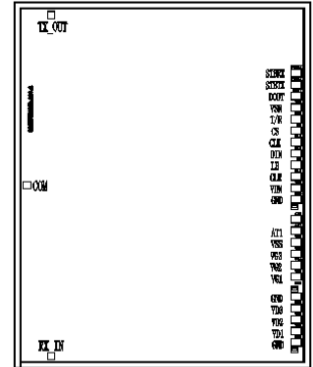


AMT1308(L1)
8 - 12GHz Multi-Function Chip



Key Features :

- Frequency range : 8 – 12GHz
- Receiver gain : 2.5dB
- Transmitter gain : 2.5dB
- Receiving, Transmitting P-1 : 6.5/6.5dBm
- Phase shift bit : 6 bits
- Phase shift step : 5.625°
- Phase shift RMS : 2.5°, phase shift additive attenuation ±1.5dB
- Attenuation bit : 6 bits
- Attenuation step : 0.5dB
- Attenuation RMS : 0.5dB, attenuation additive phase shift ±15°
- Input/output standing wave : 1.5
- Operating voltage VD1/VD2/VD3/VDN : 3.3V
- Operation voltage VSN/VSS : -2.9V
- Control method : TTL, serial control
- Applications : wireless communication, transceiver module, radio telecommunication etc.

Description :

AMT1308(L1) is a multi-function chip incorporating with amplifier, switch, 6-digit attenuator, 6-digit phase shifter, control driver etc. X band MMIC, it is designed by Gallium Arsenide (GaAs) pHEMT process. The chip uses dual voltage operation, control level is TTL, with serial control. 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)

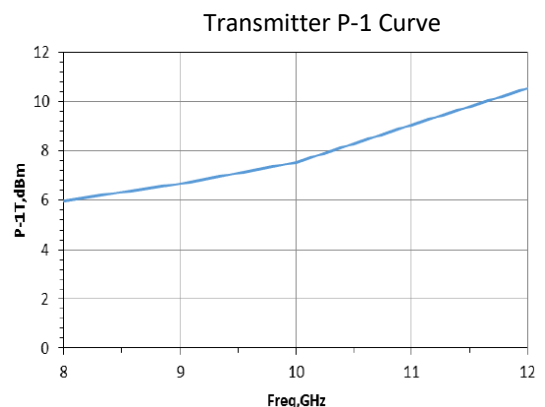
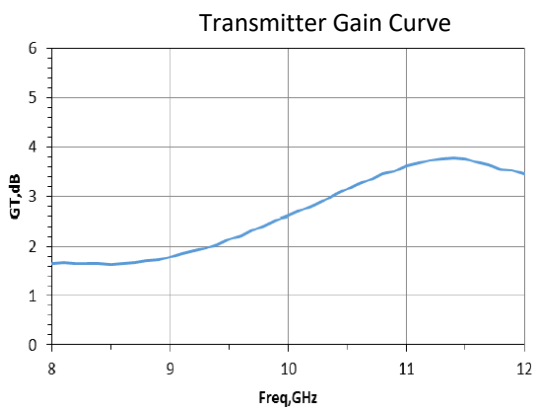
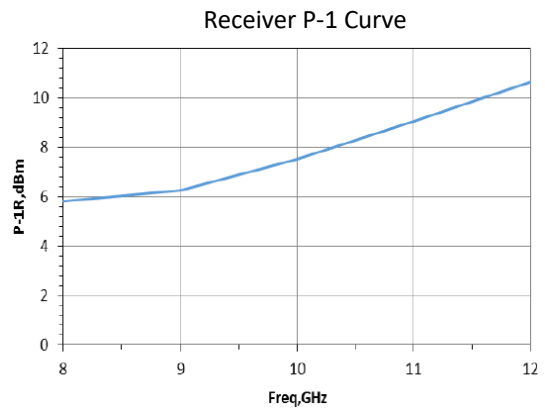
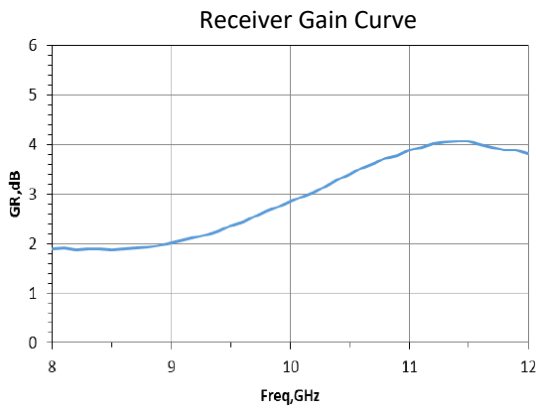
Symbol	Parameter	Value	Remark
V _{CLK} /V _{CLR} /V _{CS} /V _{LE} /V _{T/R} /V _{DIN}	Control voltage	+7V	
VD1/VD2/VD3/VDN	Operation voltage	+7V	
VSN/VSS	Operation voltage	-6V	
Pin	Max. Input Signal Power	+20dBm	
Tch	Operation Temperature	150°C	
Tm	Sintering Temperature	310°C	30s, N ₂ protection
Tstg	Storage Temperature	-65 ~ +150°C	

