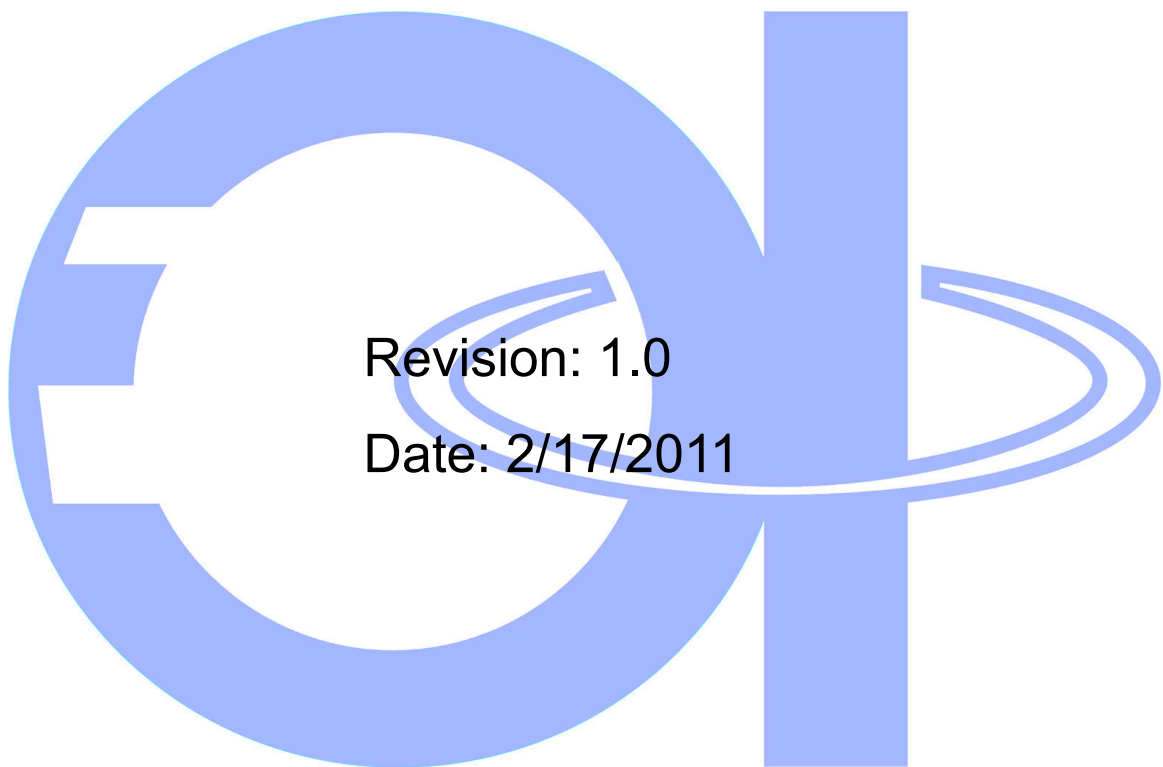


# **JL2186A\_V2**

## ***High Resolution DSC/DV Controller***



Revision: 1.0

Date: 2/17/2011

**JEILIN Technology Co., Ltd.**

8F, No.179, Jian Yi Rd., Chung Ho,  
Taipei Hsien, Taiwan

TEL : 886-2-82215466    FAX : 886-2-82215456



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**Revision History**

Revision	Description of Changes	Date
1.0	First version release	2/17/2011

Confidential



## 1 General Description

The JL2186A\_V2 is a high image quality, high integrated, and low cost SOC for Digital Still Camera (DSC) and entry level Digital Video Camcorder (DVC) applications. It is targeted at the application of DSC resolutions up to 16M pixels. It has embedded with video input interface, high quality image processor, JPEG codec, audio codec, memory card controller, video output interface, and USB 2.0 High-speed controller with embedded transceiver to make a low cost DSC/DVC easy to be realized.

The JL2186A\_V2 is capable of storing JPEG compressed pictures on storage media devices such as SD/MMC memory cards, SLC/MLC NAND flash, and serial NOR flash. It also supports such as TV display, LCD panel display, audio recording and playback. Fully supporting major DSC/DV peripherals, customer can design DSC/DV system with minimum cost.

