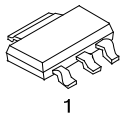
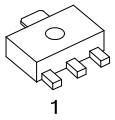
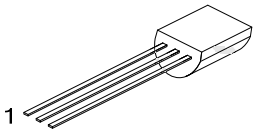
300/500mA LOW DROPOUT LINEAR VOLTAGE REGULATORS



SOT-223



SOT-89



TO-92

Lead-free: UR133L/UR133AL
Halogen-free: UR133G/UR133AG

■ 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
Normal	Lead Free	Halogen Free			
UR133①-xx-AA3-②-③	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
UR133①-xx-AB3-②-③	UR133①L-xx-AB3-②-③	UR133①G-xx-AB3-②-③	SOT-89		
UR133①-xx-T92-②-③	UR133①L-xx-T92-②-③	UR133①G-xx-T92-②-③	TO-92		
UR133①-xx-T92-②-③	UR133①L-xx-T92-②-③	UR133①G-xx-T92-②-③	TO-92		

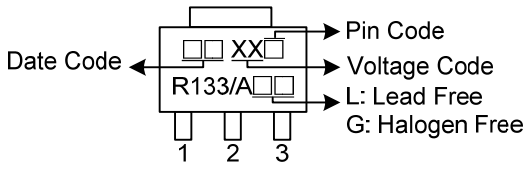
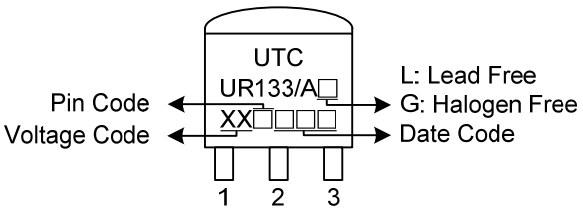
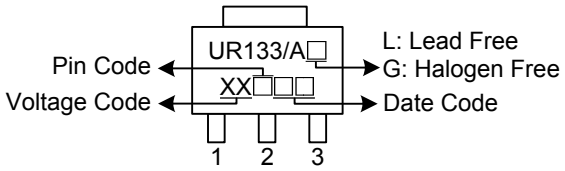
Note: 1. ①: Current code: Blank: 300mA A: 500mA
2. Pin assignment: I:V_{IN}(Positive Power Input) O:V_{OUT}(Output) G:GND(Ground/Adjustable)
3. xx: Output Voltage, refer to Marking Information.

UR133①L-xx-AB3-②-③

(1)Packing Type
(2)Pin Assignment
(3)Package Type
(4)Output Voltage Code
(5)Lead Plating
(6)Current Code

(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, Blank: Pb/Sn
(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 27:2.7V 28:2.8V 29:2.9V 30:3.0V 33:3.3V 35:3.5V 36:3.6V 37:3.7V 47:4.7V 50:5.0V AD:ADJ	A	G	O	I	
		B	O	G	I	
		C	G	I	O	
		D	I	G	O	
TO-92		A	G	O	I	
		B	O	G	I	
		C	G	I	O	
		D	I	G	O	
SOT-223		A	G	O	I	
		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 ~ +125	°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 (Ta=25°C, C_{IN}=1μF, C_{OUT}=10μF, 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=2mA, V_{IN}-V_{OUT}=1.4V	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=300mA			1.5	V
	UR133A		I_L=500mA				
Line Regulation		ΔV_{OUT}	I_L=2mA, V_{IN}-V_{OUT}=2V ~ V_{IN}=9V			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}=9V			5.0	mA
Output Voltage Temperature Coefficient					50	150	PPM/°C

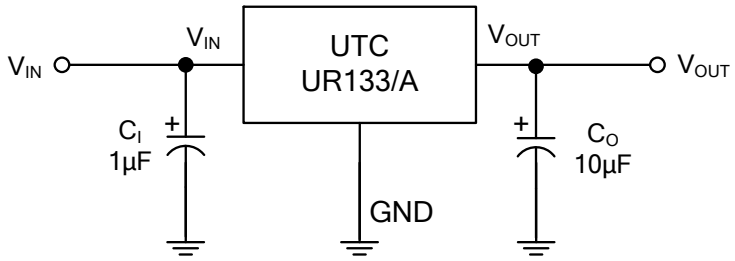
■ ELECTRICAL CHARACTERISTICS(Cont.)

