

### THREE-TERMINAL 5-VOLT REGULATORS

The LM 109, LM 209 and LM 309 are 5 V regulators. They are designed for local regulation on digital logic cards.

In CB-7 package, they can deliver output current in excess of 200 mA if adequate heatsink is provided. With CB-19 power package, the available output current is greater than 1 A.

These regulators are essentially blow-out proof. Current limiting is included and thermal shut down is provided to keep the ICs from overheating. If internal dissipation becomes too great, the regulator will shut down to prevent excessive heating.

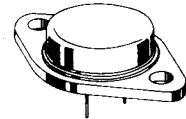
- Fixed voltage regulator requires no external component for adjusting
- Can provide other values of regulated voltages above 5 V using separate, bias resistors.
- Specified to be compatible, worst case, with TTL and DTL.

### THREE-TERMINAL 5-VOLT REGULATORS

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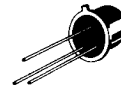
#### CASES

##### CB-19 (TO-3)



K SUFFIX  
STEEL CAN

##### CB-7 (TO-39)



H SUFFIX  
METAL CAN

### ORDERING INFORMATION

Hi-Rel versions available - See chapter 14

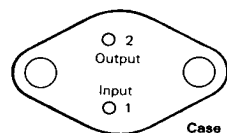
PART NUMBER	TEMPERATURE RANGE	PACKAGE	
		H	K
LM109	-55°C to +150°C	•	•
LM209	-25°C to +150°C	•	•
LM309	0°C to +125°C	•	•

Examples : LM109H, LM109K

### PIN ASSIGNMENTS

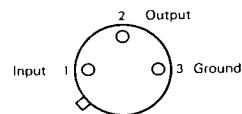
(Bottom views)

#### CB-19



Case is ground

#### CB-7



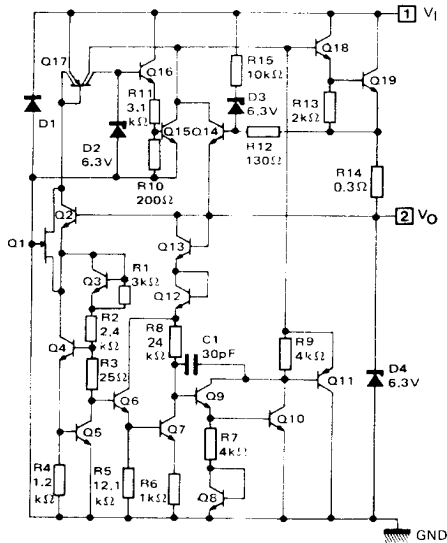
**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Input voltage	$V_I$	35	V
Internal power dissipation	$P_D$	Internally limited	W
Short-circuit output current	IOS	Internally limited	A
Operating free-air temperature range	$T_{oper}$	LM109 LM209 LM309	°C
Storage temperature range	$T_{stg}$	-65 to +150	°C

**THERMAL CHARACTERISTICS**

Rating	Symbol	Min	Typ	Max	Unit
Junction-case thermal resistance	$R_{th(j-c)}$	—	—	15	°C/W
	CB-7 CB-19	—	—	4	
Junction-ambient thermal resistance	$R_{th(j-a)}$	—	—	185	°C/W
	CB-7 CB-19	—	35	—	

**SCHEMATIC DIAGRAM**



CASE	$V_I$	$V_O$	GND
CB-19	1	2	Case 3
CB-7	1	2	3

**ELECTRICAL CHARACTERISTICS**

**LM109** :  $-55^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

**LM209** :  $-25^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

**LM309** :  $0^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

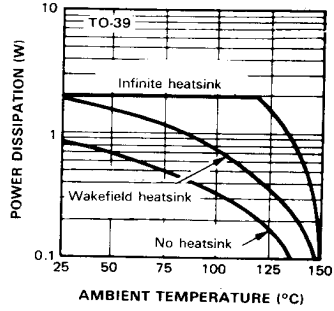
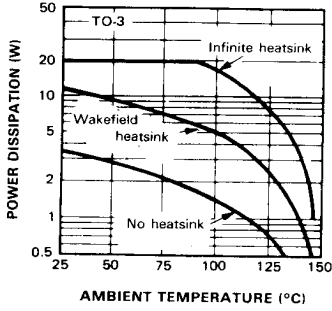
$V_I = +10\text{ V}$ ,  $I_O = 0.1\text{ A}$  (CB-7) or  $0.5\text{ A}$  (CB-19)

(Unless otherwise specified)

