



DESCRIPTION

The ES2828 modem AFE is designed to work with digital audio accelerators and AC'97 audio CODECs to offer a modem-only solution or a complete AMC'97-compatible audio-modem solution for the desktop and notebook platforms.

The ES2828 integrates a low-pass continuous anti-aliasing filter, a 16-bit resolution analog-to-digital converter (ADC), a 16-bit digital-to-analog converter (DAC), a low-pass output-reconstruction filter and an AC-Link interface.

The major functions of the ES2828 include ADC and DAC conversion of modem and voice signal data and to provide the interface and control logic to transfer data between its serial I/O terminals and the DSP.

The ES2828 consists of ADC and DAC signal processing channels and the associated data controls for each channel. The two channels operate synchronously so that data reception at the ADC channel and data transmission from the DAC channel occur during the same time interval.

The ES2828 is available in an industry-standard 48-pin Low profile Quad Flat Pack (LQFP) package.

FEATURES

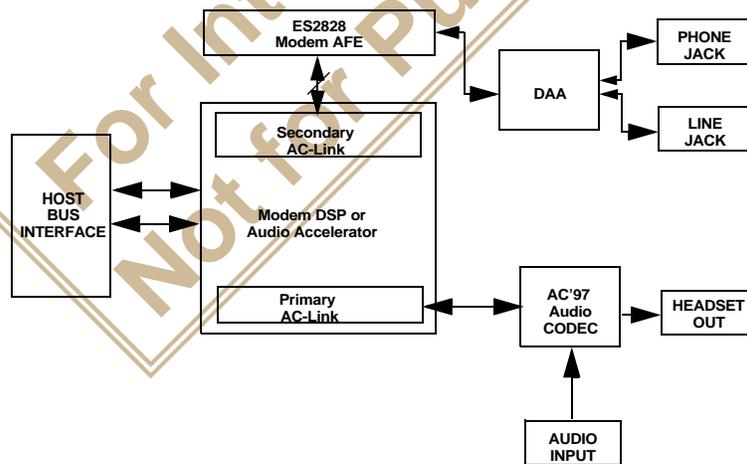
- MC'97-compliant modem codec supporting AC-Link.
- Sigma-delta modulation codec.
- Programmable down-sampling frequency for modem and voice applications.
- Multi-phase clocking support between 12.288 MHz , 18.816 MHz and 24.576 MHz.
- ACPI power management support.
- Software reset through command register.
- Power-on reset function.
- Separate 3.3V digital and 5.0V analog power supplies.
- 5V tolerance for digital circuits.
- 16-bit ADC and DAC with built-in anti-aliasing, digital interpolation, decimation, reconstruction and analog output low-pass filters.
- 48 kHz sample rate.

Compatibility

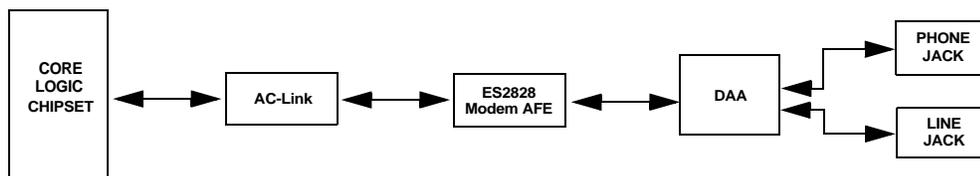
- Hardware interface compatible with Rev. 2.1 of the Intel™ AC '97 Specification.
- Compliant with ACPI 1.0 and PCI Power Management Interface 1.1, supporting D3<sub>cold</sub> wake-up on ring.

