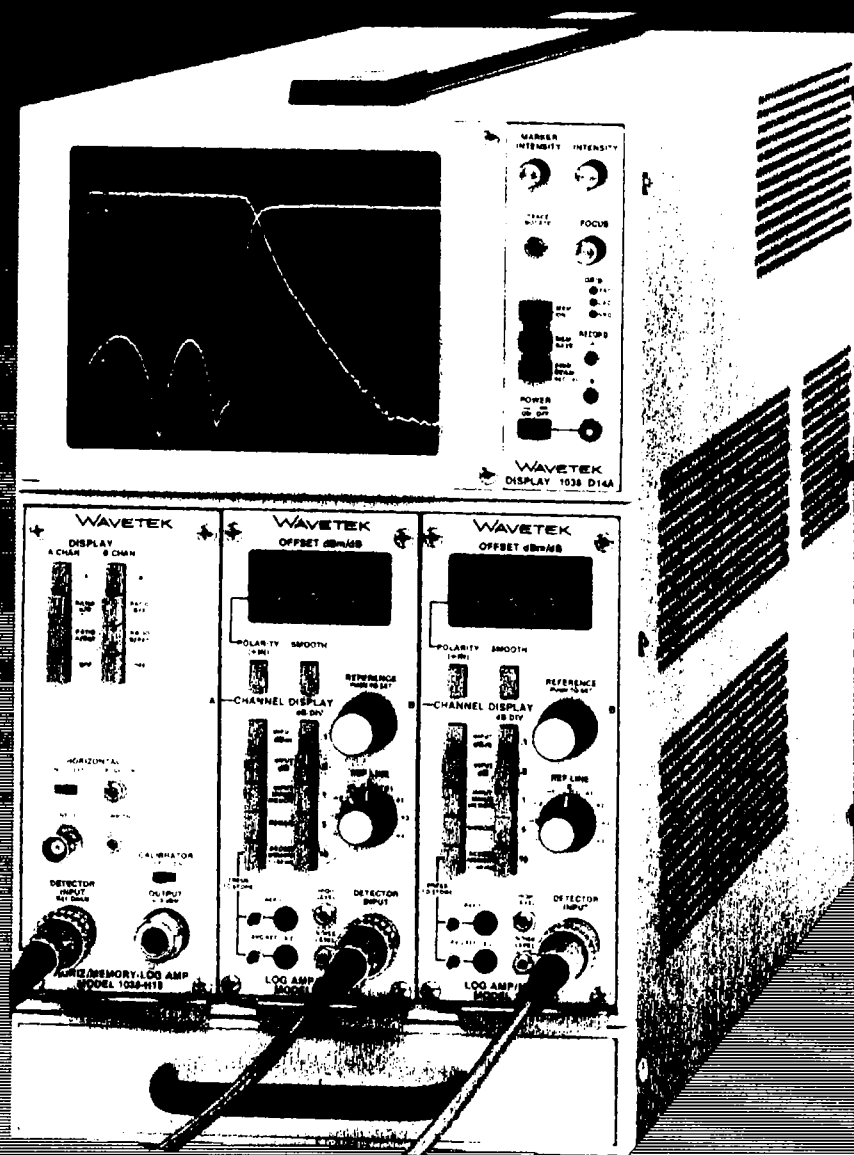


Swept Frequency Measurement System



- Return loss, insertion loss/gain, and absolute power measurements

- Accuracy, flexibility, dependability at very reasonable cost

- Automatic X-Y plotting

- Built-in calibrator

Crisper and Brighter WPM-designed display

REFRESHED DISPLAY provides flicker-free trace regardless of sweep speed

GPIB Status Lights

A/B CHANNEL RECORDER CONTROLS with pen lift logic allows recording with most X-Y Recorders. (A calibration signal is automatically sent to the recorder when the FIND BEAM (Rec Cal) button is pressed.)

