Product Specification

RS15507 Digital Step Attenuator

General Description

The RS15507 is a 1-bit digital step attenuator (DSA). It is available in a 4mm × 4mm, 24-lead LGA and provides 31.75dB attenuation range from 100 MHz to 10 GHz.

The RS15507 incorporates a negative voltage generator to operate with a single positive supply voltage from 2.7 V to 5.5 V applied to the VDD pin when all the GND pins are all connected to ground. The RS15507 provides one pin digital control interface.

Applications

- 3G/4G/5G wireless infrastructure
- Test equipment
- Land mobile radio system
- Point to point communication system

Features

- Excellent RF Performance
  - High Attenuation Accuracy and Low Insertion Loss
  - 0.8dB Insertion loss at 8GHz
- High input linearity
  - P0.1dB: 33.5dBm typical
  - Third-order intercept (IP3): 57 dBm typical
- Programming interface
  - GPIO

Functional Block Diagram

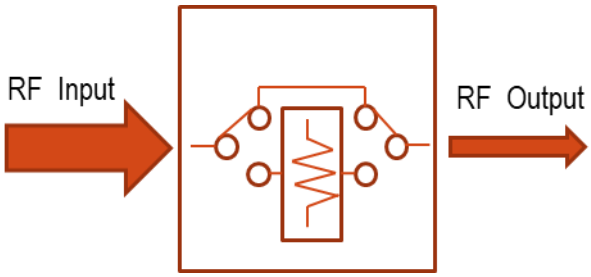


Figure 1

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Absolute Maximum Ratings

Table 1

Parameter	Min	Max	Units
VDD to GND	-0.3	5.5	V
Vctrl to GND(Parallel Mode)	-0.3	5.5	V
Input Power		31	dBm
Storage Temperature Range	-60	150	°C
ESD Voltage– HBM		2000	V
ESD Voltage– CDM		500	V

Stresses above those listed above may cause permanent damage to the device. Functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Recommended Operating Conditions

Table 2

Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage	/	2.7	5	5.5	V
Operating Temp Range	/	-40	25	105	°C
RF Frequency Range	/	50		10000	MHz
RF input Power, CW				29	dBm
Logic High	/	1.2	5	Vdd	V
Logic Low	/	-0.3	0	0.7	V

Operation should be restricted to the limits in the Recommended Operating Conditions table. Operation between operating range maximum and absolute maximum for extended periods may reduce reliability.

Specification

Typical Application Circuit, Normal mode (VDD=5V), TC = +25°C, Input power = 0dBm. PCB board trace and connector losses are de-embedded unless otherwise noted.

Table 3

Parameter	Conditions	Min	Typ	Max	Units
Operation Frequency		100		10000	MHz
Attenuation Range			31.75		dB
Insertion Loss	100MHz - 1.0GHz		0.5		dB
	1.0GHz - 3.0GHz		0.5		
	3.0GHz - 4.0GHz		0.6		
	4.0GHz - 6.0GHz		0.7		
	6.0GHz - 10.0GHz		0.8		
Attenuation Accuracy	100MHz - 1.0GHz		0.2		dB
	1.0GHz - 3.0GHz		0.3		
	3.0GHz - 4.0GHz		0.3		
	4.0GHz - 6.0GHz		0.4		
	6.0GHz - 10.0GHz		0.6		
Return Loss	100MHz - 6.0GHz		-20		dB
	6.0GHz - 10.0GHz		-20		
Input IP3	Pin = 18dBm/tone,120MHz spacing, Frequency @1880MHz		57		dBm
Input 0.1dB Compression	2500MHz		33.5		dBm
Relative Phase	32dB		10		degree
Switching Time	50% CTRL to 90% RF		300		ns
	50% CTRL to 10% RF		300		
Logic Input High Threshold		1.2		VDD	V
Logic Input Low Threshold		-0.3		0.7	V
Logic Current	For each control pin		3		μA
DC Current (V_{DD})	5V VDD		55		μA