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		Iadj	V_{IN}=12V			120	μA
Adjust Pin Current Change	UR133	ΔIadj	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.

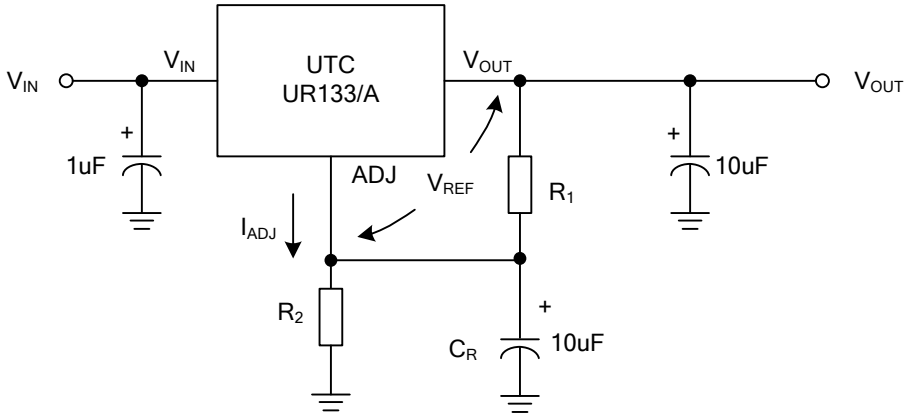
■ TYPICAL APPLICATION CIRCUIT



■ APPLICATION INFORMATION

A 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℃. The capacitance may be increased without limit.
A 1μF capacitor (or larger) should be placed between V_{IN} to GND.

UR133/A ADJUSTABLE

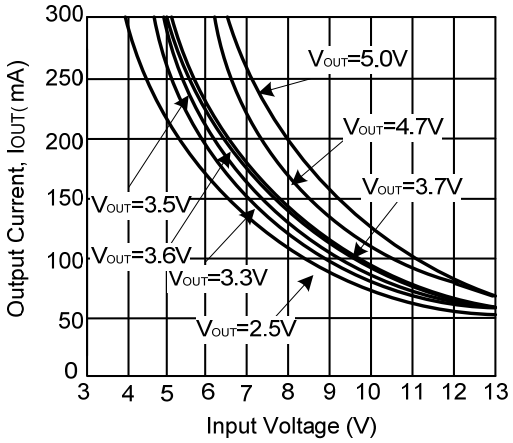


C_R:10uF to improve ripple rejection

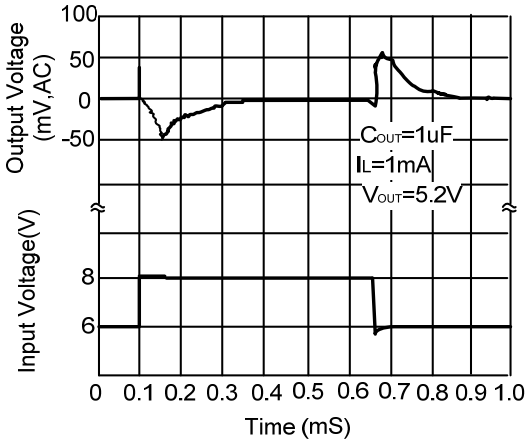
$V_{OUT}=V_{REF}(1+R_2/R_1)+I_{ADJ}*R_2$