SAVE BUTTON freezes the display for picture taking

CALIBRATED OFFSET switches from 0.1 dB to 99.9 dB

CONTINUOUS REFERENCE CONTROL cannot be accidentally moved once it is set

REFERENCE LINE CONTROL positions the reference line to any major graticule on the screen

AUTOMEMORY improves measurement convenience and accuracy by storing system characteristics and the average of open/short reflections

60 dB DYNAMIC RANGE

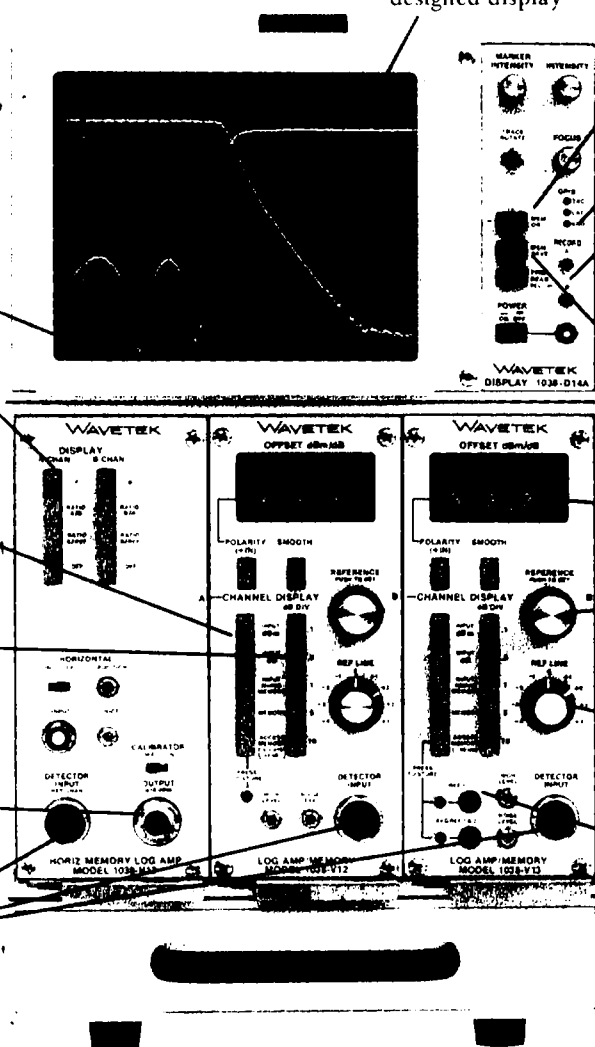
SIX DISPLAY MODES display A, A/B, A/R, B, B/A, or B/R. One mode from each channel can be displayed simultaneously

ACCURATE POWER MEASUREMENTS can be made from +10 dBm to -50 dBm. Accuracy is traceable to NBS

RANGES OF 0.1, 0.5, 1.0, OR 10.0 dB/DIVISION allows measurement of fine (0.02 dB) and gross (60 dB) variations

BUILT-IN CALIBRATOR highly accurate +10 dBm source for verifying system calibration

THREE CHANNELS detectors each have frequency calibration labels



SIMPLE, FAST AND ACCURATE

Wavetek Pacific Measurements' (WPM) powerful Model 1038-H/V Swept Frequency Measurement System markedly simplifies, speeds, and results in highly accurate simultaneous reflection and transmission measurements in the 100 kHz to 40 GHz range using WPM detectors.

With waveguide detectors from other manufacturers, this range can be extended to above 110 GHz. Measurements can be displayed in absolute (dBm) or relative (dB) power over a 60 dB dynamic range (-50 dBm to +10 dBm). Insertion loss/gain and return loss can be displayed directly and measured with 0.02 dB resolution. The noise floor of the system is near -70 dBm.

LOW COST, HIGH PERFORMANCE, PLUG-IN FLEXIBILITY

Currently available for the H/V system's multiple plug-in configuration are several models of horizontal and vertical signal conditioning plug-in modules. Either one horizontal and one vertical module, or one horizontal and two vertical modules can be selected, depending on your specific measurement requirements. This ability to select discrete combinations of the plug-in modules allows you to tailor the system to your needs and not pay for functions that you don't require.

HORIZONTAL PLUG-INS

Model 1038-H11

The Model H11 plug-in has a sweep input amplifier with front panel screwdriver adjustments for width and position of the CRT trace. A retrace blanking signal is generated internally with an internal switch to allow disabling of the circuit. This plug-in has the memory address circuits required to control the memory in the vertical plug-ins.

The calibrator in the H11 (and the H13) is a very stable 30 MHz source that provides 10 mW of power to a front panel connector to allow accurate calibration of the H/V system's detectors. The calibrator's amplitude can be periodically compared with a primary standard just like the calibrator in any diode or thermocouple power meter.

