EXTRONICS


# Operating Manual

iSOLATE500

FM C US APPROVED

**Document Number 402933**

**(See Last Page for Revision Details).**

# Contents

# 1 Introduction

The iSOLATE500 is an ATEX and IECEx approved RF galvanic isolator suitable for installation in the safe area, or in a hazardous area with additional protection such as a flameproof enclosure. The iSOLATE500 galvanically isolates circuits in the hazardous area from potentially incendive faults using the intrinsic safety concept. When the iSOLATE500 is connected to source equipment with Um ≤ 253V, it blocks DC, low-frequency AC and transient faults from appearing at the output terminal. The iSOLATE500 will allow RF signals at a frequency within its pass-band to pass through to its output; these RF signals are incapable of causing ignition if their power level is within that specified in IEC6079-0:2011 Table 4.

The galvanically isolated RF output of the iSOLATE500 allows users to use non-hazardous area certified antennas* with their wireless hardware, such as the Extronics iANT200 range of high quality rugged outdoor antennas.

* Antennas not listed in the Extronics range must be assessed by the user to ensure that they meet the requirements for the installation of equipment in hazardous areas.

# 2 Safety Information and Notes

## 2.1 Storage of this Manual

Keep this user manual safe and in the vicinity of the device. All persons who have to work on or with the device should be advised on where the manual is stored.

## 2.2 Special Conditions for Safe Use

### 2.2.1 ATEX/IECEx

2.2.1.1 The equipment must be earthed through its secure mounting to an earthed chassis, or with an earth bond wire with a cross-sectional area of at least 4mm$^2$.

2.2.1.2 It is considered inappropriate to provide conventional IS parameters for this equipment. For connection to external antenna, refer to Section 3 of this document for clarification of the antenna requirements and calculation of the RF output power.

### 2.2.2 FM

2.2.2.1 The iSOLATE500 must be earthed through the provided secure mounting to an earthed chassis or with an earth bond wire with a cross section of at least 4mm$^2$.

## 2.3 List of Notes

The notes supplied in this chapter provide information on the following.

- Danger / Warning.
    - Possible hazard to life or health.
- Caution
    - Possible damage to property.
- Important
    - Possible damage to enclosure, device or associated equipment.
- Information
    - Notes on the optimum use of the device

| | |
|---|---|
| **Warning!** | **The iSOLATE500 must only be installed in the safe-area, or with additional protection such as a flameproof enclosure.** |

| | |
|---|---|
| **Warning!** | **The RF threshold power must be limited to the levels defined in IEC60079-0:2011 Table 4; the iSOLATE500 does not provide any in-band RF power limitation. See section 3.4.1 for details.** |

| | |
|---|---|
| **Warning!** | **To maintain safe operation, the iSOLATE500 MUST be earthed. Refer to Section 3.2 for details.** |

| | |
|---|---|
| **Warning!** | **The antennas connected to the iSOLATE500 must be installed in accordance with the earthing requirements of IEC60079-14:2007 clause 12.2.4.** |

| | |
|---|---|
| **Warning!** | **The iSOLATE500 does not contain any user-serviceable parts. Any attempt to open the unit may render it unsafe and will void the warranty.** |

# 3 Installation and Setting-to-Work

## 3.1 Input / Output parameters

The iSOLATE500 has the following input/output parameters:

$U_m$=253V rms

RF threshold Output Power = Effective RF Transmitter Power Input into the iSOLATE500, multiplied by the antenna gain.

The maximum permitted RF Threshold Output Power is dependent upon the Equipment Group in which the antenna is located, as defined in the following table. See section 3.4 for further details.

| ATEX/IECEx Equipment Group | NEC 500 Group | NEC 505 Group | Maximum RF Threshold Power (Watts) | Maximum RF Threshold Power (dBm) |
|---|---|---|---|---|
| Mining Group I | N/A | N/A | 6 | 37.7 |
| Gas Group IIA | D | IIA | 6 | 37.7 |
| Gas Group IIB | C | IIB | 3.5 | 35.4 |
| Gas Group IIC | A/B | IIC | 2 | 33 |
| Dust Group III | E-G | N/A | 6 | 37.7 |

**Table 1: Maximum permitted RF Threshold Power**

## 3.2 iSOLATE500 Mounting and Earthing

| | |
|---|---|
| **Warning!** | **The iSOLATE500 must only be installed in the safe area or with additional protection such as a flameproof enclosure.** |

| | |
|---|---|
| **Warning!** | **To maintain safe operation, the iSOLATE500 MUST be earthed - see Figure 1.** |

