



## UR133/A

## LINEAR INTEGRATED CIRCUIT

### 300/500mA LOW DROPOUT LINEAR VOLTAGE REGULATORS

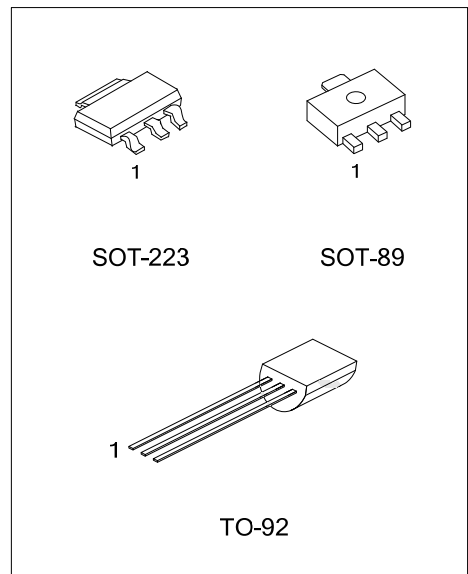
#### DESCRIPTION

The UTC **UR133/A** are 300/500mA fixed output voltage low dropout linear regulators. Wide range of available output voltage fits most of applications. Built-in output current-limiting most thermal-limiting provide maximal protection against any fault conditions.

#### FEATURES

- \*Guaranteed 300/500mA output current
- \*Input voltage range up to 12V
- \*Extremely tight load regulation
- \*Fast transient response
- \*Current-limiting and Thermal-limiting
- \*Three-terminal adjustable or fixed 1.5V, 1.8V, 2.2V, 2.5V, 2.7V, 2.8V, 2.9V, 3.0V, 3.3V, 3.5V, 3.6V, 3.7V, 4.7V, 5.0V

#### ORDERING INFORMATION



Ordering Number		Package	② Pin Assignment	Packing
Lead Free	Halogen Free			
UR133①L-xx-AA3-②-③	UR133①G-xx-AA3-②-③	SOT-223	A: GOI B: OGI C: GIO D: IGO	R: Tape Reel B: Tape Box K: Bulk
UR133①L-xx-AB3-②-③	UR133①G-xx-AB3-②-③	SOT-89		
UR133①L-xx-T92-②-③	UR133①G-xx-T92-②-③	TO-92		
UR133①L-xx-T92-②-③	UR133①G-xx-T92-②-③	TO-92		

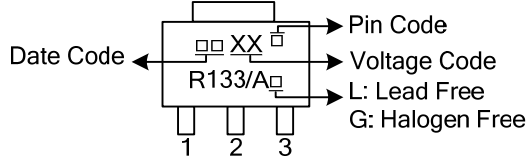
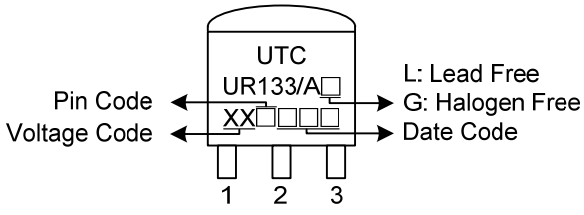
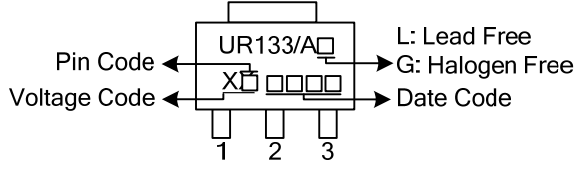
Note: 1. ①: Current code: Blank: 300mA A: 500mA

2. Pin assignment: I: V<sub>IN</sub>(Positive Power Input) O: V<sub>OUT</sub>(Output) G: GND(Ground/Adjustable)

3. xx: Output Voltage, refer to Marking Information.

