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Understanding Embedded - DSP (Digital Signal Processors)

Embedded - DSP (Digital Signal Processors) are specialized microprocessors designed to perform complex mathematical computations on digital signals in real-time. Unlike general-purpose processors, DSPs are optimized for high-speed numeric processing tasks, making them ideal for applications that require efficient and precise manipulation of digital data. These processors are fundamental in converting and processing signals in various forms, including audio, video, and communication signals, ensuring that data is accurately interpreted and utilized in embedded systems.

Applications of Embedded - DSP (Digital Signal Processors)

Details	
Product Status	Obsolete
Type	Fixed Point
Interface	I²C, SPI
Clock Rate	150MHz
Non-Volatile Memory	-
On-Chip RAM	128kB
Voltage - I/O	3.30V
Voltage - Core	1.80V
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	100-LQFP Exposed Pad
Supplier Device Package	100-LQFP (16x16)
Purchase URL	https://www.e-xfl.com/product-detail/cirrus-logic/cs47028b-dqzr

Clock Generation and Jitter Reduction

SPECIFICATIONS

Part Number	One-Time Programmable	Frequency Synth/Clock Generator	Clock Multiplier/ Jitter Remover	Power Supply (V)	Input Frequency Range	Reference Frequency Range	Output Frequency Range	Package
CS2000	CS2000-OTP	✓	✓	3.3	50 Hz to 30 MHz	8 to 75 MHz	6 to 75 MHz	10 MSOP
CS2100	CS2100-OTP	—	✓	3.3	50 Hz to 30 MHz	8 to 75 MHz	6 to 75 MHz	10 MSOP
CS2200	CS2200-OTP	✓	—	3.3	—	8 to 75 MHz	6 to 75 MHz	10 MSOP
CS2300	CS2300-OTP	—	✓	3.3	50 Hz to 30 MHz	Internally generated	6 to 75 MHz	10 MSOP

Audio A/D Converters

SPECIFICATIONS

Part Number	Resolution (bits)	Dynamic Range (dB)	THD+N (dB)	Sample Rate (kHz)	Analog Inputs	Power Supply (V)	Comments	Package
CS5340	24	101	–94	192	Single-ended	VA = 3.3 or 5, VD = 3.3 or 5, VL = 1.8 to 5	Pin compatible with CS5341	16 TSSOP
CS5341	24	105	–98	192	Single-ended	VA = 3.3 or 5, VD = 3.3 or 5, VL = 1.8 to 5	Pin compatible with CS5340	16 TSSOP
CS5342	24	105	–98	192	Single-ended	VA = 3.3 or 5, VD = 3.3 or 5, VL = 2.5 to 5	384*Fs MCLK	16 TSSOP
CS5343/44	24	98	–92	96	Single-ended	VA = 3.3 or 5	CS5343 – I^2S CS5344 – LJ	10 TSSOP
CS5345	24	104	–95	192	Single-ended	VA = 3.3 or 5, VD = 3.3 or 5, VLS/VLC = 1.8 to 5	6:1 Input MUX, PGA, MIC preamp	48 LQFP
NEW **CS5346**	24	103	–95	192	Single-ended	VA = 5, VD = 3.3, VL = 3.3 to 5	6:1 input MUX, PGA, MIC pre-amp, high input impedance	48 LQFP
CS5351	24	108	–98	192	Single-ended	VA = 5, VD = 3.3 or 5, VL = 2.5 to 5	Functionally compatible with CS5361	24 SOIC 24 TSSOP
CS5361	24	114	–105	192	Differential	VA = 5, VD = 3.3 or 5, VL = 2.5 to 5	Pin compatible with CS5381	24 SOIC 24 TSSOP
CS5364/66/68	24	114	–105	192	Differential	VA = 5, VD = 3.3 or 5, VLS/VLC = 1.8 to 5	4-/6-/8-channel ADC, TDM, on-chip oscillator	48 LQFP
CS5381	24	120	–110	192	Differential	VA = 5, VD = 3.3 or 5, VL = 2.5 to 5	Flagship performance	24 SOIC 24 TSSOP

