



**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  $\mu$  tuning applications.

**Functions**

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

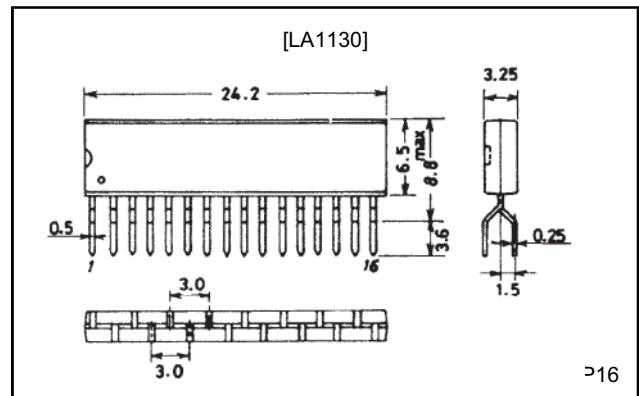
**Features**

- 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.

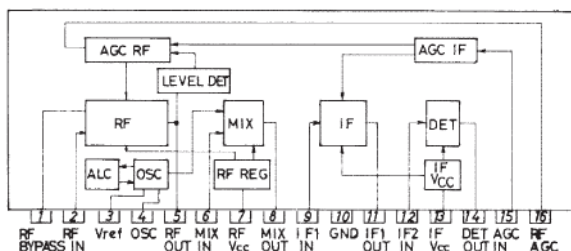
**Package Dimensions**

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

**Recommended Operating Condition** at Ta=25°C

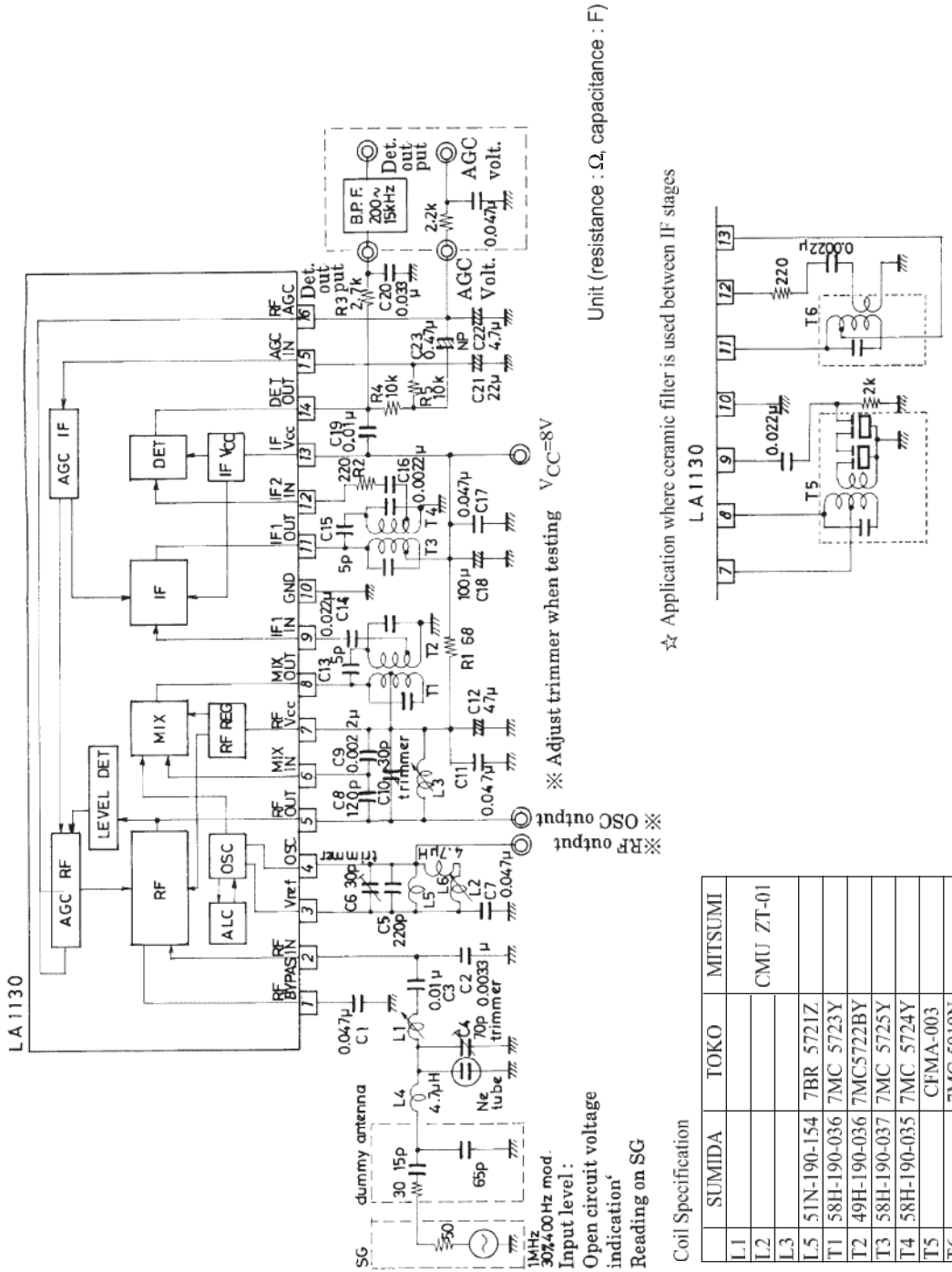
Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V <sub>CC</sub>		7.5 to 14.0	V

