

S1450 ScriptTag HD

Heavy Duty R/W Tag



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ScriptTag HD S1450 is a 2.45 GHz R/W tag for heavy duty and industrial use. It is specially designed for tough environments and high temperatures. Typical applications are indoors in heavy industry or outdoors mounted on sea containers, trains, trams, buses, trucks and lorries.

ScriptTag HD is mounted on any surface with M4 screws.

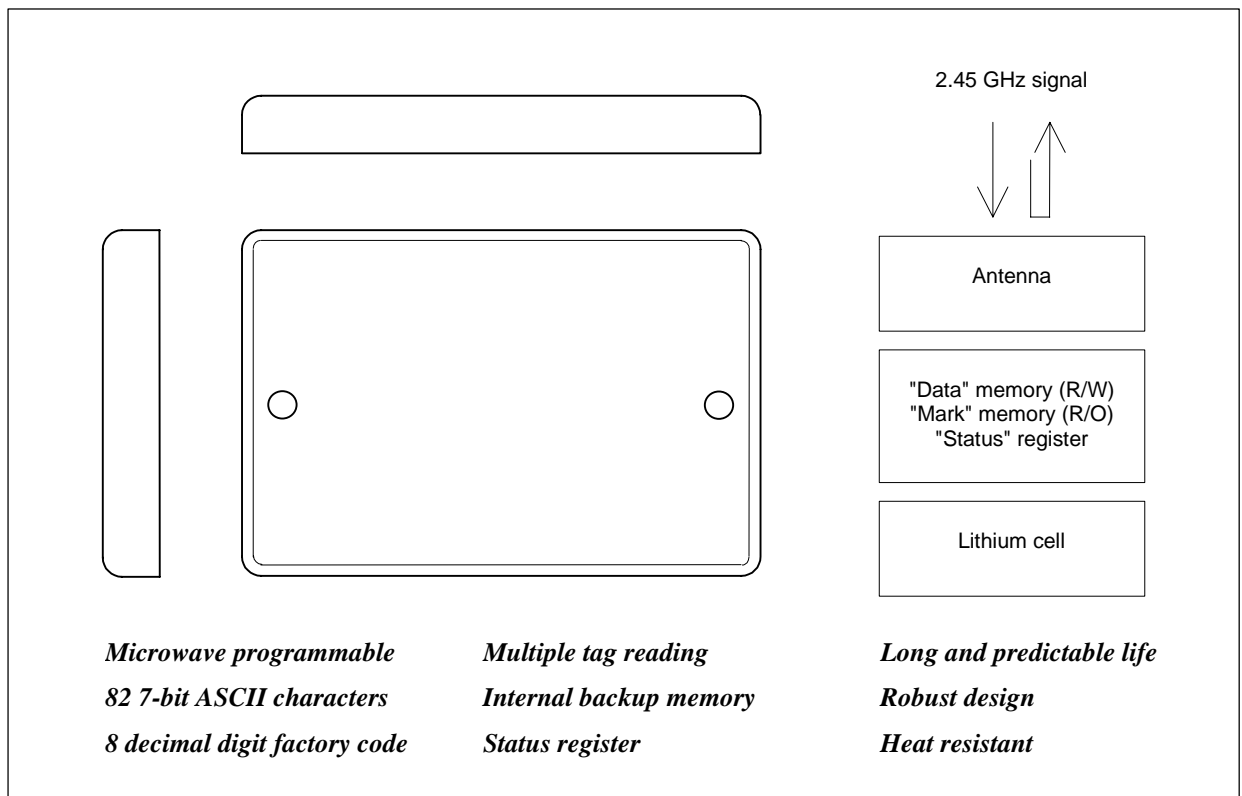
It is communicated via the microwaves and stores 606 bits including a 32 bit checksum, e.g. as 82 7-bit ASCII characters. A factory coded 8 decimal digit "mark" and a separate 32 bit checksum give the tag a unique and substitution safe identity.

The tag can be formatted via the microwaves into different operating modes regarding memory size, response interval/type and data speed.

A status register for memory and lithium cell monitoring is included. If ScriptTag HD exits the write zone during programming, a "failed write" bit is set to warn the user that an unsuccessful write attempt has occurred and the old data is restored from a backup memory.

