

**SANYO**

No.3807B

**LA7456M****8-mm VCR stereo matrix IC****Overview**

The LA7456M provides all matrix functions required by 8-mm VCR stereo application circuits. It has on-chip monoral/stereo and bilingual automatic detectors.

**Features**

- All stereo matrix switching functions
- Monoral detector circuit
- Bilingual detector circuit
- On-chip pulse generator circuit for bilingual pilot signal insertion
- Low current dissipation

**Functions**

- Stereo matrix switching functions
- Monoral detect function
- Bilingual detect function
- Pulse generator circuit
- Logic control function

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

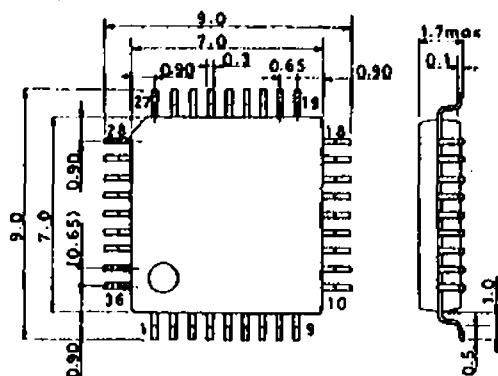
Parameter	Symbol	Value	Unit
Maximum Supply Voltage	$V_{CC \text{ max}}$	7.0	V
Allowable Power Dissipation	$P_d \text{ max}$	160	mW
Operating Temperature	$T_{opr}$	-20 to +75	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to +125	$^\circ\text{C}$

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

Parameter	Symbol	Value	Unit
Recommended Supply Voltage	$V_{CC}$	4.75	V
Operating Voltage Range	$V_{CC \text{ op}}$	4.5 to 5.5	V

**Package Dimensions 3162B**

(unit : mm)



