SILICON LABS

Description

The Si474x receiver family applies 100% RF CMOS technology to bring digital low-IF radio technology to the automotive receiver market. The Si474x receiver family builds on Silicon Laboratories' highly successful broadcast audio radio products, offering design simplicity, unmatched integration, programmability, and automotive quality and reliability.

The Si474x receiver family supports world-wide FM bands from 64–108 MHz and AM bands from 520–1710 kHz. The Si474x supports AM/FM, weather band, shortwave, and longwave radio bands. All odd-numbered part numbers in the family support international RDS/RBDS protocols.

The Si474x family leverages Silicon Laboratories' patented digital architecture, delivering superior RF performance and interference rejection. The proven digital radio technology provides excellent sensitivity in weak signal environments, and superb selectivity and inter-modulation immunity in strong signal environments.

The solution offers programmable AM/FM channel spacing and filters, auto-calibrated digital tuning, and proven AM/FM seek functionality based on multiple signal quality and band parameters. The family offers highly flexible and advanced audio features such as noise blanking, programmable soft mute, and multi-path detection and mitigation.

The Si474x receiver system has a minimal bill of materials requiring a small amount of board space. The high level of integration provides a complete, tested broadcast audio receiver that is ideal for primary automotive radio receivers.

Features

- Worldwide FM band support (64–108 MHz)
- Worldwide AM band support (520–1710 kHz)
- Shortwave, longwave support (Si4742/43/44/45 only)
- Weather band support (Si4742/43 only)
- Received signal quality indicators (RSSI, SNR, adjacent channel, wideband AM)
- Multipath detection/mitigation
- AM and FM noise blankers (Si4742/43/44/45 only)
- AM and FM programmable seek tuning
- AM and FM programmable soft mute control
- AM and FM adjustable channel bandwidth filters
- FM stereo-mono blending
- FM Hi-Cut control (Si4742/43/44/45 only)
- Digital FM stereo decoder
- RDS/RBDS processor (Si4741/43/45 only)
- Automatic frequency control (AFC)
- Automatic gain control (AGC)
- Image rejection mixer
- Frequency synthesizer with integrated VCO
- Low-IF direct conversion with no ceramic filters
- Analog or digital (I^2S) outputs
- 3.0 to 3.6 V supply voltage
- Programmable reference clock
- AECQ-100 certified
  - –40 to 85 ºC operation
- 24-pin 4 x 4 mm QFN package
  - Pb-free/RoHS compliant

Applications

- OEM automotive radio systems
- After-market automotive radio systems
- Automotive radio modules
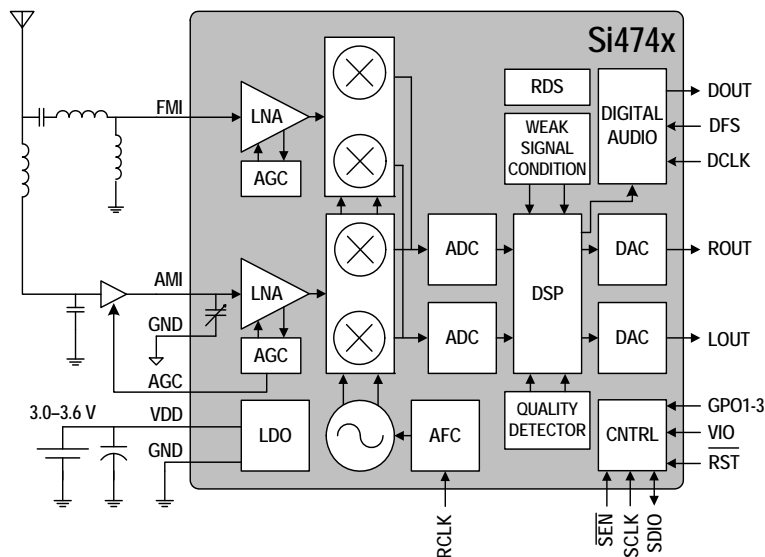
Selected Electrical Specifications[1]

