



# Linear Integrated Circuit

KA3842A

KA3842AM

## CURRENT-MODE PWM CONTROLLER

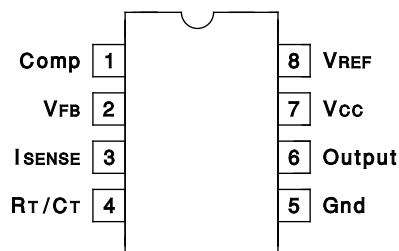
The KA3842A KA3842AM are fixed frequency current-mode PWM controller. They are specially designed for OFF-Line and DC-to-DC converter applications with minimal external components. These integrated circuits feature a trimmed oscillator for precise duty cycle control, a temperature compensated reference, high gain error amplifier, current sensing comparator, and a high current totempole output ideally suited for driving a power MOSFET.

Protection circuitry includes built under-voltage lockout and current limiting.

The KA3842A, KA3842AM have UVLO thresholds of 16 V(on) and 10 V (off).

The KA3842A, KA3842AM operate within 100% duty cycle. The KA3842A has been proven in applications using the same external components as Motorola's parts, among others. The KA3842AM has been optimized for compatibility with Samsung's parts. Many applications can use either KA3842A or KA3842AM. The KA3842A, KA3842AM have Start-Up Current 0.45 mA.

