



AM Tuner for Car Radio

Overview

The LA1130 is an IC developed for AM tuner systems in car radio applications. It provides low-level local oscillation so that it can be applied in varactor diode tuning applications as well as μ tuning applications.

Functions

- RF amplification
- MIX
- OSC (with ALC)
- IF amplification
- Detection
- AGC (normal)
- RF wide-band AGC
- Others

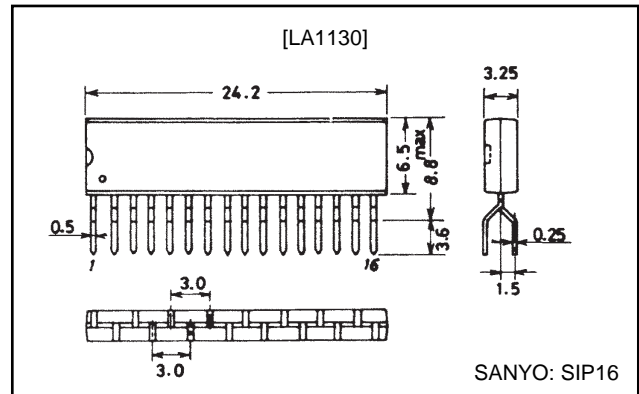
Features

- Good space factor due to single-end package.
- Easy to design printed circuit pattern due to 3mm-pitch pin interval.
- Double-balanced type MIX : Improvement in IF interference, spurious interference.
- Normal AGC : Less variation in detector output to input.
- RF wide-band AGC : Improvement in cross modulation distortion, especially strong input characteristics in varactor diode tuning applications because of low operating level (300mVrms).
- AGC drive output for FET : Possible to apply AGC to FET at input stage in varactor diode tuning applications.
- ALC at OSC stage : Improvement in tracking error due to stabilized low-level (350mVrms) oscillation output in varactor diode tuning applications.
- Reference voltage output : Possible to use 5.6V reference voltage for other bias (FET, etc.).
- VCC variation compensation : Less variation in gain, distortion, etc. (7.5 to 16V)
- Less ripple voltage : Less modulation of carrier by supply voltage ripple.
- Low pop noise : Possible to reduce pop noise at the time of VCC-on, mode-on by selecting AGC time constant.

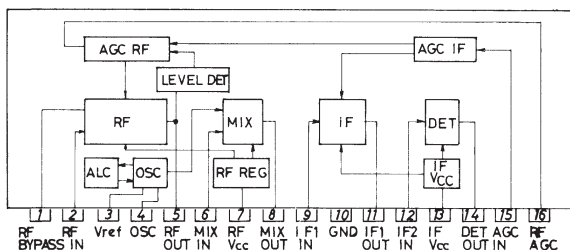
Package Dimensions

unit: mm

3020A-SIP16



Equivalent Circuit Block Diagram



LA1130

Specifications

Maximum Ratings at Ta=25°C, See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max	Pins 7, 13	16	V
Maximum output voltage	V _{O5}	Pin 5	17	V
	V _{O8, 11}	Pins 8, 11	24	V
Maximum input voltage	V _{IN} max	Pin 2	5.6	V
Maximum supply current	I _{CC} max	Total of current at pins 5, 7, 8, 11, 13	35	mA
Maximum flow-out current	I ₃	Pin 3	6	mA
Allowable power dissipation	P _d max	Ta≤45°C	520	mW
Operating temperature	T _{opr}		-20 to +70	°C
Storage temperature	T _{stg}		-40 to +125	°C

