

Evaluates: SC1905

SC1905 Evaluation Kit

General Description

The SC1905 evaluation kits (SC1905-EVKs) provide the hardware and software graphical user interface (GUI) necessary for the evaluation of the SC1905. The SC1905 is a pin-compatible upgrade of the popular SC1894 RF PA linearizer (RFPAL) supporting signal bandwidths up to 100MHz. The SC1905 is a fully adaptive, RFin/RFout predistortion linearization solution optimized for a wide range of amplifiers, power levels, and communication protocols. The SC1905 uses the PA output and input signals to adaptively generate an optimized correction function in order to minimize the PA's self-generated distortion and impairments. Using RF-domain analog signal processing enables the SC1905 to operate over wide-signal bandwidths and consume very low power.

Benefits

- Ease-of-Use
 - Integrated RFin/RFout Solution
 - Reduces System Power Consumption, OPEX, and Total BOM Costs
 - Smaller Power Supply, Heat Sink, and Enclosure
 - Lower Backoff Reduces Transistor Costs

Applications

- 4G and 5G Cellular Infrastructure
 - Single/Multicarrier, Multistandard: WCDMA, LTE, and TD-LTE
 - BTS Amplifiers, RRH, Booster Amplifiers,
- Repeaters, Small Cells, Microcells, Picocells, DAS, AAS, and MIMO Systems
- Wide Range of PAs and Output Power
 - Amplifier: Class A/AB and Doherty
 - PA Process: LDMOS, GaN, GaAs, and InGaP
- Any Application Requiring PA Linearization

Benefits and Features

- Frequency Ranges:
 - SC1905-EVK3400: 3300MHz–3800MHz
 - SC1905-EVK2400: 2300MHz–2700MHz
 - SC1905-EVK1900: 1800MHz–2200MHz
- RFin/RFout PA Linearizer SoC in Standard CMOS
 - Fully Adaptive Correction
- External Reference Clock Support:
 - 10MHz, 13MHz, 15.36MHz, 19.2MHz, 20MHz, 26MHz, and 30.72MHz
- Low Power Consumption: 1280mW
- Frequency Range: 698MHz to 3800MHz
- Input Signal Bandwidth: 5MHz to 100MHz
- Packaged in 9mm x 9mm QFN Package
- Operating Case Temperature: -40°C to +105°C
- Fully RoHS Compliant, Green Materials
- Ease-of-Use
 - Integrated RFin/RFout Solution
 - Reduced SW Development
- Reduces System Power Consumption and OPEX
- Reduces BOM Costs, Area, and Total Volume
 - Smaller Power Supply, Heat Sink, and Enclosure
 - Small Implementation Size (< 6.5cm²)

[Ordering Information](#) appears at end of data sheet.

Auxiliary Documentation

- SC1905 SPI Programming Guide is dedicated to describing how the host communicates with the SC1905. It describes the communication protocol in addition to the addresses of all the variables and parameters for monitoring the status and configuration of the SC1905.
- The SC1905 Hardware Design Guide provides guidance on how to design the SC1905 into a system; for example, recommendations on PCB layout, regulator and delay line selection etc.
- The firmware release notes provide a comprehensive user's guide to evaluate the SC1905 operation and performance with different power amplifiers.

These auxiliary documents are available on the SC1905 product web page on Maxim's website.

Ordering Information

PART	DESCRIPTION
SC1905-EVK3400	SC1905 Evaluation Kit for 3300MHz–3800MHz
SC1905-EVK2400	SC1905 Evaluation Kit for 2300MHz–2700MHz
SC1905-EVK1900	SC1905 Evaluation Kit for 1800MHz–2200MHz

#Denotes a RoHS-compliant device that may include lead(Pb) that is exempt under the RoHS requirements.

SC1905-MB Bill of Materials

DESIGNATOR	COMMENT	DESCRIPTION	QUANTITY	MANUFACTURER 1	MANUFACTURER PART NUMBER 1	PART SUBSTITUTION ALLOWED?
C1, C26, C28, C29, C30, C31, C34	NO LOAD	0603 Cap No Load	7			
C2, C3, C4, C6, C8, C25, C27, C32, C33, C35, C36, C37, C38, C39, C40, C42	NO LOAD	0402 Cap No Load	16			
C5, C19	10uF	Cap 10uF 0805	2	Murata Electronics North America	GRM21BR71A106KE51L	Yes
C7, C24	4.7uF	Cap 4.7uF 0805	2	TDK Corporation	C2012X7R1A475M125AC	Yes
C9, C10	10uF	Cap 10uF 0805	2	Murata Electronics North America	GRM21BR71A106KE51L	N/A
C23, C41	0.1uF	Cap 0.1uF 0402	2	TDK Corporation	C1005X7R1A104K050BB	Yes
R1, R2, R4, R9,	10k	10k Ohm 0402	4	Yageo	RC0402FR-0710KL	Yes
R3, R6, R26, R42, R48, R61,	0 Ohm	0 Ohm 0402	6	Yageo	RC0402JR-070RL	Yes
R5, R11, R20, R21, R22, R38, R39, R40, R41, R43, R44, R45, R46, R47, R49, R50, R51, R52 R53, R54, R55, R56, R57, R58, R59, R60, R62, R63, R64, R65	NO LOAD	NO LOAD RESISTOR 0402	30			
R7	100	RESISTOR 100 Ohm 0402	1	Panasonic Electronic Components	ERJ-2GEJ101X	Yes
R8, R10	510	RESISTOR 510 Ohm 0402	2	Yageo	RC0402JR-07510RL	Yes
R23, R24	0 Ohm	0 Ohm 0603	2	Panasonic Electronic Components	ERJ-3GEY0R00V	Yes
L1, L2	NO LOAD	NO LOAD INDUCTOR 0402	2			
J1, J5	NO LOAD	SMA RECEPTACLE END LAUNCH, Emerson 142-0701-801	2			
J2, J3, J7	SMA_EDGE	SMA RECEPTACLE END LAUNCH, Emerson 142-0701-801	3	Emerson Network Power Connectivity Johnson	142-0701-801	Yes
J4, J6, J8	NO LOAD	Two Pin Header / Jumper	3	Samtec Inc	HTSW-102-07-G-S	N/A
J9	BOX HEADER 14 pin	BOX HEADER 14 Pin	1	FCI	10056844-114LF	Yes
J10	NO LOAD	14 Pin Header	1	TE Connectivity	4-103186-0-14	Yes
J11, J14	NO LOAD	Banana Supply Connector Red	2	Deltron	571-0500	N/A
J12	UFL-R-SMT_1	Banana Supply Connector Red	1	Deltron	571-0500	Yes
J13	UFL-R-SMT_2	Banana Supply Connector Black	1	Deltron	571-0100	Yes
J15	NO LOAD	ERF8-013-01-S-D-RA-L	1	Samtec	ERF8-013-01-S-D-RA-L	N/A
MT1, MT2, MT3, MT4	Standoff	Mounting Hole / STANDOFF	4	Keystone Electronics	8400	Yes
MT1N, MT2N, MT3N, MT4N	Standoff	Mounting Hole / STANDOFF	4	B&F Fastener Supply	HNZ 440	Yes
PRINTED CIRCUIT BOARD		SC1905-MB	1		SC1905-MB	Yes
Q2	NO LOAD		1	FAIRCHILD SEMICONDUCTOR	MMBT3904	Yes
Q3	2N7002		1			Yes
SW1	B3S-1000P	Pushbutton Switch	1	Omron Electronics Inc-EMC Div	B3S-1000P	Yes
D1, D2	SML-LX23GC	Green LED	2			
U1	NO LOAD	RF Amplifier MGA-30889-BLKG	1			
U2	NO LOAD	IC Buffer	1			
U3	EP5358HUI	Enpirion Voltage Regulator	1	Enpirion	EP5358HUI	No
U4	EP53A8HQI	Enpirion Voltage Regulator	1	Enpirion	EP53A8HQI	No
U5	NO LOAD	RF Power Detector	1	Maxim Integrated	MAX2203EWT+T	N/A
U6	NO LOAD	Temp Sensor	1	ANALOG DEVICES	TMP36GRTZ-REEL7	Yes
U8	NO LOAD	Temp Sensor	1			
U9	NO LOAD	Quad OpAmp LMV324QDR	1	Texas Instruments	LMV324QDR	Yes

