Ordering number:ENN2057B

Monolithic Linear IC

LA5316M

Variable Divided Voltage Generator for LCD

Overview

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

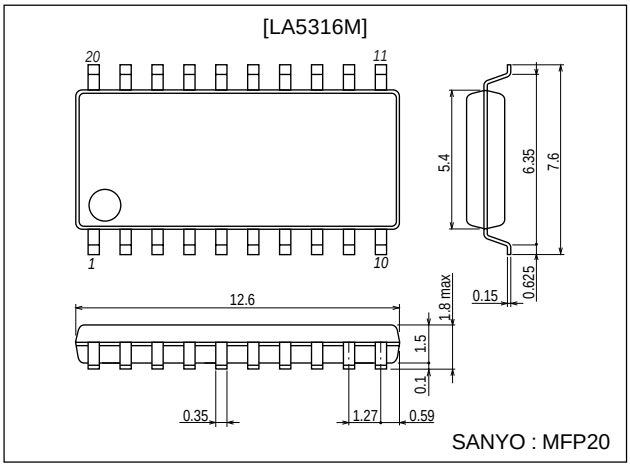
Features

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

Package Dimensions

unit:mm

3036B-MFP20



Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	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	Pd max		370	mW
Operating temperature	Topr		–20 to +75	˚C
Storage temperature	Tstg		–30 to +125	˚C

Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC} op	GND-V_{CC} : (When V1>–1V, I_{IN} is needed.) *	–30 to –10	V
Recommended input voltage	V_{REF}	GND-V_{REF} : V_{REF}≥ V_{CC} *	–30 to –6	V
Recommended input current	I_{IN}	V_{IN} : V1>–1V, current source of I_{IN} : 1V or greater relative to GND	0.2 to 3	mA
Recommended output current	I_{OUT}1	V1	–0.1 to +5	mA
	I_{OUT}2, 3	V2, V3	–5 to +5	mA
	I_{OUT}4, 5	V4, V5	–10 to +0.1	mA

note * Set V_{CC}, V_{REF} so that | V2 |, | V_{CC}-V5 | become 1V or greater.

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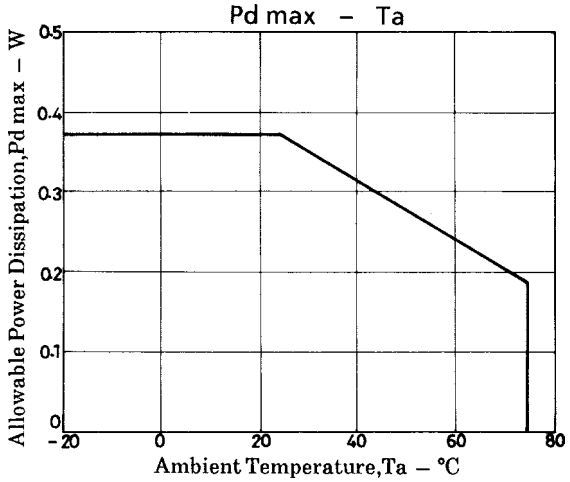
Operating Characteristics at Ta = 25˚C, V_{CC}=–16V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CC}	V_{IN}, GND-V_{CC}, V_{REF} : V_{CC}=V_{REF}=–16V, V_{IN}=GND, R_X=5R			1.5	mA
Output voltage ratio 1	Ra1	V2/V1, Vref=–12V, V_{CC}=–16V, 1/9 bias (R_X=5R)	1.96	2.00	2.04	
Output voltage ratio 2	Ra2	(V5-V3)/(V5-V4), Vref=–12V, V_{CC}=–16V, 1/9 bias (R_X=5R)	1.96	2.00	2.04	
Output voltage ratio 3	Rb1	V5/V1, Vref=–12V, V_{CC}=–16V, 1/9 bias (R_X=5R)	8.73	9.00	9.27	
