NS4168 2.5W-I2S digital input mono class D audio power amplifier

1 NS4168 Features

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2 NS4168 Application

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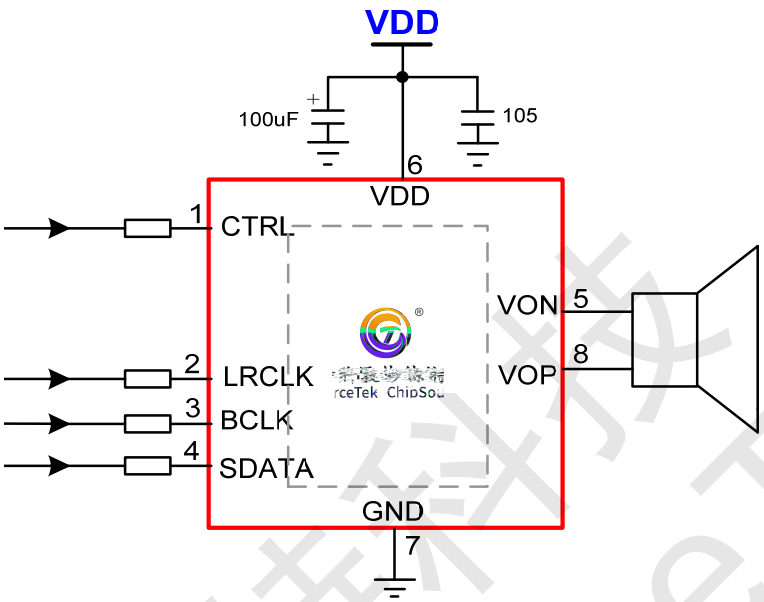
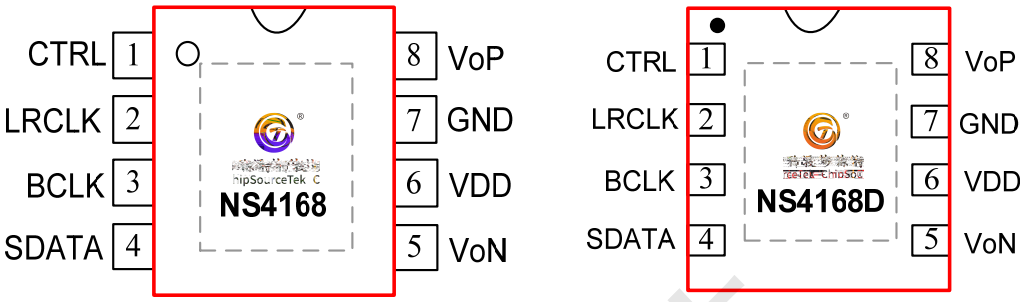
3 NS4168 Description

4 NS4168 Typical application



5 NS4168 Pin configuration

DFN3X3-8L



Pin name	No.	Description
1	CTRL	Left and right channel switching control and chip on/off control pin.
2	LRCLK	I2S left and right channel frame clock pin.
3	BCLK	I2S bit clock pin.
4	SDATA	I2S serial data input pin.
5	VoN	Audio amplifier negative output pin.
6	VDD	Power input.
7	GND	Power ground.
8	VoP	Audio amplifier positive output pin.

