



Software Product Description

PRODUCT NAME: VSI Graphical Kernel System

SPD DO-DVGSPD-00A

DESCRIPTION

This document addresses the VSI Graphical Kernel System for VSI OpenVMS.

VSI Graphical Kernel System (GKS) for OpenVMS is a two-dimensional and three-dimensional graphics support system that provides a set of programming functions for creating interactive and non-interactive graphics applications. As a development tool, VSI GKS is a solid base for portable, device-independent applications that define and display graphical images, using a variety of graphics devices.

VSI GKS for OpenVMS is VSI's implementation of the 1988 ISO 8805 standard GKS for Three Dimensions (GKS-3D) and the ISO 7942 standard GKS. VSI GKS conforms to level 2c of this standard, providing full output capabilities, including workstation-independent segment storage (level 2), and full synchronous and asynchronous input capabilities (level c).

FEATURES

VSI GKS supports DECwindows Motif for OpenVMS. VSI GKS is supported on HPE processors running the VSI OpenVMS Integrity Operating System V8.4-1H1 and higher, and on HPE AlphaServer systems running VSI OpenVMS Alpha V8.4-2L1 or higher.

VSI GKS is device-independent; the same program can generate graphical output on different devices without modification to the source code. The graphical output formats supported by VSI GKS include:

- CGM (Computer Graphics Metafile)
- DDIF (DIGITAL Document Interchange Format)
- Hewlett-Packard Graphics Language (HP-GL)
- Hewlett-Packard Printer Control Language (HP PCL)
- PostScript

VSI GKS provides four language bindings in which graphical data can be created and managed. These bindings are: C, ISO FORTRAN, GKS\$ (a two-dimensional, language-independent binding), and GKS3D\$ (a three-dimensional, language-independent binding).

VSI GKS is a subroutine library packaged as a set of shareable images with which application programs are linked. The shareable images are activated at run-time as needed.

NIST Certification

The two-dimensional subset of GKS received certification from the U.S. National Institute of Standards and Technology in December 1994.

Besides conforming to the ISO 7942, ISO 8805, and ISO 8806/1 (Fortran binding) standards, GKS satisfies the requirements of FIPS PUB 120-1.

Floating Point Formats

VSI GKS provides support for both IEEE and VAXfloat floating point formats.

PEX Support

VSI GKS supports output to the DIGITAL implementation of PEX Version 5.0 and PEX Version 5.1 servers. For OpenVMS Alpha, the PEX server extension and the PEXlib object library are available as part of the Open3D for OpenVMS Alpha product.

Output Modes

With VSI GKS, you can describe a graphical object using either segments or immediate mode. A segment is a set of output primitives that are created, manipulated, and deleted as a group, but are not modifiable. VSI GKS manages segments internally and automatically redraws them if the display is damaged (for example, if the display window is obscured and then exposed).

In immediate mode, primitives are rendered directly to the display surface without being stored internally in VSI GKS. This mode is useful when graphical data is temporary, or will be refreshed by the application.

Output Primitives

VSI GKS provides a variety of output primitives for creating basic two-dimensional and three-dimensional graphics. These primitives are:

Primitive	Description
Cell Array	A rectangular image specified by a two-dimensional array of rectangular color cells on a plane arbitrarily placed in three-dimensional space.
Fill Area	A polygonal area that can be hollow or filled with a uniform color, a pattern, or a hatch style. The edges of the area are not defined and cannot be controlled.
Fill Area Set	A set of polygonal areas with holes or disjointed regions that are treated as a single entity. These areas can be hollow or filled with a uniform color, patterns, or hatch styles. Control of edge attributes is provided.
Generalized Drawing Primitive (GDP)	A primitive providing access to drawing capabilities of graphics devices not used by the other primitives listed here; circles and arcs are two common GDPs.
Polyline	A set of connected lines defined by a series of points and having line type, line width, and color attributes defined.
Polymaker	One or more symbols that can mark significant points in a display and have type, size, scale, and color attributes defined.
Text	A character string at a given position in world coordinates. This string can be in 8-bit or 16-bit format, and can be displayed in a variety of fonts, orientations, sizes, and colors. Text size is affected by transformations.

Attributes

Each output primitive has an associated set of attributes that control the primitive's appearance. Attributes can be defined in groups (bundles) or individually. Some examples of attributes are:

Attribute	Description
Line Type	The style of a line, for example, dotted or dashed.
Line Width	The width of the line.
Color	The color of a primitive. You can select one of the predefined colors or specify the red, green, and blue intensities required to define a particular color on color devices.
Character Attributes	Text attributes, including font, character spacing, height, angle, path, and alignment.

Viewing Operations

VSI GKS allows you to specify views of three-dimensional objects and define the "working" or world coordinate system used in these views. World coordinates can have any scale. For example, one application might have a maximum range from 0 to 1000.0; another application might limit the range from 0.01 to 0.1.

