KST

KS Technologies, LLC

LoRa Alliance Member

Affinity Concentrator
for LoRaWAN Gateways
KST7030

The KST7030 Affinity Concentrator Card is based on Semtech's SX1303 LoRaWAN Concentrator chipset. The Mini-PCIe form factor maximizes compatibility with various gateways, enabling the user to add LoRaWAN capabilities.

To learn more about the KST Affinity and other KST products, we can be reached at info@kstechnologies.com

RF & Electrical Specifications

- Multi-Data Rates - SF5 ~ SF12 / 125 simultaneously kHz
- 2 Mono-Data Rates - 250/500kHz and FSK 50kbps
- Fine Timestamp for Geolocation
- RF Frequency
  - Receive: 902.3 - 914.9MHz (125kHz Bandwidth)
  - Transmit: 923.3 - 927.5MHz (500kHz Bandwidth)
  - Proof-of-Coverage Transmission: 903.9 - 905.3MHz (125kHz Bandwidth)
- FCC Part 15 Subpart C Pre-certified
- Max Tx Power +13dBm
- Min Voltage 3.0VDC, Nominal 3.3VDC, Max 3.6VDC
- Nominal Power Consumption 2.25W at 3.3VDC
- Operating Temperature -40 to +85°C
- SPI Interface
- External Interface Mini-PCIe
- Antenna Type: Dipole Terminated with RP-SMA Connector

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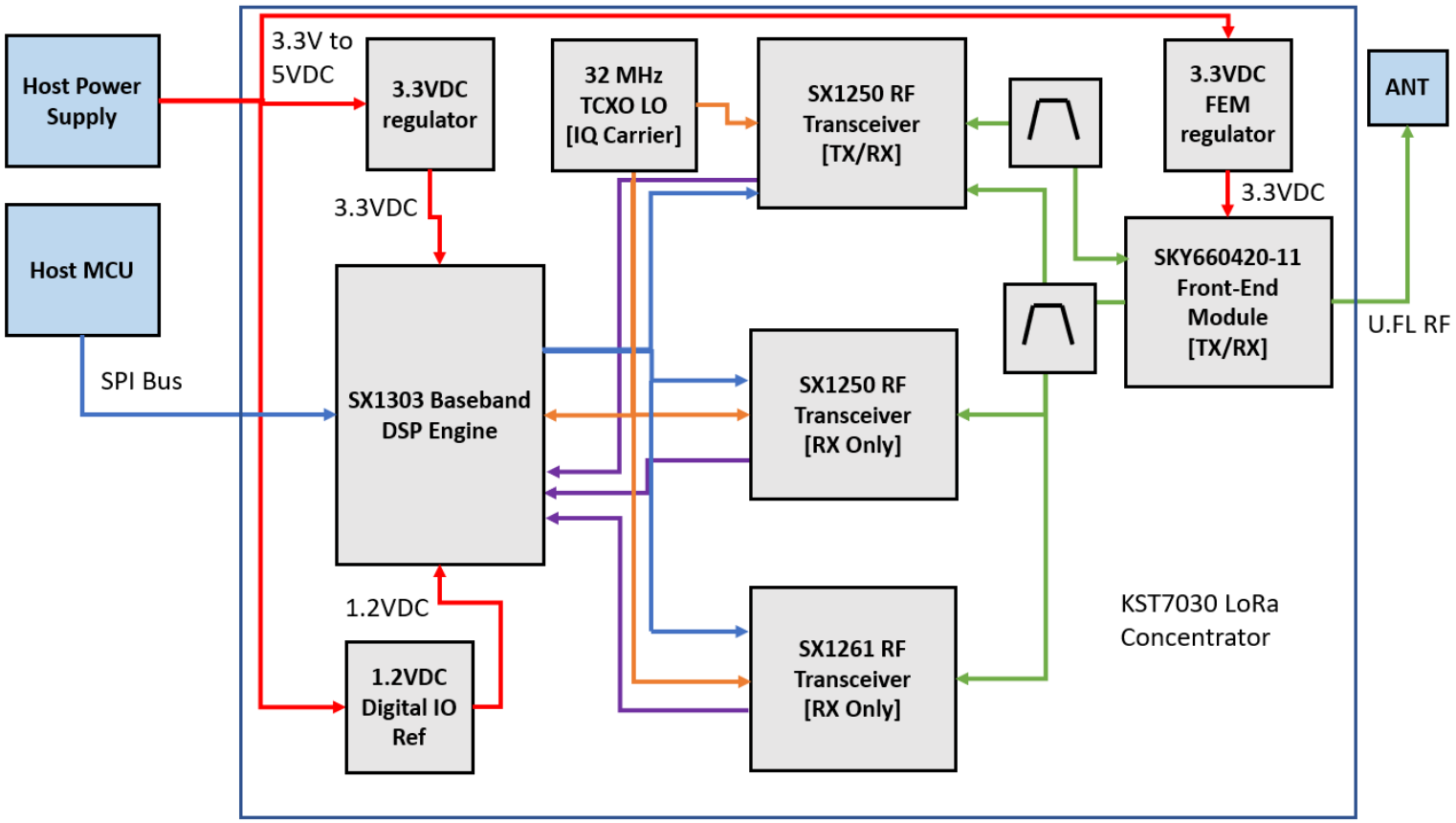
Integration Guide