<p>UR133①L-xx-AB3-②-③</p> <p>(1) Packing Type (2) Pin Assignment (3) Package Type (4) Output Voltage Code (5) Lead Plating (6) Current Code</p>	<p>(1) B: Tape Box, K: Bulk, R: Tape Reel (2) refer to Pin Assignment (3) AA: SOT-223, AB3: SOT-89, T92: TO-92 (4) xx: refer to Marking Information (5) G: Halogen Free, L: Lead Free (6) Blank: 300mA A: 500mA</p>
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### MARKING INFORMATION

PACKAGE	VOLTAGE CODE	PIN CODE	PIN 1	PIN 2	PIN 3	MARKING
SOT-89	15:1.5V 18:1.8V 22:2.2V 25:2.5V	A	G	O	I	 <p>Pin Code Voltage Code L: Lead Free G: Halogen Free</p>
		B	O	G	I	
		C	G	I	O	
		D	I	G	O	
TO-92	27:2.7V 28:2.8V 29:2.9V 30:3.0V 33:3.3V 35:3.5V 36:3.6V	A	G	O	I	 <p>Pin Code Voltage Code L: Lead Free G: Halogen Free</p>
		B	O	G	I	
		C	G	I	O	
		D	I	G	O	
SOT-223	37:3.7V 47:4.7V 50:5.0V AD:ADJ	A	G	O	I	 <p>Pin Code Voltage Code L: Lead Free G: Halogen Free</p>
		B	O	G	I	
		C	G	I	O	
		D	I	G	O	

### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage $V_{IN}$		$V_{IN}$	-0.3 ~ +12	V
Power Dissipation	SOT-89	$P_D$	500	mW
	TO-92		600	mW
	SOT-223		800	mW
Operating Temperature		$T_{OPR}$	-40 ~ +85	°C
Storage Temperature		$T_{STG}$	-65 ~ +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.				

### ■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Case	SOT-89	$\theta_{JC}$	100	°C/W
	SOT-223		15	°C/W
Junction to Ambient	SOT-89	$\theta_{JA}$	300	°C/W
	TO-92		160	°C/W
	SOT-223		60	°C/W

### ■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , $C_{IN}=1\mu\text{F}$ , $C_{OUT}=10\mu\text{F}$ , unless otherwise specified)

#### For UR133/A-1.5V, 1.8V, 2.2V, 2.5V, 2.7V, 2.8V, 2.9V, 3.0V

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage-UR133/A		$V_{OUT}$	$I_L=2\text{mA}$ , $V_{IN}-V_{OUT}=1.4\text{V}$	1.47	1.50	1.53	V
				1.77	1.80	1.83	V
				2.16	2.20	2.24	V
				2.45	2.50	2.55	V
				2.65	2.70	2.75	V
				2.74	2.80	2.86	V
				2.84	2.90	2.96	V
				2.94	3.00	3.06	V
Dropout Voltage (note 4,5)	UR133	$V_D$	$I_L=300\text{mA}$			1.5	V
	UR133A		$I_L=500\text{mA}$				
Line Regulation		$\Delta V_{OUT}$	$I_L=2\text{mA}$ , $V_{IN}-V_{OUT}=2\text{V} \sim V_{IN}=9\text{V}$			0.5	% $V_{OUT}$
Load Regulation (Note 2)	UR133	$\Delta V_{OUT}$	$I_L=2\text{mA} \sim 300\text{mA}$ , $V_{IN}-V_{OUT}=2\text{V}$		10	30	mV
	UR133A		$I_L=2\text{mA} \sim 500\text{mA}$ , $V_{IN}-V_{OUT}=2\text{V}$		10	50	mV
Current Limit (Note 3)	UR133	$I_{LIMIT}$	$V_{IN}-V_{OUT}=2\text{V}$ , $V_{OUT}=0\text{V}$		350		mA
	UR133A				550		mA
Standby Current		$I_{ST-BY}$	$I_L=0$ , $V_{IN}=9\text{V}$			5.0	mA
Output Voltage Temperature Coefficient					50	150	PPM/°C

■ ELECTRICAL CHARACTERISTICS(Cont.)

