Ordering number : EN4715B

LA1193V

Monolithic Linear IC

High-Performance FM Front End IC for Car Radios

ON Semiconductor®

http://onsemi.com

Overview

The LA1193V is front-end IC developed for use in car radios. It incorporates an extremely wide dynamic range mixer and a new AGC system consisting of a dual-system wide-band AGC and a new keyed AGC to provide excellent interference suppression characteristics.

Features

- Improved interference characteristics
  - — Expanded mixer input dynamic range
    Mixer input usable sensitivity : 15dBμ
    Mixer input I.M. QS : 90dBμ
  - — Development of a new wide-band AGC circuit
    Improved interference characteristics for both nearchannel interference and far-channel interference Improved interference characteristics for the TV band
  - — Development of a 3D-AGC system
    The adjacent channel two-signal interference characteristics can be effectively improved without degrading the strong-field three-signal interference characteristics during keyed AGC operation.
- Improved stability design
  - — AGC circuit local oscillator isolation
    Measures were taken to prevent the deterioration of AMR, noise level, THD and other characteristics during AGC operation.
  - — AGC circuit incorrect operation measures
    The LA1193V provides methods to prevent incorrect operation due to local oscillator injection and loss of DC balance.
- Improved temperature characteristics
  - — Conversion gain
  - — AGC sensitivity
  - — Antenna damping drive output current

Semiconductor Components Industries, LLC, 2013

Functions

- Double-balance mixer
- Pin diode drive output
- Differential IF amplifier
- Dual-system wide-band AGC circuit
- Local buffer output
- 3D-AGC system
- FET gate drive AGC output
- IF amplifier gain control pin

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	V_{CC} for pins 5 and 17	9	V
	V_{CC} max mix	V_{CC} for pins 10 and 11	15	V
Allowable power dissipation	Pd max	Ta ≤ 70°C Mounted on a 23×36×1.6mm^3 glass-Epoxy board	500	mW
Operating temperature	Topr	*	−40 to +85	°C
Storage temperature	Tstg		−40 to +125	°C

Note : * Connect a resistor (up to 10kΩ) between pins 17 and 19.

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.

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		8.0	V
Operating supply voltage range	V_{CC} op		7.6 to 9	V

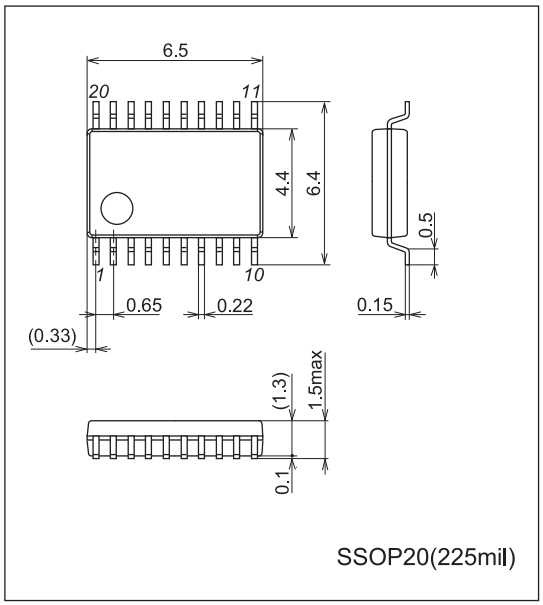
Electrical Characteristics at Ta = 25°C, V_{CC} = 8.0V, in the specified test circuit, f = 88MHz, f_{OSC} = 77.3MHz

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CCO}	No input, V_{CONT} = 0V	19	24	29	mA
Antenna damping current	ANT-DI	88MHz, 100dBμ, V_{CONT} = 4.0V	7.0	9.5	12.5	mA
AGC high voltage	V_{AGC-H}	88MHz, 0dBμ, V_{CONT} = 4.0V	7.6	7.9		V
AGC low voltage	V_{AGC-L}	88MHz, 100dBμ, V_{CONT} = 4.0V		0.4	0.9	V
Saturation output voltage	V_{OUT}	88MHz, 110dBμ, V_{CONT} = 4.0V	97	110		dBμ
−3dB limiting sensitivity	Vi-Limit	88MHz, 110dBμ, V_{CONT} = 4.0V	78	85	92	dBμ
Conversion gain	A. V	88MHz, 75dBμ, V_{CONT} = 4.0V	98	101	104	dBμ
Local buffer output	V_{OSC}-Buff	No input, no modulation	105	109		dBμ
Narrow V_{AGC-ON}	V-NAGC	88MHz, V_{CONT} = 4.0V, at an input level such that $V_{AGC-OUT}$ is 2V or less	73 (76)	80 (83)	87 (90)	dBμ
Wide V_{AGC-ON}	V-WAGC	88MHz, V_{CONT} = 0V, at an input level such that $V_{AGC-OUT}$ is 2V or less	97	101	105	dBμ
3D-AGC-ON	V3D-AGC	88MHz, V_{CONT} variable, with 95dBμ being the V_{CONT} voltage input such that $V_{AGC-OUT}$ switches from high to low and 2.0V as the V_{AGC} threshold value.	0.4	0.6	0.8	V

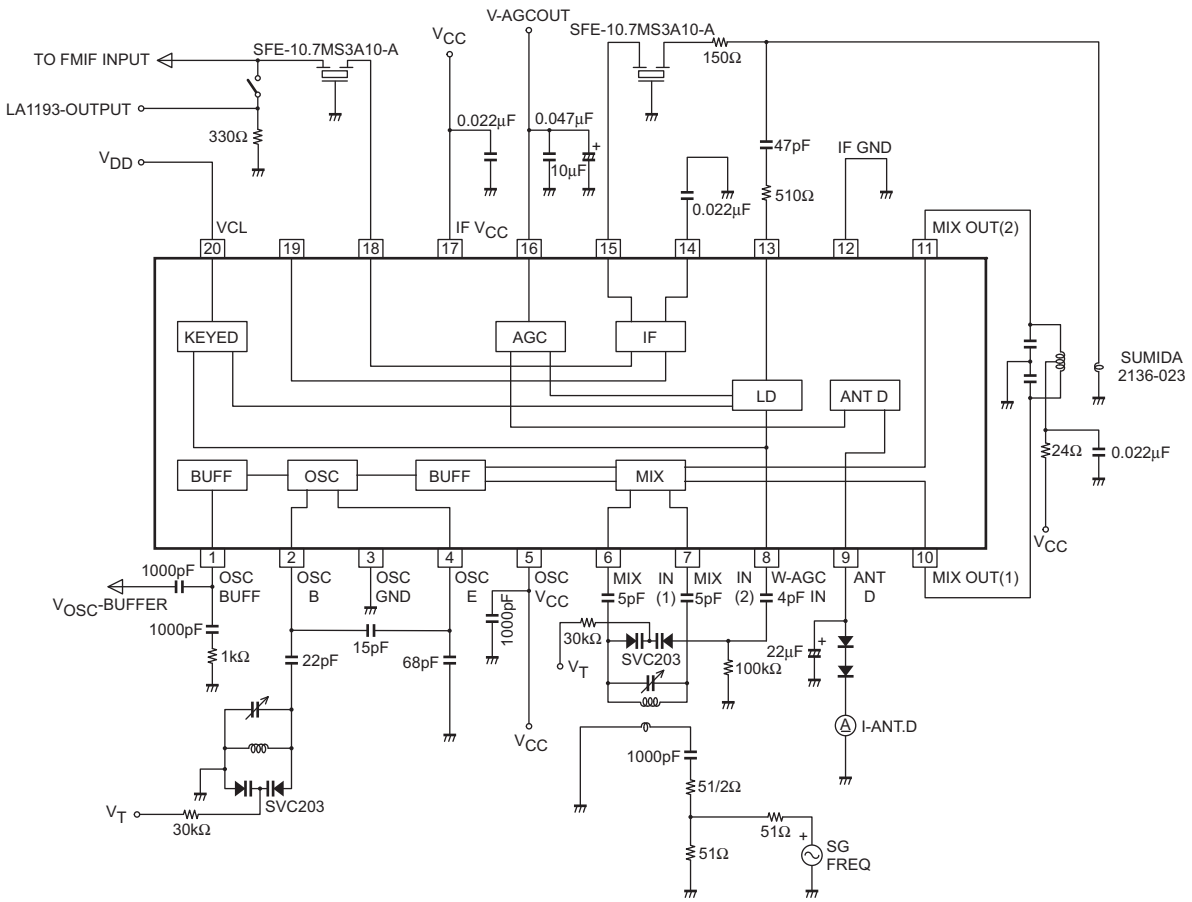
Package Dimensions

unit : mm (typ)

