



**WAVETREND®**

RFID | ACTIVATING YOUR BUSINESS

**ACTIVE RFID**



# User Manual

## Active RFID Tags

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## ABBREVIATIONS USED

Abbreviation	Meaning
ActivDuo	One of Wavetrend's two ranges of Active RFID Tags
ASK	Amplitude-shift keying modulation
BNC connector	Bayonet Neill-Concelman connector (a common type of RF connector)
CE	Conformité Européenne, "European Conformity" in French.
CISPR	Comite international Special des Perturbations Radioelectriques, "International Special Committee on Radio Interference" in French.
CSC	'Customer Site Code' – Uniquely assigned by Wavetrend to every customer, on request.
EMC	Electromagnetic Compatibility
FCC	Federal Communications Commission (USA)
ID	Identifier
IEC	International Electrotechnical Commission
IP rating	Ingress Protection rating
IPR	Intellectual Property Rights
IT	Information Technology
m	Meter (metric measurement)
MHz	Mega hertz (= 1000 Hz)
OEM	Original Equipment Manufacturing
Ohm	The unit of electrical impedance or, in the direct current case, electrical resistance, named after Georg Ohm
PUC	Product Unique Code
RF	Radio Frequency
RFID	Radio Frequency Identification
RoHS	Restriction of Hazardous Substances (EU Directive)
RTLS	Real Time Location System
SABS	South African Bureau of Standards
Tx	Transmit / Transmission
VHB	Very high bond
WEEE	Waste Electrical and Electronic Equipment (EU Directive)
µV/m	Microvolts per meter (the units used to describe the strength of an electric field created by the operation of a transmitter)

Table 1: Abbreviations Used

**IMPORTANT NOTICE TO THE READER**

Each of Wavetrend®'s ActivDuo active RFID tags have been specifically designed to operate in specific circumstances or applications and be attached to specific types of items in a specific manner. Failure to follow the guidelines and application notes contained in this manual for each tag listed can lead to their incorrect operation and failure to perform as expected or intended. The choice of which Wavetrend® tags to use in any project must be made by a fully trained and Wavetrend® certified engineer. Wavetrend® accepts no responsibility for any failure of the product in any way caused by the incorrect selection, installation and usage of Wavetrend®'s active RFID tags, readers, ancillary devices and software.

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**FCC STATEMENT**

The ActivDuo devices described in this manual comply with Part 15 of the FCC Rules. Operation is subject to the following three conditions:

The device may not cause harmful interference

The device must accept all interference received, including interference that may cause undesired operation.

The device is for commercial use only and intended for use in a confined area with an appropriate system receiver

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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# 1 THE WAVETREND RANGE OF ACTIVE RFID TAGS

## 1.1 Product Overview

Wavetrend® tags are **Active Radio Frequency Identification (RFID) beacon tags** (i.e. self-powered tags, that transmit their data at periodic intervals without being ‘asked’ to transmit by a reader) and are to be used in conjunction with the Wavetrend® range of Active RFID readers or OEM products that support reading Wavetrend’s tags.

Wavetrend tags are available in two formats Active and ActivDuo.

**Active** tags comply with the ETSI radio standards and carry a CE mark

**ActivDuo** Tags comply with the FCC part 15 regulations

All Wavetrend readers can read both Active and ActivDuo tags.

Activ Duo tags have **–A** included in their part number, e.g. TGP-**A**.

It should be noted that the supply or sale of Active tags into an FCC regulated country is illegal, only the FCC certified ActivDuo tags may be used in these countries

Wavetrend Tags can be used in various applications such as access control, personnel monitoring, asset location & status monitoring, vehicle monitoring and building management applications. Standard on-board sensors identify attempts to tamper with or move the tagged asset and the tag transmits alerts immediately, allowing the RFID system to raise real time alerts for the RFID system users. Temperature, humidity and other digital sensors can be added to the tags to transmit the data from these sensors wirelessly. Please enquire with Wavetrend® if you require such advanced sensor functionality.

The tags are suitably packaged in sealed plastic housings to meet the most common requirements for different tag usage applications; although it is advised to check with Wavetrend® and the local standards authority that the tag(s) of choice meet all regulatory requirements in the country and location of use before specifying or using it in that country and/or location. For instance, tags used within a petrochemical plant will be required to hold nationally recognized intrinsic safety (IS) certification, and many countries require that their own IS certification is obtained for the tags.

## 1.2 Key Features and Benefits of ActivDuo

Key Tag Features	Business Benefits
Transmits a Unique ID Number	Allows for the unique identification of every tag in an RFID system, and by extension, the asset or person the tag is attached to or carried by.
Incorporates a motion sensor as standard	Provides immediate notification if movement of the tag occurs. This allows the tag to operate in two modes – more frequent transmissions when in alert mode (i.e. when movement or tampering occurs), or less frequent transmissions when in standard or 'at rest' mode.
Transmits on a regular basis (called 'status transmissions'). The next transmission is initiated randomly within a very short period of time after the user programmed transmission or 'Tx' interval has elapsed after the previous transmission.	Regular transmissions at short intervals (typically 10 seconds) provide near real time tracking capability of tagged assets or personnel, while still providing an exceptional functional lifespan
Transmits on an exceptional basis (called 'alarm' or 'alert' transmissions') immediately on activation of either the tamper sensor (if armed) or the movement sensor.	Provides <b>real time</b> indication of any attempt to tamper with a tag or move a tagged asset, with alert transmissions being made at short intervals (typically 1.5 seconds) for a period of 5 seconds.
Transmits additional tag information, such as the tag type, the tag's standard transmission interval, the status of the alarm bit, the status of the tamper bit, the motion sensor counter and the tamper sensor counter.	Allows for advanced application functions to be built into the RFID system to fully utilize the RFID hardware's capabilities.
Ultra low power consumption	Life span of 5+ years when transmitting at the standard 10 second or greater interval
All tags sealed to IP64 standards or higher	Splash proof and intrinsically safe capable
All tags can be configured, activated or deactivated by the user by using a desktop tag programmer (PG101-A) available for purchase from Wavetrend or any of its Accredited Partners.	

