

Wireless Protocol Modules MiP Series

32001605xxxxW

Host Based wM-Bus Module

Datasheet



Overview

The Wireless M-Bus transceiver module family is designed for low-power sub-GHz RF communication across multiple frequency plans tailored for global markets. Featuring a compact LGA form factor and ultra-low power consumption, these modules enable highly integrated, battery-operated solutions for water, gas, heat, or electricity metering applications, suitable for both meters and concentrators.

The family supports various operating modes (S, T, C, R) to meet the requirements of one-way or two-way data communication in both stationary and mobile systems.

Integrated I²C and UART interfaces provide maximum design flexibility, streamlining the development of custom end-products worldwide.

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1. Product Features

Mechanical highlights:

- ✓ Extremely compact dimensions
- ✓ LGA pattern

Low power characteristics:

- ✓ Sleep (Deep Stop) current consumption 1.5 μ A
- ✓ Shutdown current consumption 14 nA

RF performances:

- ✓ Up to -120 dBm Sensitivity
- ✓ +14 dBm Output Power

Additional features:

- ✓ Smart serial interface selector (UART, LPUART, I²C)

2. Product Codification

Example

32001605 x E 8 x W

Zone / Frequency Plan

E4 = Europe 433 MHz

E8 = Europe 868 MHz

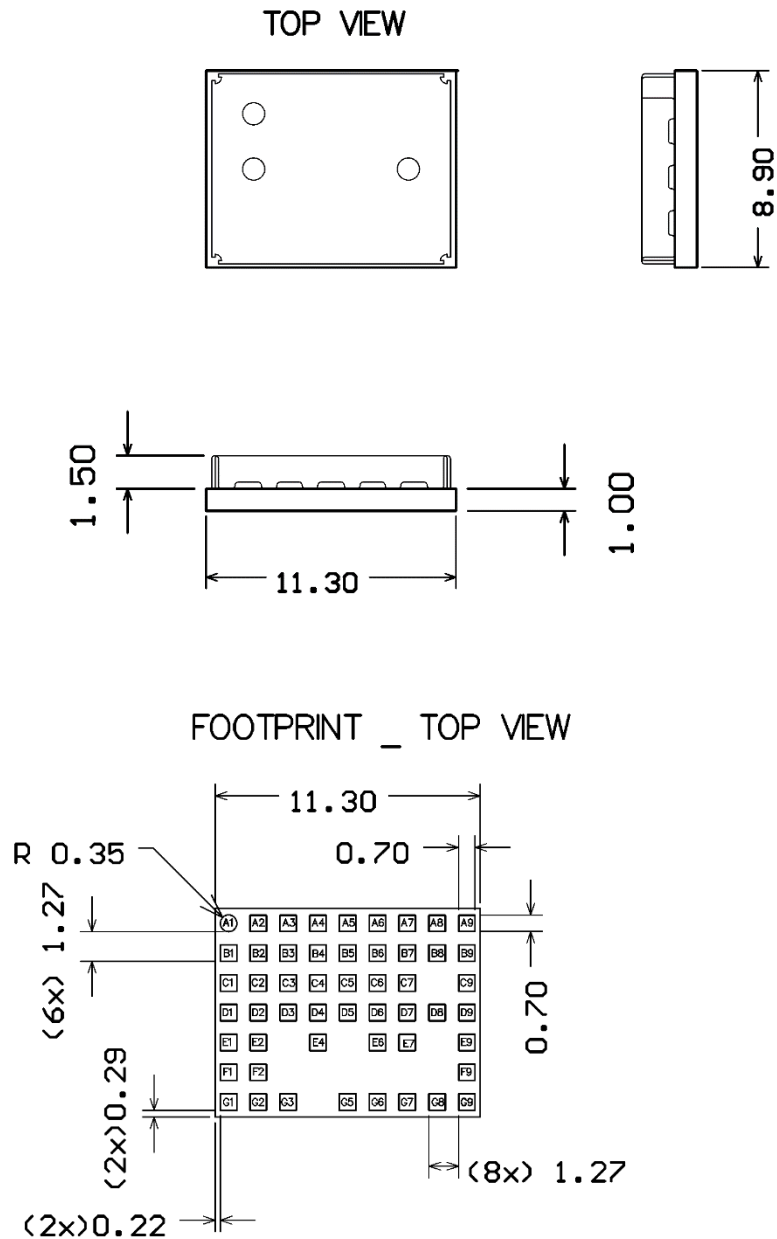
I8 = India 865 MHz

U9 = North America 915 MHz

Protocol/Modulation

W = wM-Bus

3. Mechanical Dimensions



Note: Dimension in mm. General tolerance $\pm 0.1\text{mm}$. The tolerance is not cumulative

