

APPLICATION NOTE # 23
AR RF/MICROWAVE INSTRUMENTATION PRODUCTS THAT
PROVIDE 200 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 200 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 9, 10, 11, 12, 13, 14, and 15. If the test object is larger than 14 inches on a side, items 1, 2, 3, 4, 5, 6, 7, and 8 would be appropriate.

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 16 and 17. If the DUT is 2 inches or less in height, then items 18 and 19 can be used.

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.

200 V/m CW OR PM AT A DISTANCE OF 1 METER¹

ITEM ²	FREQUENCY	AMPLIFIER	ANTENNA or CELL	DUT PLACEMENT
1	10 kHz – 25 MHz	2500L	AT3001	Between Elements
2	25 MHz – 220 MHz	2500L	AT2000	1 meter
3	220 MHz – 1 GHz	500W1000A ³	AT4000	1 meter
4	1 GHz – 4 GHz	100S1G4 ⁴	AT4510	1 meter
5	4 GHz – 8 GHz	200T4G8 ⁴	AT4003	3 meters
6	8 GHz – 18 GHz	200T8G18A	AT4004	1 meter
7	18 GHz – 26 GHz	40T18G26A	AT4540	1 meter
8	26 GHz – 40 GHz	40T26G40A	AT4550	1 meter
9	10 kHz – 100 MHz	250A250A	AT3100	Between Elements
10	100 MHz – 1 GHz	1000W1000C	AT1080	1 meter
11	1 GHz – 4 GHz	100S1G4 ⁴	AT4510	1 meter
12	4 GHz – 8 GHz	200T4G8 ⁴	AT4003	1 meter
13	8 GHz – 18 GHz	200T8G18A	AT4004	1 meter
14	18 GHz – 26 GHz	40T18G26A	AT4540	1 meter
15	26 GHz – 40 GHz	40T26G40A	AT4550	1 meter
16	10 kHz – 100 MHz	150A100B	TC3020A	Center of Cell
17	100 MHz – 375 MHz	150W1000	TC3020A	Center of Cell
18	10 kHz – 250 MHz	75A250A	TC1510A	Center of Cell
19	250 MHz – 750 MHz	30W1000B	TC1510A	Center of Cell

Table 1

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 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 200V/m, if the DUT is small and one of the TEM cells is used, the power amplifiers specified have sufficient margin.