## PIN CONNECTION



SO-8

DIP-8

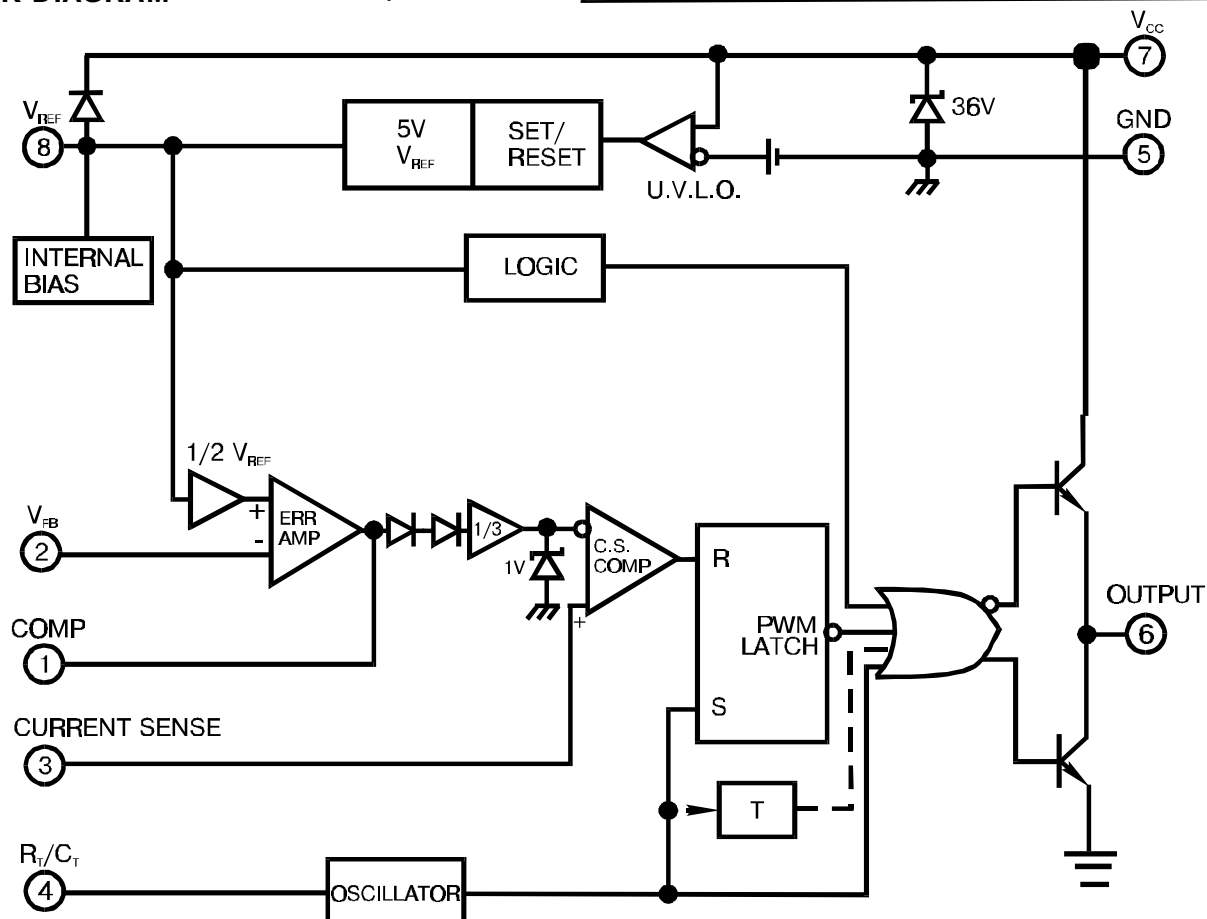
## FEATURES

- Low Start-Up Current
- Maximum Duty Cycle
- U/V Lockout With Hysteresis
- Operating Frequency Up To 500kHz

## ordering information

| Device    | Package | Operating temperature |
|-----------|---------|-----------------------|
| KA3842AM  | SO-8    | 0 to +70°C            |
| KA3842AMM | SO-8    | "                     |
| KA3842AN  | DIP-8   | "                     |
| KA3842AMN | DIP-8   | "                     |

## BLOCK DIAGRAM



## Absolute Maximum Ratings

| Characteristic                                 | Symbol            | Value            | Unit |
|------------------------------------------------|-------------------|------------------|------|
| Supply Voltage                                 | $V_{CC}$          | 30               | V    |
| Output Current                                 | $I_O$             | $\pm 1$          | A    |
| Analog Inputs                                  | $V_I$             | -0.3 to $V_{CC}$ | V    |
| Error Amp Output Sink Current                  | $I_{SINK (E.A.)}$ | 10               | mA   |
| Power Dissipation ( $T_A = 25^\circ\text{C}$ ) | $P_O$             | 1                | W    |



**Electrical characteristics (\*V<sub>CC</sub>=15V, R<sub>T</sub>=10kΩ, C<sub>T</sub>=3.3nF, T<sub>A</sub>=0°C to +70°C, unless otherwise specified)**

