Tutorial for DSI2599

NuMaker-IoT-M487

16 Oct 2020

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Microcontroller and microprocessor

微控制器(Microcontroller, MCU)



微處理器(Microprocessor, MPU)



† For the Cortex-M4F processor, the core includes a Floating Point Unit (FPU) ‡ Optional component

Nuvoton M480 series

ARM Cortex-M4 processor

The modern microprocessor



Nuvoton NUC980 series microprocessor

Memory

- Program memory / code memory
 - Flash, EEROM, PROM etc.
 - LDROM, APROM, SPROM
- Data memory
 - SRAM or DRAM
 - IRAM (Internal RAM), XRAM (External RAM)

EEH (1
rm			Indire	ect Acc	essing	RAM			
80H 7FH		Dire	ect or I	ndirect	Acces	ssing R	RAM		
30H									
2FH	7F	7E	7D	7C	7B	7A	79	78	1
2EH	77	76	75	74	73	72	71	70	
2DH	6F	6E	6D	6C	6B	6A	69	68	
2CH	67	66	65	64	63	62	61	60	
2BH	5F	5E	5D	5C	5B	5A	59	58	
2AH	57	56	55	54	53	52	51	50	
29H	4F	4E	4D	4C	4B	4A	49	48	
28H	47	46	45	44	43	42	41	40	
27H	3F	3E	3D	3C	3B	3A	39	38	Bit-addressable
26H	37	36	35	34	33	32	31	30	1
25H	2F	2E	2D	2C	2B	2A	29	28	1
24H	27	26	25	24	23	22	21	20	1
23H	1F	1E	1D	1C	1B	1A	19	18	
22H	17	16	15	14	13	12	11	10	1
21H	0F	0E	0D	0C	0B	0A	09	08	
20H	07	06	05	04	03	02	01	00	l/
1FH					<u> </u>				ň
184			н	egiste	r Bank	3			
17H						_			
104			R	egiste	r Bank	2			
OFH									General Purpose Registers
			R	legiste	r Bank	1			
08H 07H									
			R	egiste	r Bank	0			
00H I									ν

Instructions

P1M1=0x00B3 P1M2=0x00B4

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z

 $\leq_{\mathfrak{B}}$

.area	HOME (ABS,CODE)
.org	0x0000
MOV	P1M1, #0x00
MOV	P1M2, #0x04
CLR	P1.2
SJMP	

EXPLORER

> OPEN EDITORS LAB01 - ASMTEST
build.bat
Asset test.asm

> ≡ test.hex ≡ test.ihx

test.rel

🔀 File Edit Selection View Go Run Terminal Help

ASA

	Hex code	Mnemonic	Operands	Number of bytes
	0x75	MOV	data address, data value	3
	0xC2	CLR	bit address	2
	0x80	SJMP	relative code address	2
test.ası 1 test.a 2 t 3 4 5 6 6 7 8 9 10	test.asm - Lab01 - m × sm P1M1=0x00B3 P1M2=0x00B4 .area HOME (ABS,COD .org 0x0000 MOV P1M1, MOV P1M2, CLR P1.2 SJMP .	asmtest - Visual File Data APRDM LDRDM 00000000: 75 #0x00 #0x04 Programming ☑ APROM	File Name: C:\SPROM.hex File not load. Config 0: 0xFF Config 1: 0xFF Config 2: 0x63 (Update Histo Config 3: 0xFF Config 4: 0xFF On-board Flash On-board Flash SPROM APROM LDROM SPROM APROM LDROM SPROM Info B3 00 75 B4 04 C2 92 80 FE O O O O O O O O O O O O O	ry> 8 bits 16 bits 32 bits 92 80 FE Refresh Start Build: 7091r

Instruction cycle

- Fetch -> Decode -> Execute -> Restore
- Fetch: Get instruction from program memory to instruction register.
- Decode: Resolve the instruction.
- Execute: Execute the instruction, get operands from program memory if needed.
- Restore: Result will store in specific register.

24	2	ADD	A,#data
25	2	ADD	A,data addr
26	1	ADD	A,@R0
27	1	ADD	A,@R1
28	1	ADD	A,R0
29	1	ADD	A,R1
2A	1	ADD	A,R2
2B	1	ADD	A,R3
2C	1	ADD	A,R4
2D	1	ADD	A,R5
2E	1	ADD	A,R6
2F	1	ADD	A,R7

Pipeline

• Multiple instruction shift register



Hardware acceleration

- FPU : Float Point Unit
- DSP : Digital Signal Unit
- IPU : Image Processing Unit
- GPU : Graphics Processing Unit

From C language to executable binary

- Compile -> Assemble -> Link
- Compile: From C source code to assembly (with flag).
- Assemble: From assembly to binary code with flag (objects).
- Link: Link multiple objects together output an executable binary.

