

**LA5658**

3049A

Monolithic Linear IC

## Multifunction Multiple Voltage Regulator

©15158

The LA5658 is a multi-output voltage regulator intended for use in tuners and the like. It delivers 3 regulated outputs of 30V for varicap, active filter, 5.9V for microcomputer, and 15.5V for other use and contains a microcomputer reset circuit.

### Use

Voltage regulator for tuners, receivers, and the like.

### Features

#### (1) Voltage regulator function

- . 3-input, 3-output voltage regulator:  
a:30V-50mA, b:15.5V-350mA, c:5.9V-100mA
- . 15.5V output (parallel regulator) best suited for audio amp use. An external resistor can be used to adjust the maximum output current.
- . All outputs contain an overcurrent limiter.
- . On-chip thermal shutdown circuit.

#### (2) Reset function

- . Resettable when power is turned on/off.
- . Reset time securing function against short break of power.
- . An external resistor, capacitor can be used to set the reset signal pulse width.

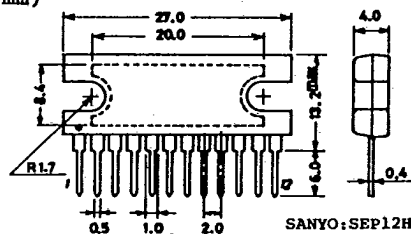
### Maximum Ratings at Ta=25°C

|                             |                     |                    | unit   |
|-----------------------------|---------------------|--------------------|--------|
| Maximum Supply Voltage      | V <sub>IN1</sub>    | 50                 | V      |
|                             | V <sub>IN2,3</sub>  | 35                 | V      |
| Maximum Output Current      | I <sub>OUT2</sub>   | 500                | mA     |
|                             | I <sub>OUT1,3</sub> | Internal           |        |
| Allowable Power Dissipation | P <sub>dmax</sub>   | Infinite heat sink | 13.8 W |
|                             |                     | IC alone           | 2.8 W  |
| Operating Temperature       | Topg                | -30 to +80         | °C     |
| Storage Temperature         | Tstg                | -40 to +125        | °C     |

### Operating Conditions at Ta=25°C

|                            |                   |            | unit |
|----------------------------|-------------------|------------|------|
| Recommended Supply Voltage | V <sub>IN1</sub>  | 35 to 48   | V    |
|                            | V <sub>IN2</sub>  | 19.5 to 33 | V    |
|                            | V <sub>IN3</sub>  | 9 to 33    | V    |
| Output Current             | I <sub>OUT2</sub> | 0 to 450   | mA   |

### Case Outline 3049A-S12HIC (unit:mm)



8287KI/N085MW/9254KI, TS No.1515-1/4

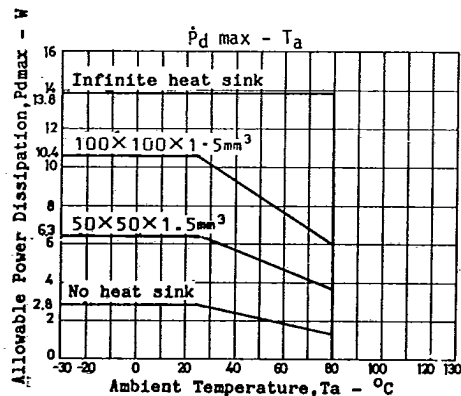
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LA5658