For UR133/A-ADJ 3.3V, 3.5V, 3.6V, 3.7V, 4.7V, 5.0V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>ADJUSTABLE (R1=120Ω, R2=200Ω, V<sub>OUT</sub>=3.3V)</b>							
Reference Voltage	V <sub>REF</sub>	V <sub>IN</sub> -V <sub>OUT</sub> =2V, I <sub>L</sub> =2mA	1.238	1.250	1.262	V	
Output Voltage-UR133/A	V <sub>OUT</sub>	I <sub>L</sub> =2mA, V <sub>IN</sub> -V <sub>OUT</sub> =1.4V	3.23	3.30	3.37	V	
			3.43	3.50	3.57	V	
			3.53	3.60	3.67	V	
			3.63	3.70	3.77	V	
			4.61	4.70	4.79	V	
			4.90	5.00	5.10	V	
Dropout Voltage (Notes 4, 5)	UR133	V <sub>D</sub>	I <sub>L</sub> =300mA		1.3	V	
	UR133A		I <sub>L</sub> =500mA				
	UR133-ADJ	V <sub>D</sub>	I <sub>L</sub> =300mA		1.5	V	
	UR133A-ADJ		I <sub>L</sub> =500mA				
Line Regulation	ΔV <sub>OUT</sub>	I <sub>L</sub> =2mA, V <sub>IN</sub> -V <sub>OUT</sub> =2V ~ V <sub>IN</sub> =12V			0.5	%V <sub>OUT</sub>	
Load Regulation (Note 2)	UR133	ΔV <sub>OUT</sub>	I <sub>L</sub> =2mA ~ 300mA, V <sub>IN</sub> -V <sub>OUT</sub> =2V		10	30	mV
	UR133A		I <sub>L</sub> =2mA ~ 500mA, V <sub>IN</sub> -V <sub>OUT</sub> =2V		10	50	mV
Current Limit (Note 3)	UR133	I <sub>LIMIT</sub>	V <sub>IN</sub> -V <sub>OUT</sub> =2V, V <sub>OUT</sub> =0V		350		mA
	UR133A				550		mA
Standby current	I <sub>ST-BY</sub>	I <sub>L</sub> =0, V <sub>IN</sub> =12V			5.0	mA	
Adjust Pin Current	I <sub>ADJ</sub>	V <sub>IN</sub> =12V			120	μA	
Adjust Pin Current Change	UR133	ΔI <sub>ADJ</sub>	V <sub>IN</sub> =2.75V~12V, I <sub>L</sub> =1mA~300mA		5		μA
	UR133A		V <sub>IN</sub> =2.75V~12V, I <sub>L</sub> =1mA~500mA		5		μA
Output Voltage Temperature Coefficient				50	150	PPM/°C	

Note 1: Guaranteed by design.

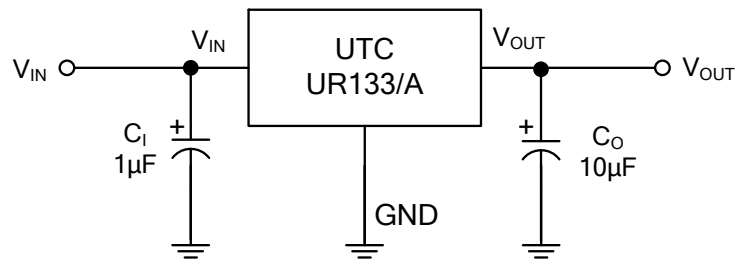
2: Regulation is measured at constant junction temperature, using pulsed ON time.

3: Current Limit is measured at constant junction temperature, using pulsed ON time.

4: Dropout is measured at constant junction temperature, using pulsed ON time, and the criterion is V<sub>OUT</sub> inside target value ±2%.

5: Dropout test is skipped at the condition of V<sub>IN</sub><3V.