MAINFRAME

(1 required)
1038-D14A
and required options:
01 Rack Mount
04 IEEE Bus

HORIZONTAL PLUG-INS

(1 required)
H11 Plug-In with calibrator
H11 Spec 5116 Plug-In
H13 Plug-In with reference channel
and calibrator
and required option:
02 APC7 connector on the calibrator

VERTICAL PLUG-INS

(1 to 2 required)
V12 Single Memory Plug-In
V13 Dual Memory Plug-In
V20 Linear Plug-In

DETECTORS

(1 to 3 required)

Single Diode Detectors:

P/N 15272 1MHz to 26.5GHz
APC3.5 connector*
P/N 13782 1MHz to 18.5GHz
Type N connector
P/N 13783 1MHz to 18.5GHz
APC7 connector

Waveguide Detectors:

P/N 15882 26.5GHz to 40.0GHz
WR28 waveguide UG-599/U
flange

*compatible with SMA connector.
(Detectors from 100kHz available on
special order)

ACCESSORIES

12777 Viewing Hood
12794 Blank Plug-In Panel
12954 Marker Input Cable
12868 Detector Cable (for mm wave-
guide detectors)
12839-1 Detector Extension Cable,
7.5 m (25')
12839-2 Detector Extension Cable,
15 m (50')

12839-3 Detector Extension Cable,
30 m (100')
12839-4 Detector Extension Cable,
60 m (200')
12839-5 Detector Extension Cable,
3 m (10')

Adapters:

11892 Adapter (N 50 ohm to WE 75
ohm)
13298 Adapter (N 50 ohm to BNC 75
ohm - Narrow Pin Type)
13299 Adapter (N 50 ohm to F 75 ohm)
15384 Adapter (N 50 ohm to BNC 75
ohm - Thick Pin Type)
15486 Adapter (N(M) to SMA(F), both
50 ohm)

CALIBRATION SUPPORT EQUIPMENT

15472 Model C10 Calibration Fixture
and Extender Kit
15484 Power Input Calibration Unit
(Detector Simulator)(15637
Detector Calibration Cable should
be specified)

Represented By:

Data subject to change without notice.

WAVETEK

WAVETEK PACIFIC MEASUREMENTS, INC.

488 TASMAN DRIVE, SUNNYVALE, CA 94089
(408) 734-5780 / TWX: (910) 339-9273

Model 1038-H13

The H13 plug-in has all of the features of the H11 plus a vertical reference channel for use when making ratio measurements with the vertical plug-ins. This reference channel is designed for power measuring from +10 dBm to -30 dBm.

Model 1038-H11 Spec 5116

The H11 Spec 5116 plug-in has the normal swept capability and all of the other features of the H11. In addition, it has a linear ramp output for driving linearizer/PIN diode attenuator combinations. This makes possible a real-time display of the linearized characteristic with resolution as fine as 0.02 dB.

Adjustment of linearizers can be accomplished both quickly and precisely with this setup. The same systems can be used for swept frequency testing without adding any accessories. Request the 1038-H11 Spec 5116 Operating Information sheet for further details.

VERTICAL PLUG-INS

Model 1038-V12

The V12 plug-in has log and detector conditioning amplifiers, and the necessary controls on the front panel for calibrating, noise level setting, offsetting, and for selecting reference line position, display sensitivity and display functions. It also has a 1024 point memory for normalizing any measurement system non-linearities. When high level and noise level adjustments have been made on the V12 (or V13), the display will provide the specified accuracy as a CW power meter, with accuracy traceable to NBS. The calibra-

tion correction factor (frequency response) of the detector being used can be read directly from the label affixed to the detector, since the correction factor must be included in the measurement reading when making absolute power measurements.

Model 1038-V13

The V13 plug-in has all of the features of the V12 plus the added capability of allowing both swept frequency short and open reflections to be measured and then averaged for storage in a 1024 point memory. This feature markedly improves the accuracy of the reading when making return loss measurements.

By using two V13 plug-ins or a V12 and a V13 plug-in, simultaneous measurements of both return loss and insertion loss/gain can quickly, easily and accurately be made with the 1038-H/V system. Insertion loss/gain is measured through one of the V13's or through the V12. The V13 or V12 is connected to the test port and system non-linearities are stored. The other V13, which will measure the return loss, is connected to the microwave bridge and the average of the open/short reflections are stored. Then the H/V system is ready to simultaneously and precisely take the return loss and insertion loss/gain readings over the chosen frequency range, and only the true response of the device under test will be displayed.