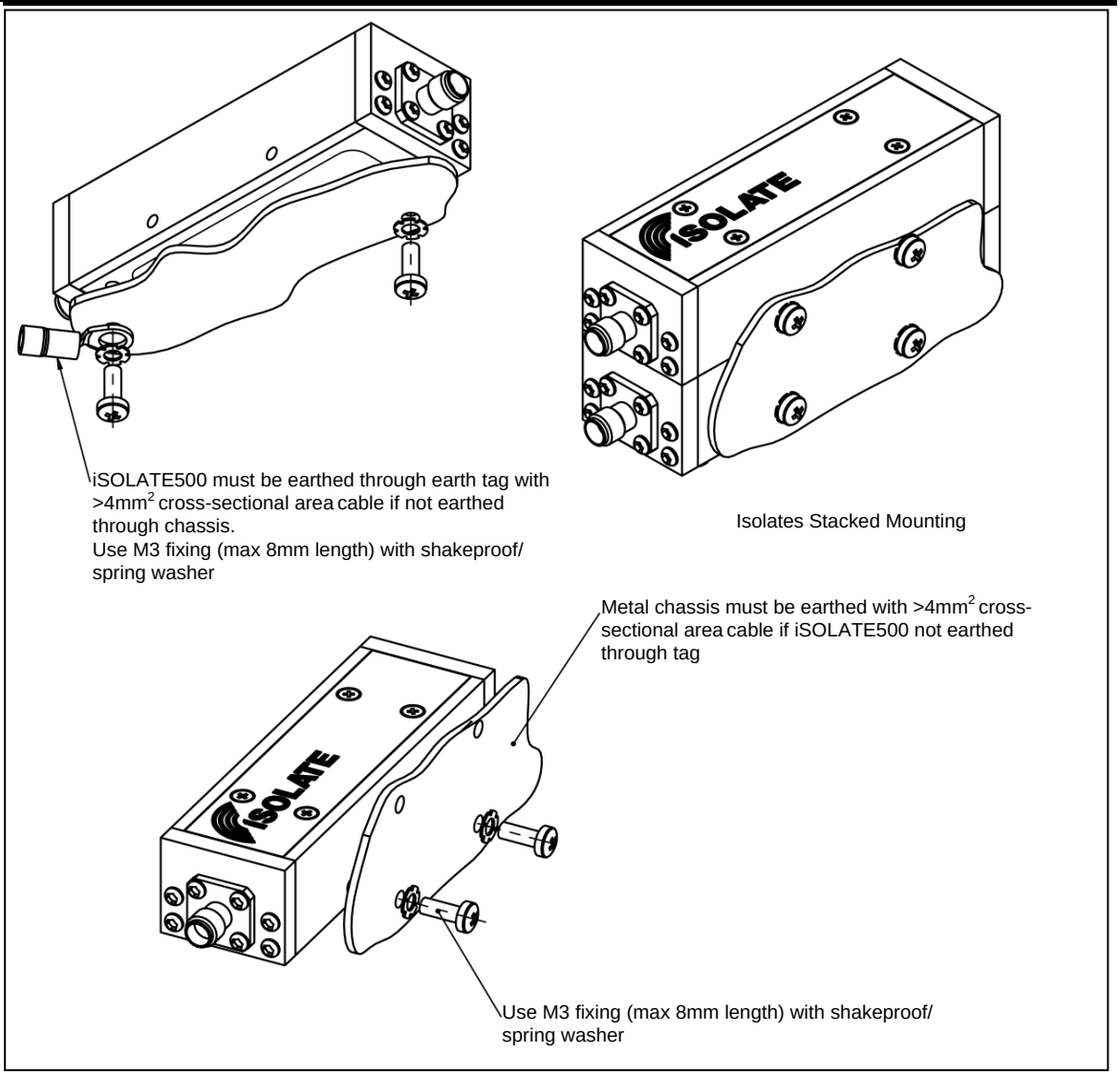



**Figure 1: Earthing and Mounting of iSOLATE500**

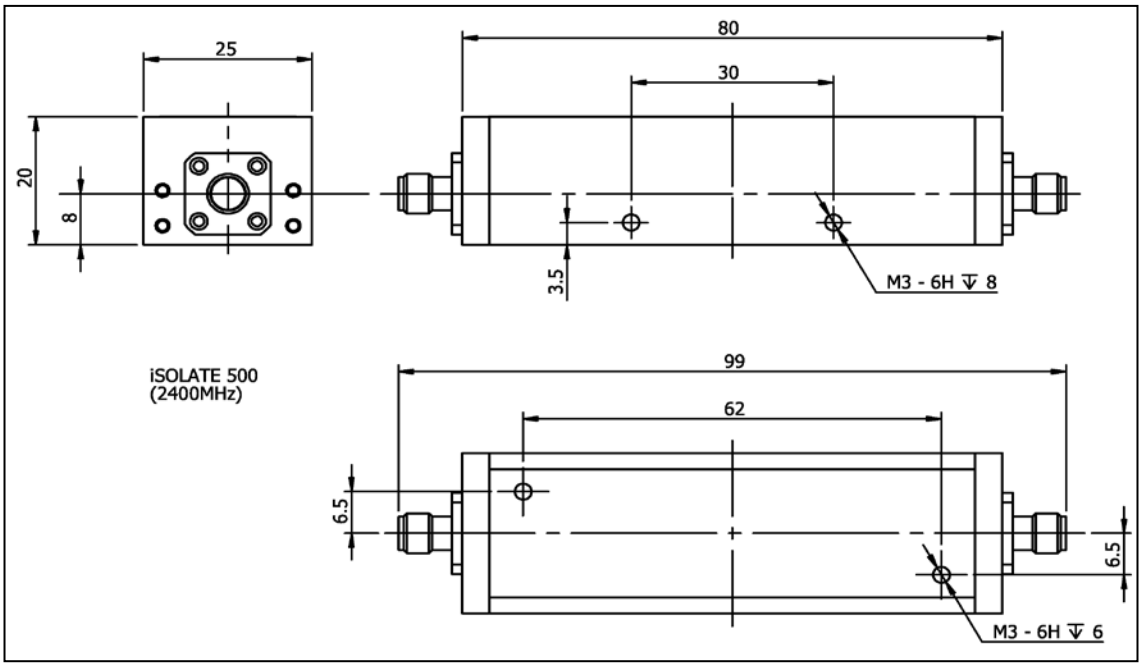



**Figure 2: iSOLATE500-2400 Dimensions**

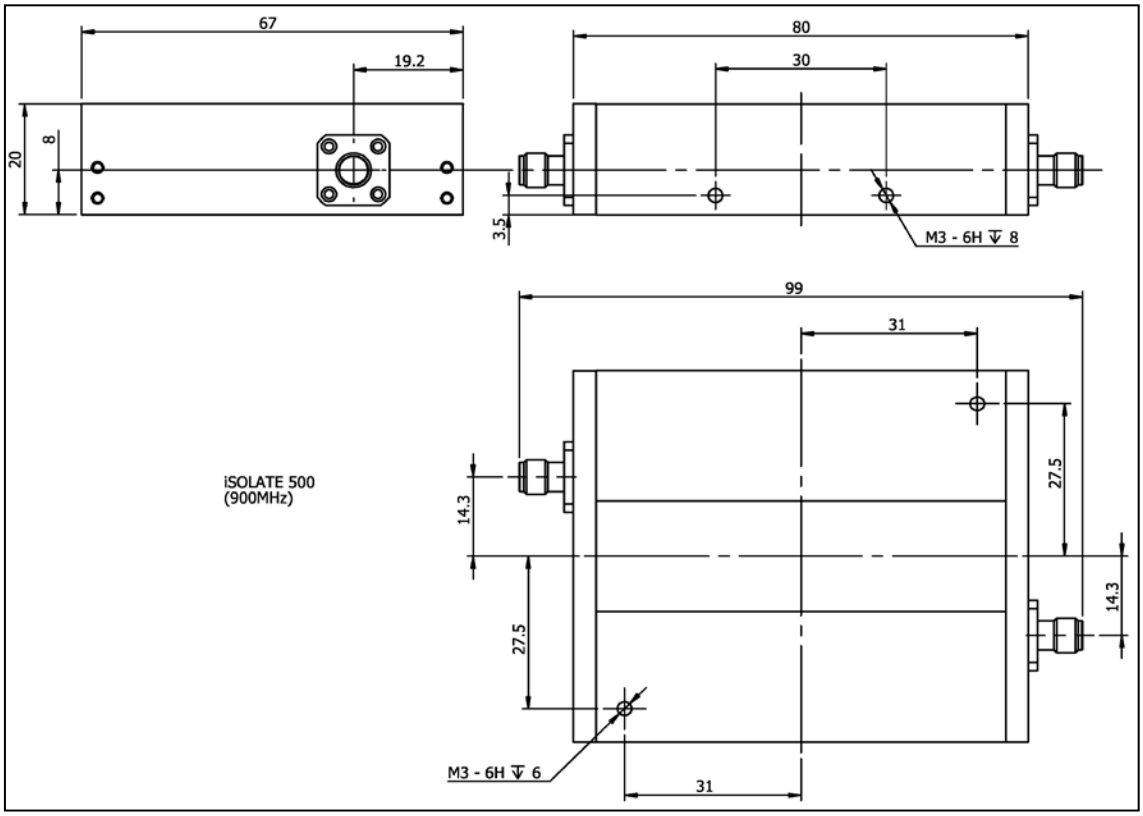



**Figure 3: iSOLATE500-0900 Dimensions**

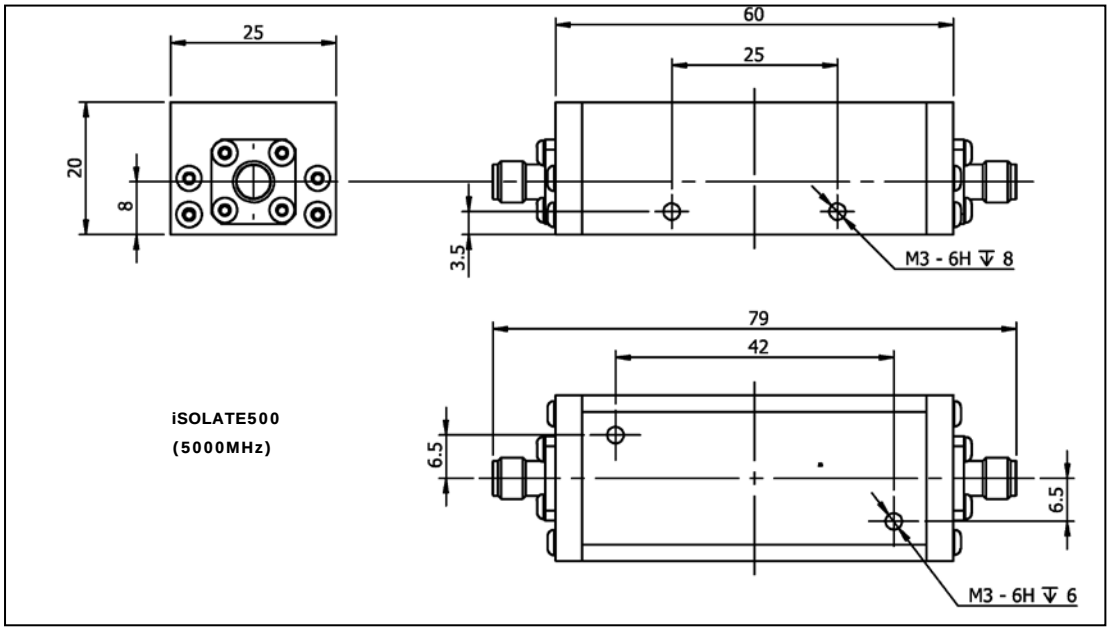



**Figure 4: iSOLATE500-5000 Dimensions**

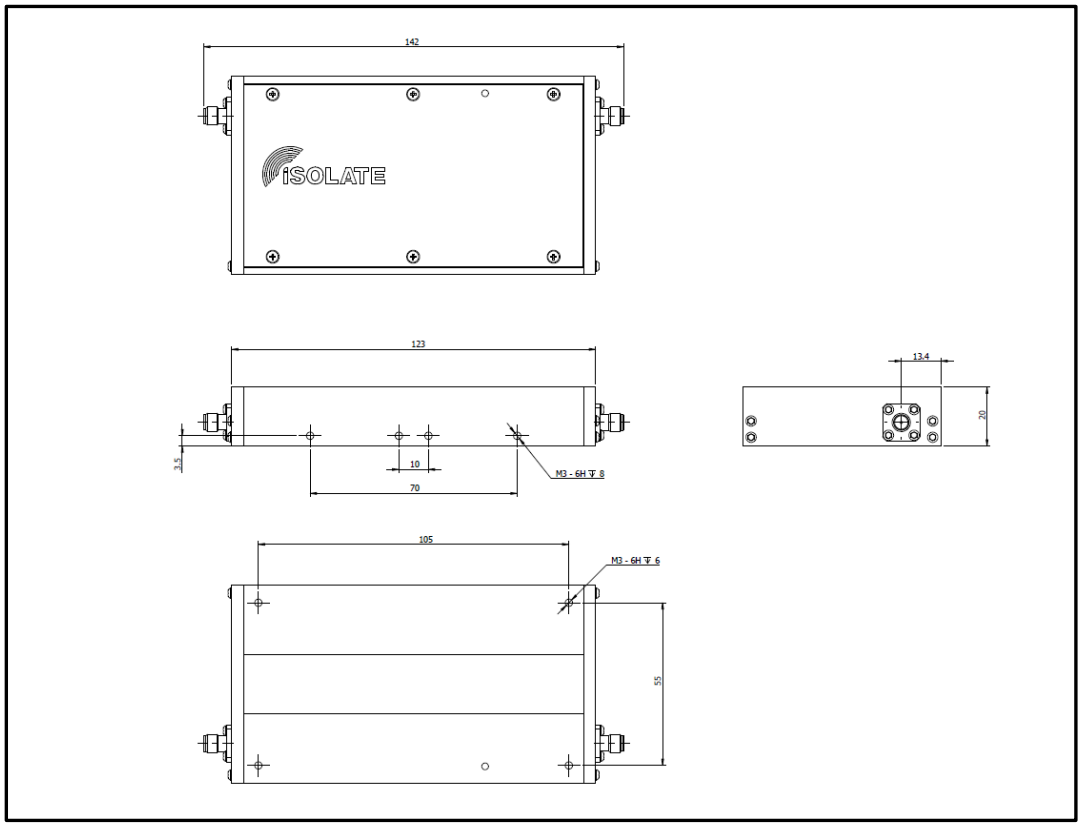



**Figure 5: iSOLATE500-2450 Dimensions**

## 3.3 RF Connections

The iSOLATE500 is fitted with two SMA female connectors, one at each end. The iSOLATE500 is a totally bi-directional device, and therefore either connector can function as the input or output.

## 3.4 Connection to a transmitter

The iSOLATE500 may be connected to any radio transmitter operating within its pass-band. It is the responsibility of the installer to ensure that the following requirements are met:

