



## UT71XX

CMOS IC

### THREE-TERMINAL LOW POWER VOLTAGE REGULATORS

#### DESCRIPTION

The UTC **UT71XX** 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

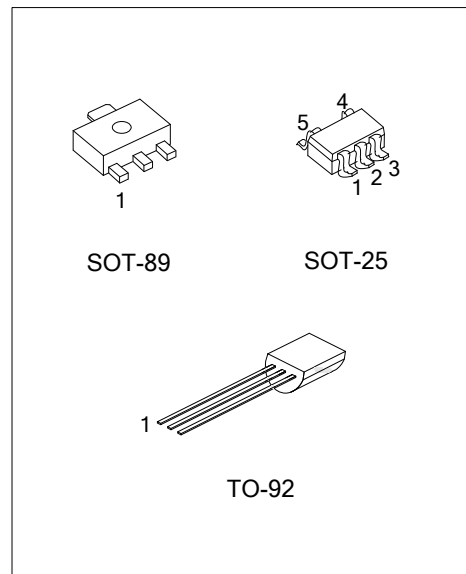
- \* Accurate output voltage range ( $\pm 2.4\%$ )
- \* Low power consumption
- \* Low voltage dropout
- \* Low temperature coefficient
- \* Wide operating voltage (24V Max.)

#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment					Packing
Lead free	Halogen Free		1	2	3	4	5	
UT71XXL-AB3-C-R	UT71XXG-AB3-C-R	SOT-89	G	I	O	-	-	Tape Reel
UT71XXL-AF5-B-R	UT71XXG-AF5-B-R	SOT-25	G	I	O	N	N	Tape Reel
UT71XXL-T92-B-B	UT71XXG-T92-B-B	TO-92	O	G	I	-	-	Tape Box
UT71XXL-T92-B-K	UT71XXG-T92-B-K	TO-92	O	G	I	-	-	Bulk
UT71XXL-T92-C-B	UT71XXG-T92-C-B	TO-92	G	I	O	-	-	Tape Box
UT71XXL-T92-C-K	UT71XXG-T92-C-K	TO-92	G	I	O	-	-	Bulk

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

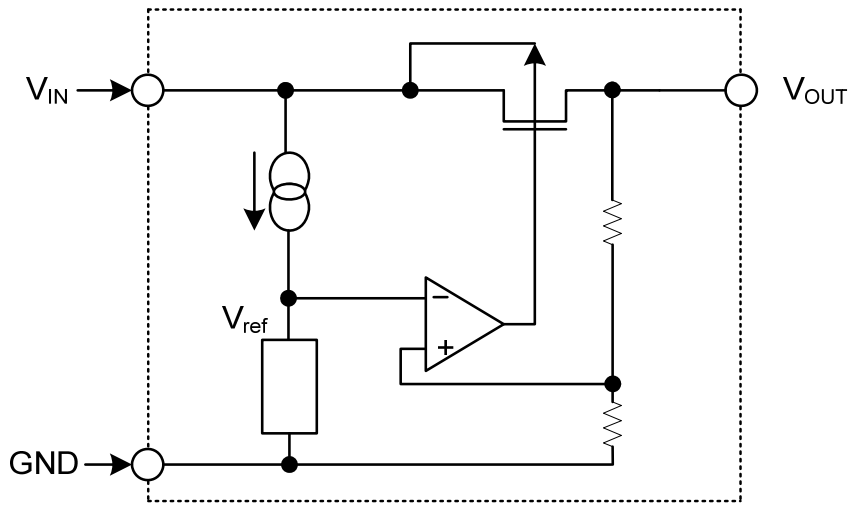
<p>UT71xxL-AB3-C-R</p> <p>(1) Packing Type (2) Pin Assignment (3) Package Type (4) Lead Free (5) Output Voltage Code</p>	<p>(1) B: Tape Box, K: Bulk, R: Tape Reel (2) refer to Pin Assignment (3) AB3: SOT-89, AF5: SOT-25, T92: TO-92 (4) L: Lead Free, G: Halogen Free (5) xx: refer to Marking Information</p>
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■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-89		
SOT-25	15:1.5V 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	
TO-92		

■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.3 ~ +28	V
Power Dissipation	SOT-89/TO-92	250	mW
	SOT-25	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 ( $T_A=25^\circ\text{C}$ )

