RFID BoosterPack

TRF7970ABP With MSP430G2 LaunchPad





Table of Contents



	0
<u>Prerequisites</u>	3
Hardware Configuration	5
Install UniFlash	7
Program LaunchPad using UniFlash	12
Install and Configure Terminal	17
NFC/RFID Read Mode	26
Troubleshooting Tips	38





Prerequisites

Hardware

- 1. 1x MSP-EXP430G2 LaunchPad, orderable from the TI eStore.
- 2. 1x DLP-7970ABP, orderable through third party vendors.

Software

- 1. Download <u>Uniflash</u> installation file.
- Download <u>TRF7970ABP</u> software zip folder. It can also be found on the <u>DLP-7970ABP Product Page</u> under Technical Documents/User Guides/DLP-7970ABP Example Code.
- 3. Download and install Terminal Program.
 - <u>Docklight</u> recommended, but any terminal can communicate with LaunchPad and BoosterPack.

Assumptions & Knowledge Base

- 1. The user should have knowledge of or be familiar with:
 - MSP430G2 LaunchPad



Basic Installation



Enable Hardware UART

- Identify revision number located under MSP-EXP430G2 text on board.
- Follow J3 Jumper placement instructions below for corresponding revision number.
- For more information regarding enabling the Hardware UART, see <u>here.</u>







Hardware Configuration Image

USB Connection to PC





Install UniFlash

- Download UniFlash zip file to preferred download location.
- Extract all files from UniFlash zip file (note: UniFlash revision numbers vary).
- The file path will depend on where the zip file has been downloaded.

UNIFLASH2.2.0.00016_	Open Open in new window		Compressed (zipp	294,593 KB
	Extract All		(
	Share with	•		
	Restore previous versions			
	Send to			
	Сору			
	Create shortcut Delete			
	Rename			
	Properties			



Install UniFlash

- Execute UniFlash installation file (.exe file extension).
- The installation file can be found in the extracted file folder.
- Follow installation instructions.
- Note location of installation folder.

CCS UniFlash v2 Setup	CCS UniFlash v2 Setup	CCS UniFlash v2 Setup	23
License Agreement Please read the following license agreement carefully.	Choose Installation Location Where should CCS UniFlash v2 be installed?	Select the setup type that best suits your needs.	S
Code Composer Studio UniFlash v2 Software License Agreement	To change the main installation folder click the Browse button.	Click the type of Setup you prefer.	
IMPORTANT - PLEASE READ THE FOLLOWING LICENSE AGREEMENT CAREFULLY. THIS IS A LEGALLY BINDING AGREEMENT. AFTER YOU READ THIS LICENSE AGREEMENT, YOU WILL BE ASKED WHETHER YOU ACCEPT AND AGREE TO THE TERMS OF THIS LICENSE AGREEMENT. DO NOT CLICK 'T ACCEPT' UNLESS: (1) YOU ARE AUTHORIZED TO ACCEPT AND AGREE TO THE TERMS OF THIS LICENSE AGREEMENT ON BEHALF OF YOURSELF AND YOUR COMPANY, AND (2) YOU INTEND TO ENTER INTO AND TO BE BOUND BY THE TERMS OF THIS LEGALLY BINDING AGREEMENT ON BEHALF OF YOURSELF AND YOUR COMPANY.	C:\ti Browse	Select this option if you wish install all features for all product families. This will result in a large download size.	
I accept the terms of the license agreement. I do not accept the terms of the license agreement. Texas Instruments	Texas Instruments	Texas Instruments	
<back next=""> Cancel</back>	< Back Next > Cancel	<back next=""> Canc</back>	cel



Install UniFlash

• Continue to follow installation instructions, installing the appropriate drivers for the application.

CCS UniFlash v2 Setup	CCS UniFlash v2 Setup 23 CCS UniFlash v2 Setup	22
Select Emulators Select the emulators you want installed and deselect emulators you want to leave out.	CCS Install Options Setup is ready to begin installation.	CCS UniFlash v2 Installation Complete
TAG Emulator Support	If you want to review or change any settings, click Back. Click Next to begin installation.	CCS UniFlash v2 has been successfully installed.
Stears Emilators Tiva E Series ARM MCUs Tiva E Series ARM MCUs MisP430 Emilators MisP430 USR FET Blachewk Emulators Tiva E Series ARM ARUS	Install Directory: C: [k]/unifashv2 Setup Type: Complete Feature Set Product Families selected: Produc	Click Finish to exit the installation wizard.
Install size: 839.91 MB. Texas Instruments	Cortex-R4F MCUs	
< Back Next > Cancel	<back next=""> Cancel</back>	Finish Cancel