SANYO : QFP36

LA7456M

Operating Characteristics at Ta = 25°C, VCC = 4.75V

				Measurement point	min	typ	max	unit	Measurement program No
Current Dissipation REC	IccR			Icc	4.8	6.1	7.4	mA	1
Current Dissipation PB	IccP			Icc	6.0	7.6	9.2	mA	2
Reference Voltage	VREF			TP11	2.300	2.375	2.450	V	3
<b>REC matrix ON mode (Lch)</b>									
Voltage Gain 1	GRML1	400Hz, -15dBs		TP9	-0.2	0	+0.2	dB	4
Total Harmonic Distortion 1	THDRML1	400Hz, -5dBs		TP9			0.1	%	5
Voltage Gain 2	GRML2	400Hz, -15dBs		TP8	-0.4	0	+0.4	dB	6
Total Harmonic Distortion 2	THDRML2	400Hz, -5dBs		TP8			0.1	%	7
Voltage Gain 3	GRML3	400Hz, -15dBs		TP7	-0.1	0	+0.1	dB	8
Total Harmonic Distortion 3	THDRML3	400Hz, -5dBs		TP7			0.1	%	9
Cross Talk	CTRML	400Hz, -15dBs		TP1			-60	dB	10
Separation	SPRML	400Hz, -15dBs, TP8 [L/R antiphase input					-40	dB	11
<b>REC matrix OFF mode (Lch)</b>									
Voltage Gain 1	GRL1	400Hz, -15dBs		TP9,TP1	-0.5	0	+0.5	dB	12
Total Harmonic Distortion 1	THDRL1	400Hz, -5dBs		TP9,TP1			0.1	%	13
Voltage Gain 2	GRL2	400Hz, -15dBs		TP8	-0.2	0	+0.2	dB	14
Total Harmonic Distortion 2	THDRL2	400Hz, -5dBs		TP8			0.1	%	15
Cross Talk	CTRL	400Hz, -15dBs		TP1			-60	dB	16
<b>PB matrix ON mode (Lch)</b>									
Voltage Gain 1	GPML1	400Hz, -15dBs		TP7	-0.5	0	+0.5	dB	17
Total Harmonic Distortion 1	THDPML1	400Hz, -5dBs		TP7			0.1	%	18
Voltage Gain 2	GPML2	400Hz, -15dBs		TP9	-0.1	0	+0.1	dB	19
Total Harmonic Distortion 2	THDPML2	400Hz, -5dBs		TP9			0.1	%	20
Cross Talk	CTPML	400Hz, -15dBs		TP3			-60	dB	21
Separation	SPPML	400Hz, -15dBs, TP7 [L/R antiphase input					-40	dB	22
<b>PB matrix OFF mode (Lch)</b>									
Voltage Gain	GPL	400Hz, -15dBs		TP7,TP3	-0.4	0	+0.4	dB	23
Total Harmonic Distortion	THDPL	400Hz, -5dBs		TP7,TP3			0.1	%	24
Cross Talk	CTPL	400Hz, -15dBs		TP3			-60	dB	25
<b>REC matrix ON mode (Rch)</b>									
Voltage Gain	GRMR	400Hz, -15dBs		TP2	-0.5	0	+0.5	dB	26
Total Harmonic Distortion	THDRMR	400Hz, -5dBs		TP2			0.3	%	27
Cross Talk	CTRMR	400Hz, -15dBs		TP9			-60	dB	28
Separation	SPRMR	400Hz, -15dBs, TP2 [L/R inphase input					-40	dB	29
<b>REC matrix OFF mode (Rch)</b>									
Voltage Gain 1	GRR1	400Hz, -15dBs		TP9,TP1	-0.5	0	+0.5	dB	30
Total Harmonic Distortion 1	THDRR1	400Hz, -5dBs		TP9,TP1			0.1	%	31
Voltage Gain 2	GRR2	400Hz, -15dBs		TP2	-0.3	0	+0.3	dB	32
Total Harmonic Distortion 2	THDRR2	400Hz, -5dBs		TP2			0.1	%	33
Cross Talk	CTRR	400Hz, -15dBs		TP9			-60	dB	34
<b>PB matrix ON mode (Rch)</b>									
Voltage Gain	GPMR	400Hz, -15dBs		TP3	-0.5	0	+0.5	dB	35
Total Harmonic Distortion	THDPMR	400Hz, -5dBs		TP3			0.4	%	36
Cross Talk	CTPMR	400Hz, -15dBs		TP9			-60	dB	37
Separation	SPPMR	400Hz, -15dBs, TP3 [L/R inphase input					-40	dB	38
<b>PB matrix OFF mode (Rch)</b>									
Voltage Gain	GPR	400Hz, -15dBs		TP3,TP7	-0.5	0	+0.5	dB	39
Total Harmonic Distortion	THDPR	400Hz, -5dBs		TP3,TP7			0.1	%	40
Cross Talk	CTPR	400Hz, -15dBs		TP7			-60	dB	41

Continued on next page.