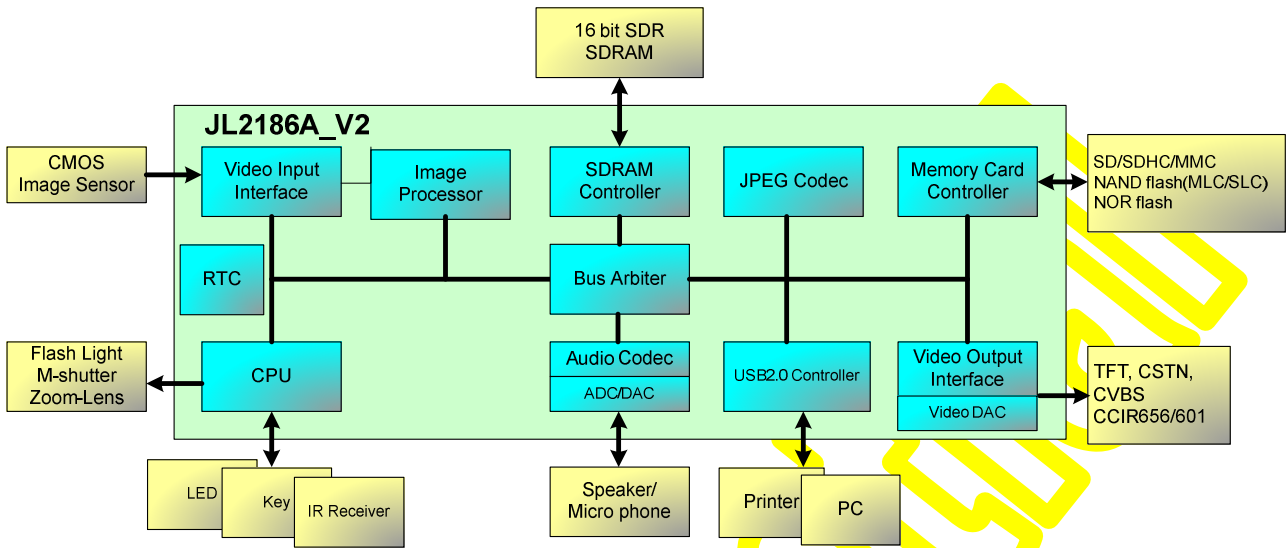
## 2 Features

- Image processor
  - Support CMOS sensor up to 16MP
  - CCIR601/656 video signal input
  - Advanced image processing engine with color-shading, lens-shading correction, adaptive anti-alias color interpolation, adaptive 2D edge-enhancement, adaptive 2D noise-reduction, auto bad pixel cancellation and AE/AWB/AF/Histogram measurement
  - 8x digital zoom for still image capture
- Video Codec
  - Support baseline JPEG codec compression and decompression.
  - Support Motion JPEG for AVI capture and playback at 30 fps @VGA
  - 4x digital zoom for video capture
- Audio Codec
  - 8/16-bit PCM, 4-bit IMA-ADPCM coding/decoding
  - Embedded one ADC for audio recording, battery detect...
  - Embedded one DAC for audio playback
  - Provide I2S interface
- LCD/TV display
  - Support 8-bit memory bus and serial-RGB interface LCD
  - Support both NTSC/PAL composite video output with integrated TV encoder and video DAC
  - Support 8-bit CCIR601/656 output interface
  - Graphic-based OSD
- Storage Media
  - Support serial NOR flash and SLC/MLC NAND flash
  - Support MMC/SD/SDHC up to 32GB



- CPU system
  - Embedded turbo CPU
  - Watch dog timer
  - Support ISP function
  - Booting from serial NOR flash or NAND flash
  - Provide one UART interface
- USB Interface
  - High-speed USB 2.0 device function with embedded transceiver
  - Compliant with Mass-storage class, Video class, PictBridge protocol
- SDRAM System
  - Support 16-bit SDR SDRAM up to 256Mb
  - Small SDRAM buffer required
- Built-in RTC、PLL, power MOS and Power-On-Reset circuit
- Power management
- Package
  - 128-pin LQFP