Recommended Operating Condition at Ta=25°C

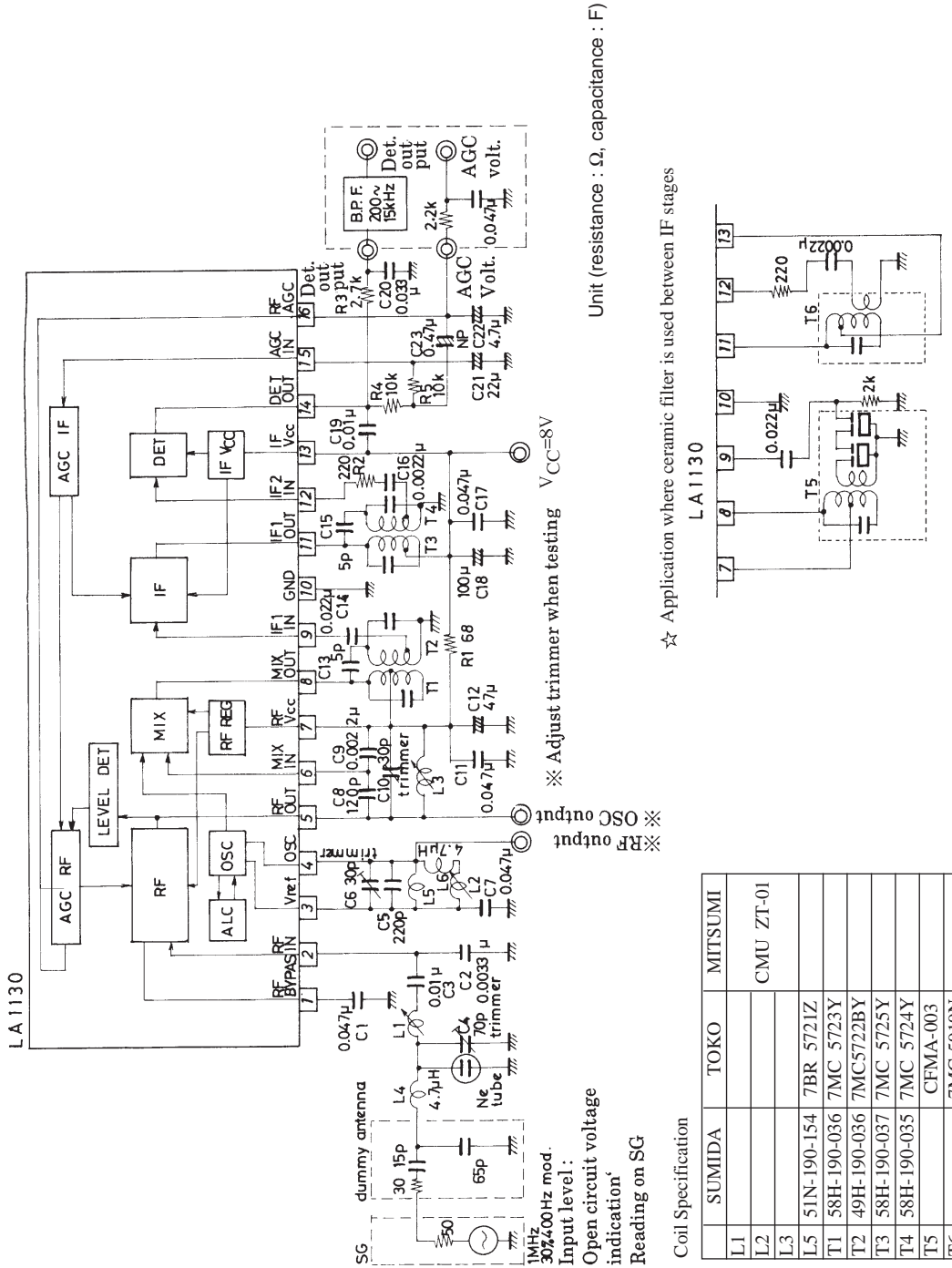
Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V _{CC}		7.5 to 14.0	V

