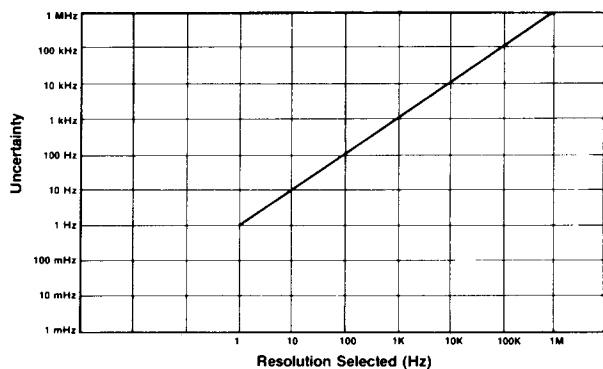
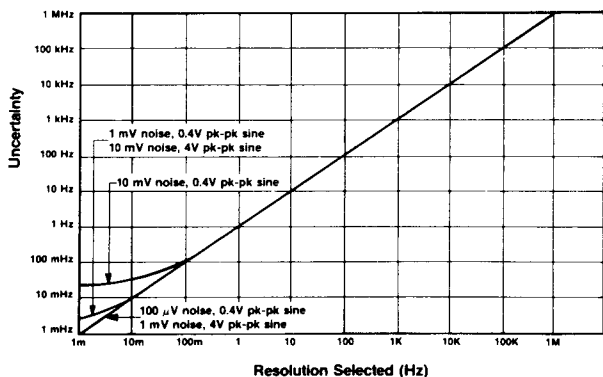


Table 1-1. Model 5350B/5351B/5352B Specifications

INPUT CHARACTERISTICS			
INPUT 1:	HP 5350B	HP 5351B	HP 5352B
<b>Frequency Range:</b>	500 MHz – 20.0 GHz	500 MHz – 26.5 GHz	500 MHz – 46 GHz
<b>Sensitivity:</b> Full Operating Environment 500 MHz to 12.4 GHz 12.4 GHz to 20.0 GHz 20.0 GHz to 26.5 GHz 26.5 GHz to 40 GHz  @ 25°C (typical) 500 MHz to 12.4 GHz 12.4 GHz to 20.0 GHz 20.0 GHz to 26.5 GHz 26.5 GHz to 40 GHz	-32 dBm -27 dBm N/A  -40 dBm -35 dBm N/A	-32 dBm -27 dBm -16 dBm  -40 dBm -35 dBm -28 dBm N/A	-25 dBm -25 dBm -25 dBm dBm = 0.741 f(GHz) – 44.6  -30 dBm -30 dBm -30 dBm dBm = 0.741 f(GHz) – 49.6
<b>Maximum Input:</b>	+7 dBm	+7 dBm	+7 dBm
<b>Damage Level:</b>	+25 dBm, peak	+25 dBm, peak	+25 dBm, peak
<b>Impedance:</b>	50Ω nominal	50Ω nominal	50Ω nominal
<b>Connector:</b>	Precision Type N female	APC –3.5 male with collar, SMA compatible	
<b>SWR:</b> 500 MHz – 10 GHz 10 GHz – 20 GHz 20 GHz – 26.5 GHz 26.5 GHz – 40 GHz	<2:1 typical <3>1 typical N/A N/A	<2:1 typical <3:1 typical <3:1 typical N/A	<2:1 typical <3:1 typical <3:1 typical <3.5:1 typical
<b>Coupling:</b>	dc to 50Ω termination, ac to instrument		
<b>Accuracy:</b>	±1 LSD ± time base error × frequency (See Graphs 1, 2, 3)		
<b>Residual Stability:</b>	When counter and source use common 10 MHz time base or counter uses external higher stability time base, 1 LSD rms typical for resolution 1 Hz – 1 kHz at 25°C; LSD = least significant digit.		
<b>Resolution:</b>	Selectable 1 Hz to 1 MHz		

