

APPLICATION NOTE #22
AR RF/MICROWAVE INSTRUMENTATION PRODUCTS THAT
PROVIDE 100 V/m CW OR PM AT A DISTANCE OF 1 METER ¹

The Amplifier / Antenna / Cell combinations shown in Table 1 provide various means of generating 100 V/m, CW or Pulse Modulated, inside a TEM Cell, between the elements of an E-field generator, or at a distance of one meter from a radiating antenna, from 10 kHz to 40 GHz. This table is used in conjunction with the enclosed product selection flow chart and system diagrams. The appropriate combination of products is determined by first noting the physical size of the Device Under Test (DUT). The size of the test object determines the appropriate path taken on the flow chart. Follow the path that accommodates the maximum expected DUT size.

As an example, to test a device 14 inches or less on a side across the entire frequency band from 10 kHz to 40 GHz, select items 8, 9, 10, 11, 12, 13 and 14. If the test object is greater than 14 inches, select items 1, 2, 3, 4, 5, 6 and 7.

When testing small objects, a TEM cell offers an economical solution in that it is used in lieu of both a radiating antenna and a shielded enclosure. For a test object 4 inches or less in height, select items 15 and 16. If the DUT is 2 inches or less in height, then items 17 and 18 can be used.

Caution: There are a number of factors that impact the ultimate selection of a power amplifier for immunity testing. Depending upon the actual test configuration, one must plan on cable and connector losses, insertion loss through the test apparatus such as directional couplers, variation in antenna characteristics such as gain and VSWR, and finally VSWR fluctuations due to reflections from the DUT and various room surfaces.

A general rule of thumb that takes these adverse effects into account is to increase the size of the power amplifier by a factor of between 2 to 3. This would accommodate the anticipated system losses of between 3 to 5 dB. In this specific case of 100V/m, if the DUT is small and one of the TEM cells is used, the power amplifiers specified have sufficient margin to account for moderate system losses.

To accurately determine field strength in the area of the DUT, a field monitor such as the AR RF/Microwave Instrumentation model FM7004 and an appropriate field probe are required. Contact the factory for specific recommendations.

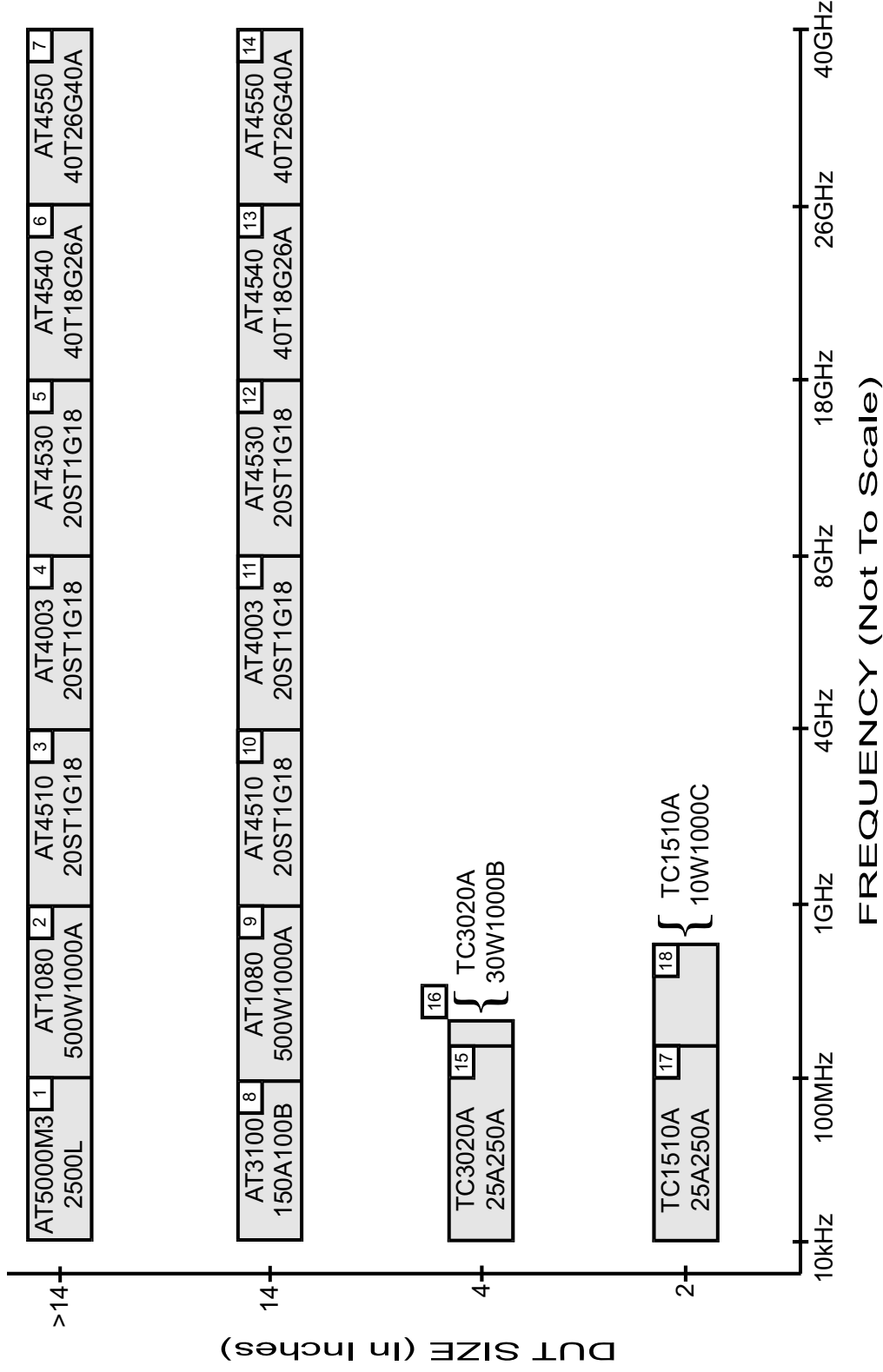
100 V/m CW OR PM AT A DISTANCE OF 1 METER ¹