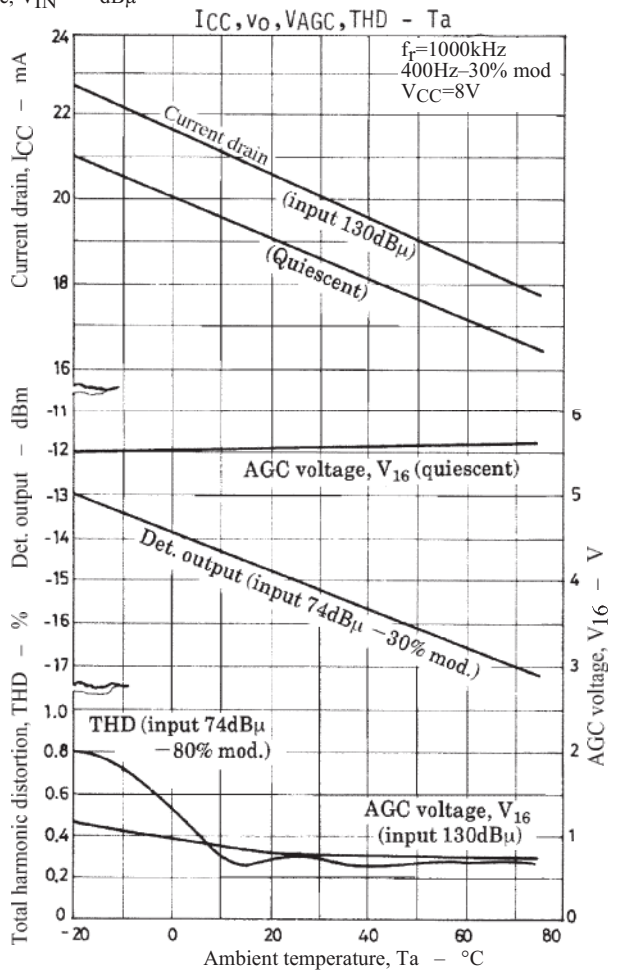
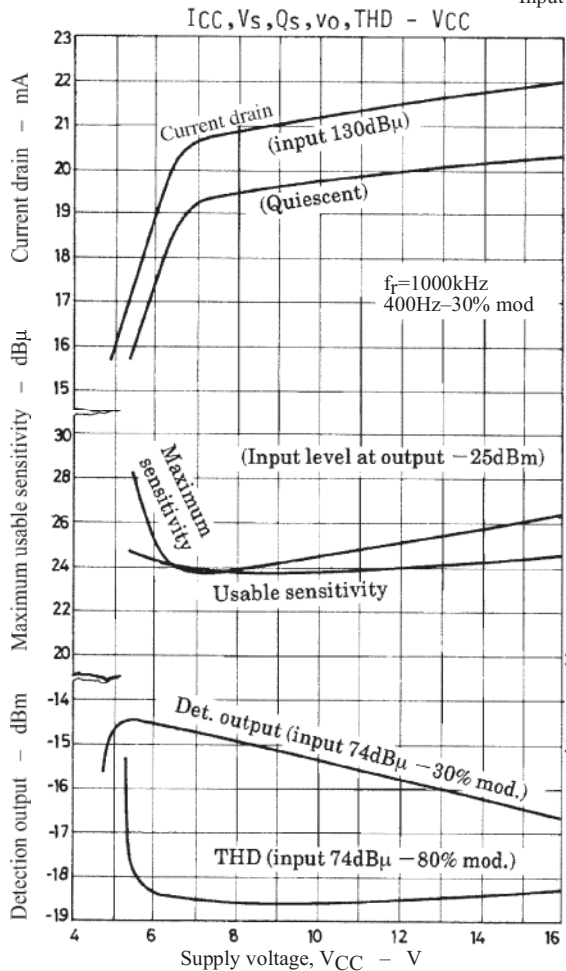
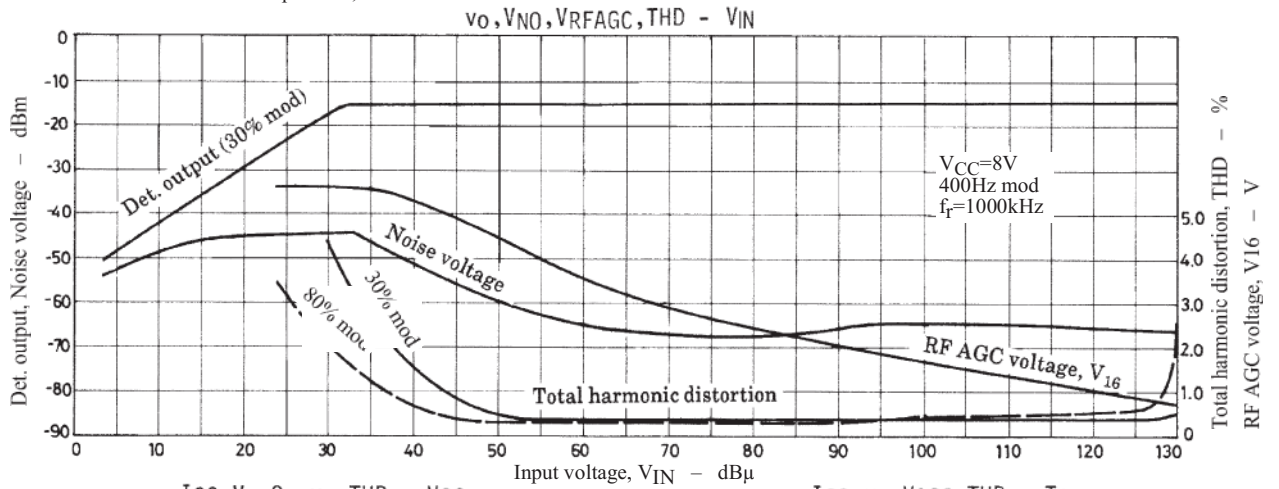
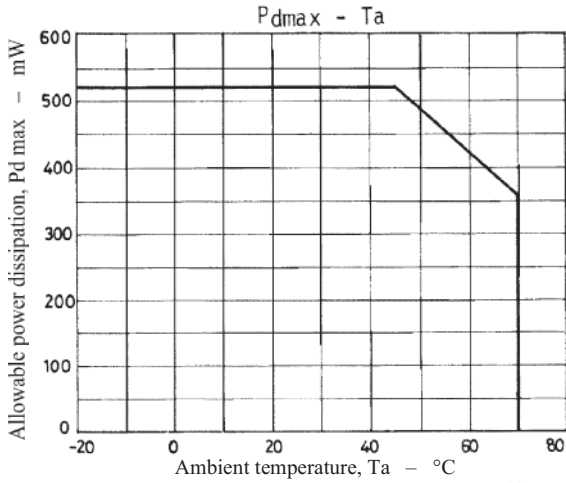
**Operating Characteristics** at Ta=25°C, V<sub>CC</sub>=8V, f<sub>r</sub>=1MHz, f<sub>m</sub>=400Hz, See specified Test Circuit.

