

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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## M65857FP

QSurround™5.1

REJ03F0222-0201

Rev.2.01

Mar 31, 2008

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### Description

The M65857FP is a Surround Processor IC for AV Amplifier, Mini-component stereo and Car audio built-in QSurround™5.1.

The QSurround™5.1 system generates 5.1ch from 2ch input and produce 3D sound.

Note: QSurround™5.1 is a trademark of QSound Labs, Inc., and is used under license from QSound Labs, Inc.

### Features

- Built-in QSurround™5.1 system
- 6 Output (5.1ch) available
- Built-in SRAM for digital delay
- Digital delay
  - Delay time: 20, 30, 40, 50 ms
  - Frequency response: 3 kHz/7 kHz
- Built-in 3wire MCU interface
- By pass mode

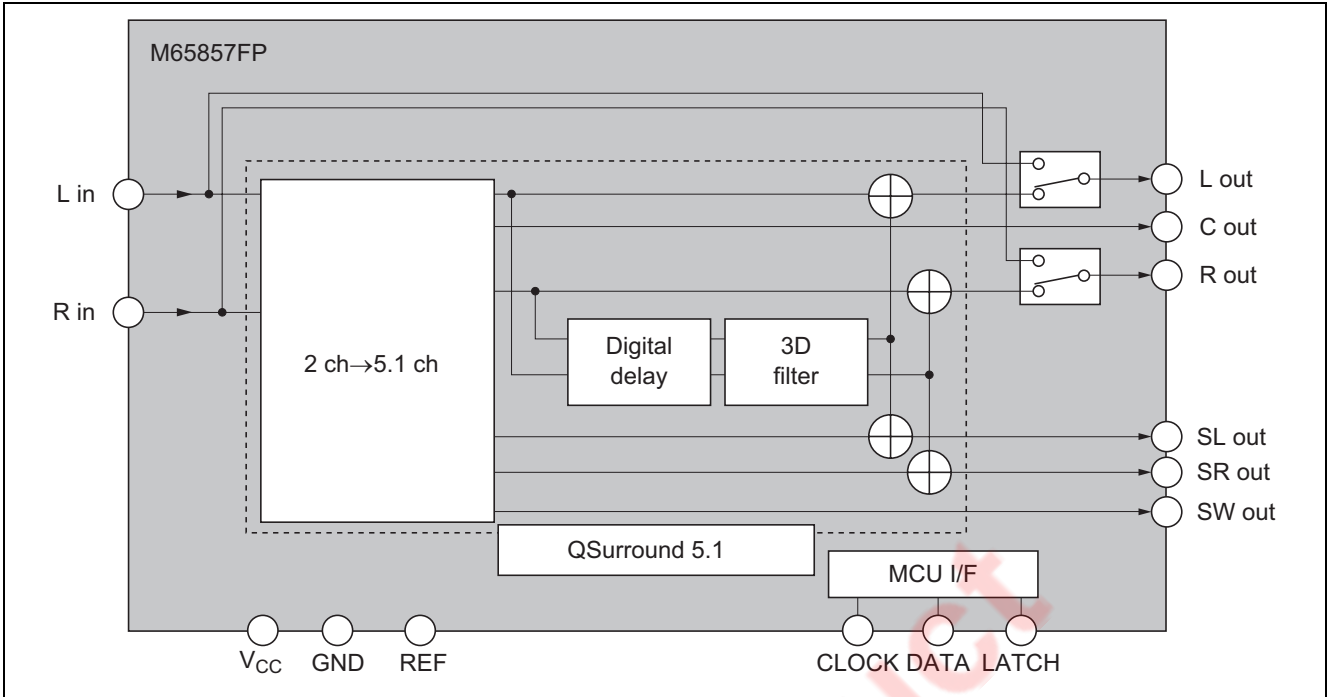
### Applications

AV Amplifier, Mini-component stereo, Car Audio

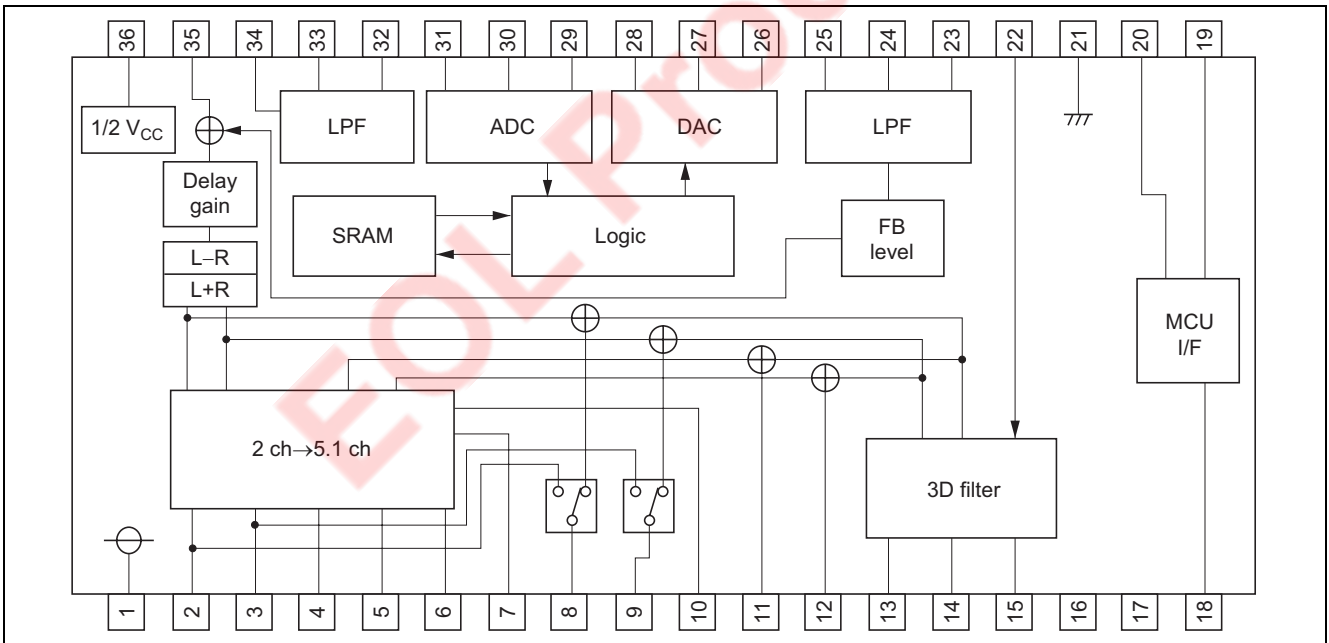
### Recommended Operating Conditions

- Supply Voltage Range:  $V_{CC} = 4.5$  to  $5.5$  V
- Rated supply voltage:  $V_{CC} = 5.0$  V

