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1. TKScope Emulator Introduction

1.1 Introdution

TKScope embedded intelligent emulator designed by Guangzhou Zhiyuan Electronics Co., Ltd. in 2008, which is a high-performance general-purpose integrated emulator and supports DSP / ARM / AVR core etc. At the same time, TKScope built-in 32-way professional logic analyzer.

TKScope DK Series Emulator built-in DSP and ARM dual simulation models, dual JTAG port can also complete the TI DSP and ARM core simulation debugging, the unique technology leads a new model to DSP and ARM development tools.



Figure 1.1 TKScope DK9

TKScope DK Series can support DSP and ARM simulation: DK5 / DK8 / DK9 / DK10.

Support the DSP chips: TI C2000 / C5000 / C6000 / OMAP / DaVinci etc.

Support the ARM core: ARM7 / ARM9 / Cortex-M0 / Cortex-M1 / Cortex-M3 / XSCALE / ARM11 etc.

Support all the mainstream IDE, such as CCS / TKStudio / Keil / ADS / IAR / RealView / SDT and so on.

1.2 **TKScope DK Performance**

TKScope DK Series built-in DSP and ARM dual simulation models, dual JTAG port can also complete the TI DSP and ARM core simulation debugging, the unique technology leads a new model to DSP and ARM development tools. At the same time, TKScope built-in 32-way professional logic analyzer.

TKScope emulator features for DSP simulation:

- Support IDE: CCS3.1 / CCS3.2 and the latest CCS3.3.
- Support full of TI DSP chips simulation: such as C2000 / C5000 / C6000 / OMAP / DaVinci and so on.

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- USB2.0 (High Speed), high-speed communication interface.
- High-speed code download function which exceeds 600KB/s, especially on the DEBUG mode, download the code for speed optimization.
- Support high-speed RTDX data link which exceeds 2MB/s.
- Real-time event triggers, to support real-time breakpoint.
- Target board IO voltage adaptation, support for JTAG IO voltage range of 1.6V~3.6V.
- Built-in PLL clock generator which can distinguish automatically, adjust to JTAG clock, support user-defined simulation clock 500K~35MHz.
- DSP simulation, ARM simulation and Logic Analyzer can work together at the same time.

TKScope emulator features for ARM simulation:

- Support the full range of ARM core simulation, such as ARM7 / ARM9 / Cortex-M0 / Cortex-M1 / Cortex-M3 / XSCLAE / ARM11 and so on, including Thumb mode;
- Support the Cortex-M0 / Cortex-M1 / Cortex-M3 core serial debug (SWD) mode;
- Support all the mainstream IDE, such as TKStudio / Keil / ADS / IAR / RealView / SDT and so on;
- Support the on-chip Flash in-circuit programming / debugging, providing each chip corresponding Flash programming algorithm file;
- Support the off-chip Flash in-circuit programming / debugging, providing hundreds of commonly used Flash device programming algorithm file;
- Support multiple interface types of external Flash programming / debugging, such as NOR / NAND / SPI Flash and so on;
- Allowing users to add their own Flash programming algorithm file;
- Provide a separate programming-Flash independent software to increase productivity;
- Support for unlimited RAM breakpoint debugging;
- Support for unlimited Flash breakpoint debugging, breaking limit the number of hardware breakpoints;
- Synchronous Flash technology, fast refresh Flash breakpoints, the speed as fast as RAM debugging;
- Support dynamic breakpoints can set / cancel any breakpoint in running;
- Support program breakpoints and data breakpoints, user-friendly and accurately track complex programs to run;
- Rapid single-step, the fastest 150 steps / sec;
- Ensure the fastest and most stable frequency changes in the target system to debug;
- Built-in special debugging algorithms, reliable debugging of the ARM core in an irregular situation;
- Support for daisy-chain connection of multi-device simulation;
- Chip-based design concepts for the hundreds of kinds of chips to provide a sound initialization file.
- Built-in comprehensive interpretation of the actuator initialization files, can be flexible system settings before and after reset / run around / Flash download around, including register settings / ARM initialization / clock Settings / delay / information and so on.

Logic Analyzer Performance

- 32 channels, 100M sampling speed, 512KB memory depth.
- Advanced triggering: edge / level / bus etc.
- Multi-document structure allows to measure and compare the other data at the same time.
- Powerful data export function to support secondary analysis of the measurement sigal.
- Flexible frequency setting breaks through traditional 1 / 2 / 5 Hex, makes measurements more precise.
- Algorithm for dynamic upgrades of hardware to make your measurements with the times.

