Datasheet

BIOS PSP OMAPL138 Datasheet

01.30.01

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1 Introduction

This PSP package consists of peripheral device drivers for the OMAPL138 device. The drivers enable rapid software development on the OMAPL138 platform. This document provides the performance data for each of the drivers on DSP/BIOS™.

2 BIOSPSP Drivers - Features

- Supported Devices
  - OMAPL138
- Developed and tested on OMAPL138 EVM
- Tools used to build DSP/BIOS™ PSP drivers
  - DSP/BIOS Version 5.41.03.17
  - Code composer studio 3.3.80.11 (Service Release 10)
  - CG tools 6.1.9
- EDMA3 LLD version used – 01.11.00.03
- Drivers supported on DSP/BIOS™:
  - I2C
  - SPI
  - UART
  - PSC
  - GPIO
  - LCD Raster
  - LCD LIDD
  - McASP
  - McBSP
  - Audio Interface
  - Aic3106 codec
  - MMCSD
  - NAND
  - SATA
  - Block Media
  - VPIF
  - UPP

3 Performance data for BIOSPSP drivers

The performance data for the drivers is captured in following sections

- Features supported/not supported
- Memory usage

  The following statistics are taken from drivers built in release mode.

  - Program memory
  - Data memory (Initialized and Un-Initialized memory)
- Resource usage
  - The OS and system resources consumed by each instance of the driver in different modes are listed.
  - OS resources include usage of semaphores
  - System resources include usage of EDMA3 resources (channels, PaRAMs), interrupts and timers
- I/O throughput and corresponding CPU loading numbers are captured for I2C, SPI, UART, McASP, McBSP, LCDC Raster, MMC/SD and NAND, SATA, UPP and VPIF drivers.

3.1 I2C Driver

3.1.1 Features supported

- Multi-instantiable and re-entrant driver
- Each instance can operate as a receiver and/or transmitter
- Supports Polled, Interrupt and DMA Interrupt Mode of operation
- Supports slave mode in Interrupt and DMA mode of operation.

3.1.2 Features not supported

None

3.1.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
I2C	16512	180	1648	18340
I2c Edma	2464	64	0	2528
Total	**18976**	244	1648	**20868**

3.1.4 Resource usage

3.1.4.1 Polled mode

SEMAPHORES	DESCRIPTION
1	For synchronization of submit API

3.1.4.2 Interrupt mode

SEMAPHORES	DESCRIPTION
None	NA

INTERRUPTS	DESCRIPTION
1	For Transmit and receive channels

3.1.4.3 DMA mode

SEMAPHORES	DESCRIPTION
None	NA

EDMA3 CHANNELS	DESCRIPTION
1	For Transmit Channel
1	For Receive Channel

EDMA3 PARAMS	DESCRIPTION
1	For Transmit Channel
1	For Receive Channel

3.1.5 I/O Throughput and CPU Loading

CPU load and thorough put are calculated between start of I/O operation and end of I/O operation at application level.

The following are setup details for measuring the throughput in different modes

Slave device: IO Expander TCA6416.

No of bytes transferred: 2 bytes.

3.1.5.1 I/O Write Performance

The following graphs represent throughput numbers and CPU loads at different bus frequencies

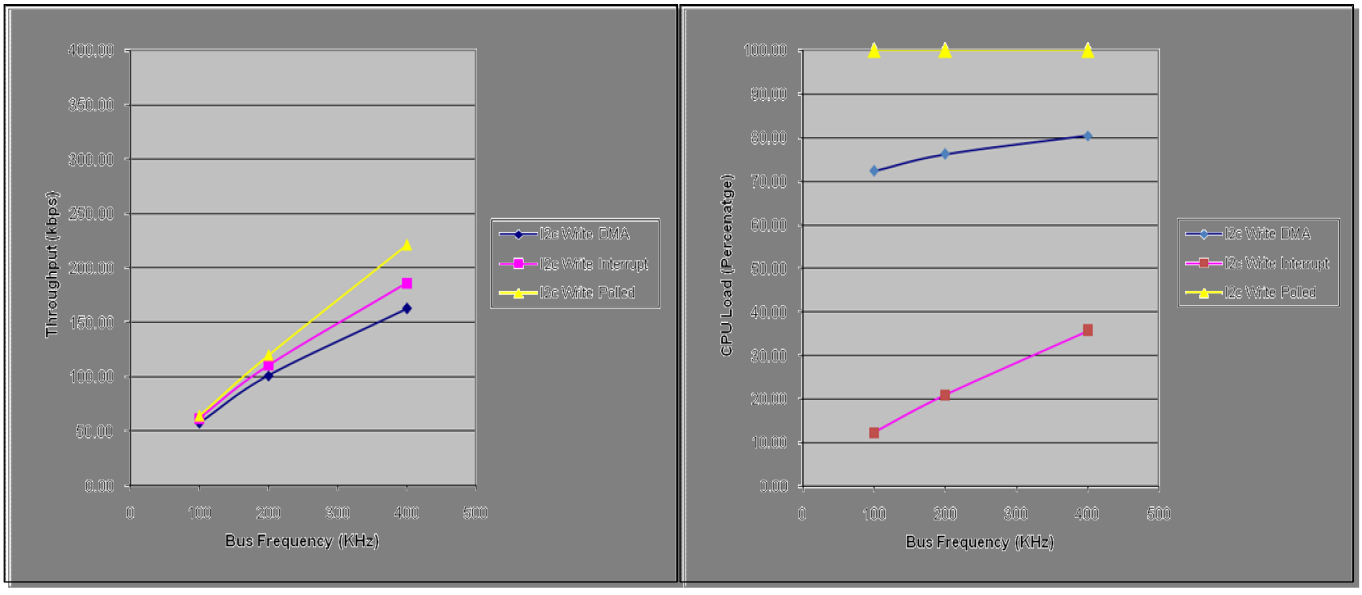

Figure 1 I2C Write Performance

DMA mode:

Bus Frequency (in KHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
100	0.34	57.78	72.34
200	0.19	101.02	76.22
400	0.12	162.76	80.39

Interrupt mode:

Bus Frequency (KHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
100	0.32	61.81	12.38
200	0.18	110.76	20.98
400	0.11	186.01	35.65

Polled mode:

Bus Frequency (KHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
100	0.31	63.90	100.00
200	0.16	119.82	100.00
400	0.09	221.11	100.00

3.1.5.2 I/O Read Performance

The following graphs represent throughput numbers and CPU loads at different bus frequencies

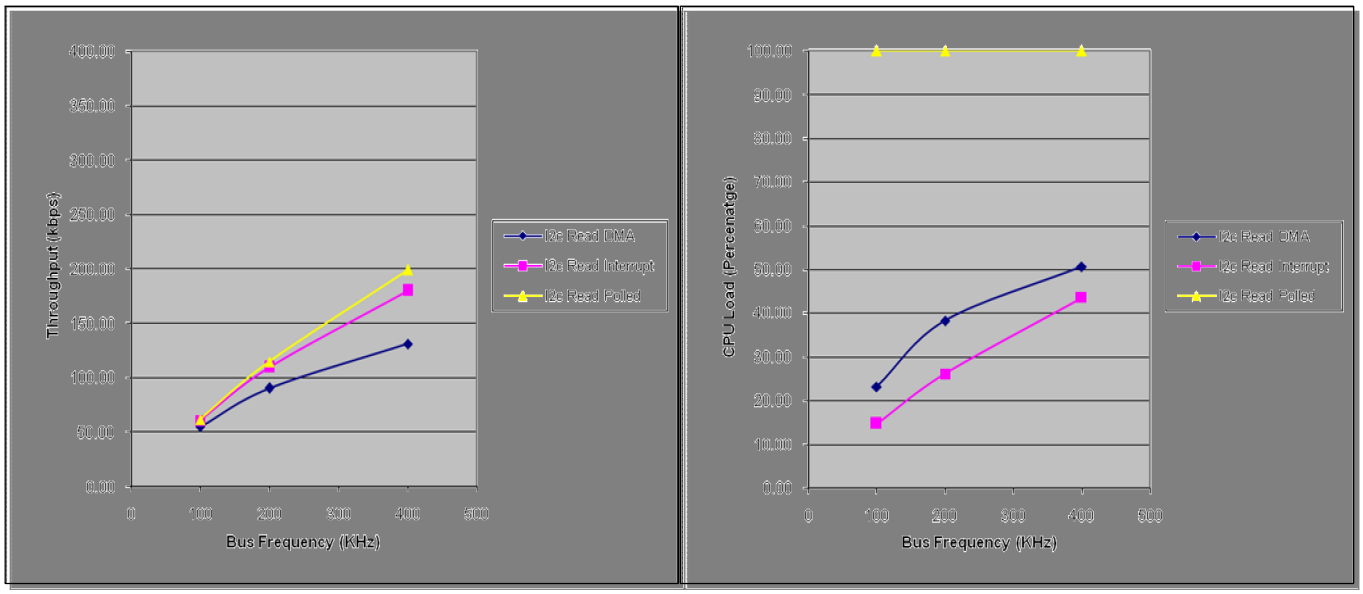

Figure 2 I2C Read performance

DMA mode:

Bus Frequency (KHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
100	0.35	55.07	23.17
200	0.22	90.42	38.21
400	0.15	131.38	50.69

Interrupt mode:

Bus Frequency (KHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
100	0.32	60.66	14.70
200	0.18	109.73	26.08
400	0.11	180.29	43.60

Polled mode:

Bus Frequency (KHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
100	0.32	61.94	100.00
200	0.17	114.89	100.00
400	0.10	199.30	100.00

3.2 SPI Driver

3.2.1 Features supported

- Multi-instantiable and re-entrant driver
- Each instance can operate as an receiver and or transmitter
- Supports Polled, Interrupt and DMA Interrupt Mode of operation
- Supports slave mode in Polled, Interrupt and DMA mode of operation.