| Characteristics                           | Symbol                | Test Condition                                        | Min  | Typ  | Max  | Unit             |
|-------------------------------------------|-----------------------|-------------------------------------------------------|------|------|------|------------------|
| Reference Section                         |                       |                                                       |      |      |      |                  |
| Reference Output Voltage                  | V <sub>REF</sub>      | T <sub>J</sub> = 25°C, I <sub>REF</sub> = 1 mA        | 4.9  | 5.0  | 5.1  | V                |
| Line Regulation                           | ΔV <sub>REF</sub>     | 12V ≤ V <sub>CC</sub> ≤ 25 V                          |      | 6.0  | 20   | mV               |
| Load Regulation                           | ΔV <sub>REF</sub>     | 1 mA ≤ I <sub>REF</sub> ≤ 20mA                        |      | 6.0  | 25   |                  |
| Short Circuit Output Current              | I <sub>SC</sub>       | T <sub>A</sub> = 25°C                                 |      | -100 | -180 | mA               |
| Oscillator Section                        |                       |                                                       |      |      |      |                  |
| Oscillation Frequency                     | f                     | T <sub>J</sub> = 25°C                                 | 47   | 52   | 57   | KHz              |
| Frequency Change with Voltage             | Δf/ΔV <sub>CCF</sub>  | 12V ≤ V <sub>CC</sub> ≤ 25 V                          |      | 0.05 | 1.0  | %                |
| Oscillator Amplitude                      | V <sub>(OSC)</sub>    |                                                       |      | 1.6  |      | V <sub>p-p</sub> |
| Error Amplifier Section                   |                       |                                                       |      |      |      |                  |
| Input Bias Current                        | I <sub>BIAS</sub>     |                                                       |      | -0.1 | -2   | μA               |
| Input Voltage                             | V <sub>I(E.A)</sub>   | V <sub>1</sub> = 2.5V                                 | 2.42 | 2.5  | 2.58 | V                |
| Open Loop Voltage Gain                    | G <sub>VO</sub>       | 2V ≤ V <sub>O</sub> ≤ 4V                              | 65   | 90   |      | dB               |
| Power Supply Rejection Ratio              | PSRR                  | 12V ≤ V <sub>CC</sub> ≤ 25 V                          | 60   | 70   |      |                  |
| Output Sink Current                       | I <sub>SINK</sub>     | V <sub>2</sub> = 2.7V, V <sub>1</sub> = 1.1V          | 2    | 7    |      | mA               |
| Output Source Current                     | I <sub>SOURCE</sub>   | V <sub>2</sub> = 2.3V, V <sub>1</sub> = 5V            | -0.5 | -1.0 |      | mA               |
| High Output Voltage                       | V <sub>OH</sub>       | V <sub>2</sub> = 2.3V, R <sub>L</sub> = 15KΩ to GND   | 5.0  | 6.0  |      | V                |
| Low Output Voltage                        | V <sub>OL</sub>       | V <sub>2</sub> = 2.7V, R <sub>L</sub> = 15KΩ to PIN 8 |      | 0.8  | 1.1  |                  |
| Current Sense Section                     |                       |                                                       |      |      |      |                  |
| Gain                                      | G <sub>V</sub>        | (Note 1 & 2)                                          | 2.85 | 3.0  | 3.15 | V/V              |
| Maximum Input Signal                      | V <sub>I(MAX)</sub>   | V <sub>1</sub> = 5V (Note1)                           | 0.9  | 1.0  | 1.1  | V                |
| Power Supply Rejection Ratio              | PSRR                  | 12V ≤ V <sub>CC</sub> ≤ 25 V (Note 1)                 |      | 70   |      | dB               |
| Input Bias Current                        | I <sub>BIAS</sub>     |                                                       |      | -3.0 | -10  | μA               |
| Output Section                            |                       |                                                       |      |      |      |                  |
| Low Output Voltage                        | V <sub>OL</sub>       | I <sub>SINK</sub> = 20 mA                             |      | 0.08 | 0.4  | V                |
|                                           |                       | I <sub>SINK</sub> = 200 mA                            |      | 1.4  | 2.2  |                  |
| High Output Voltage                       | V <sub>OH</sub>       | I <sub>SINK</sub> = 20 mA                             | 13   | 13.5 |      |                  |
|                                           |                       | I <sub>SINK</sub> = 200 mA                            | 12   | 13.0 |      |                  |
| Rise Time                                 | t <sub>R</sub>        | T <sub>J</sub> = 25°C, C <sub>L</sub> = 1nF (Note 3)  |      | 45   | 150  | nS               |
| Fall Time                                 | t <sub>F</sub>        | T <sub>J</sub> = 25°C, C <sub>L</sub> = 1nF (Note 3)  |      | 35   | 150  |                  |
| Under-Voltage Lockout Section             |                       |                                                       |      |      |      |                  |
| Start Theshold                            | V <sub>TH(ST)</sub>   |                                                       | 14.5 | 16.0 | 17.5 | V                |
|                                           |                       |                                                       |      |      |      |                  |
| Min. Operating Voltage<br>(After Turn On) | V <sub>OPR(min)</sub> |                                                       | 8.5  | 10   | 11.5 | V                |
|                                           |                       |                                                       |      |      |      |                  |
| PWM Section                               |                       |                                                       |      |      |      |                  |
| Max. Duty Cycle                           | D <sub>(MAX)</sub>    |                                                       | 95   | 97   | 100  | %                |
|                                           |                       |                                                       |      |      |      |                  |
| Min. Duty Cycle                           | D <sub>(MAX)</sub>    |                                                       |      |      | 0    |                  |
| Total Standby Current                     |                       |                                                       |      |      |      |                  |
| Start-Up Current                          | I <sub>ST</sub>       |                                                       |      | 0.17 | 0.3  | mA               |
|                                           |                       |                                                       |      |      |      |                  |
| Operating Supply Current                  | I <sub>CC (OPR)</sub> | V <sub>3</sub> = V <sub>2</sub> = 0V                  |      | 14   | 17   |                  |
| Zener Voltage                             | V <sub>Z</sub>        |                                                       | 30   | 38   |      | V                |

