

ATOM 100-250W BUC & SSPA

Operator's Manual

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ATOM 100-250W BUC & SSPA

OPERATOR'S MANUAL

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TECHNICAL SUPPORT

This manual provides engineers with information necessary to operate the applicable system. Technical support is available from Norsat.

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REVISION HISTORY

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2.2	7204	Update M&C Interface Options; Update to include 250W	JG	AY/JG	16/02/16

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Chapter 1

Introduction

Section 1.1

OVERVIEW

This operator's manual applies to all ATOM SSPAs and BUCs with the following marketing numbers:

ATOMSKUxxx (100-250W)

ATOMBKUxxx (100-250W)

This includes any ATOM that uses the 100-250W (P1dB) Ku Extended Band (13.75-14.5GHz) mechanics, such as a custom frequency band or power derated output unit.

SSPA – SOLID STATE POWER AMPLIFIER

If this unit is a SSPA, the RF input signal is amplified to the specified power.

BUC - BLOCK UP CONVERTER AND AMPLIFIER

If this unit is a BUC, the IF input signal is upconverted to Ku-Band RF frequencies and then amplified to the specified power.

Section 1.2

FEATURES

INPUTS AND OUTPUTS

Table 1-1: Input and Outputs

	100-250W
Input Type	Female N-Type Connector (standard)
	Female SMA-Type Connector (optional)
Output Type	Waveguide WR75 (standard)
	Waveguide WR62 (optional/frequency dependent)

ELECTRICAL INTERFACE

M&C Connector – a ten-pin connector is used to interface with a host computer. See **Section 2.4 J2 – Monitor and Control Interface** for detailed description of the pinouts.

Power Connector – DC Units use a four-pin connector and AC units use a six-pin connector to provide power to the ATOM. See **Section 2.3 J3 – DC/AC Power** for detailed description of pinouts.

Ground Terminal – a #10-32 screw is used to ground the chassis during use.

Section 1.3

SAFETY

WARNING



Leakage Current

The ATOM may exhibit high leakage current during use. Ensure that the ground terminal is grounded according to local electrical codes prior to powering on the ATOM.

WARNING



RF Radiation Hazard

The ATOM emits high power RF energy which is harmful to the human body. Do not operate ATOM unless the RF output flange is either terminated in an RF load (100W min) or connected to the feed of a terminal.

Do not obstruct the RF output or feed output with any body part.

WARNING



Do not allow equipment to be standing in water.

While the BUC/SSPA is designed to be used outdoors, the equipment is not designed to operate in standing water. Failure to follow this precaution could result in electric shock and injury to persons.

CAUTION



Do not allow any items to fall into the unit from the waveguide opening.

CAUTION



Apply voltage to the AC/DC input connector only as specified in the original configuration of this unit. Application of a voltage outside the specified range may cause the unit to become damaged or non-functional.

Chapter 2

Interface Control

Section 2.1

INTRODUCTION

The unit has three connectors on the input side of the housing and one waveguide port on the output side. The interface for these connectors is detailed in this document.

On the input side, there are the following connectors:

- J1 – IF or RF Input; N-Type Jack or SMA-Type Jack
- J2 – Ten-pin circular connector for M&C
- J3 – Four-pin circular power connector for DC unit or six-pin circular power connector for AC unit
- J5 (optional and not shown for ATOM 100W units) – Female SMA mute/unmute trigger input
- J6 – Ground terminal



Figure 2-1 Input Connections for ATOM 100W DC Unit

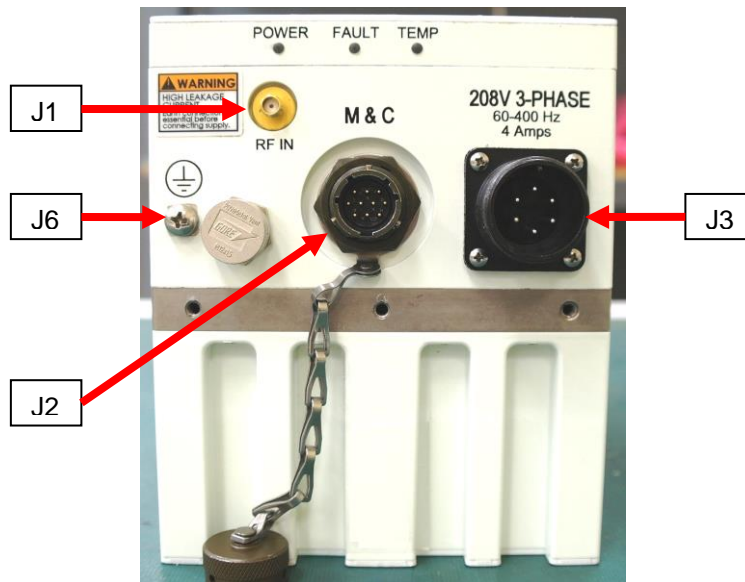


Figure 2-2 Input Connections for ATOM 100W AC Unit

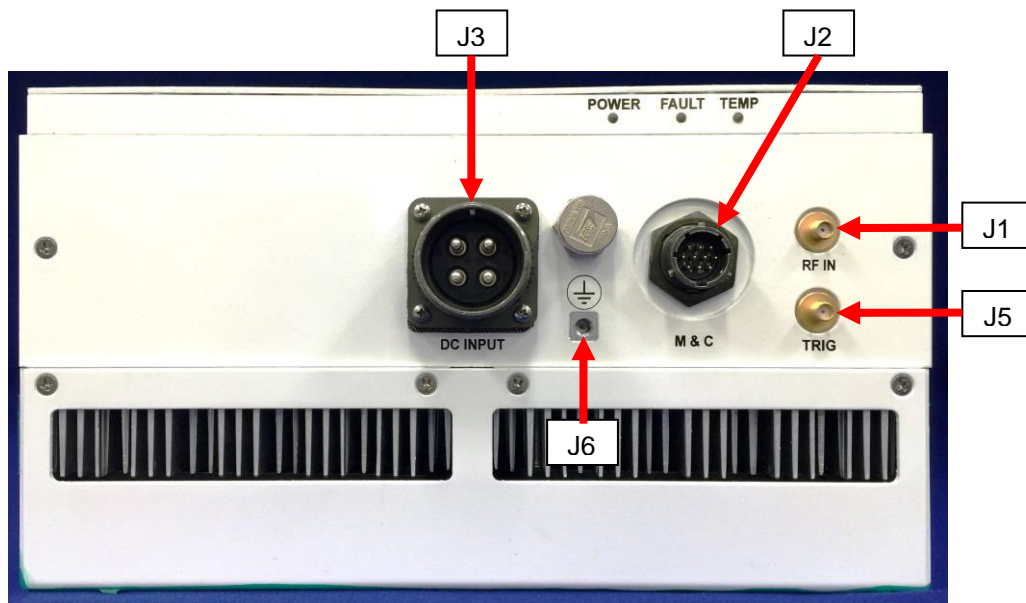


Figure 2-3 Input Connections for ATOM 250W Unit

On the output side, there is one connector:

