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LV5762QA

Bi-CMOS IC

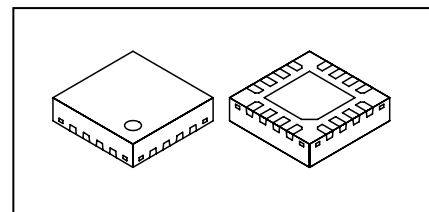
Step-down Switching Regulator

Overview

LV5762QA is a 1ch step-down voltage switching regulator.

Function

- 1ch step-down switching regulator controller
 - Load-independent soft start circuit
 - Frequency fold back function
 - ON/OFF function
 - Built-in pulse-by-pulse OCP circuit.
- It is detected by using ON resistance of an external MOS.



VQFN16J (3.0 × 3.0)

Specifications

Absolute Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|---------------------|------------|------------|------|
| Supply voltage | V _{IN} max | | 45 | V |
| Allowable power dissipation | P _d max | *) | 0.65 | W |
| Operating temperature | T _{opr} | | -40 to 85 | °C |
| Storage temperature | T _{stg} | | -55 to 150 | °C |

* Specified board: 24.0mm × 15.0mm × 1.6mm, glass epoxy board (2-layer).

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Recommended Operating Conditions at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-------------------------------|-----------------|------------|----------|------|
| Supply voltage range 1 | V _{IN} | | 8 to 42 | V |
| Error amplifier input coltage | V _{FB} | | 0 to 1.6 | V |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

LV5762QA

Electrical Characteristics at Ta = 25°C, VIN = 24V

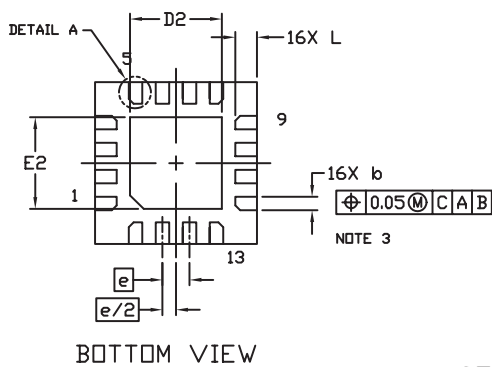
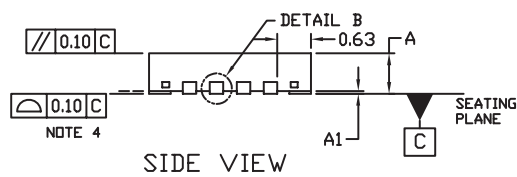
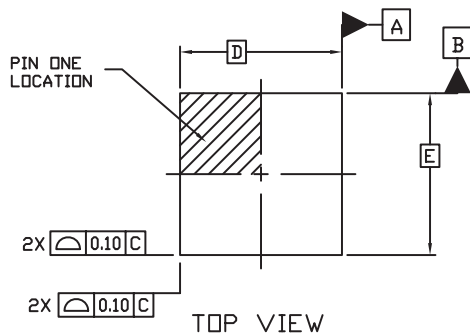
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|----------------------|---------------------------------------|-----------------------|-------|-----------------|------|
| | | | min | typ | max | |
| Reference voltage block | | | | | | |
| Internal reference voltage | V _{ref} | Including offset of E/A | 0.695 | 0.705 | 0.715 | V |
| 5V power supply | V _{DD} | I _{OUT} =0 to 5mA | 4.7 | 5.2 | 5.7 | V |
| Triangular waveform oscillator block | | | | | | |
| Oscillation frequency | f _{OSC} | | 870 | 1000 | 1130 | kHz |
| Frequency variation | f _{OSC_DV} | V _{IN} =8 to 42V | | 1 | | % |
| Oscillatory frequency fold back detection voltage | V _{OSC_FB} | Detect IN voltage after the end of SS | | 0.5 | | V |
| Oscillatory frequency after fold back | f _{OSC_FB} | | 100 | 150 | 200 | kHz |
| ON/OFF circuit block | | | | | | |
| IC start-up voltage | V _{EN_on} | V _{IN} =8 to 42V | | 3.4 | 4.3 | V |
| IC off voltage | V _{EN_off} | V _{IN} =8 to 42V | 1.1 | 1.3 | | V |
| Soft start circuit block | | | | | | |
| Soft start source current | I _{SS_SC} | EN > 5V, SS=0V | 3.4 | 4.3 | 5.2 | μA |
| Soft start sink current | I _{SS_SK} | EN < 1V, V _{DD} =5V, SS=1V | | 2 | | mA |
| Voltage to end the soft start function | V _{SS_END} | | 0.7 | 0.9 | 1.1 | V |
| UVLO circuit block | | | | | | |
| UVLO lock release voltage | V _{UVLO} | | 7.0 | 7.4 | 7.8 | V |
| UVLO hysteresis | V _{UVLO_H} | | | 0.6 | | V |
| Error amplifier | | | | | | |
| Input bias current | I _{EA_IN} | | | | 100 | nA |
| Error amplifier transconductance | GEA | | 1000 | 1400 | 1800 | μA/V |
| Common mode input voltage range | V _{EA_R} | V _{IN} =8 to 42V | 0.0 | | 1.6 | V |
| Sink output current | I _{EA_OSK} | FB=1.0V | | −100 | | μA |
| Source output current | I _{EA_osc} | FB=0V | | 100 | | μA |
| Current detection amplifier gain | GISNS | | | 1.3 | | |
| Over current limiter circuit block | | | | | | |
| Reference current | I _{LIM} | | −10% | 20 | +10% | μA |
| Over current detection comparator offset voltage | V _{LIM_OFS} | | −5 | | +5 | mV |
| Over current detection comparator common mode input range | | | V _{IN} −0.45 | | V _{IN} | V |
| PWM comparator | | | | | | |
| Input threshold voltage | V _{tmax} | Duty cycle=DMAX | 0.95 | 1.1 | 1.25 | V |
| | V _{t0} | Duty cycle=0% | 0.35 | 0.45 | 0.55 | V |
| Maximum ON duty | DMAX | | 75 | 80 | | % |
| Output block | | | | | | |
| Output stage ON resistance (the upper side) | R _{ONH} | | | 5 | | Ω |
| Output stage ON resistance (the under side) | R _{ONL} | | | 5 | | Ω |
| Output stage ON current (the upper side) | I _{ONH} | | 240 | | | mA |
| Output stage ON current (the under side) | I _{ONL} | | 240 | | | mA |
| The whole device | | | | | | |
| Standby current | I _{CCS} | EN < 1V | | | 60 | μA |
| Mean consumption current | I _{CCA} | EN > 5V | | 3.6 | | mA |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

