

# C4220 Specifications<sup>1</sup>



## Primary Specifications

|                                                 |                         |
|-------------------------------------------------|-------------------------|
| Impedance                                       | 50 Ohm                  |
| Test port connector                             | NMD 3.5 mm Male         |
| Number of test ports                            | 2                       |
| Frequency extender compatible                   | Yes; CobaltFx (2 ports) |
| Frequency range                                 | 1 kHz to 20 GHz         |
| Full CW Frequency                               | $\pm 2 \times 10^6$     |
| Frequency setting resolution                    | 1 Hz                    |
| Number of measurement points                    | 2 to 500,001            |
| Measurement bandwidths with 1/1.5/2/3/5/7 steps | 1 Hz to 2 MHz           |
| Dynamic range                                   |                         |
| 100 kHz to 1 MHz; 1 Hz IF BW                    | 120 dB                  |
| 1 MHz to 20 GHz; 1 Hz IF BW                     | 143 dB/130 dB, typ.     |
| Time per point (Typ.)                           | 12 $\mu$ sec            |
| Port switchover time (Typ.)                     | 0.2 msec                |

## Effective System Data

|                                 |         |
|---------------------------------|---------|
| Effective directivity           |         |
| 100 kHz to 10 GHz               | 46 dB   |
| 10 GHz to 20 GHz                | 42 dB   |
| Effective source match          |         |
| 100 kHz to 10 GHz               | 40 dB   |
| 10 GHz to 20 GHz                | 38 dB   |
| Effective load match            |         |
| 100 kHz to 10 GHz               | 46 dB   |
| 10 GHz to 20 GHz                | 42 dB   |
| Effective reflection tracking   |         |
| 100 kHz to 10 GHz               | 0.05 dB |
| 10 GHz to 20 GHz                | 0.10 dB |
| Effective transmission tracking |         |
| 100 kHz to 10 GHz               | 0.20 dB |
| 10 GHz to 20 GHz                | 0.05 dB |

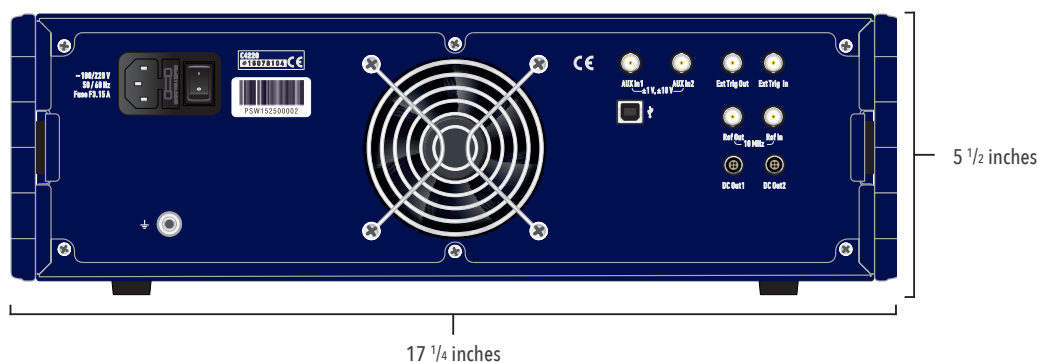
## Measurement Accuracy

| Transmission <sup>2</sup>           | (Magnitude/Phase)             |
|-------------------------------------|-------------------------------|
| 100 kHz to 1 MHz                    |                               |
| -40 dB to 0 dB                      | 0.2 dB/2°                     |
| -60 dB to -40 dB                    | 0.3 dB/3°                     |
| -80 dB to -60 dB                    | 1.1 dB/7°                     |
| 1 MHz to 20 GHz                     |                               |
| 0 dB to 10 dB                       | 0.2 dB/2°                     |
| -60 dB to 0 dB                      | 0.1 dB/1°                     |
| -80 dB to -60 dB                    | 0.2 dB/2°                     |
| -100 dB to -80 dB                   | 1.0 dB/6°                     |
| Reflection <sup>2</sup>             | (Magnitude/Phase)             |
| 100 kHz to 10 GHz                   |                               |
| -15 dB to 0 dB                      | 0.4 dB/3°                     |
| -25 dB to -15 dB                    | 1.0 dB/6°                     |
| -35 dB to -25 dB                    | 3.0 dB/20°                    |
| 10 GHz to 20 GHz                    |                               |
| -15 dB to 0 dB                      | 0.5 dB/4°                     |
| -25 dB to -15 dB                    | 1.5 dB/10°                    |
| -35 dB to -25 dB                    | 5.5 dB/30°                    |
| Trace noise magnitude (3 kHz IF BW) |                               |
| 100 kHz to 1 MHz                    | 0.02 dB RMS                   |
| 1 MHz to 9 GHz                      | 0.001 dB RMS                  |
| Temperature dependence              | 0.020 dB/°C, 0.010 dB/°C typ. |

[1] All specifications subject to change without notice.