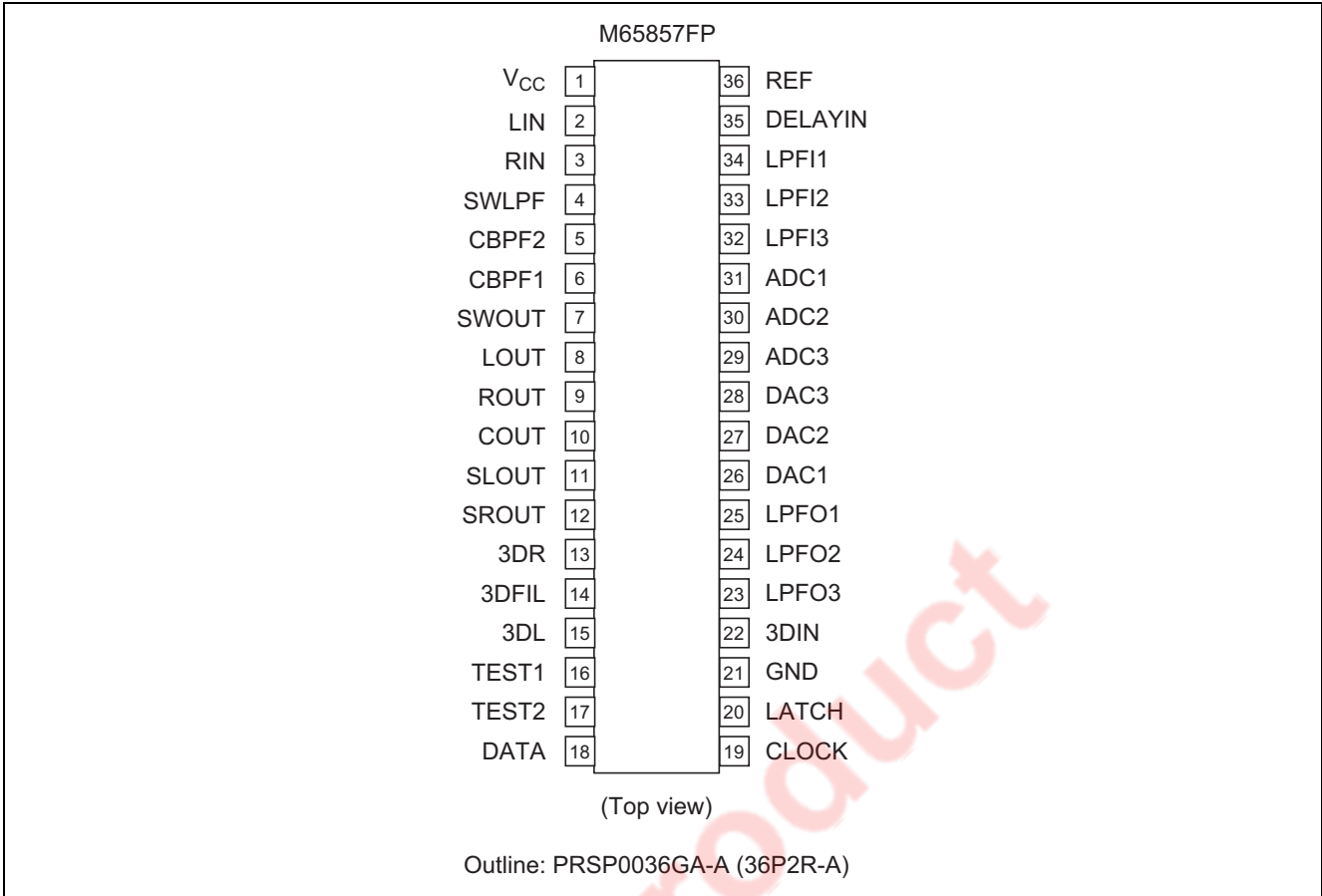
### System Block Diagram



### Block Diagram



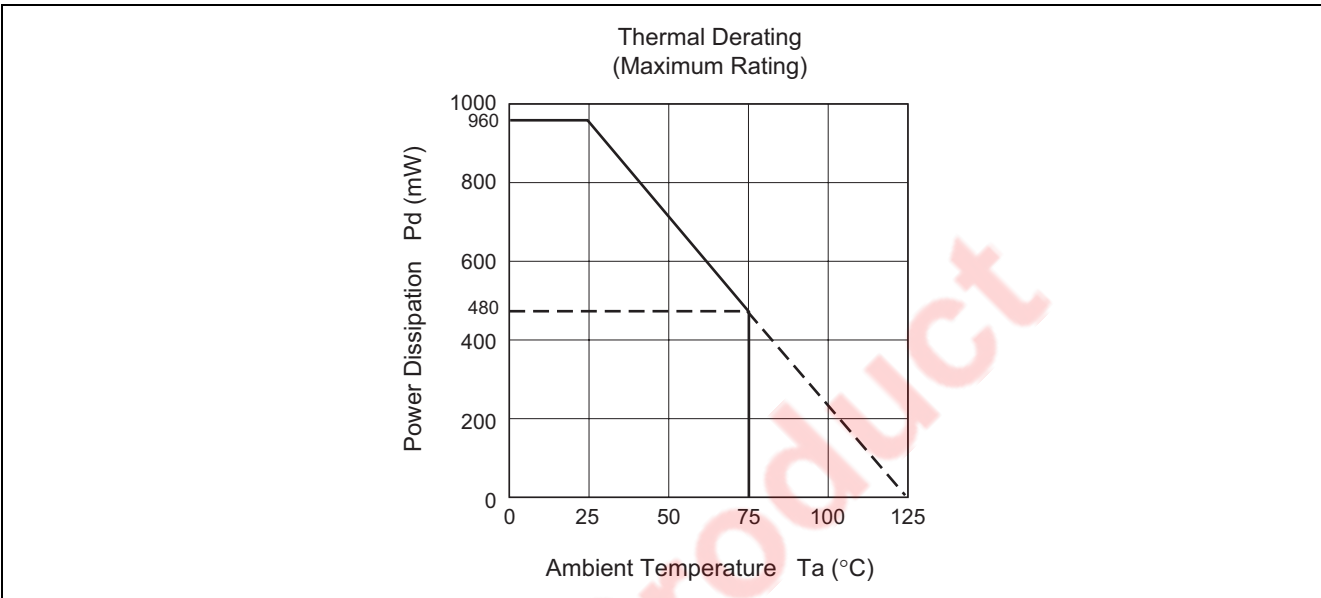
Pin Arrangement



### Absolute Maximum Ratings

(Ta = 25°C, unless otherwise noted)

Item	Symbol	Ratings	Unit	Condition
Supply voltage	V <sub>CC</sub>	6	V	
Input voltage	V <sub>I</sub>	-0.3 to V <sub>CC</sub> + 0.3	V	
Power dissipation	P <sub>d</sub>	960	mW	
Thermal derating	K <sub>θ</sub>	9.6	mW/°C	Ta ≥ 25°C