Package Dimensions

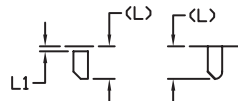
unit : mm

WQFN16 3x3, 0.5P / VQFN16J
CASE 510AX
ISSUE A

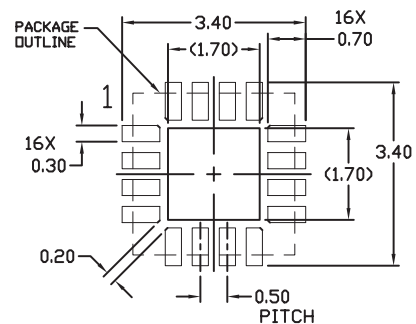


NOTES:

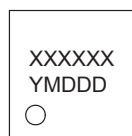
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.



| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN. | MAX. |
| A | --- | 0.80 |
| A1 | 0.00 | 0.05 |
| b | 0.20 | 0.30 |
| D | 3.00 BSC | |
| D2 | 1.70 REF | |
| E | 3.00 BSC | |
| E2 | 1.70 REF | |
| e | 0.50 BSC | |
| L | 0.30 | 0.50 |
| L1 | 0.00 | 0.15 |



GENERIC MARKING DIAGRAM*



XXXXXX = Specific Device Code

Y = Year

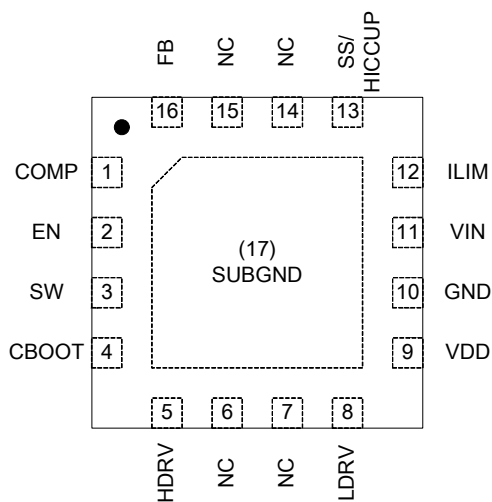
M = Month

DDD = Additional Traceability Data

*This information is generic. Please refer to device data sheet for actual part marking.
Pb-Free indicator, "G" or microdot "▪", may or may not be present.

