

# SAMPLE REPORT

## Contents

<b>1</b>	<b>INTRODUCTION.....</b>	<b>6</b>
1.1	Overview.....	6
1.2	Specific aspects addressed for YourProject project.....	6
1.3	Disclaimer.....	6
<b>2</b>	<b>ITEMS ADDRESSED BY THIS REPORT .....</b>	<b>7</b>
2.1	Quality Control & Validation .....	7
2.1.1	Quality Systems .....	7
2.1.2	Year 2000 Issues .....	7
2.1.3	Compiler Testing Prior To Release.....	7
2.1.4	Empirical Measures Of Compiler Integrity .....	7
2.1.5	Compiler Problem Status .....	8
2.1.6	Compliance with various medical, quality and safety related standards.....	8
2.1.7	Compliance with 61508 (part 3) .....	8
2.2	Standard Functions .....	8
2.2.1	Standard ISO-C library functions not provided .....	8
2.2.2	Standard ISO-C library functions that differ in prototype from what would be expected.....	10
2.2.3	Standard ISO-C functions behaving in a non-standard manner. ....	14
2.2.4	Re-entrancy.....	14
2.2.5	Library Source.....	23
2.3	Implementation-Specific Issues .....	25
2.3.2	The layout of storage for parameters.....	26
2.3.3	How a diagnostic is identified.....	30
2.3.4	What constitutes an interactive device.....	32
2.3.5	The number of bits in a character in the execution character set. ....	33
2.3.6	The result of casting a pointer to an integer or vice versa. ....	34
2.3.7	What constitutes an access to an object that has volatile-qualified type. ....	34
2.3.8	The maximum number of declarators that may modify an arithmetic, structure or union type. ....	35
2.3.9	Whether the value of a single-character character constant in a constant expression that controls conditional inclusion matches the value of the same character constant in the execution character set. Whether such a character constant may have a negative value. ....	35
2.3.10	The mapping of source file character sequences.....	35
2.3.11	The null pointer constant to which the macro NULL expands.....	35
2.3.12	CTYPE.H Functions .....	36
2.3.13	The values returned by the mathematics functions on domain errors.....	37
2.3.14	Compiler Actions With Unusually Terminated Source Files .....	41
2.3.15	The outcome when the result of an integer arithmetic function ( <i>abs</i> , <i>div</i> , <i>labs</i> , or <i>ldiv</i> ) cannot be represented.....	43
2.3.16	The outcome when an <i>lvalue</i> with an incomplete type is used in a context that requires the value of the designated object. ....	44
2.3.17	Mismatches in type between <i>lvalue</i> and object .....	44
2.3.18	Incomplete Data Declarations .....	46
2.3.19	Volatile/non-volatile mismatches .....	47
2.3.20	Incomplete Types And Tentative Declarations .....	48
2.3.21	Shift Left And Shift Right Operations.....	48
2.3.22	Integer Division Behaviour.....	49
2.3.23	Floating Point Truncation.....	49
2.3.24	Float To Integer Conversions .....	50
2.3.25	Type promotion, <i>char</i> To <i>int</i> .....	52
2.3.26	Type Promotion From <i>int</i> To <i>long</i> .....	53
2.4	Compiler System Controls Which Impact Software Integrity And Maintainability .....	54
2.4.1	Overview .....	54
2.4.2	Compiler Controls .....	55
2.4.3	Linker Controls .....	57
2.4.4	CPU Configuration Controls In START167.A66 .....	57
2.4.5	Characteristics Of HLRANGE Model Programs .....	57
2.4.6	The Special Sections "?C_CLRMEMSEC" And "?C_INITSEC" .....	61
2.4.7	The CINITTAB() Control (KEIL C166 v4.xx) .....	61
2.5	Floating Point Library Test .....	62
2.5.1	Preliminary Work.....	62
2.5.2	ESP.....	63
2.5.3	Discussion Of Results.....	63
2.6	Limits Of The Keil C166 Compiler System .....	65
2.6.1	Compiler Implementation Limits.....	65
2.6.2	Siemens/Keil OMF66 Object Module Format Limits .....	65
<b>3</b>	<b>COMPOSITION OF THE COMPILER TOOLKIT.....</b>	<b>66</b>
3.1	Changes to compiler Keil C166.....	68