Operating Characteristics at Ta=25°C, V_{CC}=8V, f_r=1MHz, f_m=400Hz, See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I _{CC1}	Quiescent	12.5	18.0	24.5	mA
	I _{CC2}	120dBμ input	14.0	20.0	26.5	mA
Detection output	V _{O1}	24dBμ input, 30% mod.	-31.0	-26.5	-12.0	dBm
	V _{O2}	74dBμ input, 30% mod.	-18.0	-15.5	-12.0	dBm
Signal to noise ratio	S/N 1	24dBμ input, 30% mod.	16	20		dB
	S/N 2	74dBμ input, 30% mod.	46	50		dB
Total harmonic distortion	THD1	74dBμ input, 30% mod.		0.35	1.0	%
	THD2	74dBμ input, 80% mod.		0.35	1.5	%
	THD3	120dBμ input, 30% mod.		0.35	2.0	%
RF AGC voltage (V ₁₆)	V _{RFAGC1}	Quiescent	5.2	5.6	5.9	V
[Reference characteristics]						
Signal to noise ratio	S/N 3	35dBμ input, 30% mod.		31		dB
Total harmonic distortion	THD4	128dBμ input, 80% mod.		0.58		%
Detection output variation	ΔV _O	V _O (128dBμ)/V _O (74dBμ)		0.4		dB
Bandwidth (6dB)	BW ₆	6dB width, 15dBμ input 30% mod.		7		kHz
	BW ₆₀	60dB width, 15dBμ input 30% mod.		30		kHz
Selectivity (1 signal)	ACA	±10kHz detuning, 15dBμ input, 30% mod.		40		dB
Ripple rejection ratio		100dBμ input, IF V _{CC} (pin 13) ripple level 50Hz to 15dBm		40.5		dB
Local oscillation voltage	V _{osc}			350		mVrms
Local osc drift	ΔV _{osc}	V _{oscL} (515kHz) to V _{oscH} (1660kHz)		20		mVrms
Whistle	2f _i Tweet	74dBμ input, 400Hz beat max.		-33		dB
RF AGC voltage (V ₁₆)	V _{RFAGC2}	120dBμ input		1		V
RF output voltage	V _{ORF}	100dBμ input, ±10kHz		300		mVrms
IF interference		f _r =600kHz, 15dBμ input		91.5		dB
Image frequency interference		f _r =1400kHz, 15dBμ input		70.5		dB

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Sample Application Circuit (excluding the area bounded by the dotted line) / also used as characteristics test circuit.



