

28 - 38GHz Amplitude and Phase Multi-Function Chip



Key Features :

- Frequency range : 28 – 38GHz
- Channel type : 4 channel
- Insertion loss : 20.5dB
- Phase shift bit : 6 bits
- Phase shift step : 5.625°
- Phase shift RMS : 3°, additive attenuation ±1.5dB
- Attenuation bit : 5 bits
- Attenuation step : 0.5dB
- Attenuation RMS : 0.5dB, additive phase shift ±5°
- COM port standing wave : 1.5
- Each channel port standing wave : 1.25
- Operation voltage : +3V, -3V
- Control method : TTL, serial control
- Chip dimensions : 6.25mm x 2.5mm x 0.1mm
- Applications : wireless communication, transceiver module, radio telecommunication etc.

Description :

AMT1325 is a 4-channel amplitude and phase multi-function GaAs (MMIC) chip, it incorporates with power separator, 5-bit control attenuator, 6-bit control phase shifter, control driver etc. functions, covers 28 - 38GHz frequency range. It is designed by Gallium Arsenide (GaAs) process. The chip control signal is TTL, and 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)

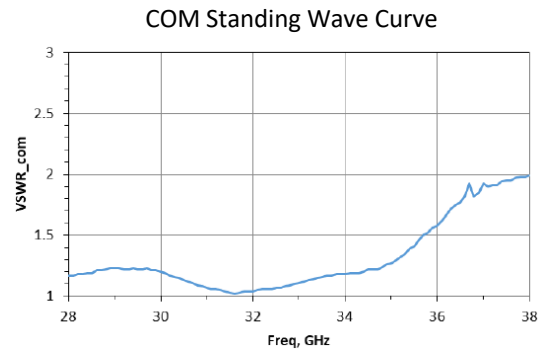
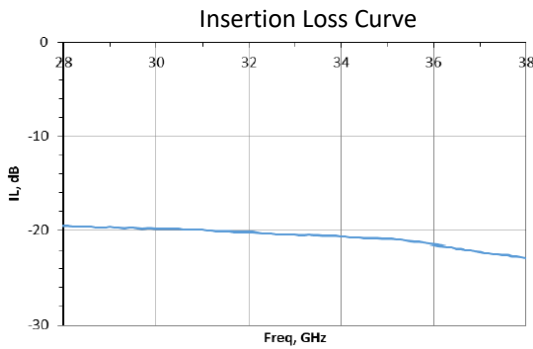
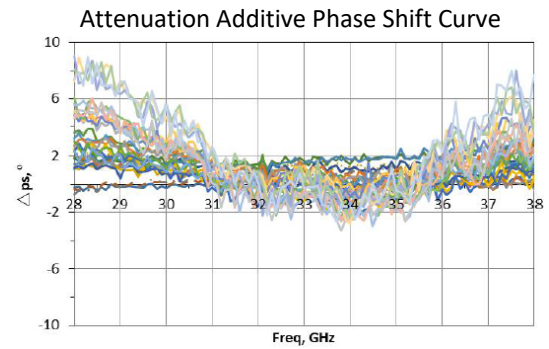
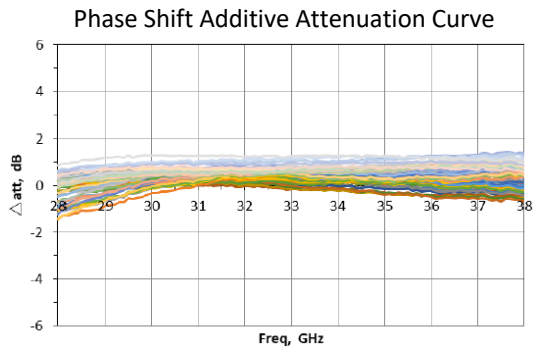
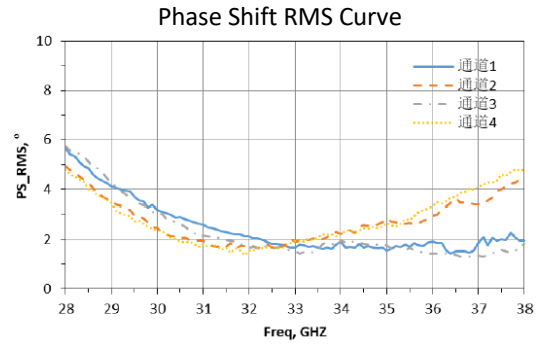
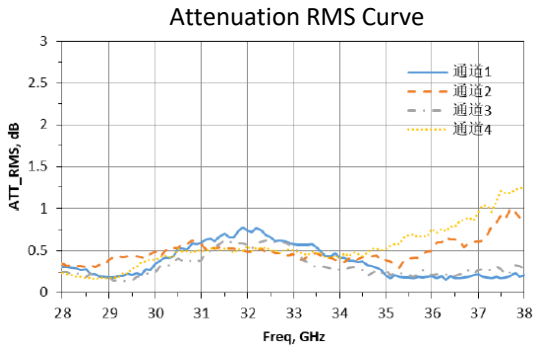
Symbol	Parameter	Value	Remark
VSN	Operation voltage	-4V	
Pin	Max. Input Signal Power	+15dBm	
Tch	Operation Temperature	150°C	
Tm	Sintering Temperature	310°C	30s, N ₂ protection
Tstg	Storage Temperature	-65 ~ +150°C	

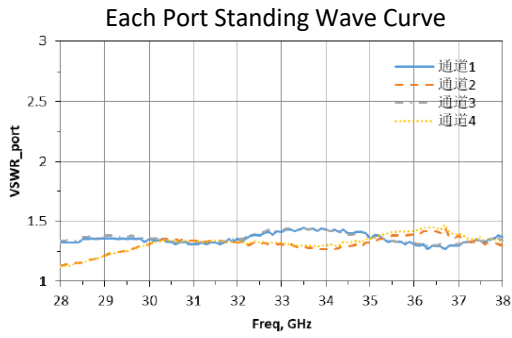
[1] Operation outside any of the Absolute Maximum Ratings may cause permanent device damage.