Output voltage ratio 4	Rb2	V5/V2, Vref=–12V, V_{CC}=–16V, 1/9 bias (R_X=5R)	4.37	4.50	4.63	
Output voltage ratio 5	Rb3	V5/(V5-V3), Vref=–12V, V_{CC}=–16V, 1/9 bias (R_X=5R)	4.37	4.50	4.63	
Output voltage ratio 6	Rb4	V5/(V5-V4), Vref=–12V, V_{CC}=–16V, 1/9 bias (R_X=5R)	8.73	9.00	9.27	
Internal resistance ratio 1	4R	V_{IN}3-R_X1, Resistance ratio referenced to R across pins ⑤ and ⑥		4		
Internal resistance ratio 2	5R	V_{IN}3-R_X2, Resistance ratio referenced to R across pins ⑤ and ⑥		5		
Internal resistance ratio 3	6R	V_{IN}3-R_X3, Resistance ratio referenced to R across pins ⑤ and ⑥		6		
Internal resistance ratio 4	7R	V_{IN}3-R_X4, Resistance ratio referenced to R across pins ⑤ and ⑥		7		
Internal resistance ratio 5	8R	V_{IN}3-R_X5, Resistance ratio referenced to R across pins ⑤ and ⑥		8		
Internal resistance ratio 6	9R	V_{IN}3-R_X6, Resistance ratio referenced to R across pins ⑤ and ⑥		9		
Resistance	R	R_X1-R_X2 : R value when 0.5V is applied across pins ⑤ and ⑥		20		kΩ
Load regulation 1	ΔV1	V1 : +100μA<I_{OUT1}<+5mA			20	mV
Load regulation 2	ΔV2	V2 : +100μA<I_{OUT2}<+5mA			20	mV
Load regulation 3	ΔV3	V3 : +100μA<I_{OUT3}<+5mA			20	mV
Load regulation 4	–ΔV2	V2 : –5mA<I_{OUT2}<–100μA			20	mV
Load regulation 5	–ΔV3	V3 : –5mA<I_{OUT3}<–100μA			20	mV
Load regulation 6	–ΔV4	V4 : –10mA<I_{OUT4}<–100μA			20	mV
Load regulation 7	–ΔV5	V5 : –10mA<I_{OUT5}<–100μA			20	mV
Regulator voltage	V_{Reg}	GND-V_{Reg} : Pins ⑦ and ⑧ shorted	–6.5	–6.2	–5.9	V
VReg load regulation	ΔV_{Reg}	V_{Reg} : –5mA<I_O<+1mA			50	mV

