



LA5318M

Variable Divided Voltage Generator for LCD Use

Overview

The LA5318M is a variable divided voltage generator IC for multiple drive of LCD matrix.

Features

- Power supply for variable bias LCD division drive (1/5 to 1/19 bias available by built-in resistances).
- Four operational amplifiers to deliver 5 voltage outputs.
- Low current drain (0.35mA typ).
- V1, V2 output current source side variable pin.
- Output on/off function V_{REF} control pins.
- Miniflat package.

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{EE\ max}$	$V_{CC}-V_{EE}$	36	V
Maximum output current	$I_{OUT\ max}$	V1 to V4	Internal *	mA
Allowable power dissipation	$P_d\ max$		330	mW
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-30 to +135	$^\circ\text{C}$

Note : 1. Continuous operation (nonbreakdown) is guaranteed when operated at the maximum ratings shown above.

2. *The maximum output current is a value specified under the conditions otherwise specified separately.

3. Output pins V1 to V4 to V_{CC} , GND short circuit not lasting more than 1ms is acceptable ($|V_{CC} - V_{EE}| < 35\text{V}$).

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

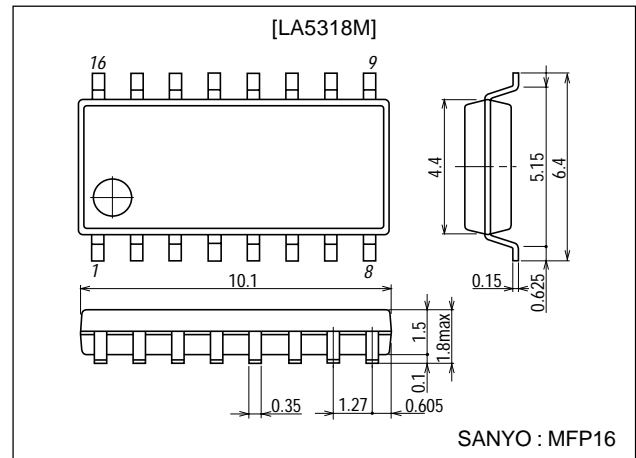
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{EE}	$V_{REF} \geq V_{EE}$	-35.5 to -6	V
Input voltage	V_{REF}		-35 to -6	V
Input current	I_{INR}		-0.2 to 0	mA
Output current	I_{OUTR}		0 to +50	mA
	$I_{OUT1, 2}$		-5 to +5	mA
	$I_{OUT3, 4}$		-10 to +5	mA

Note : 4. Set V_{CC} and V_{EE} so that $|V1|$ and $|V_{EE}-V4|$ become 1V or greater.