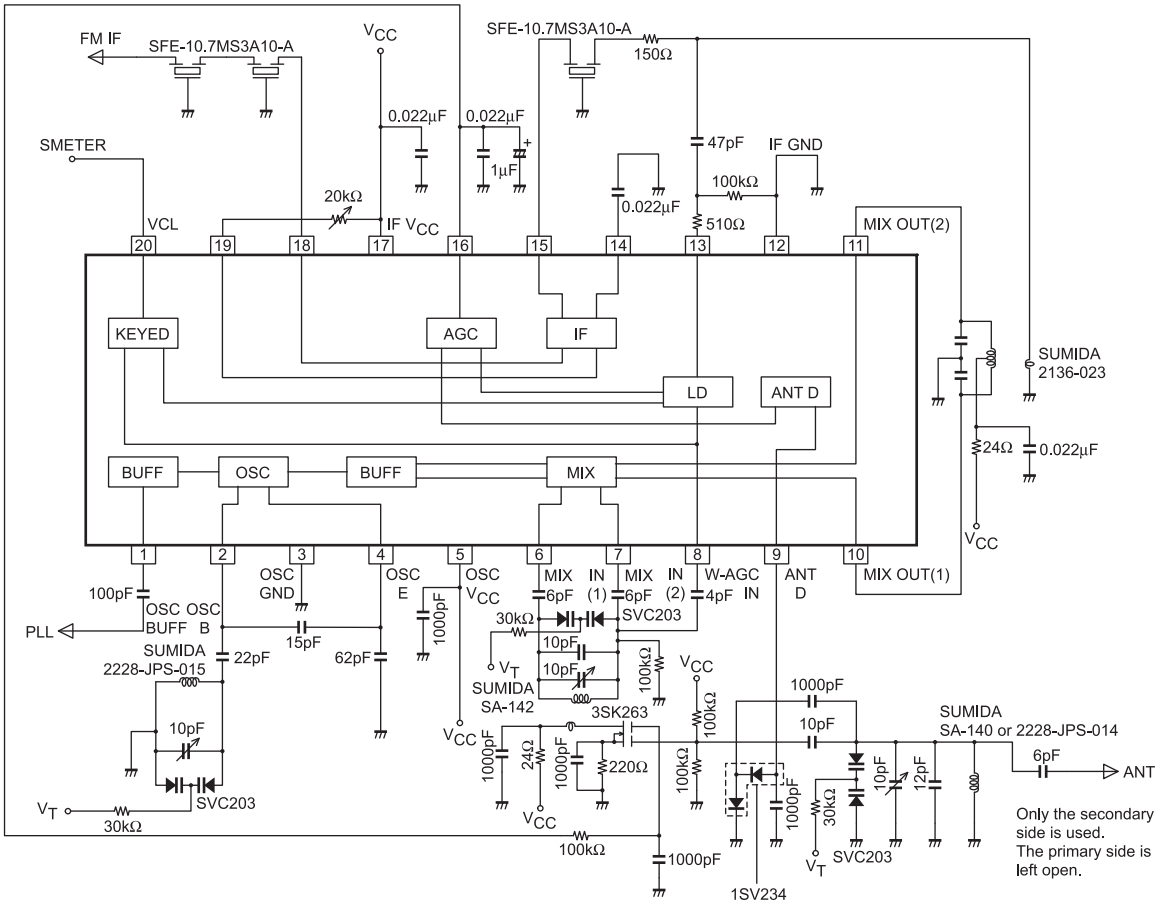
3179C



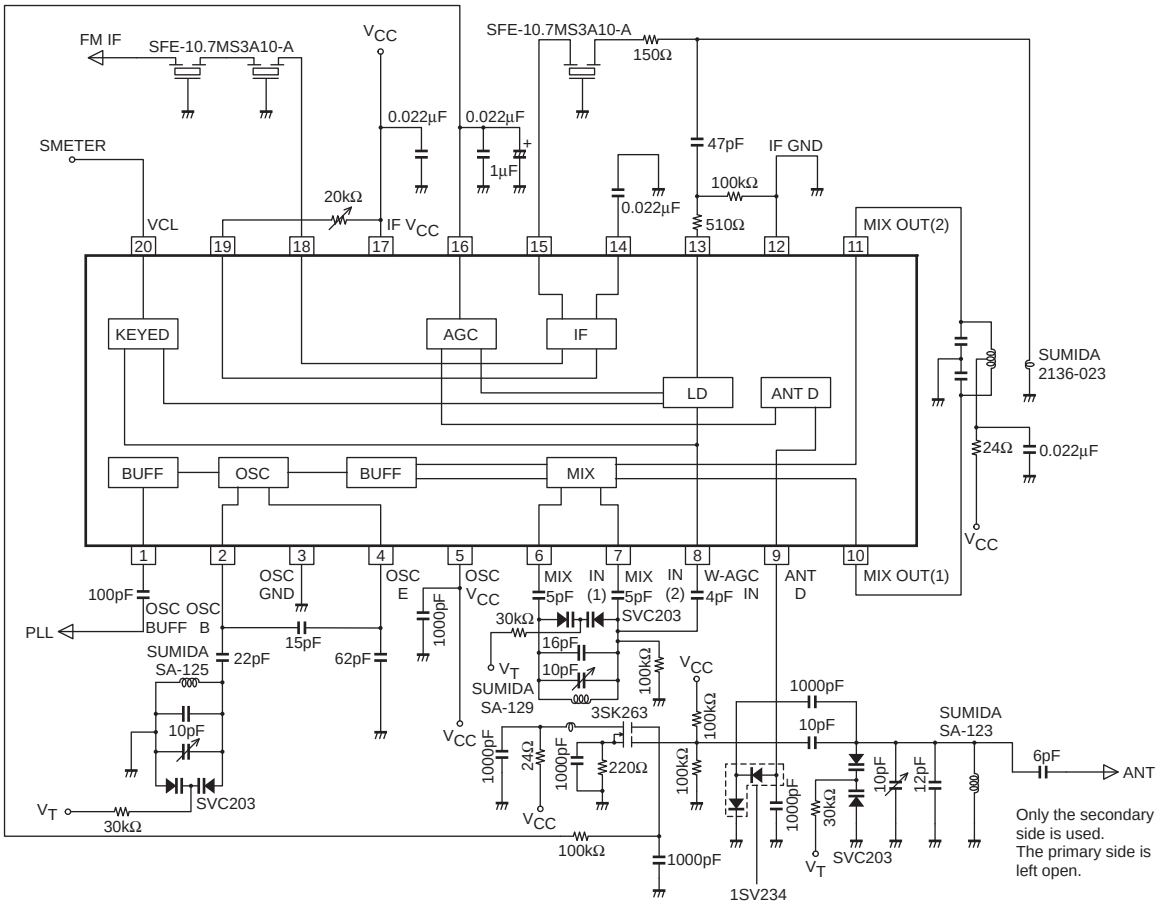
Block Diagram and Test Circuit Diagram



Application Circuit Example : USA and Europe



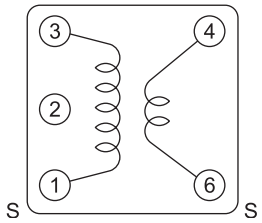
Application Circuit Example : Japan



Coil Specifications

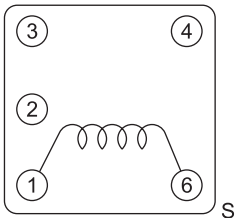
Coils Manufactured by Sumida Electronics

Japan band RF coil SA-129 or SA-143



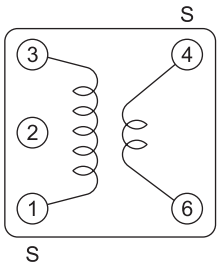
6-4 3T
1-3 3T

Japan oscillator coil SA-125



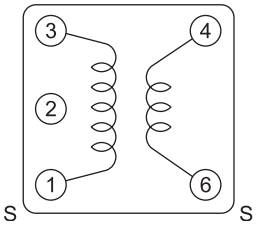
6-1 $3\frac{2}{4}$T

Japan antenna coil SA-123 or SA-144



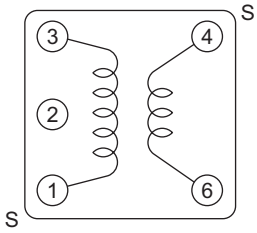
4-6 $\frac{3}{4}$T
1-3 3T

US band RF coil SA-142 or SA-250



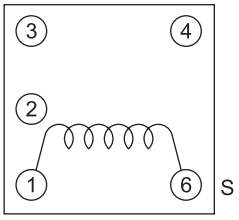
6-4 $2\frac{1}{2}$T
1-3 $2\frac{1}{2}$T

US band antenna coil SA-140 or SA-231



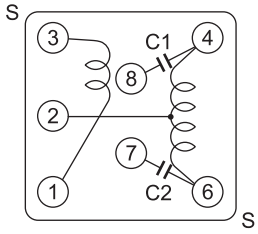
4-6 $\frac{3}{4}$T
1-3 $2\frac{1}{2}$T

US band oscillator coil SA-278



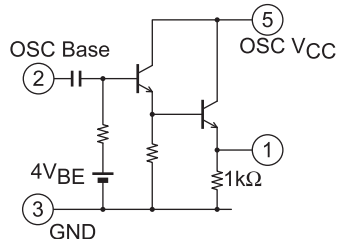
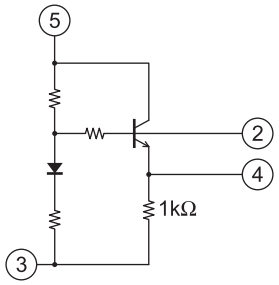
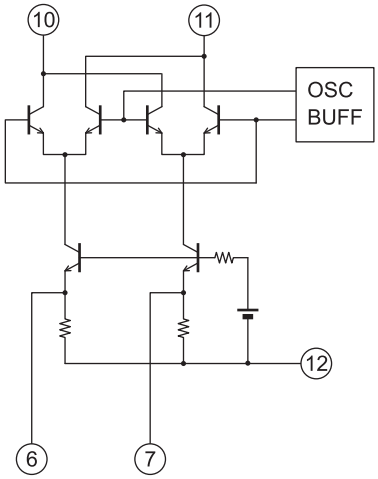
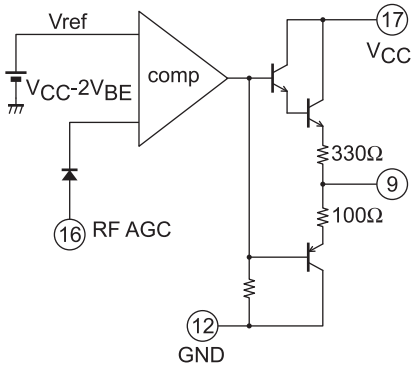
6-1 2T

Mixer coil (for both bands) SA-266



3-1 3T
6-2 $6\frac{1}{2}$T
2-4 $6\frac{1}{2}$T

Pin Functions

Pin No.	Function	Equivalent circuit	Note
1	OSC BUFF		
2 3 4 5	OSC Tr. base OSC GND OSC Tr. emitter OSC V_{CC}		Colpitts oscillator
6 7 10 11	Mix input (1) Mix input (2) Mix out (1) Mix out (2)		Mixer input usable sensitivity 15dBμ Mixer input I.M. QS 90.5dBμ (6.5dB higher than previous products) Conversion gain 15dB Input impedance 25Ω
9	Antenna damping drive output		I_{ANTD} = 10mA
12	IF GND		

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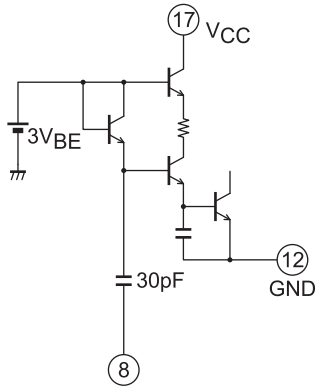
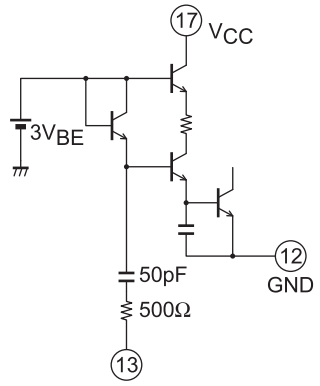
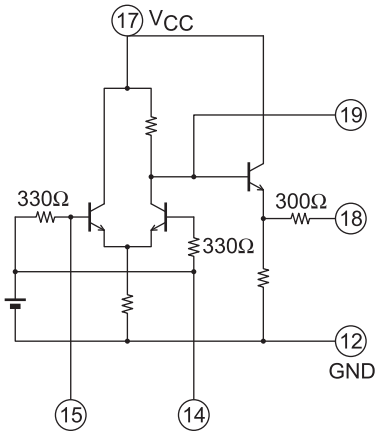
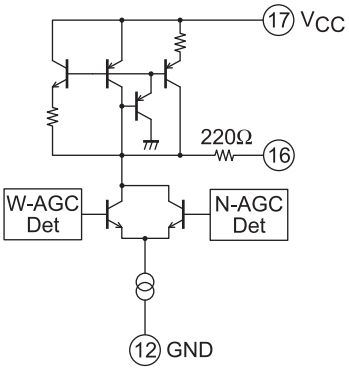
Pin No.	Function	Equivalent circuit	Note
8	W-AGC input		Since the DC cut capacitor is provided on-chip in the pin internal circuit, we have taken steps to prevent incorrect AGC operation due to inter-pin leakage currents.
13	N-AGC input		Since the DC cut capacitor is provided on-chip in the pin internal circuit, we have taken steps to prevent incorrect AGC operation due to inter-pin leakage currents.
14 15 18 19	IF AMP bypass IF AMP input IF AMP output IF AMP gain adjust		IF gain : 25dB Input and output impedances of 330Ω The IF gain can be adjusted by inserting a resistor between pins 17 and 19. The gain is at its maximum when there is no resistor inserted.
16	RF AGC OUTPUT		MOSFET Second gate control

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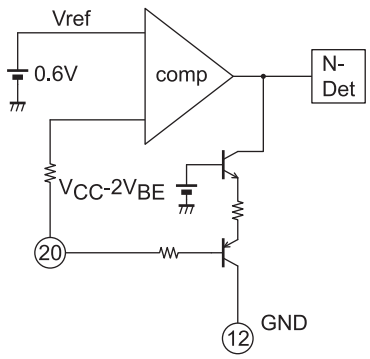
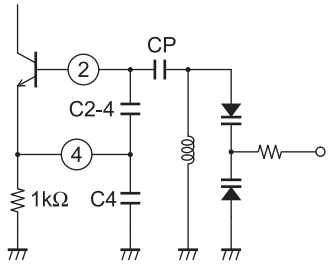
Pin No.	Function	Equivalent circuit	Note
17	IF, AGC, V_{CC}		
20	Keyed AGC input		Controls the narrow AGC.

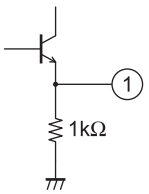
1. Oscillator Circuit



Steps were taken to prevent AMR degradation during earlier product type AGC operation, since the local oscillator block in this IC has independent Vd (pin 5) and ground (pin 3) connections.

This is a Colpitts oscillator and has the same structure as that used in earlier circuits. The oscillation level and intensity are changed by capacitors $C_{2\text{-}4}$, C_4 and C_P.

2. Local Oscillator Buffer Output



This buffer is an emitter follower circuit.

If desired, the buffer efficiency can be increased by inserting a resistor between pin 1 and ground to pass more current through the buffer transistor. However, this current must be limited so that Pdmax for the package is not exceeded.

3. Interference Characteristics

The LA1193V incorporates a newly developed 3D-AGC (triple dimension) circuit. This circuit allows three-signal interference characteristics (inter-modulation characteristics) and two-signal sensitivity suppression characteristics to be provided at the same time, a combination of characteristics previously thought difficult to achieve.

- Inter-Modulation Characteristics

The LA1193V prevents inter-modulation distortion by applying two wide-band AGC circuits.

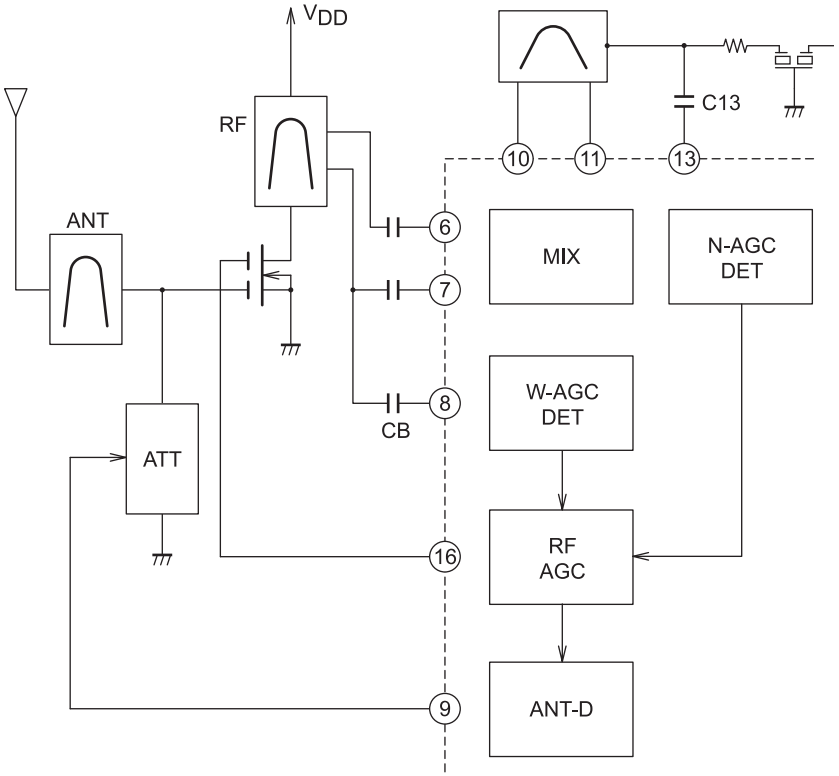


Figure 1

This double wide-band AGC system consists of two AGC circuits and a narrow AGC (pin 13 input, mixer input detection type) as shown in Figure 1. Figure 2 shows the antenna input frequency characteristics.

