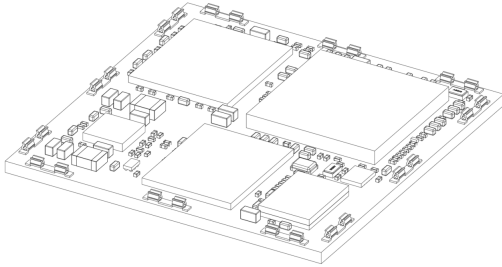


videoSOM™ Datasheet



1 Features

- ultra-small size 32x32x3.35mm
- fast time to market
- the simple design of end device
- single power supply
- energy-efficient video processing
- low heat dissipation
- build-in Wi-Fi® 802.11b/g/n and Bluetooth® connectivity
- Arm Cortex®-A5 single core up to 720MHz
- Ceva® MM3101 128-bit DSP core up to 666MHz
- H.265/HEVC encoder
Maximum encoding frame size: 8192x4096
Performance: Up to 5M@30fps+1M@30fps
- H.264/MPEG-4 AVC encoder
Maximum encoding frame size: 4096x4096
Performance: Up to 5M@30fps+1M@30fps
- JPEG codec
Maximum frame size: 7936x7936
Performance: Up to 75MPS
- MIPI, 2xsubLVDS/SLVS/HiSPi, 2xparallel
- Video output interface
Maximum display resolution: 1920x1080
Maximum pixel rate: 120MPS
- Audio I²S, line in/out, HP out, mic in, PDM
- Security: DES, TDES, AES, SHA-1, SHA-224, SHA-256, SHA384, and SHA-512
- 1xUSB2.0, 10/100/1000M Ethernet
MAC(RGMII, MII, RMII), 5xUART, 4xSPI, 3xI²C, IrDA, up to 12xPWM, up to 96xGPIO

2 Applications

- wearable camera
- security camera
- HID (Human Interface Device)
- face recognition
- license plate recognition
- audio-video systems
- cloud storage
- wireless streaming camera

- dedicated industrial camera
- traffic monitoring
- drone camera

3 Description

End-to-end solution for digital cameras based on the most efficient videoSOM™ which is based on ARM® Cortex-A family and is prepared to work with Linux OS with built-in peripherals for video and audio encoding to H.264 and H.265 format with performance up to 5M@30fps. What makes videoSOM™ perfect for a 360 camera is that it is designed to connect up to 4 image sensors at the same time.

videoSOM™ is available with built-in RAM, Flash memory, Wi-Fi®, and Bluetooth® communication which makes it a comprehensive solution for IoT devices. The form factor reduces costs and makes it easy to embed it to the device without any technical issues. By placing the most critical signals in the module, even very complex peripherals can be placed using PCB. This allows the delivery of cost-performance optimized design and speeds up time-to-market.

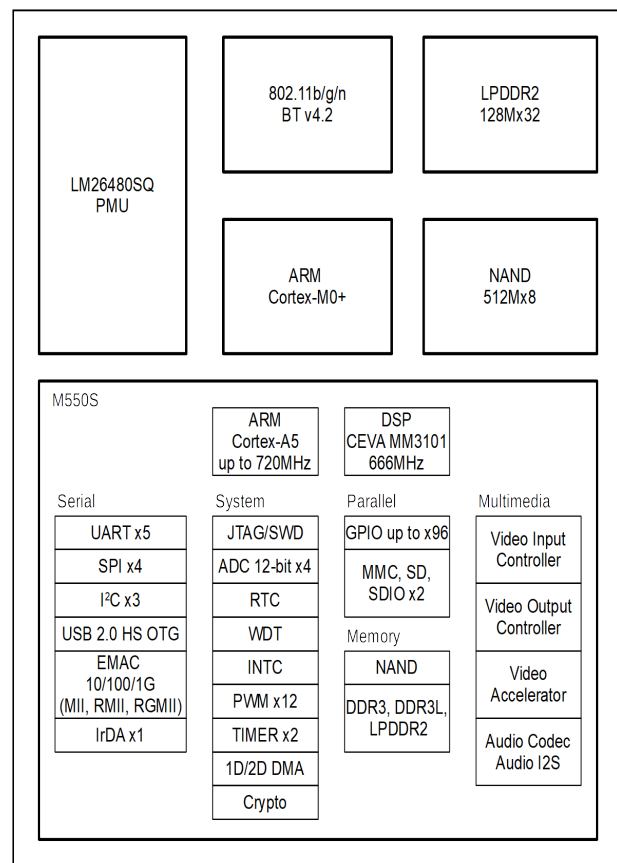


Figure 1: Functional block diagram

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4 Functional Description

4.1 Main components

4.1.1 M550S

videoSOM™ is based on Vatics M550S microprocessor. Powered by Arm Cortex®-A5 processor and CEVA® MM3101 DSP. M550S is designed to cover all user needs related with video and audio processing, by using Vatics hardware multimedia accelerators.

4.1.2 RAM

videoSOM™ arrives with up to 4Gb(128Mx32) LPDDR2 RAM memory.

4.1.3 NAND

Up to 4Gb (512Mx8) NAND Flash memory is available on videoSOM™. All signals of Nand Flash Controller are connected to bottom pads and can be used only when NAND Flash memory is not used.

4.1.4 Power Management Microcontroller (MCU)

Small microcontroller (STM32L031E6) takes care about power consumption and going into suspend mode. It turns off the core power, I/O power and set LPDDR2 to self-refresh mode.

4.1.5 Power Management Unit

LM26480 power management unit consist of dual buck converters and dual LDOs. PMU is controlled by coprocessor. Buck converters are used to power M550S core and LPDDR2 memory. This signals are available on pads, but shouldn't be used to power any external device. LDO1(1.8V) is also used to power LPDDR2, but user can draw up to 200mA from this output. LDO2 is free to use adjustable regulator with 300mA current load capability.

4.1.6 Video encoder

Vatics M550S processor contains H.265/HEVC and H.264/MPEG-4 AVC video encoder. It ensures up to 8,192x4,096 encoding frame size and performance up to 5M@30fps + 1M@30fps.

4.1.7 802.11b/g/n and Bluetooth

videoSOM™ is equipped with pre-certified 802.11b/g/n and Bluetooth® v4.2 Murata LBEE5KL1DX-883 module, providing the possibility for wireless communication.

