



MD5233-XX

LINEAR INTEGRATED CIRCUIT

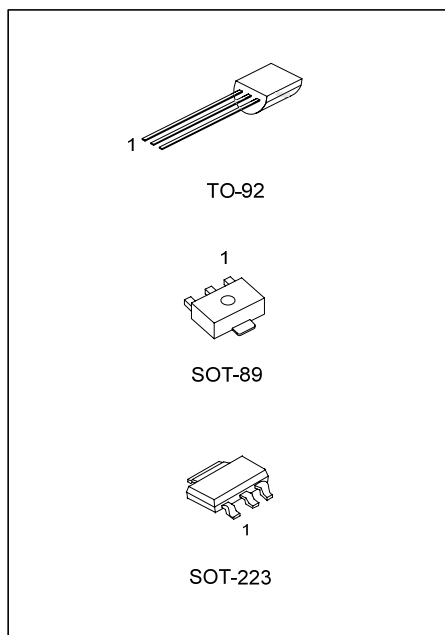
300/500mA LOW DROPOUT LINEAR VOLTAGE REGULATOR

DESCRIPTION

The MD5322 is a 300/500mA fixed output voltage low dropout linear regulator. 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



*Pb-free plating product number:
MD5322-XX

ORDERING INFORMATION

Order Number		Package	② Pin Assignment	③ Packing
Normal	Lead Free Plating			
MD5233 ①-xx-AA3-②-③	MD5233 ①L-xx-AA3-②-③	SOT-223	A: GOI	R: Tape Reel
MD5233 ①-xx-AB3-②-③	MD5233 ①L-xx-AB3-②-③	SOT-89	B: OGI	T: Tube
MD5233 ①-xx-T92-②-③	MD5233 ①L-xx-T92-②-③	TO-92	C: GIO	B: Tape Box
MD5233 ①-xx-T92-②-③	MD5233 ①L-xx-T92-②-③	TO-92	D: IGO	K: Bulk

- 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.

<p>MD5233 ①L-xx-AB3-②-③</p>	<p>(1) B: Tape Box, K: Bulk, R: Tape Reel, T: Tube (2) refer to Pin Assignment (3) AA: SOT-223, AB3: SOT-89, T92: TO-92 (4) xx: refer to Marking Information (5) L: Lead Free Plating, Blank: Pb/Sn (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	GND	OUT	IN	
		B	OUT	GND	IN	
		C	GND	IN	OUT	
		D	IN	GND	OUT	
TO-92	27:2.7V 28:2.8V 29:2.9V 30:3.0V 33:3.3V 35:3.5V 36:3.6V	A	GND	OUT	IN	
		B	OUT	GND	IN	
		C	GND	IN	OUT	
		D	IN	GND	OUT	
SOT-223	37:3.7V 47:4.7V 50:5.0V AD:ADJ	A	GND	OUT	IN	
		B	OUT	GND	IN	
		C	GND	IN	OUT	
		D	IN	GND	OUT	

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage V_{IN}	V_{IN}	-0.3 ~ +12	V
Power Dissipation	SOT-89	500	mW
	TO-92	600	
	SOT-223	800	
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
Thermal Resistance Junction-Case	SOT-89	100	°C/W
	SOT-223	15	
Thermal Resistance Junction-Ambient	SOT-89	300	°C/W
	TO-92	160	
	SOT-223	60	

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

For MD5233/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 MD5233	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)	MD5233	V_D	$I_L=300\text{mA}$		1.5	V	
	MD5233A						$I_L=500\text{mA}$
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)	MD5233	ΔV_{OUT}	$I_L=2\text{mA} \sim 300\text{mA}$, $V_{IN}-V_{OUT}=2\text{V}$		10	30	mV
	MD5233A				$I_L=2\text{mA} \sim 500\text{mA}$, $V_{IN}-V_{OUT}=2\text{V}$	10	50
Current Limit (Note 3)	MD5233	I_{LIMIT}	$V_{IN}-V_{OUT}=2\text{V}$, $V_{OUT}=0\text{V}$		350		
	MD5233A				550		mA
Standby current	I_{ST-BY}	$I_L=0$, $V_{IN}=9\text{V}$			3.0	mA	
Output Voltage Temperature Coefficient				50	150	PPM/°C	

■ ELECTRICAL CHARACTERISTICS(Cont.)

