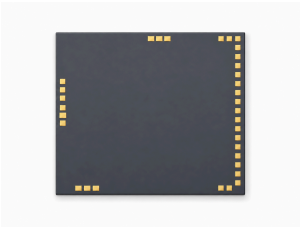
8000–12000 MHz GaAs MMIC Amplitude and Phase Control RF Front-End Die — Rx 10 dB / Tx 26 dB (typical)



LCI-APC-8000-12000-D-RXG10T · 8000–12000 MHz · GaAs MMIC Amplitude and Phase Control RF Front-End Die.

The RF table specifies: Rx 10 dB / Tx 26 dB (typical); Rx P1dB ≥ 13.5 dBm; Tx PSAT ≥ 25 dBm. RF test conditions: TA = +25 °C; VS = -5 V; Vd1 = Vd2 = +5 V.

Parallel TTL control uses P1–P6 for phase and A1–A6 for attenuation; S1 and S2 select transmit or receive states.

Apply the negative supply before the positive supply; remove the positive supply before the negative supply.

Die dimensions: 4 × 3.5 × 0.1 mm.

S1 (V) = 5; S2 (V) = 0; T / R = Tx

S1 (V) = 0; S2 (V) = 5; T / R = Rx

S1 (V) = 0; S2 (V) = 0; T / R = load state

P1 = 5.625°; P2 = 11.25°; P3 = 22.5°; P4 = 45°; P5 = 90°; P6 = 180°

A1 = 0.5 dB; A2 = 1 dB; A3 = 2 dB; A4 = 4 dB; A5 = 8 dB; A6 = 16 dB

RF characteristics

TA = +25 °C; VS = -5 V; Vd1 = Vd2 = +5 V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating frequency	f	8000	-	12000	MHz
Phase shift range	-	5.625	-	354.375	°
Attenuation range	-	0.5	-	31.5	dB
Small-signal gain (Rx)	-	-	10	-	dB
Output 1 dB compression power (Rx)	-	13.5	-	-	dBm
Noise figure (Rx)	-	-	-	7	dB
Small-signal gain (Tx)	-	-	26	-	dB
Saturated output power (Tx)	-	25	-	-	dBm
64-state RMS attenuation error (Rx)	-	-	0.4	-	dB
Attenuation-induced phase variation (Rx)	-	-	±10	-	°
64-state RMS phase error (Rx)	-	-	2.5	-	°
Phase-induced amplitude variation (Rx)	-	-	±0.5	-	dB
Input VSWR (Rx)	-	-	1.4	-	-
Output VSWR (Rx)	-	-	1.8	-	-

RF characteristics

TA = +25 °C; VS = -5 V; Vd1 = Vd2 = +5 V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
64-state RMS attenuation error (Tx)	-	-	0.7	-	dB
Attenuation-induced phase variation (Tx)	-	-	±10	-	°
64-state RMS phase error (Tx)	-	-	3	-	°
Phase-induced amplitude variation (Tx)	-	-	±0.5	-	dB
Input VSWR (Tx)	-	-	1.8	-	-
Output VSWR (Tx)	-	-	1.8	-	-

DC bias and current

TA = +25 °C

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Negative supply voltage	-	-5.3	-5	-4.7	V
Positive supply voltage	-	-	5	-	V
Negative-supply quiescent current	-	-	0.008	-	A
Positive-supply quiescent current (Rx)	-	-	-	0.105	A
Positive-supply quiescent current (Tx)	-	-	-	0.11	A
Input drive current [1]	-	-	0.0002	-	A
High-level input voltage	-	4	-	5	V
Low-level input voltage	-	0	-	0.4	V

[1] TTL = +5 V

Absolute limits

Absolute limits; these are not normal operating targets.