- J4 – WR75 or WR62 waveguide RF output
- Optional Waveguide to Coax adaptor

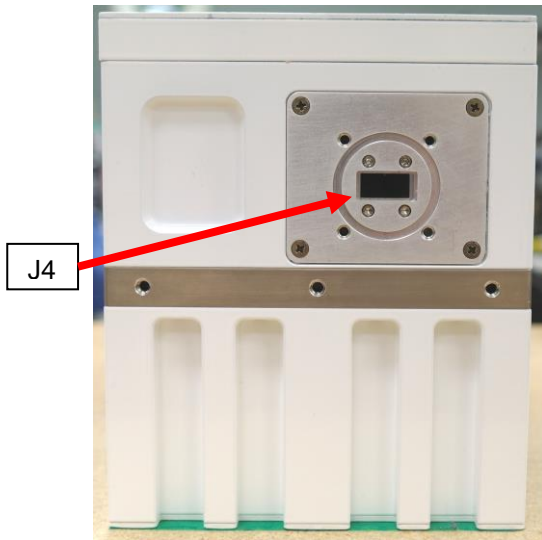


Figure 2-4 Standard Waveguide Output for ATOM 100W units

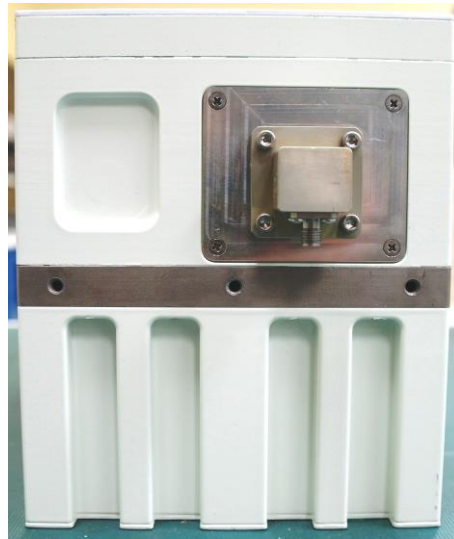


Figure 2-5 Optional Waveguide to Coax adaptor

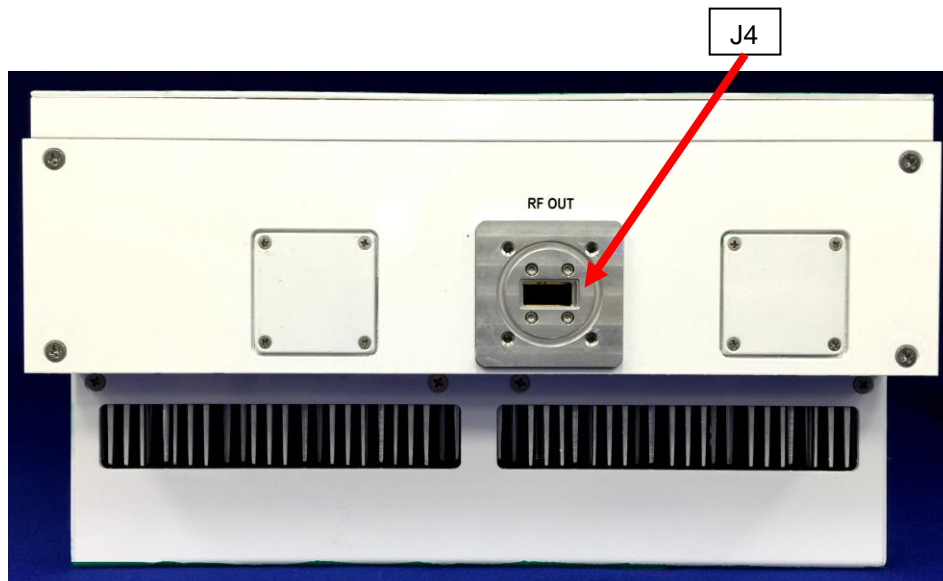


Figure 2-6 Standard Waveguide Output for ATOM 250W units

Section 2.2

J1, J5, & J6– INPUTS AND GROUNDING

J1 – IF/RF INPUT

The IF/RF input connector is a 50 ohm coaxial connector (N or SMA Type). This connector is NOT DC-blocked, and appears as a 50 ohm load at DC. Do not exceed ± 7 VDC on this port. An external DC block is required if the modem or signal source supplies a DC voltage.

J5 – TRIGGER INPUT FOR MUTE/UNMUTE (OPTIONAL FOR ATOM 100W)

The TRIG input is a 50 ohm type-SMA connector. This is an optional feature to be specified at time of order. The input must be at TTL-compatible voltage levels ($0/5V \pm 0.25V$).

J6 – GROUND TERMINAL

A #10–32 screw and lock washers are used to ground ATOM. Ensure the unit is grounded before powering it on.

Section 2.3

J3 – DC/AC POWER

The 100W ATOM power input requires either 20V to 56V DC power (DC unit) or 3-phase 208V AC power (AC unit). On the other hand, 250W ATOM power input requires 36V to 56V DC power. Each ATOM is supplied with a mating connector for the power interface.

DC POWER OPTION

The DC unit typically requires 20V to 56V DC power (100W ATOM) or 36V to 56V DC power (250W ATOM). Refer to specific configuration of the unit for the exact voltage range. Power is supplied through a four pin type cylindrical connector. Two pins are used to deliver the positive connection and two pins are used for the negative connection in order to reduce resistance. The negative connection is internally connected to case ground. The negative power connection may alternatively be applied directly to the ground screw terminal on the aluminum housing.

Connector Type

The J3 connector for the DC unit is a four pin cylindrical connector (Amphenol® MS3102E22-22P). The connector is a receptacle with pins and requires the mating connector to be a plug with sockets (e.g Amphenol® MS-3106E22-22S). A range of plug-compatible mating connectors may be used to add options to the plug such as right-angle, stress relief clamp, metal color/finish, etc. Please contact the connector manufacturer for more information and/or refer to the Amphenol® catalog 12-070. Ensure the supply cable is capable of supplying at least 540W of power (for 100W ATOM) or 1150W of power (for 250W ATOM).

DC Unit J3 Connector Pinouts

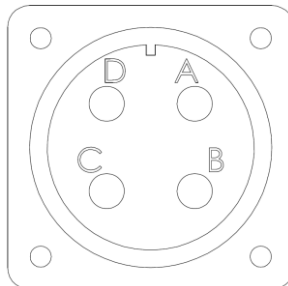


Figure 2-7: DC Unit J3 Connector Pinout

Table 2-1: DC Unit J3 Connector Pinout

Pin	Name
A	V-/Ground
B	V+
C	V+
D	V-/Ground

For the DC input units, the positive terminals are pins B/C and the negative terminals are pins A/D. Pins A and D are connected to case ground internally; pins B and C are connected together internally. It is recommended to apply the supply voltage evenly to both pairs of pins to evenly share the current among both sets of wires/pins.

The internal capacitance between the V+ and V- terminals is approximately 120 microfarads.

3 PHASE AC POWER OPTION

The 3 Phase AC Power option allows the unit to be powered with 208VAC. The input power frequency range is 60 to 400 Hz and the maximum current draw is 4 A.

Power is supplied through a six pin cylindrical type connector. Three pins are used to deliver the 3-phases of the AC power, one pin is connected to the case ground of the unit, and two pins are unconnected.

Connector Type

The J3 connector for the AC unit is a six pin cylindrical connector (AMPHENOL DL3102A18-12P). The connector has a Pre-Earth/First-Make Last-Break feature where the ground terminal mates first and provides a path for any stray voltage to be shunted to a safe ground avoiding harm to the operator and voltage sensitive equipment. The mating Amphenol connector DL3106A18012S must be used to maintain the First-Make Last-Break feature.

