



ACTIVE RFID

User Manual

ACTIV DUO Active RFID Tags



WWW.WAVETREND.NET

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 has 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.

DISCLAIMER

NOTICES REGARDING HARDWARE, SOFTWARE, DOCUMENTS AND SERVICES THAT ARE AVAILABLE FROM WAVETREND:

In no event shall Wavetrend® and/or its respective suppliers be liable for any special, indirect or consequential damages or any damages whatsoever resulting from loss of use, data or profits, whether in an action of contract, negligence or other tortious action, arising out of or in connection with the use or performance of hardware, software, documents, provision of or failure to provide services, or information available from Wavetrend® and/or our website <http://www.wavetrend.net>.

The documents published by Wavetrend® could include technical inaccuracies or typographical errors. Changes are periodically added to the information herein. Wavetrend® and/or its respective suppliers may make improvements and/or changes in the product (s) and/or the program (s) described herein at any time without prior notice.

FCC STATEMENT

Each of the devices described in this manual complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The user is cautioned that changes or modifications to this product that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Copyright © 2008 Wavetrend Technologies Limited. All rights reserved. Wavetrend and the Wavetrend logo are either registered trademarks or trademarks of Wavetrend Technologies Limited in the United States and/or other countries. All other trademarks are the property of their respective owners.

TABLE OF CONTENTS

1	THE ACTIVDUO RANGE OF ACTIVE RFID TAGS	7
1.1	Product Overview	7
1.1.1	L-Series & W-Series Explained	7
1.1.2	Key Features and Benefits of ActivDuo Tags	8
1.2	General Facts about ActivDuo Tags	10
1.3	Obtaining Professional Advice on Using Tags	10
1.3.1	Wavetrend Professional Services	10
1.3.2	Wavetrend's Product Customization Capabilities	10
1.4	Standard Tag Functionality	11
1.4.1	Standard Transmission Mode	11
1.4.2	Movement Alert Mode	11
1.4.3	Manual Alert Operation for the TG700-A Key Fob PA Tag	11
1.4.4	Tag Transmission Repetition Rates – Nominal vs. Actual	12
1.5	Tag Battery (Functional) Life Span	12
1.5.1	L-Series Life Spans	13
1.5.2	W-Series Life Spans	14
1.5.3	End of Life	14
1.5.4	Keeping Tags in Stock	14
1.6	ActivDuo Tag Accessories	14
1.6.1	Tag Attachment Kits	14
1.6.2	Anti-Tamper Tag Attachment Kits	15
1.6.3	Identifying the Correct Attachment Kit to Use	15
1.6.4	Other Attachment Methods	15
1.7	Other Hardware Requirements	16
1.7.1	Reader Network Hardware Required	16
1.7.2	External Antennas	17
1.8	Programming ActivDuo Tags	17
1.9	Activating W-Series ActivDuo Tags	18
1.9.1	Using the Auto-Wake Feature with the ActivDuo Tags	18
1.10	Disposal of Tags	18
2	THE TG100-A 'DOMINO' TAG	19
2.1	Important Facts about the TG100-A Tag	19
2.2	Attaching the TG100-A for Tracking Assets	20
2.2.1	Requirements	20
2.2.2	Preparation	20
2.2.3	Arming the anti-tamper (if using the TA100-AT attachment kit)	20
2.2.4	Final steps	20
2.3	Removing the TG100-A	20

2.3.1	Requirements.....	20
2.3.2	Removal	20
3	THE TG501-A ‘PERSONNEL’ TAG.....	22
3.1	Important Facts about the TG501-A Tag	22
3.2	Using the TG501-A for Tracking Personnel.....	22
3.2.1	Requirements & Instructions	22
3.3	Installing the TG501-A for Tracking Assets	23
3.3.1	Requirements.....	23
3.3.2	Preparation.....	23
3.3.3	Arming the anti-tamper (if using the TA501-AT attachment kit)	23
3.3.4	Final steps	23
3.4	Removing the TG501-A	23
3.4.1	Requirements.....	23
3.4.2	Removal	23
4	THE TG700-A ‘KEY FOB PA’ TAG	25
4.1	Important Facts about the TG700-A Tag	25
4.2	Using the TG700-A for Personnel Security Applications or Key Ring Tracking	25
4.2.1	Requirements & Instructions	25
4.2.2	Modes of Operation.....	26
5	THE TG800-A ‘ASSET’ TAG	27
5.1	Important Facts about the TG800-A Tag	27
5.2	Attaching the TG800-A for Tracking IT Equipments and Other Assets	28
5.2.1	Requirements.....	28
5.2.2	Preparation.....	28
5.2.3	Arming the anti-tamper (if using the TA800-AT attachment kit)	28
5.2.4	Final steps	28
5.3	Removing the TG800-A	28
5.3.1	Requirements.....	28
5.3.2	Removal	28
6	THE TG800-A-IH ‘ASSET IP67’ TAG	30
6.1	Important Facts about the TG800-A-IH Tag	30
6.2	Attaching the TG800-A-IH for Tracking Containers and Other Assets	31
6.2.1	Requirements.....	31
6.2.2	Preparation.....	31
6.2.3	Arming the anti-tamper (using the spring loaded magnet provided with the tag)	31
6.2.4	Final steps	31
6.3	Removing the TG800-A-IH.....	31
6.3.1	Requirements.....	32
6.3.2	Removal	32
7	THE TG801-A & TG801-A-WM ‘SMALL ASSET’ TAG.....	33

