

MarkTag MeM
Read/Only ID-Tag
Part. No. 124000



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MarkTag MeM

is a small versatile battery-assisted passive (BAP) 2.45 GHz RFID tag characterized by a long read-range and a wide tag-antenna lobe. A wide tag-antenna lobe makes the actual tag-orientation versus the reader less critical.

Each tag is permanently programmed with an 8 digit decimal "mark". Every TagMaster "mark" is unique and can only appear on one single tag.

The programmed code includes a 32 bit checksum for automatic "mark" authentication. The patented pre-programmed tag checksum eliminates any "mark" reading errors even if the tag is far away or if several tags are present in the same reading zone.

A lithium energy cell gives a long predictable life independent from the number of times the tag is read. If the capacity is about to run out after several years of operating life, a status bit is set to give the user a warning via the Reader. When the status bit is set, the tag will continue to function for about six months before it runs out of energy.

MarkTag MeM can easily be fitted to and removed from a special transparent tag-holder, the WinFix™ MeM. A spring-clip can also be attached creating a flexible keyfob-tag. Another accessory can fix the tag to your clothing or to a particular strap or band. For permanent attachment a suitable adhesive can always be used.

The design is vibration resistant, weatherproof, and UV stable. The front side is made from a polymer that can be printed according to user requirements. The back side, which is darker, carries a type-label and a serial No. label is attached to side of the tag. Please note that any front side sticker or label must be non-metallic.



Tag in it's holder for wind-shield or dash-board



Keyfob Tag with a spring-clip

Read- range

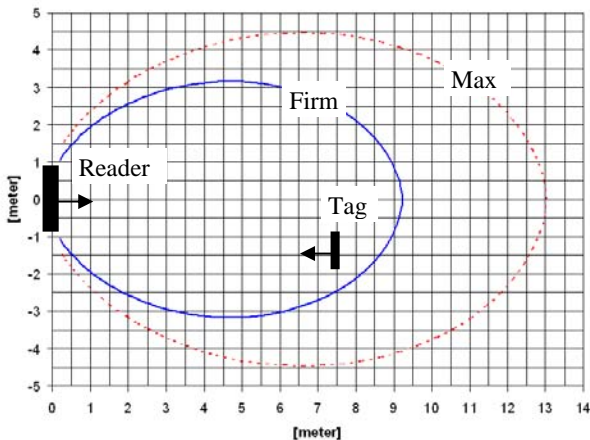
MarkTag MeM receives and reflects its signals through the front panel. The read-range is defined by a number of factors such as the positioning of the reader and the tag. The read-range also depends on the reader model and settings as well as the environment.

Any excess read-range can easily be reduced by setting the LR-reader's *Readlevel*. If the *Readlevel* function is used, very accurate identification-lobes can be defined as well as minimizing the difference between the firm and the maximum read-range.

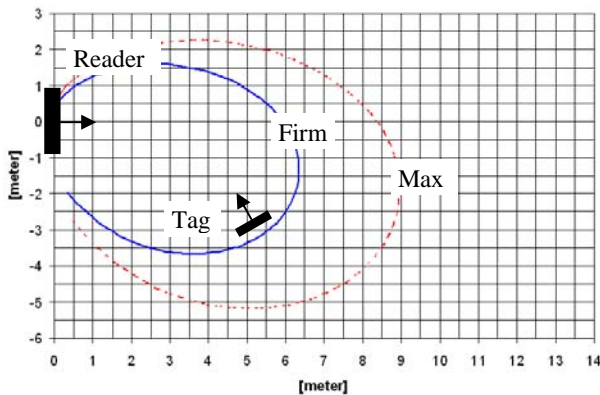
Due to the wide ID-tag antenna lobe the positioning of the tag is not very critical. For shorter distances the tag can be identified even at tag-tilt-angles close to 90° vs. the direction to the reader

Read-range cont...

The ID-tag will be read at any distance from the reader up to the maximum reading distance. The firm read-range shown in the identification-lobe diagrams below indicates the typical read-range for near 100% reading-probability in an ideal environment using the LR-6 reader at 10mW (EIRP). The max read-range below represents the 0% reading-probability.



Typical identification lobes for LR-6 at 0° Tag-tilt



Typical identification lobes for LR-6 at 60° Tag-tilt

The diagrams show typical MarkTag MeM read-range properties for an average of all available frequency channels in an ideal environment. Other readers in the LR-3/LR-6 family provide different average firm read-ranges from 5 up to 14 meters.