1. The RF threshold power radiated from the antenna must be limited to the levels shown in Table 1. The calculation of this should take into account the power output of the transmitter (as specified by the manufacturer in normal operation) and the gain of the antenna. It is permissible to consider losses in the cable in this calculation.

2. It is permissible for the maximum power output of the transmitter to be limited by a software setting, but it must not be possible for the end-user to override this.

3. Consideration of fault conditions in the transmitter is not necessary when calculating RF threshold power. The transmitter's maximum RF output power should be taken from the transmitter manufacturer's datasheet in normal operation, i.e. the maximum value of RF output power than can be set by the user.

### 3.4.1 Example of RF threshold power calculation

The following example shows how the RF threshold power may be calculated:

Maximum transmitter output power (from transmitter datasheet) = 20dBm (100mW)
Coaxial cable loss = 2dB
Antenna gain = 5dBi

Threshold power = 20dBm – 2dB + 5dBi
Threshold power = 23dBm (200mW)

## 3.5 Connection to an antenna

| | |
|---|---|
| **Warning!** | **The antennas connected to the iSOLATE500 must be installed in accordance with the earthing requirements of IEC60079-14:2007 clause 12.2.4.** |

### 3.5.1 Example 1

The conductive parts of the antenna must be isolated by at least 500Vrms from nearby conductive structures, to prevent hazardous earth currents from flowing in the coaxial cable. It is the responsibility of the installer to perform the necessary tests to verify this.