SC1905-DB1900 (1800MHz–2200MHz) Bill of Material

Designator	Comment	Description	Quantity	Manufacturer 1	Manufacturer Part Number 1	Part Substitution Allowed?
C1	1uF	1uF 0603 ceramic capacitor	1	Murata Electronics North America	GRM188R61A105KA61D	
C2, C6, C30	2.2uF	2.2uF 0603	3	Murata	GRM188R71A225KE15J	
C3, C4, C8, C9, C12, C13, C14, C25, C27, C29, C31, C32, C33, C35	1000pF	1000pF 0402	14	Murata	GRM1555C1H102JA01D	
C10, C11	10pF	10pF 0402	2	Murata	GJM1555C1H100FB01D	
C15, C22, C45, C46, C47, C48, R2, R9, R11, R13, R15, R21, R23, R24, R25, R27	NO LOAD	10pF 0402, 0402 Cap No Load, Generic Capacitor, NO LOAD RESISTOR 0402, Resistor Generic	25	Murata	GJM1555C1H100FB01D	
C17	0.2pF	0.2pF 0402	1	Murata Electronics North America	GJM1555C1HR20BB01D	No
C18	0.9pF	0.9pF 0402	1	Murata Electronics North America	GJM1555C1HR90BB01D	No
C20	0.5pF	0.5pF 0402	1	Murata Electronics North America	GJM1555C1HR50BB01D	No
C26, C28, C36	15pF	15pF 0402	3	Murata	GJM1555C1H150FB01D	
C34	1nF	1000pF 0402	1	Murata	GRM1555C1H102JA01D	
DC1	10dB Coupler	Anaren 1700 - 2200 MHz 0805 10dB Coupler	1	Anaren	DC1722J5010AHF	No
DC2	BDCN-7-25+	Mini Circuits Directional Coupler	1	Mini-Circuits	BDCN-7-25+	No
FT1, FT2	Bead	Bead	2	Murata	BLM18AG121SN1D	No
FT3	Bead	Bead 0402 470 ohm	1	Murata	BLM15BD471SN1D	No
L1	18nH	18nH	1	Taiyo Yuden	HK100518NJ-T	No
L2, L3	5.6nH	5.6nH	2	Taiyo Yuden	HK10055N6S-T	No
L4	3.3nH	3.3nH	1	Taiyo Yuden	HK10053N3S-T	
L5, L6	1.2nH	1.2nH	2	Taiyo Yuden	HK10051N2S-T	No
L7	8.2nH	8.2nH	1	Taiyo Yuden	HK10058N2J-T	No
L8, L9	2.2nH	2.2nH	2	Taiyo Yuden	HK10052N2S-T	No
PCB	DB1900_RevA	Printed Circuit Board (DB1900_RevA)	1		DB1900_RevA	
R1	10k	10k Ohm 0402	1	Yageo	RC0402FR-0710KL	
R8, R14, R17, R26, R102	0 Ohm	0 Ohm 0402	6	Yageo	RC0402JR-070RL	
R10, R16	49.9	49.9 Ohm 0402	2	KOA Speer	RK73H1ELTP49R9F	
R12	12.4k 1%	12.4k Ohm 0402	1	Panasonic Electronic Components	ERJ-2RKF1242X	
R22	0 Ohm	0 Ohm 0201	1	Yageo	RC0201JR-070RL	
T1, T2, T3	BAL 50 - 100	Anaren 1700 - 2200 MHz 50Ohm UnBal 100 Dif Balun	3	Anaren	BD1722J50100A00	No
U2	2ns delay line	Anaren Delay Line 2ns	1	Anaren	XDL15-2-020S	No
U5	SC1905	SC1905: Adaptive RF Power Amplifier Linearizer	1	Maxim Integrated	SC1905	
Y1	278-20.0M-20-W	Crystal 20MHz 278-20.0M-20-W	1	Oscilent	278-20.0M-20-W	