[2] At 23 °C  $\pm$  5 °C after 40 minutes warmup time, with  $\pm$  1 °C ambient deviation from calibration temperature, at 0 dBm output power

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## Test Port

| Directivity (without system error correction) |       |
|-----------------------------------------------|-------|
| 100 kHz to 1 MHz                              | 10 dB |
| 1 MHz to 10 GHz                               | 20 dB |
| 10 GHz to 20 GHz                              | 15 dB |

## Test Port Output

| Match (without system error correction) |                    |
|-----------------------------------------|--------------------|
| 100 kHz to 1 MHz                        | 10 dB              |
| 1 MHz to 20 GHz                         | 15 dB              |
| Power Range                             | -60 dBm to +10 dBm |
| Power Accuracy                          | ±1.5 dB            |
| Power Resolution                        | 0.050 dB           |
| Harmonic distortion (Power out 0 dBm)   | -25 dBc            |
| Non-harmonic spurious (Power out 0 dBm) | -30 dBc            |

## Test Port Input

| Match (without system error correction) |             |
|-----------------------------------------|-------------|
| 100 kHz to 1 MHz                        | 10 dB       |
| 1 MHz to 20 GHz                         | 15 dB       |
| Damage Level                            | +26 dBm     |
| Damage DC Voltage                       | 35 V        |
| Noise Floor                             |             |
| 100 kHz to 1 MHz                        | -110 dBm/Hz |
| 1 MHz to 20 GHz                         | -133 dBm/Hz |

## Measurement Speed

| Number of points (IF bandwidth 1 MHz) | Uncorrected | 2-Port Calibration |
|---------------------------------------|-------------|--------------------|
| 51                                    | 7.3 ms      | 4.4 ms             |
| 201                                   | 4.2 ms      | 8.2 ms             |
| 401                                   | 6.5 ms      | 12.8 ms            |
| 1601                                  | 20.5 ms     | 40.8 ms            |

## External Reference Input

|                                      |                 |
|--------------------------------------|-----------------|
| Connector type                       | BNC Female      |
| External reference frequency         | 10 MHz          |
| Input level                          | -2 dBm to 4 dBm |
| Input impedance at <<Ref IN 10 MHz>> | 50 Ohm          |

## External Reference Output

|                                                   |                |
|---------------------------------------------------|----------------|
| <<OUT 10 MHz>> connector type                     | BNC Female     |
| Output reference signal level at 50 Ohm impedance | 0 dBm to 2 dBm |

## External Trigger Input

|                                    |                      |
|------------------------------------|----------------------|
| Type                               | BNC, Female          |
| Input level low threshold voltage  | 0.8 V                |
| Input level high threshold voltage | 2.7 V                |
| Input level range                  | 0 to 5 V             |
| Pulse width                        | 2 µsec               |
| Polarity                           | Positive or Negative |

## External Trigger Output

|                                     |                      |
|-------------------------------------|----------------------|
| Type                                | BNC, Female          |
| Maximum output current              | 20 mA                |
| Output level low threshold voltage  | 0.4 V                |
| Output level high threshold voltage | 3.0 V                |
| Polarity                            | Positive or Negative |

## System & Power

|                       |                                |
|-----------------------|--------------------------------|
| Operating temperature | 5°C to 40°C (41°F to 104°F)    |
| Storage temperature   | -50°C to 70°C (-58°F to 158°F) |
| Humidity              | 90% at 25°C (77°F)             |
| Atmospheric pressure  | 84.0 kPa to 106.7 kPa          |
| Power Supply          | 110-240 V, 50-60 Hz            |
| Power Consumption     | 145.0 W                        |
| Weight                | 14.0 kg/494 oz                 |

## Factory Adjustment

|                                         |         |
|-----------------------------------------|---------|
| Recommended Factory Adjustment Interval | 3 Years |
|-----------------------------------------|---------|