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Bulletin No. GMHSPA-D
Drawing No. LP0964
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Model GMHSPA - Graphite® HSPA+ Cellular Module

- CONFIGURED USING CRIMSON SOFTWARE (VERSION 3.0 OR LATER)
- SUPPORTS HSPA+ CELLULAR DATA CONNECTIVITY WITH FALL BACK TO 3G AND 2G
- UP TO 21 MBPS DOWNLINK/5.76 MBPS UPLINK SPEEDS
- POWERED AND CONFIGURED FROM GRAPHITE HOST DEVICE
- **THIS MODULE MUST BE INSTALLED IN SLOT 1 OF HOST DEVICE/EXPANSION RACK DUE TO POWER REQUIREMENTS.** ONLY ONE GMHSPA MODULE PER HOST DEVICE/EXPANSION RACK COMBINATION

c UL us LISTED
IND.CONT. EQ.
3PWL

FOR USE IN HAZARDOUS LOCATIONS:
Class I, Division 2, Groups A, B, C, and D
T4

c UL US LISTED
IND. CONT. EQ.
34AD

CE

Ex

II 3 G Ex nA IIC T4 Gc
-35°C ≤ T_{AMB} ≤ 70°C
DEMKO 14 ATEX 1387X
IECEx UL 15.0035X

ABS TYPE APPROVED PRODUCT

GENERAL DESCRIPTION

The model GMHSPA is a cellular communication module designed for use with the Graphite products. The module provides the Graphite host device cellular data connectivity. The cellular standard adopted in this module is HSPA+ with fallback capability to 3G and 2G. It can get speeds up to 21 Mbps downlink and 5.76 Mbps uplink. It's built upon the GSM standard, offered in the US through AT&T and T-Mobile and widely available throughout the world. HSPA+ can be used for services such as Wireless Application Protocol (WAP) access, Short Message Service (SMS), and for Internet connectivity.

The GMHSPA module is penta-band, allowing it to work in frequencies across the Americas, Europe and Asia. US and Canada work in the 850/1900 MHz bands, while Europe, Middle East, Africa and most of Asia work in the 900/1700/2100 MHz HSPA+ frequencies.

The GMHSPA module requires the addition of a SIM (Subscriber Identity Module) card, which is inserted into the holder prior to installation of the GMHSPA module. The SIM card securely stores the service-subscriber key (IMSI) used to identify a subscriber, and is used to connect to the network to obtain an IP address from the cellular provider.

The modules connect and communicate via proprietary USB connection to the various Graphite devices. The Graphite devices, equipped with serial ports as well as Ethernet port(s), allow the system to share data with PCs, PLCs and SCADA systems. The maximum number of modules varies for each Graphite device, see specific model for details. Remove power from the host device before installing or replacing any modules.

CONFIGURATION

The Graphite is configured with Windows® compatible Crimson® software. The software is an easy to use, graphical interface which provides a means of configuration and commissioning of new systems, as well as routine module re-calibration.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in this literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use this unit to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the unit.

The antenna used for this module must be installed to provide a separation distance of at least 7.87 inches (20 cm) from all persons.
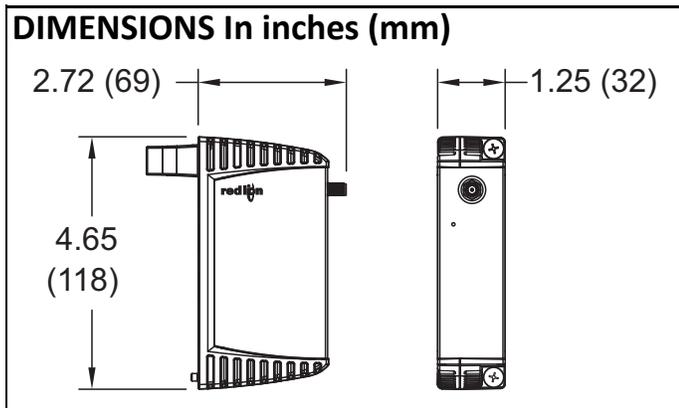
⚠ **CAUTION: Risk of Danger.**
Read complete instructions prior to installation and operation of the unit.

⚠ WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR AREA IS KNOWN TO BE NON-HAZARDOUS.

⚠ WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

DIMENSIONS In inches (mm)

2.72 (69)   1.25 (32)

4.65 (118)

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SPECIFICATIONS

1. **POWER**: Power will be supplied by the Graphite host device. Some modules, depending on usage may consume high levels of power. This may limit the total number of modules that can be installed on a single Graphite host. Check the Graphite module and Graphite host data sheets for specific usage and power requirements.