Audio D/A Converters

SPECIFICATIONS

Part Number	Channels	Resolution (bits)	Dynamic Range (dB)	THD+N (dB)	Sample Rate (kHz)	Analog Outputs	Power Supply (V)	Comments	Package
CS4334/35/38/39	2	24	96	–88	96	Single-ended	VA = 5	Entry-level stereo DAC	8 SOIC
CS4344/45/46/48	2	24	105	–90	192	Single-ended	VA = 3.3 or 5	Upgrade for CS4340 and CS4340A	10 TSSOP
CS4349	2	24	101	–91	192	Single-ended	VA = 3.3 or 5	1 V_{RMS} @ 3.3 V, Volume Control	24 TSSOP
CS4350	2	24	109	–91	192	Single-ended or Differential	VA = 3.3 or 5 VLC = 3.3 to 5 VLS = 1.5 to 5	Integrated PLL, TDM	24 TSSOP
CS4351	2	24	112	–100	192	Single-ended	VA = 9 or 12 VD = 3.3 VL = 1.8 to 3	Line driver, 2 V_{RMS} output	20 TSSOP
CS4352	2	24	106	–93	192	Single-ended	VA = 9 or 12 VD = 3.3 VL = 1.5 to 5	Line driver, 2 V_{RMS} output	20 TSSOP
NEW **CS4353**	2	24	106	–93	192	Single-ended	VA = 3.3 VCP = 3.3 VL = 0.9 to 3.3	Ground-centered 2 V_{RMS} line-level outputs	24 QFN
CS4361	6	24	105	–95	192	Single-ended	VA = 5 VL = 1.8 to 5	Entry-level 6-channel DAC	20 TSSOP
CS4362A/82A	6/8	24	114	–100	192	Differential	VA = 5 VD = 2.5 VL = 1.8 to 5	6-/8-channel DAC, DSD	48 LQFP
CS4364/84	6/8	24	103	–88	192	Single-ended	VA = 5 VD = 2.5 VL = 1.8 to 5	6-/8-channel DAC, DSD, footprint compatible with CS4365/85	48 LQFP
CS4365/85	6/8	24	114	–100	192	Differential	VA = 5 VD = 2.5 VL = 1.8 to 5	6-/8-channel DAC, DSD, TDM	48 LQFP
CS4391A	2	24	108	–94	192	Differential	VA = 5 VL = 1.8 to 5	DSD, pin compatible with CS4392	20 TSSOP
CS4392	2	24	114	–100	192	Differential	VA = 5 VL = 1.8 to 5	DSD, selectable digital filters, pin compatible with CS4391A	20 TSSOP
CS4398	2	24	120	–107	192	Differential	VA = 5 VD = 3.3 or 5 VL = 1.8 to 5	Flagship DAC, DSD processor, selectable D-filter	28 TSSOP

Multichannel CODECs

SPECIFICATIONS

Part	Resolution (bits)	Dynamic Range (dB)	THD+N (dB)	Sample Rate (kHz)	Analog I/O	Power Supply (V)	Comments	Package
CS42324/25	24	100 DAC 95 ADC	–90 DAC –88 ADC	96	Single-ended	VA = 9 or 12 VD = 3.3 VL = 1.8 or 3.3	4 DACs, 2 ADCs, 2 V_{RMS} I/O, I/O MUX, HP Driver (CS42325 only)	48 LQFP
CS42416/26	24	110/114 DAC 114 ADC	–100 DAC –100 ADC	192	Differential DACs Single-ended or Differential ADCs	VA = 5 VD = 3.3 or 5 VL = 1.8 to 5	6 DACs, 2 ADCs, digital volume control	64 LQFP
CS42418/28	24	110/114 DAC 114 ADC	–100 DAC –100 ADC	192	Differential	VA = 5 VD = 3.3 or 5 VL = 1.8 to 5	8 DACs, 2 ADCs, PLL, digital volume control	64 LQFP
CS42432	24	108 DAC 105 ADC	–98 DAC –98 ADC	192	Single-ended or Differential	VA = 3.3 or 5 VD = 3.3 VL = 1.8 to 5	6 DACs, 4 ADCs TDM I/F	52 MQFP
CS42435	24	108 DAC 105 ADC	–98 DAC –98 ADC	192	Single-ended or Differential	VA = 3.3 or 5 VD = 3.3 VL = 1.8 to 5	8 DACs, 6 ADCs TDM I/F	52 MQFP
CS42436/38	24	105/108 DAC 102/105 ADC	–95/–98 DAC –95/–98 ADC	192	Single-ended or Differential	VA = 3.3 or 5 VD = 3.3 VL = 1.8 to 5	6/8 DACs, 6 ADCs TDM I/F	52 MQFP
CS42448	24	108 DAC 105 ADC	–98 DAC –98 ADC	192	Single-ended or Differential	VA = 3.3 or 5 VD = 3.3 to 5 VL = 1.8 to 5	8 DACs, 6 ADCs TDM and PCM I/F	64 LQFP
CS42516/26	24	110/114 DAC 114 ADC	–100 DAC –100 ADC	192	Differential	VA = 5 VD = 3.3 or 5 VL = 1.8 to 5	6 DACs, 2 ADCs, S/PDIF Rx, digital volume control	64 LQFP
CS42518/28	24	110/114 DAC 114 ADC	–100 DAC –100 ADC	192	Differential	VA = 5 VD = 3.3 or 5 VL = 1.8 to 5	8 DACs, 2 ADCs, S/PDIF Rx, digital volume control	64 LQFP
CS42888	24	108 DAC 105 ADC	–98 DAC –98 ADC	192	Single-ended or Differential	VA = 3.3 or 5 VD = 3.3 or 5 VL = 1.8 to 5	8 DACs, 4 ADCs, PCM and TDM I/F	64 LQFP

