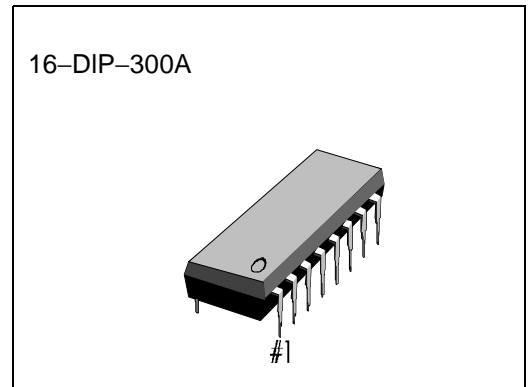


**INTRODUCTION**

The S1A0427B01 is a monolithic integrated circuit designed for portable AM/FM radios or AM/FM clock radios.

**FUNCTIONS**

- AM RF & MIX
- AM AGC
- AM/FM DET
- Regulator
- AM Local OSC
- AM/FM IF AMP
- Audio Power AMP
- FM AFC Control



**FEATURE**

- Portable AM/FM 1-chip radio
- Wide operating supply voltage range:  $V_{CC} = 3V - 12V$  (Approximately ) (Depending on the internal regulator tolerance)
- Recommended operating supply voltage:  $V_{CC} = 4.5V - 9V$

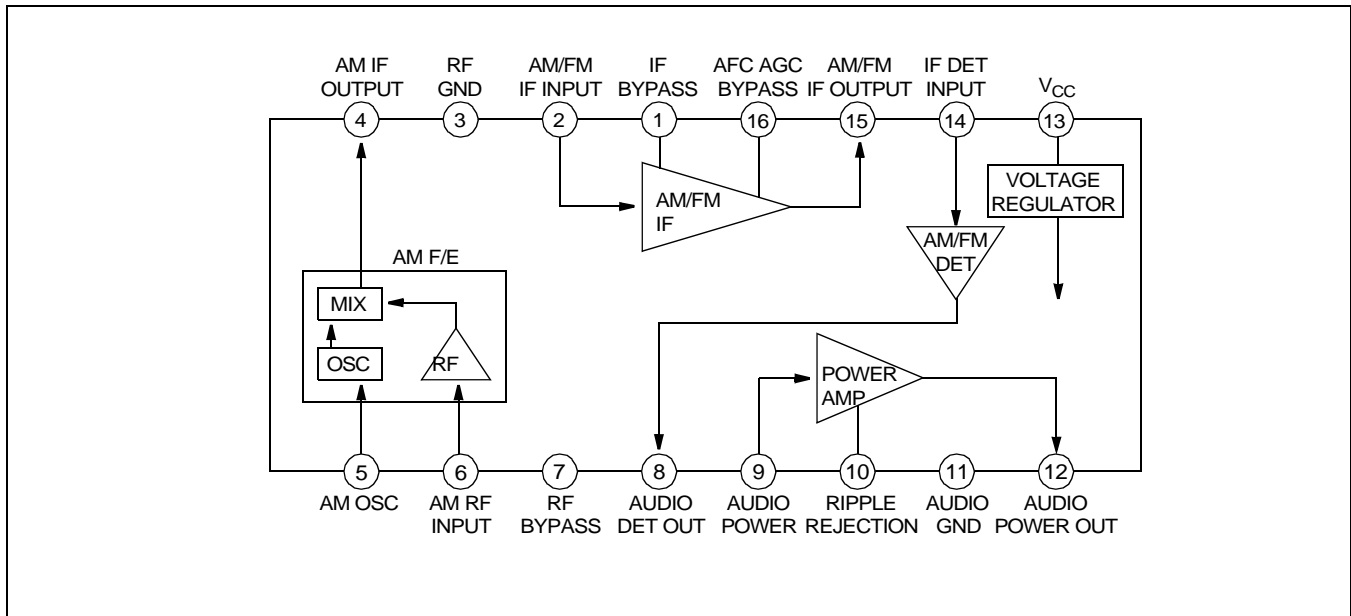
$R_L \backslash V_{CC}$	4.5V	6.0V	7.5V	9.0V	Line Operated
8Ω	O	O	O	X	X
16Ω	O	O	O	O	X
45Ω	O	O	O	O	O

- When using the AC line as an internal shunt regulator mode, it is possible to use a low cost application without a transformer (approximately 42mA)
- IF AMP gain is determined by the DC voltage appearing at IC Pin 16.
- Power output:  $P_C = 0.28W$  (Min.) at THD = 10% ( $V_{CC} = 5.5V/8Ω$ ).