4. Pin Definition

Top View

Ⓐ1	A2	A3	A4	A5	A6	A7	A8	A9
B1	B2	B3	B4	B5	B6	B7	B8	B9
C1	C2	C3	C4	C5	C6	C7		C9
D1	D2	D3	D4	D5	D6	D7	D8	D9
E1	E2		E4		E6	E7		E9
F1	F2							F9
G1	G2	G3		G5	G6	G7	G8	G9

Bottom View

A9	A8	A7	A6	A5	A4	A3	A2	Ⓐ1
B9	B8	B7	B6	B5	B4	B3	B2	B1
C9		C7	C6	C5	C4	C3	C2	C1
D9	D8	D7	D6	D5	D4	D3	D2	D1
E9		E7	E6		E4		E2	E1
F9							F2	F1
G9	G8	G7	G6	G5		G3	G2	G1

Pad	Name	Type	Pad	Name	Type
A1	RFU	-	D1	GND	S
A2	NC	-	D2	NC	-
A3	RFU	-	D3	NC	-
A4	LPUART1 TX	I/O	D4	GND	S
A5	LPUART1 RX	I/O	D5	NC	-
A6	RFU	-	D6	NC	-
A7	I2C1_SCL	I/O	D7	NC	-
A8	I2C1_SDA	I/O	D8	NC	-
A9	VDD	S	D9	RFU	-
B1	NWAKE	I	E1	GND	S
B2	NDATA_INDICATE	O	E2	GND	S
B3	NC	-	E4	NC	-
B4	NC	-	E6	NC	-
B5	USART1_TX	I/O	E7	NC	-
B6	USART1_RX	I/O	E9	NC	-
B7	NC	-	F1	ANT	RF I/O
B8	NC	-	F2	GND	S
B9	VDD	S	F9	NC	-
C1	RFU	-	G1	GND	S
C2	NC	-	G2	GND	S
C3	NC	-	G3	GND	S
C4	GND	S	G5	NRST	I
C5	NC	-	G6	NC	-
C6	NC	-	G7	NC	-
C7	NC	-	G8	NC	-
C9	GND	S	G9	NC	-

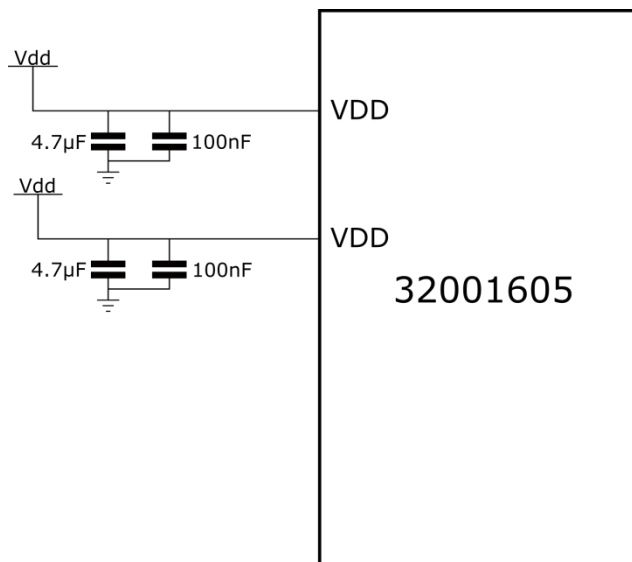
Note: NC means “do not connect”, leave the pin floating.

RFU means “Reserved for Future Use”.

5. Hardware Integration

5.1. Decoupling capacitors

Each power supply pin must be decoupled with capacitors with the values suggested in the figure.



5.2. Layout guidelines

For better noise rejection, put the decoupling capacitors as close as possible to the power pins of the module, giving precedence to the low value ones.