AC Unit J3 Connector Pinouts

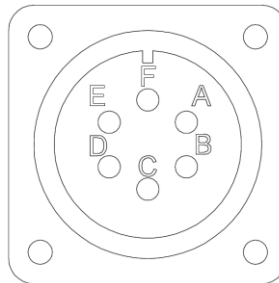


Figure 2-8: AC Unit J3 Connector Pinout

Table 2-2: AC Unit J3 Connector Pinout

Pin	Name
A	208V AC Phase 1
B	208V AC Phase 2
C	208V AC Phase 3
D	Ground
E	No Connection
F	No Connection

For the 208V AC 3-phase input, one phase is applied to pin A, another phase is applied to pin B, and the third phase is applied to pin C. Earth ground is connected to pin D, which is internally connected to the case ground.

Section 2.4

J2 – MONITOR AND CONTROL INTERFACE

The M&C interface is used to control the unit with a host computer. All on-board sensors are accessed through this interface. Use of this connection is optional. Each ATOM is supplied with a mating connector for the M&C interface.

The standard M&C configuration includes RS-485 addressing capability. The 100-250W ATOM can be ordered with web interface or RS-232 serial interface options. **Table 2-3** summarizes the M&C interface protocols available with each option.

Table 2-3: M&C Interface Options

Orderable Option	Communication Interfaces			
	RS-485 Addressable	RS-485	RS-232	Web Interface
Standard	X	X		
RS-232 Option			X	
Web Interface Option		X		X

MONITOR AND CONTROL INTERFACE PINOUT

The M&C interface is a ten pin miniature circular connector. This connector is a MIL-C-26482 Series 1 receptacle, shell size 12, 10 pin (Amphenol® part number 71-570123-10P). A mating connector is Amphenol® part number PT06E-12-10S-SR. A range of compatible part numbers for the mating connector may be used to add options to the plug such as right-angle, stress relief clamp, metal color/finish, etc. Please contact the connector manufacturer for more information and/or refer to Amphenol® catalog 12-070.

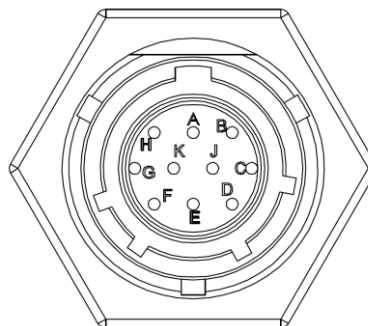


Figure 2-9: J2 M&C Connector Pin Arrangement

Table 2-4 summarizes the various pinout options for the 100-250W ATOM. Note that the pin function varies according to the M&C interface option that the ATOM was ordered with. The M&C interface option cannot be changed by the user.

Table 2-4: J2 Pinouts for ATOM Configurations

Connector Pin	Standard Configuration	Web Interface Configuration	RS-232 Configuration	Signal Description
A	RS-485 Tx-	RS-485 Tx-		Host computer Tx- signal (signal into unit)
			NC	NA
B	RS-485 Tx+	RS-485 Tx+		Host computer Tx+ signal (signal into unit)
			NC	NA
C	RS-485 Rx+	RS-485 Rx+		Host computer Rx+ signal (signal out of unit)
			NC	NA
D	Mute	Mute	Mute	Controls Muting of Amplifier
E	RS-485 ADD0			RS-485 Address 0
		Eth Tx+		Ethernet host computer Tx+ signal (signal into unit)
			RS-232 Rx	RS-232 host computer Tx signal (signal into unit)
F	RS-485 ADD1			RS-485 Address 1
		Eth Rx+		Ethernet host computer Rx+ signal (signal out of unit)
			RS-232 Tx	RS-232 host computer Rx signal (signal out of unit)
G	GND	GND	GND	Ground reference for Ethernet/RS-485/RS-232 signals. This is internally connected to case ground.
H	GND			Ground reference for RS-485 signals. This is internally connected to case ground.
		Eth Tx-		Ethernet host computer Tx- signal (signal into unit)
			NC	NA
J	RS-485 Rx-	RS-485 Rx-		Host computer Rx- signal (signal out of unit)
			NC	NA
K	RS-485 ADD2			RS-485 Address 2
		Eth Rx-		Ethernet host computer Rx- signal (signal out of unit)
			NC	NA

Ground Pin(s): Pins G & H

The GND pin is internally connected to the case ground. It is also used as a ground reference for the RS-485 address signal. If the RS-485 addressing function is used, one of the GND pins should be connected to the RS-485 ground. If the RS-485 addressing function is not used, these pins can be left floating or they can be externally connected to the case ground if desired.

Mute Control: Pin D

This pin controls the hardware mute state of the ATOM. When muted, the power transistors are turned off, reducing power consumption and providing an RF output noise close to the thermal noise floor.

The operation of this pin is fully configurable through the M&C Interface. Pin D can be biased with either an internal Pull-Down (to 0V) or an internal Pull-Up (to 4V). Pin D is also configurable to be either active high (3-5V on Pin D will mute the unit) or active low (0-0.8V on Pin D will mute the unit). All voltages are relative to Pin G or the Case Ground.

Because of the configurable pull-down / pull-up resistor, the unit can be configured to be active (i.e. not muted) when Pin D is left floating. Therefore, it is possible to operate the unit with no connection pin D.

The ATOM mute control behavior is shown below in [Table 2-5](#). Note that the ATOM may be factory ordered with alternate configurations so the Default configuration shown in the table is not reflective of all ATOM units.

Table 2-5: ATOM Mute Control Behavior

Configuration	Mute Line Polarity	Mute Line Bias	Sample Input 1	Sample Mute State 1	Sample Input 2	Sample Mute State 2	Sample Input 3	Sample Mute State 3
Default	0V = Unmute	Pull-Down	0V	Unmuted	5V	Muted	Floating	Unmuted
Sample 1	0V = Unmute	Pull-Up	0V	Unmuted	5V	Muted	Floating	Muted
Sample 2	5V = Unmute	Pull-Down	0V	Muted	5V	Unmuted	Floating	Muted
Sample 3	5V = Unmute	Pull-Up	0V	Muted	5V	Unmuted	Floating	Unmuted

Note that the ATOM mute state can also be controlled through the M&C interface. The software mute setting takes priority over the hardware pin. Refer to [Command Details](#) section for details.

RS-485 Port: Pins A, B, C, J, G

These five pins form a standard four-wire RS-485 serial port, with Rx+, Rx-, Tx+, Tx-, and serial port ground. Since communication with the ATOM is only half duplex, it is possible to deploy the ATOM on a two-wire RS-485 network by connecting the Tx+ & Rx+ and Tx- & Rx- wires together.

Tx+ and Tx- are the differential pair which carries a signal from the host computer to the unit. Rx+ and Rx- are the differential pair which carries a signal from the unit to the host computer. Connect these to the host computer RS-485 port accordingly.

RS-485 Port Address: Pins E, F, K

These three pins configure the unit address of an ATOM when it is deployed on an RS-485 bus. To change the unit address, connect some or all of the pins to ground/0V (i.e. Pin G, Pin H, or the chassis ground). Up to seven unique ATOM units can be operated on a single RS-485 bus.