BLOCK DIAGRAM

DSP/COMBO DIAGRAM



HSP/MDC/AMR/Mini PCI DIAGRAM



PINOUT

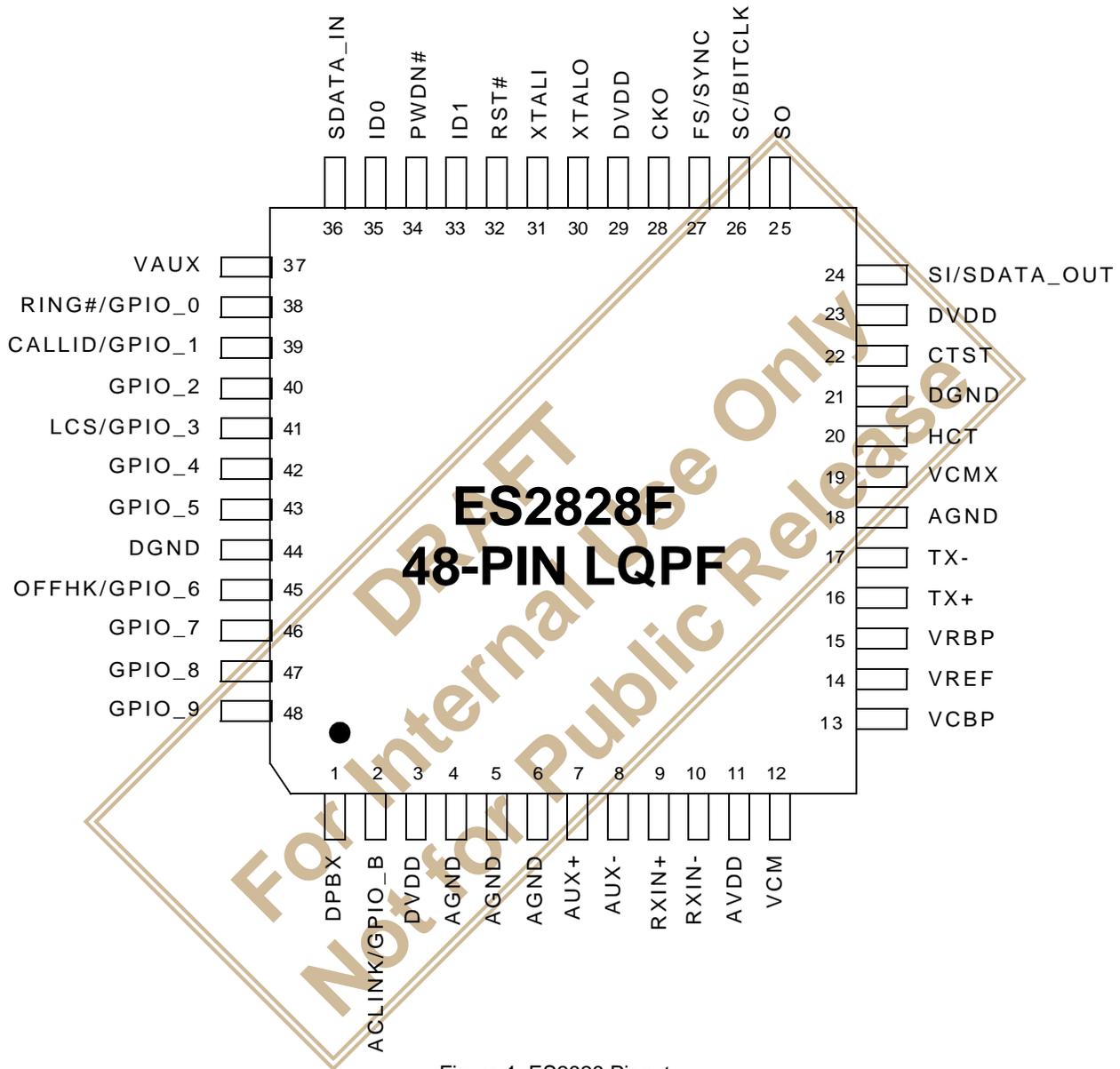


Figure 1 ES2828 Pinout

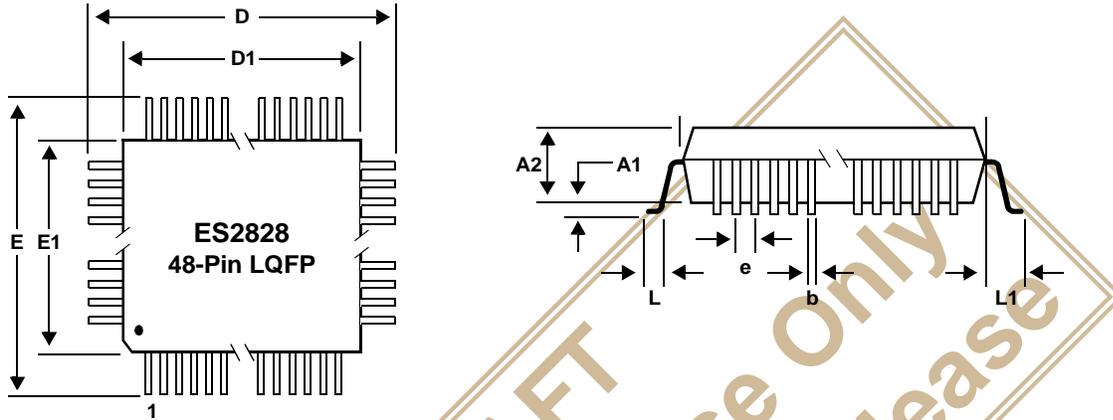
PIN DESCRIPTION

Name	Number	I/O	Definition
DPBX	1	I	Digital PBX detection.
ACLINK/GPIO_B	2	I/O	AC-Link pin (default).
DVDD	3, 23, 29	P	3.3V digital power.
AGND	4:6, 18	I	Analog ground.
AUX+	7	I	CODEC analog auxiliary differential positive input. The DC level is Vcm and the full scale input is either 2.2 Vp-p ±5% or 1.1 Vp-p±5%, depending on the gain setting.