### FOR UT7115

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=3.5V, I_{OUT}=10mA$	1.464	1.5	1.536	V
Input Voltage	$V_{IN}$				24	V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=3.5V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV
Output Current	$I_{OUT}$	$V_{IN}=3.5V$	20	30		mA
Current Consumption	$I_{SS}$	$V_{IN}=3.5V, \text{No load}$		4	6.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$2.5V \leq V_{IN} \leq 24V, I_{OUT}=0.5mA$		0.2		%/V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=3.5V, I_{OUT}=10mA$ $0^\circ\text{C} < T_A < 70^\circ\text{C}$		$\pm 0.2$		mV/°C

### FOR UT7118

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=3.8V, I_{OUT}=10mA$	1.757	1.8	1.843	V
Input Voltage	$V_{IN}$				24	V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=3.8V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV
Output Current	$I_{OUT}$	$V_{IN}=3.8V$	20	30		mA
Current Consumption	$I_{SS}$	$V_{IN}=3.8V, \text{No load}$		4	6.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$2.8V \leq V_{IN} \leq 24V, I_{OUT}=0.5mA$		0.2		%/V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=3.8V, I_{OUT}=10mA$ $0^\circ\text{C} < T_A < 70^\circ\text{C}$		$\pm 0.25$		mV/°C

### FOR UT7120

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=4V, I_{OUT}=10mA$	1.952	2.0	2.048	V
Input Voltage	$V_{IN}$				24	V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=4V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV
Output Current	$I_{OUT}$	$V_{IN}=4V$	20	30		mA
Current Consumption	$I_{SS}$	$V_{IN}=4V, \text{No load}$		4	6.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$3V \leq V_{IN} \leq 24V, I_{OUT}=0.5mA$		0.2		%/V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_a}$	$V_{IN}=4V, I_{OUT}=10mA$ $0^\circ\text{C} < T_A < 70^\circ\text{C}$		$\pm 0.3$		mV/°C

## ■ ELECTRICAL CHARACTERISTICS(Cont.)

### FOR UT7125

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=4.5V, I_{OUT}=10mA$	2.440	2.5	2.560	V
Input Voltage	$V_{IN}$				24	V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=4.5V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV
Output Current	$I_{OUT}$	$V_{IN}=4.5V$	20	30		mA
Current Consumption	$I_{SS}$	$V_{IN}=4.5V, \text{No load}$		4	6.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$3.5V \leq V_{IN} \leq 24V, I_{OUT}=0.5mA$		0.2		%/V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_A}$	$V_{IN}=4.5V, I_{OUT}=10mA$ $0^\circ C < T_A < 70^\circ C$		$\pm 0.35$		mV/ $^\circ C$

### FOR UT7127

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=4.7V, I_{OUT}=10mA$	2.635	2.7	2.765	V
Input Voltage	$V_{IN}$				24	V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=4.7V, 1mA \leq I_{OUT} \leq 20mA$		60	100	mV
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV
Output Current	$I_{OUT}$	$V_{IN}=4.7V$	20	30		mA
Current Consumption	$I_{SS}$	$V_{IN}=4.7V, \text{No load}$		4	6.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$3.7V \leq V_{IN} \leq 24V, I_{OUT}=0.5mA$		0.2		%/V
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 UT7128

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=4.8V, I_{OUT}=10mA$	2.732	2.8	2.867	V
Input Voltage	$V_{IN}$				24	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	$I_{SS}$	$V_{IN}=4.8V, \text{No load}$		4	6.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$3.8V \leq V_{IN} \leq 24V, I_{OUT}=1mA$		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 UT7130

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=5V, I_{OUT}=10mA$	2.928	3.0	3.072	V
Input Voltage	$V_{IN}$				24	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	$I_{SS}$	$V_{IN}=5V, \text{No load}$		4	6.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$4V \leq V_{IN} \leq 24V, I_{OUT}=1mA$		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 UT7133

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=5.5V, I_{OUT}=10mA$	3.220	3.3	3.379	V
Input Voltage	$V_{IN}$				24	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	$I_{SS}$	$V_{IN}=5.5V, \text{No load}$		4	6.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$4.5V \leq V_{IN} \leq 24V, I_{OUT}=1mA$		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 UT7136

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=5.6V, I_{OUT}=10mA$	3.513	3.6	3.686	V
Input Voltage	$V_{IN}$				24	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	6.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$4.6V \leq V_{IN} \leq 24V, I_{OUT}=1mA$		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 UT7144

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=6.4V, I_{OUT}=10mA$	4.294	4.4	4.505	V
Input Voltage	$V_{IN}$				24	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	$I_{SS}$	$V_{IN}=6.4V, \text{No load}$		4	7.5	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$5.4V \leq V_{IN} \leq 24V, I_{OUT}=1mA$		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/ $^\circ C$