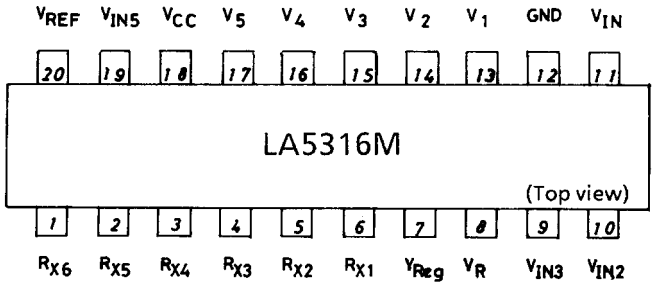


Pin Functions

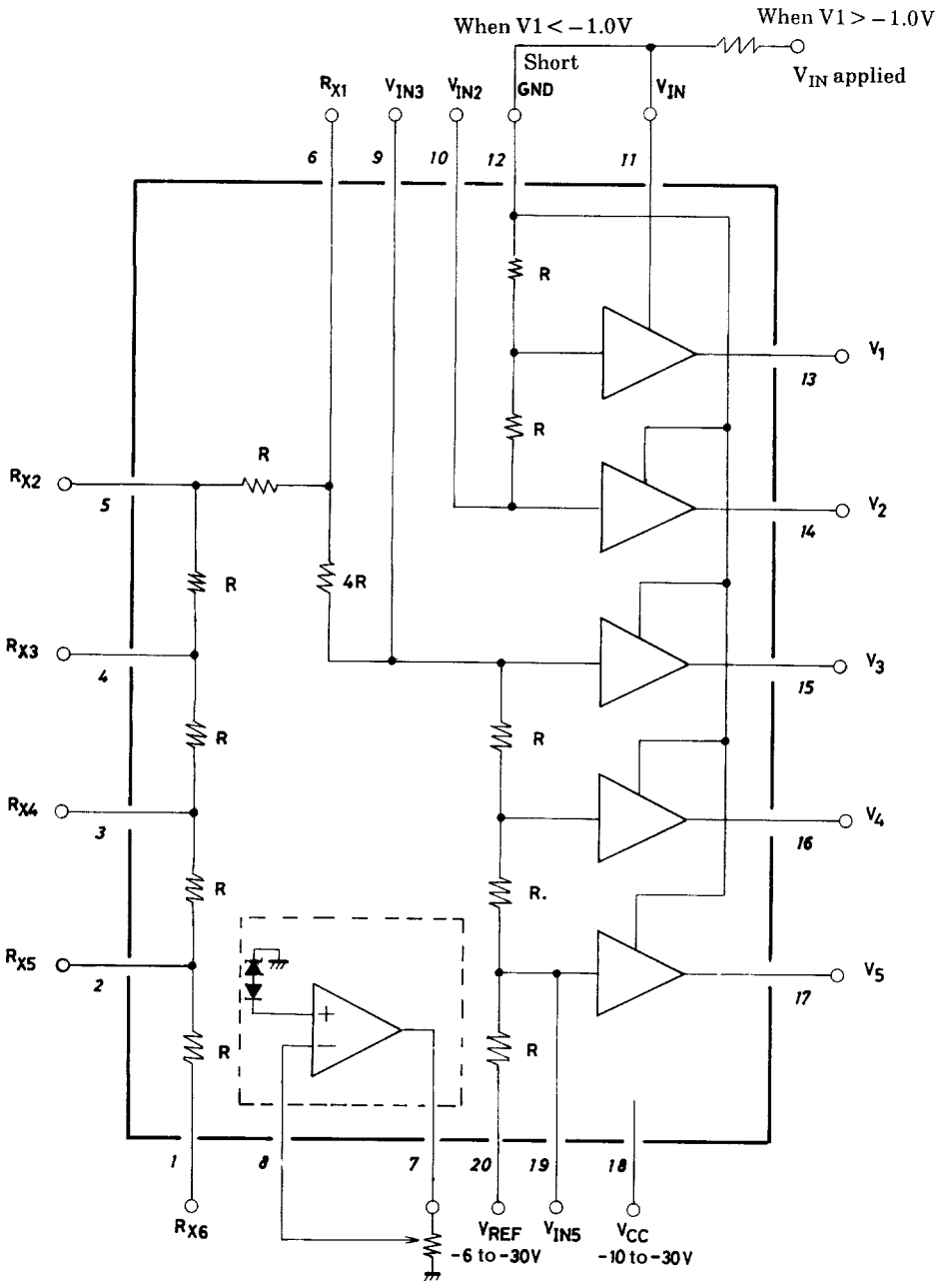
Pin No.	Pin Name	Description	Remarks
1	R_{X6}	R_X pin	Pin ⑩ shorted R_X=9R
2	R_{X5}	R_X pin	Pin ⑩ shorted R_X=8R
3	R_{X4}	R_X pin	Pin ⑩ shorted R_X=7R
4	R_{X3}	R_X pin	Pin ⑩ shorted R_X=6R
5	R_{X2}	R_X pin	Pin ⑩ shorted R_X=5R
6	R_X1	R_X pin	Pin ⑩ shorted R_X=4R
7	V_{Reg}	V_{Reg} output	For supplying V_{REF}
8	V_R	V_{Reg} operational amplifier V_{IN}–	
9	$V_{IN}3$	V_3 input	
10	$V_{IN}2$	V_2 input	
11	V_{IN}	V_1 supply (+ supply)	When V_1 > –1.0V, V_{IN} is applied. When V_1 < –1.0V, this pin is shorted to GND.
12	GND	GND	
13	V_1	V_1 output	
14	V_2	V_2 output	
15	V_3	V_3 output	
16	V_4	V_4 output	
17	V_5	V_5 output	
18	V_{CC}	V_{CC} supply (–supply)	
19	V_{IN5}	V_5 input	
20	V_{REF}	V_{REF} supply (–supply)	

Note) Do not use the NC pin.