### 1.3 Key Features and Benefits of Active Tags

Key Tag Features	Business Benefits
Transmits a Unique ID Number	Allows for the unique identification of every tag in an RFID system, and by extension, the asset or person the tag is attached to or carried by.
Transmits on a regular basis (called 'status transmissions').  The next transmission is initiated randomly within a very short period of time after the user programmed transmission or 'Tx' interval has elapsed after the previous transmission.	Regular transmissions at short intervals (typically 1.5 seconds) provide near real time tracking capability of tagged assets or personnel, while still providing an exceptional functional lifespan
Transmits on an exceptional basis (called 'alarm' or 'alert' transmissions') immediately on activation of either the tamper sensor (if armed) or the movement sensor.	Provides <b>real time</b> indication of any attempt to tamper with a tag or move a tagged asset, with alert transmissions being made at short intervals (typically 1.5 seconds) for a period of 5 seconds.
Transmits additional tag information, such as the tag type, the tag's standard transmission interval, the status of the alarm bit, the status of the tamper bit, the motion sensor counter and the tamper sensor counter.	Allows for advanced application functions to be built into the RFID system to fully utilize the RFID hardware's capabilities.
Collision avoidance algorithm	Reduces loss of data through simultaneous transmissions from multiple tags. The randomization of the transmission interval aids the collision avoidance algorithm.
Ultra low power consumption	Life span of 5+ years when transmitting at the standard 10 second or greater interval
All tags sealed to IP64 standards or higher	Splash proof and intrinsically safe capable
All tags can be configured, activated or deactivated by the user by using a desktop tag programmer (PG101-A) available for purchase from Wavetrend or any of its Accredited Partners.	



## 1.4 Data Transmitted by ActivDuo and Active Tags

Key Tag Features	Business Benefits
<b>Data Transmitted by Tags:</b>	
<ul style="list-style-type: none"> <li>Site/Vendor Code (CSC)*</li> </ul>	<ul style="list-style-type: none"> <li>A unique code that is allocated by Wavetrend to each customer on request.</li> <li>Readers can be set to accept only one specific CSC and ignore tags with 'incorrect' site codes</li> </ul>
<ul style="list-style-type: none"> <li>Tag ID*</li> </ul>	<ul style="list-style-type: none"> <li>4.2 billion Tag ID's are available per Site Code (Tag ID is different from the PUC).</li> </ul>
<ul style="list-style-type: none"> <li>Tag Age Counter</li> </ul>	<ul style="list-style-type: none"> <li>The Age Counter allows for advance notification to RFID systems of the nearing end of the tag's functional life.</li> <li>Uniquely identifies each transmission made by the tag.</li> </ul>
<ul style="list-style-type: none"> <li>Product Unique Code (PUC)</li> </ul>	<ul style="list-style-type: none"> <li>Factory set ID for the tag that can function as the tag's unique ID number instead of a Site Code/Tag ID combination.</li> <li>The user cannot change the PUC.</li> </ul>
<ul style="list-style-type: none"> <li>Various standard transmission repetition intervals* (default is 10 seconds ActivDuo) (default is 1.5 seconds Active)</li> </ul>	<p>Different status transmission intervals allow tags to be configured for use in diverse applications in a way to ensure 100% system functionality and that the maximum battery life is achieved, but without overloading the RFID system with too many unnecessary tag signals.</p>
<ul style="list-style-type: none"> <li>Various alert transmission repetition intervals* (default is 1.5 seconds, nominal)</li> </ul>	<ul style="list-style-type: none"> <li>Different alert transmission intervals allow tags to be used in diverse security applications in a way to ensure 100% system functionality is achieved, but maximizing the battery life span of the tag.</li> <li>When activated, alert transmissions continue for a maximum period of <b>5 seconds</b>.</li> </ul>
<ul style="list-style-type: none"> <li>Movement Alert</li> </ul>	<p>Provides instant notification of an attempt to move a tag by setting the alarm bit and entering Alert Tx mode for 5 seconds.</p>
<ul style="list-style-type: none"> <li>Movement Counter Value</li> </ul>	<p>Increments each time the motion sensor triggers the tag's alert transmission mode. This allows an RFID system to determine if Alert Tx mode was initiated because of movement.</p>
<ul style="list-style-type: none"> <li>Tamper Counter Value</li> </ul>	<p>Increments each time the tamper sensor triggers the tag's alert transmission mode. This allows an RFID system to determine if Alert Tx mode was initiated because of tampering, or if a tamper event occurred outside of a reading zone.</p>
<ul style="list-style-type: none"> <li>Tamper Alert</li> </ul>	<p>Provides instant notification of unauthorized attempts to remove a tag from an asset by setting the alarm bit and transmitting 4 rapid alarm Tx's.</p>

## 1.5 General Facts about Wavetrend Tags

- Radio Frequency (RF) signals are scientifically complex and subject to strict government controls to avoid causing interference with other RF signals. How tags are used and where they are used all affect how the tags perform and what may be allowed in one country may be prohibited in another.
- The products offered by other active RFID vendors are not functionally identical to Wavetrend's and may perform very differently. Using and installing RFID tags requires careful consideration of these and many other factors by a trained RFID engineer. The use of the services of a Wavetrend trained and accredited engineer to determine the requirements of an RFID system and to specify the correct Wavetrend products to use is strongly recommended to ensure a satisfactory experience for the user.
- All Wavetrend tags operate at a frequency of **433.92 MHz** as standard.
- Wavetrend Active and ActivDuo tags use different internal firmware and cannot be reconfigured as each other, i.e. an Active tag cannot be changed into an ActivDuo tag they are totally separate product lines.

