

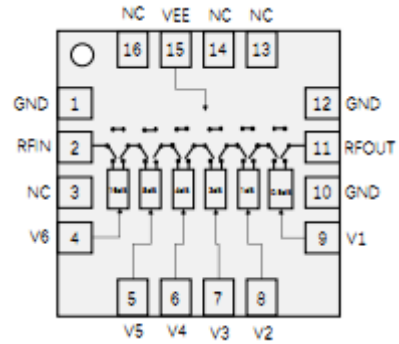
Performance Features

- Operating frequency band: DC ~ 15GHz
- Low insertion loss:
 - 2.5dB@DC~8.5GHz (typ)
 - 3.2dB@8.5GHz~15GHz (typ)
- Attenuation range: 0.5dB~31.5dB
- Package size: 16-pin QFN, 3mmx3mm

Typical Applications

- Mobile Infrastructure
- Satellite Communications
- Microwave
- Instrumentation

Functional Block Diagram



Overview

CWAT046SP3 is a six-digit CNC attenuator chip with a frequency range of DC to 15GHz and an insertion loss of 3.8dB typical. The attenuation range is from 0.5dB to 31.5dB with high attenuation accuracy, 0.5dB attenuation step and -5V bias voltage.

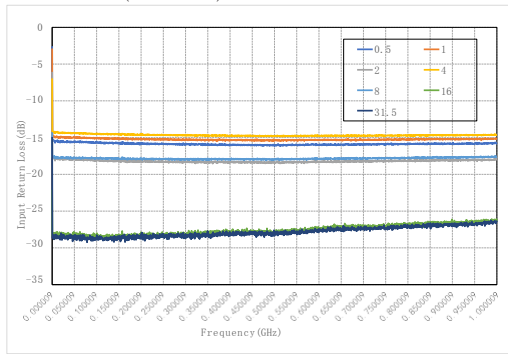
The CWAT046SP3 type attenuator is available in a QFN-16L, 3mm*3mm size package with NiPdAu pad plating.

Electrical performance table (T A = + 2 5 °C ,V_{EE}=-5V)

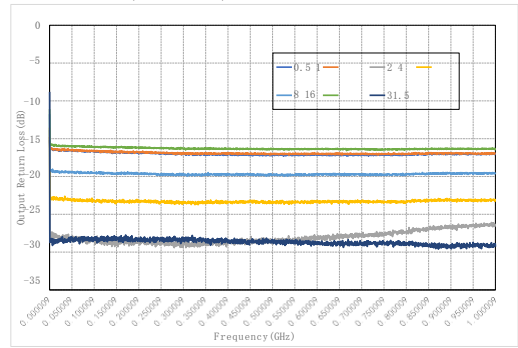
Parameter Name	Working conditions	Minimum value	Typical values	Maximum value	Unit
Frequency range		DC~15			GHz
insert loss	DC~8.5GHz		2.5		dB
	8.5GHz~15GHz		3.2		dB
Attenuation range		0.5		31.5	dB
Attenuation accuracy				2.3	dB
Input and output return loss			15		dB
Bias Voltage (V _{EE})		-5.2		-4.8	V
Bias current (I _{EE})			5		mA
0.1dB compression point input power (P _{0.1dB})			TBD		dBm
1dB compression point input power (P _{1dB})			22		dBm
Input third-order intercept points			TBD		dBm
Switching time (insertion loss state to maximum decay state)	10% to 90% RF output		50		ns
Switching time (maximum decay state to insertion loss state)	10% to 90% RF output		60		ns
Switching time	50% V _{ctl} to 10%/90% RF output		80		ns
Recommended input power			19		dBm

Test Curve

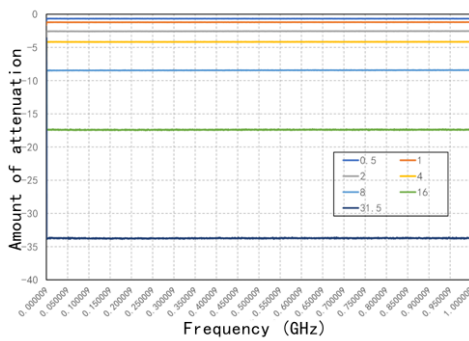
Input Return Loss VS Frequency
(@9KHz-1GHz)



