FAIRCHILD

A Schlumberger Company

μA105 • μA305 μA305A • μA376 Voltage Regulators

Linear Products

Description

The 105/305/305A/376 are Monolithic Positive Voltage Regulators constructed using the Fairchild Planar epitaxial process. Applications for these devices include both linear and switching regulator circuits with output voltages greater than 4.5 V. These devices will not oscillate when confronted with varying resistive and reactive loads and will start reliably regardless of the load within the ratings of the circuit. They also feature fast response to both load and line transients. Used independently, the 105/305 will supply 12 mA, the 305A, 45 mA and 376, 25 mA. The 105 is specified for the military temperature range (−55°C to +125°C) and the 305/376/305A are specified for 0°C to +70°C operation. The 105/305/305A are in an 8-pin TO-5 package and the 376 is available in the space and cost saving DIP.

- **LOW STANDBY CURRENT DRAIN**
- **ADJUSTABLE OUTPUT VOLTAGE FROM 4.5 TO 40 V**
- **HIGH OUTPUT CURRENTS EXCEEDING 10 A WITH EXTERNAL COMPONENTS**
- **LOAD REGULATION BETTER THAN 0.1%, FULL LOAD WITH CURRENT LIMITING**
- **DC LINE REGULATION GUARANTEED AT 0.03%/V**
- **RIPPLE REJECTION OF 0.01%/V**

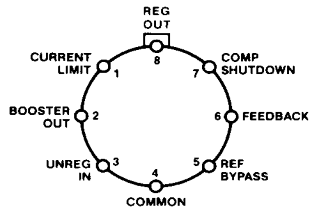
Absolute Maximum Ratings

Input Voltage	
μA105, μA305A	50 V
μA305, μA376	40 V
Input/Output Voltage Differential	40 V
Internal Power Dissipation (Note 1)	
μA105, μA305,	500 mW
μA305A, μA376	450 mW
Operating Temperature Range	
Military (μA105)	−55°C to +125°C
Commercial (μA305, μA305A, μA376)	0°C to 70°C
Storage Temperature Range	
Metal	−65°C to +150°C
DIP	−55°C to +125°C
Pin Temperature	
Metal soldering (60 s)	300°C
DIP Soldering (10 s)	260°C

Notes

1. Rating applies to ambient temperatures up to 70°C. Above 70°C ambient derate linearly at 6.25 mW/°C for the metal can and 5.6 mW/°C for the mini Dip.

Connection Diagram
8-Pin Metal Package

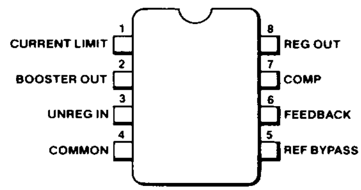


(Top View)

Order Information

Type	Package	Code	Part No.
μA105	Metal	5W	μA105HM
μA305	Metal	5W	μA305HC
μA305A	Metal	5W	μA305AHC

Connection Diagram
8-Pin DIP

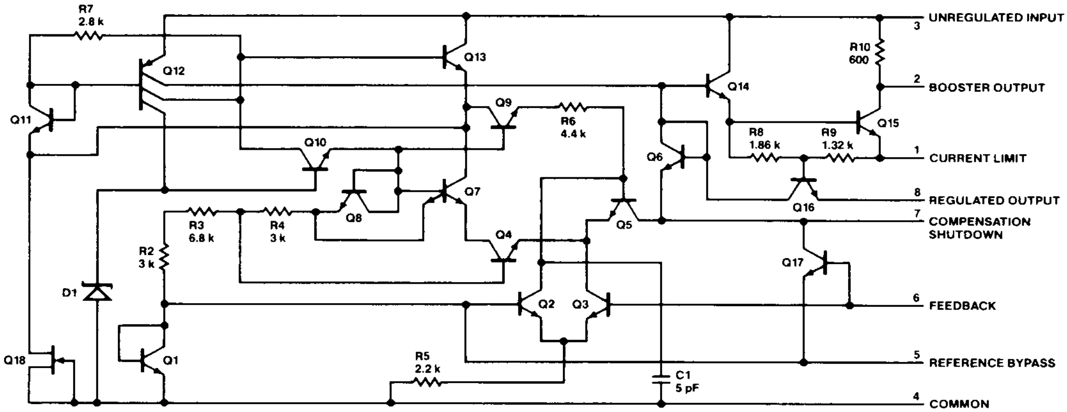


(Top View)