Self-Correcting Automemory®

One of the major features of both the 1038-V12 and V13 vertical amplifier plug-ins is the self-correcting Automemory. When simultaneous return loss and insertion loss/gain measurements are being made, the Automemory feature automatically removes errors in amplitude measurements so that the correct response of the device under test can be

seen. It also enables any response to be stored as a 0 dB reference against which future swept measurements can be compared, thus eliminating the need for grease pencil reference lines when high resolution is required.

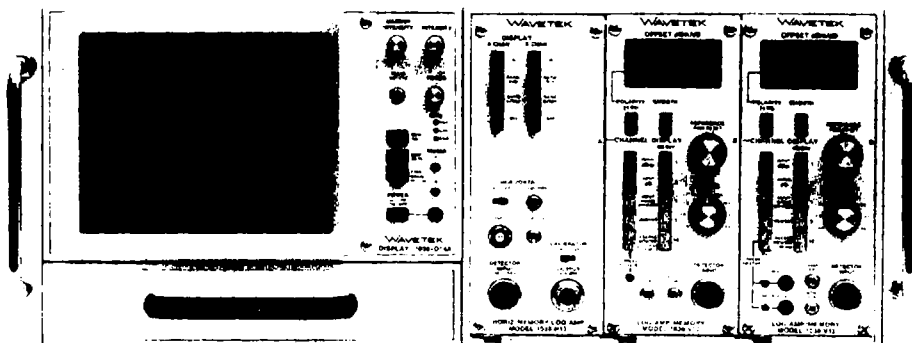
The Automemory provides automatic scale factor correction wherein a reference response can be recorded at one sensitivity (say, 0.1 dB), and a comparison measurement made at any sensitivity. The reference response is automatically scaled to the selected sensitivity, thus allowing one reference response to be used for multiple measurements without needing to be re-stored.

Model 1038-V20

The V20 plug-in has a linear amplifier for use when linear information is desired instead of logarithmic. Use of the V20 gives the 1038-H/V system the capability of making swept amplitude and swept pulse measurements.

By using a network analyzer with the H/V system, relative phase and relative amplitude readings can be taken and displayed. If the network analyzer provides a dc output proportional to the measured data, that output can be applied to the input of the V20. This causes a reference response to be stored in the V20's memory so that the desired relative response will be displayed.

Using the 1038-H/V system with the V20 plug-in in conjunction with the WPM Model 1018B RF Peak Power Meter will allow swept gain measurements to be made under pulsed conditions. The dynamic range is +10 dBm to -20 dBm. Fast swept measurements of pulsed systems can be made at frequencies up to 26.5 GHz. Request Application Note 14 for more information on swept pulsed measuring.



Model 1038-H/V System in Rack-Mount Configuration

IMPROVED MAINFRAME

Model 1038-D14A

The D14A Mainframe has the capability of displaying two independent measurements (return loss and insertion loss/gain) simultaneously, using a refresh memory to provide a clear, smooth, flicker-free CRT display. The display has a horizontal resolution of 512 points, and a vertical resolution of 1024 points.

If a real-time display is required, the refresh memory can be turned off.

The D14A contains internal circuits that, when interconnected to almost any X-Y recorder through BNC connectors on the rear of the mainframe, will provide signals to both calibrate and drive the recorder.

Pressing the FIND BEAM (Rec Cal) button of the front panel of the mainframe will cause the pen on the recorder (if the recorder is equipped with pen lift logic) to move to the upper right corner of the recorder's graph paper and lets you quickly and easily adjust the recorder to produce an accurate plot. Pressing the RECORD A or B button will cause whatever is currently being displayed in the CRT for channel A or B to be recorded. Provision is made to supply pen lift logic signals for recorders using either TTL or switch closure logic. For recorders with no pen lift feature, there is ample time to manually position the pen.

GPIB (IEEE STD 488)

The 1038-H/V system, with the microprocessor-controlled GPIB option (option 04), will provide you with the ability to "read" the contents of the channel A and B Refresh Memories for analysis and scaling, and to "write" standard response data to the normalizing memory(s) of the vertical plug-in for data comparison or display. It is also possible to read and write directly to the D14A Mainframe's display.

