



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



J-Link / J-Trace User Guide

Document: UM08001
Software Version: 6.34
Revision: 3
Date: May 24, 2018



A product of SEGGER Microcontroller GmbH

www.segger.com

Disclaimer

Specifications written in this document are believed to be accurate, but are not guaranteed to be entirely free of error. The information in this manual is subject to change for functional or performance improvements without notice. Please make sure your manual is the latest edition. While the information herein is assumed to be accurate, SEGGER Microcontroller GmbH (SEGGER) assumes no responsibility for any errors or omissions. SEGGER makes and you receive no warranties or conditions, express, implied, statutory or in any communication with you. SEGGER specifically disclaims any implied warranty of merchantability or fitness for a particular purpose.

Copyright notice

You may not extract portions of this manual or modify the PDF file in any way without the prior written permission of SEGGER. The software described in this document is furnished under a license and may only be used or copied in accordance with the terms of such a license.

© 2004-2018 SEGGER Microcontroller GmbH, Hilden / Germany

Trademarks

Names mentioned in this manual may be trademarks of their respective companies.

Brand and product names are trademarks or registered trademarks of their respective holders.

Contact address

SEGGER Microcontroller GmbH

In den Weiden 11
D-40721 Hilden

Germany

Tel. +49 2103-2878-0
Fax. +49 2103-2878-28
E-mail: support@segger.com
Internet: www.segger.com

Manual versions

This manual describes the current software version. If you find an error in the manual or a problem in the software, please report it to us and we will try to assist you as soon as possible.

Contact us for further information on topics or functions that are not yet documented.

Print date: May 24, 2018

Manual version	Revision	Date	By	Description
6.34	3	180524	LG	Chapter "J-Link software and documentation package" * Section "J-Link Commander (Command line tool)": Added new command line option "-Log".
6.34	2	180517	LG	Chapter "Open Flashloader" * Section "XML Tags and Attributes": Added new <ChipInfo> attribute "Aliases".
6.34	1	180516	NV	Chapter "J-Link software and documentation package" * Section "J-Link SWO Viewer": Refined CL option descriptions.
6.34	0	180511	AG	Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings": Added new J-Link command string "SetEnableMemCache". Chapter "Environmental Conditions & Safety" added
6.32	4	180417	NV	Chapter "J-Flash SPI" * Section "Command Line Interface": Updated description of CL option - jflashlog. * Section "Command Line Interface": Updated description of CL option - jlinklog.
6.32	3	180409	NV	Chapter "Working with J-Link and J-Trace" * Section "Script file API functions": Added new API functions "JLINK_MEM_Preserve()", "JLINK_MEM_Restore()", "JLINK_MEM_Fill()".
6.32	2	180327	LG	Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings": Added new J-Link command string "MemPreserveOnReset".
6.32	1	180327	AG	Moved contents of chapter "Segger-specific GDB protocol extensions" to separate manual (UM08036)
6.32	0	180323	AG	Moved J-Link GDB Server to separate chapter Added Segger specific GDB protocol extension qSeggerSTRACE:caps Added Segger specific GDB protocol extension qSeggerSTRACE:GetInstStats
6.30	2	180314	AG	Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings": Added new J-Link command string "SetAllowStopMode".
6.30	1	180309	NV	Chapter "Working with J-Link and J-Trace" * Section "J-Link Script Files": Added new function SWO_EnableTarget(); * Section "J-Link Script Files": Renamed function GetSWOBaseClock() to SWO_GetSWOBaseClock(); Added unit information of clock speed value.
6.30	0	180206	EL	Chapter "Working with J-Link and J-Trace" * Section "J-Link Script Files": Added new function: HandleBeforeFlashProg(); * Section "J-Link Script Files": Added new function HandleAfterFlashProg();
6.24	1	180124	EL	Chapter "Working with J-Link and J-Trace" * Section "J-Link Comamnd Strings": Updated.
6.24	0	180111	LG	Chapter "J-Link software and documentation package" * Section "J-Link GDB Server": Added new GDBServer monitor commands: ReadAP, ReadDP, WriteAP and WriteDP.
6.22	0	171214	NV	Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings": Added new J-Link Command String to set base addresses of coresight components for tracing e.g. CORESIGHT_SetETBBaseAddr. * Section "J-Link script files": Added new function GetSWOBaseClock(); Chapter "J-Link software and documentation package" * Section "J-Link SWO Viewer": Updated picture of new SWO Viewer GUI interface with additional explanation of SWO clock setting.

Manual version	Revision	Date	By	Description
6.20	8	171123	AG	Chapter "Related Software" * Section "JTAGLoad": PIO commands was listed as supported even though it is not. Fixed. * Section "JTAGLoad": PIOMAP commands was listed as supported even though it is not. Fixed.
6.20	7	171025	EL	Chapter "Monitor Mode Debugging" * Section "Enable Monitor Debugging": Updated
6.20	6	171013	EL	Chapter "Working with J-Link and J-Trace" * Section "J-Link script files": Updated Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings": Updated
6.20	5	171011	NG	Updated links to SEGGER wiki: Low power mode debugging J-Link script files J-Link Command Strings
6.20	4	171011	NG	Chapter "Working with J-Link and J-Trace" * Section "Script file API functions": Added the following functions: JLINK_C2_WriteData() JLINK_C2_ReadData() JLINK_C2_WriteAddr() JLINK_C2_ReadAddr() JLINK_CORESIGHT_ReadDAP() JLINK_GetPinState() JLINK_GetTime() JLINK_JTAG_ReadWriteBits() JLINK_JTAG_StartDR() JLINK_PIN_Override() JLINK_SelectTIF() JLINK_SetDevice() JLINK_SWD_ReadWriteBits() JLINK_TARGET_IsHalted() JLINK_TARGET_Halt() JLINK_TIF_ActivateTargetReset() JLINK_TIF_ReleaseTargetReset() JLINK_TIF_SetSpeed() JLINK_TIF_SetClrTCK() JLINK_TIF_SetClrTMS() JLINK_TIF_SetClrTDI()
6.20	3	171006	NG	Chapter "Working with J-Link and J-Trace" * Section "Script file API functions": Added return values for various functions
6.20	2	171005	EL	Chapter "Open Flashloader" * Section "Add. Info / Considerations / Limitations": Updated
6.20	1	170922	NG	Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings": Updated Added new command string "EnableLowPowerHandlingMode"
6.16	0	170320	EL	Chapter "Open Flashloader" Added "AlwaysPresent" as new attribute to the <FlashBankInfo>
6.14	6	170407	NV	Chapter "Working with J-Link and J-Trace" * Section "J-Link scriptfiles": Updated " JLINK_ExecCommand()" description
6.14	5	170320	EL	Chapter "J-Flash SPI" Updated screenshots
6.14	4	170317	NV	Chapter "Working with J-Link and J-Trace" * Section "J-Link scriptfiles": Added: " JLINK_ExecCommand()" " Section "Keil MDK-ARM" added for Command string execution
6.14	3	170220	NV	Chapter "Working with J-Link and J-Trace" * Section "J-Link scriptfiles": Added: "OnTraceStart()" and " JLINK_TRACE_Portwidth" Chapter "Trace" * Added crossreference to "JLINK_TRACE_Portwidth"
6.14	2	170216	NV	Chapter "Introduction" * Added Subsubsection "Software and Hardware Features Overview" to all device Subsections.