The trace connecting to the RF pin must have an impedance of 50 Ω. For better performance, connect the GND pads around the RF pin without thermals.

6. Electrical Characteristics

6.1. Absolute Maximum Ratings

Parameter	Max.	Unit
Supply Voltage (VDD)	3.9	V
Radio Frequency Input Level, pin F1	0	dBm
Voltage Standing Wave Ratio (VSWR) at RF Input, ANT, pin F1	10:1	
I/O Pin voltage	VDD + 0.3	V
Storage Temperature	-40 ÷ 100	°C
Operating Temperature	-40 ÷ 85	°C

6.2. Operating Condition

Note: All RF parameters measured with input (pad F1, ANT) connected to a 50 Ω impedance signal source or load.

6.2.1. GENERAL ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
Supply Voltage (VDD)	2.3	-	3.6	V	
Deep Stop DC Current	-	1.5	-	μ A	1
Shutdown DC Current	-	14	-	nA	1
Data Rate 2-FSK	-	-	100	kbit/s	

6.2.2. GENERAL RECEIVER ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
DC Current Drain	-	14	-	mA	1
Bandwidth @ -3 dB	-	45	-	kHz	4
Output Logic Low	GND	-	0.05	V	
Output Logic High	VDD – 0.2	-	VDD	V	

6.2.3. GENERAL TRANSMITTER ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
RF Output Impedance	-	50	-	Ω	
Input Logic Low	GND	-	0.05	V	
Input Logic High	VDD – 0.2	-	VDD	V	

6.2.4. MODEL SELECTION MATRIX

32001605BE8SW					
Receiver					
Parameter	Min.	Typ.	Max.	Unit	Notes
Operating Frequency	868.03	-	869.95	MHz	2
Sensitivity mode S	-	-111	-	dBm	1, 3, 4
Sensitivity mode T	-	-110	-	dBm	1, 3, 5
Sensitivity mode R	-	-120	-	dBm	1, 3, 6, 10
Sensitivity mode C	-	-110	-	dBm	1, 3, 7
Transmitter					
Parameter	Min.	Typ.	Max.	Unit	Notes
Current Drain (CW @14 dBm)	-	49	-	mA	1
Operating frequency	868.03	-	869.95	MHz	2
Maximum Output power	-	14	-	dBm	1, 3, 8

32001605BI8SW					
Receiver					
Parameter	Min.	Typ.	Max.	Unit	Notes
Operating Frequency	-	865.5	-	MHz	2
Sensitivity mode S	-	-111	-	dBm	1, 3, 4
Transmitter					
Parameter	Min.	Typ.	Max.	Unit	Notes
Current Drain (CW @14 dBm)	-	57	-	mA	1
Operating frequency	-	865.5	-	MHz	2
Maximum Output power	-	14	-	dBm	1, 3, 9

Notes:

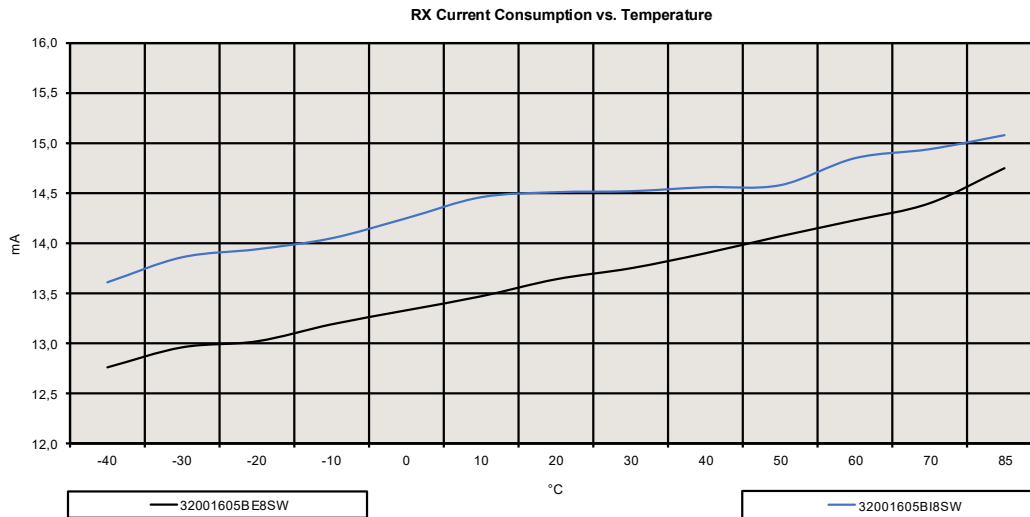
- 1) Measured at power supply level of 3.0 V.
- 2) According to EN13757-4:2026, modes S, T, R, C.
- 3) All RF parameters measured with input (pin F1, ANT) connected to 50 Ω impedance signal source or load.
- 4) Measured @ PER < 0.8 according to EN13757-4:2026 Paragraph 6.
- 5) Measured @ PER < 0.8 according to EN13757-4:2026 Paragraph 7.
- 6) Measured @ PER < 0.8 according to EN13757-4:2026 Paragraph 8.
- 7) Measured @ PER < 0.8 according to EN13757-4:2026 Paragraph 9.
- 8) In order to not exceed the maximum power permitted by the ETSI EN 300 220 regulation, choose an appropriate antenna system and power supply.
- 9) According to WPC regulation.
- 10) Limited to -20 / +60 °C operating temperature.