Operating temperature	Topr	-20 to +75	°C	
Storage temperature	Tstg	-40 to +125	°C	



### Recommended Operating Condition

(Ta = 25°C, unless otherwise noted)

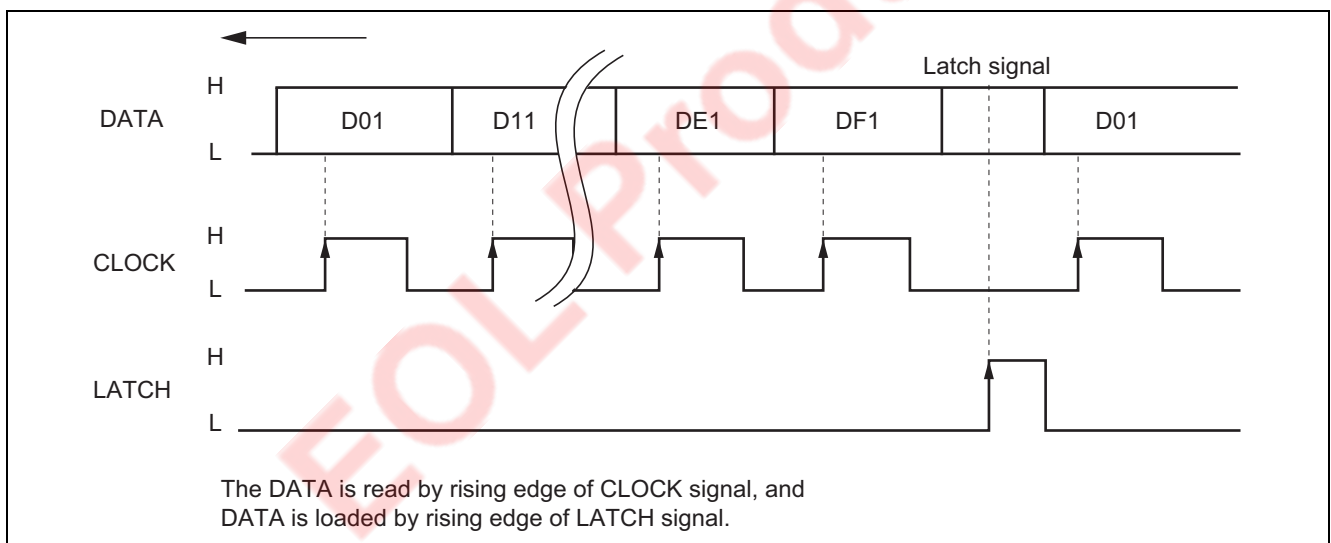
Item	Symbol	Limits			Unit	Test Conditions
		Min	Typ	Max		
Supply voltage	V <sub>CC</sub>	4.5	5.0	5.5	V	
Logic "H" level input voltage	V <sub>IH</sub>	V <sub>CC</sub> × 0.7	—	V <sub>CC</sub>	V	
Logic "L" level input voltage	V <sub>IL</sub>	GND	—	V <sub>CC</sub> × 0.3	V	

