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WHITE PAPER
ON
T4Science
MASER MTBF

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SUMMARY

INTRODUCTION

FIELD MTBF OF THE iMASER PRODUCT

This document describes the process of computing the field mean time between failures (MTBF) of deployed iMaser models (Products) from T4Science (T4S). The table below lists the Products by model and year of deployment, and the total years of operation of all the combined Products.

MTBF	S/N	Year of delivery	age
	17	1996	17
	18	1997	16
	19	1997	16
	20	1997	16
	21	1998	15
	22	2002	11
	23	2001	12
	24	2001	12
	25	2001	12
	26	2001	12
	27	2002	11
	28	2003	10
	29	2004	9
	30	2004	9
	31	2006	7
	32	2006	7
	33	2007	6
	34	2007	6
	38	2006	7
	39	2006	7
	40	2007	6
	41	2007	6
	42	2007	6
	45	2007	6
	46	2009	4
	47	2009	4
	48	2008	5
	49	2008	5
	50	2008	5
	51	2008	5
	52	2009	4
	53	2009	4
	54	2009	4
	55	2009	4
	56	2009	4
	57	2010	3
	58	2010	3
	59	2011	2
	60	2010	3
	61	2011	2
	62	2011	2
	63	2011	2
	64	2011	2
	65	2011	2
	66	2010	3
	67	2011	2
	68	2012	1
	69	2011	2
	70	2012	1
	71	2012	1
	72	2012	1
	73	2012	1
	74	2013	0
	75	2013	0

	76	2012	1
	77	2013	0
	78	2012	1
SUM			325

The number reported and repaired failures of products iMaser according to T4S' quality control procedure are 16, thereby the computed field MTBF 20 years over 321 years of cumulative continuous operation time. .

Note

The Products should be equipped with a UPS backup unit to prevent power outages. The new generation of Products has an IP monitoring capability. By analyzing the report, predictive maintenance can be operated before an eventual failure.

REMARKS

Most of the current issues were due to electronics modules.

As we have spare parts "ready to deliver" in our stock in Neuchatel Factory, the mean time to repair is influence by the delay to organize the maintenance and the accessibility of the site. More than 90% of the case were solved, repair and the maser in operation within 15 days.

Please note that in case of local spare part module and local trained technician, the time to repair will decrease regarding of standard maintenance.

CONCLUSIONS

Maser are designed and realized with the best materials and processes to be operative for the longer possible period. The performance and lifetime are very important for us. To minimize the influence of the external environment our products are compliant with the most stringent certifications of CE and ISO 17025 norms.

All our masers units have been successfully repaired and are all continuously operating.

Under stable environment and with regular preventive maintenance, the Neuchatel Maser equipments can operate more than 30 years and keep the highest stability of the market. As example, the serial number 1 is still on operation in Wettzell station, Germany since 1980.



About Us

Founded in 2006 in Neuchatel, Switzerland, T4Science is a leading designer and manufacturer of a full range of advanced, cost-effective and high-performance maser clock solutions. Its products are used in a wide variety of scientific applications and in the time and frequency industry.

The company acquired the active maser technology and product from the Observatory of Neuchatel through a joint-venture of seasoned industry experts to capture the fast-growing maser clock market. It's a combined partnership of European & Swiss companies, all serving the time and frequency industry.

Products

The **iMaser™** is a high-performance, compact active hydrogen maser. It features advanced phase noise and short term stability for high-precision applications.



Key Features

Stability (Allan Deviation)

1s	9E-14
10s	2E-14
100s	5E-15
1'000s	2E-15
10'000s & floor	2E-15

Phase Noise (5MHz)

-130dBc @1Hz

Custom iMaser™ is a customized active hydrogen maser, in which certain components are adapted or changed and the system is optimized to meet specific applications and customer requirements. This production meet the **CE** standard :

EN 55022 class B, EN 55024 and EN 61326-1

Services

We offer a complete set of first-class services over the product lifecycle for total customer satisfaction. These services, though not limited, include the following:

Supply & Installation

Training

Remote & On-Site Maintenance

On-Site Support

On-Demand Services

Contact Us

Please feel free to contact us for any request or questions you may have.

