

111 11

System Bus Access

Gaining System Insights through the Debugger

Johannes Lask

Product Manager & Embedded Expert

SEGGER





SEGGER

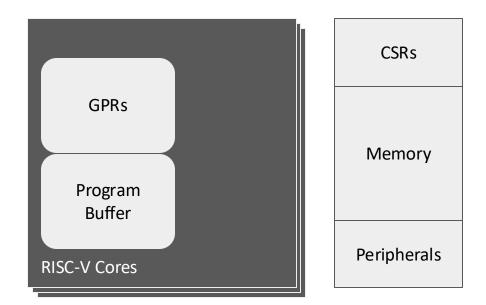






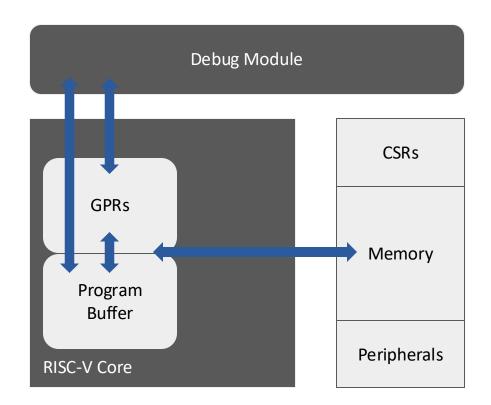


SEGGER



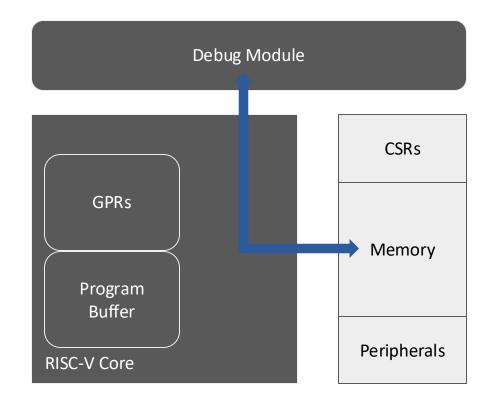


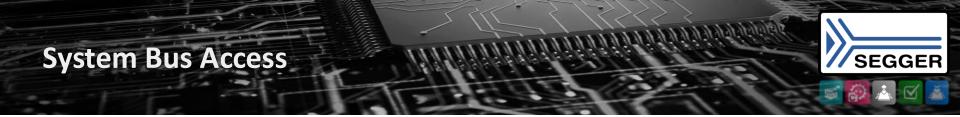
Access Register Command & Program Buffer



Access Memory Command







Debug Module	e
	CSRs
GPRs Program	Memory 🗲
Buffer RISC-V Core	Peripherals





Feature	Program Buffer	Access Memory Cmd	System Bus Access
Memory View	Core	Core	Physical
Access Rights	Restricted	Restricted	Full
Overhead	most	less	least
While Running?	No	Optional	Yes







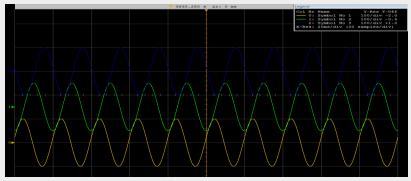
Watch Symbols

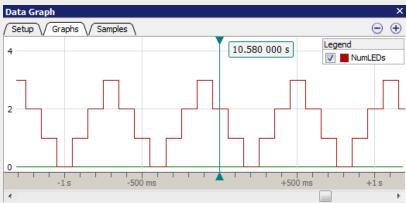
Ozone

J010 J01110 11011

Name	Value	Location	Size	Туре			
OS_	*	*	*	*			
• OS_COM_pTask	0x0	2000 0EEC	000 OEEC 4 volatile struct OS		truct OS_T	TASK_STRUCT*	
+ OS_Global		2000 0008	72	struct OS_	GLOBAL_STR	UCT	
OS_InitCalled	1 ('\001')	2000 0EFD	1	uchar			
OS_InitialSuspendCnt	0 ('\0')	2000 0EF2	1	uchar			
OS_InTimer	0 ('\0')	2000 0EFC	1	uchar			
Local Data @ SetMemb	er2						
Name	Value	Location	Size	Туре		Access	
🗉 this	2000 4374	2000 4354	4	const clas	s Class1*		
⊡ [0]		2000 4374	12	const class Class1 class Class1* int bool int			
🖭 pNext	0x0	2000 4374	4			protected	
Member 1	0xA	2000 4378	4			private	
Member 2	0	2000 437C	1			private	
StaticMember		<null></null>	4			private	
Watched Data							
Expression	Value	Location	Size	Refresh Type			
OS_Global.Time	25 790	2000 00E8	4	2 Hz 1	volatile lo	ong	
OS_Global.Time / 1000	25	const	8	2 Hz]	Long long		
StackHP[3]	[CDCD CDCD 2000 1914		4	2 Hz i	2 Hz int		
Э ТСВНР		2000 1B08	88	2 Hz s	struct OS_I	TASK_STRUCT	
🗄 pNext	2000 0DAC	2000 1B08	4	2 Hz s	struct OS_I	ASK_STRUCT*	
pStack	2000 1A78	2000 1B0C	4	2 Hz s	z struct OS REGS*		