**ORDERING INFORMATION**

Device	Package	Operating Temperature
S1A0427B01-D0B0	16-DIP-300A	20°C – +70°C

## BLOCK DIAGRAM

ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

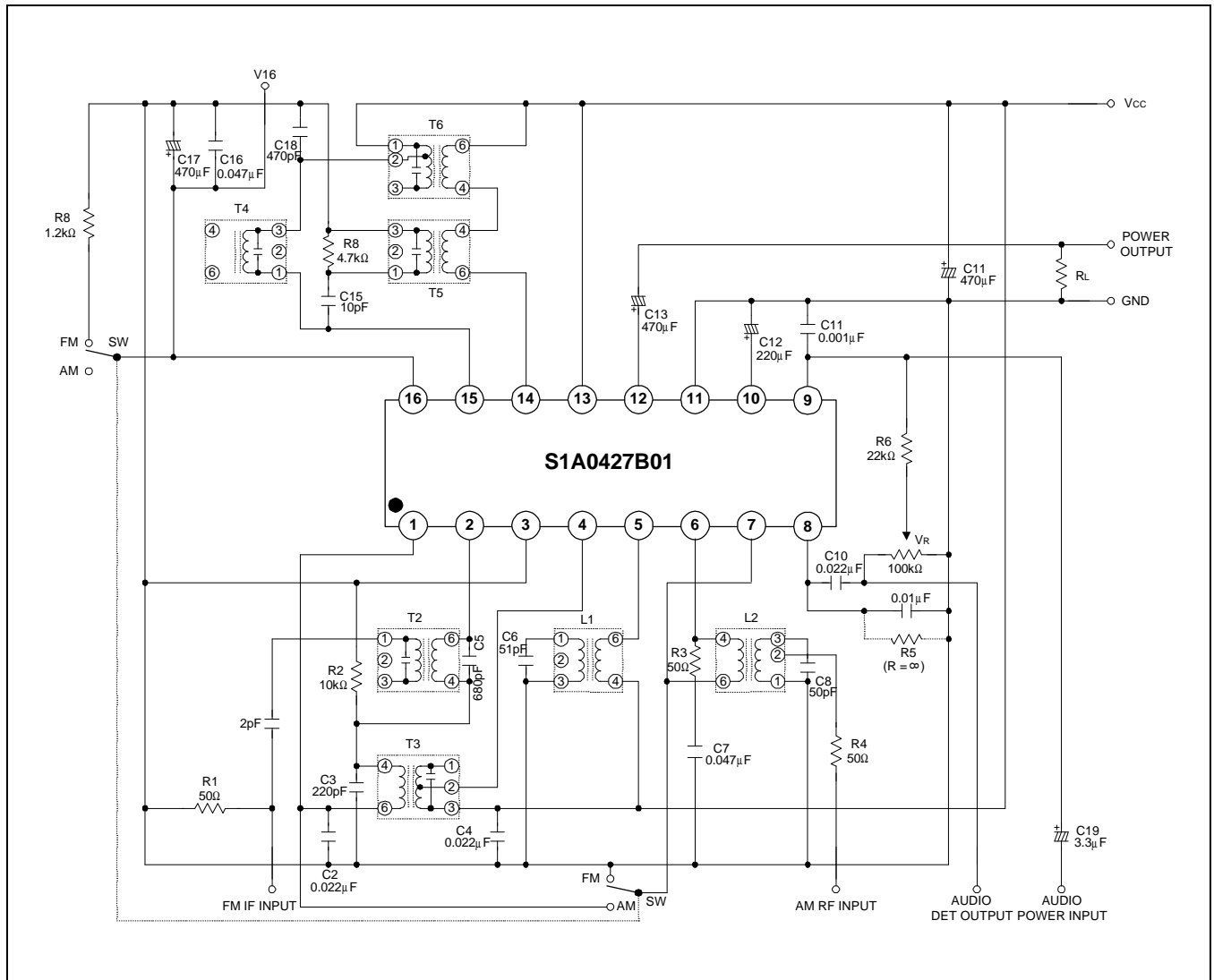
Character istic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	13	V
Power Dissipation	$P_D$	600	mW
Supply Current	$I_{CC}$	44	mA
Thermal Resistance Junction to Ambient	$R_{EJA}$	100	$^\circ\text{C}/\text{W}$
Operating Temperature	$T_{OPR}$	-20 – +70	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 – +150	$^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS**

( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5.5\text{V}$ ,  $f_m = 1\text{kHz}$ , AM:  $f = 1\text{MHz}$ , 30% Mod, FM:  $f = 10.7\text{MHz}$   
 $\Delta f = 22.5\text{kHz}$ , unless otherwise specified)

Characteristic		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
FM	Quiescent Circuit Current	$I_{CCQ}$	SW: FM, $V_{CC} = 3\text{V}$	7	12	17	mA
			SW: FM, $V_{CC} = 9\text{V}$	10	17	23	
	Pin 16 Terminal Voltage	$V_{16(\text{FM})}$	SW: FM, $V_{CC} = 9\text{V}$ , $V_I = 0$	2.0	2.4	3.1	V
	-3 dB Limiting Sensitivity	$V_{I(\text{LIM})}$	SW: FM, -3dB $V_{16} = 2.4\text{V}$ , $V_R$ Min	-	57	-	dB
AM	Internal Regulated Vtg.	$V_{CC}$	SW: AM, $I_{CC} = 42\text{mA}$	12	13.2	14.0	V
	Pin 16 Voltage	$V_{16(\text{AM})}$	SW: AM, $V_{CC} = 9\text{V}$ , $V_I = 0$	1.4	-	1.9	V
	Maximum Sensitivity	$S_{\text{MAX}}$	SW: AM, $V_{CC} = 12\text{V}$ $V_I = 37\text{dB}\mu$ , $R_L = 8\Omega$	1.5	3.0	-	V
	Signal to Noise Ratio	S/N	$V_I = 37.5\text{dB}\mu$ , $R_L = 8\Omega$ $P_O = 50\text{mW}$	15	20	-	dB
PWR AMP	Output Power	$P_O$	$f = 1\text{kHz}$ , THD = 10% $V_R$ Min, $R_L = 8\Omega$	0.28	-	-	W
	Total Harmonic Distortion	THD	$I_{CC} = 42\text{mA}$ , $R_L = 45\Omega$ $f = 1\text{kHz}$ , $V_O = 2\text{V}$ $V_R$ Min	-	0.5	4.0	%
	Voltage gain	$G_V$	$f = 1\text{kHz}$ , $R_L = 8\Omega$ , $P_O = 50\text{mW}$	-	41	-	dB

TEST CIRCUIT



## APPLICATION INFORMATION

## — EXTERNAL COMPONENTS

Part Number	Purpose	Typical	Influence	
			Smaller Than Typ	Greater Than Typ
R5	Am gain Control	47k $\Omega$ (33K – $\infty$ )	Low AM gain	AGC Distortion increase, High gain
R7	FM detector damper	4.7k $\Omega$	Low detector output, stable IF gain, low FM gain	Sharp IF AMP curve
R8	FM gain adjust	470 $\Omega$	Low FM gain	High gain, but noise increase
C2	IF bypass	0.022 $\mu$ F	Should not be less than 0.005 $\mu$ F	High IF Gain, S/N ratio degrade
C4	IF filter	0.022 $\mu$ F	Removal may cause IF oscillation	No influence
C7	AM bypass	0.047 $\mu$ F	Low gain	Using over 1 will cause FM distortion at small signal
C9	Detector filter	0.01 $\mu$ F	Unstable IF AMP oscillation	Poor FM frequency response
C10	Audio coupling	0.022 $\mu$ F	Lower sensitivity, poor low frequency response	Bass boost affects de-emphasis curve
C11	Audio Input High-cut	0.001 $\mu$ F	Audio oscillation	Poor response
C12	Ripple filter	220 $\mu$ F	Poor frequency response & Low gain	Improve AC Hum
C13	Audio output coupling	470 $\mu$ F	Poor low frequency response	Can achieve optimum output power
C14	Power line filter	470 $\mu$ F	Poor AC Hum	Improve AC Hum
C15	FM detector phase-shift	10pF	Narrow IF bandwidth	Wide IF bandwidth
C16	High freq. (IF) bypass	0.047 $\mu$ F	Removal will cause fm oscillation	No influence
C17	AN AGC time constant and high frequency (IF) bypass	0.047 $\mu$ F	Charging not recommended	–