7.1	Important Facts about the Small Asset Tag.....	33
7.2	Attaching the TG801-A for Tracking IT Equipment and Other Assets.....	33
7.2.1	Requirements.....	33
7.2.2	Preparation.....	34
7.2.3	Arming the anti-tamper (if using the TA801-AT attachment kit)	34
7.2.4	Final steps.....	34
7.3	Attaching the TG801-A-WM for Tracking IT Equipment and Other Assets	34
7.3.1	Requirements.....	34
7.3.2	Preparation.....	34
7.3.3	Arming the anti-tamper (if using the TA801-AT attachment kit)	34
7.3.4	Final steps.....	35
7.4	Removing the TG801-A or TG801-A-WM.....	35
7.4.1	Requirements.....	35
7.4.2	Removal	35
8	THE TG1800-A 'WRIST' TAG	36
8.1	Important Facts about the Wrist Tag.....	36
8.2	Attaching the TG1800-A for Tracking Patients and Other People.....	36
8.2.1	Requirements.....	36
8.2.2	Fitment	36
8.3	Attaching the TG1800-A to Objects for Asset Tracking Systems	37
8.3.1	Requirements.....	37
8.3.2	Fitment using Non-Metal Straps	37
8.3.3	Fitment using Steel/Metal Straps	37
8.4	Removing the TG1800-A	37
9	THE TG1810-A 'MINI ASSET' TAG.....	38
9.1	Important Facts about the Mini Asset Tag	38
9.2	Attaching the TG1810-A for Tracking IT Equipments and Other Assets	39
9.2.1	Requirements.....	39
9.2.2	Preparation (when using the Tag Attachment Kit).....	39
9.2.3	Arming the anti-tamper (if using the TA1810-AT attachment kit)	39
9.2.4	Final steps.....	39
9.3	Removing the TG1810-A	39
9.3.1	Requirements.....	39
9.3.2	Removal	39
APPENDIX A. STANDARD SPECIFICATIONS & CERTIFICATIONS		41
APPENDIX B. DOCUMENT INFORMATION		42

1 THE ACTIVDUO RANGE OF ACTIVE RFID TAGS

1.1 Product Overview

Wavetrend® ActivDuo 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. All ActivDuo tags have **-A** included in their part number, e.g. L-TG501-A.

ActivDuo 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.

1.1.1 L-Series & W-Series Explained

'L-Series' and 'W-Series' refer to two different proprietary communication protocols used between ActivDuo tags and Wavetrend's readers. An L-Series reader must be used with Wavetrend L-Series tags. A W-Series reader must be used with Wavetrend W-Series tags. Both types of reader can operate on the same reader network infrastructure. Please refer to the various Wavetrend reader user manuals for more information on using Wavetrend readers.

L-Series and W-Series each offer different functionality for the user from the ActivDuo tag. Generally, L-Series tags **offer greater read range**, function as a **simple identity tag**, and are better suited to RFID systems where **fewer tags are in range** of any one reader at any one time.

W-Series tags offer **a greater flexibility of the amount and type of data that is transmitted** and offer **more transmit interval options**, but are better suited to applications where **many hundreds or thousands of tags are deployed on a site** and **where shorter read ranges are suitable or preferred** i.e. where it is more important to detect a large number of tags quickly than it is to achieve very large read ranges.

W-Series data options: The user is able to choose which fixed data elements are to be transmitted by the W-tag, for instance the battery age counter is an optional data element. In addition to the fixed data elements, the user can also program the tag with their own data (up to 25 characters) for the tag to transmit.

Note: The total amount of data the tag can transmit at maximum is fixed, so the more fixed data elements that are selected for the tag to transmit, the less data space will be available for the user data, and vice versa.

The user data can only be changed through reprogramming the tag using the tag programmer, it cannot be changed at will during normal use of the tags, and as such W-Series tags are not read/write tags.

Tags are manufactured to use one of the protocols and cannot be changed afterward to use the other protocol. The tag range is available in identically designed and shaped tags for each protocol, but are typically colored Grey for L-Series tags or Black for W-Series tags. The Series prefix (L- or W-) in the tag's part number denotes the protocol the tag uses. e.g. L-TG501-A denotes an L-Series tag, W-TG501-A denotes a W-Series tag.

1.1.2 Key Features and Benefits of ActivDuo Tags

Key Tag Features	Business Benefits	Available	
		L-Series	W-Series
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.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Transmits up to 25 characters of user defined information	Allows for additional data to be stored and transmitted by the tag, such as an Electronic Product Code (EPC) identifier or Vehicle Identification Number (VIN), in addition to the unique tag ID number (the PUC)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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 real time 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.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
The user can configure the combination of data the tag will transmit by using a tag programmer	Increases tag life span and tag capacities by reducing the amount of data transmitted to the minimum data required by the RFID system.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Collision avoidance algorithm	Reduces loss of data through simultaneous transmissions from multiple tags. The randomization of the transmission interval aids the collision avoidance algorithm.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> (enhanced)
Ultra low power consumption	Life span of 7+ years when transmitting at the standard 10 second or greater interval	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
All tags sealed to IP64 standards or higher	Splash proof and intrinsically safe capable	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Data Transmitted by Tags:			
<ul style="list-style-type: none"> Site/Vendor Code (CSC)* 	<ul style="list-style-type: none"> A unique code that is allocated by Wavetrend to each customer on request. Readers can be set to accept only one specific CSC and ignore tags with 'incorrect' site codes 	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> **

Key Tag Features	Business Benefits	Available	
		L-Series	W-Series
▪ Tag ID*	▪ 4.2 billion Tag ID's are available per Site Code (Tag ID is different from the PUC).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> **
▪ Tag Age Counter	<ul style="list-style-type: none"> ▪ The Age Counter allows for advance notification to RFID systems of the nearing end of the tag's functional life. ▪ Uniquely identifies each transmission made by the tag. 	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> **
▪ Product Unique Code (PUC)	<ul style="list-style-type: none"> ▪ Factory set ID for the tag that can function as the tag's unique ID number instead of a Site Code/Tag ID combination. ▪ The user cannot change the PUC. 	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
▪ Various standard transmission repetition intervals* (default is 10 seconds, nominal)	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.	2 Intervals	11 Intervals
▪ Various alert transmission repetition intervals* (default is 1.5 seconds, nominal)	<ul style="list-style-type: none"> ▪ 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. ▪ When activated, alert transmissions continue for a maximum period of 5 seconds. 	3 Intervals	6 Intervals
▪ Movement Alert	Provides instant notification of an attempt to move a tag by setting the alarm bit and entering Alert Tx mode for 5 seconds.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
▪ Movement Counter Value	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.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> **
▪ Tamper Alert	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.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
▪ Tamper Counter Value	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.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> **
▪ Tamper Latch	Provides notification with every transmission afterward of a tamper event having occurred. This allows an RFID system to determine if a tamper occurred outside of a reading zone without having to look up the previous tamper counter value. Tamper latch can be reset using a Wavetrend tag programmer.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> **
* Indicates data that the user can configure on any tag using a Wavetrend tag programmer		** Indicates data options that the user can set the tag to transmit, if desired.	

