

Description

The Si4704/05 enhanced FM receiver is the most advanced portable solution available today offering embedded antenna support, digital audio out, worldwide FM band support, and highly flexible, mature, and proven FM functionality in a simple API. The Si4704/05 incorporates Silicon Labs' tuned-resonance antenna technology for crystal clear FM reception in wire-free device enclosures. Silabs' internationally patented tuned-resonance technology allows embedded FM antennas such as PCB traces, loops, stubs, or other devices to perform exceptionally well, enabling devices with integrated Bluetooth to receive FM transmissions without an external FM antenna, and transmit the FM content to Bluetooth-enabled headsets. This is the best, most cost-effective solution to enable wire-free FM reception.

The Si4705 also offers digital audio out for FM recording. Content recorded over the Si4705 can be shared with friends or played at a later time in MP3 format. The content can also be tagged with RDS information, allowing song name and artist labels to be displayed as is done with MP3 meta data. Using the digital audio out, the Si4705 can also reduce total system power consumption by avoiding unnecessary ADC/DAC conversions between the FM receiver and the host processor.

The Si4704/05 truly supports worldwide FM bands, starting at 64 MHz for Eastern European countries and extending all the way to 108 MHz for the rest of the world. The device supports channel spacing down to 10 kHz, and includes advanced, proven seek functionality. All the Silicon Labs proven FM receiver expertise is incorporated in the Si4704/05, gained through thousands of designs with almost every OEM and ODM in the world and over 100 million devices shipped.

The Si4704/05 leverage Silicon Labs' internationally patented and proven digital low-IF architecture, offering proven functionality in a simple and mature API. The device is offered in a highly reliable, ultra-small 3 x 3 x 0.55 mm 20-pin QFN and is layout compatible with the full suite of Silicon Labs broadcast offerings including

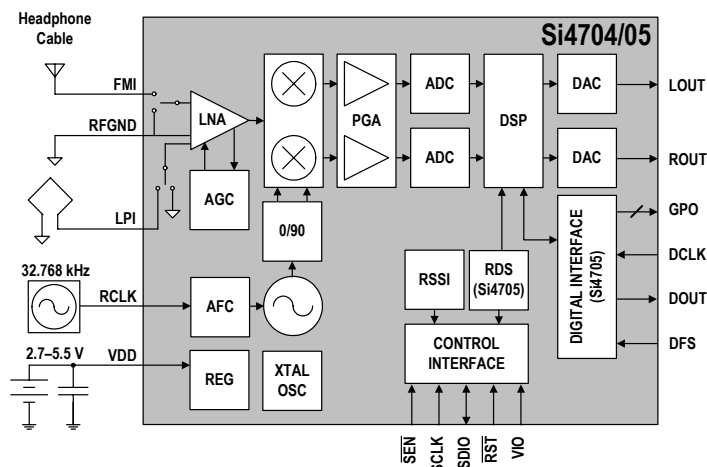
FM transmit, AM/FM/SW receive, weather band receive and SAME decode, and unparalleled RDS data receivers. The complete solution, including a minimal BOM, requires less than 15 mm² board area, or less than half that of other competing solutions. The Si4705 incorporates Silicon Labs' proven and widely adopted RDS processor, including worldwide compliance, all symbol decoding, error detection, error correction, and other RDS functions. The Si4705 RDS functionality is unmatched in the industry for performance, on-chip processing, and worldwide adoption.

Features

- Worldwide FM band support (64~108 MHz)
- Supports integrated antenna
- Digital low-IF receiver
- Excellent real-world performance
- Frequency synthesizer with integrated VCO
- Seek tuning
- Automatic frequency control (AFC)
- Automatic gain control (AGC)
- Integrated LDO regulator
- Minimal BOM
- Adjustable seek parameters
- Adjustable mono/stereo blend
- Adjustable soft mute
- RDS/RBDS decoder(Si4705 only)
- Optional digital audio output (Si4705 only)
- Programmable de-emphasis(50/75us)
- Programmable reference clock input
- Signal quality measurement
- 3 x 3 x 0.55 mm 20-pin Pb-free QFN package

