

## **Transitioning to the CS4344 family**

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### **1. Introduction**

This application note describes how to easily transition to the CS4344 family from an existing design which uses the CS4334/5/8 or CS4340/40A. The CS4344 family was designed to give a simple transition path from the CS4334 family or the CS4340/40A. Please refer to the CS4344 data sheet for supplemental information and specifications concerning operation of the device. A brief comparison between the product families is shown in Table 1.

		<b>CS4344</b>	<b>CS4340A</b>	<b>CS4340</b>	<b>CS4334</b>
<b>Dynamic Range</b>	dB	<b>105</b>	101	101	96
<b>THD+N</b>	dB	<b>-95</b>	-91	-91	-88
<b>Resolution</b>	bits	<b>24</b>	24	24	24
<b>Sample Rate</b>	kHz	<b>192</b>	192	96	96
<b>Power Supply</b>	V	<b>3-5</b>	3-5	3-5	5
<b>Volume Control</b>		<b>No</b>	No	No	No
<b>Auto Fs Detect</b>		<b>Yes</b>	Yes	No	No
<b>Package</b>		<b>10TSSOP</b>	16SOIC	16SOIC	8SOIC
<b>Price (1K)</b>		<b>\$1.55</b>	\$2.15	\$1.95	\$1.35

**Table 1. Product Comparison**

The CS4344 family offers better analog performance (dynamic range and THD+N), a smaller package, and is more cost effective than the CS4340A and CS4340. For users of the CS4334, the CS4344 family is a simple, yet affordable, upgrade to higher performance.