## 1.6 Obtaining Professional Advice on Using Tags

For most tagging applications, following the guidelines in this manual will provide sufficient basic advice to any user. If these guidelines do not provide enough assistance, then the user should contact one of Wavetrend's Accredited Partners or a Wavetrend Professional Services representative directly for further advice and assistance.



**Note on Accredited Partners:** Wavetrend has a worldwide Accredited Partner network of companies trained up in all aspects of Wavetrend technology. These companies can offer their expertise and knowledge to ensure that the best choice of Wavetrend products is made to suit user's requirements, and that the products are correctly installed, configured and operated. A full listing of Accredited Partners can be found on [www.wavetrend.net](http://www.wavetrend.net) under the Partners section.

Wavetrend does not recommend the use of services provided by any company that is not fully trained and accredited by Wavetrend.

## 1.7 ActivDuo Tag Functionality

The ActivDuo tag offers three primary modes of operation that determines how often the tag will transmit. They are defined as being ‘Standard’, ‘Movement Alert’ and ‘Tamper Alert’ transmission modes:

### 1.7.1 Standard Transmission Mode

In this mode, the tag will transmit its ID number and ancillary data regularly at the programmed status transmission interval (called the ‘**Status Tx rate**’).

The default Status Tx rate is **one transmission at least every 10 seconds** for ActivDuo and one transmission every 1.5 seconds for Active Tags.

Other transmission can be selected by the user and programmed into the tag through a tag programmer unit. See the section on tag programming for more information on how to do this.

Status Tx Rates Active	Status Tx Rates ActivDuo
0.4 seconds	<b>10 seconds (default)</b>
0.8 seconds	30 seconds
<b>1.5 seconds (default)</b>	
15 seconds	
30 seconds	

### 1.7.2 Movement Alert Mode

In this mode the tag will transmit its data at a shorter alert interval (the ‘**Alert Tx rate**’) for a short period of time if the motion sensor within the tag registers movement or vibration.

The default transmission rate for movement alert operation is **1 transmission every 1.5 seconds**. But other alert transmission intervals (0.4 or 0.8 can be selected by the user and programmed into the tag.

The tag will cease transmitting at the Alert Tx rate after **5 seconds** of entering Movement Alert mode and revert to the Status Tx rate. Each time the motion sensor is activated when the tag is in Standard mode, the tag will immediately enter the Movement Alert mode.

The movement counter will increment each time the Movement Alert mode is activated.

Alert Tx Rates Active	Alert Tx Rates ActivDuo
0.4 seconds	0.4 seconds
0.8 seconds	0.8 seconds
<b>1.5 seconds (default)</b>	<b>1.5 seconds(default)</b>

### 1.7.3 Tamper Alert Mode

In this mode, triggered by the anti-tamper circuit, the tag will transmit its data, together with setting the Alarm bit, in a rapid burst of four alert transmissions and in intervals of 0.4 seconds. The tamper alert mode will interrupt the movement alert mode if a tamper event occurs while the tag is moving. The tamper counter value will increment each time the Tamper Alert mode is activated.

## 1.8 Wavetrend Tag Families Overview

Wavetrend's new range of tags is based upon 3 distinct families Personnel (P), Asset (A) and Micro (M).

### 1.8.1 TGP (Personnel) Family

Within the TGP Family there are 4 versions

TGP (Personnel), Standard Grey Personnel Tag

TGPS (Personnel Slimline), Thinner White Personnel Tag

TGPTOLEMETRY, Tag transmits both Temperature and Humidity data

TGPHZ, (Personnel Hazard), Bright Yellow Personnel Tag that holds ATEX and IECEx Certification.

### 1.8.2 TGA (Asset) Family

Within the TGA Family there are 7 versions

TGA (Asset), Standard Black Asset tag

TGAHT(Asset High Temp) , White Asset tag rated from -30 to + 85 Degrees Celsius, that holds ATEX and IECEx Certification.

TGAE (Asset Tag Extreme), Orange Potted tag rated from -30 to + 85 Degrees Celsius, that holds ATEX and IECEx Certification.

TGAHZ (Asset Hazard), Bright Yellow Tag that holds ATEX and IECEx Certification.

TGATEMP, Tag transmits Temperature data

TGALP (Asset Low Profile), A low profile indoor asset tag

TGAS (Asset Strap), Asset tag with strap attachment

### 1.8.3 TGM (Micro) Family

Within the TGM Family there are 2 versions

TGM (Micro) Standard Tag

TGMS (Micro Strap), Micro tag with strap attachment

## 1.9 Tag Properties

The tag properties of each of the tags are summarized below

Tag Type	IP Rating	Temperature rating	Additional Certification
TGP	64	-30 to + 60 Degrees C	
TGPS	64	-30 to + 90 Degrees C	
TGPTELEMETRY	0	-30 to + 90 Degrees C	
TGPHZ	64	-30 to + 60 Degrees C	ATEX, IECEx, IS
TGA	67	-30 to + 90 Degrees C	
TGAHT	67	-30 to + 90 Degrees C	ATEX, IECEx, IS
TGAE	68	-30 to +90 Degrees C	ATEX, IECEx, IS
TGAHZ	67	-30 to + 90 Degrees C	ATEX, IECEx, IS
TGATEMP	67	-30 to + 90 Degrees C	
TGALP	67	-30 to + 90 Degrees C	
TGAS	67	-30 to + 90 Degrees C	
TGM	64	-30 to + 90 Degrees C	
TGMS	64	-30 to + 90 Degrees C	

## 1.10 Tag Battery (Functional) Life Span

Wavetrend's tags typically use a Lithium-Ion battery that the manufacturer states as offering a 10 year shelf life, rated for. The batteries are more efficient at producing current in hotter temperatures and less efficient in colder temperatures.