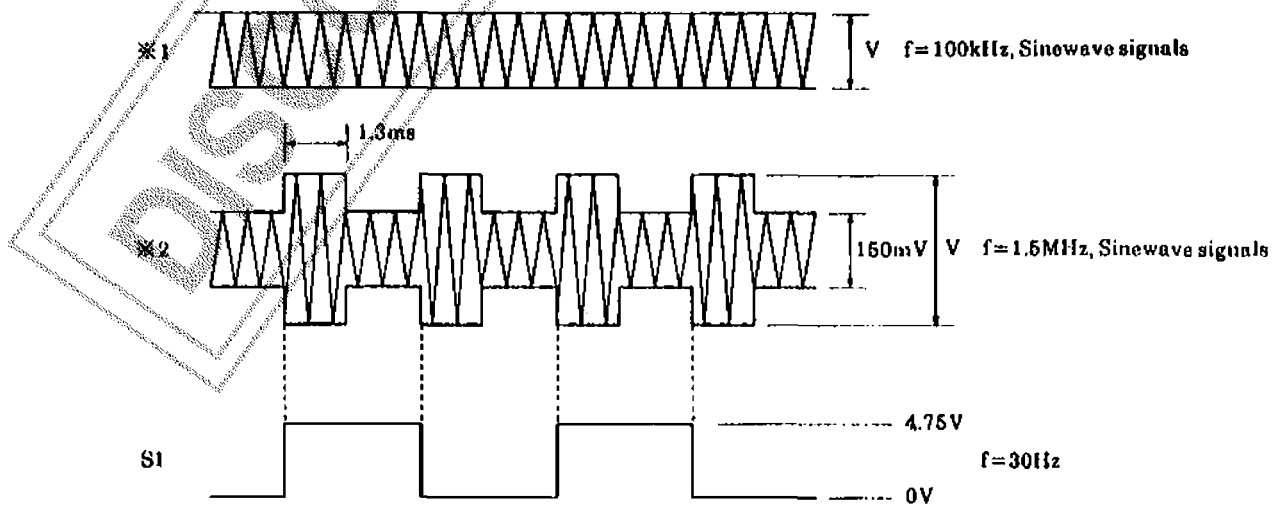
LA7456M

Continued from preceding page.

Operating Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 4.75\text{V}$

				Measurement point	min	typ	max	unit	Measurement program No
<b>Adjust Level</b>									
REC Level ADJ Range	$V_{ADJR}$	400Hz, -15dBs, TP2	1.8	3.0	$V_{CC}$	V			42
		Control with the IN 1 pin.							
PB Level ADJ Range	$V_{ADJP}$	400Hz, -15dBs, TP2	1.8	3.0	$V_{CC}$	V			43
		Control with the IN 2 pin.							
<b>MONO DET</b>									
Detect Level	$V_{MON}$	*1	TP4				1.5	Vp-p	44
Output Level [ L ]	$V_{MONL}$	*1, V=0dBs	TP4				1.0	V	45
Output Level [ H ]	$V_{MONH}$	*1, V=-15dBs	TP4	3.5				V	46
<b>BILINGUAL DET</b>									
Detect Level	$V_R$	*2	TP5	3.0	7.0			dB	47
Output Level [ L ]	$V_{RL}$	*2, V=150mV	TP5				1.0	V	48
Output Level [ H ]	$V_{RH}$	*2, V=300mV	TP5	3.5				V	49
Gate Pulse Width	$T_P$		TP6	1.2	1.3		1.4	ms	50
Gate Pulse	$V_{PI}$		TP6				1.0	V	51
Output Level [ L ]									
Gate Pulse	$V_{PH}$		TP6	3.5				V	52
Output Level [ H ]									
<b>CONTROL LOGIC THRESHOLD</b>									
PB/REC [ L ]	$V_{P/RL}$	400Hz, -15dBs	TP9				1.0	V	53
PB/REC [ H ]	$V_{P/RH}$	400Hz, -15dBs	TP9	3.5				V	54
Matrix ON/OFF [ L ]	$V_{MATL}$	400Hz, -15dBs	TP9				1.0	V	55
Matrix ON/OFF [ H ]	$V_{MATH}$	400Hz, -15dBs	TP9	4.2				V	56
Select 1 [ L ]	$V_{SIL1}$	400Hz, -15dBs	TP7				1.0	V	57
Select 1 [ H ]	$V_{SIH1}$	400Hz, -15dBs	TP7	3.5				V	58
Select 2 [ L ]	$V_{SIL2}$	400Hz, -15dBs	TP3				1.0	V	59
Select 2 [ H ]	$V_{SIH2}$	400Hz, -15dBs	TP3	3.5				V	60

