Agilent 5X143C/5X143A
Demo Boards for the ATF-5X143 Series Agilent PHEMT Devices
Applications Bulletin 107

The Agilent Technologies' 5X143C demo board is a general purpose demo board designed for amplifier applications up through several GHz. The demo board as shown in Figure 1 is built on low cost 0.031" thickness FR-4 printed circuit board material. The board makes use of small surface mount inductors, capacitors and resistors. Either 0402 or 0603 components can be used to build the prototype circuits. The individual application notes describe its' use in various LNA applications in the 900 through 2400 MHz frequency range. The demo board can be used with any of the ATF-5XX43 series of devices. The 43 package is the SOT-343 4 lead SC-70 plastic package.

Figure 2 shows a 5X143C demo board with components installed. EF Johnson end launch SMA connectors (p.n. 142-0701-881) are used for input and output connections.

Several application notes make reference to the older 5X143A demo board which has been upgraded to version 5X143C. The improved version offers greater flexibility for the designer during the prototype stage of design. Although Agilent application notes describe typical circuits for specific applications, it is not uncommon for the customer to want to develop a circuit for a slightly different frequency or to use a different circuit topology better suited for their application. The 5X143C demo board provides the flexibility to vary the design topology.

On occasion, the amplifier circuit design may require a resistor and inductor in series with the drain lead. The 5X143A demo board had space for only a single component in series with the drain. The revised 5X143C demo board has places for 2 additional series components if desired. Both spaces have been bridged with etch. When a series component is desired, then the undesired etch can be removed with a sharp knife blade.

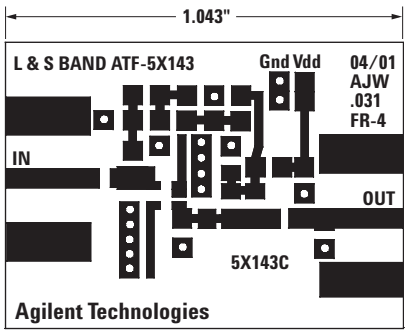

Figure 1. 5X143C Demo Board.

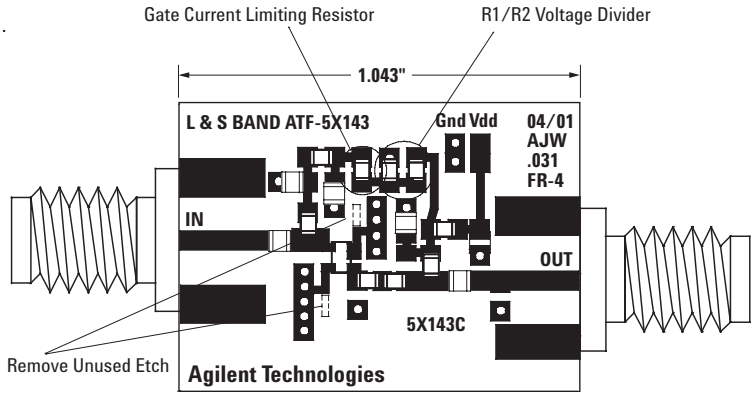

Figure 2. 5X143C Demo Board with Components Installed. Note location of PHEMT bias resistors R1 and R2.

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The gate bias for the PHEMT devices is derived from the resistive voltage divider consisting of R1 and R2 (See Figure 2). Several application notes describe the use of an additional series resistor which is connected between the junction of R1 and R2 and the gate of the device. The series resistor limits gate current when the device is subjected to drive levels approaching P1dB. The effect of this resistor is covered in detail in Agilent Application Note AN 1222. When the values of R1 and R2 are made sufficiently large in value, the series resistor becomes unnecessary and the space normally occupied by the series resistor can be bridged across with a small piece of etch. A simpler two resistor scheme for biasing the PHEMT while still limiting gate current is described in Application Note AN 1299.

One of the advantages of the demo board is the ability to make the amount of source inductance variable. This allows the designer the ability to optimize gain, input and output impedance match and most importantly stability. The effect of source inductance is covered in detail in the application notes. It is also important to remember to cut off any unused etch as shown in Figure 2. On occasion the unused etch acts as an open circuited stub which may contribute to poor amplifier stability.

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Data subject to change.

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