Signal Key: SPI BUS | IQ Clock (32 MHz) | IQ Data | Analog RF (UHF) | Power

The KST7030 Receives hardware-abstraction-layer commands from the host MCU over a traditional SPI interface. The SX1303 is a base-band DSP engine. The transceivers(SX1250s and SX1261) use the common 32MHz TCXO LO to set the IQ data carrier frequency. Those 3 transceivers have a direct-down conversion architecture and use onboard PLLs which can operate up to 927.5MHz to mix the RF signal down to 32 MHz base-band for decimation inside the SX1303. Only the top SX1250 is capable of transmitting RF. The other two RF modules are RX-only.

The KST7030 complies with Hybrid Mode Testing specific for operating on the Helium Network. In compliance with Helium Network operating requirements, the KST7030 will occasionally perform a Proof-of-Coverage (PoC) LoRaWAN Transmission. For specifics regarding this transmission, please see the KST7030 Operational Description. This device will never perform a JOIN-REQUEST nor receive a JOIN-ACCEPT from another Helium Network-operated device. However, this PoC Transmission appears as randomly selecting a single channel in Sub-Band 2 in the near term, appears as evenly distributed in the long term, and sequential hops are randomly distributed in both direction and magnitude of change. These PoC Transmissions are infrequent enough such that they do not interfere with normal LoRaWAN Edge Device uplinks nor even with other Helium Network devices that may also be transmitting PoC Transmissions. Initiation of these PoC Transmissions is the responsibility of the Helium Network.

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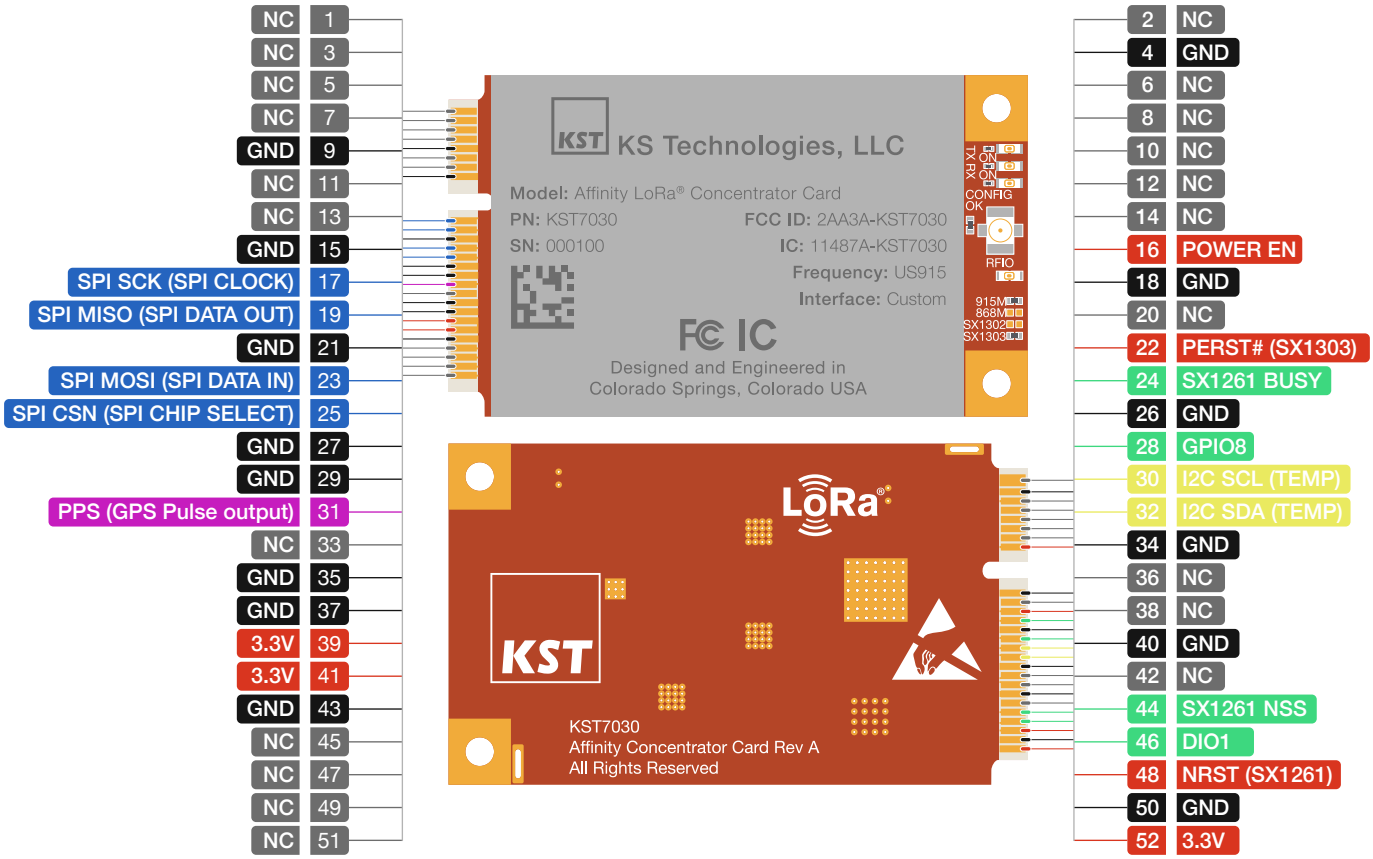
Mini-PCIe Connector Pinout