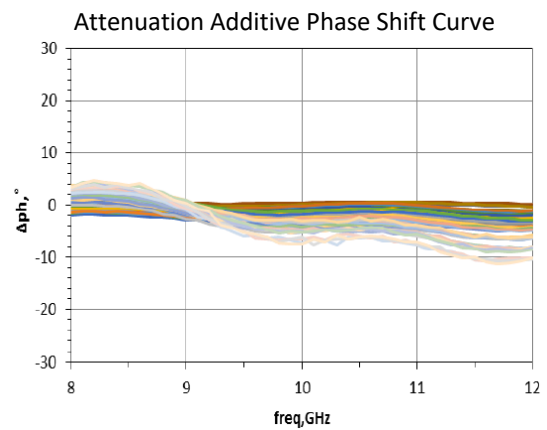
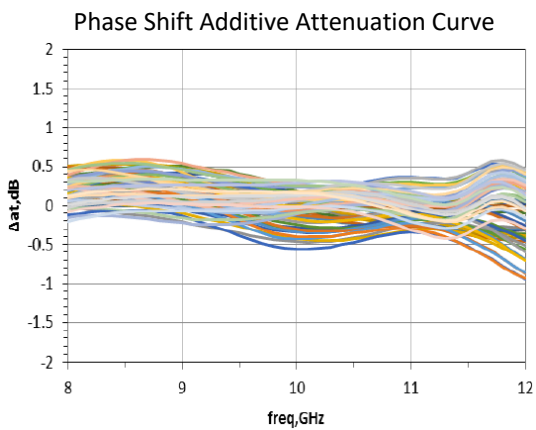
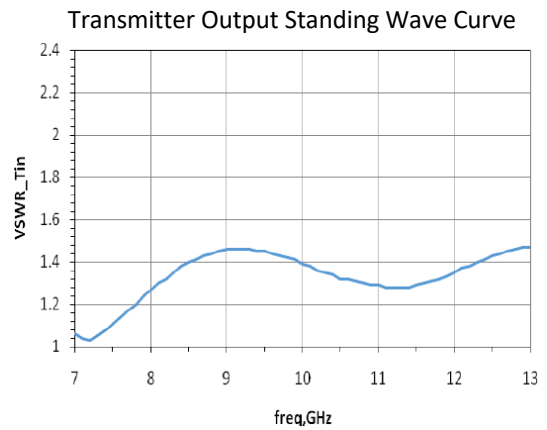
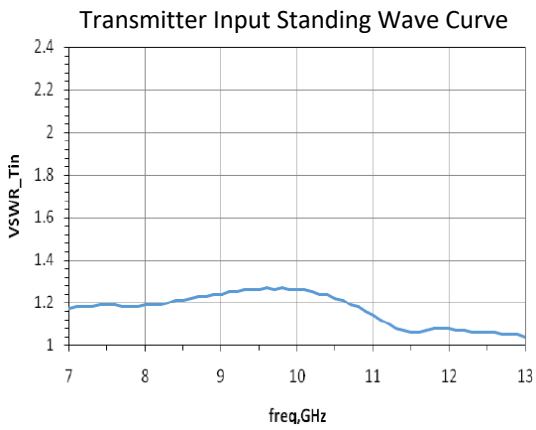
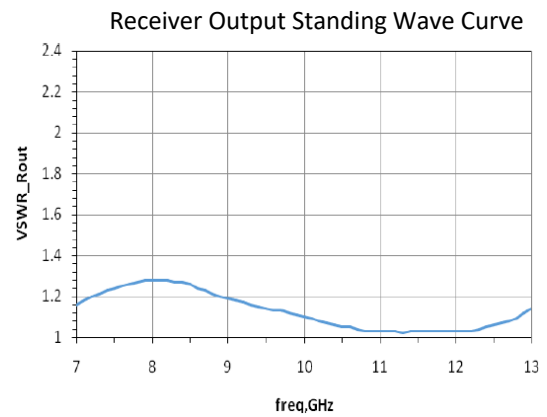