### 3 Block Diagram



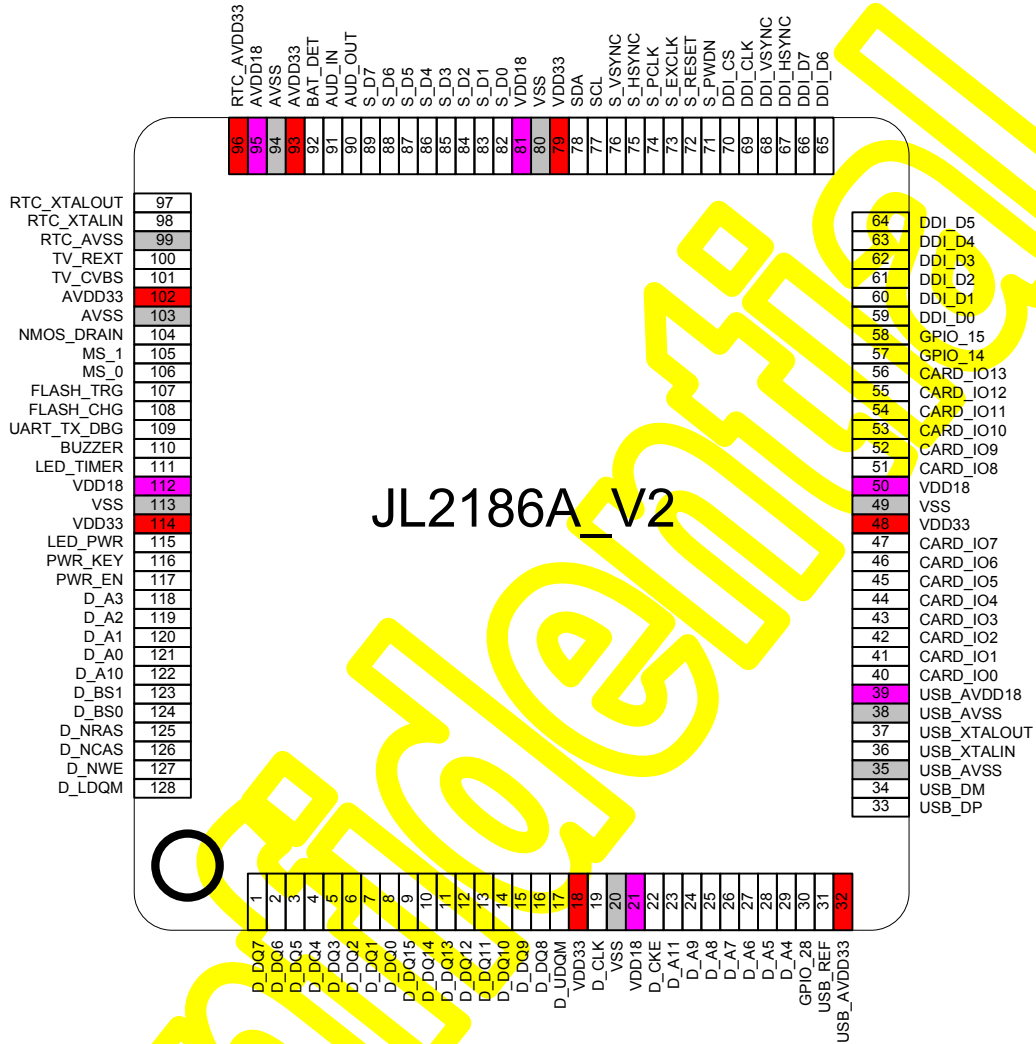
### 4 Applications

- High resolutions DSC
- Pocket DSC/DV



### 5 Pin Assignment and Pin Description

#### 5.1 Pin Assignment





## 5.2 Pin Description

Pin #	Pin name	Type	Description	Memo
1	D_DQ7	B8	SDRAM data bus 7	
2	D_DQ6	B8	SDRAM data bus 6	
3	D_DQ5	B8	SDRAM data bus 5	
4	D_DQ4	B8	SDRAM data bus 4	
5	D_DQ3	B8	SDRAM data bus 3	
6	D_DQ2	B8	SDRAM data bus 2	
7	D_DQ1	B8	SDRAM data bus 1	
8	D_DQ0	B8	SDRAM data bus 0	
9	D_DQ15	B8	SDRAM data bus 15	
10	D_DQ14	B8	SDRAM data bus 14	
11	D_DQ13	B8	SDRAM data bus 13	
12	D_DQ12	B8	SDRAM data bus 12	
13	D_DQ11	B8	SDRAM data bus 11	
14	D_DQ10	B8	SDRAM data bus 10	
15	D_DQ9	B8	SDRAM data bus 9	
16	D_DQ8	B8	SDRAM data bus 8	
17	D_UDQM	O8	SDRAM high byte data write mask, it must be connected to pull-down 8.2 K ohm resistor.	
18	VDD33	P	I/O power 3.3V	
19	D_CLK	O16	SDRAM clock	
20	VSS	G	Ground	
21	VDD18	P	Core power 1.8V	
22	D_CKE	O8	SDRAM clock enable	
23	D_A11	B8	SDRAM address bus 11	
24	D_A9	B8	SDRAM address bus 9	
25	D_A8	B8	SDRAM address bus 8	
26	D_A7	B8	SDRAM address bus 7	
27	D_A6	B8	SDRAM address bus 6	
28	D_A5	B8	SDRAM address bus 5	
29	D_A4	B8	SDRAM address bus 4	
30	GPIO_28	B8	General purpose IO	
31	USB_REF	A	Connect 12.1Kohm (1%) resistor to ground. The purpose of USB_REF is to provide a reference for the current resource of the USB transceiver.	
32	USB_AVDD33	P	3.3V power pin for USB transceiver	
33	USB_DP	A	USB D+	





Pin #	Pin name	Type	Description	Memo
34	USB_DM	A	USB D-	
35	USB_AVSS	G	USB transceiver ground	