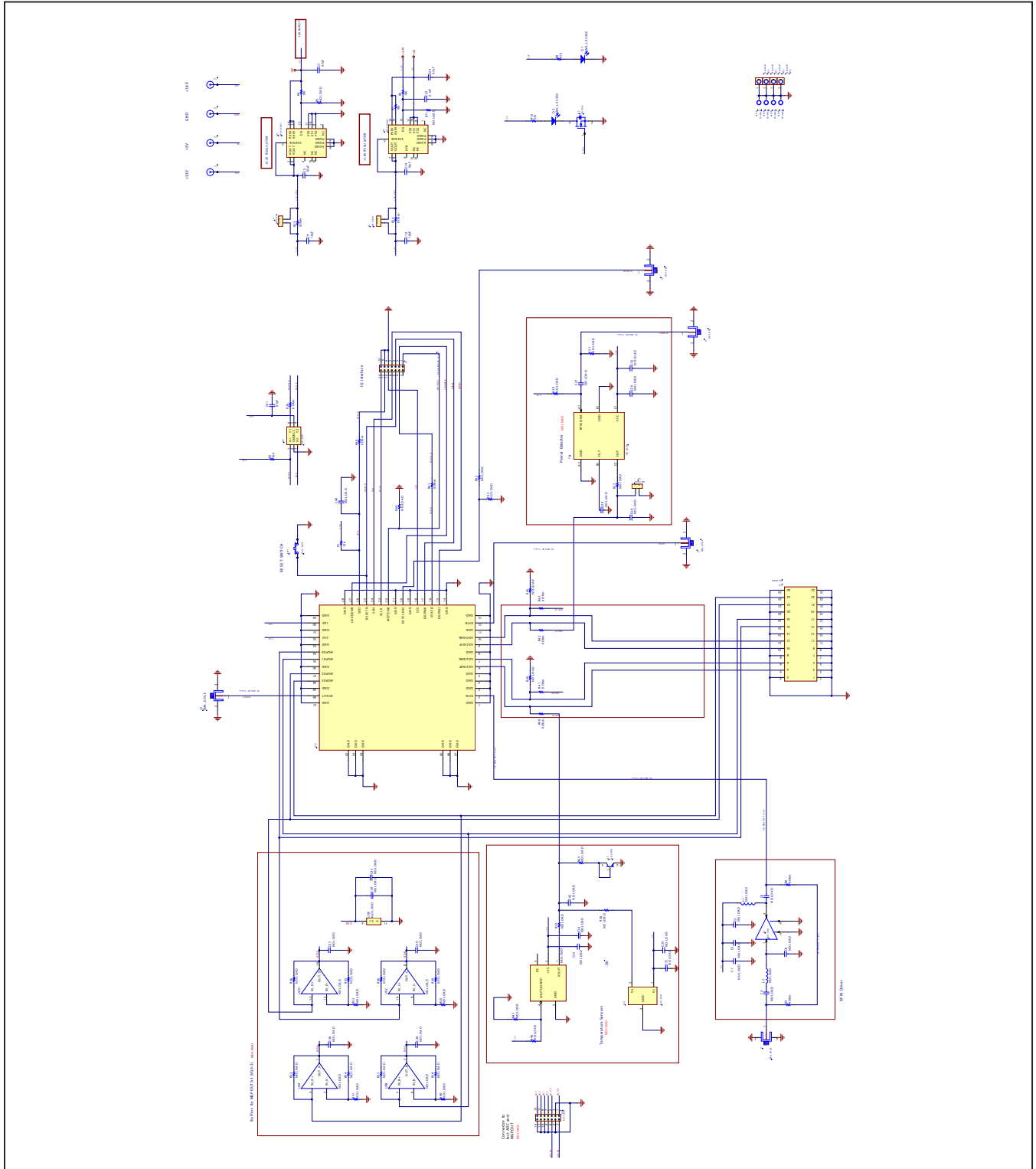
SC1905-DB2400 (2300MHz–2700MHz) Bill of Materials

DESIGNATOR	COMMENT	DESCRIPTION	QUANTITY	MANUFACTURER 1	MANUFACTURER PART NUMBER 1	PART SUBSTITUTION ALLOWED?
C1	1uF	1uF 0603 ceramic capacitor	1	Murata Electronics North America	GRM188R61A105KA61D	
C2, C6, C30	2.2uF	2.2uF 0603	3	Murata	GRM188R71A225KE15J	
C3, C4, C8, C9, C12, C13, C14, C25, C27, C29, C31, C32, C33, C35	1000pF	1000pF 0402	14	Murata	GRM1555C1H102JA01D	
C10, C11	10pF	10pF 0402	2	Murata	GJM1555C1H100FB01D	
C15, C16, C40, C45, C46, C47, C53, L7, R2, R9, R11, R21, R23, R25, R27, R104, R106	NO LOAD	0.9pF 0402, 10pF 0402, 0402 Cap No Load, Generic Capacitor, NO LOAD RESISTOR 0402, Resistor Generic, SMT Inductor	27	Murata, Murata Electronics North America	GJM1555C1H100FB01D, GJM1555C1HR90BB01D	
C17	1.1pF	1.1pF 0402	1	Murata	GJM1555C1H1R1BB01D	No
C18	1.3pF	1.3pF 0402	1	Murata	GJM1555C1H1R3BB01D	No
C19	0.4pF	0.4pF 0402	1	Murata	GJM1555C1HR40BB01D	No
C20	0.9pF	0.9pF 0402	1	Murata Electronics North America	GJM1555C1HR90BB01D	No
C21	0.3pF	0.3pF 0402	1	Murata Electronics North America	GJM1555C1HR30BB01D	No
C23	0.5pF	0.5pF 0402	1	Murata Electronics North America	GJM1555C1HR50BB01D	No
C26, C28, C36	15pF	15pF 0402	3	Murata	GJM1555C1H150FB01D	Yes
C34	1nF	1000pF 0402	1	Murata	GRM1555C1H102JA01D	
C52	2.2pF	2.2pF 0402	1	Murata	GJM1555C1H2R2BB01D	No
DC1	10dB Coupler	Anaren 2300 - 3700 MHz 0805 10dB Coupler	1	Anaren	DC2337J5010AHF	No
DC2	6dB Coupler	Mini Circuits Directional Coupler	1	Mini-Circuits	BDCN-7-25+	No
FT1, FT2	Bead	Bead	2	Murata	BLM18AG121SN1D	No
FT3	Bead	Bead 0402 470 ohm	1	Murata	BLM15BD471SN1D	No
L2, L3, L12, L13, L14, L15	2.7nH	2.7nH	6	Taiyo Yuden	HK10052N7S-T	No
L5, L6, L8, L9	1.5nH	1.5nH	4	Taiyo Yuden	HK10051N5S-T	No
L10, L11	3.3nH	3.3nH	2	Taiyo Yuden	HK10053N3S-T	No
PCB	DB2400_RevA	Printed Circuit Board (DB2400_RevA)	1		DB2400_RevA	
R1	10k	10k Ohm 0402	1	Yageo	RC0402FR-0710KL	
R8, R17, R26, R97, R102	0 Ohm	0 Ohm 0402	5	Yageo	RC0402JR-070RL	
R12	12.4k 1%	12.4k Ohm 0402	1	Panasonic Electronic Components	ERJ-2RKF1242X	
R16, R28	49.9 Ohm	49.9 Ohm 0402	2	KOA Speer	RK73H1ELTP49R9F	
R22	0 Ohm	0 Ohm 0201	1	Yageo	RC0201JR-070RL	
R24	NO LOAD	NO LOAD RESISTOR 0201	1			
T1, T2, T3	BAL 50 - 100	Anaren 2000 - 4000 MHz 50Ohm UnBal - 100 Dif Balun	3	Anaren	BD2040J50100A00	No
U1	SC1905	SC1905: Adaptive RF Power Amplifier Linearizer	1	Maxim Integrated	SC1905	
U2	2ns delay line	Anaren Delay Line 2ns	1	Anaren	XDL15-2-020S	No
Y1	278-20.0M-20-W	Crystal 20MHz 278-20.0M-20-W	1	Oscilent	278-20.0M-20-W	