You can control multiple, simultaneous views of the same objects on one or more display surfaces, as well as the position and size of the image on the surface. For example, one application program can display an image of a cube in one window on a workstation, and at the same time, the program can display a detail of the back of the cube in another window (on another workstation, if required).

Control Functions

Control functions are used to perform system management tasks related to the VSI GKS environment, the workstation environment, and the graphics display. These tasks include turning VSI GKS on and off when requested by the application, directing the flow of graphics data to logical output devices and managing the picture process.

Inquiry Functions

VSI GKS includes a complete set of inquiry functions. These functions are used to obtain information about the VSI GKS state, segment storage, workstation capabilities, or the workstation state. This information is essential for developing modular, device-independent programs.

Escape Functions

Escape functions are included with VSI GKS to enable access to functionality not provided in the GKS standard. The VSI GKS escape functions include:

- Double buffering control
- Background pixmap control
- Screen dumps

Logical Input Devices

Logical Input Device	Description
Locator	Allows you to select a point on the display.
Stroke	Allows you to input a series of points on the display.
Valuator	Allows you to select a real number from a range of numbers by sliding a pointer to a position on a radio dial.
Choice	Allows you to make a selection from a list of choices in a menu.
String	Allows you to input a character string as input to a prompt.
Pick	Allows you to select an object that is visible on the display. The information returned consists of a segment name, a pick identifier, and the segment status. Primitives outside segments cannot be picked.

Character Fonts and Sets

VSI GKS includes a series of stroke-precision character fonts. These character fonts were digitized by Dr. Allen V. Hershey of the Naval Surface Weapons Laboratory, and supplied to Digital Equipment Corporation by the National Bureau of Standards.

VSI GKS also provides text support for the native character sets of the supported graphical devices.

Language Bindings

VSI GKS functions can be accessed by four sets of subroutine calls or "bindings" as they are referred to by the GKS standards. These bindings are:

- A FORTRAN binding that conforms to the ISO (DIS 8806/1) FORTRAN binding to GKS-3D.
- A C binding that conforms to a three-dimensional extension of the ISO (DP 8651/4) C language binding to GKS.
- GKS3D\$, a language-independent, three-dimensional binding that follows the standard calling conventions and is callable by many different languages.
- GK\$, a language-independent, two-dimensional binding that follows the standard calling conventions and is callable by many different languages.

GKS-3D Metafile

VSI GKS provides the capability of reading and writing sequential files in two formats: the ISO 8805 suggested GKS-3D Metafile format and the ISO 7942 suggested two-dimensional GKSM Metafile format. The metafiles can be used to:

- Save and restore graphical information between sessions in a device-independent format
- Transfer graphical information between systems with compatible versions of VSI GKS
- Transfer graphical information between two GKS applications
- Transfer graphical information from a GKS-3D application to a GKS application
- Store accompanying non-graphical information

VSI Document Interchange Format (DDIF)

VSI GKS provides support for storing two-dimensional views of three-dimensional objects encoded in DIGITAL Document Interchange Format (DDIF). Views stored in DDIF can be processed by applications that conform to the DIGITAL Compound Document Architecture (CDA).

Computer Graphics Metafile (CGM) Output

VSI GKS provides support for storing information using the Computer Graphics Metafile (CGM), an approved ANSI standard format (ANSI X3.122-1986). VSI GKS supports CGM output for the following formats:

- Clear Text Encoding - Graphical output data stored in this format is easily created, viewed, and modified using a common text editor. This format is also suitable for transferring graphical output data through networks that support the transfer of text files only.
- Character Encoding - Graphical output data is typically stored in this format to reduce the file size. This format is especially suited to transfers through networks that do not support binary transfers.
- Binary Encoding - Graphical output data stored in this format is very compact and the fastest to read and write. This format is the least suitable for transmission over communication lines because all 8 bits in each byte are meaningful.

Graphics Handlers

VSI GKS includes support for a wide variety of graphics devices provided by many vendors. Users can develop their own graphics device handlers using the VSI GKS device handler interface.

Device handlers can be developed in VSI Fortran and VSI C.

CONFORMANCE TO STANDARDS

VSI GKS is designed to conform to the following standards:

- NIST Certification: VSI GKS satisfies the requirements of FIPS PUB 120-1.
- ISO 8805 standard GKS for Three Dimensions (GKS-3D).
- ISO 7942 standard GKS.
- MIT X Window System Version 11 Release 5 (X11R5).
- PEX Version 5.0 and 5.1.
- The FORTRAN binding conforms to the ISO (DIS 8806/1) FORTRAN binding to GKS-3D.