Detect COM Port

- Open Device Manager from Control Panel
- Determine COM Port from Ports Menu (MSP430 Application UART)





COM Port Settings

- Right click on MSP430 Application UART Port, select Properties, and visit Port Settings tab
- Adjust Virtual COM Port settings to 9600, 8, None, 1, Hardware
 - Note that COM port numbers vary between systems

🛃 Device Manager		х
File Action View Help		
	MSP430 Application UART (COM2) Properties	
 Cra0221354 Batteries Computer Computer ControlVault Device Disk drives Diply adapters DVD/CD-ROM drives Human Interface Devi Human Interface Devi Mice and other pointi Mice and other pointi Monitors Network adapters Monitors Network adapters Ports (COM & LPT) Dell Wireless 5630 CP Printer Port (L MSP430 Applicatic Sound, video and gan Sound, video and gan 	MSP430 Application UART (COM2) Properties General Port Settings Driver Details Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Row control: Hardware • Advanced Restore Defaults Port (COM4) rt (COM5)	
System devices		
👂 - 🏺 Universal Serial Bus co	ntrollers	



Unzip Software Folder

- Extract files from downloaded software folder. •
- Note location of TRF7970ABP Demo.out file. ٠
- Default location for program file is:
 - sloc297\TRF7970ABP_Demo\Debug

			TRF7970ABP_Demo Debug
	Open	Organize 👻 📄 Open	Share with ▼ Burn New folde
		🔶 Favorites	Name
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	Send to	Windows (C)	TRP/9/0ABP_Demo.out
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		OUTFile	Size: 89.9 KB



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1 KB

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90 KB

Size

Date modified

10/24/2013 3:18 PM File folder 10/24/2013 3:18 PM File folder 10/2/2013 3:44 PM

10/2/2013 3:26 PM OBJ File

10/2/2013 3:26 PM PP File

10/2/2013 3:26 PM MK File

10/2/2013 3:26 PM MK File

10/2/2013 3:26 PM MK File

10/2/2013 3:26 PM MAP File

10/2/2013 3:26 PM OUT File

Date created: 10/2/2013 3:26 PM

10/2/2013 3:44 PM

10/2/2013 3:44 PM

Type

OPT File

File

MK File



Open UniFlash

- Open uniflash.exe from installation folder.
- Uniflash may also install a shortcut to the desktop, which can be used to open the program.

							X
Compute	er ▶ Windows (C:) ▶ TI ▶ unifla:	shv2 ▶ eclipse ▶			✓ 4→ Search eclipse		Q
Organize 🔻 📑 Open	Burn New folder					II • II	?
☆ Favorites	Name	Date modified	Туре	Size			
🧮 Desktop	Configuration	9/20/2013 11:33 AM	File folder				
🗼 Downloads	퉬 features	9/5/2013 3:33 PM	File folder				
Recent Places	鷆 jre	9/5/2013 3:33 PM	File folder				
	퉬 p2	5/17/2013 10:50 AM	File folder				
🥽 Libraries	퉬 plugins	9/5/2013 3:33 PM	File folder				
Documents	퉬 scripts	5/17/2013 10:50 AM	File folder				
🌙 Music	.eclipseproduct	5/17/2013 10:49 AM	ECLIPSEPRODUCT	1 KB			
Pictures	artifacts.xml	9/5/2013 3:33 PM	XML Document	32 KB			
🛃 Videos	ccs.properties	9/5/2013 3:33 PM	PROPERTIES File	1 KB			
	🔮 ccs_config.xml	9/5/2013 3:34 PM	XML Document	10 KB			
🖳 Computer	ccs_config.xml.bk	9/5/2013 3:33 PM	BK File	11 KB			
🏭 Windows (C:)	CDC.log	9/5/2013 3:34 PM	Text Document	1 KB			
	🐝 uniflash.exe	5/17/2013 10:50 AM	Application	312 KB	←		
👊 Network	🗿 uniflash.ini	9/5/2013 3:33 PM	Configuration sett	1 KB			