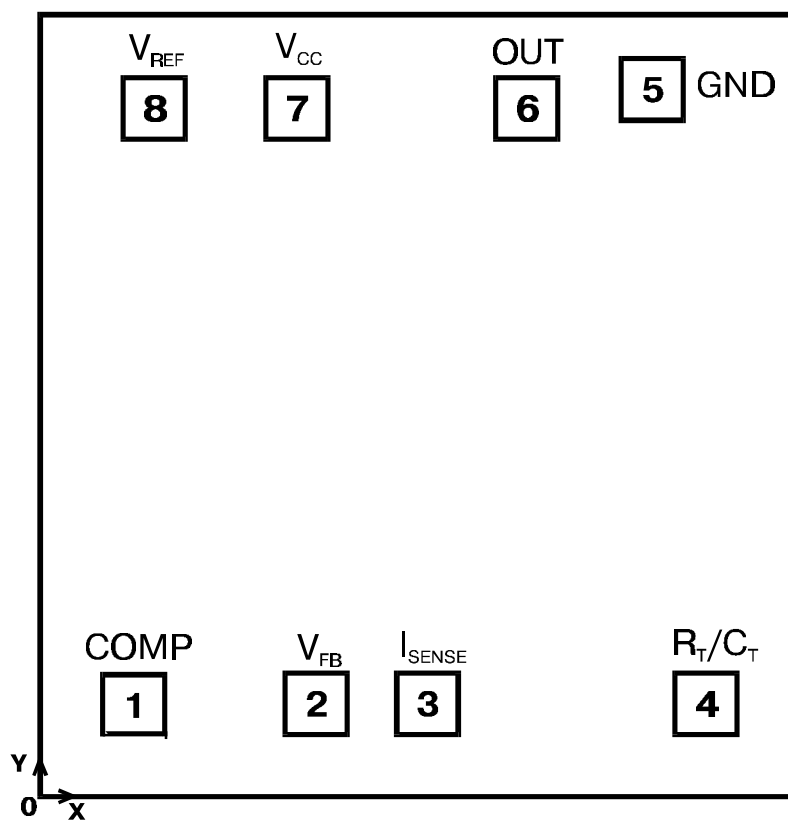
\* Adjust V<sub>CC</sub> above the start threshold before setting at 15V

Note 1: Parameter measured at trip point of I<sub>ATH</sub> with V<sub>2</sub>=0

Note 2: Gain defined as A=ΔV<sub>1</sub>/ΔV<sub>3</sub> ; 0 ≤ V<sub>3</sub> ≤ 0.8V

Note 3: These parameters, although guaranteed, are not 100% tested in production.

## Pad Location



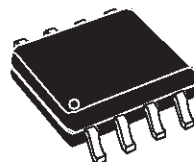
Chip size: 2.38 x 1.63 mm

| Pad<br>N | Coordinates $\mu\text{m}$ |     | Pad<br>N | Coordinates $\mu\text{m}$ |      |
|----------|---------------------------|-----|----------|---------------------------|------|
|          | X                         | Y   |          | X                         | Y    |
| 1        | 90                        | 110 | 5        | 1680                      | 1450 |
| 2        | 1050                      | 110 | 6        | 1310                      | 1410 |
| 3        | 1310                      | 110 |          |                           |      |
| 4        | 2000                      | 150 | 7        | 815                       | 1410 |
|          |                           |     | 8        | 460                       | 1390 |

| DIM.  | mm         |      |      | inch  |       |       |
|-------|------------|------|------|-------|-------|-------|
|       | MIN.       | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A     |            |      | 1.75 |       |       | 0.069 |
| a1    | 0.1        |      | 0.25 | 0.004 |       | 0.010 |
| a2    |            |      | 1.65 |       |       | 0.065 |
| a3    | 0.65       |      | 0.85 | 0.026 |       | 0.033 |
| b     | 0.35       |      | 0.48 | 0.014 |       | 0.019 |
| b1    | 0.19       |      | 0.25 | 0.007 |       | 0.010 |
| C     | 0.25       |      | 0.5  | 0.010 |       | 0.020 |
| c1    | 45° (typ.) |      |      |       |       |       |
| D (1) | 4.8        |      | 5.0  | 0.189 |       | 0.197 |
| E     | 5.8        |      | 6.2  | 0.228 |       | 0.244 |
| e     |            | 1.27 |      |       | 0.050 |       |
| e3    |            | 3.81 |      |       | 0.150 |       |
| F (1) | 3.8        |      | 4.0  | 0.15  |       | 0.157 |
| L     | 0.4        |      | 1.27 | 0.016 |       | 0.050 |
| M     |            |      | 0.6  |       |       | 0.024 |
| S     | 8° (max.)  |      |      |       |       |       |