Devices whose RS-485 address is set to a value between 0 and 6 (inclusive) using these pins are said to be operating in Addressed Mode, and will ignore all non-addressed commands and all addressed commands that are sent to them unless the command contains the device's address. Devices whose RS-485 address is set to 7 will respond to addressed commands that contain address 7, and to non-addressed commands. Please see the description of the Serial Port Interface for details.

The RS-485 address pins each have a 10K-ohm pull up to 3.3V. If RS-485 addressing is not used, pins E, F, & K should be left floating (i.e. disconnected).

Table 2-6 summarizes the unit address assignment configuration; 0 denotes a grounded pin and 1 indicates a floating pin.

Table 2-6: RS-485 Address Assignment

A2 (Pin K)	A1 (Pin F)	A0 (Pin E)	Unit Address
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

Ethernet Interface Option: Pins E, F, H, & K

These four pins form a standard 10/100Mbps Ethernet link. [Table 2-7](#) and [Figure 2-10](#) summarize how to construct an Ethernet M&C cable to access the web interface.

Table 2-7: Ethernet Cable Pinout

ATOM Connector	Twisted Pair Cable	RJ-45 Connector	Description
E	Wht/Grn	1	Ethernet host computer Tx+ signal (signal into unit)
H	Grn	2	Ethernet host computer Tx- signal (signal into unit)
F	Wht/Org	3	Ethernet host computer Rx+ signal (signal out of unit)
-	Blu	4	-
-	Wht/Blu	5	-
K	Org	6	Ethernet host computer Rx- signal (signal out of unit)
-	Wht/Brn	7	-
-	Brn	8	-

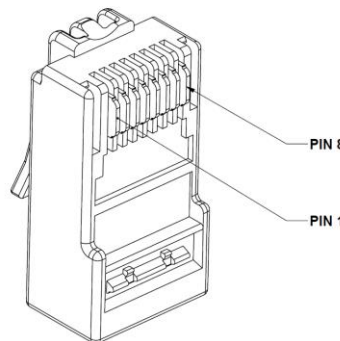


Figure 2-10: RJ-45 Plug Pinout

RS-232 Port: Pins E, F, & G

These pins form a standard RS-232 serial port. Pin E carries a signal from the host computer to the unit and Pin F carries a signal from the unit to the host computer. Pin G must be connected to the ground pin on the host computer.

Note that it is possible to use an RS-232 interface to control a standard configuration equipped ATOM through an RS-485 to RS-232 adaptor. Contact Norsat for details about the available adaptor kits.

SERIAL PORT INTERFACE (RS-485 & RS-232)

Port Settings

Communications to and from the serial interface is ASCII character based. Any standard "Terminal" program with the port parameters shown in Table 2-8 may be used.

Table 2-8: Serial Port Interface Setup

Setup Parameter	Value
Bits per second	9600
Data bits	8
Parity	None
Stop Bits	1
Flow Control	None

The serial interface supports a command line interface (CLI) which provides an easy-to-use means for gathering basic information. The CLI is supported through any terminal emulation software. The terminal should be set to echo locally so that typed commands are shown on-screen for ease of entry. The CLI does not provide a prompt; instead, commands can be entered at a blank line. The CLI requires that all sent commands be terminated with either a carriage return character (denoted <CR> in the following sections) if the device is operating in Non-addressed Mode, or with both a carriage return character and a line feed character (denoted <CR><LF>) if the device is operating in Addressed Mode. The terminal emulation software should be configured to automatically translate transmit line endings (which occur when the "Enter" key is pressed) into either <CR> or <CR><LF> as appropriate.

Commands

Each CLI command can be sent as either an Addressed Command or a Non-addressed Command. Addressed commands include an RS-485 address, and can thus be targeted at a specific device if multiple devices are connected to the same RS-485 bus. Devices will only respond to addressed commands if their RS-485 address is between 0 and 6 (inclusive) and if their RS-485 address matches the address included in the command. Devices will only respond to Non-addressed Commands if their RS-485 address is set to 7.

Note that addressed mode is not available if Ethernet option is present.

The command format for Addressed Commands is as follows:

```
<address>/<cmd><CRC><CR><LF>
```

Both a carriage return character and a line feed character are required for Addressed Command termination.

The command format for Non-addressed Commands is as follows:

```
<cmd><CR>
```

Only a carriage return character is required for Non-addressed Command termination.

In both cases, the *<cmd>* string is a command word (in ASCII text) followed by zero or more sets of parameter-value pairs. While the parameter-value pairs are required for some commands, a few commands have optional parameters that may be omitted without triggering an error response.

For Addressed Commands, the *<address>* value must match the device's RS-485 address specified via pins E, F, and K of the M&C connector. Addressed Commands sent to an address that does not match the device's RS-485 address will be ignored. Non-addressed commands will also be ignored by devices with an RS-485 address between 0 and 6 (inclusive).

Addressed Commands (and their corresponding responses) also include a CRC character immediately before the terminating *<CR>* and *<LF>*. This unsigned 8-bit CRC character can be any value between 0 and 255 (inclusive) and is calculated using the portion of the command string or response string that precedes the CRC.

The following C code can be used to calculate the CRC:

```
unsigned char GetCRC(char * szAddressAndCommand)
{
    const unsigned char crcTable[16] =
    {
        0x00, 0x1C, 0x38, 0x24, 0x70, 0x6C, 0x48, 0x54,
        0xE0, 0xFC, 0xD8, 0xC4, 0x90, 0x8C, 0xA8, 0xB4
    };

    unsigned char crc = 0x00;
    int numChars = 0;
    int i = 0;

    if (NULL != szAddressAndCommand)
    {
        numChars = strlen(szAddressAndCommand);

        for (i = 0; i < numChars; i++)
        {
            crc = ((crc >> 4) & 0x0F) ^
                crcTable[(crc & 0x0F) ^
                    crcTable[(szAddressAndCommand[i] & 0x0F)]];

            crc = ((newCRC >> 4) & 0x0F) ^
                crcTable[(crc & 0x0F) ^
                    crcTable[((szAddressAndCommand[i] >> 4) & 0x0F)]];
        }
    }

    return crc;
}
```

Command Response

The CLI operates on a command + response paradigm. Each time a command is entered, a response will be displayed.

If the device's RS-485 address is between 0 and 6 (inclusive), the response format will be:

```
<CR><LF><response><CRC><CR><LF>
```

If the device's RS-485 address is 7, the response format is:

```
<CR><LF><response><CR><LF>
```

If a command was executed correctly, the *<response>* will start with “**ok**” and will be followed by the sequence of parameter-value pairs that are specific to the response.

If a command did not get executed correctly, the *<response>* will start with “**err**” and will be followed by a description of the error that was encountered.

The potential errors that may be displayed include:

- Invalid Command – The command was not recognized
- Invalid Parameter – One or more parameters were not recognized
- Invalid Value – The value provided for one or more parameters was not valid
- Missing Parameter – A required parameter was not provided
- Inconsistent Values – The values provided to at least one parameter is not consistent with the values provided to other parameters
- Bus Error – The hardware required to process the command does not exist on this device (e.g. BUC-specific command sent to an SSPA)

Due to the inherent collisions that can occur between multiple addressed units operating on a shared serial bus, a remote processor should not send a subsequent command to any unit until it has received the response to the last command it sent to any other. For this reason, the address of a unit is not included in its response as it is not needed by the remote processor, and thus the command response format for a unit remains the same (with the exception of the inclusion of a CRC) whether the unit is operating in Addressed Mode or Non-addressed Mode.