Package Dimensions

unit:mm

3035A-MFP16



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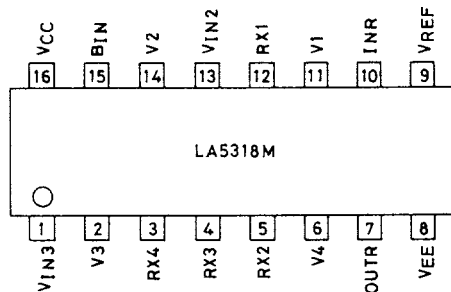
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Operating Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC}-V_{EE}=20\text{V}$, $V_{REF}=V_{EE}$, $R_X=8R$, $B_{IN}=\text{Open}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CC}, I_{EE}	$V_{CC}-V_{EE}=20\text{V}$, $R_X=8R$, $I_{NR}=V_{CC}$		0.35	0.5	mA
Output voltage ratio 1	Ra1	$V2/V1$	1.96	2.00	2.04	
Output voltage ratio 2	Ra2	$(V_{REF}-V3)/(V_{REF}-V4)$	1.96	2.00	2.04	
Output voltage ratio 3	Rb1	$V_{REF}/V1$	11.64	12.00	12.36	
Output voltage ratio 4	Rb2	$V_{REF}/V2$	5.82	6.00	6.18	
Output voltage ratio 5	Rb3	$V_{REF}/(V_{REF}-V3)$	5.82	6.00	6.18	
Output voltage ratio 6	Rb4	$V_{REF}/(V_{REF}-V4)$	11.64	12.00	12.36	
Internal resistance ratio 1	R_{X1}	$R_{X1}-R_{X2}^*$		8		
Internal resistance ratio 2	R_{X2}	$R_{X2}-R_{X3}^*$		12		
Internal resistance ratio 3	R_{X3}	$R_{X3}-R_{X4}^*$		14		
Internal resistance ratio 4	R_{X4}	$R_{X4}-V_{IN3}^*$		15		
Resistance	R	R value when 0.5V is applied across R_{X4} and V_{IN3}		30		k Ω
Load regulation 1	$\Delta V1$	$+0.1\text{mA} < I_{OUT1} < +5\text{mA}$			± 20	mV
Load regulation 2	$\Delta V2$	$+0.1\text{mA} < I_{OUT2} < +5\text{mA}$			± 20	mV
Load regulation 3	$\Delta V3$	$+0.1\text{mA} < I_{OUT3} < +5\text{mA}$			± 20	mV
Load regulation 4	$\Delta V4$	$+0.1\text{mA} < I_{OUT4} < +5\text{mA}$			± 20	mV
Load regulation -1A	$-\Delta V1A$	$-0.5\text{mA} < I_{OUT1} < -0.1\text{mA}$			± 20	mV
Load regulation -2A	$-\Delta V2A$	$-0.5\text{mA} < I_{OUT2} < -0.1\text{mA}$			± 20	mV
Load regulation -3	$-\Delta V3$	$-10\text{mA} < I_{OUT3} < -0.1\text{mA}$			± 20	mV
Load regulation -4	$-\Delta V4$	$-10\text{mA} < I_{OUT4} < -0.1\text{mA}$			± 20	mV
Load regulation -1B	$-\Delta V1B$	$-5\text{mA} < I_{OUT1} < -0.1\text{mA}$, $B_{IN}=\text{GND}$			± 20	mV
Load regulation -2B	$-\Delta V2B$	$-5\text{mA} < I_{OUT2} < -0.1\text{mA}$, $B_{IN}=\text{GND}$			± 20	mV
OUTR saturation voltage	V_{OUTR}	$I_{OUT}=20\text{mA}$, $V_{CC}-I_{NR}=2.7\text{V}$ (Source I_{OUT} is negative (-) and sink. I_{OUT} is positive (+).)			0.5	V

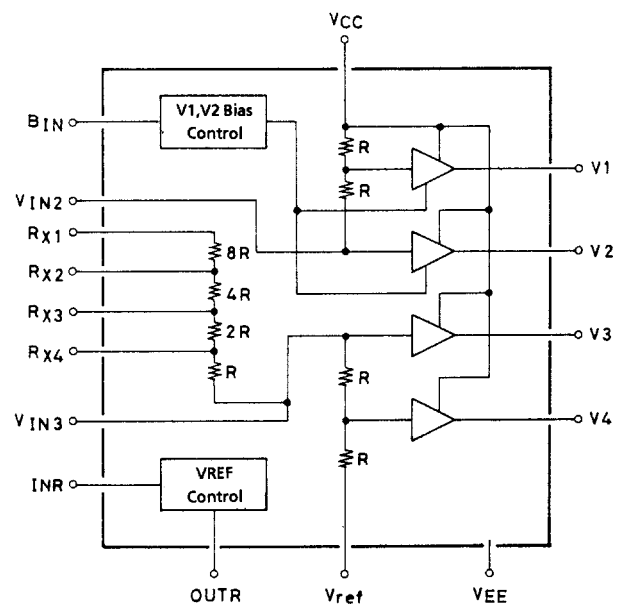
Note* : Referenced to R between R_{X4} and V_{IN3} .