Name	Number	I/O	Definition
AUX-	8	I	CODEC analog auxiliary differential negative input. The DC level is $V_{cm}$ and the full scale input is either $2.2 V_{p-p} \pm 5\%$ or $1.1 V_{p-p} \pm 5\%$ , depending on the gain setting.
RXIN+	9	I	CODEC analog differential positive input. The DC level is $V_{cm}$ and the full scale input is either $2.2 V_{p-p} \pm 5\%$ or $1.1 V_{p-p} \pm 5\%$ , depending on the gain setting.
RXIN-	10	I	CODEC analog differential negative input. The DC level is $V_{cm}$ and the full scale input is either $2.2 V_{p-p} \pm 5\%$ or $1.1 V_{p-p} \pm 5\%$ , depending on the gain setting.
AVDD	11	I	Analog 5.0V supply.
VCM	12	O	Common mode voltage bypass. Has a range of $2.16V \pm 5\%$ . Bypass to VCBP with $0.1 \mu F$ ceramic chip capacitor parallel with $10 \mu F$ tantalum capacitor.
VCBP	13	I	Ground pin for VCM.
VREF	14	O	Voltage reference bypass. Has a range of $1.2356V \pm 5\%$ . Bypass to GND2 with $0.1 \mu F$ ceramic chip capacitor parallel with $10 \mu F$ tantalum capacitor.
VRBP	15	I	Ground pin for VREF.
TX+	16	O	CODEC positive analog output. The DC level is $V_{cm}$ and the full scale ac output is either $2.8V_{p-p} \pm 5\%$ or $1.4V_{p-p} \pm 5\%$ , depending on the gain setting. The maximum loading is $20k\Omega$ in parallel with $20 pF$ for modem applications. For audio applications with low-impedance load, the maximum distortion-free (THD $< -60$ db) current is $10 mA$ rms.
TX-	17	O	CODEC negative analog output. The DC level is $V_{cm}$ and the full scale ac output is either $2.8V_{p-p} \pm 5\%$ or $1.4V_{p-p} \pm 5\%$ , depending on the gain setting. The maximum loading is $20k\Omega$ in parallel with $20 pF$ for modem applications. For audio applications with low-impedance load, the maximum distortion-free (THD $< -60$ db) current is $10 mA$ rms.
VCMX	19	O	CODEC common mode reference voltage output pin. $2.16V \pm 5\%$ , maximum current $\pm 500 \mu A$ , maximum capacitive load $20 pF$ .
HCT	20	I	CODEC digital input mode control pin.
DGND	21, 44	--	Digital ground.
CTST	22	I	CODEC Sigma Delta Modulator test port output enable.
SI/SDATA_OUT	24	I	Serial port input (default). In AC-Link mode, is AC'97 serial data input pin.
SO	25	O	Serial port output without $V_{AUX}$ support.
SC/BITCLK	26	I/O, O	Serial port clock output. While input must be TTL-compatible, should be able to handle 3.3V input. In AC-Link mode, is 12.288 MHz serial data clock BITCLK output or input for secondary Codecs, depending on Codec configuration.