Table 2 - Key Features and Benefits of ActivDuo Tags

1.2 General Facts about ActivDuo 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 ActivDuo tags operate at a frequency of **433.92 MHz** as standard. Alternate frequencies (such as 868MHz or 915MHz) or customized tag designs can be supplied for specific large scale projects, but would require product development activities. Please enquire with Wavetrend.

1.3 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 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.

1.3.1 Wavetrend Professional Services

Wavetrend's in-house Professional Service teams are also available to provide second line support to Accredited Partners or directly to users for more challenging or unusual customer applications where standard tags may or may not be suitable for use. Minor modifications to existing products to make them better suited to the application can be done, but after a detailed examination of the customer's requirements by Wavetrend.

1.3.2 Wavetrend's Product Customization Capabilities

For truly unique applications, Wavetrend can design custom tags to meet specific requirements. However, such work is expensive and time consuming and is only conducted after careful consideration of the customer requirements, the volume required and acceptance by all parties involved of the costs to be shared and the timescale of embarking on a new product development project.

1.4 Standard 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:

1.4.1 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 **1 transmission at least every 10 seconds**. Other transmission intervals for the Status Tx rate greater than 10 seconds 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.

Alert Tx Rates L Series	Status Tx Rates L-Series
0.4 seconds	10 seconds (default)
0.8 seconds	30 seconds
1.5 seconds (default)	

Table 3 - List of Programmable Nominal Transmission Rates for the **L-Series** ActivDuo tags

1.4.2 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.

For L-Series and W-Series, 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 seconds for L-Series and 0.4 / 0.8 / 1 / 3 or 5 seconds for W-Series) 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 W Series	Status Tx Rates W-Series
0.4 seconds	10 seconds (default)
0.8 seconds	15 seconds
1 second	20 seconds
1.5 seconds (default)	30 seconds
2 seconds	45 seconds
5 seconds	1 minute
-	1.5 minutes
-	2 minutes
-	3 minutes
-	5 minutes
-	10 minutes

1.4.3 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.

Table 4 - List of Programmable Nominal Transmission Rates for the **W-Series** ActivDuo tags

1.4.4 Manual Alert Operation for the TG700-A Key Fob PA Tag

The Key Fob PA tag does not include a motion sensor. In its place a push button is fitted. When pressed, the push button activates the **Movement Alert mode** of operation. The alert transmissions

are generated in exactly the same way as for the Movement Alert Mode described above, the only difference being that the transmissions are initiated by the user through a button press rather than a movement sensor being activated by motion.

For track and trace operations that require the use of the TG700-A Key Fob PA tag, set the Status Tx rate to the minimum rate available (10 seconds) to ensure regular location updates for the tag are received by the RTLS system.



Note to Software Developers: When the TG700-A's button is pressed, the Key Fob tag will set the alarm bit in the data packet for the each of the Alert Tx's generated and will appear to be indicating that a movement alert has occurred in the same way that all other ActivDuo tags which are fitted with movement sensors would do. To correctly identify that there is a panic alarm, or to allow a door to be unlocked (if used with access control systems, for example), the tag ID must be flagged in the application as being a Panic Alert tag, and the transmitted tag ID checked by the application so that the system understands that the alert transmissions are coming from a TG700-A tag because of a button press and not because of physical movement, and to then react accordingly.

Note to System Engineers: If using the TG700-A with the PA100 Wiegand Converter for simple access control purposes, or for simple audio-visual notification of the panic alert, the appropriate jumper settings can be made on the PA100 to activate the alarm relay on receipt of the alarm transmissions from the TG700-A.

1.4.5 Tag Transmission Repetition Rates – Nominal vs. Actual

All Status and Alert tag transmission rates quoted in Table 3 and Table 4 above are the nominal interval time periods. Ambient temperatures will affect actual tag transmission intervals due to the effect of temperature on the electronic components used in the tag that govern the repetition rate.

- Hotter temperatures will decrease the actual tag transmission interval
- Colder temperatures will increase the actual tag transmission interval

All stated tag life span expectations in the product data sheets for tags are based on the tags operating throughout their life at around room temperature (70°F or 21°C) and the associated actual tag transmission interval achieved when the tag is set to the default status and alert nominal intervals.

For example, setting the Status Tx interval to 10 seconds (the nominal rate) will result in a real interval of around 12.5 seconds when the tag is operating at room temperature. If the tag is used in an environment where the ambient temperature approaches 140°F (60°C), the actual status transmission interval will decrease near to 10 seconds. In the reverse, if the tag is used in an environment where the ambient temperature approaches 14°F (-10°C), the real status transmission interval will increase near to 15 seconds.

1.5 Tag Battery (Functional) Life Span

Wavetrend's ActivDuo tags typically use a Lithium-Ion battery that the manufacturer states as offering an 8 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.

While the tag batteries are manufactured on demand for Wavetrend to minimize the loss of functional life span between battery manufacture and customer activation of the tag, Wavetrend typically quotes a conservative maximum battery life span of 6 years 2 months for tags set to the default transmission rates to allow for a more than reasonable amount of time that the tag might be stored in stock by our distributors & resellers and to allow for usage in either variable temperature or colder climates.

While hotter temperatures will decrease the transmission interval rates, thus making the tag transmit more often per day, the greater efficiency of the battery exceeds the increased power usage caused by the shorter transmission interval. In reverse, the loss of battery efficiency at colder temperatures exceeds the benefit of longer actual transmission intervals.

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 between 7 and 8 years from a tag – depending very much on how the tag is configured to operate, how much data is transmitted per transmission (W-Series tags only), and the ambient temperature it will experience throughout its life span.



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.

The amount of data the tag transmits. L-Series tags transmit a fixed amount of data and life span calculations are quite straightforward. W-Series tags can transmit anything between 8 & 28 bytes of data, and this variable amount of data, and thus variable transmission duration lengths, makes life span calculations more complex.

More data = shorter life span

1.5.1 L-Series Life Spans

The L-Series ActivDuo tag will typically give the user greater than 6 years 2 months of continuous use when set to transmit at its default Status Tx rate of 10 seconds.

