

Tiny Amplifier for DX Vacation

DXV600L

Instruction Manual



THAMWAY CO., LTD

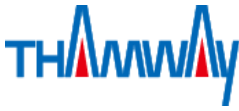
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1. General Information

1-1 Introduction

Thank you for purchasing the DXV600L linear amplifier for amateur radios.

This manual describes the installation, operation, and maintenance of the DXV600L.

Please read this manual carefully and use the product safely.

1-2 Owner Support

If you need technical or operational assistance, please contact your dealer first.

If you need more information, you can contact Thamway as follows:

Fax: +81-545-53-8978

Tel: +81-545-53-8965

E-mail: ham@thamway.co.jp

The internet page of Thamway is <http://www.thamway.co.jp/english/>.

1-3 Features

This unit was born from a completely new idea as a linear amplifier for amateur radio. It eliminates the heavy power transformer (transformer less) and has excellent features, such as small size, light in weight, high efficiency, low distortion, and low price.

- Small Size Width: 200 mm, Height: 100 mm, Depth: 300 mm (excluding protrusions)
 Width: 7.9 inches, Height: 4.1 inches, Depth: 11.9 inches (excluding protrusions)
- Light in Weight Only 3.76 kg 8.3 lbs. with output of 600 W or more
- High Efficiency 80% or more (at output of 7 MHz 600 W)
- High Gain Rated power output of each band with drive power of 20 to 50 W
- Correspondence to Semi-Break-In
- Built-In Multimeter Monitoring on traveling wave power, reflected wave power, drain voltage, and drain current
- Protection Function that can identify the cause at a glance
- Built-In Power Meter that can be used up to the 50 MHz band

1-4 Safety Precautions

DXV600L belongs to the equipment class I to prevent electric shock. The third ground wire (with two yellow stripes in green) of the power cord always needs to be connected to the ground system for safe use. The DXV600L amplifier complies with FCC regulations.

This instruction manual contains the precautions, alerts, and warnings to keep the DXV600L in safe operating condition and to ensure its safe operation at all times.



The definitions described below apply to this instruction manual.

DANGER: If not done properly, it could cause injury, fire, electric shock, and could be life threatening.

WARNING: If not done properly, it could cause damage to not only the DXV600L but also other equipment.

CAUTION: If not done properly, it could cause inconvenience.

DANGER High Voltage!

It is dangerous to touch the DC high voltage (120–160VDV) or the high frequency high voltage (1 kVp-p) inside the DXV600L or the main power supply voltage. It leads to electric shock. For safety, when removing the cover, pull the power plug from the outlet and check that the voltage of the VD meter on the front panel is 0 V after 3 minutes or more before starting work. Never energize with the cover removed because it is dangerous.

DANGER High Voltage!

In particular, never allow a child to push anything through a gap into the case. This can cause electric shock! Do not touch the antenna during transmission. There is a risk of electric shock or burns. Do not splash rain, snow, or liquid on the DXV600L, which could lead to electric shock or damage to the equipment.

DANGER

Never repair or modify the DXV600L. Repairs or modifications could endanger the health or life of you or others and could damage the DXV600L and the equipment connected to it. Such repairs or modifications are not covered by the warranty, and any subsequent warranty will be void. The manufacturer cannot be responsible for such repairs or modifications. As to repairs or modifications made without our permission, the person doing the work shall assume responsibility.

WARNING

Carefully read Chapter 2 “Installation” in this manual to avoid damage (not covered by the warranty). If you have any questions or doubts regarding the installation, operation, or safety of the DXV600L, please contact your dealer or us.

2. Installation

2-1 Unpacking and Initial Inspection

WARNING

Please read this manual carefully before starting the installation of the DXV600L. First, check the cardboard box you received for any major scratches or damage. Next, open the cardboard box and carefully inspect the DXV600L for mechanical damage. If something is missing or damaged (scratched, bent, or broken), or if there is anything wrong, please contact the store where you purchased the product immediately. Delays in contact could violate the carrier's warranty terms.