For MD5233-3.3V, 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-MD5233/A V		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)	MD5233	V _D	I _L ≠300mA			1.3	V
	MD5233A		I _L =500mA				
	MD5233-ADJ	V _D	I _L ≠300mA			1.5	V
	MD5233A-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)	MD5233	ΔV _{OUT}	I _L ≠2mA ~ 300mA, V _{IN} -V _{OUT} =2V		10	30	mV
	MD5233A		I _L =2mA ~ 500mA, V _{IN} -V _{OUT} =2V		10	50	mV
Current Limit (Note 3)	MD5233	I _{LIMIT}	V _{IN} -V _{OUT} =2V, V _{OUT} =0V	350			
	MD5233A			550			
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	MD5233	ΔI _{adj}	V _{IN} =2.75V~12V, I _L =1mA~300mA			5	μA
	MD5233A		V _{IN} =2.75V~12V, I _L =1mA~500mA			5	μA
Output Voltage Temperature Coefficient					50	150	PPM/°C

Note 1: Guaranteed by design.

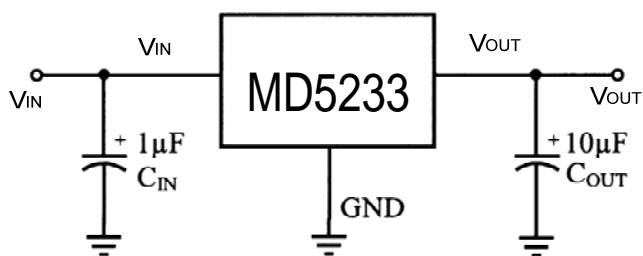
Note 2: Regulation is measured at constant junction temperature, using pulsed ON time.

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

Note 4: Dropout is measured at constant junction temperature, using pulsed ON time, and the criterion is V_{OUT} inside target value±2%.

Note 5: Dropout test is skipped at the condition of V_{IN}<3V.

■ TYPICAL APPLICATION CIRCUIT

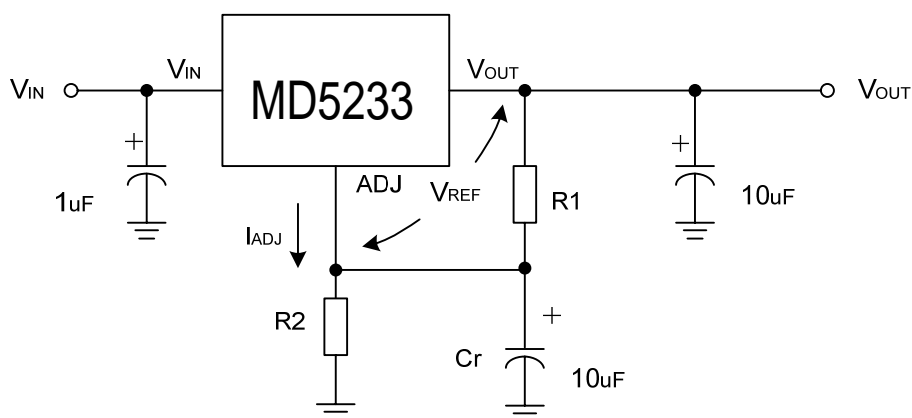


■ APPLICATION INFORMATION

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°C. The capacitance may be increased without limit.