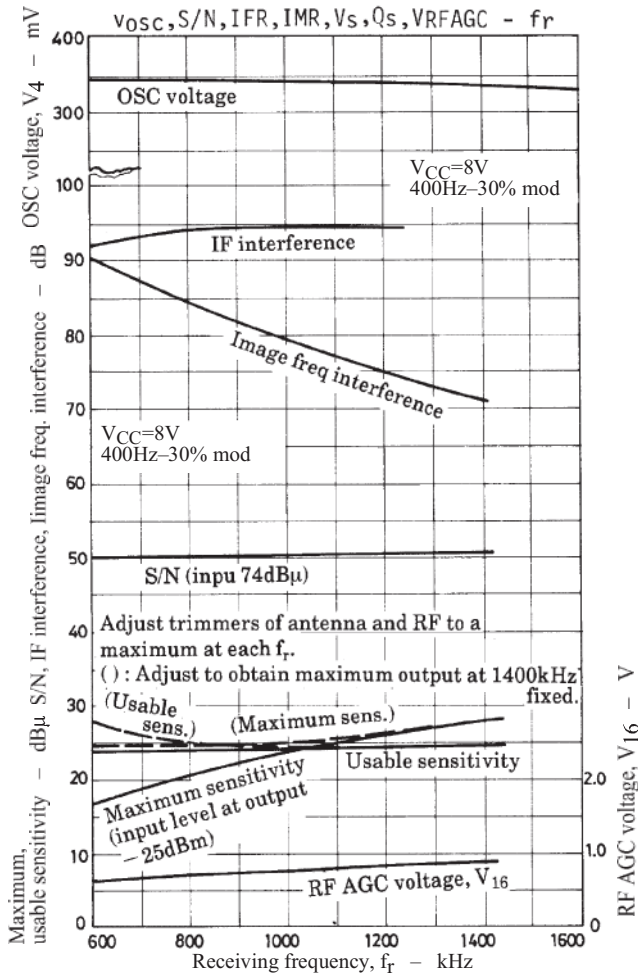
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I <sub>CC1</sub>	Quiescent	12.5	18.0	24.5	mA
	I <sub>CC2</sub>	120dBμ input	14.0	20.0	26.5	mA
Detection output	V <sub>O1</sub>	24dBμ input, 30% mod.	-31.0	-26.5	-12.0	dBm
	V <sub>O2</sub>	74dBμ input, 30% mod.	-18.0	-15.5	-12.0	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 <sub>16</sub> )	V <sub>R FAGC1</sub>	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 <sub>O</sub>	V <sub>O</sub> (128dBμ)/V <sub>O</sub> (74dBμ)		0.4		dB
Bandwidth (6dB)	BW <sub>6</sub>	6dB width, 15dBμ input 30% mod.		7		kHz
	BW <sub>60</sub>	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 <sub>CC</sub> (pin 13) ripple level 50Hz to 15dBm		40.5		dB
Local oscillation voltage	V <sub>osc</sub>			350		mVrms
Local osc drift	ΔV <sub>osc</sub>	V <sub>oscL</sub> (515kHz) to V <sub>oscH</sub> (1660kHz)		20		mVrms
Whistle	2f <sub>i</sub> Tweet	74dBμ input, 400Hz beat max.		-33		dB
RF AGC voltage (V <sub>16</sub> )	V <sub>R FAGC2</sub>	120dBμ input		1		V
RF output voltage	V <sub>ORF</sub>	100dBμ input, ±10kHz		300		mVrms
IF interference		f <sub>r</sub> =600kHz, 15dBμ input		91.5		dB
Image frequency interference		f <sub>r</sub> =1400kHz, 15dBμ input		70.5		dB

# LA1130

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







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