FAN1581

5A Adjustable/Fixed Ultra Low Dropout Linear Regulator

Features

- Ultra Low dropout voltage, 0.4V typical at 5A
- 1.2V Versions available for GTL termination
- Remote sense operation
- Fast transient response
- Load regulation: 0.05% typical
- 0.5% typical initial accuracy
- On-chip thermal limiting
- TO-263, TO-252 and TO-220 packages

Applications

- Support of GTL+ bus supply
- Low voltage logic supply
- Embedded Processor supplies
- Split plane regulator
- 2.5V, and 1.8V Logic Families
- DDR Termination Supply

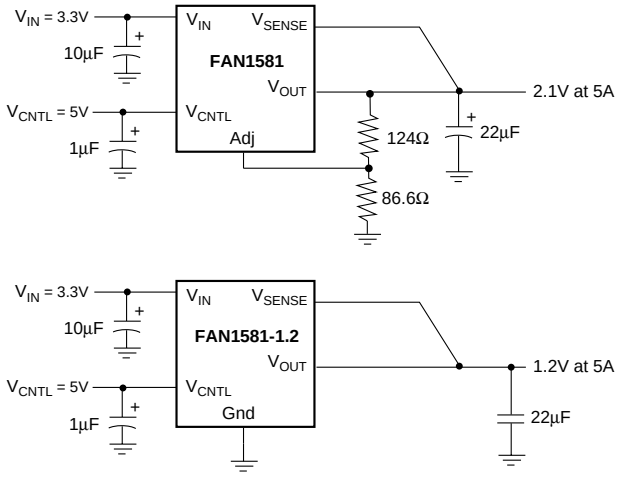
Description

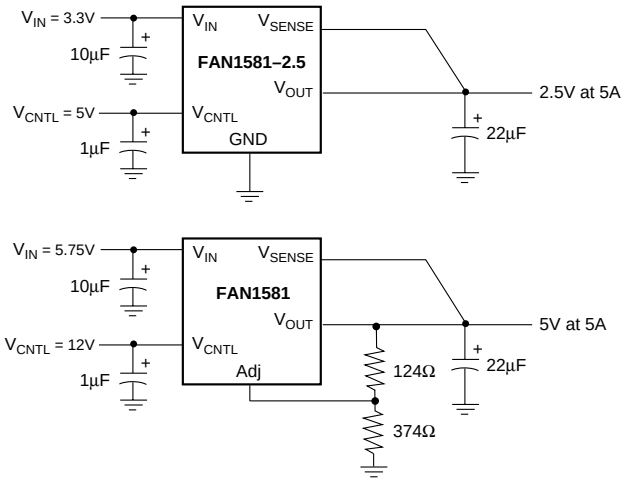
The FAN1581, FAN1581-1.2, FAN1581-1.5, and FAN1581-2.5 are ultra-low dropout regulators with 5A output current capability. These devices have been optimized for low voltage applications including V_{TT} bus termination, where transient response and minimum input voltage are critical. The FAN1581 is ideal for low voltage microprocessor applications requiring a regulated output from 1.3V to 5.7V with a power input supply of 1.75V to 6.5V. The FAN1581-1.5 offers fixed 1.5V with 5A current capabilities for GTL+ bus V_{TT} termination. Additionally, the FAN1581-1.2 offers fixed 1.2V output for CPU Bus termination. The FAN1581-2.5 offers fixed 2.5V with 5A current capability for logic IC operation and processors while minimizing the overall power dissipation.

Current limit ensures controlled short-circuit current. On-chip thermal limiting provides protection against any combination of overload and ambient temperature that would create excessive junction temperatures.

