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LA8153QA

Monolithic Linear IC Down Converter IC for Digital CATV

Overview

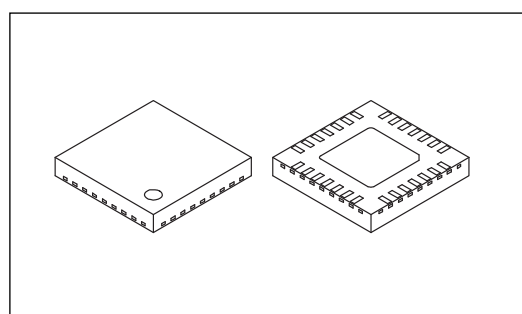
The LA8153QA is a down converter IC for digital CATV. It accepts RF input frequencies 50MHz to 150MHz. It has the power save function.

Functions

- RF Mixer
- RF AGC amplifier
- Driver for SAW filter
- IF AGC amplifier
- IF Post amplifier for ADC
- Power save

Application

- Digital Cable Set Top Boxes
- HDTV Receivers



VQFN28U

Specifications

Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|---------------------|--|-----------------|------|
| Maximum supply voltage | V _{CC} max | Pins 3, 6, 17, 18, 27, 28 | 3.6 | V |
| Circuit voltage | V max | Pin 11 | V _{CC} | V |
| Allowable power dissipation | Pd max | Ta ≤ 70°C, Mounted on a specified board. * | 750 | mW |
| Operating temperature | Topr | | -20 to +70 | °C |
| Storage temperature | Tstg | | -55 to +150 | °C |

* Specified board: 40mm × 50mm × 0.8mm, FR4, 4 layer, without soldering the Exposed Die Pad to PCB.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Recommended Operating Conditions at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|--------------------------------|--------------------|---------------------------|------------|------|
| Recommended Supply Voltage | V _{CC} | Pins 3, 6, 17, 18, 27, 28 | 3.3 | V |
| Operating Supply Voltage Range | V _{CC} OP | Pins 3, 6, 17, 18, 27, 28 | 3.2 to 3.4 | V |

ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

LA8153QA

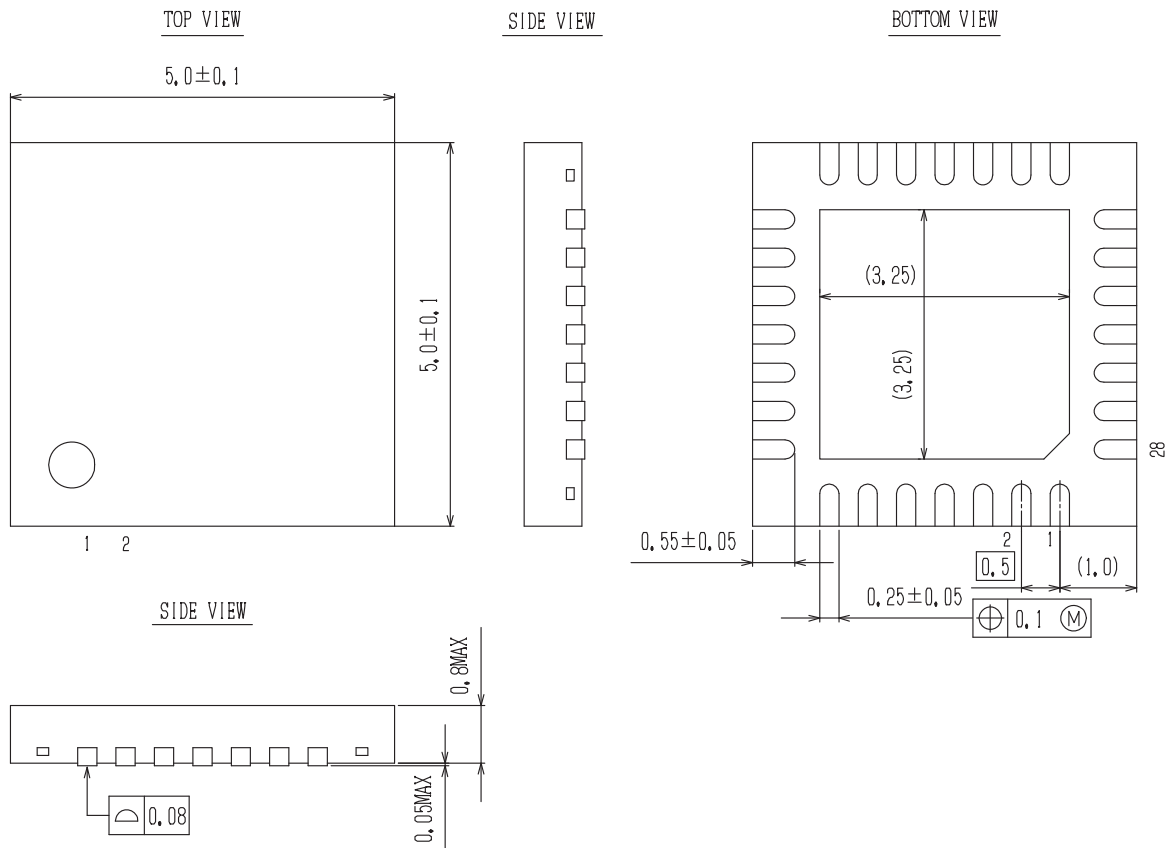
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 3.3\text{V}$