■ TYPICAL CHARACTERISTICS

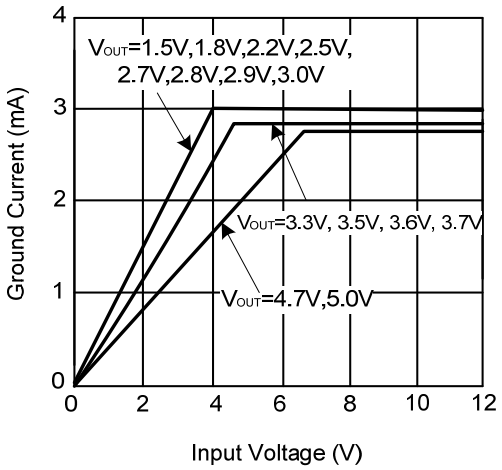
Output Current v.s. Input Voltage



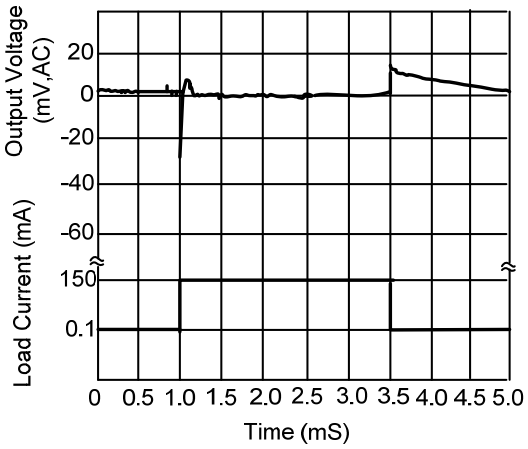
Line Transient Response



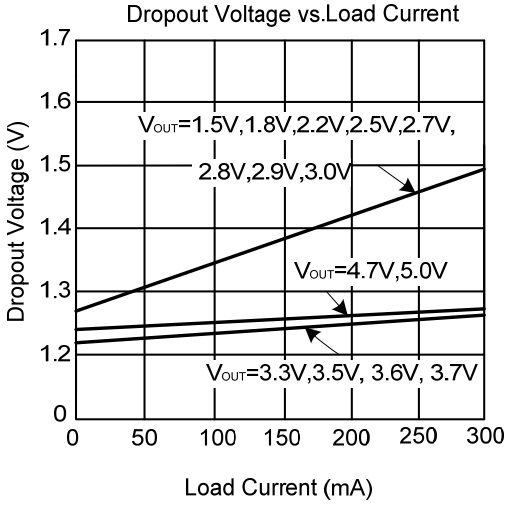
Ground Current vs.Input Voltage



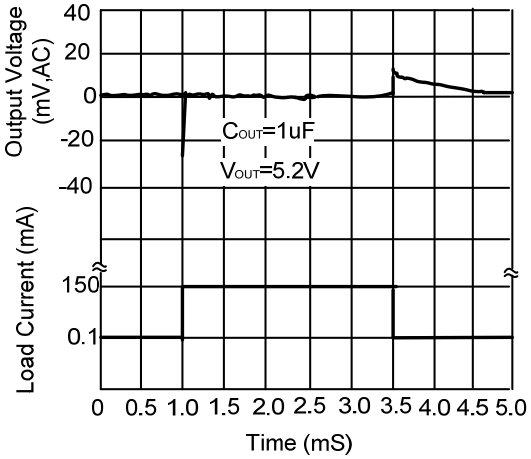
Load Transient Response



Dropout Voltage vs.Load Current

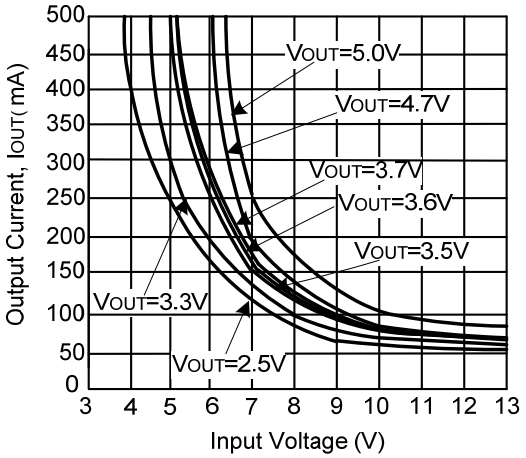