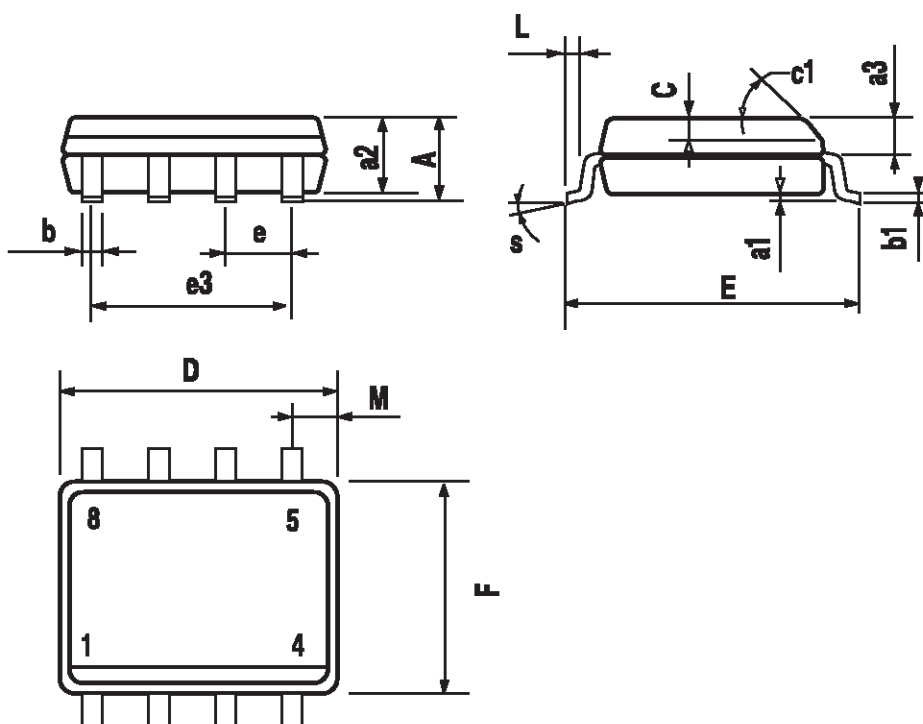
(1) D and F do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm (.006inch)

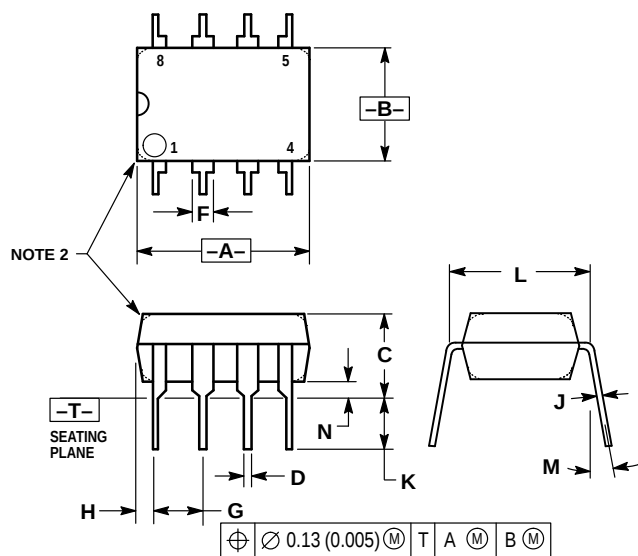
## OUTLINE AND MECHANICAL DATA



**KA3842AM**  
**KA3842AMM**

**SO8**





## NOTES:

1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 9.40        | 10.16 | 0.370     | 0.400 |
| B   | 6.10        | 6.60  | 0.240     | 0.260 |
| C   | 3.94        | 4.45  | 0.155     | 0.175 |
| D   | 0.38        | 0.51  | 0.015     | 0.020 |
| F   | 1.02        | 1.78  | 0.040     | 0.070 |
| G   | 2.54 BSC    |       | 0.100 BSC |       |
| H   | 0.76        | 1.27  | 0.030     | 0.050 |
| J   | 0.20        | 0.30  | 0.008     | 0.012 |
| K   | 2.92        | 3.43  | 0.115     | 0.135 |
| L   | 7.62 BSC    |       | 0.300 BSC |       |
| M   | 10°         |       | 10°       |       |
| N   | 0.76        | 1.01  | 0.030     | 0.040 |

**KA3842AN**  
**KA3842AMN**

**Attention: M=10°**