



ON Semiconductor®

<http://onsemi.com>

LA8153QA

Monolithic Linear IC

Down Converter IC for Digital CATV

Overview

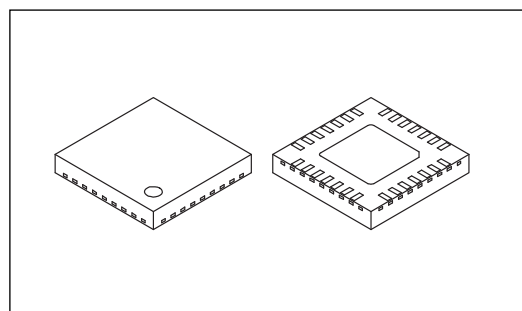
The LA8153QA is a down converter IC for digital CATV. It accepts RF input frequencies 50MHz to 150MHz. It has the power save function.

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 $T_a = 25^\circ\text{C}$

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	P_d max	$T_a \leq 70^\circ\text{C}$, Mounted on a specified board. *	750	mW
Operating temperature	T_{opr}		-20 to +70	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* Specified board: 40mm $\times$ 50mm $\times$ 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 $T_a = 25^\circ\text{C}$

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

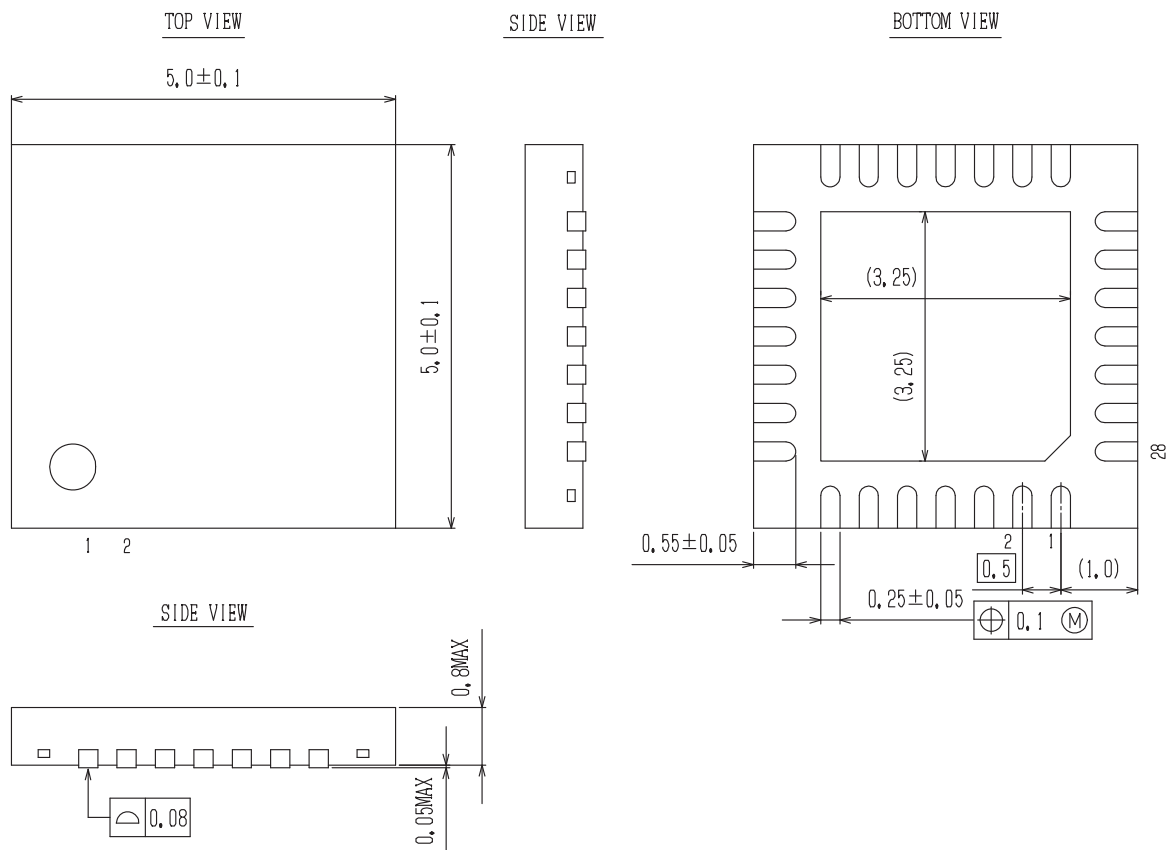
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 3.3\text{V}$

