CMUcam4

Electrical Characteristics

For the Lextronic CMUcam4 A4

Electrical Characteristics

Table 1: Current and Power Dissipation – Data in all columns taken at room temperature (25 °C) with 5 V input

Parameter	Min	Typical	Max	Units	Conditions
Camera Board Idle Current	32	33	34	mA	Assuming the power and auxiliary LED are disabled – see Table 2 (below) for more information
Camera Board Idle Power Dissipation	160	165	170	mW	
Camera Board Active Current	42	43	44	mA	
Camera Board Active Power Dissipation	210	215	220	mW	
Camera Board "SL" Current	32	33	34	mA	Assuming the power LED is disabled – see Table 2 (below) for more information
Camera Board "SL" Power Dissipation	160	165	170	mW	
Camera Board "SD" Current	0.12	0.13	0.14	mA	
Camera Board "SD" Power Dissipation	0.60	0.65	0.70	mW	
Camera Module Idle Current	30	31	32	mA	XCLK = 19.2 MHz, PCLK = 6.4 MHz
Camera Module Idle Power Dissipation	150	155	160	mW	
Camera Module Active Current	30	31	32	mA	XCLK = 19.2 MHz, PCLK = 6.4 MHz
Camera Module Active Power Dissipation	150	155	160	mW	
Camera Module "SL" Current	0.5	1.0	1.5	mA	SCCB-Initiated Standby
Camera Module "SL" Power Dissipation	2.5	5.0	7.5	mW	
Camera Module "SD" Current	0.02	0.025	0.03	mA	PWDN-Initiated Standby
Camera Module "SD" Power Dissipation	0.10	0.125	0.15	mW	
µSD Card Idle Current	0.1	0.5	0.9	mA	While the µSD card is not being accessed
µSD Card Idle Power Dissipation	0.5	2.5	4.5	mW	
µSD Card Active Current	1	5	9	mA	Current and power consumption may spike up to 10X while writing data
µSD Card Active Power Dissipation	5	35	45	mW	
µSD Card "SL" Current	0.1	0.5	0.9	mA	-
µSD Card "SL" Power Dissipation	0.5	2.5	4.5	mW	-
µSD Card "SD" Current	0.1	0.5	0.9	mA	-
µSD Card "SD" Power Dissipation	0.5	2.5	4.5	mW	-
TV Generator Idle Current	11	12	13	mA	See the "M1" (Monitor On) command – tested in a no-load scenario
TV Generator Idle Power Dissipation	55	60	65	mW	
TV Generator Active Current	11	12	13	mA	
TV Generator Active Power Dissipation	55	60	65	mW	
TV Generator "SL" Current	0	0	0	mA	See the "M0" (Monitor Off) command - tested in a no-load scenario
TV Generator "SL" Power Dissipation	0	0	0	mW	
TV Generator "SD" Current	0	0	0	mA	
TV Generator "SD" Power Dissipation	0	0	0	mW	

Parameter Totals	With a µSD Card				Without a µSD Card			
Total Idle Current	73.1	76.5	79.9	mA	73	76	79	mA
Total Idle Power Dissipation	365.5	382.5	399.5	mW	365	380	395	mW
Total Active Current	84	91	98	mA	83	86	89	mA
Total Active Power Dissipation	420	455	490	mW	415	430	445	mW
Total "SL" Current	32.6	34.5	36.4	mA	32.5	34	35.5	mA
Total "SL" Power Dissipation	163.0	172.5	182.0	mW	162.5	170	177.5	mW
Total "SD" Current	0.24	0.655	1.07	mA	0.14	0.155	0.17	mA
Total "SD" Power Dissipation	1.20	3.275	5.35	mW	0.7	0.775	0.85	mW

Note 1: "SL" (Sleeping Lightly) – Please see the "SL" (Sleep Lightly) command.
Note 2: "SD" (Sleeping Deeply) – Please see the "SD" (Sleep Deeply) command.

