

**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

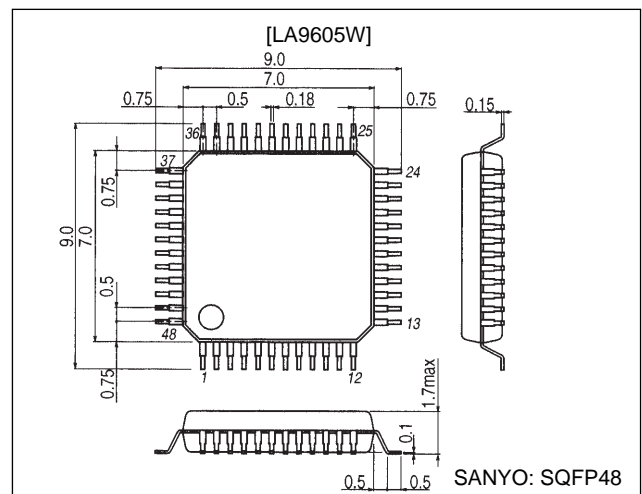
- Allows the servo error signal level to be set to an arbitrary level using a VCA circuit.
- Few peripheral components required.
- Ultraminiature package

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\text{ max}}$		7	V
Allowable power dissipation	$P_{d\text{ max}}$	When mounted on a $114.3 \times 76.1 \times 1.6$ -mm single-sided glass-epoxy printed circuit board. $T_a \leq 75^\circ\text{C}$	350	mW
Operating temperature	T_{opr}		-25 to $+75$	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to $+150$	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		5	V
Operating supply voltage range	$V_{CC\text{ op}}$		2.7 to 5.5	V

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{ V}$

Parameter		Symbol	Conditions	Ratings			Unit
				min	typ	max	
Current drain		I _{CC}		18	32	46	mA
[RF AMP GROVE]							
Gain		V _{G_{RFMG}1}	EQ _O /I : J = V _C	27	30	33	dB
[RF AMP MO.PIT]							
Offset		V _{OS_{RFMP}1}	RF _O 1 : I = J = V _C	V _C – 245	V _C – 185	V _C – 125	mV
Gain		V _{G_{RFMP}1}	EQ _O /I : I = J	15	18	21	dB
[RF AMP AL]							
Offset		V _{OS_{RFAP}1}	RF _O 1 : I = J = V _C	V _C – 152	V _C – 92	V _C – 32	mV
Gain		V _{G_{RFAP}1}	EQ _O /I : I = J = V _C	5.5	8.5	11.5	dB
[RF AMP]							
Output level	H	V _{ORFH} 1	EQ _O : RFI1 = V _C + 1 V	3.5	4.1		V
	L	V _{ORFL} 1	EQ _O : RFI1 = V _C – 1 V		0.9	1.5	V
[ABCD GR]							
Gain		V _{G_{ABG}1}	ABCD/A (10 kHz) : A = B = C = D, SGC = 0.78 V	17.5	20.5	23.5	dB
Output level	H	V _{OABGH} 2	ABCD : A = B = C = D = V _C – 400 mV, SGC = 0.78 V	4.5	4.9		V
	L	V _{OABGL} 2	ABCD : A = B = C = D = V _C + 400 mV, SGC = 0.78 V		0.1	0.5	V
[ABCD PIT]							
Gain		V _{G_{ABP}1}	ABCD/A (10 kHz) : A = B = C = D, SGC = 0.3 V	10.6	13.6	16.6	dB
Frequency characteristics		V _{ΔG_{ABP}1}	ABCD/A (10 kHz) – ABCD/A (35 kHz), SGC = 0.3 V	3.9	6.9	9.9	dB
[FOCS]							
Output level	H	V _{OFOH} 1	FE : B = D = V _C + 825 mV, A = C = V _C , SGC = 0.3 V	4.5	4.9		V
	L	V _{OFOH} 1	FE : B = D = V _C – 825 mV, A = C = V _C , SGC = 0.3 V		0.1	0.5	V
Gain		V _{GFO} 1	FE/A (5 kHz) : A = –B = C = –D, SGC = 0.3 V	13.9	16.9	19.9	dB
Frequency characteristics		V _{ΔGFO} 1	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 _{OTEGH} 1	TE : F = V _C + 200 mV, E = V _C , SGC = 0.78 V	4.5	4.9		V
	L	V _{OTEGH} 1	TE : F = V _C – 200 mV, E = V _C , SGC = 0.78 V		0.1	0.5	V
Gain		V _{GTEG} 1	TE/E (5 kHz) : E = –F, SGC = 0.78 V	31.4	34.4	37.4	dB
Frequency characteristics		V _{ΔGTEG} 1	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 _{GTEP} 1	TE/E (5 kHz) : E = –F, SGC = 0.3 V	25.2	28.2	31.2	dB
Frequency characteristics		V _{ΔGTEP} 1	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 _{OADH} 1	CAD : A = D = V _C + 0.4 V, B = C = V _C	1.4	1.7	2.0	V
	L	V _{OADL} 1	CAD : A = D = V _C – 0.4 V, B = C = V _C	3.1	3.3	3.6	V