4.2 Padmap

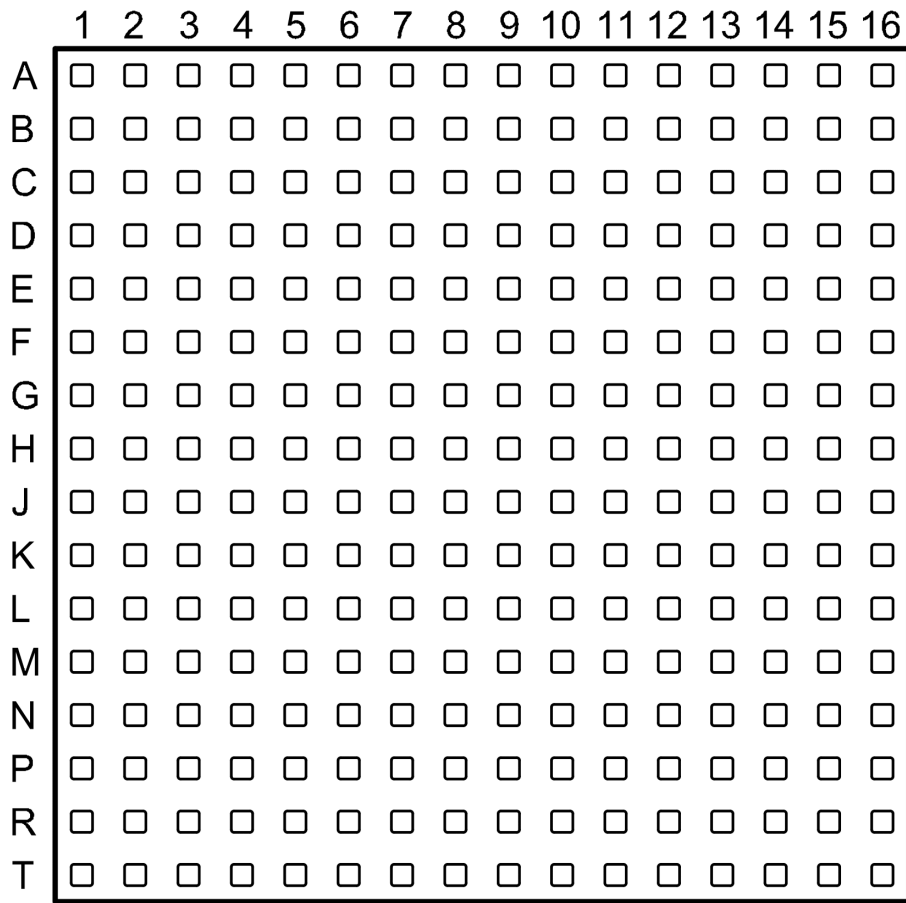


Figure 2: videoSOM™ pads (top view)

4.3 Pad description

Pad	Signal Name	Type	Power Domain	Description	Signal Length
T1	1V05_OUT	Power	-	+1.05V buck output from LM26480SQ-AA (for testing purposes only)	-
M2	1V2_OUT	Power	-	+1.2V buck output from LM26480SQ-AA (for testing purposes only)	-
M1	1V8_OUT	Power	-	+1.8V LDO output from LM26480SQ-AA (max. load 200mA)	-
P1, R1, R2	3V3_IN	Power	-	+3.3V power supply input	-
P2	3V3_MCU_IN	Power	-	+3.3V power supply input for power management microcontroller	-
T3	3V3_OUT	Power	-	+3.3V switch output	-
B2	AUDIO_I_LINE_L	Input	VSSA_AUDIO_3P3	Line In Analog Audio left channel	32.969
B1	AUDIO_I_LINE_R	Input	VSSA_AUDIO_3P3	Line In Analog Audio right channel	35.086
C1	AUDIO_I_MIC	Input	VSSA_AUDIO_3P3	Microphone Input Analog Audio	29.691
A5	AUDIO_I_PDM_L	Input	VDDIO_COMMON	PDM Input left channel	27.478
C5	AUDIO_I_PDM_R	Input	VDDIO_COMMON	PDM Input right channel	28.992
A4	AUDIO_O_HP_L	Output	VSSAHS_AUDIO_3P3	Headphones Output left channel	23.942
C4	AUDIO_O_HP_R	Output	VSSAHS_AUDIO_3P3	Headphones Output right channel	25.602
B3	AUDIO_O_LINE_L	Output	VSSA_AUDIO_3P3	Line Out Analog Audio left channel	23.333
A3	AUDIO_O_LINE_R	Output	VSSA_AUDIO_3P3	Line Out Analog Audio right channel	22.309
C2	AUDIO_O_MIC_BIAS	Output	VSSA_AUDIO_3P3	Microphone Bias	27.809
B5	AUDIO_O_PDM_CLK	Output	VDDIO_COMMON	PDM clock	27.892
B4	AUDIO_O_VCM	Output	VSSAHS_AUDIO_3P3	VCM buffer output for headphone driver capless application	22.714
N11	BT_IO_PCM_SYNC	I/O	VDDIO_WIFI	PCM sync	9.123
T13	BT_I_CTSn	Input	VDDIO_WIFI	Bluetooth UART serial Clear To Send (active low)	7.226
R12	BT_I_DEV_WAKE	Input	VDDIO_WIFI	Device Wake signal or general purpose I/O	5.949
P11	BT_I_PCM_CLK	Input	VDDIO_WIFI	PCM clock input	10.200
R11	BT_I_PCM_IN	Input	VDDIO_WIFI	PCM data input	11.437
R14	BT_I_RXD	Input	VDDIO_WIFI	Bluetooth UART serial interface input	3.521
T12	BT_O_HOST_WAKE	Output	VDDIO_WIFI	Host Wake signal or general purpose I/O	6.141
T11	BT_O_PCM_OUT	Output	VDDIO_WIFI	PCM data output	13.699
R13	BT_O_RTSn	Output	VDDIO_WIFI	Bluetooth UART serial Request To Send (active low)	5.910
T14	BT_O_TXD	Output	VDDIO_WIFI	Bluetooth UART serial interface output	6.892
E4	CA5U_I_TCK/ CA5U_I_SER_TCK/ UART0_I_RXD/ GPIO1_IO_D25	I/O	VDDIO_COMMON	Multifunction pin	27.834

