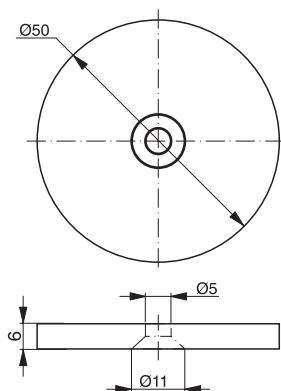
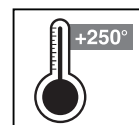


HF RFID SYSTEM TRANSPONDER RTP-0502-062

HOUSING	MEMORY SIZE	MOUNTING		
Ø50 mm	2048 Bytes	Non-embeddable	✓ Ultra high temperature HF transponder ✓ Housing with hole for fixing screw	✓ Insensitive to dirt ✓ Large usable memory ✓ Silicone free solution ✓ FRAM technology



GENERAL DATA

Type of integrated circuit	FUJITSU MB89R118C
Carrier frequency	13.56 MHz
Compatible standard	ISO 15693 / ISO 18000-3 (Partly not supported. refer to section NOTE ON USING MB89R118C)
Maximum transmission speed	53 kbit/s if fast custom commands are used, 26.5 kbit/s otherwise
Memory type	FRAM
Memory size	2 kBytes
Read-write distance max.	42 mm with RLS-1303-020 & 10mm spacer

MEMORY INFORMATION

Organization	256 blocks x 8 Bytes
User memory (R/W)	250 blocks, 2000 Bytes
Configuration memory	6 blocks, 48 Bytes
Unique identifier	8 Bytes
Data retention period (< 55 °C)	> 30 years
Number of "write" cycles	10 ¹²
Number of "read" cycles	unlimited

MECHANICAL DATA

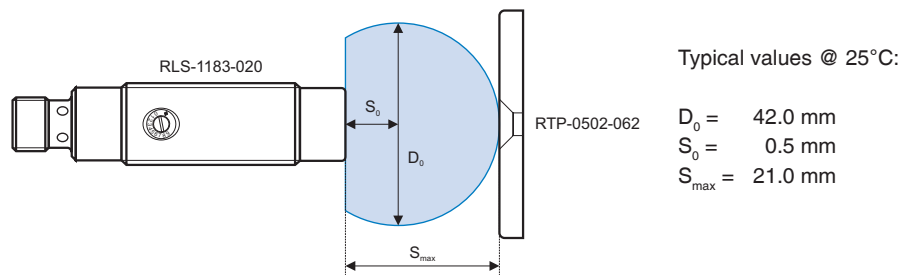
Protection degree	IP68 & IP69K
Ambient temperature range TA*	-25...+150 °C
Storage temperature range TS**	-40...+250 °C
Thermal cycling reliability @ 250 °C	1000 cycles / 1000 hours
Housing material	LCP (Liquid Crystal Polymer)
Weight	16.9 g
Tightening torque	max. 1 Nm

* Read/write operations possible

** Data retention and mechanical stability limit

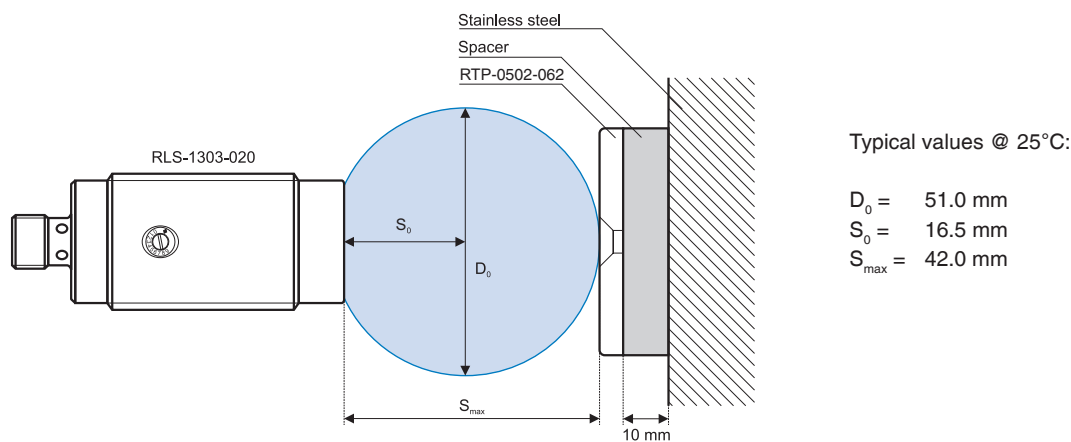
OPERATING ZONE

The operating area is highly dependent on the environment.