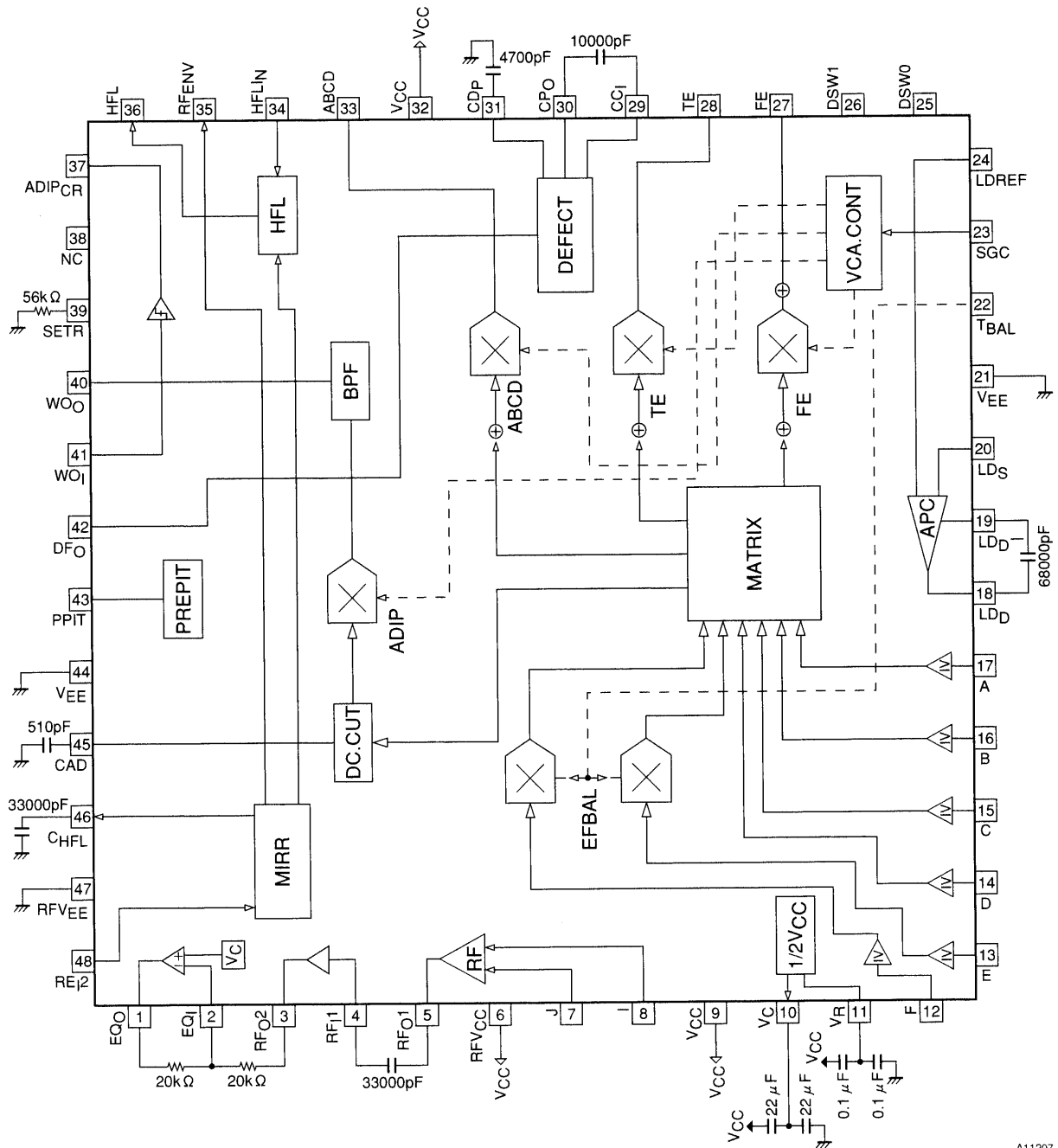
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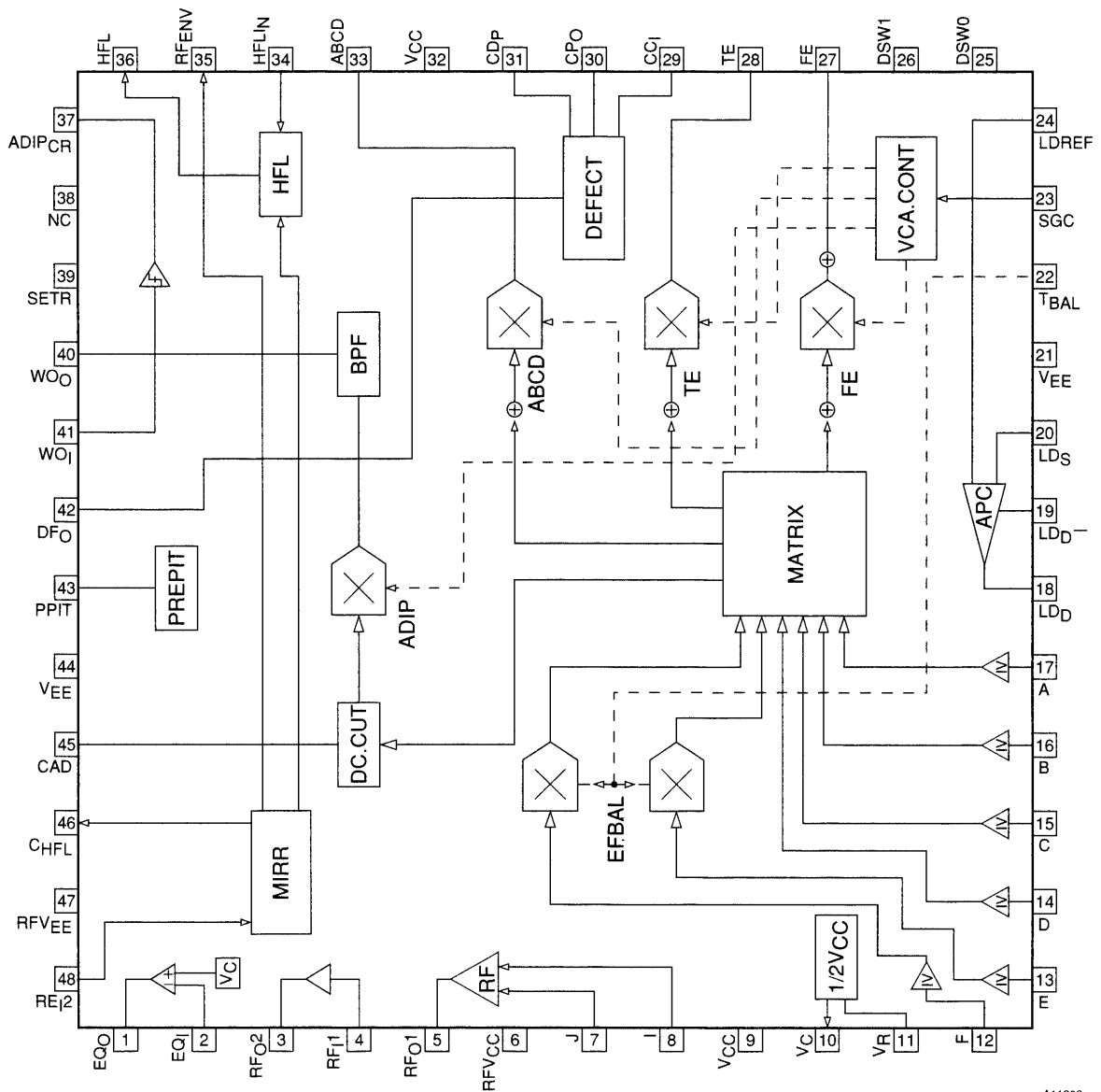
Parameter		Symbol	Conditions	Ratings			Unit
				min	typ	max	
[APC LDON]							
Output level	H	V _{OLH1}	LD _D : LD _{REF} = 0 V, LD _S = 1 V	3.7	4.2	4.7	V
	L	V _{OLL1}	LD _D : LD _{REF} = 1 V, LD _S = 0 V	0.3	0.8	1.3	V
[APC LDOFF]							
Off voltage		V _{OLOF1}	LD _D : LD _{REF} = 1 V, LD _S = 0 V	3.7	4.2	4.7	V
[HFL]							
Output level	H	V _{OHFLH1}	HFL : HFL _{IN} = V _C – 0.1 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 V	4.6	4.9		V