3.2.2 Features not supported

- NA

3.2.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Spi	17888	314	1594	19796
Spi Edma	3808	247	0	4055
Total	21696	561	1594	23851

3.2.4 Resource usage

3.2.4.1 Polled mode

SEMAPHORES	DESCRIPTION
1	For synchronization of submit API

3.2.4.2 Interrupt mode

SEMAPHORES	DESCRIPTION
None	NA

INTERRUPTS	DESCRIPTION
1	For Transmit and receive channel

3.2.4.3 DMA mode

SEMAPHORES	DESCRIPTION
None	NA

EDMA3 CHANNELS	DESCRIPTION
1	For Transmit Channel
1	For Receive Channel

EDMA3 PARAMS	DESCRIPTION
1	For Transmit Channel
1	For Receive Channel

3.2.5 I/O Throughput and CPU Loading

CPU load and thorough put are calculated between start of I/O operation and end of I/O operation at application level.

The following are setup details for measuring the throughput in different modes

Slave device: SPI Flash (M25P64)

No of bytes transferred: 256 bytes

3.2.5.1 I/O Write Performance

The following graphs represent throughput numbers and CPU loads at different bus frequencies

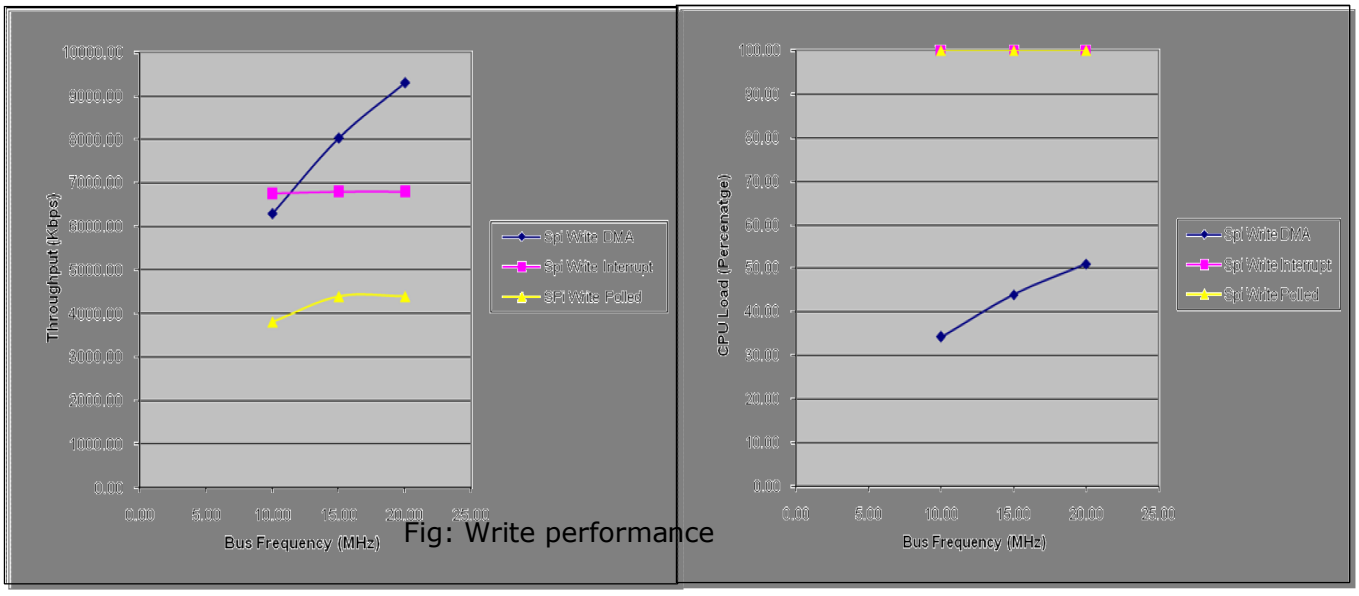

Fig: Write performance

Figure 3 SPI Write performance

DMA mode:

Bus Frequency (MHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
10.00	0.32	6295.91	34.34
15.00	0.25	8032.13	44.03
20.00	0.22	9302.33	51.08

Interrupt mode:

Bus Frequency (MHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
10.00	0.30	6756.76	100.00
15.00	0.29	6802.72	100.00
20.00	0.29	6802.72	100.00

Polled mode:

Bus Frequency (MHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
10.00	0.53	3802.28	100.00
15.00	0.46	4395.60	100.00
20.00	0.46	4395.60	100.00

3.2.5.2 I/O Read Performance

The following graphs represent throughput numbers and CPU loads at different bus frequencies

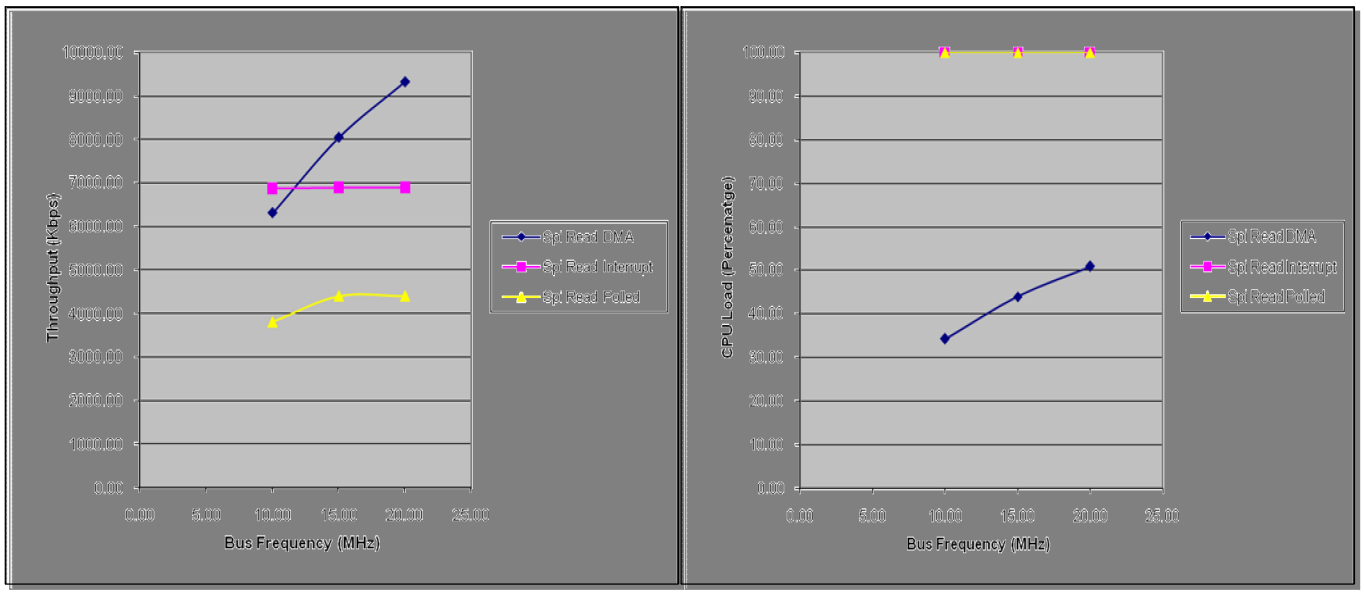

Figure 4 SPI Read Performance

DMA mode:

Bus Frequency (MHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
10.00	0.32	6309.15	34.27
15.00	0.25	8042.90	43.95
20.00	0.21	9316.77	50.91

Interrupt mode:

Bus Frequency (MHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
10.00	0.29	6864.99	100.00
15.00	0.29	6896.55	100.00
20.00	0.29	6896.55	100.00

Polled mode:

Bus Frequency (MHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
10.00	0.53	3809.52	100.00
15.00	0.45	4405.29	100.00
20.00	0.45	4405.29	100.00

3.3 UART Driver

3.3.1 Features supported

- Multi-instance support and re-entrant driver
- Each instance supports a transmit channel and a receive channel
- Supports Polled, Interrupt and DMA Interrupt Mode of operation

3.3.2 Features not supported

- Loopback is not supported in interrupt mode
- In case of time bound IO requests, on timeout the driver is not able to perform any operations on the peripheral. (This peripheral limitation is documented in the technical reference manual of I2C under ICMDR register).