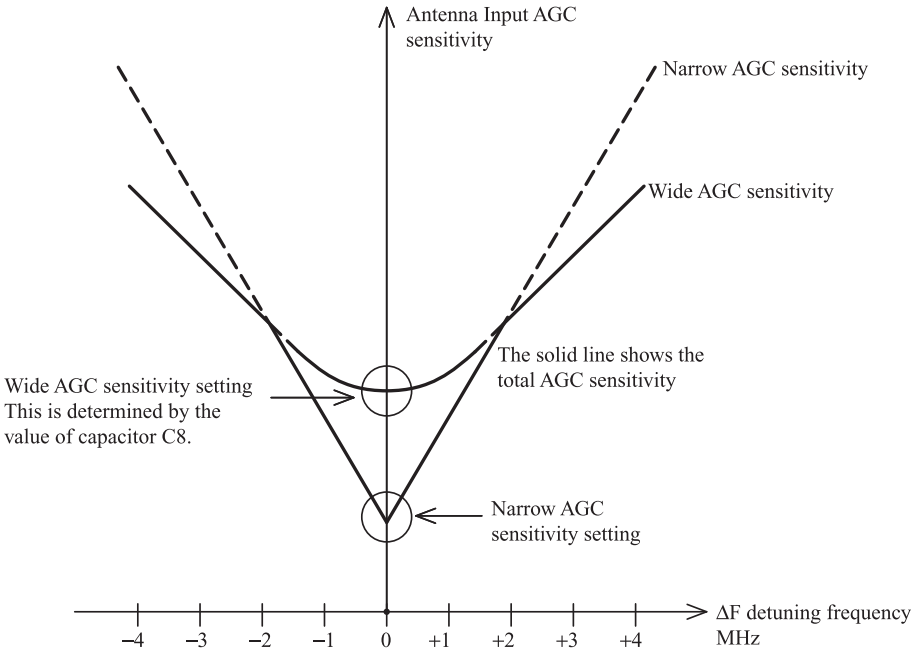


Figure 2 AGC Sensitivity Detuning Characteristics

Features of the Double Wide AGC System

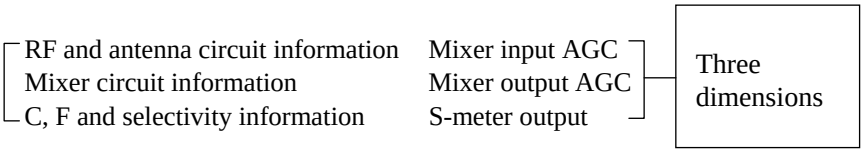
— Since this is a mixer input detection wide-band AGC, it prevents the occurrence of intermodulation due to interfering stations with $\Delta f > 1MHz$. (TV band interference prevention)
— Since this system uses a narrow AGC at the same time, the wide AGC sensitivity can be lowered, thus preventing incorrect operation due to local oscillator injection.
— Optimal sensitivities for any field conditions can be set, since the sensitivities of both the wide and narrow AGC systems can be set by changing the values of external components.
— The input level of the desired station is limited by the narrow AGC. As a result, excessive levels are no longer input to the stages that follow the mixer and the beats at multiples of $10.7 \times A$ are reduced.

- Two-Signal Sensitivity Suppression Characteristics

Previously, keyed AGC systems were used to provide good intermodulation distortion and two signal sensitivity suppression characteristics at the same time. However, in previous keyed AGC systems, when the desired station would fade or drop out, the wide band AGC level would become essentially zero. As a result, the automatic station selection function would malfunction and blocking oscillation would occur in the presence of strong interfering stations. Thus keyed AGC systems were extremely hard to use in actual practice. Sanyo has developed a new AGC system (3D-AGC) that solves these problems and allows the construction of extremely simple application circuits. The LA1193V incorporates this AGC system.

What is the 3D-AGC system?

It is a system that determines the wide-band AGC level by using information that has the following three frequency characteristics.



3D-AGC Features

Feature	Merit
The narrow AGC sensitivity, which operates for Δf of less than 1.5MHz, is controlled independently according to the field strength of the desired station.	• This is effective as a measure for mitigating two signal sensitivity suppression.
The narrow AGC sensitivity is controlled at V_{20} values under 2V.	• This allows two signal sensitivity suppression to be mitigated without deterioration in the three signal characteristics.
The wide AGC operates even when V_{20} is zero, i.e., when the desired station does not exist.	• This allows the prevention of incorrect stopping on intermodulation signals during search. • This allows the prevention of intermodulation occurring in the antenna and RF modulation circuits in the presence of strong interfering stations. Prevention of blocking oscillation due to AGC operation is also possible.
The N-AGC and the W-AGC sensitivities can be set independently.	• This allows optimal settings to match the reception field conditions.
The system has two AGC systems, the N-AGC and the W-AGC.	• Since the narrow AGC operates at the desired station and at adjacent stations, it is possible to reduce the wide AGC sensitivity. This prevents incorrect AGC operation due to local oscillator injection.

3D-AGC Sensitivity, Δf and V_{20} Characteristics

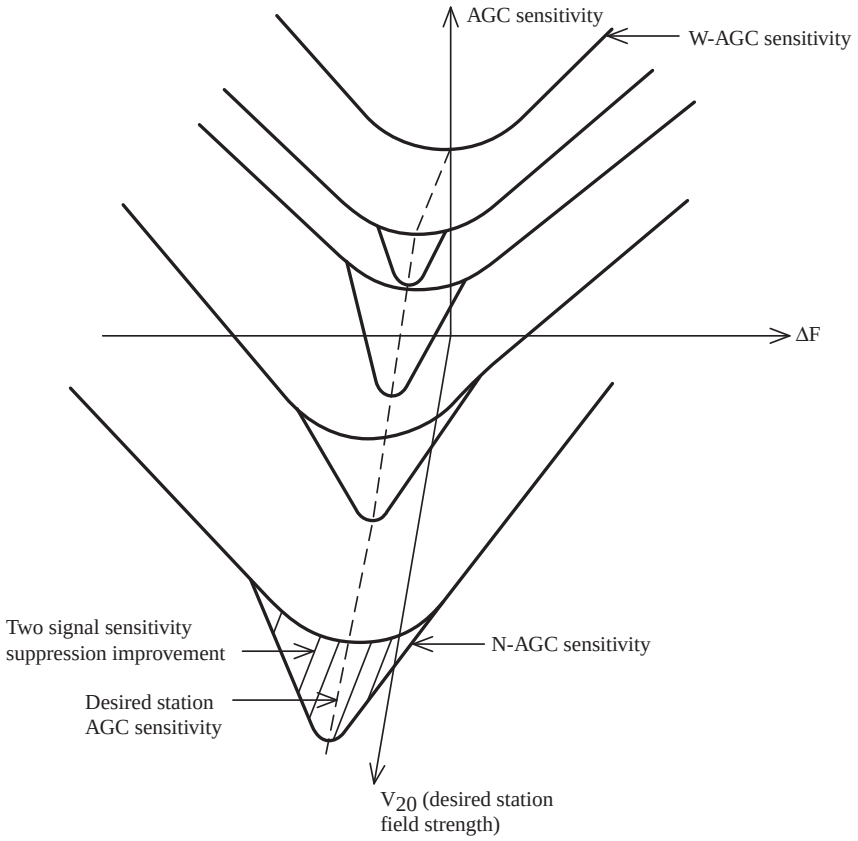


Figure 3 3D-AGC Sensitivity, Δf and V_{20} Characteristics

— The W-AGC sensitivity is determined by the antenna RF circuit selectivity independently of V_{20}.
— The N-AGC sensitivity is determined by the antenna, RF and mixer circuit total selectivity when V_{20} is 0.6V or greater. It is determined by that selectivity and V_{20} when V_{20} is over 0.6V.
— The improvement in two-signal sensitivity suppression is the shaded area in the total AGC sensitivity and corresponds to the section occupied by the N-AGC.

4. Mixer

The mixer circuit used in this IC is a balanced input/balanced output double balance mixer circuit.

• Input Format

Emitter input
Input impedance : 25Ω

Optimization of the component geometry, emitter current and bias allow this circuit to achieve the following performance.

Mixer input usable sensitivity : 15dBμ
Mixer input IMQS* : 90.5dBμ

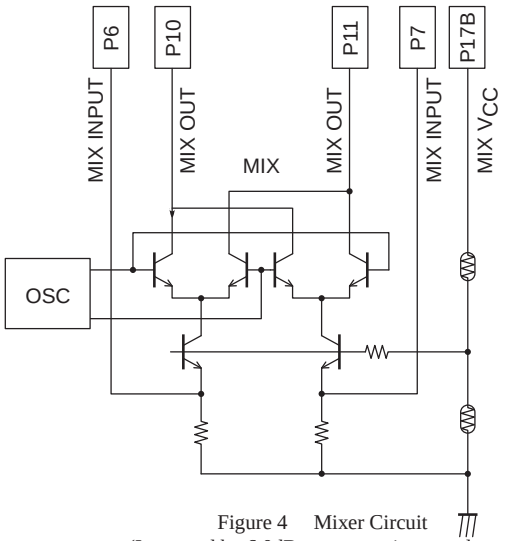


Figure 4 Mixer Circuit
(Improved by 6.0dBμ over previous products.)

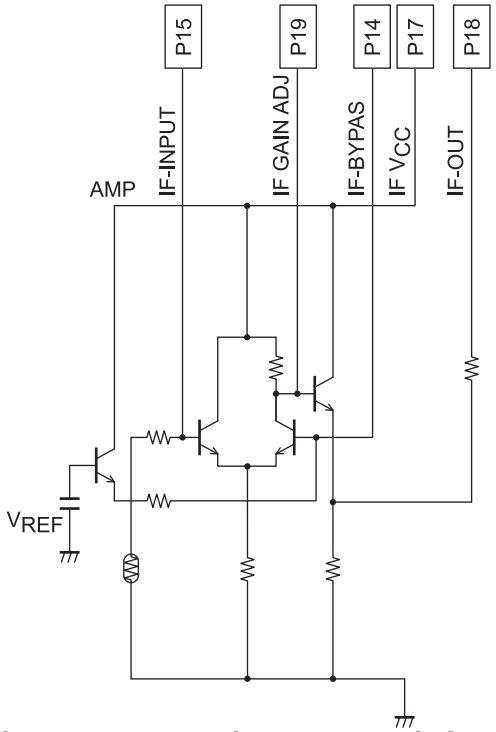
Note : *Mixer input IMQS is defined as follows :

f_r = 98.8MHz, no input
f_{u1} = 98.8MHz, 1kHz, 30% modulation
f_{u2} = 99.6MHz, no modulation

IMQS is the interference 1 and 2 input levels such that when an interference signal with the same level is input to the mixer and distortion occurs at the mixer, the generated IM output has a S/N ratio of 30dB.

5. IF Amplifier

This IF amplifier is a single stage differential amplifier.

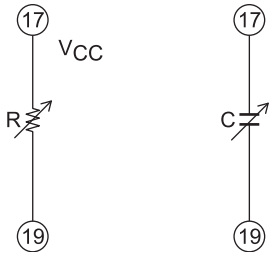


Specifications

Input impedance : 330Ω
Output impedance : 330Ω
Gain : 25dB

Gain adjustment can be provided using either of the methods shown.

IF Gain adj



Temperature Characteristics

The LA1193V uses Vref temperature characteristics correction to hold the gain temperature characteristics to the low level of about 1dB over the range −30 to +80°C.

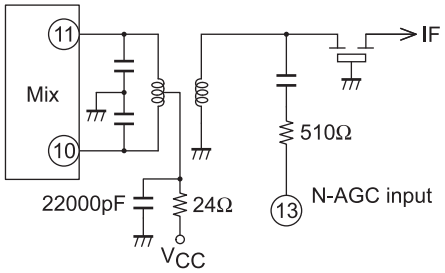
6. AGC Circuit

The LA1193V uses pin diode antenna damping (pin 9) and MOSFET second gate voltage control (pin 16) for AGC. The AGC operating sequence is as follows :

Antenna damping (pin diode) → MOSFET second gate voltage control
(attenuation) 20dB (attenuation) dB

The above AGC sequence is used for the following reasons.