Pin Diagram

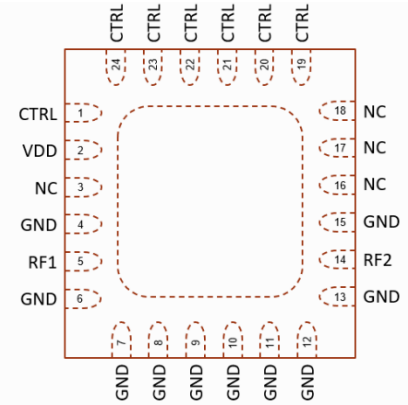


Figure 2

Pin Description

Table 4

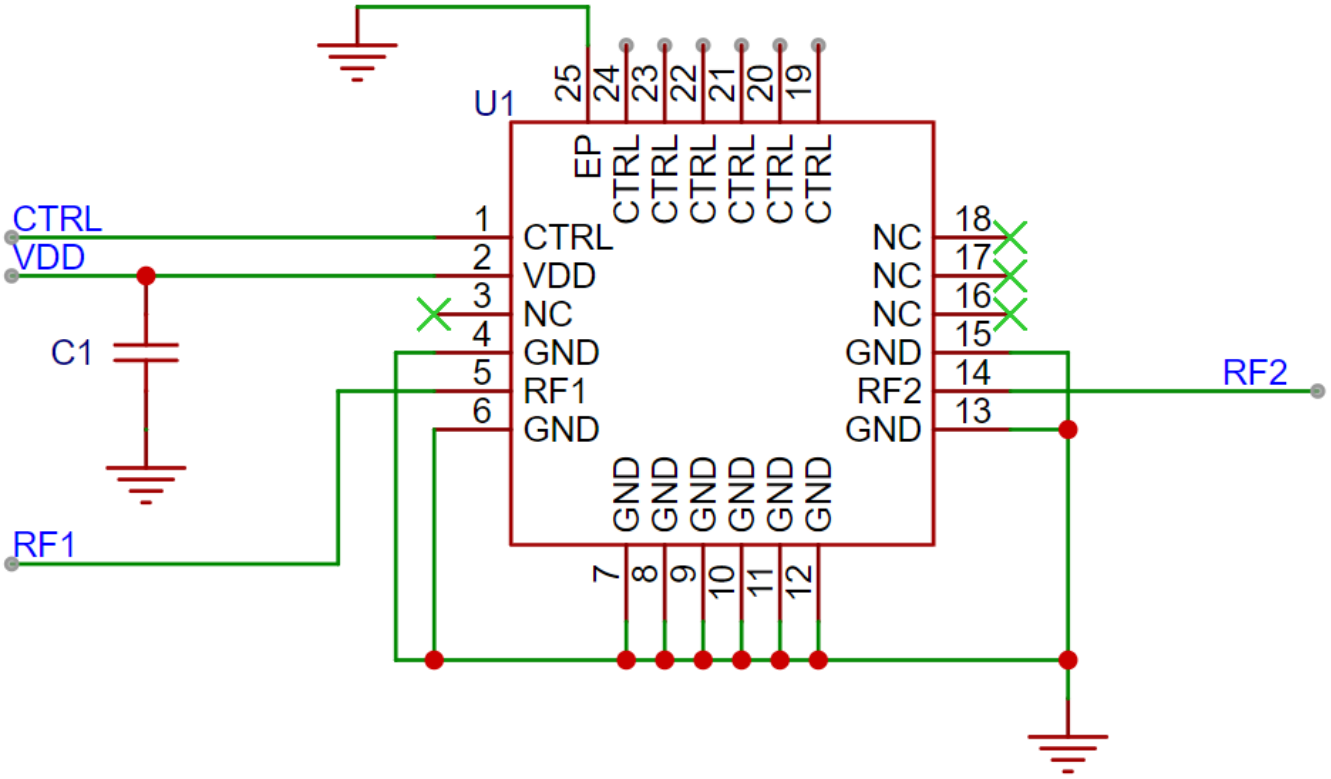
Pin No.	Label	Description
5	RF1	RF input or output
14	RF2	RF input or output
2	VDD	Power supply
1,19~24	CTRL	Control pin for attenuation (Internal pull high, attenuation mode. Any one of the CTRL pins can be selected.)
4,6,7~13,15	GND	Ground
3,16~18	NC	Both high and low connections are acceptable

Control Logic

Table 5

CTRL	Mode
High	31.75dB
Low	0dB

Application Information



Note: Any one of the CTRL pins can be selected.

