14000–18000 MHz Four-Channel SiGe T/R Beamformer Die

LCI-BF-14000-18000-4CH is a 4-channel SiGe beamformer bare die for 14000–18000 MHz, combining transmit and receive paths with digital phase and attenuation control.

Phase step: 5.625 °; Attenuation range: 0–31.5 dB; Switching time: 100 ns (maximum). Plan-view die dimensions: 5 × 6.2 mm.



RF characteristics

TA = +25 °C

Parameter	Symbol	Minimum	Typical	Maximum	Value	Unit
Operating frequency	-	14000	-	18000	-	MHz
Input/output VSWR	-	-	1.8	-	-	-
RMS phase error	-	-	-	3	-	°
RMS attenuation error	-	-	-	0.3	-	dB
Switching time	-	-	-	100	-	ns
Phase step	-	-	-	-	5.625	°
Attenuation step	-	-	-	-	0.5	dB
Attenuation range	-	-	-	-	0–31.5	dB

RF characteristics (RX)

TA = +25 °C; RFn → COM

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Small-signal gain	-	-	4	-	dB
Noise figure [1]	-	-	12	-	dB
Input power at 1 dB compression	-	-	1	-	dBm

[1] ATT = 0 dB

RF characteristics (TX)

TA = +25 °C; COM → RFn

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Small-signal gain	-	-	14	-	dB
Output 1 dB compression power	-	-	14	-	dBm

DC bias and current TA = +25 °C

Parameter	Symbol	Minimum	Typical	Maximum	Value	Unit
Operating voltage	-	-	-	-	3.3	V
Operating current [1]	-	-	0.065	-	-	A
Quiescent current [2]	-	-	0.085	-	-	A
Operating current [3]	-	-	0.135	-	-	A
Operating current [4]	-	-	0.001	-	-	A

[1] RX; n = 1 / 2 / 3 / 4
[2] TX; n = 1 / 2 / 3 / 4
[3] TX; P1dB; n = 1 / 2 / 3 / 4
[4] LOAD; n = 1 / 2 / 3 / 4

Absolute limits

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Maximum operating voltage	-	-	-	3.6	V
Maximum input power	-	-	-	15	dBm

Environmental specifications

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Storage temperature	-	-65	-	150	°C
Operating temperature	-	-55	-	125	°C

Bond-pad assignments (1–9)

Pins	Symbol	Function	Notes
1, 3, 8	GND	Ground	RF_CH2 / RF_CH1
2	RF_CH2	RF port	CH2
4, 5	AVCC33_CH2	Power supply	3.3 V
6, 7	AVCC33_CH1	Power supply	3.3 V
9	RF_CH1	RF port	CH1

Bond-pad assignments (10–37)

Pins	Symbol	Function	Notes
10, 35, 37	GND	Ground	RF_CH1 / RF_CH4
11	EN_LDO_DIG	Control	Leave floating
12, 15, 31, 34	TX2 / TX1 / TX4 / TX3	Control output	0 V; After power-on
13, 14, 32, 33	RX2 / RX1 / RX4 / RX3	Control output	3.3 V; After power-on
16	SPI_SEL	Debug; leave floating by default	-
17	DIN	Serial data input	Weak pull-down
18	DOUT	Serial data output	Weak pull-up
19	OE	Enable	Weak pull-down
20	CLK	Clock	Weak pull-down
21	DEN	Enable	Weak pull-up
22	FIN	Serial data input	Weak pull-down
23	DVDD33	Power supply	3.3 V
24	DGND	Ground	Leave floating
25	FEN	Enable	Weak pull-up
26	SET	Reset	Weak pull-down
27	TR1	Switch control	RX; Weak pull-down
28	TR2	Switch control	TX; Weak pull-down
29	EN	Enable	Weak pull-down
30	DVDD12	Power supply	Internal 1.2 V rail; external C = 0.1 µF
36	RF_CH4	RF port	CH4

Bond-pad assignments (38–63)

