



LA1875M

Single-chip, Electronic Tuner for Car Stereo

Overview

The LA1875M is an electronic tuner IC that incorporates AM, FM IF and MPX circuit sections on a single chip, making it ideal for use in car stereo equipment.

The LA1875M features an antenna-damping AM AGC circuit with rapid charge and discharge characteristics. It also features an S-meter driver, tuning and FM-stereo LED outputs, FM soft-mute and forced mono modes and a no-adjustment MPX VCO.

The LA1875M AM circuit comprises a mixer, oscillator, RF AGC, IF amplifier and IF buffer. The FM IF circuit comprises an IF amplifier, quadrature detector, and AFC and IF buffer outputs. The MPX circuit comprises a VCO and stereo noise control (SNC) and high-cut control (HCC) circuits.

The LA1875M operates from a 7 to 10V supply and is available in 36-pin MFPs.

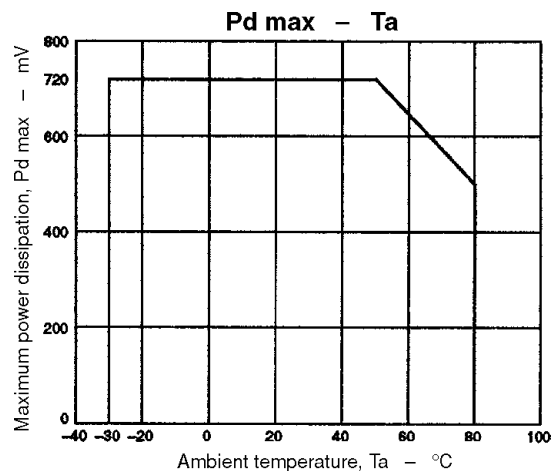
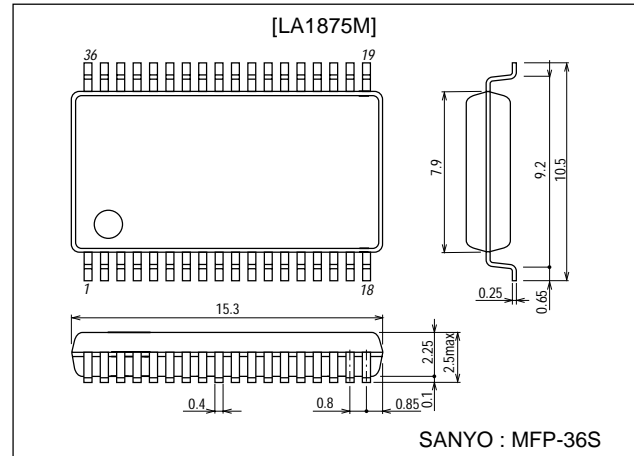
Features

- AM, FM IF and MPX circuits.
- Antenna-damping AM AGC circuit with rapid charge and discharge characteristics.
- S-meter driver.
- Tuning and FM-stereo LED outputs.
- AFC and IF buffer outputs.
- AM mixer, oscillator, AGC, IF amplifier and IF buffer.
- FM IF amplifier, quadrature detector.
- MPX no-adjustment VCO, SNC and HCC.
- FM soft-mute and forced-mono modes.
- 7 to 10V supply.
- 36-pin MFP.

Package Dimensions

unit:mm

3129-MFP36S



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SANYO Electric Co., Ltd. Semiconductor Company

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LA1875M

Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		11	V
Power dissipation ($T_a \leq 50^\circ\text{C}$)	P_D		720	mW
Operating temperature range	T_{opr}		-30 to +80	$^\circ\text{C}$
Storage temperature range	T_{stg}		-40 to +150	$^\circ\text{C}$

Recommended Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		8.5	V
Supply voltage range	V_{CC}		7 to 10	V

Electrical Characteristics

FM characteristics at $T_a = 25^\circ\text{C}$, $V_{CC}=8.5\text{V}$, $f_c=10.7\text{MHz}$, $f_m=1\text{kHz}$, 75kHz deviation unless otherwise noted.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent supply current	I_{CCO}	No signal	21	31	41	mA
-3dB limiting sensitivity	-3dBLS	Referred to $V_I=100\text{dB}\mu$, Mute is ON.	27	37	47	dB μ
Tuning LED turn-on input voltage	V_{LED}	$V_{26}=2\text{V}$	43	58	73	dB μ
Detector output voltage	V_O	$V_I=100\text{dB}\mu$	165	250	345	mV
S-meter output voltage	V_{SM}	No signal	0	0.15	0.7	V
		$V_I=100\text{dB}\mu$	5.0	6.1	7.0	
IF buffer output voltage	V_{IF}	$V_I=80\text{dB}\mu$, $V_{12}=5\text{V}$	200	360	540	mV
SNC output voltage	V_{SUB}	$V_I=100\text{dB}\mu$, $V_{34}=0.1\text{V}$. See note.		0.5	5.0	mV
Tuning LED turn-on bandwidth	BW_{LED}	$V_I=100\text{dB}\mu$, $V_{26} \geq 2\text{V}$	85	130	180	kHz
Signal-to-noise ratio	S/N	$V_I=100\text{dB}\mu$	66	74		dB
AM suppression ratio	AMR	$V_I=100\text{dB}\mu$ at 1kHz with 30% AM modulation	38	60		dB
Separation	Sep	$V_I=100\text{dB}\mu$, See note.	30	45		dB
Channel balance	CB		-1.5	0	+1.5	dB
HCC output attenuation	α	$V_I=100\text{dB}\mu$, $V_{33}=0.6\text{V}$, $f_m=10\text{kHz}$, See note.	-10.0	-5.0	-0.5	dB
Stereo LED turn-on pilot tone modulation	LED-ON	$V_I=100\text{dB}\mu$	1.8	3.2	5.0	%
Stereo LED turn-off pilot tone modulation	LED-OFF	$V_I=100\text{dB}\mu$		2.2		%
Total harmonic distortion	THD	$V_I=100\text{dB}\mu$, mono signal		0.5	2.5	%
		$V_I=100\text{dB}\mu$, main channel signal		0.5	2.5	