Sample command in Addressed Mode (RS-485 address 0 to 6):

```
Tx: 1/getidentJ<CR>
```

```
Rx: <CR><LF>ok pn AMP-Ku100 swver 1.0.1_1 sn # address # syn no,,<CR><LF>
```

Sample command in Non-addressed Mode (RS-485 address 7):

```
Tx: getident<CR>
```

```
Rx: <CR><LF>ok pn AMP-Ku100 swver 1.0.1_1 sn # address # syn no<CR><LF>
```

Command Details

The following section provides detailed information about some of the basic commands that can be sent to the ATOM device. Commands are described in Non-addressed Mode for simplicity.

getident

This command obtains identification information from the ATOM device.

Command Format:

```
getident<CR>
```

Response Format:

```
<CR><LF>ok pn <Part Name> swver <Software Version> sn <Serial Number> address <RS485 Address> syn <Synthesizer Type><CR><LF>
```

Value	Data Type	Notes
<Part Name>	string	One of the following values: <ul style="list-style-type: none"> AMP-Ku100 BUC-Ku100 AMP-Ku250 BUC-Ku250 Part Names that start with "AMP" denote SSPAs, while Part Names that start with "BUC" denote BUCs.
<Software Version>	string	The software version number, in the format Major.Minor.Revision_Build.
<Serial Number>	string	A concatenation of the Part Name, a hyphen, and the actual numeric Serial Number of the device.
<RS485 Address>	UINT16	The address used with RS-485 communication.
<Synthesizer Type>	string	One of the following values: <ul style="list-style-type: none"> "no" for no synthesizer (SSPAs only) "int" for internal synthesizer (BUCs only) "ext" for external synthesizer (BUCs only)

Example:

```
Tx: getident<CR>
```

```
Rx: <CR><LF>ok pn AMP-Ku100 swver 1.0.11_1 sn AMP-Ku100-30223 address 7 syn int<CR><LF>
```

getstatus

This command obtains status information from the ATOM device.

Command Format:

```
getstatus<CR>
```

Response Format:

```
<CR><LF>ok fault <Fault Status> fwdpwr <RF Forward Power> revpwr <RF Reverse Power>
temp <Device Temperature><CR><LF>
```

Value	Data Type	Notes
<Fault Status>	UINT16	A hexadecimal value prefixed with "0x" that indicates which of the four detectable faults have been detected. Bit values are as follows: Bit 4 (0x8): Power Fault Bit 3 (0x4): PLL Fault Bit 2 (0x2): Over Temperature Fault Bit 1 (0x1): Device is muted
<RF Forward Power>	double	The Forward RF Output Power in dBm. Positive values are prepended with a "+". Values are provided with 0.1 dBm accuracy.
<RF Reverse Power>	double	The Reverse RF Output Power in dBm. Positive values are prepended with a "+". Values are provided with 0.1 dBm accuracy.
<Device Temperature>	INT16	The temperature of Power Module 8 in degrees Celsius. Values range from -40 to 125.

Example:

Tx: `getstatus<CR>`

Rx: `<CR><LF>ok fault 0x0 fwdpwr +10.4 revpwr -21.3 temp 42<CR><LF>`

Notes:

- Power Faults indicate that one of the voltages monitored by the device's internal voltage monitor has dropped too low.
- PLL Faults typically indicate that no 10 MHz reference signal is being supplied to the device. These faults only apply to BUCs, not to SSPAs.
- Over Temperature Faults indicate that the internal temperature measured by the device is greater than the fault threshold temperature.
- The *resetfaults* command can be used to reset the Over Temperature Fault if the device's internal temperature drops below the fault reset temperature.
- The device's overall mute state is reported along with the faults. This bit will be set to 1 if the device is muted for any reason (software control, hardware control, or automatic muting due to one of the above three faults).

- The accurate forward power values range from Psat-15dB to Psat, or from 35dBm to 50dBm for an amplifier with a saturated power output of 100W. Values more than 15dB below Psat are not considered accurate.
- The Reverse RF Output Power value is currently meaningless, since the hardware required for this feature has not been implemented. Reverse RF Output Power readings can thus be safely ignored.

resetfaults

This command resets the Over Temperature Fault for the ATOM device if the current System Temperature is below the device's fault reset temperature.

Command Format:

resetfaults<CR>

Response Format:

<CR><LF>ok<CR><LF>

Example:

Tx: resetfaults<CR>

Rx: <CR><LF>ok<CR><LF>

Notes:

- The default fault threshold temperature is 90°C.
- The default fault reset temperature is 70°C.

getmute

This command obtains mute status information from the ATOM device.

Command Format:

getmute<CR>

Response Format:

<CR><LF>ok value <Mute Status><CR><LF>

Response Values:

Value	Data Type	Notes
<Mute Status>	UINT16	1 if the device is currently Muted, or 0 if the device is currently Unmuted.

Examples:

Tx: `getmute<CR>`

Rx: `<CR><LF>ok value 1<CR><LF>`

setmute

This command controls the mute state for the ATOM device.

Command Format:

`setmute value <Mute Command><CR>`

Response Format:

`<CR><LF>ok<CR><LF>`

Response Value:

Value	Data Type	Notes
<Mute Command>	UINT16	1 if the software mute should be enabled, or 0 if the software mute should be disabled.

Example:

Tx: `setmute value 1<CR>`

Rx: `<CR><LF>ok<CR><LF>`

Notes:

- If <Mute Command> is set to 1 then the device will be muted regardless of the device's fault state or the state of the hardware mute pin.
- If <Mute Command> is set to 0 then the device's mute state will be controlled by the device's fault state and the state of the hardware mute pin.

ETHERNET INTERFACE (ATOMWEB)

On units equipped with the Ethernet option, an integrated HTTP Web Server allows the user to access a web based version of the ATOMControl software to control the unit. To access this application, an Ethernet link to the ATOM must be established. Refer to [Section 2.4 Ethernet Interface Option](#) for cable connection details. Once the cable is fabricated, connect the Ethernet jack to the network (either through an Ethernet switch or directly to the host computer's RJ-45 port) and power on the ATOM unit.

Default IP Address

The default IP Address for the ATOM unit is **192.168.77.30** and default the subnet mask is **255.255.255.0**. Ensure the computer's IP Address is on the same logical network and subnet as the ATOM unit (e.g. 192.168.77.XXX, where XXX is any number *except* "30").

Accessing ATOMWeb Interface

The ATOMWeb interface is accessed through any web browser such as Mozilla Firefox (recommended), Google Chrome, Opera, or Internet Explorer. To access the web interface, launch the web browser and type in the IP Address for the ATOM:

<http://192.168.77.30/index.html>

A simplified version of the ATOM Control software will load in the browser window.

Using ATOMWeb Interface

The ATOMWeb use and operation is identical to the ATOMControl interface. Refer to the ATOMControl Software Manual for instructions on how to use the web interface (Norsat document number INS001085).

Changing the ATOM's IP Address

The factory default IP address of the BUC is **192.168.77.30** but it can be user configured through the **Network and Port Configuration** webpage. To change the ATOM's IP Address, connect the ATOM as described above, launch a web browser, and then navigate to the following address:

http://192.168.77.30/index_cong.html

Specify the desired IP Address in the text boxes and then click on the "**Save Settings and Reboot**" button. Once the web server reboots, ATOMWeb will be accessible through the new IP Address

<http://<New IP Address>/index.html>

WARNING: TAKE CARE TO RECORD THE NEW IP ADDRESS WHEN MAKING CHANGES.