Figure 3

Table 6

Reference Designator	Value	Description
C1	100nF	C0402

Typical Performance Characteristics

Figure 4 Insertion Loss

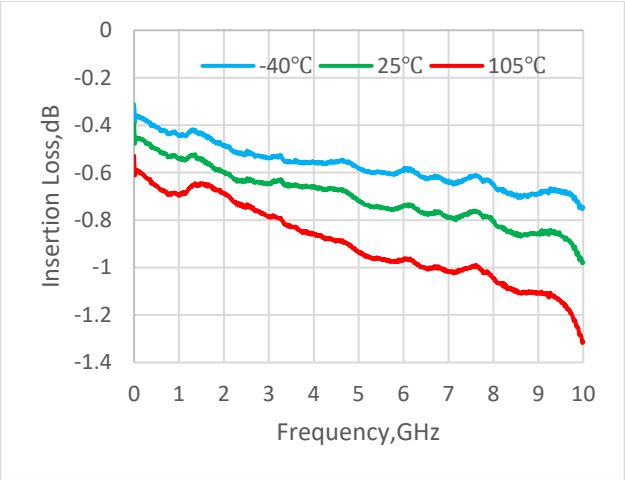


Figure 5 Relative Phase

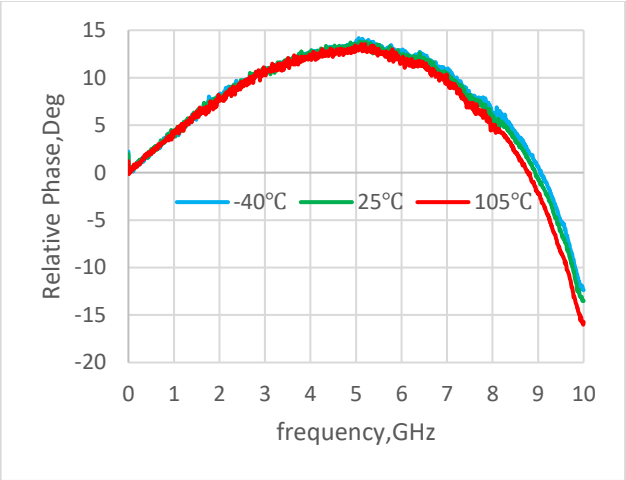


Figure 6 Return Loss RF1@CTRL=0V

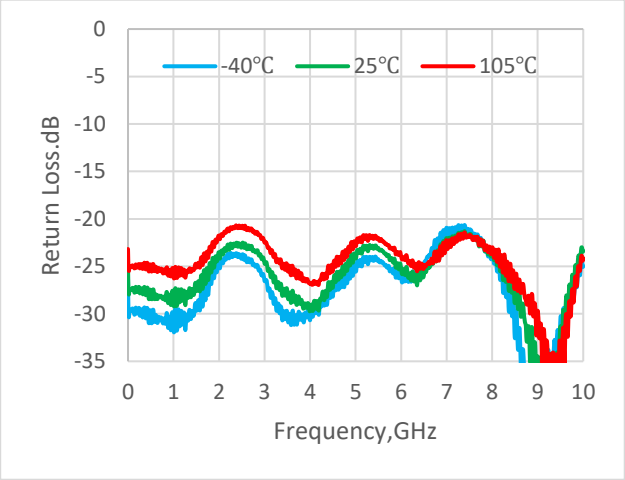


Figure 7 Return Loss RF1@CTRL=5V