## Electrical Characteristics

(Ta = 25°C, unless otherwise noted)

Item	Symbol	Limits			Unit	Test Conditions
		Min	Typ	Max		
Circuit current	I <sub>CC</sub>	—	30	50	mA	No Signal
Voltage gain	GV	-3	0	3	dB	Vi = 200mVrms, f = 1kHz Bypass, L/Rch
Total harmonic Distortion	THD	—	0.006	0.06	%	Vi = 200mVrms, f = 1kHz Bypass, L/Rch
Maximum input voltage	Vimax	1.0	1.4	—	Vrms	THD = 1%, f = 1kHz Bypass, L/Rch
Maximum output voltage	Vomax	1.0	1.4	—	Vrms	THD = 1%, f = 1kHz Bypass, L/Rch
Output noise voltage	Vno	—	4	10	μVrms	Rg = 0, JIS-A Bypass, L/Rch
Channel separation	CS	—	-80	-65	dB	Vi = 200mVrms, f = 1kHz Bypass, L/Rch
Digital delay voltage gain	GV-D	-3	0	3	dB	Vi = 200mVrms, f = 1kHz 34pin input, 23pin output Td = 40ms
Digital delay total harmonic distortion	THD-D	—	0.6	1.8	%	Vi = 200mVrms, f = 1kHz 34pin input, 23pin output Td = 40ms
Digital delay maximum output voltage	Vomax-D	0.7	1.0	—	Vrms	THD = 10%, f = 1kHz 34pin input, 23pin output Td = 40ms
Digital delay output noise voltage	Vno-D	—	50	300	μVrms	Rg = 0, JIS-A 23pin output Td = 40ms

## Data and Clock



## Data Control Specification

Chip address

D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	DA	DB	DC	DD	DE	DF
Mode	Input mode	Center ON/OFF	Rear effect	Surround effect	Delay time	Delay LPF	Delay ON/OFF	Delay gain	Delay feed back			1	0		

