JL7083E Datasheet

Zhuhai Jieli Technology Co.,LTD

Version 1.2

Date 2025.01.08

Revision History

Date	Revision	Description
2024.07.23	V1.0	Initial Release
2024.12.10	V1.1	Update Pin Definition Update Feature Update Package Information
2025.01.08	V1.2	Update Features_Bluetooth Update Block Diagram Update BT Characteristics

Table of Contents

JL7083E Features

SYSTEM

- Dual Core 32bit DSP 192MHz
- With IEEE754 Single precision FPU
- Support FFT/MATRIX/MATH
- Support NPU
- 2 x I-cache and D-cache
- Support SDTAP/EMU
- On-chip SRAM 464kbyte
- Support MMU
- Support MPU
- Built-In Flash
- 24MHz crystal oscillator
- Internal RC oscillator,PLL

DSP Audio Processing

- SBC/AAC/LDAC/LHDC/LC3/CVSD/mSBC codec
- CVSD/mSBC voice codec for BT phone
- PLC for voice processing
- Single/Multi MIC ENC
- Multi-band DRC
- Multi-band EQ
- Support spatial sound
- Support assistive listening
- Support Hi-Res Audio

ANC

- Wide band digital adaptive ANC
- Support hybrid/feedforward/feedback
- Support wind noise detection
- Support wide area tap
- Support Speak-to-Chat
- Support tip fit test & wear detection
- Input-to-output latency < 8us

Audio

- 2 x 24bit DAC
  - SNR 119dB
  - Noise 1uVrms
  - Supports differential mode
  - Sampling rate 8~192kHz
- 5 x 24bit ADC
  - SNR 106dB
  - Sampling rate 8~192kHz
  - Support ultra-low power mode
- I^2S/TDM/PDM AUDIO Master/Slave interface

Bluetooth

- Dual-mode BT6.0 with LE Audio (DN Q332415)
- Support AoA/AoD
- Support LE audio BIS/CIS
- Support long range BLE
- Maximum transmitting power 13dBm
- Receiver sensitivity
  - -98dBm @BR
  - -98.5.dBm @EDR Π/4 DQPSK
  - -92.5dBm @EDR 8DPSK

Peripherals

- 1 x Full speed USB
- 1 x SD host controller
- 6 x Multi-function 32bit timer
- 3 x UART interface
- 1 x I^2C Master/Slave interface
- 3 x SPI Master/Slave interface
- 1 x QDEC
- 1 x 10bit ADC(8 Channels)
- 4 x MCPWM
- 2 x Light strip controller
- 17x GPIO Support function remapping
- 3 x LP_Touch with low power wake up

PMU

- Integrated battery charger up to 220mA
- 3 x Buck DC-DC converter
- Support temperature sensor
- VPWR range 4.5V to 5.5V
- VBAT range 2.7V to 4.5V
- IOVDD range 2.7V to 3.6V

Packages

- QFN42(4mm*5mm)

Temperature

- Operating temperature
  TC = -20℃ to +85℃(standard range)
  TC = -40℃ to +105℃(extended range)
- Storage temperature -65℃ to +150℃

