

Document information

| Info | Content |
|-----------|---|
| Status | General Publication |
| Author(s) | Tyler Ware |
| Abstract | Measurement results of the ART1K6FH LDMOS Device in Board #AR212099 tuned for 79-85MHz at 50V |

1 Revision History

Table 1. Report revisions

| Revision No. | Date | Description | Author |
|--------------|----------|-------------------------|------------|
| 1.0 | 20201026 | Initial document | Tyler Ware |
| 2.0 | 20220426 | Updated Security Status | Tyler Ware |

2 Contents

| | | |
|-----------|---------------------------------------|-----------|
| 1 | Revision History | 2 |
| 2 | Contents..... | 2 |
| 3 | List of Figures..... | 3 |
| 4 | List of Tables | 3 |
| 5 | General Description | 3 |
| 6 | Biasing | 4 |
| 6.1 | Bias Details..... | 4 |
| 7 | Test Bench Set Up..... | 4 |
| 8 | Performance Summary | 5 |
| 9 | Performance Details..... | 6 |
| 9.1 | Small Signal Results | 6 |
| 9.2 | CW Gain Sweeps | 7 |
| 9.3 | CW Efficiency Sweeps..... | 7 |
| 10 | Fixed Power Out Results | 8 |
| 10.1 | Output Power v Frequency at P1dB..... | 8 |
| 10.2 | Output Power v Frequency at P3dB..... | 8 |
| 10.3 | Gain v Frequency at P3dB..... | 9 |
| 10.4 | Efficiency v Frequency at P3dB | 9 |
| 11 | Hardware..... | 10 |
| 11.1 | Board photograph | 10 |
| 11.2 | Main PCB layout | 11 |
| 11.3 | Bill of Materials | 12 |
| 11.4 | L3 Dimensions | 13 |
| 11.5 | PCB materials..... | 14 |
| 11.6 | Device markings | 14 |
| 12 | Legal Information | 15 |
| 12.1 | Contact information..... | 15 |

3 List of Figures

| | |
|---|----|
| Figure 1. Test Bench Equipment set up | 4 |
| Figure 2. Small Signal results, Vdd=50V, Idq=200mA, Pin=10dBm | 6 |
| Figure 3. CW Gain(dB) vs Power Out(dBm) | 7 |
| Figure 4. CW Efficiency(%) vs Power Out(dBm) | 7 |
| Figure 5. Output Power (dBm) vs Frequency (MHz) at P1dB | 8 |
| Figure 6. Output Power (dBm) vs Frequency (MHz) at P3dB | 8 |
| Figure 7. Gain (dB) vs Frequency (MHz) at P3dB | 9 |
| Figure 8. Efficiency (%) vs Frequency (MHz) at P3dB | 9 |
| Figure 9. Board Photograph | 10 |
| Figure 10. PCB Layout - Board #AR212099 | 11 |
| Figure 11. L3 Dimensions | 13 |

4 List of Tables

| | |
|--|----|
| Table 1. Report revisions | 2 |
| Table 2. RF Performance, Frequency = 81MHz, CW | 5 |
| Table 3. BOM | 12 |
| Table 4. Board Specifications | 14 |
| Table 5. Device Specifications | 14 |

5 General Description

This report presents the measurement results of Demo Board AR212099 using the ART1K6FH. The demo achieves ≥ 61 dBm across 79-85MHz at 50V.

