Kimberly Renee Alvarez

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Microwave Engineer

RF MIC, IMA, MMIC, PCB, MMIC chips in QFN packages on PCB for space or high volume production

Option: Contract Engineer as Consultant:
When a company has a focused requirement, such as needing a new power amplifier designer, design and test, or other microwave circuit design; and the position requires an active secret clearance, I can provide the service outside the closed project areas if the frequencies are modified. I have successfully worked in this manner before. The client company has the advantage of relying on the recruiter to process the clearance, and an interim status can be quickly created.

I am always open to contract extensions. I am also open to a "contract to permanent" employee. And as a consultant I am available at a rate much lower than my competitors.

Profile:
Definitions: MIC (Microwave Integrated Circuit). IMA (Integrated Microwave Assembly). A MIC and an IMA are the same thing. My experience is in MIC, IMA, MMIC technology utilizing discrete chip parts attached to a substrate with conductive epoxy and interconnected with 1 mil diameter gold wires. However, I also have experience with PCB assemblies where packaged components are soldered to the substrates. I have also worked with MMIC design. I am familiar with the Triquint 2MI and 3MI MMIC design guidelines. My website is **www.microwaveandrfconsulting.com** . My DOD Secret security clearance can be fast tracked to re-activate.

The substrates that I've used include soft-board FR-4, Rogers Duroid boards of various types (4053B, 4003C, TMM10i, etc), and hard material, such as Alumina. The layers have ranged from single layer, up to 16 layers in LTCC. I use microstrip, stripline, coplanar, and discrete techniques in my circuits, depending on application. The structures include RF layers, control line signal layers, DC voltage power layers, and ground layers. My designs are functionally oriented, but I also include EMC layout techniques such as: best bypass and decoupling capacitor types and values to use based on the application, component self-resonance and board resonance, edge rate transitions, ground loops, crosstalk, partitioning, interconnects, layer jumping with buried vias, and power vs. ground plane fringing.

I can trouble-shoot microwave circuits and sub-systems. I can trouble-shoot EMC related problems in existing RF/microwave designs. I can provide in-depth interface services between a company and an LTCC foundry in the development of multilayer substrates.

I have designed sub-systems including up and down frequency converters, frequency sources, switching matrixes, amplifiers, oscillators, mixers, filters, etc. Some of these assemblies were hermetically sealed. MIC/IMA/MMIC assemblies are the most space-friendly type of hardware due to significantly reduced size and weight. I can design/analyze cascaded RF components for gain, power, noise figure, IP3, wide bandwidths, out of band signal rejection, harmonics, spurious signals, and DC voltage/current consumption. I've worked PCB boards with soldered packaged devices, thick film MIC, thin film MIC, and LTCC MIC technologies.

I have designed amplifiers (low noise, gain blocks, and solid state power amplifiers) with inter-stage matching networks between transistors in multi-stage assemblies. My work has included GaAs, GaN, FETs, PHEMTs, and bipolar. I can design compensation networks to extend the frequency range and increase stability. I can include Drain-Gate feedback to extend the frequency range, and control the gain. I can place transistors directly in parallel to increase output power. I can design amplifiers in parallel configurations between langue couplers for increased output power. I perform stability circle analysis to ensure that there are no internal oscillations. I can design the bias circuits to provide stable turn-on and turn-off transitions. I use both DC-DC voltage converters and voltage regulators for best efficiency. All these techniques directly transfer to GaN technology. GaN delivers designs with lower current, lower junction temperatures, higher S11/S22 transistor reflection plane impedances, greater efficiencies, and smaller chip dimensions. GaN is the future of power amplifiers and I am part of that specialty.

I have designed negative resistance and feedback oscillators (VCO, CRO, and DRO). I've also designed frequency multipliers and comb generators (Step Recovery Diode or Schottky-barrier diode), mixers, limiters, attenuators, and filters. My filter design experience is in discrete lumped element, microstrip, and stripline. I have designed parallel edge-coupled filters, interdigital filters,

hair pin filters, and comb-line filters. My experience includes Lowpass, highpass, bandpass, bandstop, and highpass/Lowpass diplexers in butterworth, Chebyscheff, or elliptic topologies. I've also designed power dividers/combiners, (Wilkinson, Hybrid, Gecho, and Traveling Wave).