Applications

- Adaptive ANC headphone
- Bluetooth audio device

1 Block Diagram

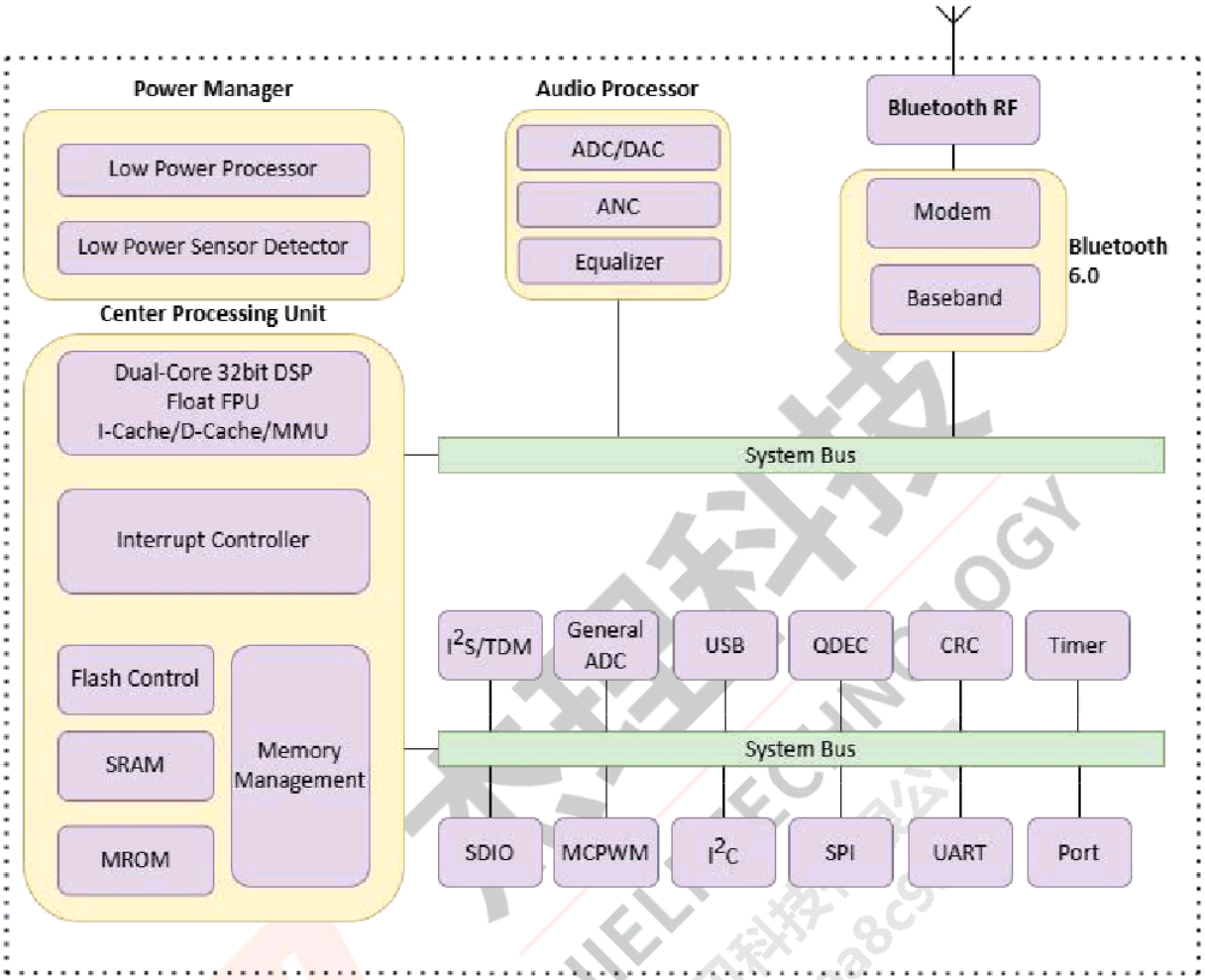


Figure 1-1 JL7083E Block Diagram

2 Pin Definition

2.1 Pin Assignment

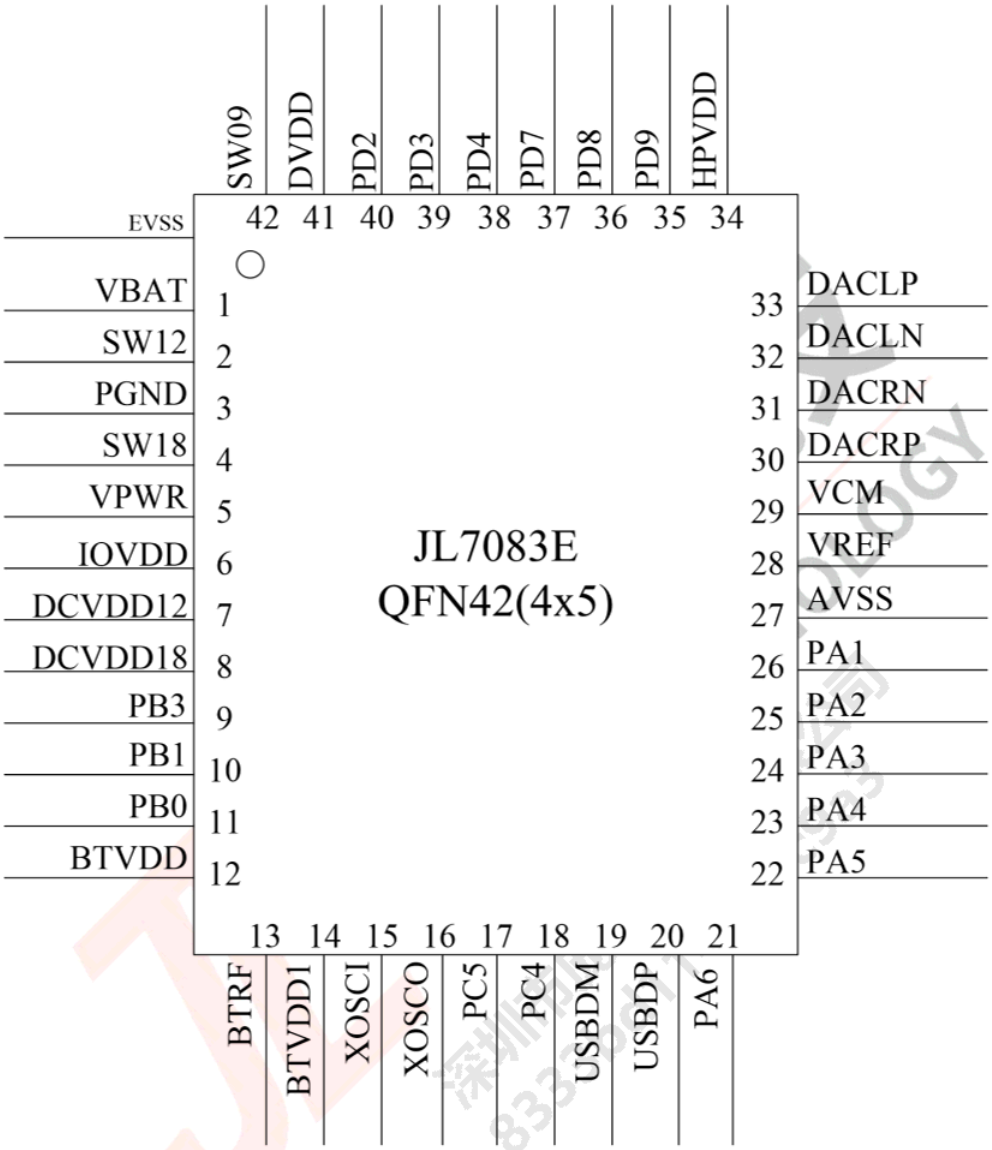


Figure 2-1 JL7083E Pin Assignment

2.2 Pin Description

Table 2-2-1 JL7083E Pin Description

Pin No.	Name	Type	IO Initial State	Description
1	VBAT	P	--	Battery Input
2	SW12	P	--	1.2V Buck DCDC Switch Port
3	PGND	G	--	Ground of Buck DC-DC converter
4	SW18	P	--	1.8V Buck DCDC Switch Port
5	VPWR	P	Z	Charge Power Input
6	IOVDD	P	--	3.0V Power
7	DCVDD12	P	--	1.2V Power
8	DCVDD18	P	--	1.8V Power
9	PB3	I/O	Z	ADC4(ADC Input Channel 4) LP_TOUCH3(TOUCH_CH3)
10	PB1	I/O	10kΩ Pull-up	ADC2(ADC Input Channel 2) LP_TOUCH1(TOUCH_CH1) Hold down 0 to reset