High-Speed Sampling





Terminal

•

Real Time Transfer





>> Output via SWO active >> Semihosting IO active >> RTT active MainTask (00.000s) > Booting... MainTask (00.002s) > System Initialization... MainTask (00.015s) > Memory Initialization... MainTask (00.251s) > OK. MainTask (00.252s) > Memory Self Test... MainTask (01.117s) > OK. MainTask (01.117s) > OK. MainTask (01.1350s) > OK. MainTask (01.350s) > OK.

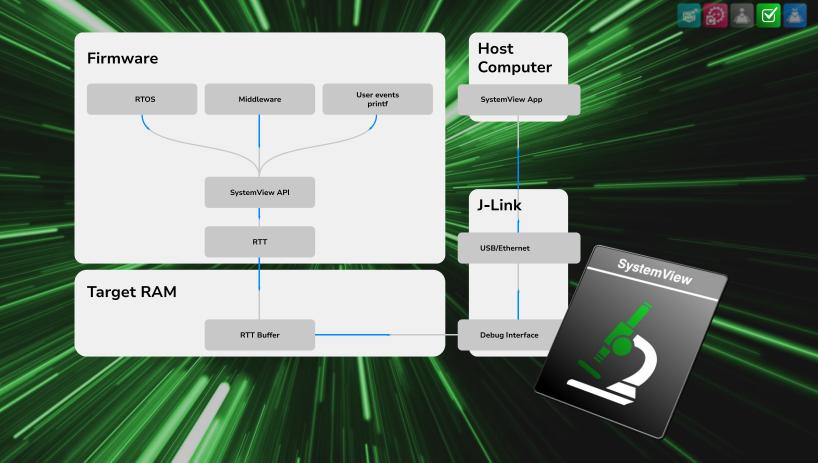
- - - - TARGET RESET - -



	stemView V3.54a - SystemView_DataPlot_Re	ec.SVDat - embOS start project [embOS] on MK66FN2M	Ooox18 License	ed to SEGGER		- 0	×
e View (Go Target Tool Window Help						
		a +					
	Time Context			Detail	Context Statistics		6
7848 7849 7850	0.667 603 500 P. Tank 0.667 607 821 P. Tank 0.667 611 893 P. Tank	OS_MUTEX_GetValue		pMutex = 0x1FFF2DCC Returns 1 after 4.321 us pMutex = 0x1FFF2DCC	Task Selection: MainTask @0x37FF00A8 *	C Hide when empty	
7851	0.667 617 393 P Task	OS_MUTEX_Unlock		Returns after 5.500 us	Context Info	Detail	
7852	0.667 622 464 III IP Task			pTask = Task 0xE0010000	Total time active	0.115 870 964 s.	
7853	0.667 627 107 III IP Task	OS TASK GetPriority		Returns 113 after 4.643 us	Y Total time blocked	0.081 923 429 8.	
7854	0.667 630 893 🛄 IP_Task	OS_TASK_GetID			By tasks	0.000 000 000 s,	1
7855	0.667 635 607 🔲 IP_Task	OS_TASK_GetID		Returns after 4.714 us	By interrupts	0.000 000 000 s.	
7856	0.667 639 857 🔝 IP_Task	OS_TASKEVENT_GetTimed		EventMask = 0000'0001, Timeout = 10 ticks	By scheduler	0.001 923 429 8.	
7857	0.667 644 571 🔝 IP_Task	II Task Block		Waiting for Task Event with timeout	 Total time suspended 	10.146 469 643 8,	
7858	0.667 650 179 🛄 Scheduler	Task Ready		MainTask, runs after 4.714 us	Delayed	10.146 469 643 8,	
7859	0.667 654 893 🚂 MainTask	Task Run		Runs for 22.500 us	Waiting for Task Event	0.000 000 000 #.	
7860	0.667 659 321 MainTask 0.667 664 321 MainTask	OS_TASK_Delay Data Plot		Returns after 2.054 ms USB Voltage (mV1, Value: 4902.763184	Waiting for Task Event with timeout	0.000 000 000 #.	-
7861	0.667 668 714 MainTask	Data Plot Data Plot		USB Voltage (mV) Value: 4902763164 Current consumption [mA], Value: 10.300000	Waiting for Muter	0.000 000 000 #,	
7863	0.667 672 286 MainTesk	OS. TASK, Delay		2 ticks	Waiting for Mutex with timeout	0.000 000 000 s.	_
7864	0.667 677 393 MainTask	Task Block		Delayed	Blocked	0.000 000 000 #.	
7865	0.667 682 893 1 Idle	System Idle		Idle for 1.871 ms	System Terminal Heap Log Context Statistics		