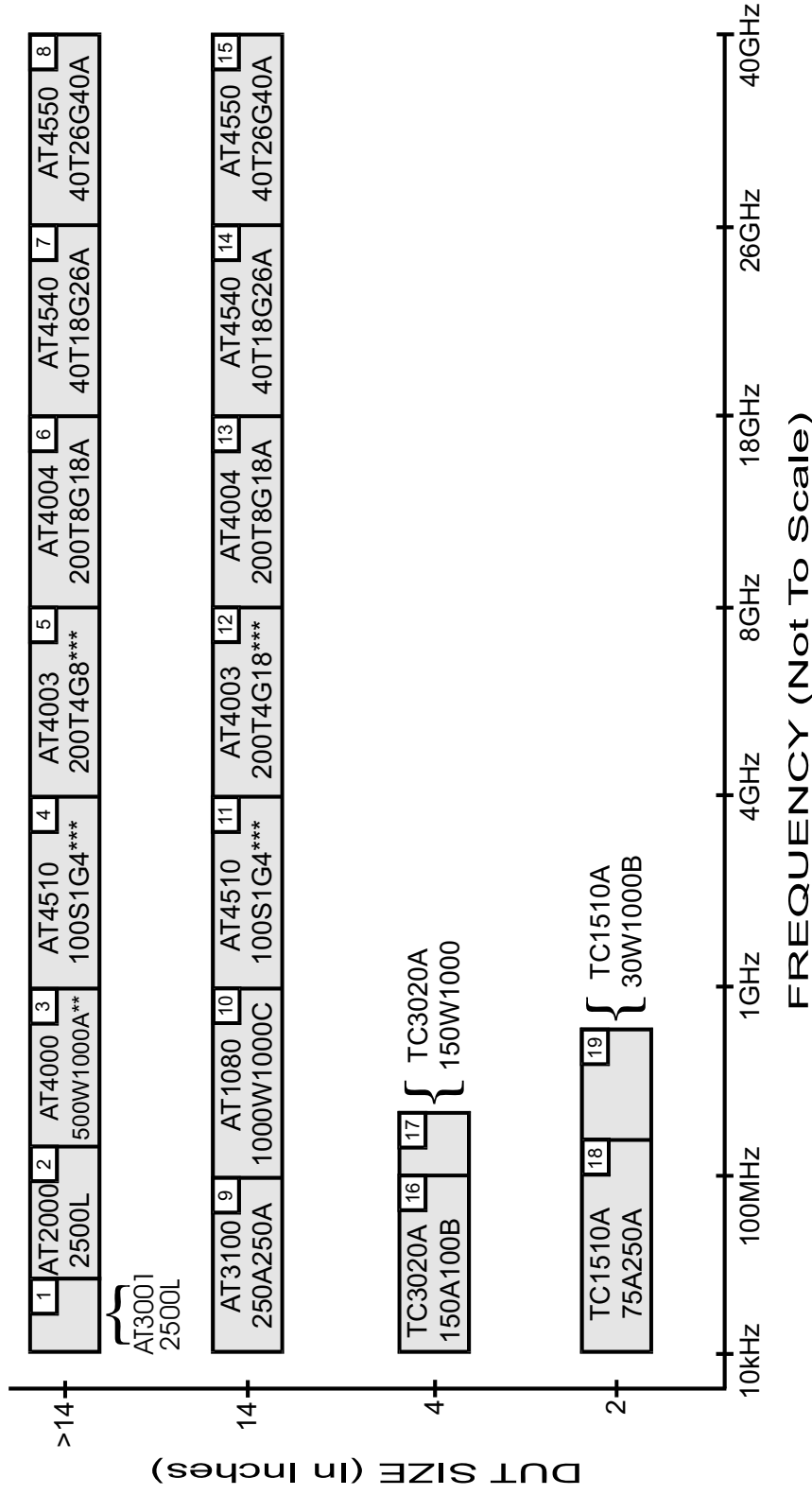
¹ The RF fields generated by the products recommended in this application note are either CW or pulse modulated, and occur at a distance of one meter unless otherwise noted. If the application mandates amplitude modulation, additional amplifier power is required. Call Application Engineering at 800-933-8181 for details.

² The Item numbers match the Block numbers on the enclosed Product Selection Flow Chart.

³ 500 watts at 200MHz provides no margin for system losses. When conducting radiated immunity tests where losses are encountered, either the DUT may need to be placed closer than 1m at these low frequencies or alternatively, one can opt for more power. In this case, a 1000W1000C power amplifier is recommended.

⁴ Alternative: Substitute a 200T1G3A for the 100S1G4 and a 200T2G8A for the 200T4G8.

200V/m CW or PM @ 1M* Amplifier/Antenna/Cell Selection Chart



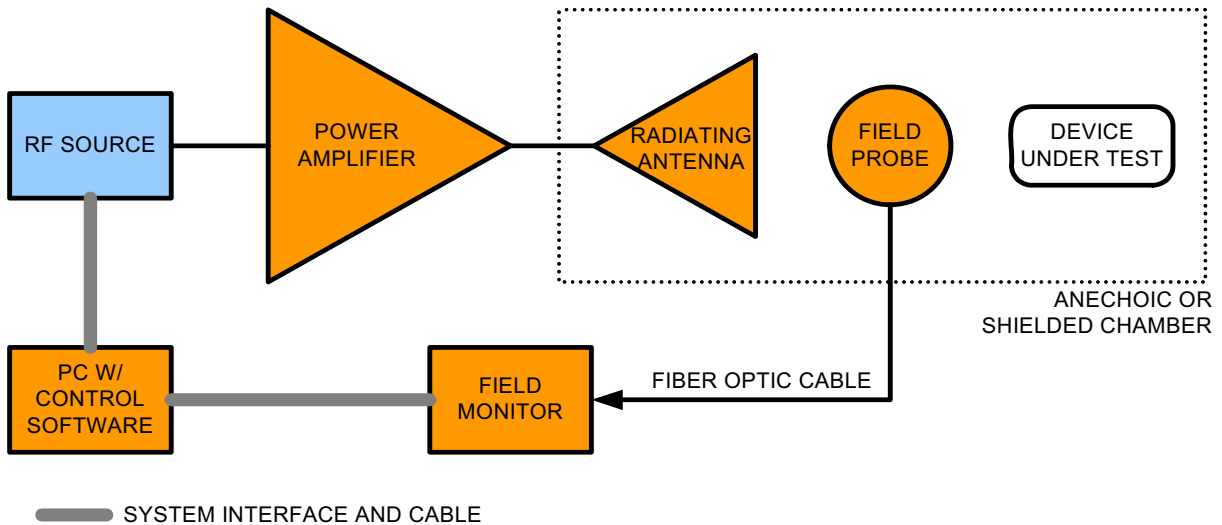
* The numbered cells represent either Amplifier / Antenna or Amplifier / Cell combinations. The actual distance from the field generator to the DUT may vary from 1 meter. See Table 1 for details.