Manual version	Revision	Date	By	Description
				*Edited Subsection "J-Trace ARM." *Section "Target interfaces and adapters": edited "RESET" to "nRESET" and updated description.
6.14	1	170210	NV	Chapter "Working with J-Link and J-Trace" * Section "Exec Commands": Updated SetResetPulseLen TraceSampleAdjust Chapter "Trace" * Section "Tracing via trace pins": Updated
6.14	0	170201	AG	Chapter "Working with J-Link" * Section "Exec Commands": Updated SelectTraceSource SetRAWTRACEPinDelay ReadIntoTraceCache Chapter "Trace" added.
6.10a	0	160820	EL	Chapter "Working With J-Link" * Section "Exec Commands": Updated ExcludeFlashCacheRanges.
6.00i	0	160802	EL	Chapter "Introduction" * Removed "Model Feature Lists" Chapter "Adding Support for New Devices": renamed to "Open Flash Loader" Chapter "Open Flash Loader" updated.
6.00	1	160617	EL	Chapter "J-Flash SPI" * Added chapter "Custom Command Sequences"
6.00	0	160519	AG	Chapter "Adding Support for New Devices" added.
5.12f	0	160503	AB	Chapter "Related Software" * Section "J-Link RTT Viewer" updated and moved from section "RTT".
5.12d	1	160427	AG	Chapter "Working with J-Link and J-Trace" * Section "J-Link script files" updated.
5.12d	0	160425	AG	Chapter "Working with J-Link and J-Trace" * Section "J-Link script files" updated.
5.12c	0	160413	NG	Chapter "Related Software" * Section "J-Link Commander" Typo fixed.
5.12c	1	160418	NG	Chapter "Related Software" * Section "J-Link Commander" Commands and commandline options added. Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings" Command "SetRTTtelnetPort" added. Chapter "Flash Download" * Section "Debugging applications that change flash contents at runtime" added.
5.10u	0	160317	AG	Chapter "Monitor Mode Debugging" * Section "Target application performs reset" added.
5.10t	0	160314	AG	Chapter "Monitor Mode Debugging" * Section "Enable Monitor Debugging" updated. * Section "Forwarding of Monitor Interrupts" added.
5.10	3	160309	EL	Chapter "J-Flash SPI" updated.
5.10	2	160215	AG	Chapter "RTT" updated.
5.10	1	151204	AG	Chapter "RDI" updated. Chapter "Semihosting" added.
5.10	0	151127	NG	Chapter "Related Software" * Section "J-Scope" removed.
5.02m	0	151125	AG	Chapter "Working with J-Link and J-Trace" * Section "The J-Link settings file" added. Chapter "Low Power Debugging" added.
5.02l	0	151123	AG	Various Chapters * Some typos corrected.
5.02i	1	151106	RH	Chapter "J-Flash SPI" * Section "Send custom commands" added.

Manual version	Revision	Date	By	Description
5.02i	0	151105	RH	Chapter "Related Software" * Section "J-Link Commander" exec command added. Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings" New commands added.
5.02f	1	151022	NG	Chapter "Related Software" * Section "J-Scope" updated.
5.02f	1	151022	EL	Chapter "Target interfaces and adapters" * Section "Reference voltage (VTref)" added.
5.02f	0	151007	RH	Chapter "Working with J-Link and J-Trace" * Section "J-Link script files" updated.
5.02e	0	151001	AG	Chapter "Working with J-Link and J-Trace" * Section "J-Link script files" updated
5.02c	1	150925	NG	Chapter "Licensing" * Section "Original SEGGER products" updated. Chapter "Flash download" * Section "Setup for various debuggers (CFI flash)" updated.
5.02c	0	150916	RH	Chapter "Flash download" * Section "Setup for various debuggers (SPIFI flash)" added.
5.02c	0	150914	RH	Chapter "Introduction" * Section "J-Link / J-Trace models" updated. * Section "Supported OS" Added Windows 10
5.02a	0	150903	AG	Chapter "Monitor Mode Debugging" added.
5.02	0	150820	AG	Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings" "DisableCortexMXPSRAutoCorrectTBit" added.
5.02	0	150813	AG	Chapter "Monitor Mode Debugging" added.
5.00	1	150728	NG	Chapter "Related Software" * Section "J-Link Commander" Sub-Section "Command line options" updated.
5.00	0	150609	AG	Chapter "Flash download" * Section "QSPI flash support" added. Chapter "Flash breakpoints" * Section "Flash Breakpoints in QSPI flash" added
5.00	0	150520	EL	Chapter "J-Flash SPI" * Initial version added
4.99b	0	150520	EL	Chapter "Related Software" * Section "J-Link STM32 Unlock" Added command line options
4.99a	0	150429	AG	Chapter "Target interfaces and Adapters" Chapter "20-pin J-Link connector", section "Pinout for SPI" added.
4.98d	0	150427	EL	Chapter "Related Software" * Section "Configure SWO output after device reset" updated.
4.98b	0	150410	AG	Chapter "Licensing" * Section "J-Trace for Cortex-M" updated.
4.98	0	150320	NG	Chapter "Related Software" * Section "J-Link Commander" Sub-Section "Commands" added. Chapter "Working with J-Link and J-Trace" * Section "J-Link script files" updated
4.96f	0	150204	JL	Chapter "Related Software" * Section "GDB Server" Exit code description added.
4.96	0	141219	JL	Chapter "RTT" added. Chapter "Related Software" * Section "GDB Server" Command line option "-strict" added. Command line option "-timeout" added.
4.90d	0	141112	NG	Chapter "Related Software"