ENLARGEMENT OF THE OPERATING AREA

The operating area is highly dependent on the environment.



MEMORY OF TRANSPONDERS

The FRAM has a memory capacity of 16384 bits and is divided in two areas. One user area of 250 blocks and one system area of 6 blocks, that means a total of 256 blocks of 8 bytes each. The block is the smallest unit used to read and write the FRAM memory.

FRAM memory configuration

Area	Block No.	Details	Read Access	Write Access
User memory (2000 bytes)	00_h to $F9_h$	User memory	✓	✓
	FA_h	UID (64 bits)	Inv. Cmd	✗
	FB_h	AFI, DSFID, EAS, security status	Get System Info Cmd EAS Cmd	Write AFI Cmd Write DSFID Cmd Write EAS Cmd
System memory (48 bytes)	FC_h to FE_h	Block security status	Get Multiple Block Security Status Cmd	Lock Block Cmd (OTP)

User memory Direct read access to blocks of this memory is always possible. Direct write access to blocks of this memory is possible depending on the value of its corresponding block security status bit.

Sytem memory Direct read or write access to blocks of this memory area is not possible

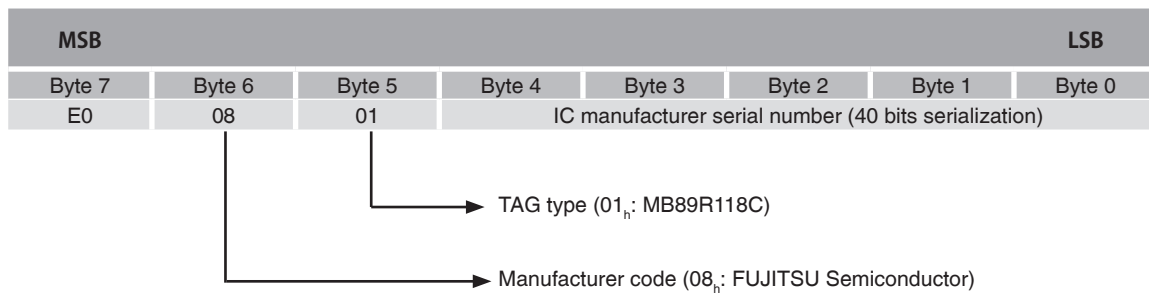
Structure of a single user memory block

MSB							LSB
Byte 7	Byte 6	Byte 5	Byte 4	Byte 3	Byte 2	Byte 1	Byte 0

UNIQUE IDENTIFICATION NUMBER (UID)

The 64-bits unique identification number (UID) is programmed during the production process according to ISO/IEC 15693-3 and cannot be changed afterwards. The type of TAG and manufacturer code are part of the UID: bytes 5 and 6 respectively.

Structure of memory block "FA_n"



SPECIAL FEATURES

AFI, DSFID, and EAS bits are written at the IC manufacturer factory, and can be updated and locked (disable to write) with specific commands. Only EAS bit cannot be locked. The LSB of Byte 7 holds the EAS bit. If the Electronic Article Surveillance is active (LSB = "1"), the transponder responds to an EAS command, otherwise it remains silent.

Structure of memory block "FB_n"

MSB					LSB	
Byte 7	Byte 6 to Byte 4			Byte 3	Byte 2	Byte 1
EAS Status	RFU			DSFID Lock Status	AFI Lock Status	DSFID
						AFI

The security status of the DSFID and AFI Identifier are stored in the Byte 3 and Byte 2 of the system memory blocks "FB_n" and are OTP (one time programmable).

SECURITY AND PROTECTIONS

The security status of the user memory is stored in the block security status bit located in the system memory blocks "FC_n" to "FF_n".

