Low Current Consumption 300mA CMOS Voltage Regulator

Features

- Low Quiescent Current: 2μA
- Output Current: 300mA
- Low Dropout Voltage: 160mV@100mA
- High Accuracy: ±1%(Typ.)
- High Power Supply Rejection Ratio: 65dB@1kHz
- Low Output Noise:89.1μVRMS (10Hz~100kHz)
- Excellent Line and Load Transient Response
- Built-in Current Limiter, Short-Circuit Protection
- Over-Temperature Protection
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free Available Upon Request By Adding Suffix "-HF"
- Lead Free Finish/RoHS Compliant ("P" Suffix designates RoHS Compliant. See ordering information)

Applications

- Cellular Telephones
- Radio Control Systems
- Laptop, Palmtops and PDAs
- Single-lens Reflex DSC
- PC Peripherals with Memory
- Wireless Communication Equipment
- Portable Audio Video Equipment
- Car Navigation Systems
- LAN Cards
- Ultra-Low Power Microcontrollers

Description

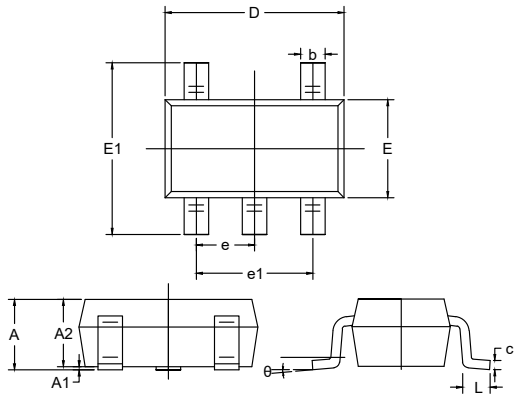
The MC6331 is a positive voltage regulator manufactured by CMOS technologies with low power consumption and low dropout voltage, which provide large output currents even when the difference of the input-output voltage is small. The MC6331 series can deliver 300mA output current and allow an input voltage as high as 18V. The series are very suitable for the battery-powered equipment, such as RF applications and other systems requiring a quiet voltage source.

MCC Part Number	Device Marking
MC6331-2.8	A9tXX(1)
MC6331-3.3	A9yXX(1)
MC6331-5.0	A9pXX(1)

Note:

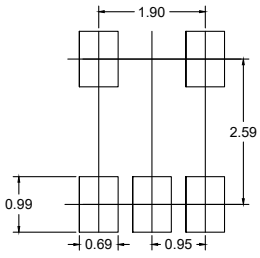
1. "XX" indicate DateCode.

SOT23-5L

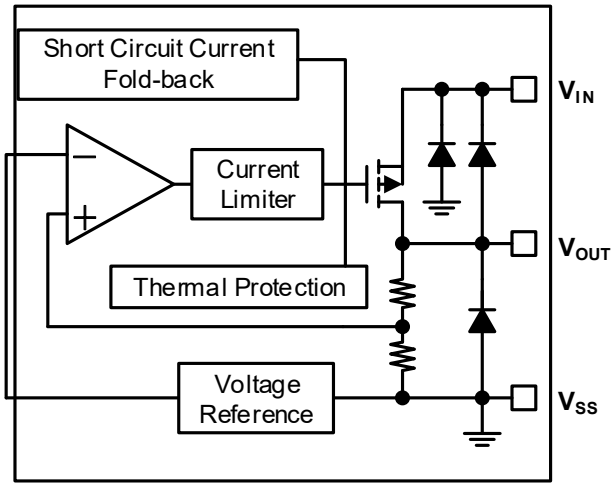


DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.041	0.049	1.05	1.25	
A1	0.000	0.004	0.00	0.10	
A2	0.041	0.045	1.05	1.15	
b	0.012	0.020	0.30	0.50	
c	0.004	0.008	0.10	0.20	
D	0.111	0.119	2.82	3.02	
E	0.059	0.067	1.50	1.70	
E1	0.104	0.116	2.65	2.95	
e	0.037(BSC)		0.950(BSC)		
e1	0.071	0.079	1.80	2.00	
L	0.012	0.024	0.30	0.60	
θ	0°	8°	0°	8°	