RF Shield Markings

KS Technologies, LLC

Model: Affinity LoRa® Concentrator Card
PN: KST7030
SN: 000100
FCC ID: 2AA3A-KST7030
IC: 11487A-KST7030
Frequency: US915
Interface: Custom

Designed and Engineered in
Colorado Springs, Colorado USA

FCC

This is a module intended to be used in a host device, which must be labeled with “Contains FCC ID 2AA3A-KST7030”.

This module has been certified against FCC Part 15.247

The end product with this module may be subject to perform FCC part 15 B unintentional emission test requirement and be properly authorized.

Additionally, it is recommended that the OEM integrator of this module follow the procedures in FCC KDB 996369 D04 and verify that this module continues to comply with the Part 15.247 requirements when installed in the host system. This should require spot checks for radiated spurious emissions using the test utility to configure the device for testing on the center channel.

The device is intended for OEM integrator only.

NOTE: This device was tested with one of three Antenna Assemblies. Antenna Assembly #1 is meant for indoor use and consists of a Pulse Larsen W9003 u.FL to RP-SMA adapter and a Linx Technologies ANT-916-OC-LG-RPS antenna. Antenna Assembly #2 is meant for outdoor use and consists of a Nm6iUFL113 (6” length, 113mm outer diameter) u.FL to N-Type adapter, an AL6-NFNFBW-9 lightning suppressor, an 0.5 meter 175101-10-M0.50 RF extension cable, and a Taoglas OMB.915.B08F21 antenna. Antenna Assembly #3 is meant for outdoor use and consists of a Pulse Larsen W9003 u.FL to RP-SMA adapter, an L-com CA-RSPNMB001 SMA to N-Type extension cable, an AL6-NFNFBW-9 lightning suppressor, an 0.5 meter 175101-10-M0.50 RF extension cable, and a Taoglas OMB.915.B08F21 antenna.

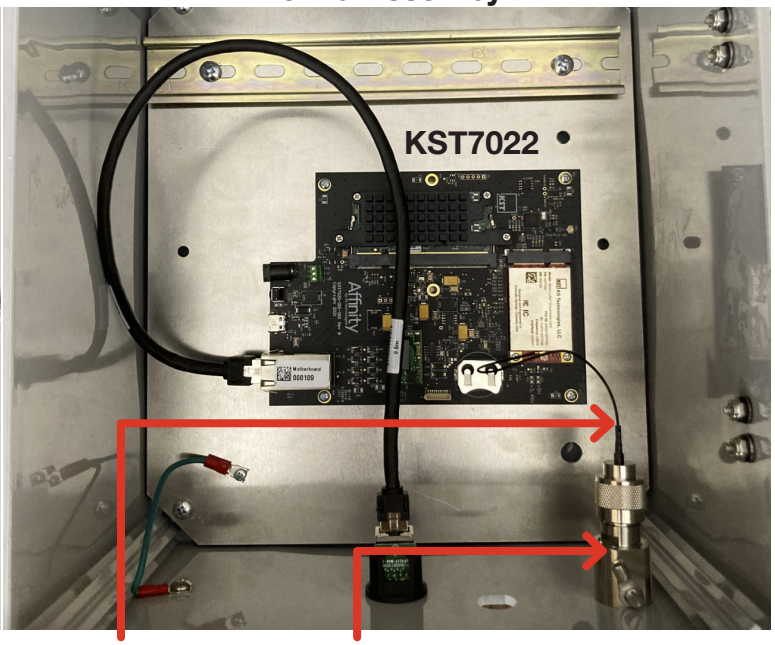
The antenna connector is accessible to the end user, do not attach anything other than what is explained in this document.