5.1 Silk screen instruction

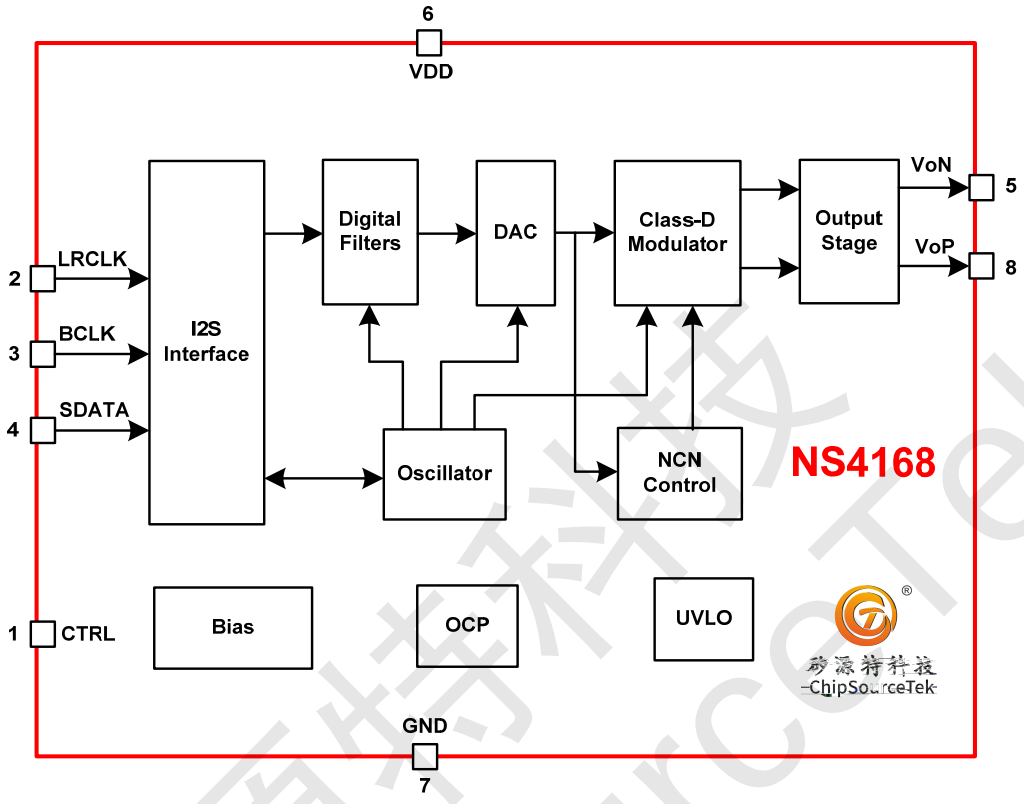
NS4168x
xxxx

The x in NS4168x stands for different package forms.

NS4168D	NS4168
DFN3x3-8L	ESOP-8L

The second line XXXX represents the production cycle. For example, 2206 indicates the packaging test time in Week 6, 2022.

6 NS4168 Structure diagram



7 NS4168 Limit operating parameters

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8 NS4168 Electrical characteristics

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Symbol	Parameter	Test condition	Min.	Stand.	Max	Unit
V_{DD}			3		5.5	V