Note

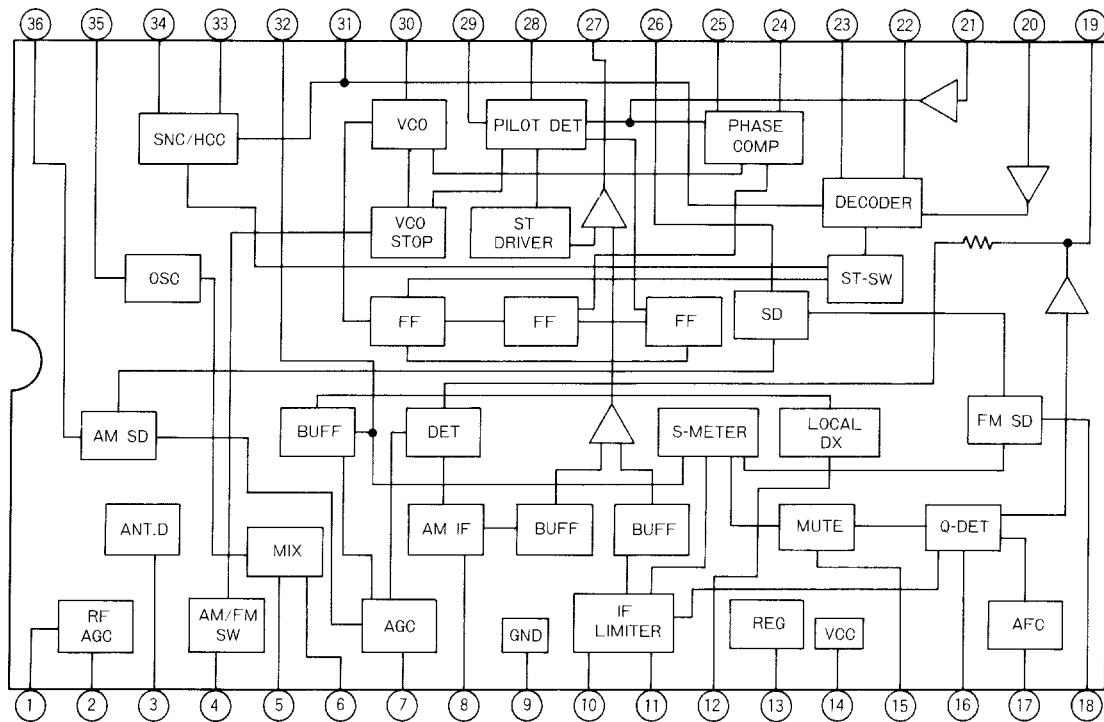
V_I comprises 90% left + right signal and 10% pilot signal.

AM characteristics at $T_a = 25^\circ\text{C}$, $V_{CC}=8.5\text{V}$, $f_c=1\text{MHz}$ with 30% modulation.