I've worked independently and also as a team member. I've also been a team leader. I can write specifications and technical descriptions and analysis for proposal bidding. I led a cost reduction team of a Comb Generator, where I reduced the manufacturing costs from $650 to $37 per unit in transitioning the Comb Generator from engineering to production.
I've worked at large and small military and commercial companies. The military companies pushed the technology envelope, while the commercial companies prioritized fast delivery and low cost. I am comfortable with both types of environments. My primary design tool is Microwave office (MWO), with which I am able to create the electrical schematic and the circuit layout concurrently. This eliminates the repeated back and forth repetition between electrical schematic design and the circuit layout. The result is a significant reduction in design delivery time. I own my License of Microwave Office and also Agilent Genesys RF Architect. I do whatever is required to meet schedules. I take ownership of my work, and always look forward to new challenges.

Other Skills: I've earned the Toastmasters "Competent Communicator" certificate. I am bilingual in English and Spanish. I earned my certificate in Paralegal Studies at Boston University.

Profile Summary:
My engineering services as a product designer are available at an attractive rate. I will travel almost anywhere within the US to secure work. My design experience and my personal investment in MWO software (Linear, Non-Linear Harmonic Balance, Layout, 2½D EMSight, and 2½D EM Axiem EM simulator) places me in a favorable position to independently design hardware. I can also provide analysis for existing designs. I can strengthen proposal writing with analysis.

PROFESSIONAL EXPERIENCE:

I designed and developed, and solved existing problems of the following microwave circuits into production products:

L3 Technlogies, Inc. Contracting Consultant Engineer on Contract October 2017 to April 2018
Designed a frequency up-converter from X Band to Ka Band (35 GHz). All the components were soldered as packaged components on a PCB Rogers 4350B 10 mil thick substrate. The components were not originally space qualified. Therefore, I modeled the die chips inside QFN packages (I also modeled the QFN package). I worked with the vendor that produced the QFN (Barry Industries) and the assembly and screening company (Integra Technologies) to ensure that the components complied with space requirements. This was all IRAD to bring PCB space technology capability at 35 GHz inside the company. QFN packaging is also applicable for high volume quantity production in a manufacturing environment.

Rockwell Collins, Inc. Contracting Consultant Engineer on Contract August 2016 to Dec 2016

1. Trouble shot a limiter circuit that was causing damage to a 20 KW amplifier. Problem solved.
2. Trouble shot a VCO/Synthesizer that was losing lock. This was a short contract. Problem solved.
3. Modeled DC biasing of power transistor MMRF5014H for 1 KW PA. Assignment completed.
4. 3D EM modeling of ribbon across air gap between Microstrip substrate and Multilayer substrate in 2 KW High Power Amp. The input was partially matched to gate input of a Freescale MMRF5014H transistor. Additional external matching was done at the input. The output was not partially matched. The output had to be an external power match. The DC bias design was designed as an external structure. The assembly was on three substrates. Balanced transistor combination pairs on a microstrip substrate between two stripline substrates which had broadside coupled input power dividers and output combiners.

Southwest Microwave, Inc. Contracting Consultant Engineer on Contract July 2014 to February 2016
Designed: Four filters, K Band (LNA, Detector, and DRO), and X Band (LNA, Detector, Two DRO-common gate and common source, and SSB De-Modulator). X Band Rat-race Mixer. X Band Branch Line Mixer with two outputs at zero Degree and 90 Degree orthogonal outputs. X Band Series-Shunt Diode Switch. X Band Transmitter, Receiver, and Transceiver. I also 3D electromagnetically modeled a 24 patch antenna, the array network, the antenna feed and match, all at 10 GHz with Microwave Office Analyst. All designs were developed for production sales.

Tampa Microwave Senior RF Engineer October 2012 to September 2013

- X Band LNA and frequency Down-Converter. I tested the LNA and DC with microwave test equipment. Project completed.

Raytheon Electronic Systems, Inc. Principal Electrical Engineer October 2000 to January 2012

- MIC/IMA 3 stage wide band balanced X band solid state power amplifier (SSPA) with Ropt Copt power matching. I also work with the load pull technique on an SSPA to comply with output power performance.
- MIC/IMA LNA: Two stage balanced KU band amplifier with 0.8 dB noise figure.
- Two wide band mixers:

- MIC/IMA: Triple balanced mixer on suspended substrate. Including wide band baluns.
- MMIC: Resistive FET mixer using Triquint 2MI (0.25 micron) process. Including wide band baluns.