Historia Pucca ack by	assignBit	A CONST size F flags 20 addr 0
#include "MS51_16K.n"	clr _EA	A XINIT size 0 flags 20 addr 0
	mov _TA,#0xaa	A CABS size 0 flags 28 addr 0
	mov _TA,#0x55	T 00 00 00
void main (void)	mov _SFRS,#0x00	R 00 00 00 02
	assignBit	T 00 00 00
/* UARIO initial setting	mov c,_BIT_TMP	R 00 00 00 03
* include sys.c in Library for modify HIRC Valu	mov _EA,c	T 00 00 00
* include wart.c in Library for UARI initial se	anl _POM1,#0xbf	R 00 00 00 04
	orl _P0M2,#0x40	T 00 00 00
MODIFY_HIRC(HIRC_24);	\\helloworld.c:28: UART_Open(2400000,UART0	R 00 00 00 06
PUG_PUSHPULL_MODE;	mov _UART_Open_PARM_2,#0x01	T 00 00 00
UARI_Upen(24000000,UARI0_11mer3,115200);	clr a	R 00 00 00 06
ENABLE_UARIO_PRINTF;	mov _UART_Open_PARM_3,a	T 00 00 00
	<pre>mov (_UART_Open_PARM_3 + 1),#0xc2</pre>	R 00 00 00 0E
printt((n Hello World:);	mov (_UART_Open_PARM_3 + 2),#0x01	T 00 00 00 02 00 00
while(1);	mov (_UART_Open_PARM_3 + 3),a	R 00 00 00 0E 02 04 00 E4
	mov dptr,#0x3600	T 00 00 00 02 00 03
	mov b,#0x6e	R 00 00 00 16 00 04 00 0E
ž	mov a,#0x01	T 00 00 03

:1300A600740EC0E07480C0E012055F15811581158180FED :0F0E62000A2048656C6C6F20776F726C642100FA 2000C900AF82A2AF9200C2AF75C7AA75C755759100A2000 :2000F900080F800A75A638800875A6308003 630A2AFC :20012900A604E5A6A2AE9200C2AE75C7AA75C75543A401A :20014900C7AA75C755539FFEA20092AFBF : 2001890075C7558E8475C7AA75C7558D8 30C24F7 :200109005387FF220F828F020280008F0 0084758203120284424F9200C24F :2001E90010758202120284758204120210758204120284A : 2002090097DFA20092AF22AF82BF02028005B :200249007F004306F7BEF705BF000280F122AF82759100B :20020900555396FB0200920F020F9200C20F75C70075C75 :2002C90000C2AF75C7AA75C755439604A20092AFA2AF920

From C language to executable binary

• Dump the binary by using a programming tool.



Nuvoton Nul											
	Micro ICP Pro	gramming	Tool 3.0	3 - NUC	029 Series				-		>
ject Chips	Tool Langu	Jage He	lp								
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tatus	Disconnector	4									
Dent No	Disconnected	, 									
Part No.											
oad File	-	CUPPO									
LDROM	File Name:	C:NEDROI	M.nex								
	51 N		10.								
APRUM	rile Name:	Ele net les	M.nex						0" . 0	0	
Data Flash	File Name:	C\Data b	1U.						Urrset: Ux	0	
Data Flash	r lie radirie.	File not loa	vd.								
SPROM	File Name:	C:\SPB0	M hex								
STITIOM		File not loa	ad.						Last Byte:	Ox FF	
Config Bits											
Setting	Config 0: 0	xFFFFFF7F	Conf	ig 1: Oxi	FFFFFFF			< 1	Jpdate Histor	y >	\sim
ile Data			On-board	d Flash			Offline Fl	ash			
DROM APRO	JM Data Flash	SPROM	LDROM	APROM	Data Flas	h SPROM	LDROM	APROM	Data Flash	SPROM	Info
										 8 bits 16 bit 32 bit 	is Is
										Refr	esh

Python

- Interpreted language, different from compiled language.
- User's code does not need to be compile.



Introduction of DSI2599 (NuMaker-IoT-M487)



Introduction of DSI2599 (NuMaker-IoT-M487)



• Switch on the dip switch on Nu-Link programmer.