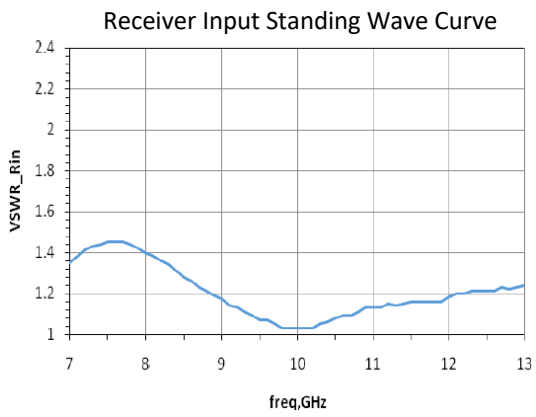
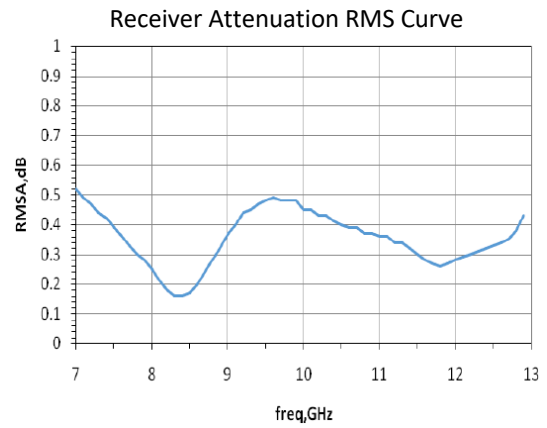
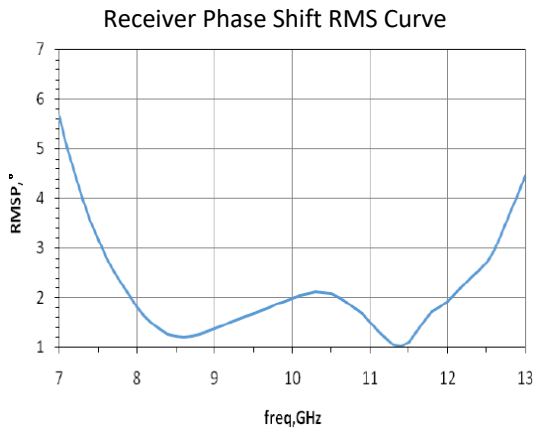
[1] Operation outside any of the Absolute Maximum Ratings may cause permanent device damage.