1.3 Selection Guide

At present, there are mainly four types of TKScope DK Series: DK5 / DK8 / DK9 / DK10, as show in Table 1.1.

Emulator Type	DK5	DK8	DK9	DK10
Simulation Type	DSP	DSP	DSP, ARM, AVR	DSP, ARM, AVR
K-Flash in-circuit				
programming			ARM, AVR	DSP, ARM, AVR
On-chip/out-chip Flash				
Communication	USB2.0	USB2.0	USB2.0	USB2.0
Logic Analyzer		\checkmark	\checkmark	\checkmark
Logic Analyzer		22	22	22
Performance		32-way/512KB/100WHz	32-way/512KB/100MHz	32-way/512KB/100MHz
			CCS, TKStudio, Keil,	CCS, TKStudio, Keil,
Support IDE	CCS	CCS, Zlglogic	ADS,	ADS,
			IAR, RealView, Zlglogic	IAR, RealView, Zlglogic

 Table 1.1
 Selaction guide table

This article explains how to use the TKScope DK9 for DSP simulation, including the installation of driver, the using steps and precautions in the CCS3.3 IDE.

2. Use TKScope Emulator

2.1 Install Driver

TKScope DK Series simulation of DSP chips, supports for TI CCS3.1 / CCS3.2 and the lastest CCS3.3 IDE. In this paper, we will take CCS3.3 for expamle, explain TKScope DK9 simulation process and methods of DSP chips in detail.

TKScope DK9 uses in CCS3.3 IDE, you must install CCS3.3 IDE interface driver (Setup TKScopeDK9ccs_v303.EXE).

1. Double-click SetupTKScopeDK9ccs_v303.EXE, the system will pop-up dialog box as shown in Figure 2.1.



Figure 2.1 Install TKScope driver

2. In Figure 2.1, click [Next] to continue, the system will pop-up dialog box as shown in Figure 2.2, prompt the user to select the driver installation path.

🛃 TKScope DK9 CCS v3.3 Emulati	on Drivers 20100818 🛛 🛛 🔀
Destination Location	(C)
Setup will install TKScope DK9 CCS v3.3 En	ulation Drivers 20100818 in the following folder.
To install into a different folder, click Browse,	and select another folder.
You can choose not to install TKScope DK9 clicking Cancel to exit Setup.	CCS v3.3 Emulation Drivers 20100818 by
Destination Folder	
C:\CCStudio_v3.3	B <u>r</u> owse
Vise Installation Wizard?	< <u>B</u> ack Next> Cancel

Figure 2.2 Driver installation path

3. In Figure 2.2, click [Browse], the system will pop-up dialog box as shown in Figure 2.3. Drivers must be installed to the CCS3.3 IDE directory.

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For example, CCS3.3 development environment installed on the C drive, therefore, TKScope emulator driver installation path to C: \ CCStudio_v3.3, as shown in Figure 2.3.

Select Destination Directory	
C:\CCStudio_v3.3	ОК
C:\ \$recycle.bin Boot	Cancel
CCStudio_v3.3 Documents and Settings Driver	
MSDCache Program Files recycler	
System Volume Information	
C: WINXP	

Figure 2.3 Select destination directory

4. After the installation path, Click [Next] to continue until the installation is completed, as shown in Figure 2.4. Click [Finish], the installation is completed.

覺 TKScope DK9 CCS 🕶	.3 Emulation Drivers 20100818
	TKScope DK9 CCS v3.3 Emulation Drivers 20100818 has been successfully installed. Click the Finish button to exit this installation.
	< <u>B</u> ack Einish ≻ Cancel

Figure 2.4 Driver installation is complete

2.2 Hardware Connection

1. For the first time, TKScope emulator power use, the system will pop-up dialog box shown in Figure 2.5. Need to specify the exact location of USB device driver.

Found New Hardware Wiz	ard
	Welcome to the Found New Hardware Wizard
	This wizard helps you install software for:
	TKScope K9
	If your hardware came with an installation CD or floppy disk, insert it now.
	What do you want the wizard to do?
	 Install the software automatically (Recommended) Install from a list or specific location (Advanced)
	Click Next to continue.
	< Back Next > Cancel

Figure 2.5 Found new hardware wizard

2. Select [Install from a list or specific location(Advanced)] option in Figure 2.5, click [Next], the system will pop-up dialog box as shown in Figure 2.6.