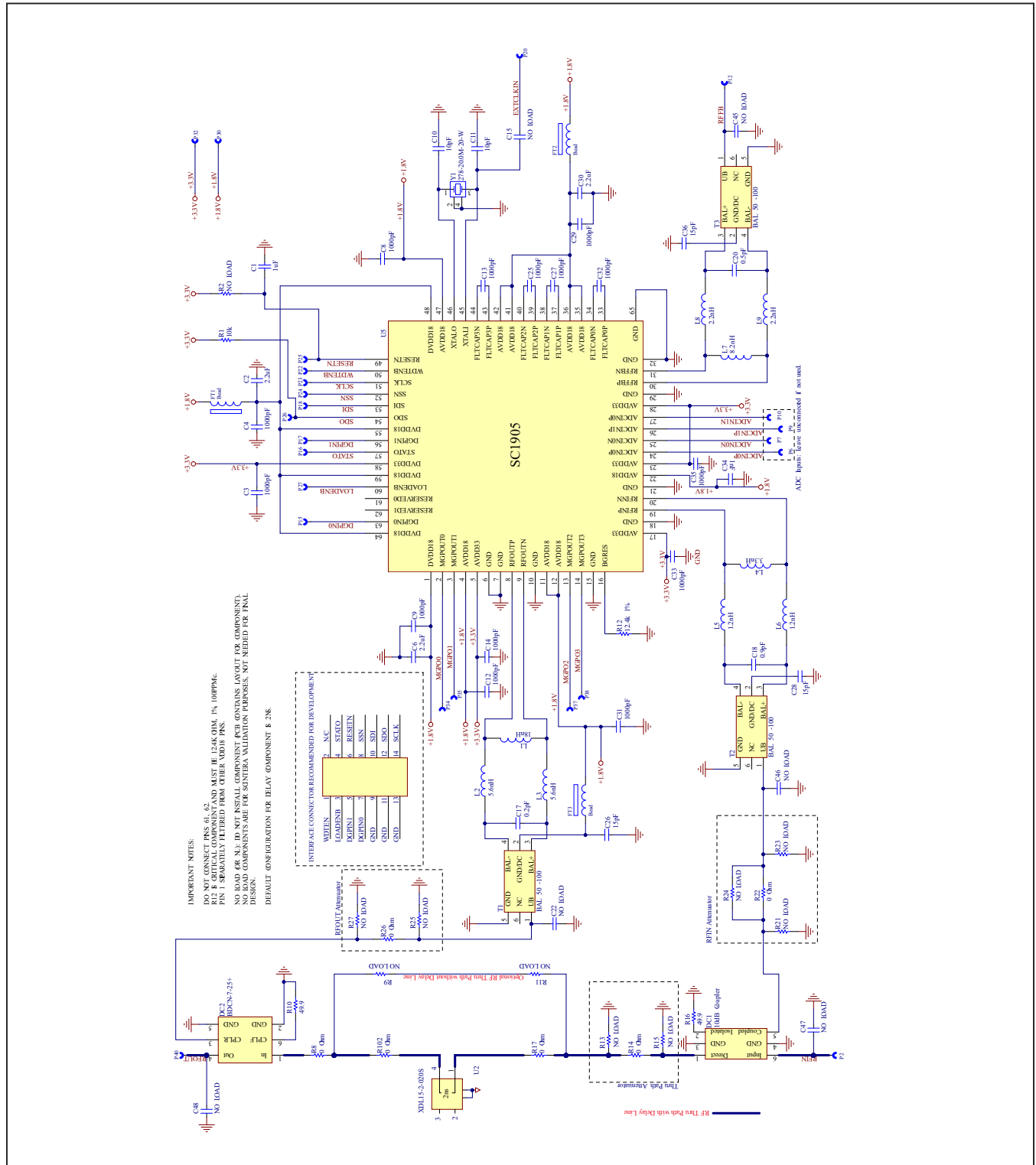
SC1905-DB3400 (3300MHz–3800MHz) Bill of Materials