Install the MSP430G2553 Target Configuration



- Click File
- Choose New Target Configuration



- Select Connection (USB1)
- Select MSP430G2553 Device

🐝 Create CCXML File	Countral Carton	×
Target Setup		
Connection:	TI MSP430 USB1 <	•
Board or Device:	Type filter text here.	-
	MSP430G2432 MSP430G2433 MSP430G2444	1
	MSP430G2452	
	MSP45002455 MSP430G2513	-
	MSP430G2533	



Load the Target Binary

- Click Program
- Choose Load Program



- Select path to TRF7970ABP_Demo.out within sloc297 folder, targeting MSP430 LaunchPad Core:
 - sloc297\TRF7970ABP_Demo\Debug

Path to Target Binary file:	23			t Binary	🕉 Open Targ	1
Target core: TI MSP430 USB1/MSP430	rowse	▼ Br		Binary file:	Path to Targe	→
		•		81/MSP430	Target core: TI MSP430 U	
OK Cance	4	Cancel	ОК			



Hardware Configuration Image

USB Connection to PC





Terminal Notes

- Any terminal program can communicate with the TRF7970ABP BoosterPack.
- If using Docklight, continue to Docklight slides for specific instructions.
- If using another terminal, enable the terminal settings as seen on the next slide.



Terminal Notes

- Ensure the following settings:
 - Send/Receive on the Comm. Channel listed in Device Manager
 - Baud Rate: 9600
 - Parity: None
 - Data Bits: 8
 - Stop Bits: 1
 - Flow Control: Hardware
- Communicating with the device will automatically read any technology present, with the device updating every second or so.
- If using another terminal, note indication lights corresponding to technology types read:
 - D2: ISO14443B / NFC Forum Type 4B Tag Platform
 - D3: ISO14443A / NFC Forum Type 2 and Type 4A Tag Platforms
 - D4: ISO15693 / NFC Forum Type V Tag Platform



Install Docklight

d to d by Labor chipa a

- Extract all files from Docklight.zip
- Run setup.exe

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🖉 🔆 Favorites	Name	Date modified Typ	oe Size	
🧮 Desktop	🔮 docklpad.xml	9/30/2013 8:53 AM XM	L Document 20 KB	
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	🔂 setup.exe	9/30/2013 8:53 AM Apr	plication 3,291 KB	<
4 潯 Libraries				
Documents				
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Zomputer				
🛛 🏭 Windows (C:)				
🛛 📭 Network				
4 items				



Install Docklight

• Follow on screen instructions, making sure to create a desktop icon.

🙀 Setup - Docklight		j Setup - Docklight		23	🔂 Setup - Docklight	
	Welcome to the Docklight Setup Wizard	Information Please read the following important info	rmation before continuing.		Select Destination Location Where should Docklight be installed?	R
	This will install Docklight V2.0 on your computer.	When you are ready to continue with Se	etup, click Next.		Setup will install Docklight into the	following folder.
	It is recommended that you close all other applications before continuing.	fuh_distribute_int.txt	<u>^</u>		To continue, dick Next, If you would like to	- celect a different folder, dick Browse
	Click Next to continue, or Cancel to exit Setup.	Flachmann und Heggelbacher Software Distribution Agreement:	=		C:\Program Files (x86)\FuH\Docklight V2.0	Browse
	[This software product is Copyright 201: (<u>www.fuh-edv.de</u>). All rights reserved. The evaluation version of this software	3 Flachmann und Heggelbacher GbR e may be freely distributed, with exceptions			
T		noted below, provided the distribution person or company may charge a fee fr without written permission from the cop not be bundled or distributed with any of the copyright belove	package (.zip file) is not modified. No for the distribution of this software product pyright holder. This software product may other package without written permission			
			*		At least 5.2 MB of free disk space is require	ed.
	Next > Cancel		< Back Next > Cance	el		< Back Next > Cancel
-		4		,	`	



setup - Docklight	
Ready to Install Setup is now ready to begin installing Docklight on your comp	puter.
Click Install to continue with the installation, or click Back if y change any settings.	ou want to review or
Destination location: C:\Program Files (x86)\FuH\Docklight V2.0	~
Start Menu folder: Dodklight V2.0	
Additional tasks: Additional icons: Create a desktop icon	
	-
•	•





Execute DockLight Terminal

- Execute Docklight from desktop icon.
- If there is no desktop icon, then Docklight should be an option in the start menu.
- Upon opening, click OK, then start a blank project

Ocklight V2.0 (Eval)	- • ×	◆ Docdight V2.0 (s-a)
File Edit Run Tools Help		File Edit Run Tools Help
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Communication port closed حجا إسليك	Colorski-Fonts Mode DDM1 9600, None, 8, 1	L-H/ Communication pot closed Collect Fonts Mode COM6 9500, None, 8, 1
Send Sequences	Communication	Send Sequences Communication
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Modify Settings

 Modify settings by double clicking on COM port assignment in upper right of screen.

