



LA9605W

MD Player RF and Matrix Signal-Processing IC

Overview

The LA9605W integrates MiniDisk playback functions, including servo error signal generation, RF signal processing, and wobble signal binarization output on a single chip. The LA9605W, when combined with an LC89640, can implement a complete MD player system.

Features

- Allows the servo error signal level to be set to an arbitrary level using a VCA circuit.
- Few peripheral components required.
- Ultraminiature package

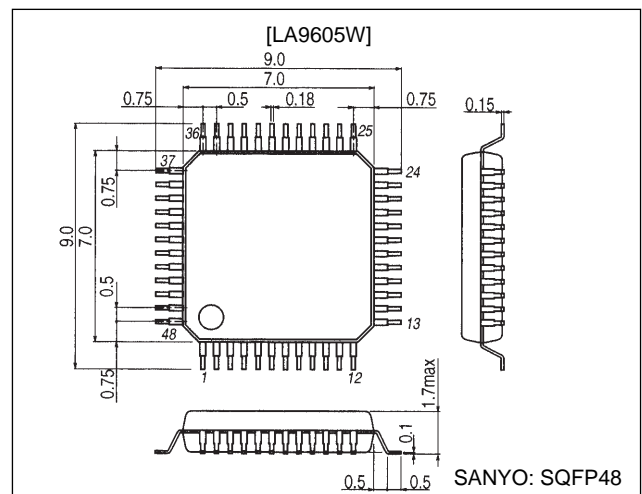
Functions

- Servo signal I-V conversion amplifier
- Pit/groove switching RF amplifier
- RF equalizer amplifier
- Servo signal VCA
- APC circuit
- Focus error amplifier
- Tracking error amplifier
- HFL circuit
- Defect detection circuit
- ADIP amplifier
- Pre-pit circuit (pit/groove discrimination circuit)
- ADIPCR

Package Dimensions

unit: mm

3163A-SQFP48



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Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max		7	V
Allowable power dissipation	Pd max	When mounted on a 114.3 × 76.1 × 1.6-mm single-sided glass-epoxy printed circuit board. Ta ≤ 75 °C	350	mW
Operating temperature	Topr		-25 to +75	°C
Storage temperature	Tstg		-40 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V _{CC}		5	V
Operating supply voltage range	V _{CC} op		2.7 to 5.5	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 5 V

Parameter	Symbol	Conditions	Ratings			Unit		
			min	typ	max			
Current drain	I _{CC}		18	32	46	mA		
[RF AMP GROVE]								
Gain	V _G RFMG1	EQ _O /I : J = V _C	27	30	33	dB		
[RF AMP MO.PIT]								
Offset	V _{OS} RFMP1	RF _O 1 : I = J = V _C	V _C - 245	V _C - 185	V _C - 125	mV		
Gain	V _G RFMP1	EQ _O /I : I = J	15	18	21	dB		
[RF AMP AL]								
Offset	V _{OS} RFAP1	RF _O 1 : I = J = V _C	V _C - 152	V _C - 92	V _C - 32	mV		
Gain	V _G RFAP1	EQ _O /I : I = J = V _C	5.5	8.5	11.5	dB		
[RF AMP]								
Output level	H	V _{ORFH} 1	EQ _O : RF11 = V _C + 1 V		3.5	4.1	V	
	L	V _{ORFL} 1	EQ _O : RF11 = V _C - 1 V			0.9	1.5	V
[ABCD GR]								
Gain	V _G ABG1	ABCD/A (10 kHz) : A = B = C = D, SGC = 0.78 V	17.5	20.5	23.5	dB		
Output level	H	V _O ABGH2	ABCD : A = B = C = D = V _C - 400 mV, SGC = 0.78 V		4.5	4.9	V	
	L	V _O ABGL2	ABCD : A = B = C = D = V _C + 400 mV, SGC = 0.78 V			0.1	0.5	V
[ABCD PIT]								
Gain	V _G ABP1	ABCD/A (10 kHz) : A = B = C = D, SGC = 0.3 V	10.6	13.6	16.6	dB		
Frequency characteristics	V _Δ GABP1	ABCD/A (10 kHz) - ABCD/A (35 kHz), SGC = 0.3 V	3.9	6.9	9.9	dB		
[FOCS]								
Output level	H	V _O FOH1	FE : B = D = V _C + 825 mV, A = C = V _C , SGC = 0.3 V		4.5	4.9	V	
	L	V _O FOL1	FE : B = D = V _C - 825 mV, A = C = V _C , SGC = 0.3 V			0.1	0.5	V
Gain	V _G FO1	FE/A (5 kHz) : A = -B = C = -D, SGC = 0.3 V	13.9	16.9	19.9	dB		
Frequency characteristics	V _Δ GFO1	FE/A (5 kHz) - FE/A (26 kHz) : A = -B = C = -D, SGC = 0.3 V	0.4	3.4	6.4	dB		
[TE GR]								
Output level	H	V _O TEGH1	TE : F = V _C + 200 mV, E = V _C , SGC = 0.78 V		4.5	4.9	V	
	L	V _O TEGL1	TE : F = V _C - 200 mV, E = V _C , SGC = 0.78 V			0.1	0.5	V
Gain	V _G TEG1	TE/E (5 kHz) : E = -F, SGC = 0.78 V	31.4	34.4	37.4	dB		
Frequency characteristics	V _Δ GTEG1	TE/E (5 kHz) - TE/E (38 kHz) : E = -F, SGC = 0.78 V	1.8	4.8	8.8	dB		
[TE PIT]								
Gain	V _G TEP1	TE/E (5 kHz) : E = -F, SGC = 0.3 V	25.2	28.2	31.2	dB		
Frequency characteristics	V _Δ GTEP1	TE/E (5 kHz) - TE/E (38 kHz) : E = -F, SGC = 0.3 V	1.8	4.8	8.8	dB		
[ADIP]								
Output level	H	V _O ADH1	CAD : A = D = V _C + 0.4 V, B = C = V _C		1.4	1.7	2.0	V
	L	V _O ADL1	CAD : A = D = V _C - 0.4 V, B = C = V _C		3.1	3.3	3.6	V