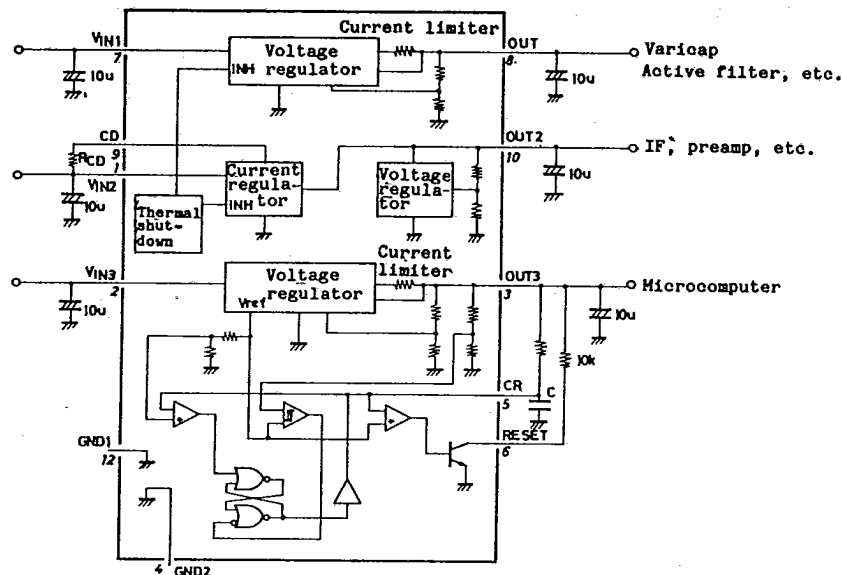
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**Operating Characteristics at Ta=25°C**

|                           |                  |                                                                         | min  | typ  | max  | unit |
|---------------------------|------------------|-------------------------------------------------------------------------|------|------|------|------|
| Quiescent Current         | I <sub>IN1</sub> | V <sub>IN1</sub> =40V, V <sub>IN2</sub> =20V                            |      | 1.2  | 2.0  | mA   |
|                           | I <sub>IN3</sub> | V <sub>IN3</sub> =10V                                                   |      | 3.8  | 5.4  | mA   |
|                           | I <sub>IN2</sub> | V <sub>IN2</sub> =20V, R <sub>CD</sub> =1ohm                            | 300  | 350  | 400  | mA   |
| Output Voltage            | V <sub>O1</sub>  | V <sub>IN1</sub> =40V, V <sub>IN2</sub> =20V                            | 27.5 | 30.0 | 32.5 | V    |
|                           | V <sub>O2</sub>  | V <sub>IN2</sub> =20V                                                   | 14.5 | 15.5 | 16.5 | V    |
|                           | V <sub>O3</sub>  | V <sub>IN3</sub> =10V                                                   | 5.5  | 5.9  | 6.3  | V    |
|                           | V <sub>O11</sub> | 35V ≤ V <sub>IN1</sub> ≤ 45V                                            |      | 10   | 50   | mV   |
| Line Regulation           | V <sub>O12</sub> | 19V ≤ V <sub>IN2</sub> ≤ 27V                                            |      | 10   | 100  | mV   |
|                           | V <sub>O13</sub> | 9V ≤ V <sub>IN3</sub> ≤ 18V                                             |      | 2    | 30   | mV   |
|                           | V <sub>O11</sub> | 0 ≤ I <sub>O</sub> ≤ 50mA, V <sub>IN1</sub> =37V, V <sub>IN2</sub> =20V |      | 6    | 40   | mV   |
| Load Regulation           | V <sub>O12</sub> | 0 ≤ I <sub>O</sub> ≤ 200mA, V <sub>IN2</sub> =20V                       |      | 40   | 200  | mV   |
|                           | V <sub>O13</sub> | 0 ≤ I <sub>O</sub> ≤ 100mA, V <sub>IN3</sub> =10V                       |      | 15   | 60   | mV   |
|                           | R <sub>r1</sub>  | f=120Hz                                                                 | 50   | 70   |      | dB   |
| Ripple Rejection          | R <sub>r2</sub>  | "                                                                       | 46   | 66   |      | dB   |
|                           | R <sub>r3</sub>  | "                                                                       | 60   | 75   |      | dB   |
| Input-Output Voltage Drop | V <sub>dr1</sub> | I <sub>O</sub> =20mA                                                    |      | 1.5  | 2.5  | V    |
|                           | V <sub>dr2</sub> | I <sub>O</sub> =200mA                                                   |      | 1.7  | 3.0  | V    |
|                           | V <sub>dr3</sub> | I <sub>O</sub> =50mA                                                    |      | 1.6  | 2.5  | V    |
| Reset Detection Voltage   | V <sub>R</sub>   |                                                                         | 4.5  | 4.9  | 5.3  | V    |
| Timer Comparison Voltage  | V <sub>C1</sub>  |                                                                         | 1.7  | 2.0  | 2.3  | V    |
|                           | V <sub>C2</sub>  |                                                                         | 0.1  | 0.2  | 0.3  | V    |
| Timer Input Bias Current  | I <sub>TB</sub>  |                                                                         |      |      | 250  | nA   |