- Intermodulation distortion can occur if a signal of 110dBμ or larger is input to the antenna circuit varactor diode. In such situations, if the AGC sequence was MOSFET second gate voltage control followed by pin diode antenna damping, as long as the receiver was not in a strong field where the 60dB or higher AGC attenuation operates, input limitation due to the antenna circuit varactor diode would operate. Therefore, we feel that the AGC operating sequence employed is appropriate.
- Consider the problem of AGC loop stability. If the two AGC loops (the antenna damping AGC loop and the MOSFET second gate control AGC loop) operate, the AGC system would become unstable and have an excessively large influence on the transient response. Therefore the following structure cannot be used.
  MOSFET second gate control → antenna damping → MOSFET second gate control
- Narrow AGC circuit
  Since the LA1193V's N-AGC (which detects the mixer output) is set to have a high sensitivity, care is required to avoid incorrect operation. In particular, there must be adequate separation from the local oscillator block on the printed circuit board pattern. Also, a resistor of at least 500Ω must be inserted at the pin 13 input. A low-pass filter is formed by the insertion of this resistor. This low-pass filter prevents incorrect AGC operation due to the local oscillator.
- The AGC sensitivity setting can be changed by adjusting the value of the capacitor connected at pin 13. Although the AGC sensitivity can be lowered by increasing the value of the series resistor, caution is required since the AGC has its own frequency characteristics.

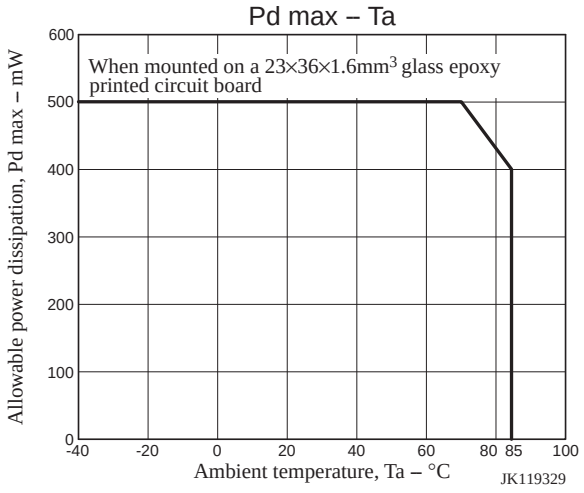


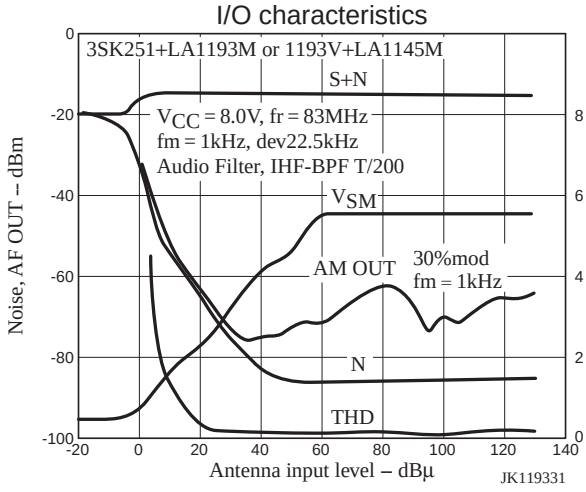
- Wide AGC circuit

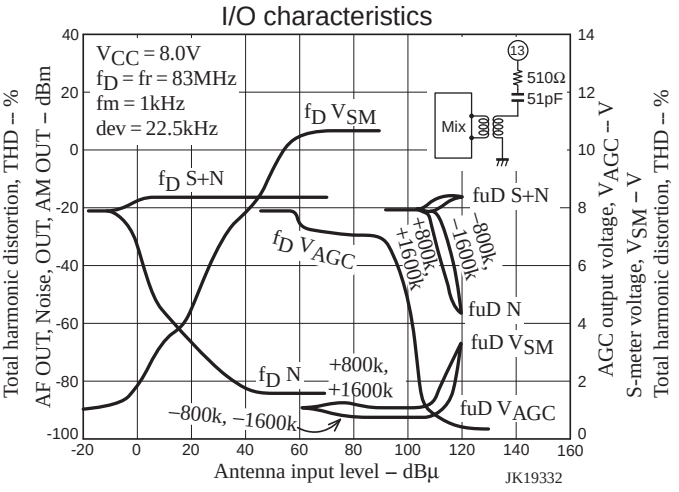
  The wide AGC sensitivity is set by the value of the capacitor on pin 8. However, since incorrect operation due to the local oscillator signal may occur if this capacitor is too large, its value must be chosen carefully.

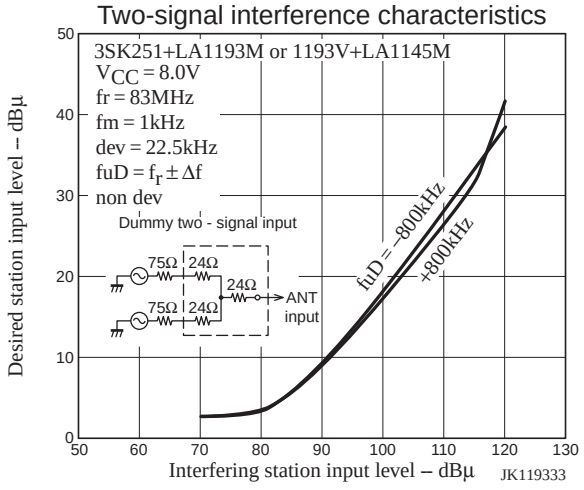
- 3D-AGC

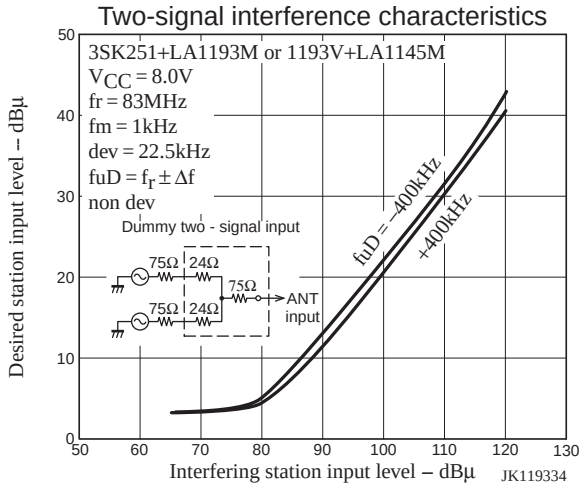
  If the difference in sensitivity between the N-AGC and the W-AGC systems is too large during 3D-AGC operation, the S/N ratio can be degraded in the vicinity of the input where the AGC switches. Therefore, the 3D-AGC setting values must be selected carefully. Although this problem can be ameliorated by applying a time constant to pin 20, in principle, this S/N ratio degradation should be prevented by limiting the sensitivity difference between the two AGC systems.

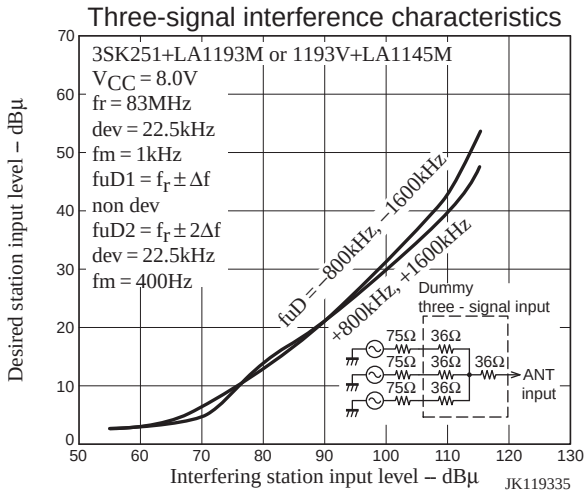


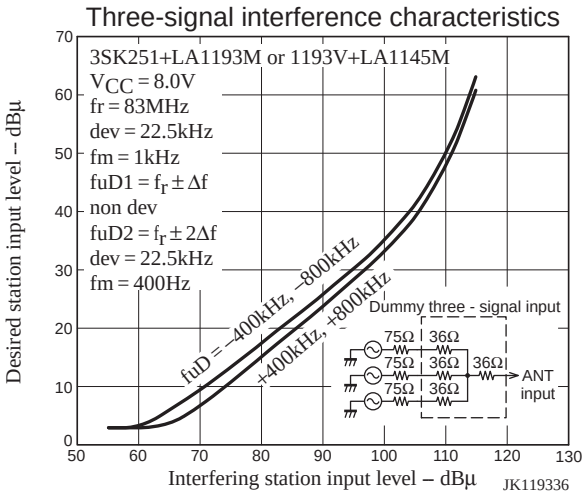


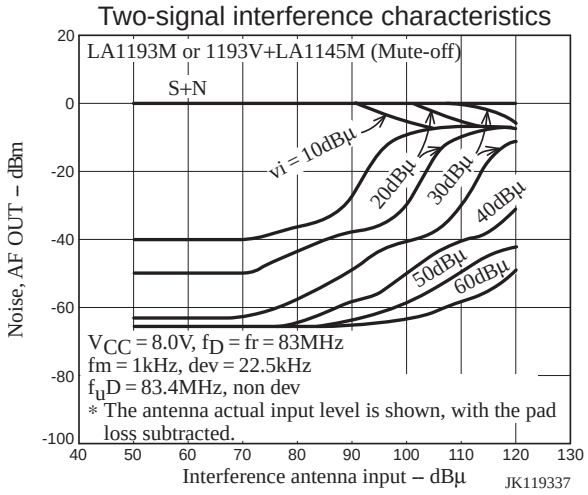


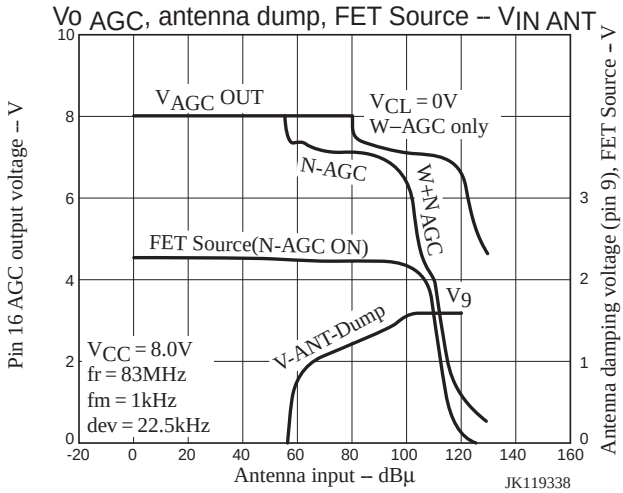


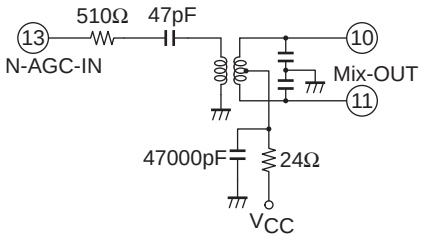


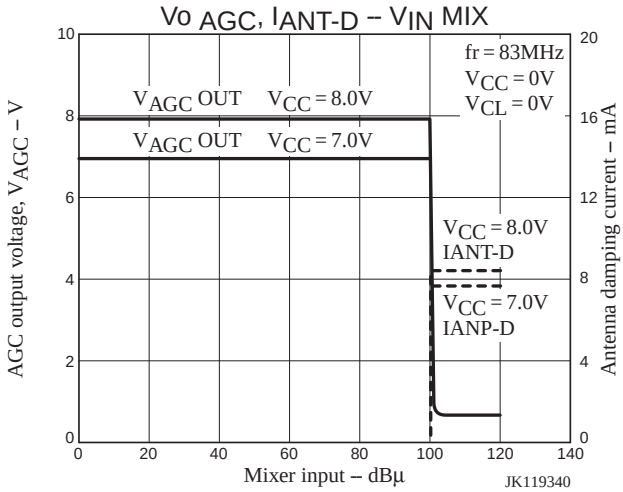

Three-signal interference characteristics
3SK251+LA1193M or 1193V+LA1145M
VCC = 8.0V
fr = 83MHz
dev = 22.5kHz
fm = 1kHz
fuD1 = fr ± Δf
non dev
fuD2 = fr ± 2Δf
dev = 22.5kHz
fm = 400Hz
fuD = –800kHz, –1600kHz
+800kHz, +1600kHz
Dummy three - signal input
75Ω 36Ω
ANT input
Desired station input level – dBµ
Interfering station input level – dBµ
JK119335

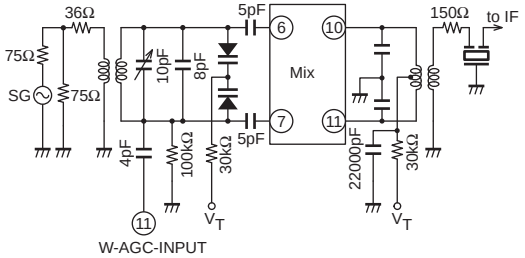

Three-signal interference characteristics
3SK251+LA1193M or 1193V+LA1145M
VCC = 8.0V
fr = 83MHz
dev = 22.5kHz
fm = 1kHz
fuD1 = fr ± Δf
non dev
fuD2 = fr ± 2Δf
dev = 22.5kHz
fm = 400Hz
fuD = –400kHz, –800kHz
+400kHz, +800kHz
Dummy three - signal input
75Ω 36Ω
ANT input
Desired station input level – dBµ
Interfering station input level – dBµ
JK119336