7. Temperature Range Curves

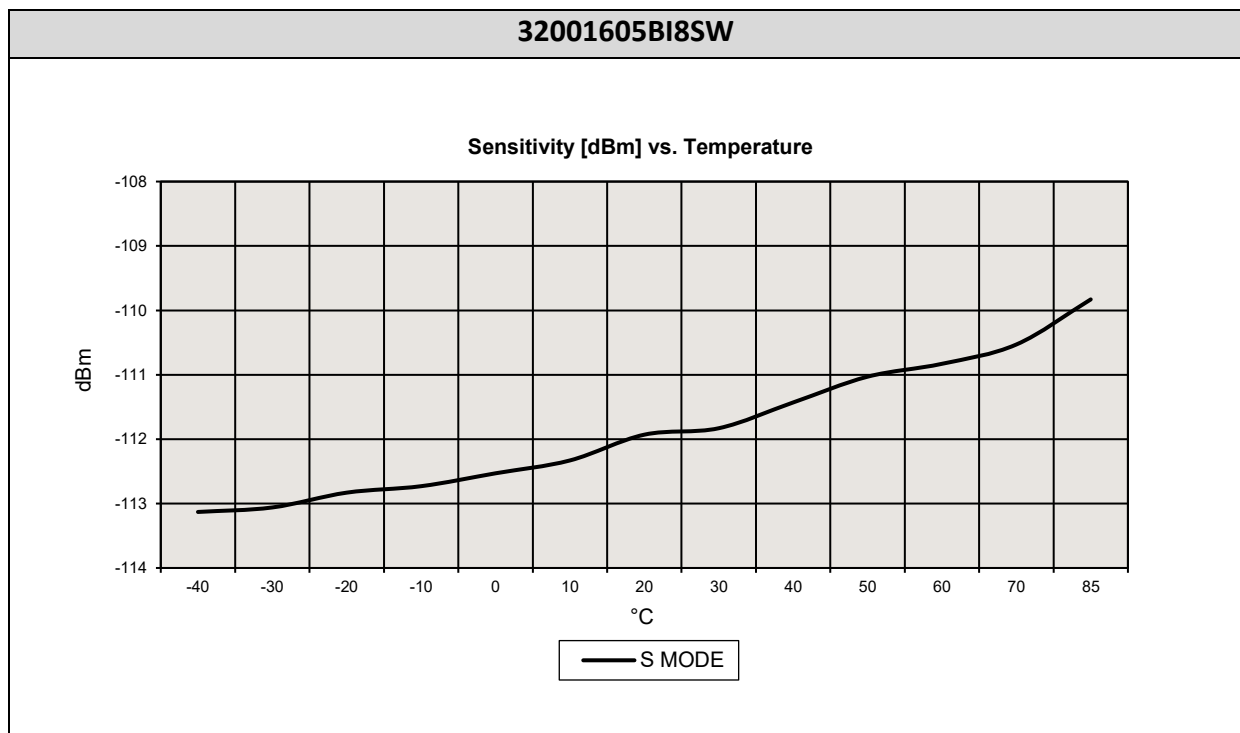
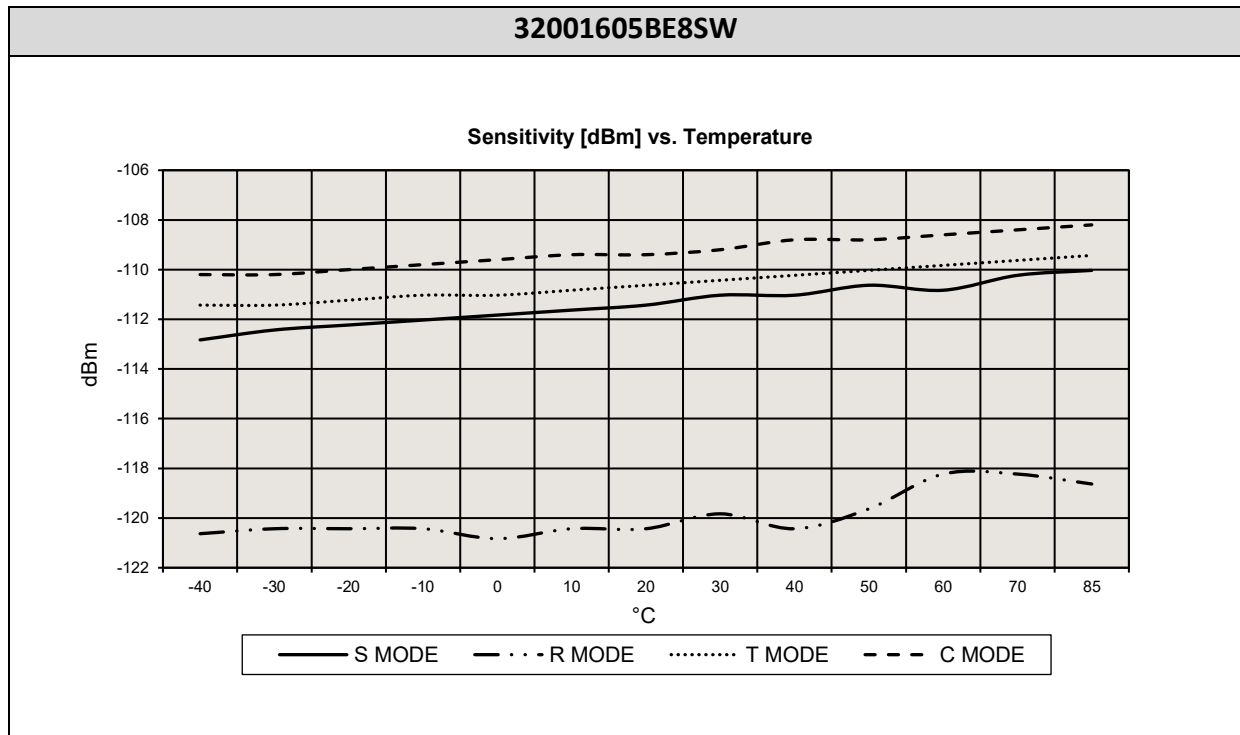
Note: All RF parameters measured with input (pad F1) connected to a 50 Ω impedance signal source or load.