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Maximum input power	-	-	-	20	dBm
Storage temperature	-	-65	-	150	°C
Operating temperature	-	-55	-	85	°C
Minimum negative supply voltage	-	-6	-	-	V
Maximum operating voltage	-	-	-	6	V
Maximum input drive current	-	-	-	0.0003	A

Die dimensions

Parameter	Value	Unit
Die dimensions	4 × 3.5 × 0.1	mm
Plan-view outline tolerance	±50	µm

Bond-pad assignments

Pins	Symbol	mm
1	GND	0.100 × 0.100
2	RF1	0.150 × 0.100
3	GND	0.100 × 0.100
4	G2	0.100 × 0.100
5	GND	0.100 × 0.100
6	G1	0.100 × 0.100
7	GND	0.100 × 0.100
8	RF2	0.150 × 0.100
9	GND	0.100 × 0.100
10	VD2	0.100 × 0.100
11	VS	0.100 × 0.100
12	VD2	0.100 × 0.100
13	A1	0.100 × 0.100
14	A2	0.100 × 0.100
15	A3	0.100 × 0.100
16	A4	0.100 × 0.100
17	A5	0.100 × 0.100
18	A6	0.100 × 0.100
19	P1	0.100 × 0.100
20	P2	0.100 × 0.100
21	P3	0.100 × 0.100
22	P4	0.100 × 0.100
23	P5	0.100 × 0.100
24	P6	0.100 × 0.100
25	S1	0.100 × 0.100
26	S2	0.100 × 0.100

Bond-pad assignments

Pins	Symbol	mm
27	VS	0.100 × 0.100
28	VD1	0.100 × 0.100
29	VS	0.100 × 0.100
30	VD1	0.100 × 0.100
31	GND	0.100 × 0.100
32	RF3	0.150 × 0.100
33	GND	0.100 × 0.100

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Integration notes

Parallel TTL control uses P1–P6 for phase and A1–A6 for attenuation; S1 and S2 select transmit or receive states. Apply the negative supply before the positive supply; remove the positive supply before the negative supply. S1 (V) = 5; S2 (V) = 0; T / R = Tx S1 (V) = 0; S2 (V) = 5; T / R = Rx S1 (V) = 0; S2 (V) = 0; T / R = load state P1 = 5.625°; P2 = 11.25°; P3 = 22.5°; P4 = 45°; P5 = 90°; P6 = 180° A1 = 0.5 dB; A2 = 1 dB; A3 = 2 dB; A4 = 4 dB; A5 = 8 dB; A6 = 16 dB

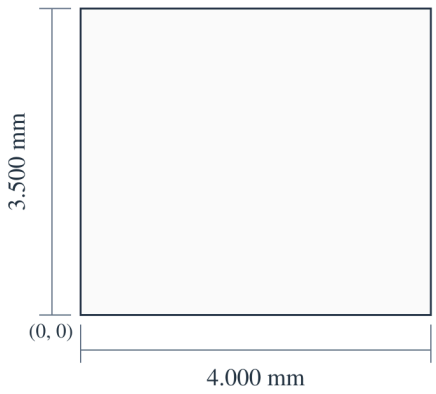
Pad connection notes

RF1: receive output and transmit input. RF2 includes a DC-blocking capacitor; RF3 does not. Floating G1/G2 pads do not reduce gain. Grounding G1 reduces receive gain by 1 dB; grounding G2 reduces it by 2 dB. Except for GND, pads with the same symbol are internally connected. The GND pads do not require wire bonding. The reference state sets all P1–P6 and A1–A6 to L. For each listed single-bit phase or attenuation value, only the corresponding bit is H and all other bits are L. H = +5 V; L = 0 V.

Mechanical Outline

Outline and dimensioned coordinates in mm. Use this drawing as a dimensional reference. Fabrication and wire bonding require complete drawings.

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X (mm)

RF2: 2.200

VD2 (10) / VD1 (30): 3.550

VS (11, 29): 3.700

RF3: 0.650

Y (mm)