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search:
C:\CCStudio_v3.3\TKScope K9 Driver\WinXP 🛛 Browse
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel

Figure 2.6 Select driver box

3. In Figure 2.6, click [Browse], open the dialog box as shown in Figure 2.7. Find the driver files in TKScope emulator installation directory, click [OK].

Br	owse For Folder 🔹 💽
5	Select the folder that contains drivers for your hardware.
	🛄 MyProjects 🔄 🔼
	🗉 🚞 plugins
	🗉 🧰 SDKv3.0
	🖃 🧰 TKScope K9 Driver
	🚞 W2K
	🗁 WinXP 👘
	🗉 🧰 tms470 👘 👘
	🗉 🧰 tutorial
	🗉 🚞 Documents and Settings
	🗉 🧰 Driver
	🗉 🫅 New Folder 🛛 💌
	To view any subfolders, click a plus sign above.
	OK Cancel

Figure 2.7 Designated driver

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4. Driver installed, the system will pop-up dialog box as shown in Figure 2.8, click [Finish] to complete.



Figure 2.8 New hardware installation has completed

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3. Simulation DSP In CCS3.3

3.1 Simulation Environment Setting

CCS3.3 IDE installation is completed, the desktop will see the "Setup CCStudio v3.3" and "CCStudio v3.3" icon of two words.

1. Double-click "Setup CCStudio v3.3", open the CCS3.3 setting interface, as show in Figure 3.1.

Lile Edit Fier Help							
System Configuration	Available Factory Barrie	Funily	Fist.	Indi.		My System	
		A11 .	• A11 •	A11	-		
By Textus	AUMIN - VEOMONIO Flatform	ADR11	ntelawis				
	ADDIN - VEORDADD Flatform	ADR11	anwalator.				
	ANNT - VPORCA20 Flatform S	ADUT	nisilator				
	and Aler Simulator, Big Radian	ADMT	nivilator	hig			
	ANT Simulator, Little Endian	ABRT	nivilator.	little			
	ADV 120510 Real ator	ABRT	x4x510				
	ADM INT INCOME AND ALOW	ABBT	# dw560				
	ADRO INCIDE TANDALOF	ABBS	a.ds510.				
	ADD ADD INCOME.	ABIES	+4x560				
	ADMONET-5 Simulator Littl	ABIRG	similator.	little			
	P140 IBC510 Real stor	Cline	+4x510.				
	\$240 I20500 Realstor	C24au	+4x500				
	PINOI INCIDE States	C24es	wdx510.				
	100 F2401 120560 Real stor	C24es	a du500				
	100 FINOR ENDING Realistor	C24es	10510				
	100 F2w02 130560 Eaulator	C24zz	# 41560				
	TO F2400 E20500 East stor	C24ee	*4x510				
	TO F2403 E20560 Easlator	Cline	+4,500				
	TRACE TRADE Desilator	CD4ex	+0/510				
	22 72 800 122560 Real stor	CINE	x4x500				
	an FINOT ENDING Saulator	C24ex	10510				
	TO F2407 E32560 Realister	C24ee	* 41560				
	an Fist 120510 Real stor	Cline .	*4-510				
	TRA FIRST TRUNCH Real story	Cline .	+4-560	÷ .			
	and Fight Thilling Real ator.	Cities.	a.du/\$10				
	TRANSPORT	Cline	+44560				
	City Couls Assesses Signal	C77++	autoficial at or				
	Color Diffiel Basiator	Cline	* 4/510				
	Concerner Elected Realister	C2710	+44560				
	TR F2010 Device Similator	Citra	similator.				
	FORID ERITIO Resilator	Citter	*4610				
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	To Factory Search Ing Cutton 5	(ar at) 🕷	Creeks Bowy		_	15 ALMAN	1
Tave & Deit Samerry 1	ere all Call Call Barried					- still Provide	