Note: As the iSOLATE500 must be earthed, the return path of the RF output connector will also be at earth potential. Therefore the verification of isolation of the antenna from earth must only be carried out when the antenna and iSOLATE500 are not connected.

### 3.5.2 Example 2

When the iSOLATE500 is installed inside an earthed enclosure, which has a single connection to earth, and the antennas are mounted to this enclosure, the antennas do not require 500V isolation from earth (as it may be earthed through the enclosure to the single earth point along with the iSOLATE500)

For more guidance consult IEC60079-14:2007 clause 12.2.4

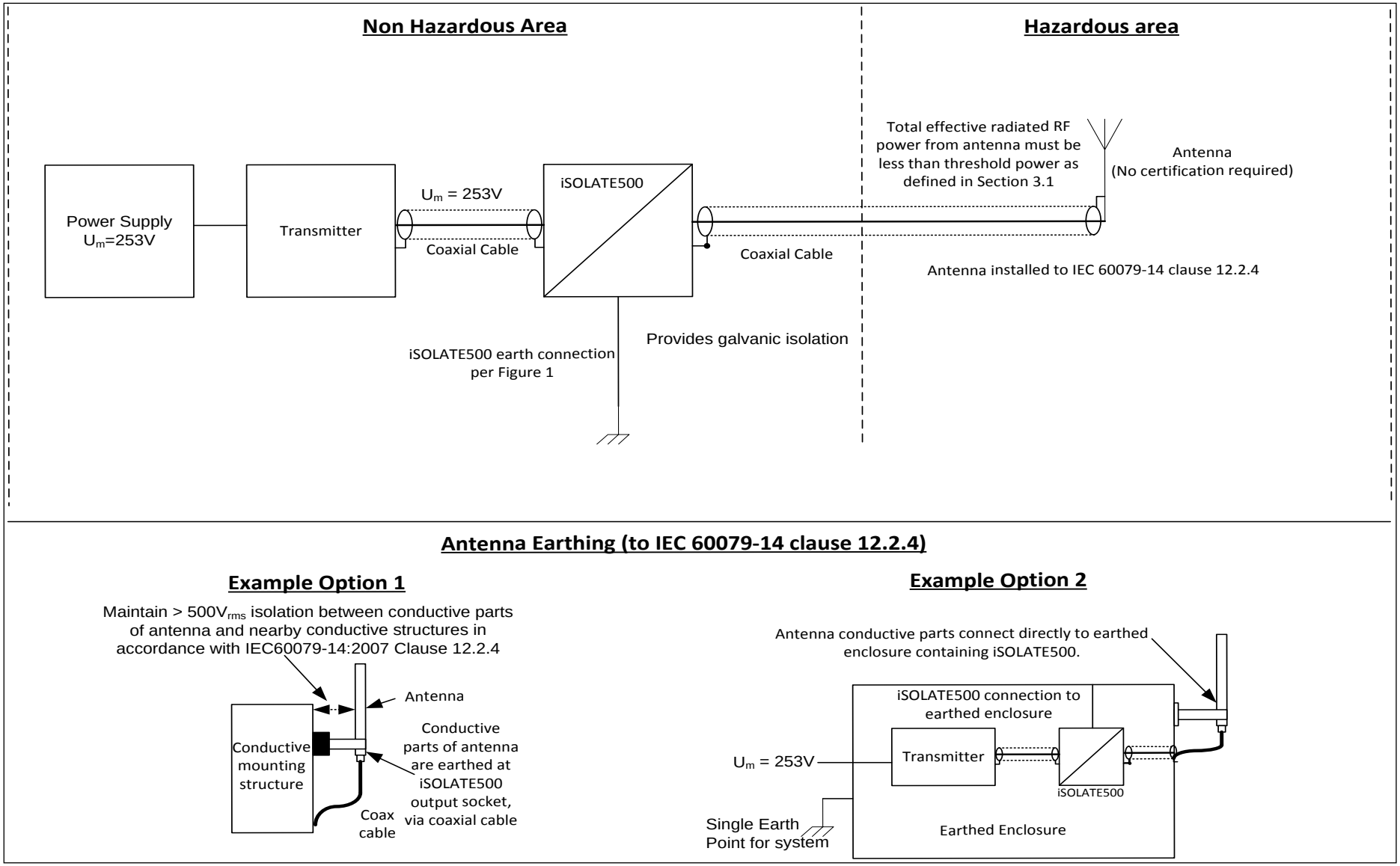


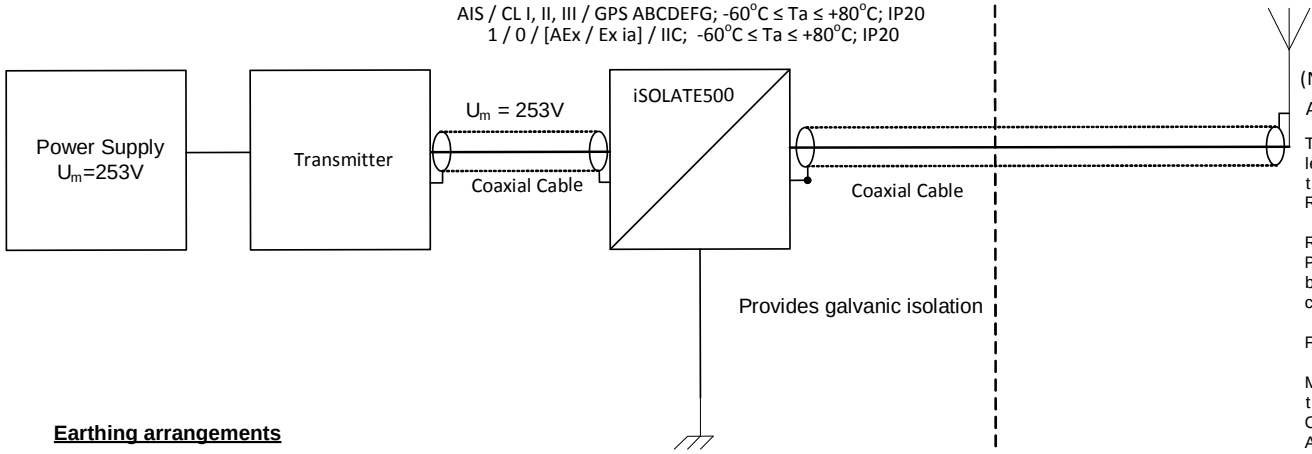

**Figure 6: Electrical Installation**

# 4 iSOLATE500 FM Control Drawing 403815

**Unclassified Area or additional protection such as explosionproof enclosure**

**iSOLATE500 FM APPROVALS**

AIS / CL I, II, III / GPS ABCDEFG; -60°C ≤ Ta ≤ +80°C; IP20
1 / 0 / [AEx / Ex ia] / IIC; -60°C ≤ Ta ≤ +80°C; IP20




**Hazardous Location (Classified)**
**Class I,II,III Division 1/Division 2**
**Groups A,B,C,D,E,F,G**
**Or**
**Ex/AEx Zone 1/21 / Zone 0/20**

Antenna
(No certification required)

Antenna installed to IEC 60079-14 clause 12.2.4

The RF threshold power must be limited to the levels defined in IEC 60079-0:2011 Table 4; the iSOLATE500 does not provide any in-band RF power limitation.

RF threshold Power = Effective RF Transmitter Power Input into the iSOLATE500, multiplied by the antenna gain. It is acceptable to consider cable losses in this calculation.

For example:

Maximum transmitter output power (from transmitter datasheet) = 20dBm (100mW)
Coaxial cable loss = 2dB
Antenna gain = 5dBi

Threshold power = 20dBm – 2dB + 5dBi
Threshold power = 23dBm (200mW)

**Earthing arrangements**

The iSOLATE500 must be earthed.

This may be achieved through one or both of the following methods:

**1**. Connection via at least one metal screw fitting (such as a machine screw or mounting pillar) fitted into at least one of the 6 threaded mounting holes indicated. This must be secured with measures to prevent loosening under vibration.

**2**. Connection of at least one earth bond wire. This wire shall have a cross section area of at least 4mm$^2$ . It shall be connected to at least one of the 6 threaded mounting holes indicated. Connection shall be made by means of a suitable crimped or soldered termination. It must be secured with measures to prevent loosening under vibration.

**RF Threshold Power as defined in IEC 60079-0:2011 Table 4**

| NEC 500 Group | NEC 505 Group | ATEX / IECEx Equipment Group | Maximum RF Threshold Power (Watts) | Maximum RF Threshold Power (dBm) |