### ■ TYPICAL APPLICATION CIRCUIT

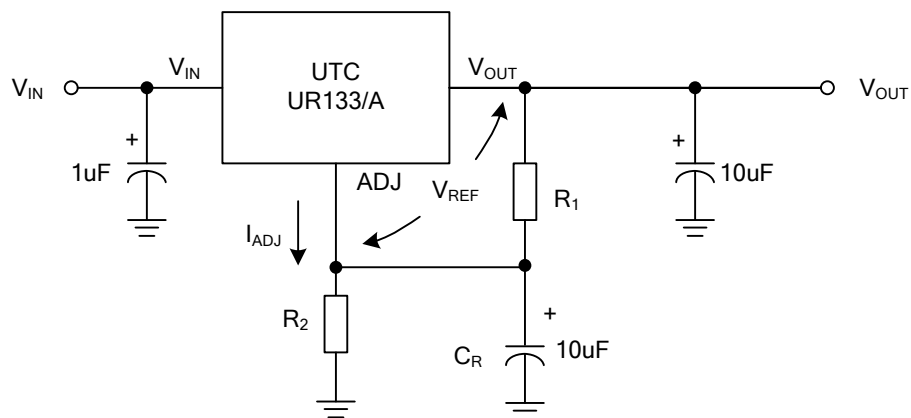


### ■ APPLICATION INFORMATION

A 10µF (or larger) capacitor is recommended between  $V_{OUT}$  and GND for stability. The part may oscillate without the capacitor. Any type of capacitor can be used, but not Aluminum electrolytics when operating below  $-25^{\circ}\text{C}$ . The capacitance may be increased without limit.