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	$G(\text{AGC})$	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= $105\text{dB}\mu\text{V}$ ($99\text{dB}\mu\text{V}$ / 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

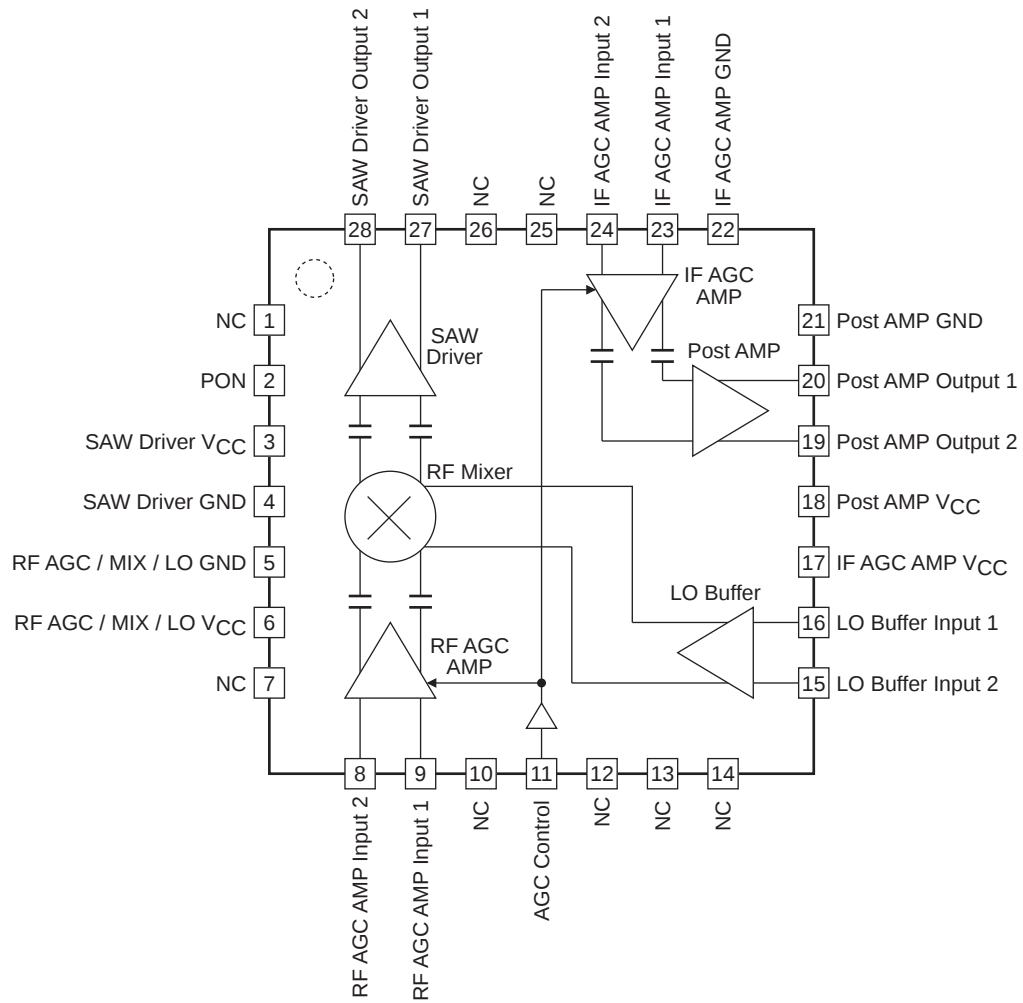
Package Dimensions

unit : mm

VQFN28 5x5, 0.5P / VQFN28U
CASE 508AV
ISSUE 0