Pins	Symbol	Function	Notes
38, 39	AVCC33_CH4	Power supply	3.3 V
40, 41	AVCC33_CH3	Power supply	3.3 V
42, 44, 53, 55	GND	Ground	-
43	RF_CH3	RF port	CH3
54	RF_COM	Common RF port	-
56	GND	Ground	Leave floating

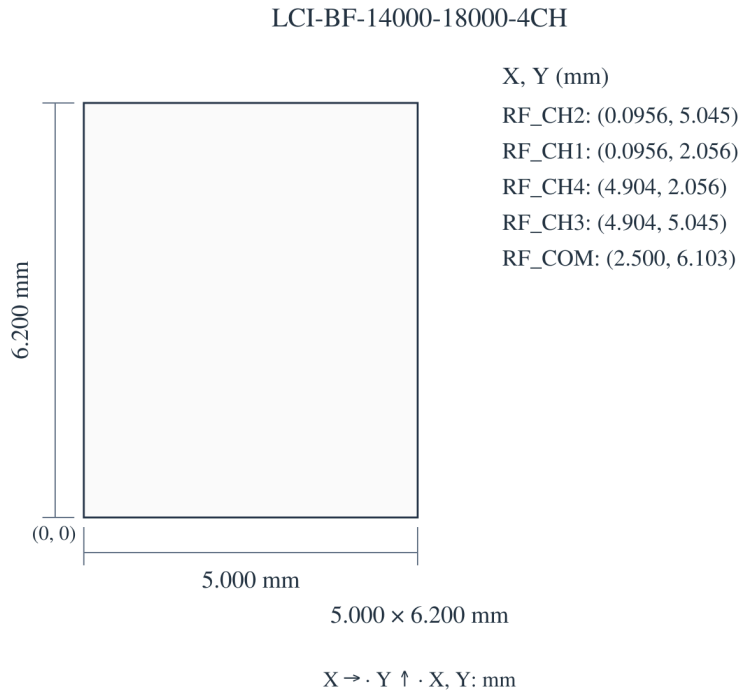
Bond-pad assignments (38–63)

Pins	Symbol	Function	Notes
45	PAD_LDO_BACKUP	Debug; leave floating by default	-
46	PAD_DSA12_REG<2>	Debug; leave floating by default	-
47	PAD_DSA12_REG<1>	Debug; leave floating by default	-
48	PAD_DSA12_REG<0>	Debug; leave floating by default	-
49	PAD_DSA_LOGIC<0>	Debug; leave floating by default	-
50	PAD_DSA_LOGIC<1>	Debug; leave floating by default	-
51	PAD_TCVVA<1>	Debug; leave floating by default	-
52	PAD_TCVVA<0>	Debug; leave floating by default	-
57	PAD_DSA_LOGIC<2>	Debug; leave floating by default	-
58	PAD_DSA_LOGIC<3>	Debug; leave floating by default	-
59	PAD_DSA_LOGIC<4>	Debug; leave floating by default	-
60	PAD_PS_REG<0>	Debug; leave floating by default	-
61	PAD_PS_REG<1>	Debug; leave floating by default	-
62	PAD_PS_REG<2>	Debug; leave floating by default	-
63	PAD_SW_TRXAMP_LTHR_H	Debug; leave floating by default	-

Die dimensions

Parameter	Value	Unit
Plan-view die dimensions	5 × 6.2	mm

Partial dimensional reference in mm. Fabrication and wire bonding require complete drawings.



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Die integration and bias sequencing

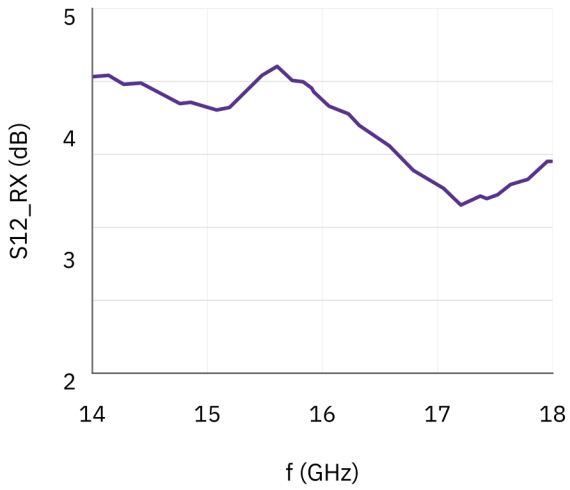
Apply VDD33 before the I/O control signals. The RF ports do not require external DC-blocking capacitors.