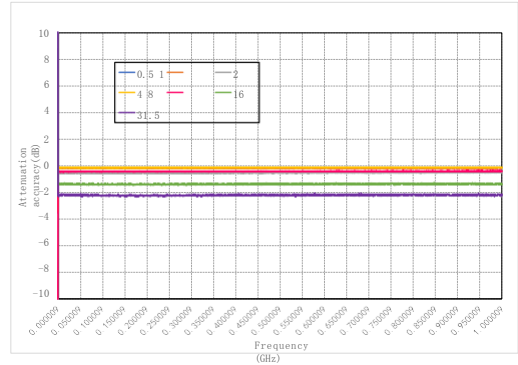
Output Return Loss VS Frequency
(@9KHz-1GHz)



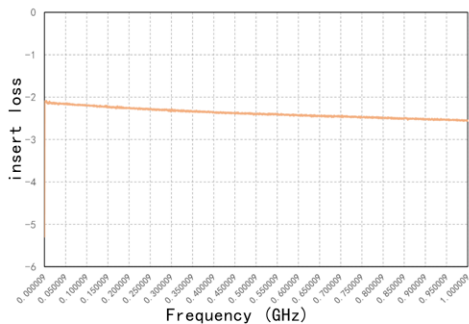
Attenuation VS Frequency
(@9KHz-1GHz)



Attenuation accuracy VS frequency (@9KHz-1GHz)



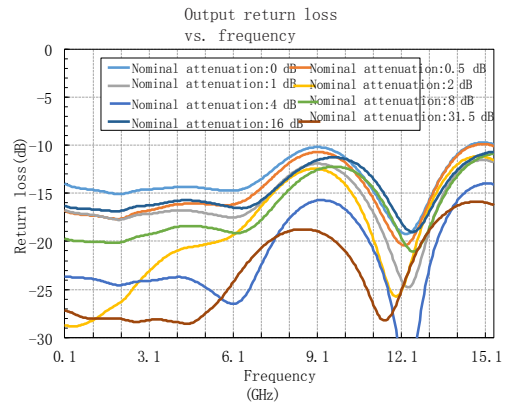
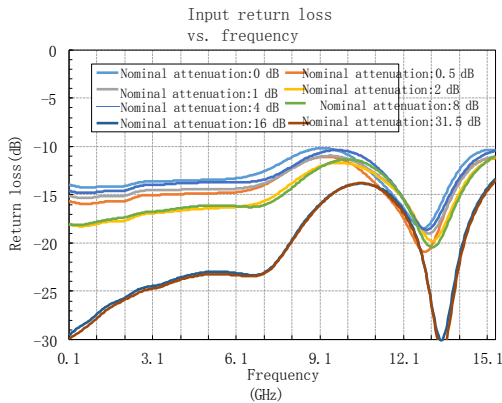
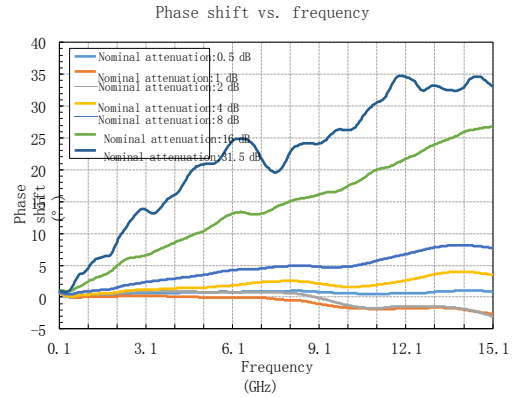
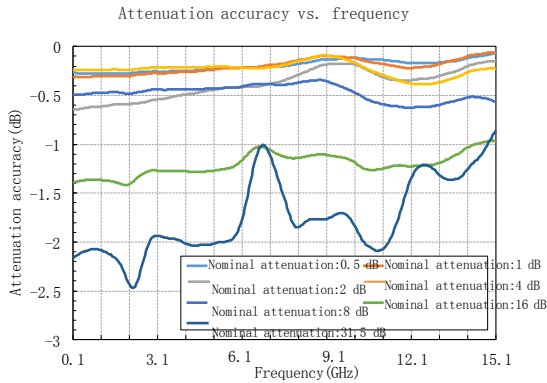
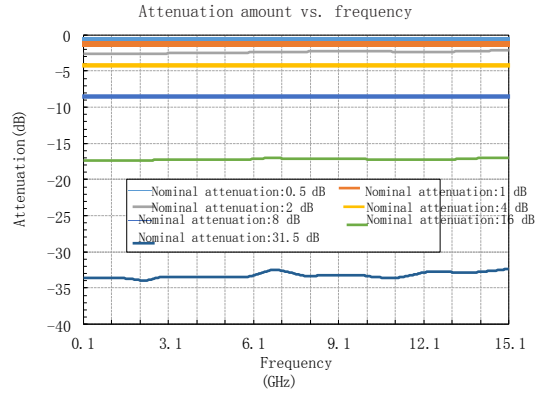
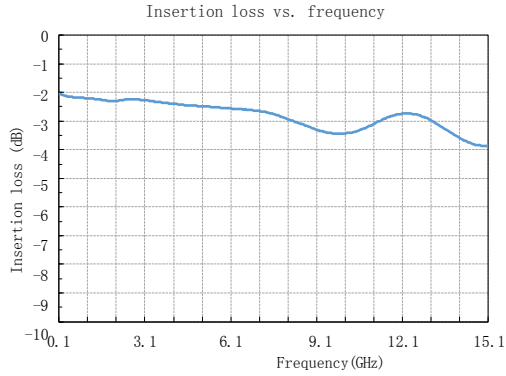
Insert loss VS frequency
(@9KHz-1GHz)