The tag will give the user just under 5 years of continuous use even if it is exposed to movement of up to 90% of its total functional life span when the Alert Tx rate is set to the default rate of 1.5 seconds.

For other Alert Tx rates less than 1.5 seconds, and where the tag moves for more than 10% of its total functional life span, the tag battery life span will be reduced, due to the greater number of transmissions initiated during its life span.

At worst the tag will offer a user just under 2 years of continuous use when set to the shortest Alert Tx rate (0.4s) and when it moves for up to 90% of its functional life span.

1.5.2 W-Series Life Spans

Battery life spans for a W-Series tag are very much determined on the amount of tag data the user selects the tag to transmit. For the purposes of this section, the best case life span figures are given for Class 1 tags which transmit the least amount of data, while the worst case life span figures are given for tags that are programmed to transmit the full amount of data possible.

The W-Series ActivDuo tag will typically give the user greater than 6 years 2 months of continuous use when set to transmit at its default Status Tx rate of 10 seconds, and is configured to carry L-Series type data (Class 5) and experiences movement for less than 10% of its functional life.

The tag will give the user at least 5 years of continuous use even if it is exposed to movement of up to 90% of its total functional life span when the Alert Tx rate is set to the default rate of 1.5 seconds.

For other Alert Tx rates less than 1.5 seconds, and where the tag moves for more than 10% of its total functional life span, the tag battery life span will be reduced, due to the greater number of transmissions initiated during its life span.

At worst the tag will offer a user over 2 years of continuous use when set to the shortest Alert Tx rate (0.4s) and when it moves for up to 90% of its functional life span.

1.5.3 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 (L-Series) or can be selected to be transmitted, if required, (W-Series). 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.

1.5.4 Keeping Tags in Stock

It is recommended that ActivDuo 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.

1.6 ActivDuo Tag Accessories

1.6.1 Tag Attachment Kits

Most of the ActivDuo 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, with most being made of clear gel, while the TG800-A-IH pads are made of VHB gel-foam pads. The VHB pads 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.)

1.6.2 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.

1.6.3 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 **TA501** kit will be used with the **TG501-A** ActivDuo 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 **TG501-A** tag is the **TA501-AT**.

1.6.4 Other Attachment Methods

Certain tags, usually those with part numbers ending in **-IH** ("Industrial Housing") or **-WM** ("wing mount"), 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.

1.7 Other Hardware Requirements

1.7.1 Reader Network Hardware Required

In order to receive the data transmissions from the tag, the user will need the following equipment at a minimum:



Any Wavetrend Reader, such as the RX201, pictured above with the AN200 antenna fitted

The appropriate power supply for the reader
(may be sold separately)

433 MHz Antenna, to extend the reader range
(sold separately)

All data is passed by the reader to a computer, where software capable of decoding the tag and reader data can then display the tag data and location data. Both Wavetrend and many of Wavetrend's Accredited Partners offer suitable software applications for asset management applications.

Figure 1 shows the basic network topography required for an active RFID system that uses ActivDuo tags.

This particular example shows the topography for the RX900 Ethernet reader. For more information on other reader topographies and how to set up and use Wavetrend readers, please refer to each reader's User Manual.

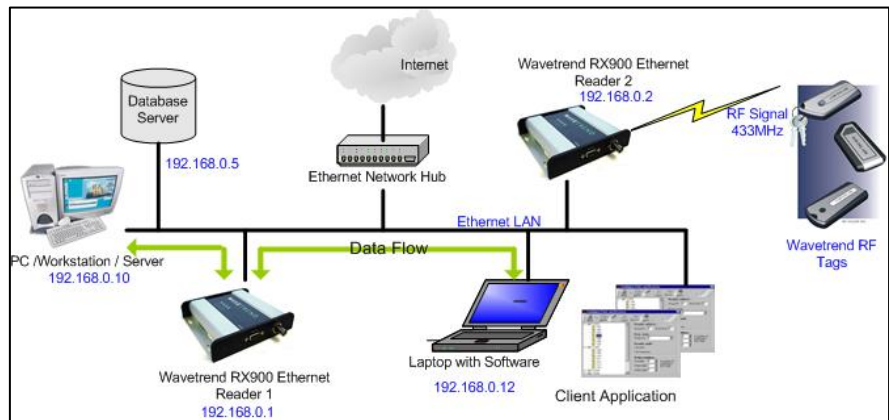
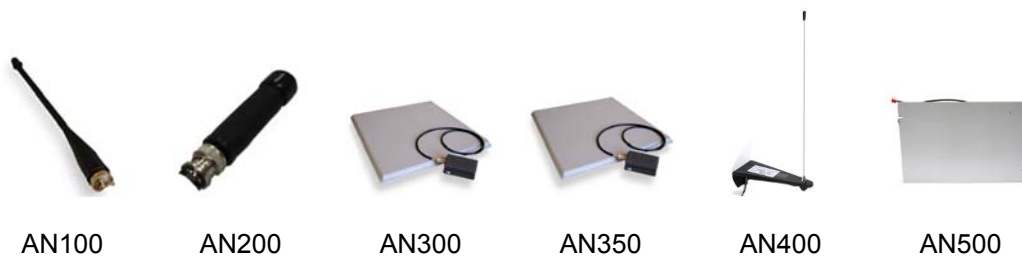


Figure 1. Example of an RFID System Topography

1.7.2 External Antennas

The read range offered by any tag is actually determined by three key factors: the type of reader used to detect the tag transmissions, the antenna that the reader uses, and environmental and “noise” conditions present at the location of use. Wavetrend readers can use any 433MHz, 50 Ohm antenna that comes with a BNC (F) connector. Wavetrend offers the following antennas for use with the RX201 / RX900 / RX1000 type readers:

- AN100 – ¼ Wave Whip Antenna
- AN200 – Stub Antenna
- AN300 – Patch Antenna – linear polarized
- AN350 – Patch Antenna – circular polarized
- AN400 – Outdoor Whip Antenna
- AN500 – Blade Antenna



If you require a specialized antenna, for example to achieve hundreds of meters of read range, please contact a Wavetrend Accredited Partner or a Wavetrend Professional Services specialist directly. Wavetrend's Accredited Partners should contact their nearest Wavetrend office with any challenging requirements.

Note: It may be impossible to achieve any and every read range requirement due to limitations of the technology, limitations imposed by the regulations applicable to the technology, or the laws of physics.