RF1: 1.750

G1: 2.450

G2: 2.150

4.000 × 3.500 × 0.100 mm

X, Y: ±0.050 mm

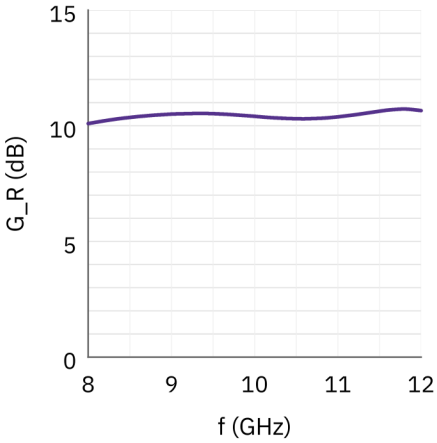
X → · Y ↑ · X, Y: mm

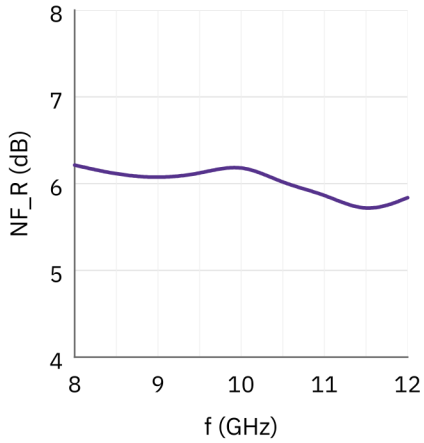
Performance curves

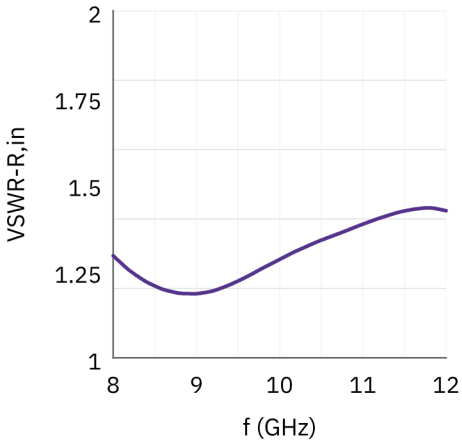
Each performance plot applies to its stated operating conditions.

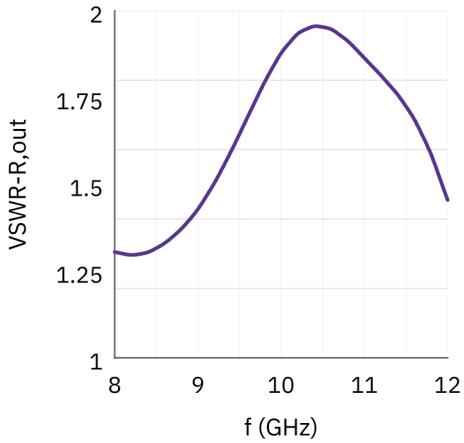
Rx — Gain; Input matching; Output matching; Noise figure; Input power at 1 dB compression; Output 1 dB compression power.

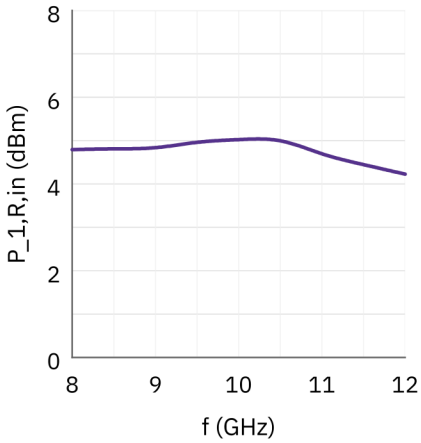
Readings are approximate.