Designator	Description	Comment	Quantity	Manufacturer 1	Manufacturer Part Number 1	Part Substitution Allowed?
C1	1uF 0603 ceramic capacitor	1uF	1	Murata Electronics North America	GRM188R61A105KA61D	
C2, C6, C30	2.2uF 0603	2.2uF	3	Murata	GRM188R71A225KE15J	
C3, C4, C8, C9, C12, C13, C14, C25, C27, C29, C31, C32, C33, C35	1000pF 0402	1000pF	14	Murata	GRM1555C1H102JA01D	
C10, C11	10pF 0402	10pF	2	Murata	GJM1555C1H100FB01D	
C15, C22, C45, C46, C47, C48, L7, R2, R9, R11, R13, R15, R21, R23, R43, R45	10pF 0402, Generic Capacitor, NO LOAD RESISTOR 0402, Resistor Generic, SMT Inductor	NO LOAD	25	Murata	GJM1555C1H100FB01D	
C17, C18, C20	0.3pF 0402	0.3pF	3	Murata Electronics North America	GJM1555C1HR30BB01D	No
C26, C28, C36	15pF 0402	15pF	3	Murata	GJM1555C1H150FB01D	
C34	1000pF 0402	1nF	1	Murata	GRM1555C1H102JA01D	
C51	0.2pF 0402	0.2pF	1	Murata Electronics North America	GJM1555C1HR20BB01D	No
C52	0.9pF 0402	0.9pF	1	Murata Electronics North America	GJM1555C1HR90BB01D	No
DC1	AVX 0603 Coupler C LGA Termination	Coupling: 5dB @ 3.5GHz	1	AVX	CP0603A0902CNTR	
DC2	AVX 0603 Coupler C LGA Termination	Coupling: 7dB @ 3.5GHz	1	AVX	CP0603A0902HNTR	
FT1, FT2	Bead	Bead	2	Murata	BLM18AG121SN1D	No
FT3	Bead 0402 470 ohm	Bead	1	Murata	BLM15BD471SN1D	No
L2, L3	1.5nH	1.5nH	2	Taiyo Yuden	HK10051N5S-T	No
L5, L6	2.2nH	2.2nH	2	Taiyo Yuden	HK10052N2S-T	No
P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P24, P25, P26, P27, P28, P29, P30, P31, P32, P33, P34, P35, P36, P37, P38, P39, P40, P41, P42, P43, P44, P45, P46, P47	Ports of RDB Daughterboards	PORT 1-M	47			
PCB	DB3400_RevB	Printed Circuit Board (DB3400_RevB)	1		DB3400_RevB	
R1	10k Ohm 0402	10k	1	Yageo	RC0402FR-0710KL	
R8, R14, R17, R25, R26, R44, R102	0 Ohm 0402	0 Ohm	8	Yageo	RC0402JR-070RL	
R10, R16	49.9 Ohm 0402	49.9 Ohm	2	KOA Speer	RK73H1ELTP49R9F	
R12	12.4k Ohm 0402	12.4k 1%	1	Panasonic Electronic Components	ERJ-2RKF1242X	
R22	NO LOAD RESISTOR 0201	NO LOAD	1			
R24	0 Ohm 0201	0 Ohm	1	Yageo	RC0201JR-070RL	
T1, T2, T3	Anaren 3100 - 5000 MHz 50Ohm UnBal - 100 Dif Balun	BAL 50 - 100	3	Anaren	BD3150N50100AHF	No
U1	SC1905: Adaptive RF Power Amplifier Linearizer	SC1905	1	Maxim	SC1905	No
U2	Anaren Delay Line 2ns	2ns delay line	1	Anaren	XDL15-2-020S	No
Y1	Crystal 20MHz 278-20.0M-20-W	278-20.0M-20-W	1	Oscilent	278-20.0M-20-W	