1.8 Programming ActivDuo Tags

Before tags can be deployed and used, they should be configured to suit the user's requirements. The ActivDuo tag is manufactured to hold a unique factory set CSC & Tag ID (L-Series) or a unique PUC (W-Series), 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 and deactivate L-Series & the W-PG101-A Programmer must be used to configure, activate and deactivate W-Series tags.

1.9 Activating W-Series ActivDuo Tags

In addition to using the PG101-A Programmer, all W-Series tags offer an 'auto-wake' feature. This feature automatically activates the tag approximately 2 minutes after fitting the tag to an asset and arming the anti-tamper circuit. If the anti-tamper feature is not going to be used, then ensure the tag is activated using the tag programmer before attachment to an asset.

1.9.1 Using the Auto-Wake Feature with the ActivDuo Tags

When fitting a tag to an asset object, ensure the correct Tag Attachment Kit with Anti-Tamper is used. The small magnet supplied with each gel pad should be fitted into the pad, and the pad orientated so that the magnet sits between the tag and the object in the correct location. This location is indicated on the back of the tag by a small indented circle, and the attachment gel pad has a hole for the magnet that allows for the positioning of the magnet in the correct location on the back of the tag.

The tag will automatically activate after 2 minutes of fitting the magnet in place. The user should have an operational reader handy to ensure that the tag has activated.

1.10 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.

2 THE TG100-A ‘DOMINO’ TAG

The TG100-A Domino tag is one of the smallest ActivDuo tags, and is ideally suited for use indoors on non-metallic assets for general tracking or movement monitoring purposes. The tag has a polycarbonate coated external antenna. The tag incorporates a motion sensor and has an anti-tamper facility.

The tag is also used to indicate ‘door open’ events wirelessly. This is achieved by fitting the tag to the door and fitting a magnet to the frame in such a way that closing the door arms the anti-tamper mechanism, and opening the door initiates the tamper alert. Place a reader within range of the tag. The tag ID will uniquely identify the door that has been opened.



2.1 Important Facts about the TG100-A Tag

- **The tag must not be installed directly onto metal surfaces.**
- The tag has a linear polarized antenna. Where all tags will be attached to assets in exactly the same orientation, use linear polarized antennas with the reader, and orientate the reader antenna to obtain the best read range. Where all tags will be attached to assets in a manner that means you cannot be sure which orientation any tag could be in when passing through a read zone, use a circular polarized antenna or expect that some tags may offer lower signal strength due to their adverse orientation in relation to the antenna.
- Do not cut or remove the antenna as this will drastically reduce the tag's read range or render it inoperable. Replacement antennas are available from Wavetrend in the event of the loss of or damage to the antenna.
- Fitting the tag with a longer antenna to extend the read range is prohibited as this will cause the tag to exceed the limits for its signal strength set by the FCC Part 15 Rules. Wavetrend is not responsible for any unauthorized modifications made to this tag by the user that compromises the tag's FCC Approval Grant and the user may face prosecution by the FCC for any such unauthorized modifications.
- The tag incorporates a movement sensor as standard and operates in three different modes, the standard operation mode that transmits its data with Status Tx rate, movement alert operation mode that transmits with the Alert Tx rate when its movement sensor senses any movement or vibration of the tag, and 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 -10°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 TG100-A 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 Attaching the TG100-A for Tracking Assets

2.2.1 Requirements

- TG100-A tag
- 1 adhesive gel pad (& magnet) from a 10-pack TA100 or TA100-AT Attachment Kit
- Glass cleaner
- Clean dry cloth

2.2.2 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.

2.2.3 Arming the anti-tamper (if using the TA100-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 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.

2.2.4 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.

2.3 Removing the TG100-A

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.

2.3.1 Requirements

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

2.3.2 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 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 while loosening the gel pad.

3 THE TG501-A ‘PERSONNEL’ TAG

The TG501-A 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.

An IP67 version of the tag will be available in 2009 – the TG501-A-IH Slimline Asset IP67 tag for use outdoors or in harsh conditions.



3.1 Important Facts about the TG501-A Tag

- **The tag must not be installed directly onto metal surfaces.**
- The tag has a linear polarized antenna. Where all tags will be attached to assets in exactly the same orientation, use linear polarized antennas with the reader, and orientate the reader antenna to obtain the best read range. Where all tags will be attached to assets in a manner that means you cannot be sure which orientation any tag could be in when passing through a read zone, use a circular polarized antenna or expect that some tags may offer lower signal strength due to their adverse orientation in relation to the antenna.
- The tag incorporates a movement sensor as standard and 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 -10°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 TG501-A 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.

3.2 Using the TG501-A for Tracking Personnel

3.2.1 Requirements & Instructions

- TG501-A 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 TG501-A tag, to enable the TG501-A to function as an ID card for the carrier.

3.3 Installing the TG501-A for Tracking Assets

3.3.1 Requirements

- TG501-A tag
- 1 adhesive gel pad (& magnet) from a 10-pack TA501 or TA501-AT Attachment Kit
- Glass cleaner
- Clean dry cloth

3.3.2 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.

3.3.3 Arming the anti-tamper (if using the TA501-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.

3.3.4 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.

3.4 Removing the TG501-A

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.

3.4.1 Requirements

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

3.4.2 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 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 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 TG700-A 'KEY FOB PA' TAG

The TG700 Key Fob PA tag is designed for use by personnel who require a 'panic alert' button that will allow them to send a specific alert message when required by pressing the button. The tag may be used also for more mundane purposes, such as opening doors or audio/visual indicators, etc. when the button is pressed. The tag has also been designed to allow for the tracking of key rings and will operate with metal keys hanging around it.