**Note about calculating tag life spans:** Wavetrend provides all Accredited Partners with an application which allows the minimum expected life span of a tag to be quite accurately calculated by entering information about the tag type, the tag configuration (data & options) and expected usage information (temperatures & amount of movement) that is available.

If you do not have access to the tag life span calculator and want to find out if a tag will provide a sufficient functional life for your intended use, please ask Wavetrend or one of our Accredited Partners to assist you.

We feel it is better to be conservative than to set expectations that may lead to customer disappointment, but for the majority of tags sold we would expect the customer to enjoy a potential maximum life span of up to 5 years from a TGP and TGA tag depending very much on how the tag is configured to operate, and the ambient temperature it will experience throughout its life span. The TGM and TGPS have smaller batteries and will last a shorter period of time.



**Summary: What can reduce a tag’s life span?**

Transmission intervals. **Shorter standard and alert intervals = shorter life span.**

Ambient temperatures. The power consumption of the electrical components inside the tag will change very slightly with changes in temperature and the battery will be less efficient in generating energy.

**Colder temperatures = shorter life span.**

Regular temperature cycles. Where the tag is subjected to repeated and regular temperature cycles (hot / cold / hot etc.) the battery life span will be reduced. The greater the extremes in hot and cold, the greater the reduction of life span.

**Regular temperature cycles = shorter life span.**

The amount of movement, and therefore how often the Alert mode is initiated, will affect life span.

**More movement = shorter life span.**

**1.10.1 End of Life**

The tag will continue to transmit its data signals at a constant strength until the battery is exhausted, at which point the tag will cease transmitting. The battery loses less than 1% of its power for every year in storage. The battery has a maximum specified shelf life of 8 years, in the case of where the tag is never activated.

The tag’s Battery Age Counter value is transmitted with every signal , by monitoring the value of the age counter, the recipient RFID software system can alert the user to the fact that the tag is nearing the end of its functional life.

**It should be noted that it is not possible for the user to replace the battery in any Wavetrend tags**

**1.10.2 Keeping Tags in Stock**

It is recommended that tags be kept in stock for **less than two years** after purchase from Wavetrend. The oldest tags held in stock should always be sold on, used or activated first. Tags should not be activated if they are to be held in stock. Activate tags only when needed for use. If tags are to be used on occasions, deactivate them when they are in storage between uses to maximize their useful life.

**1.11 Tag Accessories**

**1.11.1 Tag Attachment Kits**

Most of the Tags can be attached to most types of assets using the Tag Attachment Kits supplied by Wavetrend. The attachment kit consists of 10 very high bond (VHB), double-sided adhesive pads which are cut to match the size of the tag.

The VHB gel pads will take 24 hours to cure and reach maximum adhesion to both the tag and the asset. Within this time period it will be easier to remove the tag if it needs repositioning or has been affixed to an asset in error. If the tag & gel pad are removed from the asset soon after first being affixed to the asset, it is not recommended to try reuse the gel pad as it will not adhere to the asset surface as well for the second time. Replace the pad.

The VHB pads will not adhere to wet, greasy, dusty or rough surfaces (such as wood, concrete etc.)

**1.11.2 Anti-Tamper Tag Attachment Kits**

The kits of 10 VHB gel pads also include a small magnet that fits into the pre-punched hole in each gel pad. This magnet provides the mechanism to arm the anti-tamper circuit in the tag. If any attempt is made to remove the tag, the deformation and breakup of the gel pad caused by the attempt to remove the tag will

cause the magnet to shift in position relative to the tag, immediately activating the tamper alert transmission from the tag.

It is recommended to place a spot of Superglue™ or other suitable adhesive on the magnet so that it will adhere to the asset surface and be able to trigger a tamper alert more quickly should any unauthorized attempt be made to remove a tag from its asset. Do not glue the magnet to the back of the tag, this will prevent the anti-tamper feature from working.

### 1.11.3 Identifying the Correct Attachment Kit to Use

All attachment kits have a product code starting with the prefix 'TA', and share the same product code number as the tag type they are to be used with. For example, the TATGP kit will be used with the TGP tag.

The Anti-Tamper Tag Attachment Kit has the suffix '-AT' after the kit's product code. For example the anti-tamper kit for the TGP tag is the **TATGP-AT**.

### 1.11.4 Other Attachment Methods

The TGA Family of tags are designed to allow attachment to assets using customer supplied screws or rivets, and fixing holes are provided in the tag housing for this purpose. It is not recommended to rely purely on the VHB gel pads or other adhesives if a very secure fixture to an asset is required, such as to a vehicle or asset that is normally handled roughly.

It is recommended to test any other type of adhesive or glue before generally attaching tags to assets using this other type of adhesive. Not all adhesives will bond well with both the tag and the surface material of the tagged object. Some adhesives or glues will cause damage to the plastic tag housing and possibly to the tag.

It is not recommended to attach the tag by any type of permanent adhesive method if the tag is to be removed at the end of its functional lifespan as damage may be caused to the asset, rather use screws or rivets that can be removed without causing damage to the outdoor asset, or for indoor assets, use the tag attachment kits.

For temporary attachment to assets that allow quick removal or re-attachment of the tag when desired, adhesive Velcro™ strips are an excellent material for this purpose.

## 1.12 Programming Tags

Before tags can be deployed and used, they should be configured to suit the user's requirements. The tag is manufactured to hold a unique factory set CSC & Tag ID and is set to the default Status Tx & Alert Tx rates and motion sensor sensitivity settings previously mentioned.

Should the Status or Alert Tx rates need to be changed, or for any additional user data to be written onto the tag, the user will need to use the **PG101-A Wavetrend Tag Programmer** unit available for purchase from any Wavetrend sales agent.

Alternatively the user can order tags from their Wavetrend sales agent pre-programmed to their specification, if the agent offers this service. Wavetrend offers tag programming at manufacture for orders exceeding 1000 tags. Please enquire with Wavetrend or a sales agent for more information.