36	USB_XTALIN	A	Oscillator input. Connect to a 12MHz crystal for USB transceiver.	
37	USB_XTALOUT	A	Oscillator output. Connect to a 12MHz crystal for USB transceiver.	
38	USB_AVSS	P	USB transceiver ground	
39	USB_AVDD18	P	USB transceiver 1.8V power	
40	CARD_IO0	B8	Memory Cards IO bit 0	GPIO_0
41	CARD_IO1	B8	Memory Cards IO bit 1	GPIO_1
42	CARD_IO2	B4	Memory Cards IO bit 2	GPIO_2
43	CARD_IO3	B4	Memory Cards IO bit 3	GPIO_3
44	CARD_IO4	B4	Memory Cards IO bit 4	GPIO_4
45	CARD_IO5	B4	Memory Cards IO bit 5	GPIO_5
46	CARD_IO6	B4	Memory Cards IO bit 6	GPIO_6
47	CARD_IO7	B4	Memory Cards IO bit 7	GPIO_7
48	VDD33	P	I/O power 3.3V	
49	VSS	G	Ground	
50	VDD18	P	Core power 1.8V	
51	CARD_IO8	B4	Memory Cards IO bit 8	GPIO_8
52	CARD_IO9	B4	Memory Cards IO bit 9	GPIO_9
53	CARD_IO10	B4	Memory Cards IO bit 10	GPIO_10
54	CARD_IO11	B4	Memory Cards IO bit 11	GPIO_11
55	CARD_IO12	B4	Memory Cards IO bit 12	GPIO_12
56	CARD_IO13	B4	Memory Cards IO bit 13	GPIO_13
57	GPIO_14	B4	General purpose IO	
58	GPIO_15	B4	General purpose IO	
59	DDI_0	B4	Digital Display Interface bit 0	GPIO_16
60	DDI_1	B4	Digital Display Interface bit 1	GPIO_17
61	DDI_2	B4	Digital Display Interface bit 2	GPIO_18
62	DDI_3	B4	Digital Display Interface bit 3	GPIO_19
63	DDI_4	B4	Digital Display Interface bit 4	GPIO_20
64	DDI_5	B4	Digital Display Interface bit 5	GPIO_21
65	DDI_6	B4	Digital Display Interface bit 6	GPIO_22
66	DDI_7	B4	Digital Display Interface bit 7	GPIO_23
67	DDI_HSYNC	O4	Digital display interface horizontal synchronous	GPIO_24
68	DDI_VSYNC	O4	Digital display interface vertical synchronous	GPIO_25



