

# SysLink 02.00.00.68 beta1 DataSheet TI814x



## Introduction

The purpose of this document is to provide the performance data for the SYS/Link modules on TI814X platform.

## Terms and Abbreviations

Abbreviation	Description
CCS	Code Composer Studio
IPC	Inter-Processor Communication
GPP	General Purpose Processor e.g. ARM
DSP	Digital Signal Processor e.g. C64X
EVM	Evaluation Module
SysLink	SYS/Link
API	Application Programmable Interface
SFQ	Single Frame Queue
MFQ	Multiple Frame Queue

## Processor Information

Processor core	Speed
ARM (Cortex A8)	599 MHz
DSP (C674x)	600 MHz
Video-M3 (Cortex M3)	250 MHz
VPSS-M3 (Cortext M3)	250 MHz

Note: Performance numbers for Cortex-A8, DSP and VIDEO-M3 cores are only mentioned for all modules. VPSS-M3 numbers are not published as it is identical with VIDEO-M3.

## Setup details

- EVM and Silicon details

- \* TI814X EVM (Rev B)
- \* DDR2 interface
- \* PG1.0 Silicon

- Internal memory configuration

- \* L1 and L2 cache for DSP is configured as follows:
  - \* L1D: 32K
  - \* L1P: 32K
  - \* L2 : 256K

## Build details

The performance numbers were obtained with the following build configurations:

- IPC product build and SysLink RTOS build (SYS/BIOS side)

- \* Whole program debug
- \* Disable asserts
- \* Disable logger

- Syslink HLOS build (Linux side)

- \* Optimized build (SYSLINK\_BUILD\_OPTIMIZE = 1)
- \* Release mode (SYSLINK\_BUILD\_DEBUG = 0)
- \* Disable all the traces (SYSLINK\_TRACE\_ENABLE = 0)

- Linux kernel

- \* Default configuration with kernel debugging disabled

## Resource Usage

### Notify

- Total available events = 32
- Usage by different modules is as follows:

Module	Event Ids used
FrameQBufMgr	0
FrameQ	1
MessageQ (TransportShm)	2
RingIO	3
NameServerRemoteNotify	4

## Gate Hardware Spinlocks

- Total number of Gate hardware spinlocks = 64
- Usage by different modules is as follows:

Module	Number of spin locks used
Shared Region 0	1
Frame Queue instance	2
Frame Queue Buffer Manager instance	2
RINGIO instance	2

Note: The Frame Queue, Frame Queue Buffer Manager and RINGIO instances will utilize the above specified Gate Hardware Spinlocks only if the gate type specified is GateMP\_RemoteProtect\_SYSTEM.

## Performance data

### Notify

#### ARM to DSP round trip time

The time (round trip) taken for a notification to travel from ARM to DSP and back to ARM is measured. Here is the procedure followed to get the round trip

time:

- On ARM side, send notification from ARM to DSP (Capture the time stamp "T1" before calling Notify send API)
- On DSP side, in Notify callback function, send notification to ARM
- On ARM side, receive the notification from DSP (Capture the time stamp "T2" after get() API on ARM side)
- Measure the time elapsed "T2-T1"

Round trip time: 81.80 micro seconds

#### ARM to Video-M3 round trip time

The time (round trip) taken for a notification to travel from ARM to Video-M3 and back to ARM is measured. Here is the procedure followed to get the round trip

time:

- On ARM side, send notification from ARM to Video-M3 (Capture the time stamp "T1" before calling Notify send API)
- On Video-M3 side, in Notify callback function, send notification to ARM
- On ARM side, receive the notification from Video-M3 (Capture the time stamp "T2" after get() API on ARM side)
- Measure the time elapsed "T2-T1"

Round trip time: 102.60 micro seconds

## Message Queue

### ARM to DSP round trip time

The time (round trip) taken for a message to travel from ARM to DSP and back to ARM is measured. Here is the procedure followed to get the round trip time:

- Transfer the message from ARM to DSP (Capture the time stamp "T1" before calling put() API on ARM side)
- Receive the message on the DSP and send the received message back to ARM on another messageQ to ARM
- Receive the message on the ARM (Capture the time stamp "T2" after get() API on ARM side)
- Measure the time elapsed "T2-T1"

Message Size	Average Round Trip Time (in micro secs)
64 bytes	229
128 bytes	173
1 KB	182
10 KB	219
100 KB	270

### ARM to Video-M3 round trip time

The time (round trip) taken for a message to travel from ARM to Video-M3 and back to ARM is measured. Here is the procedure followed to get the round trip time:

- Transfer the message from ARM to Video-M3 (Capture the time stamp "T1" before calling put() API on ARM side)
- Receive the message on the Video-M3 and send the received message back to ARM on another messageQ to ARM
- Receive the message on the ARM (Capture the time stamp "T2" after get() API on ARM side)
- Measure the time elapsed "T2-T1"

Message Size	Average Round Trip Time (in micro secs)
64 bytes	148
128 bytes	141
1 KB	190
10 KB	222
100 KB	163

## Frame Queue

### API profiling (DSP)

The frames are allocated and transferred (put) through the frame queue one after the other and after this the frames are received (get) and freed one after

the other in the same thread. Profile each API during the transfer of frame with in the same processor.