CAUTION

Please keep the original packaging for future transportation.

Take out the contents of the cardboard box and carefully inspect it to see if there was any damage during transportation. If there is anything wrong, please contact the store immediately.

2-2 Installation Location and Cooling for DXV600L

Place the DXV600L near your transceiver or transmitter. The rear panel for connecting coaxial and control cables and switches and meters on the front panel of the DXV600L need to be easy to operate and monitor.

The DXV600L operates with forced-air cooling, so arrange it so that there is a space of 5 cm (2 inches) or more around it. If the ambient temperature is 40°C (104°F), the exhaust temperature could reach 65°C (150°F). If your peripherals are sensitive to external heat or use forced-air cooling, increase the distance accordingly.

CAUTION

Do not place light materials, such as paper or cloth, around the DXV600L. They are drawn in by the cooling air stream and could block the air intake. In that case, the DXV600L could easily overheat, stop due to abnormal overheating, deteriorate the parts used, and cause damage that is not covered by the warranty.

2-3 Installation

DANGER

Before connecting the DXV600L to an external ground, you need to consult a certified electrician to see if such types of connections are permitted by national and local electrical standards, safety regulations, and effective regulations. Grounding and bonding cannot be done at the same time, but in some countries, special requirements could be applicable.

DANGER

Do not ground to a gas pipe. This could cause an explosion.

DANGER

Do not ground to a water pipe. Not only yourself, but others using the same equipment could be exposed to dangerous voltages.

WARNING

Since the grounding device must withstand an emergency current of 15 A or more, it is necessary to improve conductivity with use of thicker leads and a low resistance grounding path. The ground wire must be 4 mm² or more (AWG 11 or SWG 13).

Install the product in a stable and well-ventilated place.

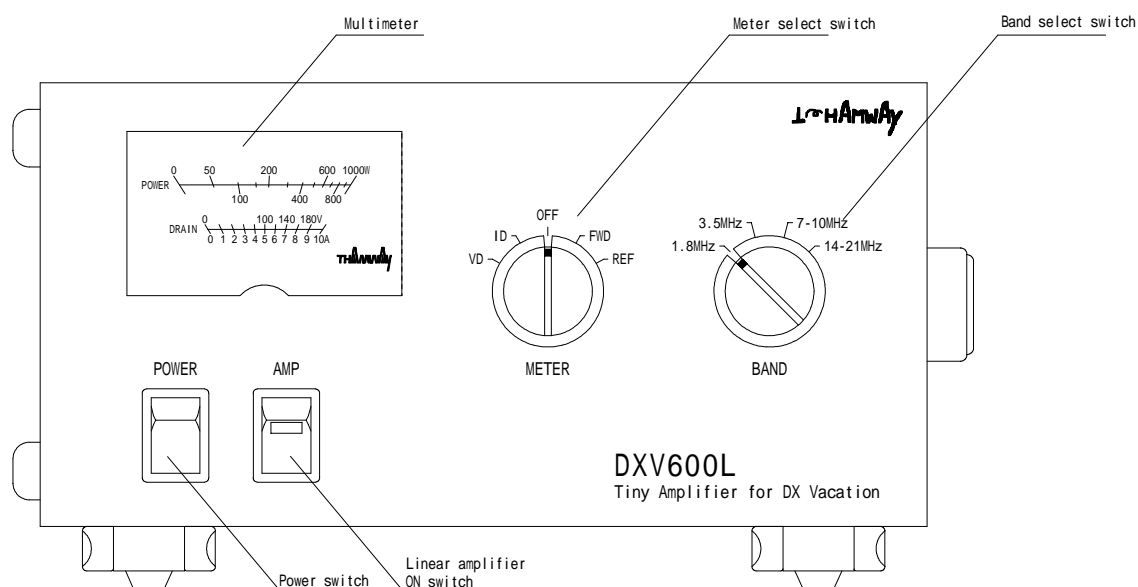
Do not push the product into a closed place because it will generate heat during transmission.