Order Information

Type	Package	Code	Part No.
μA376	Molded DIP	9T	μA376TC

Equivalent Circuit



Pin Connections Shown are for Metal Package

μA105
Electrical Characteristics T_A = 25°C unless otherwise specified (Note 2)

Characteristic	Condition		Min	Typ	Max	Unit
Input Voltage Range			8.5		50	V
Output Voltage Range			4.5		40	V
Output/Input Voltage Differential			3.0		30	V
Load Regulation (Note 3)	$0 \leq I_L \leq 12$ mA	R_{SC} = 10 Ω, T_A = 25°C		0.02	0.05	%
		R_{SC} = 10 Ω, T_A = 125°C		0.03	0.1	%
		R_{SC} = 10 Ω, T_A = −55°C		0.03	0.1	%
Line Regulation	$V_{IN} - V_O \leq 5$ V			0.025	0.06	%/V
	$V_{IN} - V_O > 5$ V			0.015	0.03	%/V
Ripple Rejection	C_{REF} = 10 μF, f = 120 Hz			0.003	0.01	%/V
Temperature Stability (Note 5)	$-55°C \leq T_A \leq 125°C$			0.3	1.0	%
Feedback Sense Voltage			1.63	1.7	1.81	V
Output Noise Voltage	$10 \text{ Hz} \leq f \leq 10$ kHz	C_{REF} = 0		0.005		%
		C_{REF} > 0.1 μF		0.002		%
Current Limit Sense Voltage (Note 4)	R_{SC} = 10Ω, T_A = 25°C, V_O = 0 V		225	300	375	mV
Standby Current Drain	V_{IN} = 50 V			0.8	2.0	mA
Long Term Stability				0.1	1.0	%

Notes

2. These specifications apply for input and output voltages within the ranges given, and for a divider impedance seen by the feedback terminal of 2 kΩ, unless otherwise specified. The load and line regulation specifications are for constant junction temperature. Temperature drift effects must be taken into account separately when the unit is operating under conditions of high dissipation.
3. The output currents given, as well as the load regulation, can be increased by the addition of external transistors. The improvement factor will be roughly equal to the composite current gain of the added transistors.
4. With no external pass transistor.
5. Temperature Stability is defined as the percentage change in output voltage for a thermal variation from room temperature to either temperature extreme.

μA305
Electrical Characteristics T_A = 25°C unless otherwise specified (Note 2)

Characteristic	Condition		Min	Typ	Max	Unit
Input Voltage Range			8.5		40	V
Output Voltage Range			4.5		30	V
Output/Input Voltage Differential			3.0		30	V
Load Regulation (Note 3)	$0 \leq I_L \leq 12$ mA	R_{SC} = 10 Ω, T_A = 25°C		0.02	0.05	%
		R_{SC} = 15 Ω, T_A = 70°C		0.03	0.1	%
		R_{SC} = 10 Ω, T_A = 0°C		0.03	0.1	%
Line Regulation	$V_{IN} - V_O \leq 5$ V			0.025	0.06	%/V
	$V_{IN} - V_O > 5$ V			0.015	0.03	%/V
Ripple Rejection	C_{REF} = 10 μF, f = 120 Hz			0.003	0.01	%/V
Temperature Stability (Note 5)	0°C ≤ T_A ≤ 70°C			0.3	1.0	%
Feedback Sense Voltage			1.63	1.7	1.81	V
Output Noise Voltage	10 Hz ≤ f ≤ 10 kHz	C_{REF} = 0		0.005		%
		C_{REF} > 0.1 μF		0.002		%
Current Limit Sense Voltage (Note 4)	R_{SC} = 10 Ω, T_A = 25°C V_O = 0 V		225	300	375	mV
Standby Current Drain	V_{IN} = 40 V			0.8	2.0	mA
Long Term Stability				0.1	1.0	%