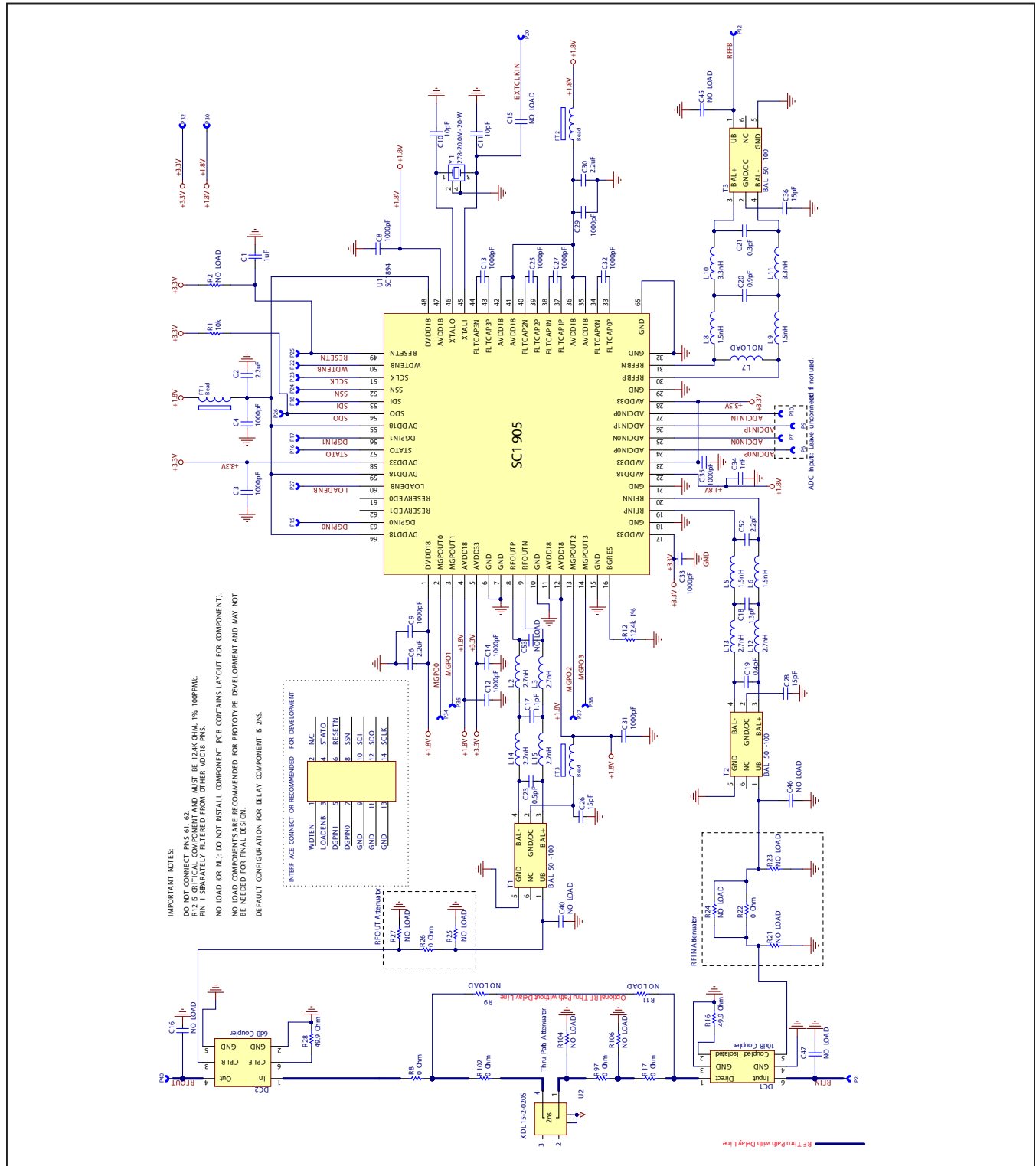
SC1905-MB Schematic



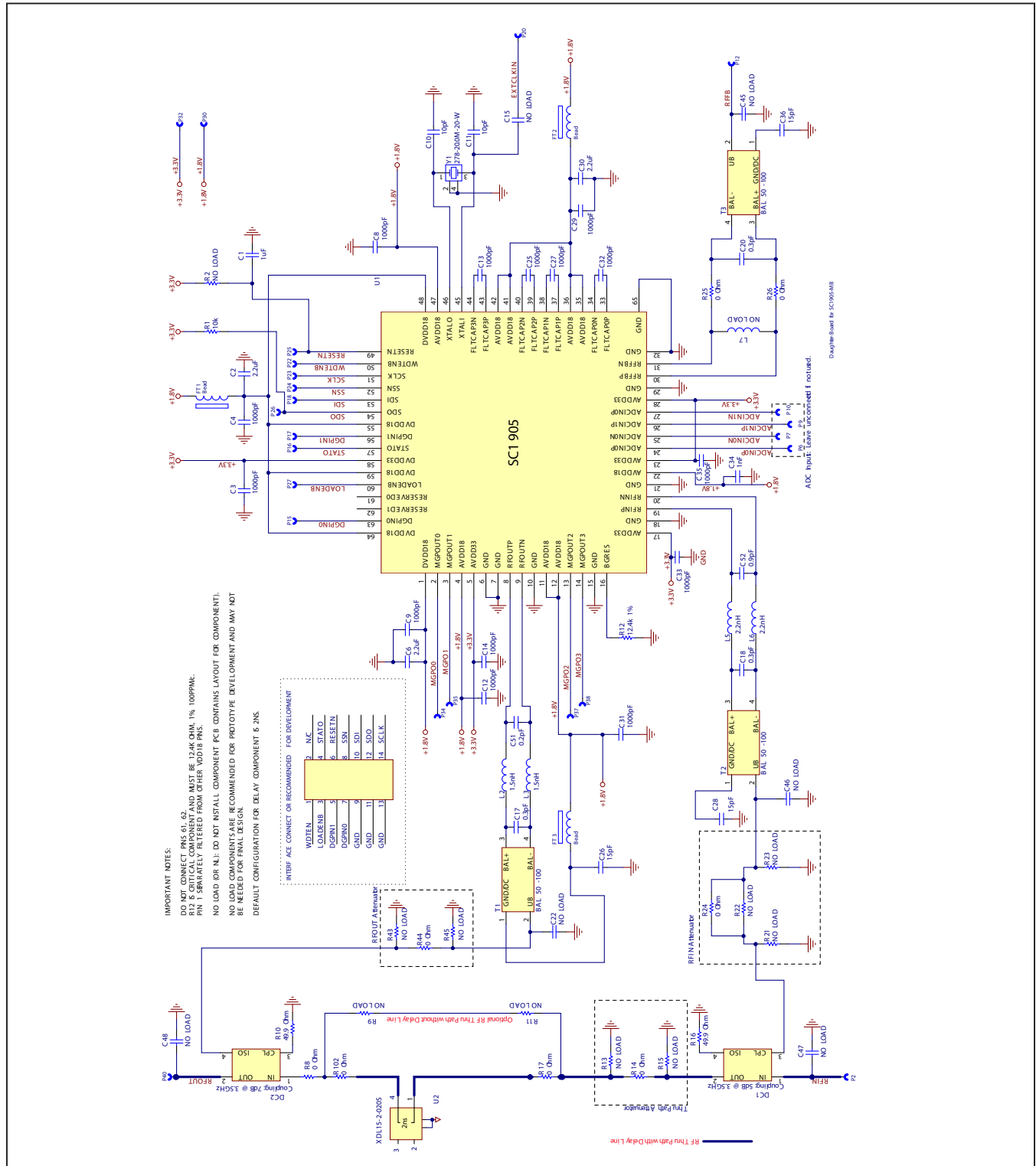
SC1905-DB1900 (1800MHz-2200MHz) Schematic