Input Signals



Switch mode table

Mode		Switches	PB /REC	Matrix ON/OFF	SELECT 1	SELECT 2
REC	Monoral		L	L	L	H
	Stereo		L	H	-	-
	Bilingual	MAIN/SUB	L	L	L	L
		MAIN/MAIN	L	L	L	H
SUB/SUB		L	L	H	L	
PB (AUTO)	Monoral		H	OPEN	L	H
	Stereo		H	OPEN	L	L
	Bilingual	MAIN/SUB	H	OPEN	L	L
		MAIN/MAIN	H	OPEN	L	H
		SUB/SUB	H	OPEN	H	L
PB (MANUAL)	Monoral		H	L	L	H
	Stereo		H	H	L	L
	Bilingual	MAIN/SUB	H	L	L	L
		MAIN/MAIN	H	L	L	H
		SUB/SUB	H	L	H	L

	PB/REC	Matrix ON/OFF	SELECT1	SELECT2
H	PB	ON	Rch output	Lch output
L	REC	OFF	Lch output	Rch output

Measurement program table

No.	Switch numbers				Input pins	Remarks
	SW1	SW2	SW3	SW4		
1	a	a	b	b		
2	a	a	b	a		
3	a	a	b	a		
4	b	b	a	b	IN5	Lch/Rch common
5	b	b	a	b	IN5	Lch/Rch common
6	b	b	a	b	IN6	
7	b	b	a	b	IN5	
8	b	b	a	b	IN4	REC matrix ON/OFF mode plus Lch/Rch common
9	b	b	a	b	IN4	REC matrix ON/OFF mode plus Lch/Rch common
10	b	b	a	b	IN5	
11	b	b	a	b	IN5, 6	IN5 and IN6 : antiphase input
12	b	a	b	b	IN5	
13	b	a	b	b	IN5	
14	b	b	b	b	IN5	
15	b	b	b	b	IN5	
16	b	b	b	b	IN5	
17	b	b	a	a	IN4	
18	b	b	a	a	IN4	
19	b	b	a	a	IN5	PB matrix ON/OFF mode plus Lch/Rch common
20	b	b	a	a	IN5	PB matrix ON/OFF mode plus Lch/Rch common

Continued on next page.