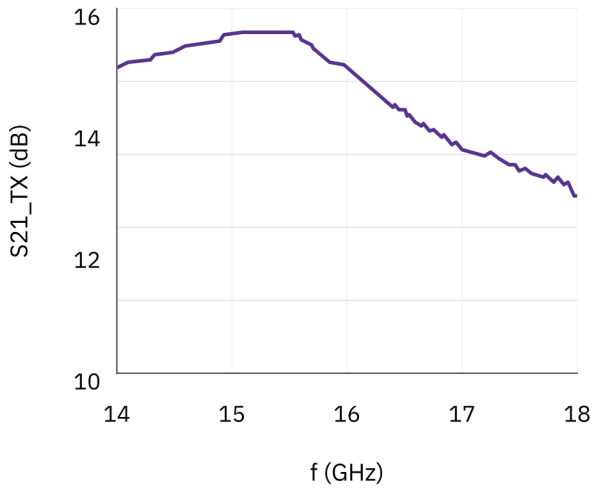
Performance curves

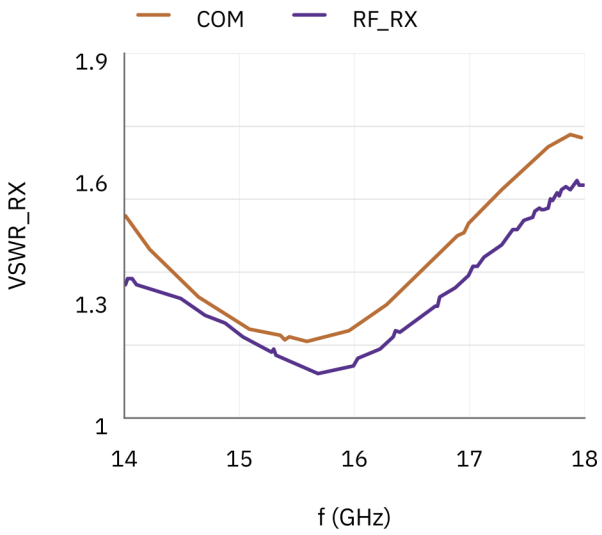
Each performance plot applies to its stated operating conditions.

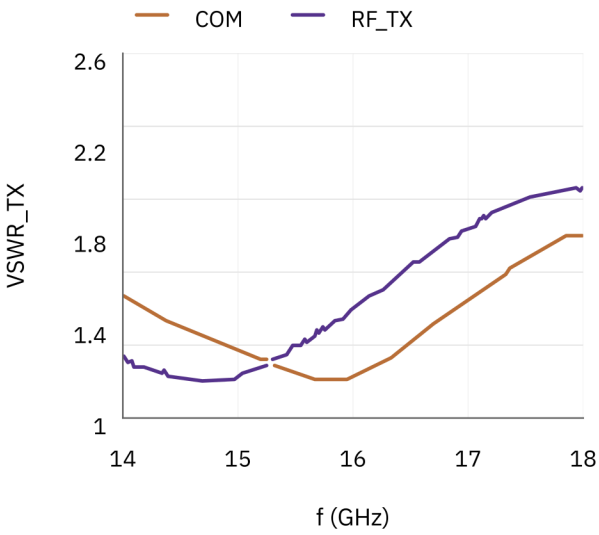
Rx / Tx — S21; S12; Input matching; Output matching.