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File Edit Run Tools Help						
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Lung Communication port closed	Coloradia and Co	9600, None, 8, 1				
Send Sequences	Communication					
Send Name Sequence	ASCII HEX Decimal Binary					
Receive Sequences						



Assign Correct COM Port

 Ensure Communication Mode is set on Send/Receive, the Comm. Channel matches the COM Port used as displayed by the device manager, and the COM Port Settings reflect 9600, N, 8, and 1

Project Settings	22
Communication Flow Control Communication Filter	1
Communication Mode ► Send/Receive C (receive only)	
Send/Receive on Comm. Channel COM6 Choose a COM port from the list of available devices, or type a C	ом
COM Port Settings Baud Rate 9600 To Data Bits 8	
Parity None 🗨 Stop Bits 1	<u> </u>
Parity Error Char. 63 ('?')	
OK Cancel	Help



Enable Handshaking

- abled.
- Ensure that Hardware Handshaking RTS/CTS is enabled.





Begin Communication

a by Later a

• Click on Blue Play Button to start.

Sr Docklight V2.0 (Eval)						
File Edit Run Tools Help						
L ☞ 🛛 ≝ → 🛤 🛛 🕉 ∞ 늘						
Colors&Fonts Mode COM6	9600, None, 8, 1					
Send Sequences Communication						
Send Name Sequence ASCII HEX Decimal Binary						
	1					
Receive Sequences						
Active Name Sequence 1sw						



NFC/RFID READ MODE



Read NFC-V Tag

- Present an NFC-V Tag.
- LED D4 will illuminate when technology is present.







Read NFC-V Tag

• Tag will be identified and read as below.

🗲 Docklight V2.0 (Eval)				-	– – X
File Edit Run Tools Help Stop Cor	mmunication (F6)				
🗅 📽 🖬 🎒 🕨 🔳 🔛 🖊 I	🔀 🛛 🖉 📾				
Commmunication port open (waiting fo جمسطي	r handshake)		Plain Text Mode	COM15 9600, None, 8, 1	RTS/CTS Handshaking
Send Sequences	Communication				
Send Name Sequence	ASCII HEX Decimal	Binary			
	Tags Found: 1				*
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
Receive Sequences	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
Active Name Sequence nsw	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			=
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
	ISO15693: Tags Found: 1	[E00700000391CC3F,7F]			
Тад Туре	ISO15693: Tags Found: 1	[E00700000391CC3F, 7F]	Signal Strength		
		T			-
		I			
		Tag ID			





Read Type 2 Tag

- Present a Type 2 Tag.
- LED D3 will illuminate when technology is present.







Read Type 2 Tag

• Tag will be identified and read as below.

🗲 Docklight V2.0 (Eval)	Docklight V2.0 (Eval)				
File Edit Run Tools Help Stop Con	nmunication (F6)				
🗅 📽 🖬 🕘 🕨 🔳 🕍 😫 🖊 🕯	🛛 🔀 🗰 🖮				
Communication port open (waiting fo	rhandshake)	Plain Text Mode COM15	9600, None, 8, 1	RTS/CTS Handshaking	
Send Sequences	Communication				
Send Name Sequence	ASCII HEX Decimal Binary				
	Tags Found: 1			*	
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
Receive Sequences	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
Active Name Sequence hsw	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1				
	ISO14443 type A: [04EFB2D2082880,7F] Tags Found: 1			E	
				-	



Read Type 4A Tag

- Present a Type 4A Tag.
- LED D3 will illuminate when technology is present.







Read Type 4A Tag

• Tag will be identified and read as below.