The MarkTag MeM is primarily intended for the LR-series readers but other TagMaster readers can also be used. The typical MarkTag MeM premium read-range as shown in the identification-lobe example above, can only be achieved using LR-readers. It should be mentioned however, that the benefit of the wide tag-antenna lobe is valid for all different readers.

MarkTag MeM mounting

To obtain the read-ranges according to the identification-lobes shown in the last section there are a few restrictions to observe.

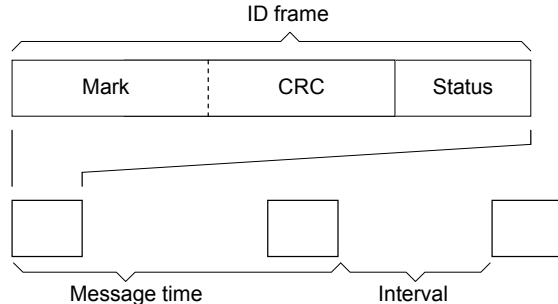
If the tag is fixed to a metal surface in parallel with the tag, the distance from the bottom of the package to the metal surface shall be between 10 and 40 mm. Just a strip of metal has a limited effect and if there is a substantial angle between the bottom of the package and the metal surface, no restrictions apply.

If the tag is carried close to the human body a 10mm distance is sufficient to obtain the full read-range. If the tag is carried closer to the human body the read-range will be reduced up to 30 – 40%. This read-range will however also be sufficient for most indoor and outdoor RFID installations for personal access or positioning systems.

If the tag is fixed to a high permittivity (ϵ_r) material like glass towards the front side of the tag, the special wind-screen holder should be used, which positions the tag at a minimum 5mm from the glass.

Communication

The ID-tag will supply the tag information to any interrogating TagMaster Reader set to any frequency (channel) within the frequency band. If different Readers are set for different channels and simultaneously illuminate the tag, the tag will be safely read by all of these without interference.

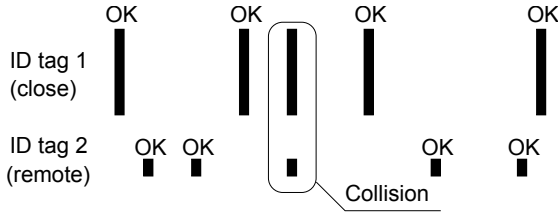


An ID-frame comprises the factory coded "mark" from the R/O memory, a 32 bit CRC checksum and a "status" field. The ID-frame is reflected from the tag at random intervals.

An interval plus leading and trailing ID-frames is called a "Message time". The "Message time", i.e. the longest time required for a complete ID-frame to be read, is always less than 150 ms. The average time is however only 80 ms which means that a tag is read 12 times every second.

Multiple tag operation

Since the MarkTag MeM emits its ID-frames at random intervals, it is possible to read several tags at the same time as is shown on the picture below:



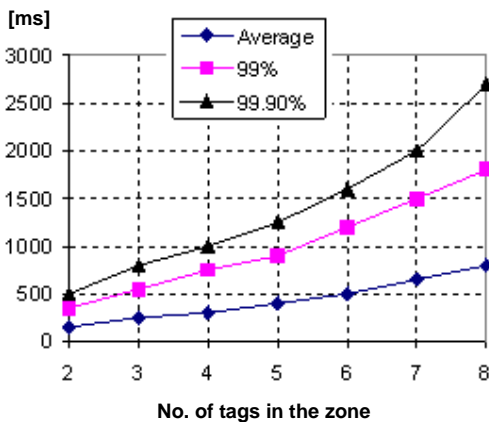
When collisions occur the checksum algorithm in the Reader will cancel any erroneous “ID-mark” readings. In the example above however, the “ID tag1” will be correctly identified, since the tag is more close to the reader.

In a worst case situation, e.g. if all tags would be remote and close to the read-range limit, or subject to strong interference, the likelihood for a reading error (wrong interpretation) is less than one in 5-E+9 (5 000 000 000) readings thanks to the 32 bit CRC checksum.

This means that in all practical cases the TagMaster reader will always provide the correct “ID-mark”.

The time required to read multiple tags within a zone is shown below.