3.3.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
UART	15616	204	1328	17148
UART EDMA	1888	64	0	1952
Total	17504	268	1328	19100

3.3.4 Resource usage

3.3.4.1 Polled mode

SEMAPHORES	DESCRIPTION
1	For synchronization of submit API

3.3.4.2 Interrupt mode

SEMAPHORES	DESCRIPTION
None	NA

INTERRUPTS	DESCRIPTION
1	For Transmit and receive channels

3.3.4.3 DMA mode

SEMAPHORES	DESCRIPTION
None	NA

EDMA3 CHANNELS	DESCRIPTION
1	For Transmit Channel
1	For Receive Channel

EDMA3 PARAMS	DESCRIPTION
1	For Transmit Channel
1	For Receive Channel

3.3.5 I/O Throughput and CPU Loading

CPU load and thorough put are calculated between start of I/O operation and end of I/O operation at application level.

The following are setup details for measuring the throughput in different modes

No of bytes transferred: 1024, 8192 and 51200 bytes

Baud rate: 115200

3.3.5.1 I/O Write Performance

The following graphs represent throughput numbers and CPU loads at different bus frequencies

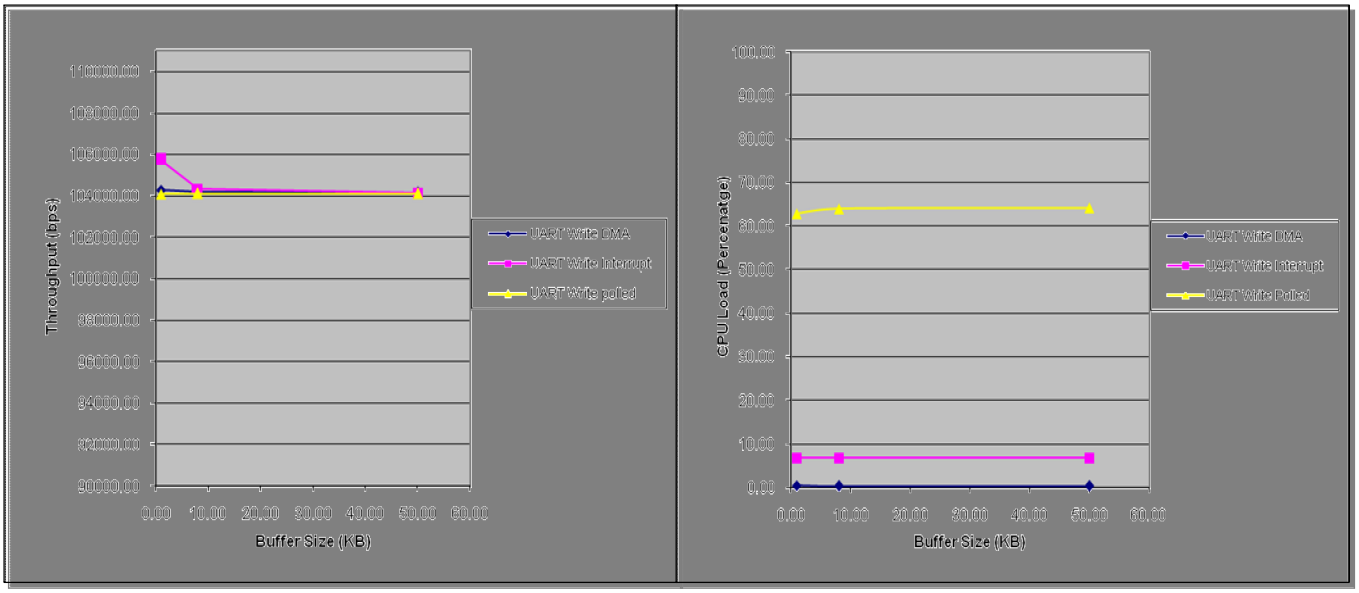

Figure 5 Uart Write Performance

DMA mode:

Buffer Size (KB)	Time Taken (milli-sec)	Throughput (bps)	CPU LOAD (%)
1.00	88.37	104289.18	0.38
8.00	707.69	104180.62	0.31
50.00	4423.62	104168.17	0.33

Interrupt mode:

Buffer Size (KB)	Time Taken (milli-sec)	Throughput (bps)	CPU LOAD (%)
1.00	87.16	105736.98	6.75
8.00	706.74	104321.64	6.72
50.00	4424.51	104147.18	6.78

Polled mode:

Buffer Size (KB)	Time Taken (milli-sec)	Throughput (bps)	CPU LOAD (%)
1.00	88.53	104099.13	62.80
8.00	708.11	104119.66	63.96
50.00	4425.88	104114.87	64.11

3.4 BLOCKMEDIA Driver

3.4.1 Features supported

- Provides both Sync access for File system as well as for Raw/Sector level access (for e.g. USB MSC Class).
- Provides interfaces for Mass Storage Class devices like USB, NAND, MMC/SD etc.
- Provides support for big block sector sizes.
- Supports cache alignment on unaligned buffers from application.
- Provides Write Protect support and Removable media support.

3.4.2 Features not supported

None

3.4.3 Memory usage Raw

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
blkmedia	9856	297	1563052	1573205
Total	9856	297	1563052	1573205

3.4.4 Memory usage File System

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
blkmedia	12736	297	1563052	1576053
Total	12736	297	1563052	1576053

3.4.5 Resource usage

3.4.5.1 Polled mode

SEMAPHORES	DESCRIPTION
NA	NA

3.4.5.2 Interrupt mode

SEMAPHORES	DESCRIPTION
NA	NA

3.4.5.3 DMA mode

SEMAPHORES	DESCRIPTION
25	Assuming MMC0, MMC1, NAND,USB0, USB1, ATA0 and ATA1 are attached to BlockMedia EDMA memcopy for I/O (Filesystem) is Enabled. EDMA memcopy for I/O (Sector level) is Enabled.

3.4.5 Brief usage of Semaphores:

1. Semaphore-1: For Block Media Event i.e. for attaching of device.
2. Semaphore-1: For Block Media Mount i.e. Mounting drives on File system.
3. Semaphores-21: For each Block Media device Semaphores-3, each for Sector I/O, File system I/O & IOCTLs invocation.
4. Semaphores-2: Each For Block Media EDMA memcopy for File system I/O and async (Sector Level I/O).

EDMA3 CHANNELS	DESCRIPTION
1	For file system access
1	For RAW access

EDMA3 PARAMS	DESCRIPTION
1	For file system access
1	For RAW access

3.4.6 I/O Throughput and CPU Loading for MMC/SD using Block media

CPU load and thorough put are calculated between start of I/O operation and end of I/O operation at application level.

The following are setup details for measuring the throughput in different modes

No of bytes transferred: 10485760 bytes (10 MB)

Card Size: 2GB SD.

Card Make: Elite Pro.

3.4.6.1 I/O Write Performance

The following graphs represent throughput numbers and CPU loads at different buffer sizes.

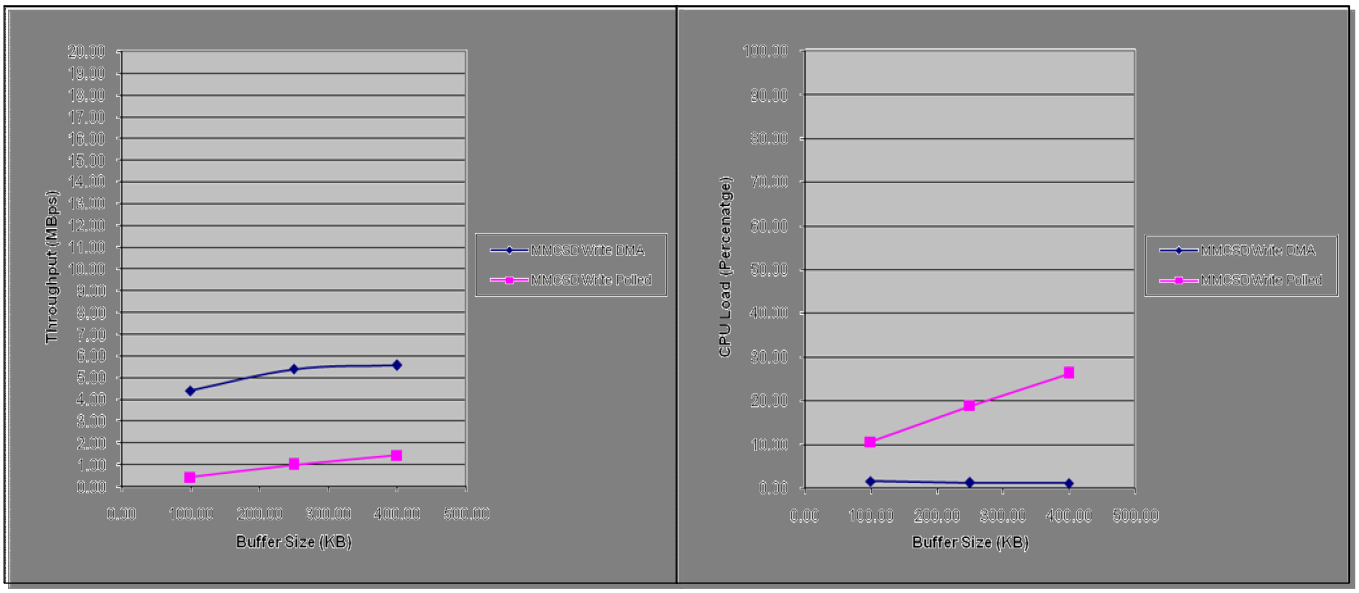

Figure 6 MMCSD WRITE Performance

DMA mode:

Buffer Size (KB)	Time Taken (seconds)	Throughput (MBps)	CPU LOAD (%)
100.00	2.27	4.41	1.51
250.00	1.85	5.41	1.23
400.00	1.79	5.58	1.12

Polled mode:

Buffer Size (KB)	Time Taken (seconds)	Throughput (MBps)	CPU LOAD (%)
100.00	22.79	0.44	10.60
250.00	10.02	1.00	18.82
400.00	6.97	1.43	26.19

3.4.6.2 I/O Read Performance

The following graphs represent throughput numbers and CPU loads at different buffer sizes.