A 1µF capacitor (or larger) should be placed between  $V_{IN}$  to GND.

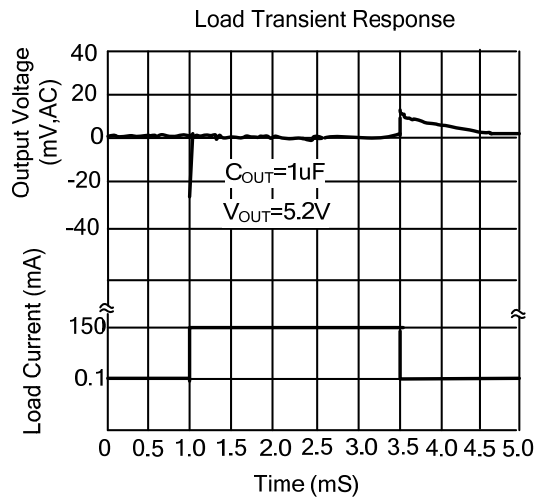
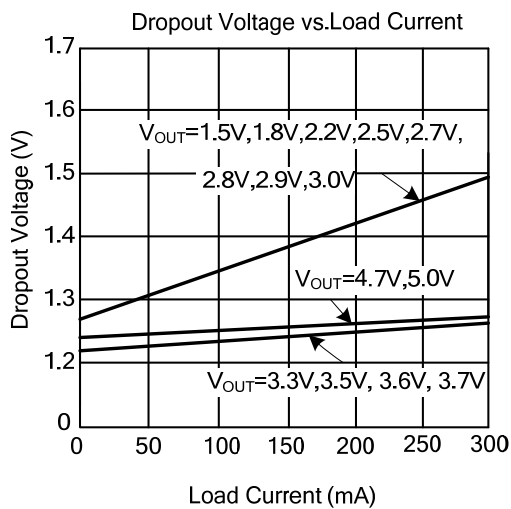
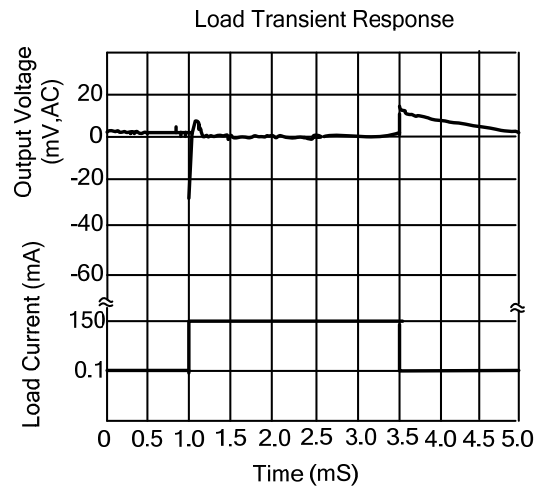
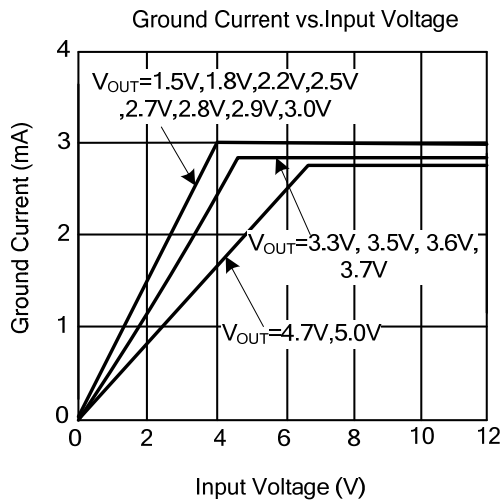
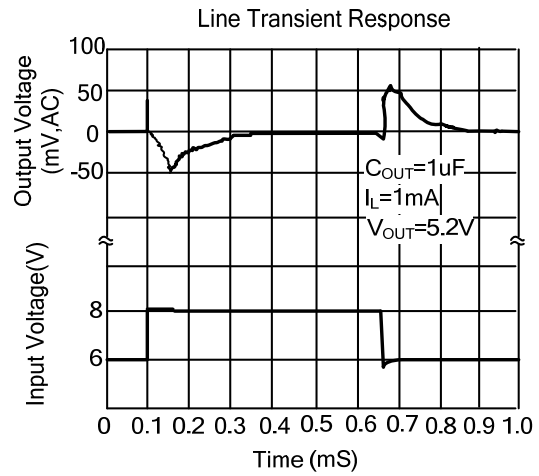
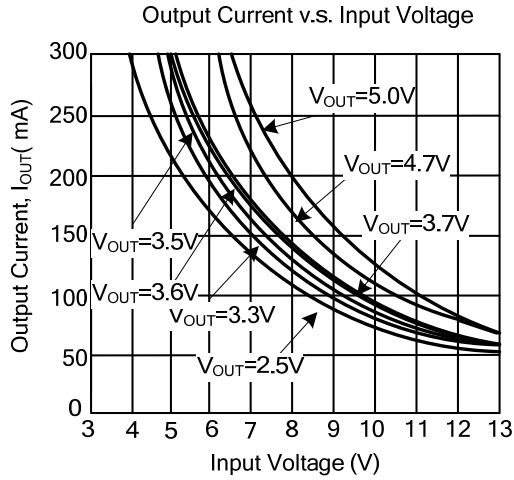
### UR133/A ADJUSTABLE