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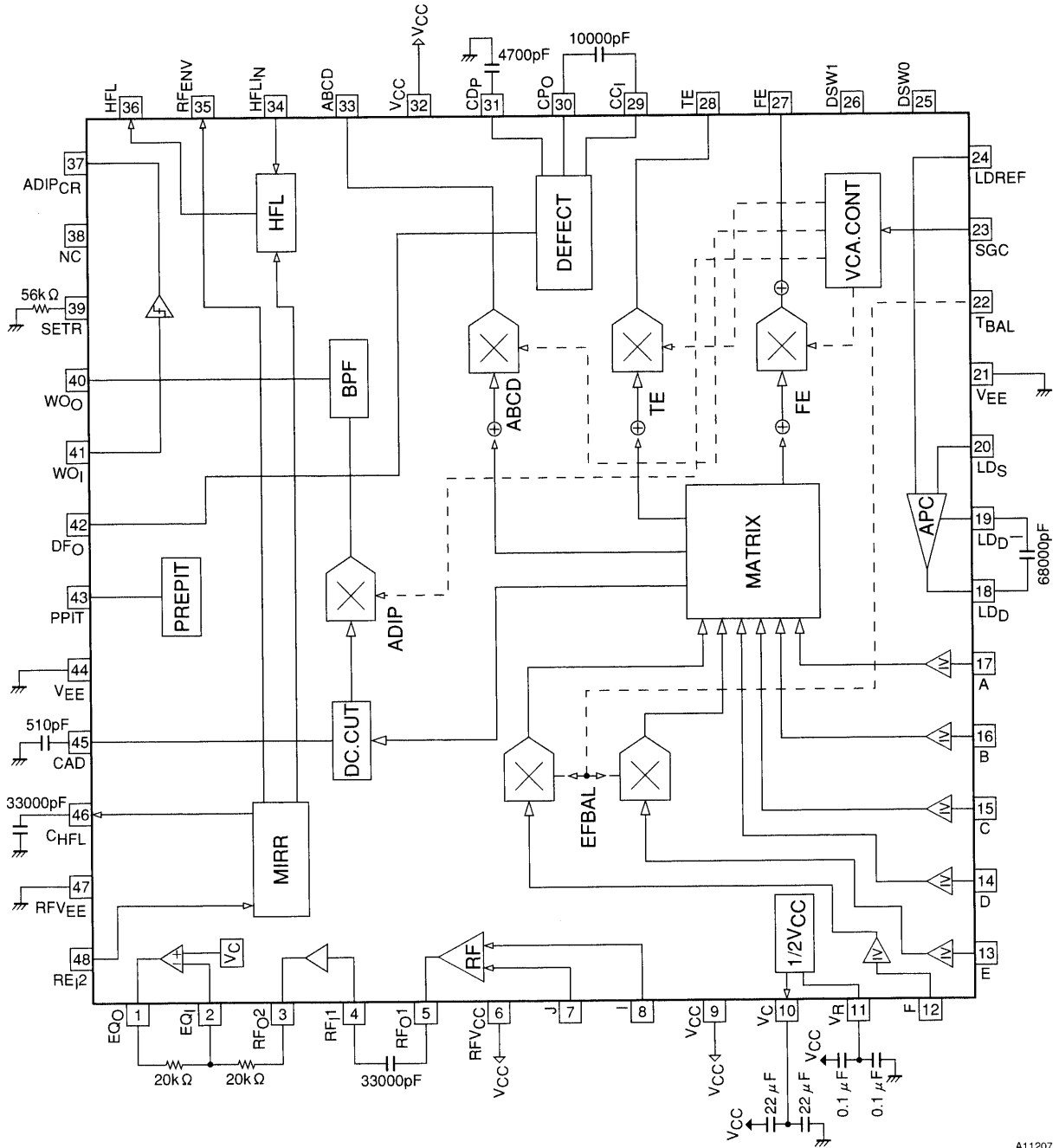
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Parameter	Symbol	Conditions	Ratings			Unit	
			min	typ	max		
[APC LDON]							
Output level	H	V_{OLH1}	$LD_D : LD_{REF} = 0\text{ V}, LD_S = 1\text{ V}$	3.7	4.2	4.7	V
	L	V_{OLL1}	$LD_D : LD_{REF} = 1\text{ V}, LD_S = 0\text{ V}$	0.3	0.8	1.3	V
[APC LDOFF]							
Off voltage		V_{OLOF1}	$LD_D : LD_{REF} = 1\text{ V}, LD_S = 0\text{ V}$	3.7	4.2	4.7	V
[HFL]							
Output level	H	V_{OHFLH1}	$HFL : HFL_{IN} = V_C - 0.1\text{ V}$	4.6	4.8		V
	L	V_{OHFL1}	$HFL : HFL_{IN} = V_C$		0.2	0.4	V
[DEFCT]							
Output level	H	V_{ODEFH1}	$DFO : CC_1 = 1.5\text{ V}$	4.6	4.9		V
	L	V_{ODEFL1}	$DFO : CC_1 = \text{OPEN}, A = B = C = D = V_C - 200\text{ mV}$		0.1	0.4	V
[VC reference voltage]							
		V_{OSC}	$V_C :$	2.35	2.5	2.65	V
		V_{OCLSO}	$V_C : V_C - 1\text{ mA}$	2.35	2.5	2.65	V
		V_{OCLSI}	$V_C : V_C + 1\text{ mA}$	2.35	2.5	2.65	V
[PREPIT MO]							
High-level output voltage		V_{OPPH1}	$PPIT : I = J = 200\text{ kHz} (95\text{ mVp-p} + V_C + 0.125\text{ V})$	4.6	4.8		V
Low-level output voltage		V_{OPPL1}	$PPIT : I = J = 30\text{ kHz} (95\text{ mVp-p} + V_C + 0.125\text{ V})$		0.2	0.4	V