## FUNCTION DESCRIPTION (PIN 16 DC VOLTAGE)

### 1. IF Gain Grouping Table

(1) Test Condition:  $V_{CC} = 9V$  (Pin 13).

Pin 8 resistance (AM) =  $47k\Omega$

Pin 16 resistance (FM) =  $1.2k\Omega$

(2) Grouping Table

<b>V16(FM)</b>	<b>V16(AM)</b>	<b>1.4 - 1.7 V</b>
2.4 – 2.85V		2B

### 2. IF gain is determined by DC voltage appeared at IC Pin 16.

The DC voltage at Pin 16 to the following values:

AM = 1.4 – 1.65V (DC)

FM = 1.9 – 2.10V (DC)

AM gain can be adjusted by the loading resistor value of Pin 8 (AM) from  $33k\Omega$  to infinity.

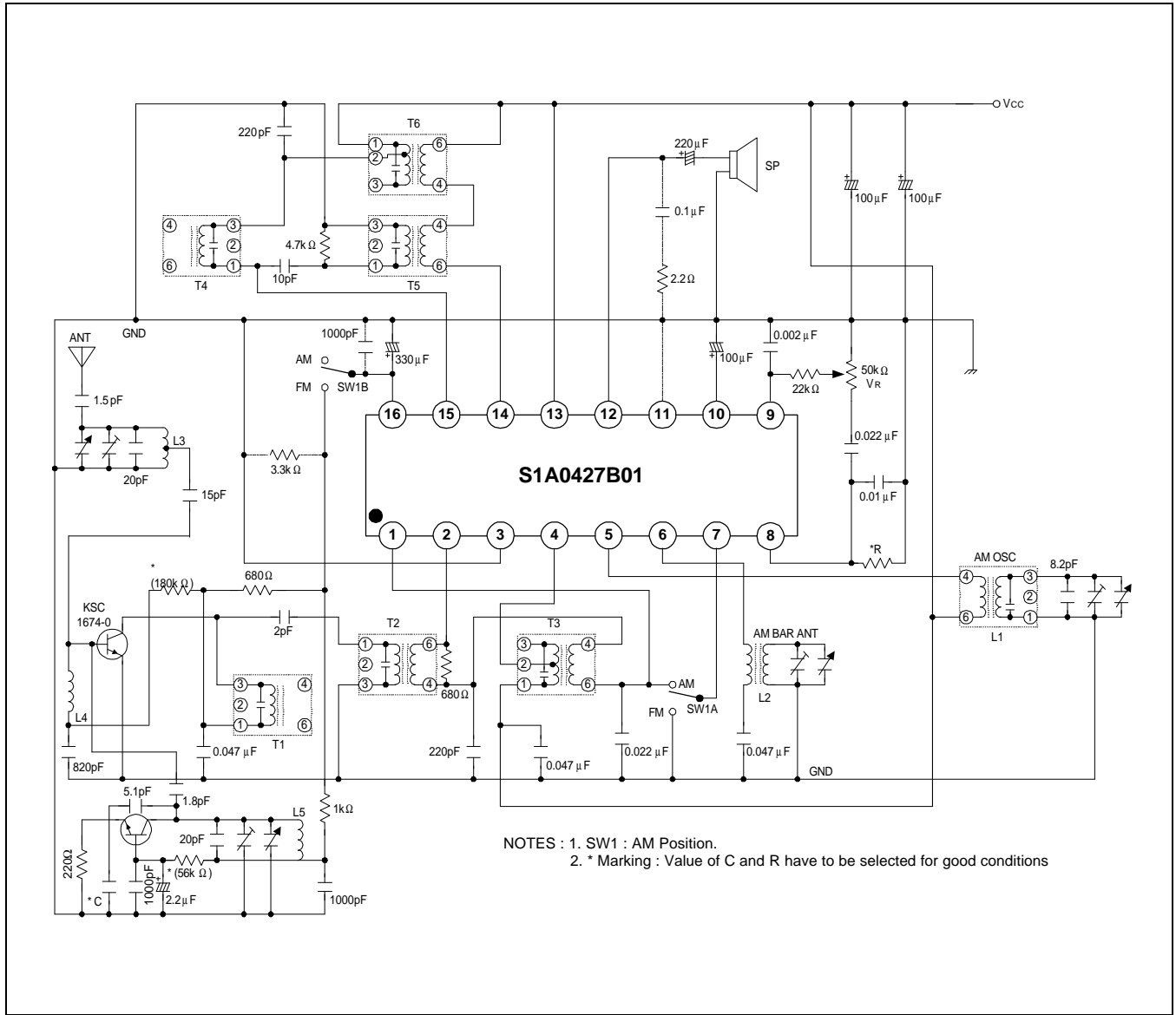
FM gain can be adjusted by the loading resistor value of Pin 16 (FM) from  $3k\Omega$  to  $680\Omega$ .