I_{DD} V_{DD}

9 NS4168 Typical characteristic curves

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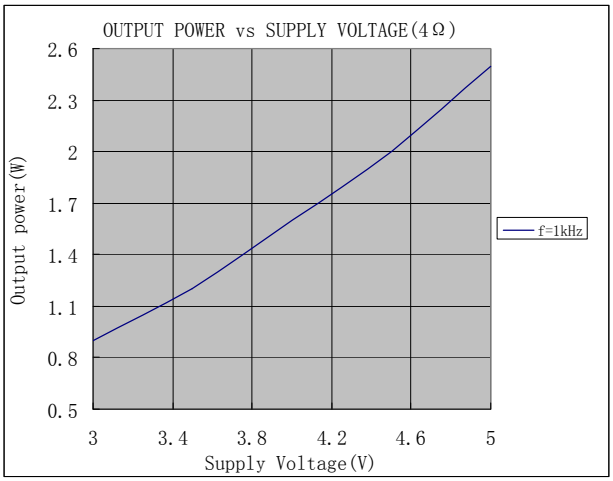
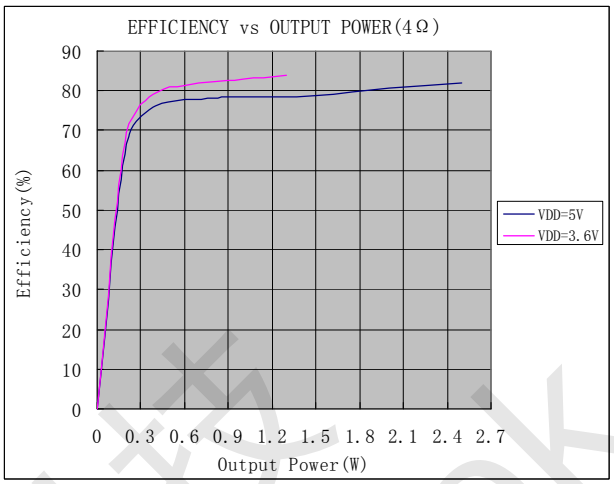
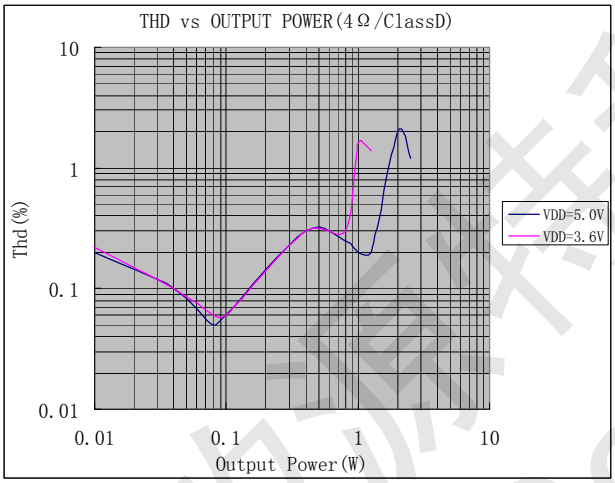
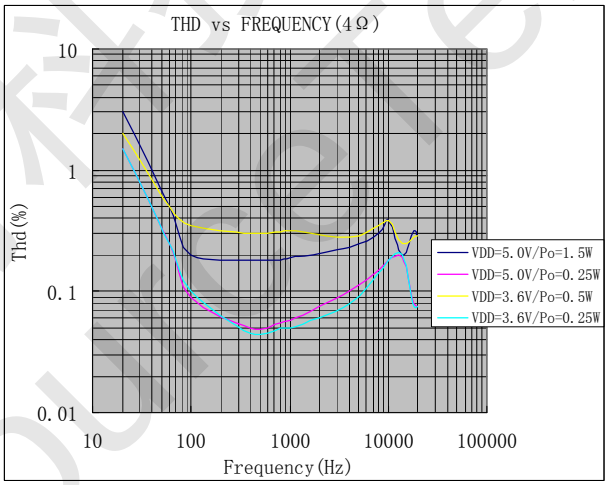








10 NS4168 Application specifications

10.1 Basic structure description

10.2 I2S digital input serial audio interface

10.2.1 I2S digital audio format

10.2.2 All timing specifications in I2S digital audio format

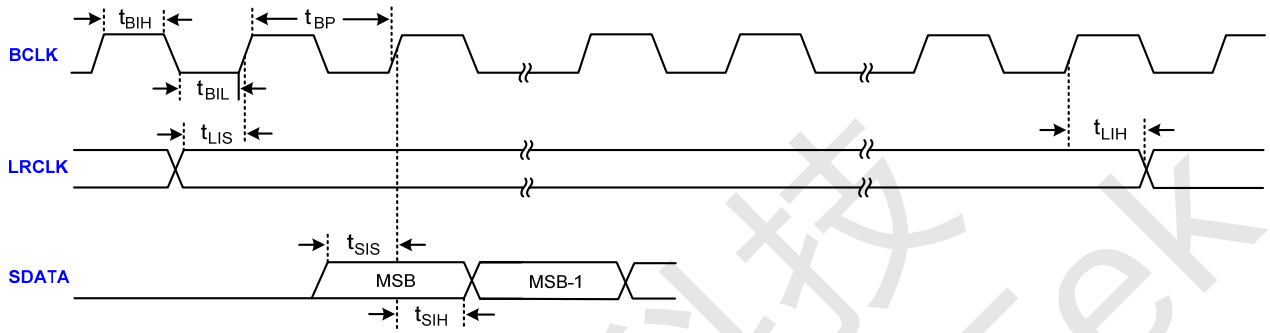


图 2 I²S Serial Audio Interface

Tab.1 Timing parameter table

Parameter	Min.	Unit	Description
t_{BIL}	40	ns	BCLK low level pulse width
t_{BIH}	40	ns	BCLK high level pulse width
t_{LIS}	10	ns	Setting time from LRCLK or SDATA edge to BCLK rising edge
t_{LIH}	10	ns	Holding time from BCLK rising edge to LRCLK or SDATA edge
t_{SIS}	10	ns	Setting time from SDATA to BCLK rising edge
t_{SIH}	10	ns	Holding time from BCLK rising edge to SDATA

