MAINTENANCE MANUAL FOR RECEIVER FRONT END MODULE 19D902782G6, G8, G9, G10, G11

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DESCRIPTION

The Receiver Front End (RXFE) Module amplifies and converts the RF signal to the first IF at 21.4 MHz. This is a down conversion process using low side (G9, G10) or high side (G6, G8, G11) injection. The RXFE module is powered by a regulated 12 volts. The RXFE printed wiring board contains the following functional circuits:

- Preselector Filter
- Preamplifier
- Image Rejection Filter
- Injection Amplifier
- Injection Filter
- Double Balanced Mixer
- Fault Detector

All but the Fault Detector circuit in the RXFE module have 50 ohm impedance terminations.

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Table 1 - General Specifications

ITEM	SPECIFICATION
FREQUENCY RANGE	380 - 400 MHz (G8) 403 - 430 MHz (G11) 470 - 492 MHz (G9) 492 - 512 MHz (G10) 403 - 425 MHz (G6)
IF FREQUENCY	21.4 MHz
3 dB BANDWIDTH	>3 MHz
IMPEDANCE	50 ohms at RF, LO, and IF Ports
CONVERSION LOSS	-1.5 ± 1.5dB
NOISE FIGURE (NF)	<7.5 dB
THIRD ORDER INTERCEPT POINT	>20 dBm (G9, G10) >16 dBm (G6, G8, G11)
IMAGE REJECTION	>100dB
INJECTION POWER	-1.5 ± 1.5dB
TEMPERATURE RANGE	-30°C TO +60°C
SUPPLY VOLTAGE	12.0 Vdc
SUPPLY CURRENT	200 mA typical

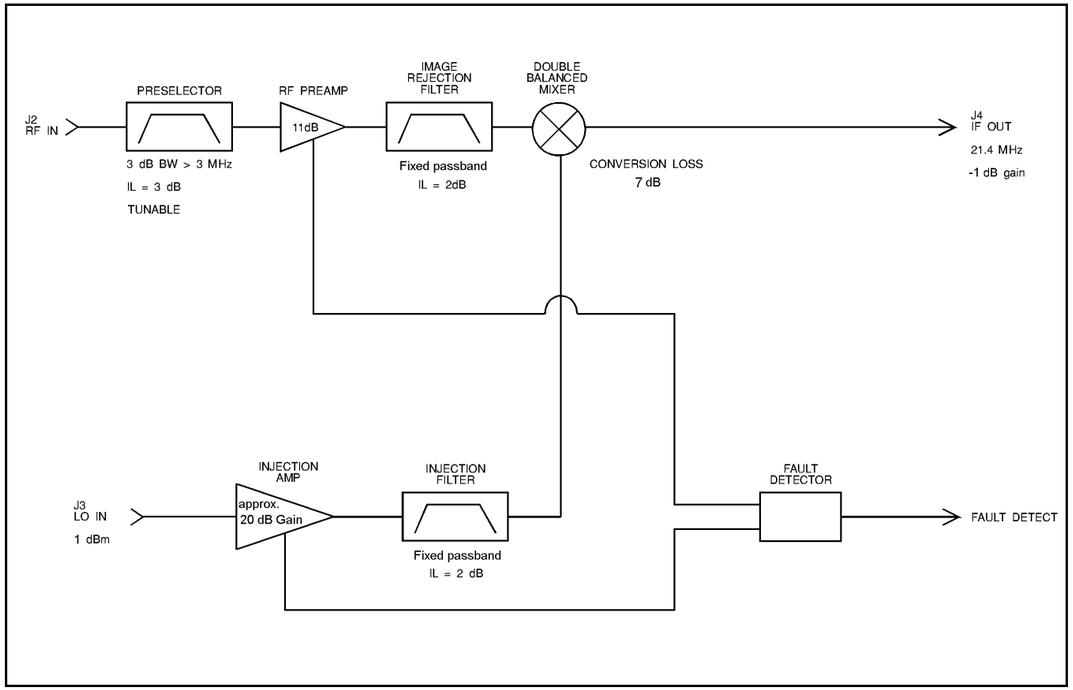

Figure 1 - Block Diagram

CIRCUIT ANALYSIS

PRESELECTOR FILTER

The received RF signal (J2) is routed through the Preselector Filter (L1 through L5). This filter provides front end selectivity and attenuates the potential spurious signals of the first conversion. Typically, the filter has an insertion loss of 3 dB and an operational bandwidth of 2 MHz. The filter is a tunable, five-pole helical bandpass filter.

PREAMPLIFIER

The output from the Preselector is coupled through an impedance matching network consisting of C1, C2 and L6 to the base of Preamplifier Q1. The Preamplifier stage is supplied by the regulated +12 Vdc line (VCC1) and draws about 80 mA. It has a low noise figure and high Third Order Intercept point. Transistor Q2 provides Q1 with a constant current source. The bias on Q1 is monitored by the Fault Detector circuit via R17. Capacitors C20 and C21 prevent any RF from entering the fault circuit. The preamplifier output signal is coupled to the Image Rejection Filter via an impedance matching network consisting of C4, C11, L8, L15, R5 and R6.

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IMAGE REJECTION FILTER

Following the Preamplifier is the Image Rejection Filter. The Image Rejection Filter is a fixed tuned helical bandpass filter. The Filter has an insertion loss of about 2 dB.