** May require the 1000W1000C at the low frequency end (220MHz).

*** Alternative: Substitute a 200T1G3A for the 100S1G4 and a 200T2G8A for the 200T4G8.

Typical Pre-Compliance Radiated Immunity Test Systems

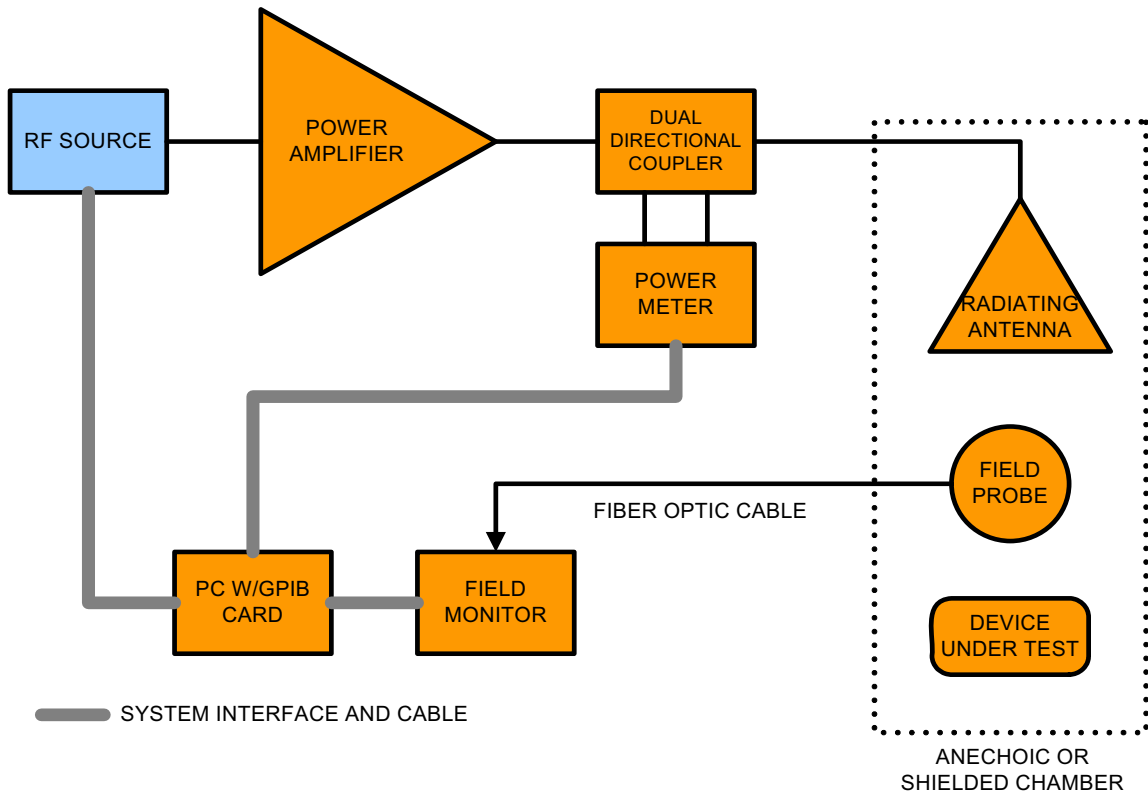
(Use in applications that call for “loop leveled” or “real-time leveled”)



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)