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

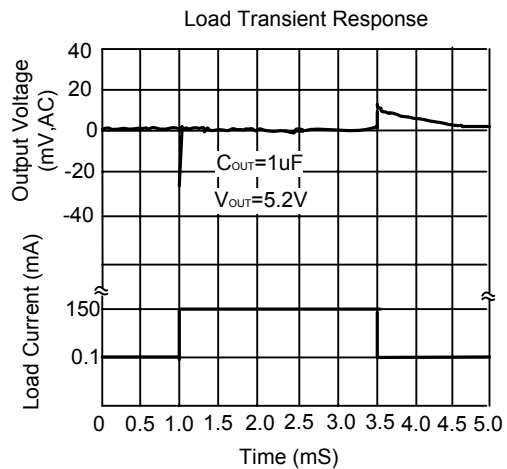
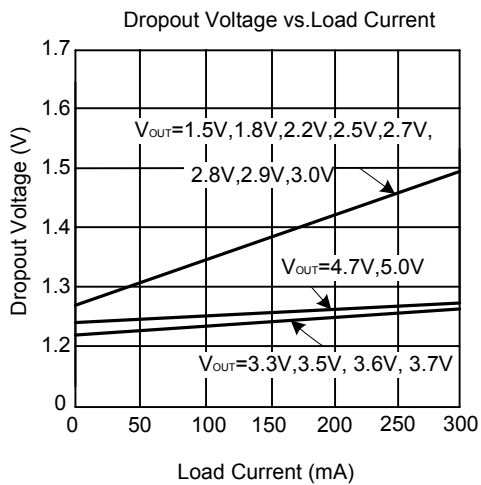
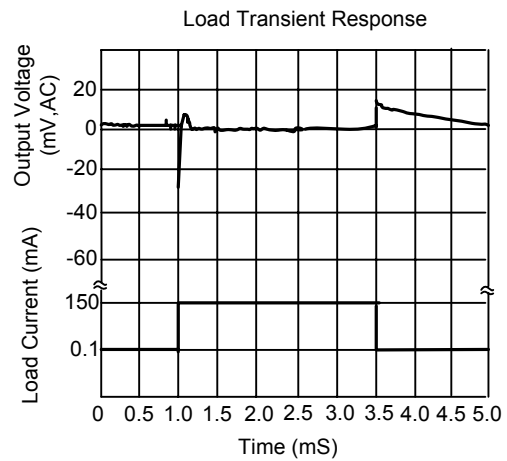
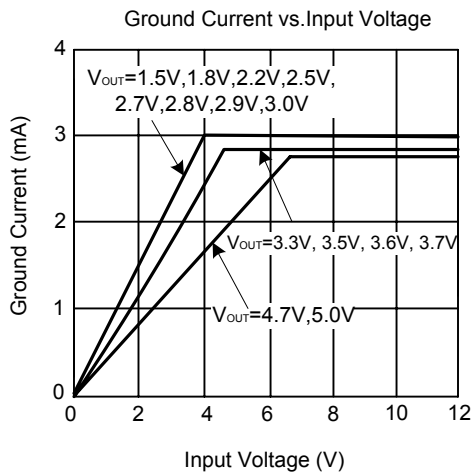
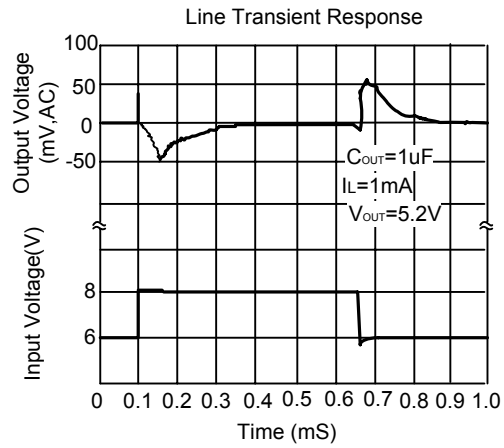
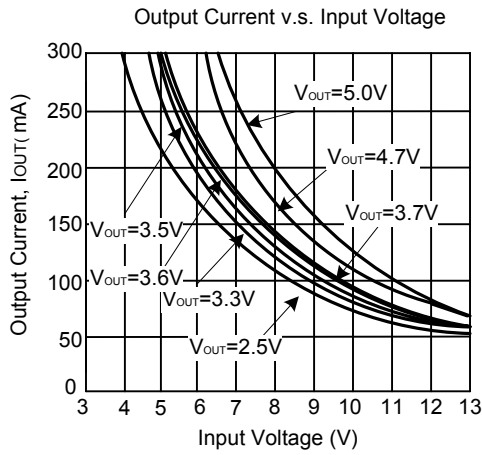
MD5233/A ADJUSTABLE



C_r:10uF to improve ripple rejection

$$V_{OUT} = V_{REF}(1 + R2/R1) + I_{ADJ} * R2$$

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS(Cont.)

