



No.2057B

LA5316M

Variable Divided
Voltage Generator for LCD

Overview

The LA5316M is a variable divided voltage generator IC for multiple drive of LCD matrix.

Features

- Power supply for variable bias LCD drive (1/5 to 1/13 bias available by on-chip resistances).
- 5 OP amps to deliver 5 voltage outputs.
- Low current dissipation (1.5mA max).
- Miniflat package.
- On-chip variable voltage regulator for V_{REF} .

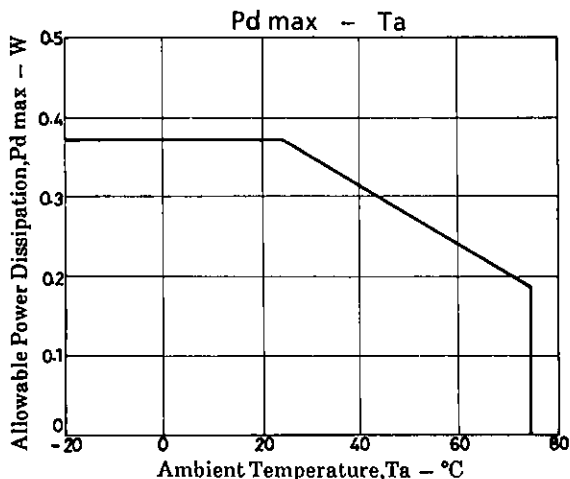
Maximum Ratings at $T_a = 25^\circ\text{C}$

| | | | | unit |
|-----------------------------|---------------|--------------------|-------------|------------------|
| Maximum Supply Voltage | V_{CC} max | GND- V_{CC} | -35 to 0 | V |
| Maximum Output Current | I_{OUT} max | V1, V2, V3, V4, V5 | 15 | mA |
| Allowable Power Dissipation | P_d max | | 370 | mW |
| Operating Temperature | T_{opr} | | -20 to +75 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | | -30 to +125 | $^\circ\text{C}$ |

Operating Conditions at $T_a = 25^\circ\text{C}$

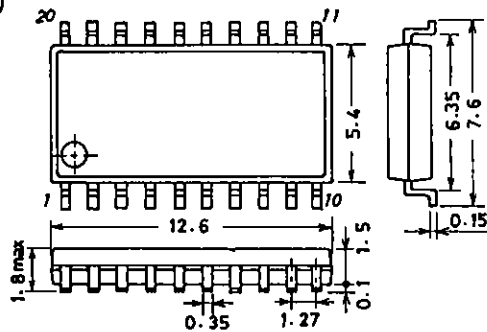
| | | | | unit |
|----------------------------|--------------|--|-------------|------|
| Supply Voltage | V_{CC} op | GND- V_{CC} : (When $V_1 > -1\text{V}$, I_{IN} is needed.) Note 1 | -30 to -10 | V |
| Recommended Input Voltage | V_{REF} | GND- V_{REF} : $V_{REF} \geq V_{CC}$ Note 1 | -30 to -6 | V |
| Recommended Input Current | I_{IN} | V_{IN} : $V_1 > -1\text{V}$, current source of I_{IN} : 1V or greater relative to GND | 0.2 to 3 | mA |
| Recommended Output Current | I_{OUT1} | V1 | -0.1 to +5 | mA |
| | $I_{OUT2,3}$ | V2, V3 | -5 to +5 | mA |
| | $I_{OUT4,5}$ | V4, V5 | -10 to +0.1 | mA |

Note 1: Set V_{CC} , V_{REF} so that $|V_2|$, $|V_{CC}-V_5|$ become 1V or greater.



Package Dimensions 3036B

(unit: mm)