Figure 3.1 CCS3.3 setting interface

2. In Figure 3.1, Click [File] option, the drop-down menu, select [Import], as show in Figure 3.2.

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evert to Saved Cys.	Cirlin Cirl+0	Available Factory Bourds	Funil All	* F1st	Redi All	- 1	My System	
		ADMAINTS - VEORCACO Flatform	ADV11	similator				
		AURI - VEORCACO Flatform	A0811	similator.				
Rest.	N.	ANT - VPORCACO Flatform S	ADUT	tiwilator.				
sport		and Aler Similator, Big Endisa	ADUT	ntelevis	hig			
art Cola Consonar	Statio	ANT Simulator, Little Endian	ABIRT	similator.	little.			
		ALS ALST INCOME THE ALST	ABRT	x4x510				
pi 4	AL+PR	AME AND INCOME AND ALON	ABBT	# dw560				
		ANNO XING XICKID Real ator	ABBS	+6(510				
		also 120560 Real ator	ASIPS	+4x560				
		ABRICELT-S Simulator Littl	ASIRS	similator	little.			
		P140 IISS10 Real stor	Clies	+de510				
		P240 IIC580 Real stor	C24ex	x 0x500				
		PINOI INCID Bealator	C24ee	+dx510				
		#9 FIGOI HESSED Realistor	C24es	a da500				
		ap FINOT INCIDE AND ALAST	02488	# 8x510				
		Rep P2402 X30560 Realstor	C24zz	= 0:550				
		100 F2400 X30500 Real-ster	C24ex	#4x510				
		10 72403 130560 Easlater	C24ex	+44500				
		12 72406 120500 Realstor	C24es	+dx510				
		12806 120560 Redator	CINER	a da500				
		B FINOT ESSED Realator	02448	a 6x510				
		RB F2w07 ISO560 Bandator	C24zz	a 8x560				
		400 F241 120510 Real stor-	C24ee	# de510				
		839 F241 130560 Real ator	C24ee	* 6x560				
		809 F243 120510 Real ator	£24es.	#du510				
		45 F243 120560 Real ator	C24ex	#4x560				
		ClTas Cycle Annarate Stand	C27##	similator				
		CITES ESSED Esslater	C27++	s-4s510.				
		Cline 120500 Bashater	C27+x	x4x560				
		P2010 Device Similator	Cline	similator				
		P2010 E25500 Backstor	Cline	wds/510		4		
		HE Partery Boards ME Custon 3	ourds 1	Cresta Bouri	1		C 1000	
and a second second	1.1					-	[_
ve A. Del S	Try Lineyre &11	Cats Bullet					- Mille Proyettie	
							and the second se	

Figure 3.2 Import option

3. The system will pop-up dialog box as shown in Figure 3.3, click [Browse] option.

iport	
	Browse
🔽 Clear <u>e</u> xisting confi	guration (Rem
-Duplicate Items	
If an item being imported as an existing item:	has the same name
🖲 Do not import	
C Replace the existing	

Figure 3.3 Import option dialog box

4. System will automatically open the CCS3.3 installation directory "import" folder, users choose appropriate option based on their use. (This example uses TKScope DK9 simulation of TMS320LF2407 chip, as show in Figure 3.4).

Select Confi	guration File		? 🔀
Look in: 🔀	import	- 🖬 🚽	•
 f2406_TKS f2406_xds' f2406_xds' f2407_TKS f2407_xds' f2407_xds' 	copeDK9xds560 510_0x240 560 copeDK9xds560 510_0x240 560	 f2801_TKScopeXD5560 f2802_TKScopeXD5560 f2806_TKScopeXD5560 f2808_TKScopeXD5560 f2808_TKScopeDK9xds560 f2810_sim f2810_TKScopeXPxds560 	9 9 9 9 9 9
<			>
File name:	f2407_TKScopeDK9x	ds560 ()pen
Files of type:	CC 5.x/4.x Configuration	on (*.ccs)	ancel

Figure 3.4 Select configuration file

5. After the right to import, CCS3.3 setup interface show in Figure 3.5. At this time, need to set the Emulator information and CPU type.