Manual version	Revision	Date	By	Description
				* Section "J-Link Remote Server" updated. * Section "J-Scope" updated.
4.90c	0	140924	JL	Chapter "Related Software" * Section "JTAGLoad" updated.
4.90b	1	140813	EL	Chapter "Working with J-Link and J-Trace" * Section "Connecting multiple J-Links / J-Traces to your PC" updated Chapter "J-Link software" * Section "J-Link Configurator" updated.
4.90b	0	140813	NG	Chapter "Related Software" * Section "J-Scope" added.
4.86	2	140606	AG	Chapter "Device specifics" * Section "Silicon Labs - EFM32 series devices" added
4.86	1	140527	JL	Chapter "Related Software" * Section "GDB Server" Command line options -halt / -nohalt added. Description for GDB Server CL version added.
4.86	0	140519	AG	Chapter "Flash download" Section "Mentor Sourcery CodeBench" added.
4.84	0	140321	EL	Chapter "Working with J-Link" * Section "Virtual COM Port (VCOM) improved." Chapter "Target interfaces and adapters" * Section "Pinout for SWD + Virtual COM Port (VCOM) added."
4.82	1	140228	EL	Chapter "Related Software" * Section "Command line options" Extended command line option -speed. Chapter "J-Link software and documentation package" * Section "J-Link STR91x Commander" Added command line option parameter to specify a customized scan-chain. Chapter "Working with J-Link" * Section "Virtual COM Port (VCOM) added." Chapter "Setup" * Section "Getting started with J-Link and DS-5"
4.82	0	140218	JL	Chapter "Related Software" * Section "GDB Server" Command line option -notimeout added.
4.80f	0	140204	JL	Chapter "Related Software" * Section "GDB Server" Command line options and remote commands added.
4.80	1	131219	JL/ NG	Chapter "Related Software" * Section "GDB Server" Remote commands and command line options description improved. Several corrections.
4.80	0	131105	JL	Chapter "Related Software" * Section "GDB Server" SEGGER-specific GDB protocol extensions added.
4.76	3	130823	JL	Chapter "Flash Download" * Replaced references to GDB Server manual. Chapter "Working with J-Link" * Replaced references to GDB Server manual.
4.76	2	130821	JL	Chapter "Related Software" * Section "GDB Server" Remote commands added.
4.76	1	130819	JL	Chapter "Related Software" * Section "SWO Viewer" Sample code updated.
4.76	0	130809	JL	Chapter "Related Software" * Sections reordered and updated. Chapter "Setup" * Section "Using JLinkARM.dll moved here.
4.71b	0	130507	JL	Chapter "Related Software" * Section "SWO Viewer" Added new command line options.

Manual version	Revision	Date	By	Description
4.66	0	130221	JL	Chapter "Introduction" * Section "Supported OS" Added Linux and Mac OSX
4.62b	0	130219	EL	Chapter "Introduction" * Section "J-Link / J-Trace models" Clock rise and fall times updated.
4.62	0	130129	JL	Chapter "Introduction" * Section "J-Link / J-Trace models" Sub-section "J-link ULTRA" updated.
4.62	0	130124	EL	Chapter "Target interfaces and adapters" * Section "9-pin JTAG/SWD connector" Pinout description corrected.
4.58	1	121206	AG	Chapter "Introduction" * Section "J-Link / J-Trace models" updated.
4.58	0	121126	JL	Chapter "Working with J-Link" * Section "J-Link script files" Sub-section "Executing J-Link script files" updated.
4.56b	0	121112	JL	Chapter "Related Software" * Section "J-Link SWO Viewer" Added sub-section "Configure SWO output after device reset"
4.56a	0	121106	JL	Chapter "Related Software" * Section "J-Link Commander" Renamed "Commander script files" to "Commander files" and "script mode" to "batch mode".
4.56	0	121022	AG	Renamed "J-Link TCP/IP Server" to "J-Link Remote Server"
4.54	1	121009	JL	Chapter "Related Software" * Section "TCP/IP Server", subsection "Tunneling Mode" added.
4.54	0	120913	EL	Chapter "Flash Breakpoints" * Section "Licensing" updated. Chapter "Device specifics" * Section "Freescale", subsection "Data flash support" added.
4.53c	0	120904	EL	Chapter "Licensing" * Section "Device-based license" updated.
4.51h	0	120717	EL	Chapter "Flash download" * Section "J-Link commander" updated. Chapter "Support and FAQs" * Section "Frequently asked questions" updated. Chapter "J-Link and J-Trace related software" * Section "J-Link Commander" updated.
4.51e	1	120704	EL	Chapter "Working with J-Link" * Section "Reset strategies" updated and corrected. Added reset type 8.
4.51e	0	120704	AG	Chapter "Device specifics" * Section "ST" updated and corrected.
4.51b	0	120611	EL	Chapter "J-Link and J-Trace related software" * Section "SWO Viewer" added.
4.51a	0	120606	EL	Chapter "Device specifics" * Section "ST", subsection "ETM init" for some STM32 devices added. * Section "Texas Instruments" updated. Chapter "Target interfaces and adapters" * Section "Pinout for SWD" updated.
4.47a	0	120419	AG	Chapter "Device specifics" * Section "Texas Instruments" updated.
4.46	0	120416	EL	Chapter "Support" updated.
4.42	0	120214	EL	Chapter "Working with J-Link" * Section "J-Link script files" updated.
4.36	1	110927	EL	Chapter "Flash download" added. Chapter "Flash breakpoints" added. Chapter "Target interfaces and adapters" * Section "20-pin JTAG/SWD connector" updated. Chapter "RDI" added. Chapter "Setup" updated.