• Insert the programmer to your laptop.



- Download NuMicroPy firmware.
 - https://github.com/OpenNuvoton/NuMicroPy
- Flash the NuMicroPy firmware. Simply just copy the file into it.



- The drive will disappear for a short time while flashing the firmware.
- Wait 5-10 seconds make sure process has been complete.

- Remove USB cable from Nu-Link programmer.
- Connect USB1.1 in the lower left corner to your laptop.



- Download PuTTY.
 - https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html





print('Hello World!!!')



Exercise 1: ADC

from pyb import Pin, ADC

adc0 = ADC(Pin.board.A0)
print(adc0.read())



Exercise 2: Wi-Fi

import network

wlan = network.WLAN()
wlan.connect('YourSSID', 'YourPasswd')
wlan.ifconfig()

Exercise 3: Script

• Create a new text file, named "ledtest.py" in your file manager.

名稱	-		修改日期	類型	大小
	檢視(Ѵ)	>	1	這個資料	4夾是空的。
	排序方式(O)	>			
	分組方式(P)	>			
	重新整理(E)				
	自訂此資料夾(F)				
	貼上(P)				
	貼上捷徑(S)				
	復原 新増(U)	Ctrl+Z			
-	Git GUI Here				
-	Git Bash Here				
×	以 Code 開啟				
	授與存取權給(G)	>			
	新増(W)	>	資料夾(F)		
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-			Microsoft Access Data	base	
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			🖬 Microsoft Word 文件		
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			🙆 OpenDocument 繪圖		
			Microsoft PowerPoint	簡報	
			Microsoft Publisher Do	ocument	
			 文字文件		
			 Microsoft Excel 工作表		

Exercise 3: Script

- Open the file with Notepad.
- Note the indent if using some others text editor.



Exercise 3: Script

from pyb import Switch, LED sw = Switch('sw2') led = LED('led0')while True: if sw.value(): led.on() else: led.off()



Flame detector

- Sensing the specific spectrum from the flame.
- Faster and more sensitive then smoke detector.





Flame detector

- The cheaper solution: Using a photo diode with visible light filter.
- Note that the photo diode working at reverse bias.
- https://reurl.cc/7oMOv9



fritzing

MCU selection guide

- System on a Chip
 - Interface: GPIO, UART, SPI, I²C, I2S, SD, USB, CAN
 - Module: Timer, PWM, ADC, DAC, RTC
 - Storage: Data flash, EEPROM
- Performance and power consumption
 - Hardware acceleration
 - VBAT
- Reliability
 - EMI, EMF, EFT
 - AEC-Q100/101/102

MCU selection guide

- Standard 8051 / 6T 8051 / 4T 8051 / 1T 8051
- ARM Cortex-M0
- ARM Cortex-M23
- ARM Cortex-M23 with TrustZone
- ARM Cortex-M4 with FPU and DSP

MCU selection guide

- Cost effective: MS51, Mini51, N76E
- General purpose: NUC029, M031, M051
- USB: M032, NUC029, M452
- Low power: ML51, Nano100
- IoT security: M2351
- Performance: M480 Series, NUC505
- Automotive (CAN): NUC131, NUC130, M453, M483
- https://direct.nuvoton.com/



Appendix 1: Resource

Resource

- NuMicroPy
- DSI2599 NuMaker-IoT-M487 User Manual
- IDEAS Chain
- Nuvoton Direct

Appendix 2: Factory Reset

While the board does not work properly even reflash the NuMicroPy firmware.

• Python script stored in the SPI Flash.



• Solution: Using Nuvoton ICP Programming Tool to access SPI Flash.

Nuvoton NuMicro ICP Program	nming Tool 3.03	×
ΠυνοΤοη		
SHILL	Select Language:	
	English	
	Select Target Chip:	
	M480 Series V	
	Quit Continue >>	
	Support Forum EN: http://forum.nuvoton.com SC: http://www.nuvoton-mcu.com/forum.p	ohp