6.1 Bias Details

Vdd = 50V
Idq = 200mA

7 Test Bench Set Up

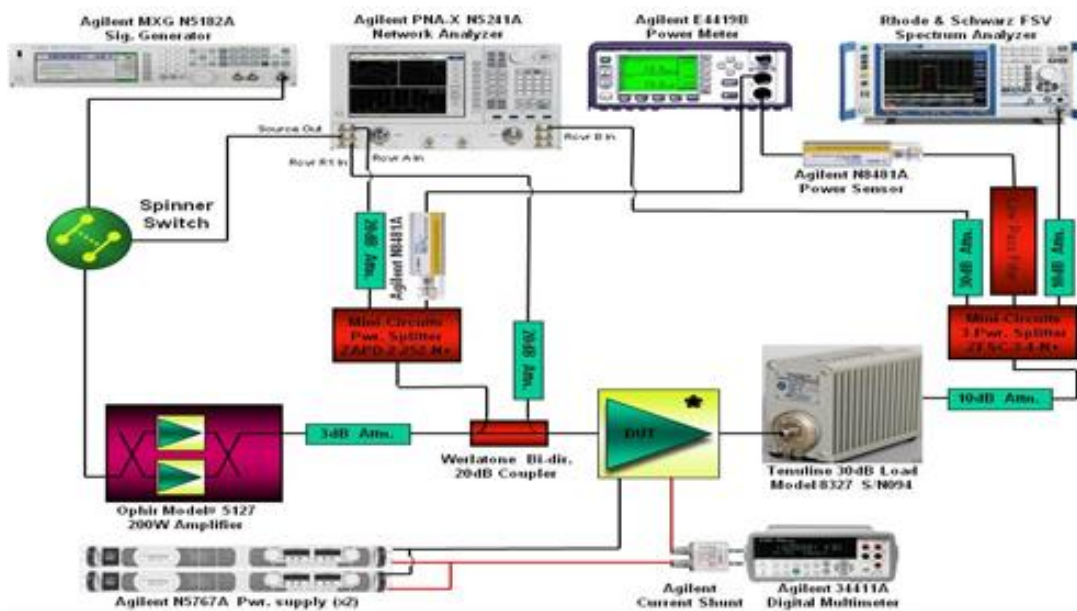


Figure 1. Test Bench Equipment set up

8 Performance Summary

Table 2. RF Performance, Frequency = 81MHz, CW

| Parameter | Measurement | Unit |
|----------------------------------|-------------|------|
| Specified frequency range | 81 | MHz |
| Drain voltage | 50 | V |
| Quiescent drain current | 200 | mA |
| Average P3dB | 1393.16 | W |
| Average CW Efficiency at P3dB | 81.33 | % |
| Average CW Gain at P3dB | 19.69 | dB |
| Average CW Gain Flatness at P3dB | +/- .5 | dB |

| AR212099_ART1K6FH_50_81MHz CW DriveUpData | | | | |
|---|--------|---------|----------------|-------------|
| Freq(MHz) | P1.0dB | Pout(W) | P1dB Gain (dB) | P1dB Eff(%) |
| 79 | 59.79 | 952.80 | 21.30 | 68.37 |
| 80 | 59.85 | 966.05 | 21.54 | 68.73 |
| 81 | 59.95 | 988.55 | 21.68 | 69.16 |
| 85 | 60.10 | 1023.29 | 22.18 | 69.43 |
| | P2.0dB | Pout(W) | P2dB Gain(dB) | P2dB Eff(%) |
| 79 | 60.84 | 1213.39 | 20.29 | 76.34 |
| 80 | 60.91 | 1233.10 | 20.54 | 77.03 |
| 81 | 61.00 | 1258.93 | 20.68 | 77.29 |
| 85 | 61.26 | 1336.60 | 21.19 | 78.55 |
| | P3.0dB | Pout(W) | P3dB Gain(dB) | P3dB Eff(%) |
| 79 | 61.27 | 1339.68 | 19.30 | 80.00 |
| 80 | 61.35 | 1364.58 | 19.55 | 80.74 |
| 81 | 61.44 | 1393.16 | 19.69 | 81.33 |
| 85 | 61.71 | 1482.52 | 20.19 | 82.25 |