7.1. Receiver Temperature Dependency

7.1.1. Current Consumption



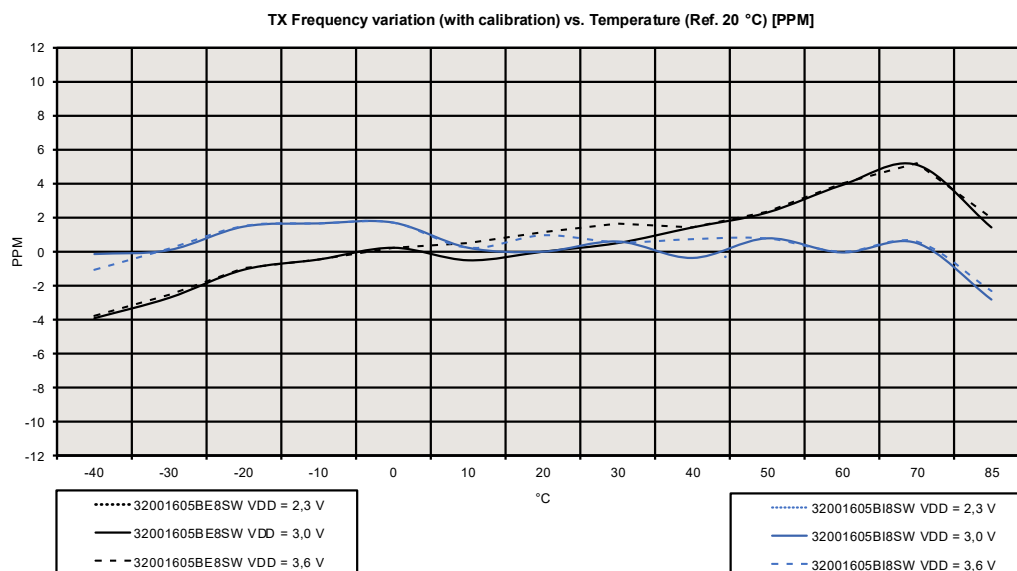
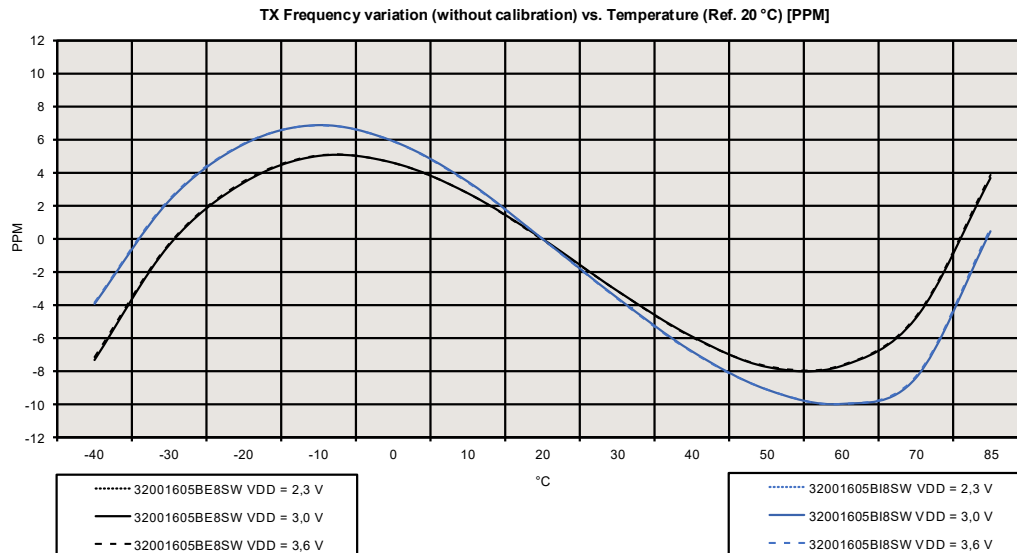
7.1.2. Sensitivity Level