Pin #	Pin name	Type	Description	Memo
69	DDI_CLK	O8	Digital display interface clock	GPIO_26
70	DDI_CS	O4	Digital display interface chip select	GPIO_27
71	S_PWDN	O4	CMOS image sensor power down	
72	S_RESET	O4	CMOS image sensor reset	
73	S_EXCLK	O8	CMOS image sensor external clock	
74	S_PCLK	I	CMOS image sensor pixel clock	
75	S_HSYNC	I	CMOS image sensor horizontal synchronous	
76	S_VSYNC	I	CMOS image sensor vertical synchronous	
77	SCL	OD	Serial clock	
78	SDA	BD	Serial data	
79	VDD33	P	I/O power 3.3V	
80	VSS	G	Ground	
81	VDD18	P	Core power 1.8V	
82	S_D0	I	CMOS image sensor data bus 0	
83	S_D1	I	CMOS image sensor data bus 1	
84	S_D2	I	CMOS image sensor data bus 2	
85	S_D3	I	CMOS image sensor data bus 3	
86	S_D4	I	CMOS image sensor data bus 4	
87	S_D5	I	CMOS image sensor data bus 5	
88	S_D6	I	CMOS image sensor data bus 6	
89	S_D7	I	CMOS image sensor data bus 7	
90	AUD_OUT	A	DAC output, for audio playback	
91	AUD_IN	A	ADC input, for audio record	
92	BAT_DET	A	ADC input, for low battery detection	
93	AVDD33	P	Analog power 3.3V	
94	AVSS	G	Ground	
95	AVDD18	P	Analog power 1.8V	
96	RTC_AVDD33	P	RTC power 3.3V	
97	RTC_XTALOUT	A	Oscillator output. Connect to a 32768 Hz crystal for RTC	
98	RTC_XTALIN	A	Oscillator input. Connect to a 32768 Hz crystal for RTC	
99	RTC_AVSS	G	RTC ground	
100	TV_REXT	A	Reference voltage for video DAC	
101	TV_CVBS	A	Composite video signal output	
102	AVDD33	P	Analog power 3.3V	
103	AVSS	G	Ground	



Pin #	Pin name	Type	Description	Memo
104	NMOS_DRAIN	A	Power MOS drain	
105	MS_1	O4	Mechanical shutter control signal 1	GPIO_38
106	MS_0	O4	Mechanical shutter control signal 0	GPIO_37
107	FLASH_TRG	O4	Flashlight trigger signal	GPIO_36
108	FLASH_CHG	O4	Flashlight charge signal	GPIO_35
109	UART_TX_DBG	O4	UART debug message output	GPIO_34
110	BUZZER	O16	Buzzer control signal	GPIO_33
111	LED_TIMER	O8	LED control signal	GPIO_32
112	VDD18	P	Core power 1.8V	
113	VSS	G	Ground	
114	VDD33	P	IO power 3.3V	
115	LED_PWR	O4	LED ON/OFF control signal	GPIO_31
116	PWR_KEY	I	Power key detect input	GPIO_30
117	PWR_EN	O4	Power switch enable output	GPIO_29
118	D_A3	B8	SDRAM address bus 3	
119	D_A2	B8	SDRAM address bus 2	
120	D_A1	B8	SDRAM address bus 1	
121	D_A0	B8	SDRAM address bus 0	
122	D_A10	B8	SDRAM address bus 10	
123	D_BS1	B8	SDRAM bank address 1	Boot Mode[1] *Note 1
124	D_BS0	B8	SDRAM bank address 0	Boot Mode[0] *Note 1
125	D_NRAS	O8	SDRAM row address strobe, active low	
126	D_NCAS	O8	SDRAM column address strobe, active low	
127	D_NWE	O8	SDRAM write enable, active low	
128	D_LDQM	B8	SDRAM low byte data write mask	Boot Mode[2] *Note 1

**Note 1:**

\*1: Pull up/down these three pins with 10K ohm resistor to select system booting method.