SANYO: MFP20

| Operating Characteristics at Ta = 25°C, VCC = -16V | | | | min | typ | max | unit |
|--|-------|--|--|------|------|------|------|
| Current Dissipation | ICC | VIN, GND-VCC, VREF: VCC = VREF = -16V, VIN = GND, RX = 5R | | | | 1.5 | mA |
| Output Voltage Ratio 1 | Ra1 | V2/V1 | Vref = -12V VCC = -16V, 1/9 bias (RX = 5R) | 1.96 | 2.00 | 2.04 | |
| Output Voltage Ratio 2 | Ra2 | (V5-V3)/(V5-V4) | | 1.96 | 2.00 | 2.04 | |
| Output Voltage Ratio 3 | Rb1 | V5/V1 | | 8.73 | 9.00 | 9.27 | |
| Output Voltage Ratio 4 | Rb2 | V5/V2 | | 4.37 | 4.50 | 4.63 | |
| Output Voltage Ratio 5 | Rb3 | V5/(V5-V3) | | 4.37 | 4.50 | 4.63 | |
| Output Voltage Ratio 6 | Rb4 | V5/(V5-V4) | | 8.73 | 9.00 | 9.27 | |
| Internal Resistance Ratio 1 | 4R | VIN3-RX1 | Resistance ratio referenced to R across pins ⑤ and ⑥ | | | 4 | |
| Internal Resistance Ratio 2 | 5R | VIN3-RX2 | | | | 5 | |
| Internal Resistance Ratio 3 | 6R | VIN3-RX3 | | | | 6 | |
| Internal Resistance Ratio 4 | 7R | VIN3-RX4 | | | | 7 | |
| Internal Resistance Ratio 5 | 8R | VIN3-RX5 | | | | 8 | |
| Internal Resistance Ratio 6 | 9R | VIN3-RX6 | | | | 9 | |
| Resistance | R | RX1-RX2: R value when 0.5V is applied across pins ⑤ and ⑥ | | 20 | | | kΩ |
| Load Regulation 1 | ΔV1 | V1: +100μA < IOU1 < +5mA | | | | 20 | mV |
| Load Regulation 2 | ΔV2 | V2: +100μA < IOU2 < +5mA | | | | 20 | mV |
| Load Regulation 3 | ΔV3 | V3: +100μA < IOU3 < +5mA | | | | 20 | mV |
| Load Regulation 4 | -ΔV2 | V2: -5mA < IOU2 < -100μA | | | | 20 | mV |
| Load Regulation 5 | -ΔV3 | V3: -5mA < IOU3 < -100μA | | | | 20 | mV |
| Load Regulation 6 | -ΔV4 | V4: -10mA < IOU4 < -100μA | | | | 20 | mV |
| Load Regulation 7 | -ΔV5 | V5: -10mA < IOU5 < -100μA | | | | 20 | mV |
| Regulator Voltage | VReg | GND-VReg: Pins ⑦ and ⑧ shorted | -6.5 | -6.2 | -5.9 | | V |
| VReg Load Regulation | ΔVReg | VReg: -5mA < IO < +1mA | | | | 50 | mV |

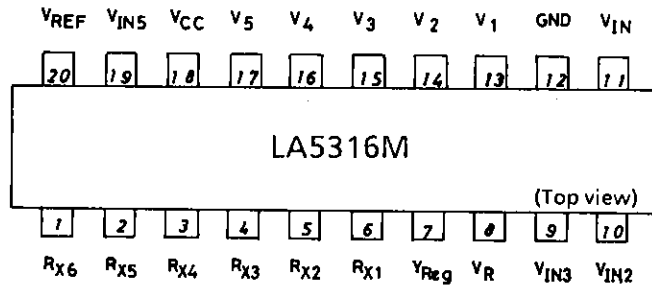
Pin Functions

| Pin No. | Pin Name | Function | Remarks |
|---------|----------|------------------------|--|
| 1 | RX6 | RX pin | Pin ⑩ shorted RX = 9R |
| 2 | RX5 | RX pin | Pin ⑩ shorted RX = 8R |
| 3 | RX4 | RX pin | Pin ⑩ shorted RX = 7R |
| 4 | RX3 | RX pin | Pin ⑩ shorted RX = 6R |
| 5 | RX2 | RX pin | Pin ⑩ shorted RX = 5R |
| 6 | RX1 | RX pin | Pin ⑩ shorted RX = 4R |
| 7 | VReg | VReg output | For supplying VREF |
| 8 | VR | VReg OP amp VIN- | |
| 9 | VIN3 | V3 input | |
| 10 | VIN2 | V2 input | |
| 11 | VIN | V1 supply (+ supply) | When V1 > -1.0V, VIN is applied. When V1 < -1.0V, this pin is shorted to GND. |
| 12 | GND | GND | |
| 13 | V1 | V1 output | |
| 14 | V2 | V2 output | |
| 15 | V3 | V3 output | |
| 16 | V4 | V4 output | |
| 17 | V5 | V5 output | |
| 18 | VCC | VCC supply (- supply) | |
| 19 | VIN5 | V5 input | |
| 20 | VREF | VREF supply (- supply) | |