Recovering the ATOM's IP Address

If the IP Address setting is lost, it is possible to determine it using one of the following procedures:

Serial Port Method (recommended method)

1. Connect the ATOM's RS-485 serial port to a computer using the appropriate adaptor and power on the ATOM.
2. Launch ATOMControl, connect to the ATOM (refer to ATOMControl Manual), and select the "Custom Commands" tab. Alternatively, a terminal program may be used with the correct settings (refer to the [Port Settings](#) section for details).

3. Send the following command and the ATOM will respond with the IP Address

Tx: `ns getipdata<CR>`

Rx: `ATOMWEB IP:192.168.0.145 MASK: 255.255.255.0<CR>`

4. Follow the instructions in the preceding section to restore the IP Address to the desired setting.

Ethernet Method (alternate method)

5. Connect the ATOM's Ethernet port directly to a computer running Microsoft Windows and power on the ATOM.
6. Disable any wireless connections (if present).
7. Launch a command prompt window (**Start>Run>cmd**)
8. Type in the following command and press the carriage return key:

Tx: `arp -a <cr>`

9. A list of all Ethernet devices connected to the computer will be displayed. In this case, the ATOM Ethernet web server should be the only device listed in the summary.
10. Follow the instructions in the preceding section to restore the IP Address to the desired setting.

Section 2.5

J4 – RF OUTPUT

The RF output port is either WR75 (standard) or WR62 (optional/frequency dependent) square waveguide flange. The unit is supplied with two screw lengths (four 6-32x3/8" and four 6-32x7/16"); it is the user's responsibility to ensure that the appropriate screw length is used. There should be at least 4 threads of engagement (0.125") with the holes in the waveguide flange.

The waveguide output port should not be relied upon to act as a mechanical support for the unit. Refer to [Appendix A](#) for the size and position of the ATOM mounting holes.

Section 2.6

GROUND CONNECTION

The unit is supplied with a #10-32 screw and internal tooth lock washers for grounding purposes. It is highly recommended that the unit be grounded according to national and local electrical codes before use.

Section 2.7

INDICATORS / LEDs

There are three LEDs on the unit that indicate the unit status to the user.

Table 2-9: Indicators / LEDs

Pin	Color	Name
POWER	Green	On = Power on Off = Power off
FAULT	Red	On = Internal voltage regulator fault, over-temperature fault, or PLL phase lock fault Off = No faults
TEMP	Red	On = Over-temperature fault Off = No over-temperature fault

When power is first applied, an LED test will be performed and all LEDs will illuminate for 1 second.

The POWER LED will illuminate whenever power is applied to the unit.

The FAULT LED will illuminate when an internal regulator is not producing the proper voltage, the internal temperature is too high, or the PLL has lost phase lock. The unit will be muted while the fault condition exists.

The TEMP LED will illuminate when the internal temperature is too high. The unit will be muted while this fault condition exists.

Chapter 3

Misc. Info

Section 3.1

ATOM INSTALLATION

MOUNTING

Depending on the configuration, an ATOM can weigh up to 7.3kg (16lbs). When choosing an installation location, ensure the mounting brackets are capable of supporting the unit weight. Norsat recommends that the unit is supported using at least eight of the mounting holes on two opposing sides (four holes per side). The waveguide output port (J4) must not be used to physically support the unit.

Refer to [Appendix A](#) for the size and position of the ATOM mounting holes.

OUTDOOR USE

The ATOM is designed for use in an outdoor environment and is sealed to prevent water ingress. Ensure the waveguide and/or feed connected to J4 are also sealed with gaskets to prevent water ingress.

Section 3.2

FANS & BASEPLATE COOLING

The standard ATOM configuration employs an integrated radiator and IP55 fans to cool the unit. A minimum clearance of 1 inch must be maintained around the air intake and exhaust during use. The fans are a field replaceable assembly; contact Norsat for details on replacement kits. If the unit is deployed inside a radome, ensure there is adequate cooling to remove heat and prevent the unit from overheating.

The ATOM is also available with a flat plate in place of the radiators and fans. It is the user's responsibility to ensure that the plate the unit is mounted to is capable of rejecting any heat produced by the unit. Please contact Norsat for cooling requirement specifications.

Section 3.3

ACCESSORIES

Each ATOM unit ships with mating connectors for the both M&C Port and the Power Port connectors as well as hardware for the waveguide flange and ground terminal. No hardware is provided to mount the unit.

A range of optional accessories such as pre-built power cables, M&C test cables, and M&C signal adaptors are also available; please contact Norsat for details.

Section 3.4

GENERAL SPECIFICATIONS

Table 3-1 summarizes general specifications applicable to most 100-250W ATOM units. Please refer to the specific ATOM datasheet available on the Norsat website for complete unit specifications.

Table 3-1: General 100-250W ATOM Specifications

Parameter	Specifications	
RF Power Output (P1dB)	100W *	250W
Gain (min)	60dB *	65dB
Operating Temperature with fans	-40°C to +60°C	
Storage Temperature	-54°C to +80°C	
Thermal Shutdown Temperature	90°C ±3°C	
Weight	6.9kg (15.3lbs) #	12.7kg (27.9lbs)
Input Voltage (DC)	20 to 56 VDC	36 to 56 VDC
Input Voltage (3-Phase AC Only)	208VAC, 60-400Hz	
Power Consumption, DC BUC unit with fan (PSAT)	540W	1150W
Power Consumption, DC BUC unit with fan (P1dB)	480W	1050W

* Frequency dependent, 100W DC BUC over 13.75-14.5GHz range

Configuration dependent

Section 3.5

STANDARD WARRANTY

Norsat International Incorporated warrants that its equipment shall be free from defects in material or workmanship for a period of one (1) year from the ship date, unless otherwise stated in the Offer Terms and Conditions. The warranty does not cover units that have:

- been damaged through improper use or physical damage (e.g. dropped units)
- been modified, altered, or repaired by the user
- the security label(s) removed or damaged
- the serial number label removed or altered

To obtain warranty repair service, please contact Norsat [Technical Support](#) for any warranty claims.