Pad	Signal Name	Type	Power Domain	Description	Signal Length
E1	CA5U_I_TDI/ UART2_I_RXD/ UART0_I_CTSn/ GPIO1_IO_D27	I/O	VDDIO_COMMON	Multifunction pin	30.891
E3	CA5U_I_TMS/ CA5U_IO_SER_DATA/ UART0_0_TXD/ GPIO1_IO_D26	I/O	VDDIO_COMMON	Multifunction pin	26.343
E2	CA5U_I_TRSTn/ UART2_0_TXD/ UART0_0_RTSn/ GPIO1_IO_D28	I/O	VDDIO_COMMON	Multifunction pin	26.572
E5	CA5U_0_TDO	Output	VDDIO_COMMON	JTAG Test Data Out	32.14
G3	GMAC_IO_MD/ VOC_0_HS/ GPIO1_IO_D22/ AGPO_0_D9	I/O	VDDIO_GMAC	Multifunction pin	18.505
G2	GMAC_I_COL/ VOC_IO_D6/ VOC_0_VS/ GPIO1_IO_D23/ AGPO_0_D10	I/O	VDDIO_GMAC	Multifunction pin	21.611
G1	GMAC_I_CRS/ VOC_IO_D7/ VOC_0_HS/ GPIO1_IO_D24/ AGPO_0_D11	I/O	VDDIO_GMAC	Multifunction pin	22.982
F4	GMAC_I_RXCLK/ VOC_IO_D0	I/O	VDDIO_GMAC	Multifunction pin	19.357
J3	GMAC_I_RXD0/ VOC_0_D10/ GPIO1_IO_D12/ AGPO_0_D0	I/O	VDDIO_GMAC	Multifunction pin	22.692
J2	GMAC_I_RXD1/ VOC_0_D11/ GPIO1_IO_D13/ AGPO_0_D1	I/O	VDDIO_GMAC	Multifunction pin	24.493
J1	GMAC_I_RXD2/ VOC_IO_D1/ GPIO1_IO_D14/ AGPO_0_D2	I/O	VDDIO_GMAC	Multifunction pin	26.762
H5	GMAC_I_RXD3/ VOC_IO_D2/ GPIO1_IO_D15/ AGPO_0_D3	I/O	VDDIO_GMAC	Multifunction pin	20.077
J4	GMAC_I_RXDV/ VOC_0_D9/ GPIO1_IO_D11	I/O	VDDIO_GMAC	Multifunction pin	24.017
J5	GMAC_I_RXER/ VOC_IO_D8/ GPIO1_IO_D10	I/O	VDDIO_GMAC	Multifunction pin	20.587
F3	GMAC_I_TXCLK/ VOC_IO_D3	I/O	VDDIO_GMAC	Multifunction pin	20.989
G4	GMAC_0_MDC/ VOC_0_VS/ GPIO1_IO_D21/ AGPO_0_D8	I/O	VDDIO_GMAC	Multifunction pin	16.389
F1	GMAC_0_REF_CLK/ VOC_0_PCLK	Output	VDDIO_GMAC	Multifunction pin	22.788
F2	GMAC_0_TXCLK/ VOC_0_D15	Output	VDDIO_GMAC	Multifunction pin	20.740
H3	GMAC_0_TXD0/ VOC_0_D13/ GPIO1_IO_D17/ AGPO_0_D4	I/O	VDDIO_GMAC	Multifunction pin	25.539

Pad	Signal Name	Type	Power Domain	Description	Signal Length
H2	GMAC_0_TXD1/ VOC_0_D14/ GPIO1_I0_D18/ AGPO_0_D5	I/O	VDDIO_GMAC	Multifunction pin	24.131
H1	GMAC_0_TXD2/ VOC_I0_D4/ GPIO1_I0_D19/ AGPO_0_D6	I/O	VDDIO_GMAC	Multifunction pin	25.008
G5	GMAC_0_TXD3/ VOC_I0_D5/ GPIO1_I0_D20/ AGPO_0_D7	I/O	VDDIO_GMAC	Multifunction pin	16.882
H4	GMAC_0_TXEN/ VOC_0_D12/ GPIO1_I0_D16	I/O	VDDIO_GMAC	Multifunction pin	18.867
C3, F8, F9, F10, G6, G7, G8, G9, G10, H6, H7, H8, H9, H10, H12, J6, J7, J8, J9, J10, K6, K7, K8, K9, K10, L10, M3, M4, N3, N7, N13, P3, P13, R3, R15, R16, T2, T15	GND	Ground	-	Power ground	-
M6	GPADC_I_D0	Input	VDDA_GPADC_3V3	ADC channel 0 analog input	20.874
L6	GPADC_I_D1	Input	VDDA_GPADC_3V3	ADC channel 1 analog input	18.451
L7	GPADC_I_D2	Input	VDDA_GPADC_3V3	ADC channel 2 analog input	17.022
M7	GPADC_I_D3	Input	VDDA_GPADC_3V3	ADC channel 3 analog input	19.561
G11	GPIO0_I0_D0/ VIC1_I_D0/ UART0_I_RXD/ AGPO_0_D0	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	8.396
G12	GPIO0_I0_D1/ VIC1_I_D1/ UART0_0_TXD/ AGPO_0_D1	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	6.249
F14	GPIO0_I0_D10/ VIC1_I_D9/ UART4_0_TXD/ AGPO_0_D9	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	6.239
F15	GPIO0_I0_D11/ VIC1_I_D10/ AGPO_0_D10	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	5.353
F16	GPIO0_I0_D12/ VIC1_I_D11/ AGPO_0_D11	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	6.923
E12	GPIO0_I0_D13/ VIC1_I_D12/ SPI3_I_RXD	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	7.840
E13	GPIO0_I0_D14/ VIC1_I_D13/ SPI3_0_CS _n	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	5.519
E14	GPIO0_I0_D15/ VIC1_I_D14/ I2C2_I0_SCL / SPI3_0_BCLK	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	3.887
E15	GPIO0_I0_D16/ VIC1_I_D15/ I2C2_I0_SDA/ SPI3_0_TXD	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	4.735

Pad	Signal Name	Type	Power Domain	Description	Signal Length
D14	GPI00_I0_D17/ VIC1_I_HS	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	9.756
D15	GPI00_I0_D18/ VIC1_I_VS	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	6.617
G13	GPI00_I0_D2/ VIC1_I_D2/ UART2_I_RXD/ UART0_I_CTSn/ AGPO_0_D2	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	3.006
G14	GPI00_I0_D3/ VIC1_I_D3/ UART2_0_TXD/ UART0_0_RTSn/ AGPO_0_D3	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	2.575
G15	GPI00_I0_D4/ VIC1_I_D4/ UART1_I_RXD/ AGPO_0_D4	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	3.452
G16	GPI00_I0_D5/ VIC1_I_D5/ UART1_0_TXD/ AGPO_0_D5	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	4.745
F11	GPI00_I0_D6/ VIC1_I_D6/ UART3_I_RXD/ UART1_I_CTSn/ AGPO_0_D6	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	10.162
F12	GPI00_I0_D7/ VIC1_I_D7/ UART3_0_TXD/ UART1_0_RTSn/ AGPO_0_D7	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	6.047
D16	GPI00_I0_D8/ VIC1_I_PCLK	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	10.102
F13	GPI00_I0_D9/ VIC1_I_D8/ UART4_I_RXD/ AGPO_0_D8	I/O	VDDIO_GPIOSENSOR1	Multifunction pin	4.394
C6	HSSI_I_CLK0n	Input	VDD_LDO_1P8	HSSI Clock0 negative	30.500
D6	HSSI_I_CLK0p	Input	VDD_LDO_1P8	HSSI Clock0 positive	29.518
C8	HSSI_I_CLK1n	Input	VDD_LDO_1P8	HSSI Clock1 negative	24.212
D8	HSSI_I_CLK1p	Input	VDD_LDO_1P8	HSSI Clock1 positive	23.474
A6	HSSI_I_D1n	Input	VDD_LDO_1P8	HSSI Data1 negative	28.031
B6	HSSI_I_D1p	Input	VDD_LDO_1P8	HSSI Data1 positive	27.030
E7	HSSI_I_D2n	Input	VDD_LDO_1P8	HSSI Data2 negative	28.300
E6	HSSI_I_D2p	Input	VDD_LDO_1P8	HSSI Data2 positive	27.878
C7	HSSI_I_D3n	Input	VDD_LDO_1P8	HSSI Data3 negative	23.171
D7	HSSI_I_D3p	Input	VDD_LDO_1P8	HSSI Data3 positive	22.151
A7	HSSI_I_D4n	Input	VDD_LDO_1P8	HSSI Data4 negative	30.867
B7	HSSI_I_D4p	Input	VDD_LDO_1P8	HSSI Data4 positive	30.143
A8	HSSI_I_D5n	Input	VDD_LDO_1P8	HSSI Data5 negative	24.610
B8	HSSI_I_D5p	Input	VDD_LDO_1P8	HSSI Data5 positive	23.629
E9	HSSI_I_D6n	Input	VDD_LDO_1P8	HSSI Data6 negative	23.231
E8	HSSI_I_D6p	Input	VDD_LDO_1P8	HSSI Data6 positive	21.962
C9	HSSI_I_D7n	Input	VDD_LDO_1P8	HSSI Data7 negative	17.865
D9	HSSI_I_D7p	Input	VDD_LDO_1P8	HSSI Data7 positive	16.606
A9	HSSI_I_D8n	Input	VDD_LDO_1P8	HSSI Data8 negative	23.965
B9	HSSI_I_D8p	Input	VDD_LDO_1P8	HSSI Data8 positive	22.959
H11	I2C0_I0_SCL	I/O	VDDIO_COMMON	I2C0 clock (connected to STM32) (1)	34.142