INJECTION AMPLIFIER

The local oscillator input (J3) from the Receiver Synthesizer is coupled to monolithic amplifier U2, then to the base of Q8. The Injection Amplifier, consisting of U2, Q8, and associated circuitry, is capable of amplifying the injection signal to approximately 18 to 22 dBm. The amplifier is powered by the regulated +12 Vdc line (VCC1). Transistor Q7 provides Q8 with a constant current source. The bias on U2 and Q8 is monitored by the Fault Detector circuit via R21 and R31, respectively. Capacitors C22, C23 and C26 prevent RF from entering the fault circuit. The Injection Amplifier output signal is coupled to the Injection Filter via an impedance matching network consisting of C8, L13, and resistors R15 and R16.

INJECTION FILTER

Following the Injection Amplifier is the Injection Filter. The injection filter is a fixed, tuned helical bandpass filter. It is used to attenuate harmonics of the Injection Amplifier. The filter has an insertion loss of about 2 dB.

DOUBLE BALANCE MIXER

The Double Balance Mixer (DBM) is a broadband mixer. It converts an RF signal to the 21.4 MHz first conversion IF frequency. The mixer uses low side (G9, G10) or high side (G6, G8, G11) injection driven by a local oscillator signal. The mixer conversion loss is typically about 7 dB. The IF output signal is then routed through a diplexer circuit to the output connector (J4).

FAULT DETECTOR

The Fault Detector circuit monitors the operation of the preamplifier and injection amplifier devices. Operational amplifiers U1.1 and U1.2 compare the bias on the Preamplifier Q1 to preset levels, while U1.3 and U1.4 compare the bias levels on Injection Amplifiers U2 and Q8.

When the bias for Q1, U2, and Q8 is within the preset window limits, the output from the comparators is a logic high level. This high level signal is sent to the Station Controller on the FLAG 0 line.

If the biasing for the amplifiers is not within the proper operating range, the fault detector circuit will pull the FLAG 0 line low.

MAINTENANCE

TEST PROCEDURE

Following is a test procedure of the module to verify proper Conversion Gain :

1. Supply 12 Vdc to pin 15A, B, C. (1C is ground.)
2. Inject the desired RF Frequency into RF IN at a level of -10 dBm.
3. Inject the desired local oscillator frequency into LO IN at a level of 0 dBm [LO frequency = RF frequency - 21.4 MHz (for groups G9, G10), or, LO frequency = RF frequency + 21.4 MHz (for groups G6, G8, G11)].
4. Measure the IF OUT power at 21.4 MHz, the ratio of RF IN to IF OUT should be -1.5 ±1.5 dB.
5. Measure the current drawn by the RXFE module. Typical current drain is 180 to 230 mA.

ALIGNMENT PROCEDURE

Alignment for the Receiver Front End module consists of tuning the five-pole Preselector Filter only. The Image Rejection Filter and LO injection filter are not to be tuned. Normally, the RXFE should only need the fine-tuning procedure. For a major receiver frequency change, the RXFE should be adjusted using the major-retuning procedure.

For Fine-Tuning

1. Supply 12 Vdc to pin 15A, B, C. (1C is ground.)
2. Inject the desired RF Frequency into RF IN (J2) at a level of -10 dBm.
3. Inject the desired local oscillator frequency into LO IN (J3) at a level of 0 dBm [LO frequency = RF frequency - 21.4 MHz (for groups G9, G10), or, LO frequency = RF frequency + 21.4 MHz (for groups G6, G8, G11)].
4. Detect IF signal at 21.4 MHz. Slightly adjust L1 to L5 to get maximum power (don't adjust more than 1/4 turn). If an RF Voltmeter is used, connect a Low Pass Filter (LPF)to the IF OUT (J4) to attenuate high frequency components. The corner of the LPF should be set for 40 MHz.
5. Repeat Test Procedure steps to verify conversion gain.

For Major Retuning

The best way to do a major retuning of the RXFE is with swept frequency tuning. The swept frequency tuning can be done using a Spectrum Analyzer and Tracking Generator. With proper Injection level the frequency response of the Preselector Filter can be seen by viewing the RF to IF port feedthrough on the spectrum analyzer. This feedthrough is typically 35 dB down from the input level at the RF port. Use the following procedure for swept frequency tuning:

1. Supply 12 Vdc to pin 15A, B, C. (1C is ground.)
2. Inject the Tracking generator output at 0 dBm into the RF IN connector, (J2).
3. Inject local oscillator power at 0 dBm into the LO IN connector, (J3) [LO frequency = RF frequency - 21.4 MHz (for groups G9, G10), or, LO frequency = RF frequency + 21.4 MHz (for groups G6, G8, G11)].
4. Preset the height of slugs with respect to the top of five-pole cavity as follows (Table 2):
5. Center the spectrum analyzer at the desired frequency and set the reference at about -30 dBm. Adjust L1 to L5 for best possible response.