|---|---|---|---|---|
| N/A | N/A | Mining Group I | 6 | 37.7 |
| D | IIA | Gas Group IIA | 6 | 37.7 |
| C | IIB | Gas Group IIB | 3.5 | 35.4 |
| A/B | IIC | Gas Group IIC | 2 | 33 |
| E-G | N/A | Dust Group III | 6 | 37.7 |

# 5 Intended Purpose Usage

| | |
|---|---|
| **Important** | **Before setting the units to work, read the technical documentation carefully.** |

| | |
|---|---|
| **Important** | **The latest version of the technical documentation or the corresponding technical supplements is valid in each case.** |

The iSOLATE500 is built using modern components and is extremely reliable in operation; however it must only be used for its intended purpose. Please note that the intended purpose also includes compliance with the instructions issued by the manufacturer for installation, setting up and service.

Any other use is regarded as conflicting with the intended purpose. The manufacturer is not liable for any subsequent damage resulting from such inadmissible use. The user bears the sole risk in such cases.

## 5.1 Transportation and Storage

All iSOLATE500 devices must be so transported and stored that they are not subjected to any excessive mechanical stresses.

## 5.2 Authorized Persons

Only persons trained for the purpose are authorized to handle the iSOLATE500; they must be familiar with the unit and must be aware of the regulation and provisions required for explosion protection as well as the relevant accident prevention regulations.

## 5.3 Cleaning and Maintenance

The iSOLATE500 and all its components require no maintenance. All work on the iSOLATE500 by personnel who are not expressly qualified for such activities will cause the Ex approval and the guarantee to become void.

## 5.4 Safety Precautions

| | |
|---|---|
| **Important** | **For the installation, maintenance and cleaning of the units, it is absolutely necessary to observe the applicable regulations and provisions concerned with explosion protection (IEC 60079-14), as well as the Accident Prevention Regulations.** |

## 5.5 Cleaning and Maintenance Intervals

The cleaning intervals depend on the environment where the system is installed.

## 5.6 Aggressive substances and environments

The iSOLATE500 is not designed to come into contact with aggressive substances or environments, please be aware that additional protection may be required.

