



# R&E International

A Subsidiary of Microchip Technology Inc.

## RE46C117

DC to DC Converter and Piezoelectric Horn Driver  
Product Specification

### General Description

The RE46C117 is intended for use in 3V or 4.5V battery or battery-backed applications. The circuit features a DC-to-DC up-converter and driver circuit suitable for driving a piezoelectric horn

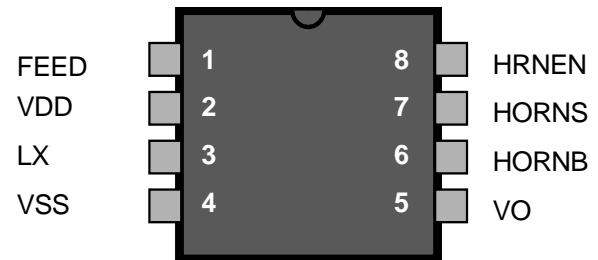
### Applications

Smoke detectors  
CO Detectors  
Personal Security Products  
Electronic Toys

### Features

- Low Quiescent Current
- 10V Up Converter
- Low Horn Driver Ron
- Available in Standard Packaging or RoHS Compliant Pb Free Packaging

### Pin Configuration



### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                       | SYMBOL     | VALUE                | UNITS |
|---|------------|----------------------|-------|
| Supply Voltage                                  | $V_{DD}$   | 5                    | V     |
| Output Voltage                                  | $V_{OUT}$  | 12                   | V     |
| Input Voltage Range Except FEED                 | $V_{in}$   | -.3 to $V_{dd} + .3$ | V     |
| FEED Input Voltage Range                        | $V_{infd}$ | -10 to +22           | V     |
| Input Current except FEED                       | $I_{in}$   | 10                   | mA    |
| Operating Temperature                           | $T_A$      | 0 to 50              | °C    |
| Storage Temperature                             | $T_{STG}$  | -55 to 125           | °C    |
| Continuous Operating Current (HornS, HornB, VO) | $I_O$      | 40                   | mA    |

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and operation at these conditions for extended periods may affect device reliability.

This product utilizes CMOS technology with static protection; however proper ESD prevention procedures should be used when handling this product. Damage can occur when exposed to extremely high static electrical charge

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## Electrical Characteristics

Limits apply at  $V_{dd}=3V$ ,  $V_{ss}=0V$ ,  $C_{vo}=10\mu F$ ,  $T_A=0^{\circ}C$  to  $50^{\circ}C$ , unless otherwise noted.  
Typical values are at  $T_A=27^{\circ}C$ .

| Parameter                | Symbol  | Test Conditions  | Limits |     |      | Units   |
|--------------------------|---------|--|--------|-----|------|---------|
|                          |         |  | Min    | Typ | Max  |         |
| Supply Voltage           | Vdd     | Operating  | 2.0    | —   | 5.0  | V       |
| Standby Supply Current   | Iddstby | HRNEN low; No loads; DC-DC Running                             | —      | 14  | —    | $\mu A$ |
| Quiescent Supply Current | Iddq    | HRNEN low; No loads; $VO=5V$ ; $V_{Ix}=0.5V$                   | —      | 7   | 10.5 | $\mu A$ |
| Quiescent Ivo            | Ivoq    | Same conditions as above for Iddq                              | —      | 4   | 7.5  | $\mu A$ |
| Input Leakage            | Iin     | HRNEN Input, $V_{in}=V_{DD}$ or $V_{SS}$                       | -100   | —   | 100  | nA      |
|                          | Iihf    | FEED=+22V; $VO=10V$  | —      | 20  | 50   | $\mu A$ |
|                          | Iilf    | FEED=-10V; $VO=10V$  | -50    | -15 | —    | $\mu A$ |
| Input Voltage Low        | Vil     | HRNEN Input  | —      | —   | 1    | V       |
| Input Voltage High       | Vih     | HRNEN Input  | 2.3    | —   | —    | V       |
| Output Low Voltage       | Vol1    | HORNB or HORNS; $I_{out}=16mA$ ; $V_{dd}=3V$                   | —      | .3  | .5   | V       |
| Output High Voltage      | Voh1    | HORNB or HORNS; $VO=10V$ ; $I_{out}=-16mA$ ; $V_{dd}=HRNEN=3V$ | 9.5    | 9.7 | —    | V       |
| VO Output Voltage        | Vvo1    | $V_{dd}=3V$ ; $HRNEN=3V$ ; $I_{out}=10mA$                      | 8.5    | 10  | 11   | V       |
|                          | Vvo2    | $V_{dd}=3V$ ; $HRNEN=0V$ ; $I_{out}=10mA$                      | 3.5    | 4   | 4.4  | V       |
| VO Efficiency            | Voeff1  | $I_{load}=10mA$ ; $V_{dd}=3V$ ; $HRNEN=0V$                     | —      | 85  | —    | %       |
|                          | Voeff2  | $I_{load}=100\mu A$ ; $V_{dd}=3V$ ; $HRNEN=0V$                 | —      | 75  | —    | %       |
| Brownout Threshold       | Vobvt   | Falling edge of VO   | 3.2    | 3.6 | 4.0  | V       |