## Equivalent Circuit Block Diagram, Pin Assignment, and Peripheral Circuit



| Pin No. | Pin Name         | Function                                                                                              |
|---------|------------------|-------------------------------------------------------------------------------------------------------|
| 1       | V <sub>IN2</sub> | Input pin for 15.5V output line                                                                       |
| 2       | V <sub>IN3</sub> | Input pin for 5.9V output line                                                                        |
| 3       | OUT3             | 5.9V output pin                                                                                       |
| 4       | GND2             | GND of 5.9V regulator and reset circuit                                                               |
| 5       | CR               | Reset pulse width setting pin                                                                         |
| 6       | RESET            | Reset signal output pin                                                                               |
| 7       | V <sub>IN1</sub> | Input pin for 30V output line                                                                         |
| 8       | OUT1             | 30V output pin                                                                                        |
| 9       | CD               | 15.5V line output current setting pin. A resistor across CD and V <sub>IN2</sub> is used for setting. |
| 10      | OUT2             | 15.5V output pin.                                                                                     |
| 11      | NC               |                                                                                                       |
| 12      | GND1             | GND of 15.5V, 30V regulators                                                                          |

Setting of 15.5V line output current  $I_{OUT2}$   
 $I_{OUT2} = 0.35 / R_{CD} \text{ (ohm)}$  [A]

Note: Do not use the NC pin.

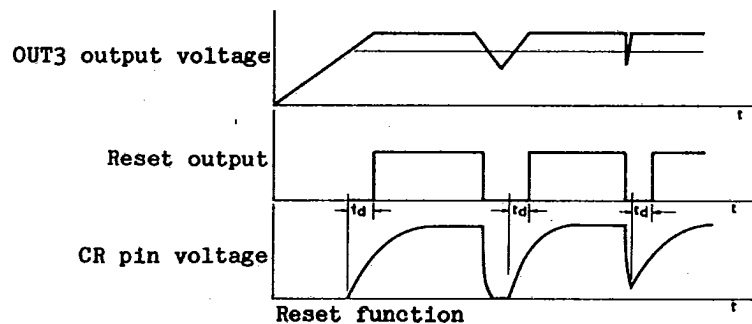
## Reset function

- (1) Reset when power is turned on  
 When power is applied and the voltage on the 5.9V output pin rises to be more than 4.9V<sub>typ</sub>, C is charged and the reset output pin is set to "L" for a preset period of time and then set to "H".
- (2) Reset when power is turned off  
 When power is turned off and the voltage on the 5.9V output pin drops to be less than 4.8V<sub>typ</sub>, C is discharged rapidly and the reset output pin is set to "L".
- (3) Short break of power (Momentary drop of output)  
 Even when the output voltage drops for a moment unlike when power is turned off and the output voltage drops gradually, a reset pulse width

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required for a microcomputer must be secured. When the voltage on the 5.9V output pin drops below 4.8Vtyp for a moment, C is discharged for this momentary period of time, however short it may be, until the voltage of C drops below 0.2Vtyp. Then, C is charged, thereby securing a reset pulse width for a preset period of time.



#### Setting of reset pulse width

$$t_d = -CR \ln(1 - V_{c1}/V_{OUT3})$$

$$t_d \approx 0.452 CR$$