Electrical Characteristics (Ta = 25°C)

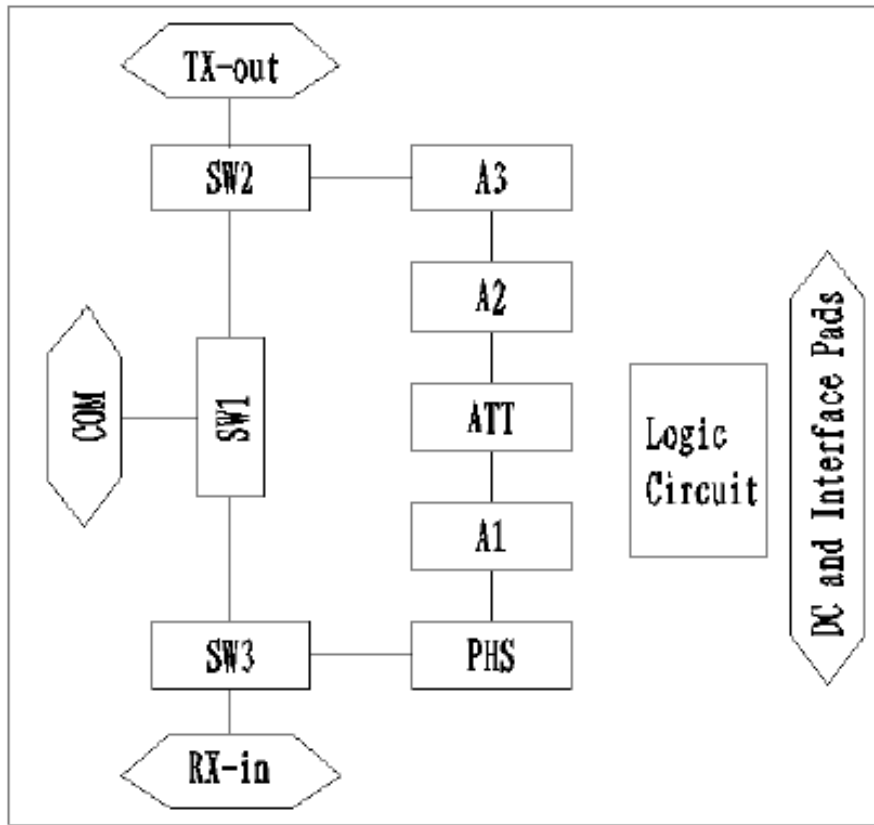
Symbol	Parameter	Value			Unit	Remark
		Min	Typical	Max		
F	Frequency	8 ~ 12			GHz	
G _R	Receiver gain	1.5	2.5	-	dB	
P _{-1R}	Receiver output at P-1 point	5	6.5	-	dBm	
NF	Noise figure	-	16	17	dB	
G _T	Transmitter gain	1.5	2.5	-	dB	
P _{-1T}	Transmitter output at P-1 point	5	6.5	-	dBm	
PS	Phase shift range	5.625 – 354.375 (6 bits phase shift)			°	
Δat	Phase shift additive attenuation variation	-1.5	-	+1.5	dB	
RMS _p	Phase shift RMS	-	2.5	4	°	
ATT	Attenuation range	0.5 – 31.5 (6 bits attenuation)			dB	
Δph	Attenuation additive phase shift variation	-15	-	+15	°	
RMS _A	Attenuation RMS	-	0.5	0.8	dB	
VSWR	Input Output Standing Wave	-	1.5	1.8		
I _d	Drain current I _d	30	40	-	mA	
I _s	Negative current I _s	-	23	25	mA	