Tags are typically shipped in an inactive or 'asleep' state to comply with regulations concerning the **air freight** of transmitting devices. The L-PG101-A Programmer must be used to configure, activate the tags prior to deployment.

### 1.13 Safe Use

Wavetrend tags impose no health or safety risk to people involved with installation, maintenance or use. They are as safe to use as any standard household electrical appliance (like a radio). In particular:

No hazardous materials are used in the manufacture of the product. The products contain no CFCs or ozone depleting materials, nor were such materials used in their manufacture.

Wavetrend Tags are lead free, and use a low voltage 3.0 volt lithium battery. When new, a tag contains less than .5 grams of lithium. This amount decreases as the tag is used, it is very small and does not pose any health risk.

### 1.14 ATEX Special Condition of Use

**Care shall be taken when wiping the tag in a Group I mining location. Only wipe with an antistatic / damp cloth.**

### 1.15 Disposal of Tags

At the end of its functional life the tag must be disposed of in a suitable local recycling facility and in accordance with any local laws pertaining to the recycling of waste electronic equipment. The tag consists of an ABS plastic housing, electronic components and a lithium battery. The tag contains no substances banned by the European Union's Restriction of Hazardous Substances (RoHS) directive.

**European customers:** under the provisions of the Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC, the spent tag must be recovered and recycled in accordance with the local regulations pertaining to WEEE. Please enquire with your European Wavetrend sales agent for details of how to dispose the tag in the correct way.

**Wavetrend (UK) Ltd. EPRN: WEE/GD0727WW**

**Please protect our environment and recycle all used electronic and electrical equipment through reputable, ethical companies who properly handle electrical waste. Do not throw the used tag out with normal garbage.**

### 1.16 FCC Conditions of use.

The FCC have granted certification of Wavetrend's ActivDuo range of tags under the following conditions of use.

**FCC Statement of Conformity**

Wavetrend , TG XXX ActivDuo ,

FCC ID: 06X XXX-A

This device complies with Part 15 of the FCC rules subject to the following three conditions:

- 1) This device may not cause harmful interference.
- 2) This device must accept all interference received, including interference that may cause undesired operation.
- 3) This device is for commercial use only and intended for use in a confined area with an appropriate system receiver

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



## 2 THE TGP PERSONNEL TAG

The TGP Personnel tag is generally used by people who need to carry a tag with them, typically for access control or time & attendance purposes. The housing incorporates a clip-slot for convenient wearing for that purpose. However, it may be used in other applications such as asset monitoring. The mounting and affixing method for the tag depends on the type of application it is used in.

The TGPHZ version of this product can be used for exactly the same purpose but in addition holds the ATEX, IECEx certifications.

### 2.1 Important Facts about the TGP Tag

- **The tag must not be installed directly onto metal surfaces.**
- The tag has an omni directional antenna, which achieves and a near perfect spherical field allowing this tag to mounted in any orientation.
- The tag can a movement sensor in Active versions TGP-MS, in Active Duo TGP-A it operates in three different modes, the standard operation mode that transmits its data with Status Tx rate, the movement alert operation mode that transmits with the Alert Tx rate when its movement sensor senses any movement or vibration of the tag, and the tamper alert mode if the tag is fixed to an object with Anti-Tamper kit.
- The tag is rated to operate in ambient temperatures between -30°C and +60°C, using the tag in ambient temperatures beyond this range will cause damage to the tag and possibly cause its complete failure.
- The Nema standard IP rating of the TGP tag is 64, which means it is protected against dust and splashing water. Using the tag in harsher conditions will cause damage to the tag and possibly cause its complete failure.

**Note:** Using this tag for an incorrect application can significantly reduce the read range the tag provides, possibly to the point that no signal from the tag can be received at all.

This manual gives instructions for the correct method and location to attach the tag; failure to follow these instructions will result in impaired operation or even the complete loss of tag signals.

### 2.2 Using the TGP for Tracking Personnel

#### 2.2.1 Requirements & Instructions

- TGP- tag
- Any standard card clip, lanyard, key ring, card holder etc.

Attach the tag to the clip / lanyard / key ring using the clip slot provided on the tag, or slide the tag into the card holder (it will fit in most). The tag should be worn with the flat back facing outward, and should not be kept in a pocket or anywhere else where it is pressed up against the body. The human body can reduce the tag's signal strength and this may lead to apparently erratic operation in certain instances.

If desired, a 'sticky-back' plastic label that is pre-printed with personal identification information can be stuck to the flat back of the TGP tag, to enable the TGP to function as an ID card for the carrier.

### 2.3 Installing the TGP for Tracking Assets

#### 2.3.1 Requirements

- TGP tag
- 1 adhesive gel pad (& magnet) from a 10-pack TATGP or TATGP-AT Attachment Kit

- Glass cleaner
- Clean dry cloth

### 2.3.2 Preparation

- Clean an area a little larger than the tag on an object. Ensure that no dust, oil, grease or residue remains.
- Position the gel pad over the back of the tag and align the hole in the pad with the embossed circle on the tag. Remove the gel pad cover and stick the gel pad to the back of the tag. Make sure the hole in the pad and the circle on the back of the tag are aligned.

### 2.3.3 Arming the anti-tamper (if using the TATGP-AT attachment kit)

- Once the gel pad is stuck firmly to the tag insert the small magnet into the pad and press around it. Make sure the magnet has stuck firmly to the pad in the hole. The tag's anti-tamper is now armed.
- It is recommended to place a spot of Superglue™ or other suitable adhesive on the magnet so that it will adhere to the asset surface and be able to trigger a tamper alert more quickly should any unauthorized attempt be made to remove a tag from its asset. Do not glue the magnet to the back of the tag; this will prevent the anti-tamper feature from working.

### 2.3.4 Final steps

- Remove the other cover from the gel pad and position the tag in a suitable location on the asset. Press firmly and ensure no air bubbles remain visible.
- The gel pad will take up to 24 hours to cure to full bond strength.