roject Chips Tool Language Help	Chip Settings	×	1
Status Disconnect Chip Connected with Nu-Link Part No. M487JIDAE LDROM File LDROM File Name: C:\LDROM.hex APROM File Name: C:\Users\danct Multi-binary	Chip Settings Brown-out Voltage Options 3.0V 2.8V 2.2V 2.0V Brown-out Detector Boot Options LDROM LDROM APROM APROM HXT Mode Selection	X 2.6V 2.4V 0.1.8V Brown-out Reset 1 1 with IAP Boot Loader	KE: (0/31) KP: (0/7) Offset: 0x 0 Multi-binary mode
Data Flash File Name: C:\Data.hex SPROM File Name: C:\SPROM.hex SPI Flash File Name: C:\Users\danct Secure Key File Name: C:\SecureKey.t	External Clock Soruce Mode I/O Initial State Options Input Tri-state Mode Data Flash Options Data Flash	Crystal Mode Crystal Mode Quasi-bidirectional Mode Base Address: 0x FFFFF Data Flack Size: 0.00K	Last Byte: 0x FF Base Address: 0x 0000000 Read Size: 355776 Bytes
Config Bits Setting Config 0: 0xFFFFFFFF (Config 2: 0xFFFF5A5A (File Data	Watchdog Security Lock	Watchdog Clock Power-down SPROM Lock Cacheable ICE Lock OSLMultikfunction Pin Select	SPI Flash SPI Key0: 0x 00000000 SPI Key1: 0x 00000000
LDROM APROM Data Flash SPROM SF	 PA.2/PA.3/PA.1/PA.0 PG.12/PG.11/PG.13/PG.14 Boot Loader UART1 TXD/RXD Multi PB.3/PB.2 PA.3/PA.2 Config Value Config 0: 0xFFFFFFFF Config 2: 0xFFFF5A5A 	PC.2/PC.3/PC.1/PC.0 PE.4/PE.5/PE.3/PE.2 -function Pin Select PA.3/PA.8 PB.7/PB.6 Config 1: 0x000FFFFF Config 3: 0xFFFFFDF	1 Data Flash SPROM SPI Flash Info
SPROM SPI Flash KPRON	OK	Cancel	Build: 7091r

 Nuvoton NuMicro ICP Programming Tool 3.03 - M480 Series Project Chips Tool Language Help 		X
ηυνοΤοη		Program Option X
Status Disconnect Chip Connected with Nu-Link (ID: 18000797) Part No. M487JIDAE LDROM:4K, APROM:512K, Data:0K, SPROM:4UID/UCID:, SPI_ID: 0x00000000 Load File Exception 0	4K, RAM:160	Operation Image: Constraint of the second
LDROM File Name: L:\LDRUM.hex APROM File Name: C:\Users\danchouzhou\Desktop\firmware.bin Multi-binary File Name: C:\Users\danchouzhou\Desktop\firmware.bin	File not lo size: 347	Write Software Serial Number Key0: 0x Reset Chip after Programming Key1: 0x Offline Programming Mode Key2: 0x
Data Flash File Name: C:\Data.hex SPROM File Name: C:\SPROM.hex SPI Flash File Name: C:\Users\danchouzhou\Desktop\firmware.bin	File not lo File not lo size: 347.	Software Serial Number (SN) Increase SN from 0x 53E70000 Write Address in Flash 0x 00100010
Secure Key File Name: C:\SecureKey.bin Config Bits Setting Config 0: 0xFFFFFFF Config 2: 0xFFFFFFFF Config 1: 0x000FFFFF Config 2: 0xFFFF5A5A Config 3: 0xFFFFFDF File Data On-board Flash DB0M ABB0M Data 515	History >	Options for Offline Programming Mode Ites Use Password for Offline Data Ites Enter Password Ites Repeat Password Ites Limit The Number of Offline Programming Ites
	aen srnu	Max Number 100 Auto-programming (Attention!) Trigger by external input signal Nu-Link Pro IO Voltage Power control is used on Nu-Link-Pro, and is valid only if target power is not detected.
Programming LDROM APROM Data Flash Config Options SPROM SPI Flash KPROM Secure Key KPROM	Options	0 1.8V 0 2.5V 0 3.3V ⊚ 5.0V Default 0K Cancel
		Build: 7091r