9 Performance Details

9.1 Small Signal Results

Vdd = 50V

Idq = 200mA

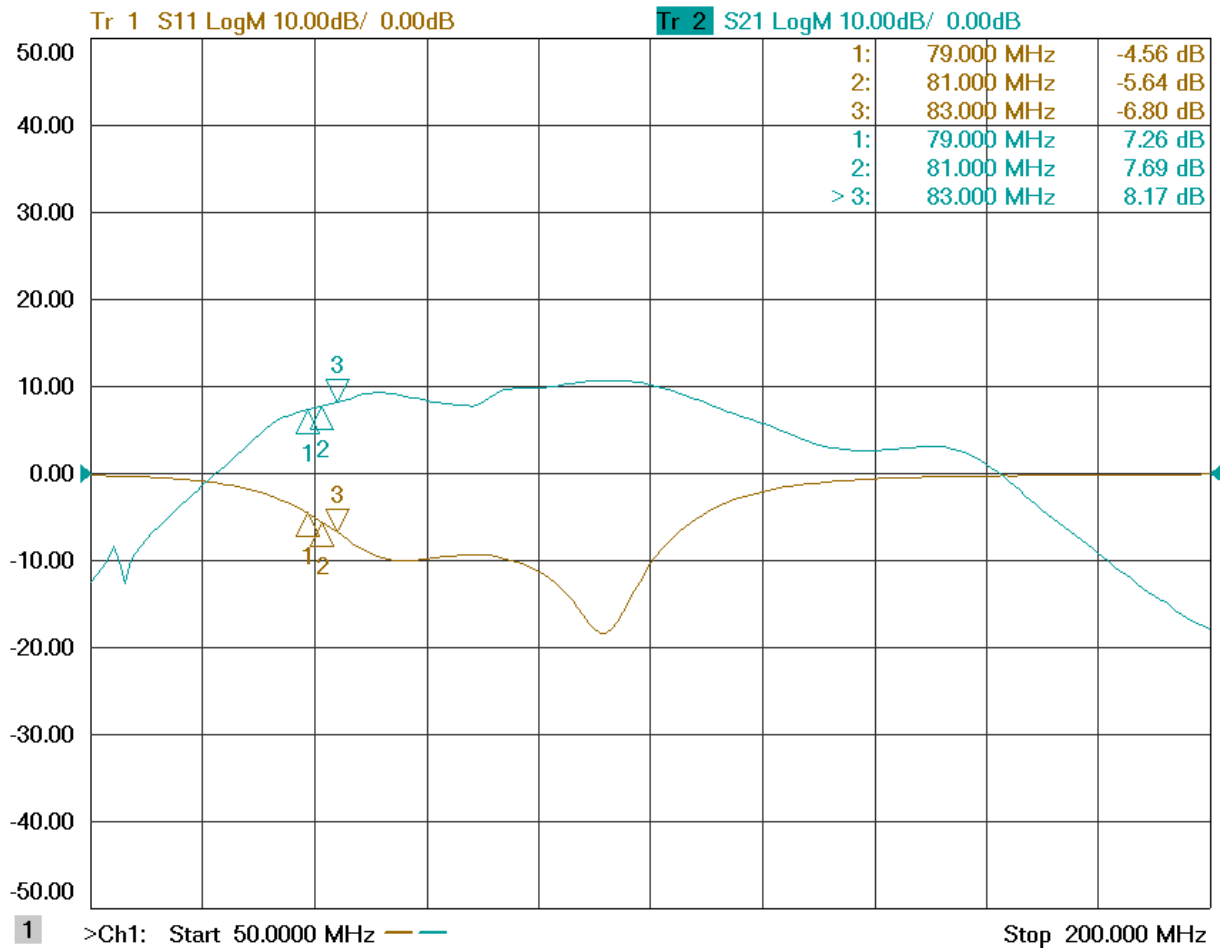


Figure 2. Small Signal results, Vdd=50V, Idq=200mA, Pin=10dBm

9.2 CW Gain Sweeps

Vdd = 50V, Idq=200mA, Frequency=79-85MHz, CW, Pout=P3dB