Appendix A Mechanical Drawings

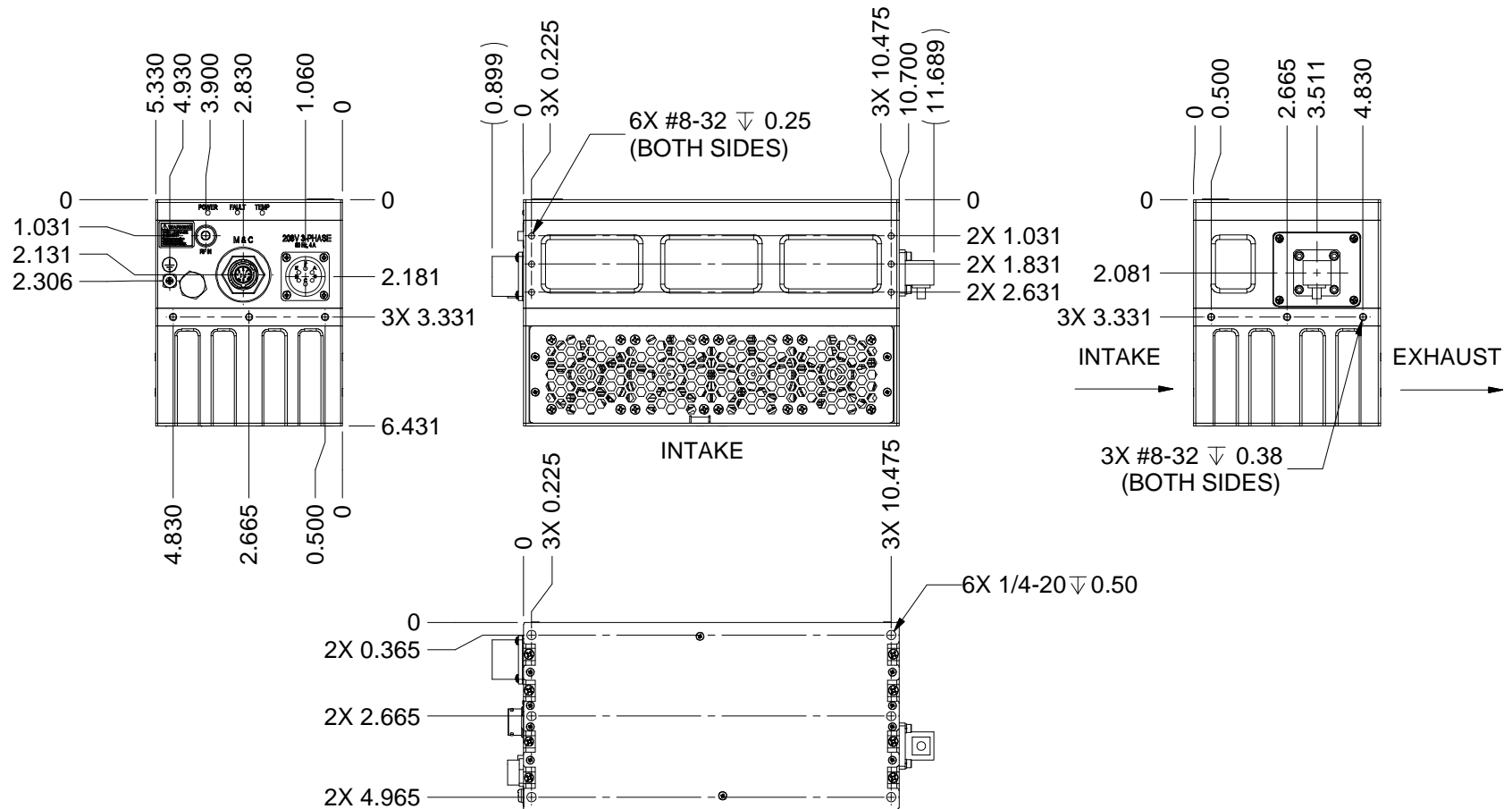


Figure A-3-1: 100W SSPA with AC Input & SMA Output

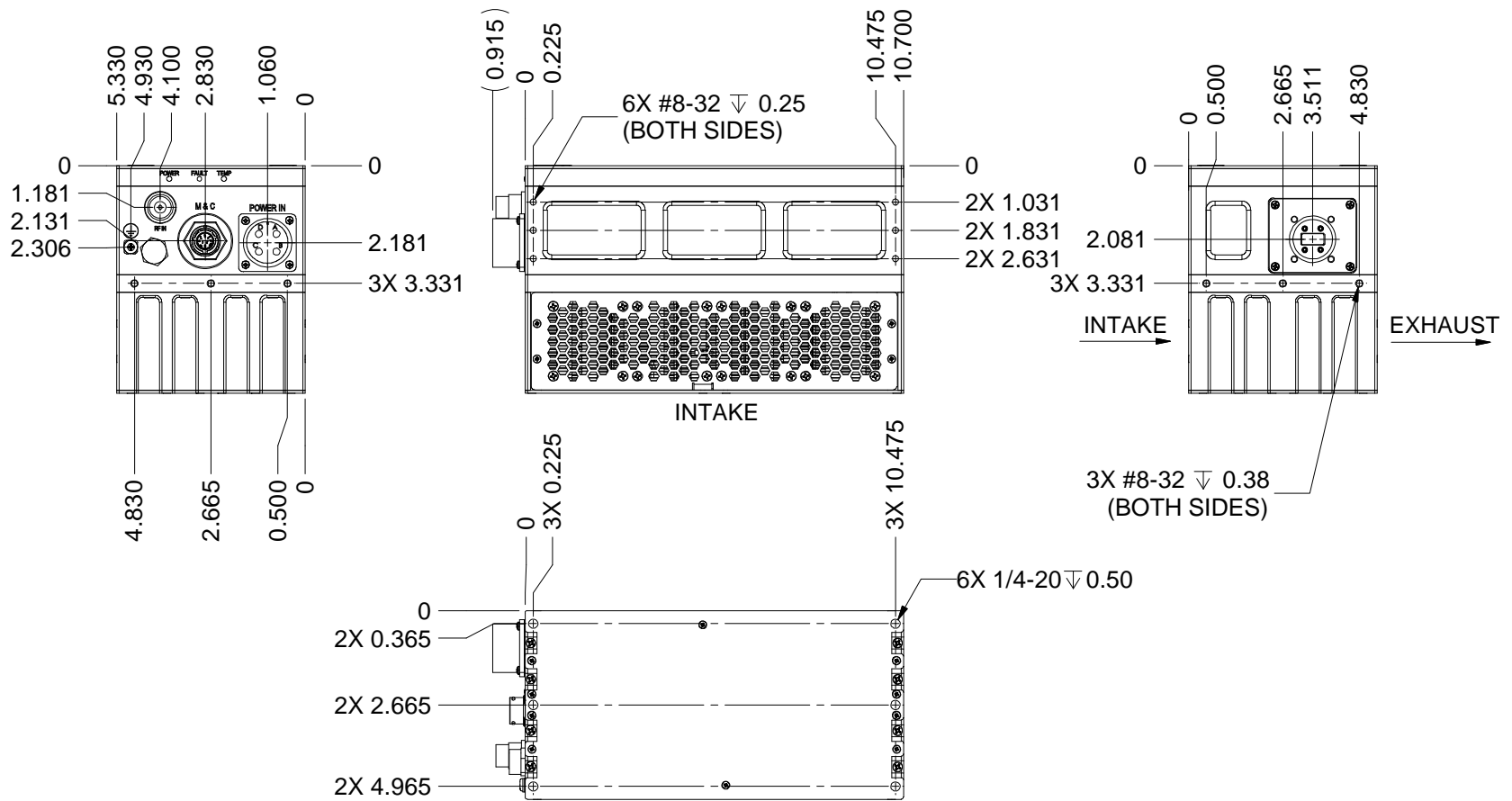


Figure A-3-2: 100W BUC/SSPA with DC Input WR62/75 Output, Fan Cooled

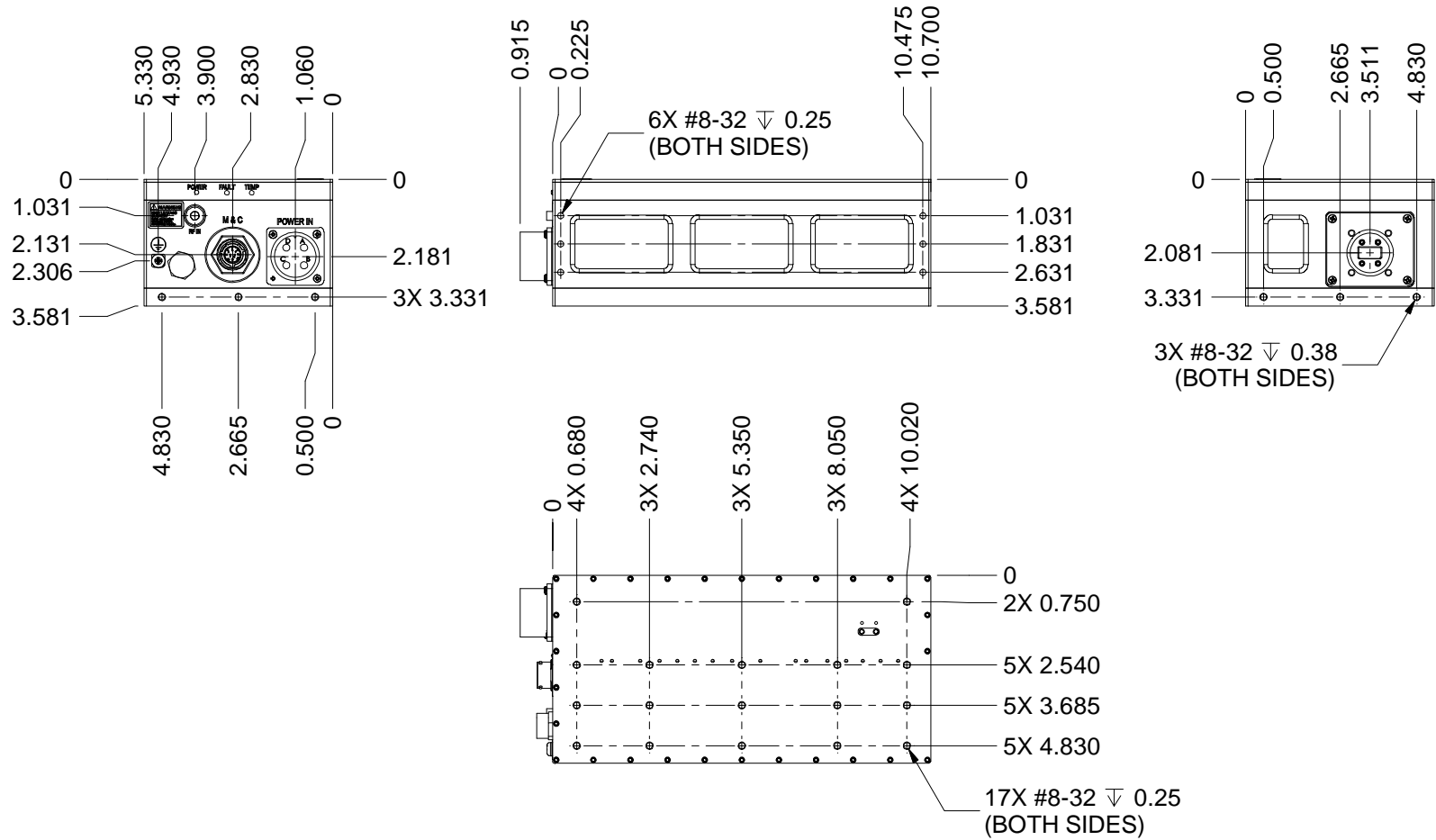


Figure A-3-3: 100W BUC/SSPA with DC Input WR62/75 Output, Baseplate Cooled

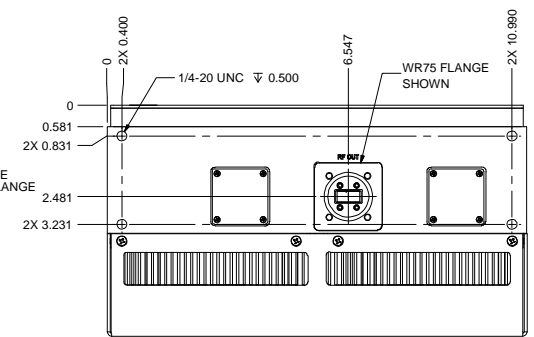
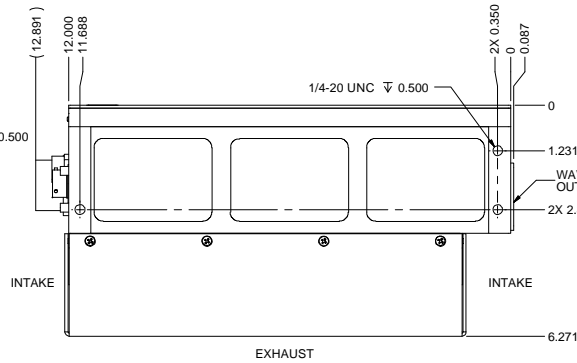
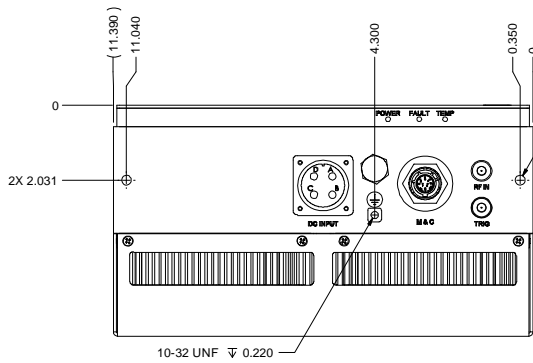
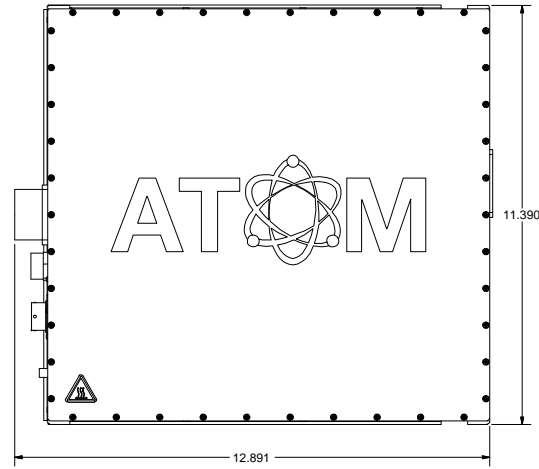


Figure A-3-4: 250W BUC/SSPA with DC Input WR62/75 Output, Baseplate Cooled

Appendix B

Acronyms and Abbreviations

The following is a list of acronyms and abbreviations referenced in this document.

Table B-3-1: Acronyms and Abbreviations

Acronym	Definition
BUC	Block Upconverter
AMP	Amplifier
C	Celsius
<CR>	Carriage Return character (ASCII)
dBm	Decibel-milliwatts
DC	Direct Current
ESD	Electrostatic Discharge
freq	Frequency
GHz	Gigahertz
GND	Ground
IF	Intermediate Frequency
kHz	kilohertz
<LF>	Line Feed character (ASCII)
M&C	Monitor and Control
MHz	Megahertz
mm	Millimeter
N/A	Not Applicable
ppm	Pulses per minute
RF	Radio Frequency
RX	Receive
SSPA	Solid State Power Amplifier
TX	Transmit
V	Volt
VDC	Volts Direct Current