11	PB0	I/O	Z	ADC1(ADC Input Channel 1) LP_TOUCH0(TOUCH_CH0) LVD(External Low Voltage Detection Input)
12	BTVDD	P	--	BT Power
13	BTRF	RF	--	Bluetooth RF Antenna
14	BTVDD1	P	--	BT Power
15	XOSCI	I	--	Crystal Oscillator Input
16	XOSCO	O	--	Crystal Oscillator Output
17	PC5	I/O	Z	ADC10(ADC Input Channel 10)
18	PC4	I/O	Z	ADC9(ADC Input Channel 9)
19	USBDM	I/O	15kΩ Pull-down	USB Negative Data ADC15(ADC Input Channel 15)
20	USBDP	I/O	15kΩ Pull-down	USB Positive Data ADC14(ADC Input Channel 14)
21	PA6	I/O	Z	AIN_AN0(Audio ADC Negative Input) LPAIN_N1(Low Power ADC Negative Input)
22	PA5	I/O	Z	AIN_AP0(Audio ADC Positive Input) LPAIN_P1(Low Power ADC Positive Input)
23	PA4	I/O	Z	MICBIASA(MIC Bias Output) LPAIN_N0(Low Power ADC Negative Input) AIN_BN1(Audio ADC Negative Input) AIN_AN1(Audio ADC Negative Input)