High/low level switching time		$DTPP1$	$PPIT : I = J = 200\text{ kHz to }30\text{ kHz} (95\text{ mVp-p} + V_C + 0.125\text{ V})$	70	150	230	μs
[BPF]							
Gain		V_{GBF1}	$WO_{O/A} (22.05\text{ kHz}) : A = -B = -C = D, SGC = 0.3\text{ V}$	23.8	26.8	29.8	dB
Filter characteristics		V_{GBF2}	$V_{GBF1}/V_{GBF2} : (16\text{ kHz}), SGC = 0.3\text{ V}$	0.8	4.8	9.8	dB
		V_{GBF3}	$V_{GBF1}/V_{GBF3} : (30\text{ kHz}), SGC = 0.3\text{ V}$	0.4	4.4	9.4	dB
[I – V]							
IV voltage A		ΔV_{RA}	$A : V (-1\ \mu\text{A}) - V (-2\ \mu\text{A})$	70	100	130	mV
IV voltage B		ΔV_{RB}	$B : V (-1\ \mu\text{A}) - V (-2\ \mu\text{A})$	70	100	130	mV
IV voltage C		ΔV_{RC}	$C : V (-1\ \mu\text{A}) - V (-2\ \mu\text{A})$	70	100	130	mV
IV voltage D		ΔV_{RD}	$D : V (-1\ \mu\text{A}) - V (-2\ \mu\text{A})$	70	100	130	mV
IV voltage E		ΔV_{RE}	$E : V (-1\ \mu\text{A}) - V (-2\ \mu\text{A})$	70	100	130	mV
IV voltage F		ΔV_{RF}	$F : V (-1\ \mu\text{A}) - V (-2\ \mu\text{A})$	70	100	130	mV
$T_a = 25^\circ\text{C}, V_{CC} = 2.7\text{ V}$							
[FOCS]							
Offset		V_{OSFO1}	$FE : A = B = C = D = \text{OPEN}, SGC = 0.78\text{ V}$	-300	0	+300	mV
[COMP]							
Offset		V_{OSCO1}	$WO_1 : WO_1 = \text{OPEN}$	-15	0	+15	mV