10.2.3 Left channel and right channel LRCLK settings

Tab.2 BCLK rates supported by different sampling frequencies

Sampling frequency Fs	Supported BCLK rates for				
	16Fs	24Fs	32Fs	48Fs	64Fs

8kHz	128kHz	192kHz	256kHz	384kHz	512kHz
16kHz	256KHz	384kHz	512kHz	768kHz	1.024MHz
32kHz	512KHz	768kHz	1.024MHz	1.536MHz	2.048MHz
44.1kHz	705.6KHz	1.058MHz	1.422MHz	2.117MHz	2.822MHz
48kHz	768KHz	1.152MHz	1.536MHz	2.304MHz	3.072MHz
96kHz	1.536MHz	2.304MHz	3.072MHz	4.608MHz	6.144MHz

10.2.4 Input channel selection

Tab.3 selection of CTRL voltage and channel

CTRL pin voltage	Channel selection
1.5V-VDD	Right channel
0.9V-1.15V	Left channel
0-0.4V	Shutdown

10.3 NCN function

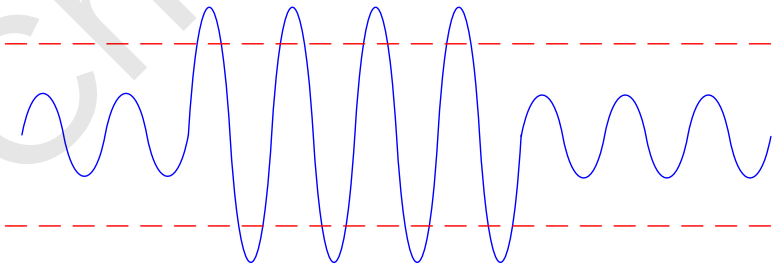


Figure1 The audio output signal is not limited by the supply voltage

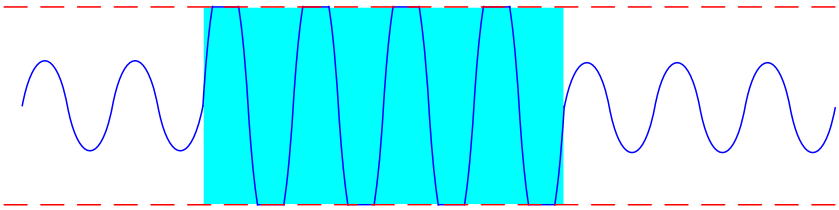


Figure2 The audio output signal is normal mode

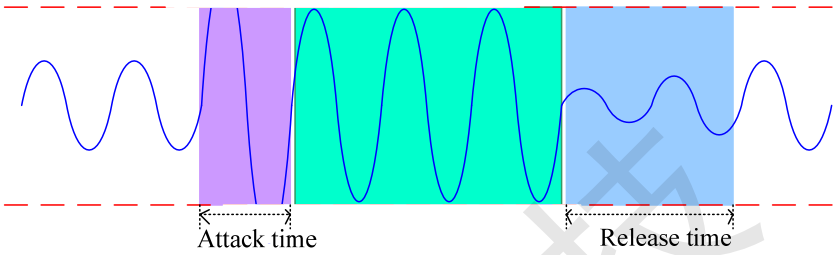
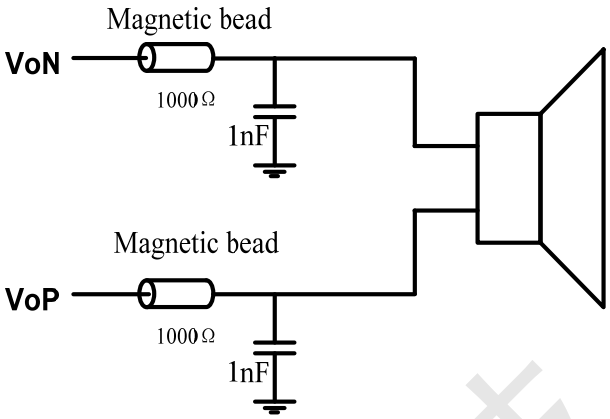