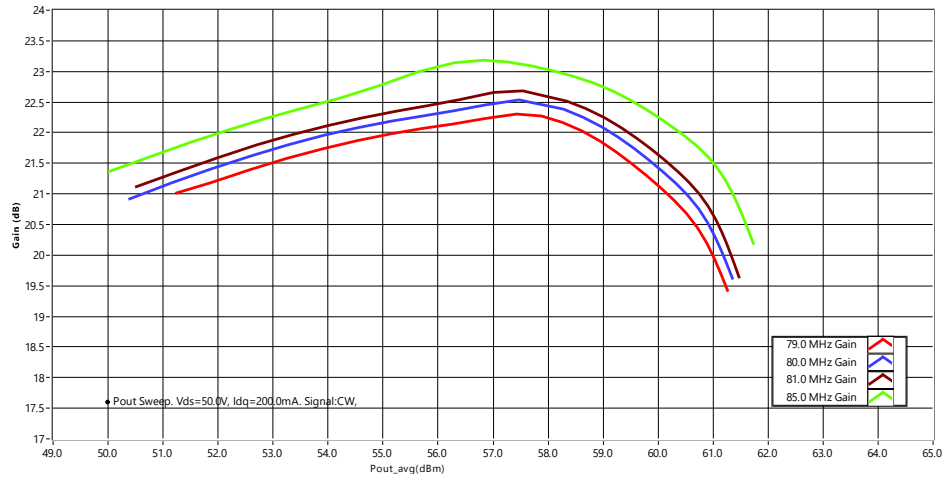


Figure 3. CW Gain(dB) vs Power Out(dBm)

9.3 CW Efficiency Sweeps

Vdd = 50V, Idq=200mA, Frequency=79-85MHz, CW, Pout=P3dB

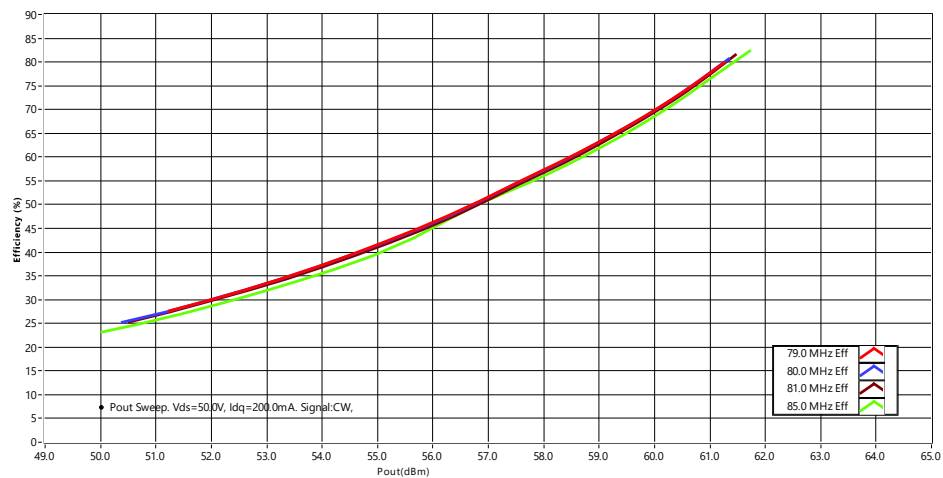


Figure 4. CW Efficiency(%) vs Power Out(dBm)