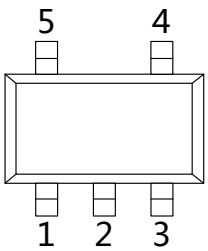
Suggested Solder Pad Layout



Functional Block Diagram

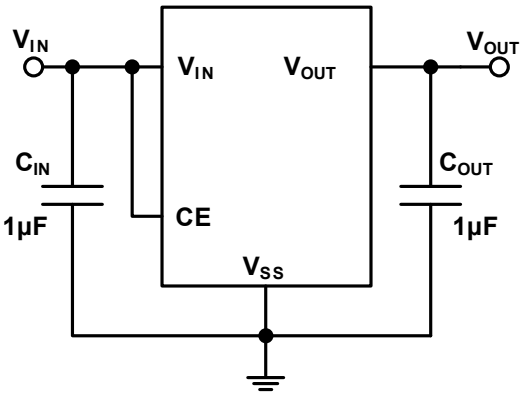


Pin Configuration and Functions (Top View)



Number	Name	Function
1	V_{IN}	Power Input Pin
2	V_{SS}	Ground
3	CE	Chip Enable Pin
4	NC	No Connection
5	V_{OUT}	Output Pin

Typical Application Circuit



Absolute Maximum Ratings(T_A=25°C unless otherwise noted)[2]

- Operating Junction Temperature Range: -40~+125°C[3]
- Storage Temperature Range: -40~+125°C
- Thermal Resistance: 250°C/W Junction to Ambient

Parameter	Symbol	Ratings	Units
Input Voltage[4]	V_{IN}	-0.3~24	V
Output Voltage[4]	V_{OUT}	-0.3~10	V
CE Pin Voltage	V_{CE}	-0.3~24	V
Output Current	I_{OUT}	300	mA
Power Dissipation	P_D	0.4	W
ESD Rating[5]	HBM	8	KV
	MM	400	V

Note:

2. Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods my affect device reliability.

3. This MC6331-3.3 includes over temperature protection that is intended to protect the device during momentary overload. Junction temperature will exceed 125°C when over temperature protection is active. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

4. All voltages are with respect to network ground terminal.

5. ESD testing is performed according to the respective JESD22 JEDEC standard.The human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin. Themachine model is a 200pF capacitor discharged directly into each pin.

Electrical Characteristics

(V_{IN}=V_{OUT}+1V, C_{IN}=C_{OUT}=1μF， T_A=25°C, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Input Voltage	V_{IN}			4.3		18	V
Output Voltage Range	V_{OUT}			2.8		5	V
DC Output Accuracy		I_{OUT}=1mA		-1		1	%
Dropout Voltage(6)	V_{dif}	I_{OUT} =100mA,V_{OUT}=3.3V			160		mV
Supply Current	I_{SS}	I_{OUT}=0A			2	5	μA
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	I_{OUT} =10mA V_{OUT} +1V≤V_{IN}≤18V			0.01	0.3	%/V
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT} +1V, 1mA≤I_{OUT}≤100mA			10		mV
Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T_A}$	I_{OUT}=10mA, -40°C<T_A<125°C			50		ppm
Output Current Limit	I_{LIM}	V_{OUT}= 0.5 x $V_{OUT(Normal)}$, V_{IN} = 7V		350	500		mA
Short Current	I_{SHORT}	V_{OUT} =V_{SS}			25		mA
Power Supply Rejection Ratio	PSRR	I_{OUT}=50mA	100Hz		80		dB
			1kHz		65		
			10kHz		50		
			100kHz		45		
Output Noise Voltage	V_{ON}	BW=10Hz to 100kHz			89.1		μV_{RMS}
Thermal Shutdown Temperature	T_{SD}				150		℃
Thermal Shutdown Hysteresis	ΔT_{SD}				20		℃
CE "High" Voltage	V_{CE}“H”			1.5		V_{IN}	V
CE "Low" Voltage	V_{CE}“L”					0.3	V
CE "High" Current	I_{CE}“H”	V_{CE}=”High”				0.2	μA