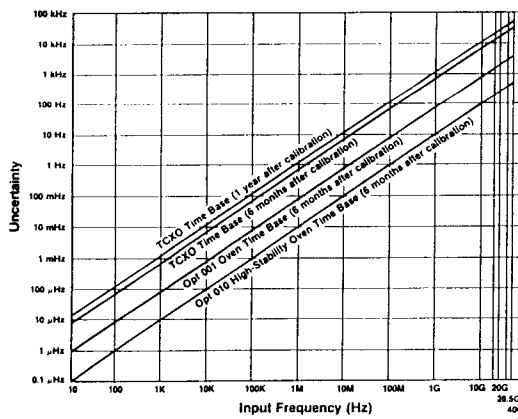


GRAPH 1. Input 1 Uncertainty Due to Resolution Selected



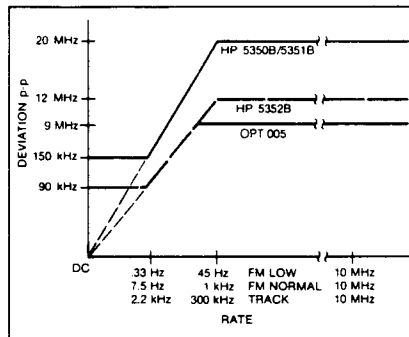
GRAPH 2. Input 2 Uncertainty Due to Trigger Error and Resolution Selected.

NOTE:  
Input 1 accuracy = resolution uncertainty (Graph 1) + time base uncertainty (Graph 3).  
Input 2 accuracy = resolution and trigger uncertainty (Graph 2) + time base uncertainty (Graph 3).



GRAPH 3. Uncertainty Due to Time Base Error.

Time Base Error can be reduced by calibrating the time base more frequently, or by using a time base with a better aging rate.



GRAPH 4. FM Rate Tolerance.

Table 1-1. Model 5350B/5351B/5352B Specifications (Continued)