10 Fixed Power Out Results

10.1 Output Power v Frequency at P1dB

Vdd = 50V, Idq=200mA, Frequency=79-85MHz, Signal:CW, Pout=P1dB

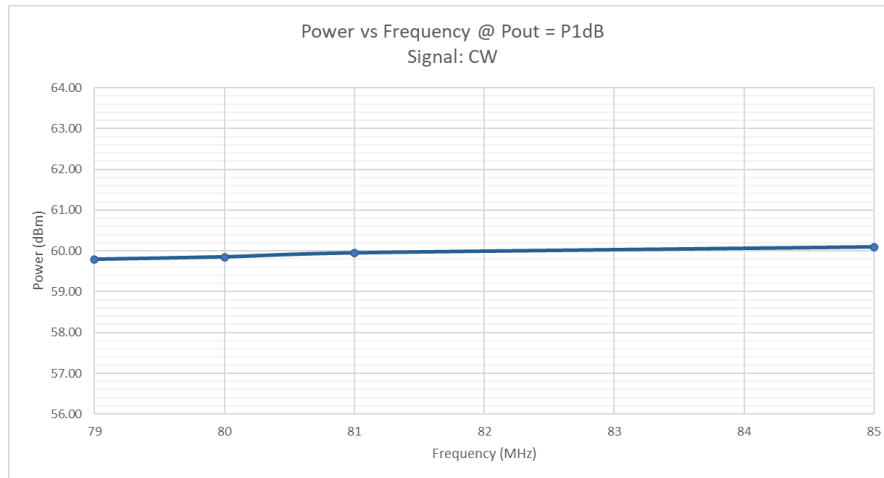


Figure 5. Output Power (dBm) vs Frequency (MHz) at P1dB

10.2 Output Power v Frequency at P3dB

Vdd = 50V, Idq=200mA, Frequency=79-85MHz, Signal:CW, Pout=P3dB

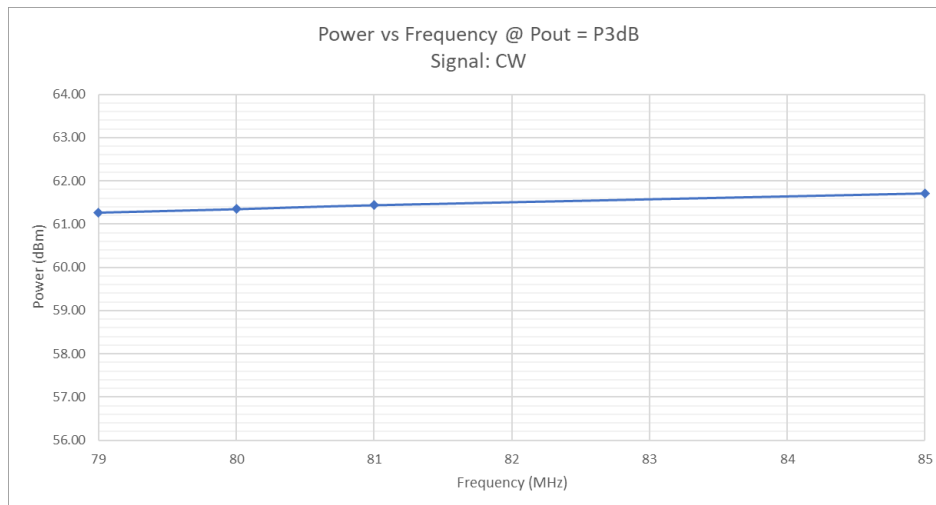


Figure 6. Output Power (dBm) vs Frequency (MHz) at P3dB

10.3 Gain v Frequency at P3dB

Vdd = 50V, Idq=200mA, Frequency=79-85MHz, Signal:CW, Pout=P3dB

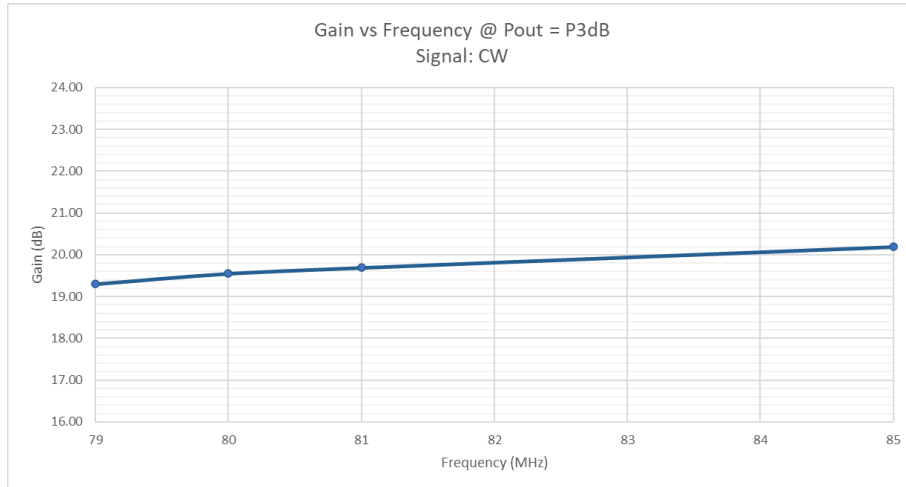


Figure 7. Gain (dB) vs Frequency (MHz) at P3dB

10.4 Efficiency v Frequency at P3dB

Vdd = 50V, Idq=200mA, Frequency=79-85MHz, Signal:CW, Pout=P3dB

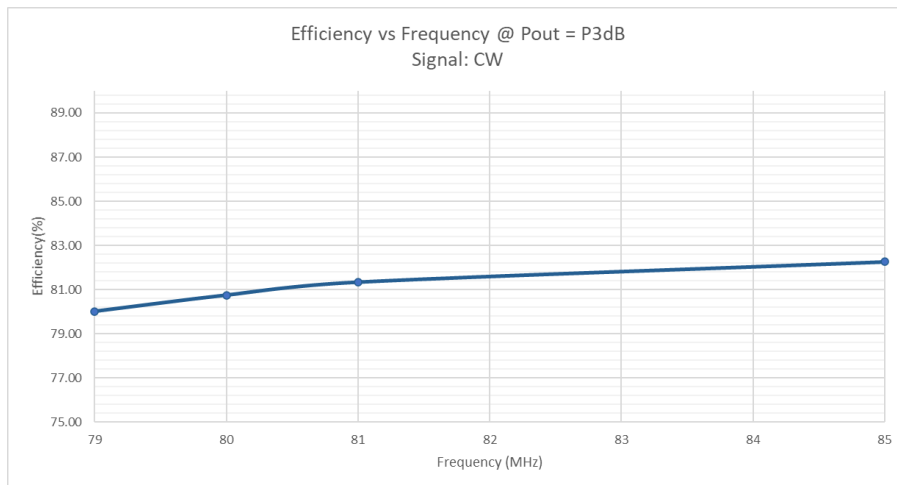


Figure 8. Efficiency (%) vs Frequency (MHz) at P3dB

11.1 Board photograph