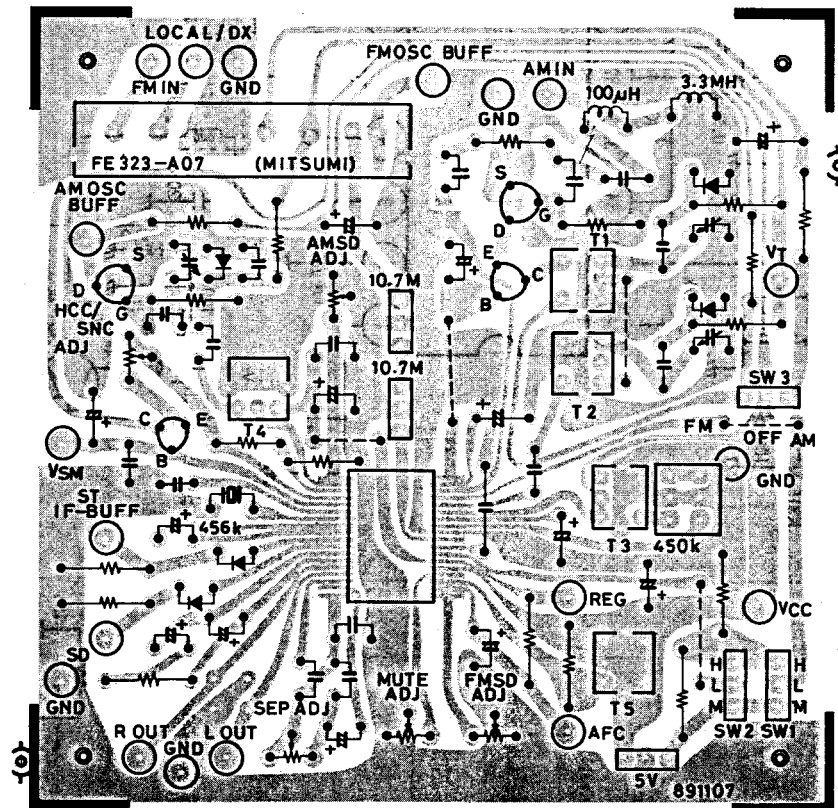
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent supply current	I_{CCO}	No signal	16	24	33	mA
Tuning LED turn-on input voltage	V_{LED}	$V_{26}=2\text{V}$	21	30	39	dB μ
RF AGC turn-on input voltage	V_{AGC}	$V_I=3\text{V}$	50	57	64	dB μ
Detector output voltage	V_O	$V_I=25\text{dB}\mu$	18	40	68	mV
		$V_I=74\text{dB}\mu$	70	105	156	
IF buffer output voltage	V_{IF}	$V_I=50\text{dB}\mu$, $V_{12}=5\text{V}$	150	260	390	mV
S-meter output voltage	V_{SM}	No signal	0	0.7	1.3	V
		$V_I=74\text{dB}\mu$	2.6	3.7	5.2	
Pin-diode driver current	I_{antd}	$V_I=0.7\text{V}$	2.0	2.5	3.0	mA
Signal-to-noise ratio	S/N	$V_I=25\text{dB}\mu$	17	21		dB
		$V_I=74\text{dB}\mu$	42	49		
Total harmonic distortion	THD	$V_I=74\text{dB}\mu$		0.35	1.0	%
		$V_I=130\text{dB}\mu$		0.4	2.0	