Pres Barr Dear Bark					_	[÷
System Configuration	Available Factory Bourds	Family	Flatfors	Endra.	- 2	My System	
B. Delleview	BRAIRIL - VERENCE Flatform Elementation	ADDIT	similator		-	F2407 THScope DH9 XD9560	
FINT DEscent HEP HESSED Evalutor	ANNI - VIORISO Flatfurs fiesdator	ARMIT	nimilator			Envulator	
- CTE 1	ANT - WORCASO Flatform Simulator	AND	aisalater			Number of Denses	
	and ADWT firmilator. Big Radian	ABUT	nieslater	hie	1.12		
	and alor Lightlater, Little Radius	AXET	nimilator	little			
	STRAINT INCOME AND ALAN	ADDIT	= #s\$10				
	and alor 110560 faul stor	ABIRT	+4+560				
	ADD ADD INCOME THE ADD	43203	+44520				
	also also Thinks Real ator	10.000	+44560				
	an appropriate Simulator Little Radian	4389	nimilator	little			
	ER F140 IES10 Real stor	Chief	n#s520				
	ER FIND INCOME And story	Cho	×84560				
	and FINOL TRIDIO Bandator	Chief	1000				
	REPROT EDITED Instator	C24ct	a \$1560				
	an PINOT EDDIOD Bandator	CD4ce	a 84000				
	BR F2NOT 130580 Bashater	C24er	x 8x580				
	an P2400 Ibiliob Badater	COles	*##510				
	TR F2803 120560 Realator	Cho	14500				
	and \$7806 Thilling Realister.	Cha	10510				
	100 FINOS INCOME Instator	CD4m	a 81560				
	an FINOT ESSENT faulator	COlor	a 4x510				
	an Frant 130560 Realister	Cline	241580				
	an Fist 120510 Real stor	Cline	*******				
	an Fig1 120560 Each stor	Cline	*1:580				
	an Figh Thiling Real ator	Clare	*44520				
	TRANSPORT	Chier	+14580				
	Cites Couls Annarate Simulator	C2Tes	similator				
	Concerner Electron Realister	C2Tes	*#4510				
	COTTon DECKO Realator	CTTre	+1650				
	20 22010 Device Significant	Cibo	similator				
	FIRID ERISIO Resistor	Citra	×44520				
	and a second second second		a thread			press and	
	In Factory Sourds In Conton Proriti		ta prove j			16:111 12	
Tave & Doi 1	Call Scale of Call Science					oh In Transmitte	

Figure 3.5 Completing settings interface

6. Users can open the properties dialog box emulator, set according to actual needs, as show in Figure 3.6.

Pres Barr Pres Bres	3			
System Configuration		Available Processor	Briver Location	F2407 TKScope DK9 *
 Prote Prote Protection Protection Protection 	Bannin Rapora Drawi na Impo Draporti or	Radio State	C. VIZTedu, 20 Tukewa Vikadobicka, er C. VIZTedu, 20 Tukewa Vikadobicka, er	Driver Location C CCCCCCC 2 2 Denormal Series Network Matternith C Constant Network D C Constant Network D C Constant Network D C Constant Network
		Die Facture Tauch Die	Custon Barris County Barris	_

Figure 3.6 Set emulator properties

7. Emulator properties dialog box show in Figure 3.7, the user can set TCLK mode. In general, choose [Automatic].

Connection Properties		? 🗙
Connection Name & Data File	Connection Properties	
Propert	Value	
TCLK	Automatic	
Emulator Name	Automatic Legacy (10.368MHz) Uzer Defined	
Change property value as no	ecessary in the right column.	
	Finish H	则消

Figure 3.7 emulator properties dialog box

8. Users can also open the CPU properties dialog box, set according to actual needs, as show in Figure 3.8.

Code Composer Studie Setup			E	×
Eile Edit Eine Belg System Configuration	Course Barrow	Arian Localian	CPU_1	
ty Dystes ■ Trivit HE cop+ HD HE580 Isolator ↓ Inne+ F2	• THE SECOND AND	C.\CCStudie_v0.3\driverx\tinds560x24a.dev	Device Type: CPU OEL/File	
Ramon Dul Truct An Dypan Dropartics Alto	Tatar b		Manhard Store Task	
	M Factory Boards	🖬 Custon Boards 🌰 Croate Board		2
Inve & Deit Zamere All	CICALL CA	an manual	shify Propertie	

Figure 3.8 Set CPU properties

9. CPU properties dialog box show in Figure 3.9, users can modify the CPU property. In

general, CPU properties without having to modify.

Processor Properti	es	×
Property	Value	
GEL File	C:\CCStudio_v3.3\cc\ge	l\f240"
Master/Slave	N/A	
Change property value	as necessary in the right co	lumn.
Summary		
		~
OK	Cancel	

Figure 3.9 CPU properties dialog box

10. When settings are completed, click [Save & Quit] option in Figure 3.1, save and close CCS3.3 setting interface. At this time, system will pop-up dialog box as shown in Figure 3.10. Click [Yes], the system will open CCS3.3 operating environment; Click [No], need to the user open it.