Pin Assignment and Block Diagram



LA8153QA

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		

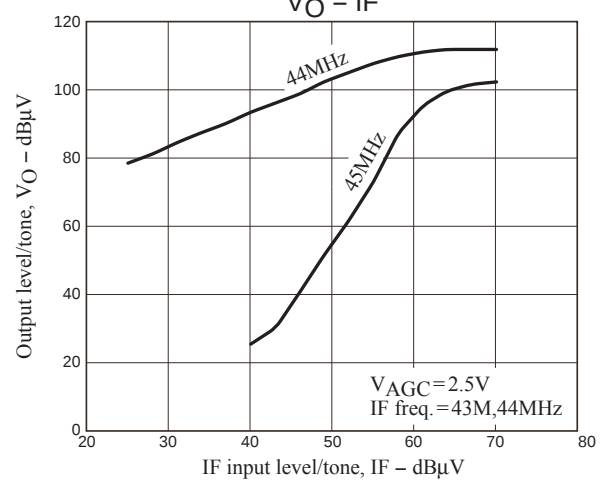
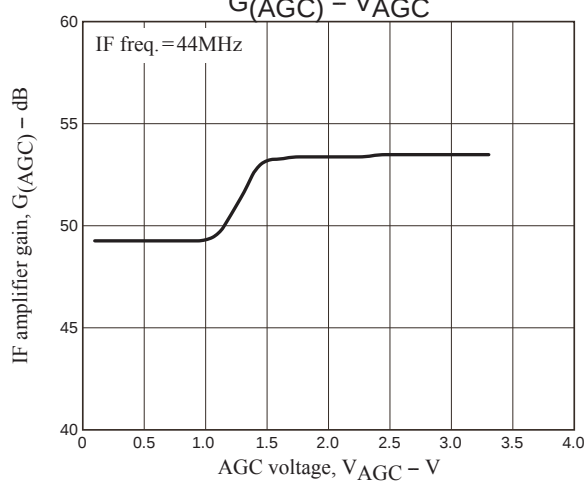
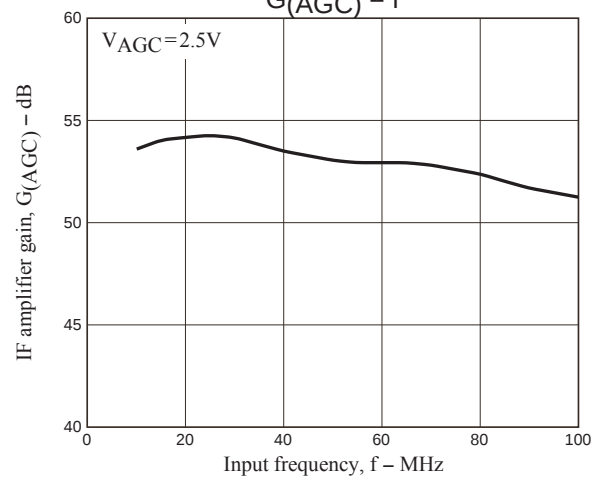
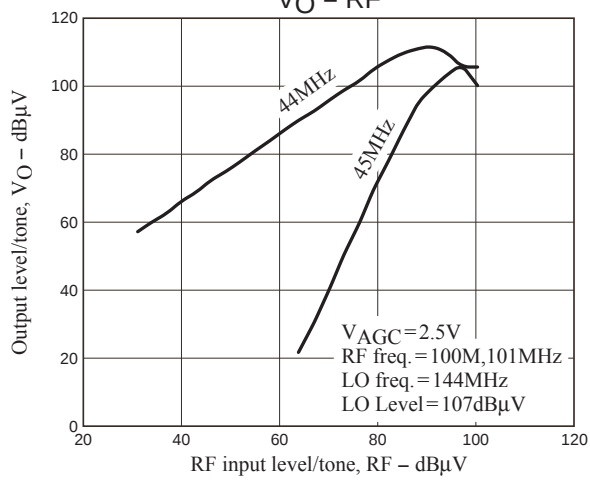
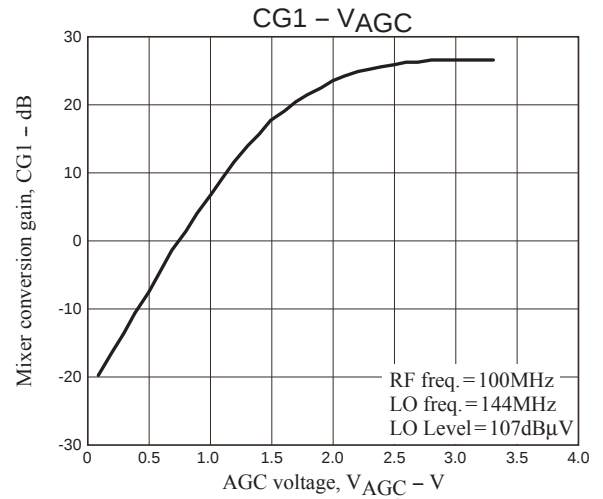
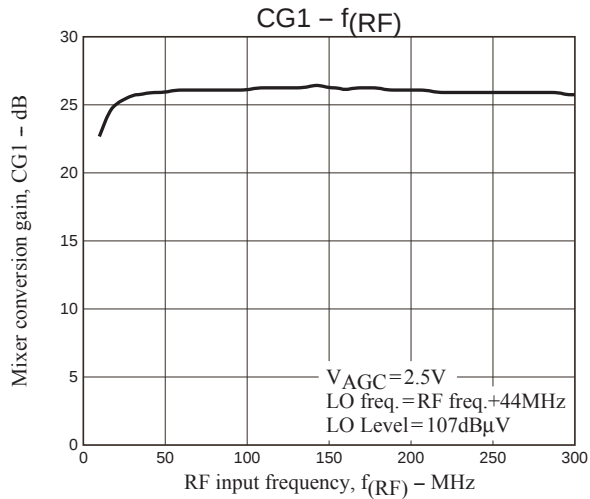
Continued on next page.