Figure3 The audio output signal is NCNI mode

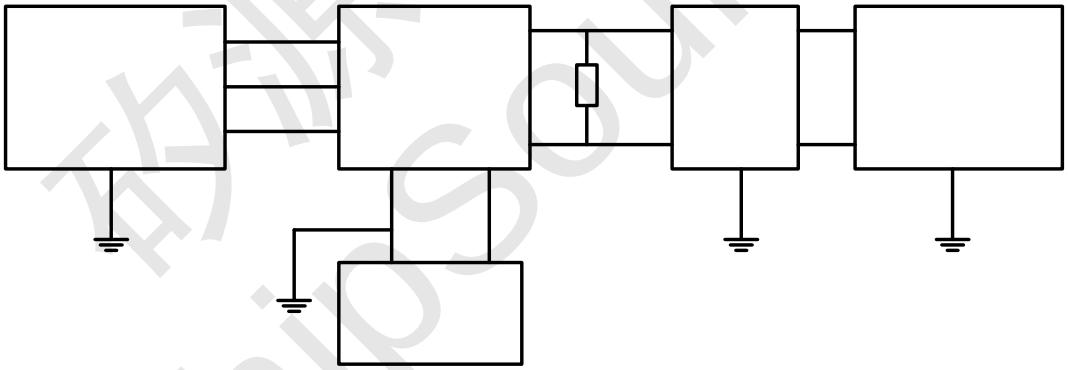
10.4 Power supply filter capacitor selection