| ITEM ² | FREQUENCY | AMPLIFIER | ANTENNA or CELL | DUT PLACEMENT |
|-------------------|-------------------|-----------|-----------------|----------------------|
| 1 | 10 kHz – 100 MHz | 2500L | AT5000M3 | 1 meter ³ |
| 2 | 100 MHz – 1 GHz | 500W1000A | AT1080 | 1 meter |
| 3 | 1 GHz – 4 GHz | 20ST1G18 | AT4510 | 1 meter |
| 4 | 4 GHz – 8 GHz | 20ST1G18 | AT4003 | 1 meter |
| 5 | 8 GHz – 18 GHz | 20ST1G18 | AT4530 | 1 meter |
| 6 | 18 GHz – 26 GHz | 40T18G26A | AT4540 | 1 meter |
| 7 | 26 GHz – 40 GHz | 40T26G40A | AT4550 | 1 meter |
| 8 | 10 kHz – 100 MHz | 150A100B | AT3100 | Between Elements |
| 9 | 100 MHz – 1 GHz | 500W1000A | AT1080 | 1 meter |
| 10 | 1 GHz – 4 GHz | 20ST1G18 | AT4510 | 1 meter |
| 11 | 4 GHz – 8 GHz | 20ST1G18 | AT4003 | 1 meter |
| 12 | 8 GHz – 18 GHz | 20ST1G18 | AT4530 | 1 meter |
| 13 | 18 GHz – 26 GHz | 40T18G26A | AT4540 | 1 meter |
| 14 | 26 GHz – 40 GHz | 40T26G40A | AT4550 | 1 meter |
| 15 | 10 kHz – 250 MHz | 25A250A | TC3020A | Center of Cell |
| 16 | 250 MHz – 375 MHz | 30W1000B | TC3020A | Center of Cell |
| 17 | 10 kHz – 250 MHz | 25A250A | TC1510A | Center of Cell |
| 18 | 250 MHz – 750 MHz | 10W1000C | TC1510A | Center of Cell |

Table 1

- ¹ The RF fields generated by the products recommended in this application note are either CW or pulse modulated, and occur at a distance of one meter unless otherwise noted. If the application mandates amplitude modulation, additional amplifier power is required to produce undistorted, linear fields. Call Application Engineering at 800-933-8181 for details.
- ² The Item numbers match the Block numbers on the enclosed Product Selection Flow Chart.
- ³ There is little to no margin below 100 kHz. The DUT may need to be placed closer than 1m at these points.