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Project Chips	Tool Lan	guage He	p												
nuvo	Ton														
Status															
Disconnect	Chip Conn	ected with Nu-l	Link (ID: 180	00797)											
Part No.	M487JIDA	E LDRO UID/I)M:4K, APR(JCID:, SP	0M:512K, Data:0 I_ID: 0x0000000	K, SPROM 0	:4K, RAM	1:160K						KE: (0/3 KP: (0/7)	1) I	
Load File															
LDROM	File Name:	C:\LDROM.	nex			File n	iot load.								
APROM	File Name:	C:\Users\da	nchouzhou\l	Desktop\firmware	e.bin	size:	347.4K I	Bytes, chec	ksum: a573	3		Offset: 0)х (О		
Multi-binary												🗌 Multi	i-binary m	ode	
Data Flash	File Name:	C:\Data.hex				File n	iot load.								
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SPI Flash	File Name:	C:\Users\da	nchouzhou\\	Desktop\firmware	e.bin	size:	347.4K I	Bytes, chec	ksum: a573	3	Bas Bea	e Address: id Size:	0x 0000	000 76 But	
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	Config 2:	0xFFFF5A5A	Config 3:	0xFFFFFDF								SPI Key	1: 0x 00	000000)
File Data				On-board Flash					Offline Fl	lash					
LDROM APRO	M Data Fla	sh SPROM	SPI Flash	LDROM APRO)M Data	Flash Sl	PROM	SPI Flash	LDROM	APROM	Data Flash	SPROM	SPI Flas	h Info	1
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														Build:	7091r

atus					
Disconnect	Chip Connected with Nu-Link	(ID: 18000585)			
Part No.	M487JIDAE LDROM: UID/UCI	4K, APROM:512K, Data:0K, SPRC D:, SPI_ID: 0x001640EF	0M:4K, RAM:160K	Ki Ki	E: (0/31) P: (0/7)
ad File					
LDROM	File Name: C:\LDROM.hex		File not load.		
APBOM	File Name: C:\Users\danch	ouzhou\Desktop\firmware.bin	size: 347.4K Bytes, checksum: a573	Offset: 0x	0
Multi-binary				Multi-b	inary mode
	Ci Data hay		File webland		
Data Hash	File Name: C:\Data.nex		File not load.		
SPROM	File Name: C:\SPROM.hex		File not load.	Last Byte:	Ox FF
SPI Flash	File Name: C:\Users\danch	ouzhou\Desktop\firmware.bin	size: 347.4K Bytes, checksum: a573	Base Address: 0>	0000000
				Read Size:	355776 Byte
Secure Key	File Name: C:\SecureKey.b	n NuMicro			
nfig Bits				SPI Flash	
Setting	Config 0: 0xFFFFFFFF 0	Config 1: 0x000FFFFF	mming flash, OK!	✓ SPI Key0:	0x 00000000
	Config 2: 0xFFFF5A5A 0	Config 3: 0xFFFFFFDF		SPI Key1:	0x 00000000
e Data	,	On-board Flas	確定 ne Flash		
ROM APRO	M Data Flash SPROM SF	I Flash LDROM APF	OM APR	OM Data Flash SPROM S	PI Flash Info
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ogramming			0000		

Nuvoton NuMicro ICP Programming Tool 3.03 - M480 Series	X
Project Chips Tool Language Help	
nuvolon	Program Option X
Status Disconnect Chip Connected with Nu-Link (ID: 18000585) Part No. M487JIDAE LDROM:4K, APROM:512K, Data:0K, SPROM:4K, RAM:16(UID/UCID:, SPI ID: 0x001640EF	Operation Erase Erase Whole Chip Program
Load File	Verifu Verifu SPI Unipek KPROM Key
LDROM File Name: C:\LDROM.hex File not lo	□ Write Software Serial Number Ke <mark>0</mark> :0x ●●●●●●●●
APROM File Name: C:\Users\danchouzhou\Desktop\firmware.bin size: 347.	Reset Chip after Programming Ke <mark>1</mark> :0x
Multi-binary	Offline Programming Mode Ke <mark>2</mark> :0x
Data Flash File Name: C:\Data.hex File not lo	Software Serial Number (SN)
SPROM File Name: C:\SPROM.hex File not lo	Increase SN from 0x 53E70000
SPI Flash File Name: C:\Users\danchouzhou\Desktop\firmware.bin size: 347.	Write Address in Flash 0x 00100010
Secure Key File Name: C:\SecureKey.bin	Options for Offline Programming Mode
Config Bits	Use Password for Offline Data
Setting Config 0: 0xFFFFFFF Config 1: 0x000FFFFF < Update History >	Enter Password
Config 2: 0xFFF5A5A Config 3: 0xFFFFFDF	Repeat Password
File Data On-board Flash	Limit The Number of Offline Programming
LDROM APROM Data Flash SPROM SPI Flash LDROM APROM Data Flash SPRO	Max Number 100
	Auto-programming (Attention!)
	Trigger by external input signal
	Nu-Link Pro IO Voltage
	Power control is used on Nu-Link-Pro, and is valid only if target power is not detected.
Programming	○ 1.8V ○ 2.5V ○ 3.3V ● 5.0V
LDROM APROM Data Flash Config Options SPROM SPI Flash KPROM Secure Key KPROM Options	Default OK Cancel
	Build: 7091r