- MIC/IMA Two SRD Comb Generators: 100 MHZ input with 20 output harmonics. 1 GHz input with 12 harmonics output.
- Several MIC/IMA multi-layer structures on LTCC substrates. Components were bare die connected by 1 mil wires.
- MIC/IMA Passive microwave circuits such as filters, couplers, power dividers, etc.
- I led a cost reduction team to reduce manufacturing costs of my Comb Generator from $650 to $37 per unit.

High Frequency Products, Inc. Consultant. March 2000 to Aug 2000

- Modified 12.3 GHz DRO oscillator. +17 dBm output, phase noise 110 dB/Hz @ 100 KHz carrier offset. This was a standard PCB surface mount design, intended for high volume production. Project completed.
- Designed two DRO oscillators at 9 and 13 GHz. Both fixed frequency. Project completed.

California Amplifier, Inc. Consultant. July 1999 to March 2000

- Two CRO (2.4 & 2.7 GHz) oscillators. SSB was -64 dBc/Hz @ 100 Hz, -69 dBc/Hz @ 1 KHz, -97 dBc/Hz @ 10 KHz, -110 dBc/Hz @ 100 KHz, & -120 dBc/Hz @ 1 MHz. These oscillators included output buffer amplifiers to reduce frequency pulling.
- Three frequency doublers @ 4.8, 5.4, & 10.8 GHz output. Several microwave amplifiers, and filters. Projects completed.
- Up/Down frequency converter portion of LMDS wireless Transceiver. I presented the design to the customer. We were awarded the contract. Project completed.

QuinStar Technology, Inc. Consultant. March 1999 to July 1999

- Provided EM simulations of 40 GHz MEM switches and delay lines.
- Microstrip filters at 18, 21, & 38 GHz. Power dividers at 78 & 94 GHz. The power dividers were traveling wave structures.

Delphi Components, Inc. / Amplica, Inc, / Microwave dB, Inc. Engineer. November 1997 to March 1999

- Microstrip bandpass filter @ 20 GHz.
- Two VCO oscillators @ 900 MHz & 2.5 GHz, a 3.5 GHz LNA, and a diode limiter circuit.
- Dielectric resonator filter @ 30 GHz.
- Modified existing design: Deactivated input stage amp for ON-OFF channel switching with PIN diode, and improved stability.

SiRF Technology, Inc. Consultant, then Regular Employee as Senior RF Engineer. January 1997 to September 1997

- RF front end of 2.4 GHz wireless Transceiver (antenna filter, IF filter, LNA, & PA). Performed transmit & receive spur analysis.
- Portion of phase lock loop. Two pole op amp loop filter.
- Single ended and balanced filters.
- Four layer PCB assembly for all of the above circuits. Working breadboard produced in six months.
- Design support for GPS RF circuits.

ADDITIONAL RELEVENT PROFESSIONAL EXPERIENCE:

Northrup Grumman (formally TRW, Electronic Systems Group) Senior Staff Engineer. March 1979 to January 1997

- Two stage single ended FET 17 dB gain amp @ 15 GHz on alumina substrate.
- Two balanced FET amps (s band and X band) with Lange couplers.
- Lowpass, highpass, bandpass, band-reject, microstrip and stripline filters; and a highpass/Lowpass lumped element diplexer.
- Active filters.
- 8900 – 9660 MHz VCO (negative resistance type).
- Two stage Radar Transceiver (preamps, variable gain amps, VCO, linearizers, integrators, summers, differential and active filters.
- 20 GHz frequency doubler.
- Modified a DRO oscillator.
- 38 MHz VCXO for the PLUTO Satellite with a Q of 100,000 for very low phase noise.
- Two stage 24 watt SSPA using Fujitsu transistors for the ODYSSEY project.
- Pierce oscillator for the FORD/LINCOLN remote entry transmitter. Extremely high Q provided by SAW resonator.
- Several VCO oscillators (bipolar transistors in common base, emitter, and collector and also FET configurations).

EDUCATION: Bachelor of Science of Electrical Engineering. West Coast University

General School Number: 818-299-5500 Asst Registrar: Ana Linky 818-299-5516

- Seminar in nonlinear circuits that specialized in microwave mixer design. Instr: Dr. Stephen Maas.
- Raytheon in-house workshop in ADS. Agilent, Inc.
- Raytheon in-house workshop in HFSS. Ansoft, Inc.
- Wireless seminar workshop in class F microwave amplifier design techniques. Steve C. Cripps

- Workshop in multi-layer circuit board design techniques. Wireless Seminar
- TRW in-house class in RDE training.
- TRW in-house class in low noise amplifier design techniques. Les Besser
- TRW in-house class in MMIC design techniques.
- Two week workshop in Microwave antenna near-field measurement techniques. National Bureau of Standards.
- Additional Graduate Classes at California State University, Fullerton; and at the University of Southern California

PROFESSIONAL ASSOCIATIONS: Senior Member: IEEE: Institute of Electrical and Electronics Engineers.
Senior Member: MTT: Microwave Theory & Techniques Group (Society within IEEE).
Member: IEEE National Consultants Network and LAACN (Los Angeles Area).