🗲 Docklight V2.0 (Eval)				- • ×	
File Edit Run Tools Help Stop Communication (F6)					
□ ☞ 🖬 🚳 → 🖬 🖆 🔎 🗚 🕻	D ☞ 🖬 🕾 → 🔳 🗳 🔎 M 🔀 🕱 🗰 🖮				
Commmunication port open (waiting for	r handshake)	Plain Text Mode COM15	9600, None, 8, 1	RTS/CTS Handshaking	
Send Sequences	Communication				
Send Name Sequence	ASCII HEX Decimal Binary				
	Tags Found: 1			*	
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
Beceive Sequences	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
Active Name Sequence hsw	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1				
	ISO14443 type A: [0483191A8A2884,7E] Tags Found: 1			=	
	ISO14443 type A: [88048319,40] Tags Found: 1			=	
				-	



Read Type 4B Tag

- Present a Type 4B Tag.
- LED D2 will illuminate when technology is present.







Read Type 4B Tag

• Tag will be identified and read as below.

🛇 Docklight V2.0 (Eval)				- • ×
File Edit Run Tools Help Stop Con	nmunication (F6)			
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Commmunication port open (waiting fo	r handshake) F	Plain Text Mode COM15	5 9600, None, 8, 1	RTS/CTS Handshaking
Send Sequences	Communication			
Send Name Sequence	ASCII HEX Decimal Binary			
	Tags Found: 1			*
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
Receive Sequences	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
Active Name Sequence hsw	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			
	ISO14443 type B: [62481BC8,7F] Tags Found: 1			E
				•



Read Multiple Tags

- Hardware can read multiple tags simultaneously.
- Corresponding LED for each tag type present will illuminate when technology is present.





Read Multiple Tags

a by Looph chipan

• Tags will be identified and read as below.

G= Docklight V2.0 (Eval)				
File Edit Run Tools Help Stop Con	File Edit Run Tools Help Stop Communication (F6)			
🗅 📽 🖬 🚳 🕨 🔳 🖆 🔎 🗛 (🕅 📝 🗰 🖮			
Communication port open (waiting fo	r handshake)	Plain Text Mode CC	0M15 9600, None, 8, 1	RTS/CTS Handshaking
Send Sequences	Communication			
Send Name Sequence	ASCII HEX Decimal Binary			
	IS015693: [E007000012EA538D,64] IS014443 type A: [0483191A8A2884,7E] IS014443 type B: [62481BC8,7C] Tags Found: 3			^
Pasaina Saguanaa	ISO15693: [E007000012EA538D,64] ISO14443 type A: [0483191A8A2884,7E] ISO14443 type B: [62481BC8,7C] Tags Found: 3			
Active Name Sequence isw	ISO15693: [E007000012EA538D,64] ISO14443 type A: [0483191A8A2884,7E] ISO14443 type B: [62481BC8,7C] Tags Found: 3			
	ISO15693: [E007000012EA538D,64] ISO14443 type A: [0483191A8A2884,7E] ISO14443 type B: [62481BC8,7C] Tags Found: 3			
	ISO15693: [E007000012EA538D,64] ISO14443 type A: [0483191A8A2884,7E] ISO14443 type B: [62481BC8,7C] Tags Found: 3			
	ISO15693: [E007000012EA538D,64] ISO14443 type A: [0483191A8A2884,7E] ISO14443 type B: [62481BC8,7C] Tags Found: 3			
	IS015693: [E007000012EA538D,64] IS014443 type A: [0483191A8A2884,7E] IS014443 type B: [62481BC8,7C] Tags Found: 3			
	IS015693: [E007000012EA538D,64] IS014443 type A: [0483191A8A2884,7F] IS014443 type B: [62481BC8,63] Tags Found: 3			F
				•



Ending Communication



🗢 Docklight V2.0 (Eval)					
File Edit Run Tools Help Stop Communication (F6)					
D 🚅 🛛 🚄 🔪 🔹 🖆 🖉 🗚	🕅 📆 📾 🔚				
Communication port open (waiting l	or handshake)	Colors&Fonts Mode	COM6	9600, None, 8, 1	RTS/CTS Handshaking
Send Sequences	Communication				
Send Name Sequence	ASCII HEX Decimal Binary				
Receive Sequences					
Active Name Sequence rsw					



TROUBLESHOOTING



Troubleshooting Tips

- If the blinking red "heartbeat" on the LaunchPad stops, reset the LaunchPad by pressing the reset button. If the "heartbeat" does not resume, go through the Uniflash flash steps again to re-flash the system.
- If LaunchPad is not responding, close Uniflash and terminal program, then unplug/replug LaunchPad.



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