

**DOLPHIN INTEGRATION**

**SMASH 7.4.0 - SCROOGE 4.4.0 -  
SHAKER 7.4.0**  
**New Features**  
**June 27, 2019**

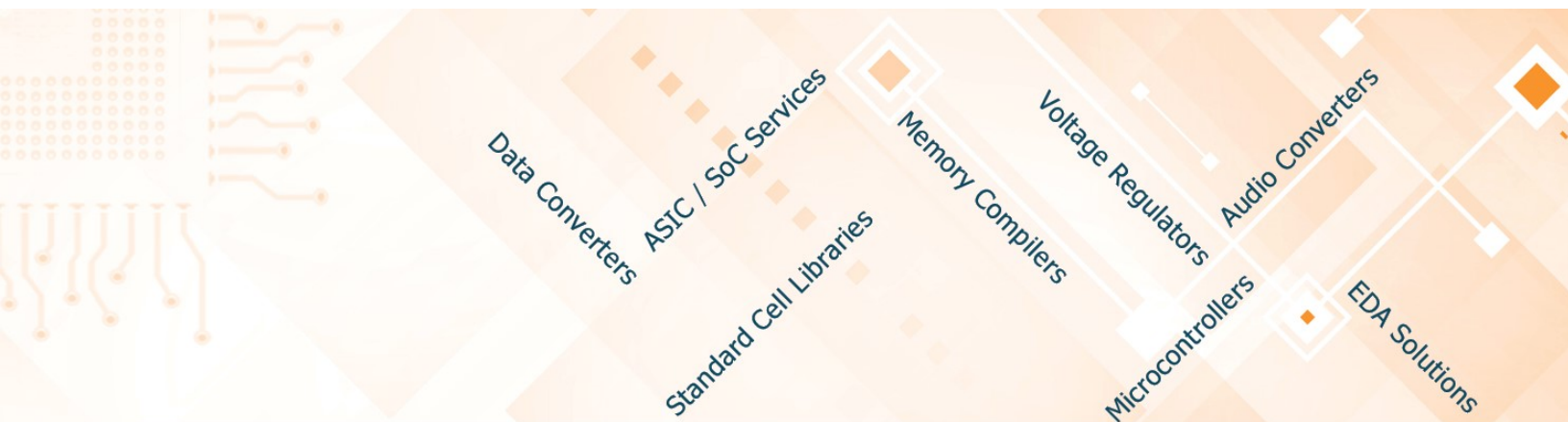
**Dolphin Integration**

1bisA Chemin du Pre Carre - 38240-MEYLAN - FRANCE

Phone : + 33 4 76 41 10 96 - Fax : + 33 4 76 90 29 65

[www.dolphin-integration.com](http://www.dolphin-integration.com)

[contact@dolphin.fr](mailto:contact@dolphin.fr)



Not just a supplier of Technology, but provider of the Dolphin Integration **know-how!**

COPYRIGHT © 1992 - 2019 Dolphin Integration. All rights reserved. No part of this document may be transmitted, reproduced, or transcribed in a retrieval system without prior written consent of Dolphin Integration.

The information in this manual is subject to change without notice and does not represent a commitment on the part of Dolphin Integration. Except as may be explicitly set forth in a written agreement between Dolphin Integration and its customer, Dolphin Integration does not make, and expressly disclaims, any representations or warranties as to the completeness, accuracy or usefulness of the information contained in this document. Dolphin Integration reserves the right to revise this document without any obligation to notify any person of such revision or change.

The software described in this manual is supplied under a license agreement between you and Dolphin Integration. The license agreement authorizes the number of copies that may be made and the computer systems on which they may be used. Any unauthorized duplication or use in whole or part is forbidden.

**DOLPHIN INTEGRATION** is a brand of Dolphin Design.

**SMASH** is a registered trademark of Dolphin Design.

**Mac OS** is a registered trademark of Apple Inc.

**Microsoft Windows** is a registered trademark of Microsoft Corporation.

**Verilog** is a registered trademark of Cadence Design Systems Inc.

## Contents

<b>Contents</b>	<b>3</b>
<b>Preamble</b>	<b>5</b>
Web Site . . . . .	5
Supported Platforms . . . . .	5
Microsoft Windows . . . . .	5
Linux on Intel x64 platform . . . . .	5
<b>Credits &amp; Copyrights</b>	<b>6</b>
wxWidgets: A free C++ framework for cross-platform programming . . . . .	6
Scintilla Source Code Editor Component . . . . .	6
OpenSSL Secure Sockets Layer toolkit . . . . .	6
OpenSSL License . . . . .	6
Original SSLeay License . . . . .	7
Trio: portable and extendable printf and string functions . . . . .	8
Gear-Brayton Integration Method . . . . .	9
EKV3 Compact MOSFET Model Documentation . . . . .	9
VDA / FAT Open Source Library . . . . .	9
FUNDAMENTALS_VDA . . . . .	9
SPICE2VHD . . . . .	9
AUTOMOTIVE_VDA . . . . .	9
<b>New Features</b>	<b>10</b>
SMASH - Kernel . . . . .	10
Enhancements . . . . .	10
Bug fixing . . . . .	10
SMASH - Licensing . . . . .	10
Enhancements . . . . .	10
SMASH - Models . . . . .	10
Enhancements . . . . .	10
Bug fixing . . . . .	11
SMASH - SPICE . . . . .	11
Enhancements . . . . .	11
Bug fixing . . . . .	11
SMASH - Verilog-AMS . . . . .	11
Enhancements . . . . .	11
Bug fixing . . . . .	11