Never use the product in a place where it gets wet or where it may get wet because it could cause a malfunction or electric shock.

Do not put anything through the gap into the product. It could cause a malfunction or electric shock.

3. Names and Functions of Each Portion

3-1 Front Panel



WARNING

Check the power supply voltage, grounding status, and connection status of each connector before turning on the power. If you connect the product incorrectly, you could damage the main unit and connected devices.

(i) Power switch (POWER)

When turning on the power, make sure that the I / O connector and control terminal are connected correctly, and that the transmitter is in the receiving state.

When ON: The input signal is output as it is without being amplified. Even at this time, the power meter still works. If the AMP switch is turned on in this state, the input signal is amplified and output.

When OFF: The input signal is output as it is without being amplified. Even at this time, the power meter still works.

WARNING

Do not operate any switch other than the meter select switch while transmitting from the transceiver or transmitter connected to the DXV600L. It could cause a serious failure.



WARNING

When the protection circuit operates, check the cause and eliminate the cause before use.
If you continue to use the product as it is, it could cause a serious failure.

(ii) Linear Amplifier ON Switch (AMP)

It is a switch that turns on / off the operation (power amplification) of the linear amplifier.

When ON (when the red LED is lit): Power is amplified and output.

When ON (when the red LED is blinking): When the protection circuit is operating.

BIAS is not applied, and it is not operating as a linear amplifier.

Immediately turn off the switch once and perform the reset operation.

Abnormality can be identified by the way it blinks.

See section 4-2 “Operation” for details.

When OFF: The input signal is output as it is without being amplified. Even at this time, the power meter still works.

WARNING

Do not operate any switch other than the meter select switch while transmitting from the transceiver or transmitter connected to the DXV600L. It could cause a serious failure.

WARNING

Before you start transmitting, make sure that the transmission frequency of the transceiver or transmitter matches the band switch. Transmitting in a different band could cause serious damage to the DXV600L. The DXV600L malfunctions caused by incorrect band switching operations will be repaired for a fee even within the warranty period.

(iii) Band select switch (BAND)

It is a changeover switch for each frequency.

Be sure to operate when there is no RF input (reception state).

If the band select switch is operated during transmission, it could lead to a serious failure where the relay contacts burn out or the amplifier is damaged.



(iv) Meter select switch (METER)

It is used to check each operating status during RF output.

VD: It displays the drain voltage of the power amplification FET. (It shall be used within the range of 120 to 160 V.)

ID: It displays the drain current of the power amplification FET. (It shall be used at 6.6 A or less)

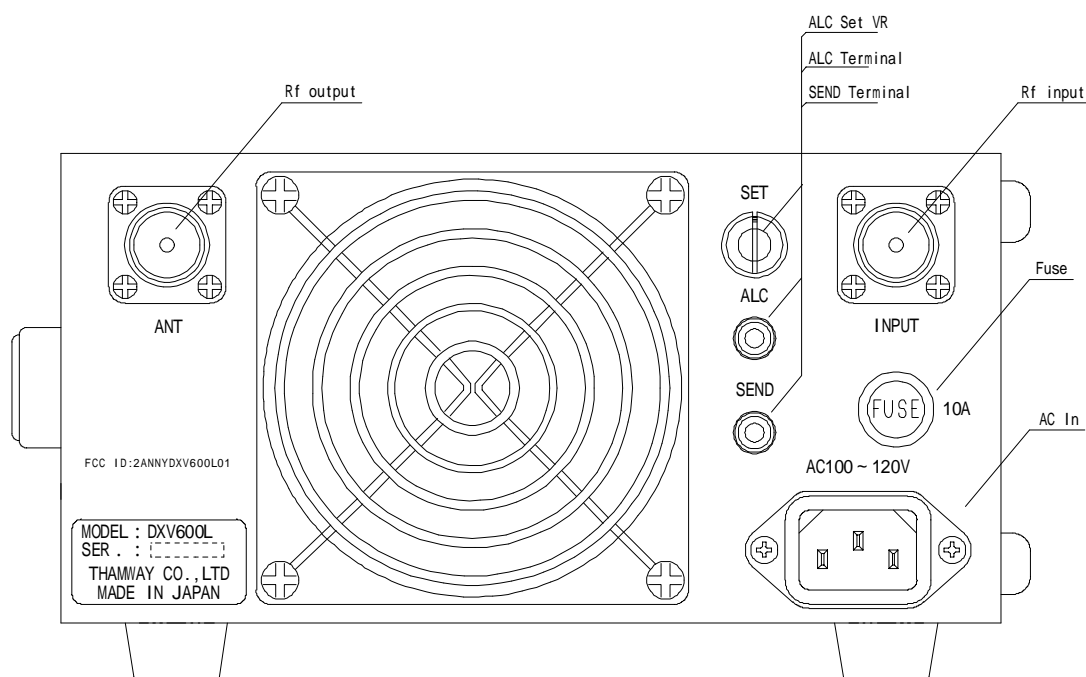
FWD: It displays the traveling wave. (It shall be used at 600 W or less)