| Parameter | Symbol | Pin No. | Conditions | Ratings | | | Unit |
|--------------------------|-------------------|----------------------------|---|---------|-----|-----|------|
| | | | | min | typ | max | |
| Circuit Current | I_{total} | 3, 6, 17, 18, 27, 28 | No Signal | 77 | 100 | 130 | mA |
| Power Save Current | I_{ps} | 3, 6, 17, 18, 27, 28 | No Signal | 17 | 23 | 32 | mA |
| RF Input Frequency Range | $f(\text{RF})$ | 8, 9 | $f_c = -3\text{dB}$ | 50 | | 150 | MHz |
| RF AGC Range | GR1 | 27, 28 | $V_{11}=2.5$ to 0V | 40 | 48 | | dB |
| Mixer Conversion Gain | CG1 | 27 / 8 28 / 8 | $V_{11}=2.5\text{V}$ | 23 | 26 | 29 | dB |
| Mixer Inter Modulation 1 | IM3 (1) | 27 / 8 28 / 8 | Input= $70\text{dB}\mu\text{V}$ $V_{11}=2.5\text{V}$ | 40 | 50 | | dB |
| IF Input Frequency Range | $f(\text{IF})$ | 23, 24 | $f_c = -3\text{dB}$ | 30 | | 100 | MHz |
| IF Amplifier Gain | G(AGC) | 19 / 23, 24 20 / 23, 24 | $V_{11}=2.5\text{V}$ | 50 | 54 | 58 | dB |
| IF Inter Modulation 2 | IM3(2) | 19 / 23, 24 20 / 23, 24 | Output= $105\text{dB}\mu\text{V}$ ($99\text{dB}\mu\text{V} / \text{tone}$) | 50 | 60 | | dB |
| IF AGC Range | GR2 | 19, 20 | IF Output Level $< \pm 1\text{dB}$ | 3 | 5 | | dB |
| IF AGC Output Level | $V_O(\text{IF})1$ | 19 | Single output | | 0.5 | | Vp-p |
| IF AGC Output Level | $V_O(\text{IF})2$ | 20 | Single output | | 0.5 | | Vp-p |