### Notes on Electrical Characteristics:

- DC-DC converter in high boost mode (normal  $VO=10V$ ) can draw current pulses of greater than 1 Amp and is therefore very sensitive to series resistance. Critical components of this resistance are the inductor DC resistance, the internal resistance of the battery and the resistance in the connections from the inductor to the battery, from the inductor to the LX pin and from the Vss2 pin to the battery. In order to function properly under full load at  $V_{dd}=2V$ , the total of the inductor and the interconnect resistances should not exceed 0.3 ohm. The internal battery resistance should be no more than 0.5 ohm and a low ESR capacitor of 10 $\mu F$  or more should be connected in parallel with the battery to average current over the boost converter cycle.
- In the Electrical Characteristics Table, wherever a specific VO value is listed under test conditions, the VO is forced externally with the inductor disconnected and the DC-DC converter is not running.
- The brown-out threshold voltage is the VO voltage at which the horn will be disabled.
- The limits shown are 100% tested at 25C only. Test limits are guard-banded based on temperature characterization to guarantee compliance at temperature extremes.

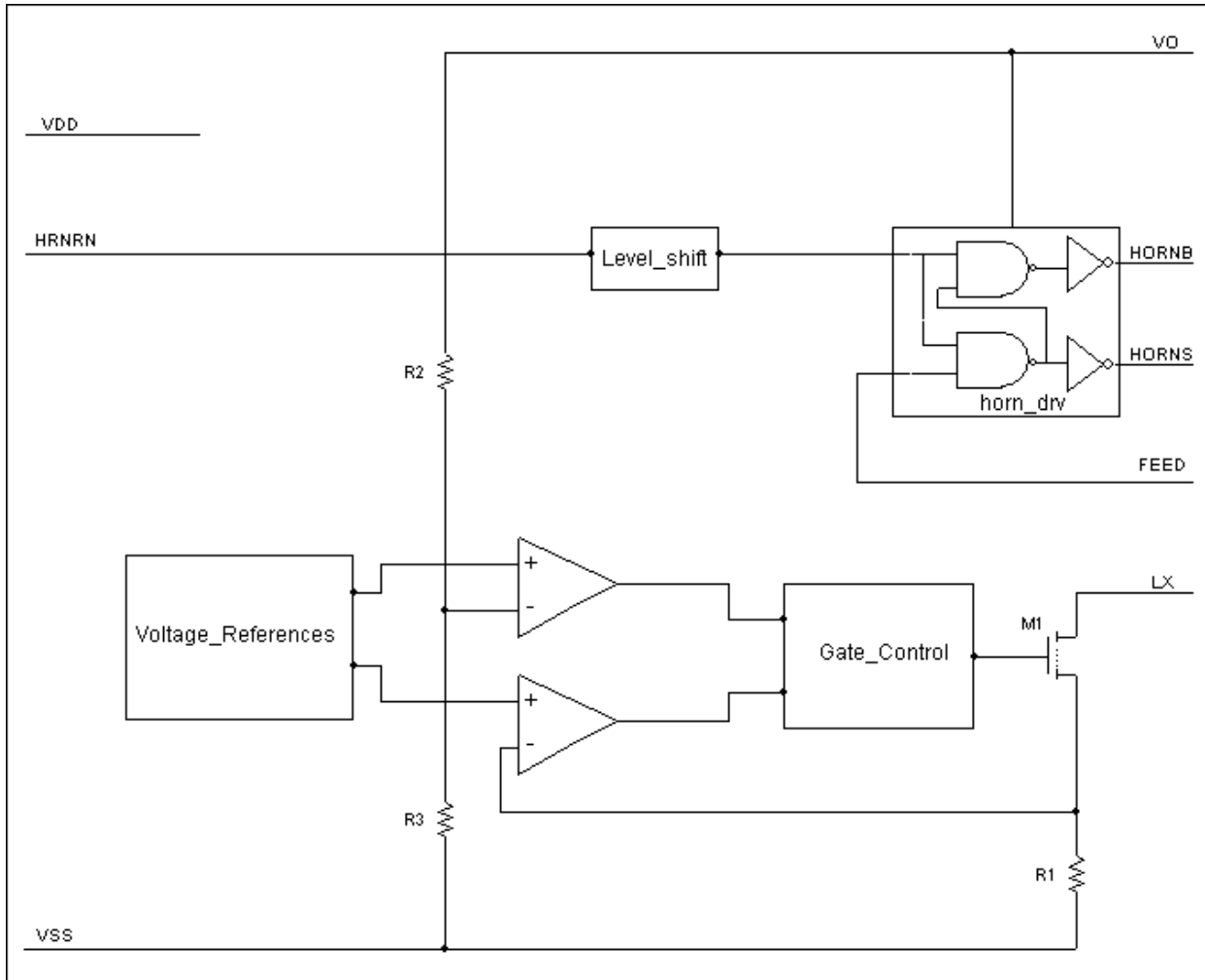
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## Functional Block Diagram



