



Release Notes

GVERSE Petrophysics 2019.3





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Contents

Introduction	1
What is GVERSE Petrophysics?	1
Main Features	2
Benefits	10
Installing GVERSE Petrophysics	11
What's New in GVERSE Petrophysics 2019.3	
Fixed Issues	14
Third Party Acknowledgements	15
International Trade Compliance	
Definitions	
Contacting LMKR Support	

Introduction

LMKR is pleased to announce the release of GVERSE® Petrophysics 2019.3.

This document provides an introduction to the GVERSE Petrophysics features and benefits. It also gives instructions on how launch this application along with a brief overview of the interface.

What is GVERSE Petrophysics?



GVERSE® Petrophysics is a 64bit petrophysical application designed to assist geoscientists and petrophysicists in analyzing and interpreting well log data and characterization of the reservoir using simple to advanced log interpretation workflows in a large multi-well multi-user environment.

GVERSE Petrophysics supports the import of digital data from numerous sources and provides you with integrated data views and analysis. Using this application you can view, edit, and analyze well log data in three different views:

- Log View
- Crossplot View
- Report View

GVERSE Petrophysics enables you to quickly analyze well log data using industry standard petrophysical algorithms. In addition, the Petrophysics Development Kit allows you to write user-defined interpretive models in C, C++, and Visual Basic programming languages for application in GVERSE Petrophysics.

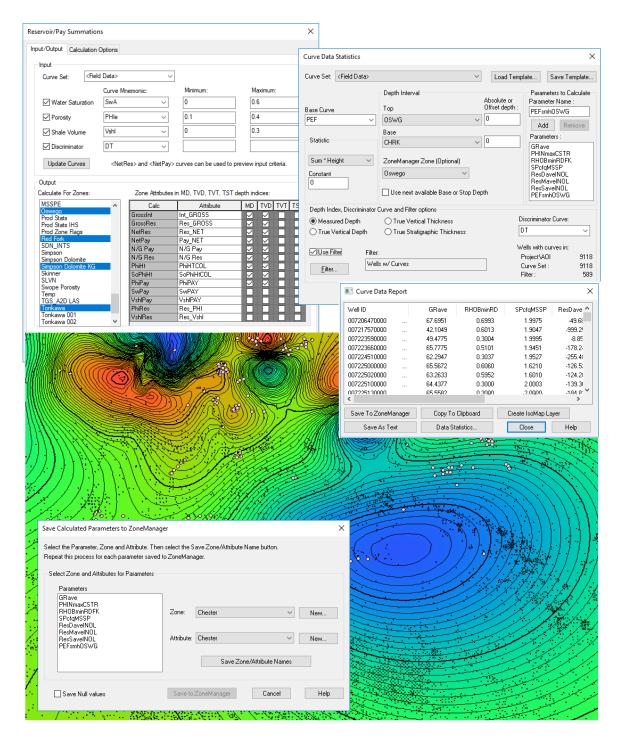
GVERSE Petrophysics works on the Windows platform and is integrated with the GeoGraphix Discovery Geology applications, and GVERSE Geophysics. In GVERSE Petrophysics, you work with the active GeoGraphix project (selected in ProjectExplorer), into which you import curve data and well files, and access well data directly from the database. You can use log templates created in GVERSE Petrophysics to display wells in GVERSE Geomodeling and XSection, create cross sections from wells displayed in GVERSE Petrophysics, view WellBase information for wells displayed in GVERSE Petrophysics, and create IsoMap layers from GVERSE Petrophysics curve data statistics. In addition to these integration features, when working with well data in GeoAtlas, GVERSE Geomodeling, or XSection, you can instantly view the selected wells in GVERSE Petrophysics.