INPUT 1: HP 5350B/5351B/5352B	TCXO TIME BASE	OPTIONAL HIGH STABILITY TIME BASE OPTION 010 <sup>9</sup>																
<p><b>Modes of Operation:</b> Automatic: Counter automatically acquires and displays highest level signal within sensitivity range. Manual: Center frequency must be entered to within ±20 MHz of input frequency; ±3 MHz worst case below 1 GHz; increases measurement and data output rate.</p> <p><b>Automatic Amplitude Discrimination:</b> Automatically measures the largest of all signals present, providing that signal is &gt;6 dB (typical) above any signal within 500 MHz; &gt;20 dB (typical) above any signal within 500 MHz to 20 (40) GHz.</p> <p><b>FM Tolerance (See Graph 4):</b></p> <table border="1" data-bbox="154 625 574 758"> <tr> <td><b>Automatic Mode:</b></td> <td>20 MHz p-p 12 MHz p-p 9 MHz p-p</td> <td>HP 5350B/51B HP 5352B HP 5352B, Opt 005</td> </tr> <tr> <td><b>Manual Mode:</b></td> <td>60 MHz p-p 55 MHz p-p 55 MHz p-p</td> <td>HP 5350B/51B HP 5352B HP 5352B, Opt 005</td> </tr> </table> <p><b>Tracking Speed:</b> Fast-Acquisition Track; 1 GHz/s. Normal FM Rate: 1 MHz/s. Low FM Rate: 80 kHz/s.</p> <p><b>Acquisition Time:</b> Automatic Mode: Fast-Acquisition Track: &lt;60 ms. Normal FM Rate: &lt;125 ms Low FM Rate: &lt;1.25s. Manual Mode: &lt;20 ms</p> <p><b>AM Tolerance:</b> Any modulation index provided the minimum signal level is not less than the sensitivity specification.</p> <p><b>Gate time:</b> For 1 Hz resolution</p> <table border="1" data-bbox="154 1045 574 1150"> <tr> <td>500 MHz - 5.7 GHz</td> <td>200 ms</td> </tr> <tr> <td>5.7 - 11.3 GHz</td> <td>400 ms</td> </tr> <tr> <td>11.3 - 16.9 GHz</td> <td>600 ms</td> </tr> <tr> <td>16.9 - 22.5 GHz</td> <td>800 ms</td> </tr> <tr> <td>&gt;22.5 GHz</td> <td>1000 ms</td> </tr> </table>	<b>Automatic Mode:</b>	20 MHz p-p 12 MHz p-p 9 MHz p-p	HP 5350B/51B HP 5352B HP 5352B, Opt 005	<b>Manual Mode:</b>	60 MHz p-p 55 MHz p-p 55 MHz p-p	HP 5350B/51B HP 5352B HP 5352B, Opt 005	500 MHz - 5.7 GHz	200 ms	5.7 - 11.3 GHz	400 ms	11.3 - 16.9 GHz	600 ms	16.9 - 22.5 GHz	800 ms	>22.5 GHz	1000 ms	<p><b>Crystal Frequency:</b> 10 MHz <b>Stability:</b> Aging Rate: &lt;1 × 10<sup>-7</sup> per month. Short Term: &lt;1 × 10<sup>-9</sup> for 1 s averaging time. Temperature: &lt;1 × 10<sup>-8</sup>, 0-50°, if referenced to +25°C and set to the offset frequency. Line Variation: &lt;1 × 10<sup>-7</sup> for 10% change from nominal. <b>Time Base Output:</b> 10 MHz and 1 MHz, &gt; 2.4V square wave ac coupled into 1 kΩ; &gt;1.5V p-p into 50Ω; available from rear panel BNC connectors whenever the instrument has ac power connected. <b>External Time Base:</b> 1, 2, 5 or 10 MHz, 0.7V min, to 8V max p-p; sine wave or square wave into &gt;1kΩ shunted by &lt;30pF, via rear panel BNC connector. External reference automatically selected when signal is present, an indicator (▼) appears in the display. TCXO power turned off, oven heater on, oscillator signal disconnected.</p>	<p><b>Crystal Frequency:</b> 10 MHz <b>Stability:</b> Long Term (Aging Rate): A. &lt;5 × 10<sup>-10</sup> per day after 24-hour warm-up when: 1. oscillator off-time was less than 24 hours. 2. oscillator aging rate was &lt;5 × 10<sup>-10</sup> per day prior to turn off. B. &lt;5 × 10<sup>-10</sup> per day in less than 30 days of continuous operation for off-time greater than 24 hours. C. &lt;1 × 10<sup>-7</sup> per year for continuous operation. <b>Temperature:</b> &lt;7 × 10<sup>-9</sup>, 0-50°C <b>Line Variation:</b> &lt;1 × 10<sup>-10</sup> for 10% change from nominal <b>Warmup:</b> Same as Warmup for Opt 001</p>
<b>Automatic Mode:</b>	20 MHz p-p 12 MHz p-p 9 MHz p-p	HP 5350B/51B HP 5352B HP 5352B, Opt 005																
<b>Manual Mode:</b>	60 MHz p-p 55 MHz p-p 55 MHz p-p	HP 5350B/51B HP 5352B HP 5352B, Opt 005																
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5.7 - 11.3 GHz	400 ms																	
11.3 - 16.9 GHz	600 ms																	
16.9 - 22.5 GHz	800 ms																	
>22.5 GHz	1000 ms																	