PWM Controllers

SPECIFICATIONS

Part	Resolution (bits)	Dynamic Range (dB)	THD+N %	Sample Rate (kHz)	Power Supply (V)	Comments	Package
CS4461	—	—	—	—	VD = 5 VL = 3.3 to 5	PSR feedback ADC	24 TSSOP
CS44600	24	100	< 0.05	192	VD = 2.5 VL = 3.3 to 5	6-channel digital amplifier controller	64 LQFP
CS44800	24	100	< 0.05	192	VD = 2.5 VL = 3.3 to 5	8-channel digital amplifier controller	64 LQFP

Power Stage

SPECIFICATIONS

Part	Power (W)	Dynamic Range (dB)	THD+N %	Channels	Power Supply (V)	Comments	Package
CS4412A	30	102	0.1	4	VP = 8 to 18 VD = 2.5 or 5	Quad power stage IC thermally enhanced	48 QFN

Integrated Class-D Audio Amplifiers

SPECIFICATIONS

Part	Power (W)	Dynamic Range (dB)	THD+N %	Channels	Power Supply (V)	Comments	Package
NEW **CS3511**	2 x 10	98	0.03	2.0	VP = 9 to 12	Integrated digital audio amp w/ feedback and differential input	32 QFN
CS4525	2 x 15	102	0.1	2.1	VP = 8 to 18 VD = 2.5 or 5	Integrated digital audio amp w/ ADC, SRC and signal processor	48 QFN

Volume Control

SPECIFICATIONS

Part	Channel	Dynamic Range (dB)	THD+N (dB)	Analog I/O	Power Supply (V)	Comments	Package
CS3308	8	123	–112	Single-ended	VA = ±5 VD = 3.3	+22 dB gain/–96 dB attenuation, 0.25 dB step	48 LQFP
CS3310	2	116	–100	Single-ended	VA = ±5 VD = 5	+31.5 dB gain/–95.5 dB attenuation, 0.5 dB step	16 SOIC
CS3318	8	127	–112	Single-ended	VA = ±8 to ±9 VD = 3.3	+22 dB gain/–96 dB attenuation, 0.25 dB step	48 LQFP

Interfaces & Sample-Rate Converters

SPECIFICATIONS

Part	Sample Rate (kHz)	S/PDIF, IEC-60958 Transmitter	S/PDIF, IEC-60958 Receiver	AES/EBU	EIAJ CP1201	Host Interface	Channel Status Buffer Memory	SRC	Package
CS8406	192	✓	—	✓	✓	✓	✓	—	28 SOIC 28 TSSOP
CS8416	192	—	✓	✓	✓	✓	✓	—	28 SOIC 28 TSSOP 28 QFN
CS8420	96	✓	✓	✓	✓	✓	✓	✓	28 SOIC
CS8421	192	—	—	—	—	—	—	✓	20 TSSOP 20 QFN
NEW **CS8422**	192	—	✓	✓	✓	✓	✓	✓	32 QFN
CS8427	96	✓	✓	✓	✓	✓	✓	—	28 SOIC 28 TSSOP

AC '97 CODECs

SPECIFICATIONS

Part	Bus	Converters	Feature	Package
CS4202	AC '97	20-bit stereo DAC; 18-bit stereo ADC	S/PDIF transmitter	48 TQFP/LQFP
CS4205	AC '97	20-bit stereo DAC; 18-bit stereo ADC	Sample-rate converter	48 TQFP/LQFP
CS4299	AC '97	20-bit stereo DAC; 18-bit stereo ADC	Sample-rate converter	48 TQFP/LQFP