Pin No.	Name	Type	IO Initial State	Description
24	PA3	I/O	Z	MICBIASB(MIC Bias Output) LPAIN_P0(Low Power ADC Positive Input) AIN_BP1(Audio ADC Positive Input) AIN_AP1(Audio ADC Positive Input)
25	PA2	I/O	Z	AIN_BN0(ADC Negative Input) AIN_DN1(ADC Negative Input)
26	PA1	I/O	Z	AIN_BP0(Audio ADC Positive Input) AIN_DP1(Audio ADC Positive Input)
27	AVSS	G	--	Audio Ground
28	VREF	P	--	Audio Power
29	VCM	P	--	Audio reference voltage
30	DACRP	O	--	Right Channel DAC Positive Output
31	DACRN	O	--	Right Channel DAC Negative Output
32	DACLN	O	--	Left Channel DAC Negative Output
33	DACLP	O	--	Left Channel DAC Positive Output
34	HPVDD	P	--	Audio Power
35	PD9	I/O	Z	ADC13(ADC Input Channel 13) MICLDO(MIC Bias LDO Output) MICBIASC(MIC Bias Output)
36	PD8	I/O	Z	AIN_CN0(Audio ADC Negative Input) LPAIN_N2(Low Power ADC Negative Input)
37	PD7	I/O	Z	AIN_CP0(Audio ADC Positive Input) LPAIN_P2(Low Power ADC Positive Input)
38	PD4	I/O	Z	AIN_EN0(Audio ADC Negative Input)
39	PD3	I/O	Z	AIN_EP0(Audio ADC Positive Input)
40	PD2	I/O	Z	AIN_EN1(Audio ADC Negative Input) MICBIASD(MIC BiaDs Output)
41	DVDD	P	--	Digital Power
42	SW09	P	--	0.9V Buck DCDC Switch Port

Note

1.IO initial state abbreviations Z--High resistance, H--High level, L--Low level, X--May be changed during power on.

2.Timer, MCPWM, QDEC, UART, LEDC, I^2C, I^2S, SPI and SD functions can be remapped to any I/O.

Table 2-2-2 Pin types description

Pin Type	Description	Pin Type	Description
P	Power	I/O	Input or Output
G	Ground	I	Input
RF	RF antenna	O	Output

3 Electrical Characteristics

3.1 Absolute Maximum Ratings

Table 3-1 Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
Topt	Operating temperature	-20	+85	℃
Tstg	Storage temperature	-65	+150	℃
VBAT	Supply Voltage	-0.3	4.5	V
VPWR		-0.3	6.0	V
IOVDD		-0.3	3.6	V
DCVDD12		-0.3	1.3	V
DCVDD18		-0.3	2.0	V
BTVDD		-0.3	2.0	V
BTVDD1		-0.3	1.3	V
VREF		-0.3	1.0	V
HPVDD		-0.3	2.0	V
GPIO	Input voltage of GPIO	-0.3	3.6	V

Note

1.Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device.