Manual version	Revision	Date	By	Description
				Chapter "Device specifics" updated.
4.36	0	110909	AG	Chapter "Working with J-Link" * Section "J-Link script files" updated.
4.26	1	110513	KN	Chapter "Introduction" * Section "J-Link / J-Trace models" corrected.
4.26	0	110427	KN	Several corrections.
4.24	1	110228	AG	Chapter "Introduction" * Section "J-Link / J-Trace models" corrected. Chapter "Device specifics" * Section "ST Microelectronics" updated.
4.24	0	110216	AG	Chapter "Device specifics" * Section "Samsung" added. Chapter "Working with J-Link" * Section "Reset strategies" updated. Chapter "Target interfaces and adapters" * Section "9-pin JTAG/SWD connector" added.
4.23d	0	110202	AG	Chapter "J-Link and J-Trace related software" * Section "J-Link software and documentation package in detail" updated. Chapter "Introduction" * Section "Built-in intelligence for supported CPU-cores" added.
4.21g	0	101130	AG	Chapter "Working with J-Link" * Section "Reset strategies" updated. Chapter "Device specifics" * Section "Freescale" updated. Chapter "Flash download and flash breakpoints" * Section "Supported devices" updated * Section "Setup for different debuggers (CFI flash)" updated.
4.21	0	101025	AG	Chapter "Device specifics" * Section "Freescale" updated.
4.20j	0	101019	AG	Chapter "Working with J-Link" * Section "Reset strategies" updated.
4.20b	0	100923	AG	Chapter "Working with J-Link" * Section "Reset strategies" updated.
0.00	90	100818	AG	Chapter "Working with J-Link" * Section "J-Link script files" updated. * Section "J-Link Command Strings" updated. Chapter "Target interfaces and adapters" * Section "19-pin JTAG/SWD and Trace connector" corrected. Chapter "Setup" * Section "J-Link Configurator added."
0.00	89	100630	AG	Several corrections.
0.00	88	100622	AG	Chapter "J-Link and J-Trace related software" * Section "SWO Analyzer" added.
0.00	87	100617	AG	Several corrections.
0.00	86	100504	AG	Chapter "Introduction" * Section "J-Link / J-Trace models" updated. Chapter "Target interfaces and adapters" * Section "Adapters" updated.
0.00	85	100428	AG	Chapter "Introduction" * Section "J-Link / J-Trace models" updated.
0.00	84	100324	KN	Chapter "Working with J-Link and J-Trace" * Several corrections Chapter Flash download & flash breakpoints * Section "Supported devices" updated
0.00	83	100223	KN	Chapter "Introduction" * Section "J-Link / J-Trace models" updated.
0.00	82	100215	AG	Chapter "Working with J-Link" * Section "J-Link script files" added.
0.00	81	100202	KN	Chapter "Device Specifics" * Section "Luminary Micro" updated. Chapter "Flash download and flash breakpoints"

Manual version	Revision	Date	By	Description
				* Section "Supported devices" updated.
0.00	80	100104	KN	Chapter "Flash download and flash breakpoints" * Section "Supported devices" updated
0.00	79	091201	AG	Chapter "Working with J-Link and J-Trace" * Section "Reset strategies" updated. Chapter "Licensing" * Section "J-Link OEM versions" updated.
0.00	78	091023	AG	Chapter "Licensing" * Section "J-Link OEM versions" updated.
0.00	77	090910	AG	Chapter "Introduction" * Section "J-Link / J-Trace models" updated.
0.00	76	090828	KN	Chapter "Introduction" * Section "Specifications" updated * Section "Hardware versions" updated * Section "Common features of the J-Link product family" updated Chapter "Target interfaces and adapters" * Section "5 Volt adapter" updated
0.00	75	090729	AG	Chapter "Introduction" * Section "J-Link / J-Trace models" updated. Chapter "Working with J-Link and J-Trace" * Section "SWD interface" updated.
0.00	74	090722	KN	Chapter "Introduction" * Section "Supported IDEs" added * Section "Supported CPU cores" updated * Section "Model comparison chart" renamed to "Model comparison" * Section "J-Link bundle comparison chart" removed
0.00	73	090701	KN	Chapter "Introduction" * Section "J-Link and J-Trace models" added * Sections "Model comparison chart" & "J-Link bundle comparison chart" added Chapter "J-Link and J-Trace models" removed Chapter "Hardware" renamed to "Target interfaces & adapters" * Section "JTAG Isolator" added Chapter "Target interfaces and adapters" * Section "Target board design" updated Several corrections
0.00	72	090618	AG	Chapter "Working with J-Link" * Section "J-Link control panel" updated. Chapter "Flash download and flash breakpoints" * Section "Supported devices" updated. Chapter "Device specifics" * Section "NXP" updated.
0.00	71	090616	AG	Chapter "Device specifics" * Section "NXP" updated.
0.00	70	090605	AG	Chapter "Introduction" * Section "Common features of the J-Link product family" updated.
0.00	69	090515	AG	Chapter "Working with J-Link" * Section "Reset strategies" updated. * Section "Indicators" updated. Chapter "Flash download and flash breakpoints" * Section "Supported devices" updated.
0.00	68	090428	AG	Chapter "J-Link and J-Trace related software" * Section "J-Link STM32 Commander" added. Chapter "Working with J-Link" * Section "Reset strategies" updated.
0.00	67	090402	AG	Chapter "Working with J-Link" * Section "Reset strategies" updated.
0.00	66	090327	AG	Chapter "Background information" * Section "Embedded Trace Macrocell (ETM)" updated. Chapter "J-Link and J-Trace related software" * Section "Dedicated flash programming utilities for J-Link" updated.
0.00	65	090320	AG	Several changes in the manual structure.

Manual version	Revision	Date	By	Description
0.00	64	090313	AG	Chapter "Working with J-Link" * Section "Indicators" added.
0.00	63	090212	AG	Chapter "Hardware" * Several corrections. * Section "Hardware Versions" Version 8.0 added.
0.00	62	090211	AG	Chapter "Working with J-Link and J-Trace" * Section "Reset strategies" updated. Chapter J-Link and J-Trace related software * Section "J-Link STR91x Commander (Command line tool)" updated. Chapter "Device specifics" * Section "ST Microelectronics" updated. Chapter "Hardware" updated.
0.00	61	090120	TQ	Chapter "Working with J-Link" * Section "Cortex-M3 specific reset strategies"
0.00	60	090114	AG	Chapter "Working with J-Link" * Section "Cortex-M3 specific reset strategies"
0.00	59	090108	KN	Chapter Hardware * Section "Target board design for JTAG" updated. * Section "Target board design for SWD" added.
0.00	58	090105	AG	Chapter "Working with J-Link Pro" * Section "Connecting J-Link Pro the first time" updated.
0.00	57	081222	AG	Chapter "Working with J-Link Pro" * Section "Introduction" updated. * Section "Configuring J-Link Pro via web interface" updated. Chapter "Introduction" * Section "J-Link Pro overview" updated.
0.00	56	081219	AG	Chapter "Working with J-Link Pro" * Section "FAQs" added. Chapter "Support and FAQs" * Section "Frequently Asked Questions" updated.
0.00	55	081218	AG	Chapter "Hardware" updated.
0.00	54	081217	AG	Chapter "Working with J-Link and J-Trace" * Section "J-Link Command Strings" updated.
0.00	53	081216	AG	Chapter "Working with J-Link Pro" updated.
0.00	52	081212	AG	Chapter "Working with J-Link Pro" added. Chapter "Licensing" * Section "Original SEGGER products" updated.
0.00	51	081202	KN	Several corrections.
0.00	50	081030	AG	Chapter "Flash download and flash breakpoints" * Section "Supported devices" corrected.
0.00	49	081029	AG	Several corrections.
0.00	48	080916	AG	Chapter "Working with J-Link and J-Trace" * Section "Connecting multiple J-Links / J-Traces to your PC" updated.
0.00	47	080910	AG	Chapter "Licensing" updated.
0.00	46	080904	AG	Chapter "Licensing" added. Chapter "Hardware" Section "J-Link OEM versions" moved to chapter "Licensing"
0.00	45	080902	AG	Chapter "Hardware" Section "JTAG+Trace connector" JTAG+Trace connector pinout corrected. Section "J-Link OEM versions" updated.
0.00	44	080827	AG	Chapter "J-Link control panel" moved to chapter "Working with J-Link". Several corrections.
0.00	43	080826	AG	Chapter "Flash download and flash breakpoints" Section "Supported devices" updated.
0.00	42	080820	AG	Chapter "Flash download and flash breakpoints" Section "Supported devices" updated.
0.00	41	080811	AG	Chapter "Flash download and flash breakpoints" updated. Chapter "Flash download and flash breakpoints",