HARDWARE REQUIREMENTS

Processors Supported:

- VSI GKS for Integrity is supported on the following HPE Integrity servers. Note that for 3D graphics support on HPE Integrity servers, an AB551A graphics adapter is required.
 - rx1600
 - rx2600, rx2620, rx2660
 - rx3600
 - rx6600
 - rx7640
 - rx8640
 - rx2800 i2, rx2800 i4
 - BL860c i2, BL860c i4
 - BL870c i2, BL870c i4
 - BL890c i2, BL890c i4

- VSI GKS for Alpha is supported on these HPE AlphaServer systems:
 - AlphaServer DS10, DS10L
 - AlphaServer DS15
 - AlphaServer DS20, 20E, 20L
 - AlphaServer DS25
 - AlphaServer ES40
 - AlphaServer ES45
 - AlphaServer ES47
 - AlphaServer ES80¹
 - AlphaServer GS80¹
 - AlphaServer GS160¹
 - AlphaServer GS320¹
 - AlphaServer GS1280¹

See the latest VSI OpenVMS Alpha or VSI OpenVMS Integrity Operating System Software Product Descriptions for information about supported servers.

Memory Requirements for DECwindows Motif Support

The minimum supported memory for VSI GKS running in a standalone DECwindows Motif environment, with both the client and server executing on the same system, is 32 MB. The memory size suggested for most typical hardware configurations, however, is 64 MB or more, depending on the system.

The system configuration and performance requirements of DECwindows Motif applications can determine the memory needed on your system as follows:

- Less memory may be required on the client system (where the software is installed and executed) if the server (component displaying the application) resides on another system.
- More memory may be required on a system where improved performance is desired, or where several applications are running.

¹ System support is anticipated, pending completion of testing.

OPTIONAL HARDWARE

VSI GKS supports a variety of interactive and hard copy devices. At least one of these devices is required to display graphics output.

Device	Model
Terminal for DECwindows Motif Clients	DECterminal VXT 2000
Terminals	<ul style="list-style-type: none"> • VT125 with black and white or optional color monitor (ReGIS) • VT240 with black and white monitor (ReGIS) • VT241 with color monitor (ReGIS) • VT330 with black and white monitor • VT340 with color monitor • TEKTRONIX 4014 with enhanced graphics module (Option 34) or equivalent <p>Note: The emulation of a TEKTRONIX 4014 is not supported on any hardware.</p> <ul style="list-style-type: none"> • TEKTRONIX 4107, 4128, 4129, 4207 terminals
Compatible Sixel Devices	<ul style="list-style-type: none"> • DIGITAL DEClaser 1100, 2100, 2150, 2200, 2250, 2300, 2400 Laser Printers • DIGITAL LN03 with LN03S-UA upgrade kit • DIGITAL LN03 PLUS Laser Printer • DIGITAL LN03S-JA Laser Printer • DIGITAL LA50 (restricted to a 2:1 aspect ratio) • DIGITAL LA75 • DIGITAL LA84 • DIGITAL LA86 • DIGITAL LA100 • DIGITAL LA280 • DIGITAL LA324 (Color Sixel Printer) • DIGITAL LA380 • TEKTRONIX 4611 hard copy unit when connected to the TEKTRONIX 4014 computer display terminal
Compatible Hewlett-Packard Graphics Language Devices	<ul style="list-style-type: none"> • DIGITAL LVP16 Pen Plotter • Hewlett-Packard Pen Plotters HP7475, HP7550, HP7580, HP7585 • LASERGRAPHICS MPS-2000 Film Recorder
Compatible Hewlett-Packard PCL Level 4 Devices	Hewlett-Packard LaserJet II
Ink Jet Plotters	<ul style="list-style-type: none"> • DIGITAL LCG01 Color Ink Jet Plotter (ReGIS) • DIGITAL LJ250 (Color Sixel)
Compatible PostScript Devices	<ul style="list-style-type: none"> • Apple LaserWriter, LaserWriter Plus • DIGITAL DEClaser 1150, 2150, 2250 • DIGITAL LN03R ScriptPrinter • DIGITAL LPS20 Laser Printer • DIGITAL Laser Printers LPS20-GJ, LPS32, and LPS40 • DIGITAL LPS40-AJ, LPS40-DJ Laser Printers

SOFTWARE REQUIREMENTS

VSI GKS for OpenVMS requires the following OpenVMS software:

- VSI OpenVMS Integrity Version 8.4-1H1 or higher, plus VSI DECwindows Motif V1.7F or higher
- VSI OpenVMS Alpha Version 8.4-2L1 or higher, plus VSI DECwindows Motif V1.7F or higher

For the development of applications and programs that use VSI GKS on OpenVMS, one of the languages supported by VSI GKS is also required.

OPTIONAL SOFTWARE

On PEX workstation types, VSI GKS requires Open3D (the version supported by the VSI OpenVMS Alpha version installed on your machine).