μA305A
Electrical Characteristics T_A = 25°C unless otherwise specified (Note 2)

Characteristic	Condition		Min	Typ	Max	Unit
Input Voltage Range			8.5		50	V
Output Voltage Range			4.5		40	V
Output/Input Voltage Differential			3.0		30	V
Load Regulation	$0 \leq I_L \leq 45$ mA	R_{SC} = 0 Ω, T_A = 25°C		0.02	0.2	%
		R_{SC} = 0 Ω, T_A = 70°C		0.03	0.4	%
		R_{SC} = 0 Ω, T_A = 0°C		0.03	0.4	%
Line Regulation	$V_{IN} - V_O \leq 5$ V			0.025	0.06	%/V
	$V_{IN} - V_O > 5$ V			0.015	0.03	%/V
Ripple Rejection	C_{REF} = 10 μF, f = 120 Hz			0.003		%/V
Temperature Stability (Note 5)	0°C ≤ T_A ≤ 70°C			0.3	1.0	%
Feedback Sense Voltage			1.55	1.7	1.85	V
Output Noise Voltage	10 Hz ≤ f ≤ 10 kHz	C_{REF} = 0		0.005		%
		C_{REF} > 0.1 μF		0.002		%
Current Limit Sense Voltage (Note 4)	R_{SC} = 10 Ω, T_A = 25°C, V_O = 0 V		225	300	375	mV
Standby Current Drain	V_{IN} = 50 V			0.8	2.0	mA
Long Term Stability				0.1	1.0	%

Notes on following page.

μA376
Electrical Characteristics $0°C \leq T_A \leq 70°C$

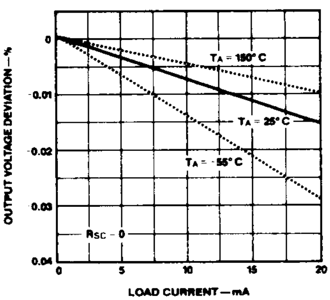
Characteristic	Condition		Min	Typ	Max	Unit
Input Voltage Range			9.0		40	V
Output Voltage Range			5.0		37	V
Output/Input Voltage Differential			3.0		30	V
Load Regulation	$0 \leq I_L \leq 25$ mA	$R_{SC} = 0\ \Omega$, $T_A = 25°C$			0.2	%
		$R_{SC} = 0\ \Omega$, $T_A = 70°C$			0.5	%
		$R_{SC} = 0\ \Omega$, $T_A = 0°C$			0.5	%
Line Regulation	$T_A = 25°C$				0.03	%/V
	$0°C \leq T_A \leq 70°C$				0.1	%/V
Ripple Rejection	f = 120 Hz, $T_A = 25°C$				0.1	%/V
Standby Current Drain	$V_{IN} = 30$ V, $T_A = 25°C$				2.5	mA
Reference Voltage			1.60	1.72	1.80	V
Current Limit Sense Voltage				360		mV

Notes

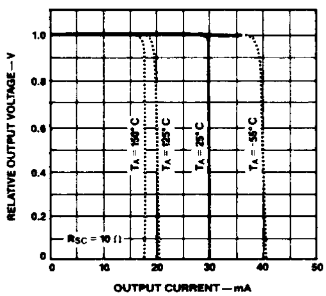
2. These specifications apply for input and output voltages within the ranges given, and for a divider impedance seen by the feedback terminal of 2 kΩ, unless otherwise specified. The load and line regulation specifications are for constant junction temperature. Temperature drift effects must be taken into account separately when the unit is operating under conditions of high dissipation.
3. The output currents given, as well as the load regulation, can be increased by the addition of external transistors. The improvement factor will be roughly equal to the composite current gain of the added transistors.
4. With no external pass transistor.
5. Temperature Stability is defined as the percentage change in output voltage for a thermal variation from room temperature to either temperature extreme.