Antenna Assembly #1 has a total cable loss of 0.6dB and an antenna gain of +2.2dBi.
Antenna Assembly #2 has a total cable loss of 1.25dB and an antenna gain of +8dBi.
Antenna Assembly #3 has a total cable loss of 1.25dB and an antenna gain of +8dBi.

These antenna assemblies, or equivalent antenna assemblies with equal or lesser gain, shall be used with this module. Further, the bulkhead connector by FCC requirement contains a non-standard, unique connector. Therefore, non-standard antennas, such as those identified in this User Guide, are required for authorized usage.

Antenna Assemby #1

Antenna Assemby #2



Nm6iUFL113 (6”, 113)

AL6-NFNFBW-9

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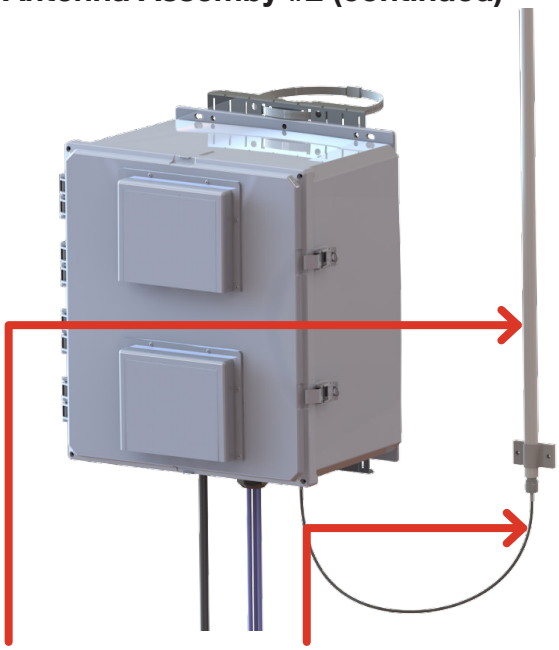
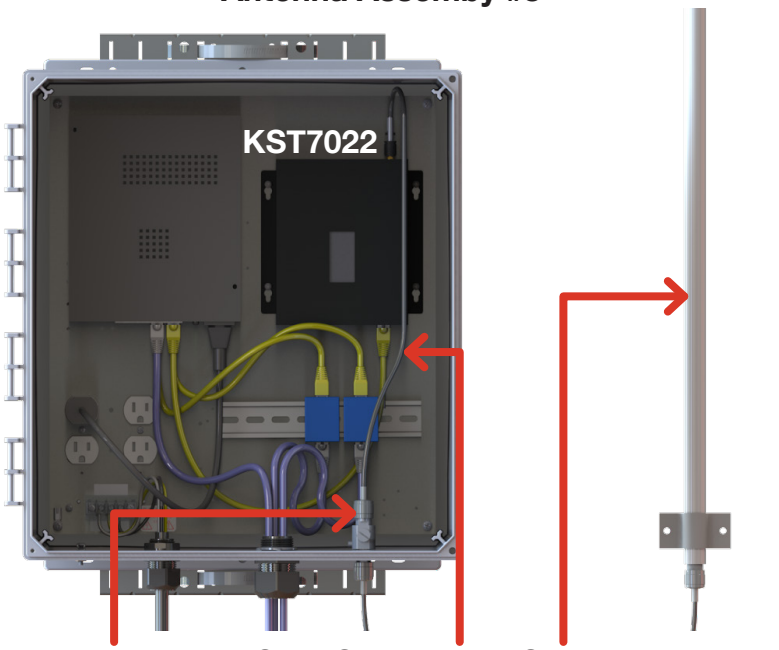
Antenna Assemby #2 (continued)



OMB.915.B08F21 175101-10-M0.50

Antenna Assemby #3



AL6-NFNFBW-9 CA-RSPNMB001 OMB.915.B08F21

FCC Compliance Declaration

15.21
Changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

15.105(b)
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

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 of the device.

Model: KST7030
Party responsible for compliance:
KS Technologies LLC
11580 Black Forest Road Suite #60
Colorado Springs, Colorado 80908
info@kstechnologies.com

FCC RF Radiation Exposure Declaration

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. The module is certified against FCC rules to be installed into host systems where the antenna will be located at distances of at least 20cm from human bodies or appendages. Use in portable hosts, where the antenna is less than 20cm from persons, will require additional certification with FCC. Co-location with other transmitters that may operate at the same time as this module requires assessment for RF exposure and compliance with other FCC rules, please refer to FCC KDB 996369 D04 for guidance. The user manual for the host system shall contain RF exposure warnings indicating that the device must be installed to provide at least 20cm from human bodies or appendages thereof.

KS Technologies offers engineering services to help you solve whatever remote sensing problem you might be facing. Contact us today to learn more about how we can integrate your sensor solution with the Cloud.

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