4.1 Important Facts about the TG700-A Tag

- The tag has a linear polarized antenna. Where all tags will be attached to assets in exactly the same orientation, use linear polarized antennas with the reader, and orientate the reader antenna to obtain the best read range. Where all tags will be attached to assets in a manner that means you cannot be sure which orientation any tag could be in when passing through a read zone, use a circular polarized antenna or expect that some tags may offer lower signal strength due to their adverse orientation in relation to the antenna.
- The tag incorporates a movement sensor as standard and operates three different modes, the standard operation mode that transmits its data with Status Tx rate, movement alert operation mode that transmits with the Alert Tx rate when its movement sensor senses any movement or vibration of the tag, and tamper alert mode if the tag's button is pressed. The tag does incorporate a movement sensor and we may need to decide if the press button is sufficient for activation of the alert tx and may need to incorporate the MS in here which has some implications...
- The tag is rated to operate in ambient temperatures between -10°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 TG700-A tag is 65, which means it is protected against dust and low pressure water jets. 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 Using the TG700-A for Personnel Security Applications or Key Ring Tracking

4.2.1 Requirements & Instructions

- TG700-A tag
- Suitable attachment location on the person or asset

Attach the tag to the key ring / belt / lanyard / asset using the ring provided with the tag. The tag should be worn loosely on the body, and should not be kept in a pocket or anywhere else where it is pressed up against the body as it may also lead to inadvertent button presses. The human body can reduce the tag's signal strength and this may lead to apparently erratic operation in certain instances.

4.2.2 Modes of Operation

- The TG700-A tag's button will activate the alert transmission from the tag whether the tag has its Status Transmissions activated or not. Where the tag is to be used purely for personnel panic alert or access control purposes, this mode may be sufficient.
- For all personnel or asset tracking and tracing purposes, the tag should be activated to allow the Status Transmissions to be issued at least once every 10s.

5 THE TG800-A ‘ASSET’ TAG

The TG800-A Asset tag is specially designed for use in asset tagging applications such as laptops, IT equipment, vehicles and transportation media. The TG800-A is specifically designed for operating on metallic surfaces (or plastics containing a high metal content). When placed on metal it offers the best read range performance.

For non-metal assets, it is recommended to use the TG501-A Personnel tag or TG100-A Domino tag instead of the TG800-A Asset tag. The Personnel or Domino tags will provide full signal strength when used on non-metal assets.



5.1 Important Facts about the TG800-A Tag

- The tag should be installed directly onto metal surfaces to obtain the best read range performance from the tag.
- The tag has a linear polarized antenna. Where all tags will be attached to assets in exactly the same orientation, use linear polarized antennas with the reader, and orientate the reader antenna to obtain the best read range. Where all tags will be attached to assets in a manner that means you cannot be sure which orientation any tag could be in when passing through a read zone, use a circular polarized antenna or expect that some tags may offer lower signal strength due to their adverse orientation in relation to the antenna.
- Attaching the tag to plastic or other non-metal surfaces will reduce the maximum read range the tag can provide. This is because the tag's antenna is designed to be more effective when placed against a metal surface. Please ensure that, especially when the tag is intended to be used with other Wavetrend tags in the system, you can obtain sufficient read range to ensure the system will operate correctly despite the lower signal strength output by this tag when installed on non-metal surfaces.
- The tag incorporates a movement sensor as standard and 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 -10°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 TG800-A 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.

5.2 Attaching the TG800-A for Tracking IT Equipments and Other Assets

5.2.1 Requirements

- TG800-A tag
- 1 adhesive gel pad (& magnet) from a 10-pack TA800 or TA800-AT Attachment Kit
- Glass cleaner
- Clean dry cloth

5.2.2 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.

5.2.3 Arming the anti-tamper (if using the TA800-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.

5.2.4 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.

5.3 Removing the TG800-A

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.

5.3.1 Requirements

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

5.3.2 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 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.

6 THE TG800-A-IH ‘ASSET IP67’ TAG

The TG800-A-IH Asset IP67 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 TG800-A-IH is specially designed for operating on metallic surfaces (or plastics containing a high metal content).

For non-metal assets requiring a robust, waterproof tag, it is recommended to use the TG501-A-IH Slimline Asset IP67 Tag instead of the TG800-A-IH Asset IP67 tag. The Slimline Asset IP67 tag will provide full signal strength when used on non-metal assets. The TG501-A-IH Slimline Asset IP67 tag will be available to order in early 2009.



6.1 Important Facts about the TG800-A-IH Tag

- The tag should be installed directly onto metal surfaces to obtain the best read range performance from the tag.
- The tag has a linear polarized antenna. Where all tags will be attached to assets in exactly the same orientation, use linear polarized antennas with the reader, and orientate the reader antenna to obtain the best read range. Where all tags will be attached to assets in a manner that means you cannot be sure which orientation any tag could be in when passing through a read zone, use a circular polarized antenna or expect that some tags may offer lower signal strength due to their adverse orientation in relation to the antenna.
- Attaching the tag to plastic or other non-metal surfaces will reduce the maximum read range the tag can provide. This is because the tag's antenna is designed to be more effective when placed against a metal surface. Please ensure that, especially when the tag is intended to be used with other Wavetrend tags in the system, you can obtain sufficient read range to ensure the system will operate correctly despite the lower signal strength output by this tag when installed on non-metal surfaces.
- The tag's back plate is slightly curved meaning that, when fitted to perfectly flat surfaces, the VHB pad will typically bond only the edges of the tag to the asset, rather than providing a bond across the entire back surface of the tag. The curve is part of the original design for the tag, where it was to be fitted to petrochemical tankers. For this reason it is recommended to attach the tag using both the VHB pad and screws or rivets to ensure the tag cannot become accidentally detached during use.
- The tag incorporates a movement sensor as standard and 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 -10°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 TG800-A-IH 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.
- The anti-tamper spring loaded magnet is supplied loose with the tag. The tag cannot be programmed if the anti-tamper magnet is fitted, so first program the tag and activate it, and then fit the magnet.

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.

6.2 Attaching the TG800-A-IH for Tracking Containers and Other Assets

6.2.1 Requirements

- TG800-A-IH tag (comes with VHB foam-gel pad attached)
- Anti-tamper spring magnet (supplied with the tag, to be fitted only once the tag has been programmed and activated and is ready for attachment to the asset)
- Glass cleaner
- Clean dry cloth

6.2.2 Preparation

- Clean an area a little larger than the tag on an object. Ensure that no dust, oil, grease or residue remains.

6.2.3 Arming the anti-tamper (using the spring loaded magnet provided with the tag)

- Fit the spring loaded magnet to the tag using a small diameter cylindrical tool (such as a ball point pen casing) to press down the end of the spring magnet over the fitment stub in the magnet recess on the back of the tag. Ensure the magnet is fitted firmly to the stub and is not capable of easy removal.
- Once the spring magnet is fitted, remove the gel pad cover from the magnet. The tag's anti-tamper is ready and will be armed as soon as the tag is fitted to the asset.