## 2.4 Removing the TGP

The tag may require removal from the object either at the end of its functional life, or in instances where the tag has been damaged, or where the asset is at end of its life cycle and must be replaced or disposed of. In the case of asset replacement or disposal and where the tag is still fully functional, the tag can be installed onto a new asset with a new gel pad.

### 2.4.1 Requirements

- 1 thin, flat instrument or blade, such as a dinner table knife

### 2.4.2 Removal

- Carefully insert the blade into the gel pad repeatedly, working all the way around the edge of the tag.
- Repeat this as many times as it takes to loosen enough of the gel pad around the edge of the tag to allow gentle twisting or rotation of the tag in a clock-wise then anti-clockwise manner. Use the blade to continue loosening or breaking up the gel pad to allow greater rotation of the tag.
- Continue to twist the tag until it comes off the object.

#### Notes:

The anti-tamper feature will cause the tag to alarm immediately if any attempt is made to remove the tag before the end of its functional lifespan.

Do not try to pull the tag off the object when removing it, the best way to break down the bond between the gel pad and the tag & object is to rotate the tag clockwise and anti-clockwise repeatedly.

- Continue to twist the tag until it comes off the object.

**Notes:**

The anti-tamper feature (if used) will cause the tag to alarm immediately if any attempt is made to remove the tag before the end of its functional lifespan.

Do not try to pull the tag off the object when removing it, the best way to break down the bond between the gel pad and the tag & object is to rotate the tag clockwise and anti-clockwise repeatedly.

### 3 THE TGA ASSET TAG

The TGA Asset tag is specially designed for use in asset tagging applications such as containers, vehicles and transport media where the tag must be water proof and capable of withstanding extremely harsh treatment. The TGA is optimized to operate on metal assets however it can be used equally well on non metallic assets as well.

The TGAHZ can be used in exactly the same applications as the TGA but in addition holds the ATEX, IECEx certifications.

#### 3.1 Important Facts about the TGA Tag

- The tag should be installed directly onto metal surfaces to obtain the best read range performance from the tag.
- The tag has an Omni directional antenna. When mounted on metal it can be read through 180 degrees , when mounted on plastic it can be read from the full 360 degrees.
- Attaching the tag to plastic or other non-metal surfaces will reduce the maximum read range the tag can provide by approximately 10%
- The tag can a movement sensor in Active versions TGA-MS, in Active Duo TGA-A it operates in three different modes, the standard operation mode that transmits its data with Status Tx rate, the movement alert operation mode that transmits with the Alert Tx rate when its movement sensor senses any movement or vibration of the tag, and the tamper alert mode if the tag is fixed to an object with Anti-Tamper kit.
- The tag is rated to operate in ambient temperatures between -30°C and +90°C, using the tag in ambient temperatures beyond this range will cause damage to the tag and possibly cause its complete failure.
- The Nema standard IP rating of the TGP tag is 67, which means it is dustproof and waterproof but is not capable of being submerged deep in water. Using the tag in harsher conditions will cause damage to the tag and possibly cause its complete failure.

#### 3.2 TGAHT

The TGAHT extends the operating temperature range of the TGA, allowing it to in ambient temperatures between -30°C and +90°C, using the tag in ambient temperatures beyond this range will cause damage to the tag and possibly cause its complete failure.

The TGA holds the ATEX, IECEx certifications.

#### 3.3 TGAE

The TGAHT extends the IP rating and the temperature range of the TGA, allowing it to in ambient temperatures between -30°C and +90°C, using the tag in ambient temperatures beyond this range will cause damage to the tag and possibly cause its complete failure. The Nema standard IP rating of the TGAE tag is 68, which means it is dustproof and waterproof and is capable of being submerged in water to a depth of 2 meters.

The TGAE holds the ATEX, IECEx certifications.

**Note:** Using this tag for an incorrect application can significantly reduce the read range the tag provides, possibly to the point that no signal from the tag can be received at all.

This manual gives instructions for the correct method and location to attach the tag; failure to follow these instructions will result in impaired operation or even the complete loss of tag signals.

### 3.4 Attaching the TGA for Tracking Containers and Other Assets

#### 3.4.1 Requirements

- TGA tag (comes with VHB foam-gel pad attached)
- Anti-tamper Kit
- Glass cleaner
- Clean dry cloth

#### 3.4.2 Preparation

- Clean an area a little larger than the tag on an object. Ensure that no dust, oil, grease or residue remains.
- Position the gel pad over the back of the tag and align the hole in the pad with the embossed circle on the tag. Remove the gel pad cover and stick the gel pad to the back of the tag. Make sure the hole in the pad and the circle on the back of the tag are aligned.

#### 3.4.3 Arming the anti-tamper (if using the TATGA-AT attachment kit)

- Once the gel pad is stuck firmly to the tag insert the small magnet into the pad and press around it. Make sure the magnet has stuck firmly to the pad in the hole. The tag's anti-tamper is now armed.
- It is recommended to place a spot of Superglue™ or other suitable adhesive on the magnet so that it will adhere to the asset surface and be able to trigger a tamper alert more quickly should any unauthorized attempt be made to remove a tag from its asset. Do not glue the magnet to the back of the tag; this will prevent the anti-tamper feature from working.

#### 3.4.4 Final steps

- Remove the paper cover from the gel pad on the back of the tag and position the tag in a suitable location on the asset. Press firmly to ensure a firm bond.
- The gel pad will take up to 24 hours to cure to full bond strength.
- For all assets that will be driven or transported and/or which may experience rough handling and/or cleaning with high pressure water jets it is strongly recommended to fix the TGA tag to the asset with screws or rivets in addition to the VHB gel pad. 4mm diameter screws or rivets are suitable.
- It is helpful to first attach the tag to the asset using the VHB pad and then to drill the required holes for the screws or rivets as the tag will be held in the correct location by the VHB pad while you are working.