Main Features

Multi-Well Interpretation

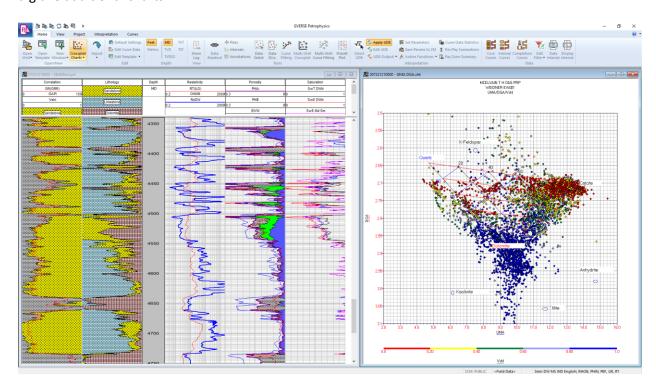
- Perform one-step reservoir pay summations for common reservoir attributes such as gross, net, net/gross, porosity feet, and hydrocarbon-filled porosity with corrections for true, vertical, and stratigraphic thickness.
- Generate virtually any statistic from curve-derived attributes over a zone or depth interval of interest with Curve Data Statistics.
- Easily confirm results using data-distribution histograms, statistics, and cross plots.
- Map directly in GeoGraphix or save results to ZoneManager attributes.

 Create proposed completion stages and perforation cluster intervals, then save as proposed completion records in the WellBase Completion table. These records are available for data posting symbology on the well log templates.



Petrophysical Analysis

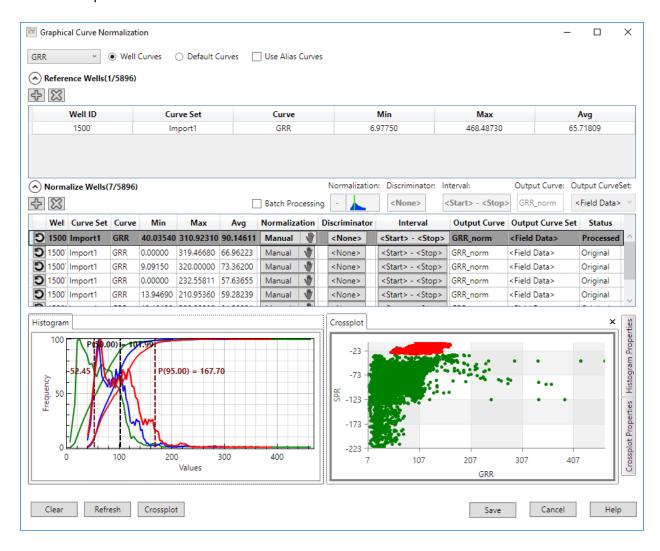
- Easily perform quick and interactive log calculations for standard interpretations and reconnaissance with user-defined equations.
- Utilize pre-written interpretations for 3 and 4-mineral determinations and Archie, Dual-Water,
 Indonesian, and Modified Simandoux saturation models.
- Link complex, external models written in C, C++, or Visual Basic.
- Build and save personal equations with user-defined equations comprised of over 250 pre-defined standard log analysis equations.
- Calculate Poisson's Ratio and Young's Modulus using mechanical properties/UDE Group.
- Utilize standard Halliburton, Schlumberger, and Baker Atlas charts for environmental corrections or digitize additional charts.



Curve Data Management

- Import standard LAS, LBS, ASCII, DLIS, and LIS/TIF data files.
- Automatically merge and splice curves using the curve import tool or optionally merge or splice at user defined depths.
- Benefit from project-based mnemonic inventory, mnemonic aliases, and unit conversions.
- Manually or bulk normalize curves using the graphical curve normalization utility which includes average, single, and two-point normalization methods.

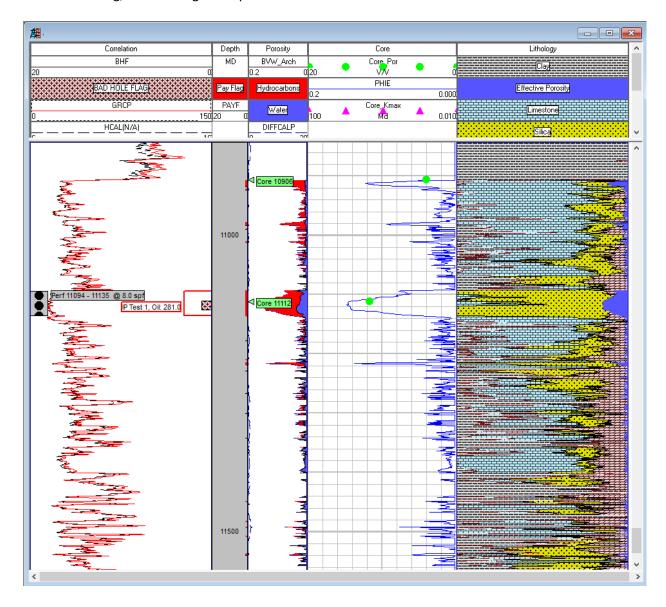
- Utilize single or multi-well curve copy, renaming, deletion, rescaling, min/max clipping and filter smoothing tools.
- View standard core curve analysis attributes plus 200 new user-defined core curves.
- Combine multiple curve mnemonics for similar curve types in hierarchical order based on a predetermined preference.