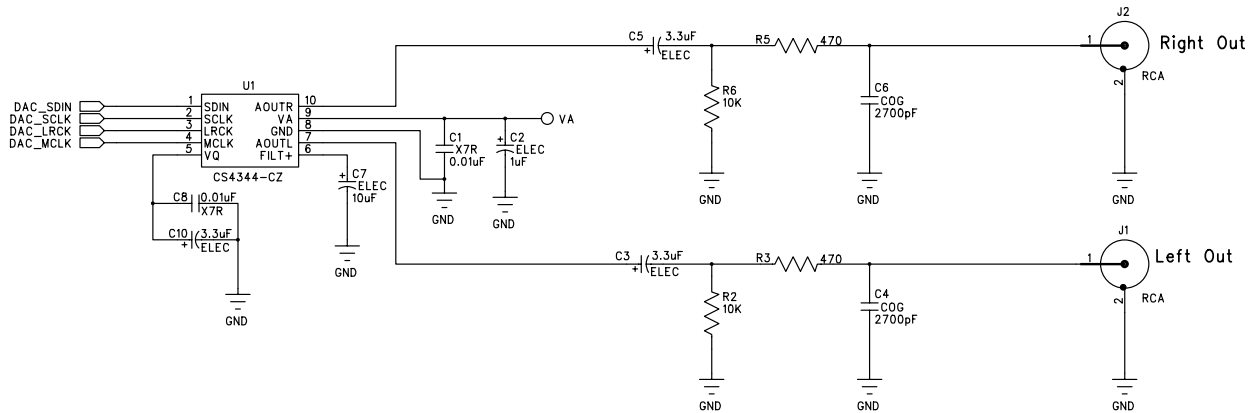
### **2. The Design Transition**

#### **2.1 Transitioning from the CS4340/40A**

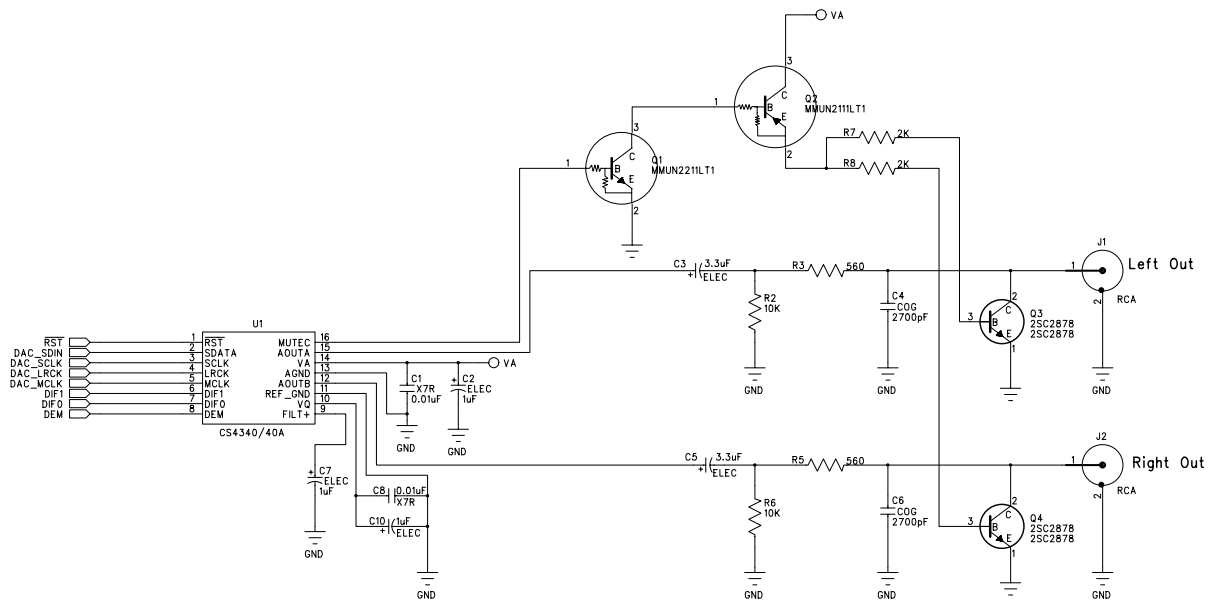
##### **2.1.1 Hardware changes**

The CS4344 family removes six pins from the sixteen pins of the CS4340/40A. The CS4344 family also uses a smaller lead pitch which takes up about 75% less space than the CS4340/40A.

Figure 1 is a modification of the Figure 2 schematic which helps show the changes between the CS4340/40A and the CS4344. Figure 1 shows the schematic for the CS4344/5/6/8. Figure 2 shows the original example schematic for the CS4340/40A.



**Figure 1. CS4344/5/6/8 Design Schematic**



**Figure 2. CS4340/40A Design Schematic**

The changes made from Figure 2 to Figure 1 were as follows:

- Removed Q1, Q2, Q3, Q4, R7, and R8.
- Deleted the nets  $\overline{\text{RST}}$ , DIF1, DIF0, and DEM.
- Changed C7 to 10  $\mu\text{F}$ , changed C10 to 3.3  $\mu\text{F}$ , changed R3 and R5 to 470  $\Omega$ .
- Replaced CS4340/40A with CS4344.

- Note that the same C4 and C6 capacitors may be used.

The following table shows the pin for pin mapping between the two part families:

Pin Name	CS4340/40A	CS4344 family
$\overline{RST}$	1	
$SDATA > SDIN$	2	1
$SCLK > DEM/SCLK$	3	2
$LRCK$	4	3
$MCLK$	5	4
$DIF1$	6	
$DIF0$	7	
$DEM$	8	
$FILT+$	9	6
$VQ$	10	5
$REF\_GND$	11	
$AOUTB$	12	10
$AGND$	13	8
$VA$	14	9
$AOUTA$	15	7
$MUTE_C$	16	

**Table 2. CS4334 to CS4344 pin mapping**

The part number of the CS4344 family which you will transition to can be determined from the state of the DIF0 and DIF1 pins as outlined below:

CS4340/40A Pin		CS4344 family Part # and Serial Format Mode
DIF1	DIF0	
0	0	CS4344 - I <sup>2</sup> S
0	1	CS4345 - LJ
1	0	CS4346 - RJ24
1	1	CS4348 - RJ16