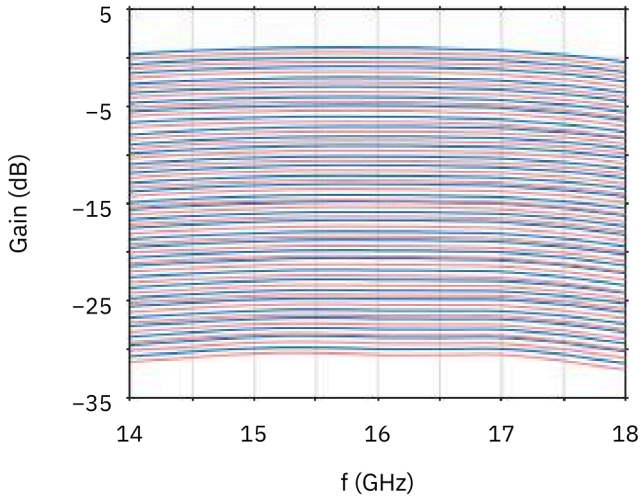
Readings are approximate. Room-temperature test; no numerical TA is stated. Gain and VSWR were measured on-wafer. Phase and attenuation were measured on an evaluation board, including board loss. Rx: S12_RX (dB), COM / RF_RX; Tx: S21_TX (dB), COM / RF_TX.