Typical Performance

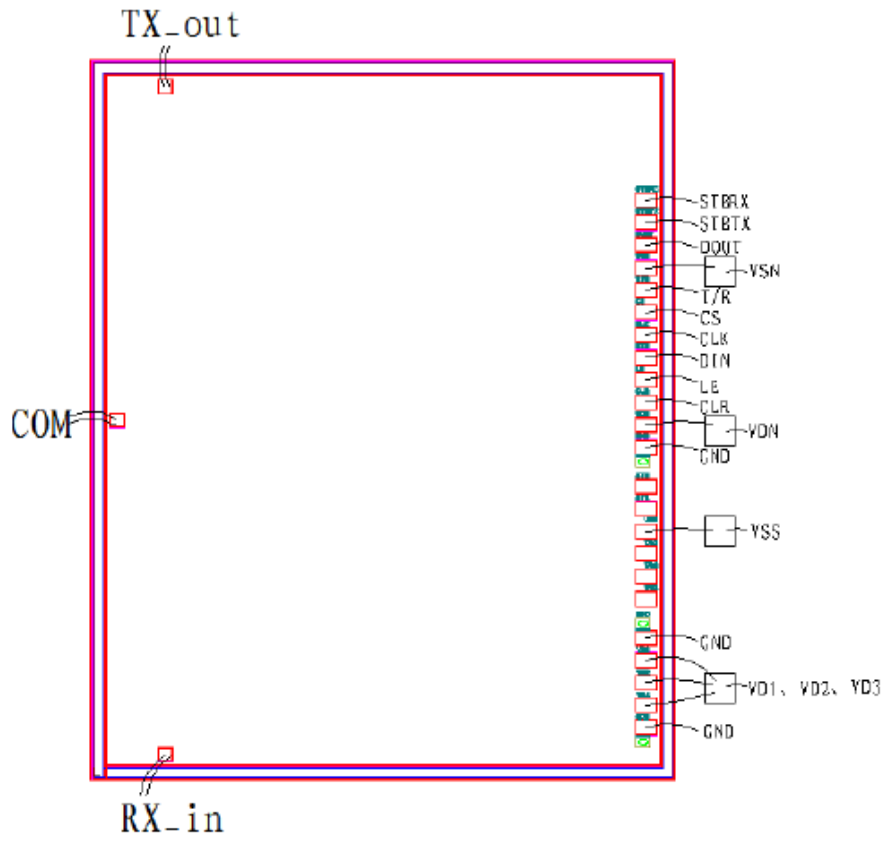




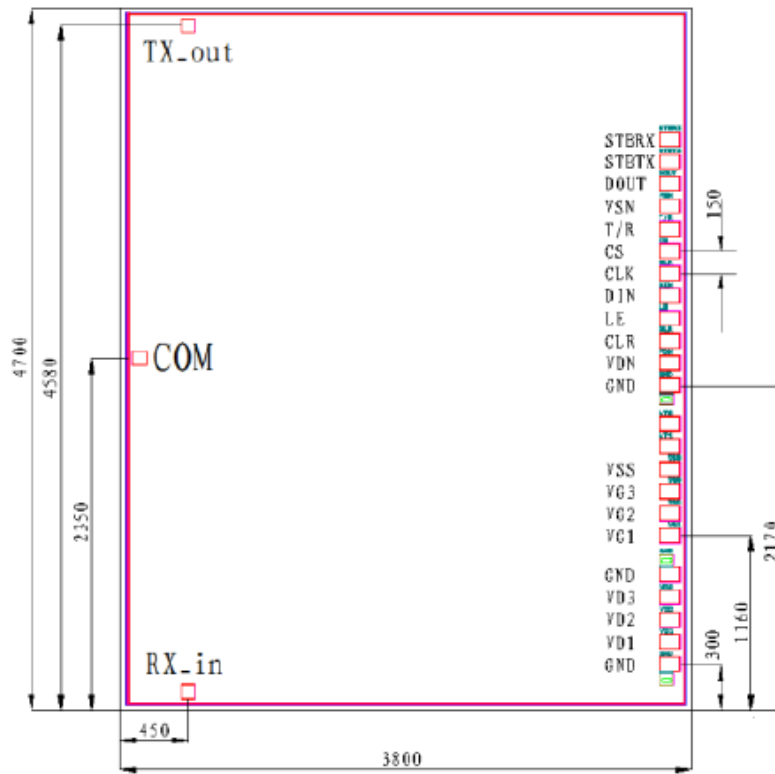
Internal Functional Block Diagram



Chip Dimensions (Unit : μm)



