



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

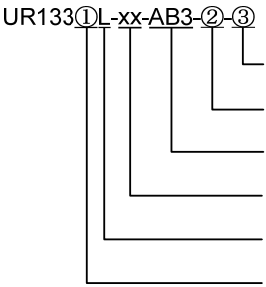
ORDERING INFORMATION

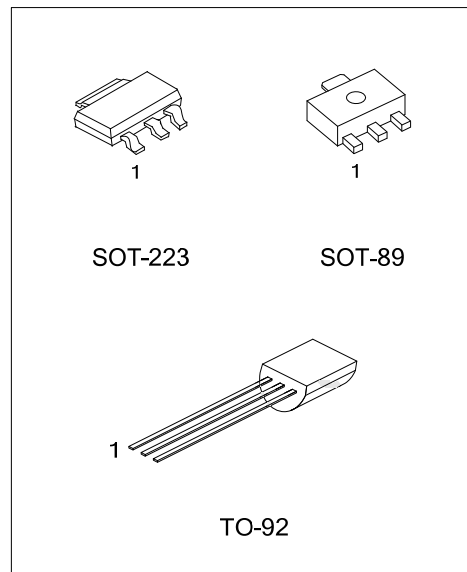
Ordering Number		Package	② Pin Assignment	Packing
Lead Free	Halogen Free			
UR133①L-xx-AA3-②-③	UR133①G-xx-AA3-②-③	SOT-223	A: GOI B: OGI C: GIO D: IGO	R: Tape Reel B: Tape Box K: Bulk
UR133①L-xx-AB3-②-③	UR133①G-xx-AB3-②-③	SOT-89		
UR133①L-xx-T92-②-③	UR133①G-xx-T92-②-③	TO-92		
UR133①L-xx-T92-②-③	UR133①G-xx-T92-②-③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

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

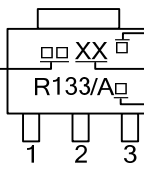
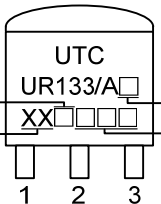
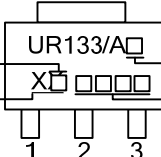
2. Pin assignment: I: V_{IN}(Positive Power Input) O: V_{OUT}(Output) G: GND(Ground/Adjustable)

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

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



■ 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	 Pin Code Voltage Code L: Lead Free G: Halogen Free
		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	 Pin Code Voltage Code L: Lead Free G: Halogen Free
		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	 Pin Code Voltage Code L: Lead Free G: Halogen Free
		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	θ_{JC}	100	°C/W
	SOT-223		15	°C/W
Junction to Ambient	SOT-89	θ_{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		ΔV_{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	ΔV_{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
ADJUSTABLE (R1=120Ω, R2=200Ω, V_{OUT}=3.3V)							
Reference Voltage		V _{REF}	V _{IN} -V _{OUT} =2V, I _L =2mA	1.238	1.250	1.262	V
Output Voltage-UR133/A		V _{OUT}	I _L =2mA, V _{IN} -V _{OUT} =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 _D	I _L =300mA			1.3	V
	UR133A		I _L =500mA				
	UR133-ADJ	V _D	I _L =300mA			1.5	V
	UR133A-ADJ		I _L =500mA				
Line Regulation		ΔV _{OUT}	I _L =2mA, V _{IN} -V _{OUT} =2V ~ V _{IN} =12V			0.5	%V _{OUT}
Load Regulation (Note 2)	UR133	ΔV _{OUT}	I _L =2mA ~ 300mA, V _{IN} -V _{OUT} =2V		10	30	mV
	UR133A		I _L =2mA ~ 500mA, V _{IN} -V _{OUT} =2V		10	50	mV
Current Limit (Note 3)	UR133	I _{LIMIT}	V _{IN} -V _{OUT} =2V, V _{OUT} =0V		350		mA
	UR133A				550		mA
Standby current		I _{ST-BY}	I _L =0, V _{IN} =12V			5.0	mA
Adjust Pin Current		I _{ADJ}	V _{IN} =12V			120	μA
Adjust Pin Current Change	UR133	ΔI _{ADJ}	V _{IN} =2.75V~12V, I _L =1mA~300mA			5	μA
	UR133A		V _{IN} =2.75V~12V, I _L =1mA~500mA			5	μA
Output Voltage Temperature Coefficient					50	150	PPM/°C

