Linear Voltage Regulator – SiS293050

Positive Fixed 5V 0.3A Ultra-Low Dropout Voltage Regulator in bare die form

Rev 1.0
29/04/24

Description

The SiS293050 low-noise, low dropout, high precision linear regulator operates with up to 12V input and provides 300mA output current. Typical output noise is 44µV_{RMS} with dropout voltage 270mV at 150mA load. The SiS293050 is highly accurate over temperature and exhibits excellent load and line transient response. Ruggedized features include internal output current limiting; short-circuit protection and thermal overload protection. Very small die size enables high integration.

Features:

- Low Temperature Coefficient: ±100ppm/°C
- Low Dropout: 270mV at 150mA
- ± 3% Voltage Accuracy at 300mA load
- Excellent Line Regulation: 0.05%/V
- Low Noise (10Hz to 100kHz): 44µV_{RMS}
- High PSRR: 60dB Range to 10kHz
- Input Voltage up to 12V (absolute max 14V)
- Low Quiescent Current: 8µA.

Ordering Information

The following part suffixes apply:

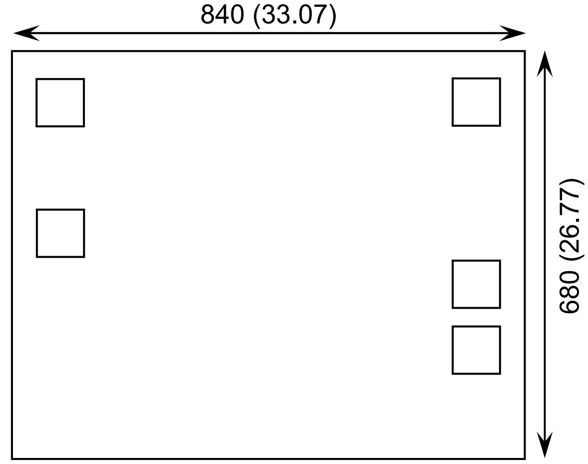
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "**H**" - MIL-STD-883 /2010B Visual Inspection
  + MIL-PRF-38534 Class H LAT
- "**K**" - MIL-STD-883 /2010A Visual Inspection (Space)
  + MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

www.siliconsupplies.com\quality\bare-die-lot-qualification

Die Dimensions in µm (mils)



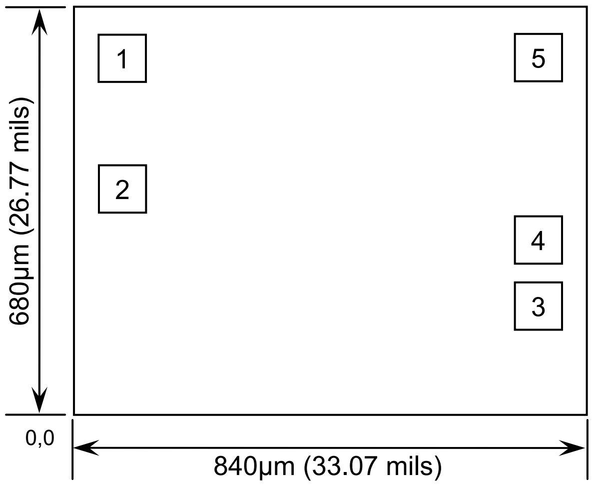
Supply Formats:

- Default – Die in Waffle Pack (400 per tray capacity)
- Sawn Wafer on Tape – On request
- Unsawn Wafer – On request
- Tape & Reel – On request
- In Metal or Ceramic package – On request

Mechanical Specification

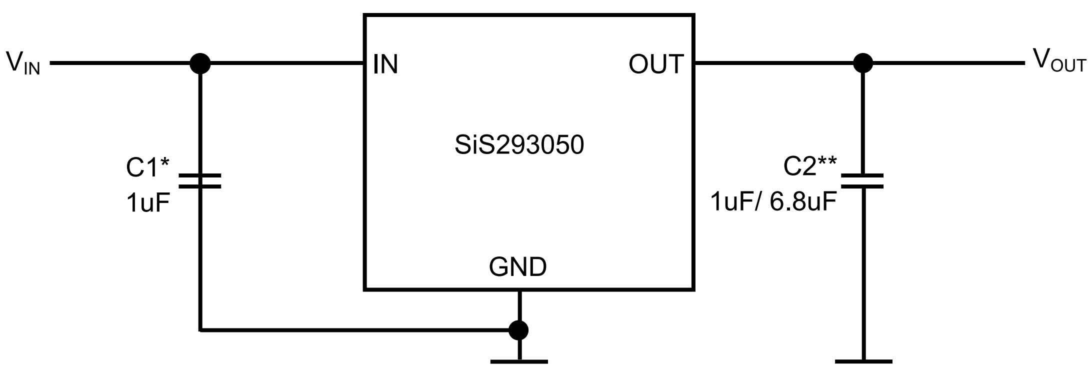
Die Size (Unsawn)	840 x 680 33.07 x 26.77	µm mils
Minimum Bond Pad Size	70 x 70 2.75 x 2.75	µm mils
Die Thickness	350 (±20) 13.78 (±0.79)	µm mils
Top Metal Composition	Al 99.5% Cu 0.5%2µm	
Back Metal Composition	Si	