Chip Layout Diagram



Solder Pad Definition

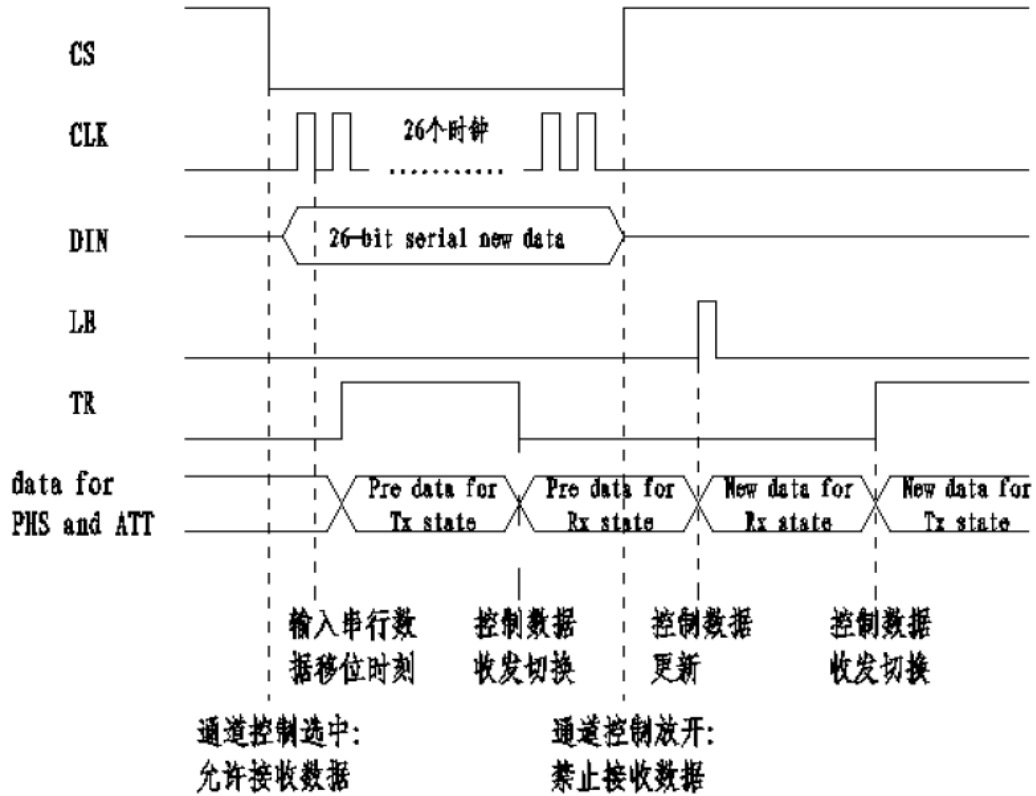
Name	Dimension	Remark
RX_in/TX_out	100μm x 100μm	Receiver Input/Transmitter Output
COM	100μm x 100μm	Receiver Output/Transmitter Input
STBRX/STBTX/DOUT	100μm x 140μm	TTL, Output : Receive Standby/Transmit Standby/Serial Control Data
VSN/VSS/VDN/VD123	100μm x 140μm	Power Supply Pad : -2.9V/-2.9V/+3.3V/+3.3V
CS/CLK/DIN/LE/TR	100μm x 140μm	TTL, Control Signal Input, rate 40MHz
CLR	100μm x 140μm	TTL, Reset Signal Input
VG1/VG2/VG3	100μm x 140μm	Can be floating. Gate adjust pad, -0.4V ~ -1V
GND	100μm x 140μm	Grand Pad

