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LW 360 DIGITAL TUNER MEASURING SYSTEM

GENERAL

The LW 360 is a comprehensive measuring system that integrates the necessary functions for adjusting and testing electronic TV tuners.

It inherits the design concepts of the conventional LW 347/348 and is fully compatible.

Various functions have been enhanced such as expanded power supply terminals for tuners, increased current capacity, and expanded tuner control signals to support the next generation tuners.

In addition, improved printout and interface functions achieve high efficiency in production lines and enable the LW 360 to be used in a wide range of applications such as evaluation of tuners in the design and quality assurance departments.

FEATURES

[Multi-Functionality and High Performance]

■ Support for VHF, UHF, CATV, and Digital TV Tuners

Sweep from 25 MHz to 1 GHz to cover FM, VHF, UHF, and CATV channels. IF input frequency from 1 MHz to 120 MHz provide support even for terrestrial digital broadcasting tuners and FM tuners.

■ Easy Editing and Data Evaluation with the Multi Screen Display

The XGA display enables clear 4 screen display. When editing the settings, all items can be modified while monitoring the measured waveforms. The 4 screen waveform display shows up to 12 channels of measured waveforms simultaneously, which is convenient for tuner evaluation and data acquisition. The waveform colors are selectable.

■ Integration of Power Supplies for Tuners and Control Signals

The LW 360 is equipped with all the functions necessary for tuner operation such as power supplies to drive the tuners (Vt, +B, AGC, AFT, etc.), voltage/current measurement of control outputs, and PLL tuner control (supports I²C, 3Wire, and CCB). I²C control signals are supported up to 256 bytes.

■ Wide Variety of Measured Parameters

Covers all the measured parameters of the conventional LW 347/348 plus additional convenient functions.

[Suitable for Product Evaluation in Development and Quality Assurance Departments]

■ Powerful Data Acquisition Capability

Various data such as waveform data and measured results can be printed and saved to memory cards. These features are convenient for the product evaluation and report generation in the development and quality assurance departments. The support for Ethernet and RS232C enables data and screen images to be transmitted to an external PC.

[Careful Consideration to Product Lines]

■ Support for Small Scale Production of Various Products

Settings can be stored to the LW 360 or memory cards enabling quick switching of lines. Integrated functions necessary for measurements also facilitate line switching.

■ Network Support

Supports 10/100BASE-T. The interface can be used to acquire test data, transmit tuner models, etc. RS232C interface is also provided.

■ Compatibility with Conventional Models

Tuner model data used on the conventional LW 347/348 can be loaded directly allowing effective use of past resources.

■ LW 360 Rear Panel



SPECIFICATIONS

LW 360

Measurement

Standard Measurement Items (FIXED ITEM): 16 (Factory installed)

Measurement Item	Description of Measurement	Measured and Judgment Range
1 PCS LEVEL	Specified point level from a peak of waveform Level ratio between specified points Position of the waveform peak point	0 to -10 dB 0 to ±10 dB 0 to ±20 MHz
2 POWER GAIN	Gain from ANT input to IF output Attenuation from peak point to fc ± 20 MHz (with respect to the specified point)	0 to 70 dB 0 to -30 dB
3 AGC	Gain control by the AGC voltage	0 to -70 dB
4 IMAGE	Level rejection of image frequency	-20 to -90 dB
5 ndB WIDTH	Bandwidth at n dB (-0.5 to -6 dB) against peak point	0 to 30 MHz
6 AFT	LO frequency control by AFT voltage	0 to ±20 MHz
7 VSWR	Standing wave voltage ratio at the ANT input terminal	2 to 10
8 IF REJ	IF signal interference rejection ratio from ANT input to IF output	-20 to -90 dB
9 +B DRIFT	LO frequency variation due to change in +B voltage	0 to ±20 MHz
10 GUARD BAND	Receiving frequency tolerance between lower Vt voltage and upper Vt voltage	0 to 20 MHz
11 PCS CHECK	Judgment of PCS level in a specified Vt or f range	0 to -10 dB
12 TOTAL WAVE	Simultaneous measurement of PCS level, power gain, VSWR, etc.	Each measurement and range
13 PCS/IMAGE	Simultaneous measurement of PCS level and image	Each measurement and range
14 AGC VOLT	Operating voltage of AGC loop of tuner with IF	0 to 15 V
15 PLL LOCK F	Error in lock frequency of PLL tuner	0 to ±999 MHz
16 NF	Measurement of the relative NF value by setting the NF ENR value	2 to 15 dB

User Defined Measurement Items: Users can create new measurement items by combining setting items and operational measurement functions.

Setting Items: RF output section settings, receiving section settings, tuner control section settings, and marker settings

Operational Measurement Function Selections: Power gain measurement, level measurement, frequency measurement, voltage/current measurement, and VSWR measurement

RF Signal Output Section

Synthesized Sweep Signal Generator Section

Frequency Range: 25 to 1000 MHz (image measurement: 1150 MHz max.)
Sweep Mode: SINGLE, DUAL, or TRIPLE

Output Section

Output Level: 0 dBm max.
Attenuator: 0 to 70 dB, 1 dB steps (program control)

VSWR Measurement Bridge

Frequency Range: 25 to 1000 MHz
Built-in Amplifier: 40 dB
Directivity: At least 30 dB

Receiving Section

IF Signal Input Section

Frequency Range: Within fc ±20 MHz in the range of 1 to 120 MHz
fc range : 4 to 105 MHz
Input Level Range: 1 to 300 mVrms
Auto-Tracking Function: Displays the waveform at the center of the sweep even when the tuning frequency of the tuner varies