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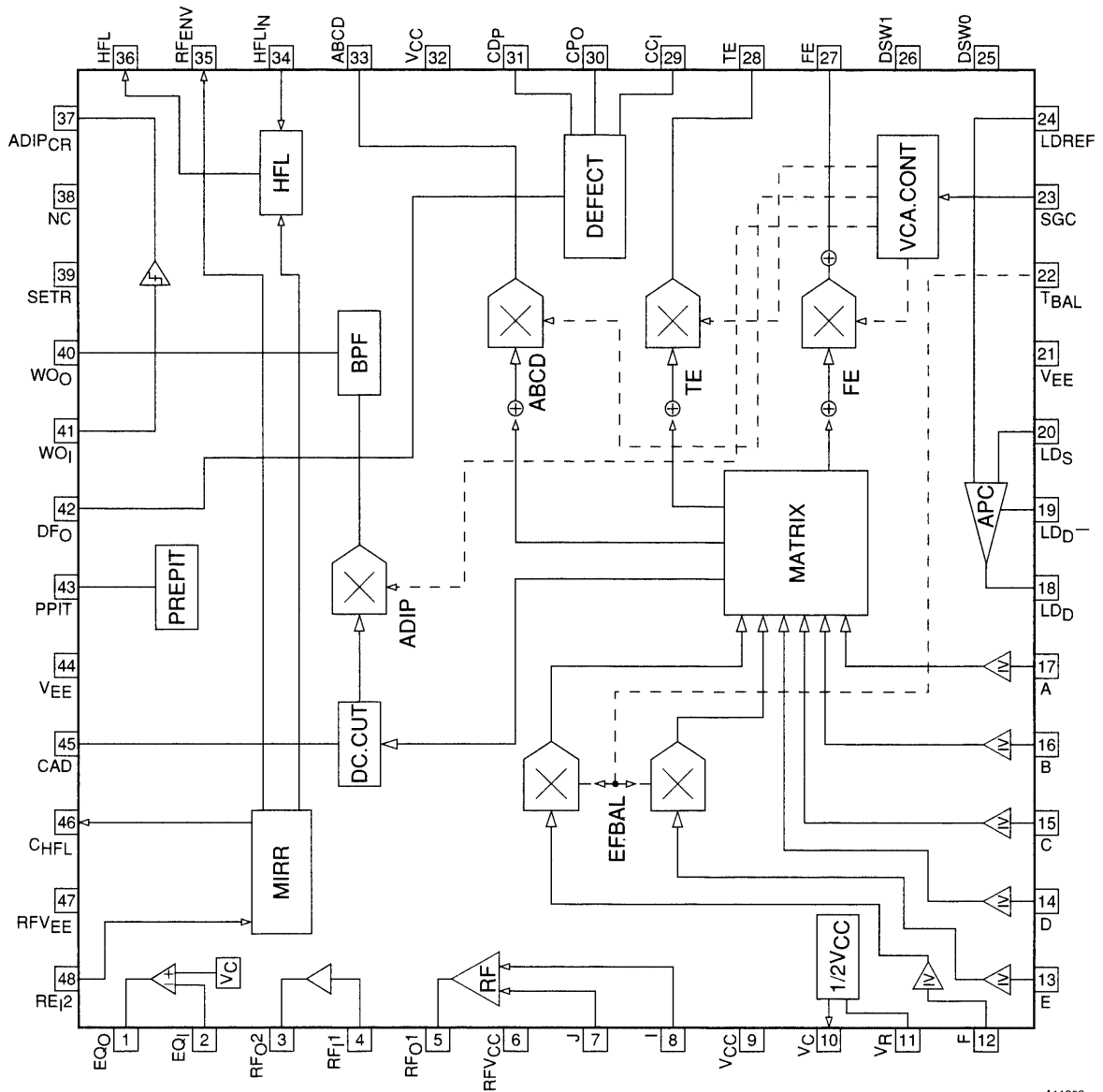
Test Circuit