REF: It displays the reflected wave from the load (antenna). (It shall be used at 75 W or less)

(v) Multimeter

It displays the content selected with the meter select switch.

3-2 Rear Panel



WARNING

The power supply voltage for the DXV600L is 115–120 VAC. Check it again before connecting the power cord. If you accidentally connect it to the 200VAC system, it could cause a serious failure and could cause a fire or electric shock.

WARNING

When using the DXV600L at the rated power, a power capacity of 120 VAC 10 A is required. Dedicate the outlet to be used for the DXV600L, and avoid using it with other devices. If used together, the breaker of the switchboard could break during use, which could affect the operation of other equipment.

(i) AC IN

Use the AC input within the range of 115 V to 120 V.

Use the included power cable for connection. Also, be sure to ground the ground wire.

When using an existing outlet in your home, pay attention to the current capacity including other connected devices. The rated operation of this unit is 10 A.

(ii) ALC Set VR (SET)

ALC Terminal (ALC)

Read the section on ALC circuits described later.

WARNING

Connect a relay contact or open collector to the input of this control terminal, and do not apply voltage to it from the outside. If you apply voltage, do not exceed the TTL level (+ 5 V). If a voltage exceeding the TTL level (+ 5 V) is applied, the internal circuit could be damaged.

(iii) SEND Terminal (SEND)

Connect to the terminal that becomes GND level at the time of transmission.

The input level is the TTL level. Never apply a voltage of + 5 V or more.

We recommend non-voltage contact output and an open collector.

WARNING

Connect the coaxial connector firmly so that it is not loose. If it is loose, it could cause a poor connection to lead to a malfunction of the transceiver or transmitter. Also, make sure that the input power does not exceed the rating. Exceeding the rated input power significantly, it could lead to serious failure. However, when the POWER switch or AMP switch is OFF, it is possible to pass up to 100 W in the 1.8 MHz to 50 MHz band.

(iv) RF Input (INPUT)

M Type Female Connector

Use a good quality coaxial cable for connection.

Do not input any frequency other than the specified frequency.

However, the power meter can be used from 1.8 MHz band to 50 MHz band.

WARNING

Connect the coaxial connector firmly so that it is not loose. If it is loose, it could cause a discharge or fire due to a poor connection during transmission, and at the same time, it could cause a serious failure in the DXV600L. Also, do not touch it during transmission. When you touch it, be sure to turn off the power switch of the DXV600L and turn off the power of the connected transceiver or transmitter.

(v) RF Output (ANT)

M Type Female Connector

Connect coaxial cable / antenna that is matched with 50 Ω .

Coaxial cable / antenna handles high frequency power of 600 W or more, so select it in consideration of power durability.

4. How to Use

DANGER High Voltage!