Audio DSPs

SPECIFICATIONS

Part	Processor	DSP Tools	Key Firmwares & Features	Temp Range	Package
CS493xxx	**Supported exclusively with existing firmwares, many functions available for license, ideal for reduced requirements and low-cost opportunities**				
CS493253	Dual 24-bit	None	DD + PLII, IEC61937 via I²S	86 MHz~70 °C	44 PLCC
CS493254	Dual 24-bit	None	DD + PLII, IEC61937 via I²S + DDEX	86 MHz~70 °C	44 PLCC
CS493263	Dual 24-bit	None	DD + PLII, IEC61937 via I²S + DTS	86 MHz~70 °C	44 PLCC
CS493264	Dual 24-bit	None	DD + PLII, IEC61937 via I²S + DDEX	86 MHz~70 °C	44 PLCC
CS493295	Dual 24-bit	None	also includes support for AAC	86 MHz~70 °C	44 PLCC
CS493302	Dual 24-bit	None	MP3 & PCM Processor for THX® & automotive applications	86 MHz~70 °C & 72 MHz~85 °C	44 PLCC
CS493105	Dual 24-bit	None	Broadcast audio decoder, DD, MPEG, AAC ES/PES streams	86 MHz~70 °C	44 PLCC
CS493115	Dual 24-bit	None	Broadcast audio decoder, DD, MPEG, AAC ES/PES streams	86 MHz~70 °C	44 PLCC
CS493122	Dual 24-bit	None	Broadcast audio decoder, DD, MPEG, AAC ES/PES streams	86 MHz~70 °C	44 PLCC
CS485xx	**Tiny, cost effective, mega-performance PCM processors targeted for: mini-systems, DVD receivers, speaker bars, car audio, DTVs**				
CS48520	Single 32-bit	DSP Composer, ASM, C	4 channel audio PP1	150 MHz~70 °C (300 M MAC/Sec)	48 QFP
CS48540	Single 32-bit	DSP Composer, ASM, C	8 channel audio PP1	150 MHz~70 °C (300 M MAC/Sec)	48 QFP
CS48560	Single 32-bit	DSP Composer, ASM, C	> 8 channel audio PP1	150 MHz~70 °C & 130 MHz~85 °C	48 QFP
CS48AU2x	**Audyssey® EQ/Dynamic Volume/Dynamic EQ/BassXT-enabled device ideally targeted for DTVs, portable audio docking stations, automotive entertainment, I²S I/O**				
CS48AU2B	Single 32-bit	DSP Composer	2.0 channel Audyssey® EQ/Dynamic Volume/Dynamic EQ/BassXT controller (selected additional functions available through DSP Composer)	150 MHz~70 °C (300 M MAC/Sec)	48 LQFP
CS48DV2x	**Dolby® Volume-enabled device ideally targeted for DTVs, portable audio docking stations, automotive entertainment, I²S I/O**				
CS48DV2A	Single 32-bit	Demo GUI	2 channel Dolby® Volume controller (fixed function)	150 MHz~70 °C (300 M MAC/Sec)	48 LQFP
NEW **CS48DV2B**	Single 32-bit	DSP Composer	2.1 channel Dolby® Volume controller (selected additional functions available through DSP Composer)	150 MHz~70 °C (300 M MAC/Sec)	48 LQFP
CS48DV6x	**Dolby® Volume-enabled device ideally targeted for 5.1 channel audio/video receivers, DVD receivers, soundbars, I²S I/O**				
NEW **CS48DV6B**	Single 32-bit	DSP Composer	5.1 channel Dolby® Volume controller (fixed function)	150 MHz~70 °C (300 M MAC/Sec)	48 LQFP
CS4953xx	**Single-chip multistandard surround sound decoder targeted for playback from analog & S/PDIF sources**				
CS495303	Dual 32-bit	DSP Composer, ASM, C	(DD, DDEX, AAC, MPEG) + PP2	150 MHz~70 °C (600 M MAC/Sec)	128 LQFP
CS495313	Dual 32-bit	DSP Composer, ASM, C	(DD, DDEX, DTS, DTSES, DTS96, AAC, MPEG) + PP2	150 MHz~70 °C (600 M MAC/Sec)	128 LQFP 144 LQFP