LA1875M

Block Diagram



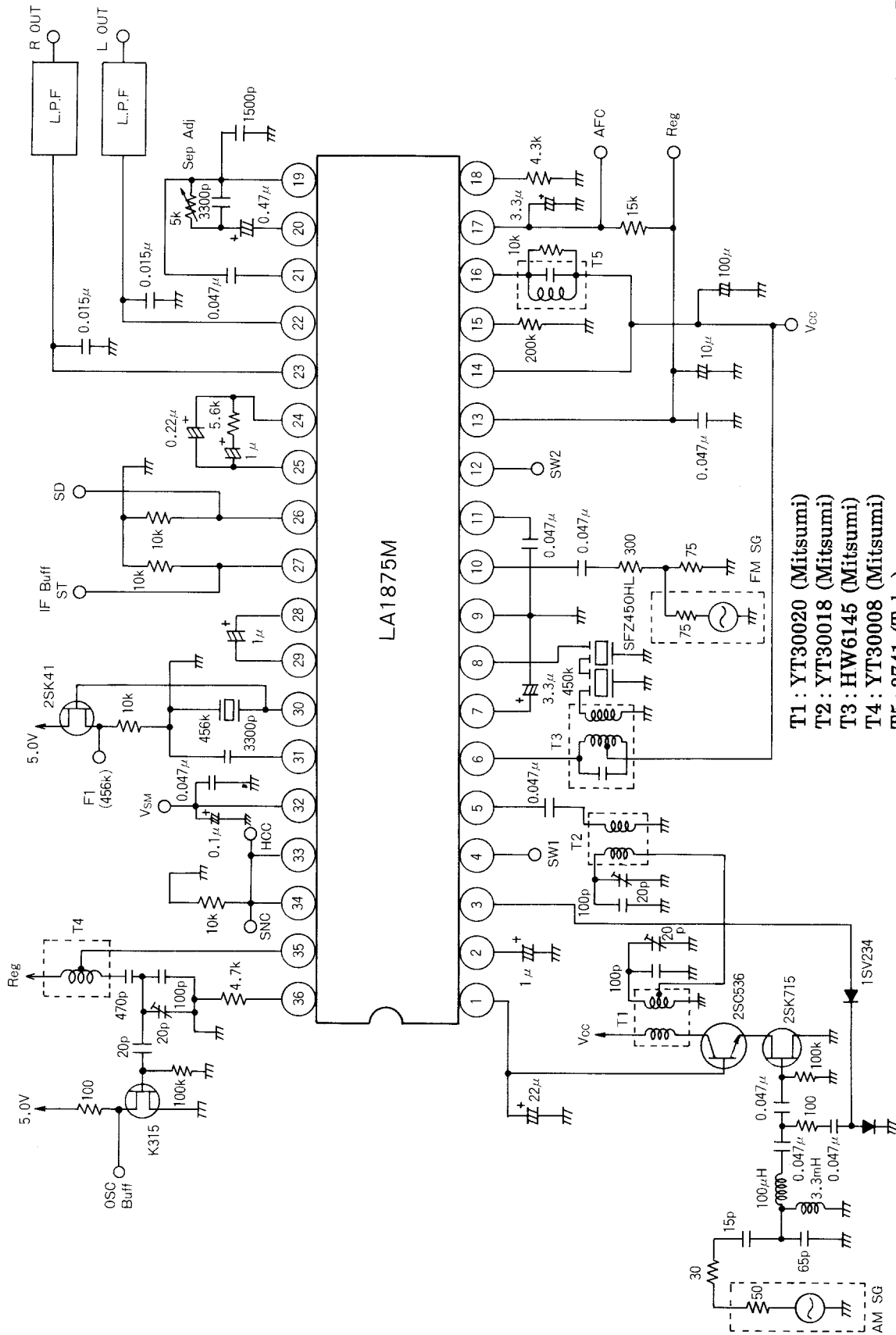
Sample Printed Circuit Pattern



Cu-foiled area 90×90mm²

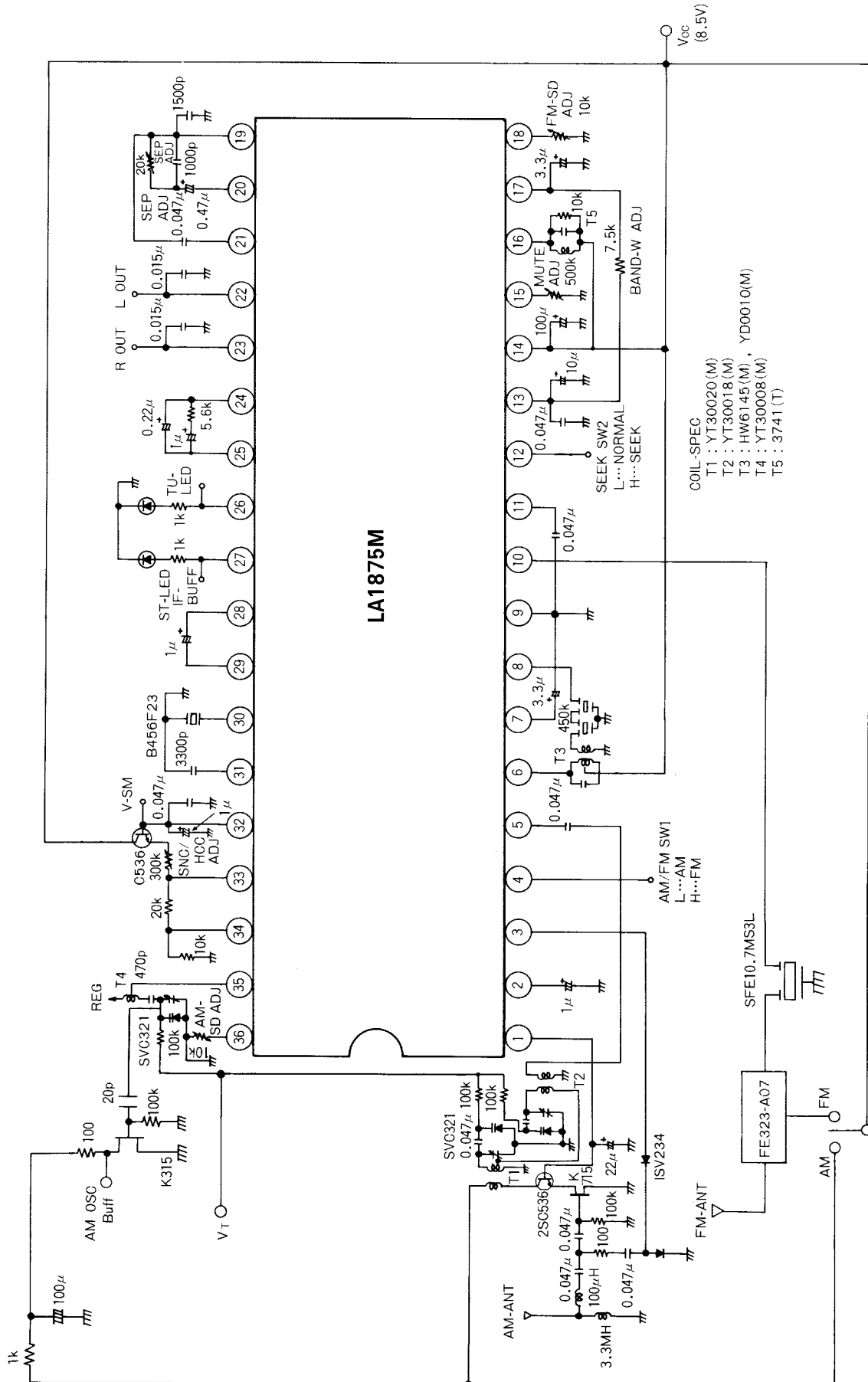
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Specified Test Circuit



LA1875M

Sample Application Circuit

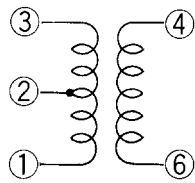


Unit (resistance: Ω, capacitance: F)

LA1875M

LA1875M Coil Specifications

T1 RF double tuning coil (Primary)



$$L1 - 3 = 224\mu\text{H}$$

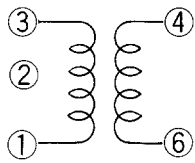
YT-30020 (Mitsumi)