CWAT

Digital decelerator series

Test Curve



Working parameters

Bias voltage VEE	-4.8V to -5.2V
Control voltage VCTL	0V~0.8V (Low) 3V to 5V (High)
Operating temperature	-40℃~+85℃

Control ports: V6, V5, V4, V3,
V2, V1

Absolute maximum rating

RF input power	+25dBm
Bias voltage VEE	-6.5V
Control voltage VCTL	-VEE-0.5V
Storage temperature	-65℃~+150℃
ESD (HBM)	TBD

Package Information

Model	Packaging Materials	Solder plate plating	MSL level [1]	Package identification [2]	Environmental requirements
CWAT046SP3	Green resin compounds	NiPdAu	MSL 3	S046 XXXXX	RoHS compliant

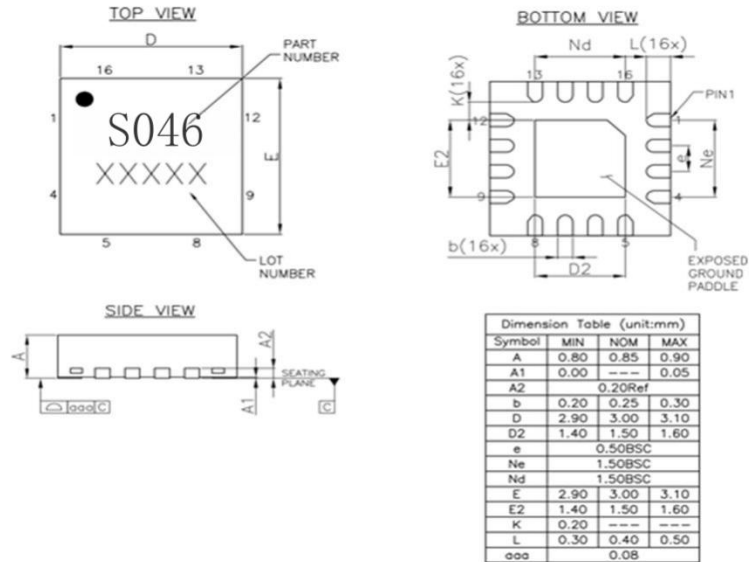
[1] Maximum reflow temperature 260° C

[2] XXXXX is the lot number

Truth Table

VEE	Control Port						Decay state
	0.5dB V1	1dB V2	2dB V3	4dB V4	8dB V5	16dB V6	
-5V							RF1 to RF2
	+5V	+5V	+5V	+5V	+5V	+5V	straightforward state
	0	+5V	+5V	+5V	+5V	+5V	0.5dB
	+5V	0	+5V	+5V	+5V	+5V	1dB
	+5V	+5V	0	+5V	+5V	+5V	2dB
	+5V	+5V	+5V	0	+5V	+5V	4dB
	+5V	+5V	+5V	+5V	0	+5V	8dB
	+5V	+5V	+5V	+5V	+5V	0	16dB
	0	0	0	0	0	0	31dB

Dimension



Description:

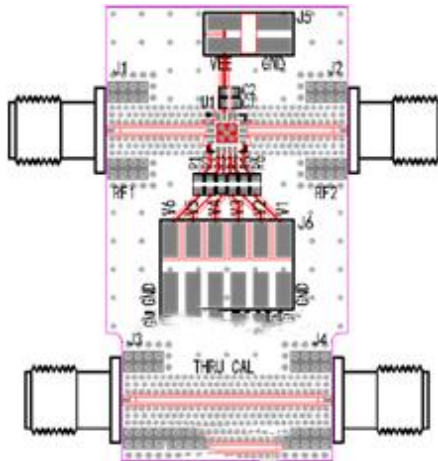
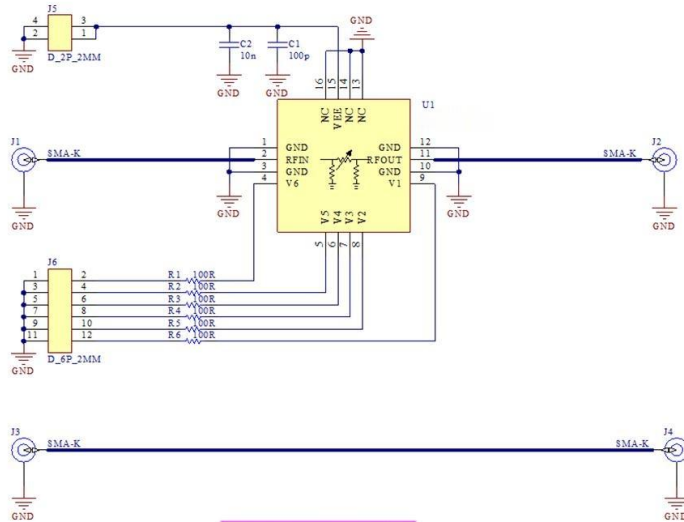
1. Unit: mm
2. Lead frame material: copper alloy