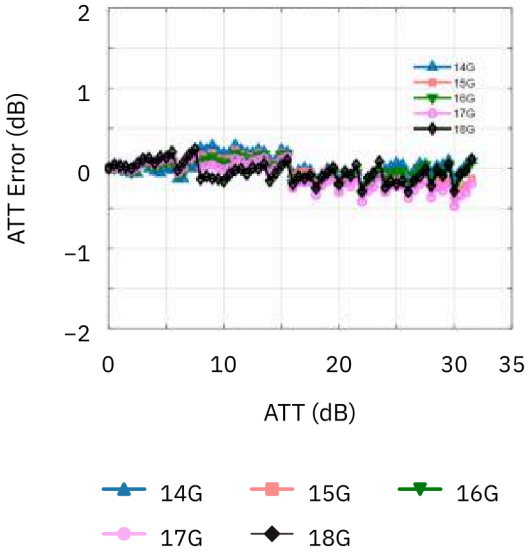


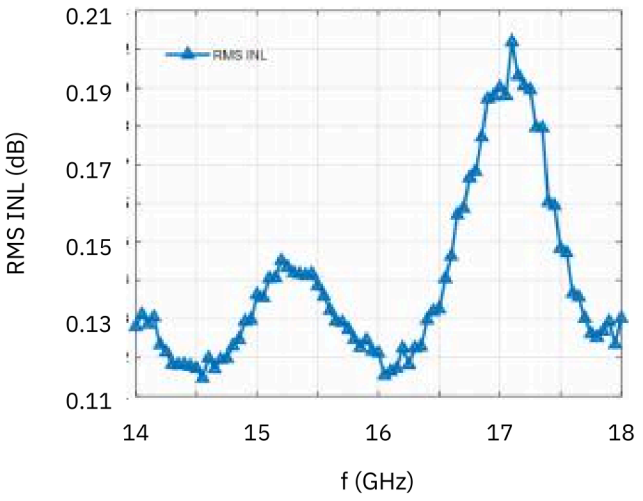


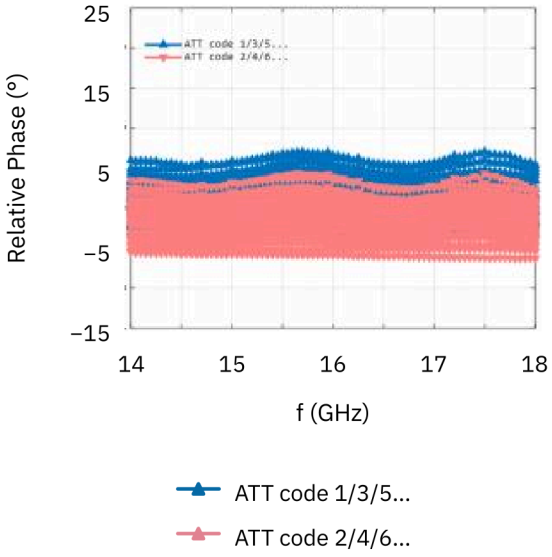




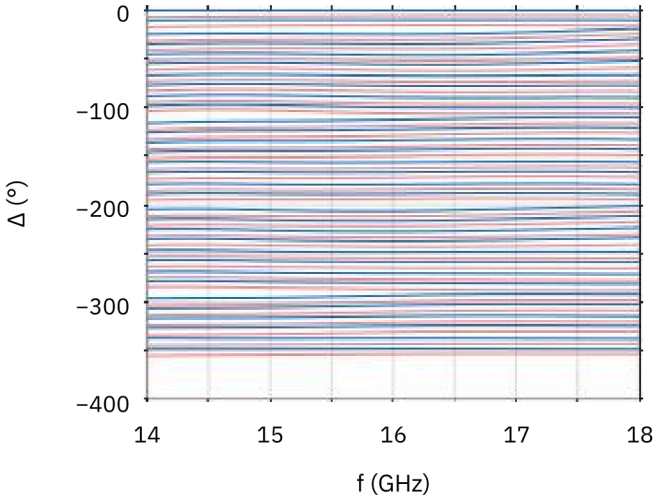


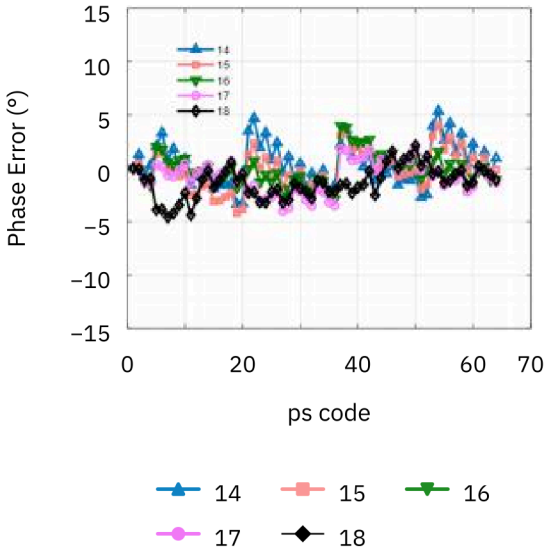


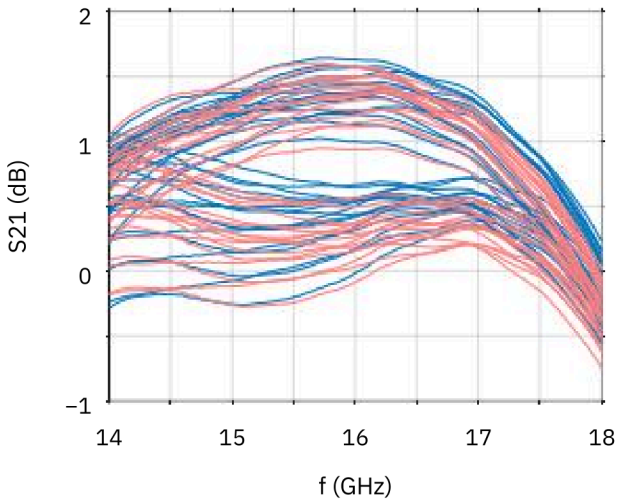


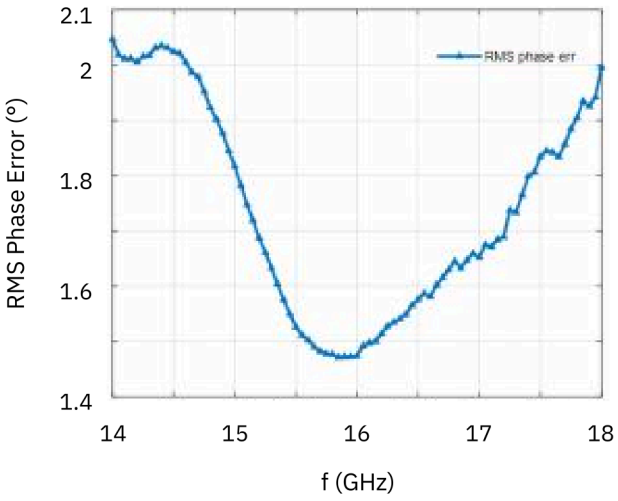


Rx — Gain (dB); Attenuation error (dB); RMS INL (dB); Relative phase (°). Gain and VSWR were measured on-wafer. Phase and attenuation were measured on an evaluation board, including board loss. Legend identifiers: 14G / 15G / 16G / 17G / 18G. Units are unspecified.