① - ② 2T

⑥ - ④ 37T

② - ③ 82T

T2 RF double tuning coil (Secondary)



$$L1 - 3 = 224\mu\text{H}$$

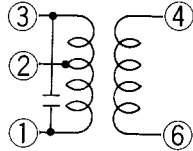
YT-30018 (Mitsumi)

① - ② 2T

⑥ - ④ 15T

② - ③ 82T

T3 AM IFT Coil (Matching Coil for SFZ 450 HL3)



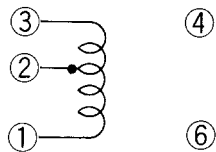
HW-6145 (Mitsumi)

③ - ② 67T $Q_0 = 70 \pm 20\%$

② - ① 85T $f = 450\text{kHz}$

⑥ - ④ 10T internal 180pF

T4 AM OSC Coil



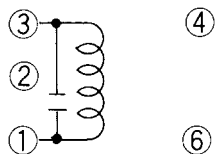
$$L1 - 3 = 118\mu\text{H}$$

YT-30008 (Mitsumi)

① - ② 29T

② - ③ 29T

T5 FM DET Coil



292TEAS-3741Z (Toko)

① - ③ 21T

$f = 10.7\text{MHz}$

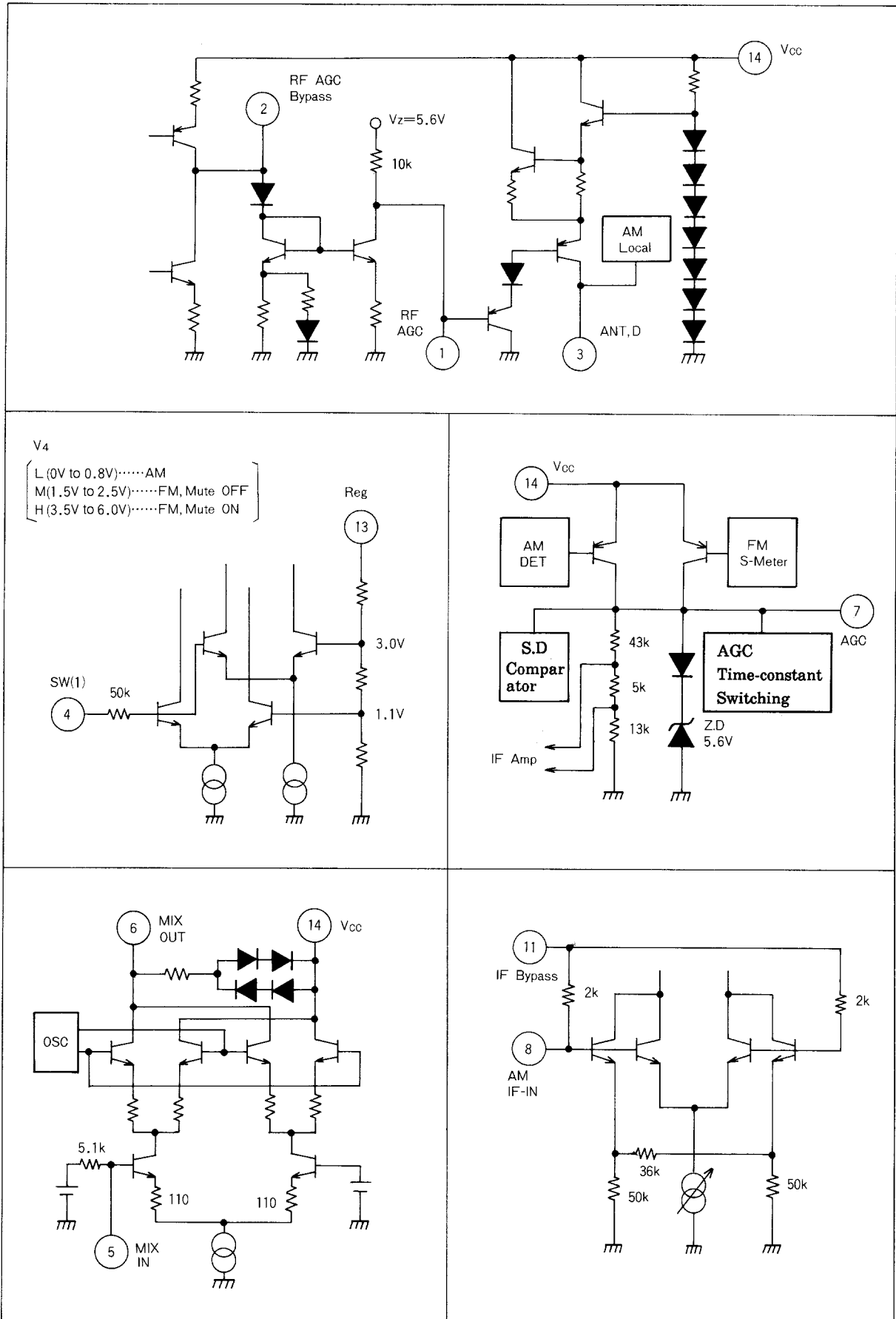
internal 82pF

$Q_0 = 38 \pm 20\%$

LA1875M

IC Internal Equivalent Circuit Diagrams

Unit (resistance: Ω)