Table 2

G6 & G11	HEIGHT (in inches)				
Frequency (MHz)	L1	L2	L3	L4	L5
403	12/64	10/64	12/64	13/64	12/64
408	13/64	13/64	14/64	14/64	13/64
413	14/64	14/64	14/64	15/64	14/64
418	16/64	16/64	15/64	16/64	15/64
423	17/64	17/64	16/64	18/64	16/64

G8	HEIGHT (in inches)				
Frequency (MHz)	L1	L2	L3	L4	L5
380	16/64	16/64	16/64	16/64	16/64
385	17/64	17/64	17/64	17/64	17/64
390	18/64	18/64	18/64	18/64	18/64
395	19/64	19/64	19/64	19/64	19/64
400	20/64	20/64	20/64	20/64	20/64

G9	HEIGHT (in inches)				
Frequency (MHz)	L1	L2	L3	L4	L5
470	12/64	12/64	12/64	12/64	12/64
474	13/64	13/64	13/64	13/64	13/64
478	14/64	14/64	14/64	14/64	14/64
482	15/64	15/64	15/64	15/64	15/64
486	16/64	16/64	16/64	16/64	16/64
490	17/64	17/64	17/64	17/64	17/64
492	18/64	18/64	18/64	18/64	18/64

G10	HEIGHT (in inches)				
Frequency (MHz)	L1	L2	L3	L4	L5
492	12/64	10/64	10/64	10/64	8/64
497	12/64	10/64	12/64	12/64	9/64
502	14/64	12/64	13/64	14/64	10/64
507	15/64	15/64	16/64	16/64	12/64
512	17/64	16/64	17/64	17/64	14/64

TROUBLESHOOTING GUIDE

SYMPTOM	AREAS TO CHECK	READING (TYP.)
LOW CONVERSION GAIN	Check Vcc	12 V
	Preselector Loss	3 dB
	Preamplifier Gain	11 dB
	Image Rej. Filter Loss	2 dB
	1st Mixer Conversion Loss	7 dB
FAULT INDICATOR LOW	Check Vc of Q1	9 TO 10V
	Check Vc of U2	5 TO 6 V
	Check Vc of Q8	9 TO 10 V
IF FREQUENCY OFF	Check L.O. FREQUENCY	L.O. frequency=RF frequency - 21.4 MHz (G9,G10) + 21.4 MHz (G6, G8, G11)
LOW L.O. POWER*	Injection Amplifier Gain	approx 20 dB Gain
	Injection Filter Loss	2 dB

* NOTE: For troubleshooting the gain or loss, the RXFE needs to be under the normal operating condition:

- 12 Vdc supply.
- Inject L.O. power at a level of 0 dBm into LO IN (J3), [LO freq. = RF freq. - 21.4 MHz (G9, G10) or, LO frequency = RF frequency + 21.4 MHz (G6, G8, G11)].
- Inject the desired RF signal at a level of -10 dBm into RF IN (J2).
- Terminate the IF OUT (J4) with a good 50 ohm impedance.
- Use a Spectrum Analyzer and 50 ohm probe (with good RF grounding) to probe at the input and output of each stage to check its gain or loss (see schematic diagram).

RECEIVER FRONT END MODULE
19D902782G6 (403-425 MHz)
19D902782G8 (380-400 MHz)
19D902782G9 (470-494 MHz)
19D902782G10 (492-512 MHz)
19D902782G11 (403-430 MHz)
ISSUE 2

SYMBOL	PART NO.	DESCRIPTION
		RECEIVER FRONT END BOARD 19D902782G6, G8-G11
		- - - - - - - - - - DIODES - - - - - - - - - -
CR1	344A3062P1	Diode, Schottky.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
CR2	19A703595P10	Diode, optoelectric: Red; sim to HP HLMP-1301-010 (Used in G8).
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A702061P37	Ceramic: 33 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/°C. (Used in G8).
C1	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW. (Used in G6, G10 and G11).
C1	19A702061P21	Ceramic: 15 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM. (Used in G9).
C2	19A702061P17	Ceramic: 12 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM. (Used in G6, G8 and G11).
C2	19A702061P21	Ceramic: 15 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM. (Used in G9).
C2	19A702061P12	Ceramic: 8.2 pF + or - 0.5 pF, 50 VDCW, temp or - 60 PPM. (Used in G10).
C3	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C7	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW. (Used in G8).
C7	19A702061P33	Ceramic: 27 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM. (Used in G6 and G11).
C7	19A702236P32	Ceramic: 18 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM. (Used in G9).
C7	19A702061P37	Ceramic: 33 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/°C. (Used in G10).
C8	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW. (Used in G6, G8, G9 and G11).
C8	19A702061P17	Ceramic: 12 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM. (Used in G10).
C9	19A702061P9	Ceramic: 4.7 pF + or - 0.5 pF, 50 VDCW, temp or - 60 PPM. (Used in G6, G8, and G11).
C10	19A702061P11	Ceramic: 6.8 pF + or - 0.5 pF, 50 VDCW, temp or - 60 PPM. (Used in G6, G8, G10 and G11).
C10	19A702236P17	Ceramic: 4.7 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM. (Used in G9).
C11	19A702061P33	Ceramic: 27 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/°C. (Used in G10).
C12	19A702061P8	Ceramic: 3.9 pF + or - 0.5 pF, 50 VDCW, temp or - 120 PPM. (Used in G9 and G10).
C20 thru C26	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C28	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C29 and C30	19A702061P89	Ceramic: 1500 pF + or - 5%, 50 VDCW, temp coef - 30 PPM.
C31 thru C33	19A702236P40	Ceramic: 39 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM.
C34 thru C36	19A702061P37	Ceramic: 33 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/°C.
C37 and C38	19A705205P26	Tantalum: 3.3 uf + or - 20%, 16 VDCW. (Used in G8, G10 and G11).
C39 and C40	19A705205P15	Tantalum: 33 uf + or - 20%, 16 VDCW. (Used in G8, G10 and G11).

* COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1	19A705458P8	Helical, 378-402 MHz. (Used in G8).
FL1	19A705458P4	Helical, UHF: 403-425 MHz. (Used in G6).
FL1	19A705458P9	Helical, 403-430 MHz. (Used in G11).
FL1	19A705458P2	Helical, UHF: 470-492 MHz. (Used in G9).
FL1	19A705458P6	Helical, UHF: 492-515 MHz. (Used in G10).
FL2	19A705458P4	Helical, UHF: 403-425 MHz. (Used in G8).
FL2	19A705458P5	Helical, UHF: 424-450 MHz. (Used in G6 and G11).
FL2	19A705458P1	Helical, UHF: 450-470 MHz. (Used in G9).
FL2	19A705458P2	Helical, UHF: 470-492 MHz. (Used in G10).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
J1	19B801587P7	Connector, Din: 96 male contacts, right angle mounting; sim to AMP 650889-1.
J2 thru J4	19A115938P24	Connector, receptacle.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19C850817P30	Coil, RF. (Used in G8).
L1	19C850817P29	Coil, RF. (Used in G6 and G11).
L1	19C850817P3	RF Coil: sim to Paul Smith SK853-1. (Used in G9).
L1	19C850817P18	RF Coil: sim to Paul Smith SK853-1. (Used in G10).
L2	19C850817P31	Coil. RF. (Used in G8).
L2	19C850817P5	RF Coil: sim to Paul Smith SK853-1. (Used in G6 and G11).
L2	19C850817P4	RF Coil: sim to Paul Smith SK853-1. (Used in G9).
L2	19C850817P17	RF Coil: sim to Paul Smith SK853-1. (Used in G10).
L3	19C850817P31	RF Coil: (Used in G8).
L3	19C850817P5	RF Coil: sim to Paul Smith SK853-1. (Used in G6 andG11).
L3	19C850817P4	RF Coil: sim to Paul Smith SK853-1. (Used in G9).
L3	19C850817P17	RF Coil: sim to Paul Smith SK853-1. (Used in G10).
L4	19C850817P31	Coil, RF. (Used in G8).
L4	19C850817P5	RF Coil: sim to Paul Smith SK853-1. (Used in G6 and G11).
L4	19C850817P4	RF Coil: sim to Paul Smith SK853-1. (Used in G9).
L4	19C850817P17	RF Coil: sim to Paul Smith SK853-1. (Used in G10).
L5	19C850817P30	Coil, RF. (Used in G8).
L5	19C850817P29	Coil, RF. (Used in G6and G11).
L5	19C850817P3	RF Coil: sim to Paul Smith SK853-1. (Used in G9).
L5	19C850817P18	RF Coil: sim to Paul Smith SK853-1. (Used in G10).
L6	19A705470P4	Coil, Fixed: 18 nH; sim to Toko 380NB-18nM. (Used in G8).
L6	19A705470P1	Coil, Fixed: 10 nH; sim to Toko 380NB-10nM. (Used in G6, G9 and G11).
L6	19A705470P5	Coil, Fixed: 22 nH; sim to Toko 380NB-22nM. (Used in G10).
L7	19A705470P16	Coil, Fixed: 0.18 uH; sim to Toko 380NB-R18M.
L8	19A705470P12	Coil, fixed: 82nH; sim to Toko 380NB-82nM. (Used in G8).
L8	19A705470P11	Coil, fixed: 68 nH; sim to Toko 380NB-68nM. (Used in G6 and G11).
L8	19A705470P6	Coil: 27 nH; sim to Toko 380NB-27nM. (Used in G9 and G10).
L9	19A705470P6	Coil: 27 nH; sim to Toko 380NB-27nM. (Used in G8 and G9).
L9	19A705470P14	Coil, fixed: 0.12 uH; sim to Toko 380NB-R12M. (Used in G6 and G11).
L9	19A705470P1	Coil, fixed: 10 nH; sim to Toko 380NB-10nM. (Used in G10).
L10	19A705470P16	Coil, fixed: 0.18 uH; sim to Toko 380NB-R18M.