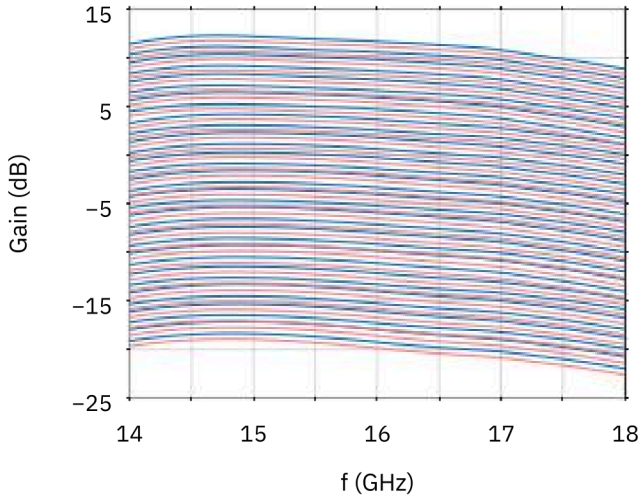


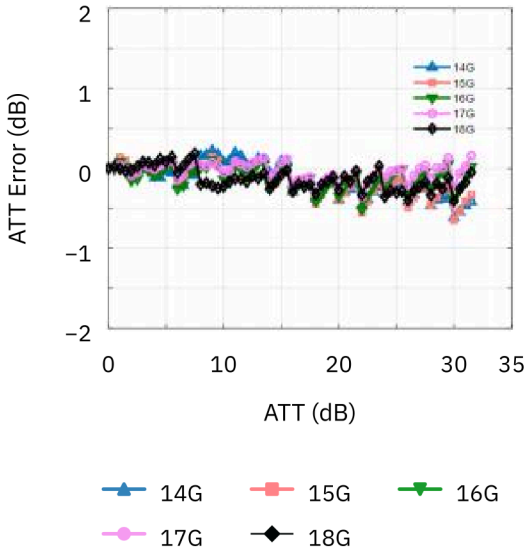


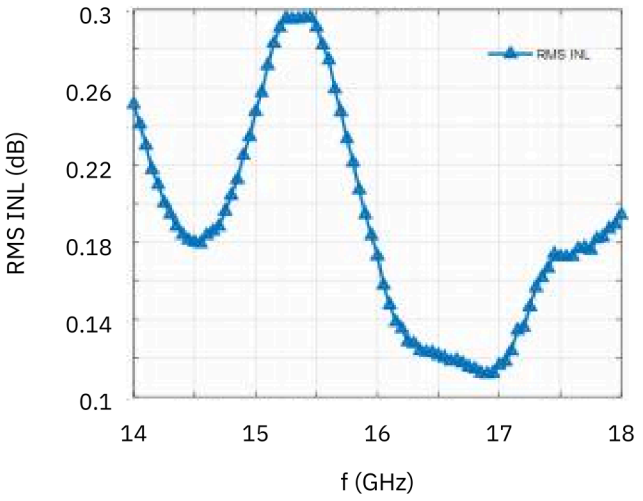


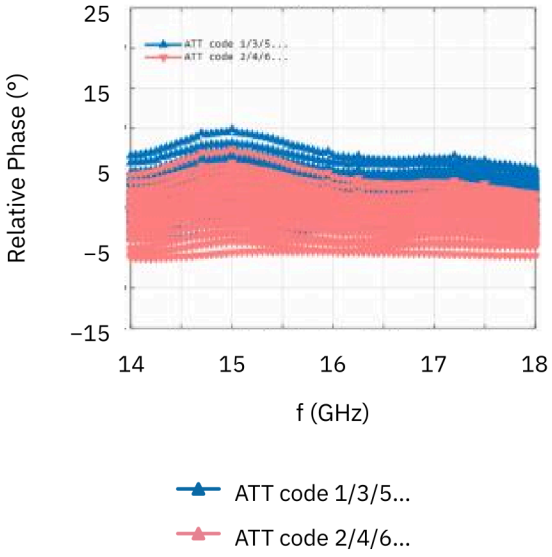


Rx — Phase shift; Phase error; RMS phase error; S21 (dB). Gain and VSWR were measured on-wafer. Phase and attenuation were measured on an evaluation board, including board loss. Legend identifiers: 14 / 15 / 16 / 17 / 18. Units are unspecified.