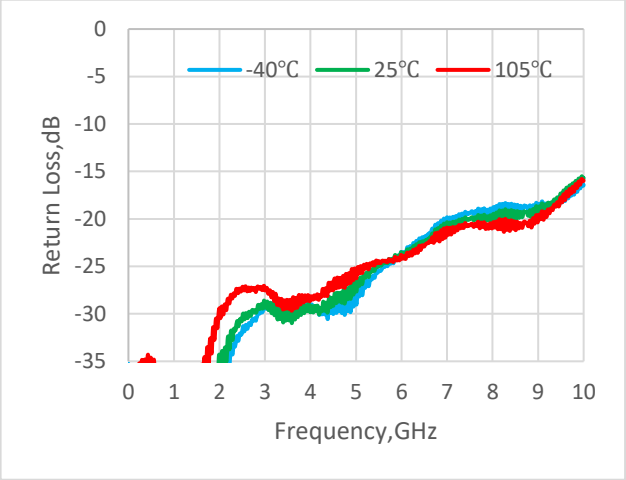


Figure 8 Return Loss RF2@CTRL=0V

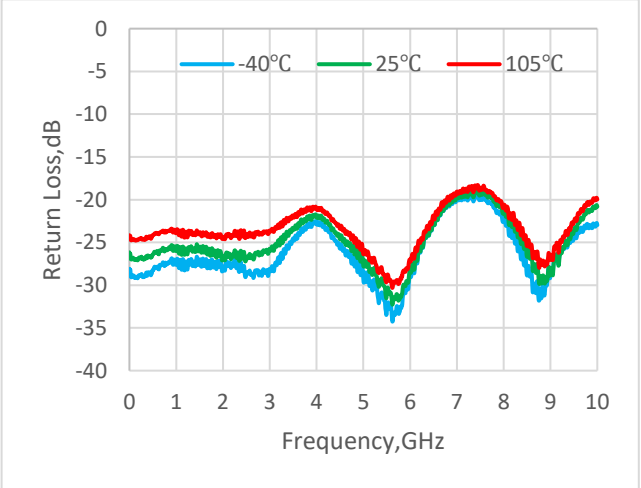
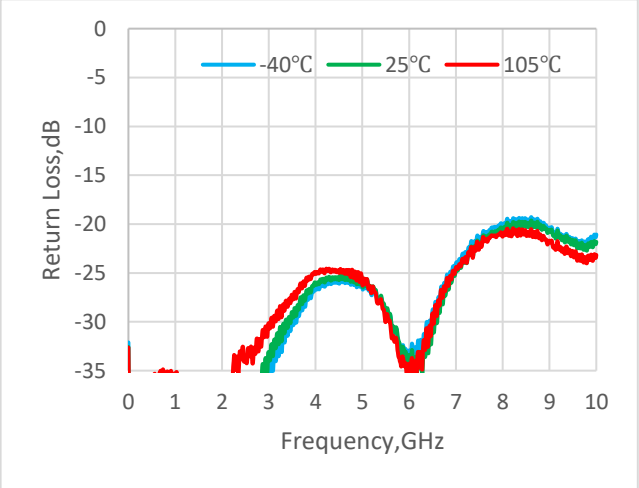


Figure 9 Return Loss RF2@CTRL=5V



Typical Performance Characteristics

Figure 10 Attenuation

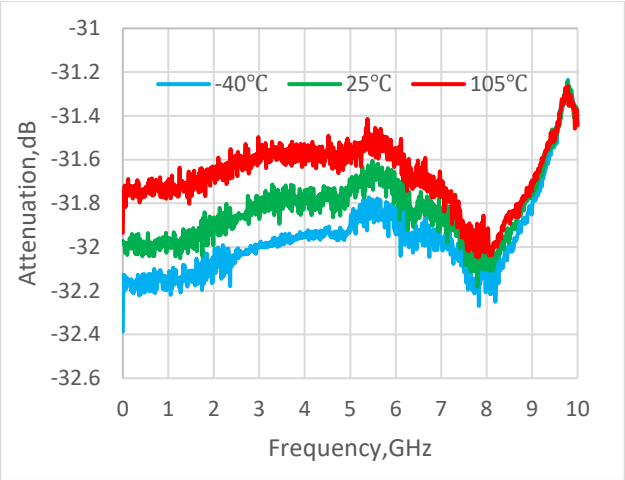
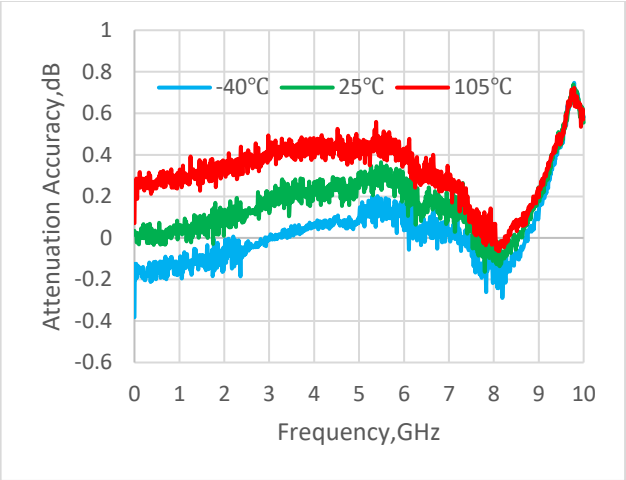