Manual version	Revision	Date	By	Description
				section "Supported devices" updated.
0.00	40	080630	AG	Chapter "Flash download and flash breakpoints" updated. Chapter "J-Link status window" renamed to "J-Link control panel" Various corrections.
0.00	39	080627	AG	Chapter "Flash download and flash breakpoints" Section "Licensing" updated. Section "Using flash download and flash breakpoints with different debuggers" updated. Chapter "J-Link status window" added.
0.00	38	080618	AG	Chapter "Support and FAQs" Section "Frequently Asked Questions" updated Chapter "Reset strategies" Section "Cortex-M3 specific reset strategies" updated.
0.00	37	080617	AG	Chapter "Reset strategies" Section "Cortex-M3 specific reset strategies" updated.
0.00	36	080530	AG	Chapter "Hardware" Section "Differences between different versions" updated. Chapter "Working with J-Link and J-Trace" Section "Cortex-M3 specific reset strategies" added.
0.00	35	080215	AG	Chapter "J-Link and J-Trace related software" Section "J-Link software and documentation package in detail" updated.
0.00	34	080212	AG	Chapter "J-Link and J-Trace related software" Section "J-Link TCP/IP Server (Remote J-Link / J-Trace use)" updated. Chapter "Working with J-Link and J-Trace" Section "J-Link Command Strings" updated. Chapter "Flash download and flash breakpoints" Section "Introduction" updated. Section "Licensing" updated. Section "Using flash download and flash breakpoints with different debuggers" updated.
0.00	33	080207	AG	Chapter "Flash download and flash breakpoints" added Chapter "Device specifics": Section "ATMEL - AT91SAM7 - Recommended init sequence" added.
0.00	32	080129	SK	Chapter "Device specifics": Section "NXP - LPC - Fast GPIO bug" list of device enhanced.
0.00	31	080103	SK	Chapter "Device specifics": Section "NXP - LPC - Fast GPIO bug" updated.
0.00	30	071211	AG	Chapter "Device specifics": Section "Analog Devices" updated. Section "ATMEL" updated. Section "Freescale" added. Section "Luminary Micro" added. Section "NXP" updated. Section "OKI" added. Section "ST Microelectronics" updated. Section "Texas Instruments" updated. Chapter "Related software": Section "J-Link STR91x Commander" updated
0.00	29	070912	SK	Chapter "Hardware", section "Target board design" updated.
0.00	28	070912	SK	Chapter "Related software": Section "J-LinkSTR91x Commander" added. Chapter "Device specifics": Section "ST Microelectronics" added. Section "Texas Instruments" added. Subsection "AT91SAM9" added.
0.00	28	070912	AG	Chapter "Working with J-Link/J-Trace": Section "J-Link Command Strings" updated.
0.00	27	070827	TQ	Chapter "Working with J-Link/J-Trace": Section "J-Link Command Strings" updated.
0.00	26	070710	SK	Chapter "Introduction": Section "Features of J-Link" updated. Chapter "Background Information": Section "Embedded Trace Macrocell" added. Section "Embedded Trace Buffer" added.

Manual version	Revision	Date	By	Description
0.00	25	070516	SK	Chapter "Working with J-Link/J-Trace": Section "Reset strategies in detail" - "Software, for Analog Devices ADuC7xxx MCUs" updated - "Software, for ATMEL AT91SAM7 MCUs" added. Chapter "Device specifics" Section "Analog Devices" added. Section "ATMEL" added.
0.00	24	070323	SK	Chapter "Setup": "Uninstalling the J-Link driver" updated. "Supported ARM cores" updated.
0.00	23	070320	SK	Chapter "Hardware": "Using the JTAG connector with SWD" updated.
0.00	22	070316	SK	Chapter "Hardware": "Using the JTAG connector with SWD" added.
0.00	21	070312	SK	Chapter "Hardware": "Differences between different versions" supplemented.
0.00	20	070307	SK	Chapter "J-Link / J-Trace related software": "J-Link GDB Server" licensing updated.
0.00	19	070226	SK	Chapter "J-Link / J-Trace related software" updated and reorganized. Chapter "Hardware" "List of OEM products" updated
0.00	18	070221	SK	Chapter "Device specifics" added Subchapter "J-Link Command Strings" added
0.00	17	070131	SK	Chapter "Hardware": "Version 5.3": Current limits added "Version 5.4" added Chapter "Setup": "Installing the J-Link USB driver" removed. "Installing the J-Link software and documentation pack" added. Subchapter "List of OEM products" updated. "OS support" updated
0.00	16	061222	SK	Chapter "Preface": "Company description" added. J-Link picture changed.
0.00	15	060914	OO	Subchapter 1.5.1: Added target supply voltage and target supply current to specifications. Subchapter 5.2.1: Pictures of ways to connect J-Trace.
0.00	14	060818	TQ	Subchapter 4.7 "Using DCC for memory reads" added.
0.00	13	060711	OO	Subchapter 5.2.2: Corrected JTAG+Trace connector pinout table.
0.00	12	060628	OO	Subchapter 4.1: Added ARM966E-S to List of supported ARM cores.
0.00	11	060607	SK	Subchapter 5.5.2.2 changed. Subchapter 5.5.2.3 added.
0.00	10	060526	SK	ARM9 download speed updated. Subchapter 8.2.1: Screenshot "Start sequence" updated. Subchapter 8.2.2 "ID sequence" removed. Chapter "Support" and "FAQ" merged. Various improvements
0.00	9	060324	OO	Chapter "Literature and references" added. Chapter "Hardware": Added common information trace signals. Added timing diagram for trace. Chapter "Designing the target board for trace" added.
0.00	8	060117	OO	Chapter "Related Software": Added JLinkARM.dll. Screenshots updated.
0.00	7	051208	OO	Chapter Working with J-Link: Sketch added.
0.00	6	051118	OO	Chapter Working with J-Link: "Connecting multiple J-Links to your PC" added. Chapter Working with J-Link: "Multi core debugging" added. Chapter Background information: "J-Link firmware" added.
0.00	5	051103	TQ	Chapter Setup: "JTAG Speed" added.
0.00	4	051025	OO	Chapter Background information: "Flash programming" added.