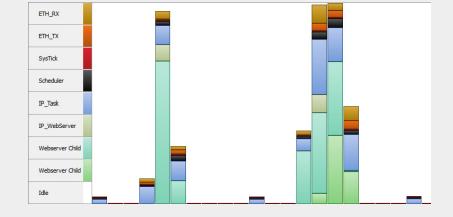




Context Runtime and Communication

vents List C	ore M4MAIN			Ð
#	Time	Context	Event Resource Detail	
607	18.452 003 383	Main	 Task Info Worker 4 (0x00002B38): Priority= 	'
608	18.452 006 900	Main	 Stack Info Worker 4 (0x00002B38): 1024 @ 0)
609	18.452 011 317	🔲 Main	Task Ready Worker 4, runs after 16.404 ms	
610	18.452 014 533	🔲 Main	OS_TASK_CreateEx Returns after 37.733 us	
611	18.452 018 044	Main	OS_QUEUE_Create	t
612	18.452 022 194	Main	OS_QUEUE_Create Returns after 4.150 us	
613	18.452 025 961	Main	S_DEBUG_SetObjName Responses 4 ID = Responses 4, Name = 0x1A.	
614	18.452 031 378	Main	 Resource Name 0x00002FBC: Responses 4 	
	18.452 035 422	_	OS_DEBUG_SetObjName Returns after 9.461 us	
	18.452 038 950	📃 Main	OS_EVENT_GetTimed Sub RX DS_EVENT_GetTimed DS_EVENT_GetTIME <p< td=""><td></td></p<>	
	18.452 043 833	Main 📃	Task Block Waiting for Event Object with ti	•
	18.452 049 572	Worker 1	Task Run Runs for 1.261 ms	
	18.453 301 444	Worker 1	✓ Mark Echo Job Elapsed time 20.437 ms, pass #2	
	18.453 306 956	Worker 1	OS_QUEUE_GetPtrBlocked Responses 1 pQ = Responses 1, pData = 0xC	
	18.453 311 239	Worker 1	Task Block Waiting for message in Queue	
	18.453 317 017		Task Run Runs for 5.029 ms	
	18.453 320 911	Worker 2	Start Encrypt Job Run Count: 1	
	18.458 336 472	Worker 2	∫∗ Mark Encrypt Job	
	18.458 341 761 18.458 346 022	Worker 2 Worker 2	OS_QUEUE_GetPtrBlocked Responses 2 pQ = Responses 2, pData = 0xC. Waiting for message in Queue	
		VVOrker 2	Task Block Waiting for message in Queue	_
Un	ified			
ET	H_RX			
ET	н тх			
	_IA			
Sv	sTick			
Sel	heduler			
SU	leuuler			
IP_	Task			
IP	WebSer	ver	i	F
 We 	ebserver	Child 🕨		
We	bserver	Child		
Tdl	-			
TCI	-			

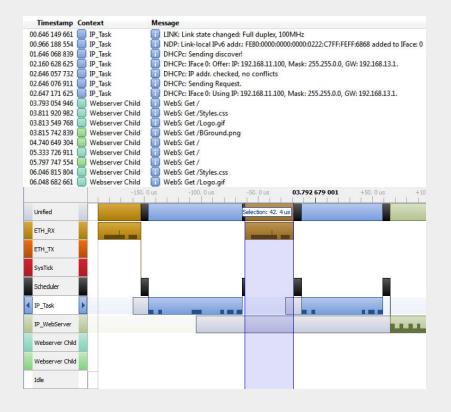




CPU Load Analysis



API Execution Measurement and Message Logging



Date Plotting

SystemView



18.420 57... Acceleration 18.421 30... Acceleration 18.421 31... Acceleration 18.421 33... Acceleration 18.421 34... Acceleration 18.421 36... Acceleration 18.421 37... 🗹 Acceleration 18.421 38... 🖸 Idle 18.421 40... 🖉 TIMER2 18.421 43... 🗹 TIMER2 18.421 45... 🖾 Compass 18.421 84... 🔲 Compass 18.421 85... 🔲 Compass 18.421 87... Compass 18.421 88... Compass 18.421 89... 🖾 Compass C Timer Exit

