



rev 1.0

2.5V LCD Panel Reduction IC

Features

- FCC approved method of EMI attenuation.
- Provides up to 15dB of EMI suppression.
- Generates a low EMI spread spectrum clock of the input frequency.
- Input frequency range: 30MHz to 75 MHz.
- Optimized for 32.5MHz, 54MHz, and 65MHz.
- Internal loop filter minimizes external components and board space.
- Selectable spread deviation.
- SSON# control pin for spread spectrum enable and disable options.
- Low cycle-to-cycle jitter.
- 2.5V or 3.3V operating voltage range.
- TTL or CMOS compatible outputs.
- Ultra-low power CMOS design.
- Supports most mobile graphic accelerator and LCD timing controller specifications.
- Available in 8-pin SOIC and TSSOP.

Product Description

The L2042A is a versatile spread spectrum frequency modulator designed specifically for digital flat panel applications. The L2042A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of down stream clock and data dependent signals. The L2042A allows significant system

cost savings by reducing the number of circuit board layers ferrite beads, shielding and other passive components that are traditionally required to pass EMI regulations.

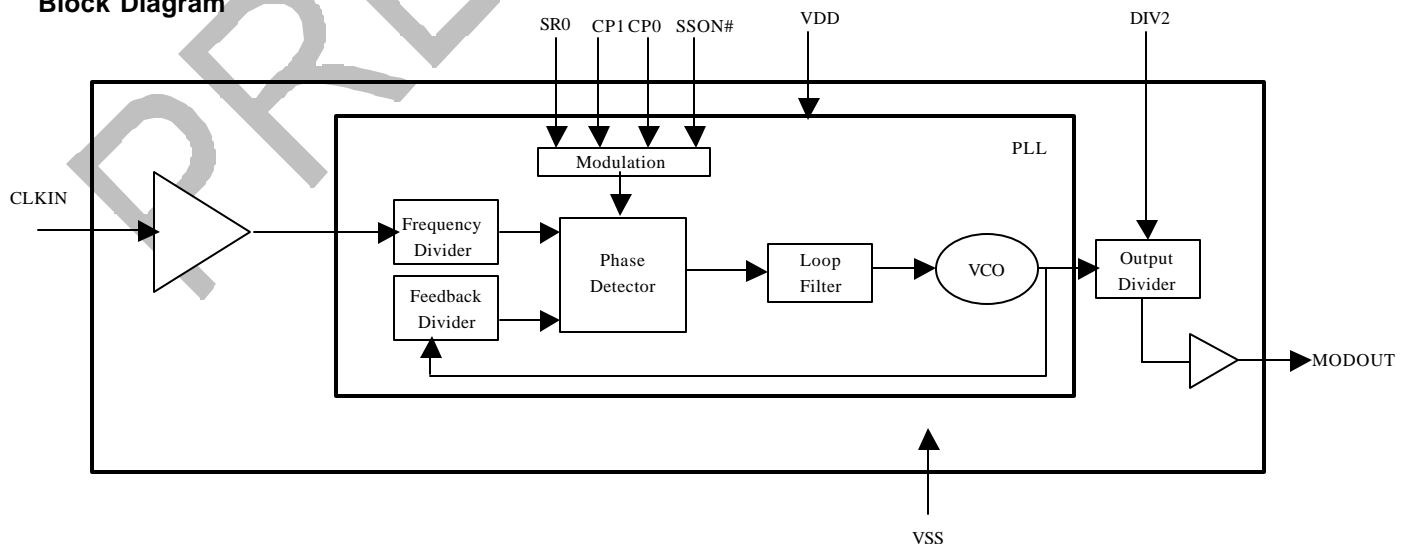
The L2042A uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all digital method.

The L2042A modulates the output of a single PLL in order to "spread" the bandwidth of a synthesized clock, and more importantly, decreases the peak amplitudes of its harmonics. This results in significantly lower system EMI compared to the typical narrow band signal produced by oscillators and most frequency generators. Lowering EMI by increasing a signal's bandwidth is called 'spread spectrum clock generation'.

Applications

The L2042A is targeted towards digital flat panel applications for Notebook PCs, Palm-size PCs, office automation equipment, and LCD monitors.