## Setting Code

### (1) Mode (Bypass/QSurround™5.1)

Mode	D0
By pass	0
QSurround™5.1	1

### (2) Input

Input	D1
Mono	0
Stereo	1

### (3) Center

Input	D2
OFF	0
ON	1

### (4) Surround Output

Surround Output	D3
OFF	0
ON	1

### (5) Surround Effect

Surround Effect	D4
Narrow	0
Wide	1

### (6) Delay Time

Delay Time (ms)	D5	D6
20	0	0
30	1	0
40	0	1
50	1	1

### (7) Delay LPF Cut-off Frequency

Cut-off Frequency	D7
fc = 3 kHz	0
7 kHz	1

### (8) Delay Effect

Delay Effect	D8
OFF	0
ON	1

### (9) Delay Gain

Delay gain	D9	DA
Gain 1 Low	0	0
2 ↓	1	0
3 ↓	0	1
4 High	1	1

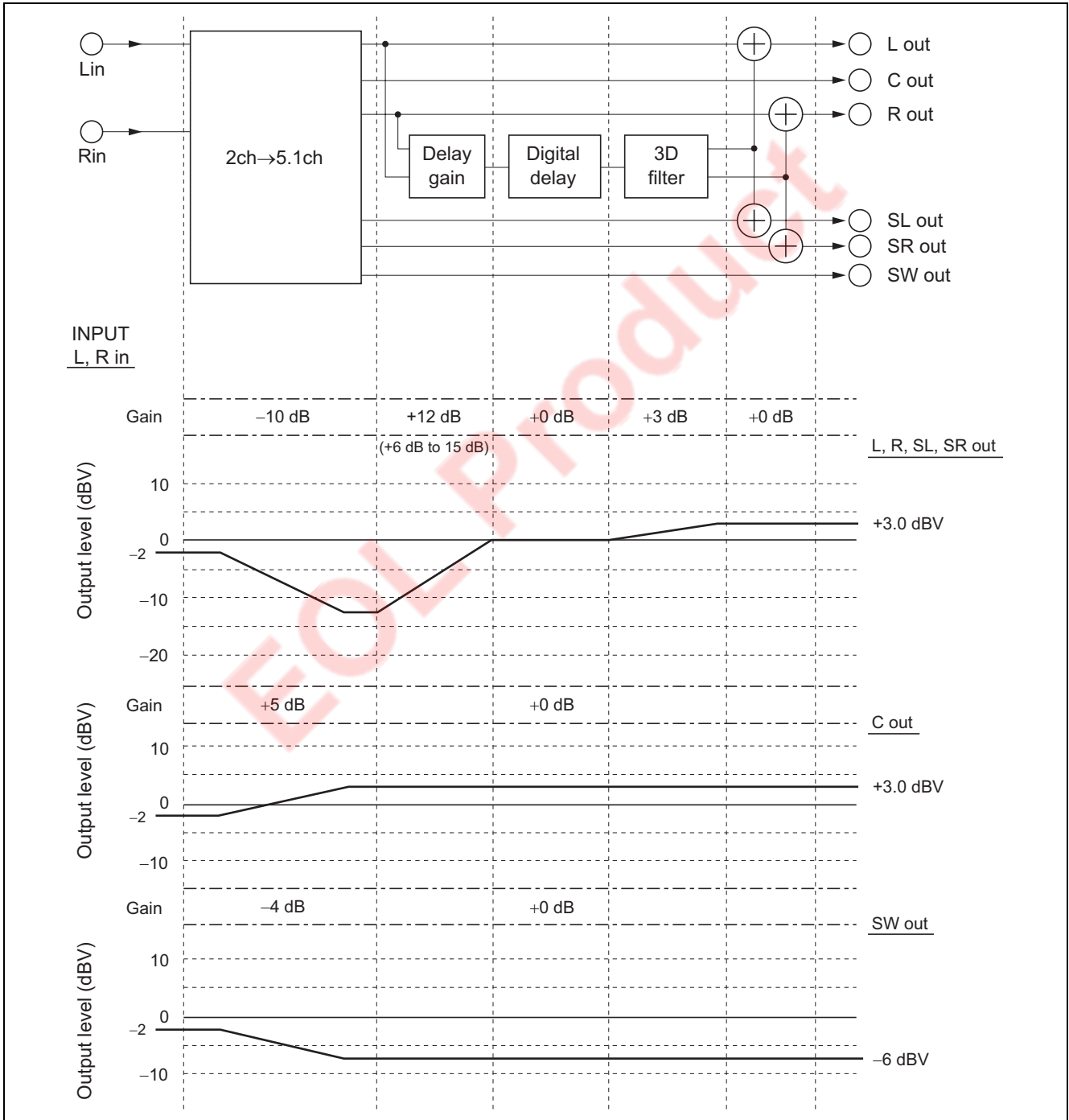


(10) Delay Feed Back Gain

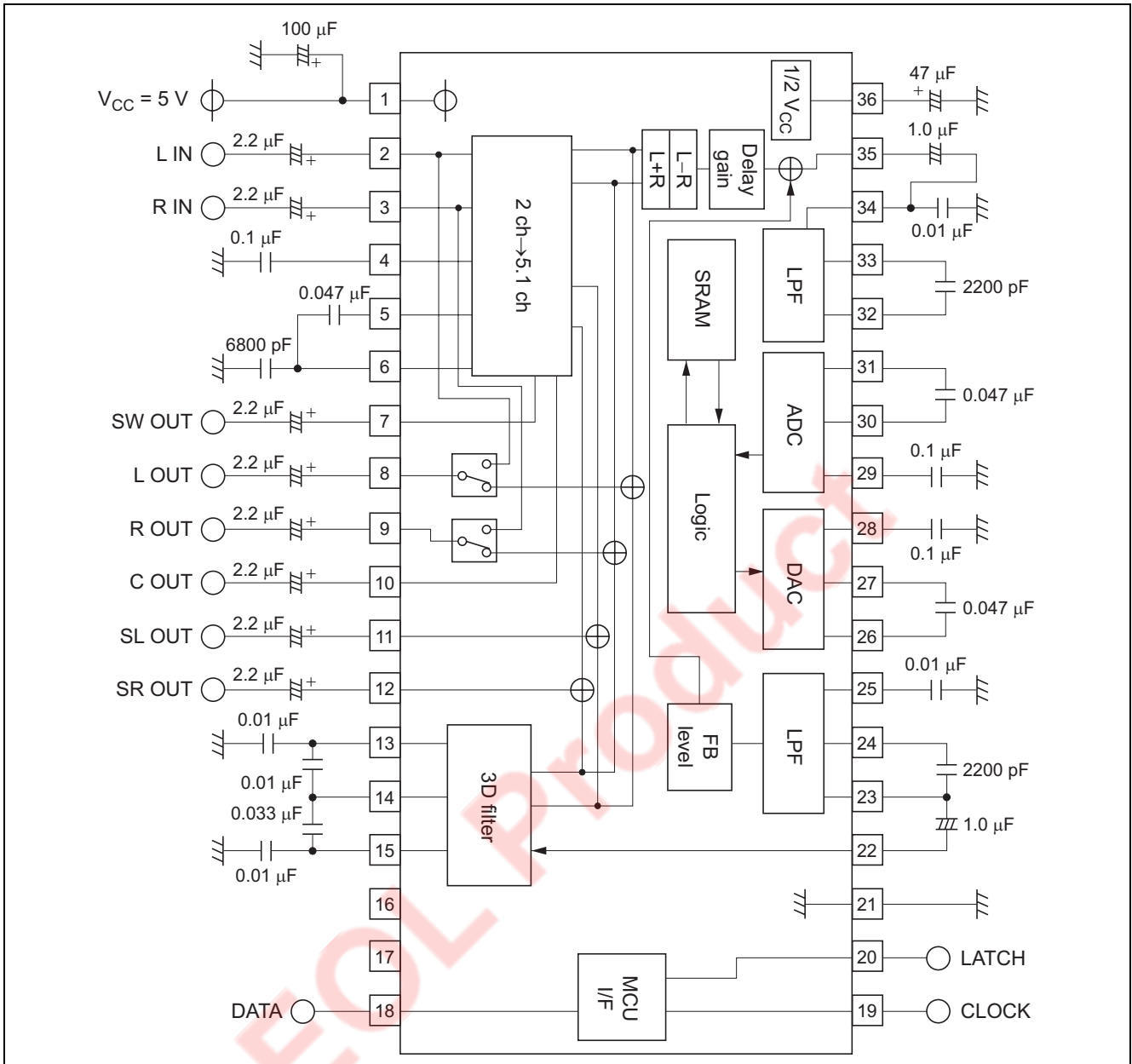
Feed Back Gain	DB	DC	DD
-3 dB	0	0	0
-6 dB	1	0	0
-9 dB	0	1	0
-12 dB	1	1	0
-∞	1	1	1

Level Diagram