3.2 ESD Ratings

Table 3-2 ESD Ratings

Parameter	Typ	Test pin	Reference standard
Human Body Mode	±4kV	All pins	JEDEC EIA/JESD22-A114
Machine Mode	±200V	All pins	JEDEC EIA/JESD22-A115
Charge Device Model	±1kV	All pins	ANSI/ESDA/JEDEC JS-002-2022

3.3 PMU Characteristics

Table 3-3 PMU Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VBAT	Power supply	--	2.7	3.7	4.5	V
VPWR	Power supply	--	4.5	5.0	5.5	V
Operating mode						
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
IOVDD	Voltage output	--	--	3.0	--	V
	Loading current	IOVDD=3.0V@VBAT = 3.7V	--	--	200	mA
DCVDD12	Voltage output	--	--	1.2	--	V
	Loading current	DCVDD12=1.2V@VBAT = 3.7V	--	--	150	mA
DCVDD18	Voltage output	--	--	1.8	--	V

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
	Loading current	DCVDD18=1.8V@VBAT = 3.7V	--	--	180	mA
Low Power mode						
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
IOVDD	Loading current	IOVDD=3.0V@VBAT = 3.7V	--	--	20	mA

3.4 Battery Charge

Table 3-4 Charger Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
VPWR	Charge Input Voltage	VBAT+0.1V	5.0	5.5	V
CV	CV Mode Voltage Accuracy	4.175	4.2	4.225	V
		4.325	4.35	4.375	V
CC	CC Mode Current	20	--	220	mA
I_{end}	End Of Charge Current	2	--	22	mA
V_{Trikl}	Trickle Charge Voltage	--	3.0	--	V

3.5 IO Characteristics

Table 3-5 IO Characteristics

Input Characteristics						
Symbol	**Parameter**	**Conditions**	**IO**	**Min**	**Max**	**Unit**
V_{IL}	Low-Level Input Voltage	IOVDD = 3.0V	PA1~PA6 PB0,PB1,PB3 PC4,PC5 PD2~PD4,PD7~PD9 USBDP USBDM VPWR	-0.3	1.4	V
V_{IH}	High-Level Input Voltage	IOVDD = 3.0V	PA1~PA6 PB0,PB1,PB3 PC4,PC5 PD2~PD4,PD7~PD9 USBDP USBDM	1.7	3.3	V
		IOVDD = 3.0V	VPWR	1.7	5.5	V
Output Characteristics						
Symbol	**Parameter**	**Conditions**	**IO**	**Typ**		**Unit**

| I_{OL} |	Output Current	IOVDD = 3.0V Voutput = 0.3V	PA1~PA6 PB0,PB1,PB3 PC4,PC5 PD2~PD4,PD7~PD9	2(HD=0) 8(HD=1) 26(HD=2) 50(HD=3)	mA
		IOVDD = 3.0V Voutput = 0.3V	USBDP USBDM	8	mA
		IOVDD = 3.0V Voutput = 0.3V	VPWR	2	mA
| I_{OH} |	Output Current	IOVDD = 3.0V Voutput = 2.7V	PA1~PA6 PB0,PB1,PB3 PC4,PC5 PD2~PD4,PD7~PD9	2(HD=0) 8(HD=1) 26(HD=2) 50(HD=3)	mA
		IOVDD = 3.0V Voutput = 2.7V	USBDP USBDM	8	mA
		IOVDD = 3.0V Voutput = 2.7V	VPWR	2	mA
Internal Resistance Characteristics					
Symbol	**Parameter**	**Conditions**	**IO**	**Typ**	**Unit**
R_{pu}	Pull-up Resistance	IOVDD = 3.0V	PA1~PA6 PB0,PB1,PB3 PC4,PC5 PD2~PD4,PD7~PD9 VPWR	10k(PU=1) 100k(PU=2) 1M(PU=3)	Ω
		IOVDD = 3.0V	USBDP	1.5k	Ω
		IOVDD = 3.0V	USBDM	180k	Ω
R_{pd}	Pull-down Resistance	IOVDD = 3.0V	PA1~PA6 PB0,PB1,PB3 PC4,PC5 PD2~PD4,PD7~PD9 VPWR	10k(PD=1) 100k(PD=2) 1M(PD=3)	Ω
		IOVDD = 3.0V	USBDP USBDM	15k	Ω