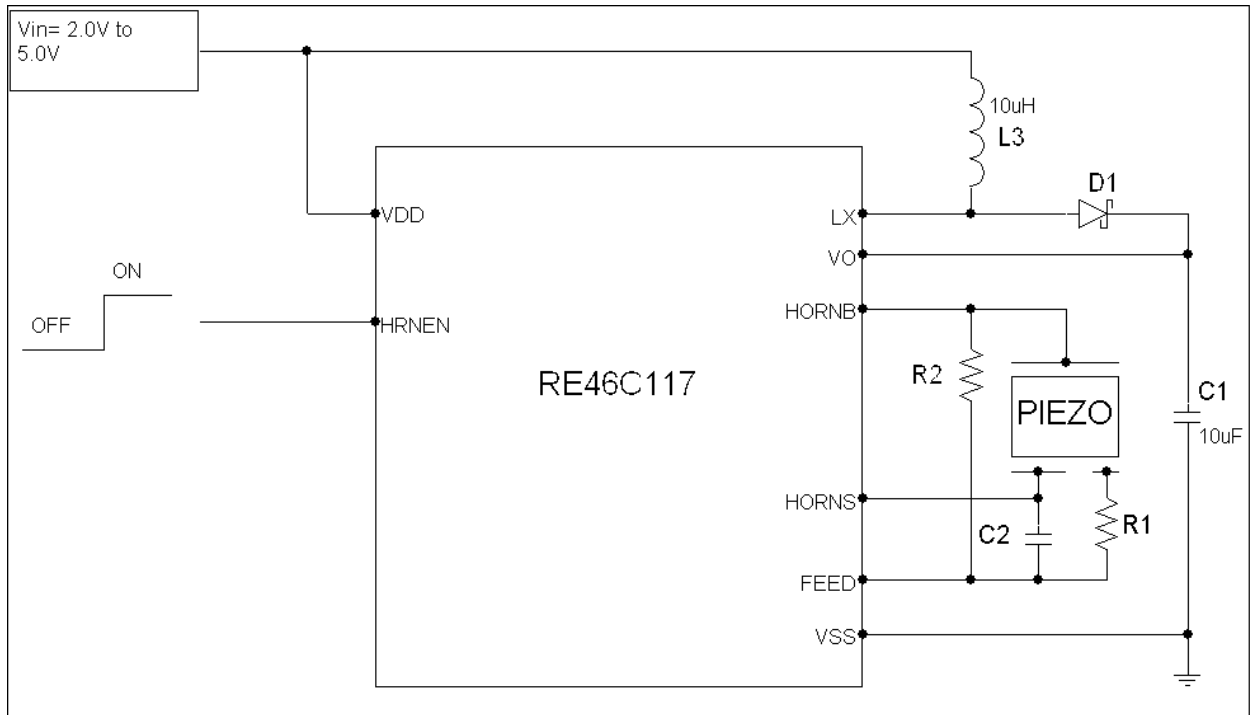
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## Typical Application Circuit



### Notes:

1/ Schottky diode D1 must have maximum peak current rating of at least 1.5A and for best results should have forward voltage spec of less than 0.5V at 1 Amp.

2/ Inductor L3 must have maximum peak current rating of at least 1.5A and for best results should have DC resistance of less than 0.5 ohm.

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## **Notes**

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## JONHON

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