SYMBOL	PART NO.	DESCRIPTION
L11	19A705470P1	Coil, fixed: 10 nH; sim to Toko 380NB-10nM. (Used in G6 and G11).
L11	19A705470P48	Coil, fixed: 82 uH; sim to TOKO 380KB-820K. (Used in G9).
L11	19A705470P7	Coil, fixed: 33 nH + or -20%; sim to Toko 380NB-33nM. (Used in G10).
L12	19A705470P16	Coil, fixed: 0.18 uH; sim to Toko 380NB-R18M.
L13	19A705470P10	Coil, fixed: 56 nH; sim to Toko 380NB-56nM. (Used in G6 and G11).
L14	19A705470P4	Coil, fixed: 18 nH; sim to Toko 380NB-18nM. (Used in G6, G8 and G11).
L14 and L15	19A705470P6	Coil: 27 nH; sim to Toko 380NB-27nM. (Used in G10).
L21	19A705470P16	Coil, fixed: 0.18 uH; sim to Toko 380NB-R18M.
L22	19A700021P105	Coil, RF: fixed. (Used in G6, G8, G10, and G11).
L22	19A700021P106	Coil, RF. (Used in G9).
L23	19A700021P13	Coil, RF: fixed, 470 nH.
L24	19A700000P122	Coil, fixed: 8.2 uF + or -10%; sim to Jeffers 22-8.2-10 (Used in G8, G10 and G11).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q7	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q8	344A3058P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B800607P332	Metal film: 3.3K ohms + or -5%, 1/8 w. (Used in G8).
R1	19B800607P183	Metal film: 18K ohms + or -5%, 1/8 w. (Used in G6, G9, G10, and G11).
R2	19B800607P102	Metal film: 1K ohms + or -5%, 1/8 w.
R3	19B800607P331	Metal film: 330 ohms + or -5%, 1/8 w.
R4	19B800607P560	Metal film: 56 ohms + or -5%, 1/8 w.
R5	19B800607P1	Metal film: Jumper. (Used in G8 and G9).
R5	19B800607P100	Metal film: 10 ohms + or -5%, 1/8 w. (Used in G6 and G11).
R6	19B800607P101	Metal film: 100 ohms + or -5%, 1/8 w. (Used in G8).
R6	19B800607P391	Metal film: 390 ohms + or -5%, 1/8 w. (Used in G6 and G11).
R7	19B800607P201	Metal film: 200 ohms + or -5%, 1/8 w.
R8	19B800607P121	Metal film: 120 ohms + or -5%, 1/8 w.
R9	19B800607P100	Metal film: 10 ohms + or -5%, 1/8 w. (Used in G6, G8 and G11).
R9	19B800607P1	Metal film: Jumper. (Used in G9 and G10).
R10	19B800607P101	Metal film: 100 ohms + or -5%, 1/8 w. (Used in G8).
R10	19B800607P391	Metal film: 390 ohms + or -5%, 1/8 w. (Used in G6 and G11).
R11	19B800607P332	Metal film: 3.3K ohms + or -5%, 1/8 w.
R12	19B800607P562	Metal film: 5.6K ohms + or -5%, 1/8 w.
R13	19B800607P122	Metal film: 1.2K ohms + or -5%, 1/8 w.
R14	19B800607P390	Metal film: 39 ohms + or -5%, 1/8 w. (Used in G8 and G10).
R14	19B800607P560	Metal film: 56 ohms + or -5%, 1/8 w. (Used in G6 and G11).
R14	19B800607P330	Metal film: 33 ohms + or -5%, 1/8 w. (Used in G9).
R15	19B800607P1	Metal film: Jumper. (Used in G8, G9, and G10).
R15	19B800607P100	Metal film: 10 ohms + or -5%, 1/8 w. (Used in G6 and G11).
R16	19B800607P101	Metal film: 100 ohms + or -5%, 1/8 w. (Used in G8).
R16	19B800607P391	Metal film: 390 ohms + or -5%, 1/8 w. (Used in G6 and G11).
R17	19B800607P103	Metal film: 10K ohms + or -5%, 1/8 w.
R18	19B800607P562	Metal film: 5.6K ohms + or -5%, 1/8 w.
R19	19B800607P183	Metal film: 18K ohms + or -5%, 1/8 w.

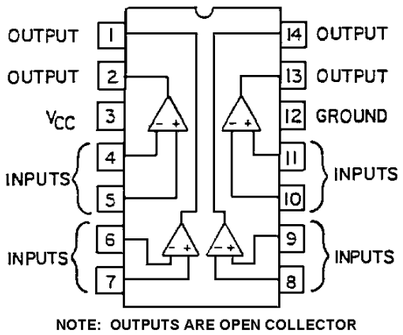
SYMBOL	PART NO.	DESCRIPTION
R20	19B800607P333	Metal film: 33K ohms + or -5%, 1/8 w.
R21	19B800607P103	Metal film: 10K ohms + or -5%, 1/8 w.
R22	19B800607P272	Metal film: 2.7K ohms + or -5%, 1/8 w.
R23	19B800607P152	Metal film: 1.5K ohms + or -5%, 1/8 w.
R24	19B800607P153	Metal film: 15K ohms + or -5%, 1/8 w.
R25	19B800607P390	Metal film: 39 ohms + or -5%, 1/8 w. (Used in G8 and G10).
R25	19B800607P560	Metal film: 56 ohms + or -5%, 1/8 w. (Used in G6 and G11).
R25	19B800607P330	Metal film: 33 ohms + or -5%, 1/8 w. (Used in G9).
R26	19B800607P560	Metal film: 56 ohms + or -5%, 1/8 w.
R27	19B800607P121	Metal film: 120 ohms + or -5%, 1/8 w.
R28	19B800607P103	Metal film: 10K ohms + or -5%, 1/8 w.
R29	19B800607P682	Metal film: 6.8K ohms + or -5%, 1/8 w.
R30	19B800607P201	Metal film: 200 ohms + or -5%, 1/8 w.
R31	19B800607P103	Metal film: 10K ohms + or -5%, 1/8 w.
R32	19B800607P101	Metal film: 100 ohms + or -5%, 1/8 w. (Used in G8).
R32	19B800607P331	Metal film: 330 ohms + or -5%, 1/8 w. (Used in G10).
R33	19B800607P510	Metal film: 51 ohms + or -5%, 1/8 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - -
T1 and T2	344A3063P1	Transformer.
		- - - - - - - INTEGRATED CIRCUITS - - - - - - -
U2	344A3907P1	Integrated circuit, MMIC: sim to Avantek MSA-1105.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
4	19D902555P1	Handle.
6	19A702381P1506	Screw, thread forming: Torx, No. M3.5-.6 x 6.
7	19A702381P1513	Screw, thread forming: Panhead..
11	19A702381P1508	Screw, thread forming: No. 3.5-0.6 x 8.
20	19B800701P2	Tuning screw.
21	19A701800P1	Stop nut.
22	19D902467P2	Casting.
27	19D902508P5	Chassis..
28	19D902534P2	Cover, RF.
29	19D904572P1	Gasket.
30	19B802690P1	Grommet.

PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number on the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for the description of parts affected by these revisions.

REV. A - RECEIVER FRONT END BOARD 19D902490G6
RECEIVER FRONT END BOARD 19D902490G11
Add new splits. PWB changed.

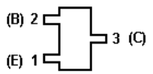
REV. A - RECEIVER FRONT END BOARD 19D902490G8 & G10
REV. B - RECEIVER FRONT END BOARD 19D902490G11
To eliminate receiver spurious response at 100 kHz switching power supply frequency. Added C37 thru C40 and L24.



NOTE: OUTPUTS ARE OPEN COLLECTOR

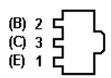
U1
19A704125P1
Quad Operational Amplifier

(SOT) TRANSISTORS
(TOP VIEW)



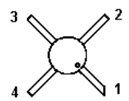
LEAD IDENTIFICATION FOR
Q2, Q7

(SOT) TRANSISTORS
(TOP VIEW)

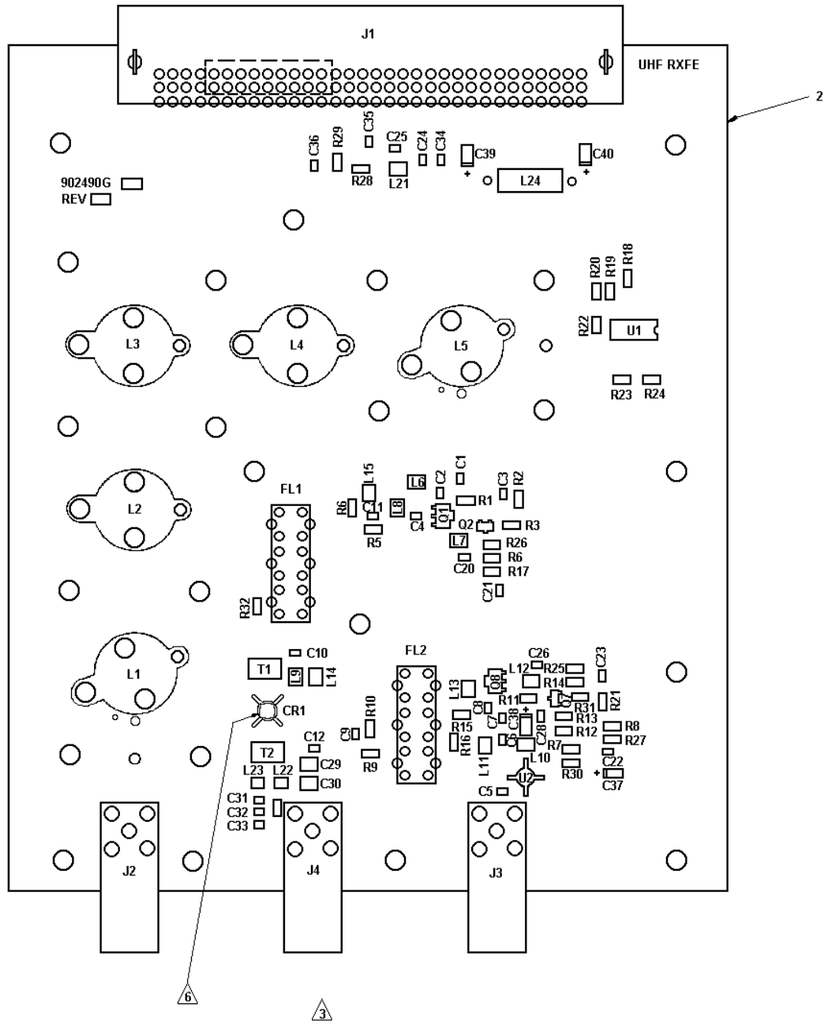


LEAD IDENTIFICATION FOR
Q1, Q8

RECTIFIER
(TOP VIEW)