※ Adjust trimmer when testing $V_{CC}=8V$

※ RF output

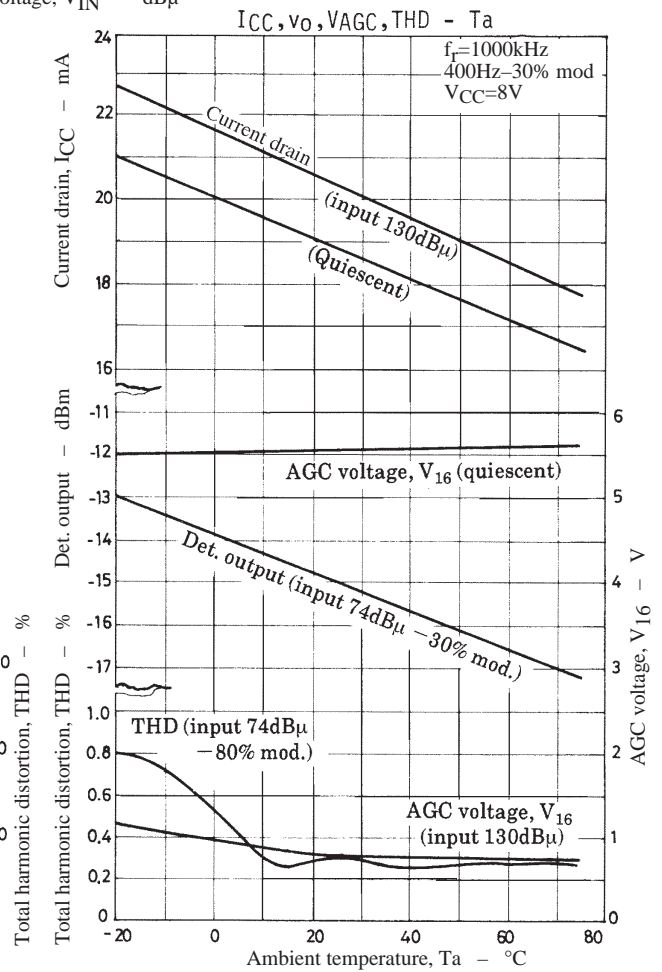
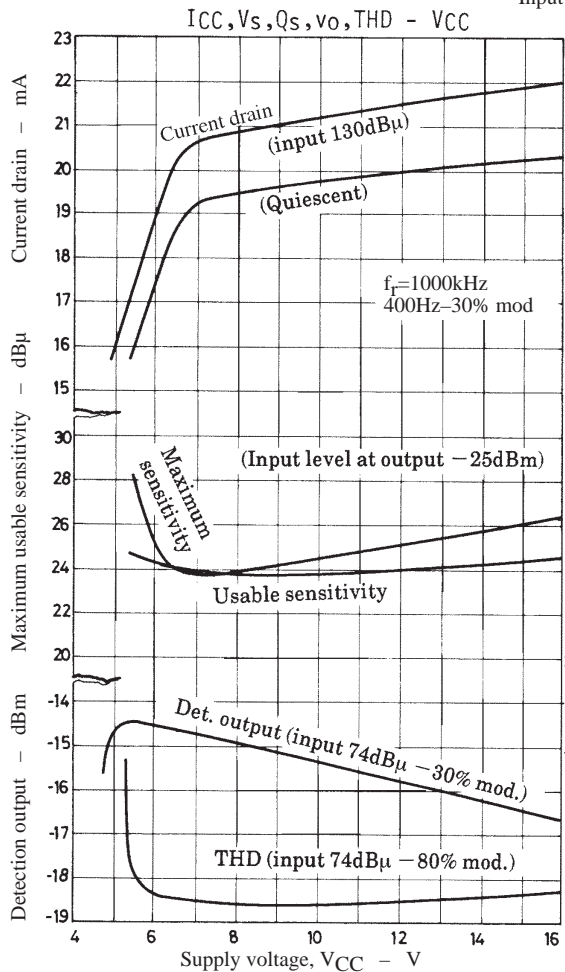
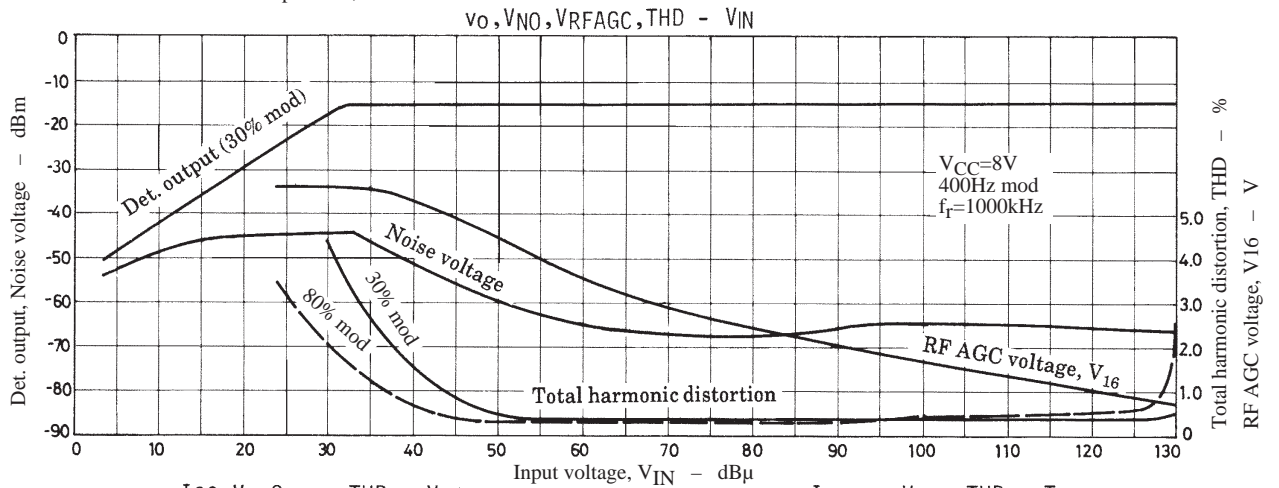
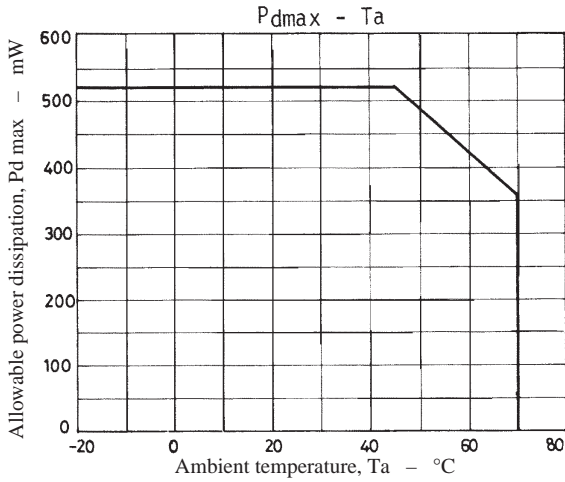
※ OSC output