Note

1.Internal pull-up/pull-down resistance accuracy ±20%

3.6 Audio DAC Characteristics

Table 3-6-1 Stereo DAC Characteristics under HPVDD 1.8V

Parameter	Conditions	Min	Typ	Max	Unit
Resolution	--	--	24	--	bits
Output Sample Rate	--	8	--	192	kHz
SNR①	Differential Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	119	--	dB
Dynamic Range	Differential Mode Fin=1kHz@-60dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	109	--	dB
THD+N	Differential Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=32Ω	--	-87	--	dB
Noise Floor	Differential Mode B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	2.6	--	uVrms
Noise Floor with MUTE	Differential Mode B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	1	--	uVrms
Stereo Crosstalk	Differential Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	-130	--	dB
Max Output Power	Differential Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=16Ω THD+N＜0.1%	--	30	50	mW

Note

1.①SNR is the ratio of output level with a 1kHz full-scale input to output level with MUTE on.

Table 3-6-2 Stereo DAC Characteristics under HPVDD 1.2V

Parameter	Conditions	Min	Typ	Max	Unit
Resolution	--	--	24	--	bits
Output Sample Rate	--	8	--	192	kHz
SNR①	Differential Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	117	--	dB
Dynamic Range	Differential Mode Fin=1kHz@-60dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	107	--	dB
THD+N	Differential Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=32Ω	--	-83	--	dB
Noise Floor	Differential Mode B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	2.6	--	uVrms
Noise Floor with MUTE	Differential Mode B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	1	--	uVrms
Stereo Crosstalk	Differential Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=10kΩ	--	-130	--	dB
Max Output Power	Differential Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted Load=16Ω THD+N＜0.1%	--	20	TBC	mW

Note

1.①SNR is the ratio of output level with a 1kHz full-scale input to output level with MUTE on.

3.7 Audio ADC Characteristics

Table 3-7 Audio ADC Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Resolution	--	--	24	--	bits
Input Sample Rate	--	8	--	192	kHz
SNR	Differential input Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted ADC gain=0dB	--	106	--	dB
	Single-ended input Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted ADC gain=0dB	--	104	--	dB
Dynamic Range	Differential input Mode Fin=1kHz@-60dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted ADC gain=0dB	--	106	--	dB
	Single-ended input Mode Fin=1kHz@-60dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted ADC gain=0dB	--	104	--	dB
THD+N	Differential input Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted ADC gain=0dB	--	-90	--	dB
	Single-ended input Mode Fin=1kHz@0dBFS Fs=44.1kHz B/W=20Hz~20kHz A-Weighted ADC gain=0dB	--	-90	--	dB
Analogue Gain		-6	--	21	dB
Max Input Level	Differential input Mode ADC gain=0dB	--	1	--	Vrms
	Single-ended input Mode ADC gain=0dB	--	0.5	--	Vrms

3.8 BT Characteristics

3.8.1 Transmitter

Table 3-8-1-1 Transmitter characteristics under BTVDD 1.8V

Parameter	Conditions	Min	Typ	Max	Unit
Maximum RF Transmit Power	BR	--	10	13	dBm
Maximum RF Transmit Power	EDR Π/4 DQPSK EDR 8DPSK	--	10	--	dBm
Relative Transmit Power	EDR Π/4 DQPSK EDR 8DPSK	--	-3	--	dB
Maximum RF Transmit Power	BLE-1Mbps	--	10	13	dBm
Maximum RF Transmit Power	BLE-2Mbps	--	10	13	dBm

Table 3-8-1-2 Transmitter characteristics under BTVDD 1.2V

Parameter	Conditions	Min	Typ	Max	Unit
Maximum RF Transmit Power	BR	--	7	10	dBm
Maximum RF Transmit Power	EDR Π/4 DQPSK EDR 8DPSK	--	7	--	dBm
Relative Transmit Power	EDR Π/4 DQPSK EDR 8DPSK	--	-3	--	dB
Maximum RF Transmit Power	BLE-1Mbps	--	7	10	dBm
Maximum RF Transmit Power	BLE-2Mbps	--	7	10	dBm