Package Dimensions

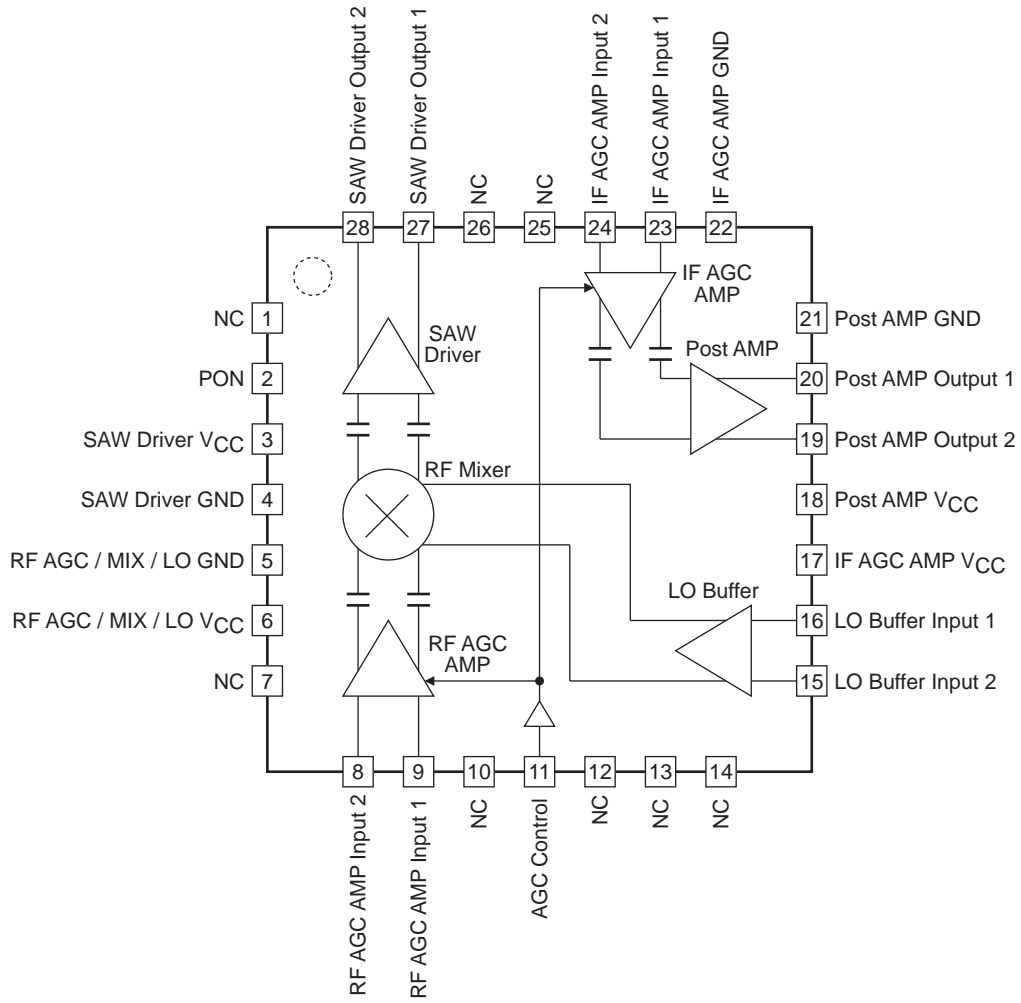
unit : mm

VQFN28 5x5, 0.5P / VQFN28U
CASE 508AV
ISSUE O



LA8153QA

Pin Assignment and Block Diagram



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Pin Description at $T_a = 25^\circ\text{C}$, $V_{CC} = 3.3\text{V}$

| Pin No. | Pin voltage | Description | Equivalent circuit |
|------------|-------------|----------------------------|--------------------|
| 1 | - | NC (connect to GND) | |
| 2 | 0.3V | PON | |
| 3 | 3.3V | SAW Driver V_{CC} | |
| 4 | 0V | SAW Driver GND | |
| 5 | 0V | RF AGC / MIX / LO GND | |
| 6 | 3.3V | RF AGC / MIX / LO V_{CC} | |
| 7 | - | NC (connect to GND) | |
| 8 | 1.35V | RF AGC Amplifier Input | |
| 9 | 1.35V | | |
| 10 | - | NC (connect to GND) | |
| 11 | - | AGC Control | |
| 12, 13, 14 | - | NC (connect to GND) | |
| 15 | 1.6V | LO Buffer Inputs | |
| 16 | 1.6V | | |
| 17 | 3.3V | IF AGC Amplifier V_{CC} | |
| 18 | 3.3V | Post Amplifier V_{CC} | |
| 19 | 1.0V | Post Amplifier Outputs | |
| 20 | 1.0V | | |

