

SANYO

No.4145

LA5318M**Variable Divided Voltage Generator
for LCD Use****Overview**

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

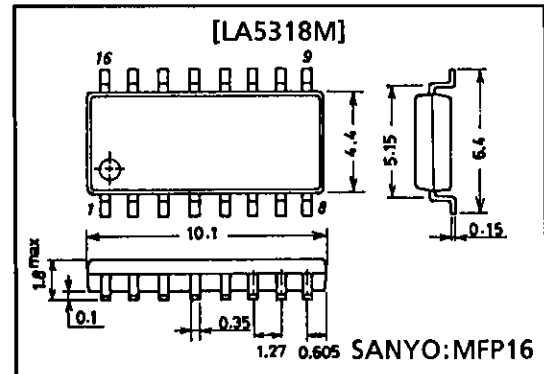
Features

- 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 (0.35 mA typ)
- V1, V2 output current source side variable pin
- Output on/off function V_{REF} control pins
- Miniflat package

Package Dimensions

unit : mm

3035A-MFP16

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

				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 $T_a = 25^\circ\text{C}$

				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.

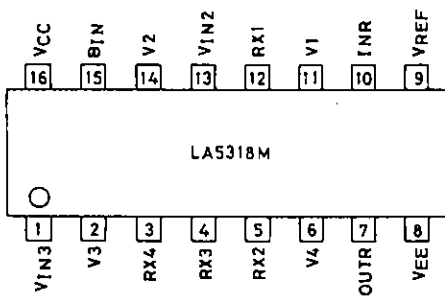
LA5318M

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

				min	typ	max	Unit
Current drain	I_{CC}, I_{EE}	$V_{CC} - V_{EE} = 20\text{V}, R_X = 8R,$ $INR = V_{CC}$		0.35	0.5	0.5	mA
Output voltage ratio	1	Ra1	V_2/V_1	1.96	2.00	2.04	-
	2	Ra2	$(V_{REF} - V_3) / (V_{REF} - V_4)$	1.96	2.00	2.04	-
	3	Rb1	V_{REF} / V_1	11.64	12.00	12.36	-
	4	Rb2	V_{REF} / V_2	5.82	6.00	6.18	-
	5	Rb3	$V_{REF} / (V_{REF} - V_3)$	5.82	6.00	6.18	-
	6	Rb4	$V_{REF} / (V_{REF} - V_4)$	11.64	12.00	12.36	-
Internal resistance ratio	1	R_{X1}	$R_{X1} - R_{X2}^*$		8		-
	2	R_{X2}	$R_{X2} - R_{X3}^*$		12		-
	3	R_{X3}	$R_{X3} - R_{X4}^*$		14		-
	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	ΔV_1	$+0.1\text{mA} < I_{OUT1} < +5\text{mA}$			± 20	mV
	2	ΔV_2	$+0.1\text{mA} < I_{OUT2} < +5\text{mA}$			± 20	mV
	3	ΔV_3	$+0.1\text{mA} < I_{OUT3} < +5\text{mA}$			± 20	mV
	4	ΔV_4	$+0.1\text{mA} < I_{OUT4} < +5\text{mA}$			± 20	mV
	-1A	$-\Delta V_{1A}$	$-0.5\text{mA} < I_{OUT1} < -0.1\text{mA}$			± 20	mV
	-2A	$-\Delta V_{2A}$	$-0.5\text{mA} < I_{OUT2} < -0.1\text{mA}$			± 20	mV
	-3	$-\Delta V_3$	$-10\text{mA} < I_{OUT3} < -0.1\text{mA}$			± 20	mV
	-4	$-\Delta V_4$	$-10\text{mA} < I_{OUT4} < -0.1\text{mA}$			± 20	mV
	-1B	$-\Delta V_{1B}$	$-5\text{mA} < I_{OUT1} < -0.1\text{mA}, B_{IN} = \text{GND}$			± 20	mV
	-2B	$-\Delta V_{2B}$	$-5\text{mA} < I_{OUT2} < -0.1\text{mA}, B_{IN} = \text{GND}$			± 20	mV
OUTR saturation voltage	V_{OUTR}	$I_{OUT} = 20\text{mA}, V_{CC} - INR = 2.7\text{V}$ (Source I_{OUT} is negative(-) and sink I_{OUT} is positive(+).)			0.5		V