The GPIB option allows the H/V system to be used as a "talker" with any sweep-er" and, since the display is accessible to the GPIB bus, a controller without display (such as the HP9825) can be used. Changes or corrections can be made to collected data with the results displayed directly on the CRT screen of the D14A Mainframe.

POWER DETECTORS

WPM currently has four different models of power detectors available for use with the 1038-H/V system. These detectors will cover several frequency bands within the 100 kHz (on special order) to 40 GHz frequency range. Standard coaxial detectors measure from 1 MHz to 26.5 GHz. The WPM balanced element waveguide detector measures from 26.5 to 40 GHz. (Other diode-type waveguide detectors can extend the frequency range to 110 GHz using the WPM adapter cable.) Each detector is supplied with frequency correction data so that improved accuracy can be achieved when making absolute power measurements.

APPLICATION NOTES ON THE 1038 SYSTEM

For further information, please request the appropriate Application Note (A/N):

A/N 14 Swept Frequency Pulse Modulated Testing

A/N 19 Programming the Model 1038-D14 Swept Measurement System

A/N 20 Swept Frequency Return Loss and Insertion Loss/Gain Measurements and Improved Reflectometer Accuracy using the Model 1038 Measurement System with Automemory

ACCESSORIES

A number of accessories and calibration aids are available for the H/V system (see complete listing on the back page).

Detector adapter cables are provided so that the H/V system can be used with a variety of the high quality microwave bridges and millimeter wave detectors currently available on the market.

Included among the accessories and calibration aids offered by WPM are the following:

Detector Cable (P/N 12868)

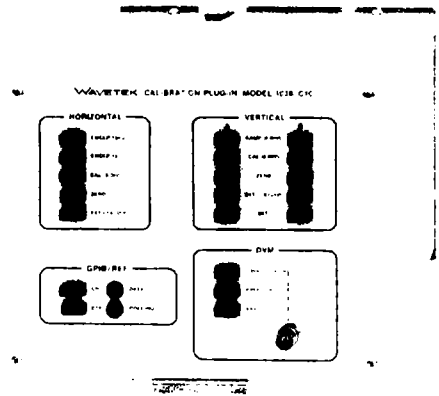
This cable is used with waveguide diode detectors and other manufacturers' coaxial diode detectors. It interfaces the external detectors with the vertical plug-in connector.

Detector Extension Cables (see back page for P/Ns)

Each detector is supplied with an attached 5' cable. Several detector extension cables (10' and 25') are available from stock. Other lengths (50', 100' and 200' are standard) are available on special order.

Marker Input Cable (P/N 12954)

This cable allows frequency markers to be added to the CRT display of the Model 1038-H/V System.

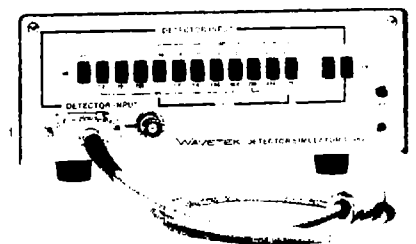


Model C-10 Calibration Unit

Calibration Support Equipment

The Model C10 (P/N15472) Calibration Fixture and Extender Kit provides for direct calibration and check out of the D14A Mainframe. It has extension cables to permit calibration and maintenance of the H/V system plug-ins.

The Power Input Calibrator Unit (Detector Simulator - P/N 15484) will act as a "Standard" detector to furnish accurate voltages to the H/V system when it is desired to calibrate the amplitude correction circuitry. The unit comes complete with the P/N 15637 Detector Calibration Cable for use with the H/V system.



Power Input Calibration Unit

SYSTEM

FREQUENCY RANGE:

1 MHz to 40.0 GHz, expandable to above 110 GHz with millimeter band detectors from other manufacturers. (Frequencies down to 100 kHz available on special order.) See detector listing on the back page for available WPM detectors.

DYNAMIC RANGE:

Vertical Channels: +10 dBm to -50 dBm. Maximum input power +23 dBm (200 mW) for coaxial detectors and +20 dBm (100 mW) for waveguide detectors.

Reference Channel: 40 dB (+10 dBm to -30 dBm). Maximum input power is +23 dBm (200 mW) for coaxial detectors, and +20 dBm (100 mW) for waveguide detectors.