### 3.5 Removing the TGA

The tag may require removal from the object either at the end of its functional life, or in instances where the tag has been damaged, or where the asset is at end of its life cycle and must be replaced or disposed of. In the case of asset replacement or disposal and where the tag is still fully functional, the tag can be installed onto a new asset with a new VHB pad and screws/rivets.

### 3.5.1 Requirements

- 1 strong, flat tipped instrument, such as a flat head screw driver
- Drill or screw driver to remove any rivets or screws used to fix the tag to the asset

### 3.5.2 Removal

- For plastic assets or assets made of softer metal, it is highly likely that some surface damage could occur during removal of the tag. Take as much care as possible to avoid this by working carefully to break the VHB bond and use an instrument that is less likely to gouge or scratch the asset surface.
- First remove any fixing screws or drill out any rivets used to fix the tag to the asset.
- Carefully work the flat tipped instrument (screwdriver) under the tag.
- Break the adhesive bond by leveraging the tag off the asset slowly, adjusting the position of the instrument to the left and then to the right repeatedly, working all the way around the edge of the tag to loosen the VHB bond.
- Repeat this as many times as it take to loosen enough of the gel pad around the edge of the tag to allow gentle twisting or rotation of the tag in a clock-wise then anti-clockwise manner or to lift the tag by one edge. Use the blade to continue loosening or breaking up the gel pad to allow greater rotation of the tag.
- Continue to twist and lift the tag until it comes off the object.

**Notes:**

The anti-tamper feature will cause the tag to alarm immediately if any attempt is made to remove the tag before the end of its functional lifespan.

Do not try to pull the tag off the object when removing it, the best way to break down the bond between the gel pad and the tag & object is to rotate the tag clockwise and anti-clockwise repeatedly.

## 4 THE TGM MICRO TAG

The TGM Micro tag is specially designed for use in asset tagging applications such as laptops, IT equipment, vehicles and transport media. The TGM is optimized to operate on metal assets however it can be used equally well on non metallic assets as well.

### 4.1 Important Facts about the Micro Tag

- The tag has an Omni directional antenna. When mounted on metal it can be read through 180 degrees, when mounted on plastic it can be read from the full 360 degrees.
- Attaching the tag to plastic or other non-metal surfaces will reduce the maximum read range the tag can provide by approximately 10%
- The tag can a movement sensor in Active versions TGM-MS, in Active Duo TGM-A it operates in three different modes, the standard operation mode that transmits its data with Status Tx rate, the movement alert operation mode that transmits with the Alert Tx rate when its movement sensor senses any movement or vibration of the tag, and the tamper alert mode if the tag is fixed to an object with Anti-Tamper kit.
- The tag is rated to operate in ambient temperatures between -30°C and +90°C, using the tag in ambient temperatures beyond this range will cause damage to the tag and possibly cause its complete failure.
- The Nema standard IP rating of the TGM tag is 64, which means it is protected against dust and splashing water. Using the tag in harsher conditions will cause damage to the tag and possibly cause its complete failure.

**Note:** Using this tag for an incorrect application can significantly reduce the read range the tag provides, possibly to the point that no signal from the tag can be received at all.

This manual gives instructions for the correct method and location to attach the tag; failure to follow these instructions will result in impaired operation or even the complete loss of tag signals.

### 4.2 Attaching the TGM for Tracking IT Equipment and Other Assets

#### 4.2.1 Requirements

- TGM tag
- 1 adhesive gel pad (& magnet) from a 10-pack TAM or TAM-AT Attachment Kit
  - Glass cleaner
  - Clean dry cloth

#### 4.2.2 Preparation

- Clean an area a little larger than the tag on an object. Ensure that no dust, oil, grease or residue remains.
- Position the gel pad over the back of the tag and align the hole in the pad with the embossed circle on the tag. Remove the gel pad cover and stick the gel pad to the back of the tag. Make sure the hole in the pad and the circle on the back of the tag are aligned.

#### 4.2.3 Arming the anti-tamper (if using the TAM-AT attachment kit)

- Once the gel pad is stuck firmly to the tag insert the small magnet into the pad and press around it. Make sure the magnet has stuck firmly to the pad in the hole. The tag's anti-tamper is now armed.
- It is recommended to place a spot of Superglue™ or other suitable adhesive on the magnet so that it will adhere to the asset surface and be able to trigger a tamper alert more quickly should any

unauthorized attempt be made to remove a tag from its asset. Do not glue the magnet to the back of the tag; this will prevent the anti-tamper feature from working.

#### **4.2.4 Final steps**

- Remove the other cover from the gel pad and position the tag in a suitable location on the asset. Press firmly and ensure no air bubbles remain visible.
- The gel pad will take up to 24 hours to cure to full bond strength.
- If fitting the tag to the asset using screws or rivets with the VHB gel pad it is helpful to first attach the tag to the asset using the gel pad and then to drill the required holes for the screws or rivets as the tag will be held in the correct location by the VHB pad while you are working.
- If fitting the tag to the asset using screws or rivets without the VHB gel pad, mark the centre of each hole using the tag's fixing holes as your guide.
- Then to drill the required holes for the screws or rivets and fix the tag to the asset using the screws or rivets.

### **4.3 Removing the TGM**

The tag may require removal from the object either at the end of its functional life, or in instances where the tag has been damaged, or where the asset is at end of its life cycle and must be replaced or disposed of. In the case of asset replacement or disposal and where the tag is still fully functional, the tag can be installed onto a new asset with a new gel pad.