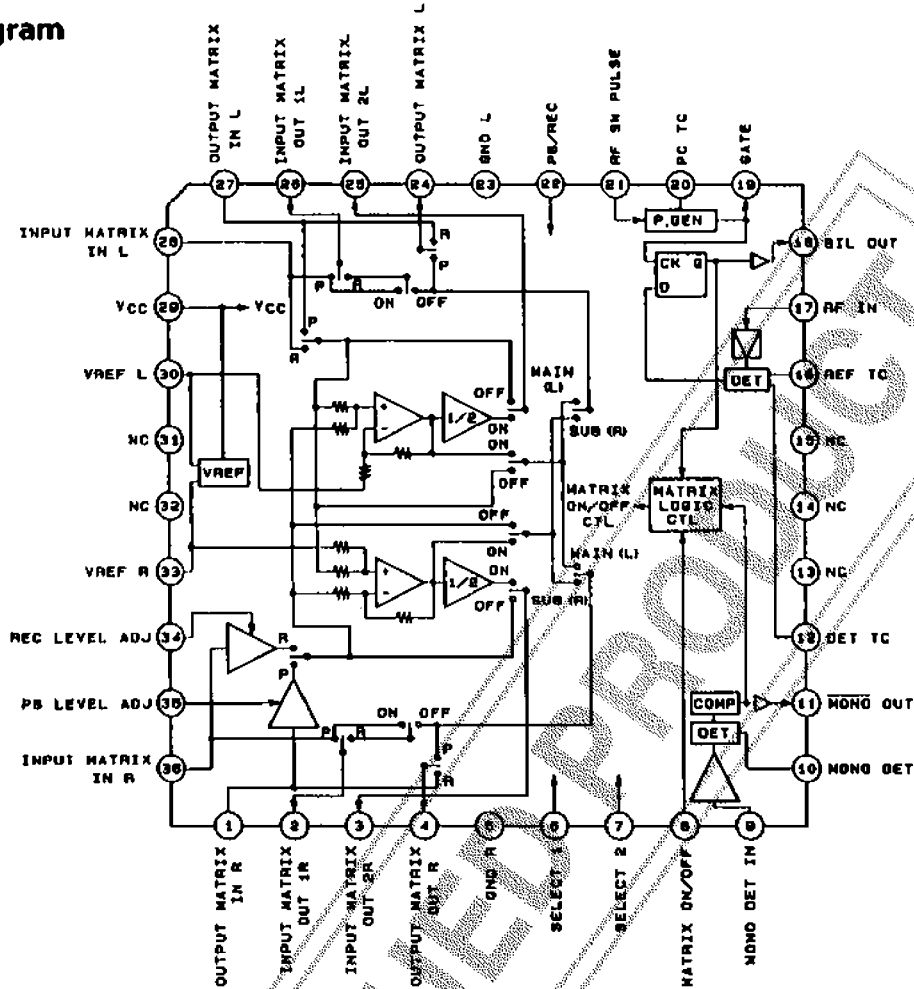
## LA7456M

Continued from preceding page.

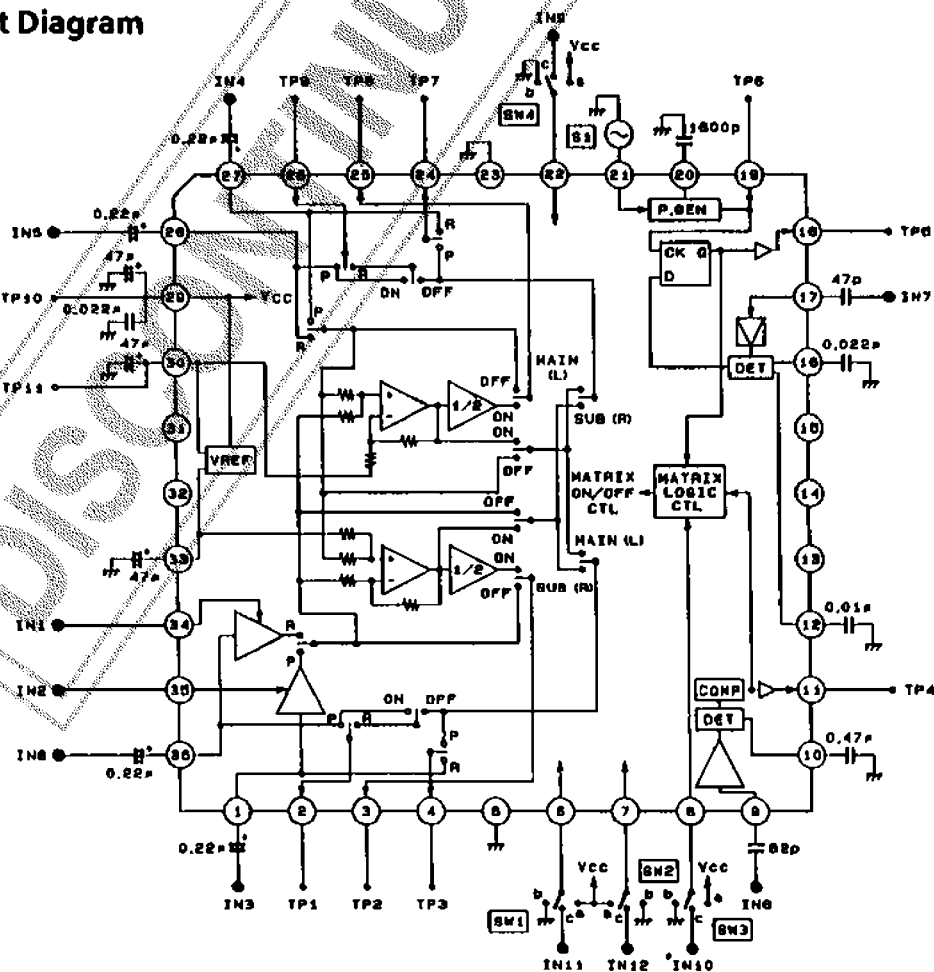
No.	Switch numbers				Input pins	Remarks
	SW1	SW2	SW3	SW4		
21	b	b	a	a	IN5	
22	b	b	a	a	IN3, 4	IN3 and IN4 : antiphase input
23	b	a	b	a	IN4	
24	b	a	b	a	IN4	
25	b	b	b	a	IN4	
26	b	b	a	b	IN6	
27	b	b	a	b	IN6	
28	b	b	a	b	IN6	
29	b	b	a	b	IN5, 6	IN5 and IN6 : inphase input
30	a	b	b	b	IN6	
31	a	b	b	b	IN6	
32	b	b	b	b	IN6	
33	b	b	b	b	IN6	
34	b	b	b	b	IN6	
35	b	b	a	a	IN3	
36	b	b	a	a	IN3	
37	b	b	a	a	IN6	
38	b	b	a	a	IN3, 4	IN3 and IN4 : inphase input
39	a	b	b	a	IN3	
40	a	b	b	a	IN3	
41	b	b	b	a	IN3	
42	b	b	b	b	IN6	DC voltage should be applied to the IN1 pin to allow the TP2 output to fluctuate in the $\pm 3$ dB variable range.
43	b	b	b	a	IN3	DC voltage should be applied to the IN2 pin to allow the TP2 output to fluctuate in the $\pm 3$ dB variable range.