Audio DSPs

SPECIFICATIONS

Part	Processor	DSP Tools	Key Firmwares & Features	Temp Range	Package
CS4970xx	**Single-chip multistandard surround sound decoder targeted for playback from HD DVD™, Blu-ray Disc® players, & all analog, S/PDIF & HDMI® sources**				
CS497004	Dual 32-bit	DSP Composer, ASM, C	(DD+, DTHD, DTSHRA, DTSMA, DTSLBR, DTSES, DTS96, DD, DDEX, DTS, AAC, MPEG) + PP2	150 MHz~70 °C (600 M MAC/Sec)	144 LQFP
CS497024	Dual 32-bit	DSP Composer, ASM, C	(DD+, DTHD, DTSHRA, DTSMA, DTSLBR, DTSES, DTS96, DD, DDEX, DTS, AAC, MPEG) + PP2	150 MHz~70 °C (600 M MAC/Sec)	128 LQFP
CS49DV8x	**Dolby® Volume-enabled device ideally targeted for audio/video receivers and DVD receivers, I²S I/O**				
NEW **CS49DV8C**	Dual 32-bit	DSP Composer	8 channel Dolby® Volume control (fixed function)	150 MHz~70 °C (600 M MAC/Sec)	128 LQFP

Audio SOCs (DSP with Integrated Mixed-Signal)

SPECIFICATIONS

Part	Processor	Speed (MIPS)	Car Audio DSPs	General Audio DSPs	Resolution (bits)	Dynamic Range (dB)	A/D Channels	D/A Channels	Comments	Package
CS470xx	**Tiny, cost effective, mega-performance PCM processors with integrated CODEC targeted for mini-systems, DVD receivers, speakerbars, car audio, DTVs**									
NEW **CS47024**	Single 32-bit	150	CS47024B-DQZ	CS47024B-CQZ	24	108 DAC 105 ADC	2	4	2 ADC w/ 5:1 MUX, 4 DAC, S/PDIF Rx/Tx, SRC	100 LQFP
NEW **CS47028**	Single 32-bit	150	CS47028B-DQZ	CS47028B-CQZ	24	108 DAC 105 ADC	2	8	2 ADC w/ 5:1 MUX on 1 ADC, 8 DAC, S/PDIF Rx/Tx, SRC	100 LQFP
NEW **CS47048**	Single 32-bit	150	CS47048B-DQZ	CS47048B-CQZ	24	108 DAC 105 ADC	4	8	4 ADC w/ 5:1 MUX, 8 DAC, S/PDIF Rx/Tx, SRC	100 LQFP

Recommended Replacements for New Design

Not Recommended for New Design	Recommended Replacement
CS494xxx (CS494003)	CS4953xx
CS4950xx (CS495002)	CS4953xx
CS4951xx (CS495102)	CS4953xx
CS4952xx (CS495202)	CS4953xx

Algorithm & Nomenclature Abbreviations

Decoding Algorithm & Nomenclature Abbreviation Table	
DTSES = DTS-ES™ Matrix/Discrete	DD = Dolby Digital®
DTS = DTS Digital Surround™	DDEX = Dolby Digital® Surround EX®
DTS96 = 96 kHz/24-bit	DD+ = Dolby Digital® Plus
DTHD = Dolby® TrueHD	DTSHRA = DTS® High Resolution Audio
AAC = MPEG-2 AAC Multichannel	DTSMA = DTS® Master Audio
PP = Post-Processing	DTSLBR = DTS® Express
ES = Elementary Stream	MPEG = MPEG 2, Layer II Stereo & Multichannel
PES = Packetized Elementary Stream	MP3 = MPEG 1, Layer II & III CBR & VBR
CBR = Constant Bit Rate	VBR = Variable Bit Rate

Industrial Components

HIGH-PRECISION ANALOG & MIXED-SIGNAL ICs

Cirrus Logic high-precision analog and mixed-signal ICs for industrial measurement applications—such as industrial process control, analytical instruments, consumer utility, digital power meters and seismic systems—are based on proprietary advanced Delta-Sigma technology. Cirrus Logic provides many proprietary products, including analog-to-digital converters, digital-to-analog converters, modulator and amplifier ICs.

