

# STAR-Module Plus 910 MHz

*Preliminary*  
*Rev 1.1*

## ***Integration Guide***

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**Document History**

Rev 1.1 FW release 1.35

<b>Introduction.....</b>	<b>2</b>
<b>Pinout.....</b>	<b>3</b>
<b>Electrical characteristics.....</b>	<b>3</b>
<b>RF chracteristics.....</b>	<b>4</b>
<b>Timings.....</b>	<b>4</b>
<b>Block diagram.....</b>	<b>4</b>
<b>Basic module states.....</b>	<b>5</b>

**Regulatory :**

***This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:***

- 1) This device may not cause harmful interference, and***
- 2) This device must accept any interference received, including interference that may cause undesired operation.***

***Any change or modification to the product not expressly approved by Datalogic Scanning Group S.r.l. could void the user' s authority to operate the device.***

***This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.***

***Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.***

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## Introduction

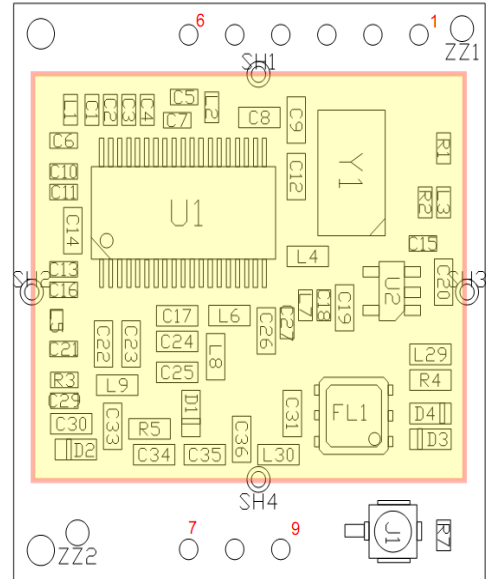
The STAR-Module Plus 910 is an FSK RF half-duplex transceiver working at 910 MHz.

Its main features are:

- FSK Frequency Shift Keying Modulation
- Default RF baud rate 36864 bps Manchester encoded
- UART baud rate : 38400 8 n 1 bps
- Extended 5.5 to 3.1 V power supply
- Temperature range  $-20^{\circ}\text{C}$  /  $+55^{\circ}\text{C}$
- High RF frequencies precision, due to utilization of a PLL synthesizer
- Factory calibration parameters saved on write protected flash block
- Factory pre-loaded unique 32 bit mac address for each module
- RF front-end with SAW filter for high out-of-band noise rejection and low spurious level emission
- On-board temperature sensor for frequency drift compensation.
- Bootloader for in circuit firmware upgrade
- Sub-milliampere sleep mode
- On-board EEPROM for configuration parameters

Pin	Direction	Description
J1	-	RF CONNECTOR
1	-	GROUND
2	Output	CD# (active low)
3	Input	IDLE
4	Output	TX_DATA
5	Input	RX_DATA
6	-	GROUND
7	-	Vdc (3.1 to 5.5 V)
8	Input	RESET_
9	-	GROUND

TOP VIEW



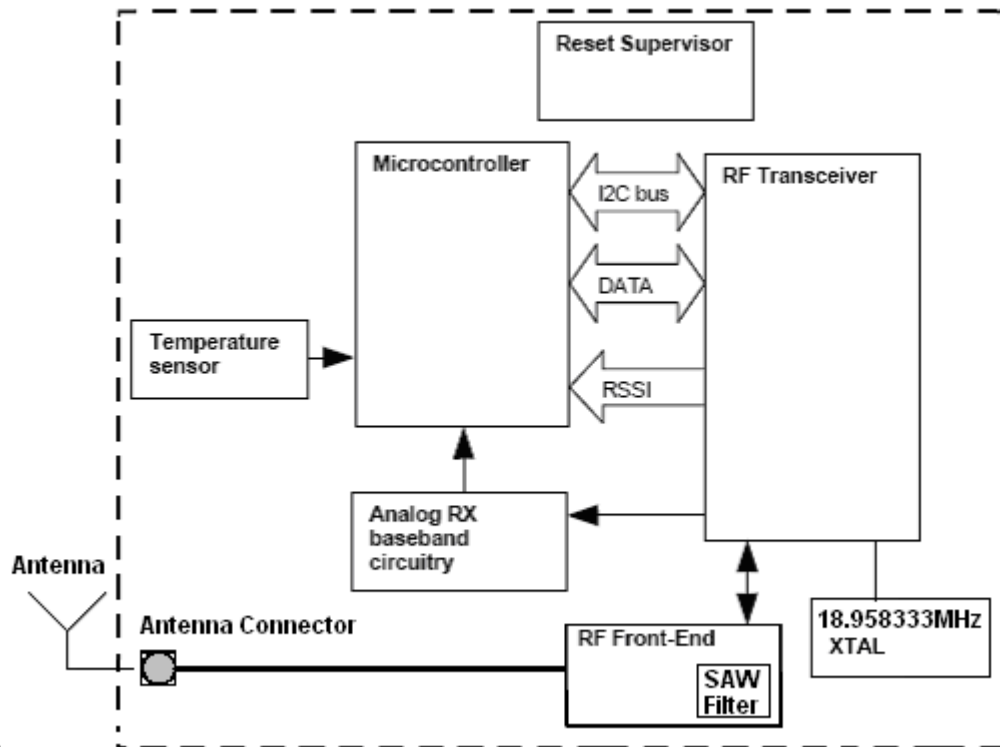
IDLE	Function
HIGH	Sleep Mode
LOW	Rx mode – Data received sent on TX_DATA, CD# asserted means RF channel is busy