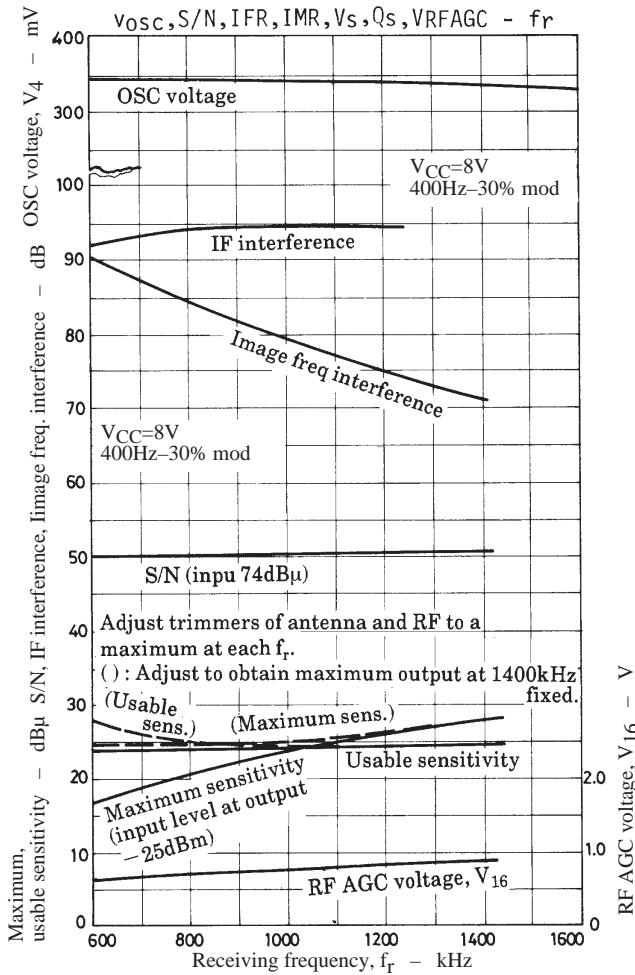
Unit (resistance : Ω, capacitance : F)

☆ Application where ceramic filter is used between IF stages

Coil Specification			
	SUMIDA	TOKO	MITSUMI
L1			
L2			CMU ZT-01
L3			
L5	51N-190-154	7BR 5721Z	
T1	58H-190-036	7MC 5723Y	
T2	49H-190-036	7MC5722BY	
T3	58H-190-037	7MC 5725Y	
T4	58H-190-035	7MC 5724Y	
T5		CFMA-003	
T6		7MC-5919N	

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