## 5.7 Exposure to external stresses

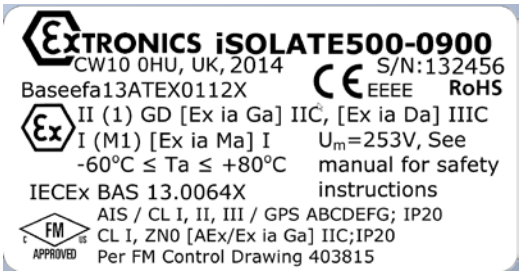
The iSOLATE500 is not designed to be subjected to excessive stresses e.g. vibration, heat, impact. Additional protection is required to protect against these external stresses.

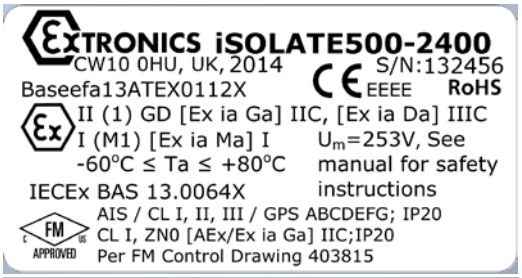
The iSOLATE500 will require additional protection if it is installed in a location where it may be subjected to damage.

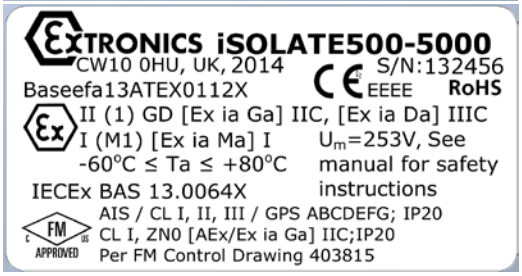
# 6 Technical Data

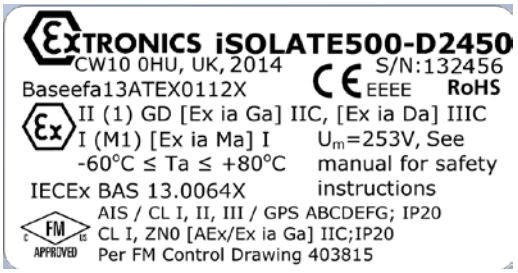
<table>
<tr><td>Certification Type</td><td>II (1) GD [Ex ia Ga] IIC, [Ex ia Da] IIIC<br>I (M1) [Ex ia Ma] I<br>AIS Class I, II & III Division 1, Groups A-G,<br>Class I, Zone 0, Group IIC</td></tr>
<tr><td>Maximum Input / Output Power</td><td>
<table>
<tr><th>ATEX/IECEx Equipment Group</th><th>NEC 500 Group</th><th>NEC 505 Group</th><th>Maximum RF Threshold Power (Watts)</th><th>Maximum RF Threshold Power (dBm)</th></tr>
<tr><td>Mining Group I</td><td>N/A</td><td>N/A</td><td>6</td><td>37.7</td></tr>
<tr><td>Gas Group IIA</td><td>D</td><td>IIA</td><td>6</td><td>37.7</td></tr>
<tr><td>Gas Group IIB</td><td>C</td><td>IIB</td><td>3.5</td><td>35.4</td></tr>
<tr><td>Gas Group IIC</td><td>A/B</td><td>IIC</td><td>2</td><td>33</td></tr>
<tr><td>Dust Group III</td><td>E-G</td><td>N/A</td><td>6</td><td>37.7</td></tr>
</table>
</td></tr>
<tr><td>Enclosure Material</td><td>Nickel Plated Aluminium</td></tr>
<tr><td>Environmental</td><td>Ambient temperature: -60ºC to +80ºC<br>Relative humidity; 0 to 95%, non-condensing</td></tr>
<tr><td>Dimensions (w x h x d)<br>Weight</td><td>900MHz: 100 x 65 x 20 mm (300g)<br>2400MHz: 100 x 25 x 20 mm (120g)<br>5000MHz: 80 x 25 x 20 mm (100g)<br>2400/5000MHz Dual: 142 x 67 x 20 mm (350g)</td></tr>
<tr><td>RF Connections</td><td>SMA Female</td></tr>
<tr><td>Certification</td><td>Baseefa13ATEX0112X, IECEx BAS 13.0064X, FM 3050659</td></tr>
<tr><td colspan="2">[1] Please note that it is the customers' responsibility to ensure the maximum values for RF Threshold power as per Table 4.0 of IEC 60079-0:2011 are not exceeded. The maximum RF output of the wireless transmitter and antenna gain must be taken into account when installing equipment. Refer to manual for full details.</td></tr>
</table>

# 7 Label Drawings



# 8 Type Codes

- 900MHz variant: iSOLATE500-0900
- 2400MHz variant: iSOLATE500-2400
- 5000MHz variant: iSOLATE500-5000
- 2400 & 5000Mhz Dual Band Variant: iSOLATE500-D2450

# 9 EC Declaration of Conformity

EXTRONICS

Wireless Vision Engineering Tracking

**EC Declaration of Conformity**

**Extronics Ltd, 1 Dalton Way, Midpoint 18, Middlewich, CW10 0HU**

*Declare under sole responsibility that the products,*

**iSOLATE500-0900, iSOLATE500-2400, iSOLATE500-5000, iSOLATE500-D2450**

*To which this declaration relates is in accordance with the provision of the following directives*

| | |
|---|---|
| **94/9/EC** | Equipment and protective systems intended for use in potentially explosive atmospheres |
| **2011/65/EU** | Restriction of the use of certain hazardous substances electrical and electronic equipment (RoHS2) |
| **2002/96/EC** | Waste Electrical and Electronic Equipment Directive (WEEE) |