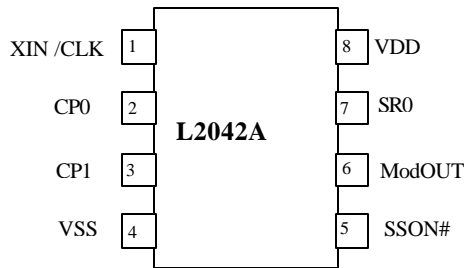
Block Diagram





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Pin Configuration



Pin Description

| Pin# | Pin Name | Type | Description |
|------|----------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | CLKIN | I | External reference frequency input. Connect to an externally generated reference signal. |
| 2 | CP0 | I | Digital logic input used to select charge pump current. Refer Modulation Selection Table. This pin has an internal pull-up resistor. |
| 3 | CP1 | I | Digital logic input used to select charge pump current. Refer Modulation Selection Table. This pin has an internal pull-up resistor. |
| 4 | VSS | P | Ground to entire chip. Connect to system ground. |
| 6 | SSON# | I | Digital logic input used to enable Spread Spectrum function (Active LOW). Spread Spectrum function enabled when LOW, disabled when HIGH. This pin has an internal pull-low resistor. |
| 7 | ModOUT | O | Spread spectrum clock output. |
| 5 | SR0 | I | Digital logic input used to select Spreading Range Refer Modulation Selection Table. This pin has an internal pull-up resistor. |
| 8 | VDD | P | Power supply for the entire chip (+2.5V or 3.3V) |

Modulation Selection Table

| CP0 | CP1 | SR0 | Spreading Range (± %) | | | | Modulation Rate |
|-----|-----|-----|-----------------------|-------|-------|-------|-----------------------------------|
| | | | 32.5MHz | 54MHz | 65MHz | 70MHz | |
| 0 | 0 | 0 | 0.49 | 0.92 | 0.88 | 0.87 | (F _{IN} /40) * 62.49 KHz |
| 0 | 0 | 1 | 1.71 | 1.48 | 1.37 | 1.32 | |
| 0 | 1 | 0 | 1.2 | 0.92 | 0.88 | 0.84 | |
| 0 | 1 | 1 | 1.69 | 1.48 | 1.37 | 1.33 | |
| 1 | 0 | 0 | 1.09 | 0.71 | 0.58 | 0.42 | |
| 1 | 0 | 1 | 1.68 | 1.14 | 0.9 | 0.73 | |
| 1 | 1 | 0 | 0.8 | 0.4 | 0.3 | 0.25 | |
| 1 | 1 | 1 | 1.29 | 0.62 | 0.48 | 0.37 | |



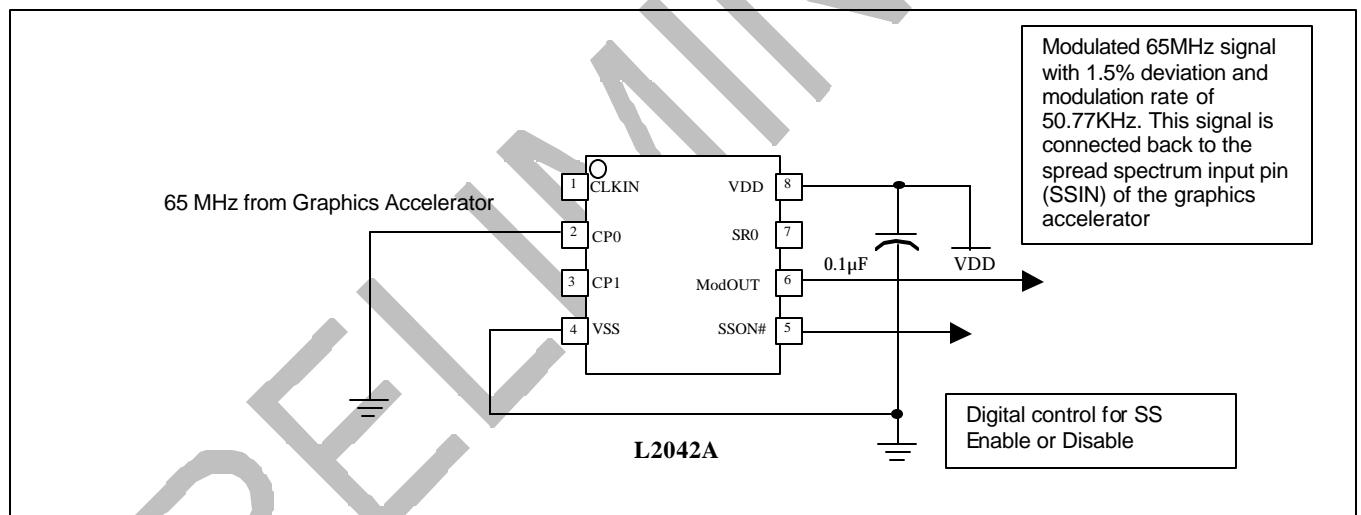
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Spread Spectrum