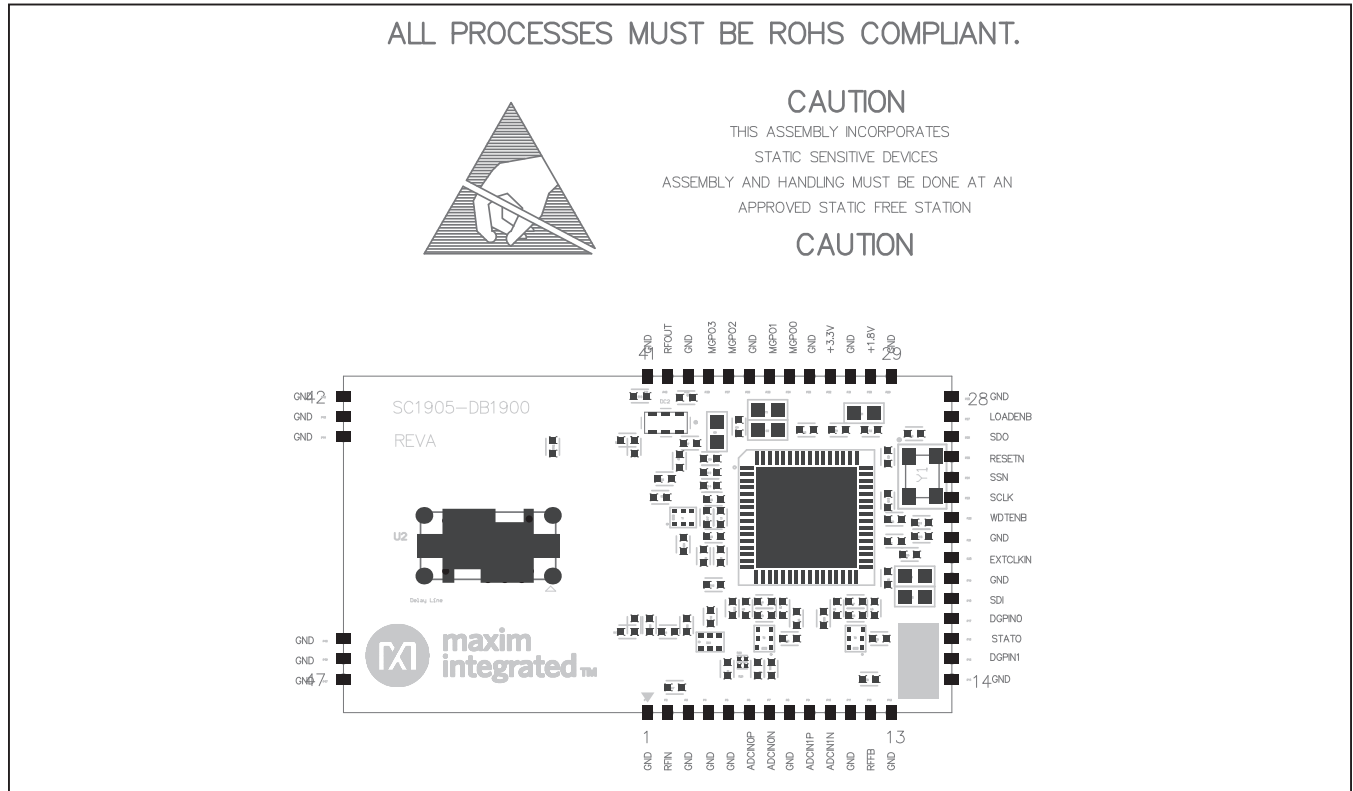
SC1905-DB2400 (2300MHz–2700MHz) Schematic



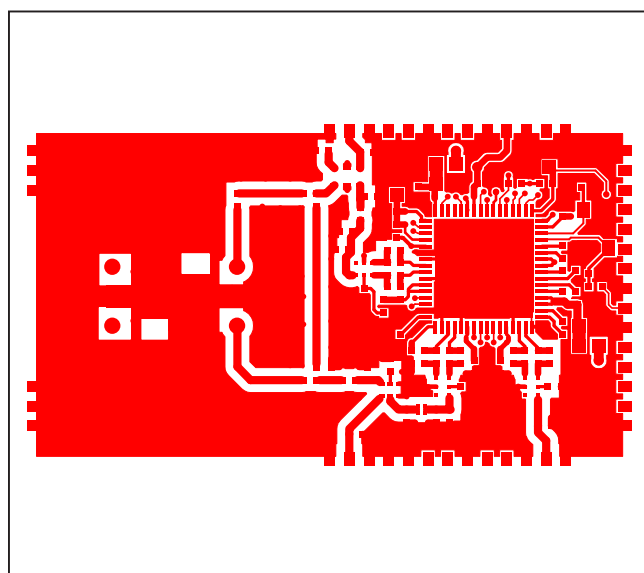
SC1905-DB3400 (3300MHz -3800MHz) Schematic



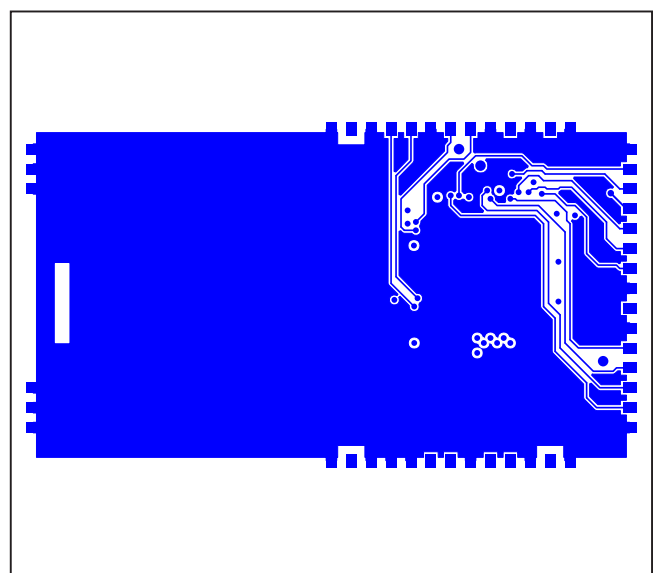
SC1905-DB1900 (1800MHz-2200MHz) PCB Layout Diagrams