Load Transient Response

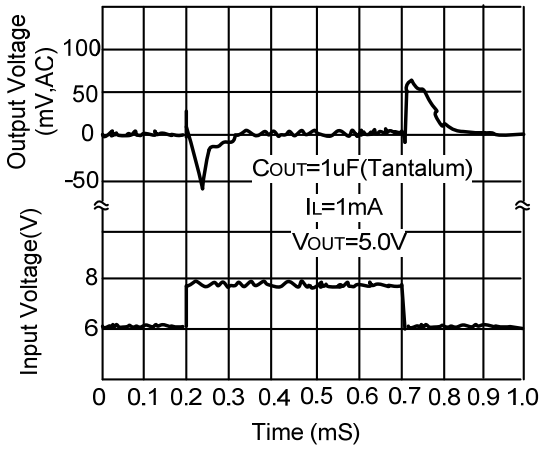


■ TYPICAL CHARACTERISTICS(Cont.)

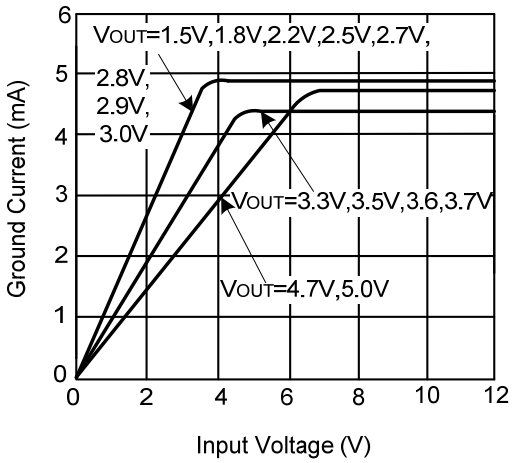
Output Current v.s. Input Voltage



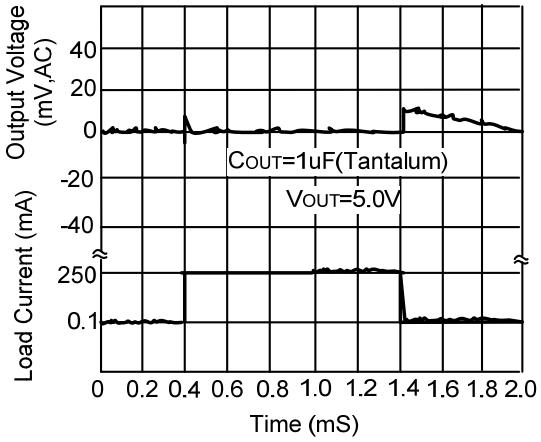
Line Regulation Response



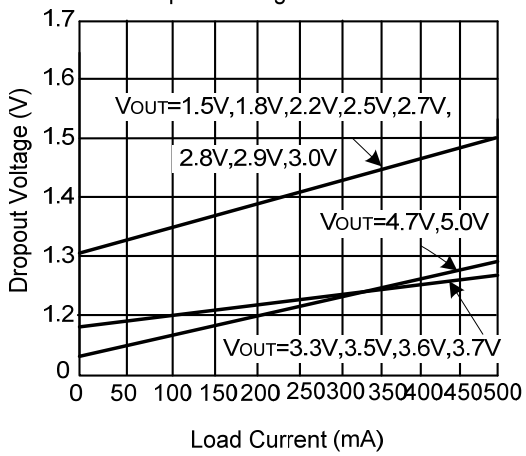
Ground Current vs.Input Voltage



Load Transient Response



Dropout Voltage vs.Load Current



Load Transient Response