Typical Performance Curves for μA105/μA305/μA305A

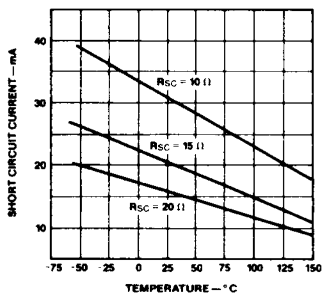
Load Regulation



Current Limiting Characteristics

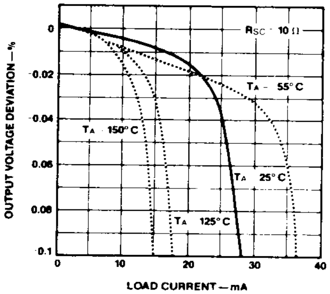


Short Circuit Current as a Function of Temperature

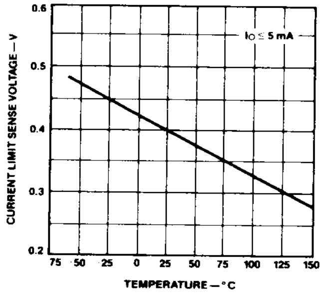


Performance Curves for μA105/μA305/μA305A (Cont.)

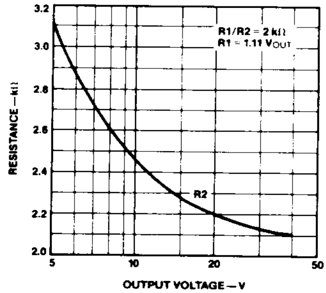
Current Limiting Characteristics



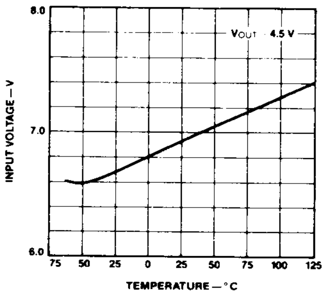
Current Limit Sense Voltage as a Function of Temperature



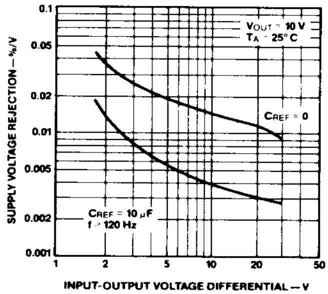
Optimum Divider Resistance Values



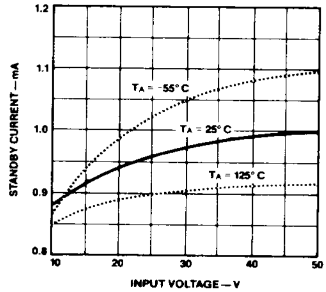
Minimum Input Voltage as a Function of Temperature



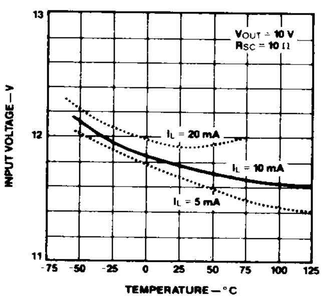
Supply Voltage Rejection as a Function of Input/Output Voltage Differential



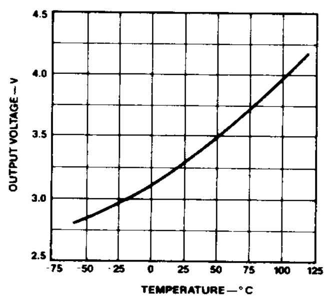
Standby Current Drain as a Function of Input Voltage