### FOR UT7145

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=6.5V, I_{OUT}=10mA$	4.392	4.5	4.608	V
Input Voltage	$V_{IN}$				24	V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=6.5V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV
Output Current	$I_{OUT}$	$V_{IN}=6.5V$	20	30		mA
Current Consumption	$I_{SS}$	$V_{IN}=6.5V, \text{No load}$		4	7.5	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$5.5V \leq V_{IN} \leq 24V, I_{OUT}=1mA$		0.2		%/V
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_A}$	$V_{IN}=6.5V, I_{OUT}=10mA$ $0^\circ C < T_A < 70^\circ C$		$\pm 0.7$		mV/ $^\circ C$

### ■ ELECTRICAL CHARACTERISTICS(Cont.)

#### FOR UT7150

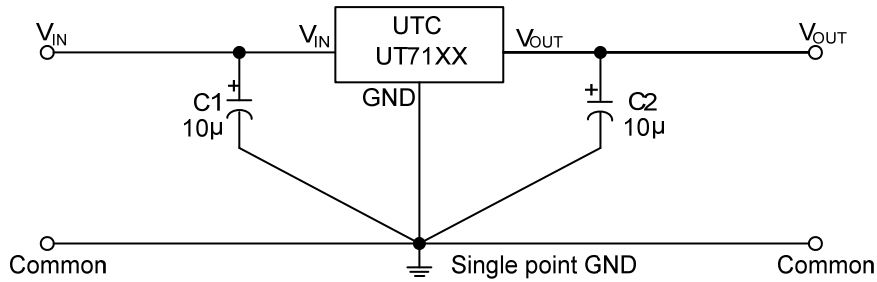
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=7V, I_{OUT}=10mA$	4.88	5.0	5.12	V
Input Voltage	$V_{IN}$				24	V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=7V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV
Output Current	$I_{OUT}$	$V_{IN}=7V$	20	30		mA
Current Consumption	$I_{SS}$	$V_{IN}=7V, \text{No load}$		5	9.0	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$6V \leq V_{IN} \leq 24V, I_{OUT}=1mA$		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 UT7170

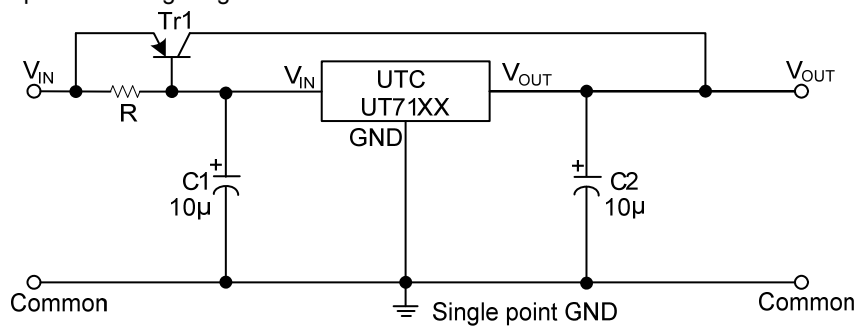
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$V_{IN}=9V, I_{OUT}=10mA$	6.832	7.0	7.168	V
Input Voltage	$V_{IN}$				24	V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=9V, 1mA \leq I_{OUT} \leq 30mA$		60	100	mV
Voltage Dropout	$V_D$	$I_{OUT}=1mA$		60		mV
Output Current	$I_{OUT}$	$V_{IN}=9V$	20	30		mA
Current Consumption	$I_{SS}$	$V_{IN}=9V, \text{No load}$		5	12.5	$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$8V \leq V_{IN} \leq 24V, I_{OUT}=1mA$		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/ $^\circ C$

## ■ TYPICAL APPLICATION CIRCUIT

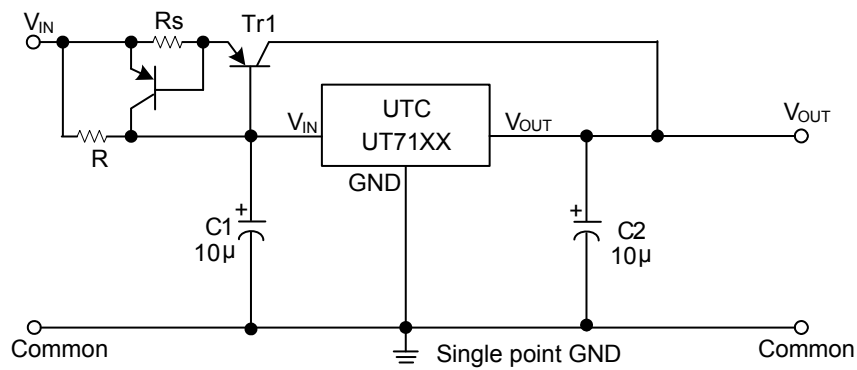
The basic circuits using the UTC **UT71XX** series