RESOLUTION:

0.1, 0.5, 1.0, 5.0 or 10.0 dB per major division. One major division is 0.5 inches (12.2 mm).

OFFSET:

±99.9 dB in 0.1 dB steps with typical accuracy of 0.01 dB.

SMOOTHING:

A smoothing filter can be accessed for elimination of undesirable fine grain signals on the display.

AUXILIARY OUTPUTS:

A Channel Out - 100 mV/DIV

B Channel Out - 100 mV/DIV

Horizontal Out - 100 mV/DIV

Response Recorder:

Pen Lift Contact

Record X

Record Y

Pen Lift TTL

AUXILIARY INPUTS:

Blanking In - TTL Levels

External Retrace Signal Input

COMPONENTS

HORIZONTAL PLUG-INS

Model 1038-H11 and H13:

Horizontal Input

Range: 10 to 20V p-p

Impedance: 50k ohms

Calibrator Output

Level: 10 mW ±1.5% (30 MHz)

Impedance: 50 ohms (SWR<1.1)

Model 1038-H11 Spec 5116

Output

Displayed Ramp: 0 to 60 dB continuously variable, displayed on channel B.

Ramp: 0 to +10V continuously variable

Calibration: 1% of reading ±0.01 V.

DC: 0 to ±10V continuously variable.

DC & Ramp: 12V 12mA maximum.

Output Impedance: <1.0 ohm

Connector: BNC

VERTICAL PLUG-INS

Model 1038-V12 and V13:

Dynamic Range: 60 dB (+10 dBm to -50 dBm).

Frequency Range: Determined by the detector.

System Linearity: 0.1 dB/10 dB plus 0.5 dB at -50 dBm.

Display Sensitivity: 0.1, 0.5, 1.0, 5.0 and 10.0 dB/DIV.

Offset: ±99.9 dB in 0.1 dB steps.

Model 1038-V20:

Display Sensitivity: 1, 2, 5, 10, 20 and 50 mV/DIV - 0.1, 0.2, 0.5 and 1V/DIV

Input Offset: 0 to ±100 mV and 0 to ±10V

Input: 1M ohm in parallel with about 30 pF, 15 kHz bandwidth

Memory: Resolution: 0.01 Division Horizontal, 0.03 Division Vertical

POWER DETECTORS

Single Diode Coaxial (P/N's 15272, 13782, and 13783)

Maximum Input Power: +23 dBm (200 mV peak or average)

Input Impedance: 50 ohms, nominal

Return Loss: 1MHz to 2GHz:

>25.0dB, SWR <1.12

2GHz to 12.4GHz:

>18.0dB, SWR <1.29

12.4GHz to 26.5GHz:

>14.0dB, SWR <1.50

Frequency Response Curve Data

Accuracy:

The uncertainty of calibration at 1mW (0dBm) is 3% to 18.5GHz, and 5% to 26.5GHz

Flatness: P/N 15272:

±0.5dB (to 18.5GHz)

±1.0dB (18.5 to 26.5GHz)

P/N 13782:

±1.0dB (to 18.5GHz)

P/N 13783:

±1.0dB (to 18.5GHz)

Waveguide Detector (P/N 15882)

Maximum Input Power: +20 dBm (100 mV) peak or average

Input Impedance: 50 ohms, nominal

Return Loss: 26.5 to 40GHz:

>10.0dB, SWR <1.92

Frequency Response Curve Data

Accuracy:

The relative uncertainty of calibration at 1mW (0dBm) is 5% between 26.5 and 40.0GHz

Flatness: P/N 15882

±2.0dB (26.5 to 40.0GHz)

Physical (all detectors):

Cable Length: 1.5 m (5 ft.)

Weight: Approx. 230 gm. (8 oz.)

ENVIRONMENTAL (complete H/V System)

Temperature:

Operating 0° to 45°C

(+32° to +113°F)

Storage -40° to +65°C

(-40° to +149°F)

POWER: (complete H/V System)

Approx. 100VA @ 50 - 440Hz; 100, 120, 240VAC ±10%

DIMENSIONS: (complete H/V System)

Bench Mount: (HxWxD)

381 x 216 x 483 mm

(15 x 8.5 x 19 in.)

Rack Mount: (HxWxD)

178 x 483 x 483 mm

(7 x 19 x 19 in.)

SHIPPING WEIGHT:

18.2 kg (40 lbs)