VSI GKS for OpenVMS Alpha supports the following languages:

- VSI C Version 7.4-1 or higher
- VSI Fortran Version 8.3-3 or higher
- VSI Pascal Version 6.2-125 or higher

VSI GKS for OpenVMS Integrity supports the following languages:

- VSI C Version 7.4-01 or higher
- VSI Fortran Version 8.3-2-1 or higher
- VSI Pascal Version 6.2 or higher

SOFTWARE LICENSING

A software license is required in order to use the VSI GKS software product. Version update licenses are not available. Rights to use future revisions of VSI GKS are available only through a Support Agreement or through a new license purchase.

VSI GKS is available in two forms: as a Development kit and as a Run-Time-Only kit. These kits are furnished only under a license.

- The Development kit license enables you to develop and run your own graphics applications.
- The Run-Time kit license allows you to run applications that were developed on a system where the full VSI GKS product was installed. As a result, the Run-Time-Only kit license is available at a substantially lower cost per system than the Development kit license.

For more information about OpenVMS licensing terms and policies, contact your VSI account representative. Information is also available at the following website: <http://vmsssoftware.com/services>

LICENSE MANAGEMENT FACILITY SUPPORT

VSI GKS for OpenVMS supports the *VSI OpenVMS License Management Facility*. For more information about the License Management Facility, refer to the *VSI OpenVMS License Management Utility Manual* in the OpenVMS documentation set.

GROWTH CONSIDERATIONS

The minimum hardware and software requirements for any future version of this product may be different from the requirements for the current version.

ORDERING INFORMATION

VSI GKS on OpenVMS licenses are available as electronic licenses (E-LTU) or physical licenses (P-LTU). VSI GKS Development and RunTime software kits are available as separate downloads from VSI's secure ftp server.

For VSI GKS on OpenVMS Integrity

Order Number	Description
	VSI Graphical Kernel System Development P-LTU
SL-LIGK1P-72V	VSI Graphical Kernel System Development PSL Single Core Server 1 P-LTU Units
SL-LIGK2P-72V	VSI Graphical Kernel System Development PSL 2 Core Server 2 P-LTU Units
SL-LIGK4P-72V	VSI Graphical Kernel System Development PSL 4 Core Server 4 P-LTU Units
SL-LIGK8P-72V	VSI Graphical Kernel System Development PSL 8 Core Server 8 P-LTU Units
	VSI Graphical Kernel System Development E-LTU
SL-LIGK1E-72V	VSI Graphical Kernel System Development PSL Single Core Server 1 E-LTU Unit
SL-LIGK2E-72V	VSI Graphical Kernel System Development PSL 2 Core Server 2 E-LTU Units
SL-LIGK4E-72V	VSI Graphical Kernel System Development PSL 4 Core Server 4 E-LTU Units
SL-LIGK8E-72V	VSI Graphical Kernel System Development PSL 8 Core Server 8 E-LTU Units
	VSI Graphical Kernel System RunTime P-LTU
SL-LIGR1P-72V	VSI Graphical Kernel System RunTime PSL Single Core Server 1 P-LTU Units
SL-LIGR2P-72V	VSI Graphical Kernel System RunTime PSL 2 Core Server 2 P-LTU Units
SL-LIGR4P-72V	VSI Graphical Kernel System RunTime PSL 4 Core Server 4 P-LTU Units
SL-LIGR8P-72V	VSI Graphical Kernel System RunTime PSL 8 Core Server 8 P-LTU Units
	VSI Graphical Kernel System RunTime E-LTU
SL-LIGR1E-72V	VSI Graphical Kernel System RunTime PSL Single Core Server 1 E-LTU Units
SL-LIGR2E-72V	VSI Graphical Kernel System RunTime PSL 2 Core Server 2 E-LTU Units
SL-LIGR4E-72V	VSI Graphical Kernel System RunTime PSL 4 Core Server 4 E-LTU Units
SL-LIGR8E-72V	VSI Graphical Kernel System RunTime PSL 8 Core Server 8 E-LTU Units

For VSI GKS on OpenVMS Alpha

A license for VSI GKS is included in the VSI OpenVMS **ALPHA-LP PAK** that is included with the purchase of a support contract for VSI OpenVMS Alpha. The support contract also includes the **ALPHA-SYSTEM PAK** that enables the base VSI OpenVMS Alpha operating system. Contact VSI at info@vmsssoftware.com for more information about ordering VSI OpenVMS GKS for use on an Alpha system.

SOFTWARE PRODUCT SERVICES

A variety of service options are available from VSI. For more information, contact your VSI account representative or distributor. Information is also available at the following website:
<http://vmsssoftware.com/services>

SOFTWARE WARRANTY

This software product is provided by VSI with a 90-day conformance warranty in accordance with the VSI warranty terms applicable to the license purchase.

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