Log Analysis and Display

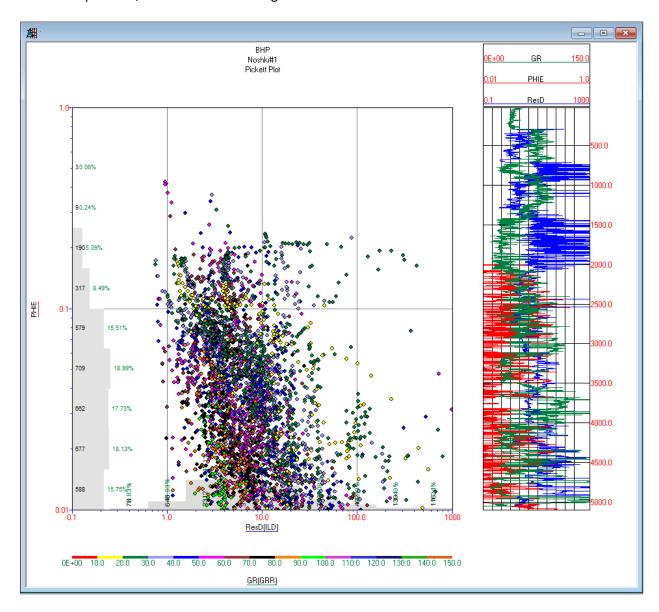
- Control presentation templates to display curve and depth-registered images with virtually unlimited tracks, curves, colors, and pattern fills.
- Display different track types including linear, logarithmic, mineral percent, depth registered images, text, core description, lithology pattern fills, tadpoles, and descriptions.
- Easily cut, copy, and paste curves between tracks using the on-screen presentation editing feature.
- Automatically post DST, core, perforation, mechanicals, IP, casing, tubing, and zone information.

- Interactively pick and display formation and fault markers and user-defined attribute intervals.
- On-screen QC editing of curves including performing simple or complex depth shifting, adjusting SP baseline shifting, and utilizing curve patch tools.



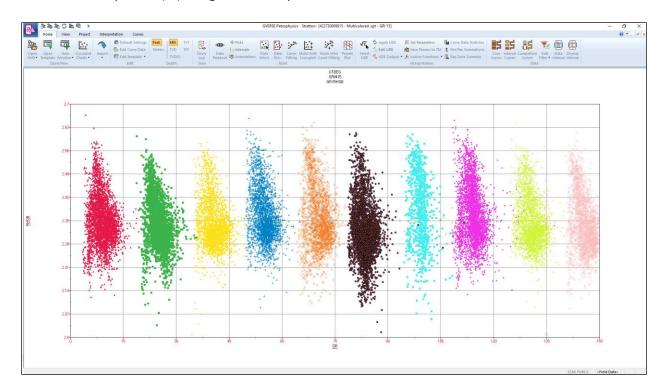
Cross Plot Analysis and Display

- Display data relationships over total well depths, user-specified depth range, or one or more zone(s)
- Create three-axis display with linear or logarithmic scale, user-controlled symbols, size and color, Z-axis color spectrum, and X and Y axis histograms