The *Modulation Selection Table* illustrates the possible spread spectrum options. The optimal setting should minimize system EMI to the fullest without affecting system performance. The spreading is described as a percentage deviation of the center frequency (Note: The center frequency is the frequency of the external reference input on CLKIN, Pin1).

Example:

The L2042A is designed for high-resolution flat panel applications and is able to support panel frequencies from 30 to 75 MHz. For a 65MHz pixel clock frequency, a spreading selection of CP0=0 and CP1=1 and SR0=1 gives a percentage deviation of TBD%. Refer *Modulation Selection Table*. This results in frequency on ModOUT being swept from TBD to TBD MHz. This particular example (See figure below) given here is a common EMI reduction method for notebook LCD panel and has already been implemented by most of the leading OEM and mobile graphic accelerator manufacturers.



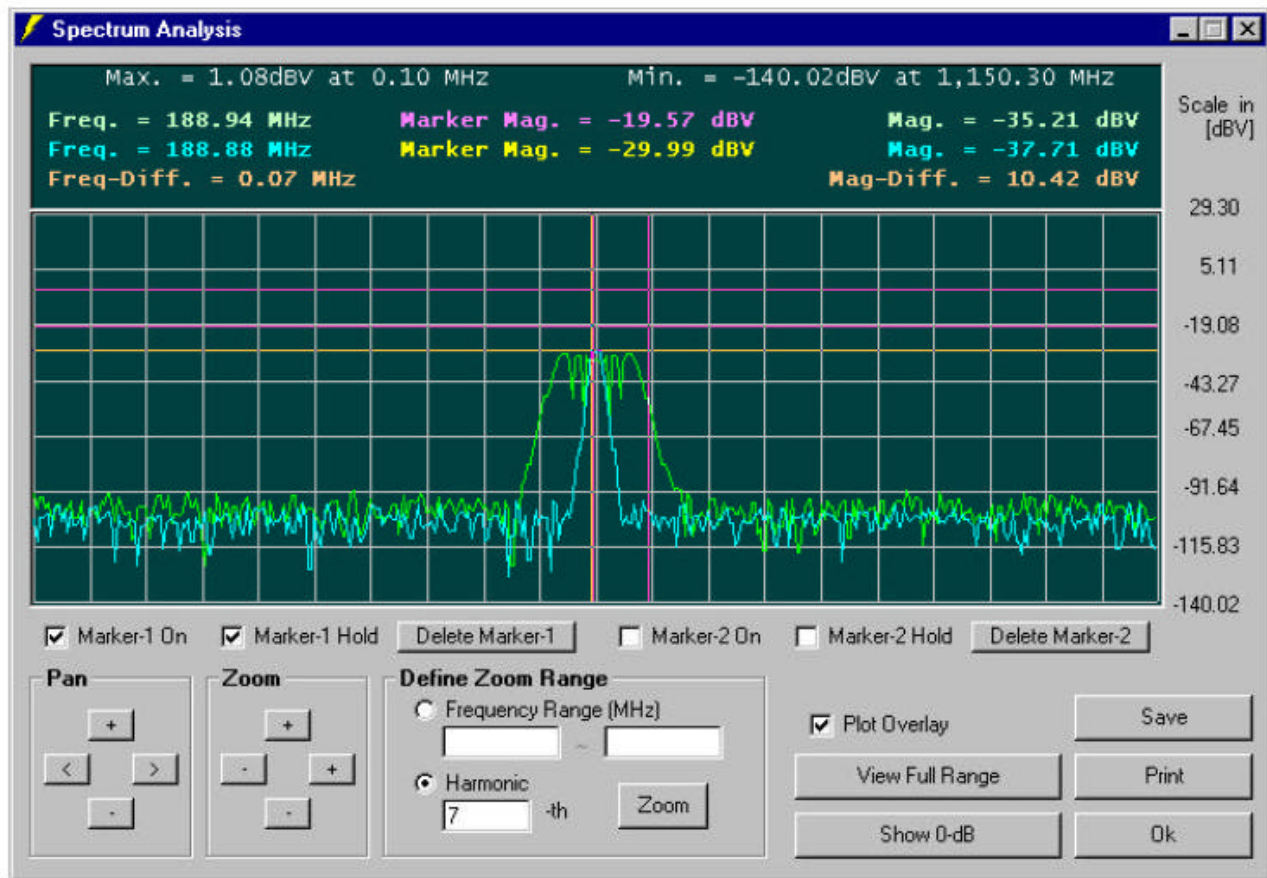


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EMC Software Simulation

By using Alliance's proprietary EMC simulation software – EMI-Lator®, radiated system level EMI analysis can be made easier, allowing quantitative measure on the benefits of Alliance's EMI reduction products. The simulation engine of this EMC software has already been characterized to correlate with the electrical characteristics of Alliance EMI reduction ICs. The figure below is an illustration of this simulation result.

Please visit our website at www.alsc.com for information on how to obtain a free copy and demonstration of EMI-Lator®.



Simulation results From EMI-Lator®



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Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit |
|------------------|----------------------------------------|---------------|------|
| V_{DD}, V_{IN} | Voltage on any pin with respect to GND | -0.5 to + 7.0 | V |
| T_{STG} | Storage temperature | -65 to +125 | °C |