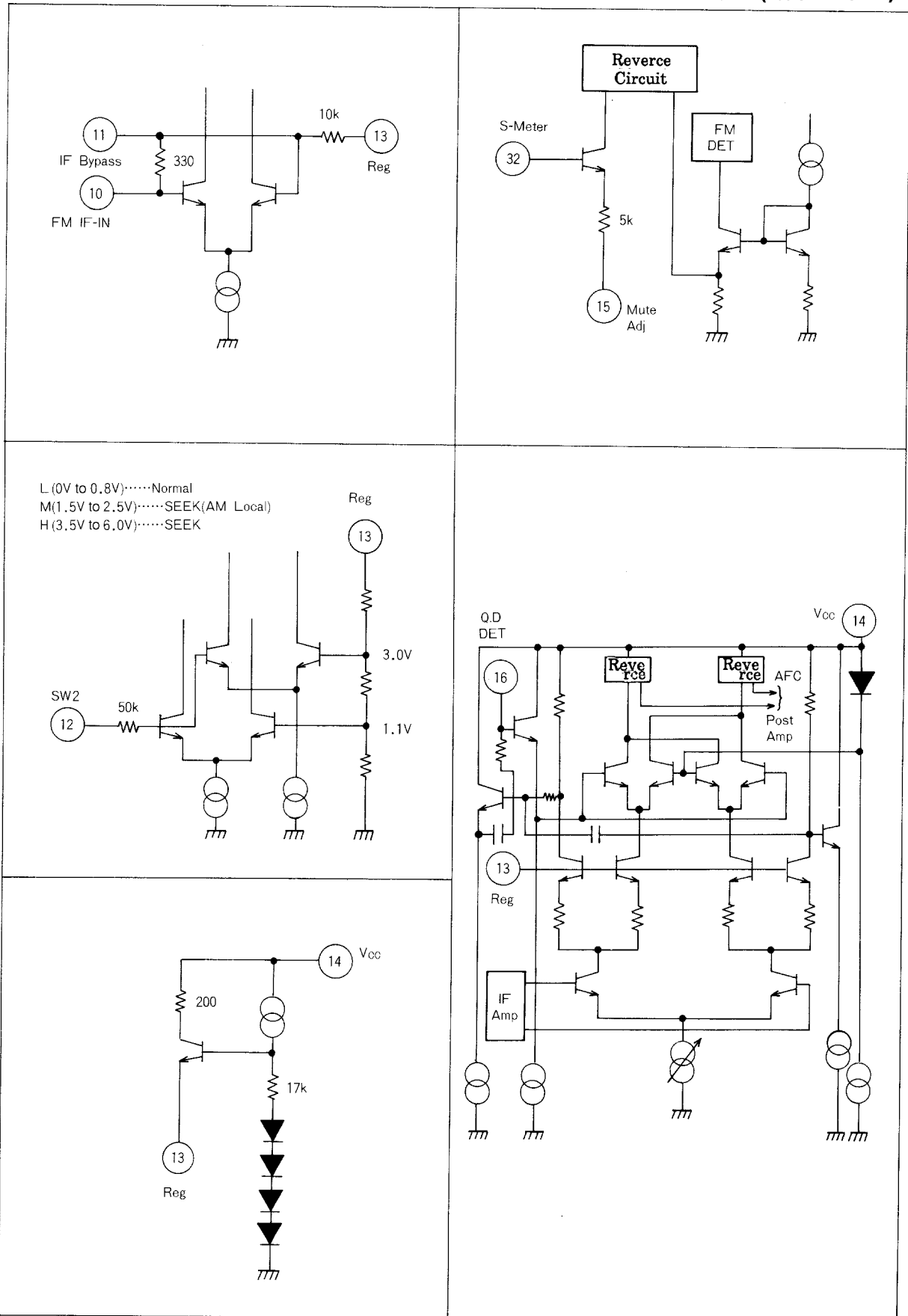


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LA1875M

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Unit (resistance: Ω)