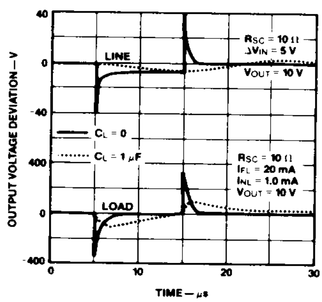
Regulator Dropout Voltage



Minimum Output Voltage as a Function of Temperature

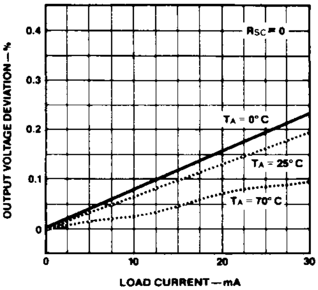


Transient Response

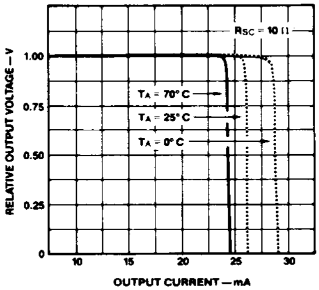


Typical Performance Curves for μA376

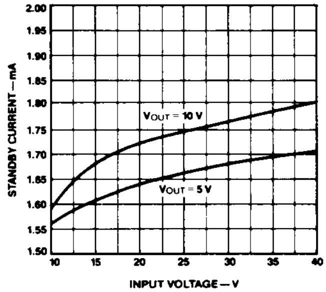
Load Regulation



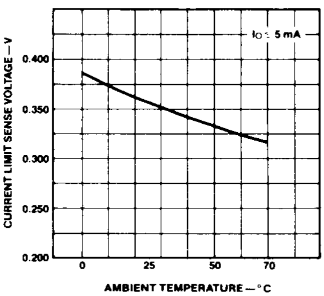
Current Limiting Characteristics



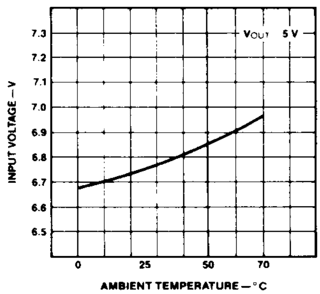
Standby Current Drain as a Function of Input Voltage T_A = 25°C



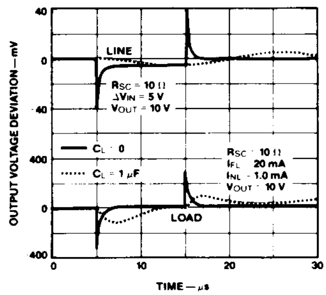
Current Limit Sense Voltage as a Function of Temperature



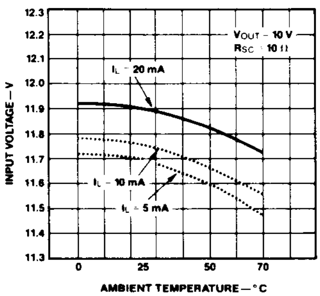
Minimum Input Voltage as a Function of Temperature



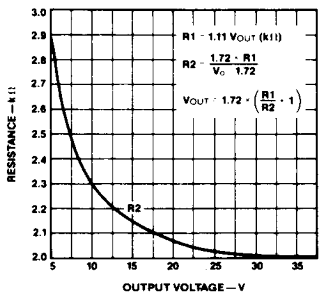
Transient Response



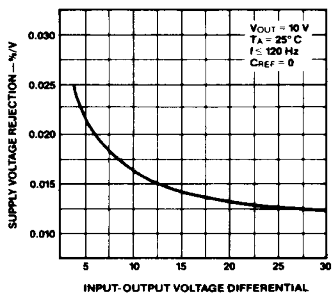
Regulator Dropout Voltage



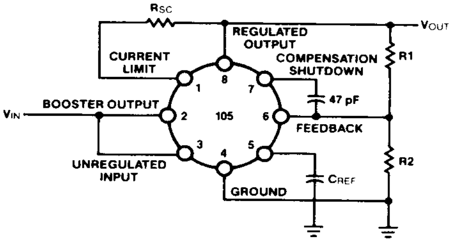
Optimum Divider Resistance



Supply Voltages Rejection as a Function of Input/Output Voltage Differential



Typical Applications
Basic Positive Regulator With Current Limiting



$$V_{OUT} \approx 1.72 \frac{R1 + R2}{R2} V$$

$$I_{SC} \approx \frac{V_{SENSE}}{R_{SC}} mA$$