| T_A | Operating temperature | 0 to 70 | °C |

Note: These are stress ratings only and functional operation is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

DC Electrical Characteristics

| Symbol | Parameter | Min | Typ | Max | Unit |
|-----------|-----------------------------------------------------------------------|-------------|------|----------------|------|
| V_{IL} | Input low voltage | GND – 0.3 | - | 0.8 | V |
| V_{IH} | Input high voltage | 2.0 | - | $V_{DD} + 0.3$ | V |
| I_{IL} | Input low current (pull-up resistors on inputs SR0, SR1, CP0 and CP1) | - | - | -35 | μA |
| I_{IH} | Input high current (pull-down resistor on input SSON#) | - | - | 35 | μA |
| V_{OL} | Output low voltage ($V_{DD} = 3.3V, I_{OL} = 20mA$) | - | - | 0.4 | V |
| V_{OH} | Output high voltage ($V_{DD} = 3.3V, I_{OH} = 20mA$) | 2.5 | - | - | V |
| I_{CC} | Dynamic supply current normal mode (2.5V, and 15pF loading) | TBD @ 30MHz | - | TBD @ 70MHz | mA |
| I_{DD} | Static supply current standby mode | - | 0.6 | - | mA |
| V_{DD} | Operating voltage | 2.25 | 2.85 | 3.7 | V |
| t_{ON} | Power up time (first locked clock cycle after power up) | - | 0.18 | - | mS |
| Z_{OUT} | Clock output impedance | - | 50 | - | |



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AC Electrical Characteristics

| Symbol | Parameter | Min | Typ | Max | Unit |
|------------|---------------------------------------------|-----|-----|-----|------|
| f_{IN} | Input frequency | 30 | - | 75 | MHz |
| f_{OUT} | Output frequency | 30 | - | 75 | MHz |
| t_{LH}^* | Output rise time (measured at 0.8V to 2.0V) | 0.7 | 0.9 | 1.1 | ns |
| t_{HL}^* | Output fall time (measured at 2.0V to 0.8V) | 0.6 | 0.8 | 1.0 | ns |
| t_{JC} | Jitter (cycle to cycle) | - | - | 360 | ps |
| t_D | Output duty cycle | 40 | 50 | 55 | % |

* t_{LH} and t_{HL} are measured into a capacitive load of 15pF

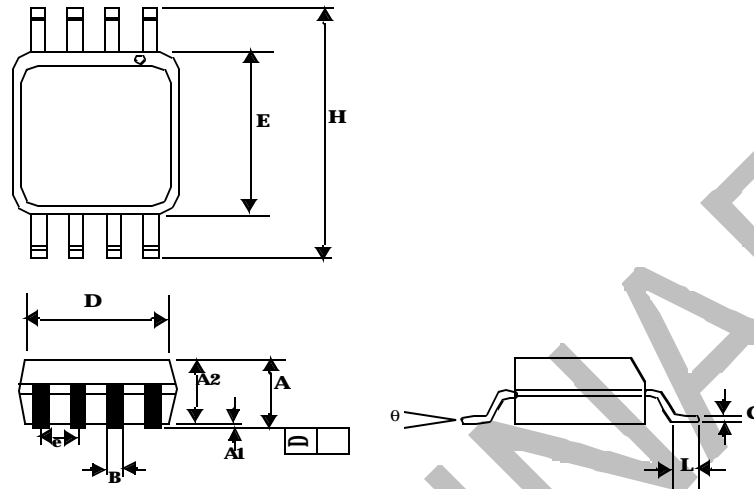
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Package Information