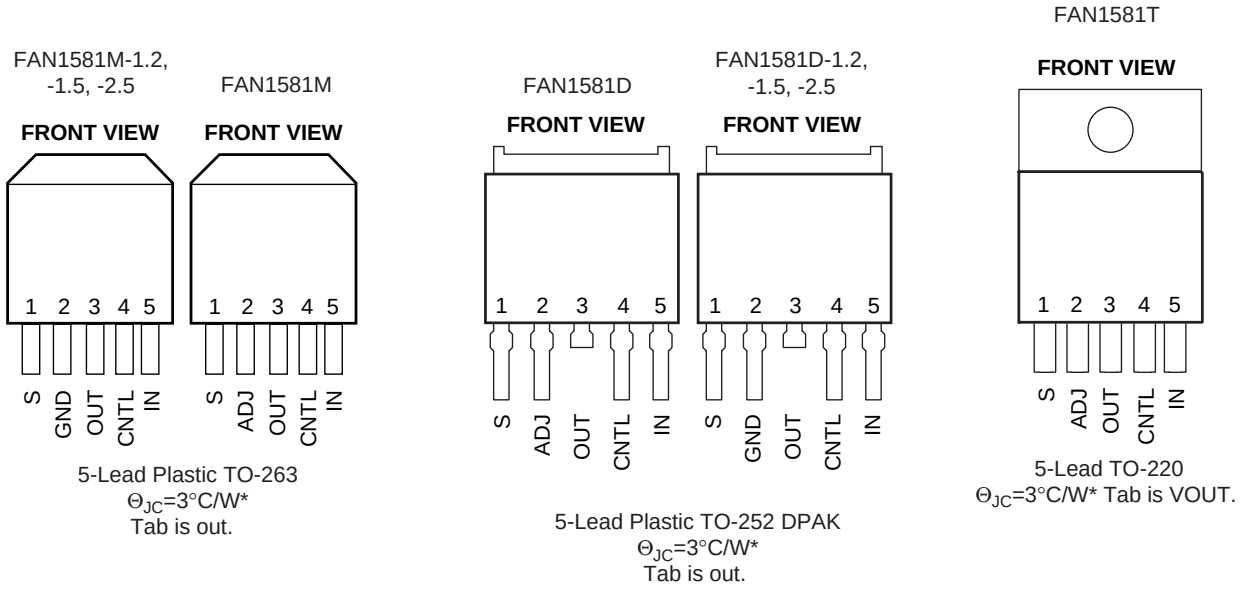
The FAN1581 series regulators are available in the 5-pin TO-263, TO-252 and TO-220 packages.

Typical Applications





Pin Assignments

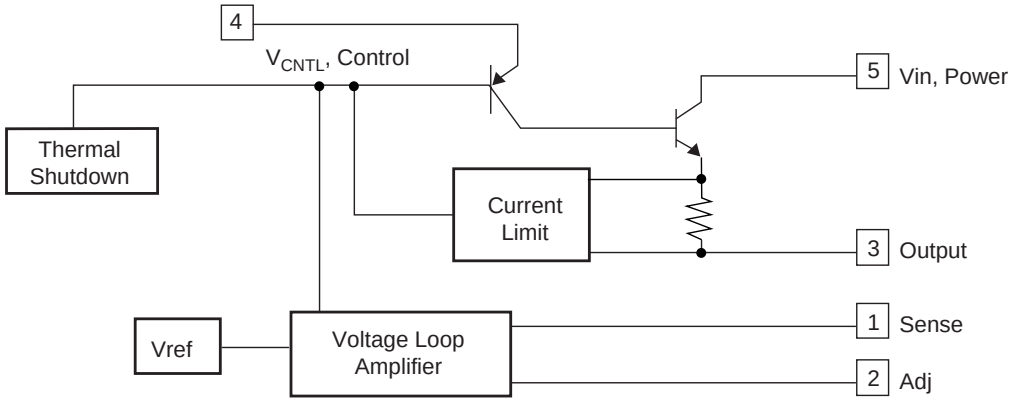


*With package soldered to 0.5 square inch copper area over backside ground plane or internal power plane, θ_{JA} can vary from 30 °C/W to more than 40 °C/W. Other mounting techniques can provide a thermal resistance lower than 30 °C/W.

Pin Definitions

Pin Number	Pin Name	Pin Function Description
1	VSense	**Remote Voltage Sense**. Connect this pin to the load to permit true remote sensing and avoid trace drops.
2	ADJ/GND	**Adjust or Ground.** On the FAN1581, this pin forms the feedback to determine the output voltage. On the FAN1581-1.2, -1.5 and -2.5, connect this pin to ground.
3	VOUT	**Output Voltage.** This pin and the tab are output.
4	VCNTL	**Control Voltage.** This pin draws small-signal power to control the FAN1581 circuitry. Connect to a voltage higher than VIN, as shown in the applications circuits.
5	VIN	**Input Voltage.**

Internal Block Diagram



Absolute Maximum Ratings

Parameter	Min.	Max.	Unit
V_{IN}		7	V
V_{CNTL}		13.2	V
Operating Junction Temperature Range	0	125	°C
Lead Temperature (Soldering, 10 sec.)		300	°C
Storage Temperature Range	-65	150	°C