44	b	b	b	a	IN8	Measure the IN8 input level that enables TP4 switching from [ II ] to [ I, ] .
45	b	b	b	a	IN8	
46	b	b	b	a	IN8	
47	b	b	b	a	IN7	Increase the IN7 pin voltage level from 0 until the TP5 output will reach the [ II ] level (150mV).
48	b	b	b	a	IN7	
49	b	b	b	a	IN7	
50	b	b	b	b		Measure the pulse width of the TP6 output signal.
51	b	b	b	b		Measure the TP6 [ L ] level output.
52	b	b	b	b		Measure the TP6 [ H ] level output.
53	a	b	b	c	IN5, 9	Increase the IN9 input voltage from 0 until the IN5 input will be output to the TP9.
54	a	b	b	c	IN5, 9	
55	a	b	c	b	IN5, 10	Increase the IN10 input voltage from 0 until the IN5 input will be output to the TP9.
56	a	b	c	b	IN5, 10	
57	c	b	b	a	IN4, 11	Increase the IN11 input voltage from 0 until the IN4 input will be output to the TP7.
58	c	b	b	a	IN4, 11	
59	b	c	b	a	IN3, 12	Increase the IN12 input voltage from 0 until the IN4 input will be output to the TP3.
60	b	c	b	a	IN3, 12	