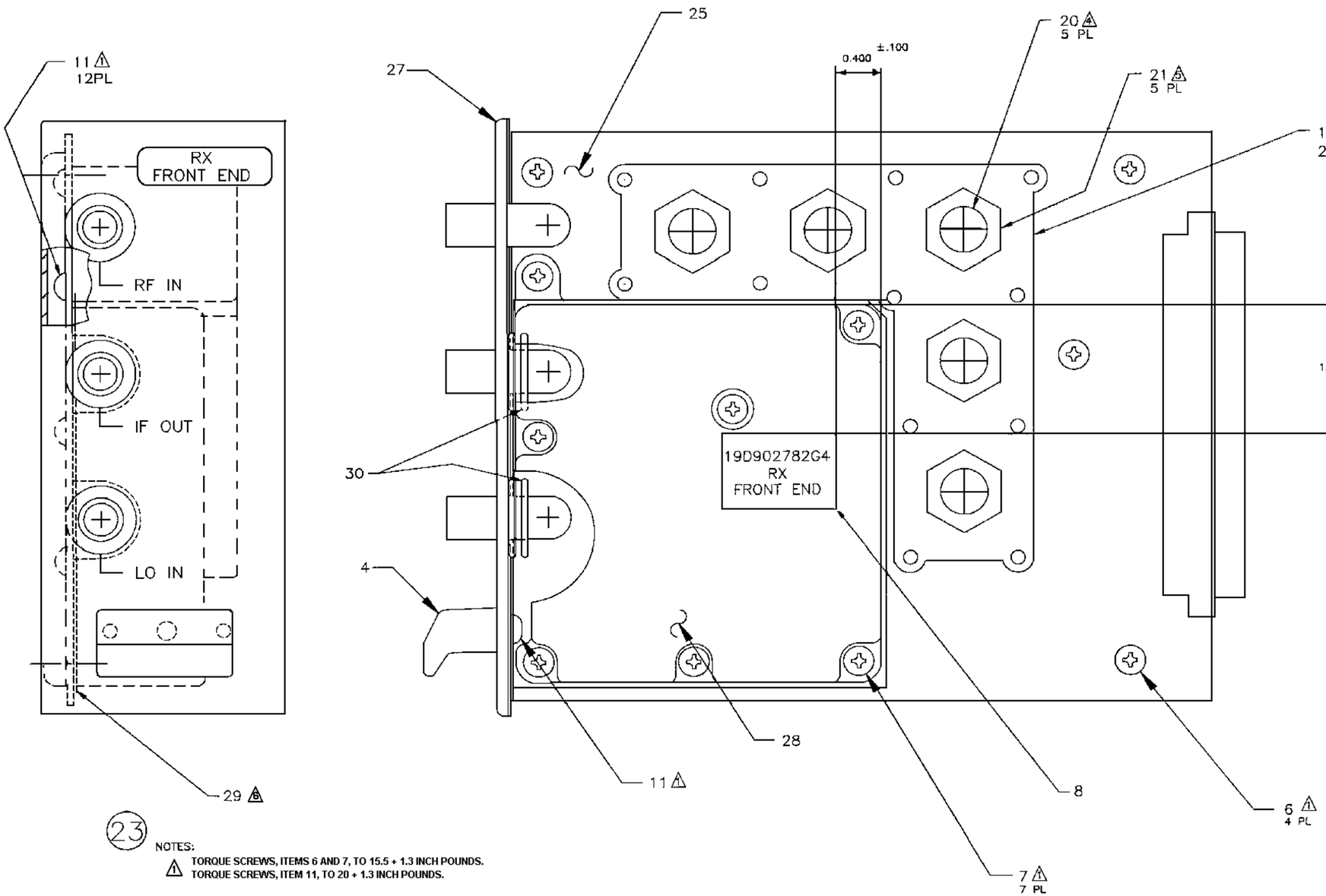


LEAD IDENTIFICATION FOR
CR1



(19D902490, Sh. 7, Rev. 5)

RECEIVER FRONT END BOARD
19D902490G6, G8 - G11



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NOTES:

⚠1 TORQUE SCREWS, ITEMS 6 AND 7, TO 15.5 + 1.3 INCH POUNDS.
TORQUE SCREWS, ITEM 11, TO 20 + 1.3 INCH POUNDS.

⚠4 COAT THREADS OF TUNING SCREWS ITEM 20.

⚠5 TIGHTEN TUNING NUTS, ITEM 21 SO THAT TORQUE ON TUNING SCREWS, ITEM 20 ARE 100 IN. OZ. AT MIDDLE OF TUNING RANGE WITH POINTS ON TUNING NUTS BETWEEN RAISED SERATIONS ON CASTINGS ITEM 19.

⚠6 ITEM 29, GASKET MOUNTING HOLES TO ALIGN WITH ITEM 28, COVER.