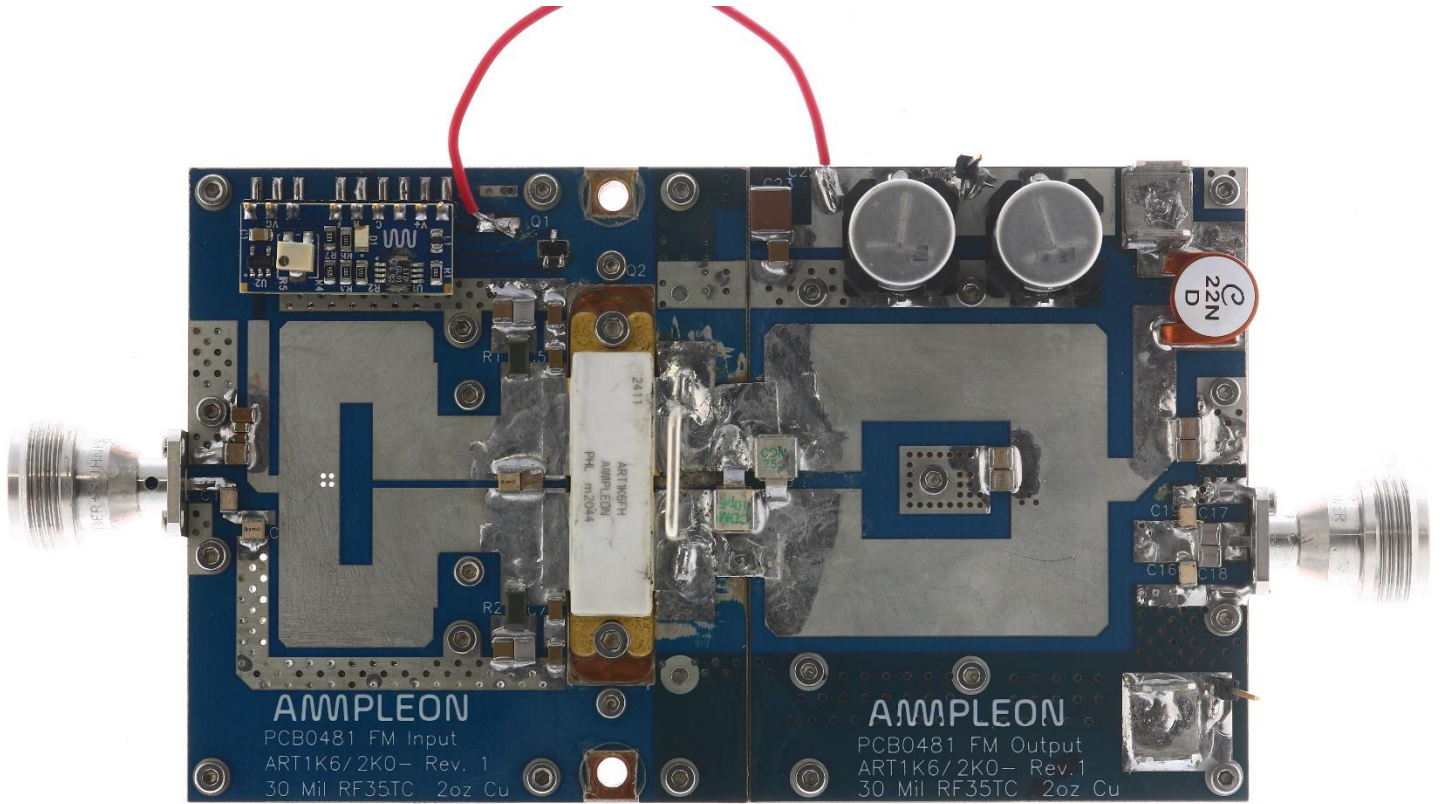


Figure 9. Board Photograph

11.2 Main PCB layout

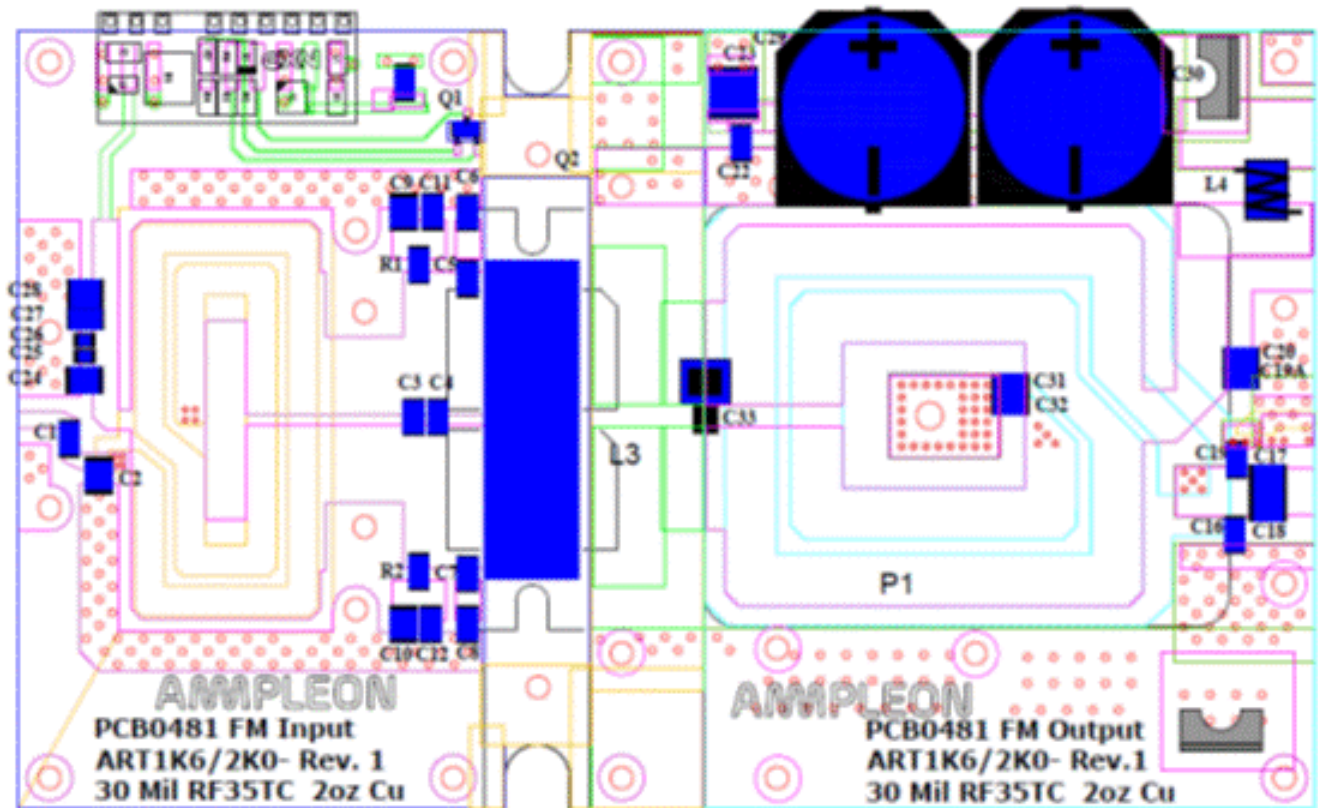


Figure 10. PCB Layout - Board #AR212099

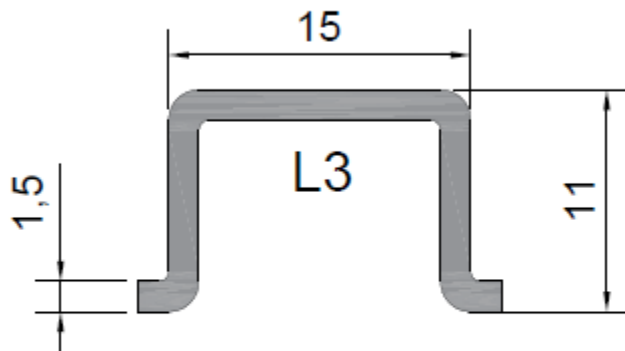
11.3 Bill of Materials

Table 3. BOM

| Designator | Description | Manufacturer | Part # |
|---------------------|-----------------------------------|---------------------|--------------------------|
| Input PCB | 30 mil thk.RF35TC | Avanti | PCB0481 Input Rev0 |
| Output PCB | 30 mil thk.RF35TC | Avanti | PCB0481 Output Rev0 |
| P1 | 0.2" Thick Thermal Gap Filler | Chomerics | Therm-a-gap 976 |
| A1 | LDMOS bias module | Ampleon | CA-330-11 |
| Q1 | 2N2222 NPN Transistor | Fairchild | MMBT2222 |
| Q2 | LDMOS Transistor | Ampleon | ART1K6FH |
| R1,R2 | 5 Ohm ALN50W | IMS | NG3-2010WA5R0J |