	L	V _{ODEFL1}	DFO : CC ₁ = OPEN, A = B = C = D = V _C – 200 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 mA	2.35	2.5	2.65	V
		V _{OCLSI}	V _C : V _C + 1 mA	2.35	2.5	2.65	V
[PREPIT MO]							
High-level output voltage		V _{OPPH1}	PPIT : I = J = 200 kHz (95 mVp-p + V _C + 0.125 V)	4.6	4.8		V
Low-level output voltage		V _{OPPL1}	PPIT : I = J = 30 kHz (95 mVp-p + V _C + 0.125 V)		0.2	0.4	V
High/low level switching time		DTPP1	PPIT : I = J = 200 kHz to 30 kHz (95 mVp-p + V _C + 0.125 V)	70	150	230	μs
[BPF]							
Gain		V _{GBF1}	WO _{O/A} (22.05 kHz) : A = –B = –C = D, SGC = 0.3 V	23.8	26.8	29.8	dB
Filter characteristics		V _{GBF2}	V _{GBF1} /V _{GBF2} : (16 kHz), SGC = 0.3 V	0.8	4.8	9.8	dB
		V _{GBF3}	V _{GBF1} /V _{GBF3} : (30 kHz), SGC = 0.3 V	0.4	4.4	9.4	dB
[I – V]							
IV voltage A		ΔV _{RA}	A : V (–1 μA) – V (–2 μA)	70	100	130	mV
IV voltage B		ΔV _{RB}	B : V (–1 μA) – V (–2 μA)	70	100	130	mV
IV voltage C		ΔV _{RC}	C : V (–1 μA) – V (–2 μA)	70	100	130	mV
IV voltage D		ΔV _{RD}	D : V (–1 μA) – V (–2 μA)	70	100	130	mV
IV voltage E		ΔV _{RE}	E : V (–1 μA) – V (–2 μA)	70	100	130	mV
IV voltage F		ΔV _{RF}	F : V (–1 μA) – V (–2 μA)	70	100	130	mV
Ta = 25°C, V _{CC} = 2.7 V							
[FOCS]							
Offset		V _{OSFO1}	FE : A = B = C = D = OPEN, SGC = 0.78 V	–300	0	+300	mV
[COMP]							
Offset		V _{OSCO1}	WO ₁ : WO ₁ = OPEN	–15	0	+15	mV

