

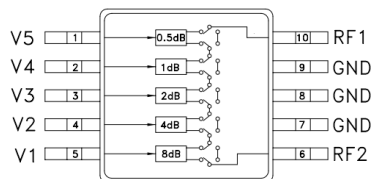
## Performance Features

- Operating frequency band: 0.5~3.8GHz
- Low insertion loss:
  - 0.96dB@0.5GHz~1.4GHz (typ)
  - 1.02dB@1.4GHz~2.3GHz (typ)
  - 1.08dB@2.3GHz~2.7GHz (typ)
  - 1.18dB@2.7GHz~3.8GHz (typ)
- Attenuation range: 15.5dB

## Typical Applications

- Mobile Infrastructure
- ISM, MMS, WLAN, WIMAX
- Microwave
- Test equipment and sensors

## Functional Block Diagram



## Overview

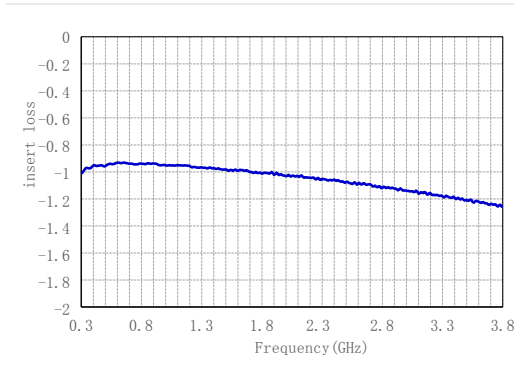
CWAT191P10 is a five-digit CNC attenuator chip with a frequency range of 0.5~3.8GHz and insertion loss below 1.2dB typical. The attenuation accuracy is high with 0.5dB attenuation step.

### Electrical performance table ( $T_A=+25^{\circ}\text{C}$ , $V_D=+3.6\text{V}$ , $V_{CTL}=0/V_D$ )

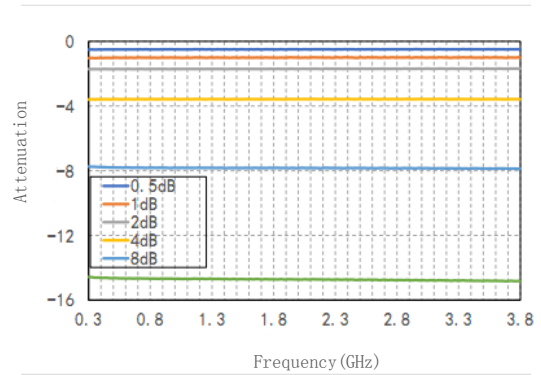
Parameter Name	Working conditions	Minimum value	Typical values	Maximum value	Unit
Frequency range		0.5~3.8			GHz
insert loss	0.5GHz~1.4GHz		0.96		dB
	1.4GHz~2.3GHz		1.02		dB
	2.3GHz~2.7GHz		1.08		dB
	2.7GHz~3.8GHz		1.18		dB
Attenuation range	0.5~3.8GHz	0.5		15.5	dB
Attenuation accuracy (with insertion loss as reference)	0.5GHz~1.4GHz	$\pm (0.30 + 5\% \text{ of Atten. Setting})$			dB
	1.4GHz~2.3GHz	$\pm (0.25 + 3\% \text{ of Atten. Setting}) \text{ Max}$			dB
	2.3GHz~2.7GHz	$\pm (0.25 + 3\% \text{ of Atten. Setting}) \text{ Max}$			dB
	2.7GHz~3.8GHz	$\pm (0.30 + 5\% \text{ of Atten. Setting})$			dB
Return loss (RF1&RF2, main state)	0.5~3.8GHz		20		dB
Bias Voltage ( $V_{DD}$ )			3.6		V
Bias Current ( $I_{DD}$ )			0.2		mA
Control current			0.35		mA
Input 1dB compression point power (P1dB)	0.5~3.8GHz	24			dBm
Rise and fall time (10/90% RF)	0.5~3.8GHz		25		ns
On time, off time (50% CTL to 10/90% RF)	0.5~3.8GHz		35		ns