It is dangerous to touch the DC high voltage (120–160 VDC) or the high frequency high voltage (1 kVp-p) inside the DXV600L or the main power supply voltage. It leads to electric shock. For safety, when removing the cover, pull the power plug from the outlet and check that the voltage of the VD meter on the front panel is 0 V after 3 minutes or more before starting work. Never energize with the cover removed because it is dangerous.

DANGER

The power supply voltage for the DXV600L is 115–120 VAC. Check it again before connecting the power cord. If you accidentally connect it to the AC 200 V system, it could cause a serious failure and could cause a fire or electric shock.

WARNING

When using the DXV600L at the rated power, a power capacity of AC 120 V 10 A is required. Dedicate the outlet to be used for the DXV600L, and avoid using it with other devices. If used together, the breaker of the switchboard could break during use, which could affect the operation of other equipment.

WARNING

Do not operate any switch other than the meter select switch while transmitting from the transceiver or transmitter connected to the DXV600L. It could cause a serious failure.

WARNING

Before you start transmitting, make sure that the transmission frequency of the transceiver or transmitter matches the band switch. Transmitting in a different band could cause serious damage to the DXV600L. The DXV600L malfunctions caused by incorrect band switching operations will be repaired for a fee even within the warranty period.

4-1 Precautions for Use

Fit the connectors firmly.

We recommend VSWR 1.5 or lower for the antenna.

It can be used with VSWR2 or higher, but lower the maximum power as long as the reflected power does not exceed 75 W.

Do not transmit with the wrong BAND switch or switch the band during transmission.

It could lead to the damage to the FET or failure of the relay or filter.

There is a place where high voltage is applied inside this unit. Never remove the cover and energize it because it is extremely dangerous. If you touch the inside carelessly, you could receive an electric shock.

WARNING

Check the power supply voltage, grounding status, and connection status of each connector before turning on the power. If you connect the product incorrectly, you could damage the main unit and connected devices.

4-2 Operation

WARNING

Before you start transmitting, make sure that the transmission frequency of the transceiver or transmitter matches the band switch. Transmitting in a different band could cause serious damage to the DXV600L. The DXV600L malfunctions caused by incorrect band switching operations will be repaired for a fee even within the warranty period.

WARNING

When using the DXV600L at the rated power, a power capacity of 120 VAC 10 A is required. Dedicate the outlet to be used for the DXV600L, and avoid using it with other devices. If used together, the breaker of the switchboard could break during use, which could affect the operation of other equipment.

WARNING

Connect a relay contact or open collector to the input of this control terminal, and do not apply voltage to it from the outside. If you apply voltage, do not exceed the TTL level (+ 5 V). If a voltage exceeding the TTL level (+ 5 V) is applied, the internal circuit could be damaged.



Check the connection of each cable.

Connect an antenna with VSWR 1.5 or lower that can withstand 600 W.

Since the output power is a large power of 600 W, use a coaxial cable equivalent to RG8A / U or higher.

Connect the AC input to a power supply of a single-phase of 115 to 120 V with current capacity of 15 A or more.

Connect SEND to TTL or non-voltage contacts such as relay or the open collector.

It will be in the transmission state when the TTL level is L or the contact is closed.

Connect ALC to an input that can be controlled from 0 to -4.4 V at 600 W.

Set the BAND switch to the frequency you want to use.

Narrow down the ALC level on the back to CCW (counterclockwise).

Set the RF power setting of the transmitter (transceiver) to the minimum.

When the POWER switch is turned on, the voltage gradually rises, and after about 5 seconds, a click sounds and the relay turns on.

The VD at that time indicates 120 to 160 V depending on the voltage of the AC line.

Next, turn on the AMP switch. When it is turned on, the LED lights up and the amplifier goes into standby state.

If the LED is blinking or off when it is turned on, it could be a malfunction (although it is unlikely). Please contact us.

Transmit in CW (continuous) or RTTY, gradually increase the input and adjust the FWD to the rating of each band. It indicates a value of 300 to 800 W depending on the impedance of the antenna. The VD at that time indicates a value of 120 to 160 V depending on the voltage on the primary side. When the ID is 6.6 A or higher (1.8 to 21 MHz), the protection circuit for current limitation works.