Environmentally harmless lithium cell powering gives long reading range, high reading speed and multitag possibility. The cell life is related to into which mode ScriptTag HD has been formatted, but is independent from how often it is read as well as from exposure to electrically noisy environments. When the capacity is about to run out, the status register warns via a "battery low" bit.

The design is vibration resistant, watertight, corrosion free, UV stable and withstands chemicals. The front side can be printed according to user requirements. The rear side label is printed with type code and serial number.



Reading range

ScriptTag HD S1450 receives/reflects its signals through the front panel and rejects signals in the back direction. The maximum reading range is defined by a number of factors, all resulting in R parameters for the tag and communicator. Multiply these factors and the resulting reading range in meters is found.

Example: The $R_{1450, \text{low speed}}$ for S1450 is 1.5 m (4.92 Ft) and the R_{1500} for the S1500 communicator is 2.7, resulting in a reading range R of $1.5 (4.92) * 2.7 = 4.0 \text{ m (13.2 Ft)}$.

The tag reads at all distances from the maximum reading distance down to zero. The maximum reading range can be reduced by power and sensitivity setting commands in the communicator.

Writing range

A detection circuit forwards write signals from the communicator to the tag memory. The writing range is defined by a number of factors, all resulting in W parameters for the tag and the communicator. Multiply these to find the resulting writing range in meters.

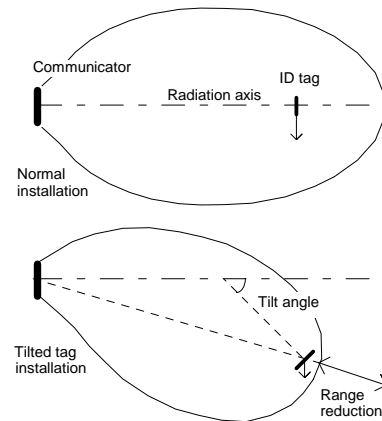
Example: The W_{1450} for S1450 is 0.5 m (1.64 Ft) and the W_{1500} for the S1500 communicator is 1.0, resulting in a writing range W of $0.5 (1.64) * 1.0 = 0.5 \text{ m (1.64 Ft)}$.

The tag writes at all distances from the maximum writing distance down to zero.

Lobe shape

The typical lobe shape is found in the communicator's data sheet. Usually the communicators have circular polarisation, making reading and writing unaffected by tag rotation around the radiation axis. The lobe is unaffected if ScriptTag HD S1450 is mounted on a metal surface, and non metallic materials in front of the tag usually have little effect on the range.

If the tag is very tilted in relation to the radiation axis, the lobe is "squinted" in direction to the position where the tag faces the communicator. See figure:

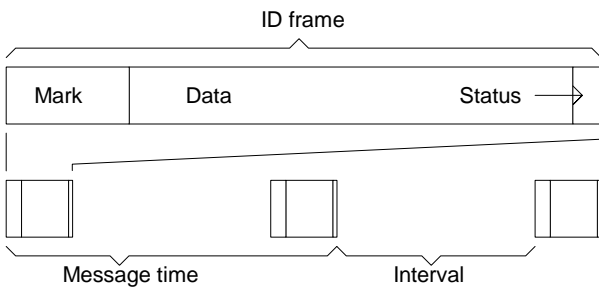


Communication

ScriptTag HD S1450 repeatedly reflects data to any Confident communicator, regardless of which frequency in the operational band 2.435 - 2.465 GHz that is used. If communicators at different frequencies illuminate the tag, it can be read by all of these.

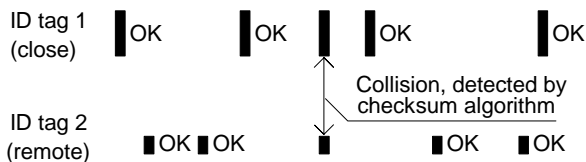
If more than 4 tags are expected in the zone, it may be appropriate to set the tag to longer intervals. The figures above assumes that the tag is formatted to MR4H, i.e. mini memory, random interval 4 and high speed (see chapter *Operating modes* for definitions).