#### **4.3.1 Requirements**

- 1 thin, flat instrument or blade, such as a dinner table knife

#### **4.3.2 Removal**

- For plastic assets or assets made of softer metal, it is highly likely that some surface damage could occur during removal of the tag. Take as much care as possible to avoid this by working carefully to break the VHB bond and use an instrument that is less likely to gouge or scratch the asset surface.
- Carefully insert the blade into the gel pad repeatedly, working all the way around the edge of the tag.
- Repeat this as many times as it take to loosen enough of the gel pad around the edge of the tag to allow gentle twisting or rotation of the tag in a clock-wise then anti-clockwise manner. Use the blade to continue loosening or breaking up the gel pad to allow greater rotation of the tag.
- Continue to twist the tag until it comes off the object.

**Notes:**

The anti-tamper feature (if used) will cause the tag to alarm immediately if any attempt is made to remove the tag before the end of its functional lifespan.

Do not try to pull the tag off the object when removing it, the best way to break down the bond between the gel pad and the tag & object is to rotate the tag clockwise and anti-clockwise repeatedly.



## APPENDIX A. DOCUMENT INFORMATION

### AMENDMENT HISTORY

Issue	Date	Amendment Details	Amended By
1.1	22 <sup>nd</sup> August 2011	First Draft , further tags to be added	Will Damerell
1.2	24 <sup>th</sup> August 2011	Second draft ATEX amendments	Will Damerell
1.3	26 <sup>th</sup> August 2011	ATEX label changes	Will Damerell
1.4	1 <sup>st</sup> September 2011	Cleaning instructions added and label changes.	Will Damerell
1.5	2 <sup>nd</sup> September 2011	ATEX amendments	Will Damerell
1.6	9 <sup>th</sup> September 2011	Temperature changes to TGA	Will Damerell
1.7	12 <sup>th</sup> September 2011	Temperature changes to TGA	Will Damerell
1.8	13 <sup>th</sup> September 2011	ATEX Label changes	Will Damerell
1.9	22 <sup>nd</sup> September 2011	Approval changes	Will Damerell
2.0	23 <sup>rd</sup> September 2011	Approval Changes	Will Damerell
2.1	17 <sup>th</sup> November 2011	Approval Changes	Will Damerell
2.2	05 <sup>th</sup> December 2011	Approval changes	Will Damerell

Table 2: Amendment History

### APPROVALS

Number	Name	Designation	Date	Signature
1.				
2.				
3.				
4.				
5.				

Table 3: Approvals

## APPENDIX B. CERTIFICATIONS

The Wavetrend Active Tag range hold the following Certifications

### CE

ETSI EN 300 220 Class 7a	Effectuated Radiated Power (Carrier)
ETSI EN 300 220	Effectuated Radiated Power (Spurious Emissions)
ETSI EN 300 220	Range of modulation bandwidth for wide band equipment
ETSI EN 300 220	Frequency stability under low voltage conditions
BS EN55022 Class B	Emissions Standard for domestic and light industrial environments
BS EN61000-4-2	1995 ESD Requirements
BS EN61000-4-3	2006 Radiated Susceptibility

### ATEX

ATEX directive 94/9/EC

EMC directive 2004/108/EC

Low Voltage Directive 2006/95/EC

Based on the following harmonised standards:

EN60079-0:2006	EN60079-11:2007
EN60079-26:2007	EN61241-0:2006
EN61241-11:2006	EN300 220-2 V2.12(2007-2006)

And therefore complies with all of the relevant essential requirements of those directives.

The following Notified Body has been involved in the conformity assessment process:

Notified Body	TRaC Global Ltd
Notified Body No.	0891
Role:	Issue of ATEX EC Type Examination certificate
Certificate No.	TRAC11ATEX11298X

Additional information:

TGPHZ

ATEX coding	II 1 G D Ex ia IIC T4 Ga Ex iaD 20 IP64 T60°C Da I M Ex ia I
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Limitations on use See ATEX EC Type Examination certificate

**TGAHZ ,TGAHT,TGAE**

<b>ATEX coding</b>	II 1 G D Ex ia IIC T4 Ga Ex iaD 20 IP64 T90°C Da I M Ex ia I
<b>Limitations on use</b>	See ATEX EC Type Examination certificate

## APPENDIX C. ELECTRICAL SPECIFICATIONS

The Electrical characteristics are summarised below by Tag type

Tag Type	Battery Type	Battery Voltage	Battery Capacity
TGP	CR2450	3.0	620 mah
TGPS	CR2430	3.0	300 mah
TGPHZ	CR2430	3.0	620 mah
TGA	CR2450	3.0	620 mah
TGAHT	CR2450HR	3.0	550 mah
TGAHZ	CR2450	3.0	620 mah
TGAE	CR2450HR	3.0	550 mah
TGM	CR1632	3.0	140 mah

It should be noted that it is not possible to change the batteries in any Wavetrend Tags .

## APPENDIX D. ATEX TAG LABELLING

Tag labelling



TGPHZ ATEX labelling

**Wavetrend Europe, TW9 2PR**

**Model: TGPHZ**

**IECEX TRC 11.0005X**

**Ex ia I, Ex ia IIC T4 Ga**

**Ex iaD 20 IP64 T60°C Da**

**TRAC11ATEX11298X**

**Ex IM Ex II 1 GD CE 0891**

**TGAHZ ATEX labelling**

**Wavetrend Europe, TW9 2PR**

**Model : TGAHZ**

**IECEX TRC 11.0005X**

**Ex ia I , Ex ia IIC T4 Ga**

**Ex iaD 20 IP64 T90°C Da**

**TRAC11ATEX11298X**



**TGAHT ATEX labelling**

**Wavetrend Europe, TW9 2PR**

**Model : TGAHT**

**IECEX TRC 11.0005X**

**Ex ia I , Ex ia IIC T4 Ga**

**Ex iaD 20 IP64 T90°C Da**

**TRAC11ATEX11298X**



**TGAE ATEX labelling**

**Wavetrend Europe, TW9 2PR**

**Model : TGAE**

**IECEX TRC 11.0005X**

**Ex ia I , Ex ia IIC T4 Ga**

**Ex iaD 20 IP64 T90°C Da**

**TRAC11ATEX11298X**