Pin Assignment



Top view

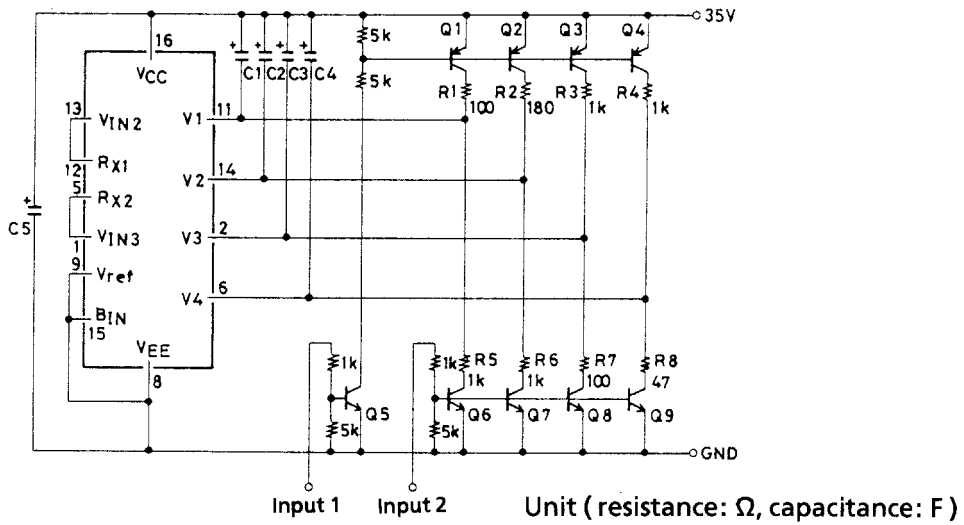
Block Diagram



Note : Use the IC so that $V_{RX1} \geq V_{RX2} \geq V_{RX3} \geq V_{RX4}$ must be obeyed.

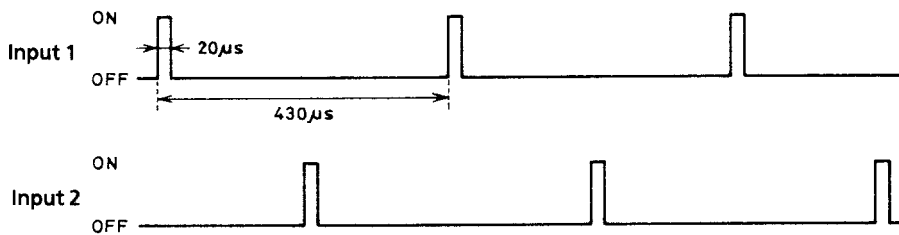
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Maximum Output Current Load Test Conditions



$V_{CC}-V_{EE}=35V$ $R_X=8R$ $C1$ to $C4=10\mu F$ $C5=33\mu F$ R ; 1W or more
 $Q1$ to 4 ; 2SA984 E or F rank
 $Q5$ to 9 ; 2SC2274 E or F rank

Output load resistances R1 to R8 are set in order that current of 25 to 30mA max. (V3, V4 source side : about 60mA) are supplied to both source and sink sides when an on-level input is applied to the inputs 1 or 2.



V_{REF} Control Block

How to calculate the Q1 drive current.

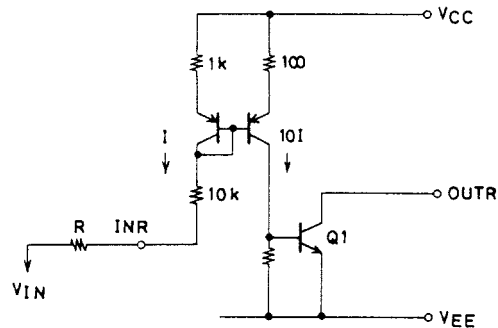
$$I = \frac{V_{CC} - V_{BE} - V_{IN}}{11k + R}$$