Boot Mode[2:0]	Function
000	Booting from the internal ROM
001	Booting from serial NOR Flash
011	Booting from NAND Flash memory
others	Reserved



\*2: All digital input pin can take 5V tolerance

Type	Description
P	Power pin
G	Ground pin
A	Analog pin
I	3.3V CMOS input pin
O4	3.3V CMOS output pin with 4mA driving ability
O8	3.3V CMOS output pin with 8mA driving ability
O16	3.3V CMOS output pin with 16mA driving ability
B4	3.3V CMOS bi-direction pin with 4mA driving ability
B8	3.3V CMOS bi-direction pin with 8mA driving ability
BD	3.3V CMOS open drain bi-direction pin



### 5.3 GPIO MUX Table

Each GPIO pin has its own function select registers, Alt[2:0], firmware can configure each GPIO pin to different function individually.

PIN Name	Alt[2:0]= "000"		Alt[2:0]= "001"		Alt[2:0]= "010"		Alt[2:0]= "011"		Alt[2:0]= "100"	
CARD_IO0	GPIO_0	B8	SD1_CLK	O						
CARD_IO1	GPIO_1	B8			NF_NCE	O	SPI_nCS0	O		
CARD_IO2	GPIO_2	B4	SD1_CMD	B	NF_D0	B				
CARD_IO3	GPIO_3	B4	SD1_D0	B	NF_D1	B	SPI_CLK	O		
CARD_IO4	GPIO_4	B4	SD1_D1	B	NF_D2	B	SPI_DI	I		
CARD_IO5	GPIO_5	B4	SD1_D2	B	NF_D3	B	SPI_DO	O		
CARD_IO6	GPIO_6	B4	SD1_D3	B	NF_D4	B				
CARD_IO7	GPIO_7	B8			NF_D5	B	D_A12	B		
CARD_IO8	GPIO_8	B4	SPI_nCS1	O	NF_D6	B	PG1_Out_0	O	I2S_WS	O
CARD_IO9	GPIO_9	B4	SPI_CLK	O	NF_D7	B	PG1_Out_1	O	I2S_DO	O
CARD_IO10	GPIO_10	B4	SPI_DI	I	NF_ALE	O	PG2_Out_0	O	I2S_BCK	O
CARD_IO11	GPIO_11	B4	SPI_DO	O	NF_NRE	O	PG2_Out_1	O		
CARD_IO12	GPIO_12	B4	SPI_Ext_Int_0	I	NF_CLE	O	PG3_Out_0	O		
CARD_IO13	GPIO_13	B4	SPI_Ext_Int_1	I	NF_NWE	O	PG3_Out_1	O		
GPIO_14	GPIO_14	B4	Ext_Wakeup	I	NF_RDY	I	PG2_Out_0	O		
GPIO_15	GPIO_15	B4	SPI_SCK_E	O	IR_IN	I	PG2_Out_1	O		
DDI_D0	GPIO_16	B4	Serial_RGB_D0	O	MPU_LCD_D0	B	CCIR601_D0/ CCIR656_D0	O		
DDI_D1	GPIO_17	B4	Serial_RGB_D1	O	MPU_LCD_D1	B	CCIR601_D1/ CCIR656_D1	O		
DDI_D2	GPIO_18	B4	Serial_RGB_D2	O	MPU_LCD_D2	B	CCIR601_D2/ CCIR656_D2	O		
DDI_D3	GPIO_19	B4	Serial_RGB_D3	O	MPU_LCD_D3	B	CCIR601_D3/ CCIR656_D3	O		
DDI_D4	GPIO_20	B4	Serial_RGB_D4	O	MPU_LCD_D4	B	CCIR601_D4/ CCIR656_D4	O		
DDI_D5	GPIO_21	B4	Serial_RGB_D5	O	MPU_LCD_D5	B	CCIR601_D5/ CCIR656_D5	O		
DDI_D6	GPIO_22	B4	Serial_RGB_D6	O	MPU_LCD_D6	B	CCIR601_D6/ CCIR656_D6	O		
DDI_D7	GPIO_23	B4	Serial_RGB_D7	O	MPU_LCD_D7	B	CCIR601_D7/ CCIR656_D7	O		
DDI_HSYNC	GPIO_24	B4	Serial_RGB_HSYNC	O	MPU_LCD_A0	O	CCIR601_HSYNC	O		
DDI_VSYNC	GPIO_25	B4	Serial_RGB_VSYNC	O	MPU_LCD_nWR	O	CCIR601_VSYNC	O		
DDI_CLK	GPIO_26	B8	Serial_RGB_CLK	O	MPU_LCD_TE	I	CCIR601_CLK/ CCIR656_CLK	O		
DDI_CS	GPIO_27	B4	MPU_LCD_nRD	O	MPU_LCD_nCS	O	RTC_CKOUT	O		