# SAMPLE REPORT

3.1.1	KEIL C166 Version 4.27 Release .....	68
3.1.2	KEIL C166 Version 4.26a Release .....	68
3.1.3	KEIL C166 Version 4.26 Release .....	68
3.1.4	KEIL C166 Version 4.25 Release .....	68
3.1.5	KEIL C166 Version 4.24 Release .....	68
3.1.6	KEIL C166 Version 4.23 Release .....	69
3.1.7	KEIL C166 Version 4.22 Release .....	69
3.1.8	KEIL C166 Version 4.20 Release .....	69
3.1.9	KEIL C166 Version 4.12 Release .....	69
3.1.10	KEIL C166 Version 4.10a Release .....	69
3.1.11	KEIL C166 Version 4.06 Release .....	70
3.1.12	KEIL C166 Version 4.05 Release .....	70
3.1.13	KEIL C166 Version 4.03 Release .....	70
3.1.14	KEIL C166 Version 4.02 Release .....	70
3.1.15	KEIL C166 Version 4.01 Release .....	71
3.1.16	KEIL C166 Version 4.00 Release .....	72
3.1.17	KEIL C166 Version 3.** Releases .....	74
<b>4</b>	<b>APPENDIX A .....</b>	<b>76</b>
4.1.1	Moving The USERSTACK On-Chip .....	76
<b>5</b>	<b>APPENDIX B .....</b>	<b>80</b>
5.1	Pointer Casting And Conversions .....	80
5.1.1	Casting From Basic Types To Pointers .....	80
<b>6</b>	<b>APPENDIX C .....</b>	<b>82</b>
6.1	Pointers In The KEIL C166 Compiler .....	82
6.2	The Most Common Pointers In KEIL C166 .....	82
6.2.1	far Pointers .....	82
6.2.2	huge Pointers .....	82
6.2.3	xhuge Pointers .....	82
6.2.4	sdata Pointers .....	82
6.3	Summary Of Pointer Declarations .....	82
6.4	Special Note On #pragma MOD167 For C167 CPUs .....	83
<b>7</b>	<b>APPENDIX D .....</b>	<b>84</b>
7.1	BSI Definition Of Year 2000 Compliance – Keil C166 Tools .....	84
<b>8</b>	<b>APPENDIX E .....</b>	<b>88</b>
8.1	Paranoia .....	88
8.1.1	Paranoia Hatton .....	89
8.1.2	Paranoia Hitex .....	94
8.1.3	Results Log Of PARANOIA Test For Microsoft C v11.00 .....	99
8.2	Whetstones .....	104
8.3	Dhrystones .....	104
8.4	Sieve of Eratosthenes .....	105
<b>9</b>	<b>APPENDIX F .....</b>	<b>106</b>
9.1	The Plum Hall Test Suite .....	106
9.2	Plum-Hall test summary files .....	106
9.2.1	Invocation Batch File .....	107
9.3	Run on V4.10 .....	109
9.3.1	Summary File .....	109
9.3.2	Explanation Of Error Reports .....	115
9.4	Run on 4.27 .....	117
9.4.1	Summary file .....	117
9.4.2	Explanation Of Error Reports .....	123
<b>10</b>	<b>APPENDIX G .....</b>	<b>126</b>
10.1	Release Dates and Versions for KEIL C166 V4 .....	126
10.2	Known Problems In KEIL C166 V3 .....	126
10.2.1	v3.12j & k .....	126
10.2.2	Additional Problems That Were Notified After 3.12k was frozen .....	135
10.3	Changes and Known Problems In KEIL C166 v4 .....	135
10.3.1	Part 1: KEIL C166 Version 4.00/4.00b .....	136
10.3.2	Part 2: KEIL C166 Version 4.01 .....	142
10.3.3	Part 3: KEIL C166 Version 4.02 .....	144
10.3.4	Part 4: KEIL C166 Version 4.03 .....	146

# SAMPLE REPORT

10.3.5	Part 5: KEIL C166 Version 4.05 .....	179
10.3.6	Part 6: KEIL C166 Version 4.06 .....	182
10.3.7	Part 7: KEIL C166 Version 4.11 .....	193
10.3.8	Part 7: KEIL C166 Version 4.20 .....	200
10.3.9	Part 8: KEIL C166 Version 4.22 .....	214
10.3.10	Part 9: KEIL C166 Version 4.23 .....	216
10.3.11	Part 10: KEIL C166 Version 4.24 .....	222
10.3.12	Part 11: KEIL C166 Version 4.25 .....	226
10.3.13	Part 12: KEIL C166 Version 4.26a .....	233
10.3.14	Part 12: KEIL C166 Version 4.27 .....	234
<b>11</b>	<b>APPENDIX H.....</b>	<b>245</b>
11.1	Compliance to Standards .....	245
11.2	ISO .....	245
11.2.1	ISO 9899:1999 The C programming Language .....	245
11.3	BSI and EN (UK/Europe).....	245
11.3.1	BS EN 46001:1997 Application of ISO 9001 to the manufacture of medical devices .....	246
11.3.2	EN14971: 2000 Medical Device Risk Analysis.....	246
11.3.3	EN 60601-1-4 Collateral Standard: Medical Electrical Equipment-Programmable electrical medical systems .....	246
11.4	International Electro-technical Commission .....	247
11.4.1	61508.....	247
11.5	US Food and Drug Administration (USA) .....	247
11.5.1	Content of Pre-market Submissions for Software Contained in Medical Devices.....	247
11.5.2	Off-The-Shelf-Software Use in Medical Devices: 1999 .....	248
11.5.3	General Principals of Software Validation: Final Guidance for Industry and FDA Staff:2002 .....	249
11.5.4	Part 820.30 Quality System Regulation, Design controls.....	250
11.6	NIST (US).....	250
11.6.1	Reference Information For the Software Validation Process. ....	250
11.7	MISRA-C (UK).....	250
<b>12</b>	<b>APPENDIX Z.....</b>	<b>252</b>
12.1	Changes In Revision H.....	252
12.2	Changes in Revision J Aug 2001 .....	252
12.3	Changes in Revision K : Jan 2004 .....	252
12.4	Changes in Revision L: .....	252