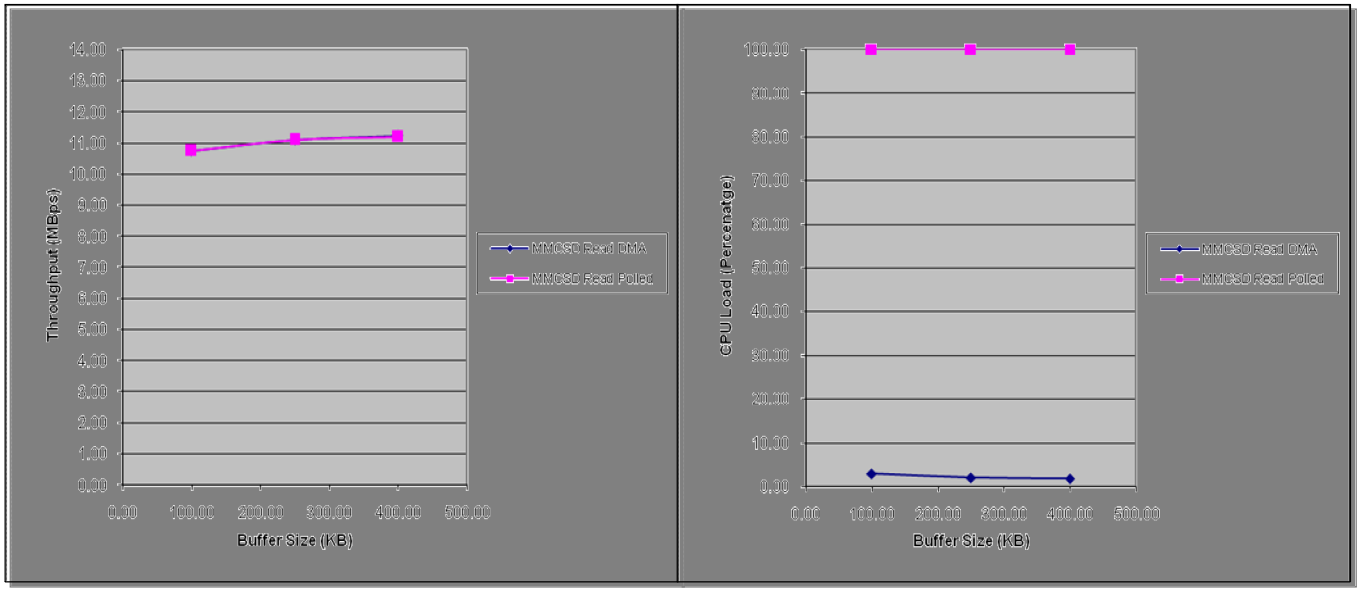

Figure 7 MMCSD READ Performance

DMA mode:

Buffer Size (KB)	Time Taken (seconds)	Throughput (MBps)	CPU LOAD (%)
100.00	0.93	10.75	2.88
250.00	0.90	11.11	1.99
400.00	0.89	11.24	1.76

Polled mode:

Buffer Size (KB)	Time Taken (seconds)	Throughput (MBps)	CPU LOAD (%)
100.00	0.93	10.75	100.00
250.00	0.90	11.11	100.00
400.00	0.89	11.19	100.00

3.4.7 I/O Throughput and CPU Loading for NAND using Block media

The following are setup details for measuring the throughput in different modes

No of bytes transferred: 5242880 bytes (5 MB)

Size of NAND: 512 MB.

3.4.7.1 I/O Write Performance

The following graphs represent throughput numbers and CPU loads at different buffer sizes.

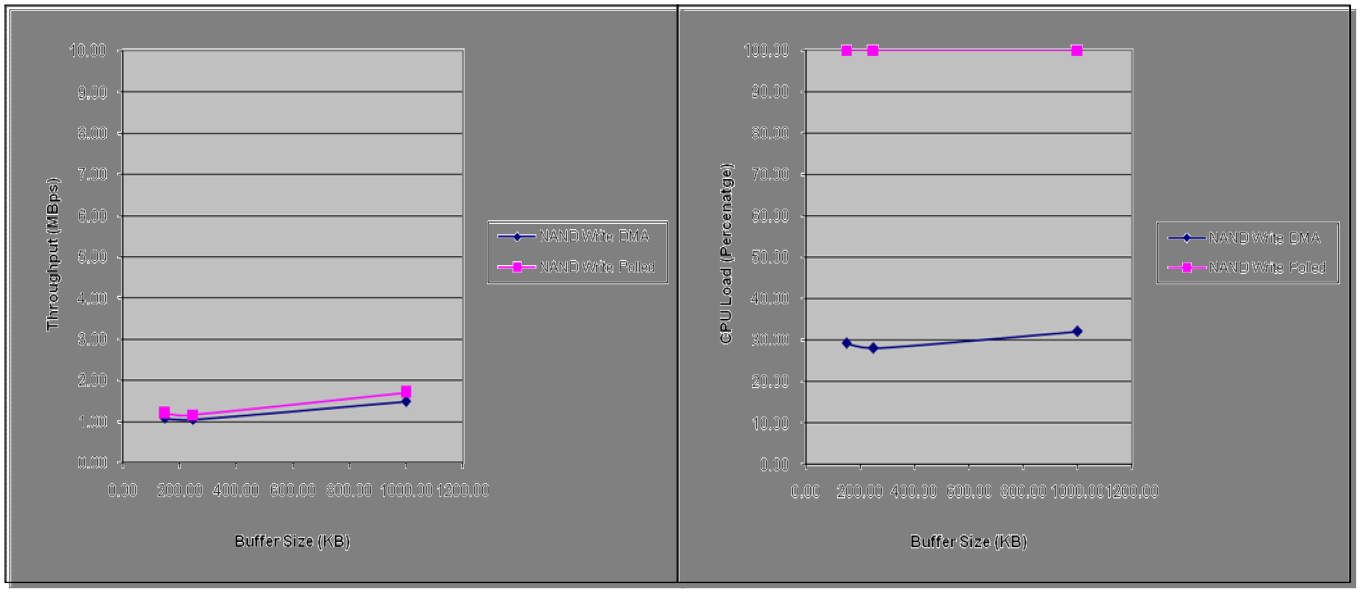

Figure 8 NAND WRITE Performance

DMA mode:

Buffer Size (KB)	Time Taken (seconds)	Throughput (MBps)	CPU LOAD (%)
150.00	4.62	1.08	29.26
250.00	4.75	1.05	28.07
1000.00	3.37	1.48	32.09

Polled mode:

Buffer Size (KB)	Time Taken (seconds)	Throughput (MBps)	CPU LOAD (%)
150.00	4.19	1.19	100.00
250.00	4.31	1.16	100.00
1000.00	2.94	1.70	100.00

3.4.7.2 I/O Read Performance

The following graphs represent throughput numbers and CPU loads at different buffer sizes.

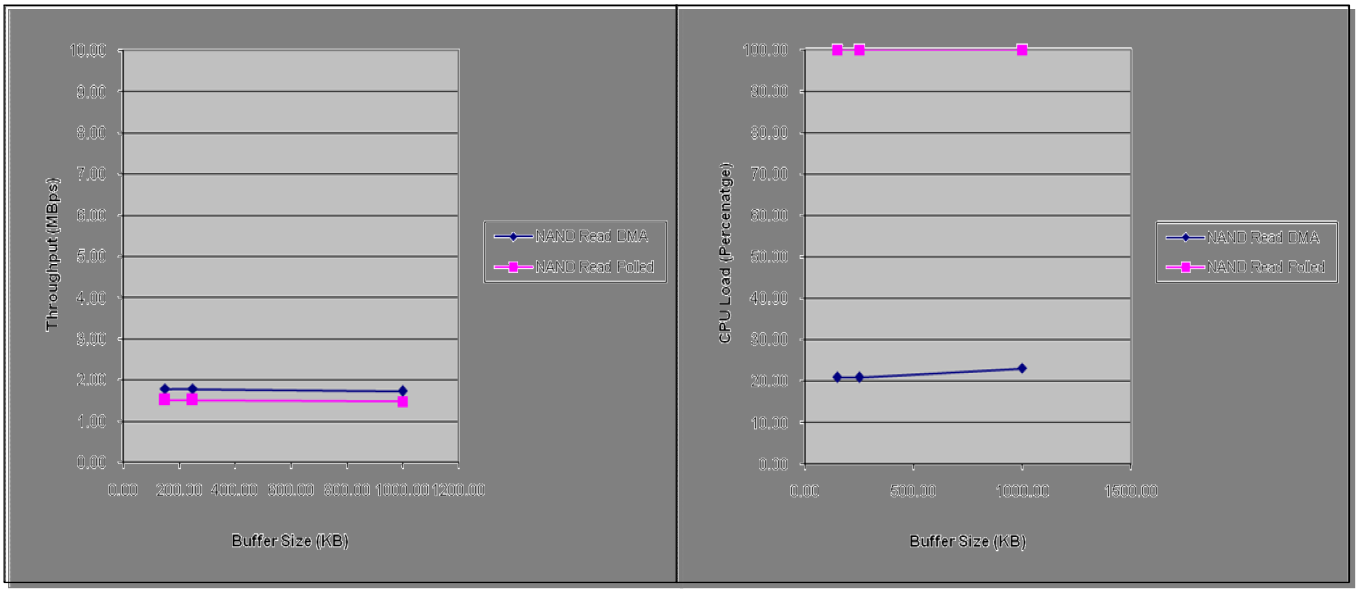

Figure 9 NAND READ Performance

DMA mode:

Buffer Size (KB)	Time Taken (seconds)	Throughput (MBps)	CPU LOAD (%)
150.00	2.80	1.78	20.86
250.00	2.80	1.78	20.88
1000.00	2.89	1.73	23.10

Polled mode:

Buffer Size (KB)	Time Taken (seconds)	Throughput (MBps)	CPU LOAD (%)
150.00	3.31	1.51	100.00
250.00	3.31	1.51	100.00
1000.00	3.39	1.47	100.00

3.4.8 I/O Throughput and CPU Loading for SATA using Block media

The following are setup details for measuring the throughput in different modes

No of bytes transferred: 104857600 bytes (100 MB)

Drive Size: 500 GB.

Make: SEAGATE SATA HDD.

3.4.8.1 I/O Write Performance

The following graphs represent throughput numbers and CPU loads at different buffer sizes.

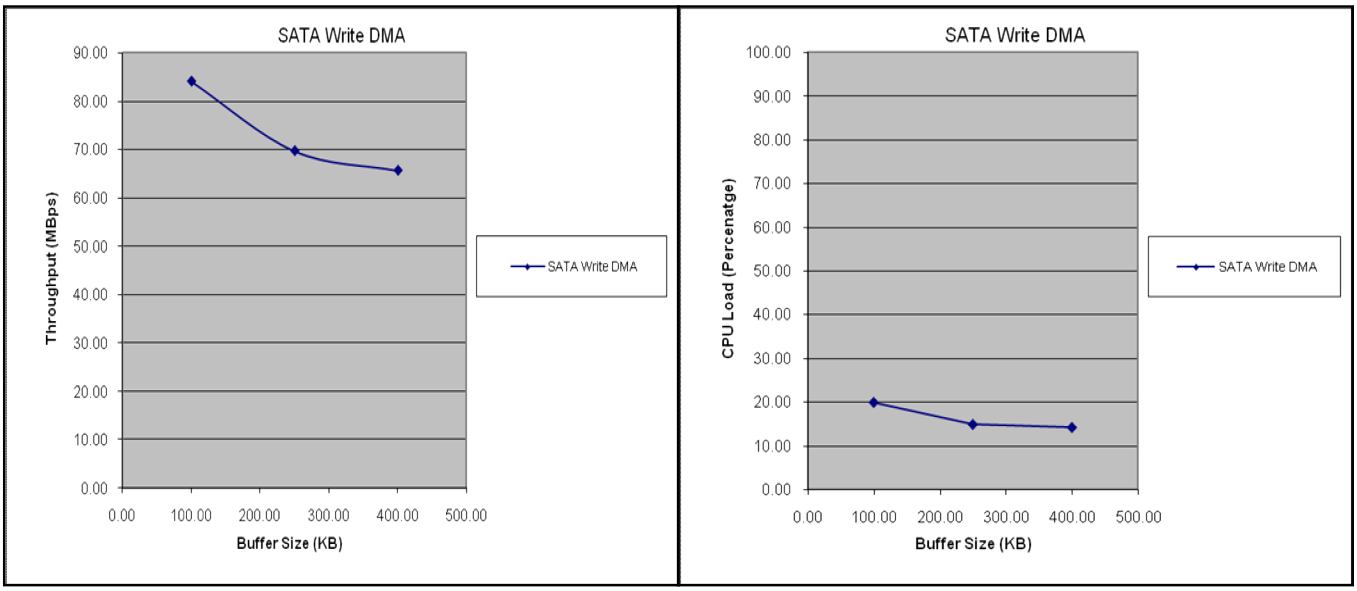

Figure 10 SATA Write Performance

DMA mode:

Buffer Size (KB)	Time Taken (milli-sec)	Throughput (MBps)	CPU LOAD (%)
100.00	1188.86	84.11	19.87
250.00	1434.67	69.70	14.91
400.00	1523.56	65.64	14.23

3.4.8.2 I/O Read Performance

The following graphs represent throughput numbers and CPU loads at different buffer sizes.

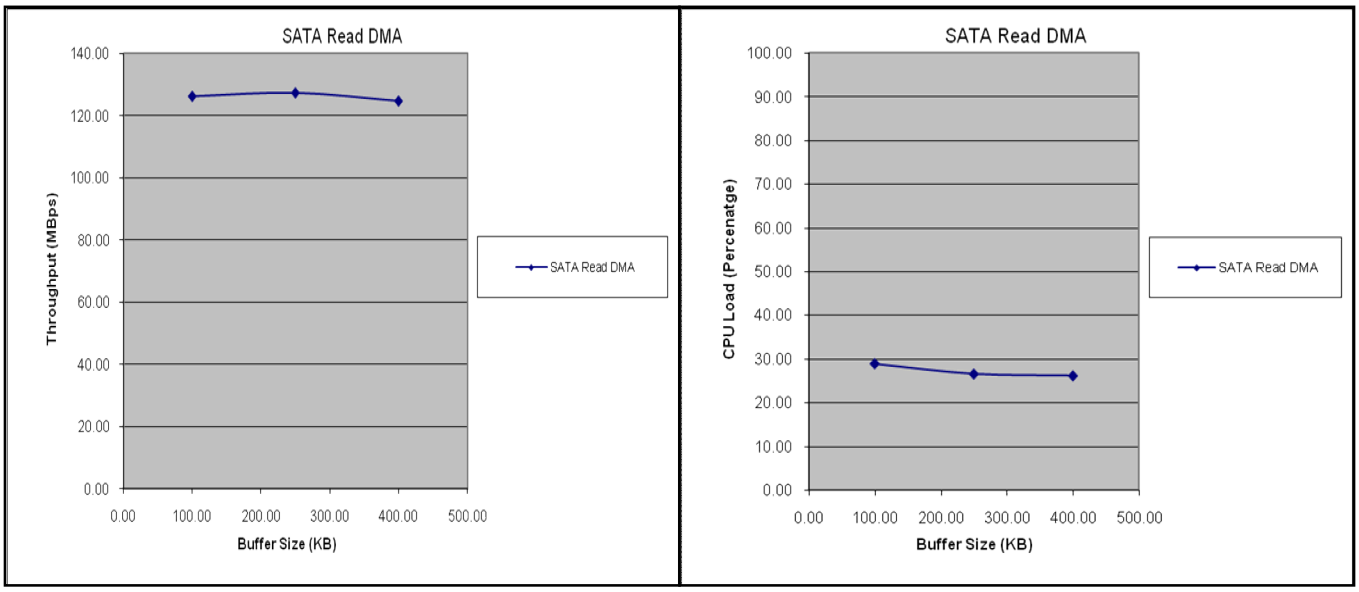

Figure 11 SATA Read Performance

DMA mode:

Buffer Size (KB)	Time Taken (milli-sec)	Throughput (MBps)	CPU LOAD (%)
100.00	792.05	126.25	28.82
250.00	785.37	127.33	26.53
400.00	801.33	124.79	26.14

3.5 GPIO

3.5.1 Features supported

- Setting GPIO pin directions
- Marking pins or banks as available for use
- Enabling and Disabling of bank interrupts
- Registering interrupt handlers for a pin or bank interrupt
- Getting or setting a group of pins to a value

3.5.2 Features not supported

None

3.5.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Gpio	3904	1254	2862	8020
Total	3904	1254	2862	8020

3.5.4 Resource usage

3.5.4.1 Semaphores

SEMAPHORES	DESCRIPTION
NA	NA

3.5.4.2 EDMA resources

EDMA3 CHANNELS	DESCRIPTION
NA	NA

EDMA3 PARAMS	DESCRIPTION
NA	NA

3.6 LCDC LIDD Driver

3.6.1 Features supported

- Multi-instance able, asynchronous and re-entrant driver.
- Each instance operates as a LIDD controller instance of the LCDC.
- Supports only character LCD type.