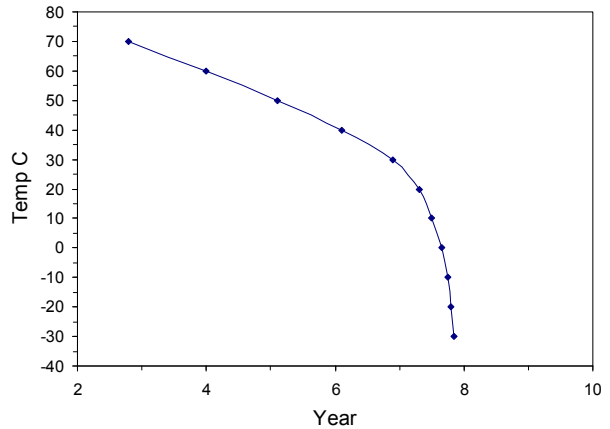
<u>Tags in the zone</u>	Average (ms)	99% (ms)	99,9% (ms)
2 tags	150	350	500
3 tags	250	550	800
4 tags	300	750	1000
5 tags	400	900	1250
6 tags	500	1200	1600
7 tags	650	1500	2000
8 tags	800	1800	2700



Tag life

TagMaster have an excellent tag endurance experience for their semi-passive tags since 1995. The lithium cell is specified for high temperature operation, such as when the tag is installed in a car window. The operating temperature is the key to predict the operating life of the tag. The typical tag life performance for different constant temperatures can be found in the diagram below.

Theoretical battery-life vs. constant temperature for the 124000 MarkTag MeM

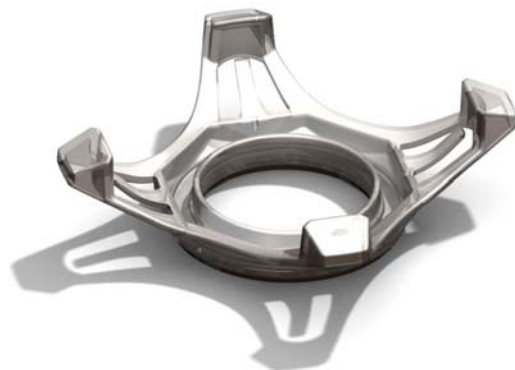


The diagram do not represent the tag life in terms of average temperature. To be able to predict the operational life of a tag the duration in different temperatures has to be known.

The tag holder

The special WinFix™ MeM tag holder is attached to the mounting surface by a ring of flexible adhesive tape fixed to the rear side of the holder. The tag is snapped into the holder and then easily turned loose. The round area within the bottom of the holder is available for the customer for the attachment of a thin piece of printed plastic material.

Please refer to the WinFix™ MeM tag holder documentation for more information



Security

For security reasons, the serial number (s/n) which is printed on the tag has no relation to the 8 digit decimal electronic "mark" stored in the memory of the tag. Both are running numbers that are never repeated. The "mark" is unique and is set at the semiconductor manufacturing level and can not be changed. The s/n and "mark" information is only supplied to the specific customer.

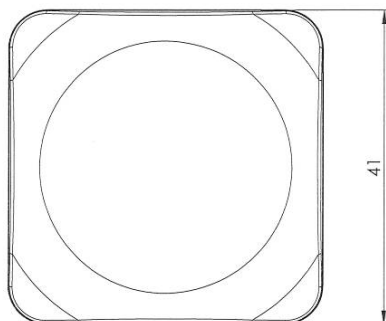
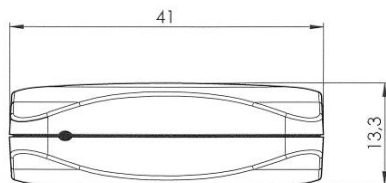
Communication range data

Reader	Firm Read-range [meter]
LR-3	Up to 5.5
LR-6	Up to 9.5
LR-6 (opt. PL1 25mW)	Up to 11.5
LR-6 XL	Up to 13

Mechanical data

Weight	13 grams
Front colour	Light grey
Back colour	Dark grey
Encapsulation	Polymer
Assembly method	Ultra-Sonic welding

Outline drawing



Environmental data

Operating temperature	-20° ... +70°
Storage temperature	-40° ... +85°
Ingress protection	IP 54
Immunity	According to CE
Emission	According to CE

Certifications

All MarkTag MeM tag versions are CE approved

Order information

Item	Part No
MarkTag MeM	124000
WinFix™ MeM	193800
Spring Clip MeM	193900