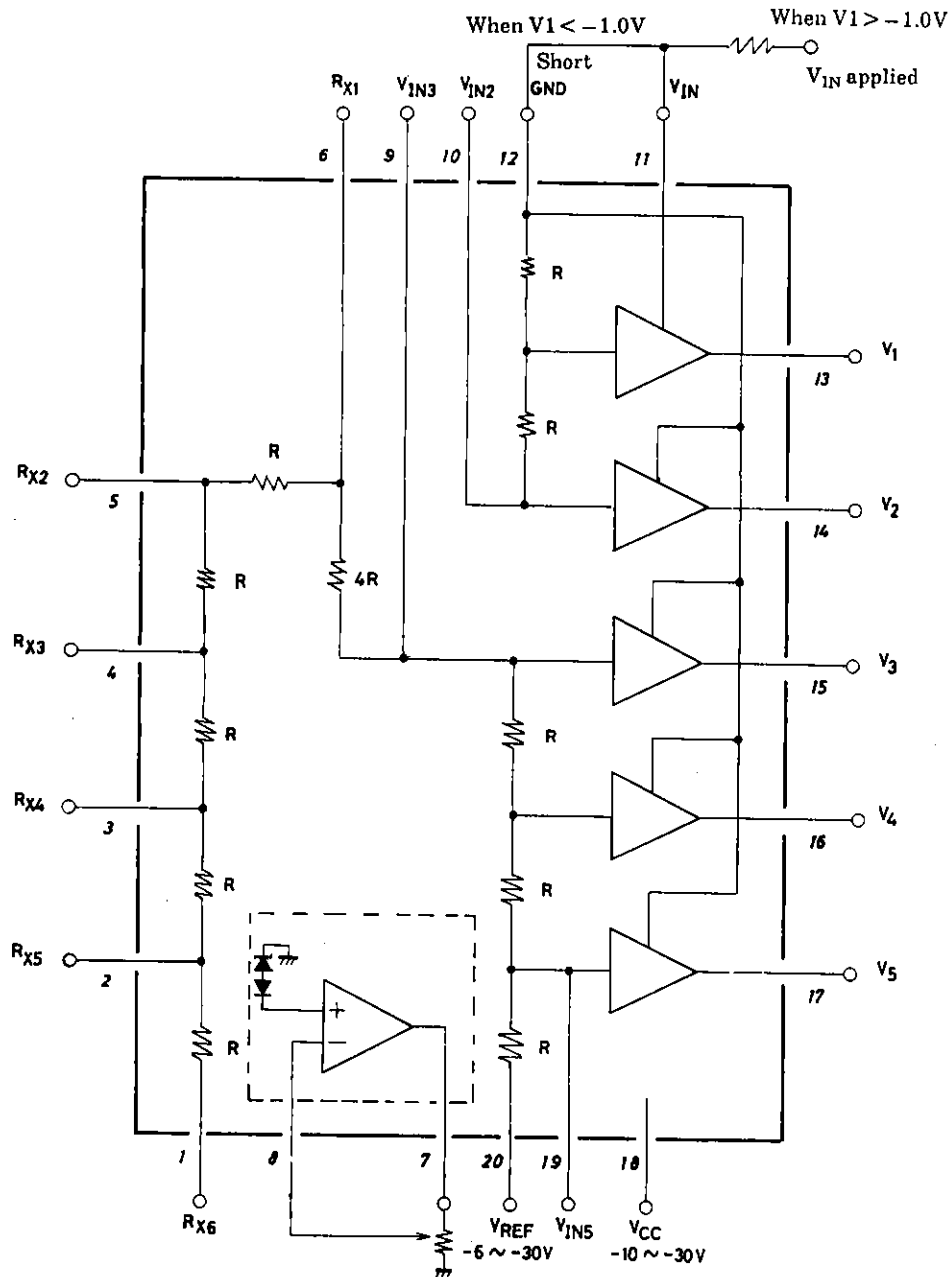
(Note) Do not use the NC pin.