Test Circuit



A11207

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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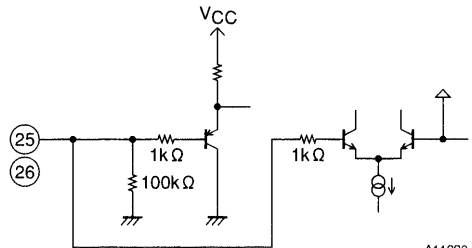
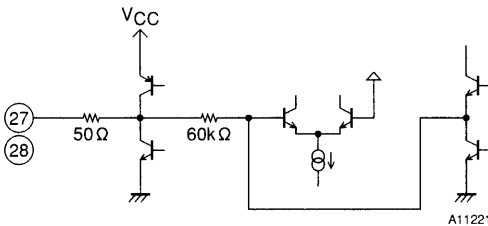
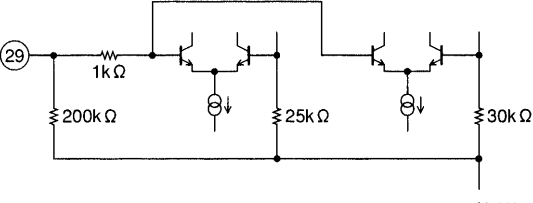
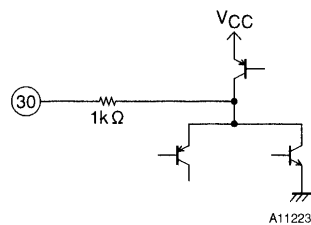
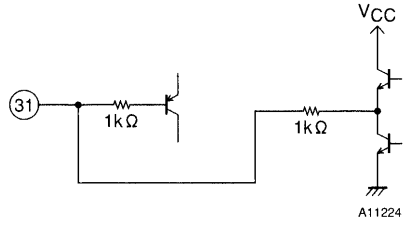
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Pin No.	Pin	I/O	Function	Equivalent circuit
9	V _{CC}	P	Matrix block power supply	
10	V _C	O	1/2 V _{CC} output (reference voltage)	
11	V _R	I	1/2 V _{CC} input	
12	F	I	Side beam signal inputs	
14	D		Main beam signal inputs	
15	C			
16	B			
17	A			
18	LD _D	O	APC output	
19	LD _D -	I	APC phase compensation capacitor connection	
20	LD _S	I	I/V converted laser optical intensity input	
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	
23	SGC		V _{CA} gain control voltage input (ground reference)	

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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	
34	HFL _{IN}	I	HFL detection optical intensity signal AC coupled input used in groove mode	
35	RF _{ENV}	O	RF envelope signal output	
46	C _{HFL}		Mirror peak hold capacitor connection	
36	HFL	O	HFL signal (tracking on/off signal) output	

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Pin No.	Pin	I/O	Function	Equivalent circuit
37	ADIP _{CR}	O	ADIP carrier output	
38	NC	—	No connection	
39	SETR	I	Bandpass filter fo setting	
40	WO _O	O	Wobble signal output	
41	WO _I	I	Wobble signal AC coupled input	
42	DF _O	O	Defect detection signal output	
43	PPIT	O	Pit/groove	
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	
47	RFV _{EE}	P	RF block ground	
48	RF _{I2}	I	RF signal input	

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