LV5762QA

Pin Assignment



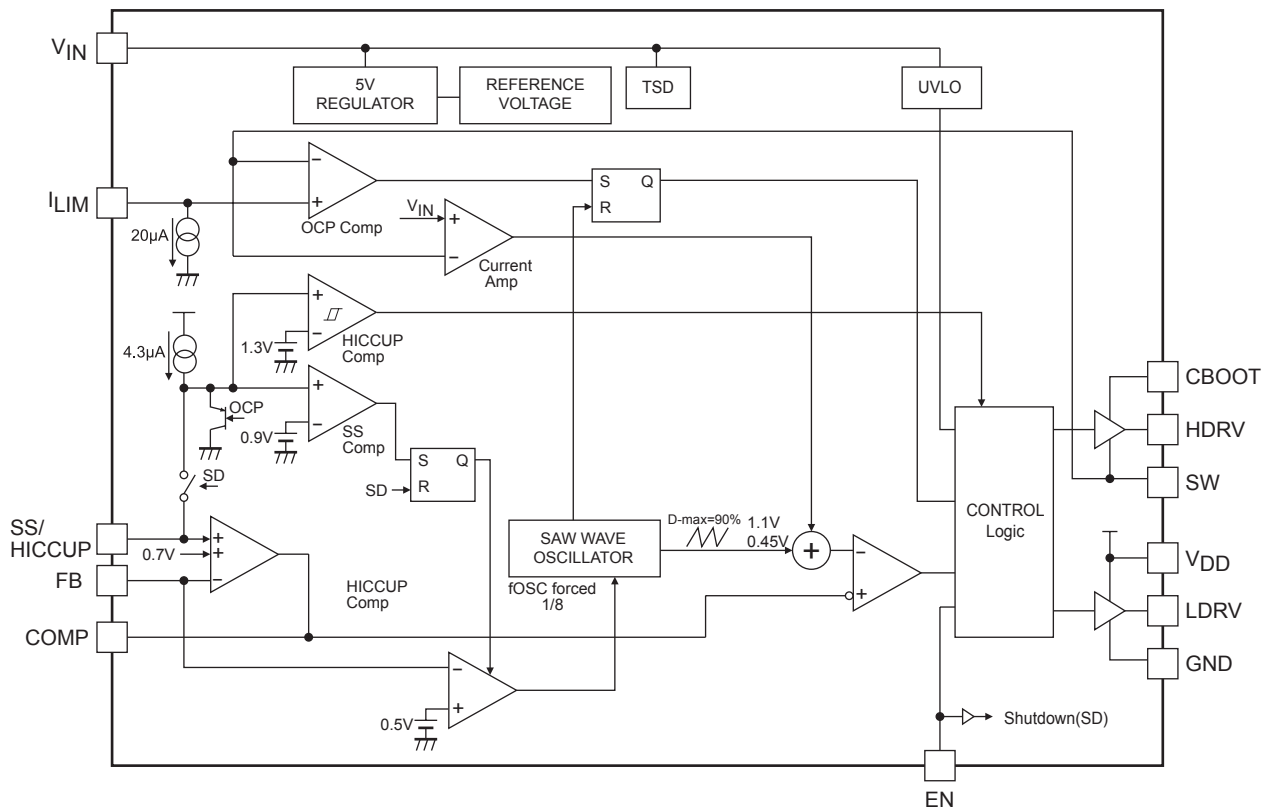
(TOP VIEW)