<p><b>INPUT 2: HP 5350B/5351B/5352B</b></p>	<p><b>OPTIONAL OVEN TIME BASE OPTION 001<sup>8</sup></b></p>	<p><b>GENERAL</b></p>																
<p><b>Frequency Range:</b> 10 Hz to 525 MHz <b>Mode of Operation:</b> 50Ω: 10 MHz to 525 MHz 1 MΩ: 10 Hz to 80 MHz</p> <p><b>Sensitivity:</b> Full Operating Environment: 50Ω: 10 MHz to 525 MHz, 25 mV rms. 1 MΩ: 10 Hz to 80 MHz, 25 mV rms @ 25°C (typical): 50Ω: 10 MHz to 525 MHz, 15 mV rms. 1 MΩ: 10 Hz to 80 MHz, 15 mV rms.</p> <p><b>Gate Time = 1/Resolution</b> 1 ms minimum. <b>Resolution:</b> selectable 1 Hz to 1 MHz <b>High Resolution:</b> 1 MΩ mode: 0.001 Hz for 100 kHz input; 0.01 Hz for &lt;1 MHz input; 0.1 Hz for &lt;10 MHz input; 1 Hz for &gt;10 MHz input 1 second gate.</p> <p><b>Accuracy:</b> ± 1 LSD ± <math>\left( \frac{1.4 \times \text{Trigger Error}^{(1)}}{\text{Gate Time}} \pm \text{Time base error} \right) \times \text{Freq.}</math></p> <p>(See graphs 1, 2, and 3)</p> <p><b>Impedance:</b> Selectable: 1 MΩ nominal shunted by &lt;70 pF or 50Ω nominal.</p> <p><b>Coupling:</b> ac <b>Connector:</b> Replaceable fuse, Type BNC female.</p> <p><b>Maximum input:</b> 50Ω + 10 dBm; 1 MΩ 1V rms</p> <p><b>Damage Level:</b> 50Ω or 1 mΩ dc - 5 kHz: 250V (dc + ac peak); &gt;5 kHz: 5.5V rms (+28 dBm) + 1.25 × 10<sup>6</sup> V rms/FREQ.</p> <p><b>Panel Label:</b> 5.5 V rms (+28 dBm)</p>	<p><b>Crystal Frequency:</b> 10 MHz <b>Stability:</b> Aging Rate: Same as Long Term Aging Rate - Opt 010 Short Term: &lt;1 × 10<sup>-10</sup> for 1 s average. <b>Temperature:</b> &lt;7 ± 10<sup>-9</sup>, 0° - 50°C <b>Line Variation:</b> &lt;1 × 10<sup>-10</sup> for 10% change from nominal. <b>Warmup:</b> Within 5 × 10<sup>-9</sup> of final value (see below) 10 min. after turn-on when: 1. oscillator is operated in a 25°C environment with 20 Vdc Oven Supply voltage applied. 2. oscillator off-time was less than 24 hours. 3. oscillator aging rate was &lt;5 × 10<sup>-10</sup> per day prior to turn-off. Final value is defined as oscillator frequency 24 hours after turn-on.</p>	<p><b>Display:</b> Segmented 24-character alpha-numeric LCD with 24 annunciators (backlighted); lockout (see Diagnostics) <b>Keyboard:</b> Set up stored in STBY mode; lockout (See Diagnostics). <b>Self-Check:</b> Tests for correct circuit operation using LO frequency divided by ten. <b>Diagnostics:</b> Front panel or HP-IB selectable, Display and Keyboard Lockout, Service Diagnostics and User Information. <b>Data Output:</b> Over HP-IB bus, varies with Frequency and Resolution. <b>Automatic Mode:</b> 100 readings per second. <b>Manual Mode:</b> 120 readings per second. 10 kHz resolution, no math functions "DUMP MODE". <b>Math Functions:</b> Result = measurement × scale + offset. Offset: Measurement is offset by entered value. Scale: Measurement is multiplied by entered value. Smooth: Displayed resolution is determined using exponential averaging; Displays only stable digits. <b>Sample Rate:</b> Variable from less than 50 ms between measurements to HOLD, which holds the display indefinitely or until Trigger occurs. <b>Display Rate:</b> 5/s, 1 kHz resolution. <b>Overload Indication:</b> "OVERLOAD" A user message; external pad or signal attenuation should be used to avoid damage. <b>Sleep Mode:</b> Input 1 emissions reduced to &lt;-70 dBm typical when sleep mode or input 2 is selected. <b>IF Output:</b> Rear panel BNC provides 30-110 MHz down-converted microwave signal at &gt;-20 dBm into 50Ω, ac coupled. <b>HP-IB:</b> Functions and diagnostics are programmable; address settable from front panel. Default switches on rear panel; Teach/Learn programming; IEEE 728 compatible command structure; Function subset SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT1, CO, EI. Reset/Local: returns to local control. <b>Operating Temperature:</b> 0°C to 50°C. <b>Power Requirements:</b> 100 VA max. <b>Line Select:</b> 100V (90-105 VAC rms; 47.5-440 Hz) 115/120V (104-126 VAC rms; 47.5-440 Hz). 220V (198 - 231 VAC rms; 47.5 - 66 Hz) 230/240V (207-252 VAC rms; 47.5-66 Hz). <b>Accessories Furnished:</b> Power cord, manual. <b>Size:</b> D/133 mmH × 425.5 mmW × 358 mmD (5 1/4 in. H × 16.75 in. W × 14 in. D) <b>Weight:</b> 11 kg (24 lb)</p>																