8-Pin SOIC

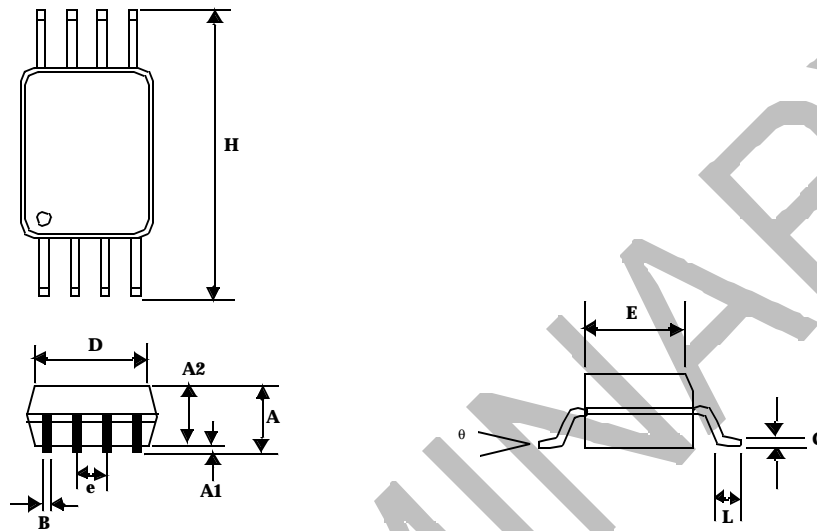


| Symbol | Dimensions in inches | | Dimensions in millimeters | |
|--------|----------------------|-------|---------------------------|------|
| | Min | Max | Min | Max |
| A | 0.057 | 0.071 | 1.45 | 1.80 |
| A1 | 0.004 | 0.010 | 0.10 | 0.25 |
| A2 | 0.053 | 0.069 | 1.35 | 1.75 |
| B | 0.012 | 0.020 | 0.31 | 0.51 |
| C | 0.004 | 0.01 | 0.10 | 0.25 |
| D | 0.186 | 0.202 | 4.72 | 5.12 |
| E | 0.148 | 0.164 | 3.75 | 4.15 |
| e | 0.050 BSC | | 1.27 BSC | |
| H | 0.224 | 0.248 | 5.70 | 6.30 |
| L | 0.012 | 0.028 | 0.30 | 0.70 |
| θ | 0° | 8° | 0° | 8° |



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8-Pin TSSOP



| Symbol | Dimensions in inches | | Dimensions in millimeters | |
|--------|----------------------|-------|---------------------------|------|
| | Min | Max | Min | Max |
| A | 0.047 | | | 1.10 |
| A1 | 0.002 | 0.006 | 0.05 | 0.15 |
| A2 | 0.031 | 0.041 | 0.80 | 1.05 |
| B | 0.007 | 0.012 | 0.19 | 0.30 |
| C | 0.004 | 0.008 | 0.09 | 0.20 |
| D | 0.114 | 0.122 | 2.90 | 3.10 |
| E | 0.169 | 0.177 | 4.30 | 4.50 |
| e | 0.026 BSC | | 0.65 BSC | |
| H | 0.244 | 0.260 | 6.20 | 6.60 |
| L | 0.018 | 0.030 | 0.45 | 0.75 |
| è | 0° | 8° | 0° | 8° |



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Ordering Codes

| Part Number | Marking | Package type | Qty/reel | Temperature |
|-------------|---------|----------------------------|----------|-------------|
| L2042A-08ST | L2042A | 8 PIN SOIC, TUBE | | 0°C To 70°C |
| L2042A-08SR | L2042A | 8-PIN SOIC, TAPE AND REEL | 2,500 | 0°C To 70°C |
| L2042A-08TT | L2042A | 8-PIN TSSOP, TUBE | | 0°C To 70°C |
| L2042A-08TR | L2042A | 8-PIN TSSOP, TAPE AND REEL | 2,500 | 0°C To 70°C |

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