Manual version	Revision	Date	By	Description
				Chapter Setup: "Scan chain configuration" added. Some smaller changes.
0.00	3	051021	TQ	Performance values updated.
0.00	2	051011	TQ	Chapter "Working with J-Link" added.
0.00	1	050818	TW	Initial Version

About this document

Assumptions

This document assumes that you already have a solid knowledge of the following:

- The software tools used for building your application (assembler, linker, C compiler).
- The C programming language.
- The target processor.
- DOS command line.

If you feel that your knowledge of C is not sufficient, we recommend *The C Programming Language* by Kernighan and Richie (ISBN 0-13-1103628), which describes the standard in C programming and, in newer editions, also covers the ANSI C standard.

How to use this manual

This manual explains all the functions and macros that the product offers. It assumes you have a working knowledge of the C language. Knowledge of assembly programming is not required.

Typographic conventions for syntax

This manual uses the following typographic conventions:

Style	Used for
Body	Body text.
Keyword	Text that you enter at the command prompt or that appears on the display (that is system functions, file- or pathnames).
Parameter	Parameters in API functions.
Sample	Sample code in program examples.
Sample comment	Comments in program examples.
Reference	Reference to chapters, sections, tables and figures or other documents.
GUI Element	Buttons, dialog boxes, menu names, menu commands.
Emphasis	Very important sections.

Table of contents

1	Introduction	26
1.1	Requirements	27
1.2	Supported OS	28
1.3	Common features of the J-Link product family	29
1.4	Supported CPU cores	30
1.5	Built-in intelligence for supported CPU-cores	31
1.5.1	Intelligence in the J-Link firmware	31
1.5.2	Intelligence on the PC-side (DLL)	31
1.5.3	Firmware intelligence per model	32
1.6	Where to find further information	33
1.6.1	SEGGER debug probes	33
1.6.2	Using a feature in a specific development environment	33
2	Licensing	34
2.1	Components requiring a license	35
2.2	Legal use of SEGGER J-Link software	36
2.2.1	Use of the software with 3rd party tools	36
2.3	Illegal Clones	37
3	J-Link software and documentation package	38
3.1	Software overview	39
3.2	J-Link Commander (Command line tool)	40
3.2.1	Commands	40
3.2.2	Command line options	56
3.2.3	Using J-Link Command Files	59
3.3	J-Link Remote Server	60
3.3.1	List of available commands	60
3.3.2	Tunneling mode	60
3.4	J-Mem Memory Viewer	64
3.5	J-Flash	65
3.6	J-Link RTT Viewer	66
3.6.1	RTT Viewer Startup	66
3.6.2	Connection Settings	67
3.6.3	The Terminal Tabs	67
3.6.4	Sending Input	68
3.6.5	Logging Terminal output	68
3.6.6	Logging Data	68
3.6.7	Command line options	69
3.6.8	Menus and Shortcuts	71

3.6.9	Using "virtual" Terminals in RTT	72
3.6.10	Using Text Control Codes	72
3.7	J-Link SWO Viewer	74
3.7.1	Usage	75
3.7.2	List of available command line options	75
3.7.3	Configure SWO output after device reset	77
3.7.4	Target example code for terminal output	78
3.8	SWO Analyzer	80
3.9	JTAGLoad (Command line tool)	81
3.10	J-Link RDI (Remote Debug Interface)	82
3.10.1	Flash download and flash breakpoints	82
3.11	Processor specific tools	83
3.11.1	J-Link STR91x Commander (Command line tool)	83
3.11.2	J-Link STM32 Unlock (Command line tool)	86
3.12	J-Link Software Developer Kit (SDK)	89
4	J-Link GDB Server	90
4.1	J-Link GDB Server CL (Windows, Linux, Mac)	92
4.2	Debugging with J-Link GDB Server	93
4.2.1	Setting up GDB Server GUI version	93
4.2.2	Setting up GDB Server CL version	93
4.2.3	GDB Server user interface	94
4.2.4	Running GDB from different programs	95
4.3	Supported remote (monitor) commands	98
4.3.1	clrbp	99
4.3.2	cp15	100
4.3.3	device	100
4.3.4	DisableChecks	100
4.3.5	EnableChecks	101
4.3.6	flash breakpoints	101
4.3.7	getargs	101
4.3.8	go	101
4.3.9	halt	102
4.3.10	interface	102
4.3.11	jtagconf	102
4.3.12	memU8	102
4.3.13	memU16	103
4.3.14	memU32	103
4.3.15	reg	103
4.3.16	regs	104
4.3.17	reset	104
4.3.18	semihosting breakOnError	104
4.3.19	semihosting enable	105
4.3.20	semihosting IOClient	105
4.3.21	semihosting ARMSWI	106
4.3.22	semihosting ThumbSWI	106
4.3.23	setargs	106
4.3.24	setbp	106
4.3.25	sleep	107
4.3.26	speed	107
4.3.27	step	107
4.3.28	SWO DisableTarget	108
4.3.29	SWO EnableTarget	108
4.3.30	SWO GetMaxSpeed	109
4.3.31	SWO GetSpeedInfo	109
4.3.32	waithalt	109
4.3.33	wice	109
4.3.34	ReadAP	110
4.3.35	ReadDP	110