Code Composer	Studio Setu	ıp 🛛 🛛
Start Co	de Composer	Studio on exit?
Yes	No	Cancel

Figure 3.10 Choose dialog box

3.2 Debugging method

Users can debug after the completion of the emulator settings.

3.2.1 Device Connection

Double-click "CCStudio v3.3", open the CCS3.3 IDE interface, as show in Figure 3.11. At this moment, system prompts "No target connected".



Figure 3.11 No target connected interface

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Click [Debug] menu, select [Connect] option, connect the target board, as show in Figure 3.12.

- 101	The ambernet		N 10 10 10 10 10	19-18 前部 臣臣 (本法法事 *
	Receiving Towner Steppin Day Late Day Day Day App	4 711 711 711 711 711	5 9 4	
Y ends files	Im ph1 ph1mete fm pro- fm pro- fm from fm fm to former fporter ph1mete ph1mete ph1mete fporter fpor	IS Burnetti Annetti Charles Charles Charles Charles Charles Charles Charles Charles Charles Charles Charles Charles	-	
	- Enteret	41195	d	
	Dersid Lavel Bebegung Beal-time Bode Bade Beal-time Rode			
	- flash Dipeline on Bait			

Figure 3.12 Connect the target board operation

If the emulator connets with the target board correctly, the system will prompt the target board is connected, as show in Figure 3.13.

₽ ₽ 3 % 8 ~~~		E) + % % • (a)
1	- (SHHA) 0 8 0 4	
P 100 P	P Dreservably Image: Constraint of the const	
target is are connected		

Figure 3.13 Target board is connected interface

If the emulator connets with the target board incorrectly, the system will pop-up dialog box shown in Figure 3.14. This moment, users need to check whether the target board power, or JTAG interface is normal, or CCS3.3 environment settings are correct and so on.

F2407	TKScope DK9 KDS560 Emulator/CPU_1	×
8	Error initializing emulator Board Name: F2407 TKScope DK3 XDS560 Emulator Cpu Name: CPU_1	
	Abort: Close Code Composer Studio. Retry: Try to initialize the emulator again. Ignore: Ignore the initialization error and	*
	Abort Retry Disgnosti	c

Figure 3.14 Error initializing emulator

If the default of gel documentation systems can not meet user requirements, users can delete the system default file, add your own gel file, show in Figure 3.15.

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er S	2 Sand	5 C 8 0 4	
er P			
Pilet			
Property and Property of the Advancement Property of the Advancement Property of the Advancement Property of the Advancement Research of the A	©000 7900 B 7900 B	E 108 8003 8004 8004 8004 8004 8004 8004 8114	

Figure 3.15 Remove gel file operation

3.2.2 Download the project

After emulator connected with target board correctly, the user can load their own project and debug.

Click [project], select [open], load the user's project, as show in Figure 3.16.



Figure 3.16 Open the project

Load the gel file of the project, as show in Figure 3.17.





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Click [File], select [Load Program], as show in Figure 3.18.

Die Bar Ber brund Bar (B. Beim, Fuhlt Leit Rate Bar Ber. Under State Ber. Ortstate Ber. </th <th># /#2407 TKScope DES</th> <th>105560 Emilat</th> <th>nr/CPB_1 - TES320C2xx - Code Composer Studio</th> <th></th>	# /#2407 TKScope DES	105560 Emilat	nr/CPB_1 - TES320C2xx - Code Composer Studio	
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Figure 3.18 Load program operation

After download the .OUT file, you can start debugging, as show in Figure 3.19.



Figure 3.19 Debug interface

3.2.3 Debugging Tools

CCS debugging environment provides the following debugging tools, as shown in Table 3.1.

lcon	Description
()	Source-Single Step.
<mark>0</mark> 9	Source-Step Over.
ፁ	Step Out.
(*)	Assembly-Single Step.
9	Assembly-Step Over.
→0	Run to Cursor.
(¹)	Set PC to Cursor.
æ	Run.
2	Halt.
滏	Animate.
1	Enable/Disable Breakpoint.
2	Disable All Breakpoints.

Table 3.1 Debugging tools

CCS debugging environment provides the following watching tools, as shown in Table 3.2

Table 3.2 Watching tools

lcon	Description		
öx	Open Register Window.		
2	Open Watch Window.		
60	Opne Quick Watch.		

Application Note

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