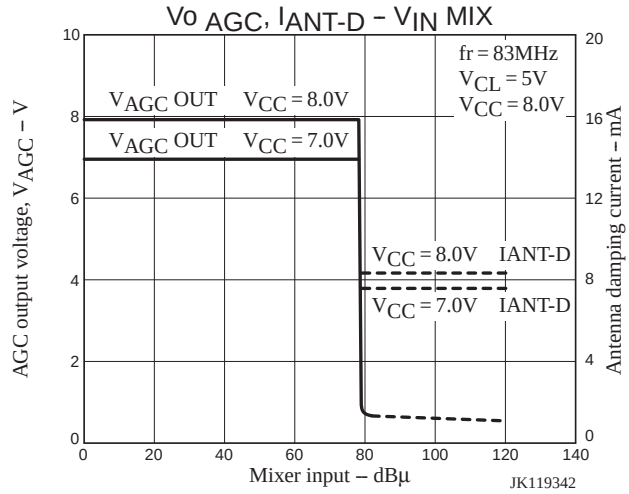

Two-signal interference characteristics
LA1193M or 1193V+LA1145M (Mute-off)
S+N
vi = 10dBµ
20dBµ
30dBµ
40dBµ
50dBµ
60dBµ
VCC = 8.0V, fD = fr = 83MHz
fm = 1kHz, dev = 22.5kHz
fuD = 83.4MHz, non dev
* The antenna actual input level is shown, with the pad loss subtracted.
Noise, AF OUT – dBm
Interference antenna input – dBµ
JK119337

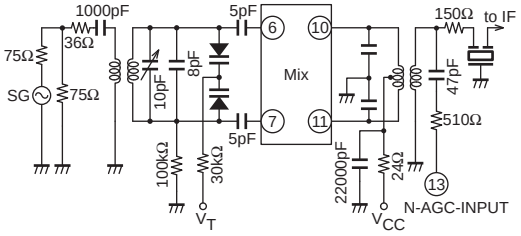

Vo AGC, antenna dump, FET Source – VIN ANT
VAGC OUT
VCL = 0V
W–AGC only
N-AGC
W+N AGC
FET Source(N-AGC ON)
V9
V-ANT-Dump
VCC = 8.0V
fr = 83MHz
fm = 1kHz
dev = 22.5kHz
Pin 16 AGC output voltage – V
Antenna damping voltage (pin 9), FET Source – V
Antenna input – dBµ
JK119338

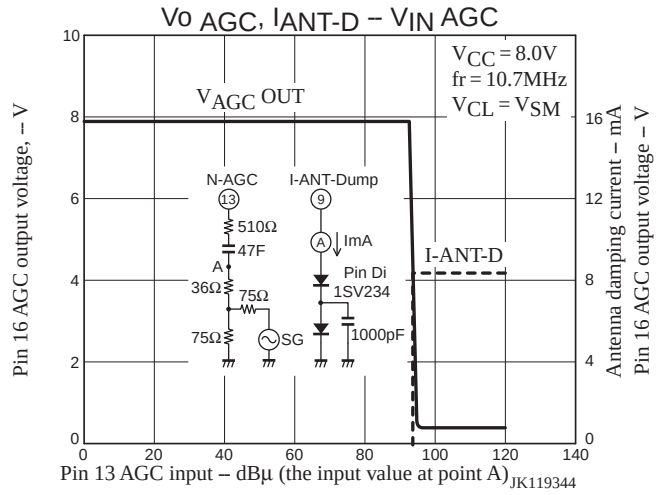

510Ω
47pF
13
N-AGC-IN
10
Mix-OUT
11
47000pF
24Ω
VCC

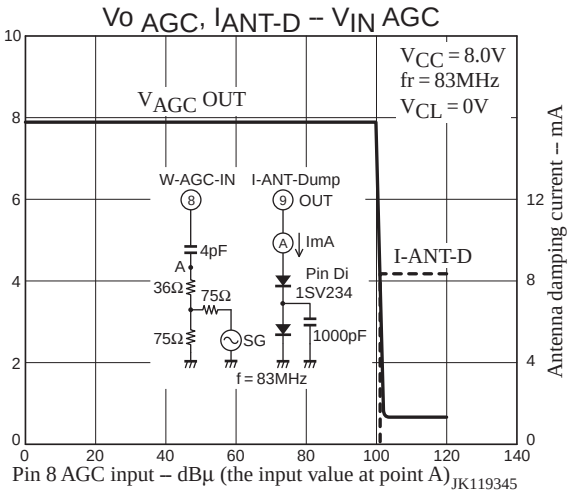

Vo AGC, IANT-D – VIN MIX
fr = 83MHz
VCC = 0V
VCL = 0V
VAGC OUT VCC = 8.0V
VAGC OUT VCC = 7.0V
VCC = 8.0V
IANT-D
VCC = 7.0V
IANP-D
AGC output voltage, VAGC – V
Antenna damping current – mA
Mixer input – dBµ
JK119340

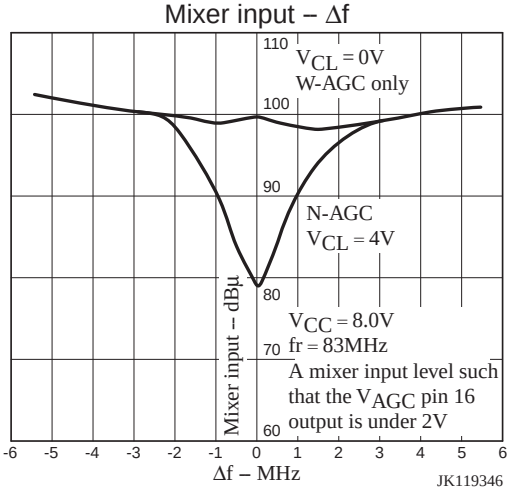

36Ω
5pF
150Ω
to IF
75Ω
SG
75Ω
10pF
8pF
Mix
4pF
100kΩ
30kΩ
5pF
22000pF
30kΩ
VT
W-AGC-INPUT

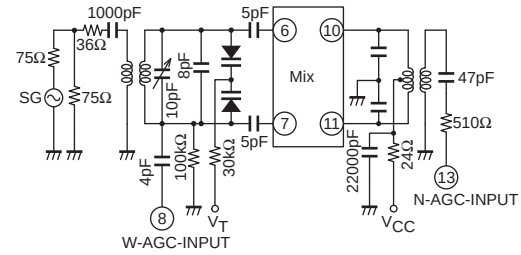

Vo AGC, IANT-D – VIN MIX
fr = 83MHz
VCL = 5V
VCC = 8.0V
VAGC OUT VCC = 8.0V
VAGC OUT VCC = 7.0V
VCC = 8.0V IANT-D
VCC = 7.0V IANT-D
AGC output voltage, VAGC – V
Antenna damping current – mA
Mixer input – dBμ
JK119342

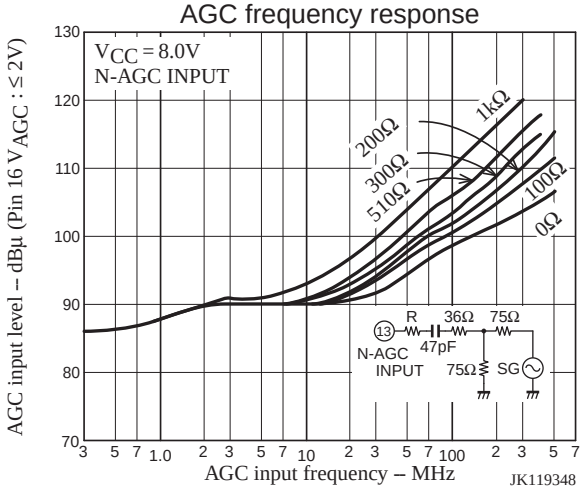

1000pF
5pF
150Ω
to IF
36Ω
75Ω
SG
75Ω
10pF
8pF
Mix
47pF
510Ω
5pF
100kΩ
30kΩ
22000pF
24Ω
VT
VCC
N-AGC-INPUT

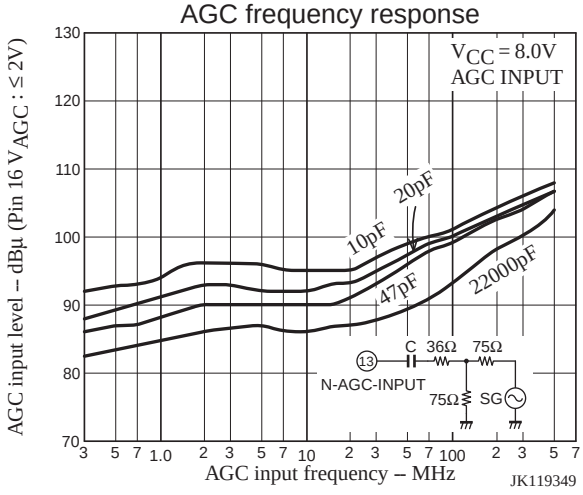

Vo AGC, IANT-D – VIN AGC
VCC = 8.0V
fr = 10.7MHz
VCL = VSM
VAGC OUT
N-AGC
I-ANT-Dump
510Ω
47F
1mA
Pin Di
1SV234
I-ANT-D
36Ω
75Ω
SG
1000pF
Pin 16 AGC output voltage, – V
Antenna damping current – mA
Pin 13 AGC input – dBμ (the input value at point A)
JK119344

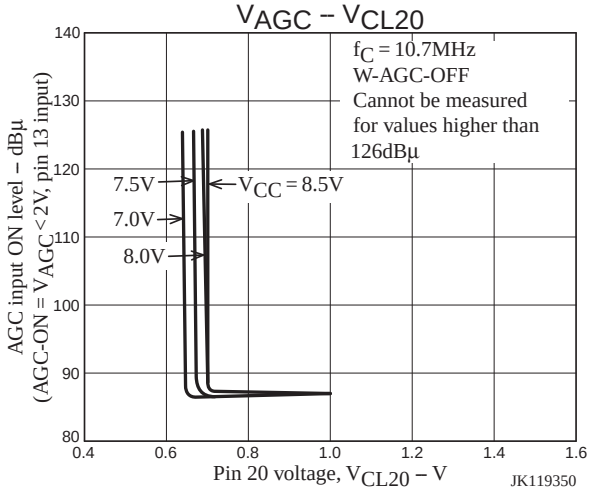

Vo AGC, IANT-D – VIN AGC
VCC = 8.0V
fr = 83MHz
VCL = 0V
VAGC OUT
W-AGC-IN
I-ANT-Dump
OUT
4pF
1mA
Pin Di
1SV234
I-ANT-D
36Ω
75Ω
SG
1000pF
f = 83MHz
Pin 16 AGC output voltage – V
Antenna damping current – mA
Pin 8 AGC input – dBμ (the input value at point A)
JK119345

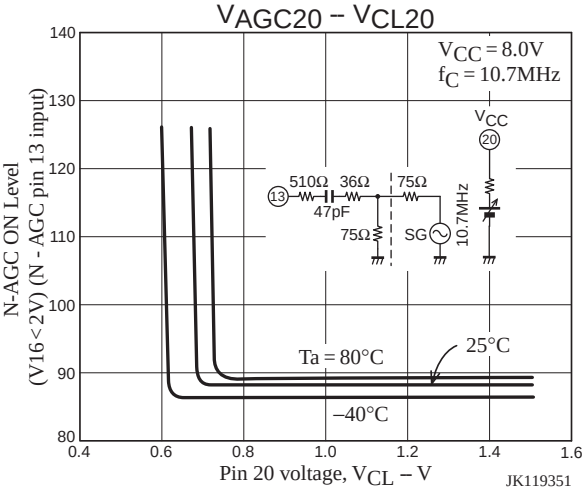

Mixer input – Δf
VCL = 0V
W-AGC only
N-AGC
VCL = 4V
VCC = 8.0V
fr = 83MHz
A mixer input level such
that the VAGC pin 16
output is under 2V
Mixer input – dBμ
Δf – MHz
JK119346

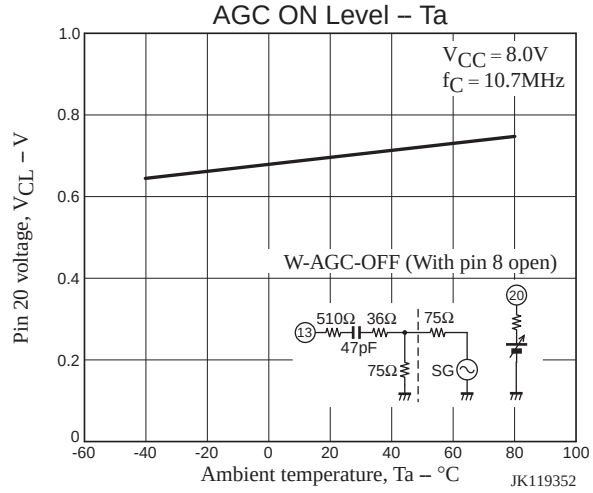

1000pF
5pF
36Ω
75Ω
SG
75Ω
8pF
10pF
Mix
47pF
510Ω
5pF
4pF
100kΩ
30kΩ
22000pF
24Ω
VT
VCC
N-AGC-INPUT
W-AGC-INPUT