LA7456M

Block Diagram



Test Circuit Diagram



LA7456M

Pin I/O circuit type

Unit (resistance : Ω)

Pin No.	Pin Name	Standard DC Voltage	Standard AC Voltage	I/O circuit type	Remarks	
1	OUTPUT MATRIX IN R	2.375V			Reference input - 15dBs	
2	INPUT MATRIX OUT 1R	2.375V	- 15dBs		At reference input mode	
3	INPUT MATRIX OUT 2R	2.375V	0V		At reference input mode	REC STEREO
			- 15dBs		Non-REC STEREO mode	
4	OUTPUT MATRIX OUT R	2.375V	0V		At reference input mode	PB STEREO
			- 15dBs			Non-PB STEREO mode
5	GND					
6	SELECT 1				[ H ] = Rch output [ L ] = Lch output	
7	SELECT 2				[ H ] = Lch output [ L ] = Rch output	
8	MATRIX ON/OFF	2.5V			[ H ] = MATRIX ON OPEN = PB auto detection [ L ] = MATRIX OFF	
9	MONO DET IN	3V			Reference input mode <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">MONO</div> </div> <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="margin-right: 10px;">STEREO</div> </div>	

Continued on next page.

LA7456M

Continued from preceding page.

Unit (resistance :  $\Omega$ )

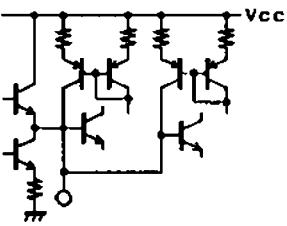

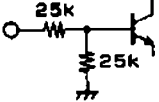

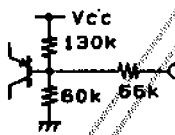
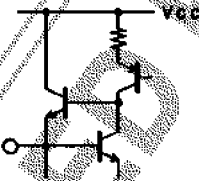
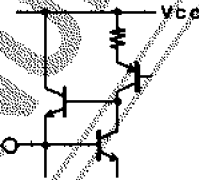
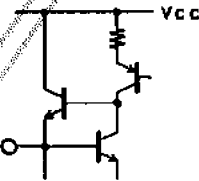
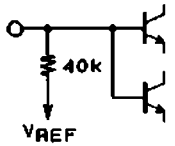
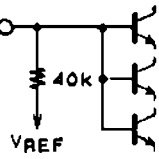
Pin No.	Pin Name	Standard DC Voltage	Standard AC Voltage	I/O circuit type	Remarks
10	MONO DET	2.2V or more			At reference input mode MONO
		1.8V or less			STEREO
11	MONO OUT	1V or less			At reference input mode MONO
		3.5V or more			STEREO
12	DET TC				At reference input mode NORMAL. 
					BILINGUAL. 
13	NC				
14	NC				
15	NC				
16	REF TC				At reference input mode NORMAL. 
					BILINGUAL. 
17	RF IN	2.375V			Reference input mode NORMAL. 
					BILINGUAL. 
18	BIL OUT	1V or less			At reference input mode NORMAL
		3.5V or more			BILINGUAL
19	GATE OUT				

Continued on next page.

LA7456M

Continued from preceding page.

Unit (resistance :  $\Omega$ )

Pin No.	Pin Name	Standard DC Voltage	Standard AC Voltage	I/O circuit type	Remarks	
20	PCTC					
21	RF SW PULSE				Reference input 	
22	PB/REC	1.5V			[ H ] = PB OPEN / [ L ] = REC	
23	GND					
24	OUTPUT MATRIX OUT L	2.375V	-9dB		At reference input mode	PB STEREO
			-15dBs		Non-PB STEREO mode	
25	INPUT MATRIX OUT 2L	2.375V	-15dBs		At reference input mode	
26	INPUT MATRIX OUT 1L	2.375V	-15dBs		At reference input mode	
27	OUTPUT MATRIX IN L	2.375V			At reference input mode -15dBs	
28	INPUT MATRIX IN L	2.375V			At reference input mode -15dBs	
29	VCC					
30	VREFL	2.375V				
31	NC					

Continued on next page.

LA7456M

Continued from preceding page.