**Table 3. CS4340/40A Mode Settings to CS4344 Family Part Numbers**

### 2.1.2 Functional changes

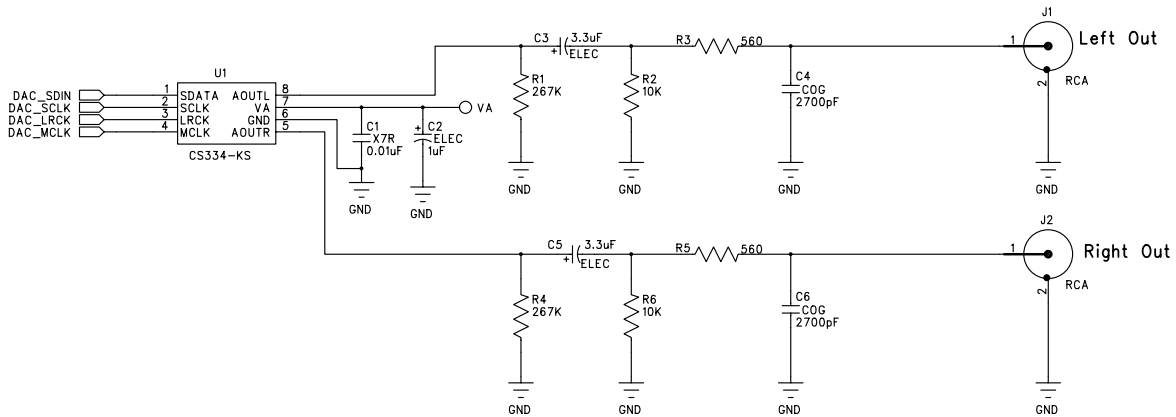
- The CS4344 family supports de-emphasis through internal SCLK mode. See the CS4344 datasheet for details.
- The reset state, or power down, is achieved by removing the MCLK signal (instead of the  $\overline{RST}$  pin).
- The CS4340 MCLK/LRCK ratio of 512x with a 32 kHz sampling rate is not supported by the CS4344 family. All other MCLK/LRCK ratios and sample rates from the CS4340 are supported. It is recommended for best performance not to use *Double Speed Mode* with sample rates below 50 kHz, as noted in the CS4344 datasheet.
- The CS4340A MCLK/LRCK ratios of 512x and 768x with a 32 kHz sampling rate are not supported by the CS4344. All other MCLK/LRCK ratios and sample rates from the CS4340A are supported.
- Mute circuit control is not supported by the CS4344 family.

## 2.2 Transitioning from the CS4334/5/8

### 2.2.1 Hardware changes

The CS4344 family adds two filter pins (which require capacitors) to the eight pins of the CS4334 family. The CS4344 family also uses a smaller lead pitch which takes up about 50% less space than the CS4334 family.

Figure 3 shows an example schematic for the CS4334. Figure 1 shows the modified new schematic for the CS4344



**Figure 3. CS4334 family Design Schematic**

The changes made between Figures 3 and 1 were as follows:

- Removed the 267 kΩ resistors R1 and R4.
- Added the 10 µF C7, and added the 3.3 µF C8.
- changed R3 and R5 to 470 Ω.
- replaced CS4334 with CS4344.
- Note that the same C4 and C6 capacitors may be used.

The following table shows the pin for pin mapping between the two part families:

pin name	CS4334 family	CS4344 family
<i>SDATA &gt; SDIN</i>	1	1
<i>DEM/SCLK</i>	2	2
<i>LRCK</i>	3	3
<i>MCLK</i>	4	4
<i>AOUTR</i>	5	10
<i>GND</i>	6	8
<i>VA</i>	7	9
<i>AOUTL</i>	8	7
<i>VQ</i>		5
<i>FILT+</i>		6

**Table 4. CS4334 to CS4344 pin mapping**

Note that the AOUTL and AOUTR pins have changed position.

### 2.2.2 Functional Changes

- The CS4344 supports the same internal SCLK mode for de-emphasis support as in the CS4334 family.
- The part numbers for the CS4344 family were assigned to be congruent with those of the CS4334 family. The last digits of each variant in each family are the same for similar devices. This allows for an easy decision on which new part to use. Note that the CS4349 (18-bit RJ) is not available at this time. Ordering information is provided in the back of the CS4344 datasheet.
- The CS4334 family MCLK/LRCK ratio of 512x with a 32 kHz sampling rate is not supported by the CS4344 family. All other MCLK/LRCK ratios and sample rates from the CS4334 family are supported. It is recommended for best performance not to use *Double Speed Mode* with sample rates below 50 kHz as noted in the CS4344 datasheet.
- 192 kHz sampling can be achieved simply by lowering the MCLK/LRCK ratio to 192x, 128x, 96x, or 64x and increasing the sampling rate.

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## Contacting Cirrus Logic Support

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