SC1905-DB1900—Assembly Drawing

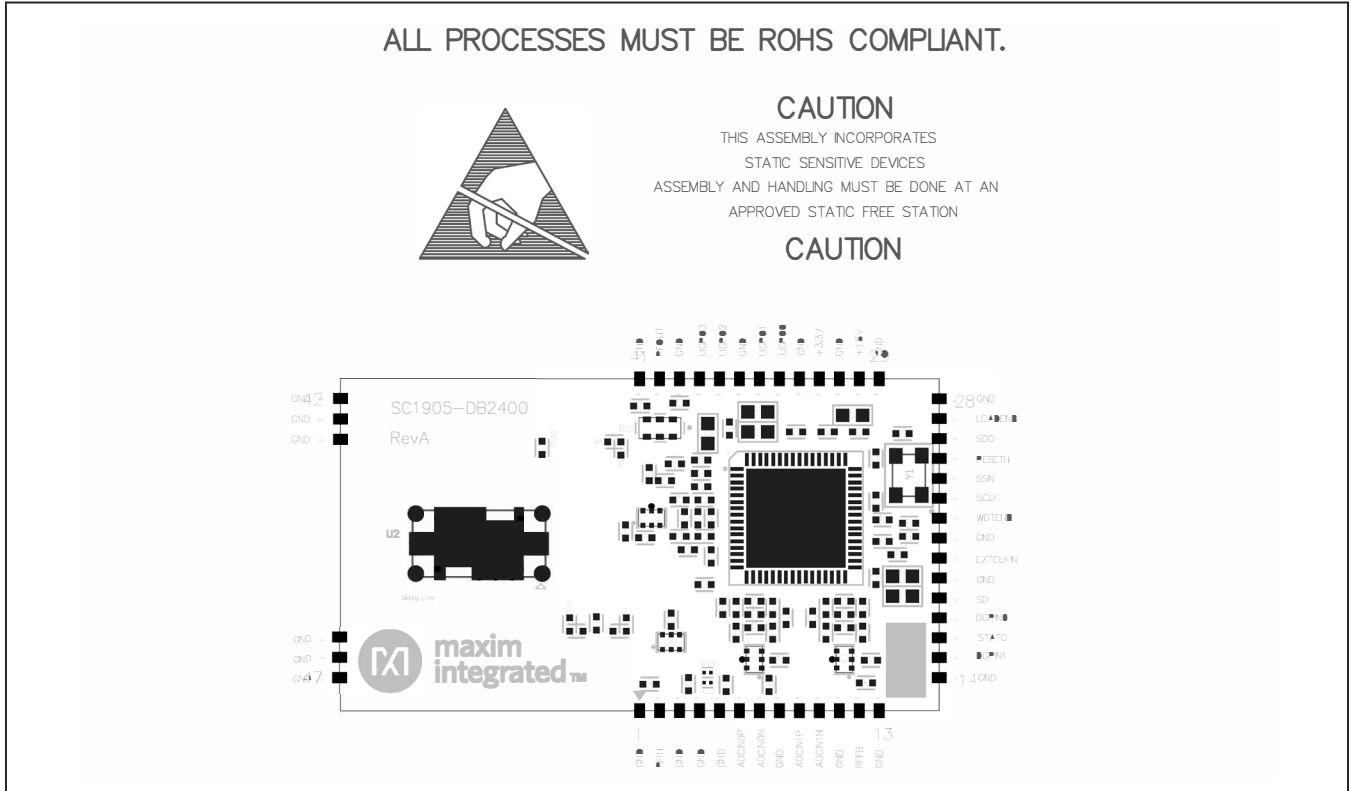


SC1905-DB1900—PCB Layout—Top

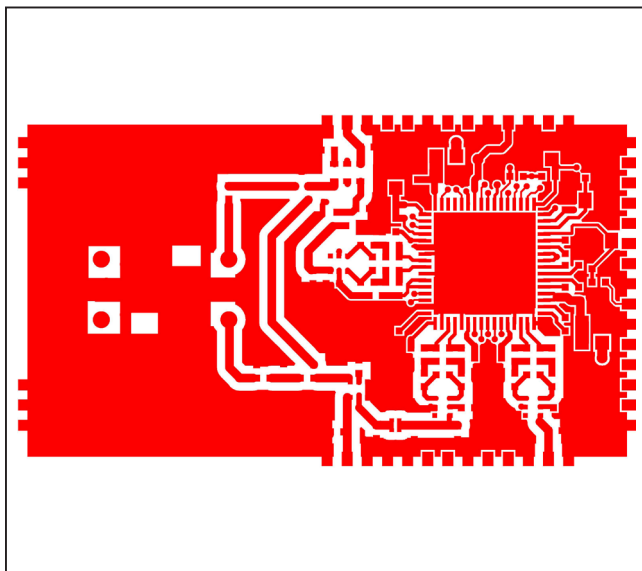


SC1905-DB1900—PCB Layout—Bottom

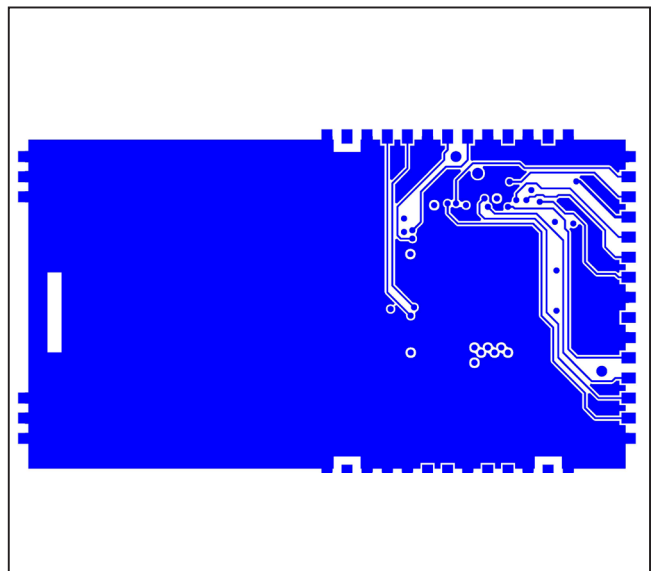
SC1905-DB2400 (2300MHz-2700MHz) PCB Layout Diagrams



SC1905-DB2400—Assembly Drawing



SC1905-DB2400—PCB Layout—Top



SC1905-DB2400—PCB Layout—Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/18	Initial release	—
1	4/19	Added SC1905-EVK1900, replaced SC1905-DB3400 BOM, and added frequency ranges	1–15
2	7/21	Updated <i>SC1905-DB1900 (1800MHz–2200MHz) Bill of Material, SC1905-DB2400 (2300MHz–2700MHz) Bill of Materials, SC1905-MB Schematic, SC1905-DB1900 (1800MHz–2200MHz) Schematic, SC1905-DB2400 (2300MHz–2700MHz) Schematic, and SC1905-DB3400 (3300MHz -3800MHz) Schematic diagrams</i>	5, 7–10



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