Applications

- Cellular handsets
- MP3 players
- Portable media players
- Personal computers
- Portable navigation devices
- Consumer electronics





Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Input Frequency	f_{RF}		64	—	108	MHz
Sensitivity (76–108 MHz)		(S+N)/N = 26 dB	—	1.1	—	μ V EMF
Input IP3		$ f_2 - f_1 > 1$ MHz; $f_0 = 2 \times f_1 - f_2$ AGC disabled	—	105	—	dB μ V EMF
Adjacent Channel Selectivity		± 200 kHz	—	50	—	dB
Alternate Channel Selectivity		± 400 kHz	—	70	—	dB
RCLK Frequency			—	32.768	—	kHz
RCLK Frequency Tolerance			–100	—	100	ppm
Audio Output Voltage			72	80	90	mVrms
Audio Mono S/N			55	63	—	dB
Audio THD			—	0.1	0.5	%
Supply Voltage	V_D, V_A		2.7	—	5.5	V
Interface Supply Voltage	V_{IO}		1.5	—	3.6	V
Ambient Temperature	T_A		–20	25	85	°C
Supply Current	I_{AD}		—	19.2	—	mA
Powerdown Current	I_{PD}		—	10	12	μ A
Seek/Tune Time			—	—	80	ms/channel
SCLK Frequency	f_{CLK}	3-wire operation	—	—	2.5	MHz
	f_{SCL}	2-wire operation	—	—	400	kHz
Powerup Time		From powerdown	—	—	110	ms

Pin diagram of the ATtiny10 microcontroller. The chip is square with pins numbered 1 to 11. Pin 1 (top-left) is NC. Pin 2 (top-left) is FMI. Pin 3 (top-left) is RFGND. Pin 4 (top-left) is LPI. Pin 5 (top-left) is RST. Pin 6 (bottom-left) is SEN. Pin 7 (bottom-left) is SCLK. Pin 8 (bottom-left) is SDIO. Pin 9 (bottom-left) is RCLK. Pin 10 (bottom-left) is VIO. Pin 11 (bottom-left) is VDD. Pin 12 (bottom-right) is GND. Pin 13 (bottom-right) is ROUT. Pin 14 (bottom-right) is LOUT. Pin 15 (bottom-right) is DOUT. Pin 16 (top-right) is DFS. Pin 17 (top-right) is GPO3/DCLK. Pin 18 (top-right) is GPO2/INT. Pin 19 (top-right) is GPO1. Pin 20 (top-right) is NC. A large central square is labeled GND PAD.

The figure contains three detailed technical drawings of a laser head assembly:

- Top View:** Shows a square base with dimensions 16x16. It includes a central hole with diameter $\Phi 10$, four corner holes with diameter $\Phi 8$, and a circular feature with diameter $\Phi 12$. Dimensions include 20, 16, 15, 11, 10, 6, 5, and 1. Features are labeled with callouts: PIN#1 I.D. (LASER MARK), 2X, $\square bbb[C]B$, $\square aaa[C]A$, and $\square e$.
- DETAIL "A-A":** A cross-sectional view showing the internal profile of the assembly. It includes dimensions 20X L, 20X L1, 20X b, and $e/2$. Callouts include $\square e$ and $\Phi ada\textcircled{W}[C]A[B]$.
- DETAIL "B-B":** Another cross-sectional view showing a different part of the assembly. It includes dimensions D2/2, D2, E2/2, E2, 16, 20, 15, 11, 10, and 1. Callouts include PIN#1 I.D., $\square ccc[C]$, $\square i$, $\square d$, $\square o$, $\square u$, $\square v$, $\square w$, $\square x$, $\square y$, $\square z$, $\square aa$, $\square ab$, $\square ac$, $\square ad$, $\square ae$, $\square af$, $\square ag$, $\square ah$, $\square ai$, $\square aj$, $\square ak$, $\square al$, $\square am$, $\square an$, $\square ao$, $\square ap$, $\square aq$, $\square ar$, $\square as$, $\square at$, $\square au$, $\square av$, $\square aw$, $\square ax$, $\square ay$, $\square az$, $\square ba$, $\square bb$, $\square bc$, $\square bd$, $\square be$, $\square bf$, $\square bg$, $\square bh$, $\square bi$, $\square bj$, $\square bk$, $\square bl$, $\square bm$, $\square bn$, $\square bo$, $\square bp$, $\square bq$, $\square br$, $\square bs$, $\square bt$, $\square bu$, $\square bv$, $\square bw$, $\square bx$, $\square by$, $\square bz$, $\square ca$, $\square cb$, $\square cc$, $\square cd$, $\square ce$, $\square cf$, $\square cg$, $\square ch$, $\square ci$, $\square cj$, $\square ck$, $\square cl$, $\square cm$, $\square cn$, $\square co$, $\square cp$, $\square cq$, $\square cr$, $\square cs$, $\square ct$, $\square cu$, $\square cv$, $\square cw$, $\square cx$, $\square cy$, $\square cz$, $\square da$, $\square db$, $\square dc$, $\square dd$, $\square de$, $\square df$, $\square dg$, $\square dh$, $\square di$, $\square dj$, $\square dk$, $\square dl$, $\square dm$, $\square dn$, $\square do$, $\square dp$, $\square dq$, $\square dr$, $\square ds$, $\square dt$, $\square du$, $\square dv$, $\square dw$, $\square dx$, $\square dy$, $\square dz$, $\square ea$, $\square eb$, $\square ec$, $\square ed$, $\square ee$, $\square ef$, $\square eg$, $\square eh$, $\square ei$, $\square ej$, $\square ek$, $\square el$, $\square em$, $\square en$, $\square eo$, $\square ep$, $\square eq$, $\square er$, $\square es$, $\square et$, $\square eu$, $\square ev$, $\square ew$, $\square ex$, $\square ey$, $\square ez$, $\square fa$, $\square fb$, $\square fc$, $\square fd$, $\square fe$, $\square ff$, $\square fg$, $\square fh$, $\square fi$, $\square fj$, $\square fk$, $\square fl$, $\square fm$, $\square fn$, $\square fo$, $\square fp$, $\square fq$, $\square fr$, $\square fs$, $\square ft$, $\square fu$, $\square fv$, $\square fw$, $\square fx$, $\square fy$, $\square fz$, $\square ga$, $\square gb$, $\square gc$, $\square gd$, $\square ge$, $\square gf$, $\square gg$, $\square gh$, $\square gi$, $\square gj$, $\square gk$, $\square gl$, $\square gm$, $\square gn$, $\square go$, $\square gp$, $\square gq$, $\square gr$, $\square gs$, $\square gt$, $\square gu$, $\square gv$, $\square gw$, $\square gx$, $\square gy$, $\square gz$, $\square ha$, $\square hb$, $\square hc$, $\square hd$, $\square he$, $\square hf$, $\square hg$, $\square hh$, $\square hi$, $\square hj$, $\square hk$, $\square hl$, $\square hm$, $\square hn$, $\square ho$, $\square hp$, $\square hq$, $\square hr$, $\square hs$, $\square ht$, $\square hu$, $\square hv$, $\square hw$, $\square hx$, $\square hy$, $\square