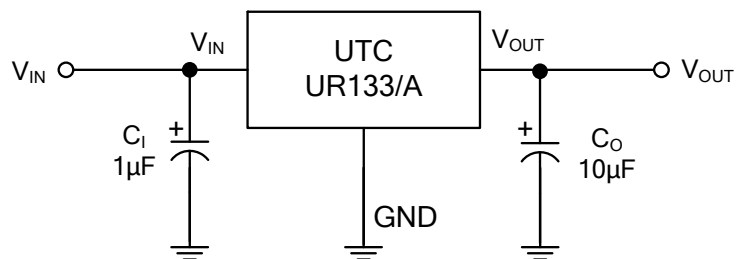
Note 1: Guaranteed by design.

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_{OUT} inside target value ± 2%.5: Dropout test is skipped at the condition of V_{IN} < 3V.

■ TYPICAL APPLICATION CIRCUIT

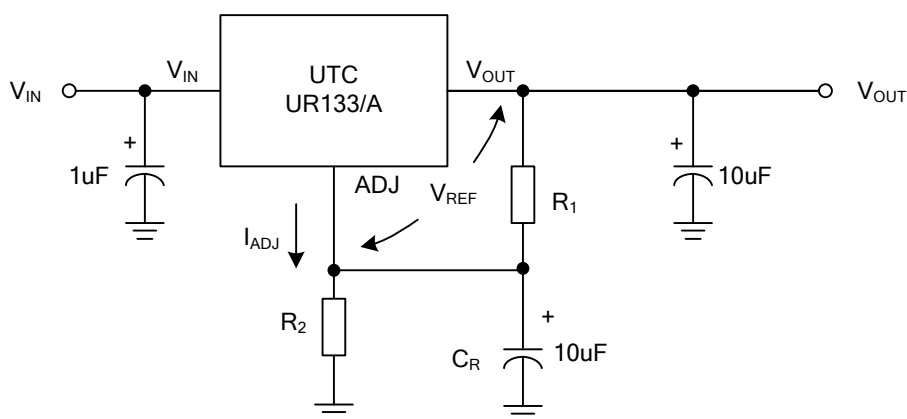


■ APPLICATION INFORMATION

A 10 μ F (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°C. The capacitance may be increased without limit.