   GMHSPA Max Power:
   HSPA+ Mode: During continuous active webserver traffic
   Instantaneous maximum: 5.4 W
   Average: 3.5 W
   GPRS Mode:
   Instantaneous maximum: 15.0 W (1.1 msec every 4.6 msec)
   Average: 8.5 W

2. **LINK STATUS LEDs**:
   Link Status - Link Status LED shows cellular link condition.

3. **COMMUNICATIONS**:
   Isolation from GMHSPA Antenna connector to Graphite host device: 500 VDC for 1 minute.

4. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature Range: -35 to 70 °C, or lowest range among equipment used in your Graphite system. Consult the user manual or www.redlion.net/OpTemp for further details.
     * See Thermal Performance and Consideration Section
   Storage Temperature Range: -40 to +85 °C
   Operating and Storage Humidity: 85% max. relative humidity, non-condensing.
   Altitude: Up to 2000 meters

5. **CERTIFICATIONS AND COMPLIANCES**:
   CE Approved
   EN 61326-1 Immunity to Industrial Locations
   IEC/EN 61010-1
   RoHS Compliant

   ATEX Approved
   ⓔ II 3 G Ex nA IIC T4 Gc
   DEMKO 14 ATEX 1387X
     EN 60079-0, -15
   IECEx Approved
   Ex nA IIC T4 Gc
   IECEx UL 15.0035X
     IEC 60079-0, -15
   UL Listed: File #E302106
   UL Hazardous: File #E317425
   Note: The GMHSPA module has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules.
   ABS Type Approval for Shipboard Applications

6. **ANTENNA CONNECTOR**:
   SMA Female connector requires:
   50 Ohm antenna with SMA male connector
   Penta-band HSPA+ antenna (850/900/1700/1900/2100 MHz) for global support.
   Dual-band (850/1900 MHz) antenna for US and Canada only
   Dual band (900/2100 MHz) for Europe only
   Voltage Standing Wave Ratio (VSWR) should not exceed 2.0:1
   The antenna cable should be 50Ω impedance, RG178/U or RG174/U type and be able to connect to the RSMA (Male) jack bulkhead. The antenna could be horizontal, vertical or right angled. Longer antenna cable would equate to signal loss.

7. **CONSTRUCTION**: Case body is all metal construction.

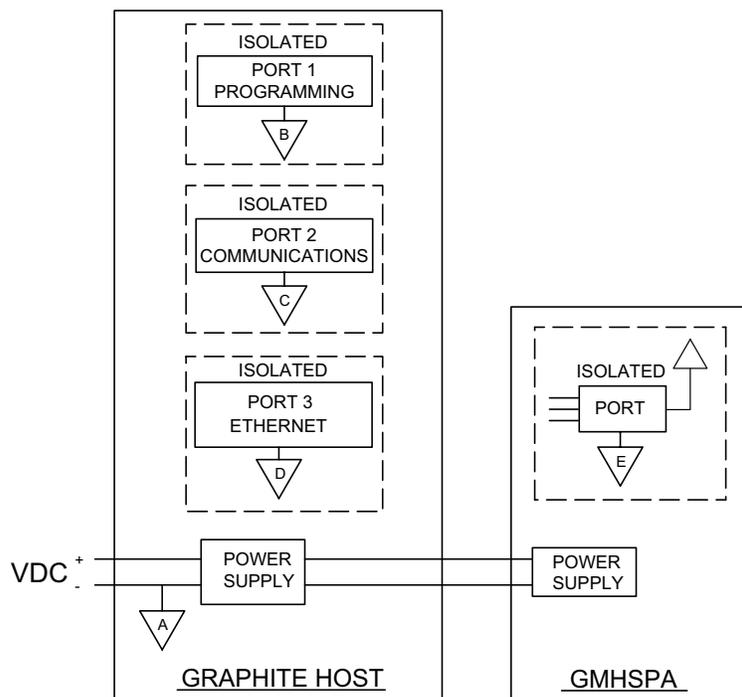8. **CONNECTIONS**: Antenna connector for external antenna.

9. **MOUNTING**: Screws to host

10. **WEIGHT**: 7.8 oz (221.13 g)

Block Diagram for GMHSPA

EMC INSTALLATION GUIDELINES

Although Red Lion Controls products are designed with a high degree of immunity to Electromagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into a unit may be different for various installations. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed are some EMI guidelines for a successful installation in an industrial environment.