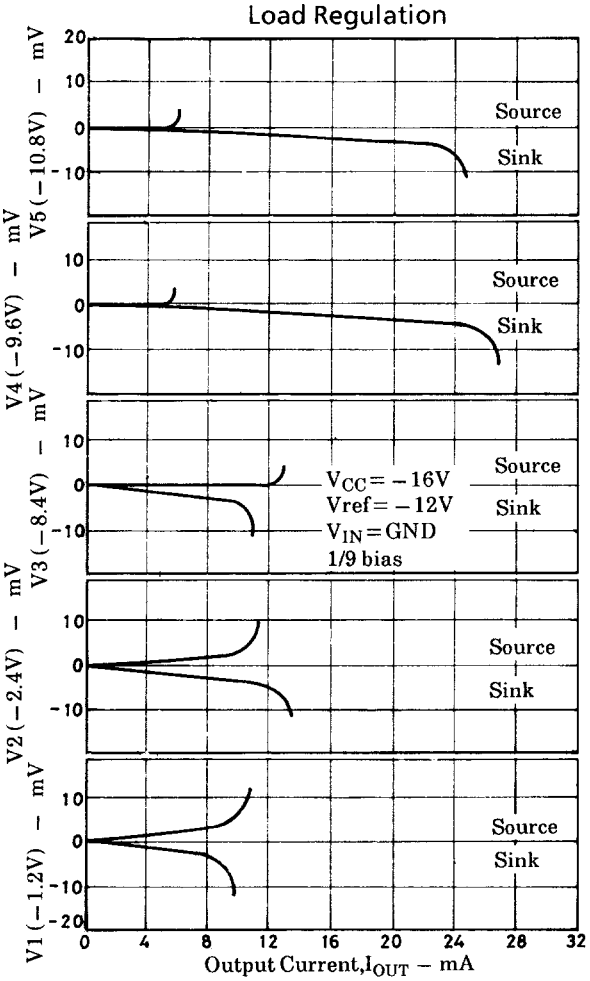
Pin Assingment



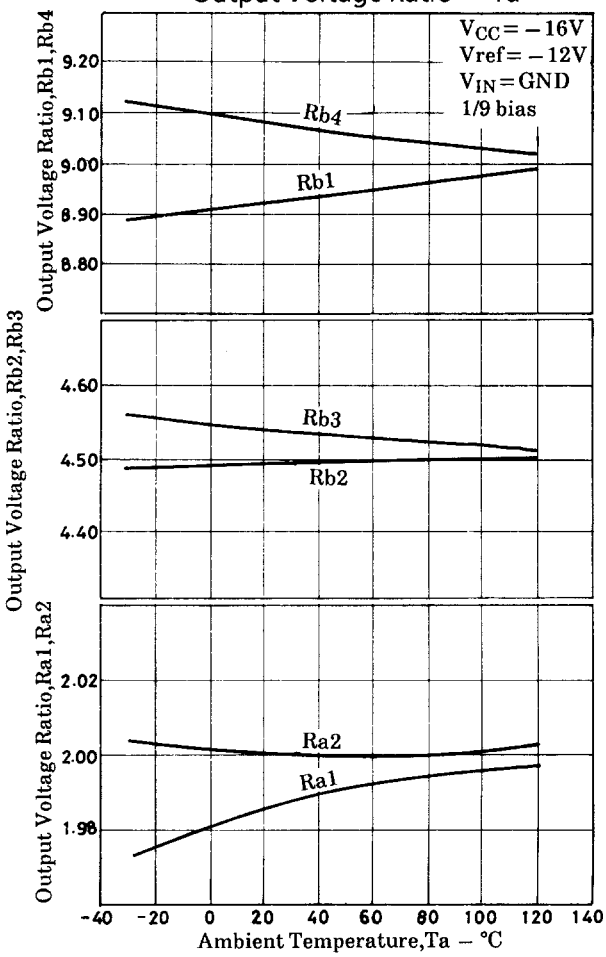
Equivalent Circuit Block Diagram



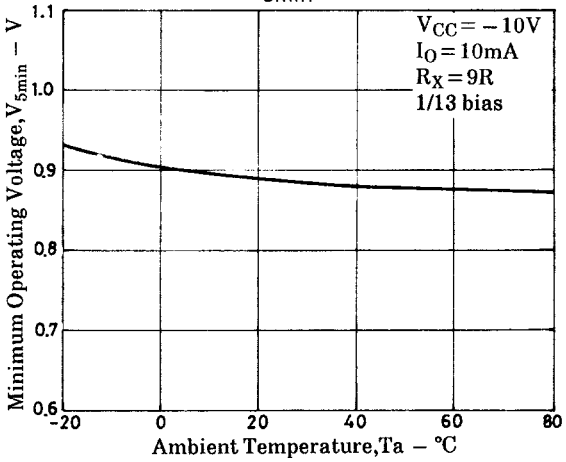
Load Regulation



Output Voltage Ratio − Ta



V_{5min} − Ta



V_{2min} − Ta