Table 2: Current and Power Dissipation – Data in all columns taken at room temperature (25 °C) with 5 V input

Parameter	Min	Typical	Max	Units	Conditions
Power LED Current	2.5	2.75	3	mA	Please see Note 3
Power LED Power Dissipation	12.5	13.75	15	mW	
Auxiliary LED Current	2.5	2.75	3	mA	Please see Note 4
Auxiliary LED Power Dissipation	12.5	13.75	15	mW	

Note 3: If the power LED is not disabled, increase the total current and power consumption for the camera board in Table 1 by the amount in Table 2 for the power LED. The power LED can be disabled by cutting the trace on the camera board located right next to "PWR" label inside of the copper solder jumper. To re-enable the power LED, bridge the copper solder jumper using a ball of solder.

Note 4: If the auxiliary LED is not disabled, increase the total current and power consumption for the camera board in Table 1 by the amount in Table 2 for the auxiliary LED. The auxiliary LED can be disabled by using the "L0" (LED Off) command or by cutting the trace on the camera board located right next to the "AUX" label inside of the copper solder jumper. To re-enable the auxiliary LED, bridge the copper solder jumper using a ball of solder.

Table 3: Electrical Characteristics – Data in all columns taken at room temperature (25 °C) with 5 V input

Parameter	Min	Typical	Max	Units	Notes
Operating Temperature Range	10	25	40	°C	Can be 12 V at or around room temperature – 25 °C
Supply Voltage Range	4	5	9	V	
Pan and Tilt Pin Maximum Short-circuit Current	-	-	7	mA	A 430 Ω resistor is in series with both the pan and tilt pins to prevent shorts
Pan and Tilt Pin Maximum Power Dissipation	-	-	35	mW	
Pan Pin Output High	2.8	2.9	3.0	V	-
Pan Pin Output Low	0.0	0.2	0.4	V	-
Pan Pin Input High	1.8	-	3.3	V	-
Pan Pin Input Low	0.0	-	0.6	V	-
Tilt Pin Output High	2.8	2.9	3.0	V	-
Tilt Pin Output Low	0.0	0.2	0.4	V	-
Tilt Pin Input High	1.8	-	3.3	V	-
Tilt Pin Input Low	0.0	-	0.6	V	-
TX Out Pin Output High	2.8	2.9	3.0	V	3.3 V and 5 V tolerant
TX Out Pin Output Low	0.0	0.2	0.4	V	
RX In and DTR Pin Input High	0.0	3.3	12.0	V	3.3 V and 5 V tolerant
RX In and DTR Pin Input Low	-0.2	0.0	0.2	V	

Component Characteristics

Table 4: Component Characteristics – Data in all columns taken at room temperature (25 °C) with 5 V input

Parameter	Min	Typical	Max	Units	Notes
P8X32A Processor Frequency	-	96	-	MHz	20 KHz while "SD" (Sleeping Deeply)
P8X32A Processor Instructions per Second	-	192	-	MIPS	Split among 8 cores (24 MIPS per core)
P8X32A Processor RAM	-	32	-	KB	-
P8X32A Processor ROM	-	32	-	KB	64 KB EEPROM
OV9665 Camera Horizontal Resolution	-	640	-	pixels	Down-sampled by 4X to 160 pixels
OV9665 Camera Vertical Resolution	-	480	-	pixels	Down-sampled by 4X to 120 pixels
OV9665 Color Depth	-	16	-	bits	5-bits (R/V) : 6-bits (G/Y) : 5-bits (B/U)
OV9665 Frame Rate	-	8	-	FPS	-
Servo Controller Frequency	-	40	-	Hz	-
Servo Controller Resolution	-	1	-	µS	-
Serial Baud Rate	1	19,200	150,000	BPS	See "BM" (Baud Mode) command
Serial Stop Bits	1	1	2^{31}	Bits	See "DM" (Delay Mode) command