| C1 | 43pF | ATC or Passive Plus | 100B or 1111N |
| C2 | 27pF | ATC or Passive Plus | 100B or 1111N |
| C3 | 20pF | ATC or Passive Plus | 100B or 1111N |
| C4 | 330pF | ATC or Passive Plus | 100B or 1111N |
| C5,C6,C7,C8,C21,C27 | 1uF | Murata | GRM31CR72A105KA01L |
| C9,C10 | 100nF | Murata | GRM320R72E104KW |
| C11,C12, | 10nF | TDK | C3225C0G2E103J |
| C16,C19 | 20pF | ATC or Passive Plus | 100B or 1111N |
| C17, C18 | 470pF | ATC or Passive Plus | 100B or 1111N on side |
| C19A,C20,C31,C32 | 1000pF | ATC or Passive Plus | 100B or 1111N |
| C22 | 2.2uF | Murata | GRM32ER72A225KA35L |
| C23 | 10uF | TDK | C5750X7R1H106M |
| C24 | 820pF | Passive Plus | 1111N |
| C25 | 10nF | Generic | 0805' |
| C26 | 100nF | Multicomp | S0805W104K1HRN-P4 |
| C29, C30 | 150 uF, 80V, Electrolytic | Panasonic | EEE-FK1K151AV |
| C33 | 75pF Mica (See Note) | Cornell Dublier | MIN02-002EC750J |
| L3 | silver plated wire 1.5mm diameter | Hairpin Formed | See Figure 11 on Page 13 |
| L4 | 22nH | COILCRAFT | 1212VS-22NM |

Note: The value of C33 has been split into two due to industry shortages in capacitor values.

11.4 L3 Dimensions



Silver plated copper wire
 diameter = 1.5mm

Figure 11. L3 Dimensions

11.5 PCB materials

Table 4. Board Specifications

| Parameter | Value |
|--------------|----------------------------------|
| Manufacturer | Rogers |
| Type | 30RF35 |
| Thickness | 30 mils, 1oz. copper |
| Layers | 2, top/bottom. Bottom all copper |

11.6 Device markings

Table 5. Device Specifications

| Parameter | Value |
|--------------|-----------|
| Manufacturer | Ampleon |
| Device | ART1K6FH |
| Date Code | PHL m2044 |

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