Timer Enter
Data Sample
Data Sample
Data Sample
OS_TIMER_Restart
OS_TIMER_Restart
OS_TIMER_Restart
System Idle
ISR Enter
ISR Exit
Timer Enter
Data Sample
Data Sample
OS_TIMER_Restart
OS_TIMER_Restart
OS_TIMER_Restart
OS_TIMER_Restart

Accel, X

Accel, Y

Accel, Z

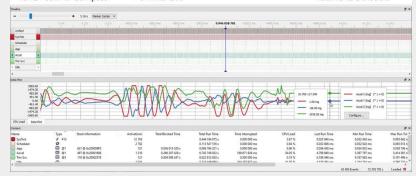
Mag. X

* Mag. Y

Compass

Acceleration

Runs for 800.450 us -297.942078 mg 204.301636 mg 825.862244 mg pTimer = Acceleration Returns after 18,544 us **Returns to Scheduler** Idle for 46.333 us Runs for 33,856 us Returns to Scheduler Runs for 444.089 us -10.769231 uT -31.794872 uT pTimer = Compass Returns after 18.544 us Returns to Scheduler





Неар

Heap and Stack Monitoring

Неар			
Time	Context	Resource	Detail
Filter	~	Filter	Filter
1.058 969 300	Audio Enumerator	0x03969720	 Allocate 44 bytes at 0x03969720, remains in use 43108510 used, 91109218 free, 32.11% ft
1.065 910 600	Audio Enumerator	0x03969754	* Allocate 44 bytes at 0x03969754, remains in use 43108562 used, 91109166 free, 32.11% ft
1.070 046 100	UI Task	0x03860100	 Allocate 8 bytes at 0x03860100, will be freed by event #3872, lifespan 6.842 ms 43108578
1.070 049 300	🔲 UI Task	0x03860110	* Allocate 8 bytes at 0x03860110, will be freed by event #3870, lifespan 6.838 ms 43108594
1.070 050 600	UI Task	0x03969788	 Allocate 32 bytes at 0x03969788, will be freed by event #3770, lifespan 2.800 us 4310863
1.070 051 800	🔲 UI Task	0x03969780	* Allocate 48 bytes at 0x03969780, will be freed by event #3869, lifespan 6.835 ms 431086!
1.070 053 400	UI Task	0x03969788	* Free 32 bytes at 0x03969788 allocated by event #3768, lifespan 2.800 us 43108650 used, 1
1.070 053 900		0x03969788	 Allocate 8 bytes at 0x03969788, will be freed by event #3871, lifespan 6.833 ms 43108666
	Audio Enumerator	0x039697E8	* Allocate 44 bytes at 0x039697E8, remains in use 43108718 used, 91109010 free, 32.11% ft
1.075 112 500	MIDI Enumerator	0x03969798	 Allocate 8 bytes at 0x03969798, will be freed by event #3811, lifespan 11.700 us 4310873-
1.075 114 300	MIDI Enumerator	0x0396981C	 Allocate 32 bytes at 0x0396981C, will be freed by event #3810, lifespan 9.300 us ~ 4310877
1.075 123 600	MIDI Enumerator	0x0396981C	* Free 32 bytes at 0x0396981C allocated by event #3809, lifespan 9.300 us 43108734 used,
1.075 124 200	MIDI Enumerator	0x03969798	* Free 8 bytes at 0x03969798 allocated by event #3808, lifespan 11.700 us 43108718 used, 1
1.075 127 000	MIDI Enumerator	0x0396981C	* Allocate 24 bytes at 0x0396981C, remains in use 43108750 used, 91108978 free, 32.11% fi
1.075 134 700	MIDI Enumerator	0x0396983C	* Allocate 40 bytes at 0x0396983C, remains in use 43108798 used, 91108930 free, 32.11% fr
1.075 137 700	MIDI Enumerator	0x03969798	* Allocate 8 bytes at 0x03969798, remains in use 43108814 used, 91108914 free, 32.11% ful
1.075 139 400	MIDI Enumerator	0x0396986C	* Allocate 24 bytes at 0x0396986C, remains in use 43108846 used, 91108882 free, 32.11% fi
1.075 141 200	MIDI Enumerator	0x0396988C	* Allocate 24 bytes at 0x0396988C, remains in use 43108878 used, 91108850 free, 32.11% fi
1.075 142 400	MIDI Enumerator	0x039698AC	* Allocate 12 bytes at 0x039698AC, remains in use 43108898 used, 91108830 free, 32.11% f
1.075 143 200	MIDI Enumerator	0x039698C0	 Allocate 8 bytes at 0x039698C0, will be freed by event #3834, lifespan 2.200 us ~ 43108914



111 11

System Bus Access

Gaining System Insights through the Debugger