FS/SYNC	27	O	Serial port frame sync. In AC-Link mode, is 48 kHz fixed rate sample sync.
CKO	28	O	3.3V clock output.
XTALO	30	O	24.576 MHz crystal oscillator output.
XTALI	31	I	24.576 MHz crystal oscillator input.
RST#	32	I	Reset pin.
ID1	33	I	Modem AFE configuration strap pin 1. When pulled down internally with ID0 pin 35, helps set primary and secondary modem Codec ID configuration.
PWDN#	34	I	Powerdown pin (active-low).
ID0	35	I	Modem AFE configuration strap pin 0. When pulled down internally with ID1 pin 33, helps set primary and secondary modem Codec ID configuration.
SDATA_IN	36	O	Serial data output pin. Serial port output with $V_{AUX}$ support.
$V_{AUX}$	37	I	Power to device during implementation of the $D3_{cold}$ state required by PCI Power Management Interface specification.
RING#/GPIO_0	38	I/O	Ring In Detection (default). This pin is used for ring detect input during the $D3_{cold}$ state to drive the device back to its default power-up state. In AC-Link mode, is GPIO_0 I/O pin.
CALLID/GPIO_1	39	I, I/O	Caller ID (default output). Otherwise, is GPIO_1 I/O pin.
GPIO_2	40	I/O	Used for Voice Relay Control pin (output).
LCS/GPIO_3	41	I, I/O	Loop Current Sense pin (default input). Otherwise, is GPIO_3 I/O pin.
GPIO_4	42	I/O	Used for Ring Sensitivity (RISEN#) Control pin. (International DAA) (output).
GPIO_5	43	I/O	Used for Pulse Dialing Control pin (output).
OFFHK/GPIO_6	45	O, I/O	Off-Hook Relay Control pin (default output). Otherwise, is GPIO_6 I/O pin.
GPIO_7	46	I/O	Used for Current Limit Control pin (output).

Name	Number	I/O	Definition
GPIO_8	47	I/O	Used for Complex Impedance Mach Control pin (output).
GPIO_9	48	I/O	General purpose I/O pin.

**MECHANICAL DIMENSIONS**



Symbol	Description	Millimeters		
		Min	Nom	Max
D	Lead to lead, X-axis	8.75	9.0	9.25
D1	Package's outside, X-axis	6.90	7.0	7.10
E	Lead to lead, Y-axis	8.75	9.0	9.25
E1	Package's outside, Y-axis	6.90	7.0	7.10
A1	Board standoff	0.05	0.1	0.15
A2	Package thickness	1.35	1.40	1.45
b	Lead width	0.17	0.22	0.27
e	Lead pitch	-	0.5 BSC	-
L	Foot length	0.45	0.6	0.75
L1	Lead length	0.93	1.0	1.07
-	Foot angle	0 deg	-	7 deg
-	Coplanarity	-	-	0.1
-	Leads in X-axis	-	12	-
-	Leads in Y-axis	-	12	-
-	Total leads	-	48	-
-	Package type	-	LQFP	-



**ESS Technology, Inc.**  
**48401 Fremont Blvd.**  
**Fremont, CA 94538**  
**Tel: 510-492-1088**  
**Fax: 510-492-1098**

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