Pad Layout and Functions



PAD	FUNCTION	COORDINATES (µm)		DESCRIPTION
		X	Y	
1	VOUT	75	545	Regulator Output. Requires 1µF low-ESR capacitor to GND for stable operation.
2	NC	75	346.36	Not Connected
3	NC	705.005	168.265	Not Connected
4	GND	705.005	268.27	Ground pin.
5	V_{IN}	705.005	544.995	Supply Input. Connect to power source (6V to 12V). Bypass with 1µF capacitor to GND.
CONNECT CHIP BACK TO V_{IN}				

Typical Application



* C1 Input capacitor is recommended for all applications
** C2 is recommended for stability. 1µF Tantalum capacitor or 6.8µF ceramic capacitor is recommended.

Absolute Maximum Ratings[1]

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{IN}	14V	V
Power Dissipation[2]	P_D	Internally Limited	
Operating Junction Temperature[3]	T_J	-40 to 125	°C
Storage Temperature	T_{STG}	-65 to 150	°C
Thermal Resistance (Assembled in SOT-89-3)	$R_{\theta JA}$	93.4	°C/W
ESD Capability(HBM)	V_{ESD}	2	kV

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Voltage	V_{IN}	6	12	V
Output Current	I_{OUT}	10	300	mA
Operating Junction Temperature Range[3]	T_J	-40 to 125		°C

DC Electrical Characteristics C_{IN} C_{OUT} = 1μF, T_J = 25°C (unless noted otherwise)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	V_{IN} = 6V , 1mA ≤ I_{OUT} ≤ 10mA	4.9	5.0	5.1	V
Line Regulation[4]	ΔV_{OUT}	I_{OUT} = 10mA, 4V ≤ V_{IN} ≤6V	-	0.05	0.2	% / V_{OUT}
Load Regulation[4]	ΔV_{OUT}	V_{IN} = 6V, 1mA ≤ I_{OUT} ≤ 300mA	-	60	-	mV
Output Voltage Accuracy		I_{OUT} = 300mA	-3	-	+3	%
Dropout Voltage	V_{DO}	I_{OUT} = 150mA	-	270	-	mV
Supply Current	I_S	V_{IN} = 6V, V_{OUT} Floating	-	8	15	μA
Output Voltage Noise	V_n	BW = 10Hz~100kHz	-	44	-	μV_{RMS}
	$\Delta V_{OUT} / \Delta T.V_{OUT}$	I_{OUT} = 10mA	-	±100	-	ppm/°C
Power Supply Rejection Ratio	PSRR	f = 100Hz,Ripple = 0.5Vp-p V_{IN} = 6V	-	60	-	dB
Maximum Output Current	I_{LIMIT}	V_{IN} - V_{OUT} = 1V	-	-	340	mA
Thermal Shutdown Threshold	T_{SHDN}		-	155	-	°C
Thermal Shutdown Hysteresis	ΔT_{SHDN}		-	25	-	°C

1. Operation above absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability. **2.** Maximum allowable power dissipation of any T_A (ambient temperature) is $P_{DMAX} = (T_{JMAX}-T_A)/\theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature and the regulator will go into thermal shutdown **3.** This IC includes over temperature protection to protect the device during momentary overload conditions. 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.** Regulation is measured at a constant junction temperature, using pulse testing with a low duty cycle.

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Typical Electrical Characteristics C_{IN} C_{OUT} = 1μF, T_J = 25°C (unless noted otherwise)