10.5 Protection circuit

10.6 Layout suggesting

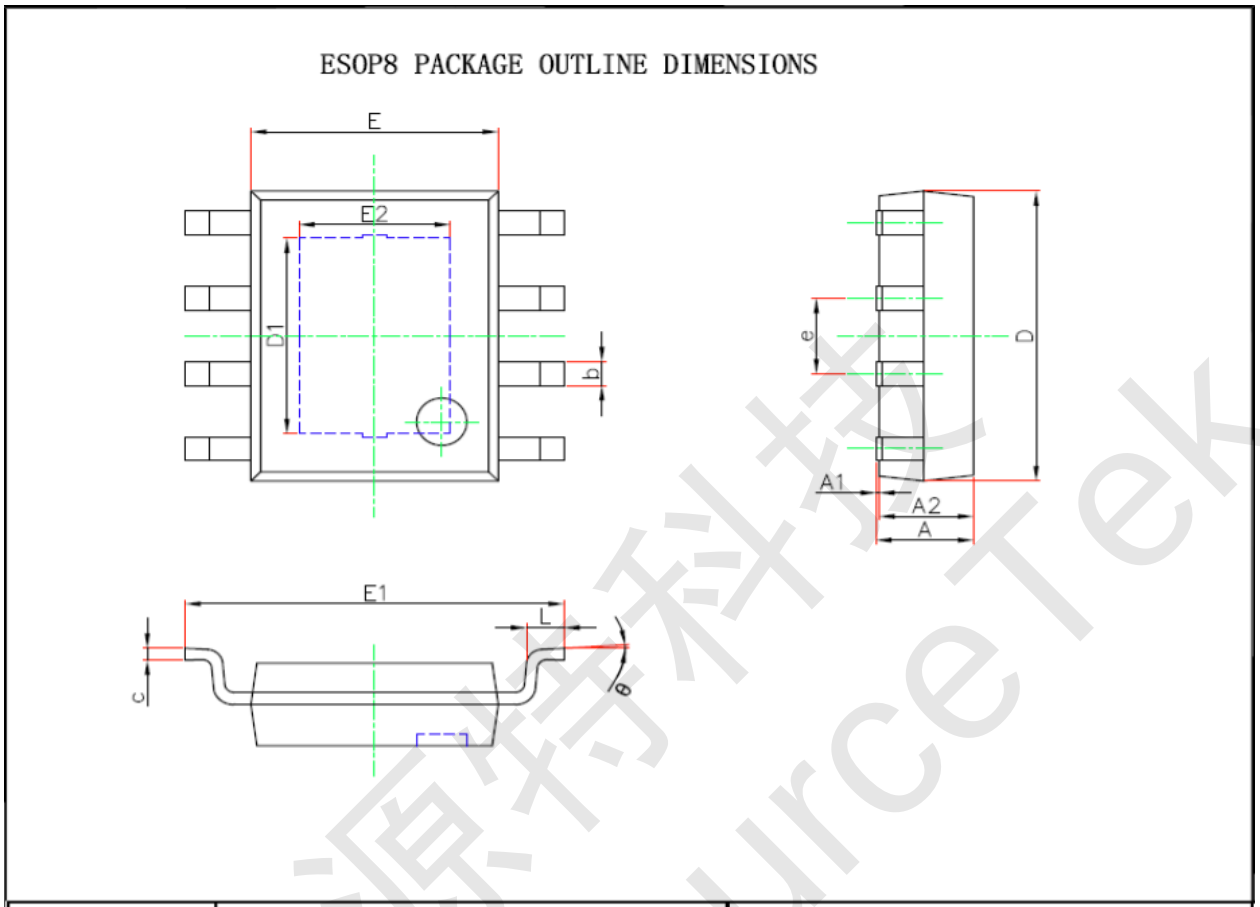


10.7 Test circuit



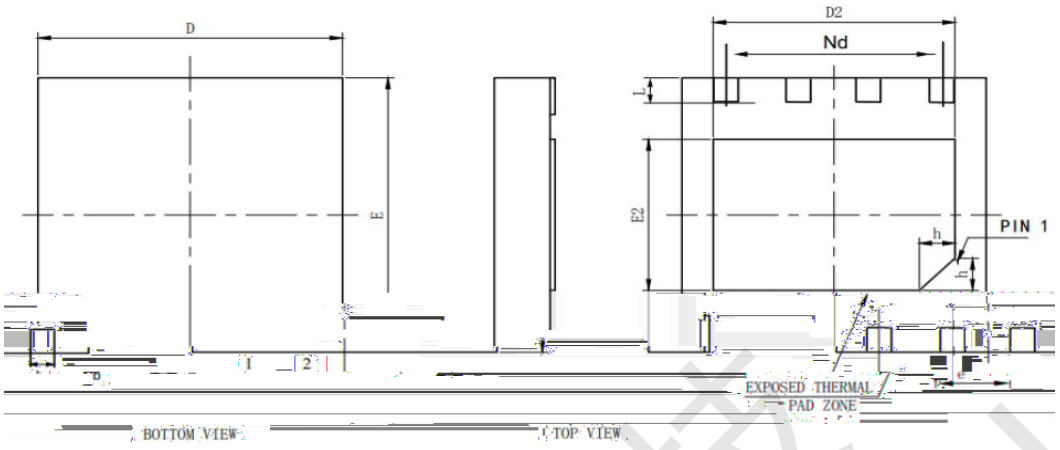
11 NS4168 Packaging information

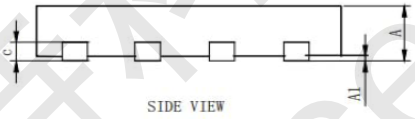
11.1 Dimensional drawing of ESOP-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.300	1.700	0.051	0.067
A1	0.000	0.150	0.000	0.004
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

11.1 Dimensional drawing of DFN3X3X0.75-8L





SYMBOL	MILLIMETER		
	MIN	MID	MAX
A	0.70	0.75	0.80
A1	—	0.02	0.05
b	0.20	0.25	0.30
c	0.18	0.20	0.25
D	2.90	3.00	3.10
D2	2.20	2.30	2.40
e	0.65BSC		
E	2.90	3.00	3.10
E2	1.40	1.50	1.60
L	0.20	0.25	0.30
h	0.30	0.35	0.40
Nd	1.95BSC		
L/F载体尺寸	2.70*2.10		

12 Revision history