AMPLIFIERS

- CS3001
- CS3002
- CS3003
- CS3004
- CS3011
- CS3012
- CS3013
- CS3014

DELTA-SIGMA A/D CONVERTERS

- CS5505
- CS5506
- CS5507
- CS5508
- CS5509
- CS5510
- CS5511
- CS5512
- CS5513
- CS5529

DELTA-SIGMA A/D CONVERTERS WITH INTEGRATED AMPLIFIERS

- CS5521
- CS5522
- CS5523
- CS5524
- CS5525
- CS5526
- CS5528
- CS5530
- CS5531
- CS5532
- CS5533
- CS5534
- CS5550

HIGH-THROUGHPUT DELTA-SIGMA A/D CONVERTERS

- CS5560
- CS5566
- CS5571
- CS5581

GEOPHYSICAL PRODUCTS

Single-S™

- CS3301A
- CS3302A
- CS5373A
- CS5378

Total-S™

- CS3301A
- CS3302A
- CS4373A
- CS5371A
- CS5372A
- CS5376A

Extreme-S™

- CS5201
- CS5203A
- CS5204
- CS5205
- CS5207

ENERGY MEASUREMENT

- CS5451A
- CS5460A
- CS5461A
- CS5462
- CS5463
- CS5464
- CS5466
- CS5467

ENERGY MEASUREMENT SYSTEM-ON-CHIP

- CS740111
- CS740121
- CS740131

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Amplifiers

SPECIFICATIONS

Part Number	Device	Supply Voltage (V)	Supply Current (mA)	V_{OS} (µV) Max	V_{OS} Drift (µV/°C)	e_{NOISE} (nV/√Hz)	A_{OL} min (dB)	Package
CS3001	Single	2.7 to 6.7	2.1	10	0.05	6	200	8 SOIC
CS3002	Dual	2.7 to 6.7	3.6	10	0.05	6	200	8 SOIC
CS3003	Single	2.7 to 5.25	1.0	10	0.05	17	150	8 SOIC
CS3004	Dual	2.7 to 5.25	2.0	10	0.05	17	150	8 SOIC
CS3011	Single	2.7 to 6.7	0.9	10	0.05	12	200	8 SOIC
CS3012	Dual	2.7 to 6.7	1.7	10	0.05	12	200	8 SOIC
CS3013	Single	2.7 to 5.25	0.5	10	0.05	22	135	8 SOIC
CS3014	Dual	2.7 to 5.25	1.0	10	0.05	22	135	8 SOIC

Delta-Sigma A/D Converters

SPECIFICATIONS

Part Number	Resolution (bits)	Throughput (Sps)	Integral Linearity (%FS)	Differential Linearity (±LSB)	Number of Channels	Power Consumption (mW)	Package
CS5505	16	20 – 100	0.0015%	0.25	4	3.2	24 SOIC
CS5506	20	20 – 100	7.0E-4%	NMC	4	3.2	24 SOIC
CS5507	16	20 – 100	0.0015%	0.25	1	3.2	20 SOIC
CS5508	20	20 – 100	7.0E-4%	NMC	1	3.2	20 SOIC
CS5509	16	20 – 200	0.0015%	0.25	1	1.7	16 SOIC
CS5510	16	53 – 212	0.0015%	NMC	1	1.4	8 SOIC
CS5511	16	100 (typical)	0.0015%	NMC	1	1.5	8 SOIC
CS5512	20	53 – 326	7.0E-4%	NMC	1	1.8	8 SOIC
CS5513	20	100 (typical)	7.0E-4%	NMC	1	1.9	8 SOIC
CS5529	16	1 – 303	0.0015%	NMC	1	2.6	20 SOIC

Geophysical Products Total-S™

SPECIFICATIONS

Part	Description	Resolution (bits)	Dynamic Range (dB)	THD (dB)	Power Consumption Per Channel (mW)	Signal Range (V)	Package
CS3301A	Geophone amplifier	—	—	–121	27.5	5 V_{p-p} diff	24 SSOP
CS3302A	Hydrophone amplifier	—	—	–118	25	5 V_{p-p} diff	24 SSOP
CS4373A	D/A converter	24	114	–116	10	5 V_{p-p} diff	28 SSOP
CS5371A	Single A/D converter	24	124	–118	25	5 V_{p-p} diff	24 SSOP
CS5372A	Dual A/D converter	24	124	–118	25	5 V_{p-p} diff	24 SSOP
CS5376A	Quad filter	—	—	—	<10	—	64 TQFP

Geophysical Products Extreme-S™

SPECIFICATIONS

Part	Description	Resolution (bits)	Dynamic Range (dB)	THD (dB)	Power Consumption Per Channel (mW)	Signal Range (V)	Package
CS5201	High-temperature D/A converter	24	114	–116	10	5 V_{p-p} diff	28 SOIC ceramic
CS5203A	High-temperature amplifier	—	—	–121	28	5 V_{p-p} diff	24 SOIC ceramic
CS5204	High-temperature quad filter	—	—	—	<10	—	64 ceramic
CS5205	High-temperature A/D converter	24	122	–117	32.5	5 V_{p-p} diff	24 SOIC ceramic
CS5207	High-temperature A/D converter	24	122	–117	32.5	5 V_{p-p} diff	24 SOIC ceramic