(V_{DD} = 2.7 to 5.5 V, V_{IO} = 1.5 to 3.6 V, T_A = –40 to 85 °C)

| Parameter	Test Condition	Min	Typ	Max	Unit
FM					
Input Frequency		64	—	108	MHz
Sensitivity	(S+N)/N = 26 dB	—	2	—	µV EMF
RDS Sensitivity	Δf = 2 kHz, RDS BLER < 5%	—	8	—	µV EMF
Audio S/N (Mono)[2,3]	f_{MOD} = 1 kHz, Δf = 22.5 kHz, V_{EMF} = 60 dBµV_{EMF}	—	63	—	dB
Audio THD (Mono)[2,3]	f_{MOD} = 1 kHz, Δf = 75 kHz, V_{EMF} = 60 dBµV_{EMF}	—	0.1	—	%
Input IP3	f_1 = 4000 kHz; f_2 = 8000 kHz	—	105	—	dBµV EMF
Audio Output Voltage		—	80	—	mVrms
Adjacent Channel Selectivity	±200 kHz	—	50	—	dB
Alternate Channel Selectivity	±400 kHz	—	70	—	dB
AM Suppression[4]	m = 0.3; Δf = 22.5 kHz; f_{RF} = 76 to 108 MHz; Measured at V_{EMF} = 60 dBµV_{EMF}	—	55	—	dB
Audio Stereo Separation[4]	f_{RF} = 76 to 108 MHz; Measured at V_{EMF} = 60 dBµV_{EMF}; Δf = 75 kHz	—	45	—	dB
Supply Voltage[5]		3	—	3.6	V
Supply Current[5]		—	26	—	mA
AM					
Input Frequency		520	—	1710	kHz
Sensitivity	(S+N)/N = 26 dB	—	28	—	µV EMF
Audio S/N[4,6]	30% modulation, f_{MOD} =1 kHz, RF level = 74 dBµV EMF; Δf = 22.5 kHz	—	53	—	dB
Audio THD[4,6]	30% modulation, f_{MOD} =1 kHz, RF level = 74 dBµV EMF; Δf = 22.5 kHz	—	0.3	—	%
Input IP3[7]	f_1 = 40 kHz; f_2 = 80 kHz	—	112	—	dBµV
Audio Output Voltage[4]		54	60	66	mVrms
Adjacent Channel Selectivity	±10 kHz	—	40	—	dB
Alternate Channel Selectivity	±20 kHz	—	60	—	dB

Notes:
1. Specifications refer to Si474x application circuit input.
2. B_{AF} = 300 Hz to 15 kHz.
3. f_{RF} = 76 to 108 MHz.
4. F_{MOD} = 1 kHz, 75 µs de-emphasis, MONO = enabled, and L = R unless noted otherwise.
5. Applies to both FM and AM modes.
6. AGC is disabled.
7. Specification refers to Si474x input.

Pin Assignments
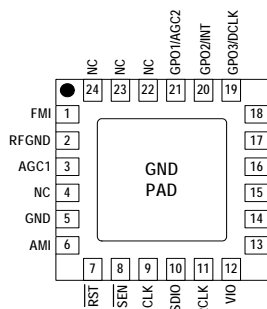
4 x 4 x 0.85 mm 24-pin QFN Package Information
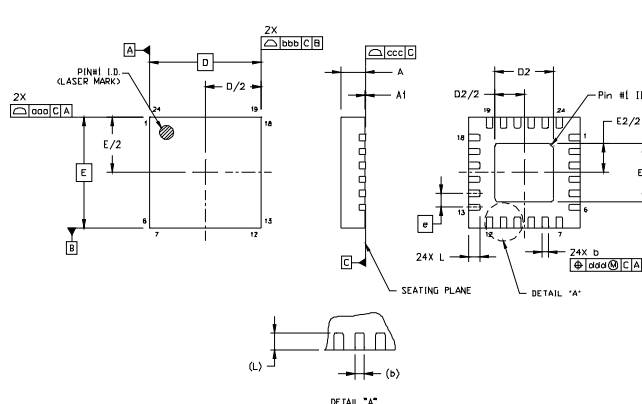
Symbol	Millimeters		
	Min	Nom	Max
A	0.80	0.85	0.90
A1	0.00	0.02	0.05
b	0.18	0.25	0.30
D	4.00 BSC		
D2	2.00	2.10	2.20
e	0.50 BSC		
E	4.00 BSC		
E2	2.00	2.10	2.20
L	0.30	0.40	0.50
aaa	—	—	0.10
bbb	—	—	0.10
ccc	—	—	0.08
ddd	—	—	0.10
eee	—	—	0.10

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