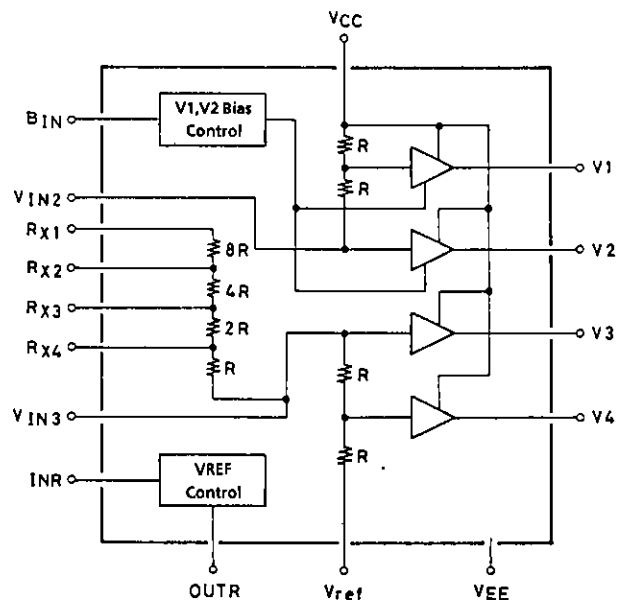
Note*: Referenced to R between R_{X4} and V_{IN3}

Pin Assignment



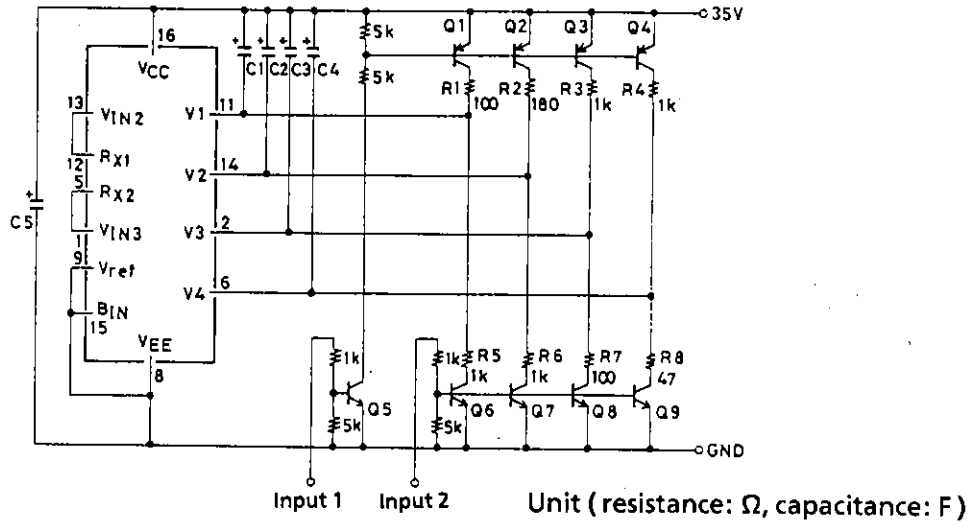
Top view

Block Diagram



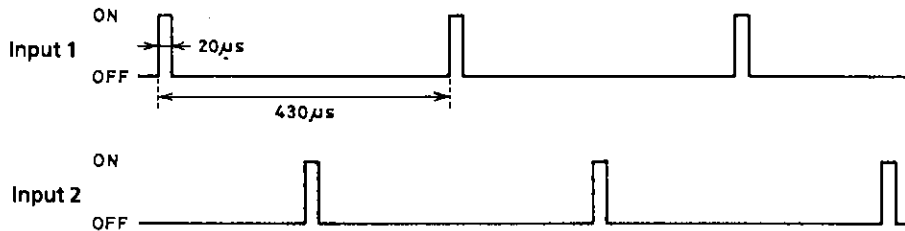
Note: Use the IC so that $V_{RX1} \geq V_{RX2} \geq V_{RX3} \geq V_{RX4}$ must be obeyed.

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 30 mA max. ($V3, V4$ source side: about 60 mA) 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

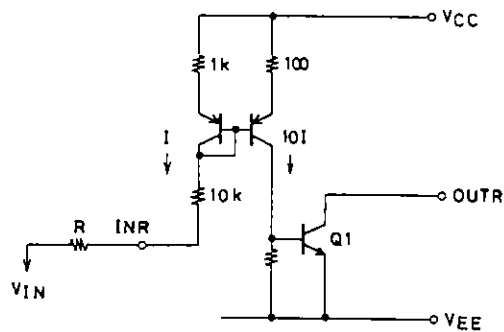
$$I = \frac{V_{CC} - V_{BE} - V_{IN}}{11k + R}$$