Apex Precision Power™ Products

POWER ANALOG ICs, MODULES AND HYBRIDS

Apex Precision Power™ is the brand name for Cirrus Logic's high performance precision power analog family of products. Apex Precision Power™ products drive innovation in the design and manufacturing of power operational amplifiers (linear) and pulse width modulation amplifiers (PWM/switching). A mix of IC, board-level module and hybrid product designs is used to deliver up to 50 A of output current while operating on voltage supplies ranging from 8.5 V up to 1200 V. Target applications focus on the high power precision control of current, voltage and speed applications in the industrial, test and measurement, aerospace and medical markets.

APEX PRECISION POWER™ HIGH-CURRENT LINEAR AMPLIFIERS

- PA50
- PA52
- MP230FC
- PA03
- PA05
- MP240FC
- PA04
- MP111FD
- PA12A
- PA13A
- MP108FDA
- MP39CLA
- MP108FD
- MP39CL
- PA12
- PA13
- PA51
- PA61
- MP38CLA
- PA93
- MP38CL
- PA01
- PA02
- PA07
- PA10
- PA16
- PA73
- PA162
- PA119
- PA92
- PA09M
- PA74A
- PA76A
- PA74
- PA76
- PA09
- PB50
- PA60EU
- PA75CC
- PA96
- PB51
- PB58
- PA12H

APEX PRECISION POWER™ HIGH-CURRENT PWM AMPLIFIERS

- SA03
- SA08
- SA01
- MSA260KC
- MSA240KC
- SA12
- SA306
- SA60
- SA50
- SA57

APEX PRECISION POWER™ HIGH-VOLTAGE LINEAR AMPLIFIERS

- PA89
- PA94
- PA95
- PA97
- PA15
- PA85
- PA88
- PA91
- PA98
- PA90
- PA92
- PA93
- PA240CC
- PA241CE
- PA243DF
- PA78DK
- PA79DK
- PA08
- PA82J
- PA83
- PA84
- PA96
- PB51
- PB58
- MP108FD
- MP240FC
- MP38CL
- PA04
- PA52
- PA69EU
- PA86EU
- PB50
- PA03
- PA81J
- MP111FD
- MP230FC
- MP39CL
- PA05
- PA07
- PA50

APEX PRECISION POWER™ HIGH-VOLTAGE PWM AMPLIFIERS

- MSA260KC
- SA08
- SA12
- MSA240KC
- SA01
- SA03
- SA50
- SA60

APEX PRECISION POWER™ HIGH-SPEED LINEAR AMPLIFIERS

- PA98
- PA85
- PA119
- PA94
- PA79DK
- PA78DK
- PA86EU
- MP400
- PA91
- PA90
- PB58
- PA96
- PA69EU
- PA09
- PA84
- MP108FDA
- MP108FD
- MP111FD
- PB51
- PB50
- PA05

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Apex Precision Power™ High-Voltage PWM Amplifiers

SPECIFICATIONS

Model	Supply Voltage MAX (V)	Output Current MAX (A)	Switching Frequency (kHz)	Power Delivery MAX (W)	Int. Power MAX (W)
MSA260KC	450	20	50	250	300
SA08	450	20	22.5	250	250
SA12	200	15	200	250	185
MSA240KC	100	20	50	250	250
SA01	100	20	42	185	250
SA03	100	30	22.5	300	250
SA50	80	5	45	120	140
SA60	80	10	250	140	80

Apex Precision Power™ High-Speed Linear Amplifiers

SPECIFICATIONS

Model	Slew Rate TYP (V/us)	Supply Voltage MAX (V)	Output Current MAX (A)	Standby Current MAX (mA)	Power Dissipation MAX (W)
PA98	1000	450	0.2	25	30
PA85	1000	450	0.2	25	30
PA119	900	80	4	120	78
PA94	700	900	0.1	24	30
PA79DK	350	350	0.15	2.5	26
PA78DK	350	350	0.15	2.5	23
PA86EU	350	200	0.15	2.5	23
NEW **MP400**	350	50	0.2	2.5	14.2
PA91	300	450	0.2	14	30
PA90	300	400	0.2	14	30
PB58	250	300	1.5	35	70
PA96	250	300	1.5	18	83
PA69EU	200	200	0.05	2.5	23
PA09	200	80	2	85	78
PA84	180	300	0.04	7.5	17.5
MP108FDA	170	200	11	65	100
MP108FD	170	200	10	65	100
MP111FD	130	100	15	157	170
PB51	100	300	1.5	18	83
PB50	100	200	2	25	35
PA05	100	100	30	120	250