Recommended resistance (Pin 8, Pin 16).

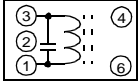
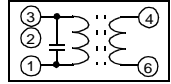
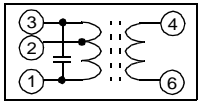
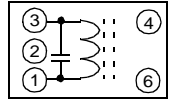
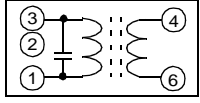
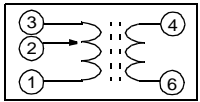
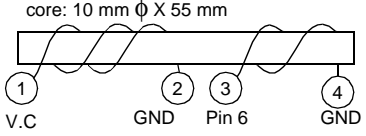
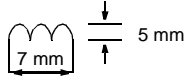
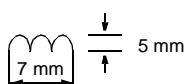
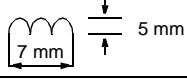
Pin 8 (AM) =  $47k\Omega$

Pin 16 (FM) =  $470k\Omega$

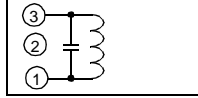
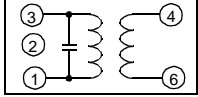
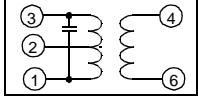
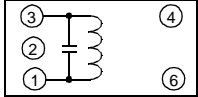
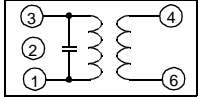
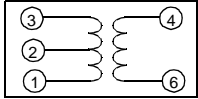
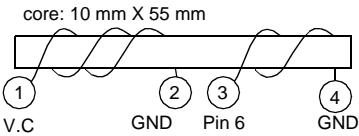
APPLICATION CIRCUIT

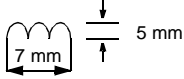
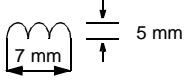
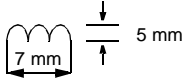