1. A unit should be mounted in a metal enclosure, which is properly connected to protective earth.
2. Use shielded cables for all Signal and Control inputs. The shield connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield to earth ground (protective earth) at one end where the unit is mounted.
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is over 1 MHz.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors, feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run through metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter. Also, Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
4. Long cable runs are more susceptible to EMI pickup than short cable runs.
5. In extremely high EMI environments, the use of external EMI suppression devices such as Ferrite Suppression Cores for signal and control cables is effective. The following EMI suppression devices (or equivalent) are recommended:
   Fair-Rite part number 0443167251 (Red Lion Controls #FCOR0000)
   Line Filters for input power cables:
   Schaffner # FN2010-1/07 (Red Lion Controls #LFIL0000)
6. To protect relay contacts that control inductive loads and to minimize radiated and conducted noise (EMI), some type of contact protection network is normally installed across the load, the contacts or both. The most effective location is across the load.
   a. Using a snubber, which is a resistor-capacitor (RC) network or metal oxide varistor (MOV) across an AC inductive load is very effective at reducing EMI and increasing relay contact life.
   b. If a DC inductive load (such as a DC relay coil) is controlled by a transistor switch, care must be taken not to exceed the breakdown voltage of the transistor when the load is switched. One of the most effective ways is to place a diode across the inductive load. Most Red Lion products with solid state outputs have internal zener diode protection. However external diode protection at the load is always a good design practice to limit EMI. Although the use of a snubber or varistor could be used.
   Red Lion part numbers: Snubber: SNUB0000
   Varistor: ILS11500 or ILS23000
7. Care should be taken when connecting input and output devices to the instrument. When a separate input and output common is provided, they should not be mixed. Therefore a sensor common should NOT be connected to an output common. This would cause EMI on the sensitive input common, which could affect the instrument's operation.

Visit www.redlion.net/emi for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion products.

THERMAL PERFORMANCE AND CONSIDERATIONS

This module is rated for operation from -35 to +70 °C (See below for thermal deratings) when the proper thermal considerations are taken into account. Please refer to the following information to maximize the performance of this module when it's operated under extreme temperatures.

High Temperature Operating Conditions:

This module has many modes of operation which can cause the power consumption and corresponding heat dissipation to vary greatly. This factor, along with others, can affect the performance and longevity of the unit.

The maximum ambient temperature rating is further defined as follows:
- 50 °C maximum for continuous data usage and webserver operation with refresh rate set at 0 seconds in Crimson:
- 55 °C maximum for continuous webserver operation with refresh rate set to 10 seconds in Crimson
- 60 °C maximum for continuous web server operation with a refresh rate set to 30 seconds in Crimson
- 70 °C maximum for SMS mode of operation (sending and receiving text messages). These units may also be operated at 70 °C if data usage is brief and intermittent (e.g. downloading a 100 kB log file once an hour).

- For best performance and longevity, try to maintain an ambient air temperature less than 50 °C.
- The ambient temperature is defined as the temperature of the air immediately surrounding the unit.
- Reduced wireless performance may occur when operating above +50 °C in continuous webserver mode of operation with refresh rate set at 0 seconds.
- Running at temperatures above 50 °C for extended periods of time may reduce the performance and longevity of the unit.

If your wireless communications is atypically high or frequent, then the maximum ambient operating temperature may be reduced. The wireless circuit(s) in this module may shutdown to protect from permanent damage when the internal circuitry temperature becomes extreme (typically around 95 °C).

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HARDWARE INSTALLATION

SIM CARD INSTALLATION

Before installing the module in the Graphite host device, a SIM Card from one of the GSM/HSPA+ providers, with data enabled, has to be purchased and inserted into the module SIM Card slot.To insert the SIM card, the wrapper has to be removed from the module.

1. Remove the metal cover from the GMHSPA unit by sliding it off of unit.
2. Insert the SIM card as shown in Figure 1.
3. Replace the metal cover onto the unit and bend the eight tabs on the rear of the unit to secure the metal as shown in Figure 2.

NOTCH
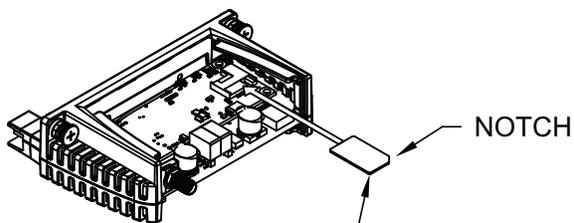
ORIENT SIM CARD AS SHOWN

Figure 1
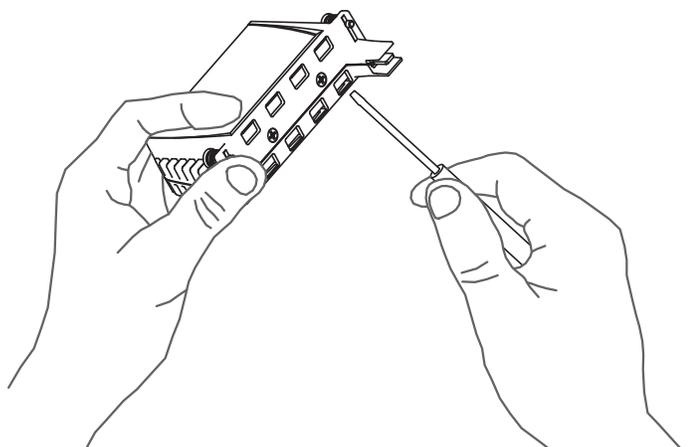
BEND EIGHT TABS TO SECURE METAL
AFTER INSERTING SIM CARD