The reflected data comprises a factory coded "mark" from the permanent R/O memory, "data" from the R/W memory and a "status" field. A "mark"+"data"+"status" sequence is called an "ID frame".



The ID frame is given with constant or random intervals, as formatted. Two subsequent ID frames with an interval in between is called a "message time".

When ScriptTag HD S1450 is set to a random interval mode, it is possible to read multiple tags in the lobe:



When collisions occur, a checksum algorithm in the communicator cancels these ID frames. In a worst case situation, e.g. if all tags would be at the range limit, the likelihood for a substitution error (wrong interpretation) is less than one in $5 \cdot 10^9$ read tags thanks to the 32 bit checksum.

The time to read all tags in the zone is shown below.

	Average Comfort	Safe
	99%	99,9%
<u>Tags in the zone</u>	(ms)	(ms)
2 tags	200	800
3 tags	350	1400
4 tags	500	2000

Operating modes

The tag can be set to different operating modes by microwave write commands. Parameters affected are memory size, interval type, interval length and data speed.

Memory modes

M-mini 46 bits, e.g. 4 digits + check

Q-quarter 186 bits, e.g. 22 ASCII (7 bit) + check

F-full 606 bits, e.g. 82 ASCII (7 bit) + check

Interval type modes

C-constant i.e. interval is constant between ID frames

R-random i.e. interval is varying randomly

Interval length modes

0-zero i.e. continuous

4-small i.e. 4 times the ID frame time

8-medium i.e. 8 times the ID frame time

Data speed modes

L-low reading 4 kbps, writing 4 kbps

H-high reading 16 kbps, writing 4 kbps

Modes are designated MC0L, MR4H, FC0H etc., and are possible in all combinations. Interval 16 can also be used. A short guide to how the mode setting optimises each situation is given below.

Formatting

Memory modes
speed

Interval type/length
life

Data speed

Optimises

Storage space vs

Speed and multiplicity vs

Reading range vs speed

Tag reading

The table shows the max message time (Tmm), i.e. the time for two ID frames and an interval. It also shows the cell life at room temperature in low data speed mode. The cell life is independent from how often the tag is read or written and the tag can be stored up to 2000 hours at 85°C (185°Fh) with less than 10% reduction in the cell life as specified below.

	Tmm at speed		Cell life (years)
	High (ms)	Low (ms)	
<u>Mini memory</u>			
MC0-H/L	50	130	6
MC4-H/L	100	360	6
MC8-H/L	170	660	10
MR4-H/L	170	660	9
<u>Quarter memory</u>			
QC0-H/L	70	240	6
QC4-H/L	180	700	9
QC8-H/L	350		10
QR4-H/L	350	1300	9
<u>Full memory</u>			
FC0-H/L	140	520	6
FC4-H/L	370	1400	9
FC8-H/L	750		10
FR4-H/L	750		10

Tag writing

The writing time depends on the tag operating mode and a statistical time distribution. For manual processes, where the user is given a "write complete" signal by a buzzer, LED or the like, two levels are specified; "average" and "comfort". The later defines a time frame within which it is guaranteed that the writing is completed in more than 99 % of the cases.

For processes where waiting cannot be arranged, a high security level, "factory", is specified. This level defines a write security of min 99,999 % (1:100.000).

Some fields are left blank to indicate that the mode normally is too slow, and therefore not recommended.

High speed Average Comfort Factory

	(ms)	99%	99,999%
<u>Mini memory</u>		(ms)	(ms)
MC0H	200	300	600
MC4H	300	400	800
MC8H	300	900	2100
MR4H	300	900	2100
<u>Quarter memory</u>			
QC0H	300	400	800
QC4H	500	1000	2300
QC8H	500	1900	4800
QR4H	500	1800	4500