A11207

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Block Diagram and Pin Assignment



A11208

Pin Functions

Pin No.	Pin	I/O	Function	Equivalent circuit
1	EQ _O	O	RF equalizer output	
2	EQ _I	I	RF equalizer input	
3	RF _{O2}	O	RF output	
4	RF _{I1}	I	RF AC coupled input	
5	RF _{O1}	O	RF AC coupled output	
6	RFV _{CC}	P	RF block power supply	
7	J	I	I/V converted RF signal input	
8	I		I/V converted RF signal input	

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Pin No.	Pin	I/O	Function	Equivalent circuit
9	V _{CC}	P	Matrix block power supply	
10	V _C	O	1/2 V _{CC} output (reference voltage)	<p style="text-align: right;">A11214</p>
11	V _R	I	1/2 V _{CC} input	
12	F	I	Side beam signal inputs	<p style="text-align: right;">A11215</p>
14	D		Main beam signal inputs	
15	C			
16	B			
17	A			
18	LD _D	O	APC output	<p style="text-align: right;">A11216</p>
19	LD _{D-}	I	APC phase compensation capacitor connection	
20	LD _S	I	I/V converted laser optical intensity input	<p style="text-align: right;">A11217</p>
24	LD _{REF}		Laser power setting input	
21	V _{EE}	P	Matrix block ground	
22	T _{BAL}	I	Tracking error signal balance adjustment voltage input	<p style="text-align: right;">A11218</p>
23	SGC		V _{CA} gain control voltage input (ground reference)	<p style="text-align: right;">A11219</p>

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Pin No.	Pin	I/O	Function	Equivalent circuit
25	DSW0	I	Disc mode switching signal input, laser off input High: Low reflectance disc Low: High reflectance disc If both DSW0 and DSW1 are low, the laser is off.	
26	DSW1		Disc mode switching signal input, laser off input High: Tracking is over a pit Low: Tracking is over a groove If both DSW0 and DSW1 are low, the laser is off.	
27	FE	O	Focus error signal output	
28	TE		Tracking error signal output	
29	CC _I	I	Defect peak hold signal AC coupled input	
30	CP _O	O	Defect peak hold signal output	
31	C _{DP}	O	Defect peak hold capacitor connection	
32	V _{CC}	P	ADIP block power supply	

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Pin No.	Pin	I/O	Function	Equivalent circuit
33	ABCD	O	Main beam optical intensity signal output	<p>A11225</p>
34	HFL _{IN}	I	HFL detection optical intensity signal AC coupled input used in groove mode	<p>A11226</p>
35	RF _{ENV}	O	RF envelope signal output	<p>A11227</p>
46	C _{HFL}		Mirror peak hold capacitor connection	
36	HFL	O	HFL signal (tracking on/off signal) output	<p>A11228</p>

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Pin No.	Pin	I/O	Function	Equivalent circuit
37	ADIP _{CR}	O	ADIP carrier output	<p style="text-align: right;">A11229</p>
38	NC	—	No connection	
39	SETR	I	Bandpass filter fo setting	<p style="text-align: right;">A11230</p>
40	WO _O	O	Wobble signal output	<p style="text-align: right;">A11231</p>
41	WO _I	I	Wobble signal AC coupled input	<p style="text-align: right;">A11232</p>
42	DF _O	O	Defect detection signal output	<p style="text-align: right;">A11233</p>
43	PPIT	O	Pit/groove	<p style="text-align: right;">A11234</p>
44	V _{EE}	P	ADIP block ground	

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Pin No.	Pin	I/O	Function	Equivalent circuit
45	CAD	—	Wobble DC cut capacitor connection	<p style="text-align: right;">A11235</p>
47	RFV _{EE}	P	RF block ground	
48	RF _{I2}	I	RF signal input	<p style="text-align: right;">A11236</p>

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