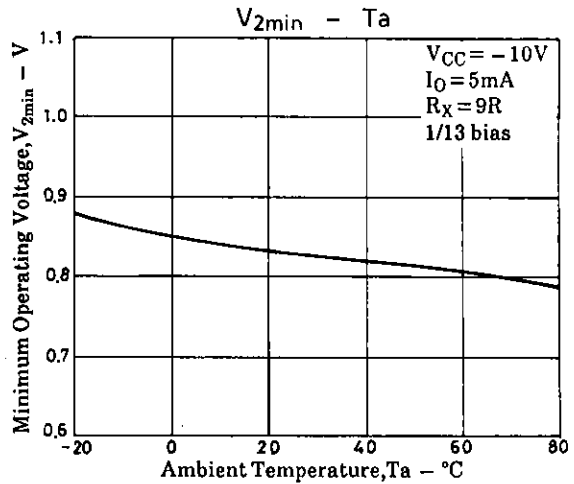
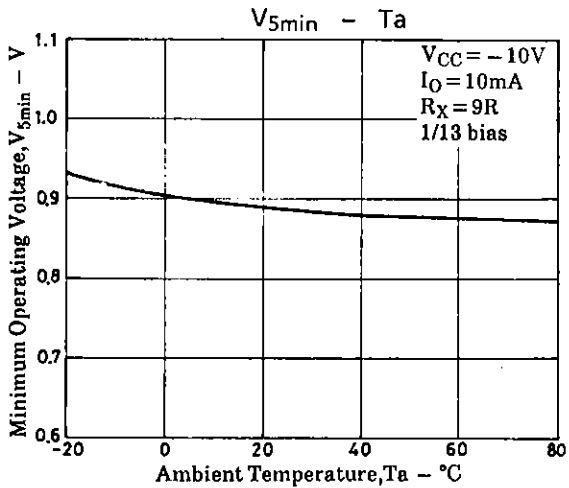
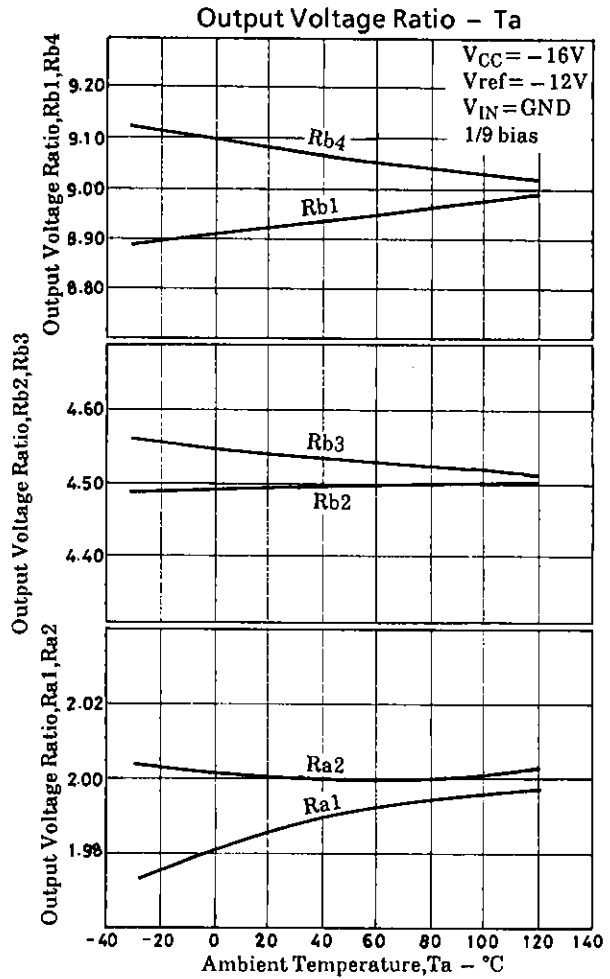
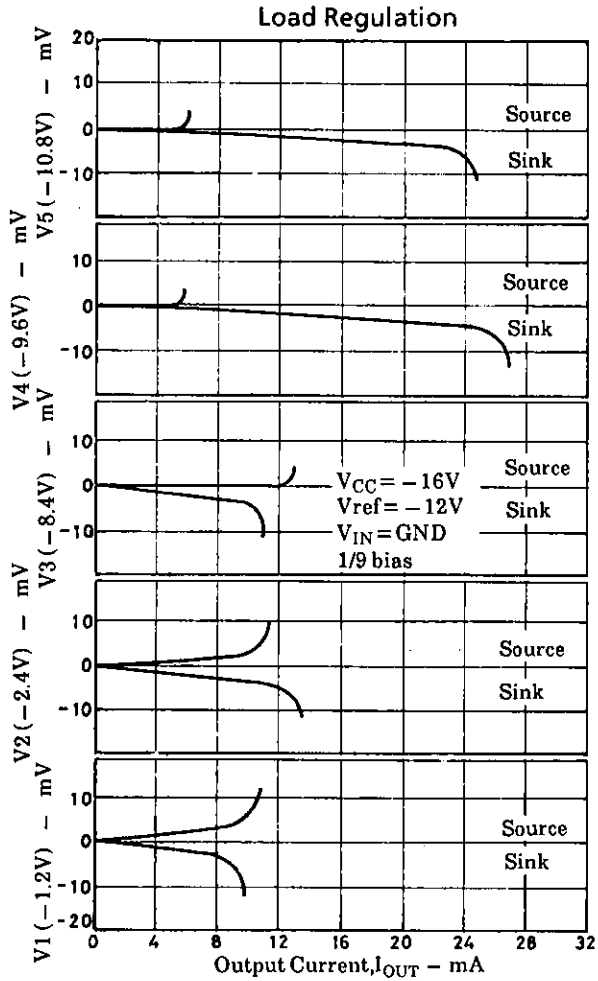
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Pin Assignment



Equivalent Circuit Block Diagram





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