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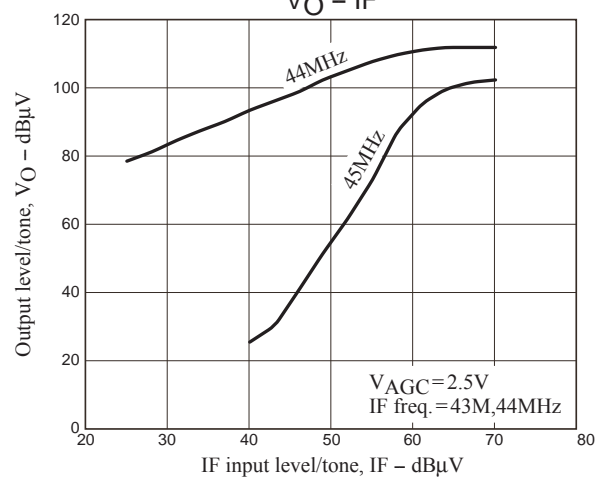
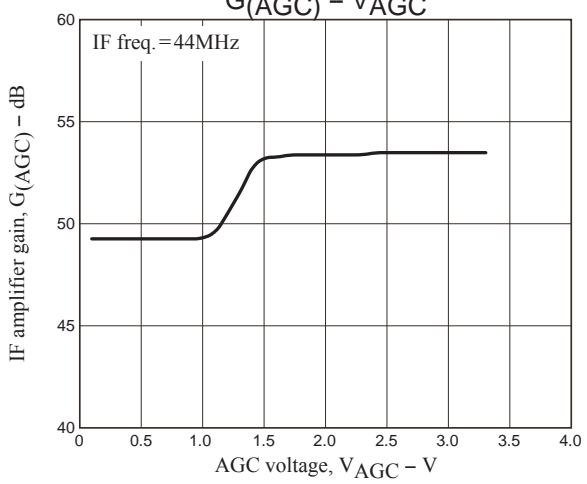
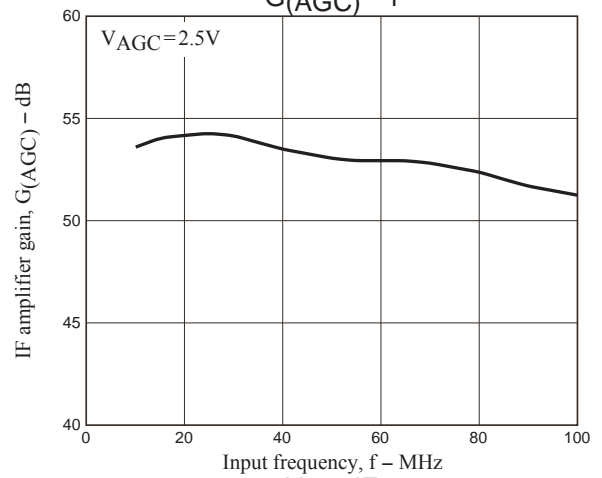
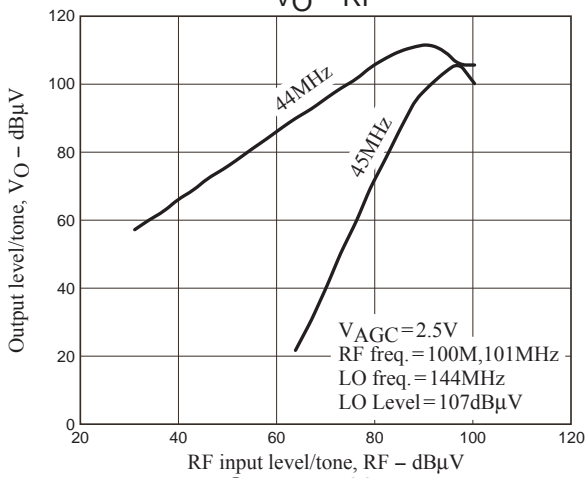
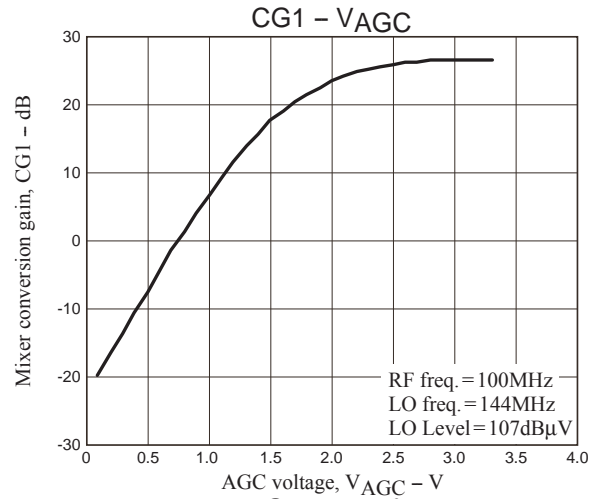
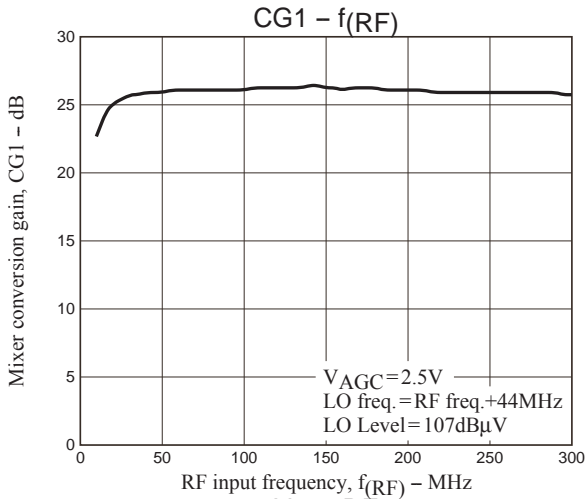
LA8153QA