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Project Chips	Tool Language Help						
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Part No.	M487JIDAE LDROM:	4K, APROM:512K, Data:0K, SPROM D: SPL ID: 0x001640EF		KE: (0/31) KP: (0/7)			
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APROM	File Name: C:\Users\danch	ouzhou\Desktop\firmware.bin	size: 347.4K Bytes, checksur	Offset: 0x 0			
Multi-binary					Multi-binary mode		
Data Flash	File Name: C:\Data.hex		File not load.				
SPROM	File Name: C:\SPROM.hex		File not load.		Last Byte: 0x FF		
SPI Flash	File Name: C:\Users\danch	ouzhou\Desktop\firmware.bin	size: 347.4K Bytes, checksur	n: a573 B R	ase Address: 0x 0000000 ead Size: 355776 Bytes		
Secure Key	File Name: C:\SecureKey.b	in NuMicro	ICP Programming Tool X				
Config Bits			5 5		SPI Flash		
Setting	Config 0: 0xFFFFFFF Config 1: 0x000FFFFF Programm		nming flash, OK!	~	SPI Key0: 0x 00000000		
	Config 2: 0xFFFF5A5A U	Config 3: 0xFFFFFDF			SPI KeyI: 0X 0000000		
File Data		On-board Flas	確定	ne Flash			
LDRUM APRO	M Data Flash SPROM SF	PI Flash LDROM APF		DM APROM Data Flas	h SPROM SPI Flash Info		
					 8 bits 16 bits 32 bits 		
					Refresh		
Programming							
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SPROM	SPI Flash KPROM	1 Secure Key KPR0	DM Options				
					Verify 100%		

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Disconnect	Chip Conne		анк (ю. тоо	000003j									
Part No.	M487JIDAE LDROM:4K, APROM:512K, Data:0K, SPROM:4K, RAM:160K UID/UCID:, SPI_ID: 0x001640EF						KE: (0/31) KP: (0/7)						
Load File													
LDROM	File Name:	File Name: C:\LDROM.hex			File not lo	iad.							
APROM	File Name:	C:\Users\dar	nchouzhou\	Desktop\firmware.t	oin	size: 347.	4K Bytes, checks	sum: a573			Offset: 0x 0		
Multi-binary											🗌 Multi	-binary mode	
Data Flash	File Name:	C:\Data.hex				File not lo	ad.						
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Secure Key	File Name:	C:\SecureKe	y.bin										
Config Bits	r										SPI Flash		
Setting	Config 0:	OxFFFFFFFF	Config 1:	0x000FFFFF	< Update	History >				\sim	SPI Key	0: 0x 00000	0000
	Config 2:	0xFFFF5A5A	Config 3:	0xFFFFFDF							SPI Key	1: 0x 00000	0000
File Data				On-board Flash				Offline Fla	ish				
	DM Data Ela	sh SPBOM	SPI Flash		(Data Fl	ash SPRC) SPI Flash	DROM	APROM	Data Flash	SPROM	SPI Flash	Info
00000000:000000000000000000000000000000	FF FF FF F FF FF FF F	FF FF FF FF FF FF FF FF	FF FF F	F FF FF FF FF	F FF FF F FF FF						^	🖲 8 bits	
00000020:	FF FF FF F	FF FF FF FF FF FF FF FF	FF FF F	F FF FF FF FF	F FF FF							16 bits	\$
00000040:	FF FF FF F	FF FF FF FF FF FF FF FF	FF FF F	F FF FF FF FF	F FF FF							 32 bits 	5
00000060:	FF FF FF F	FF FF FF FF FF FF FF FF	FF FF F	F FF FF FF FF	F FF FF								
00000080:	FF FF FF F FF FF FF F	FF FF FF FF FF FF FF FF	FF FF F	F FF FF FF FF	F FF FF							Save	As
000000A0: 000000B0:	FF FF FF F FF FF FF F	FF FF FF FF FF FF FF FF	FF FF F	F FF FF FF FF	F FF FF							Refre	sh
100000000	FF FF FF F	FE FE FE FE	FF FF F	F FF FF FF FF	E EE EE						•		
Filogramming													
		M ∐Data	i Flash	Config	Uptions		Start						
SPROM	🗹 SPI Fla	ash 🗌 KPR	OM	Secure Key	KPROM	Options							
												Βι	uild: 7091r