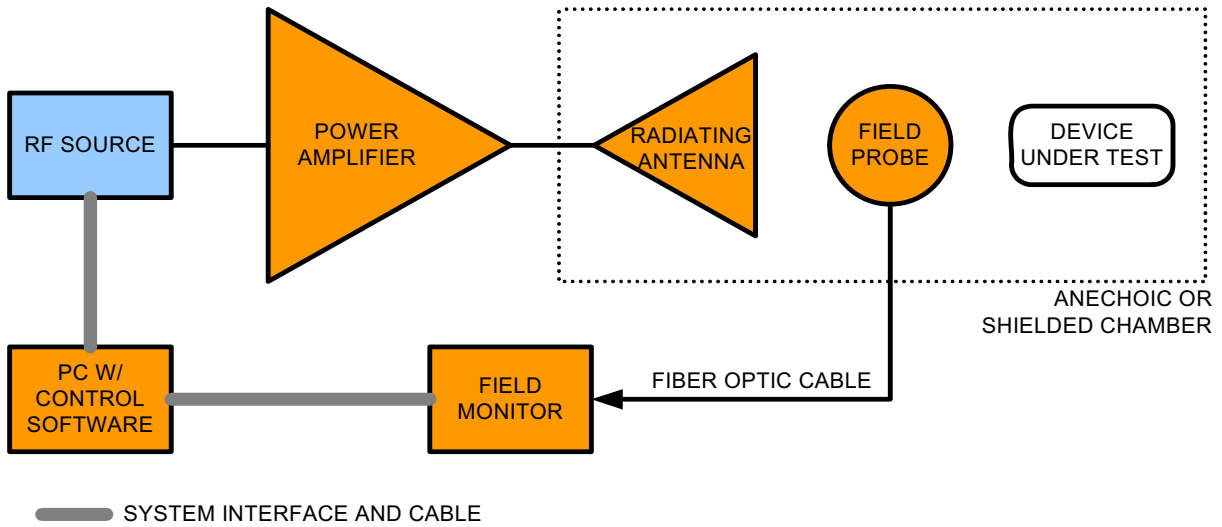
100V/m CW or PM @ 1M* Amplifier/Antenna/Cell Selection Chart



* The numbered cells represent either Amplifier / Antenna or Amplifier / Cell combinations. The actual distance from the field generator to the DUT may vary from 1 meter. See Table 1 for details.

Typical Pre-Compliance Radiated Immunity Test Systems

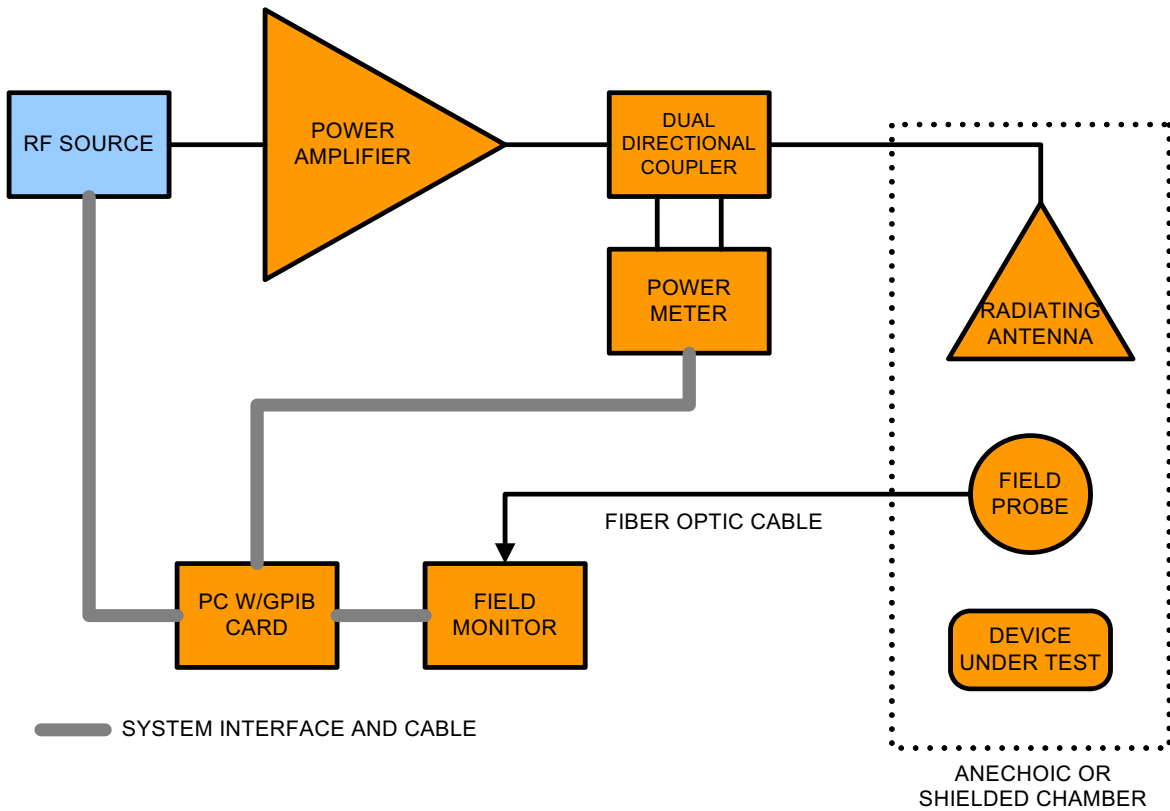
(Use in applications that call for “loop leveled” or “real-time leveled”)



BASIC LOOP LEVELLED SYSTEM

Full Compliance Radiated Immunity Test Systems

(Use in applications that call for “substitution method” testing)



Fully Automated Multi-Band System Full Compliance Radiated Immunity Test Systems

(Use in applications that call for "substitution method" testing)