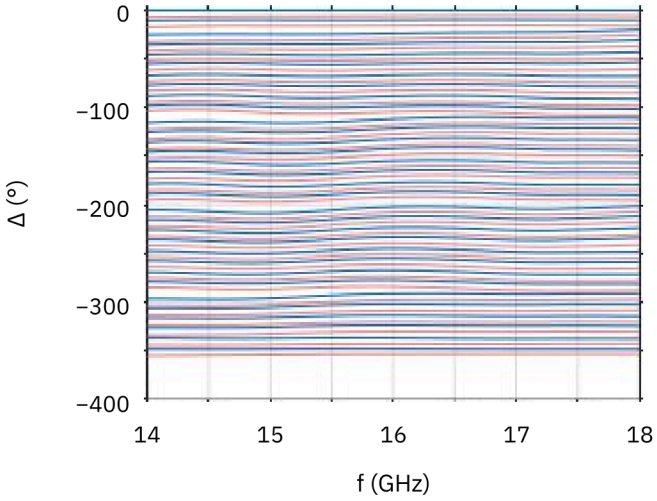


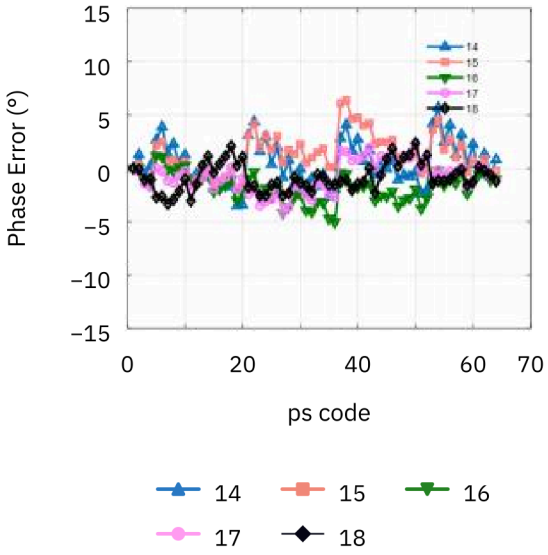


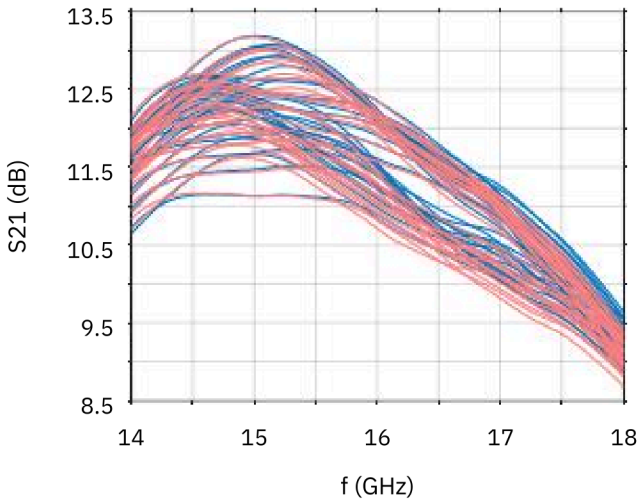


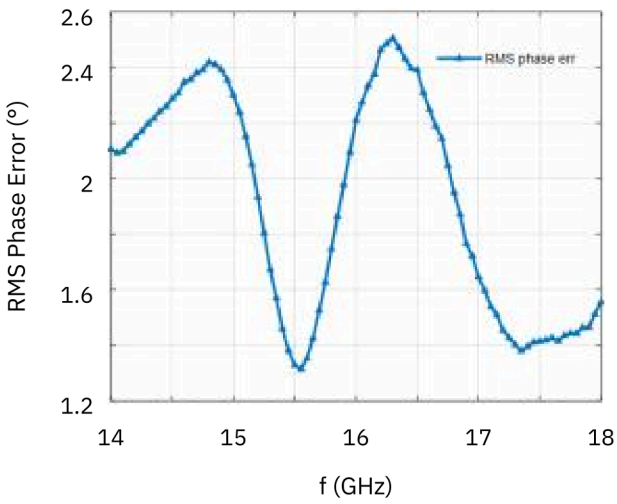


Tx — Gain (dB); Attenuation error (dB); RMS INL (dB); Relative phase (°). Gain and VSWR were measured on-wafer. Phase and attenuation were measured on an evaluation board, including board loss. Legend identifiers: 14G / 15G / 16G / 17G / 18G. Units are unspecified.





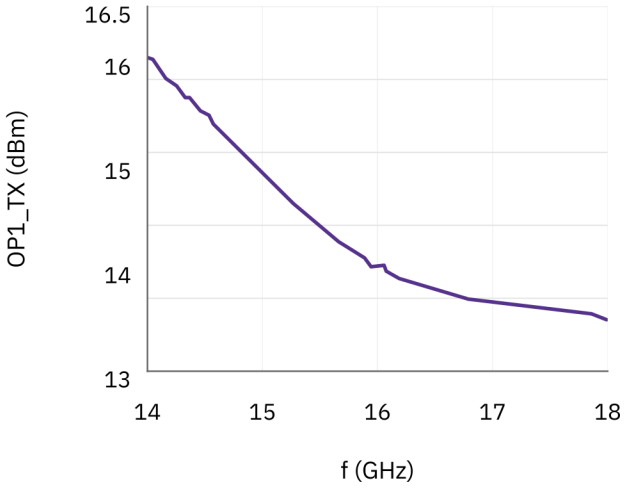


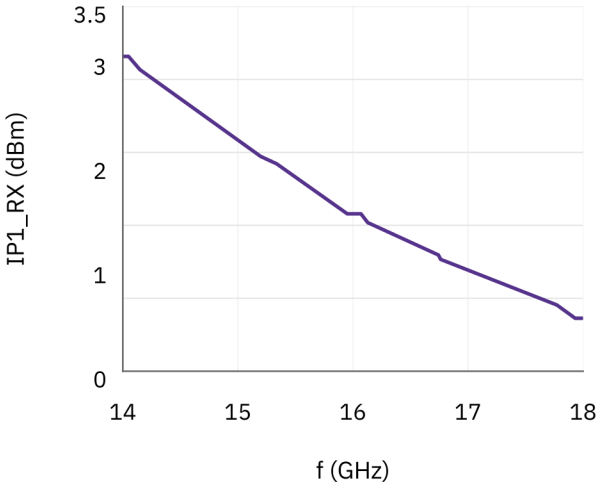


Tx — Phase shift; Phase error; RMS phase error; S21 (dB). Gain and VSWR were measured on-wafer. Phase and attenuation were measured on an evaluation board, including board loss. Legend identifiers: 14 / 15 / 16 / 17 / 18. Units are unspecified.

Rx / Tx — Output power at compression (Tx); Input power at compression (Rx).

Readings are approximate. Tx: OP1_TX (dBm); Rx: IP1_RX (dBm). The test fixture for the P1 plots is unspecified.





Document notice

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