Pin Function

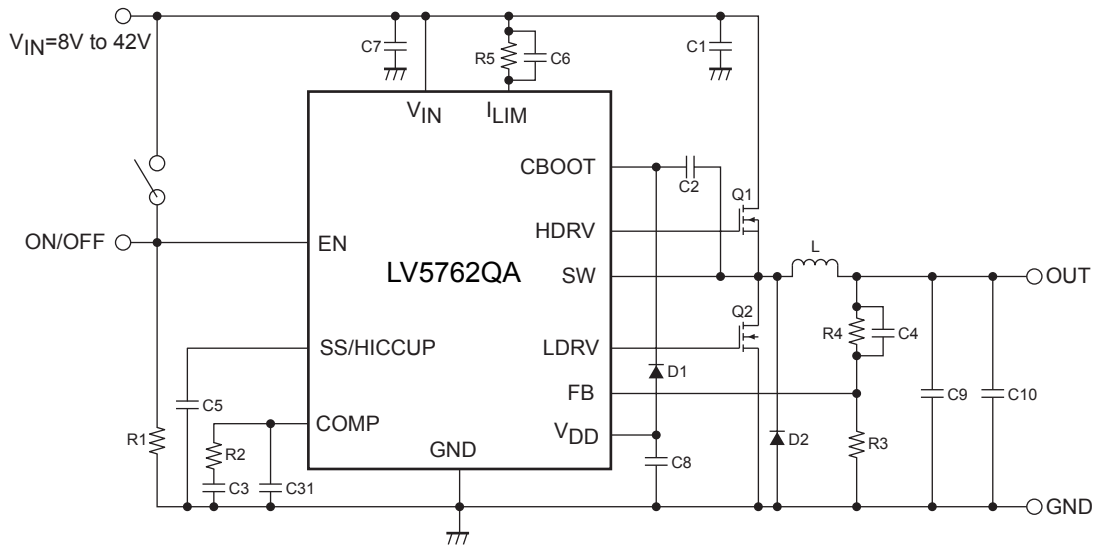
| Pin No. | Pin name | Function |
|---------|------------------|--|
| 1 | COMP | Error amplifier output pin. Connect a phase compensation circuit between this pin and GND. |
| 2 | EN | ON/OFF pin. |
| 3 | SW | Pin to connect with switching node. The source of Nch MOSFET connects to this pin. |
| 4 | CBOOT | Bootstrap capacity connection pin. This pin becomes a GATE drive power supply of an external Nch MOSFET. Connect a bypath capacitor between CBOOT and SW. |
| 5 | HDRV | An external the upper MOSFET gate drive pin. |
| 6 | NC | No connection |
| 7 | | |
| 14 | | |
| 15 | | |
| 8 | LDRV | An external the lower MOSFET gate drive pin. |
| 9 | V _{DD} | Power supply pin for an external the MOS-FET gate drive. |
| 10 | GND | Ground pin. Each reference voltage is based on the voltage of the ground pin. |
| 11 | V _{IN} | Power supply pin. This pin is monitored by UVLO function. When the voltage of this pin becomes 7.8V or more by UVLO function, The IC starts and the soft start function operates. |
| 12 | I _{LIM} | Reference current pin for current detection. The sink current of about 20μA flows to this pin. When a resistance is connected between this pin and V _{IN} outside and the voltage applied to the SW pin is lower than the voltage of the terminal side of the resistance, the upper Nch MOSFET is off by operating the current limiter comparator. This operation is reset with respect to each PWN pulse. |
| 13 | SS/HICCUP | Pin to connect a capacitor for soft start. A capacitor for soft start is charged by using the voltage of about 4.3μA. This pin ends the soft start period by using the voltage of about 0.9V and the frequency fold back function becomes active. |
| 16 | FB | Error amplifier reverse input pin. By operating the converter, the voltage of this pin becomes 0.7V. The voltage in which the output voltage is divided by an external resistance is applied to this pin. Also, the oscillation frequency become one-eighth when the voltage of this pin becomes 0.4V or less after soft start function. |
| 17 | SUBGND | Connect to GND |

LV5762QA

Block Diagram



Sample Application Circuit



ORDERING INFORMATION

| Device | Package | Shipping (Qty / Packing) |
|-------------|-------------------------------------|--------------------------|
| LV5762QA-NH | VQFN16J (Pb-Free / Halogen Free) | 2000 / Tape & Reel |

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