PUBLICATIONS:

- AWARD: From U.S. Dept of Transportation for excellence in Transportation Research and Development, TRW RailSentry Team Member. 1996
- Wrote & presented paper at IEEE-MTT International Microwave Symposium. W Band Collision Avoidance Radar for Light Rail Applications. 1996
- Wrote & presented paper at MAES (Mexican American Engineering Society) Symposium: Subject: Voltage Controlled Oscillator Design at Microwave Frequencies. 1988

Design a Step-Recovery-Diode Based Comb Generator. Magazine: Microwaves & RF May 2017

Wrote & Presented six papers at 2004, 2005, 2006 & 2008 Raytheon RF Symposiums:

- Future Fab-less Design Road Map of the Solid State Microwave Dept to Design & Manufacture Integrated Microwave Assemblies. 2008
- New MMIC Resistive FET Mixer Design. 2006
- Resistive FET Mixer. A state of the art mixer in a multi-function MMIC chip. 2005
- Comb Generator Design Approach enables 90% Cost Reduction by eliminating tuning. 2005
- Comb Generator Stability & Efficiency, "Microwave Office" used to design Comb Generator. 2004
- 3 Dimensional IMA Package Concepts for Volume & Weight Reductions that reduce System Costs. 2004

Owner of the following Software:

- Applied Wave Research Microwave Office License 228 (Includes Linear, Non-Linear, Layout, with 2&1/2D EMSight, and 2&1/2D Axiem EM Simulator.
- Agilent/Eagleware Genesys RF Architect**.**

Can also provide design and analysis with the following Software:

- Ansoft HFSS. (No longer use HFSS for a long time).
- Autodesk AutoCad. (No longer use AutoCad for a long time).
- Microsoft Project Scheduler. (No longer use Project Scheduler for quite a while, but I could get easily get back into this)

SECURITY CLEARANCE: DOD Secret. Can be fast tracked to re-activate.
Languages: I am bilingual in both English and Spanish.

RFERENCES:

Manager	L3 Technologies, Inc.	Bob Hayes	Work:	513-573-6356	Cell:	513-767-4027
Manager	L3 Technologies, Inc.	James Lundt	Work:	513-573-6894	Cell:	513-767-2196
Manager	Rockwell Collins	Louis Bedal	Work:	319-263-9910		
Manager	Rockwell Collins	Jeffrey Medina	Work	319-295-3708		
Colleague	Rockwell Collins	Daniel Shaw	Work:	319-263-7742	Cell:	678-697-2793
Manager	Southwest Microwave	Steven O'Brien	Work:	480-783-0201	Cell:	602-717-5100
Manager	Southwest Microwave	James Cheal	Work	480-783-0201Ext 316		
Manager	Raytheon	David Drapeau	Work #1:	310-647-4544 #2:	310-334-7231	Cell: 310-469-3786
Colleague	Raytheon	Tony Nguyen			Cell:	323-309-7143
Colleague	Raytheon	Chetan Gandhi	Work:	310-334-1968	Home: 562-921-4912	Cell: 562-405-7544
Colleague	Raytheon	Jay Kurland	Work:	310-616-1036	Cell:	562-305-4925
Colleague	Raytheon	Timothy D. Aust	Work:	310-334-8055	Cell:	805-443-1726
Manager	Raytheon	Michael Sholley	Work:	310-813-4420	Home:	562-424-2894
Manager	Raytheon	Jitendra Goel	Work:	310-334-7228	Home:	310-541-0201
Project Leader	Raytheon	Bob Allison			Cell:	310-913-9799

Tony was my mentor that showed me how to design power amplifiers.
Chetan is a colleague that has seen my amplifier design work and witnessed measurement results.

Jay knows my work because we've worked closely on a number of projects.
Timothy knows my abilities and is also my mentor.
Michael was my manager and is now be retired.
Jitendra is retired and might have returned to India. He sponsored me for IEEE Senior membership.
David was my manager at Raytheon. He has retired.
Bob Allison was one of my project leaders on a mixer design.