SMASH - Viewer . . . . .	11
Enhancements . . . . .	11
Bug fixing . . . . .	11

## Preamble

As always for new releases, we would like to thank those customers who take the time to report problems and/or to suggest improvements (please remember that the best way to do so is by sending an email to [support@dolphin-integration.com](mailto:support@dolphin-integration.com) with an accurate description of your problem or suggestion, together with the relevant files if any). As you will see in the new features, we do our best to take remarks into account. And even if your suggestion does not appear this time, don't think it was lost or disregarded. Simply, it means that its implementation could not fit into the development plan for this particular release, but be assured that we will try to take it into account in a future release.

## Web Site

Our web site <http://www.dolphin-integration.com> is a source of information on our EDA solutions. Aside from evaluation kits for our products, a number of application notes, courses or upgrades are available for download.

## Supported Platforms

### Microsoft Windows

SMASH is designed to run on Microsoft Windows Vista / 7 / 8 / 10 on x86\_64 platforms.

### Linux on Intel x64 platform

SMASH is designed to run under X-Window on RedHat Enterprise Linux 6 (RHEL6) and supports compatible Linux distributions on x86\_64 platforms.

## Credits & Copyrights

### **wxWidgets: A free C++ framework for cross-platform programming**

<http://www.wxwidgets.org>

wxWindows Library License, Version 3

Copyright (C) 1998 Julian Smart, Robert Roebing [, ...]

#### TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Library General Public License as published by the Free Software Foundation (<http://www.gnu.org>); either version 2 of the License, or (at your option) any later version.

This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Library General Public License for more details.

### **Scintilla Source Code Editor Component**

License for Scintilla and SciTE

Copyright 1998-2005 by Neil Hodgson

All Rights Reserved

Permission to use, copy, modify, and distribute this software and its documentation for any purpose and without fee is hereby granted, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation.

NEIL HODGSON DISCLAIMS ALL WARRANTIES WITH REGARD TO THIS SOFTWARE, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS, IN NO EVENT SHALL NEIL HODGSON BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTUOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

### **OpenSSL Secure Sockets Layer toolkit**

The OpenSSL toolkit stays under a dual license, i.e. both the conditions of the OpenSSL License and the original SSLeay license apply to the toolkit. See below for the actual license texts. Actually both licenses are BSD-style Open Source licenses.

#### **OpenSSL License**

Copyright 1998-2011 The OpenSSL Project. All Rights Reserved

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgment: "This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org/>)"
4. The names "OpenSSL Toolkit" and "OpenSSL Project" must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact [openssl-core@openssl.org](mailto:openssl-core@openssl.org).
5. Products derived from this software may not be called "OpenSSL" nor may "OpenSSL" appear in their names without prior written permission of the OpenSSL Project.
6. Redistributions of any form whatsoever must retain the following acknowledgment: "This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>)"

THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT "AS IS" AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE OpenSSL PROJECT OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

This product includes cryptographic software written by Eric Young. This product includes software written by Tim Hudson.

### **Original SSLey License**

Copyright 1995-1998 Eric Young

All rights reserved.

This package is an SSL implementation written by Eric Young. The implementation was written so as to conform with Netscapes SSL.

This library is free for commercial and non-commercial use as long as the following conditions are aheared to. The following conditions apply to all code found in this distribution, be it the RC4, RSA, lhash, DES, etc., code; not just the SSL code. The SSL documentation included with this distribution is covered by the same copyright terms except that the holder is Tim Hudson.

Copyright remains Eric Young's, and as such any Copyright notices in the code are not to be removed. If this package is used in a product, Eric Young should be given attribution as the author

of the parts of the library used. This can be in the form of a textual message at program startup or in documentation (online or textual) provided with the package.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgment: "This product includes cryptographic software written by Eric Young (eay@cryptsoft.com)" The word 'cryptographic' can be left out if the routines from the library being used are not cryptographic related :-).
4. If you include any Windows specific code (or a derivative thereof) from the apps directory (application code) you must include an acknowledgment: "This product includes software written by Tim Hudson (tjh@cryptsoft.com)"

THIS SOFTWARE IS PROVIDED BY ERIC YOUNG "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

### **Trio: portable and extendable printf and string functions**

Copyright (C) 1998-2001 by Bjorn Reese and Daniel Stenberg.