4.3.36	WriteAP	111
4.3.37	WriteDP	111
4.4	SEGGER-specific GDB protocol extensions	113
4.5	Command line options	114
4.5.1	-cpu	115
4.5.2	-device	116
4.5.3	-endian	116
4.5.4	-if	116
4.5.5	-ir	117
4.5.6	-excdbg	117
4.5.7	-jtagconf	117
4.5.8	-localhostonly	118
4.5.9	-log	118
4.5.10	-logtofile	118
4.5.11	-halt	119
4.5.12	-noir	119
4.5.13	-nolocalhostonly	119
4.5.14	-nologtofile	119
4.5.15	-nohalt	120
4.5.16	-nosilent	120
4.5.17	-nostayontop	120
4.5.18	-notimeout	121
4.5.19	-novd	121
4.5.20	-port	121
4.5.21	-rtos	121
4.5.22	-jlinkscriptfile	122
4.5.23	-select	122
4.5.24	-settingsfile	122
4.5.25	-silent	122
4.5.26	-singlerun	123
4.5.27	-speed	123
4.5.28	-stayontop	123
4.5.29	-timeout	123
4.5.30	-strict	124
4.5.31	-swoport	124
4.5.32	-telnetport	124
4.5.33	-vd	125
4.5.34	-x	125
4.5.35	-xc	125
4.6	Program termination	126
4.6.1	Exit codes	126
4.7	Semihosting	127
5	Setup	128
5.1	Installing the J-Link software and documentation pack	129
5.1.1	Setup procedure	129
5.2	Setting up the USB interface	130
5.2.1	Verifying correct driver installation	130
5.2.2	Uninstalling the J-Link USB driver	131
5.3	Setting up the IP interface	133
5.3.1	Configuring J-Link using J-Link Configurator	133
5.3.2	Configuring J-Link using the webinterface	133
5.4	FAQs	135
5.5	J-Link Configurator	136
5.5.1	Configure J-Links using the J-Link Configurator	136
5.6	J-Link USB identification	138
5.6.1	Connecting to different J-Links connected to the same host PC via USB ...	138
5.7	Using the J-Link DLL	139
5.7.1	What is the JLink DLL?	139

5.7.2	Updating the DLL in third-party programs	139
5.7.3	Determining the version of JLink DLL	139
5.7.4	Determining which DLL is used by a program	140
6	Working with J-Link and J-Trace	141
6.1	Supported IDEs	142
6.2	Connecting the target system	143
6.2.1	Power-on sequence	143
6.2.2	Verifying target device connection	143
6.2.3	Problems	143
6.3	Indicators	144
6.3.1	Main indicator	144
6.3.2	Input indicator	144
6.3.3	Output indicator	145
6.4	JTAG interface	146
6.4.1	Multiple devices in the scan chain	146
6.4.2	Sample configuration dialog boxes	146
6.4.3	Determining values for scan chain configuration	148
6.4.4	JTAG Speed	149
6.5	SWD interface	150
6.5.1	SWD speed	150
6.5.2	SWO	150
6.6	Multi-core debugging	152
6.6.1	How multi-core debugging works	152
6.6.2	Using multi-core debugging in detail	153
6.6.3	Things you should be aware of	154
6.7	Connecting multiple J-Links / J-Traces to your PC	155
6.7.1	How does it work?	155
6.8	J-Link control panel	157
6.8.1	Tabs	157
6.9	Reset strategies	163
6.9.1	Strategies for ARM 7/9 devices	163
6.9.2	Strategies for Cortex-M devices	164
6.10	Using DCC for memory access	168
6.10.1	What is required?	168
6.10.2	Target DCC handler	168
6.10.3	Target DCC abort handler	168
6.11	The J-Link settings file	169
6.11.1	SEGGER Embedded Studio	169
6.11.2	Keil MDK-ARM (uVision)	169
6.11.3	IAR EWARM	169
6.11.4	Mentor Sourcery CodeBench for ARM	169
6.12	J-Link script files	170
6.12.1	Actions that can be customized	170
6.12.2	Script file API functions	173
6.12.3	Global DLL variables	197
6.12.4	Global DLL constants	201
6.12.5	Script file language	202
6.12.6	Script file writing example	203
6.12.7	Executing J-Link script files	204
6.13	J-Link Command Strings	205
6.13.1	List of available commands	205
6.13.2	Using J-Link Command Strings	227
6.14	Switching off CPU clock during debug	228
6.15	Cache handling	229
6.15.1	Cache coherency	229
6.15.2	Cache clean area	229
6.15.3	Cache handling of ARM7 cores	229
6.15.4	Cache handling of ARM9 cores	229

6.16	Virtual COM Port (VCOM)	230
6.16.1	Configuring Virtual COM Port	230
7	Flash download	232
7.1	Introduction	233
7.2	Licensing	234
7.3	Supported devices	235
7.4	Setup for various debuggers (internal flash)	236
7.5	Setup for various debuggers (CFI flash)	237
7.6	Setup for various debuggers (SPIFI flash)	238
7.7	QSPI flash support	239
7.7.1	Setup the DLL for QSPI flash download	239
7.8	Using the DLL flash loaders in custom applications	240
7.9	Debugging applications that change flash contents at runtime	241
8	Flash breakpoints	242
8.1	Introduction	243
8.2	Licensing	244
8.2.1	Free for evaluation and non-commercial use	244
8.3	Supported devices	245
8.4	Setup & compatibility with various debuggers	246
8.4.1	Setup	246
8.4.2	Compatibility with various debuggers	246
8.5	Flash Breakpoints in QSPI flash	247
8.5.1	Setup	247
8.6	FAQ	248
9	Monitor Mode Debugging	249
9.1	Introduction	250
9.2	Enable Monitor Debugging	251
9.3	Availability and limitations of monitor mode	252
9.3.1	Cortex-M3	252
9.3.2	Cortex-M4	252
9.4	Monitor code	253
9.5	Debugging interrupts	254
9.6	Having servicing interrupts in debug mode	255
9.7	Forwarding of Monitor Interrupts	256
9.8	Target application performs reset (Cortex-M)	257
10	Low Power Debugging	258
10.1	Introduction	259
10.2	Activating low power mode handling for J-Link	260
10.3	Restrictions	261
11	Open Flashloader	262
11.1	Introduction	263
11.2	General procedure	264
11.3	Adding a new device	265
11.4	Editing/Extending an Existing Device	266
11.5	XML Tags and Attributes	267
11.5.1	<Database>	267
11.5.2	<Device>	267
11.5.3	<ChipInfo>	267
11.5.4	<FlashBankInfo>	269
11.6	Example XML file	271
11.7	Add. Info / Considerations / Limitations	272
11.7.1	CMSIS Flash Algorithms Compatibility	272