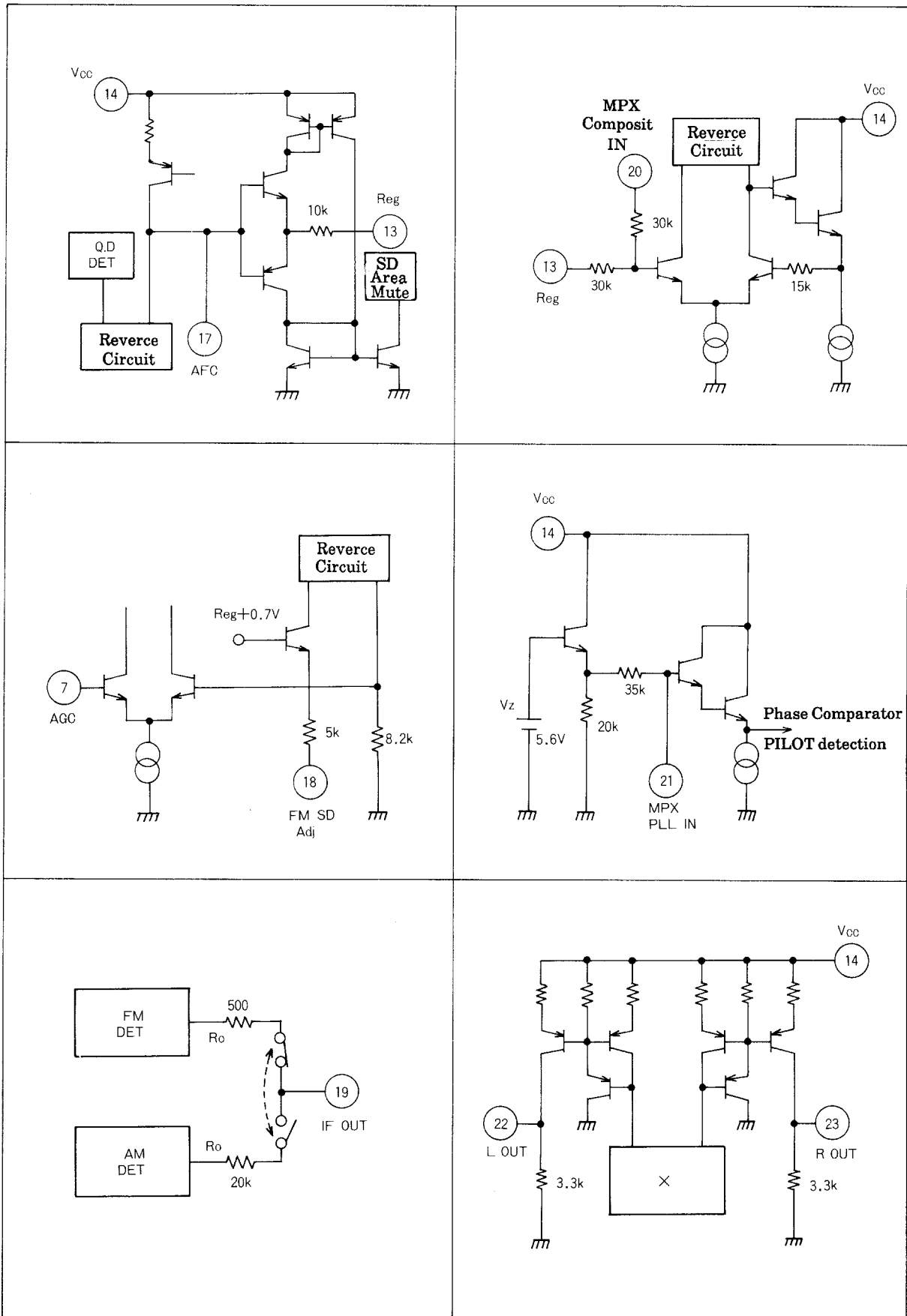


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LA1875M

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Unit (resistance: Ω)