A user memory is unlocked when the corresponding block security status bit is "0". It is locked (disable to write) when the corresponding block security status bit is "1".

The user memory, DSFID and AFI protections are OTP (one time programmable).

Structure of memory block "FC_n" to "FF_n"

Block No.	Block Security Status (BSS)																LSB
	Byte 7								Byte 6 to Byte 1		Byte 0						
FC _n	3F	3E	3D	3C	3B	3A	39	38			3	2	1	0	FD ₃	02	01
FD _n	7F	7E	7D	7C	7B	7A	79	78			47	46	45	44	43	42	41
FE _n	BF	BE	BD	BC	BB	BA	B9	B8			87	86	85	84	83	82	81
FF _n	RFU (6 bits)							F9	F8			C7	C6	C5	C4	C3	C2

LIST OF COMMANDS					
	Command Name	Command Code	Description	RLS-1xxx-	
				x20	320
Mandatory ISO 15693	Inventory	01 _h	Execute the anti-collision sequence and return UID	✓	✓
	Stay Quiet	02 _h	Enter the Quiet state	✓	✗
Optional ISO 15693	Read Single Block	20 _h	Read the requested 1 block data in the user/system memory	✓	✓
	Write Single Block	21 _h	Write the requested 1 block data in the user memory	✓	✓
	Lock Block	22 _h	Lock permanently the requested 1 block in the user memory	✓	✗
	Read Multiple Blocks	23 _h	Read the requested 1 or 2 blocks data in the user memory	✗	✗
	Write Multiple Blocks	24 _h	Write the requested 1 or 2 blocks data in the user memory	✗	✗
	Select	25 _h	Enter the Select state	✓	✗
	Reset to ready	26 _h	Enter the Ready state	✓	✗
	Write AFI	27 _h	Write AFI (Application Family Identifier) value into FRAM	✓	✗
	Lock AFI	28 _h	Lock permanently AFI value	✓	✗
	Write DSFID	29 _h	Write DSFID (Data Storage Format Identifier) value into FRAM	✓	✗
	Lock DSFID	2A _h	Lock permanently DSFID value	✓	✗
	Get System Information	2B _h	Read the system information value (UID, DSFID, AFI, number of bytes per block, etc)	✓	✗
	Get Multiple Block Security Status	2C _h	Read the block security status stored in system area	✗	✗
	-	2D _h to 9F _h	Reserved for future use	-	✗
Custom ISO 15693	EAS	A0 _h	When EAS bit is "1", reply response code 6 times	✗	✗
	Write EAS	A1 _h	Write EAS data (1 bit). Data "1" validates anti-theft/ goods-monitoring. Data "0" invalidates them	✗	✗
	Read Multiple Blocks Unlimited	A5 _h	Read the specified data of up to 256 blocks in the user/ system memory at once	✗	✗
	Fast Inventory	B1 _h	Fast response Inventory command	✗	✗
	Fast Read Single Block	C0 _h	Fast response Read Single Block command	✗	✗
	Fast Write Single Block	C1 _h	Fast response Write Single Block command	✗	✗
	Fast Read Multiple Blocks	C3 _h	Fast response Read Multiple Blocks command	✗	✗
	Fast Write Multiple Blocks	C4 _h	Fast response Write Multiple Blocks command	✗	✗
	Fast Write EAS	D1 _h	Fast response Write EAS command	✗	✗
	Fast Read Multiple Blocks Unlimited	D5 _h	Fast response Read Multiple Blocks Unlimited command	✗	✗

NOTES ON USING MB89R118C		
Parameter	ISO/IEC 15693 Specification	MB89R118C
Data coding	1 out of 256	Not correspondance
Subcarrier	2-subcarrier	Not correspondance
Optional command	Read Multiple Blocks command	Correspondance up to 2 blocks
	Write Multiple Blocks command	Correspondance up to 2 blocks

The above table presents the discrepancies between the IC MB89R118C and the ISO/IEC 15693 standard.

AVAILABLE TYPES			
Part number	Part reference	Ø	Mounting
720-000-205	RTP-0502-062	50 mm	Non-embeddable