Control Explanation

Signal Function Definition

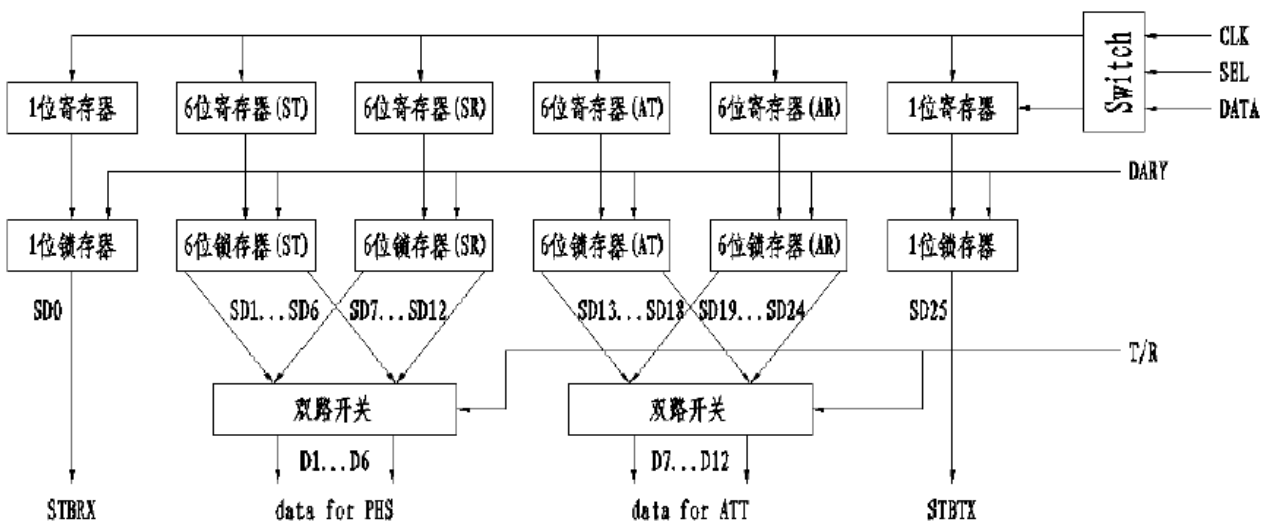
No.	Signal	Level	Function		Remark	
			"0"	"1"		
1	TR	Input (TTL Level)	Receive	Transmit	Transmit, receive control signal	
2	CS	Input (TTL Level)	Load data	Hold data	Chip select signal, low active	
3	CLK	Input (TTL Level)	-	-	Clock signal, falling edge active	
4	LE	Input (TTL Level)	-	-	Data ready signal, rising edge active	
5	DIN	Bit0	Input (TTL Level)	Operate	Standby	Receive standby signal : operate means normal receiving status
		Bit1 ~ Bit24	Input (TTL Level)	Off	On	Phase attenuation control signal : ON means phase shifter and attenuator enable
		Bit25	Input (TTL Level)	Operate	Standby	Transmit standby signal : operate means normal transmitting status
6	CLR	Input (TTL Level)	-	-	Reset signal : 100ms low level after power on, reset activates.	
7	STBRX	Output (TTL Level)	-	-	Receive standby signal	
8	STBTX	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.	

Timing



通道控制、控制数据更新、控制数据收发切换三者之间没有时序关联

Serial Parallel Conversion Illustration



DIN Serial Control Word Definition

BIT	Description	
BIT0	Receive standby	STBRX output
BIT1	5.625 °	Transmit phase shift
BIT2	11.25 °	
BIT3	22.5 °	
BIT4	45 °	
BIT5	90 °	
BIT6	180 °	
BIT7	5.625 °	Receive phase shift
BIT8	11.25 °	
BIT9	22.5 °	
BIT10	45 °	
BIT11	90 °	
BIT12	180 °	
BIT13	0.5 dB	Transmit attenuation
BIT14	1 dB	
BIT15	2 dB	
BIT16	4 dB	
BIT17	8 dB	
BIT18	16 dB	
BIT19	0.5 dB	Receive attenuation
BIT20	1 dB	
BIT21	2 dB	
BIT22	4 dB	
BIT23	8 dB	
BIT24	16 dB	
BIT25	Transmit standby	STBTX output

Switch Truth Table

Bit 0	Bit 25	TR	COM-TX_out	COM-RX_in	COM_Load	Internal Amplifier Operation Status
0	0	0	Off	On	Off	Operating
0	0	1	On	Off	Off	Operating
0	1	0	Off	On	Off	Operating
0	1	1	Off	Off	Off	Operating
1	0	0	Off	Off	Off	Operating
1	0	1	On	Off	Off	Operating
1	1	0/1	Off	Off	On	Standby

Please see appendix A for details.