{V_{OUT}}{Ta}$	$V_{IN}=4.5V, I_{OUT}=10mA$ $0^\circ C < Ta < 70^\circ C$		±0.35		mV/	

■ 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	V_{OUT}	$V_{IN}=4.7V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$3.7V \leq V_{IN} \leq 12V, I_{OUT}=0.5mA$		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	μA	
Temperature Coefficient	$\frac{V_{OUT}}{T_a}$	$V_{IN}=4.7V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		± 0.4		mV/	

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	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	μA	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$3.8V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{V_{OUT}}{T_a}$	$V_{IN}=4.8V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		± 0.4		mV/	

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	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	μA	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$4V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{V_{OUT}}{T_a}$	$V_{IN}=5V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		± 0.45		mV/	

■ 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	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	μA	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$4.5V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{V_{OUT}}{T_a}$	$V_{IN}=5.5V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		± 0.5		mV/	

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	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	μA	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$4.6V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{V_{OUT}}{T_a}$	$V_{IN}=5.6V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		± 0.6		mV/	

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	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	μA	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$5.4V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{V_{OUT}}{T_a}$	$V_{IN}=6.4V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		± 0.7		mV/	

■ ELECTRICAL CHARACTERISTICS(Cont.)

FOR UT1050

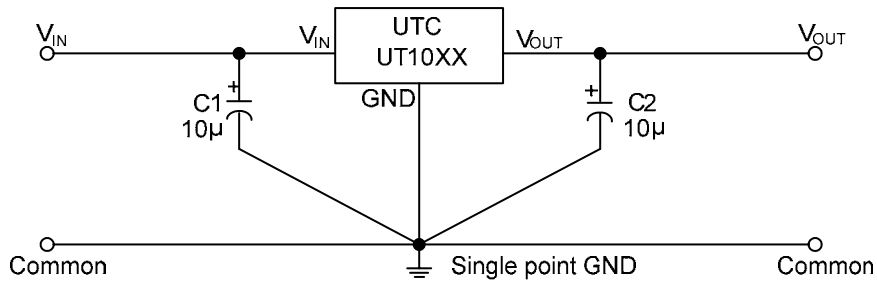
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=7V, I_{OUT}=10mA$	$\pm 2.4\%$	4.88	5.0	5.12	V
			$\pm 5\%$	4.75	5.0	5.25	V
Input Voltage	V_{IN}				12	V	
Load Regulation	V_{OUT}	$V_{IN}=7V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV	
Voltage Dropout	V_D	$I_{OUT}=1mA$		60		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	μA	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$6V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{V_{OUT}}{T_a}$	$V_{IN}=7V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		± 0.75		mV/	

FOR UT1070

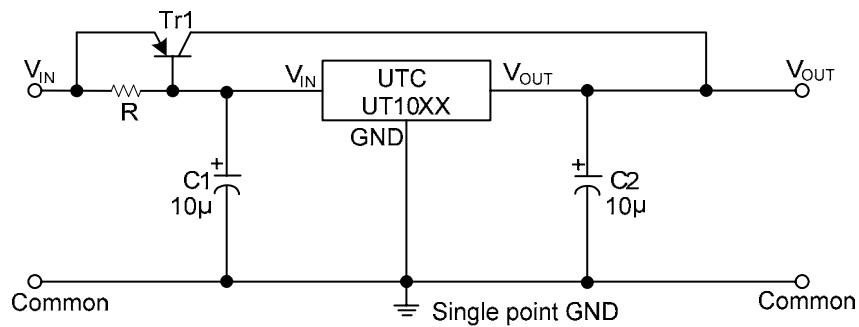
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Output Voltage	V_{OUT}	$V_{IN}=9V, I_{OUT}=10mA$	$\pm 2.4\%$	6.832	7.0	7.168	V
			$\pm 5\%$	6.65	7.0	7.35	V
Input Voltage	V_{IN}				12	V	
Load Regulation	V_{OUT}	$V_{IN}=9V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV	
Voltage Dropout	V_D	$I_{OUT}=1mA$		60		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	μA	
Line Regulation	$\frac{V_{OUT}}{V_{IN} \times V_{OUT}}$	$8V \leq V_{IN} \leq 12V, I_{OUT}=1mA$		0.2		%/V	
Temperature Coefficient	$\frac{V_{OUT}}{T_a}$	$V_{IN}=9V, I_{OUT}=10mA$ $0^\circ C < T_a < 70^\circ C$		± 1.05		mV/	