#### Test Curve

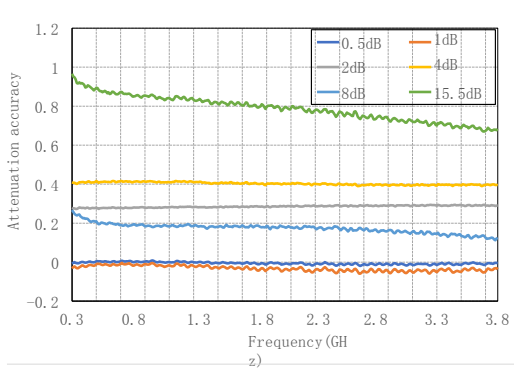
Insertion loss vs. frequency



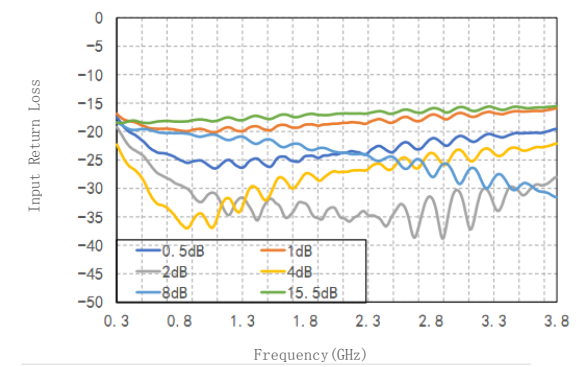
Attenuation amount vs. frequency



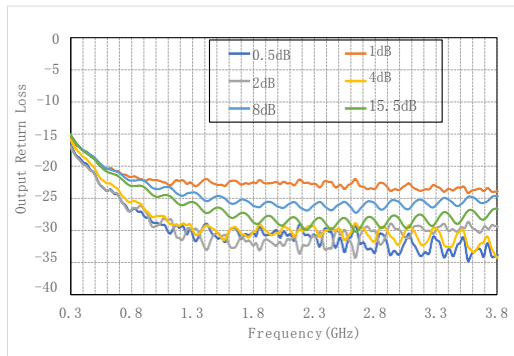
Attenuation accuracy vs. frequency



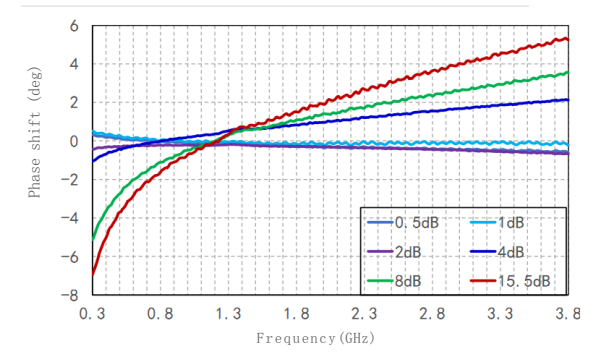
Input return loss vs. frequency



Output return loss vs. frequency



Phase Shift VS Frequency



CWAT

Digital decelerator series

### Working parameters

Bias voltage VDD	3.3V~5V
Control voltage VCTL	0V ~ 0.3V (Low) V <sub>DD</sub> ±0.3 (High)
Operating temperature	-40℃~+85℃

### Absolute maximum rating

RF input power	+27dBm
Bias voltage VDD	5.3V
Control voltage VCTL	5.3V
Storage temperature	-65℃~+150℃
ESD (HBM)	500V

### Package Information

Model	Packaging Materials	Solder plate plating	MSL Level	Package identification <sup>[2]</sup>	Environmental requirements
CWAT191P10	Green resin compounds	Sn	TBD	S191 XXXXX	RoHS compliant