Electrical Characteristics

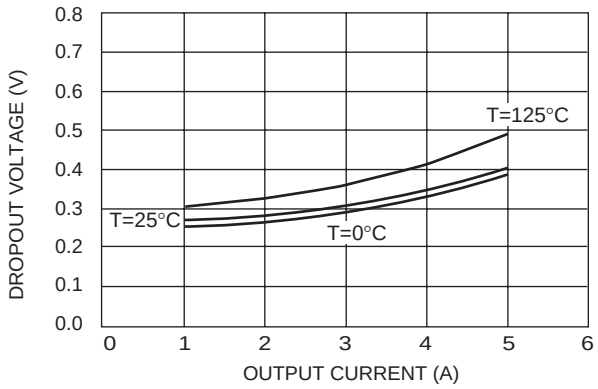
T_J=25°C, $V_{OUT} = V_{SENSE}$, V_{ADJ} = 0V unless otherwise specified.
The • denotes specifications which apply over the specified operating temperature range.

Parameter	Conditions		Min.	Typ.	Max.	Units
Reference Voltage[3]	2.05V ≤ V_{IN} ≤ 5.5V, 2.7V ≤ V_{CNTL} ≤ 12V, 10mA ≤ I_{OUT} ≤ 5A	•	1.237	1.250	1.263	V
Adjustable Output Voltage	3V ≤ V_{IN} ≤ 7V (function of Vout), 10mA ≤ I_{OUT} ≤ 5A	•	Vref	1.5	5.7	V
Output Voltage[4]	3V ≤ V_{IN} ≤ 7V, 10mA ≤ I_{OUT} ≤ 5A	•	1.47	1.5	1.53	V
Output Voltage[5]	4V ≤ V_{IN} ≤ 7V, 10mA ≤ I_{OUT} ≤ 5A	•	2.474	2.5	2.526	V
Output Voltage[6]	2.7V ≤ V_{IN} ≤ 7V, 10mA ≤ I_{OUT} ≤ 5A	•	1.176	1.200	1.224	V
Line Regulation[1,2]	1.75V ≤ V_{IN} ≤ 5.5V, 2.5V ≤ V_{CNTL} ≤ 12V, I_{OUT} = 10mA	•		1	3	mV
Load Regulation[1,2]	V_{IN} = 2.1V, V_{CNTL} = 2.75V, 10mA ≤ I_{OUT} ≤ 5A	•		1	5	mV
Dropout Voltage Minimum (V_{CNTL}–V_{OUT})	V_{IN} = 2.05V, ΔV_{REF} = 1%, I_{OUT} = 5A	•		1.05	1.18	V
Dropout Voltage Minimum (V_{IN}–V_{OUT})	V_{CNTL} = 2.75V, ΔV_{REF} = 1%, I_{OUT} = 5A			0.4	0.5	V
Dropout Voltage Minimum V_{IN}	V_{CNTL} = 2.75V, ΔV_{REF} = 1%, I_{OUT} = 5A	•		0.5	0.6	V
Current Limit	V_{IN} = 2.05V, V_{CNTL} = 2.75V	•	5.2			A
Control Pin Current	V_{IN} = 2.05V, V_{CNTL} = 2.75V, I_{OUT} = 10mA	•		3	6	mA
Adjust Pin Current[3]	V_{IN} = 2.05V, V_{CNTL} = 2.75V	•		50	120	µA
Minimum Load Current	V_{IN} = 3.3V, V_{CNTL} = 5V	•		5.0	10	mA
Ripple Rejection	V_{IN} = 3.75V, V_{CNTL} = 3.75V, f = 120Hz, C_{OUT} = 22µF Tantalum, I_{OUT} = 2.5A		60	80		dB
Thermal Resistance, Junction to Case	TO-263 SPAK			3 2		°C/W
Thermal Regulation	T_A = 25°C, 30ms pulse			0.002	0.02	%/W
Thermal Shutdown				150		°C

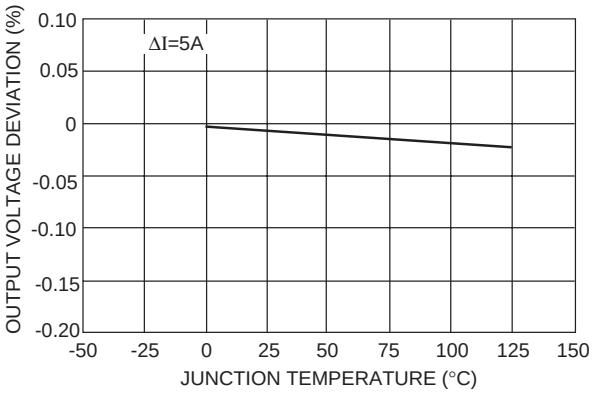
Notes:

1. See thermal regulation specifications for changes in output voltage due to heating effects. Load and line regulation are measured at a constant junction temperature by low duty cycle pulse testing.
2. Line and load regulation are guaranteed up to the maximum power dissipation (18W). Power dissipation is determined by input/output differential and the output current. Guaranteed maximum output power will not be available over the full input/output voltage range.
3. FAN1581 only.
4. FAN1581-1.5 only.
5. FAN1581-2.5 only.
6. FAN1581-1.2 only.