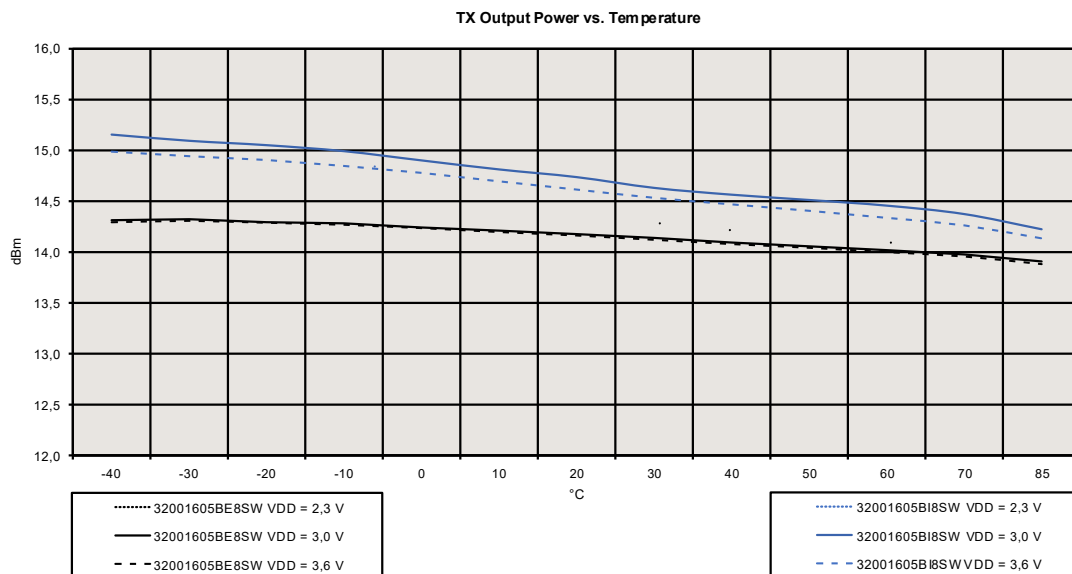
7.2. Transmitter Temperature Dependency

7.2.1. Frequency Variation

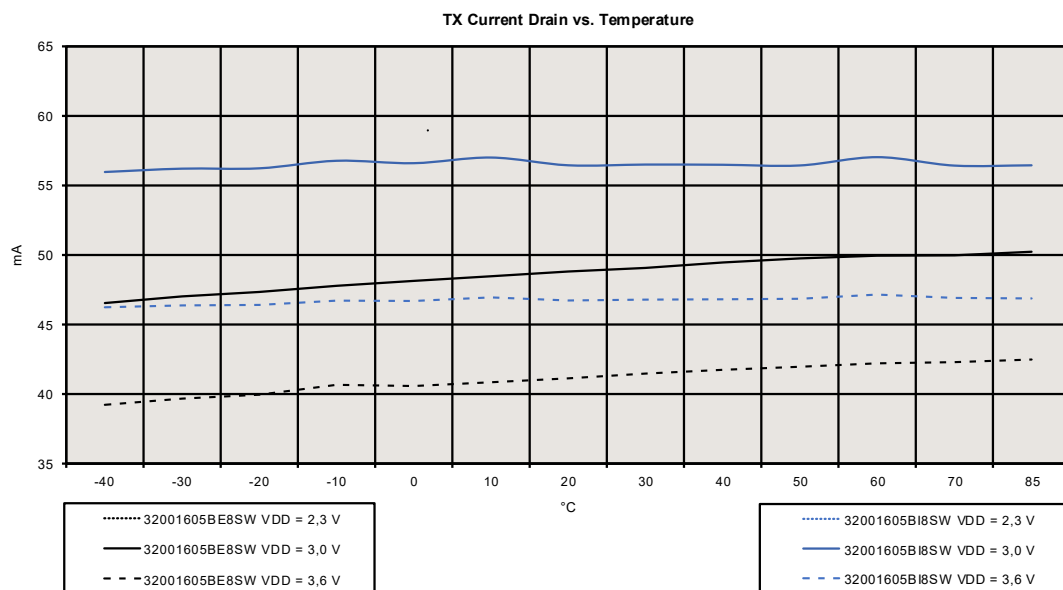
The calibration of the HSE oscillator is mandatory to enable the use of synchronous messages. This process is also highly recommended to compensate for temperature drifts experienced by the radio module. For more detailed information, please refer to the dedicated command reference manual.



