

AMT1309
8 - 12GHz Multi-Function Chip



Key Features :

- Frequency range : 8 – 12GHz
- Receiver gain : 4dB
- Transmitter gain : 33dB
- Receiving, Transmitting P-1 : 10/31dBm
- Phase shift bit : 6 bits
- Phase shift step : 5.625°
- Phase shift RMS : 5°, phase shift additive attenuation ±1dB
- Attenuation bit : 6 bits
- Attenuation step : 0.5dB
- Attenuation RMS : 0.5dB, attenuation additive phase shift ±5°
- Input/output standing wave : 1.5
- Operating voltage VDD : 5V
- Operation voltage VEE : -5V
- Control method : TTL
- Chip dimensions : 4mm x 3.5mm x 0.1mm
- Applications : wireless communication, transceiver module, radio telecommunication etc.

Description :

AMT1309 is a multi-function chip incorporating with amplifier, switch, 6-digit attenuator, 6-digit phase shifter, control driver etc. functions X band MMIC, it is designed by Gallium Arsenide (GaAs) pHEMT process. The chip uses +5V/-5V voltage operation, control level is TTL, with serial control for phase shift and attenuation. This chip is designed with ground through metal vias on the back technology. All chip products p are 100% RF tested.

Absolute Maximum Ratings (Ta = 25°C)

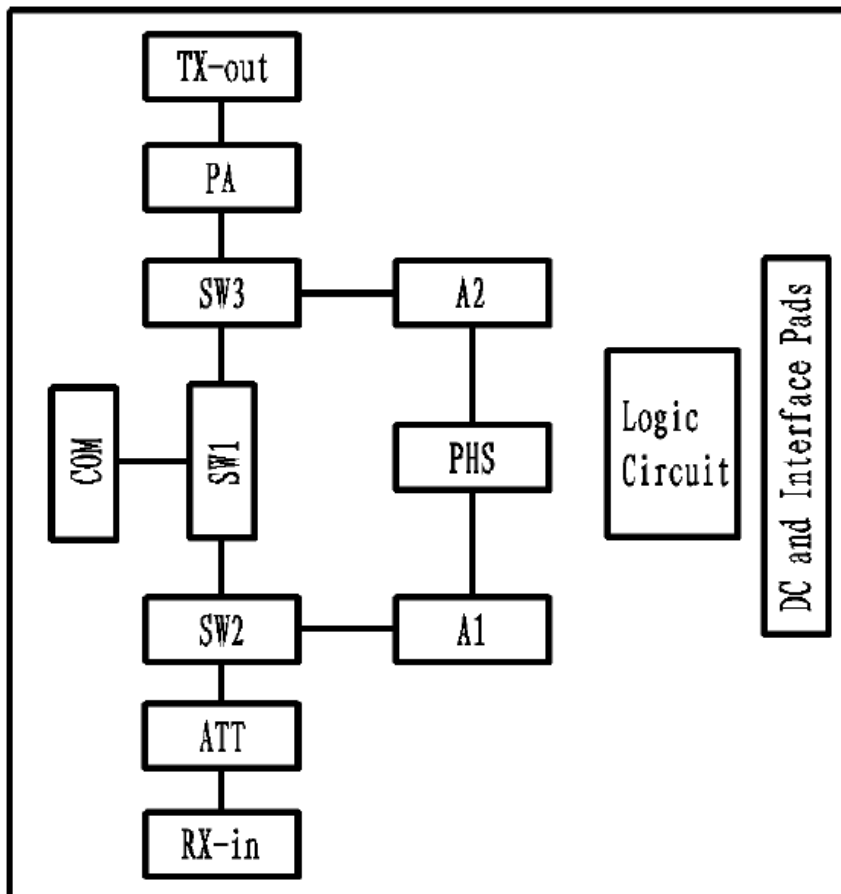
Symbol	Parameter	Value	Remark
V _{CLK} /V _{CLR} /V _{SEL} /V _{DARY} /V _{T/R} /V _{DATA}	Control voltage	+6V	
VDD	Operation voltage	+7V	
VEE	Operation voltage	-6V	
Pin	Max. Input Signal Power	+20dBm	
Tch	Operation Temperature	150°C	
Tm	Sintering Temperature	310°C	30s, N ₂ protection
Tstg	Storage Temperature	-65 ~ +150°C	

[1] Operation outside any of the Absolute Maximum Ratings may cause permanent device damage.

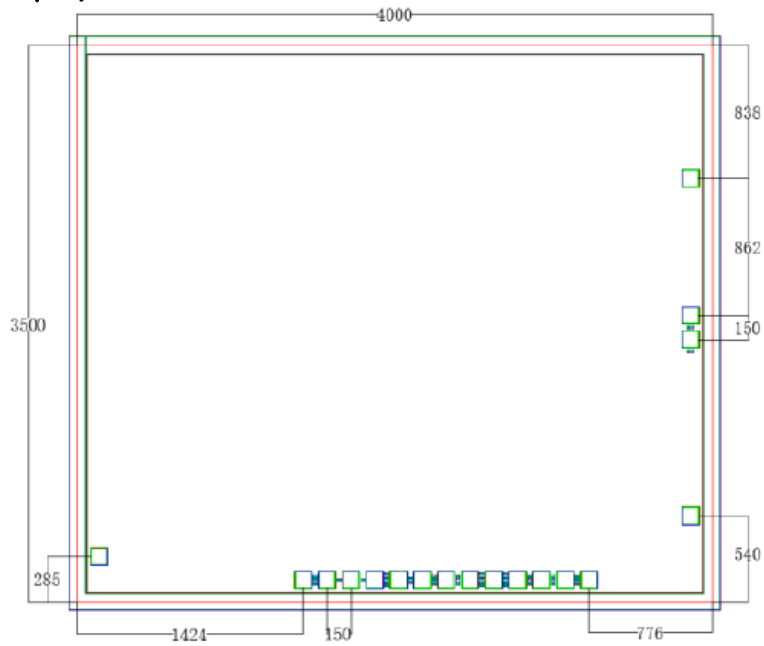
Electrical Characteristics (Ta = 25°C)