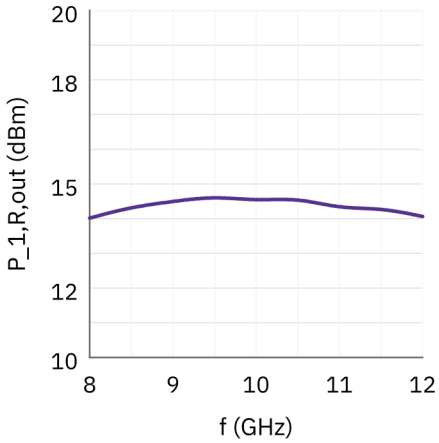






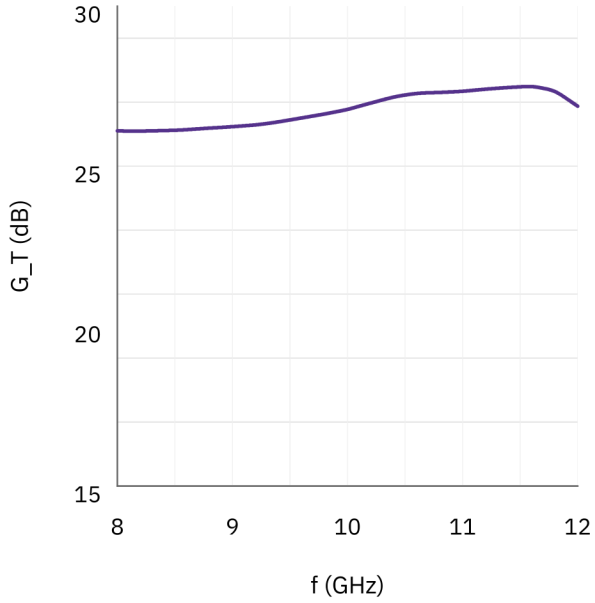


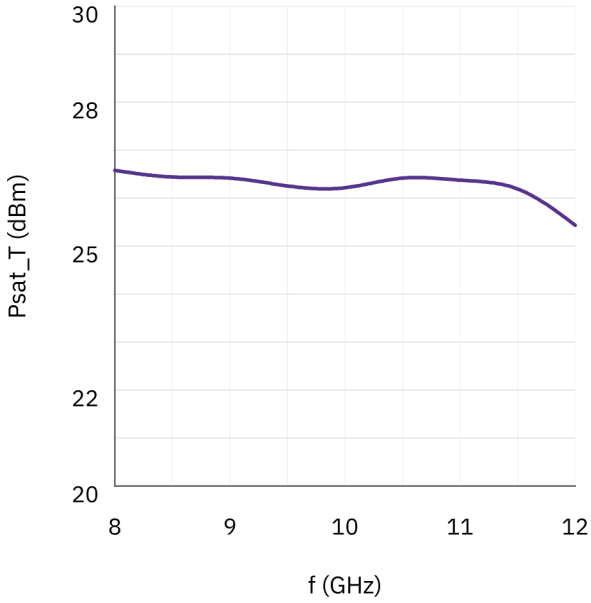


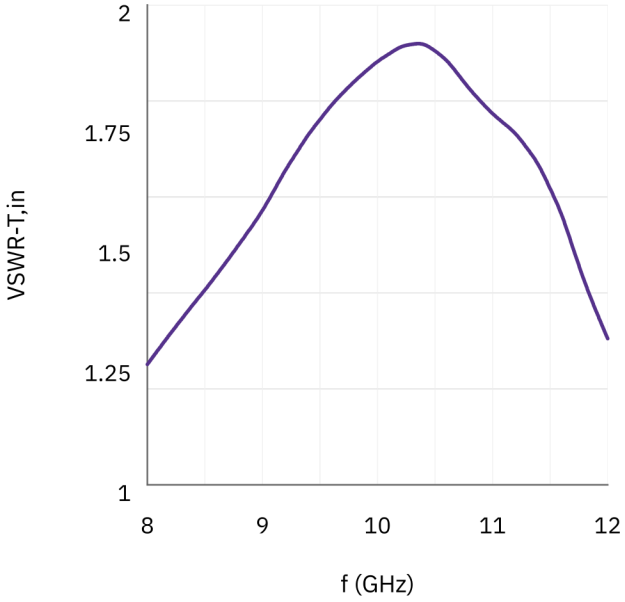


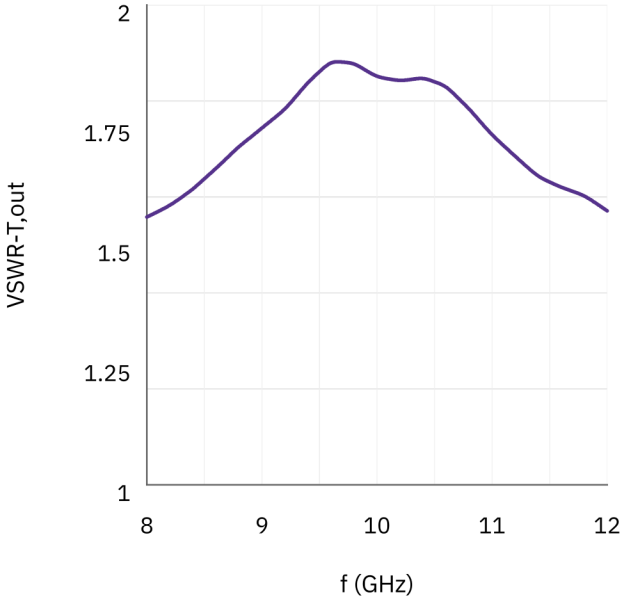
Tx — Gain; Saturated output power; Input matching; Output matching.