Full memory

FC0H	400	1300	3000
FC4H	800	2600	6000
FC8H	1700		
FR4H	1300		

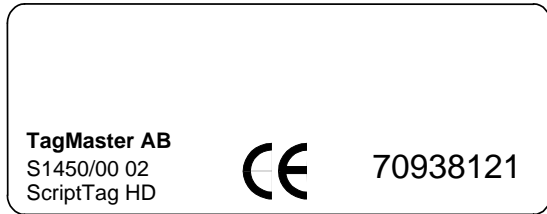
Low speed Average Comfort Factory

	(ms)	99%	99,999%
<u>Mini memory</u>	(ms)	(ms)	(ms)
MC0L	300	600	1400
MC4L	500	1200	2800
MC8L	900	2600	6000
MR4L	800	2700	
<u>Quarter memory</u>			
QC0L	500	1300	2900
QC4L	1000	2900	
QC8L	2400		
QR4L	1800		
<u>Full memory</u>			
FC0L	1100	3200	
FC4L	2500		
FC8L			
FR4L			

A backup function is provided to handle the case when the tag by accident is taken out from the write zone while it receives data via the microwaves. Then the old data is automatically restored from the tag backup memory, and a "failed write" flag is set in the status register to give automatic warning to the user system.

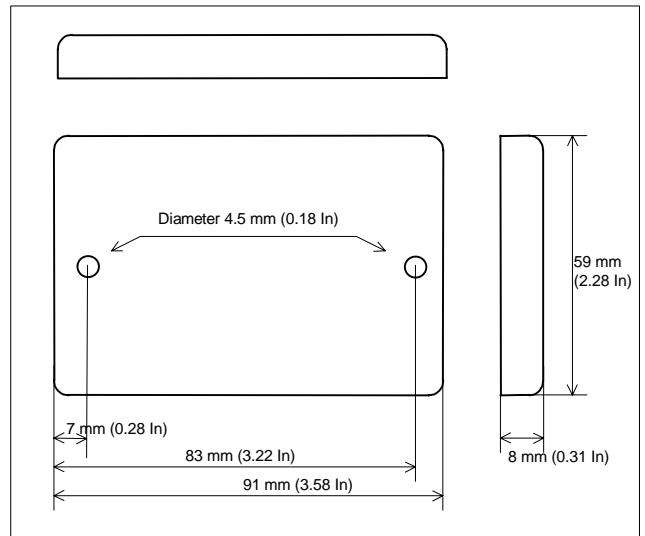
Mechanical data

Product information according to the figure below is printed on the ScriptTag HD rear side label.



For security reasons, there is no relation between the serial number and the 8 digit electronic "mark". Both are running numbers that never are repeated.

The revision code is for internal use only.



Weight (2.12 Oz) 60 grams
 Casing colour Black
 Casing material Polymer
 Label material, rear Polyester

Communication range data

Reading range parameter:	$R_{low\ speed}$	1.5 m (4.92 Ft)	(4.0m (13.11 Ft) with S1500 and S1501, 6.0m (19.67 Ft with S1503)
	$R_{high\ speed}$	1.0 m (3.28 Ft)	(2.7m (8.85 Ft) with S1500 and S1501, 4.0m (13.11 Ft) with S1503)
Writing range parameter:	W	Min: 0.25 m (0.82 Ft) Typ: 0.5 m (1.64 Ft)	(minimum 0.25m (0.82 Ft) with S1500, S1501 and S1503)

The interpretation of the R and W parameters are described in the Communicator data sheets S1500, S1501 and S1503.

Environmental data

Cold IEC68-2-1 Ad	-40°C(-40°Fh)	Bump Oz) 6 ms, IEC68-2-29 Eb	40 g (1.41 1000x 3 dir	Chemical Resistance: Oil, grease Resistant Petrol Resistant Triclorethylene Resistant Acid Resistant Alkali (bases) Resistant
Heat IEC68-2-2 Bd	+85°C(+185°Fh)	Vibration Oz)	10-500Hz,5g(0.18	
Sealing IEC529	IP 67	IEC68-2-6Fc	10 sweeps x3dir	
Shock (17.64 Oz)1 ms, IEC68-2-27 Ea	500 3 x 3 dir	g	Solar radiation 1120 W/sqm (1.04 W/sqFt) IEC68-2-5 Sa C 56 days Immunity Acc. to CE leg. prETS 300 683 Emission Acc. to CE leg. I-ETS 300 440	

Options

The ordering code of the product in this data sheet is "ScriptTag HD S1450/00".