Pad	Signal Name	Type	Power Domain	Description	Signal Length
H13	I2C0_I0_SDA	I/O	VDDIO_COMMON	I2C0 data (connected to STM32) (1)	27.816
M10	I2S_I0_TX_BCLK	I/O	VDDIO_COMMON	I2S Tx serial clock	15.325
M9	I2S_I0_TX_WS	I/O	VDDIO_COMMON	I2S Tx frame synchronization signal	15.442
T10	I2S_I_RXD	Input	VDDIO_COMMON	I2S Rx data input	17.834
N10	I2S_I_RX_BCLK	Input	VDDIO_COMMON	I2S Rx serial clock	17.950
L9	I2S_I_RX_WS	Input	VDDIO_COMMON	I2S Tx frame synchronization signal	17.716
P10	I2S_I0_MCLK	Output	VDDIO_COMMON	I2S master clock output	17.634
R10	I2S_I0_TXD	Output	VDDIO_COMMON	I2S Tx data input	15.436
E10	IRDA_I_SDA/ USB_0_DRV_VBUS/ GPIO0_I0_D19/ AGPO_0_D1	I/O	VDDIO_COMMON	Multifunction pin	9.771
N2	LD02_FB	Input	-	LDO2 feedback pin (Vfb=0.5V)	-
N1	LD02_OUT	Power	-	LDO2 output from LM26480SQ-AA (max. load 300mA)	-
P16	CLK_0_32KHZ	Output	3V3_MCU_IN	Sleep mode clock output (32.768kHz)	10.595
P12	MCU_I0_PA3	I/O	3V3_MCU_IN	Multifunction pin	12.04
N12	MCU_I0_PA4	I/O	3V3_MCU_IN	Multifunction pin	11.615
M15	MCU_I0_PA9/ USART2_TX	I/O	3V3_MCU_IN	Multifunction pin	6.892
M16	MCU_I0_PA10/ USART2_RX	I/O	3V3_MCU_IN	Multifunction pin	6.211
M13	MCU_I0_PA13/ SWDIO	I/O	3V3_MCU_IN	Multifunction pin	8.408
M14	MCU_I0_PA14/ SWDCLK	I/O	3V3_MCU_IN	Multifunction pin	6.573
N15	MCU_I_EXT_INTn	Input	3V3_MCU_IN	External interrupt pin	5.887
M12	MCU_I_RSTn	Input	3V3_MCU_IN	Global reset (active low)	6.931
N16	MCU_I0_PB1	I/O	3V3_MCU_IN	Multifunction pin	7.843
P15	MCU_I_BOOT0	Input	3V3_MCU_IN	STM32 booting configuration pin	8.344
R8	MIPI_I0_CLKON	I/O	VDD_LDO_1P8	MIPI Clock negative	27.260
T8	MIPI_I0_CLKOP	I/O	VDD_LDO_1P8	MIPI Clock positive	27.230
N8	MIPI_I0_D0N	I/O	VDD_LDO_1P8	MIPI Data0 negative	23.170
P8	MIPI_I0_D0P	I/O	VDD_LDO_1P8	MIPI Data0 positive	23.180
L8	MIPI_I0_D1N	I/O	VDD_LDO_1P8	MIPI Data1 negative	23.200
M8	MIPI_I0_D1P	I/O	VDD_LDO_1P8	MIPI Data1 positive	23.230
R9	MIPI_I0_D2N	I/O	VDD_LDO_1P8	MIPI Data2 negative	23.220
T9	MIPI_I0_D2P	I/O	VDD_LDO_1P8	MIPI Data2 positive	23.190
N9	MIPI_I0_D3N	I/O	VDD_LDO_1P8	MIPI Data3 negative	22.940
P9	MIPI_I0_D3P	I/O	VDD_LDO_1P8	MIPI Data3 positive	23.150
N5	MM3101_I_RSTn/ NFC_I0_D0/ UART1_0_TXD/ GPIO1_I0_D30/ AGPO_0_D0	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	30.391
P5	MM3101_I_TCK/ NFC_I0_D1/ UART3_I_RXD/ UART1_I_CTSn/ GPIO1_I0_D31/ AGPO_0_D1	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	28.860