3.6.2 Features not supported

- The LCDC controller has two modes of operation. One is the Raster mode and the other is the LIDD mode. However, only one mode can be operation can be chosen at a time. Following this constraint, the drivers for these two modes have been separated out and the each mode has a different driver/module, namely Raster and Lidd. Only one driver should be used at a time.

3.6.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Lidd	8736	120	344	9200
Total	8736	120	344	9200

3.6.4 Resource usage

3.6.4.1 Polled mode

SEMAPHORES	DESCRIPTION
NA	NA

3.6.4.2 Interrupt mode

SEMAPHORES	DESCRIPTION
NA	NA

3.6.4.3 DMA mode

SEMAPHORES	DESCRIPTION
None	NA

EDMA3 CHANNELS	DESCRIPTION
None	None

3.7 LCDC RASTER Driver

3.7.1 Features supported

- Supports QVGA display.
- Supports enabling and disabling of raster.
- Supports display at various bits per pixel configurations – 1, 2, 4, 8, 12 and 16bpp.
- Supports channel creation and deletion through SIO create and delete APIs and queueing and dequeing of buffers through SIO issue and reclaim APIs.
- Supports ioctls to retrieve the raster and sub panel configuration.
- Supports ioctls for setting the sub panel and DMA configurations(frame buffer mode, burst size and end of frame interrupt).
- Supports adding and clearing events and event stats.

3.7.2 Features not supported

- The LCDC controller has two modes of operation. One is the Raster mode and the other is the LIDD mode. However, only one mode can be operation can be chosen at a time. Following this constraint, the drivers for these two modes have been separated out and the each mode has a different driver/module, namely Raster and Lidd. Only one driver should be used at a time.

3.7.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Raster	15424	505	432	16361
Total	15424	505	432	16361

3.7.4 Resource usage

3.7.4.1 Polled mode

SEMAPHORES	DESCRIPTION
NA	NA

3.7.4.2 Interrupt mode

SEMAPHORES	DESCRIPTION
NA	NA

3.7.4.3 DMA mode

SEMAPHORES	DESCRIPTION
None	NA

EDMA3 CHANNELS	DESCRIPTION
None	NA

EDMA3 PARAMS	DESCRIPTION
None	NA

3.7.5 I/O CPU Loading

CPU load and thorough put are calculated between start of I/O operation and end of I/O operation at application level.

In 16 bpp mode, here are the performance values:

Frames per second = 60

CPU Load = 20.72%

3.8 McASP Driver

3.8.1 Features supported

- Multi-instance support and re-entrant driver
- Each instance can operate as a receiver and/or transmitter
- Supports multiple data formats
- Can be configured to operate in multi-slot TDM, I2S, DSP and DIT (S/PDIF) modes
- Mechanism to transmit desired data (such as NULL tone) when idle
- Explicit control of PIN directions for High Clock, Bit Clock and Frame Sync PINS.
- FIFO support for both TX and RX sections.

3.8.2 Features not supported

- Sample rate change IOCTL is not supported in master mode.

3.8.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Mcasp	17984	332	1476	19792
Mcasp Edma	5408	124	0	5532
Mcasp ioctl	7424	116	0	7540
Total	**30816**	572	1476	**32864**

3.8.4 Resource usage

3.8.4.1 DMA mode

SEMAPHORES	DESCRIPTION
0	NA

INTERRUPTS	DESCRIPTION
1	For transmit and receive combined.

EDMA3 CHANNELS	DESCRIPTION
1	Per channel

EDMA3 PARAMS	DESCRIPTION
2	Per channel

3.8.5 I/O Throughput and CPU Loading

CPU load and thorough put are calculated between start of I/O operation and end of I/O operation at application level at different number of samples with below mentioned configurations.

The following are setup details for measuring the performance in different number of samples.

Codec device: AIC3106

Sample Rate: 48 KHz

Word Length: 32 bit

Mode of MCASP: DSP

3.8.5.1 I/O Read-Write Performance

The following graphs represent latency period and CPU loads at different sample size.

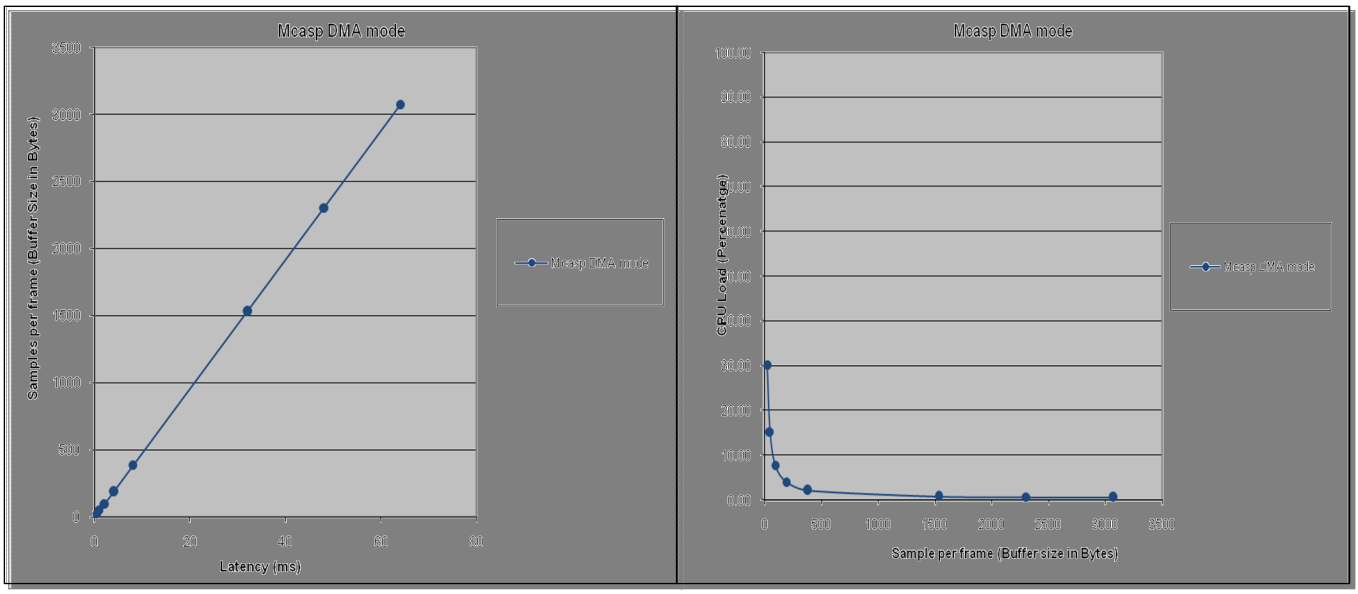

Figure 12 Mcasp Read write peformance

The following graph represent latency period at different sample size.

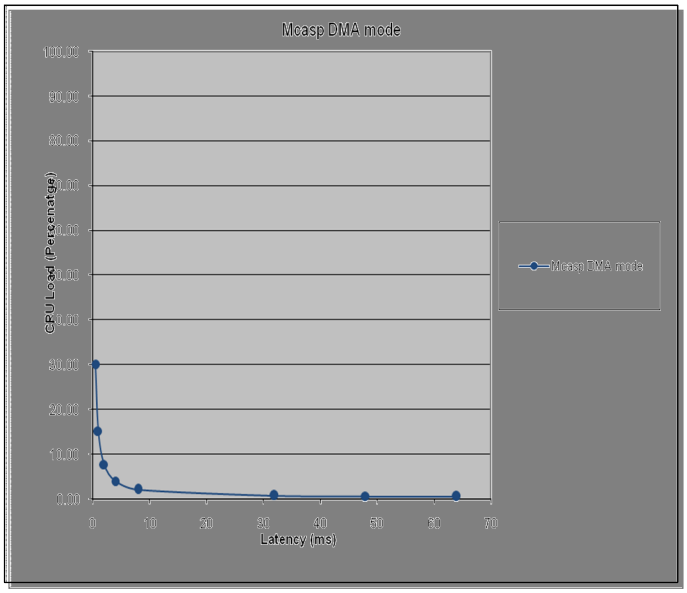

Figure 13 Mcasp latency

DMA mode:

Latency (ms)	Sample Size	CPU Load (%)
0.5	24	30.15
1	48	15.21
2	96	7.76
4	192	4.03
8	384	2.17
32	1536	0.79
48	2304	0.64
64	3072	0.57

3.9 McBSP Driver

3.9.1 Features supported

- Multi-instance support and re-entrant driver
- Each instance can operate as a receiver and/or transmitter
- Supports multiple data formats
- Mechanism to transmit desired data (such as NULL tone) when idle

3.9.2 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Mcbsp	15712	180	1968	17860
Mcbsp Edma	4640	64	0	4704
Mcbsp ioctl	2080	0	0	2080
Total	**22432**	244	1968	**24644**

3.9.3 Resource usage

3.9.3.1 DMA mode

SEMAPHORES	DESCRIPTION
0	NA

INTERRUPTS	DESCRIPTION
1	For transmit and receive combined.

EDMA3 CHANNELS	DESCRIPTION
1	Per channel

EDMA3 PARAMS	DESCRIPTION
2	Per channel

3.9.4 I/O Throughput and CPU Loading

CPU load and thorough put are calculated between start of I/O operation and end of I/O operation at application level at different number of samples with below mentioned configurations.