## COIL SPECIFICATION 1

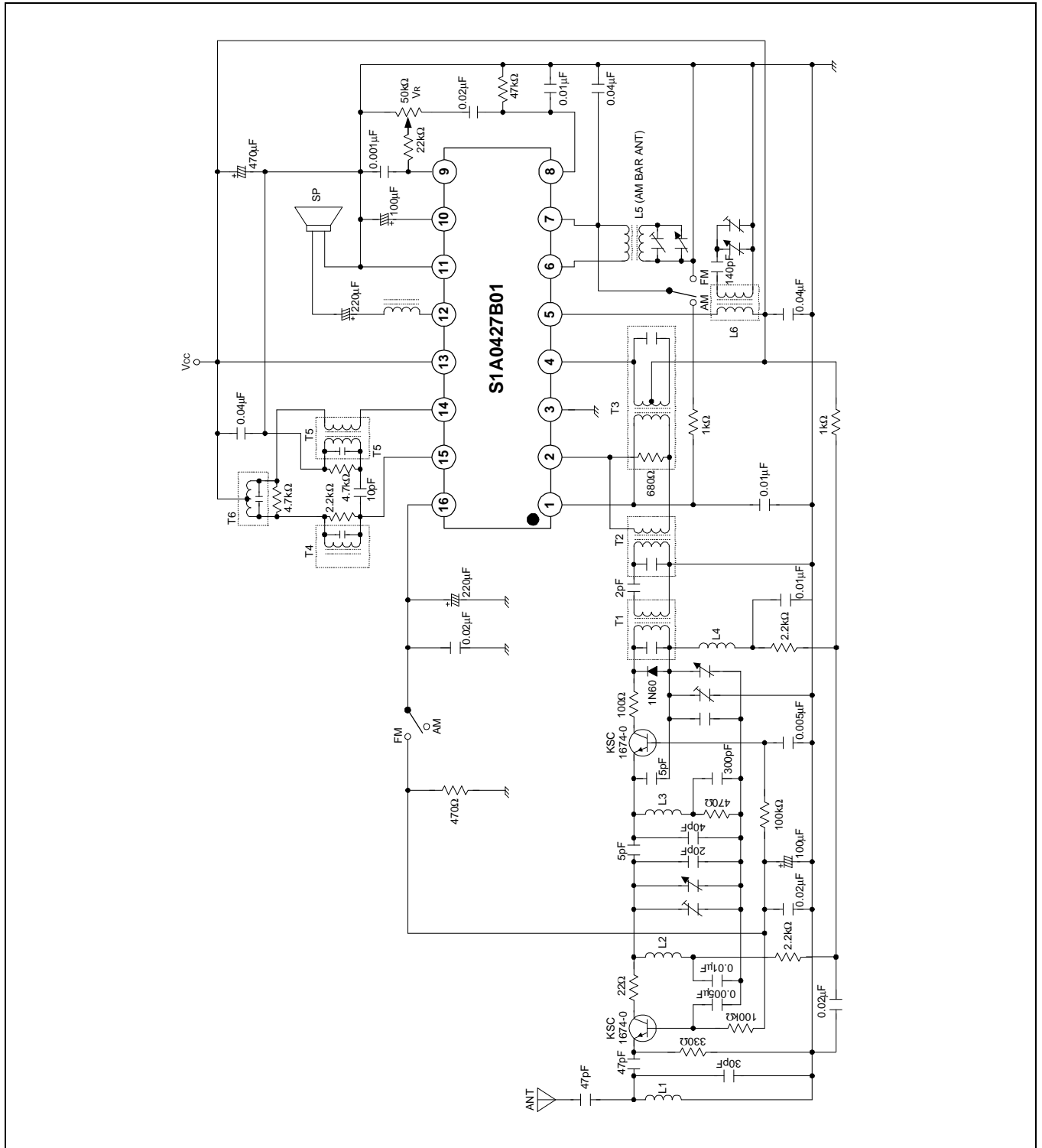
Coil No.	f	Q <sub>O</sub>	Turns		C <sub>O</sub>	Connections (KOREA TOKO)
T1	10.7MHz	120	1-3	8T	150 pF	
T2	10.7MHz	70 min	1-3	11T	75 ± 5 pF	
			4-6	2T		
T3 (T6)	455kHz	80 min	1-2	91T	180 ± 5 pF	
			2-3	55T		
			4-6	6T		
T4	10.7MHz	45 min	1-3	11T	82 ± 3 pF	
T5	10.7MHz	25 min	1-3	7T	180 pF	
			4-6	7T		
L1	AM Local Oscillator	90 min	1-3	86T		
			4-6	7T		
L2	AM ANT	200	1-2 (L = 560μH)	138T		
			3-4	9T		
L3	FM ANT		0.8mmφ UEW TAP	5T		
				0.5T		
L4	Trap		0.32mmφ UEW	10T		
L5	FM Oscillator		0.8mmφ UEW	4T	-	