LA8153QA

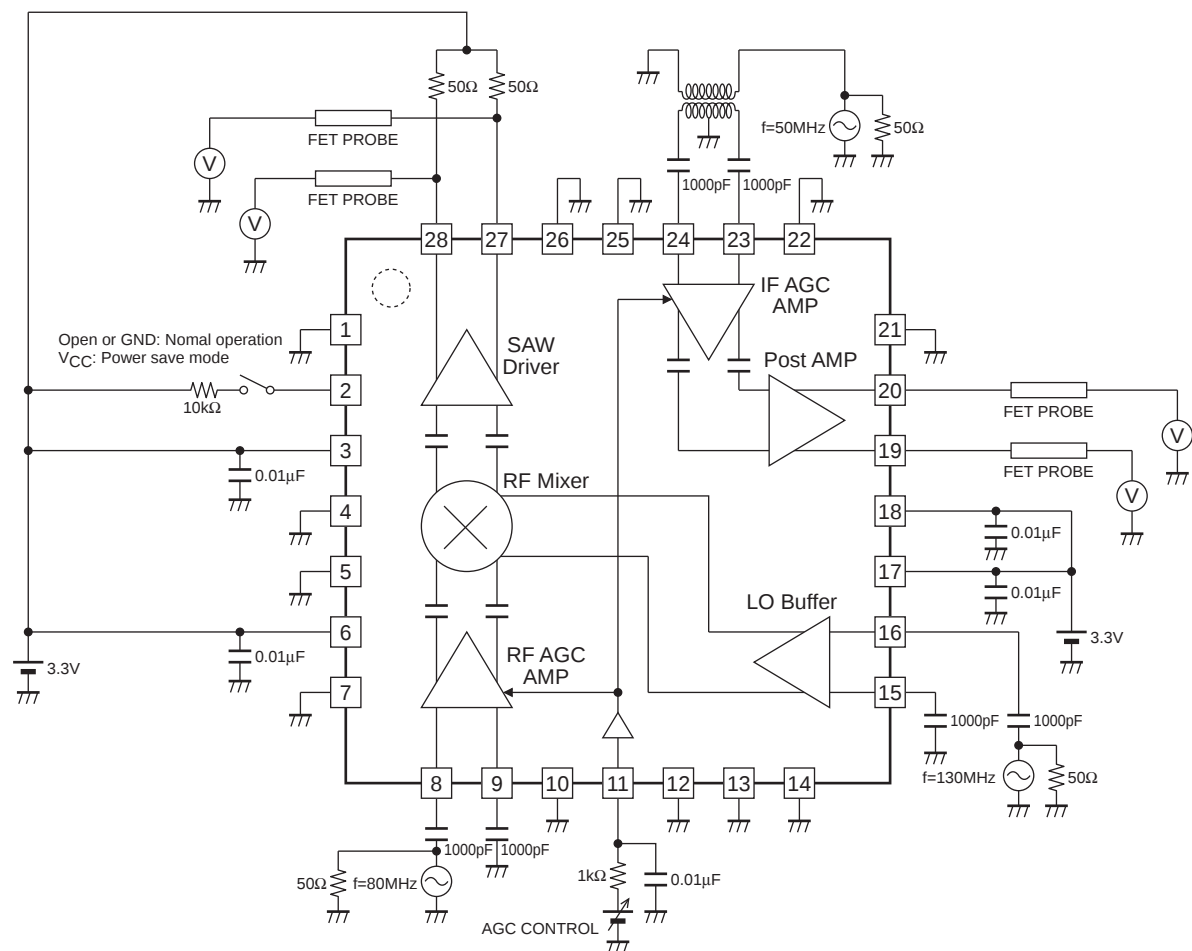
Continued from preceding page.

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	

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



Test Circuit



Attention

Electrostatic capacity of some pins is $\pm 100\text{V}$ under the condition of $C = 200\text{pF}$ 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

ON Semiconductor and the ON logo are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.