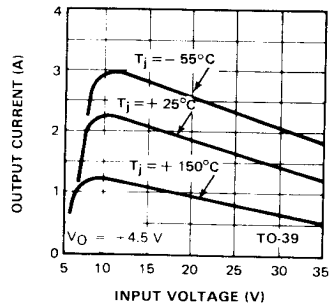
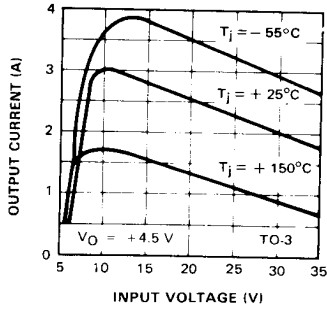
Characteristic	Symbol	LM109 - LM209			LM309			Unit
		Min	Typ	Max	Min	Typ	Max	
Output voltage range $T_j = +25^{\circ}\text{C}$ $T_{\min} \leq T_{\text{amb}} \leq T_{\max}$ $+7\text{ V} \leq V_I \leq +25\text{ V}$ , $5\text{ mA} \leq I_O \leq 200\text{ mA}$ , $P < 2\text{ W}$ CB-7 $5\text{ mA} \leq I_O \leq 1\text{ A}$ , $P < 20\text{ W}$ CB-19	$V_O$	4.7	5.05	5.3	4.8	5.05	5.2	V
Line regulation ( $+7\text{ V} \leq V_I \leq +25\text{ V}$ , $T_j = +25^{\circ}\text{C}$ )	$K_{VI}$	—	4	50	—	4	50	mV
Load regulation ( $T_j = +25^{\circ}\text{C}$ ) $5\text{ mA} \leq I_O \leq 0.5\text{ A}$ CB-7 $5\text{ mA} \leq I_O \leq 1.5\text{ A}$ CB-19	$K_{VO}$	—	20	50	—	20	50	mV
Quiescent current ( $+7\text{ V} \leq V_I \leq +25\text{ V}$ )	$I_B$	—	5.2	10	—	5.2	10	mA
Quiescent current deviation $+7\text{ V} \leq V_I \leq +25\text{ V}$ $5\text{ mA} \leq I_O \leq 200\text{ mA}$ CB-7 $5\text{ mA} \leq I_O \leq 1\text{ A}$ CB-19	$\Delta I_B$	—	—	0.5	—	—	0.5	mA
Output noise voltage ( $T_{\text{amb}} = +25^{\circ}\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )	$V_{NO}$	—	—	40	—	—	40	$\mu\text{V}$
Long term stability	$K_{VH}$	—	—	10	—	—	20	mV

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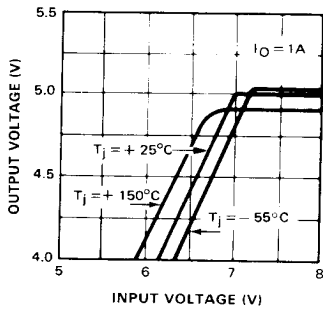
MAXIMUM AVERAGE POWER DISSIPATION



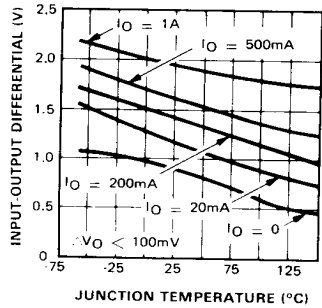
PEAK OUTPUT CURRENT

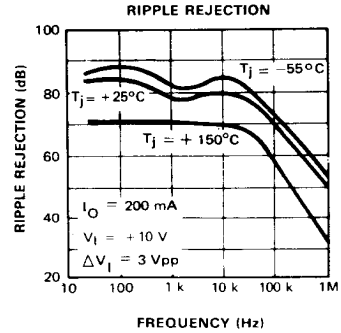
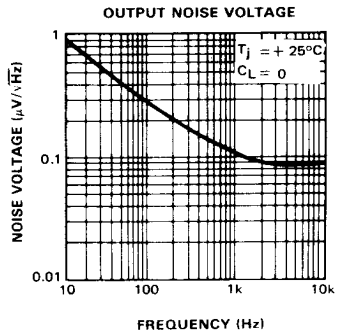
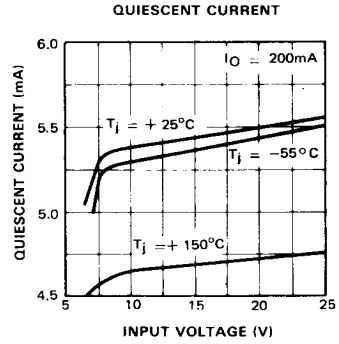
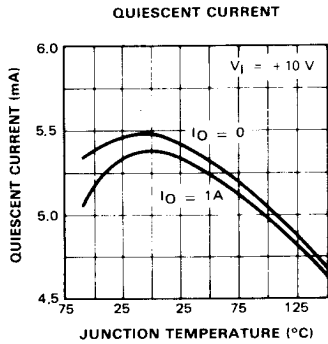
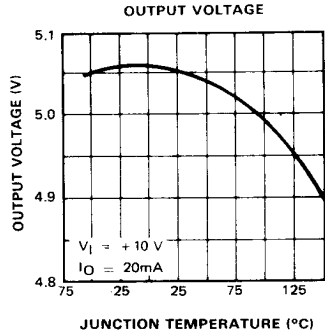
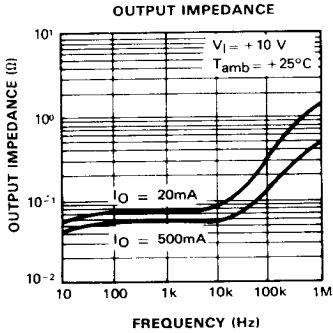