- Frame transfer using SFQ with in DSP with Notify Disabled

API	Average (cycles)
FrameQ_alloc	1269
FrameQ_put	2409
FrameQ_get	1546
FrameQ_free	2533
Total time	7757

- Frame transfer using MFQ with in DSP with Notify Disabled (16 frame pools and internal queues)

API	Average (cycles)
FrameQ_allocv	11311
FrameQ_putv	29233
FrameQ_getv	15776
FrameQ_freev	38215
Total time	94536

### **API profiling (Video-M3)**

The frames are allocated and transferred (put) through the frame queue one after the other and after this the frames are received (get) and freed one after

the other in the same thread. Profile each API during the transfer of frame with in the same processor.

- Frame transfer using SFQ with in Video-M3 with Notify Disabled

API	Average (cycles)
FrameQ_alloc	1721
FrameQ_put	3130
FrameQ_get	2650
FrameQ_free	3288
Total time	10789

- Frame transfer using MFQ with in Video-M3 with Notify Disabled (16 frame pools and internal queues)

API	Average (cycles)
FrameQ_allocv	20175
FrameQ_putv	40083
FrameQ_getv	27561
FrameQ_freev	48339
Total time	136218

### **API profiling (ARM to DSP)**

The frames are allocated and transferred (put) from ARM to DSP and on the DSP side the received (get) and freed one after the other. The same procedure is

repeated from DSP to ARM. The APIs are profiled during the above transfers.

- ARM side

API	Average time(usec)
FrameQ_alloc	35
FrameQ_put	52
FrameQ_get	38
FrameQ_free	43
Total time	164

- DSP side

API	Average (cycles)
FrameQ_alloc	3435
FrameQ_put	14476
FrameQ_get	8365
FrameQ_free	7875
Total time	34151

#### **API profiling (ARM to Video-M3)**

The frames are allocated and transferred (put) from ARM to Video-M3 and on the Video-M3 side the received (get) and freed one after the other. The same procedure is

repeated from Video-M3 to ARM. The APIs are profiled during the above transfers.

- ARM side

API	Average time(usec)
FrameQ_alloc	34
FrameQ_put	46
FrameQ_get	36
FrameQ_free	40
Total time	157

- Video-M3 side

API	Average (cycles)
FrameQ_alloc	5797
FrameQ_put	12053
FrameQ_get	6740
FrameQ_free	9733
Total time	34323

#### **API profiling (Inter Ducati)**

- Frame transfer using SFQ between in Video-M3 and VPSS-M3 with Notify Enabled

API	Average (cycles)
FrameQ_alloc	1724
FrameQ_put	3971
FrameQ_get	2572
FrameQ_free	4060
Total time	12327

## RingIO

### Data transfer from ARM to DSP

The numbers are captured while transferring 1Kbytes of data from ARM to DSP.

- ARM

APIs	Average time(usec)
Create()	9892
Open()	6927
Acquire()	38
Release()	44
SetAttributes()	46
Close()	1040
Delete()	1256

- DSP

APIs	Cycles
Create()	109859
Open()	92026
Acquire()	3433
Release()	10603
SetAttributes()	4717
Close()	12501
Delete()	28827

### Data transfer from ARM to Video-M3

The numbers are captured while transferring 1Kbytes of data from ARM to Video-M3.

- ARM

APIs	Average time(usec)
Create()	9912
Open()	7249
Acquire()	42
Release()	42
SetAttributes()	30
Close()	1055
Delete()	1183

- Video-M3

APIs	Cycles
Create()	105159
Open()	77959
Acquire()	3856
Release()	11840
SetAttributes()	5286
Close()	15446
Delete()	34665

## Proc Manager

### DSP

The time taken to load and start the DSP image from ARM is captured. The size of the DSP image is 8.04 MB and loaded through nfs

APIs	Average time(usec)
Proc load	92795
Proc start	33

### Video-M3

The time taken to load and start the Video-M3 image from ARM is captured. The size of the Video-M3 image is 4.63 MB and loaded through nfs



APIs	Average time(usec)
Proc load	68763
Proc start	38

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