QSurround™5.1 Mode

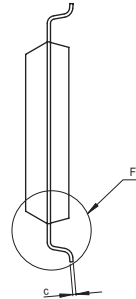
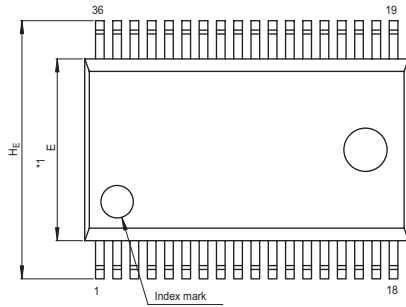


Application Circuit

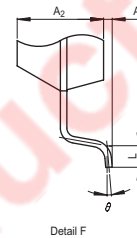
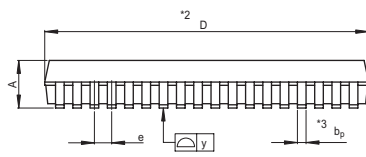


### Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SSOP36-8.4x15-0.80	PRSP0036GA-A	36P2R-A	0.5g



NOTE)  
 1. DIMENSIONS \*\*1\* AND \*\*2\* DO NOT INCLUDE MOLD FLASH.  
 2. DIMENSION \*\*3\* DOES NOT INCLUDE TRIM OFFSET.



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	14.8	15.0	15.2
E	8.2	8.4	8.6
A <sub>2</sub>	—	2.0	—
A	—	—	2.4
A <sub>1</sub>	0.05	—	—
b <sub>p</sub>	0.35	0.4	0.5
c	0.13	0.15	0.2
θ	0°	—	10°
H <sub>E</sub>	11.63	11.93	12.23
e	0.65	0.8	0.95
y	—	—	0.15
L	0.3	0.5	0.7

EOL Product

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