<p><b>INPUT 2: HP 5350B/5351B/5352B</b></p>	<p><b>OPTIONAL REAR PANEL INPUTS OPTION 002<sup>2</sup></b></p>	<p><b>GENERAL</b></p>																
<p><b>Frequency Range:</b> 10 Hz to 525 MHz <b>Mode of Operation:</b> 50Ω: 10 MHz to 525 MHz 1 MΩ: 10 Hz to 80 MHz</p> <p><b>Sensitivity:</b> Full Operating Environment: 50Ω: 10 MHz to 525 MHz, 25 mV rms. 1 MΩ: 10 Hz to 80 MHz, 25 mV rms @ 25°C (typical): 50Ω: 10 MHz to 525 MHz, 15 mV rms. 1 MΩ: 10 Hz to 80 MHz, 15 mV rms.</p> <p><b>Gate Time = 1/Resolution</b> 1 ms minimum. <b>Resolution:</b> selectable 1 Hz to 1 MHz <b>High Resolution:</b> 1 MΩ mode: 0.001 Hz for 100 kHz input; 0.01 Hz for &lt;1 MHz input; 0.1 Hz for &lt;10 MHz input; 1 Hz for &gt;10 MHz input 1 second gate.</p> <p><b>Accuracy:</b> ± 1 LSD ± <math>\left( \frac{1.4 \times \text{Trigger Error}^{(1)}}{\text{Gate Time}} \pm \text{Time base error} \right) \times \text{Freq.}</math></p> <p>(See graphs 1, 2, and 3)</p> <p><b>Impedance:</b> Selectable: 1 MΩ nominal shunted by &lt;70 pF or 50Ω nominal.</p> <p><b>Coupling:</b> ac <b>Connector:</b> Replaceable fuse, Type BNC female.</p> <p><b>Maximum input:</b> 50Ω + 10 dBm; 1 MΩ 1V rms</p> <p><b>Damage Level:</b> 50Ω or 1 mΩ dc - 5 kHz: 250V (dc + ac peak); &gt;5 kHz: 5.5V rms (+28 dBm) + 1.25 × 10<sup>6</sup> V rms/FREQ.</p> <p><b>Panel Label:</b> 5.5 V rms (+28 dBm)</p>	<p>All specifications are the same except Input 1: <b>Sensitivity:</b> Sensitivity is reduced by: 1 dBm, 500 MHz to 12.4 GHz 2 dBm, 12.4 GHz to 20.0 GHz 3 dBm, 20.0 GHz to 26.5 GHz <b>SWR:</b> 500 MHz - 10 GHz (&lt;2.5:1 typical) 10 GHz - 20 GHz (&lt;3.5:1 typical) 20 GHz - 26.5 GHz (&lt;3.5:1 typical, 5351B)</p>	<p><b>OPTIONAL FREQUENCY RANGE EXTENSION, 5352B OPTION 005</b></p>																
<p><b>INPUT 2: HP 5350B/5351B/5352B</b></p>	<p><b>OPTIONAL FREQUENCY RANGE EXTENSION, 5352B OPTION 005</b></p>	<p><b>OPTIONAL FREQUENCY RANGE EXTENSION, 5352B OPTION 005</b></p>																
<p><b>INPUT 2: HP 5350B/5351B/5352B</b></p>	<p><b>Sensitivity:</b> 41 GHz to 46 GHz 0.741 × Frequency in GHz -44.6 dBm for frequencies greater than 26.5 GHz (-10dBm at 46 Hz)</p>	<p><b>OPTIONAL FREQUENCY RANGE EXTENSION, 5352B OPTION 005</b></p>																
<p><b>INPUT 2: HP 5350B/5351B/5352B</b></p>	<p><b>OPTIONAL INCREASED DAMAGE LEVEL OPTION 006<sup>2</sup></b></p>	<p><b>OPTIONAL INCREASED DAMAGE LEVEL OPTION 006<sup>2</sup></b></p>																
<p><b>INPUT 2: HP 5350B/5351B/5352B</b></p>	<p>Protects Input 1 from damage by limiting high level signals. All specifications are the same except Input 1: <b>Damage Level</b> 500 MHz to 6 GHz +39 dBm (8 Watts) 6 GHz to 18 GHz +36 dBm (4 Watts) 18 GHz to 26.5 GHz +34.8 dBm (3 Watts) <b>Sensitivity:</b> Sensitivity is reduced by: 3 dBm, 500 MHz to 12.4 GHz 4 dBm, 12.4 GHz to 20.0 GHz 5 dBm, 20.0 GHz to 26.5 GHz <b>SWR:</b> 500 MHz - 10 GHz (&lt;2.5:1 typical) 10 GHz - 20 GHz (&lt;3.5:1 typical) 20 GHz - 26.5 GHz (&lt;3.5:1 typical, 5351B)</p>	<p><b>Power Requirements:</b> 100 VA max. <b>Line Select:</b> 100V (90-105 VAC rms; 47.5-440 Hz) 115/120V (104-126 VAC rms; 47.5-440 Hz). 220V (198 - 231 VAC rms; 47.5 - 66 Hz) 230/240V (207-252 VAC rms; 47.5-66 Hz). <b>Accessories Furnished:</b> Power cord, manual. <b>Size:</b> D/133 mmH × 425.5 mmW × 358 mmD (5 1/4 in. H × 16.75 in. W × 14 in. D) <b>Weight:</b> 11 kg (24 lb)</p>																
<p><b>INPUT 2: HP 5350B/5351B/5352B</b></p>	<p><b>OPTIONAL INCREASED DAMAGE LEVEL OPTION 006<sup>2</sup></b></p>	<p><b>Footnotes:</b> <sup>(1)</sup> Trigger Error: <math display="block">\sqrt{e_1^2 + e_n^2}</math> Input Slew Rate in V/s at Trigger point s rms Where e<sub>1</sub> = Effective rms noise of counter's input channel (100 μV typical) e<sub>n</sub> = rms noise of the input signal for a 500 MHz bandwidth <sup>(2)</sup> Available with HP5350B/5351B only. <sup>(3)</sup> Options 001 and 010 are mutually exclusive.</p>																