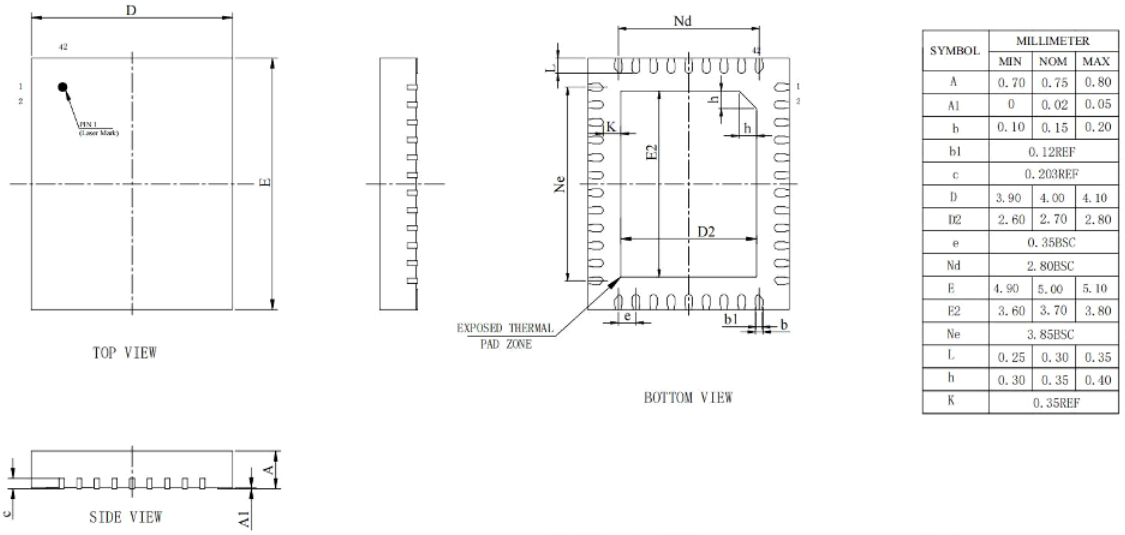
3.8.2 Receiver

Table 3-8-2 Receiver characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Sensitivity	BR	--	-98	--	dBm
	EDR Π/4 DQPSK	--	-98.5	--	dBm
	EDR 8DPSK	--	-92.5	--	dBm
	BLE-1Mbps	--	-101	--	dBm
	BLE-2Mbps	--	-97.5	--	dBm
	BLE-S2	--	-104	--	dBm
	BLE-S8	--	-109	--	dBm

4 Package Information

4.1 QFN42_4×5mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.10	0.15	0.20
b1		0.12REF	
c		0.203REF	
D	3.90	4.00	4.10
D2	2.60	2.70	2.80
e		0.35BSC	
Nd		2.80BSC	
E	4.90	5.00	5.10
E2	3.60	3.70	3.80
Ne		3.85BSC	
L	0.25	0.30	0.35
h	0.30	0.35	0.40
K		0.35REF	

Figure 4-1 JL7083E Package

5 IC Marking Information

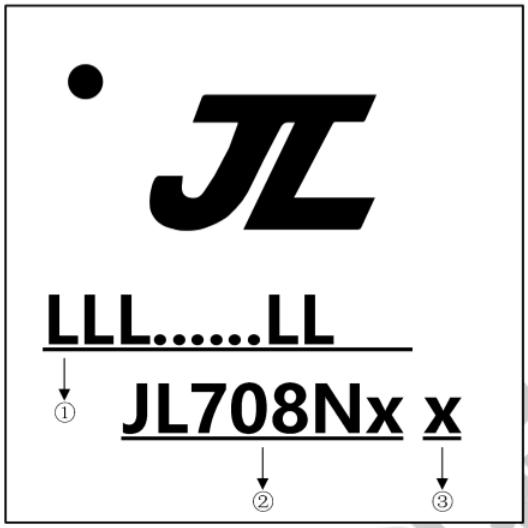


Figure 5-1 JL7083E Package Outline

① LLL.....LL： LOT No. , It contains 7 to 18 alphanumerics
② JL708Nx : Chip Model
③ x : Built-in flash size
0 : No Flash Memory
2 : 2Mbit Flash
4 : 4Mbit Flash
8 : 8Mbit Flash
6 : 16Mbit Flash
3 : 32Mbit Flash