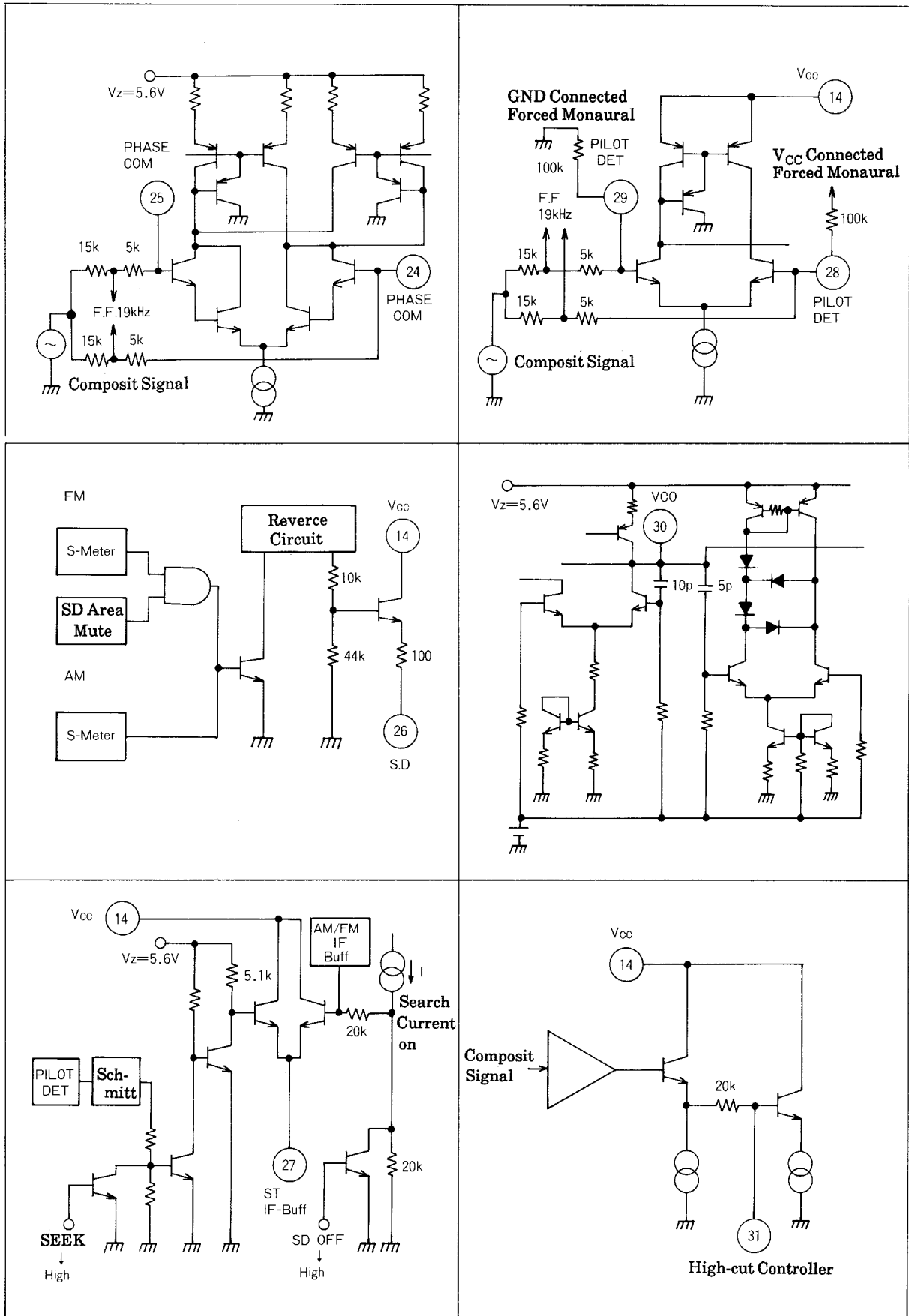


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LA1875M

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Unit (resistance: Ω)

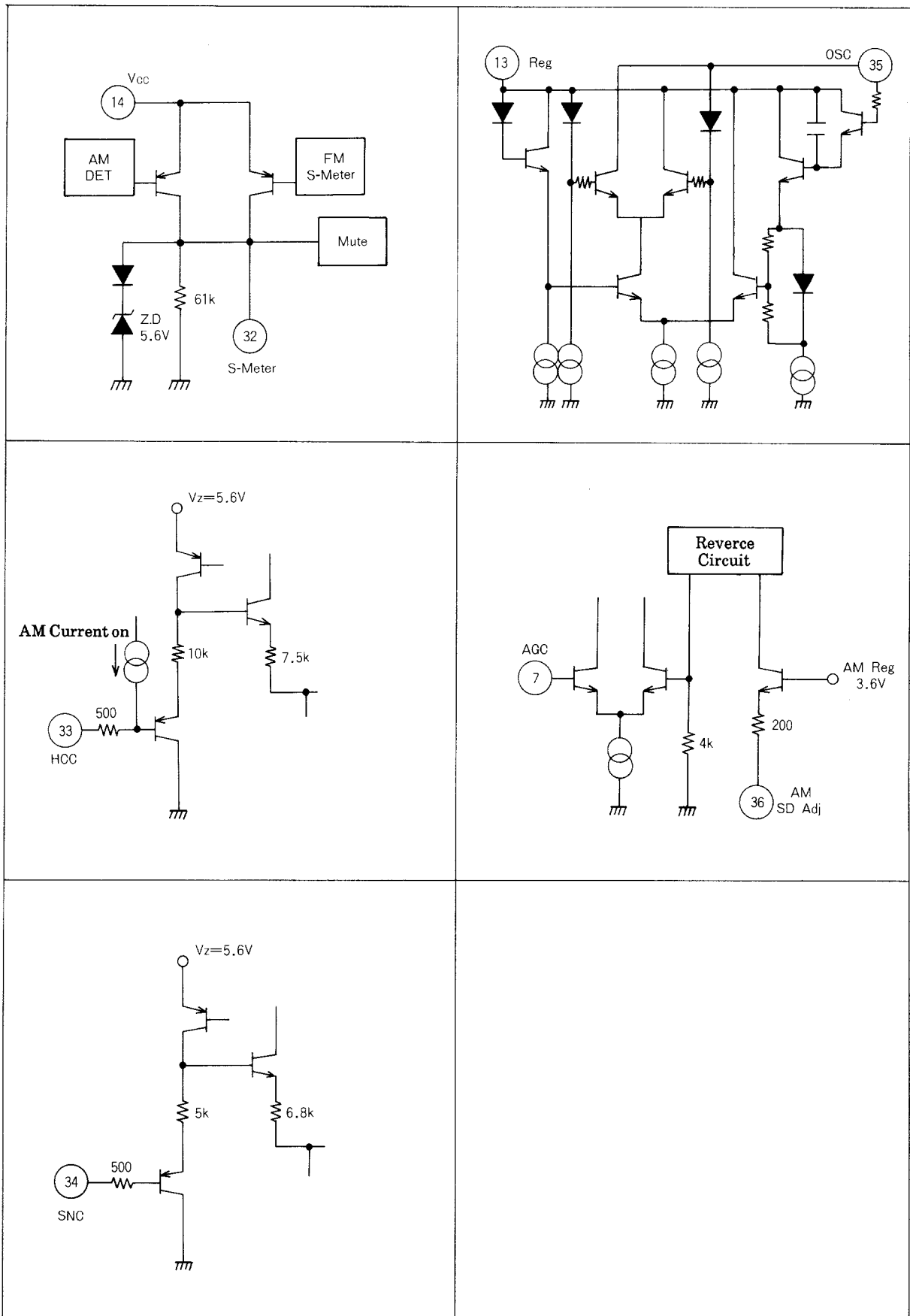


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LA1875M

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Unit (resistance: Ω)



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