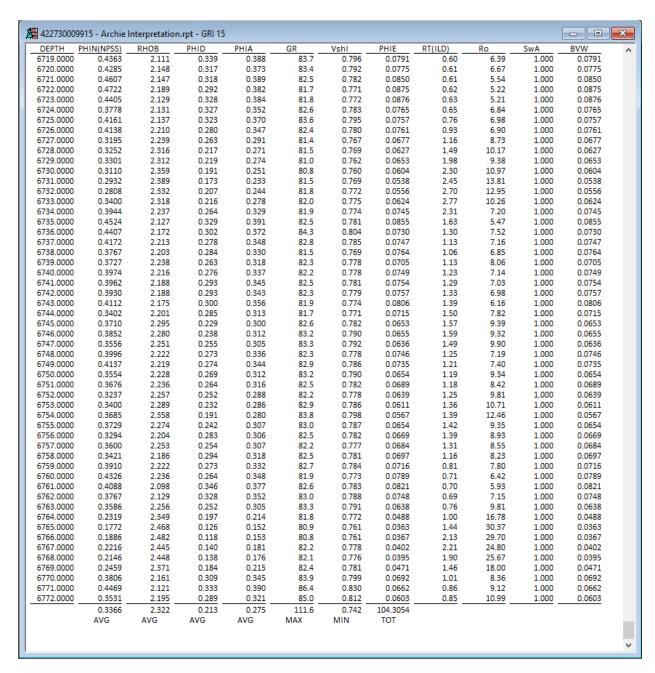
Multi-Well Cross Plots

- Benefit from multi-level discrimination with user-drawn polygon capabilities
- Differentiate between wells by assigning colors to individual wells for better analysis
- Fit curves using linear regression, reduced to major axis, and polynomial regression capabilities
- Interactively determine the Formation Water Resistivity (Rw), Bound Water Resistivity (Rwb) and Cementation Exponent (m) using the Pickett plot



Customizable Reports

- Create user-defined well reports such as net pay, average porosity, water saturation, total porosity
 feet, or hydrocarbon-filled porosity
- Define curve choices, sample rates, depth interval, or zone selection using the provided tabular list
- Export to tab or comma delimited text files, or copy results to the Microsoft® Windows® clipboard



Benefits

Intuitive Language: GVERSE Petrophysics uses a simple and intuitive scripting language. With little effort, users create sophisticated petrophysical models. These models can then be applied to individual wells for detailed analysis or to thousands of wells to generate reservoir-to-regional scale formation characterizations. Utilizing log template displays and petrophysical interpretations, users then multi-dimensionally view the petrophysical models from single-well log templates to multi-well cross sections to 3D fence diagrams.

Scalable Functionality: GVERSE Petrophysics includes over 250 predefined standard log analysis equations as well as several predefined water saturation, lithology, and coal bed methane (CBM) models. The equations are grouped into easy-to-understand families of calculations that can be copied and edited into a script to solve most formation-analysis problems. For the more sophisticated user, GVERSE Petrophysics can be linked to external models created in Visual Basic, C, or C++ code. External models offer unlimited analytical complexity as well as integration with presentation, attribute extraction, and mapping utilities.

Seamless Petrophysical Analysis, Attribute Extraction, and Mapping: Users can extract attributes generated in the petrophysical models within formation zones of interest and/or filtered well-sets for direct map layer creation, statistical analysis, or export. GVERSE Petrophysics easily links to ZoneManager, GeoGraphix attribute analysis application, to support well-by-well/zone-by-zone parameters for petrophysical models or read/write parameters for Pickett Plot analysis.

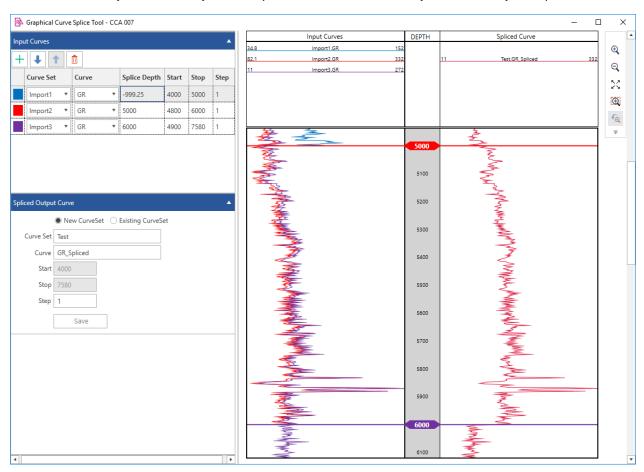
Installing GVERSE Petrophysics

GVERSE Petrophysics is installed seamlessly as part of the GeoGraphix installation. For system prerequisites and installation instructions, refer to the GeoGraphix Installation Guide on the LMKR Support Portal > Knowledge Center > Release Notes and Installation Guides page.