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| Pin No. | Pin voltage | Description | Equivalent circuit |
|----------|--------------|-------------------------|--------------------|
| 21 | 0V | Post Amplifier GND | |
| 22 | 0V | IF AGC Amplifier GND | |
| 23 24 | 2.5V 2.5V | IF AGC Amplifier Inputs | |
| 25, 26 | – | NC (connect to GND) | |
| 27 28 | 2.4V 2.4V | SAW Driver Outputs | |

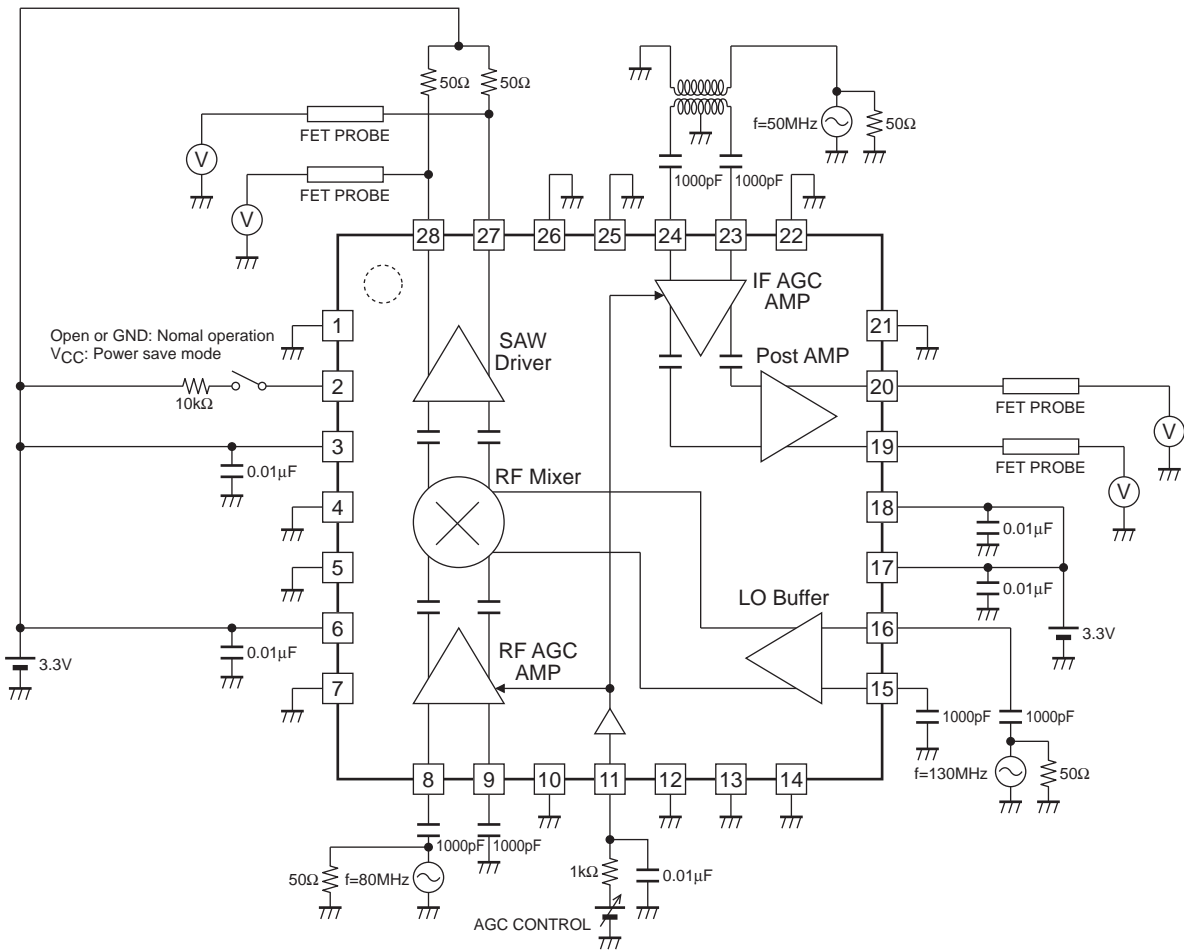
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AC Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 3.3\text{V}$



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Test Circuit



Attention

Electrostatic capacity of some pins is $\pm 100V$ under the condition of $C = 200pF$ and $R = 0\Omega$, so please handle carefully enough.

ORDERING INFORMATION

| Device | Package | Shipping (Qty / Packing) |
|-------------|--|--------------------------|
| LA8153QA-WH | VQFN28 5x5, 0.5P / VQFN28U (Pb-Free / Halogen Free) | 2000 / Tape & Reel |

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