Figure 11 Attenuation Accuracy



Package Drawing

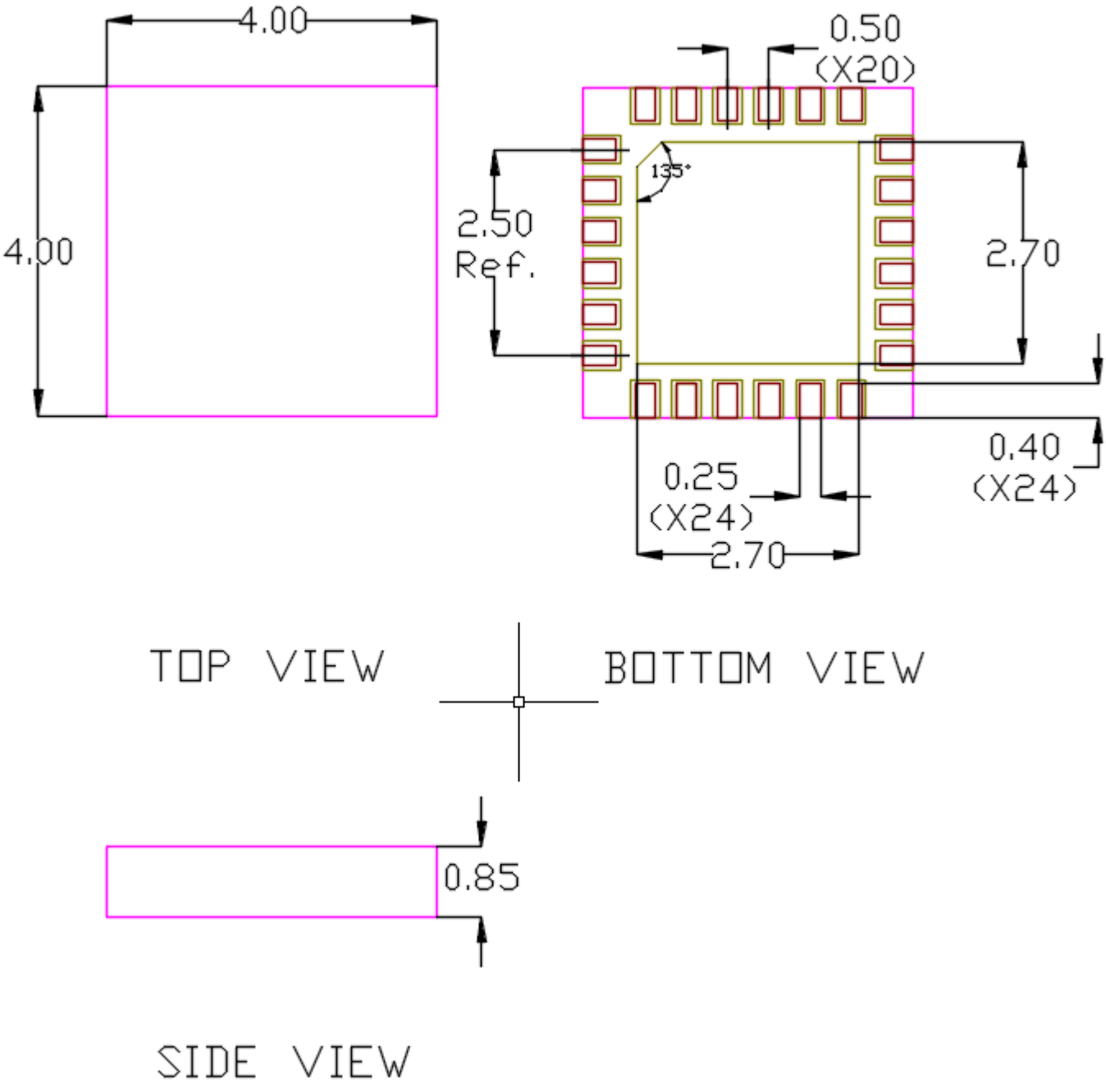


Figure 12

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Revision History

Table 9

Revision Number	Revision Date	Description	Modifications
0	2022/2/11	Draft	—
0.2	2022/7/20	Update table with newest data	
0.3	2023/2/16	Preliminary Specification	
0.4	2024/1/5	Preliminary Specification	
0.5	2024/5/10	Product Specification	
0.6	2025/6/10	Product Specification	
0.7	2025/11/27	Product Specification	Update Package

Document Categories

Advance Information

The product is in a formative or design stage. The datasheet contains design target specifications for product development. Specifications and features may change in any manner without notice.

Preliminary Specification

The datasheet contains preliminary data. Additional data may be added at a later date. RFone Technology reserves the right to change specifications at any time without notice in order to supply the best possible product.

Product Specification

The datasheet contains final data. In the event RFone Technology decides to change the specifications, RFone Technology will notify customers of the intended changes by issuing a CNF (Customer Notification Form).

Sales Contact

For additional information, contact Sales at sales@rfonetech.com.

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