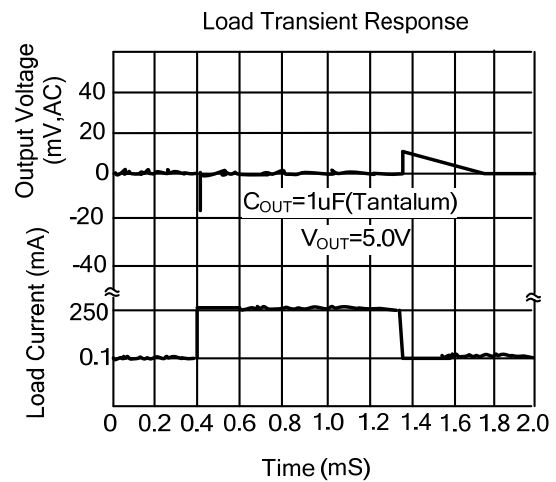
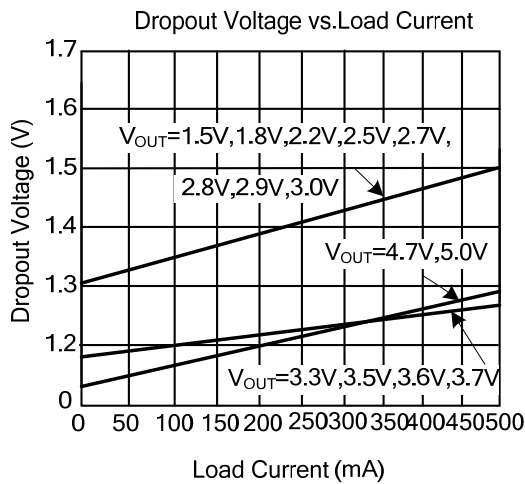
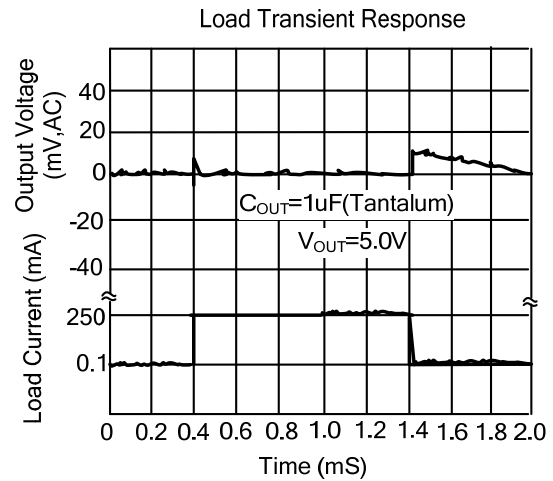
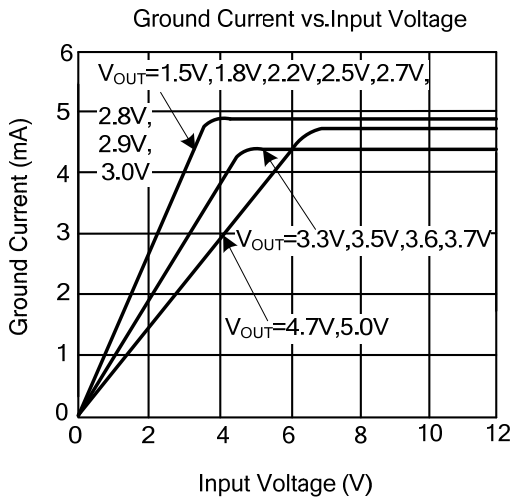
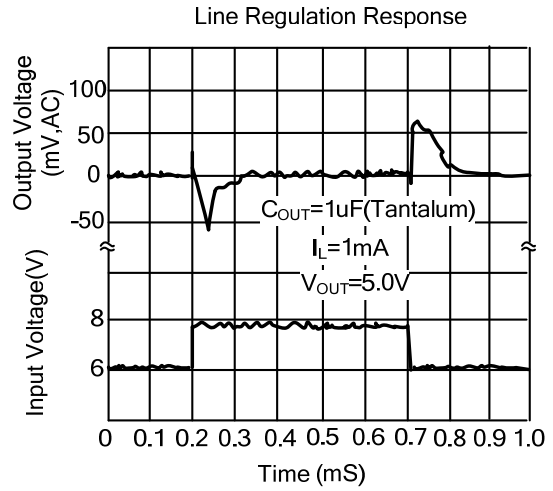
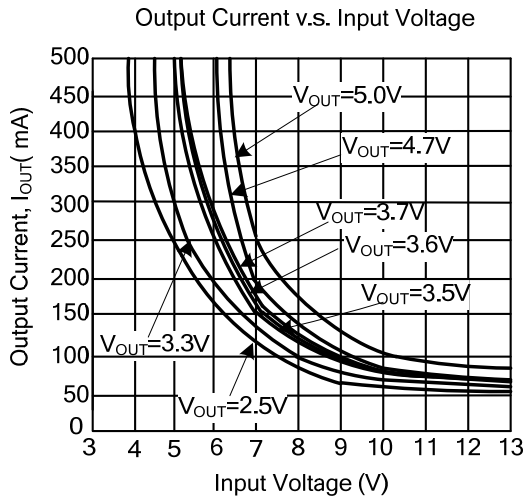
$C_R$ : 10µF to improve ripple rejection

$$V_{OUT} = V_{REF}(1 + R_2/R_1) + I_{ADJ} * R_2$$

## TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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