APPLICATION CIRCUIT

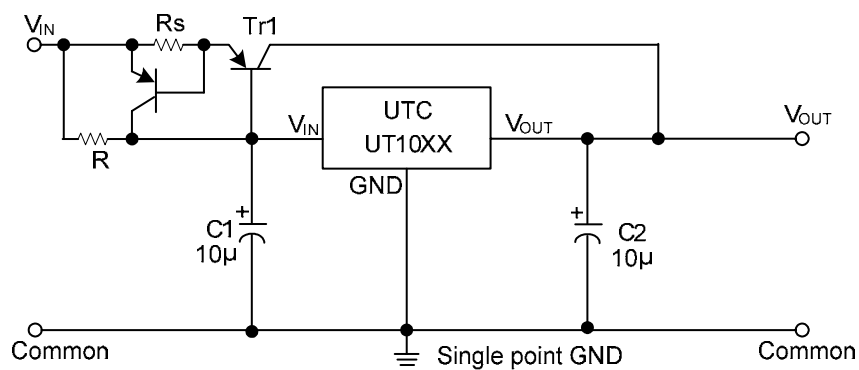
The basic circuits using the UTC **UT10XX** series



High output current positive voltage regulator

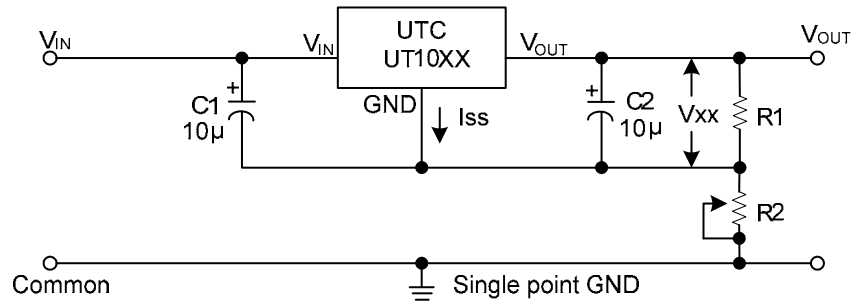


Short-circuit protection for Tr1



■ APPLICATION CIRCUITS(Cont.)

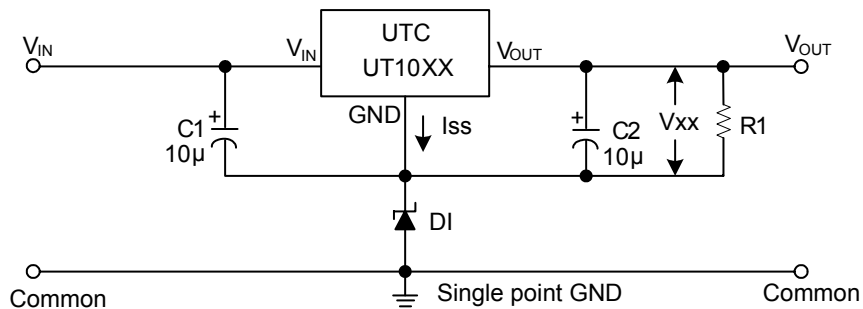
Circuit for increasing output voltage



$$V_{OUT} = V_{XX} \left(1 + \frac{R2}{R1}\right) + I_{SS} R2$$

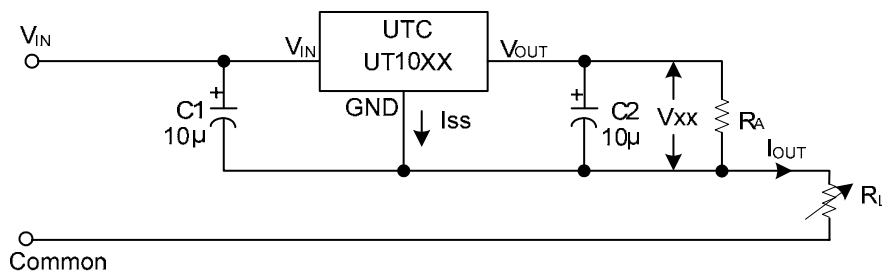
$$\approx V_{XX} \left(1 + \frac{R2}{R1}\right)$$

Circuit for increasing output voltage



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

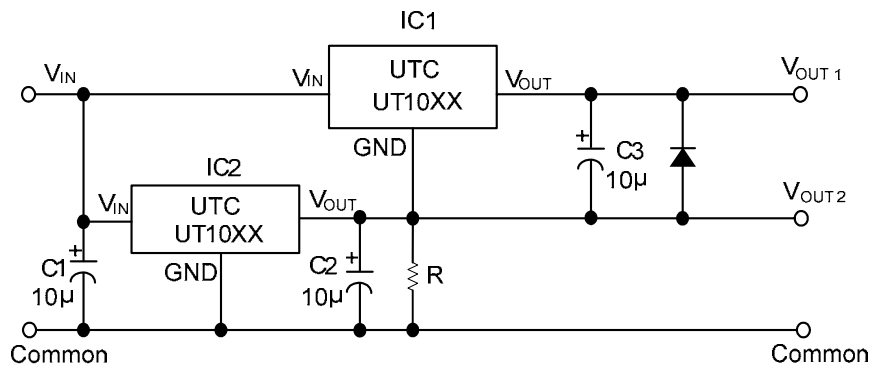
Constant current regulator



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

■ APPLICATION CIRCUIT(Cont.)

Dual supply



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