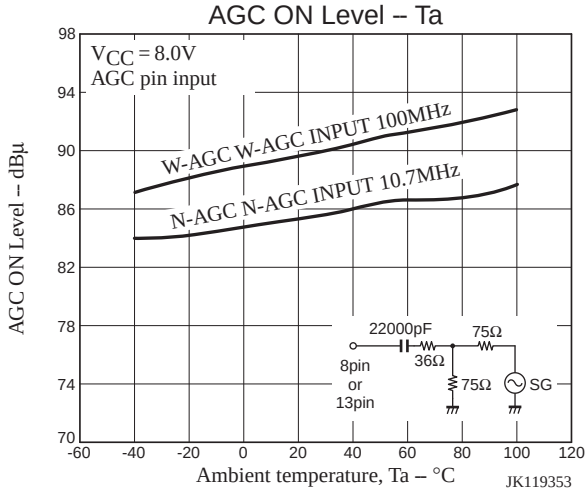

AGC frequency response
VCC = 8.0V
N-AGC INPUT
1kΩ
200Ω
300Ω
510Ω
100Ω
0Ω
R
36Ω
75Ω
N-AGC
INPUT
47pF
75Ω
SG
AGC input level – dBμ (Pin 16 VAGC : ≤ 2V)
AGC input frequency – MHz
JK119348

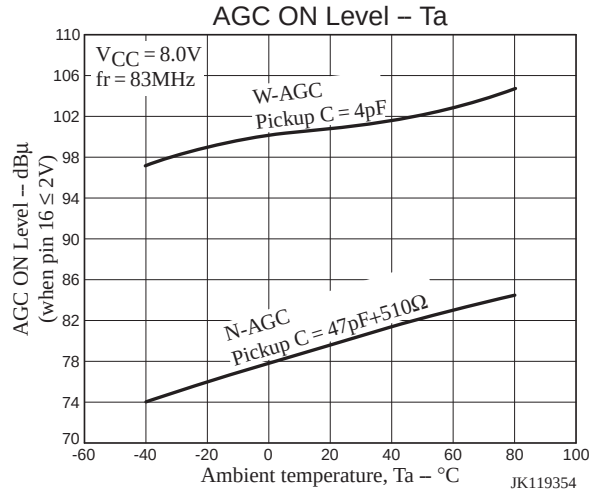

AGC frequency response
VCC = 8.0V
AGC INPUT
20pF
10pF
47pF
22000pF
C
36Ω
75Ω
N-AGC-INPUT
75Ω
SG
AGC input level – dBμ (Pin 16 VAGC : ≤ 2V)
AGC input frequency – MHz
JK119349

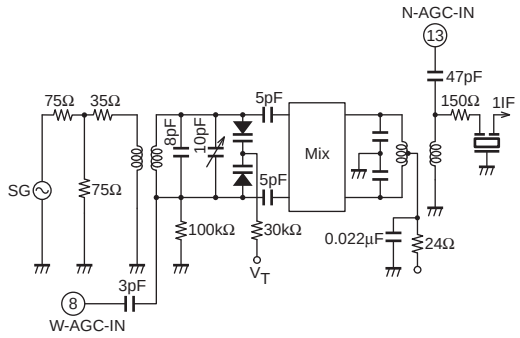

VAGC − VCL20
fC = 10.7MHz
W-AGC-OFF
Cannot be measured
for values higher than
126dBμ
7.5V
7.0V
8.0V
VCC = 8.5V
AGC input ON level – dBμ
(AGC-ON = VAGC < 2V, pin 13 input)
Pin 20 voltage, VCL20 – V
JK119350

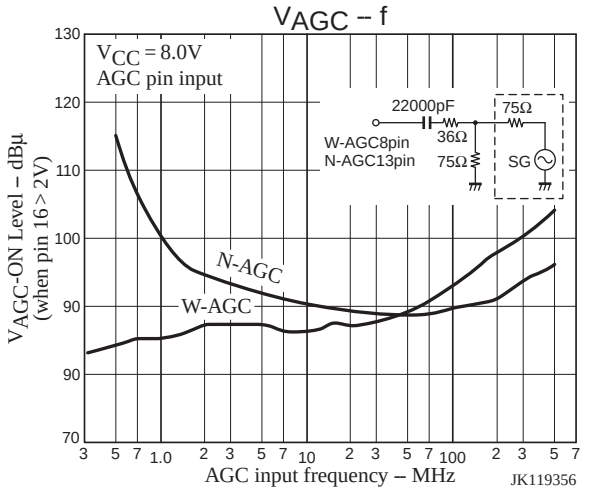

VAGC20 − VCL20
VCC = 8.0V
fC = 10.7MHz
VCC
20
510Ω 36Ω 75Ω
13
47pF
75Ω
SG
10.7MHz
Ta = 80°C
25°C
–40°C
N-AGC ON Level
(V16 < 2V) (N - AGC pin 13 input)
Pin 20 voltage, VCL – V
JK119351

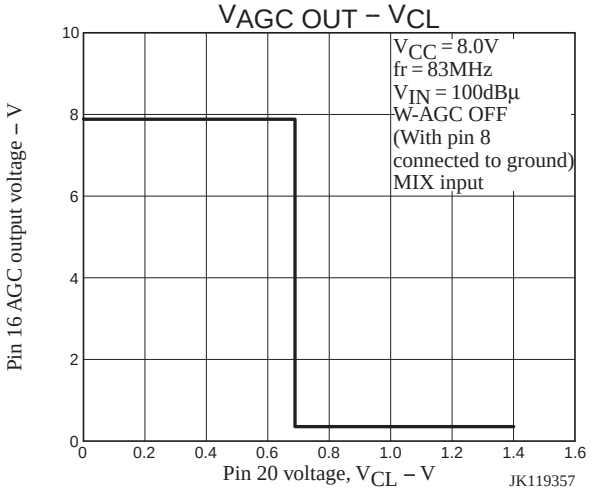

AGC ON Level – Ta
VCC = 8.0V
fC = 10.7MHz
W-AGC-OFF (With pin 8 open)
510Ω 36Ω 75Ω
13
47pF
75Ω
SG
20
Pin 20 voltage, VCL – V
Ambient temperature, Ta – °C
JK119352

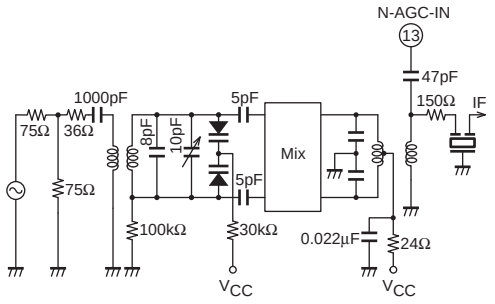

AGC ON Level – Ta
VCC = 8.0V
AGC pin input
W-AGC W-AGC INPUT 100MHz
N-AGC N-AGC INPUT 10.7MHz
22000pF
75Ω
36Ω
8pin
or
13pin
75Ω
SG
AGC ON Level – dBμ
Ambient temperature, Ta – °C
JK119353

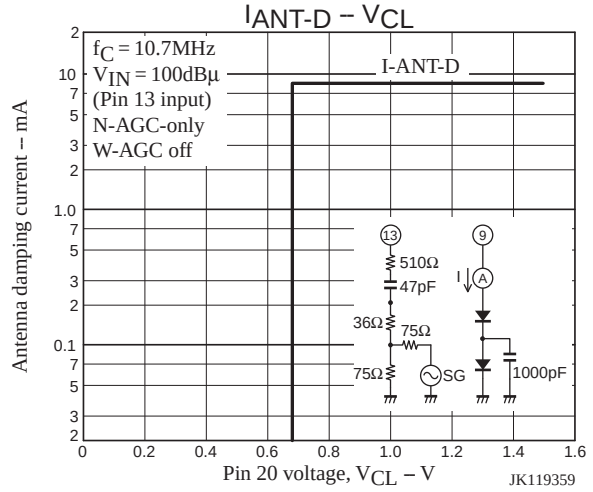

AGC ON Level – Ta
VCC = 8.0V
fr = 83MHz
W-AGC
Pickup C = 4pF
N-AGC
Pickup C = 47pF+510Ω
AGC ON Level – dBμ
(when pin 16 ≤ 2V)
Ambient temperature, Ta – °C
JK119354

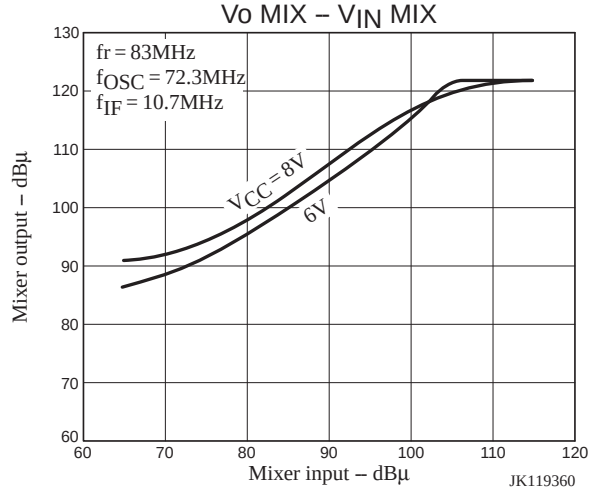

N-AGC-IN
13
47pF
150Ω
1IF
75Ω
35Ω
5pF
8pF
10pF
Mix
SG
75Ω
5pF
100kΩ
30kΩ
0.022μF
24Ω
VT
3pF
8
W-AGC-IN

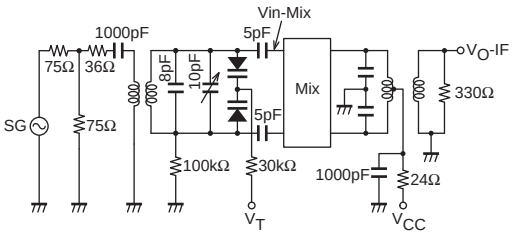

VAGC − f
VCC = 8.0V
AGC pin input
22000pF
75Ω
W-AGC8pin
N-AGC13pin
36Ω
75Ω
SG
N-AGC
W-AGC
VAGC-ON Level – dBμ
(when pin 16 > 2V)
AGC input frequency – MHz
JK119356

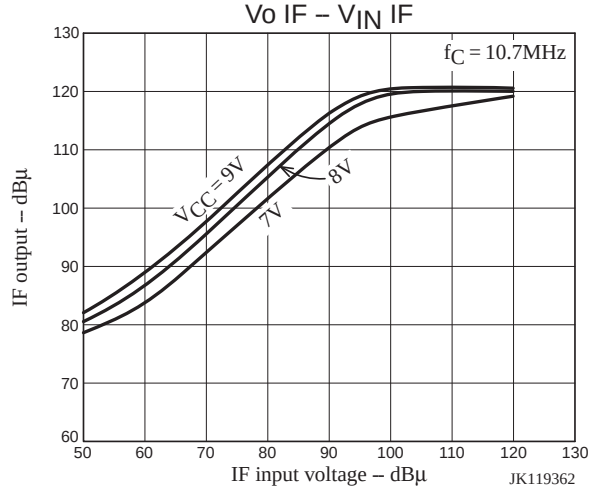

VAGC OUT – VCL
VCC = 8.0V
fr = 83MHz
VIN = 100dBμ
W-AGC OFF
(With pin 8
connected to ground)
MIX input
Pin 16 AGC output voltage – V
Pin 20 voltage, VCL – V
JK119357

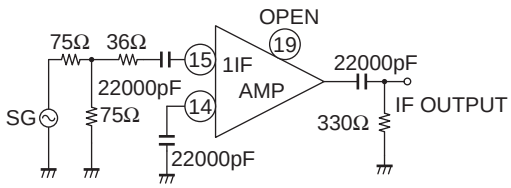

N-AGC-IN
13
47pF
150Ω
IF
1000pF
75Ω
36Ω
8pF
10pF
5pF
5pF
Mix
75Ω
100kΩ
30kΩ
0.022μF
24Ω
VCC
VCC

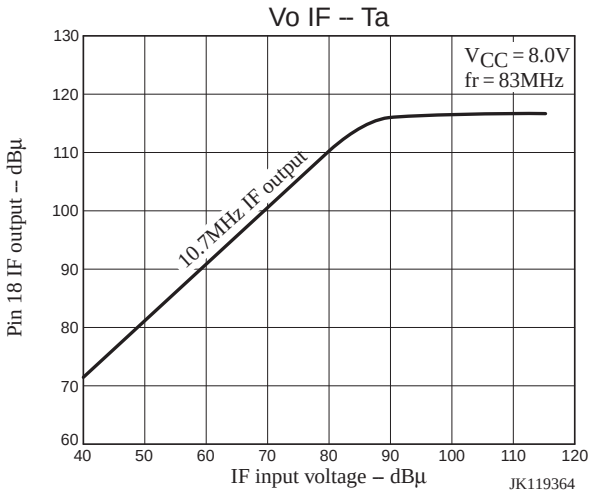

IANT-D – VCL
fC = 10.7MHz
VIN = 100dBμ
(Pin 13 input)
N-AGC-only
W-AGC off
I-ANT-D
510Ω
47pF
36Ω
75Ω
75Ω
SG
1000pF
Antenna damping current – mA
Pin 20 voltage, VCL – V
JK119359