Actually, transmit with SSB and CW and check that the protection circuit does not work.

If it works, lower the output slightly and set it to a point where it does not work.

WARNING

If the reflected power protection circuit works, readjust the antenna or insert an external antenna tuner between the RF OUTPUT connector of DXV600L and the antenna to lower the VSWR.

Turn off the antenna tuner built into the transceiver or transmitter.

When the protection circuit operates at the current limitation value (for example, 6 A) or less, it is when the reflected power limitation is activated in a short time. (In rare cases, the overheat protection circuit could work due to poor environment or load.) Either lower the VSWR of the antenna (such as installing an external tuner between the output of the DXV600L and the antenna), or lower the output and use it with power that does not activate the protection circuit to operate.

WARNING

When the protection circuit operates, check the cause and eliminate the cause before use.
If you continue to use the product as it is, it could cause a serious failure.

The operation of the protection circuit is as follows.

This unit has three types of protection functions.

In VSWR (Reflected Power: 75 W or more), overcurrent (described above), or overheating (Heatsink Temperature: 100 degrees or more), **the protection circuit operates, it is turned into the "AMP OFF" state, and the "TX ON LED" blinks.**

In addition, it is possible to instantly identify with the blinking state of the TX ON LED which abnormality is caused.

1 Blink > Abnormality in VSWR

2 Blinks > Overcurrent

3 Blinks > Heatsink Overheating

In addition, there are bands that do not reach the current limitation value due to the state of ANT. In that case, be careful about over-input.

The through circuit and wattmeter of this unit can be used up to the 50 MHz band. The upper limit is about 100 W according to the standard of the coaxial cable used. There is no problem in practical use because the directionality of the directional coupler is sufficient.

To prevent malfunctions due to erroneous operation, do not turn on the POWER switch for use in the 24 MHz band or higher.

4-3 Quantitative Power Measurement

WARNING

When touching the coaxial connector, turn off the DXV600L and the connected transceiver or transmitter.

Connect a calibrated RF wattmeter to the RF OUTPUT (ANT) connector and terminate it with a dummy load of 50 Ω 1000 W or more. Next, turn on the transceiver and transmitter, output the rated power, and compare it with the indicated value of the FWD meter on the front panel. Generally, a RF wattmeter has a large error, so there is no problem if it is about $\pm 10\%$ of the displayed value.

At that time, operate the meter select switch and check that the indicated value of REF (reflected power) is almost 0 W.

4-4 ALC Circuit

CAUTION

When adjusting the ALC, connect a dummy load of 50 Ω 1000 W or more to the RF OUTPUT connector.

WARNING

When touching the coaxial connector, turn off the DXV600L and the connected transceiver or transmitter.

The ALC circuit of this unit is a circuit that only detects a part of the output, unlike the grid current detection type, the circuit that compares the linearity of input and output. Therefore, if you set the input so that it slightly exceeds 600 W when there is no ALC (Set VR.CCW full) and set it so that 600 W output is obtained when ALC is applied, a relatively good IMD can be obtained.

However, depending on the impedance of the antenna, the display of output shows a value of 500 to 800 W. In either case, avoiding excessive overdrive and applying ALC in an amount that slightly reduces the output is the key to emitting clean radio waves. Also, if ALC is applied too much and it is used in an overdrive state, the protection circuit will operate frequently, and smooth operation will not be possible.

The characteristics of ALC differ depending on each manufacturer and model.

Even if ALC is not applied, good quality radio waves can be emitted if the drive signal can be completely restricted.

In either case, monitoring with an external receiver or oscilloscope to know the capabilities of the device is the key to emitting clean radio waves.

5. Maintenance

5-1 Periodic Maintenance; General Check and Cleaning

DANGER High Voltage!

It is dangerous to touch the DC high voltage (120–160 VDC) or the high frequency high voltage (1 kVp-p) inside the DXV600L or the main power supply voltage. It leads to electric shock. For safety, when removing the cover, pull the power plug from the outlet and check that the voltage of the VD meter on the front panel is 0 V after 3 minutes or more, before starting work. Never energize with the cover removed because it is dangerous.