6.2.4 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 TG800-A-IH 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.

6.3 Removing the TG800-A-IH

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.

6.3.1 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

6.3.2 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.
- 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. Start by inserting the instrument under the tag in the middle of the tag at the bottom (assuming the 'Wavetrend' brand appears in landscape orientation, the right way up) and gently push under the tag. The slight curve of the tag's back plate means that the bottom middle of the tag is the best location to easily insert the tool.
- 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 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 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.

7 THE TG801-A & TG801-A-WM ‘SMALL ASSET’ TAG

The TG801-A Small Asset tag is specially designed for use in asset tagging applications such as laptops, IT equipment, vehicles and transport media. The TG801-A is specially designed for operating on metallic surfaces (or plastics containing a high metal content). When placed on metal with dimensions of at least 86mm x 86 mm, it offers the best read range performance.

The Small Asset tag is also available with wing mount option (TG801-A-WM), providing two fixing holes that can be used to attach the tag to an asset using screws or rivets.



7.1 Important Facts about the Small Asset Tag

- The tag should be installed directly onto metal surfaces to obtain the best read range performance from the tag.
- Attaching the tag to plastic or other non-metal surfaces will reduce the maximum read range the tag can provide. This is because the tag's antenna is designed to be more effective when placed against a metal surface. Please ensure that, especially when the tag is intended to be used with other Wavetrend tags in the system, you can obtain sufficient read range to ensure the system will operate correctly despite the lower signal strength output by this tag when installed on non-metal surfaces.
- The tag has a linear polarized antenna. Where all tags will be attached to assets in exactly the same orientation, use linear polarized antennas with the reader, and orientate the reader antenna to obtain the best read range. Where all tags will be attached to assets in a manner that means you cannot be sure which orientation any tag could be in when passing through a read zone, use a circular polarized antenna or expect that some tags may offer lower signal strength due to their adverse orientation in relation to the antenna.
- The tag incorporates a movement sensor as standard and 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 -10°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 TG801-A 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.

7.2 Attaching the TG801-A for Tracking IT Equipment and Other Assets

7.2.1 Requirements

- TG801-A tag
- 1 adhesive gel pad (& magnet) from a 10-pack TA801 or TA801-AT Attachment Kit

- Glass cleaner
- Clean dry cloth

7.2.2 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.

7.2.3 Arming the anti-tamper (if using the TA801-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.

7.2.4 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.

7.3 Attaching the TG801-A-WM for Tracking IT Equipment and Other Assets

7.3.1 Requirements

The Tag Attachment Kit can be used on its own to attach the TG801-A-WM tag to an asset, or can be used together with screws and rivets. Alternatively, the tag can be attached using just screws or rivets. The requirements below list all possible items you will need.

- TG801-A-WM tag
- 4mm diameter screws or rivets (if required)
- 1 adhesive gel pad (& magnet) from a 10-pack TA801 or TA801-AT Attachment Kit (if required)
 - Glass cleaner
 - Clean dry cloth

7.3.2 Preparation

- Clean an area a little larger than the tag on the asset. Ensure that no dust, oil, grease or residue remains.

7.3.3 Arming the anti-tamper (if using the TA801-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.

7.3.4 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.
- 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.

7.4 Removing the TG801-A or TG801-A-WM

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.

7.4.1 Requirements

- 1 thin, flat instrument or blade, such as a dinner table knife
- Drill or screw driver to remove any rivets or screws used to fix the tag to the asset

7.4.2 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 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 (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.

8 THE TG1800-A ‘WRIST’ TAG

The TG1800-A Wrist tag is specially designed for use on people's wrists for the purpose of personnel tracking or other similar uses, such as patient tracking. The TG1800-A is capable of operating on metallic surfaces (or plastics containing a high metal content), although this type of use is unlikely given the tag's design.

This tag will be available to order in 2009.

An IP67 version of the tag will be available in 2009 – the TG1800-A-IH Wrist IP67 tag for use outdoors or in harsh conditions.



8.1 Important Facts about the Wrist Tag

- The tag is specifically designed to fit a human wrist, but can be attached to curved metal surfaces.
- The tag has a linear polarized antenna. Where all tags will be attached to assets in exactly the same orientation, use linear polarized antennas with the reader, and orientate the reader antenna to obtain the best read range. Where all tags will be attached to assets in a manner that means you cannot be sure which orientation any tag could be in when passing through a read zone, use a circular polarized antenna or expect that some tags may offer lower signal strength due to their adverse orientation in relation to the antenna.
- The tag incorporates a movement sensor as standard and operates in two different modes, the standard operation mode that transmits its data with Status Tx rate; and the movement alert operation mode that transmits with the Alert Tx rate when its movement sensor senses any movement or vibration of the tag.
- The tag is rated to operate in ambient temperatures between -10°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 TG1800-A 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. The tag should not be submerged during use (i.e. in a bath or swimming pool), but can be worn when washing hands or showering.

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.

8.2 Attaching the TG1800-A for Tracking Patients and Other People

8.2.1 Requirements

- An adjustable wrist strap of the user's choice. Examples could be hospital ID straps or any type of plastic, silicon or rubber wrist strap that can fit through the TG1800-A tag's side slots.

8.2.2 Fitment

- Thread the strap up through one of the side slots on the tag, pass the strap over the top of the tag and thread the strap down through the other side slot on the tag.

- Once the strap is fitted to the tag, secure the strap comfortably around the users wrist so that the tag & strap cannot easily rotate around the wrist whilst being worn, but not too tight as to cause discomfort for the wearer.

8.3 Attaching the TG1800-A to Objects for Asset Tracking Systems

8.3.1 Requirements

- An adjustable strap of the user's choice. Examples could be any type of plastic, silicon or rubber wrist strap that can fit through the TG1800-A tag's side slots. Steel or metal straps can be used, but take note of the important instruction below.

8.3.2 Fitment using Non-Metal Straps

- Thread the strap through one of the side slots on the tag, pass the strap either over the top of the tag or underneath it and thread the strap through the other side slot on the tag.
- Once the strap is fitted to the tag, secure the strap tightly around the object so that the tag & strap cannot rotate around the object during use.