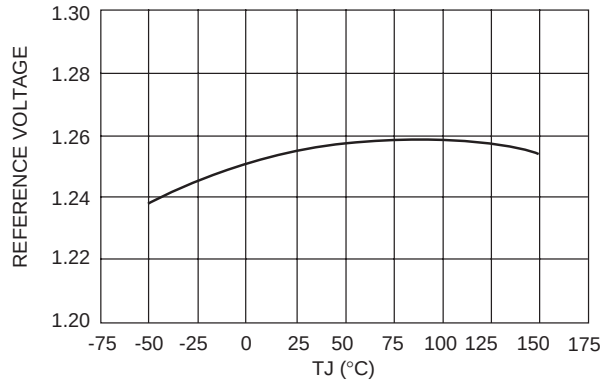
Typical Perfomance Characteristics



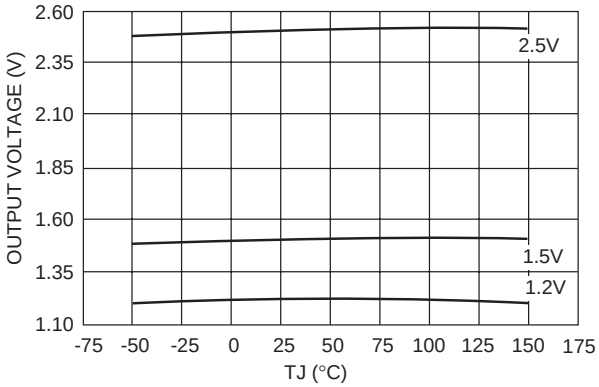
Dropout Voltage vs. Output Current



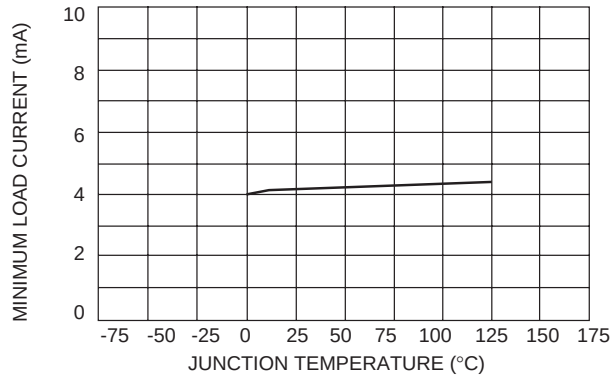
Load Regulation vs. Temperature



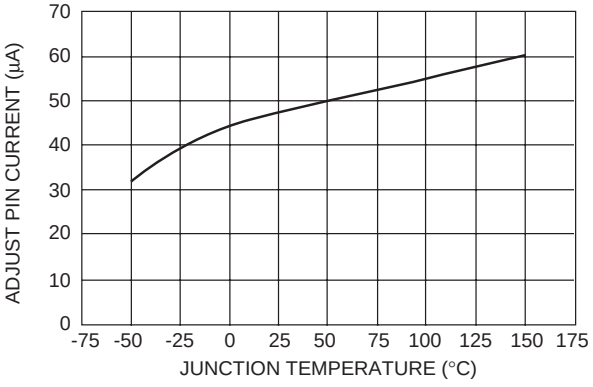
Reference Voltage vs. Temperature



Output Voltage vs. Temperature



Mimimum Load Current vs. Temperature



Adjust Pin Current vs. Temperature

Ordering Information

Product Number	Package
FAN1581MX	TO-263 in Tape and Reel
FAN1581DX	TO-252 DPAK in Tape and Reel
FAN1581M12X	TO-263 in Tape and Reel
FAN1581D15X	TO-252 DPAK in Tape and Reel
FAN1581M25X	TO-263 in Tape and Reel
FAN1581D25X	TO-252 DPAK in Tape and Reel
FAN1581T	TO-220 in Tape and Reel