- a) Periodically (at least once a year) check the reliability of the connection, the cleanliness of the contacts, and the tightening of all connectors especially including the outer conductors of coaxial connectors. Pay particular attention to the power plug and outlet. Consult an electrician.
Periodically check the VSWR of the antenna and whether it has changed over time. Problems could occur frequently in bad weather conditions, such as rain, snow, or strong winds.
- b) Clean the DXV600L with its cover removed periodically (at least once a year in a dusty environment). When removing the cover, unplug the power outlet and wait at least 3 minutes before starting work.

5-2 Replacement of Fuse

DANGER High Voltage!

If you need to replace the fuse, first pull out the power plug from the outlet and wait at least 3 minutes!

The main fuse for DXV600L is on the rear panel. The fuse must be a high-speed type with a current of 10 A.

WARNING

The rated voltage of the fuse must correspond to the nominal rated voltage (10 A for 100–120 V AC). Use only standard fuses.

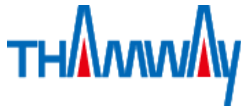
WARNING

Do not replace the fuse inside the DXV600L without special instructions from your dealer! Blown internal fuses could be a symptom of a more serious problem. It needs to be resolved in advance. Unauthorized replacement of the internal fuse violates the warranty conditions!

6. Specification

6-1 Specification

	DXV600L	
BAND	1.8MHz Band 1,800 - 2,000kHz 3.5MHz Band 3,500 - 4,000kHz 7 - 10MHz Band 7,000 - 10,150kHz 14 - 21MHz Band 14,000 - 21,450kHz *It changes with the rotary switch that exists in the front panel.	
Output Power	1.8 - 3.8MHz 600W 7MHz 600W 10MHz 450W 14 - 18MHz 400W 21MHz 300W at 120 VAC	
Mode	SSB/CW/RTTY/JT65/FT8,etc Please use AM in less than 1/4 of rated apparent power.	
Harmonic Distortion	Less than -50dB (In the rated power in 50Ω load)	
3 rd IMD	Less than -30dB (In the rated power)	
Drive Power	20W to 50W (In the rated power)	
Final Device	C2M0160120D x 6 (3 Parallel Push-Pull)	
Final Input	140V, 6.6A 920W (7MHz at 740W) 50Ω load operated by 120 VAC	
I/O Connector	M-Female (SO239)	
T/R Control	Receive: H Transmit: L	
Break-in	Semi Break-in	
Cooling	Forced Air Temperature proportional rotation control	
Monitor circuit	Analog meter display FWD Power, REV Power Final Drain Voltage, Final Drain Current *It selects it with the rotary switch of the front panel.	
ALC Out	0 to -4.4V Adjustable	
Protection Circuit	REV Power Protection When the REV power Amplifier becomes about 60W the amplifier is turned off. Over Current Protection When the drain current becomes about 6.6A, the amplifier is turned off. Over Temperature Protection When the temperature of the heat sink becomes about 212°F, the amplifier is turned off. Protection circuit reset A linear ON switch is turned off once, and it turned on again afterwards. Over Input Protection Please use ALC.	
Power Supply	120 VAC 50/60Hz Less than 1200 VA	
Size W×H×D	200×100×300 mm 7.9×4.1×11.9 inches	
Weight	3.76 kgs 8.3 lbs	
Accessories	AC power cable (1.8m) 1 SEND/ALC cable (1m) 1 User Manual 1	



7. Denial of liability

All specifications and descriptions of the DXV600L are based on the latest information available at the time of printing this document. All products, product specifications, and data are subject to change as we constantly strive to improve and update our products. Thamway also reserves the right to make changes or improvements without notice.

This document has been created to improve the reliability, function, quality, design, and/or performance of the DXV600L. In addition, this document is provided as is, and Thamway is not responsible for any errors that might be described here.