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

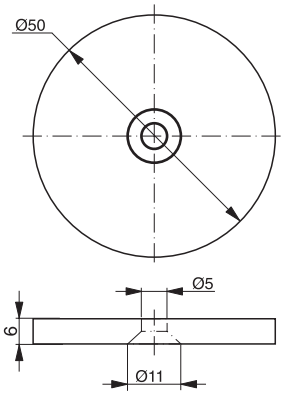
CE

IP 68 69K

+250°

100% SILICONE FREE

HF ISO 15693



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

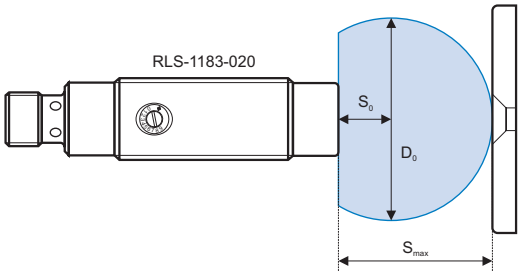
Protection degree	IP68 & IP69K
Ambient temperature range TA*	-25...+150 °C
Storage temperature range TS**	-40...+250 °C
Thermal cycling reliability @ 250 °C	1000 cycles / 1000 hours
Housing material	LCP (Liquid Crystal Polymer)
Weight	16.9 g
Tightening torque	max. 1 Nm

* Read/write operations possible

** Data retention and mechanical stability limit

OPERATING ZONE

The operating area is highly dependent on the environment.

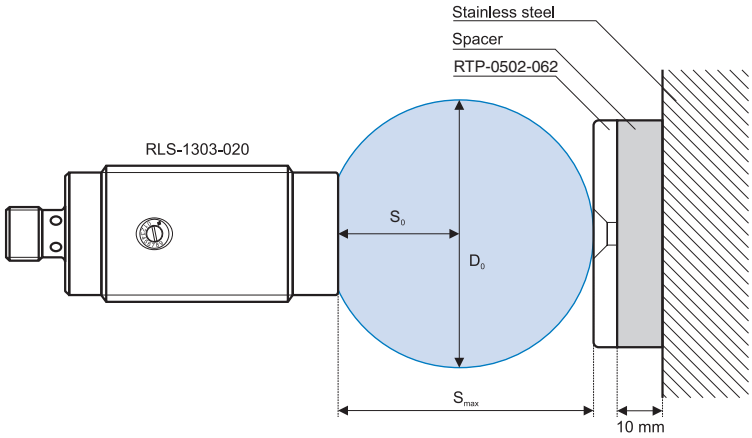


Typical values @ 25°C:

D_0 = 42.0 mm
S_0 = 0.5 mm
S_{max} = 21.0 mm

ENLARGEMENT OF THE OPERATING AREA

The operating area is highly dependent on the environment.



Typical values @ 25°C:

D_0 = 51.0 mm
S_0 = 16.5 mm
S_{max} = 42.0 mm

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	✓	✓
System memory (48 bytes)	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
	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

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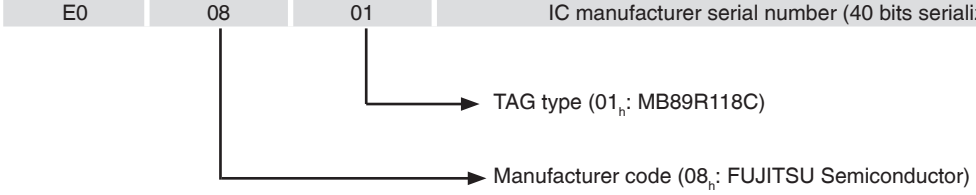
UNIQUE IDENTIFICATION NUMBER (UID)

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_h"

MSB							LSB
Byte 7	Byte 6	Byte 5	Byte 4	Byte 3	Byte 2	Byte 1	Byte 0
E0	08	01	IC manufacturer serial number (40 bits serialization)				



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_h"

MSB					LSB
Byte 7	Byte 6 to Byte 4	Byte 3	Byte 2	Byte 1	Byte 0
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_h" 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_h" to "FF_h".

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_h" to "FF_h"

Block No.	MSB Block Security Status (BSS) LSB																	
	Byte 7								Byte 6 to Byte 1	Byte 0								
FC_h	3F	3E	3D	3C	3B	3A	39	38	.....	3	2	1	0	FD_3	02	01	00	
FD_h	7F	7E	7D	7C	7B	7A	79	78	.....	47	46	45	44	43	42	41	40	
FE_h	BF	BE	BD	BC	BB	BA	B9	B8	.....	87	86	85	84	83	82	81	80	
FF_h	RFU (6 bits)						F9	F8	.....	C7	C6	C5	C4	C3	C2	C1	C0	

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 1or 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

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