Pad	Signal Name	Type	Power Domain	Description	Signal Length
R5	MM3101_I_TDI/ NFC_IO_D2/ UART3_0_TXD/ UART1_0_RTSn/ GPIO2_IO_D0/ AGPO_0_D2	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	31.352
T5	MM3101_I_TMS/ NFC_IO_D3/ UART4_I_RXD/ GPIO2_IO_D1/ AGPO_0_D3	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	31.716
N4	MM3101_0_TDO/ NFC_IO_D4/ UART4_0_TXD/ GPIO2_IO_D2/ AGPO_0_D4	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	28.666
A1	RTC_0_ALARM	Output	VDDA_RTC_3V3	Programmable RTC alarm output	-
A13	SDI00_IO_CMD/ GPIO0_IO_D22/ AGPO_0_D2	I/O	VDDIO_SDI00	Multifunction pin	11.428
A15	SDI00_IO_D0/ GPIO0_IO_D23/ AGPO_0_D3	I/O	VDDIO_SDI00	Multifunction pin	10.917
A16	SDI00_IO_D1/ GPIO0_IO_D24/ AGPO_0_D4	I/O	VDDIO_SDI00	Multifunction pin	11.638
A11	SDI00_IO_D2/ GPIO0_IO_D25/ AGPO_0_D5	I/O	VDDIO_SDI00	Multifunction pin	11.436
A12	SDI00_IO_D3/ GPIO0_IO_D26/ AGPO_0_D6	I/O	VDDIO_SDI00	Multifunction pin	11.013
E11	SDI00_I_Cn/ GPIO0_IO_D20/ AGPO_0_D0	I/O	VDDIO_SDI00	Multifunction pin	10.921
D11	SDI00_I_WP/ GPIO0_IO_D21/ AGPO_0_D1	I/O	VDDIO_SDI00	Multifunction pin	10.934
A14	SDI00_0_CLK	Output	VDDIO_SDI00	SDIO0 clock	11.749
B13	SDI01_IO_CMD/ GPIO0_IO_D27/ AGPO_0_D7	I/O	VDDIO_SDI01	Multifunction pin	9.945
B15	SDI01_IO_D0/ SDI00_IO_D4/ GPIO0_IO_D28/ AGPO_0_D8	I/O	VDDIO_SDI01	Multifunction pin	9.933
B16	SDI01_IO_D1/ SDI00_IO_D5/ GPIO0_IO_D29/ AGPO_0_D9	I/O	VDDIO_SDI01	Multifunction pin	10.436
B11	SDI01_IO_D2/ SDI00_IO_D6/ GPIO0_IO_D30/ AGPO_0_D10	I/O	VDDIO_SDI01	Multifunction pin	10.292
B12	SDI01_IO_D3/ SDI00_IO_D7/ GPIO0_IO_D31/ AGPO_0_D11	I/O	VDDIO_SDI01	Multifunction pin	10.022
B14	SDI01_0_CLK	Output	VDDIO_SDI01	SDIO1 clock	10.178
T7	SPI0_I_RXD/ NFC_0_CEn/ GPIO2_IO_D7/ AGPO_0_D9	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	23.776
P6	SPI0_0_BCLK/ NFC_0_WPn/ GPIO2_IO_D6/ AGPO_0_D8	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	26.946

Pad	Signal Name	Type	Power Domain	Description	Signal Length
R4	SPI0_0_CS0n/ NFC_IO_D6/ GPIO2_IO_D4/ AGPO_0_D6	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	29.586
P4	SPI0_0_CS1n/ NFC_IO_D5/ GPIO2_IO_D3/ AGPO_0_D5	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	29.845
T4	SPI0_0_TXD/ NFC_IO_D7/ GPIO2_IO_D5/ AGPO_0_D7	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	31.030
P7	SPI1_1_RXD/ NFC_I_RBn/ GPIO2_IO_D12	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	22.298
T6	SPI1_0_BCLK/ NFC_0_CLE/ GPIO2_IO_D11	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	27.300
R7	SPI1_0_CS0n/ NFC_0_WEn/ GPIO2_IO_D9/ AGPO_0_D11	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	21.277
R6	SPI1_0_CS1n/ NFC_0_REn/ GPIO2_IO_D8/ AGPO_0_D10	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	26.679
N6	SPI1_0_TXD/ NFC_0_ALE/ GPIO2_IO_D10	I/O	VDDIO_COMMON	Multifunction pin (connected to NAND Flash memory) (2)	26.620
D1	SYS_I_BOOT_MODE0	Input	3V3_OUT	Boot configuration (3)	50.566
D2	SYS_I_BOOT_MODE1	Input	3V3_OUT	Boot configuration (3)	43.811
D3	SYS_I_BOOT_MODE2	Input	3V3_OUT	Boot configuration (3)	47.036
D4	SYS_I_BOOT_MODE3	Input	3V3_OUT	Boot configuration (3)	41.976
D5	SYS_I_BOOT_MODE4	Input	3V3_OUT	Boot configuration (3)	26.971
F7	SYS_I_EFUSE	Input	VDDIO_COMMON	High: programming / Low: sensing (4)	-
N14	SYS_I_RSTn	Input	VDDIO_COMMON	M550S reset (active low) / This pin has internal 10k pull-up to 3.3V.	60.576
L5	UART0_I_RXD/ VOC_0_PCLK / GPIO1_IO_D0/ AGPO_0_D2	I/O	VDDIO_UART	Multifunction pin	26.613
L4	UART0_0_TXD/ VOC_0_BLANK/ GPIO1_IO_D1/ AGPO_0_D3	I/O	VDDIO_UART	Multifunction pin	29.578
L1	UART1_I_RXD/ VOC_0_D20/ GPIO1_IO_D4/ AGPO_0_D6	I/O	VDDIO_UART	Multifunction pin	31.008
K5	UART1_0_TXD/ VOC_0_D21/ GPIO1_IO_D5/ AGPO_0_D7	I/O	VDDIO_UART	Multifunction pin	26.817
L3	UART2_I_RXD/ VOC_0_D22/ UART0_I_CTSn/ GPIO1_IO_D2/ AGPO_0_D4	I/O	VDDIO_UART	Multifunction pin	28.092
L2	UART2_0_TXD/ VOC_0_D23/ UART0_0_RTSn/ GPIO1_IO_D3/ AGPO_0_D5	I/O	VDDIO_UART	Multifunction pin	29.371
K4	UART3_I_RXD/ VOC_0_D18/ UART1_I_CTSn/ GPIO1_IO_D6/ AGPO_0_D8	I/O	VDDIO_UART	Multifunction pin	23.606
K3	UART3_0_TXD/ VOC_0_D19/ UART1_0_RTSn/ GPIO1_IO_D7/ AGPO_0_D9	I/O	VDDIO_UART	Multifunction pin	24.332