The following are setup details for measuring the performance in different number of samples.

Buffer Length: 100

Word Length: 32 bit

No of Channel: 1

3.9.4.1 I/O Write Performance

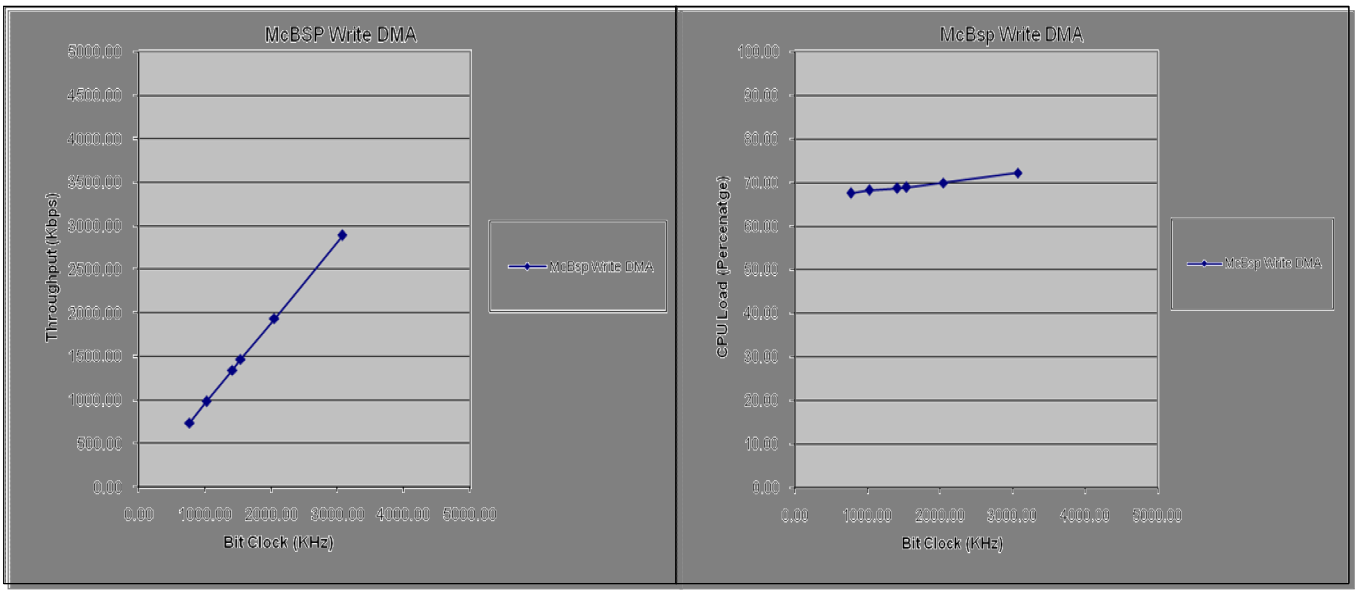

Figure 14 Mcbsp Write performance

DMA mode:

Bit Clock (KHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
768.00	4.23	738.60	67.58
1024.00	3.18	982.70	68.21
1411.20	2.32	1345.63	68.68
1536.00	2.13	1467.37	68.96
2048.00	1.62	1934.98	69.99
3072.00	1.08	2893.52	72.20

3.10 Audio Interface Driver

3.10.1 Features supported

- Multi-instance support and re-entrant driver.
- Each instance can be used to configure a complete receive and transmit section of an audio configuration consisting of an audio device and multiple audio codecs.

3.10.2 Features not supported

None

3.10.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Audio	2688	89	364	3141
Total	2688	89	364	3141

3.10.4 Resource usage

None

3.11 Aic3106 codec Driver

3.11.1 Features supported

- Multi-instance support and re-entrant driver.
- Each instance can operate as a receiver and or transmitter.
- Interfaces to control the codec specific features like sample rate etc.

3.11.2 Features not supported

None

3.11.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Aic31	8768	93	164	9025
Total	8768	93	164	9025

3.11.4 Resource usage

SEMAPHORES	DESCRIPTION
1	For Both TX and RX channels combined.

3.12 MMCSD Driver

3.12.1 Features supported

- Plain module like interface (non-IOM drivers)
- Re-entrant safe driver
- Provides Async IO mechanism
- Configurable to operate in Polled and DMA mode
- Supports hot removal and insertion of MMC/SD card
- Supports variety of SD and MMC cards
    - Patriot 8GB SD card
    - Transcend 512 MB SD card
    - Sandisk 4GB SD card
    - Transcend 128MB MMC card
    - Transcend 256MB MMC card
    - Transcend 1GB MMC card
    - Transcend 2GB MMC card
    - 2GB High speed Elite pro SD card

3.12.2 Features not supported

- 4 bit and 8 bit MMC operation

3.12.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
dda_mmcsdBios	3808	248	68	4124
dda_mmcsdCfg	0	14	8	22
ddc_mmcsd	35712	186	2618	38516
llc_mmcsd	2880	0	0	2880
Total	42400	448	2694	45542

3.12.4 Resource usage

3.12.4.1 Polled mode

SEMAPHORES	DESCRIPTION
6	Blkmedia callback, driver alignment and sync operations.

3.12.4.2 Interrupt mode

SEMAPHORES	DESCRIPTION
NA	NA

3.12.4.3 DMA mode

SEMAPHORES	DESCRIPTION
6	Blkmedia callback, driver alignment and sync operations.

EDMA3 CHANNELS	DESCRIPTION
2	For Transmit Channel
2	For Receive Channel

EDMA3 PARAMS	DESCRIPTION
2	For Transmit Channel
2	For Receive Channel

3.13 NAND Driver

3.13.1 Features supported

- Plain module like interface (non-IOM drivers)
- Supports 512-byte page and 2048-byte page NAND devices.
- Supports 8-bit and 16-bit NAND devices
- Error correction using 4-bit ECC mechanism
- Supports wear-leveling and bad-block management functionalities
- Supports protecting a portion of the NAND flash from application access

3.13.2 Features not supported

None

3.13.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
dda_nandBios	2368	47	28	2443
ddc_nandFtl	7616	0	20288	27904
ddc_nand	1024	36	32	1092
llc_nand	10464	355	488	11307
Total	21472	438	20836	42746

3.13.4 Resource usage

3.13.4.1 Polled mode

SEMAPHORES	DESCRIPTION
1	For exclusive locking of IO APIs, erase IOCTL, driver registration, and completion callback to blkmedia driver.

3.13.4.2 Interrupt mode

SEMAPHORES	DESCRIPTION
NA	NA

3.13.4.3 DMA mode

SEMAPHORES	DESCRIPTION
2	For exclusive locking of IO APIs, erase IOCTL, driver registration, completion callback to blkmedia driver and edma synchronization

EDMA3 CHANNELS	DESCRIPTION
1	For Transmit and receive Channel

EDMA3 PARAMS	DESCRIPTION
1	For Transmit and receive Channels

3.14 SATA

3.14.1 Features supported

- Support ATA/ATAPI protocol

3.14.2 Features not supported

- Port Multiplier support
- Power Management support.
- CD/DVD – ATAPI support
- SATA as removable media
- Native command Queueing.

3.14.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Ahci	8000	0	10804	18804
Ata	29440	164	3544	33148
Ata_remmed	2240	0	28	2268
Atadrv	1568	212	56	1836
Atapi	2368	20	0	2388
Sata_intf	2912	124	80	3116
Sata_pm	4320	36	4	4360
Total	50848	556	14516	65920

3.14.4 Resource usage

NA

3.15 PSC

3.15.1 Features supported

- Simple module level functions.
- Standalone module (driver).

3.15.2 Features not supported

- PSC does NOT support instances.
- PSC does not implement IOM interface.

3.15.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Psc	768	0	256	1024
Total	768	0	256	1024

3.15.4 Resource usage

NA

3.16 EvmInit

3.16.1 Features supported

- Evm specific initializations for the required modules.

3.16.2 Features not supported

- Initializations specific only to those instances used by the sample application are supported.

3.16.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
audio_evmInit	224	0	44	268
common_evmInit	32	0	0	32
gpio_evmInit	64	0	0	64
i2c_evmInit	64	0	0	64
lcdlidd_evmInit	1312	6	52	1370
lcdraster_evmInit	736	41	8	785
mcbsp_evmInit	64	0	0	64
mmcsd_evmInit	448	0	0	448
mmcsd_startup	416	0	0	416
nand_evmInit	128	0	0	128
nand_startup	416	0	0	416
sata_evmInit	64	0	0	64
sata_startup	544	32	24	600
spi_evmInit	96	0	0	96
uart_evmInit	96	0	0	96
upp_evmInit.c	1792	79	52	1923
vpif_evmInit	2560	35	52	2647
Total	9056	193	232	9481

3.16.4 Resource usage

NA

3.17 VPIF Driver

3.17.1 Features supported

- Supports Multiple VPIF channels (2 capture and 2 display channels are supported on OMAPL138 EVM)
- Supports dual channel 8-bit BT.656 capture and single channel 8, 10 or 12-bit RAW capture.
- Supports dual channel 8-bit BT.656 display.
- External Device Control Interface using EDC driver for seamless integration with different video encoder or decoder devices
- Supports flipping/exchange of multiple frame buffers for seamless capture and display operation

3.17.2 Features not supported

- HD Capture and Display
- RAW Display
- VBI data Capture and Display

3.17.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Vpif	21600	1544	1376	24520
Total	21600	1544	1376	24520

3.17.4 Resource usage

3.17.4.1 DMA mode

SEMAPHORES	DESCRIPTION
None	NA

EDMA3 CHANNELS	DESCRIPTION
None	NA

EDMA3 PARAMS	DESCRIPTION
None	NA

3.17.5 I/O Throughput and CPU Loading

CPU load and thorough put are calculated between start of I/O operation and end of I/O operation at application level at different number of samples with below mentioned configurations.