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

Drive current

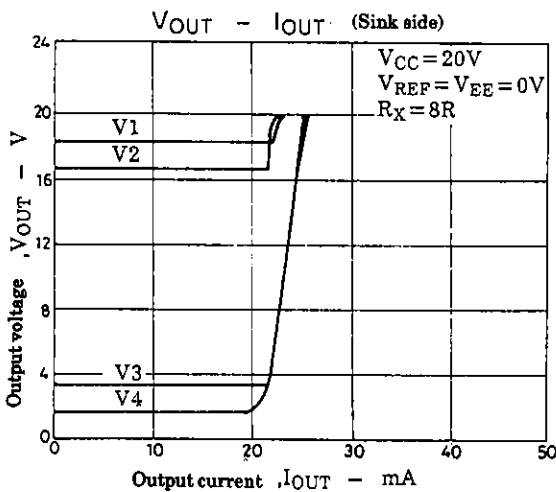
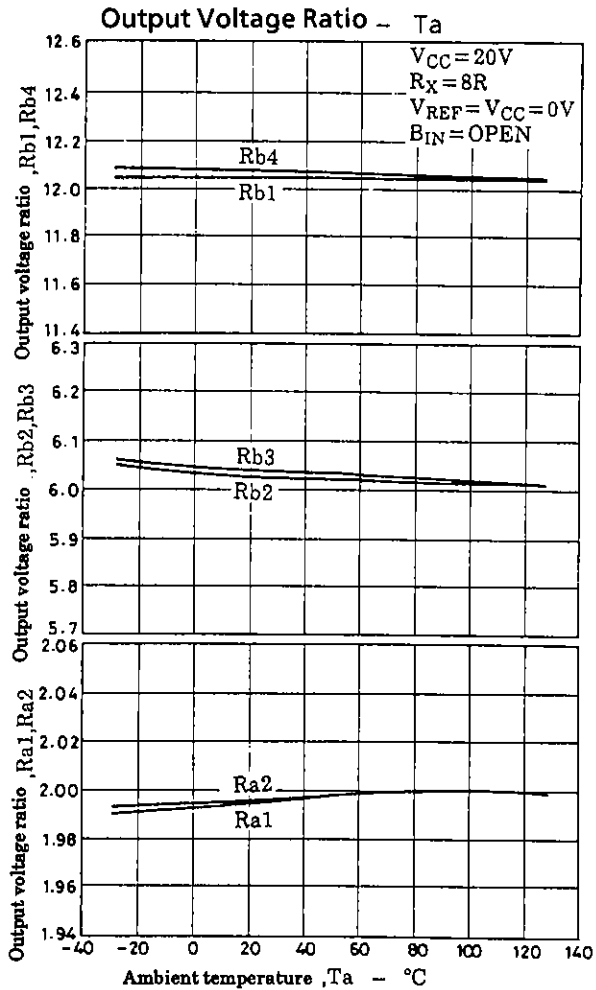
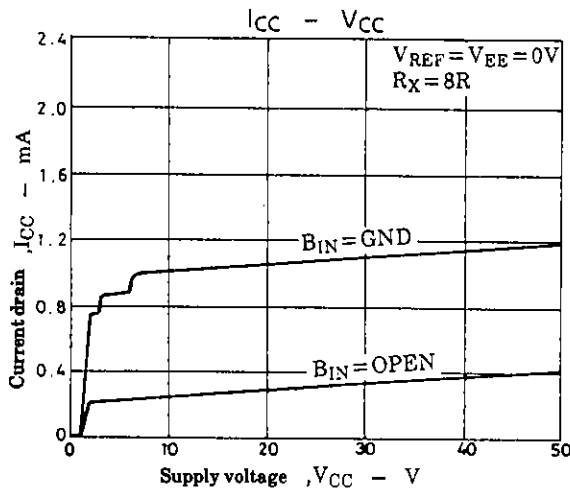
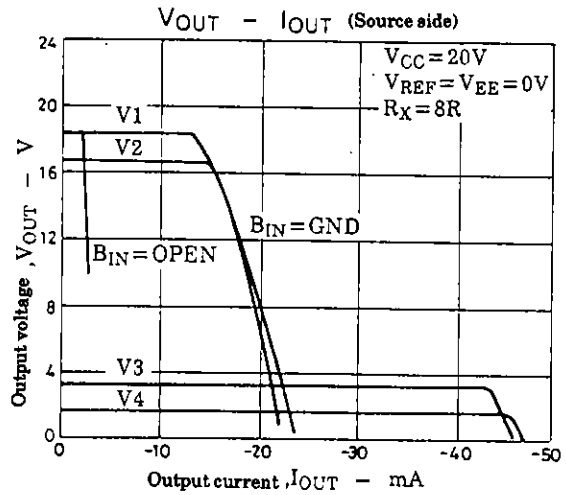
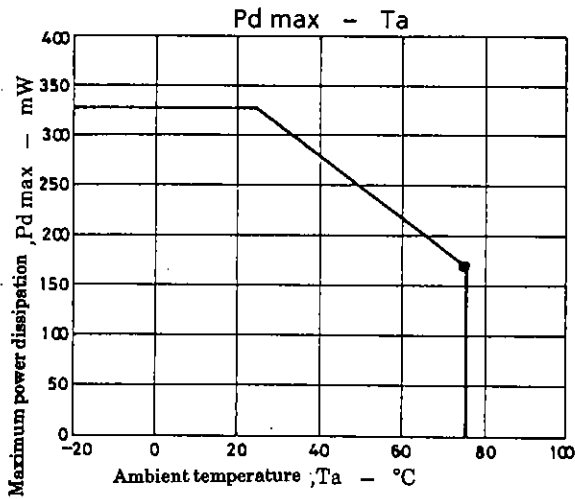
$$I_O \cong 10I = \frac{V_{CC} - 0.7 - V_{IN}}{11k + R} \times 10$$

$Q1$ 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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