EC type Examination Certificate
**Baseefa13ATEX0112X, latest supplement Issue 1 - dated 13th March 2014**

Provisions of Directive fulfilled by the equipment **II (1) GD [Ex ia Ga] IIC (-60°C ≤ $T_a$ ≤ +80°C)**
**[Ex ia Da] IIIC (-60°C ≤ $T_a$ ≤ +80°C)**

**I (M1) [Ex ia Ma] I (-60°C ≤ $T_a$ ≤ +80°C)**

Notified Body for EC Type Examination **Baseefa, 1180, Buxton, UK**

Notified Body for production **SIRA, 0518, Chester UK**

*And is in conformity with the following standards or other nominative documents*

| | |
|---|---|
| **EN60079-0:2012** | Electrical apparatus for potentially explosive gas atmospheres – General requirements |
| **EN60079-11:2012** | Electrical apparatus for potentially explosive gas atmospheres – Equipment protection by intrinsic safety 'i' |

Signed

David Crump
Development Manager
Date: 14/03/2014

Document 402931-2.1

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Cheshire CW10 0HU. United Kingdom
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Email: info@extronics.com
Web: www.extronics.com

# 10 FM approvals US Certificate of Compliance

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

## CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

***iSOLATE500-a Series RF Isolators***
AIS / I, II, III / 1, 2 / ABCDEFG; -60°C ≤ Ta ≤ +80°C - 403815; IP20
I / 0 / [AEx ia] / IIC; -60°C ≤ Ta ≤ +80°C – 403815; IP20

a = MHz Variant: 0900, 2400, 5000, or D2450

*Special Conditions of Use:*
1. *The iSOLATE500 must be earthed through the provided secure mounting to an earthed chassis or with an earth bond wire with a cross section of at least 4mm$^2$.*

Equipment Ratings:

Associated Intrinsically Safe for Class I, II, & III, Division 1, Groups A-G; Class I, Zone 0, Group IIC Hazardous (Classified) Locations, per Control Drawing 403815.

FM Approved for:

Extronics Ltd
Middlewich, Cheshire, United Kingdom

To verify the availability of the Approved product, please refer to www.approvalguide.com

FM Approvals
Member of the FM Global Group

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

| | |
|---|---|
| Class 3600 | 2011 |
| Class 3610 | 2010 |
| ANSI/ISA 60079-0 | 2011 |
| ANSI/ISA 60079-11 | 2012 |

Original Project ID: 0003050659 Approval Granted: April 2, 2014

Subsequent Revision Reports / Date Approval Amended

| Report Number | Date | Report Number | Date |
|---|---|---|---|

FM Approvals LLC

J.E. Marquedant
Manager, Electrical Systems

2 April 2014
Date

# 11 FM approvals Canadian Certificate of Compliance

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

## CERTIFICATE OF COMPLIANCE

HAZARDOUS LOCATION ELECTRICAL EQUIPMENT
PER CANADIAN REQUIREMENTS

This certificate is issued for the following equipment:

***iSOLATE500-a Series RF Isolators***
AIS / I, II, III / 1, 2 / ABCDEFG; -60°C ≤ Ta ≤ +80°C - 403815; IP20
I / 0 / [Ex ia] / IIC; -60°C ≤ Ta ≤ +80°C – 403815; IP20

a = MHz Variant: 0900, 2400, 5000, or D2450

*Special Conditions of Use:*
1. *The iSOLATE500 must be earthed through the provided secure mounting to an earthed chassis or with an earth bond wire with a cross section of at least 4mm$^2$.*

Equipment Ratings:

Associated Intrinsically Safe for Class I, II, & III, Division 1, Groups A-G; Class I, Zone 0, Group IIC Hazardous (Classified) Locations, per Control Drawing 403815.

FM Approved for:

Extronics Ltd
Middlewich, Cheshire, United Kingdom

To verify the availability of the Approved product, please refer to www.approvalguide.com

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

| | |
|---|---|
| CAN/CSA C22.2 No. 157-92 | R2012 |
| CAN/CSA C22.2 No. 60079-0:11 | 2012 |
| CAN/CSA E60079-11-02 | R2011 |

Original Project ID: 0003050659C Approval Granted: April 2, 2014

Subsequent Revision Reports / Date Approval Amended

| Report Number | Date | Report Number | Date |
|---|---|---|---|

FM Approvals LLC

J.E. Marquedant
Manager, Electrical Systems

2 April 2014
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

# 12 Manual Revision History

| Revision | Description | Date | By |
|---|---|---|---|
| 1.0 | Added iSOLATE500-D2450 variant. Replaces 3348147_02 | BTS | 04/02/14 |
| 2.0 | Revised special conditions of safe use | BTS | 14/03/14 |
| 3.0 | Added FM approval information | BTS | 18/07/14 |
| 3.1 | Minor alignment change | BTS | 30/7/14 |
| 4.1 | Revision alignment | AR | 30/04/14 |
| 4.2 | Added dimensional drawing | SA | 07/05/15 |