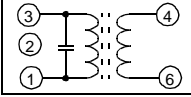
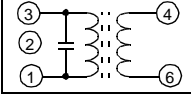
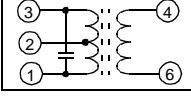
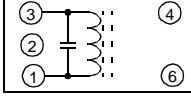
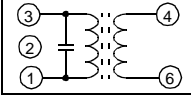
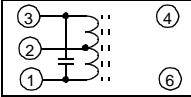
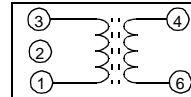
Coil No.	f	Q <sub>0</sub>	Turns		C.L.	Connections (KWANG SUNG PART NO)
T1	10.7MHz	120	1-3	8T	150pF	 <p>KSI-FD5</p>
T2	10.7MHz	70min	1-3	11T	75pF	 <p>KSI-FA2</p>
			4-6	2T		
T3 (T6)	455kHz	80min	1-2	91T	180pF	 <p>KSI-AA4</p>
			2-3	55T		
			4-6	6T		
T4	10.7MHz	45min	1-3	11T	82pF	 <p>KSI-FD4</p>
T5	10.7MHz	45min	1-3	7T	180pF	 <p>KSI-FA4</p>
			4-6	7T		
L1	AM Local Oscillator	90min	1-3	86T		 <p>KSI-AO4</p>
			4-6	7T		
L2	AM ANT	200	1-2 L = 560uH	138T		 <p>core: 10 mm X 55 mm</p> <p>KSA-ANT560</p>
			4-6	9T		

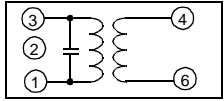
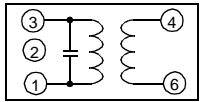
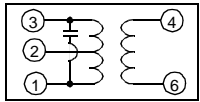
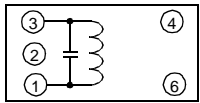
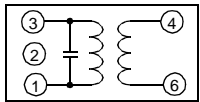
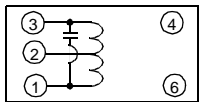
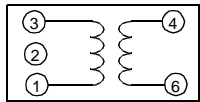
Coil No.	f	$Q_0$	Turns		C.L.	Connections (KWANG SUNG PART NO)
L3	FM ANT		0.8mm $\phi$ UEW	5T		 KSS-SP5
				0.5T		
L4	Trap		0.32mm $\phi$ UEW	10T		 KSS-SP4
L5	FM Oscillator		0.8mm $\phi$ UEW	4T		 KSS-SP3

APPLICATION CIRCUIT 2



## COIL SPECIFICATION 2

Coil No.	f	Q <sub>0</sub>	Turns		C.L.	Connections
			1-3			
T1	10.7MHz	90	1-3	11	82pF	
			4-6	3		
T2	10.7MHz	60	1-3	5	390pF	
			4-6	2		
T3	455kHz	100	1-2	127	180pF	
			2-3	28		
			4-6	10		
T4	10.7MHz	45 (Min)	1-3	11	82 pF	
T5	10.7MHz	25 (Min)	1-3	7	180pF	
			4-6	7		
T6	455kHz	100	1-2	50	390pF	
			2-3	50		
L6	796kHz	100	1-3	100	360μH	
			4-6	10		

Coil No.	f	Q <sub>0</sub>	Turns		C.L.	Connections (KWANG SUNG PART NO)
			1-3	4-6		
T1	10.7MHz	90	1-3	4-6	82pF	 KSI-FA3
			11	3		
T2	10.7MHz	60	1-3	4-6	390pF	 KSI-FA5
			5	2		
T3	455kHz	100	1-2	127	180pF	 KSI-AA3
			2-3	28		
			4-6	10		
T4	10.7MHz	45min	1-3	11	82pF	 KSI-FD4
T5	10.7MHz	45min	1-3	7	180pF	 KSI-FA4
			4-6	7		
T6	455kHz	100	1-2	50	390pF	 KSI-AA2
			2-3	50		
L6	796kHz	100	1-3	100	360uH	 KSI-A03
			4-6	10		

NOTES