hz$, $\square ia$, $\square ib$, $\square ic$, $\square id$, $\square ie$, $\square if$, $\square ig$, $\square ih$, $\square ii$, $\square ij$, $\square ik$, $\square il$, $\square im$, $\square in$, $\square io$, $\square ip$, $\square iq$, $\square ir$, $\square is$, $\square it$, $\square iu$, $\square iv$, $\square iw$, $\square ix$, $\square iy$, $\square iz$, $\square ja$, $\square jb$, $\square jc$, $\square jd$, $\square je$, $\square jf$, $\square jg$, $\square jh$, $\square ji$, $\square jj$, $\square jk$, $\square jl$, $\square jm$, $\square jn$, $\square jo$, $\square jp$, $\square jq$, $\square jr$, $\square js$, $\square jt$, $\square ju$, $\square jv$, $\square jw$, $\square jx$, $\square jy$, $\square jz$, $\square ka$, $\square kb$, $\square kc$, $\square kd$, $\square ke$, $\square kf$, $\square kg$, $\square kh$, $\square ki$, $\square kj$, $\square kk$, $\square kl$, $\square km$, $\square kn$, $\square ko$, $\square kp$, $\square kq$, $\square kr$, $\square ks$, $\square kt$, $\square ku$, $\square kv$, $\square kw$, $\square kx$, $\square ky$, $\square kz$, $\square la$, $\square lb$, $\square lc$, $\square ld$, $\square le$, $\square lf$, $\square lg$, $\square lh$, $\square li$, $\square lj$, $\square lk$, $\square ll$, $\square lm$, $\square ln$, $\square lo$, $\square lp$, $\square lq$, $\square lr$, $\square ls$, $\square lt$, $\square lu$, $\square lv$, $\square lw$, $\square lx$, $\square ly$, $\square lz$, $\square ma$, $\square mb$, $\square mc$, $\square md$, $\square me$, $\square mf$, $\square mg$, $\square mh$, $\square mi$, $\square mj$, $\square mk$, $\square ml$, $\square mm$, $\square mn$, $\square mo$, $\square mp$, $\square mq$, $\square mr$, $\square ms$, $\square mt$, $\square mu$, $\square mv$, $\square mw$, $\square mx$, $\square my$, $\square mz$, $\square na$, $\square nb$, $\square nc$, $\square nd$, $\square ne$, $\square nf$, $\square ng$, $\square nh$, $\square ni$, $\square nj$, $\square nk$, $\square nl$, $\square nm$, $\square nn$, $\square no$, $\square np$, $\square nq$, $\square nr$, $\square ns$, $\square nt$, $\square nu$, $\square nv$, $\square nw$, $\square nx$, $\square ny$, $\square nz$, $\square oa$, $\square ob$, $\square oc$, $\square od$, $\square oe$, $\square of$, $\square og$, $\square oh$, $\square oi$, $\square oj$, $\square ok$, $\square ol$, $\square om$, $\square on$, $\square oo$, $\square op$, $\square oq$, $\square or$, $\square os$, $\square ot$, $\square ou$, $\square ov$, $\square ow$, $\square ox$, $\square oy$, $\square oz$, $\square pa$, $\square pb$, $\square pc$, $\square pd$, $\square pe$, $\square pf$, $\square pg$, $\square ph$, $\square pi$, $\square pj$, $\square pk$, $\square pl$, $\square pm$, $\square pn$, $\square po$, $\square pp$, $\square pq$, $\square pr$, $\square ps$, $\square pt$, $\square pu$, $\square pv$, $\square pw$, $\square px$, $\square py$, $\square pz$, $\square qa$, $\square qb$, $\square qc$, $\square qd$, $\square qe$, $\square qf$, $\square qg$, $\square qh$, $\square qi$, $\square qj$, $\square qk$, $\square ql$, $\square qm$, $\square qn$, $\square qo$, $\square qp$, $\square qq$, $\square qr$, $\square qs$, $\square qt$, $\square qu$, $\square qv$, $\square qw$, $\square qx$, $\square qy$, $\square qz$, $\square ra$, $\square rb$, $\square rc$, $\square rd$, $\square re$,

Symbol	Millimeters		
	Min	Nom	Max
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
b	0.18	0.25	0.30
c	0.27	0.32	0.37
D	3.00 BSC		
D2	1.60	1.70	1.80
e	0.50 BSC		
E	3.00 BSC		
E2	1.60	1.70	1.80

Symbol	Millimeters		
	Min	Nom	Max
f	2.53 BSC		
L	0.35	0.40	0.45
L1	0.00	—	0.10
aaa	—	—	0.10
bbb	—	—	0.10
ccc	—	—	0.08
ddd	—	—	0.10
eee	—	—	0.10

1. All dimensions are shown in millimeters unless otherwise noted.
2. Dimensioning and tolerancing per ANSI Y14.5M-1994.