The following are setup details for measuring the performance in different number of samples.

No of frames: 300

3.17.5.1 I/O Read-Write Performance

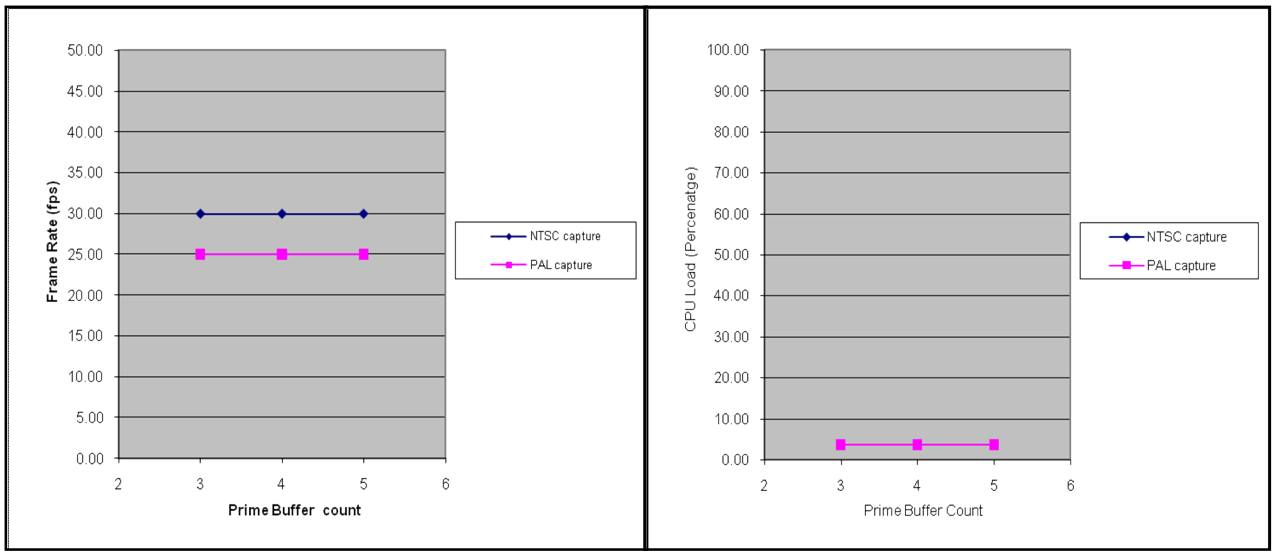

Fig: Read-Write performance

NTSC mode:

Buffer Size	Time Taken (seconds)	Throughput (fps)	CPU LOAD (%)
3	10.01	29.97	3.66
4	10.01	29.97	3.64
5	10.01	29.97	3.64

PAL mode:

Buffer Size	Time Taken (seconds)	Throughput (fps)	CPU LOAD (%)
3	12.00	25.00	3.62
4	12.00	25.00	3.62
5	12.00	25.00	3.62

3.18 VPIF EDC Driver

3.18.1 Features supported

- Generic interface for codec interaction
- Plain Module like interface (non-IOM drivers)
- ADV7343 encoder support
- TVP5147 decoder support
- MT9T001 external image sensor support

3.18.2 Features not supported

- ED and HD parameter settings are not supported

3.18.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
Adv7343	6400	218	116	6734
CodecInterface	2272	42	252	2566
Mt9t001	4864	318	64	5246
Tvp5147	6432	382	176	6990
Total	19968	960	608	21536

3.18.4 Resource usage

SEMAPHORES	DESCRIPTION
1	For synchronization of submit API

3.19 UPP Driver

3.19.1 Features supported

- Multi-instance support and re-entrant driver.
- Each instance can operate as a receiver and or transmitter.
- Interfaces to change the channel configurations.

3.19.2 Features not supported

- NA

3.19.3 Memory usage

Component	Memory Statistics (Bytes)			
	Program Memory	Data Memory		Total
		Initialized	Un-Initialized	
upp.c	11360	104	528	11992
upp_ioctl.c	3008	0	0	3008
Total	14368	104	528	15000

3.19.4 Resource usage

- NA

3.19.5 I/O Throughput and CPU Loading

CPU load and thoroughput are calculated between start of I/O operation and end of I/O operation at application level at different bit clocks with below mentioned configurations.

The following are setup details for measuring the performance in different number of samples.

No of bytes: 409600

3.19.5.1 I/O Read-Write Performance

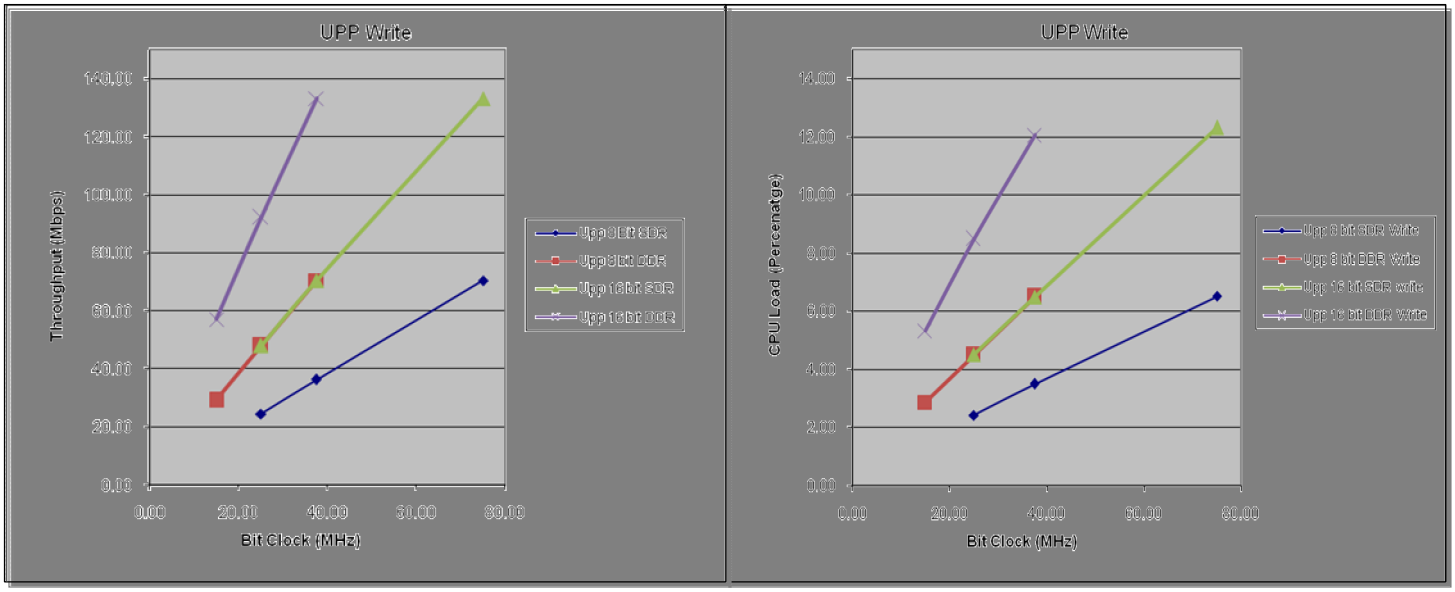

Figure 15 Upp Write Performance

UPP 1 channel 8 bit single Data rate Write Performance Values:

I/O Clock (MHz)	Time Taken (micro-sec)	Throughput (Mbps)	CPU LOAD (%)
75.00	5806.50	70.54	6.52
37.50	11266.50	36.36	3.50
25.00	16728.17	24.49	2.43

UPP 1 channel 16 bit single Data rate Write Performance Values:

I/O Clock (MHz)	Time Taken (milli-sec)	Throughput (Mbps)	CPU LOAD (%)
75.00	3075.67	133.17	12.32
37.50	5806.33	70.54	6.50
25.00	8537.00	47.98	4.51

UPP 1 channel 8 bit Double Data rate Write Performance Values:

I/O Clock (MHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
37.50	5806.33	70.54	6.51
25.00	8537.00	47.98	4.50
15.00	14000.67	29.26	2.88

UPP 1 channel 16 bit Double Data rate Write Performance Values:

I/O Clock (MHz)	Time Taken (milli-sec)	Throughput (Kbps)	CPU LOAD (%)
37.50	3075.00	133.20	12.07
25.00	4440.67	92.24	8.50
15.00	7171.33	57.12	5.34