DROPOUT CHARACTERISTICS

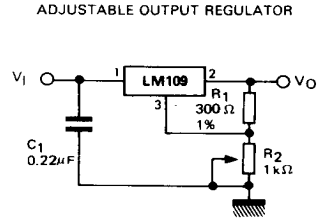
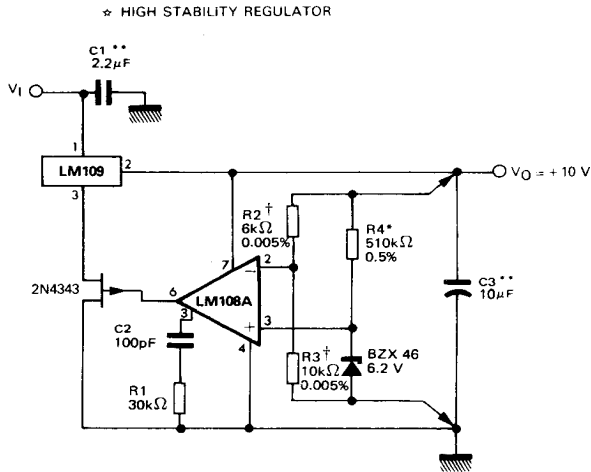


DROPOUT VOLTAGE



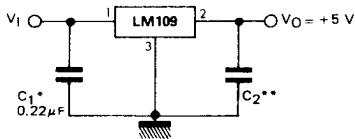


TYPICAL APPLICATIONS



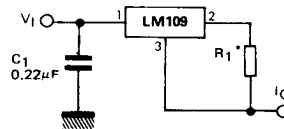
- ✧ Regulation better than 0.01% load, line and temperature can be obtained
- \* Determines zener current. May be adjusted to minimize thermal drift
- \*\* Solid tantalum
- † High stability resistors

FIXED 5 V REGULATOR

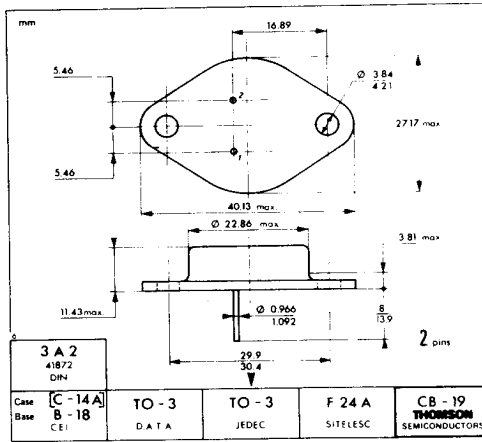


- \* Required if regulator is located an appreciable distance from power supply filter capacitor.
- \*\* Although no output capacitor is needed for stability, it does improve transient response.

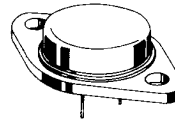
CURRENT REGULATOR



- \* Determines output current

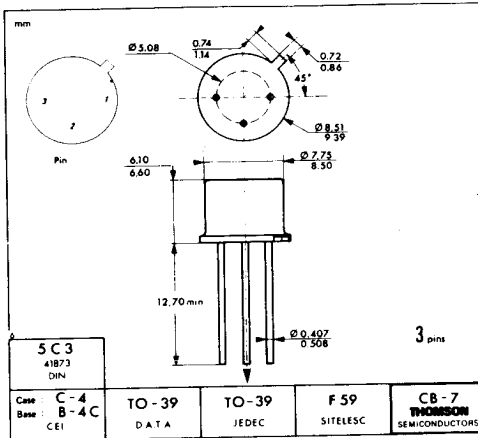


CB-19  
(TO-3)

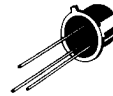


K SUFFIX  
STEEL CAN

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CB-7  
(TO-39)



H SUFFIX  
METAL CAN

These specifications are subject to change without notice.  
Please inquire with our sales offices about the availability of the different packages.