PIN Name	Alt[2:0]= "000"		Alt[2:0]= "001"		Alt[2:0]= "010"		Alt[2:0]= "011"		Alt[2:0]= "100"	
GPIO_28	GPIO_28	B8	D_A12	B	Pulse_Counter_IN	I	Ext_INT_IN	I		
PWR_EN	GPIO_29	B4								
PWR_KEY	GPIO_30	B4								
LED_PWR	GPIO_31	B4	IR_IN	I	RC_PWM_IN	I	SPI_DI_E	I		
LED_TIMER	GPIO_32	B8	D_A12	B	Pulse_Counter_IN	I	SPI_DO_E	O		
BUZZER_OUT	GPIO_33	B16	BUZZER_OUT	O	RC_PWM_IN	I	RTC_SECOUT	O		
UART_TX_DBG	GPIO_34	B4			UART_TX_1	O				
FLASH_CHG	GPIO_35	B4	PG1_Out_0	O	Ext_INT_IN	I			I2S_WS	O
FLASH_TRG	GPIO_36	B4	PG1_Out_1	O	UART_RX_0	I			I2S_DO	O
MS_0	GPIO_37	B4	PG3_Out_0	O	UART_RX_1	I	UART_RX_0	I	I2S_BCK	O
MS_1	GPIO_38	B4	PG3_Out_1	O			UART_TX_0	O		



## 6 Electrical Characteristic

- Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
VDD33, AVDD33, RTC_AVDD33, USB_AVDD33	Power Supply (3.3V)	-0.3 to 3.6	V
VDD18, AVDD18, USB_AVDD18	Power Supply (1.8V)	-0.3 to 1.98	V
AUD_IN, BAT_DET	ADC Input Voltage	0 to 3.3	V
V <sub>IN</sub>	Input Voltage	-0.3 to V <sub>CC</sub> +0.3	V
V <sub>OUT</sub>	Output Voltage	-0.3 to V <sub>CC</sub> +0.3	V
T <sub>STG</sub>	Storage Temperature	-55 to 150	°C

- Recommended Operation Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD33, AVDD33, RTC_AVDD33, USB_AVDD33	Power Supply (3.3V)	3.0	3.3	3.6	V
VDD18, AVDD18, USB_AVDD18	Power Supply (1.8V)	1.62	1.8	1.98	V
T <sub>OPR</sub>	Operating Temperature	0	25	70	°C