Symbol	Parameter	Value			Unit	Remark
		Min	Typical	Max		
F	Frequency	8 ~ 12			GHz	
G _R	Receiver gain		4	-	dB	
P _{-1R}	Receiver output at P-1 point		10	-	dBm	
G _T	Transmitter gain		33	-	dB	
P _{-1T}	Transmitter output at P-1 point		31	-	dBm	
PS	Phase shift range	5.625 – 354.375 (6 bits phase shift)			°	
Δat	Phase shift additive attenuation variation	-1	-	+1	dB	
RMSp	Phase shift RMS		5		°	
ATT	Attenuation range	0.5 – 31.5 (6 bits attenuation)			dB	
Δps	Attenuation additive phase shift variation	-5	-	+5	°	
RMS _A	Attenuation RMS	-	0.5		dB	
VSWR	Input Output Standing Wave	-	1.5			
I _D	Operation current	-	35	-	mA	
I _E	Operation current	-	10	-	mA	
I _T	Operation current	-	800	-	mA	

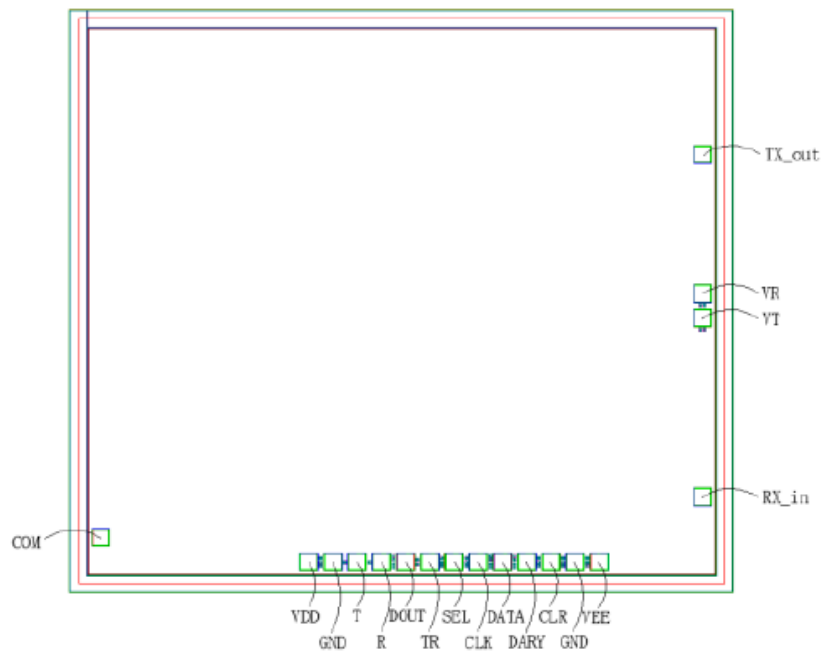
Internal Functional Block Diagram



Chip Dimensions (Unit : μm)



Chip Layout Diagram



Solder Pad Definition

Name	Dimension	Remark
RX_in/TX_out	100μm x 100μm	Receiver Input/Transmitter Output
COM	150μm x 100μm	Receiver Output/Transmitter Input
T/R/DOUT	100μm x 100μm	TTL, Output : Receive Standby/Transmit Standby/Serial Control Word
VEE/VDD	100μm x 100μm	Power Supply Pad : -5V/+5V
SEL/CLK/DATA/DARY/TR	100μm x 100μm	TTL, Control Signal Input, rate 40M
CLR	100μm x 100μm	TTL, Reset Signal Input
GND	100μm x 100μm	Grand Pad
VR/VT	100μm x 100μm	DCFL, TR inversion/in-phase output

Control Explanation

Signal Function Definition

No.	Signal	Level	Function		Remark	
			"0"	"1"		
1	TR	Input (TTL Level)	Receive	Transmit	Transmit, receive control signal	
2	SEL	Input (TTL Level)	Load data	Hold data	Chip select signal, low active	
3	CLK	Input (TTL Level)	-	-	Clock signal, falling edge active	
4	DARY	Input (TTL Level)	-	-	Data ready signal, rising edge active	
5	DATA	Bit 18	Input (TTL Level)	-	Operate	Receive standby signal : operate means normal receiving status
		Bit 0 ~ Bit 17	Input (TTL Level)	Off	On	Phase shift attenuation control signal ON means phase shifter and attenuat enable
			Input (TTL Level)	-	Operate	
		Bit 19	Input (TTL Level)	-	Operate	Transmit standby signal : operate means normal transmitting status
6	CLR	Input (TTL Level)	-	-	Reset signal : 100ms low level after power on, reset activates.	
7	R	Output (TTL Level)	-	-	Receive standby signal	
8	T	Output (TTL Level)	-	-	Transmit standby signal	
9	DOUT	Output (TTL Level)	-	-	Output DIN control signal : when there is new serial control data sending to the shift register, the original control data in the register will be output in sequence from DOUT.	

Serial Control Word Definition

BIT	Description
BIT0	Transmit phase shift
BIT1	
BIT2	
BIT3	
BIT4	
BIT5	
BIT6	Receive phase shift
BIT7	
BIT8	
BIT9	
BIT10	
BIT11	
BIT12	Receive attenuation
BIT13	
BIT14	
BIT15	
BIT16	
BIT17	
BIT18	Receive enable
BIT19	Transmit enable

Timing