Pad	Signal Name	Type	Power Domain	Description	Signal Length
K2	UART4_I_RXD/ VOC_0_D16/ GPIO1_IO_D8/ AGPO_0_D10	I/O	VDDIO_UART	Multifunction pin	27.588
K1	UART4_0_TXD/ VOC_0_D17/ GPIO1_IO_D9/ AGPO_0_D11	I/O	VDDIO_UART	Multifunction pin	30.154
A10	USB_IO_D_N	I/O	VDDA_USB_3P3	USB data minus	9.480
B10	USB_IO_D_P	I/O	VDDA_USB_3P3	USB data plus	9.480
C10	USB_I_ID	Input	VDDA_USB_3P3	USB OTG ID input	8.266
D10	USB_I_VBUS	Input	VDDA_USB_3P3	USB 5V VBUS sense input	18.115
M5	VDDA_GPADC_3V3	Power	-	+3.3V ADC reference voltage output	-
A2	VDDA_RTC_3V3	Power	-	RTC power supply	-
F6	VDDIO_GMAC	Power	-	GMAC I/O port power supply	-
E16	VDDIO_GPIOSENSOR1	Power	-	GPIOSENSOR1 I/O port power supply	-
D13	VDDIO_SDIO0	Power	-	SDIO0 I/O port power supply	-
D12	VDDIO_SDIO1	Power	-	SDIO1 I/O port power supply	-
H16	VDDIO_SENSOR0	Power	-	SENSOR0 I/O port power supply	-
F5	VDDIO_UART	Power	-	UART I/O port power supply	-
P14	VDDIO_WIFI	Power	-	WIFI and Bluetooth I/O power supply	-
L15	VIC0_I_D0/ GPIO2_IO_D15/ AGPO_0_D0	I/O	VDDIO_SENSOR0	Multifunction pin	8.369
L16	VIC0_I_D1/ GPIO2_IO_D16/ AGPO_0_D1	I/O	VDDIO_SENSOR0	Multifunction pin	11.574
J13	VIC0_I_D10/ GPIO2_IO_D26/ AGPO_0_D10	I/O	VDDIO_SENSOR0	Multifunction pin	5.413
J14	VIC0_I_D11/ GPIO2_IO_D27/ AGPO_0_D11	I/O	VDDIO_SENSOR0	Multifunction pin	4.600
J15	VIC0_I_D12/ SPI2_I_RXD/ GPIO2_IO_D28	I/O	VDDIO_SENSOR0	Multifunction pin	3.969
J16	VIC0_I_D13/ SPI2_0_CS _n / GPIO2_IO_D29	I/O	VDDIO_SENSOR0	Multifunction pin	6.766
H14	VIC0_I_D14/ I2C1_IO_SCL/ SPI2_0_BCLK/ GPIO2_IO_D30	I/O	VDDIO_SENSOR0	Multifunction pin	3.448
H15	VIC0_I_D15/ I2C1_IO_SDA/ SPI2_0_TXD/ GPIO2_IO_D31	I/O	VDDIO_SENSOR0	Multifunction pin	2.583
K11	VIC0_I_D2/ GPIO2_IO_D17/ AGPO_0_D2	I/O	VDDIO_SENSOR0	Multifunction pin	9.210
K12	VIC0_I_D3/ GPIO2_IO_D18/ AGPO_0_D3	I/O	VDDIO_SENSOR0	Multifunction pin	7.807
K13	VIC0_I_D4/ GPIO2_IO_D19/ AGPO_0_D4	I/O	VDDIO_SENSOR0	Multifunction pin	5.590

Pad	Signal Name	Type	Power Domain	Description	Signal Length
K14	VIC0_I_D5/ GPIO2_IO_D20/ AGPO_0_D5	I/O	VDDIO_SENSOR0	Multifunction pin	4.342
K15	VIC0_I_D6/ GPIO2_IO_D21/ AGPO_0_D6	I/O	VDDIO_SENSOR0	Multifunction pin	7.386
K16	VIC0_I_D7/ GPIO2_IO_D22/ AGPO_0_D7	I/O	VDDIO_SENSOR0	Multifunction pin	8.052
J11	VIC0_I_D8/ GPIO2_IO_D24/ AGPO_0_D8	I/O	VDDIO_SENSOR0	Multifunction pin	9.159
J12	VIC0_I_D9/ GPIO2_IO_D25/ AGPO_0_D9	I/O	VDDIO_SENSOR0	Multifunction pin	6.699
L12	VIC0_I_HS/ I2C1_IO_SCL/ GPIO2_IO_D13	I/O	VDDIO_SENSOR0	Multifunction pin	8.091
L13	VIC0_I_PCLK/ GPIO2_IO_D23	I/O	VDDIO_SENSOR0	Multifunction pin	7.358
L11	VIC0_I_VS/ I2C1_IO_SDA/ GPIO2_IO_D14	I/O	VDDIO_SENSOR0	Multifunction pin	9.192
L14	VIC0_0_REF_CLK	Output	VDDIO_SENSOR0	VIC0 Reference Clock	11.277
T16	ANT	I/O	VDDIO_WIFI	LBEE5KL1DX antenna pin	5.141
C13	WIFI_IO_CMD	I/O	VDDIO_WIFI	LBEE5KL1DX SDIO Command pin	30.724
C15	WIFI_IO_D0	I/O	VDDIO_WIFI	LBEE5KL1DX SDIO Data0 pin	26.748
C16	WIFI_IO_D1	I/O	VDDIO_WIFI	LBEE5KL1DX SDIO Data1 pin	26.342
C11	WIFI_IO_D2	I/O	VDDIO_WIFI	LBEE5KL1DX SDIO Data2 pin	34.692
C12	WIFI_IO_D3	I/O	VDDIO_WIFI	LBEE5KL1DX SDIO Data3 pin	32.575
C14	WIFI_I_CLK	Input	VDDIO_WIFI	LBEE5KL1DX SDIO Clock	25.602
M11	WL_0_HOST_WAKE	Output	VDDIO_WIFI	WiFi Host Wake signal	6.052

- (1) Reserved I²C0 addresses 0x2E, 0x5C, 0x5D, 0x1F
- (2) Do not connect, when NAND flash memory is installed on module
- (3) See section 5 - Boot options
- (4) High: 1.5V, Low: Gnd

4.3.1 Power supply

There are four pads for videoSOM™ power supply: 3V3_IN (P1, R1, R2) and 3V3_MCU_IN (P2). Dedicated pads for each of M550S ports guarantee the flexibility in connecting different subsystem devices.

- VDDA_RTC_3V3
- VDDIO_GMAC
- VDDIO_GPIOSSENSOR1
- VDDIO_SDIO0
- VDDIO_SDIO1
- VDDIO_SENSOR0
- VDDIO_UART
- VDDIO_WIFI

See section 6 - Electrical characteristics for additional informations.

4.3.2 Video Interfaces

Available video interfaces:

- MIPI
- subLVDS
- SLVS
- HiSPi
- parallel
- serial

ensure that image sensors with different interfaces can be connected to videoSOM™.

Maximum sensor resolution: 7,936x7,936 px.

Maximum output resolution: 1,920x1,080 px.

4.3.3 Audio Interfaces

- full-duplex stereo I²S
- analog mono microphone input
- stereo PDM digital microphone input
- stereo line input and output
- stereo headphones output

4.3.4 Peripheral Interfaces

There are many different interfaces that videoSOM™ ensure for communication:

- USB 2.0
- up to four SPI interfaces
- high-speed UARTs
 - up to five basic UARTs interfaces
 - up to two extended UARTs interfaces with flow control
- up to three I²C interfaces
 - standard mode 100Kbps
 - fast-mode 1Mbps
- 10/100/1000M Ethernet MAC interface (RGMII, MII and RMII protocol)

- one IrDA interface

4.3.5 Connectivity

videoSOM™ contains pre-certified Murata Wi-Fi® and Bluetooth® module, which supports IEEE 802.11b/g/n and Bluetooth 4.2 BR/EDR/LE functionality.

Communication with Wi-Fi® submodule is possible over a 4-bit SDIO interface(data rate up to 65Mbps).