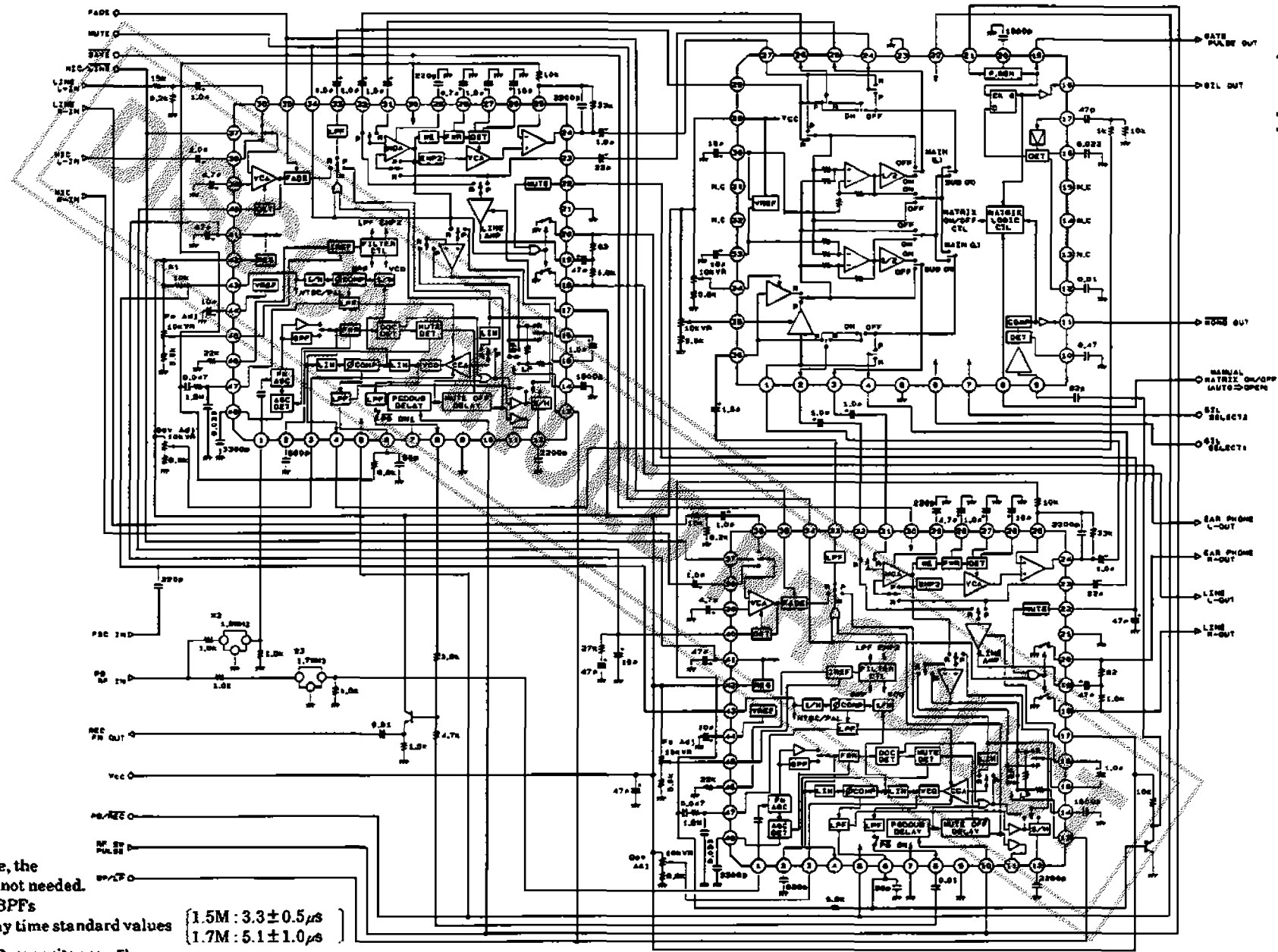
Unit (resistance :  $\Omega$ )

Pin No.	Pin Name	Standard DC Voltage	Standard AC Voltage	I/O circuit type	Remarks
32	NC				
33	V <sub>REFR</sub>	2.375V			
34	REC LEVEL ADJ				Input voltage 1.8V to V <sub>CC</sub> : $\pm 3$ dB variable 1V or less : through
35	PB LEVEL ADJ				Input voltage 1.8V to V <sub>CC</sub> : $\pm 3$ dB variable 1V or less : through
36	INPUT MATRIX IN R	2.375V			Reference input - 15dBs

DISCONTINUED PRODUCT

Example Application Circuit

LA7456M



\*1 : In the PAL mode, the 10kΩ resistor is not needed.

\*2 and \*3 : 3-series BPFs  
 Delay time standard values  $1.5M : 3.3 \pm 0.5 \mu s$   
 $1.7M : 5.1 \pm 1.0 \mu s$

Unit (resistance : Ω, capacitance : F)