Note:

6. Vdif: The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 98% of $V_{OUT(E)}$.

Curve Characteristics

Fig.1 - Output Voltage vs Temperature

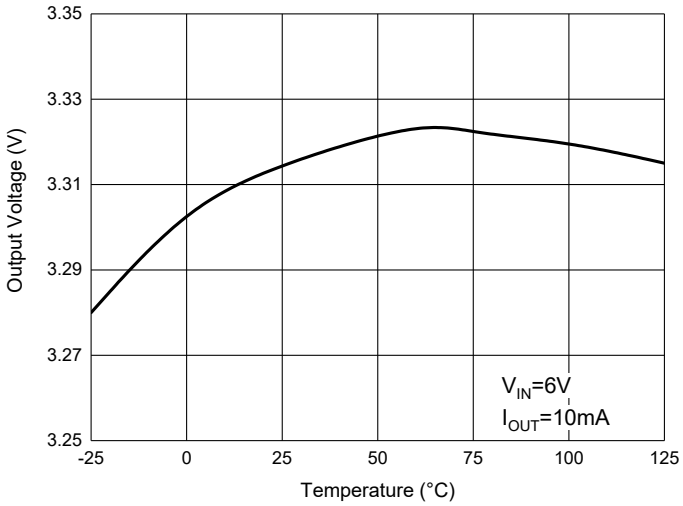


Fig.2 - Output Voltage vs Output Current

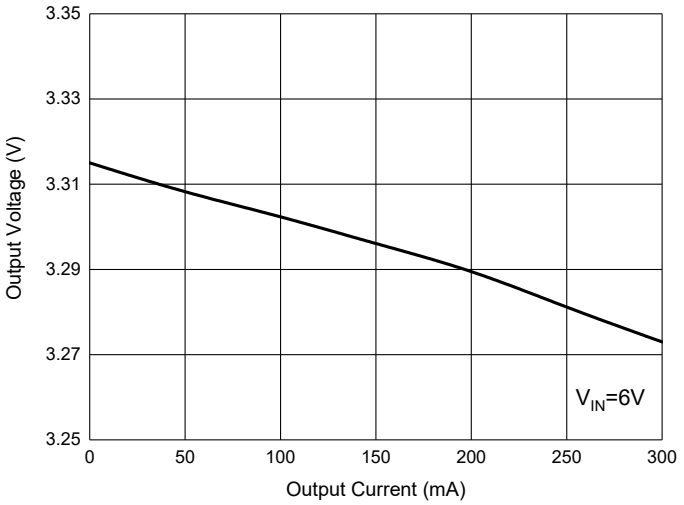


Fig.3 - Output Voltage vs Input Voltage

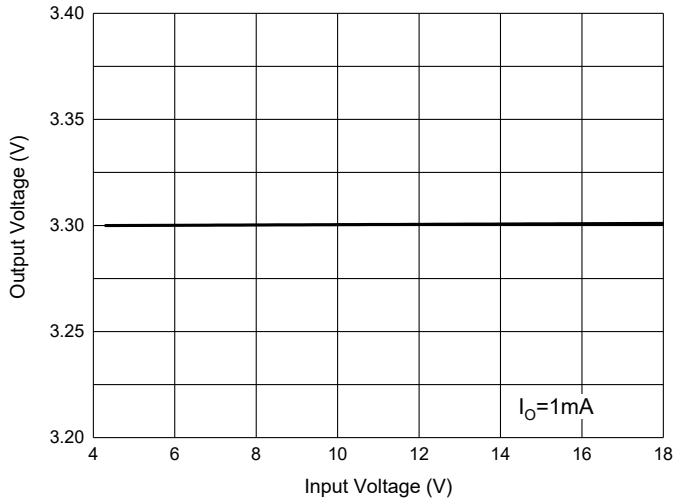


Fig.4 - Ground Current vs Load Current