Readings are approximate.



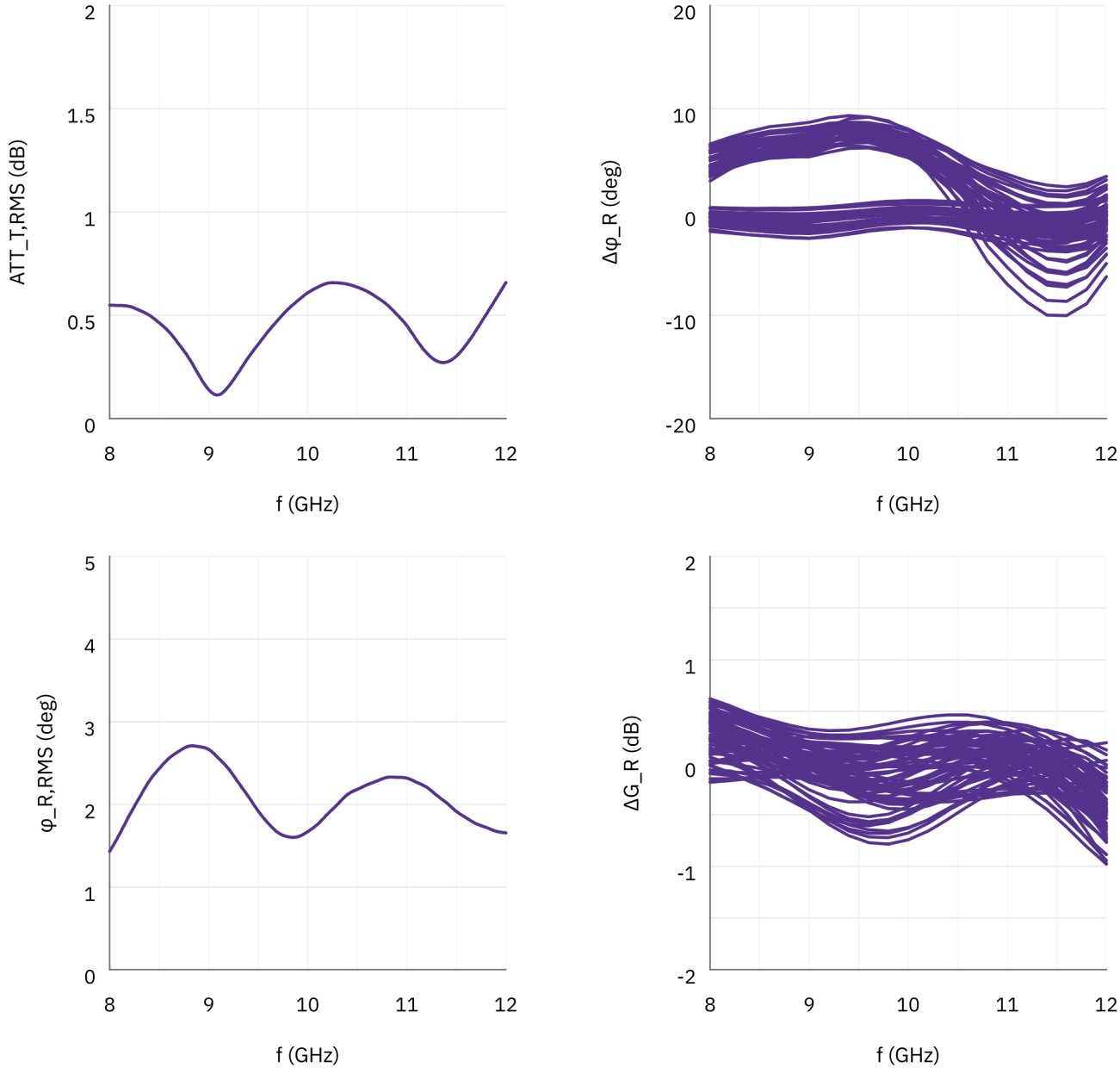






Gain variation (Rx); RMS phase error; Phase-induced amplitude variation; RMS attenuation error; Attenuation-induced phase variation.

Readings are approximate.



Document notice

Specifications are subject to revision. Before design release, confirm the current document revision and product-specific requirements with LCRF. The approved quotation and order documentation define the supplied configuration.