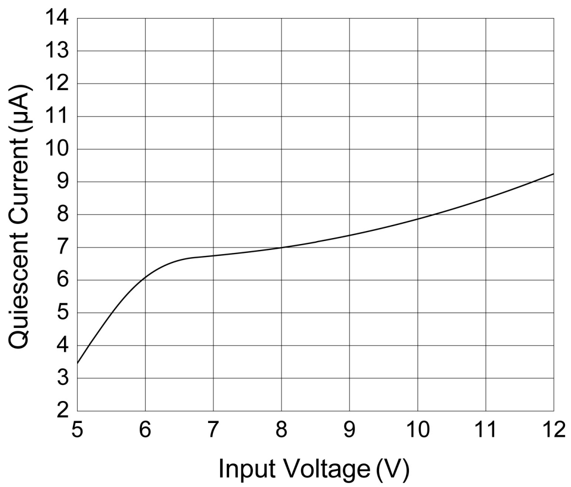

Figure 1 – Quiescent Current VS Input Voltage

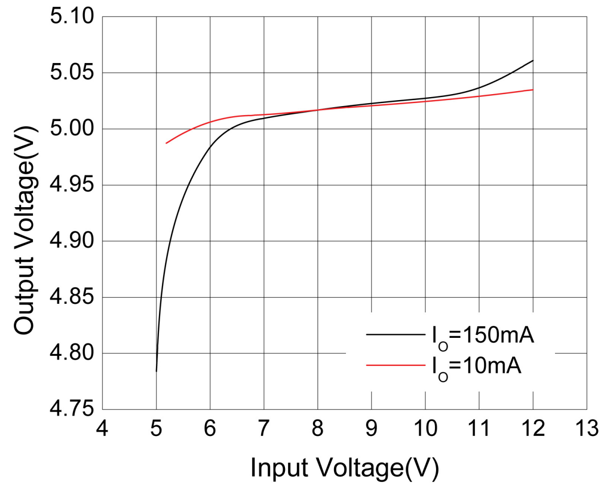

Figure 2 – Input Voltage VS Output Voltage

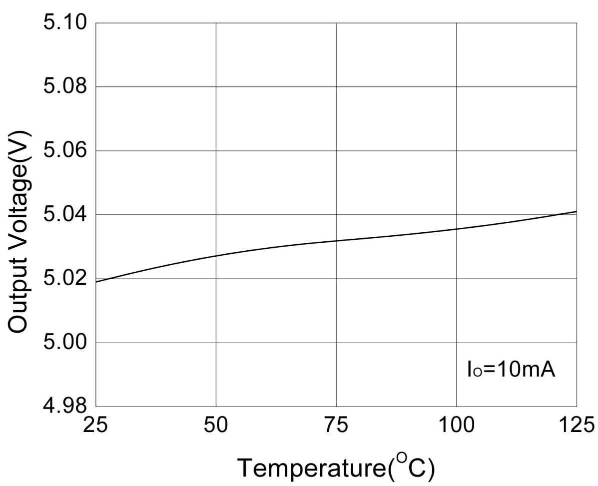

Figure 3 – Output Voltage VS Temperature

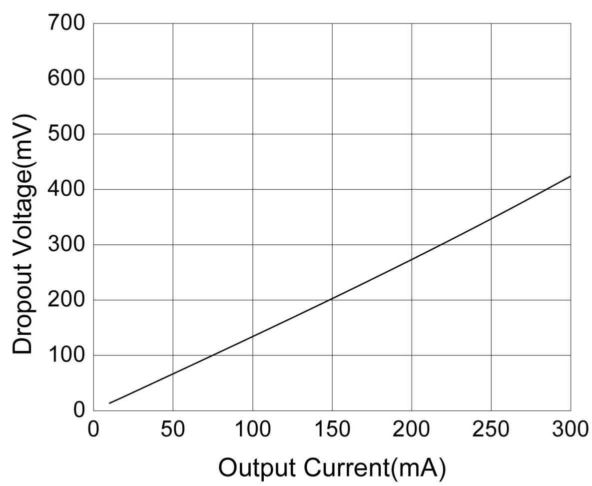

Figure 4 – Dropout Voltage VS Output Current

Typical Electrical Characteristics C_{IN} C_{OUT} = 1µF, T_J = 25°C (unless noted otherwise)

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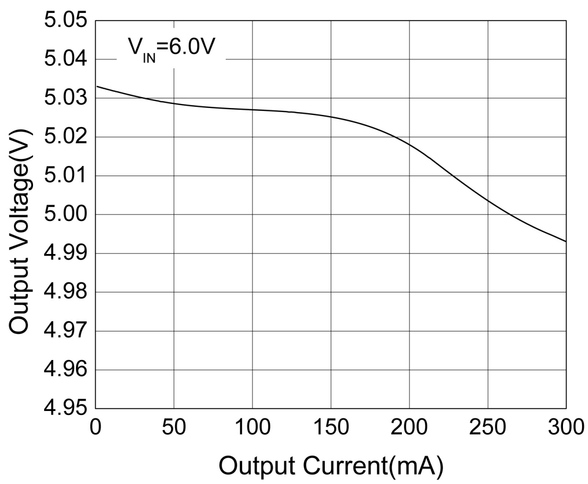

Figure 5 – Output Voltage VS Output Current

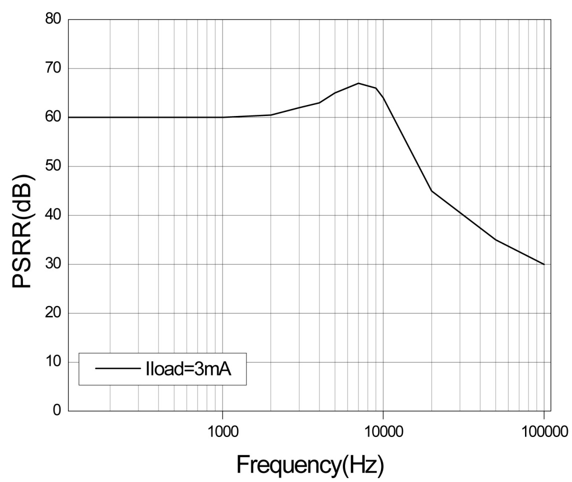

Figure 6 – PSRR VS Frequency