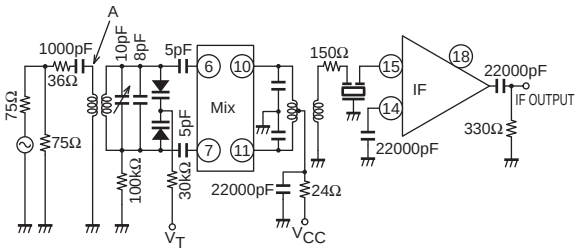

Vo MIX – VIN MIX
fr = 83MHz
fOSC = 72.3MHz
fIF = 10.7MHz
VCC = 8V
6V
Mixer output – dBμ
Mixer input – dBμ
JK119360

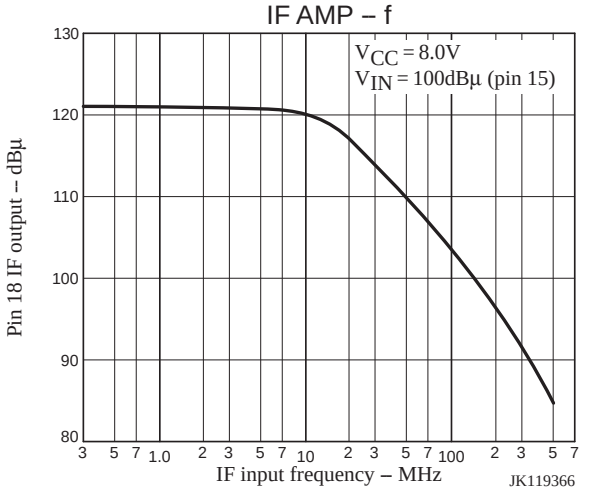

Vin-Mix
1000pF
5pF
VO-IF
75Ω
36Ω
8pF
10pF
Mix
330Ω
SG
75Ω
5pF
100kΩ
30kΩ
1000pF
24Ω
VT
VCC

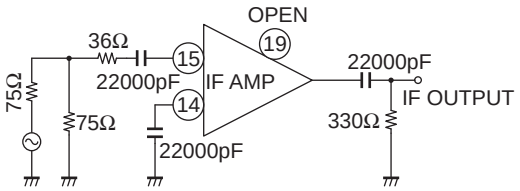

Vo IF – VIN IF
fC = 10.7MHz
VCC = 9V
8V
7V
IF output – dBμ
IF input voltage – dBμ
JK119362

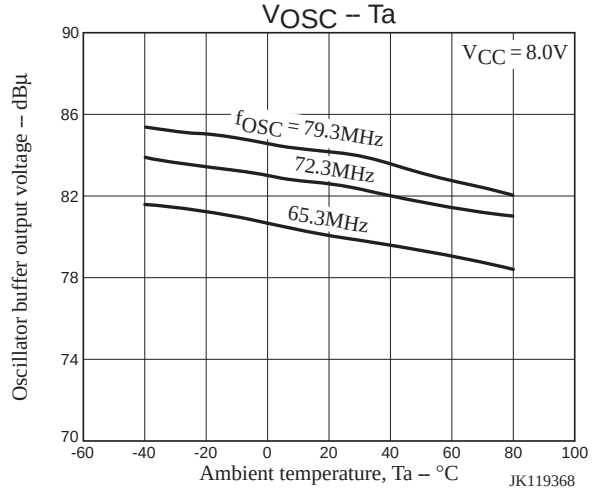

OPEN
19
75Ω
36Ω
15
1IF
AMP
22000pF
22000pF
14
SG
75Ω
IF OUTPUT
330Ω
22000pF

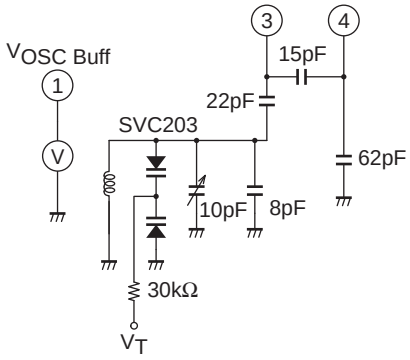

Vo IF – Ta
VCC = 8.0V
fr = 83MHz
10.7MHz IF output
Pin 18 IF output – dBμ
IF input voltage – dBμ
JK119364

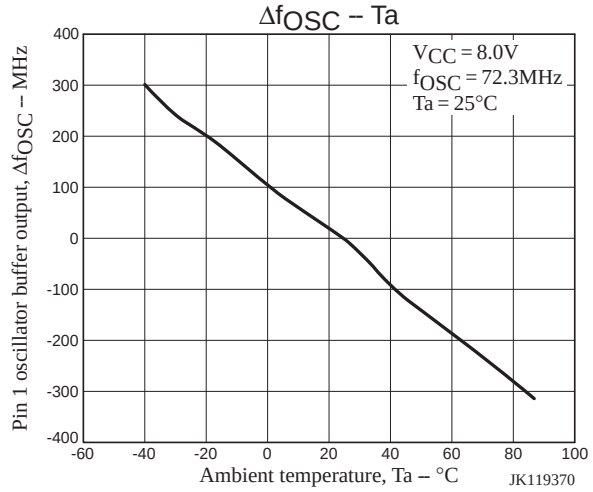

A
1000pF
36Ω
75Ω
75Ω
10pF
8pF
5pF
5pF
100kΩ
30kΩ
Mix
150Ω
IF
22000pF
IF OUTPUT
330Ω
22000pF
22000pF
24Ω
VT
VCC

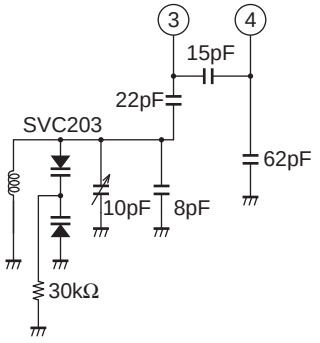

IF AMP – f
VCC = 8.0V
VIN = 100dBμ (pin 15)
Pin 18 IF output – dBμ
IF input frequency – MHz
JK119366

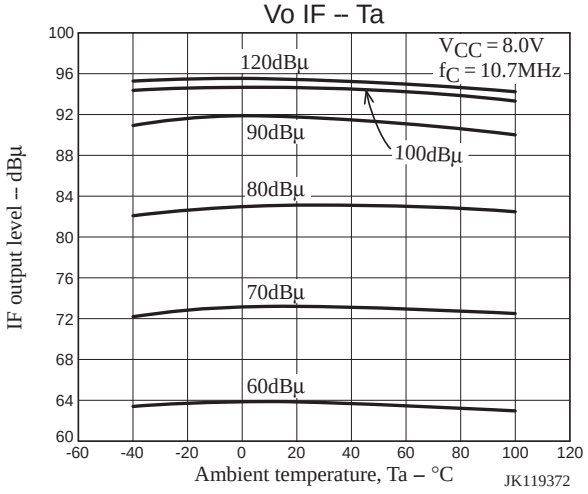

OPEN
36Ω
22000pF
75Ω
75Ω
IF AMP
22000pF
IF OUTPUT
330Ω
22000pF

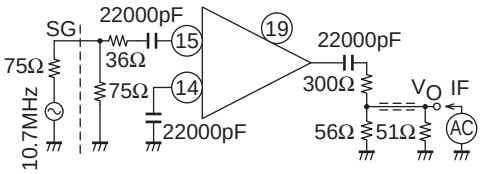

VOSC – Ta
VCC = 8.0V
fOSC = 79.3MHz
72.3MHz
65.3MHz
Oscillator buffer output voltage – dBμ
Ambient temperature, Ta – °C
JK119368

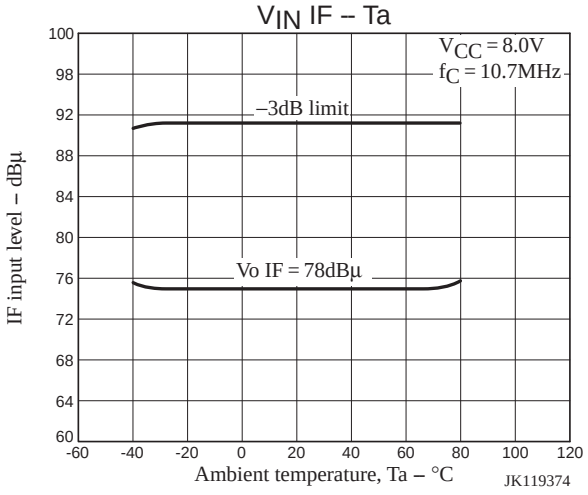

VOSC Buff
15pF
22pF
SVC203
62pF
10pF
8pF
30kΩ
VT

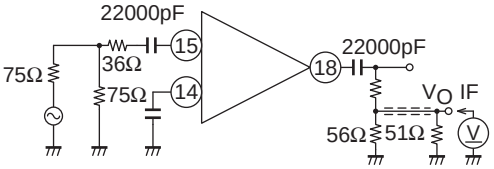

ΔfOSC – Ta
VCC = 8.0V
fOSC = 72.3MHz
Ta = 25°C
Pin 1 oscillator buffer output, ΔfOSC – MHz
Ambient temperature, Ta – °C
JK119370

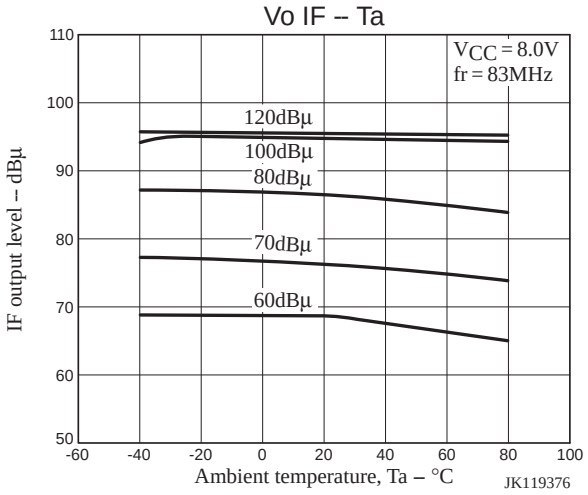

15pF
22pF
SVC203
62pF
10pF
8pF
30kΩ

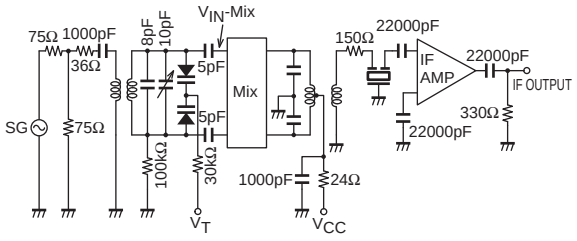

Vo IF – Ta
V_{CC} = 8.0V
f_C = 10.7MHz
120dBμ
90dBμ
100dBμ
80dBμ
70dBμ
60dBμ
IF output level – dBμ
Ambient temperature, Ta – °C
JK119372

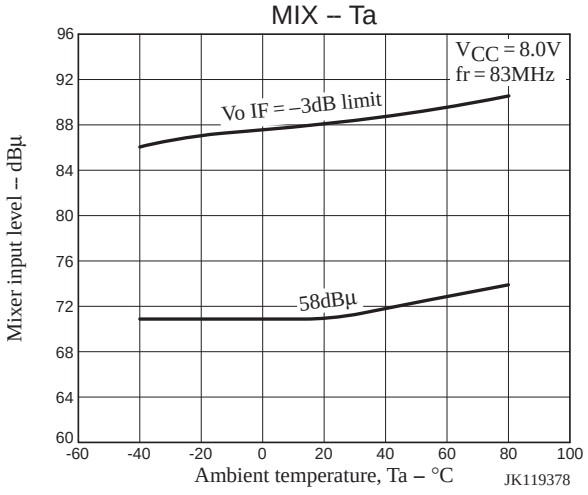

SG
10.7MHz
75Ω
22000pF
36Ω
75Ω
22000pF
15
14
19
22000pF
300Ω
V_O IF
56Ω
51Ω
AC

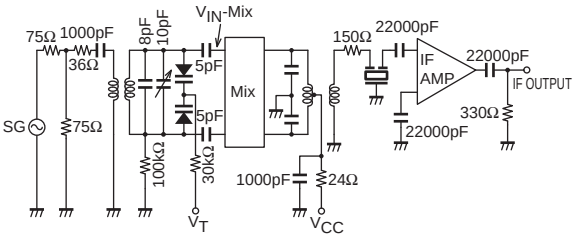

V_{IN} IF – Ta
V_{CC} = 8.0V
f_C = 10.7MHz
–3dB limit
Vo IF = 78dBμ
IF input level – dBμ
Ambient temperature, Ta – °C
JK119374