Figure 2

CAUTION: Some modules, depending on usage, may consume high levels of power. This may limit the total number of modules that can be installed on a single Graphite host. Check the Graphite module and Graphite host data sheets for specific usage and power requirements.

GMHSPA MODULE INSTALLATION

GMHSPA module MUST be installed in Slot 1 of host device/ expansion rack due to power requirements. There can only be one GMHSPA module installed in the Graphite host device/expansion rack combination. The physical order of all installed modules must match the modules order in Crimson. Torque screws to 6.0 pound-force inch [96 ounce-force inch] (0.68 Nm).

REMOVE RUBBER
MODULE PLUG
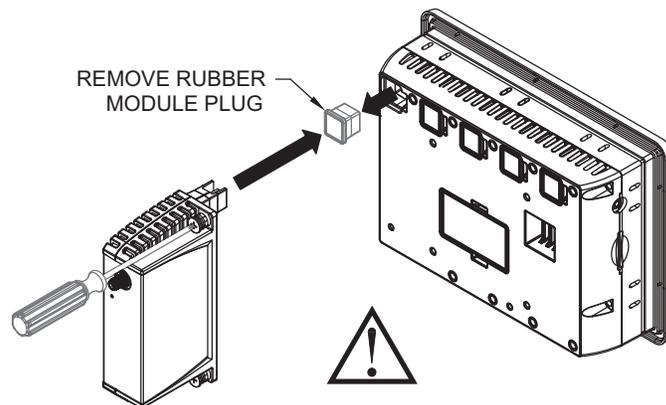
**GMHSPA MUST BE INSTALLED
IN SLOT 1 (FAR LEFT SLOT)**

⚠ **WARNING - EXPLOSION HAZARD - DO NOT CONNECT OR DISCONNECT CABLES WHILE POWER IS APPLIED UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.**

⚠ **WARNING: Disconnect all power to the unit before installing or removing modules.**

ANTENNA INSTALLATION

Antennas intended for use in Class 1, Division 2 and Zone 2 Hazardous Locations must be installed within the end use enclosure. For remote mounting in an unclassified location, routing and installation of the antennas shall be in accordance with the National Electrical Codes requirements.

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COMMUNICATING WITH THE GMHSPA MODULE

LED

LINK STATUS – Modem Status LED

The Link Status LED is a green LED that provides information regarding the state of the modem module's cellular connection. The status is described below.

OFF	No power to the unit
ON	Powered and not registered on the cellular network.
BLINKING	Powered and registered on the cellular network.

CONFIGURING A GMHSPA MODULE

The GMHSPA module is configured using Crimson (3.0 or later) software. After choosing the appropriate Cellular modem module, it is set up as a PPP Modem client, PPP Modem Server or SMS via HSPA+ Modem. Find additional information in your Graphite host device hardware literature and the Crimson 3.0 manual.

SIM CARD DETAILS

A SIM Card with data plan enabled has to be installed on the GMHSPA module before installing the module in the Graphite host device. Please contact your GSM/HSPA+ cellular network provider on setting up an account and data plan. The carrier should provide you with a SIM card to insert into the module, along with the APN, username, and password for data connectivity.

GRAPHITE TROUBLESHOOTING

If for any reason you have trouble operating, connecting, or simply have questions concerning your new Graphite unit, contact Red Lion's technical support.

Email: support@redlion.net
Website: www.redlion.net
Inside US: +1 (877) 432-9908
Outside US: +1 (717) 767-6511

ORDERING INFORMATION

TYPE	DESCRIPTION	PART NUMBER
Input Modules	Graphite Module, HSPA+ Cellular Module	GMHSPA00
Antennas	2G/3G 3" hinged antenna	ANT-TG090113
	2G/3G/4G LTE low profile direct permanent mount antenna, IP67 rated	ANT-G30B108111
	2G/3G 4.5" whip magnetic mount antenna, IP65 rated	ANT-GA107201111
	2G/3G low profile direct permanent mount antenna, IP65 rated	ANT-G21B301111

A listing of the entire Graphite family of products and accessories can be found at www.redlion.net.

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