

SIM

Technical
Documentation

TELE2



INTERNET OF THINGS

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1. Introduction

When selecting the robustness class of your SIM card, there are a number of things to consider. This fact sheet assists in these decisions by providing information regarding how the SIM card's lifetime expectancy is defined and how it can be affected by the application.

2. SIM Card Lifetime Expectancy Parameters

SIM cards have a limited lifetime physical memory. Providers of memory typically use two parameters to indicate the performance of the product:

- Maximum write/erase cycles
- Data retention

1.1 Maximum write/erase cycles

The maximum write/erase cycles define the expected number of erase/write cycles on each memory cell. Each time there is a write/erase it wears down the memory cell until it is not able to store any information.

The typical memory cell lasts from 100 thousand to one million write/erase cycles. In order to increase the lifetime of the SIM card, some models use special functions, such as evenly spreading the write/erase cycles across the memory cells.

1.2 Data retention

The data retention parameter indicates how long the memory cell will hold information and assumes the SIM card is used in certain operating conditions. If the given operating conditions are exceeded, the data retention lifetime of the SIM card will be reduced. Some examples include corrosive environments, removing the SIM card frequently, high frequency write/erase cycles, and operating outside – or constantly on the extreme edges – of given temperature ranges.

3. SIM Card write/erase Cycles

What can cause write/erase cycles:

1. Network attach/detach (note that this happens when changing between roaming networks)
2. Re-authentication to network (can be caused by the network and differ between different roaming networks)
3. Power-cycling the device

4. Sample Calculations

In the table below “Expected Lifetime”, Tele2 IoT has calculated the expected lifetime for a Tele2 IoT commercial-grade SIM card with maximum write/erase cycles (500,000) based on the number of write/erase cycles that the application and network cause per day.

Write/Erase Cycles Per Day	Expected Lifetime (Years)
1	1370
5	274
10	137
20	68
40	34
80	17
160	9

Table Expected Lifetime based on write/erase cycles per day

5. Application Optimization

Before distributing a large number of SIM cards, Tele2 IoT recommends customers validate the SIM cards' lifetime expectancy in accordance with their application. This should be done both on a theoretical level (by estimating the number of write/erase cycles per day) and on a practical level (measuring the performance.)

Note that the actual performance might differ due to local network conditions. Having sufficient margins is important, as changing SIM cards already in operation could be costly.

6. Tele2 IoT SIM Cards

Tele2 IoT supplies SIM cards that are customized for IoT in two form factor classes: 1) plug-in, and 2) embedded. They also are offered in two different robustness classes: 1) M2M commercial, and 2) M2M Premium industrial. For further information please see the tables below.

6.1 Commercial SIM

	PLUG-IN STANDARD SIM	PLUG-IN MICRO SIM	PLUG-IN NANO SIM
Form factor	2FF	3FF	4FF
Dimensions	25mm x 15mm	15mm x 12mm	12,3mm x 8,8mm
Environment	Normal conditions	Normal conditions	Normal conditions
Operational temperature	-25° C to +85° C	-25° C to +85° C	-25° C to +85° C
Anti-corrosion	No	No	No
Endurance	Minimum 500 000 write/erase cycles	Minimum 500 000 write/erase cycles	Minimum 500 000 write/erase cycles
Data retention time	10 Years	10 Years	10 Years
Vibration standard	No	No	No
Package	*50 pcs, 1 Box, W 89 mm x D 58 mm x H 50 mm *500 pcs, 1 Box (50*10), W 270 mm x D 100 mm x H 123 mm *2500 pcs, 1 Box (50*50) W 557 mm x D 518 mm x H 67 mm	*50 pcs, 1 Box, W 89 mm x D 58 mm x H 50 mm *500 pcs, 1 Box (50*10), W 270 mm x D 100 mm x H 123 mm *2500 pcs, 1 Box (50*50) W 557 mm x D 518 mm x H 67 mm	*50 pcs, 1 Box, W 89 mm x D 58 mm x H 50 mm *500 pcs, 1 Box (50*10), W 270 mm x D 100 mm x H 123 mm *2500 pcs, 1 Box (50*50) W 557 mm x D 518 mm x H 67 mm
Typical application	Indoor applications, such as simple home alarms, indoor utility meters	Indoor applications, such as simple home alarms, indoor utility meters	Indoor applications, such as simple home alarms, indoor utility meters

6.2 Premium Industrial SIM

	PLUG-IN STANDARD SIM	PLUG-IN MICRO SIM	EMBEDDED SIM
Form factor	2FF	3FF	MFF2
Dimensions	25mm x 15mm	15mm x 12mm	6mm x 5mm
Environment	Extreme conditions	Extreme conditions	Extreme conditions
Operational temperature	-40° C to +105° C	-40° C to +105° C	-40° C to +105° C
Anti-corrosion	Salt atmosphere	Salt atmosphere	Salt Atmosphere Test is not applicable while package is being soldered on PCB
Endurance	Minimum 4 200 000 write/erase cycles	Minimum 4 200 000 write/erase	Minimum 4 200 000 write/erase cycles
Data retention time	10 years +	10 years +	10 years +
Vibration standard	Automotive shock	Automotive shock	Automotive shock
Package	*50 pcs, 1 Box, W 89 mm x D 58 mm x H 50 mm *500 pcs, 1 Box (50*10), W 270 mm x D 100 mm x H 123 mm *2500 pcs, 1 Box (50*50) W 557 mm x D 518 mm x H 67 mm	*50 pcs, 1 Box, W 89 mm x D 58 mm x H 50 mm *500 pcs, 1 Box (50*10), W 270 mm x D 100 mm x H 123 mm *2500 pcs, 1 Box (50*50) W 557 mm x D 518 mm x H 67 mm	100, 500, 1000 OR 3000 13 INC REEL 1 Box, W 215 mm x 195 mm x 55 mm
Typical application	Industrial telematics applications with large number of network changes, high bandwidth, and industry applications	Industrial telematics applications with large number of network changes, high bandwidth, and industry applications	Industrial telematics applications with large number of network changes, high bandwidth, and industry applications

¹Storage conditions: Air 5-40 C, relative humidity <90% and shelf-lifetime max 12 months in reference to delivery date.



Tele2 IoT



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