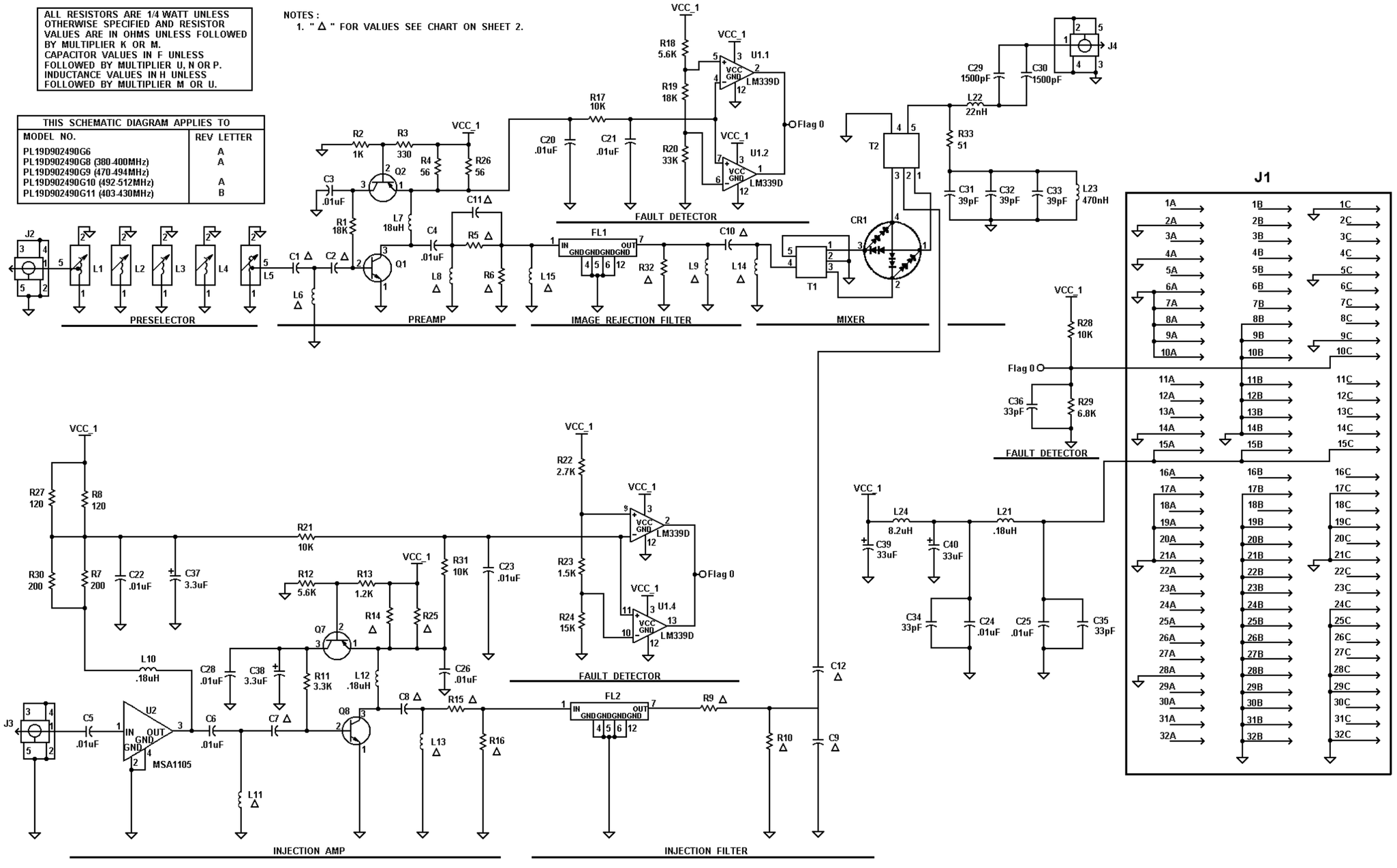
RECEIVER FRONT END MODULE
19D902782G6, G8 - G11

(19D902782 Sh.2 Rev.6)

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES ARE IN OHMS UNLESS FOLLOWED BY MULTIPLIER K OR M.
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER U, N OR P.
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER M OR U.

NOTES :
1. " Δ " FOR VALUES SEE CHART ON SHEET 2.

THIS SCHEMATIC DIAGRAM APPLIES TO	
MODEL NO.	REV LETTER
PL19D902490G6	A
PL19D902490G8 (380-400MHz)	A
PL19D902490G9 (470-494MHz)	
PL19D902490G10 (492-512MHz)	A
PL19D902490G11 (403-430MHz)	B



RECEIVER FRONT END MODULE
19D902782G6, G8-G11

(188D5789 Sh.1 Rev.6)

COMPONENT	380-100 MHZ SPLIT G8	403-425 MHZ SPLIT G6	470-492 MHZ SPLIT G9	492-512 MHZ SPLIT G10	403-430 MHZ SPLIT G11
C1	33pF	0.01uF	15pF	0.01uF	0.01uF
C2	12pF	12pF	15pF	8.2pF	12pF
C7	0.01uF	27pF	18pF	33pF	27pF
C8	0.01uF	0.01uF	0.01uF	12pF	0.01uF
C9	4.7pF	4.7pF	NOT USED	NOT USED	4.7pF
C10	6.8pF	6.8pF	4.7pF	6.8pF	6.8pF
C11	NOT USED	NOT USED	NOT USED	27pF	NOT USED
C12	0.01uF	0.01uF	3.9pF	3.9pF	0.01uF
L6	18nH	10nH	10nH	22nH	10nH
L8	82nH	68nH	27nH	27nH	68nH
L9	27nH	0.12uH	27nH	10nH	0.12uH
L11	0.18nH	10nH	82nH	33nH	10nH
L13	NOT USED	56nH	NOT USED	NOT USED	56nH
L14	18nH	18nH	NOT USED	27nH	18nH
L15	NOT USED	NOT USED	NOT USED	27nH	NOT USED
R5	0 OHMS	10 OHMS	0 OHMS	NOT USED	10 OHMS
R6	100 OHMS	390 OHMS	NOT USED	NOT USED	390 OHMS
R9	10 OHMS	10 OHMS	0 OHMS	0 OHMS	10 OHMS
R10	100 OHMS	390 OHMS	NOT USED	NOT USED	390 OHMS
R14	39 OHMS	56 OHMS	33 OHMS	39 OHMS	56 OHMS
R15	0 OHMS	10 OHMS	0 OHMS	0 OHMS	10 OHMS
R16	100 OHMS	390 OHMS	NOT USED	NOT USED	390 OHMS
R25	39 OHMS	56 OHMS	33 OHMS	39 OHMS	56 OHMS
R32	100 OHMS	NOT USED	NOT USED	390 OHMS	NOT USED

RECEIVER FRONT END MODULE
19D902782G6, G8 - G11

(188D5789 Sh.2 Rev.6)