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

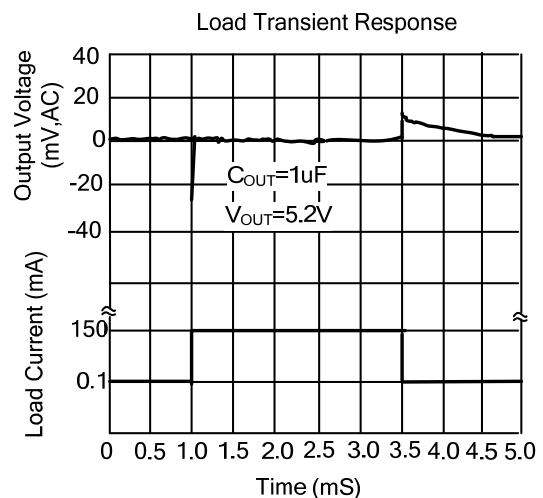
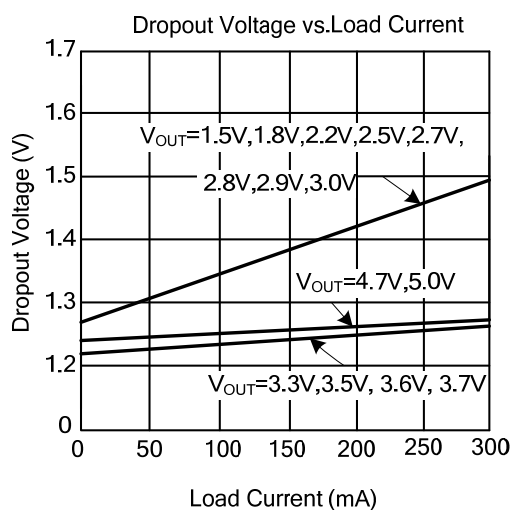
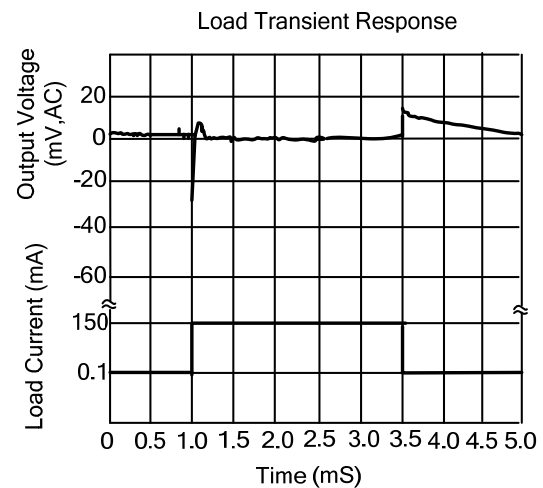
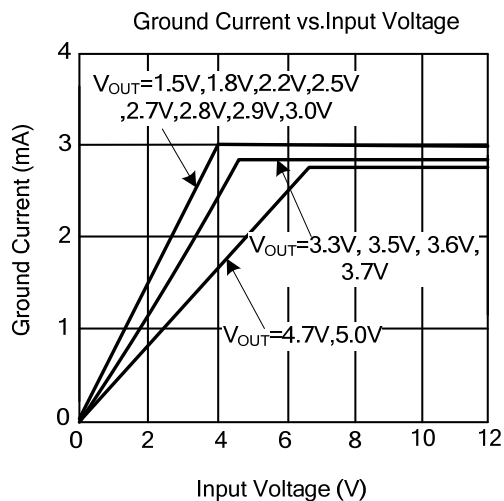
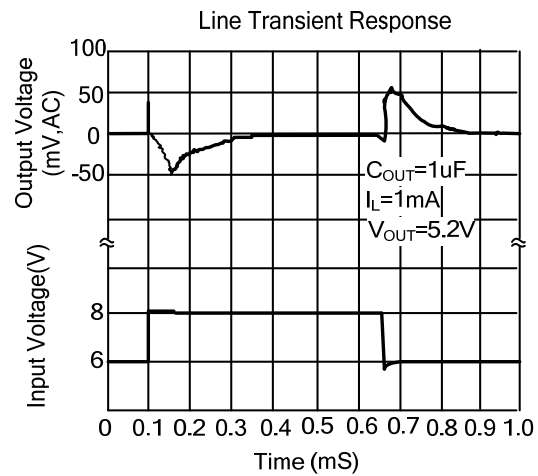
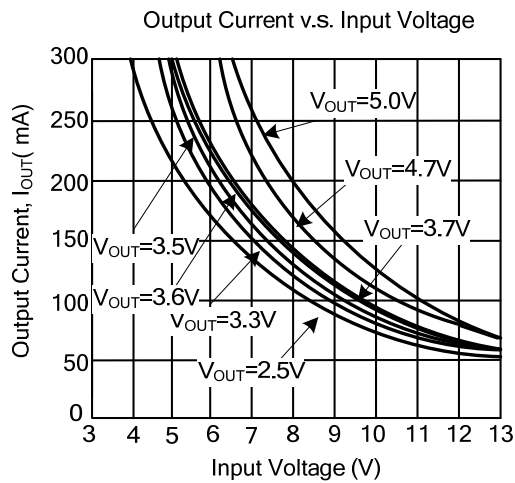
UR133/A ADJUSTABLE



C_R : 10 μ F to improve ripple rejection

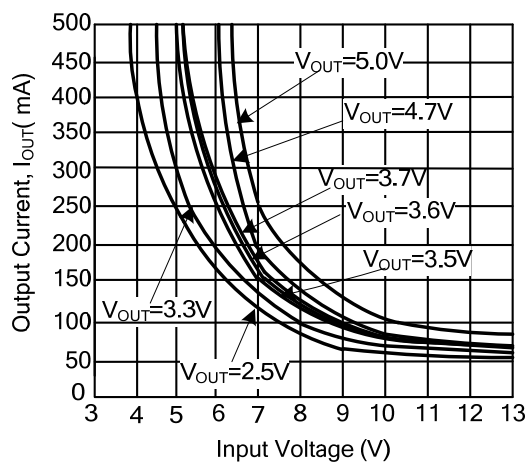
$$V_{OUT}=V_{REF}(1+R_2/R_1)+I_{ADJ}*R_2$$