What's New in GVERSE Petrophysics 2019.3

Graphical Curve Splice

Introducing a tool that graphically splices the curve data for different runs in a well by allowing the user to combine two or more curves logged on different depth ranges to form a continuous composite curve. To launch the **Graphical Curve Splice** utility, select **Curves** tab >> **Graphical Curve Splice** option.

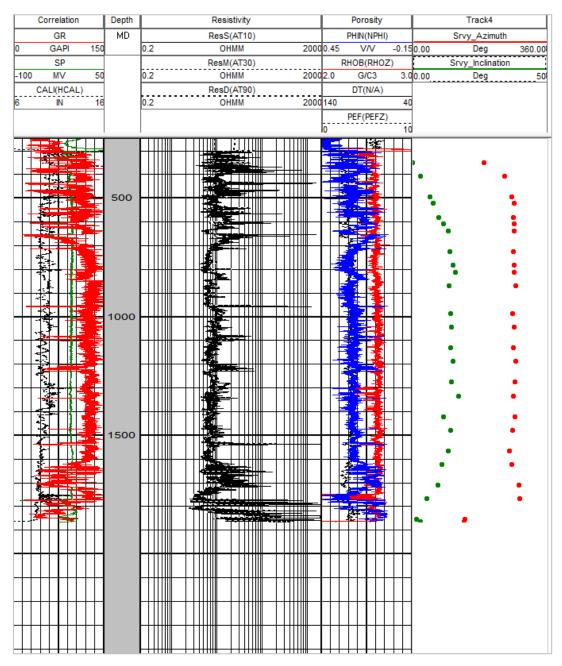


Filter Wells with Curves in Zone

Define a **Wells with Curves in Zone** filter to refine inventory that focuses on only wells with curves lying fully or partially in the corresponding zones. To apply the filter, select either **Home** tab >> **Open Well** option or **View** tab >> **Select Well** option and use **Filter** button.

Survey Curves

Display the Survey Curves in **GVERSE Petrophysics** using the Azimuth and Inclination survey data from **WellBase**. Use the Survey Curves as discriminator curve or as equations in UDE and display them in cross sections. To display Survey Curves in Log View, select **Home** tab >> **Survey Curves** option.



Data Sorting

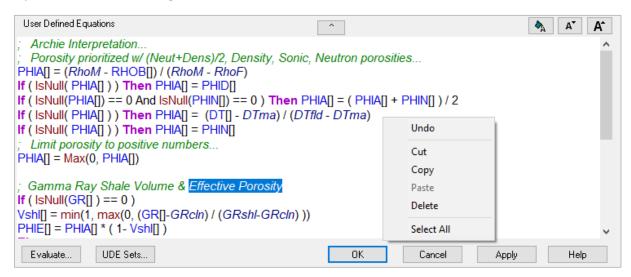
Attribute management is made easier with sorted list of Well with Computed Curve Sets in **Assign Field Data** and **Delete Computed Curves** feature.

Alphanumeric LAS Import

GVERSE Petrophysics integrates many types of data and starting from this release the user can easily import LAS files with alphanumeric text.

UDE Enhancements

Bringing together all important actions into one place using the right-click context menu. Manage your input controls in UDE using this menu.



Filter Image Names

Efficiently retrieve and highlight the Image Names in the Image List using key words in **DepthRegistration Default and Alias Image Names** feature. Use the filtered images in Image Track of Log Template in **GVERSE Petrophysics**.

Fixed Issues

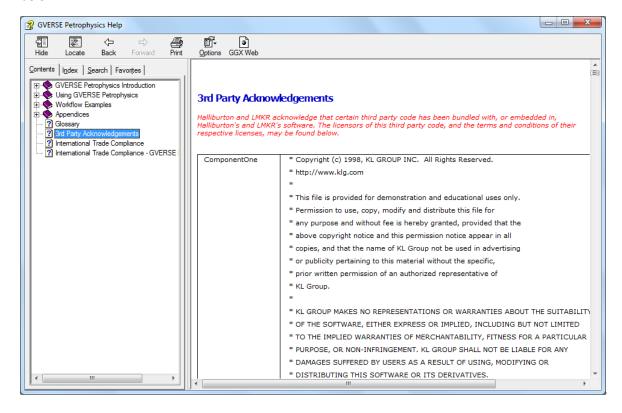
ID	Description
197172	Fixed the erroneous cursor position calculation in the Edit UDE dialog box. Previously, in case of a syntax error in an equation, a wrong character position was being highlighted.
197608	A right-click context menu is now added to the UDE text control of the "Edit User Defined Equations" dialog.
202964	In a network environment, creating IsoMap layers from GVERSE Petrophysics sometimes resulted in a 'server busy' message. This issue has been fixed.
208718	Fixed the UDE settings related to interpretation sets. Previously, it was not being saved within a session.
209249	Fixed the query syntax for adding import records in the table of "Import History" in
	Project Explorer view. Previously LAS files with an apostrophe in the file name were being imported with errors.
210003	Fixed the query syntax for adding import records in the table of "Import History" in Project Explorer view. Previously, importing curve names with an apostrophe resulted in an error message.