- WIFL_IO_CMD
- WIFL_IO_D0
- WIFL_IO_D1
- WIFL_IO_D2
- WIFL_IO_D3
- WIFL_CLK

Communication with Bluetooth® submodule is realized over a high-speed(up to 4Mbps) UART Interface:

- BT_I_CTSn
- BT_I_RXD
- BT_O_RTSn
- BT_O_TXD

Only one antenna is needed for simultaneous Wi-Fi® and Bluetooth® wireless communication. It shares only one pad ANT.

More informations can be found in Murata LBEE5KL1DX datasheet.

5 Boot options

videoSOM™ can be booted from:

- UART
- SD card
- SPI-NOR
- SPI-NAND
- NAND Flash
- USB drive

Boot devices are selected via physical pins configurations. `SYS_I_BOOT_MODE0..4` states are readed after power-on and determine the boot flow. This pins should not be floating and remain in the same state after power-on. Pull-up or pull-down resistors should be used to drive this inputs to appropriate state.

Pin No	Pin Name
1	SYS_I_BOOT_MODE0
2	SYS_I_BOOT_MODE1
3	SYS_I_BOOT_MODE2
4	SYS_I_BOOT_MODE3
5	SYS_I_BOOT_MODE4

5.1 System boot mode selectors

MODE[4:3]	Description	MODE[2:0]	Description
00b	Invalid	-	-
01b	Boot from USB first	-	If USB boot fail, then check MODE[2:0] to boot.
10b	Boot from SD first	-	If SD boot fail, then check MODE[2:0] to boot.
11b		000b	Boot from serial Flash through SPI device 0 interface.
11b		001b	Boot from serial Flash through SPI device 1 interface.
11b		010b	Boot from SPI-NAND through SPI device 0 interface.
11b		011b	Boot from SPI-NAND through SPI device 1 interface.
11b		100b	Boot from NAND Flash interface with four address cycles.
11b		101b	Boot from NAND Flash interface with five address cycles.
11b		110b	Boot from UART port 0.
11b		111b	Boot from UART port 1.

6 Electrical Characteristics

6.1 Absolute Maximum Ratings

	Minimum	Maximum	Unit
Supply voltage 3V3_IN	-0.3	3.45	V
Supply voltage 3V3_MCU_IN	-0.3	4.0	V
Terminal current 3V3_IN		1.5	A
Terminal current 3V3_MCU_IN		100	mA
Terminal current 3V3_OUT		500	mA
Terminal current LD02_OUT		300	mA
Terminal current 1V8_OUT		200	mA
Terminal current 1V05_OUT		5	mA
Terminal current 1V2_OUT		5	mA
Operating ambient temperature	-25	70	°C

6.2 Recommended Operating Conditions

	Minimum	Nominal	Maximum	Unit
Supply voltage 3V3_IN	3.15	3.3	3.45	V
Supply voltage 3V3_MCU_IN	1.80	3.3	3.60	V
Supply voltage VDDA_RTC_3V3	1.60		3.60	V
Supply voltage VDDIO_GMAC	1.71	1.8	1.89	V
	2.40	2.5/3.3	3.45	V
Supply voltage VDDIO_GPIOSENSOR1	1.71	1.8	1.89	V
	2.40	2.5/3.3	3.45	V
Supply voltage VDDIO_SDI00	1.71	1.8	1.89	V
	2.40	2.5/3.3	3.45	V
Supply voltage VDDIO_SDI01	1.71	1.8	1.89	V
	2.40	2.5/3.3	3.45	V
Supply voltage VDDIO_SENSOR0	1.71	1.8	1.89	V
	2.40	2.5/3.3	3.45	V
Supply voltage VDDIO_UART	1.71	1.8	1.89	V
	2.40	2.5/3.3	3.45	V
Supply voltage VDDIO_WIFI	1.71	1.8/3.3	3.6	V