IF Signal Detector

Frequency Range: 1 to 120 MHz

Detection Signal Input Section

Input System: 5 systems: DET IN 1 to 3 (rear panel), internal connection IF signal detection output, and internal connection VSWR signal detection output
Select the 5 systems and set the program.
Max. Input: ±400 mV (including superimposed DC)
ARC Function: (ARC: Auto Response Control)
Displays the signal at constant amplitude at all times even when the input signal amplitude varies

Tuner Interface Section

Power Supply for Tuner (Output and Short-Circuit Sensor: ON/OFF Program Control)

Type	Application	Voltage Range	Max. Load Current	Note
MB1	+B voltage	2 to 13.5 V	300 mA	Measurement and judgment of load current
MB2	+B voltage	2 to 10.5 V	300 mA	Measurement and judgment of load current
MB3	+B voltage and PLL control voltage	1 to 6 V	400 mA	Measurement and judgment of load current
MB4	+B voltage	1 to 6 V	400 mA	Measurement and judgment of load current
BL, BM, BH, BU	Band	MB1, GND, OPEN	Included in MB1	Measurement and judgment of load current
AGC	AGC voltage	0 to 15 V	10 mA	
AFT	AFT voltage	0 to 15 V	10 mA	
TU SW1to 3	Control terminal drive	3 to 13.5 V	300 mA	Voltage output, GND, OPEN
Vt	Tuning voltage	0 to 30 V	20 mA	LOWER/UPPER setting, fixed
(Vt _{is})	PLL control	28 to 33 V		VT/VTB auto switching

Vt Auto Function

Operation: Auto setting function of tuning voltage

PLL Tuner Frequency Control Output

Tuner: PLL
Control Signal: Serial (3 wire, I²C, or CCB)

Tuner Control Terminal Measurement Section

[Vt IN]
Input Voltage Range: 0 to 30 V

[AGC, AFT]

Input: Same terminal as the output, auto switched according to measurement item

Input Voltage Range: 0 to 15 V

[LOCK IN]

Operation: PLL LOCK detection and input voltage measurement/judgment

[TU SET SENSOR]

Operation: Control TUNER POWER (MB1 to MB4, BAND, AGC, AFT, and VT) voltage by detecting LOW level

Total Judgement Output

Output: Total judgement output of all measurement items

Monitor Display

Display Output: XGA compatible monitor output (rear panel), 15-pin D-sub male (3 rows)
Displayed Contents: Measured waveforms, setting data, markers, measured values, judgement results, etc.

Measurement Waveform

Number of Waveforms: Display up to 3 channels x 3 waveforms x 4 screens simultaneously
Display Scale: 12 x 6 ON/OFF selectable

Marker Display

Marker Type: RF marker and IF marker
IF Marker: 1 to 120 MHz, 1 kHz steps
RF Marker: 30 to 1000 MHz, 1 kHz steps
Marker Points: Up to 12 points of IF and RF markers

GO/NO GO Judgment

Judgment Result Display: Measured values displayed in red for NO GO judgment.

Total Judgement Result Display: Indicated by a green or red measurement screen frame

Measurement Condition Setting Method

Input Method: Via IBM PC-AT compatible keyboard (PS/2 or USB)
Number of Settable Models: Up to 20
Number of Settable Steps: Up 99 steps per model
Setting Items: RF output section control, tuner control, measurement parameters, display parameters, judgment parameters, etc.

Panel Control:

Selects the tuner model

Remote Control

Control: Using the LW 360-01 Remote Controller (supplied as an accessory)
Function: Switches measurement steps, ALL SCAN, PROTECTOR OFF, VT voltage, and parameter remote

Memory Card Interface

Memory Card (sold separately): CFA TYPE-I compact flash card
Function: Stores/Transmits measurement conditions externally and stores ALL SCAN data
Stores screen capture data

Printer Interface

Measurement Waveform Output: Prints the waveform displayed on the monitor
Connector: USB or 25-pin D-sub connector

RS232C Interface

Function: Outputs the measured results of ALL SCAN and transmits/receives tuner model data

LAN Interface (Ethernet)

Function: Remote control using an external computer, data acquisition, tuner model transmission, etc.
Type: 100BASE-TX/10BASE-T

USB Interface

Type: USB 1.1 compatible
Function: USB keyboard, mouse, and printer interface

Environment Conditions

Operating Temperature: 0 to 40 °C
Operating Humidity: ≤85 % RH (without condensation)
Spec-Guaranteed Temperature: 10 to 35 °C
Spec-Guaranteed Humidity: ≤85 % RH (without condensation)
Operating Environment: Indoor use
Operating Altitude: Up to 2000 m
Overvoltage Category: II
Pollution Degree: 2

Power Requirements

Power Consumption: 90 to 250 VAC, 50/60 Hz
120 W max.

Dimensions and Weight

426 (W) × 149 (H) × 450 (D) mm, 13 kg

Accessories

Remote Controller [LW 360-01] 1
Cables
BNC-BNC cable (75 Ω, 50 cm) for RF OUT/IF IN..... 2
Amphenol cable (24-pin, 2 m) for tuner power..... 1
Amphenol cable (36-pin, 2 m) for remote controller 1
Power cord..... 1
PS/2 splitter cable..... 1
Instruction manual 1

Option Name [Number]	Measurement/Function	Description
Option 70 [LW 360-70]	PARAMETER REMOTE	Remotely controls SWEEP, RF, ATT, AGC, RF REF, MKR, etc.