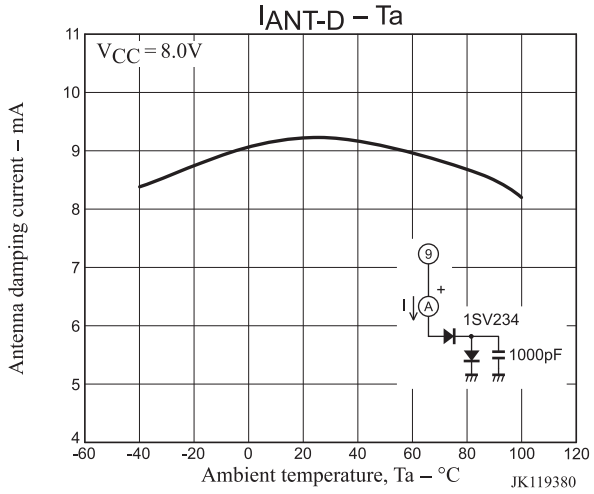

22000pF
75Ω
36Ω
75Ω
15
14
18
22000pF
V_O IF
56Ω
51Ω
V

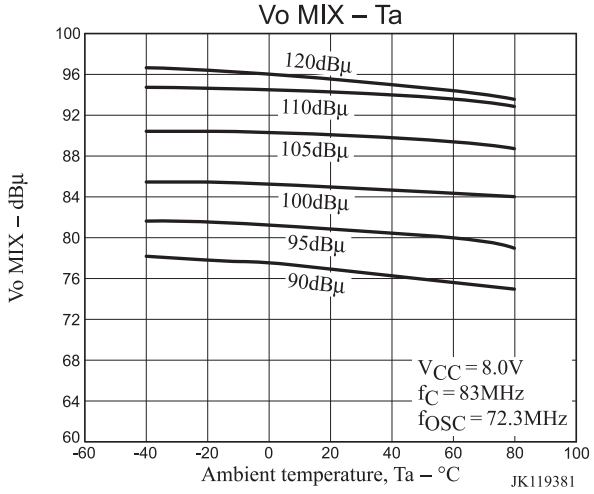

Vo IF – Ta
V_{CC} = 8.0V
fr = 83MHz
120dBμ
100dBμ
80dBμ
70dBμ
60dBμ
IF output level – dBμ
Ambient temperature, Ta – °C
JK119376

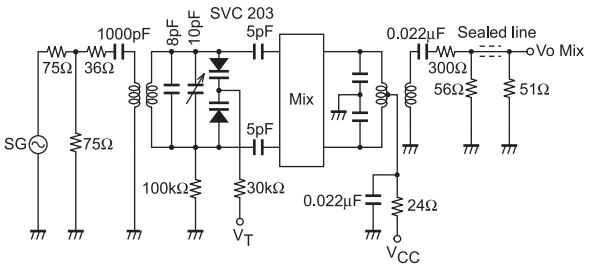

75Ω
1000pF
36Ω
8pF
10pF
V_{IN}-Mix
5pF
5pF
Mix
SG
75Ω
100kΩ
30kΩ
1000pF
24Ω
V_T
V_{CC}
150Ω
22000pF
IF
AMP
22000pF
IF OUTPUT
330Ω
22000pF

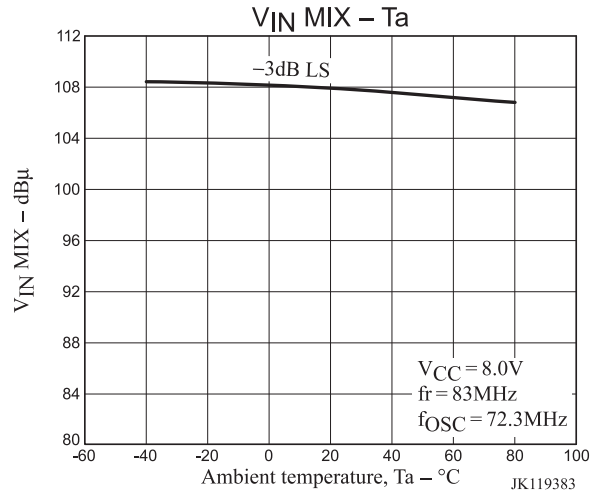

MIX – Ta
V_{CC} = 8.0V
fr = 83MHz
Vo IF = –3dB limit
58dBμ
Mixer input level – dBμ
Ambient temperature, Ta – °C
JK119378

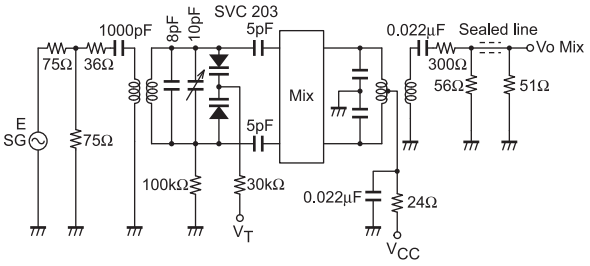

75Ω
1000pF
36Ω
8pF
10pF
V_{IN}-Mix
5pF
5pF
Mix
SG
75Ω
100kΩ
30kΩ
1000pF
24Ω
V_T
V_{CC}
150Ω
22000pF
IF
AMP
22000pF
IF OUTPUT
330Ω
22000pF

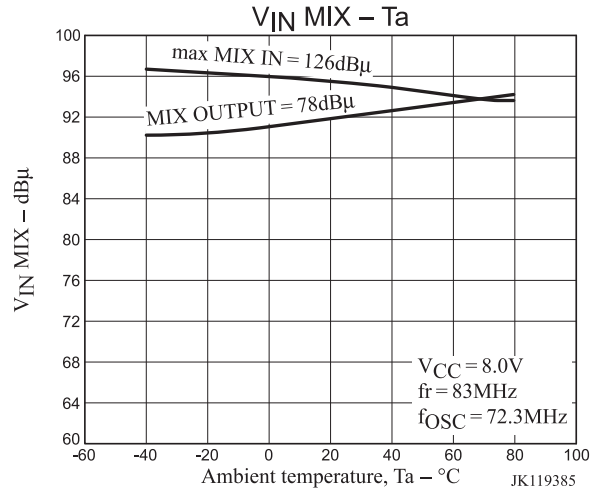

I_{ANT-D} – Ta
V_{CC} = 8.0V
Antenna damping current – mA
Ambient temperature, Ta – °C
JK119380
9
A
1SV234
1000pF

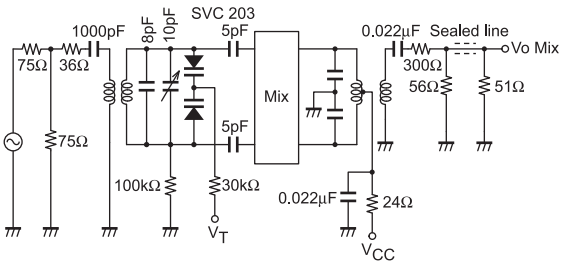

Vo MIX – Ta
120dBμ
110dBμ
105dBμ
100dBμ
95dBμ
90dBμ
Vo MIX – dBμ
V_{CC} = 8.0V
f_C = 83MHz
f_{OSC} = 72.3MHz
Ambient temperature, Ta – °C
JK119381

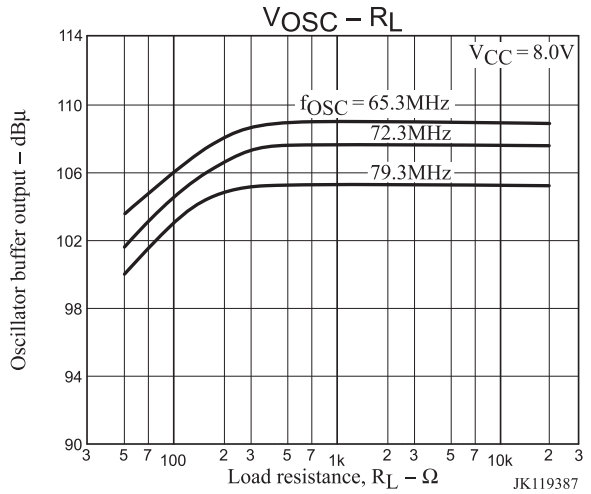

SVC 203
1000pF
8pF
10pF
5pF
0.022μF
Sealed line
Vo Mix
75Ω
36Ω
300Ω
56Ω
51Ω
Mix
SG
75Ω
5pF
100kΩ
30kΩ
0.022μF
24Ω
V_T
V_{CC}

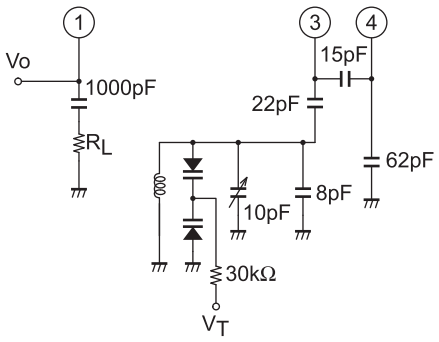

V_{IN} MIX – Ta
−3dB LS
V_{IN} MIX – dBμ
V_{CC} = 8.0V
fr = 83MHz
f_{OSC} = 72.3MHz
Ambient temperature, Ta – °C
JK119383

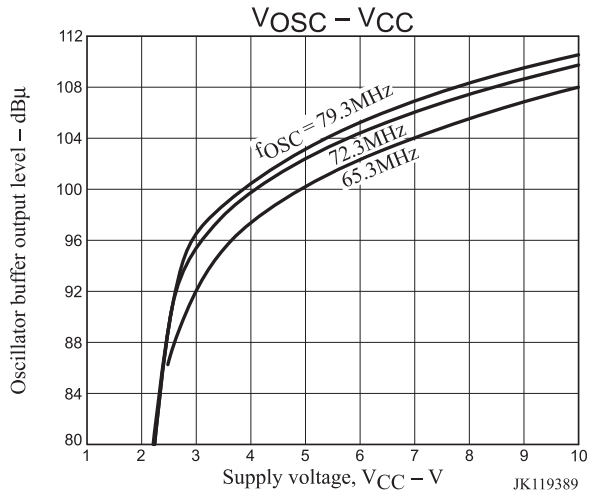

SVC 203
1000pF
8pF
10pF
5pF
0.022μF
Sealed line
Vo Mix
75Ω
36Ω
300Ω
56Ω
51Ω
Mix
E
SG
75Ω
5pF
100kΩ
30kΩ
0.022μF
24Ω
V_T
V_{CC}

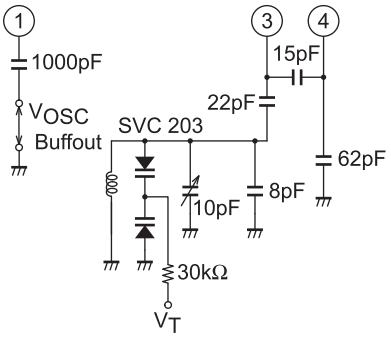

V_{IN} MIX – Ta
max MIX IN = 126dBμ
MIX OUTPUT = 78dBμ
V_{IN} MIX – dBμ
V_{CC} = 8.0V
fr = 83MHz
f_{OSC} = 72.3MHz
Ambient temperature, Ta – °C
JK119385

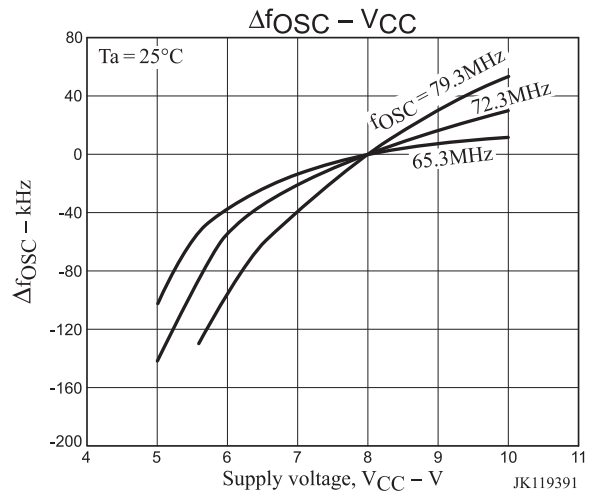

SVC 203
1000pF
8pF
10pF
5pF
0.022μF
Sealed line
Vo Mix
75Ω
36Ω
300Ω
56Ω
51Ω
Mix
75Ω
5pF
100kΩ
30kΩ
0.022μF
24Ω
V_T
V_{CC}

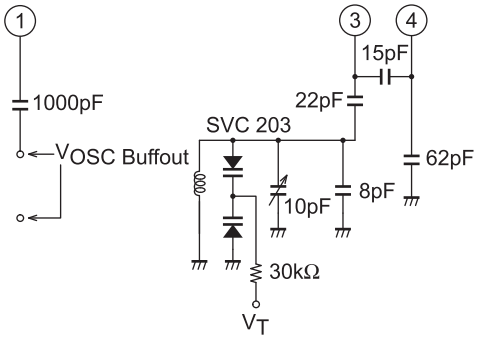

VOSC – RL
VCC = 8.0V
fOSC = 65.3MHz
72.3MHz
79.3MHz
Oscillator buffer output – dBμ
Load resistance, RL – Ω
JK119387


Vo
1000pF
RL
15pF
22pF
62pF
8pF
10pF
30kΩ
VT


VOSC – VCC
fOSC = 79.3MHz
72.3MHz
65.3MHz
Oscillator buffer output level – dBμ
Supply voltage, VCC – V
JK119389


1000pF
VOSC
Buffout
SVC 203
15pF
22pF
62pF
8pF
10pF
30kΩ
VT


ΔfOSC – VCC
Ta = 25°C
fOSC = 79.3MHz
72.3MHz
65.3MHz
ΔfOSC – kHz
Supply voltage, VCC – V
JK119391


1000pF
VOSC Buffout
SVC 203
15pF
22pF
62pF
8pF
10pF
30kΩ
VT

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