7 Mechanical Characteristics

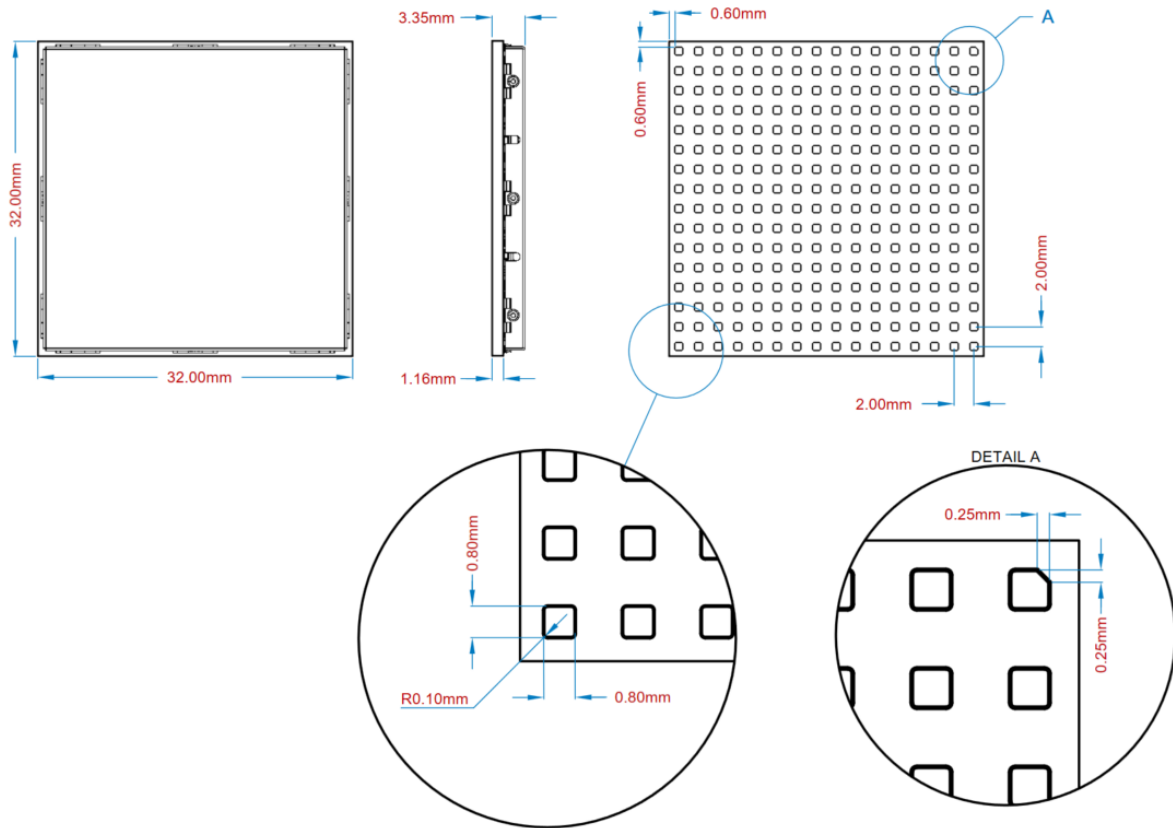


Figure 3: videoSOM™ dimensions

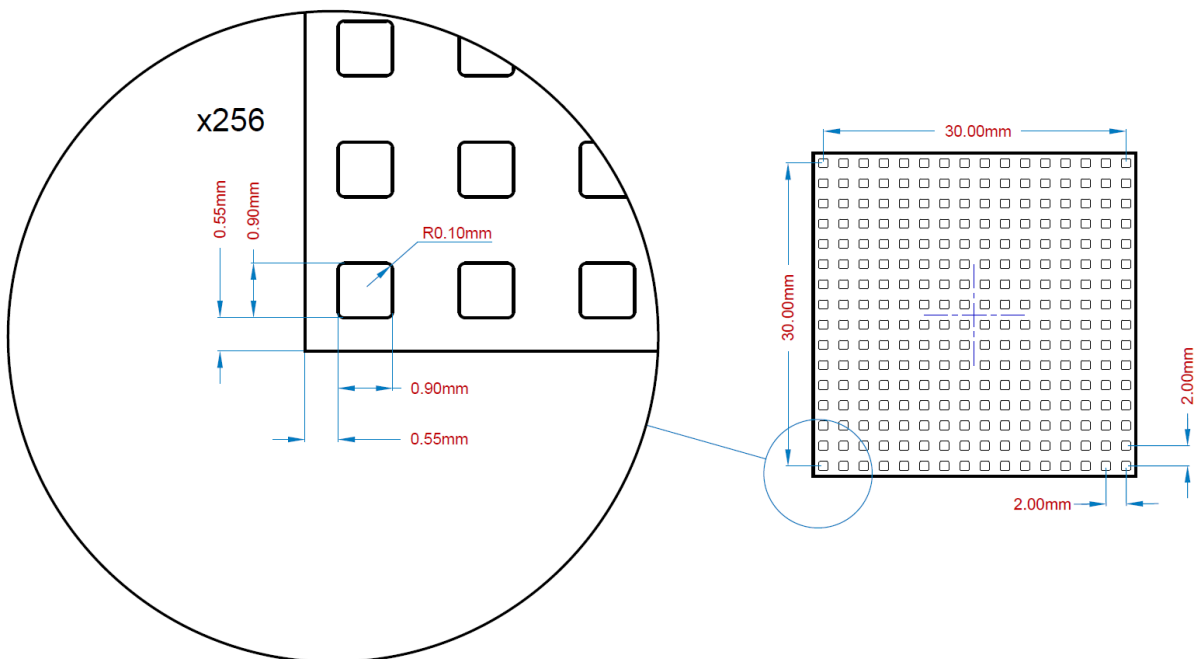
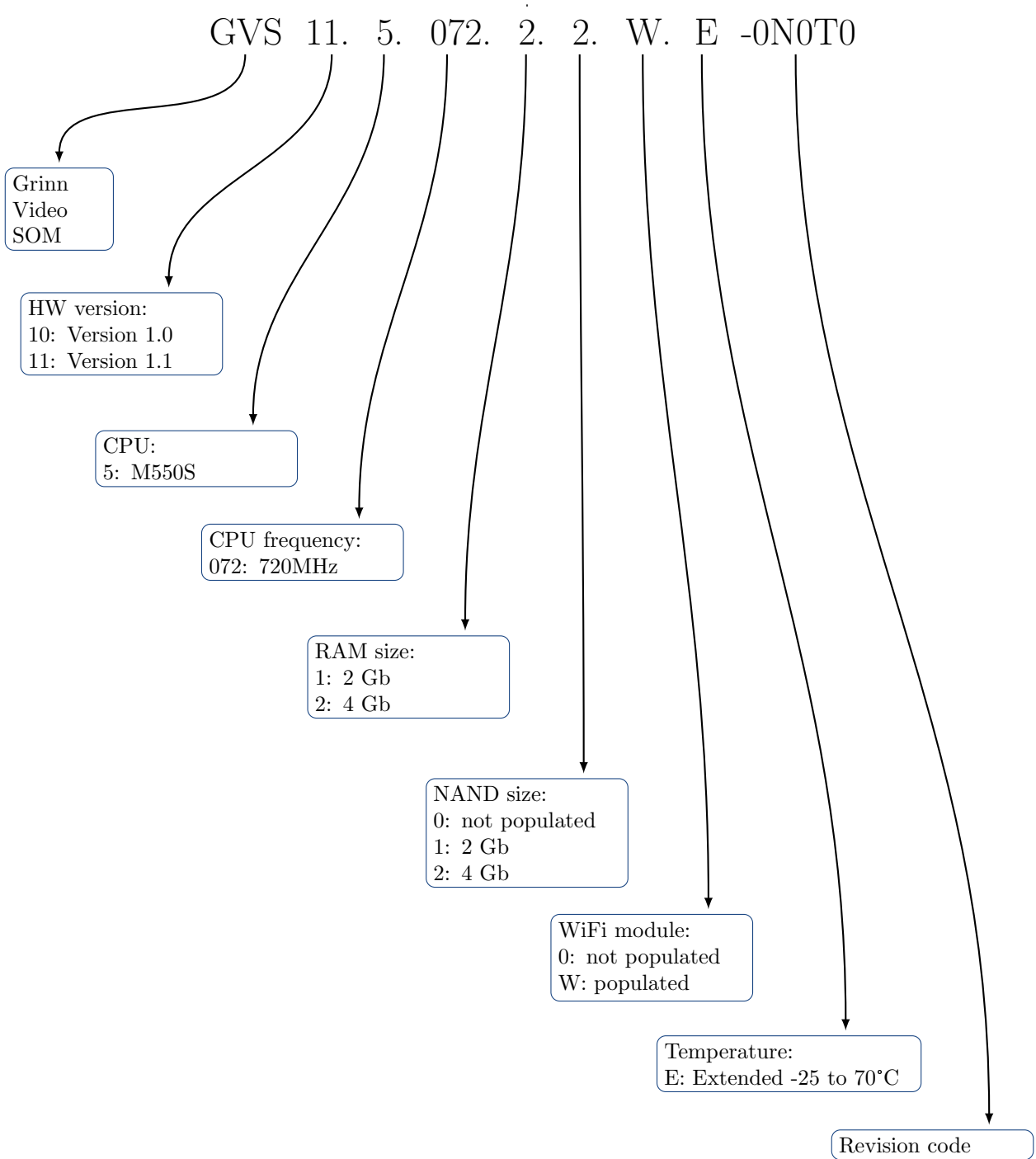


Figure 4: Land pattern and solder paste example

8 Ordering informations



9 Revision History

Revision	Changes
1.0	Initial revision.
1.1	<ul style="list-style-type: none">- reduce max. CPU speed to 720MHz (p.1)- change Microcontroller part number (p.3)- change LDO1 max current output value from 250mA to 200mA (p.3)- change Terminal current 1V8_OUT to 200mA (p.18)- change A1 pad shape (p.19)- change pad names and functions (global)- split four Power supply pins to 3x3V3_IN and 1x3V3_MCU_IN (global)

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