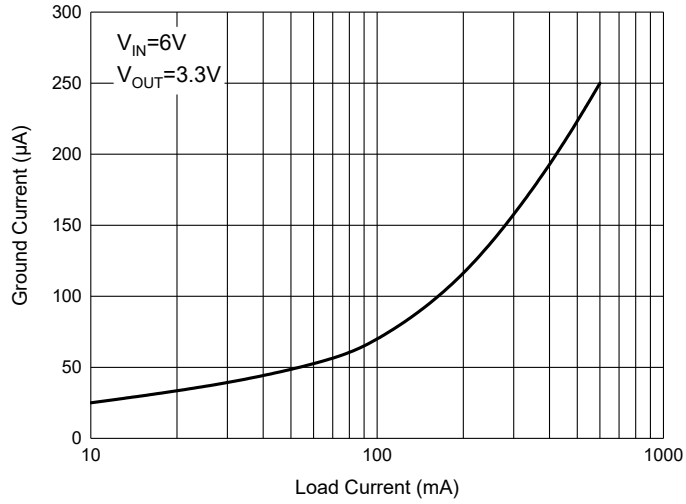


Fig.5 - Dropout Voltage vs Load Current

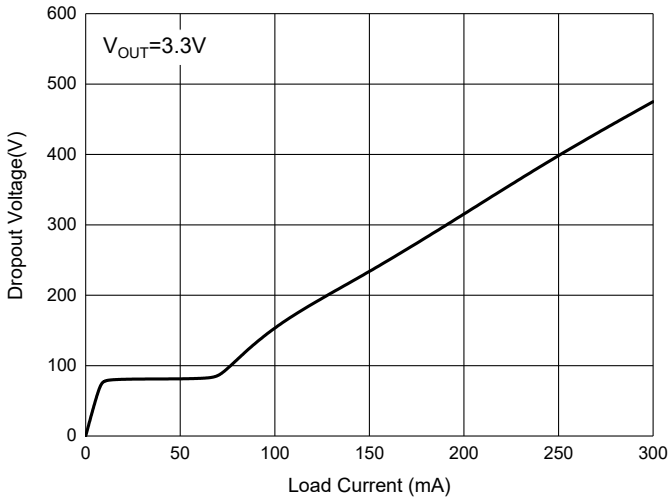
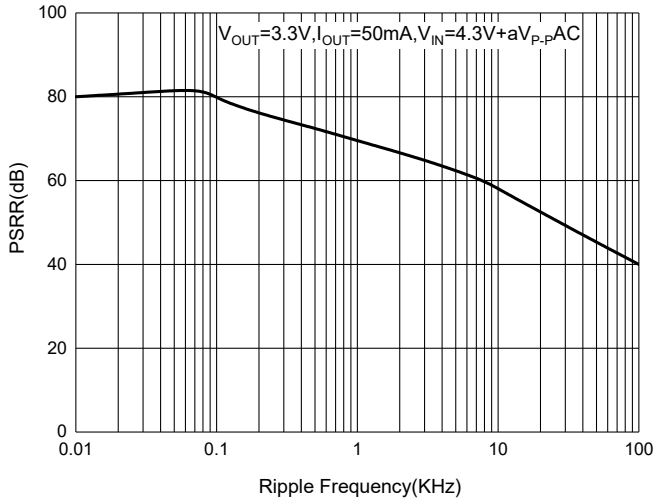


Fig. 6 - PSRR vs. Frequency



Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 3Kpcs/Reel

Note : Adding "-HF" Suffix for Halogen Free, eg. Part Number-TP-HF

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