Short-Haul Single-Port Line Interface Units

SPECIFICATIONS

Part	Power Supply (V)	Control Modes	Line Coders	Number of Channels	TBR-12 Compliant	Impedance Matching Line Driver	Package
CS61535A	5	Host, H/W & Extended H/W	AMI, B8ZS & HDB3	1	✓	✓	28 PLCC
CS61574A	5	Host, H/W & Extended H/W	AMI, B8ZS & HDB3	1	✓	✓	28 PLCC
CS61575	5	Host, H/W & Extended H/W	AMI, B8ZS & HDB3	1	✓	✓	28 PLCC
CS61577	5	Host, H/W & Extended H/W	AMI, B8ZS & HDB3	1	✓	—	28 PLCC

Short-Haul Multi-Port Line Interface Units

SPECIFICATIONS

Part	Power Supply (V)	Control Modes	Line Coders	Number of Channels	TBR-12 Compliant	Impedance Matching Line Driver	Arbitrary Waveform Option	Package
CS61584A	3.3 or 5	Host & H/W	AMI, B8ZS & HDB3	2	✓	✓	✓	64 TQFP
CS61880	3.3	Host & H/W	AMI & HDB3	8	✓	✓	✓	144 LQFP 160 BGA
CS61884	3.3	Host & H/W	AMI, HDB3 & B8ZS	8	✓	✓	✓	144 LQFP

Infrared & Echo Canceller

SPECIFICATIONS

Part	Media Supported	Digital Interface	Number of Channels	Power Supply (V)	Package
CS6422	Analog audio (MIC and telephone)	Acoustic interface and network interface (both ANALOG)	2 – Full Duplex	5	20 SOIC
CS8130	IR	IrDA, HPSIR, ASK (CW) and TV remote compatible	1	2 to 5	20 SSOP (5x7 mm)

Ethernet

SPECIFICATIONS

Part	Media Supported	Digital Interface	Number of Channels	Power Supply	Package
CS8900A	10Base-T	ISA and general purpose parallel	1	5 V, 3.3 V	100 LQFP
CS8952	10Base-T, 100Base-X and NRZ (optical)	MII	1	5 V with support of 3.3 V digital I/O	100 TQFP

ARM 7 Embedded Processors

SPECIFICATIONS

Part	Processor	Processor Speed (MHz)	Cache	MMU	DRAM Controller	On-chip SRAM (KB)	LCD Controller	DAI	Package
EP7309	ARM 720T	74	8 KB unified	✓	—	48	✓	✓	208 LQFP 256 PBGA
EP7311	ARM 720T	90 & 74	8 KB unified	✓	SDRAM	48	✓	—	208 LQFP 256 PBGA
EP7312	ARM 720T	90 & 74	8 KB unified	✓	SDRAM	48	✓	✓	208 LQFP 256 PBGA

ARM 9 Embedded Processors

SPECIFICATIONS

Part	Processor Speed (MHz)	Cache Data/Code (K)	Ethernet MAC	PCMCIA Device	IDE/IF	USB Hosts	Display I/F	Graphics Engine	Math Crunch Engine	Touch/ ADC	Package
EP9301	166	16/16	✓	—	—	2	—	—	—	5 ADC	208 TQFP
EP9302	200	16/16	✓	—	—	2	—	—	✓	5 ADC	208 LQFP
EP9307	200	16/16	✓	—	—	3	✓	✓	✓	8-wire	272 TFBGA
EP9312	200	16/16	✓	—	2	3	✓	—	✓	8-wire	352 PBGA
EP9315	200	16/16	✓	✓	2	3	✓	✓	✓	8-wire	352 PBGA

Networked Attached Storage (NAS) Reference Design

Reference Design	Target Device	Development Platform	Operating System	Key Software Features
NAS ARM 9	EP9312 and EP9315	EDB9315A	Linux®	Auto-detect for easy customer set-up, network file server, print server, group and user level security and customizable user interface

Internet Protocol Radio Demonstration Platform

Reference Design	Target Device	Development Platform	Operating System	Key Software Features
Internet Protocol Radio (IPR)	EP9307	ERD9307IPR	Linux®	The IPR demo platform provides a low cost solution for demonstrating and exploring the capability of using Cirrus Logic EP9307 for Internet radio applications

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Notes