11.7.2	Supported Cores	272
11.7.3	Information for Silicon Vendors	272
11.7.4	Template Projects and How To's	272
12	J-Flash SPI	273
12.1	Introduction	274
12.1.1	What is J-Flash SPI?	274
12.1.2	J-Flash SPI CL (Windows, Linux, Mac)	274
12.1.3	Features	275
12.1.4	Requirements	275
12.2	Licensing	276
12.2.1	Introduction	276
12.3	Getting Started	277
12.3.1	Setup	277
12.3.2	Using J-Flash SPI for the first time	277
12.3.3	Menu structure	278
12.4	Settings	281
12.4.1	Project Settings	281
12.4.2	Global Settings	285
12.5	Command Line Interface	287
12.5.1	Overview	287
12.5.2	Command line options	287
12.5.3	Batch processing	289
12.5.4	Programming multiple targets in parallel	289
12.6	Creating a new J-Flash SPI project	291
12.7	Custom Command Sequences	292
12.7.1	Init / Exit steps	292
12.7.2	Example	292
12.7.3	J-Flash SPI Command Line Version	293
12.8	Device specifics	296
12.8.1	SPI flashes with multiple erase commands	296
12.9	Target systems	297
12.9.1	Which flash devices can be programmed?	297
12.10	Performance	298
12.10.1	Performance values	298
12.11	Background information	299
12.11.1	SPI interface connection	299
12.12	Support	300
12.12.1	Troubleshooting	300
12.12.2	Contacting support	300
13	RDI	301
13.1	Introduction	302
13.1.1	Features	302
13.2	Licensing	303
13.3	Setup for various debuggers	304
13.3.1	ARM AXD (ARM Developer Suite, ADS)	304
13.3.2	ARM RVDS (RealView developer suite)	306
13.3.3	GHS MULTI	311
13.4	Configuration	314
13.4.1	Configuration file JLinkRDI.ini	314
13.4.2	Using different configurations	314
13.4.3	Using multiple J-Links simultaneously	314
13.4.4	Configuration dialog	314
13.5	Semihosting	323
13.5.1	Unexpected / unhandled SWIs	323

14	RTT	324
14.1	Introduction	325
14.2	How RTT works	326
14.2.1	Target implementation	326
14.2.2	Locating the Control Block	326
14.2.3	Internal structures	326
14.2.4	Requirements	327
14.2.5	Performance	327
14.2.6	Memory footprint	327
14.3	RTT Communication	328
14.3.1	RTT Viewer	328
14.3.2	RTT Client	328
14.3.3	RTT Logger	328
14.3.4	RTT in other host applications	328
14.4	Implementation	329
14.4.1	API functions	329
14.4.2	Configuration defines	335
14.5	ARM Cortex - Background memory access	337
14.6	Example code	338
14.7	FAQ	339
15	Trace	340
15.1	Introduction	341
15.1.1	What is backtrace?	341
15.1.2	What is streaming trace?	341
15.1.3	What is code coverage?	341
15.1.4	What is code profiling?	342
15.2	Tracing via trace pins	343
15.2.1	Cortex-M specifics	343
15.2.2	Trace signal timing	343
15.2.3	Adjusting trace signal timing on J-Trace	343
15.2.4	J-Trace models with support for streaming trace	344
15.3	Tracing with on-chip trace buffer	345
15.3.1	CPUs that provide tracing via pins and on-chip buffer	345
15.4	Target devices with trace support	346
15.5	Streaming trace	347
15.5.1	Download and execution address differ	347
15.5.2	Do streaming trace without prior download	347
16	Target interfaces and adapters	348
16.1	20-pin J-Link connector	349
16.1.1	Pinout for JTAG	349
16.1.2	Pinout for SWD	351
16.1.3	Pinout for SWD + Virtual COM Port (VCOM)	353
16.1.4	Pinout for SPI	354
16.2	19-pin JTAG/SWD and Trace connector	355
16.2.1	Target power supply	356
16.3	9-pin JTAG/SWD connector	357
16.4	Reference voltage (VTref)	358
16.5	Adapters	359
17	Background information	360
17.1	JTAG	361
17.1.1	Test access port (TAP)	361
17.1.2	Data registers	361
17.1.3	Instruction register	361
17.1.4	The TAP controller	361
17.2	Embedded Trace Macrocell (ETM)	364

17.2.1	Trigger condition	364
17.2.2	Code tracing and data tracing	364
17.2.3	J-Trace integration example - IAR Embedded Workbench for ARM	364
17.3	Embedded Trace Buffer (ETB)	368
17.4	Flash programming	369
17.4.1	How does flash programming via J-Link / J-Trace work?	369
17.4.2	Data download to RAM	369
17.4.3	Data download via DCC	369
17.4.4	Available options for flash programming	369
17.5	J-Link / J-Trace firmware	371
17.5.1	Firmware update	371
17.5.2	Invalidating the firmware	371
18	Designing the target board for trace	373
18.1	Overview of high-speed board design	374
18.1.1	Avoiding stubs	374
18.1.2	Minimizing Signal Skew (Balancing PCB Track Lengths)	374
18.1.3	Minimizing Crosstalk	374
18.1.4	Using impedance matching and termination	374
18.2	Terminating the trace signal	375
18.2.1	Rules for series terminators	375
18.3	Signal requirements	376
19	Semihosting	377
19.1	Introduction	378
19.1.1	Advantages	378
19.1.2	Disadvantages	378
19.2	Debugger support	379
19.3	Implementation	380
19.3.1	SVC instruction	380
19.3.2	Breakpoint instruction	380
19.3.3	J-Link GDBServer optimized version	380
19.4	Communication protocol	383
19.4.1	Register R0	383
19.4.2	Command SYS_OPEN (0x01)	383
19.4.3	Command SYS_CLOSE (0x02)	384
19.4.4	Command SYS_WRITEC (0x03)	384
19.4.5	Command SYS_WRITE0 (0x04)	385
19.4.6	Command SYS_WRITE (0x05)	385
19.4.7	Command SYS_READ (0x06)	385
19.4.8	Command SYS_READC (0x07)	386
19.4.9	Command SYS_ISTTY (0x09)	386
19.4.10	Command SYS_SEEK (0x0A)	386
19.4.11	Command SYS_FLEN (0x0C)	387
19.4.12	Command SYS_REMOVE (0x0E)	387
19.4.13	Command SYS_RENAME (0x0F)	387
19.4.14	Command SYS_GET_CMDLINE (0x15)	388
19.4.15	Command SYS_EXIT (0x18)	388
19.5	Enabling semihosting in J-Link GDBServer	389
19.5.1	SVC variant	389
19.5.2	Breakpoint variant	389
19.5.3	J-Link GDBServer optimized variant	389
19.6	Enabling Semihosting in J-Link RDI + AXD	390
19.6.1	Using SWIs in your application	390
20	Environmental Conditions & Safety	391
20.1	J-Link	392
20.1.1	Affected models	392

20.2	Flasher	393
20.2.1	Affected models	393
20.3	J-Trace	394
20.3.1	Affected models	394
21	Support and FAQs	395
21.1	Measuring download speed	396
21.2	Troubleshooting	397
21.2.1	General procedure	397
21.3	Contacting support	398
21.3.1	Contact Information	398