6 Solder-Reflow Condition

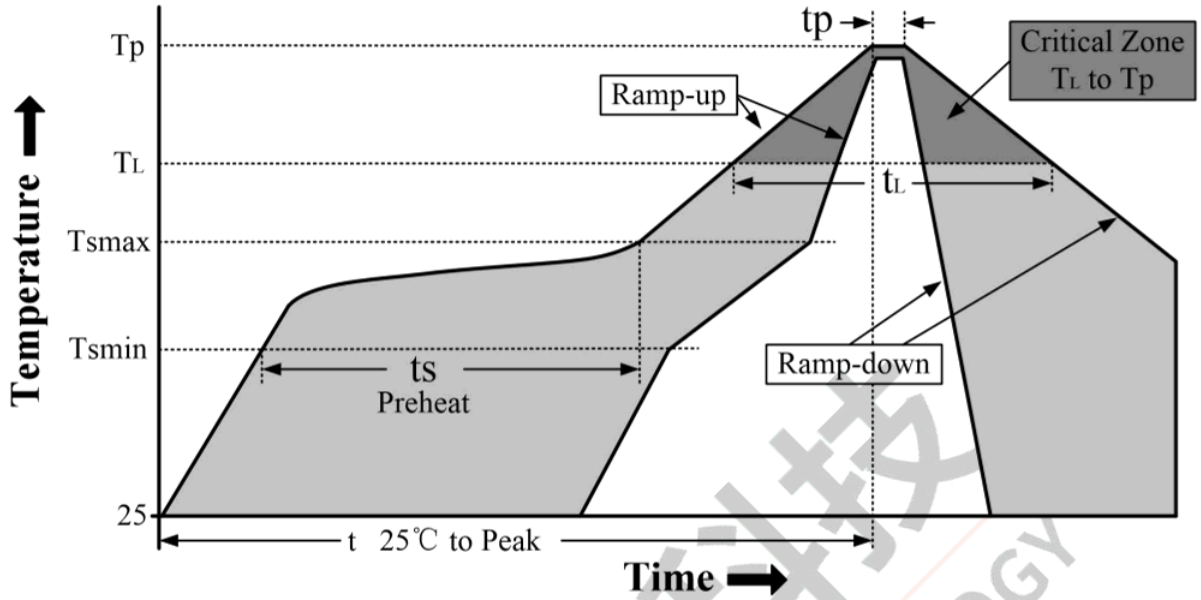


Figure 6-1 Classification Reflow Profile

Table 6-1 Classification Profiles

Profile Feature		Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat/Soak	Temperature Min (T_{smin})	100℃	150℃
	Temperature Max (T_{smax})	150℃	200℃
	Time (ts) from (T_{smin} to T_{smax})	60-120 seconds	60-180 seconds
Average ramp-up rate (T_{smax} to T_p)		3℃/second max	3℃/second max
Liquidous temperature (T_L) Time (t_L) maintained above T_L		183℃ 60-150 seconds	217℃ 60-150 seconds
Peak package body temperature (T_p)		See Table 6-2	See Table 6-3
Time within 5℃ of actual Peak Temperature (tp)[2]		10-30 seconds	20-40 seconds
Ramp-down rate (T_p to T_L)		6℃/second max	6℃/second max
Time 25℃ to peak temperature		6 minutes max	8 minutes max

Note

1.All temperatures refer to topside of the package, measured on the package body surface

2.Time within 5℃ of actual peak temperature (tp) specified for the reflow profiles is a "supplier" and "user" maximum.

Table 6-2 SnPb Classification Temperature

Package Thickness	Volume mm^3 < 350	Volume mm^3 ≥ 350
<2.5 mm	240 +0/-5℃	225 +0/-5℃
≥2.5 mm	225 +0/-5℃	225 +0/-5℃

Table 6-3 Pb-free - Classification Temperature

Package Thickness	Volume mm³ < 350	Volume mm³ 350 - 2000	Volume mm³ > 2000
< 1.6mm	260℃	260℃	260℃
1.6 mm - 2.5mm	260℃	250℃	245℃
> 2.5mm	250℃	245℃	245℃

Note

1.*Tolerance The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature (this means Peak reflow temperature +0℃.For example 260℃+0℃)at the rated MSL level.