Third Party Acknowledgements

LMKR acknowledges that certain third party code has been bundled with, or embedded in, its software. The licensors of this third party code, and the terms and conditions of their respective licenses, may be found in the help file.

To access the 3rd party license agreements:

- 1. To access the online help, click the **help** tab located on the tab commands bar.
 - The Help window displays.
- 2. In the **Contents** pane, locate the **Third Party Acknowledgements** help topic as shown in the image below.



International Trade Compliance

This application is manufactured or designed using U.S. origin technology and is therefore subject to the export control laws of the United States. Any use or further disposition of such items is subject to U.S. law. Exports from the United States and any re-export thereafter may require a formal export license authorization from the government. If there are doubts about the requirements of the applicable law, it is recommended that the buyer obtain qualified legal advice. These items cannot be used in the design, production, use, or storage of chemical, biological, or nuclear weapons, or missiles of any kind.

The ECCNs provided here (if available) represent LMKR's opinion of the correct classification for the product today (based on the original software and/or original hardware). Classifications are subject to change. If you have any questions or need assistance please contact us at support@lmkr.com.

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The URL is: http://www.bis.doc.gov.

Definitions

ECCN - Export Control Classification Number - The ECCN is an alpha-numeric code, e.g., 3A001, that describes a particular item or type of item, and shows the controls placed on that item. The CCL (Commerce Control List) is divided into ten broad categories, and each category is further subdivided into five product groups. The CCL is available on the EAR Website.

EAR - Export Administration Regulation - The EAR is a set of regulations that are administered by the Bureau of Industry and Security, which is part of the US Commerce Department. In general, the EAR govern whether a person may export a thing from the U.S., re-export the thing from a foreign country, or transfer a thing from one person to another in a foreign country. The EAR apply to physical things (sometimes referred to as "commodities") as well as technology and software.

The EAR number and the License type for this product are included in the table below. Also included is the date the table was last updated.

Product/Component/R5000	EAR Number	License	Last Updated On
GVERSE Petrophysics	EAR99	EAR	07/22/2019

Contacting LMKR Support

LMKR is committed to providing the highest level of technical customer support in the industry. With an average tenure of more than thirteen years, our highly trained and experienced staff of technical analysts is comprised of geoscientists, engineers, land professionals, petrophysicists, and system specialists.

Please refer to our Customer Support timings mentioned below to ensure that you have access to our support analysts assigned to your region. When getting in touch with LMKR support, please remember that real-time support will not be available during bank holidays or after office hours. If you do get in touch with LMKR Support outside of work hours, please leave a voice message with a brief description of the issue that you are facing. Your voice message will be used to automatically create a support case for you. This will enable our analysts to attend to your issue and provide you with a resolution as soon as possible

North and South America	Europe, Middle East & Africa
Monday – Friday 8 am-6 pm CST* Toll Free (US/Canada): +1 855 GGX LMKR (449 5657)	UK: Monday - Friday 8 am – 5 pm* +44 20 3608 8042
Colombia: +57 1381 4908 United States: +1 303 295 0020 Canada: +1 587 233 4004	UAE: Sunday - Thursday (Dubai GMT+4) 8 am - 5 pm* +971 4 3727 999
*Excluding bank holidays	*Excluding bank holidays
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*Excluding bank holidays	*Excluding bank holidays

Helpful Links

Name	Website Address
LMKR Homepage	http://www.lmkr.com
LMKR GVERSE	http://www.lmkr.com/gverse
LMKR Support Portal	http://support.lmkr.com