**Electrical characteristics**

Description	@ 3.3 V	@ 5	Unit
TX mode current	18	31	mA
RX mode current	16	21	mA
IDLE mode current	32	52	uA

**RF characteristics**

Description	Typ	Unit
TX/RX center frequency	910	MHz
FSK modulation frequency deviation	+/-100	kHz
RX bandwidth	500	kHz
Output power (50 Ohm load, typ )	-1.0	dBm
RX Sensitivity (PER < 10% @36864 baud)	-95	dBm
CD# threshold	-80	dBm
CD# threshold hysteresys	10	dBm
RF in/out impedance	50	Ohm
Frequency drift from -25 to +55°C	+/- 50	ppm

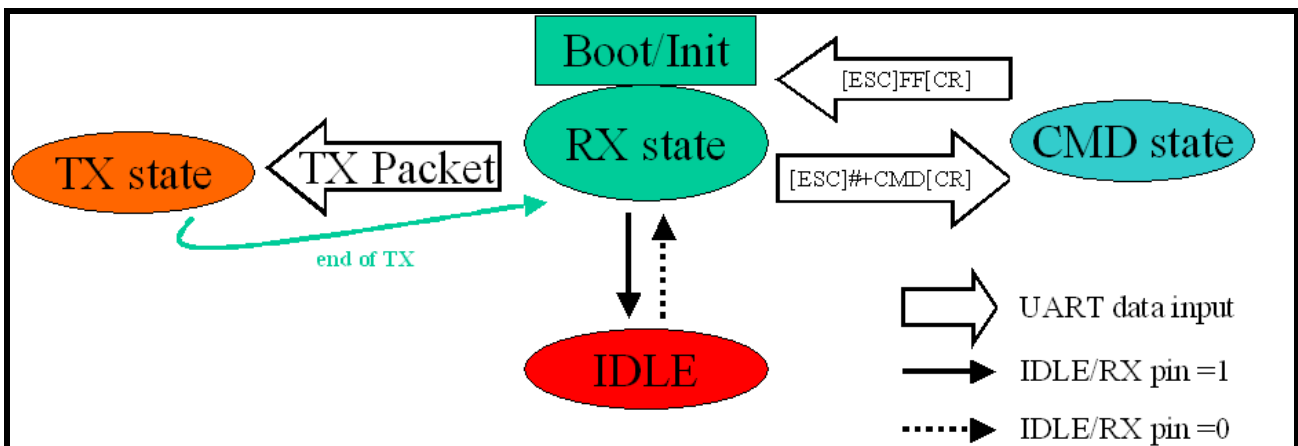


**Block diagram**

**Blocks description:**

- Reset supervisor: the microcontroller is reset when power supply falls below 3.0 V
- Temperature sensor: 10kOhm NTC
- Microcontroller: Atmel ATmega8L with RISC AVR core, 8kB Flash, 1kB SRAM, 512 B EEPROM, ADC, UART, I2C controller, 8MHz internal clock oscillator
- RF Transceiver: Infineon TDA5252 with PLL synthesizer (reference oscillator 18.958333MHz)
- Analog RX baseband circuitry: processing of analog signal from transceiver demodulator to uC ADC
- RF Front End: SAW filter, PIN-diode based RX-TX switch

**Basic module states**



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## RF interface

StarModuleSLC910 has 50 Ohm impedance on RF out in TX and RX mode, therefore impedance matching is required for antenna system of host.

Care must be taken for the proximity of conductive materials or the user's hand that will cause a mismatch of the antenna, decreasing the transceiver RF characteristics.

Moreover, care must be taken to ensure that the host system doesn't have spurious emissions in the range 910MHz+/-200kHz, that could cripple receiver sensitivity: it is advised to put a ground plane under the RF module and to filter the power supply.

Noisy parts, like system buses, must be shielded in order not to irradiate spurious fields.

**Integration Examples**