8.3.3 Fitment using Steel/Metal Straps

- Thread the strap down through one of the side slots on the tag, pass the strap **underneath** the tag or underneath it and thread the strap up through the other side slot on the tag.
- Once the strap is fitted to the tag, secure the strap tightly around the object so that the tag & strap cannot rotate around the object during use.
- NOTE: Do not pass a metal strap over the top of the tag, this will seriously degrade the RF signal from the tag and reduce the read range considerably, if not entirely.

8.4 Removing the TG1800-A

The tag can be removed from the wrist or asset by either unlocking the strap (if possible) or by cutting the strap.

If the tag is to be re-used by another person, clean and sterilize the tag by wiping it thoroughly using a liquid chemical sterilization solution and follow the instructions for the sterilization solution to ensure complete sterilization of the tag's housing is achieved. Fit the tag to the new user as instructed above, using a new wrist strap.

9 THE TG1810-A ‘MINI ASSET’ TAG

The TG1810-A Mini Asset tag is specially designed for use in asset tagging applications for a diverse array of assets such as laptops, IT equipment, vehicles and transportation media. The TG1810-A is specifically suited for operating on metallic surfaces (or plastics containing a high metal content).

This tag will be available to order in 2009.

An IP67 version of the tag will be available in 2009 – the TG1810-A-IH Mini Asset IP67 tag for use outdoors or in harsh conditions.



9.1 Important Facts about the Mini Asset Tag

- The tag should be installed directly onto metal surfaces to obtain the best read range performance from the tag.
- The tag has a linear polarized antenna. Where all tags will be attached to assets in exactly the same orientation, use linear polarized antennas with the reader, and orientate the reader antenna to obtain the best read range. Where all tags will be attached to assets in a manner that means you cannot be sure which orientation any tag could be in when passing through a read zone, use a circular polarized antenna or expect that some tags may offer lower signal strength due to their adverse orientation in relation to the antenna.
- Attaching the tag to plastic or other non-metal surfaces will reduce the maximum read range the tag can provide. This is because the tag's antenna is designed to be more effective when placed against a metal surface. Please ensure that, especially when the tag is intended to be used with other Wavetrend tags in the system, you can obtain sufficient read range to ensure the system will operate correctly despite the lower signal strength output by this tag when installed on non-metal surfaces.
- The tag incorporates a movement sensor as standard and 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 -10°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 TG1810-A 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.

9.2 Attaching the TG1810-A for Tracking IT Equipments and Other Assets

9.2.1 Requirements

- TG1810-A tag
- 1 adhesive gel pad (& magnet) from a 10-pack TA1810 or TA1810-AT Attachment Kit
- Glass cleaner
- Clean dry cloth
- Alternately, a tie strap (max. 5mm width) can be used to attach the tag to the asset by using the slot provided at the top of the tag.

9.2.2 Preparation (when using the Tag Attachment Kit)

- 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.

9.2.3 Arming the anti-tamper (if using the TA1810-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.

9.2.4 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.

9.3 Removing the TG1810-A

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.

9.3.1 Requirements

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

9.3.2 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 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. STANDARD SPECIFICATIONS & CERTIFICATIONS

Standard Tag Specifications

The standard specifications applicable to the ActivDuo tag range are shown in the table alongside.

Product Information sheets on all Wavetrend products are available for download from the company website:


WWW.WAVETREND.NET

IPR Statement

The products described in this document are protected by various patents held by Wavetrend. Refer to the URL www.wavetrend.net/IPR for information on all patents and trademarks held, and for Wavetrend's Policy on Intellectual Property Rights.

Environmental	
Operating temperature	: -10°C to +60°C
Storage temperature	: -20°C to +70°C
Humidity	: 5% to 90% (non-condensing)
Physical	
Please refer the individual tag data sheets.	
Radio Frequency	
Transmit Frequency	: 433.92 MHz
Power Output	: 72dBµV/m @3m, 4300 µV/m
Modulation	: ASK
Bandwidth	: 1 MHz
Stability	: SAW Stabilized
Range	: 1 to 50+ meters (actual range is determined by the choice of reader & antenna used to detect the tag and the environment it is used in)
Electrical	
Power	: Internally powered by lithium battery
Accessories	
(All sold in packs of 10)	
TA***	: Tag attachment kit
TA***-AT	: Tag attachment kit with Anti-Tamper

Regulatory Certifications for the ActivDuo Tags:

Regulatory Authority	Details
RoHS (2002/95/EC)	All tags comply with the Restriction of Hazardous Substances Directive (RoHS)
	APPLICABLE TO ALL ACTIVDUO TAGS DESCRIBED IN THIS DOCUMENT:
	This device is currently in the certification process for FCC approval under Part 15.209 & 15.231 Part (a) and (e) of the FCC Rules
	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
	The user is cautioned that changes or modifications to this product that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Copyright © 2008 Wavetrend Technologies Limited. All Rights Reserved. Wavetrend and the Wavetrend logo are either registered trademarks or trademarks of Wavetrend Technologies Limited in the United States and/or other countries. All other trademarks are the property of their respective owners.

APPENDIX B. DOCUMENT INFORMATION

AMENDMENT HISTORY

Issue	Date	Amendment Details	Amended By
0.1	22 May 2008	Final Draft Compiled	Yuri Guest
0.2	22 May 2008	Final Draft Reviewed, minor edits	Warren Scott
0.3	16 June 2008	Some abbreviations were added 1.1.2 Key Features were edited TG801 was added	Yuri Guest
0.4	15 July 2008	Pictures were added	Yuri Guest
0.6	1 December 2008	Updates to all sections	Warren Scott
0.7	2 December 2008	Completed Draft Prepared	Warren Scott
0.8	3 December 2008	Final Updates	Warren Scott

Table 5: Amendment History

APPROVALS

Number	Name	Designation	Date	Signature
1.	Edward Gonsalves	SVP Product Development		
2.	Des Reddy	Product Manager		
3.	Warren Scott	Product Marketing Manager		
4.				
5.				

Table 6: Approvals

REFERENCED DOCUMENTS

Number	Title	Document Number	Rev	Source
1.				
2.				
3.				
4.				
5.				

Table 7: Referenced Documents