$$(V_{BE} \approx 0.7V)$$

Drive current

$$I_O \approx 10I = \frac{V_{CC} - 0.7 - V_{IN}}{11k + R} \times 10$$

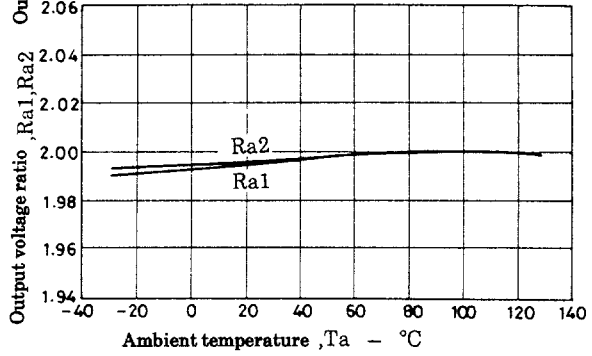
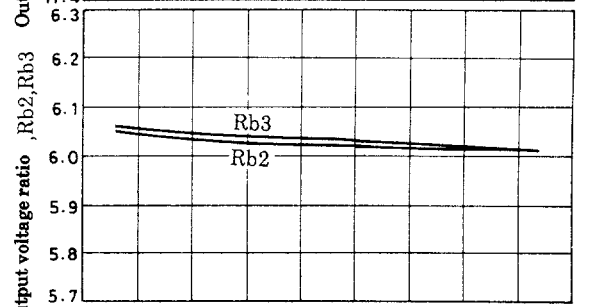
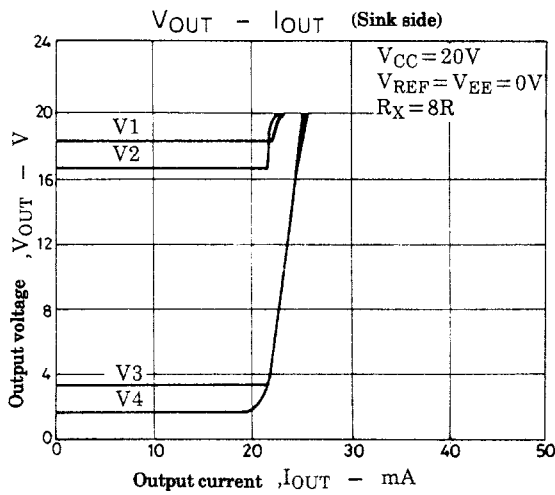
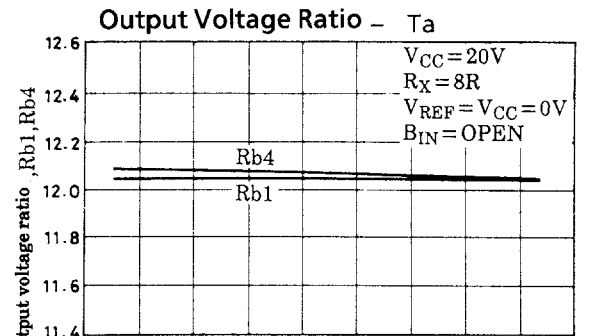
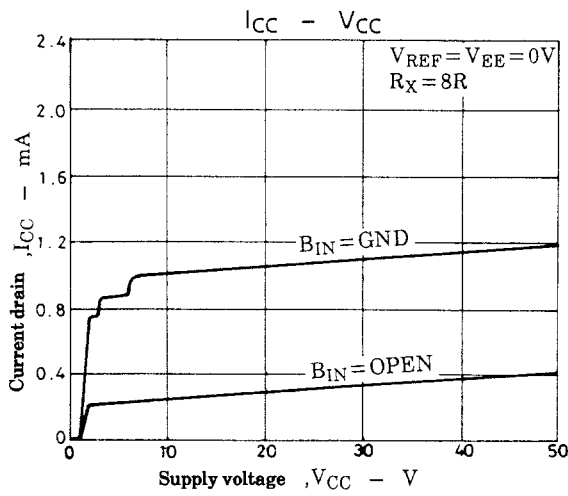
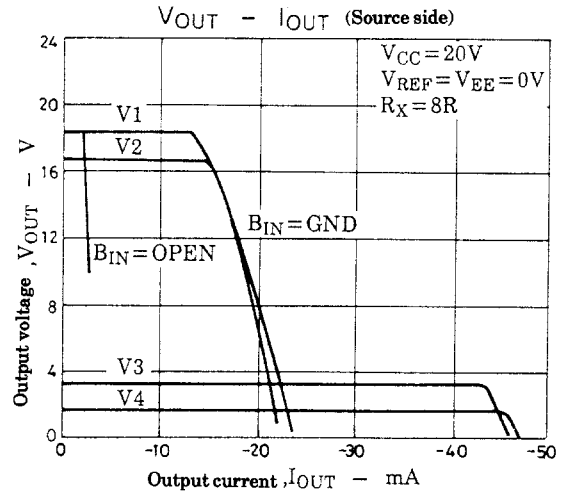
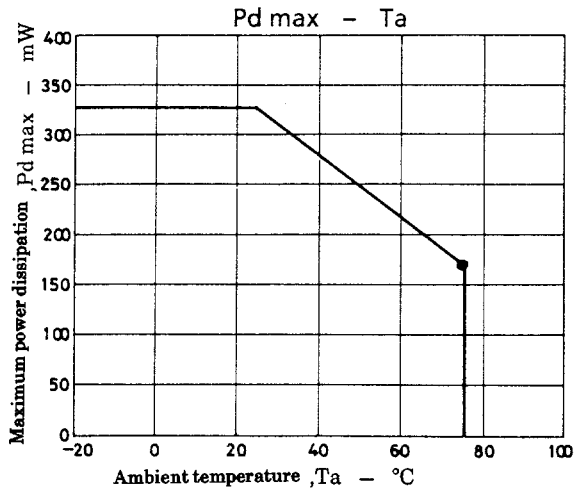
Q1 h_{FE} is assumed to be 50.



Unit (resistance: Ω)

* Set $V_{CC}=INR$ when INR and OUTR are not used.

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