Permission to use, copy, modify, and distribute this software for any purpose with or without fee is hereby granted, provided that the above copyright notice and this permission notice appear in all copies.

THIS SOFTWARE IS PROVIDED "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE AUTHORS AND CONTRIBUTORS ACCEPT NO RESPONSIBILITY IN ANY CONCEIVABLE MANNER.



## **Gear-Brayton Integration Method**

The new formulation of the Gear-Brayton integration method included in SMASH was perfected and implemented at Supélec - Service des Mesures.

## **EKV3 Compact MOSFET Model Documentation**

A. Bazigos, M. Bucher, F. Krummenacher, J.-M. Sallese, A.-S. Roy, C. Enz, "*EKV3 Compact MOSFET Model Documentation, Model Version 301.01*", Technical Report, Technical University of Crete, November 23, 2007.

## **VDA / FAT Open Source Library**

The open source library of VHDL-AMS components created by the VDA / FAT working group is delivered with SMASH.

The VDA / FAT Working Group AK 30 "Simulation of Mixed Systems with VHDL-AMS" is organized within the Association for Research in Automobile Technology (FAT - Forschungsvereinigung Automobiltechnik) of the German Association of the Automotive Industry (VDA - Verband der Automobilindustrie). It promotes the relationship between car manufactures and their suppliers concerning simulation of mixed systems and model exchange.

The working group promotes the development of VHDL-AMS models that are integrated in different libraries.

## **FUNDAMENTALS\_VDA**

Public library with general VHDL-AMS models like time sources, converters between different domains, table-lookup models, relays, switches...

## **SPICE2VHD**

VHDL-AMS models with nearly the same terminal behavior like Spice models of basic electrical elements like resistor, capacitor, inductor, and level1 models of semiconductor devices.

## **AUTOMOTIVE\_VDA**

Library under development with special parameterized models like wires, fuses, bulbs, EMC test signals...

## New Features

### SMASH - Kernel

#### Enhancements

- Improved operating-point power-up method to be allowed when the circuit contains logic items (DDIsa13454 - SMASH 7.4.0)
- Improved the .CONNECT directive management to reduce the matrix size and thus improve the overall simulation performance (DDIsa13474 - SMASH 7.4.0)
- Implemented Tian's method to make the '.LSTB' directive insensitive to the direction of the voltage source (DDIsa13478 - SMASH 7.4.0)
- Implemented Zeq method to compute the voltage of each node of the circuit during '.LSTB' analyses (DDIsa13479 - SMASH 7.4.0)
- Modified the default behavior of bang '!' character to not treat it as starting comment line (DDIsa13500 - SMASH 7.4.0)

#### Bug fixing

- Corrected archive file creation to include Verilog files included by other Verilog files (DDIsa13502 - SMASH 7.4.0)
- Corrected SMASH to work on Linux when the installation directory contains spaces (DDIsa13517 - SMASH 7.4.0)

### SMASH - Licensing

#### Enhancements

- Changed the limitations associated with the Discovery options (DDIsa13510 - SMASH 7.4.0)

### SMASH - Models

#### Enhancements

- Improved the memory consumption of SPICE compact models when ports can be merged (DDIsa13443 - SMASH 7.4.0)
- Updated SPICE model BSIM-BULK v106.2 with last TMI noise equations (DDIsa13485 - SMASH 7.4.0)
- Implemented TMI noise equations support for BSIM-CMG v106.1 SPICE model (DDIsa13488, DDIsa13314 - SMASH 7.4.0)

**Bug fixing**

- Corrected a crash that occurs when inductance is instantiated with POLY parameter without value (DDIsa13465 - SMASH 7.4.0)

**SMASH - SPICE****Enhancements**

- Improved the .CONNECT directive to display a warning message when a node does not exist (DDIsa12246 - SMASH 7.4.0)
- Implemented the RM\_CMIN option to ignore small capacitors (DDIsa13507 - SMASH 7.4.0)

**Bug fixing**

- Corrected the evaluation of .MEASURE extract=DX with input parameters "YL" and "YH" when there are few waveform points (DDIsa13501 - SMASH 7.4.0)
- Corrected transient convergence problem caused by switching of matrix from KLU to SPARSE (DDIsa13504 - SMASH 7.4.0)

**SMASH - Verilog-AMS****Enhancements**

- Implemented access to Verilog-Ams grounded nets from SPICE directives (DDIsa13490 - SMASH 7.4.0)

**Bug fixing**

- Corrected Verilog-Ams grounded port management to force connected net to be grounded (DDIsa13489 - SMASH 7.4.0)

**SMASH - Viewer****Enhancements**

- Implemented a new preference for displaying complex HTML pages (DDIsa03446 - SMASH 7.4.0)

**Bug fixing**

- Corrected the display of 'CapaMin' field value from the 'Directives' dialog box (DDIsa13503 - SMASH 7.4.0)