7.2.2. Output Power

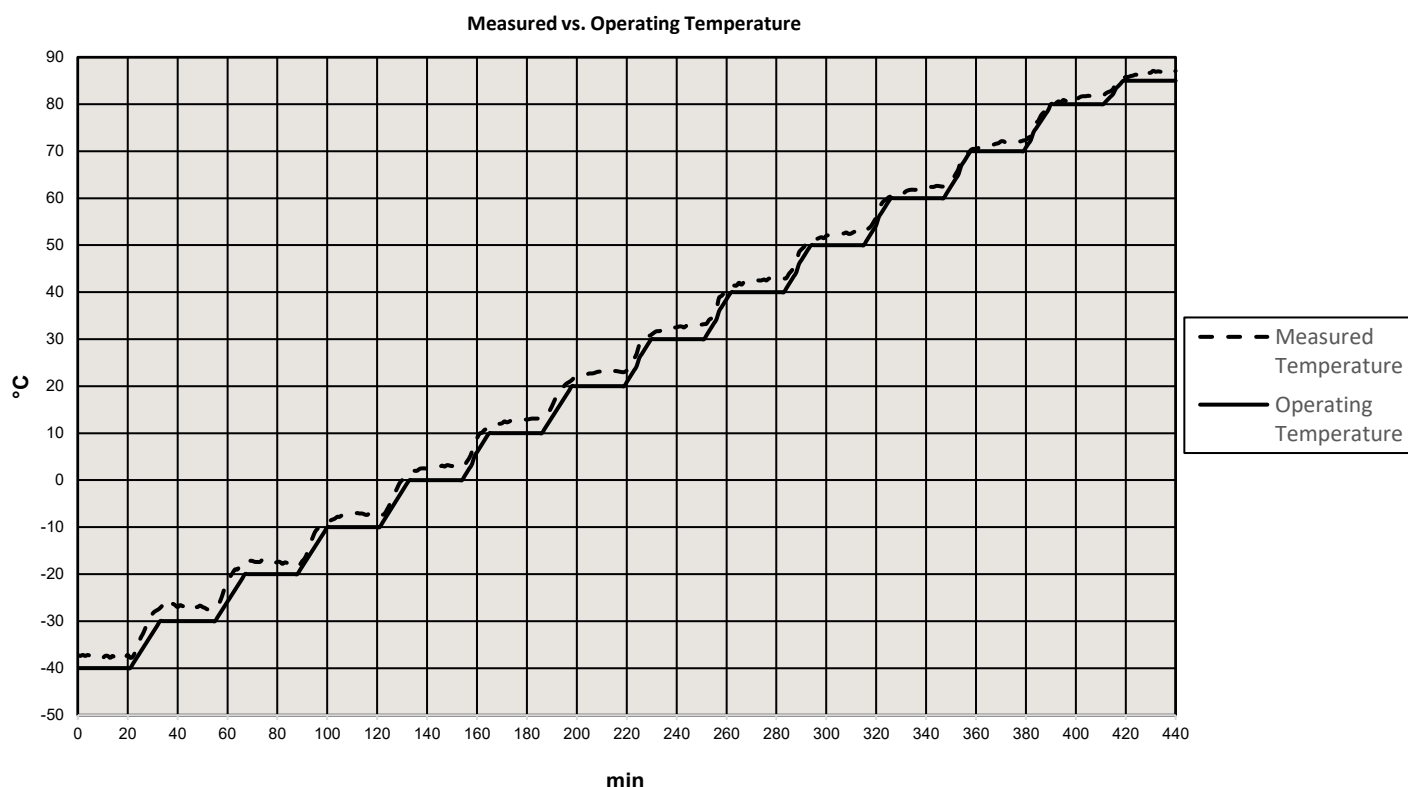


7.2.3. Current Consumption (CW Mode)



7.3. Measured Temperature

The following graph displays the relationship between the module's operating temperature and its measured temperature. The temperature read by the module differs from the operating temperature because it is affected by the heat generated by the device itself. This discrepancy is especially noticeable at lower temperatures. For more detailed information, please refer to the dedicated command reference manual.



8. Safety note

To meet safety requirements, the module must be powered by an external power source that meets limits of ES1 and PS1 according to IEC 62368-1.

9. Application Notes

Title	Description	Doc
Manufacturing Process Information for LGA MiP Series Modules	Packaging information, Tape & Reel Specification, Reflow soldering information	AN_MNF002

10. Revision History

Revision	Date	Description
0.0	21.10.2025	Draft
0.1	20.11.2025	Updated sensitivity values
0.2	11.02.2026	Updated RX current drain value Updated sleep current value Updated supply voltage values Updated data rate value Updated “Pin Definition” table Changed module’s image
0.3	13.03.2026	Updated supply voltage min value
0.4	12.05.2026	Updated maximum output power value Updated TX current consumption value Added Shutdown current consumption
0.5	17.09.2026	Added temperature dependence graphs Updated sensitivity and TX current drain typical values Updated the header image
0.6	07.10.2026	Changed document name from 32001605BE8SW to 32001605xxxxW Changed document header Added product codification paragraph Revised parameter table Added graphs for module 32001605BI8SW