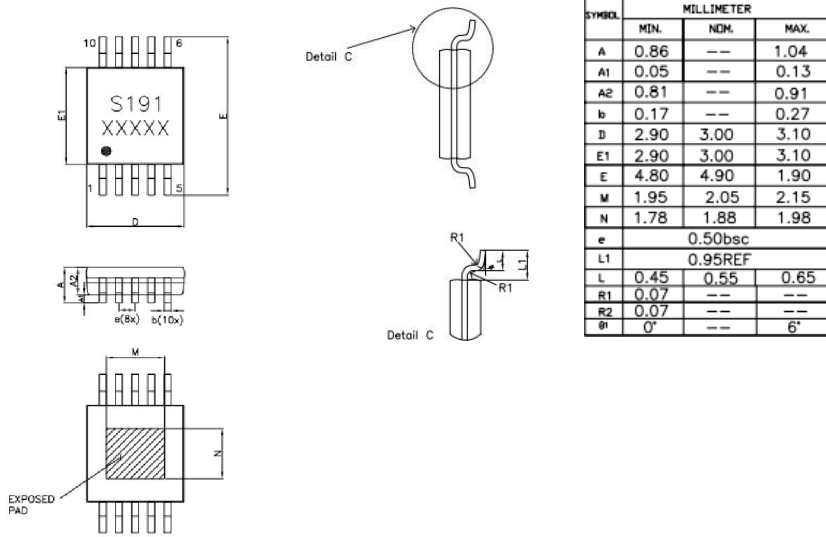
[1] Maximum reflow temperature 260° C

[2] XXXXX is the lot number

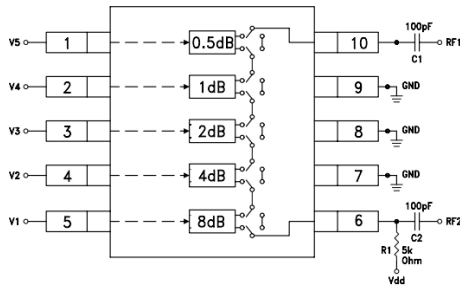
### Truth Table

VDD	Control Port					Decay state
+3.6V	V5	V4	V3	V2	V1	RF1 to RF2
	+3.6V	+3.6V	+3.6V	+3.6V	+3.6V	Straight through state
	+3.6V	+3.6V	+3.6V	+3.6V	0	0.5dB
	+3.6V	+3.6V	+3.6V	0	+3.6V	1dB
	+3.6V	+3.6V	0	+3.6V	+3.6V	2dB
	+3.6V	0	+3.6V	+3.6V	+3.6V	4dB
	0	+3.6V	+3.6V	+3.6V	+3.6V	8dB
	0	0	0	0	0	15.5dB

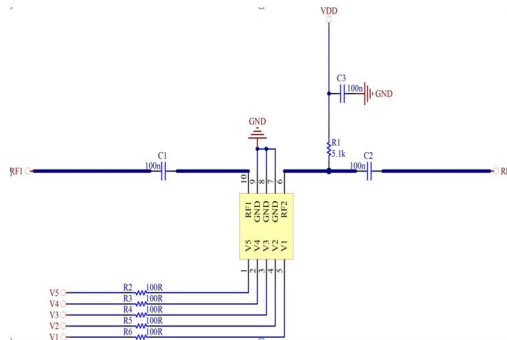
#### Package Outline Diagram



#### Pin Definition



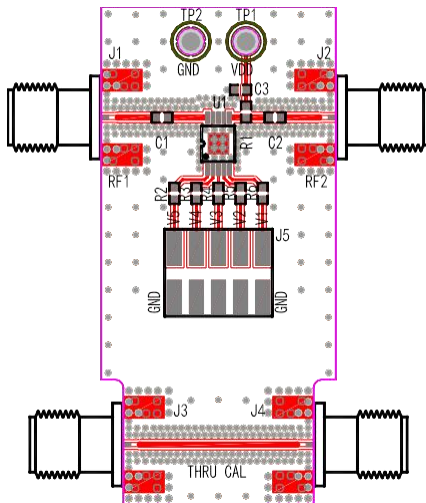
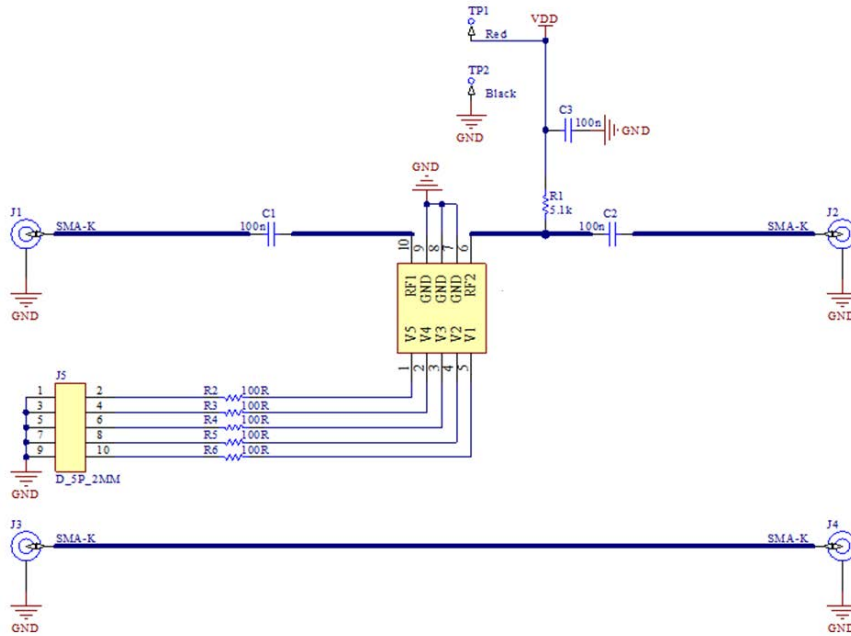
#### Typical Application Diagram



VDD and R1 comparison table

VDD (V)	3.3	3.6	5
R1 (kΩ)	2.7	5.1	16

#### Evaluation Board Circuit Diagram



Designator	Description
C1, C2, C3	Multilayer Ceramic Capacitor 0402 100nF
R1	Resistor 0402 5.1kΩ
R2, R3, R4, R5, R6	Resistor 0402 100Ω
J1, J2	SMA-K PCB connectors
J5	2.00mm DC pins
TP1, TP2	DC test terminal
U1	CWAT191P10
J1, J2 recommended to use Nanjing Aoven D550B12E01-023 type SMA-K connector	
NC indicates an unused port or the device is not soldered. The chip NC port can be connected externally to GND	