3. Package surface warpage: not more than 0.05mm
4. All ground pins please connect PCB RF ground

Pin Definition

Pin Number	Function Symbols	Function Description	Pin Number	Function Symbols	Function Description
1	GND	RF Ground	9	V1	Console 1
2	RFIN	RF side	10	GND	RF Ground
3	NC	Vacant	11	RFOUT	RF side
4	V6	Console 6	12	GND	RF Ground
5	V5	Console 5	13	NC	Vacant
6	V4	Console 4	14	NC	Vacant
7	V3	Console 3	15	VEE	Negative Power
8	V2	Console 2	16	NC	Vacant

All NC pins are recommended to be connected to RF ground when in use

Evaluation Boards



Designator	Description
C1	Multilayer ceramic capacitor 100pF 0402
C2	Multilayer Ceramic Capacitor 10nF 0402
J1, J2, J3, J4	SMA-K connector Nanjing Aowen D550B12E01-048
J5	D_2P_2MM DC pins
J6	D_6P_2MM DC pin
r1, r2, r3, r4, r5, r6	100Ω 0402
U1	CWAT046SP3

Circuit board material: Rogers 4350B

The circuit board of the device application should be designed according to the RF circuit design method, the signal line should be designed according to the 50 ohm impedance, and the ground pin of the package shell should be grounded nearby (similar to the figure), and there should be enough grounding holes to connect the top and bottom ground layers.

CWAT

Digital decelerator series