- DC Electrical Characteristics for 3.3 volts operation

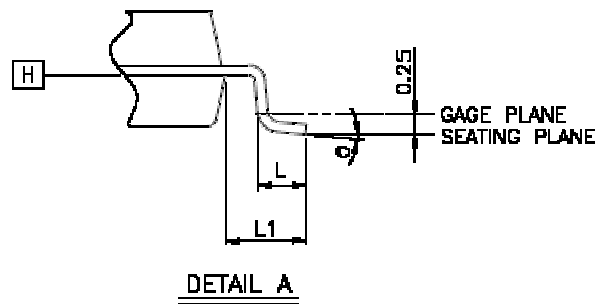
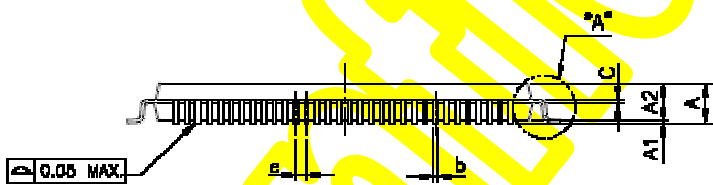
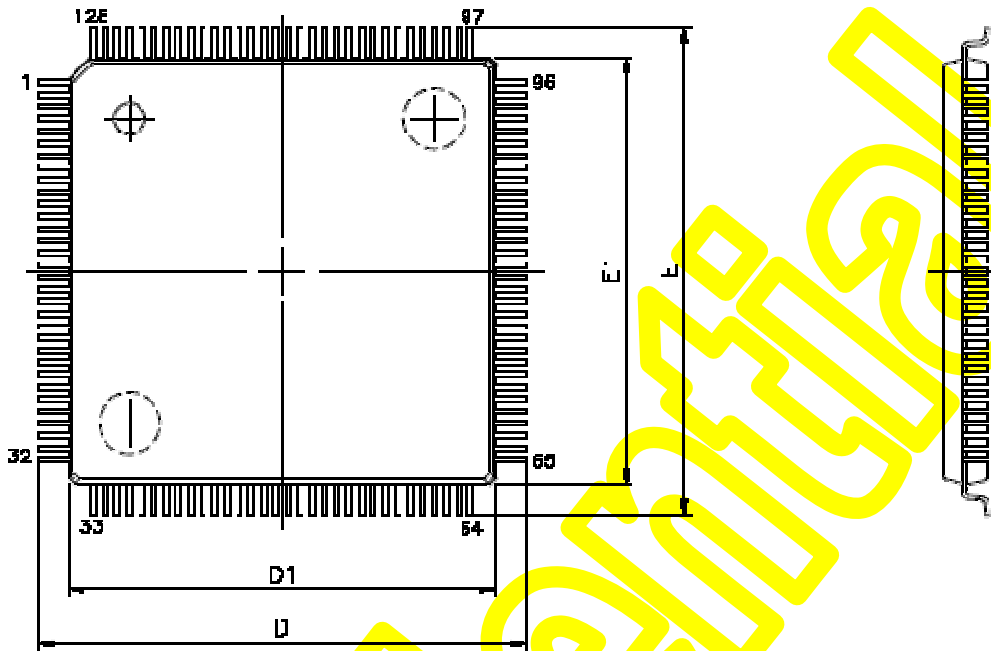
(Under Recommended Operating Conditions and V<sub>CC</sub> = 3.0V ~ 3.6V, T<sub>j</sub> = 0°C to + 70°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>IL</sub>	Input Low Voltage	-0.3		0.8	V
V <sub>IH</sub>	Input High Voltage	2.0		V <sub>CC</sub> +0.3	V
V <sub>T-</sub>	Schmitt Input Low Voltage	-0.3		0.8	V
V <sub>T+</sub>	Schmitt Input High Voltage	2.0		V <sub>CC</sub> +0.3	V
V <sub>OL</sub>	Output Low Voltage			0.4	V
V <sub>OH</sub>	Output High Voltage	2.4			V



### 7 Package Outline and Dimension

- Package Outline (128-pin LQFP)







- Dimension (128-pin LQFP)

Dimension	Min	Nom	Max
A			1.6
A1	0.05		0.15
A2	1.35	1.4	1.45
b	0.13	0.16	0.23
c	0.09		0.20
D	16.00 BSC		
D1	14.00 BSC		
E	16.00 BSC		
E1	14.00 BSC		
e	0.40 BSC		
L	0.45	0.6	0.75
L1	1.00 REF		
$\theta$	0°	3.5°	7°

Unit: mm

REF: Reference

BSC: Basic Spacing between Centers (integrated circuit package dimension)



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JEILIN Technology Co., Ltd.  
8F, No. 179, Jian Yi Rd., Chung Ho,  
Taipei Hsien, Taiwan  
Tel: 886-2-8221-5466  
Fax: 886-2-8221-5456  
Website: [www.jeilin.com.tw](http://www.jeilin.com.tw)  
Email: [jeilin@jeilin.com.tw](mailto:jeilin@jeilin.com.tw)

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