■ TYPICAL CHARACTERISTICS

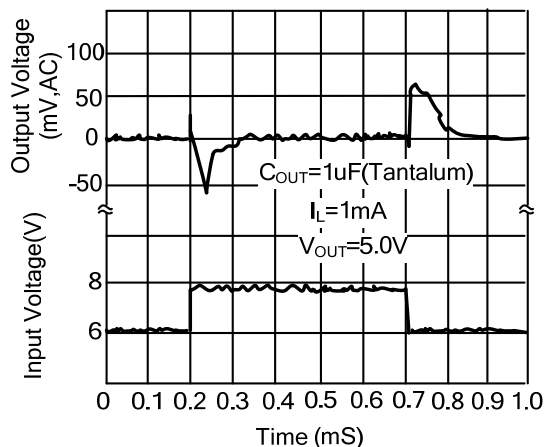


■ TYPICAL CHARACTERISTICS(Cont.)

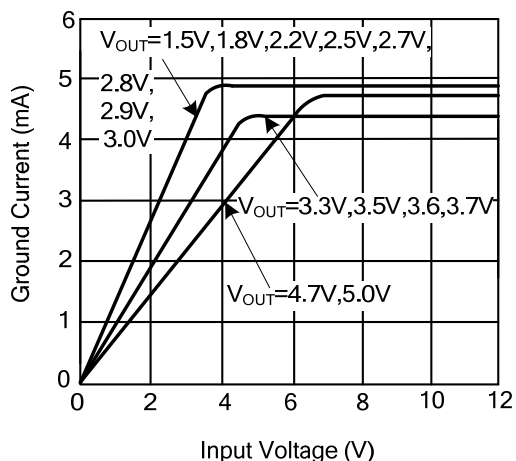
Output Current v.s. Input Voltage



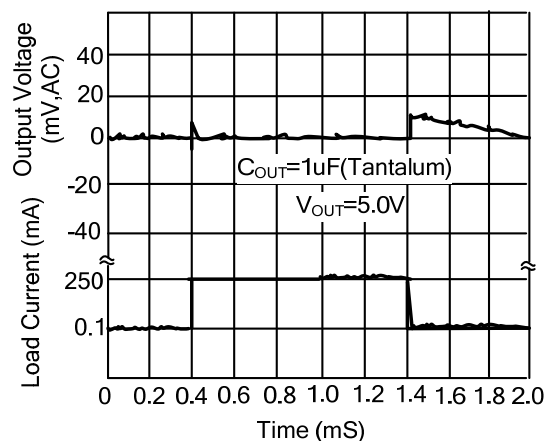
Line Regulation Response



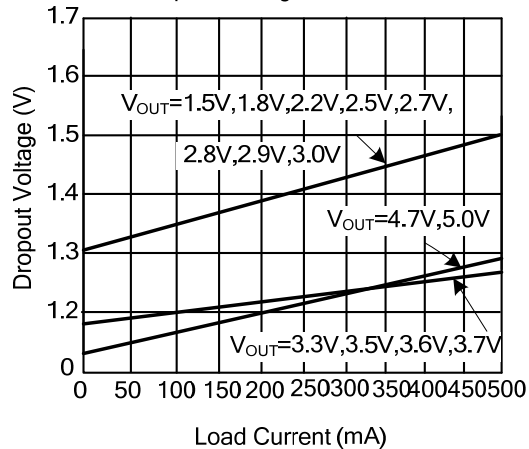
Ground Current vs. Input Voltage



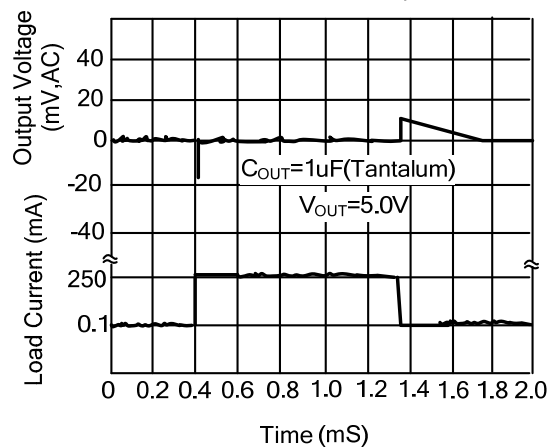
Load Transient Response



Dropout Voltage vs. Load Current



Load Transient Response



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