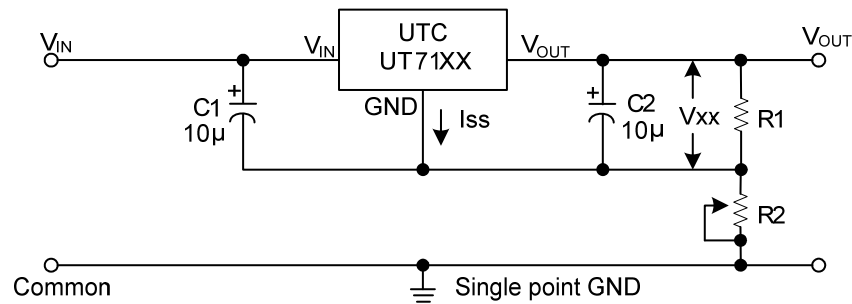
High output current positive voltage regulator



Short-circuit protection for Tr1



Circuit for increasing output voltage



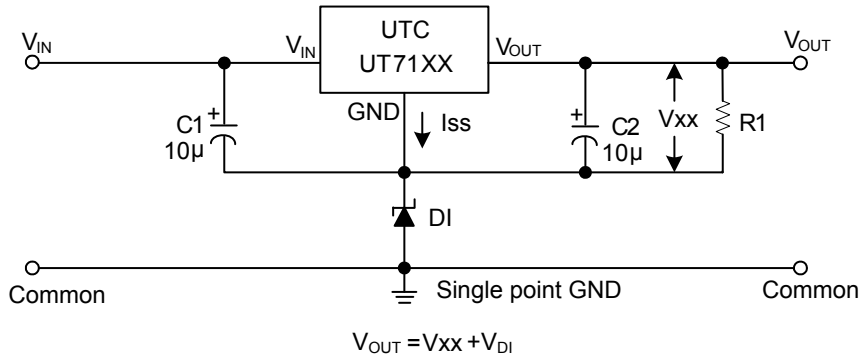
$$V_{OUT} = V_{XX} \left(1 + \frac{R_2}{R_1}\right) + I_{SS} R_2$$

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

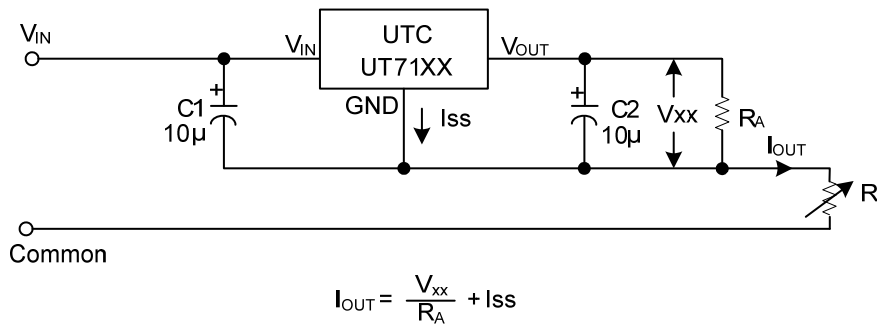


## ■ TYPICAL APPLICATION CIRCUIT(cont.)

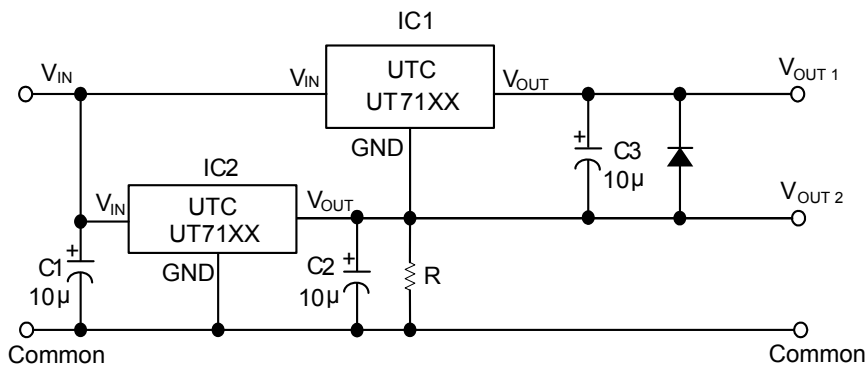
Circuit for increasing output voltage



Constant current regulator



Dual supply



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