Electrical Characteristics (Ta = 25°C)

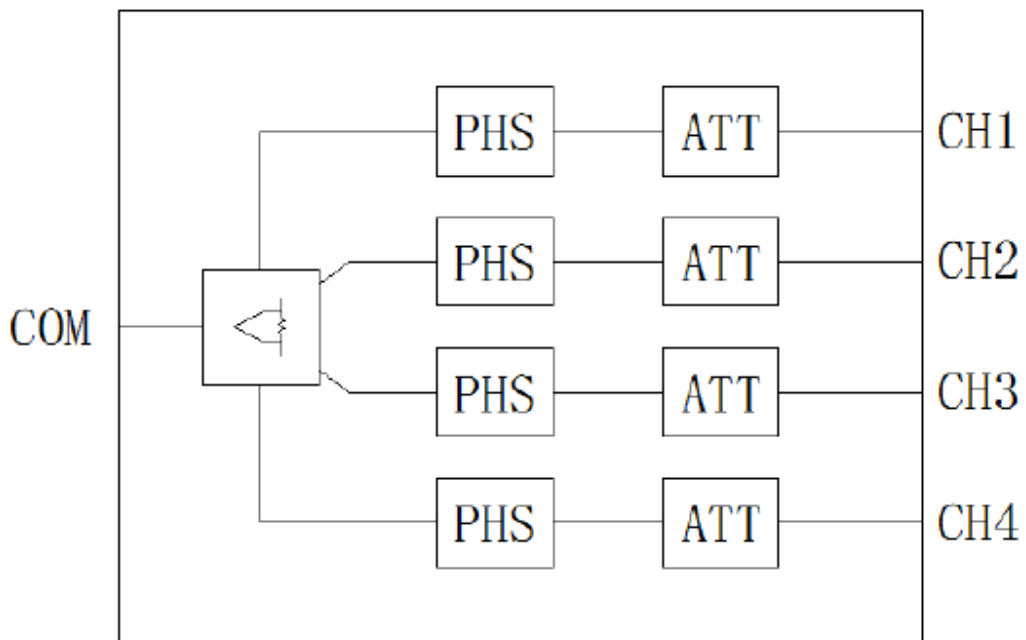
Symbol	Parameter	Value			Unit	Remark
		Min	Typical	Max		
F	Frequency	28 ~ 38			GHz	
IL	Insertion loss	-	20.5	-	dB	
PS	Phase shift range	5.625 – 354.375 (6 bits phase shift)			°	
Δatt	Phase shift additive attenuation variation	-	± 1.5	± 2	dB	
RMS_ps	Phase shift RMS	-	3	6	°	
ATT	Attenuation range	0.5 – 15.5 (5 bits attenuation)			dB	
Δps	Attenuation additive phase shift variation	-	± 5	± 10	°	
RMS_att	Attenuation RMS	-	0.5	1.25	dB	
VSWR_com	COM port standing wave	-	1.5	2.3	-	
VSWR_port	Each port standing wave	-	1.25	1.4	-	
I	Operation current	-	40	-	mA	

Typical Performance

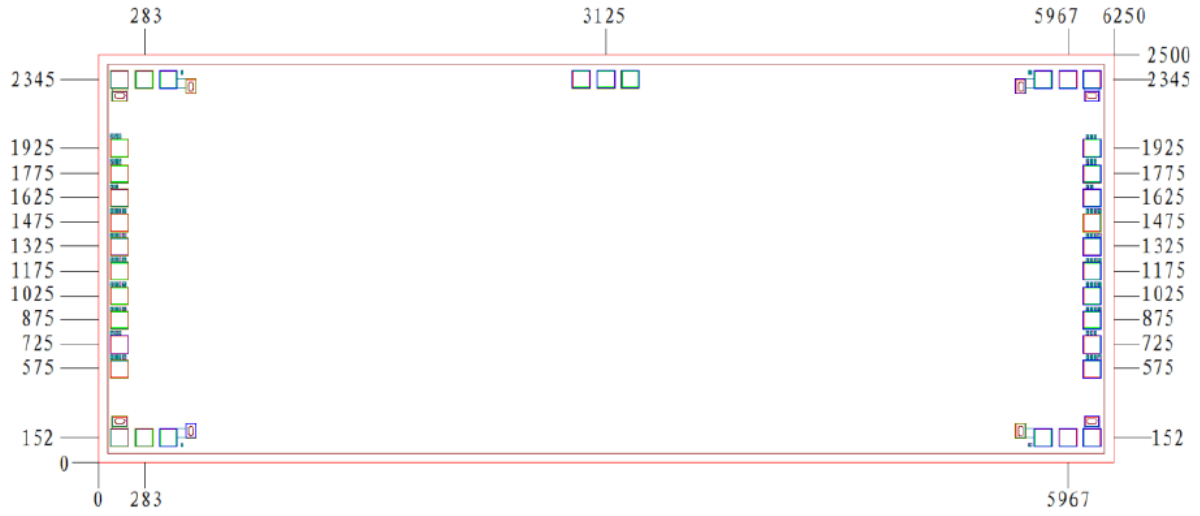




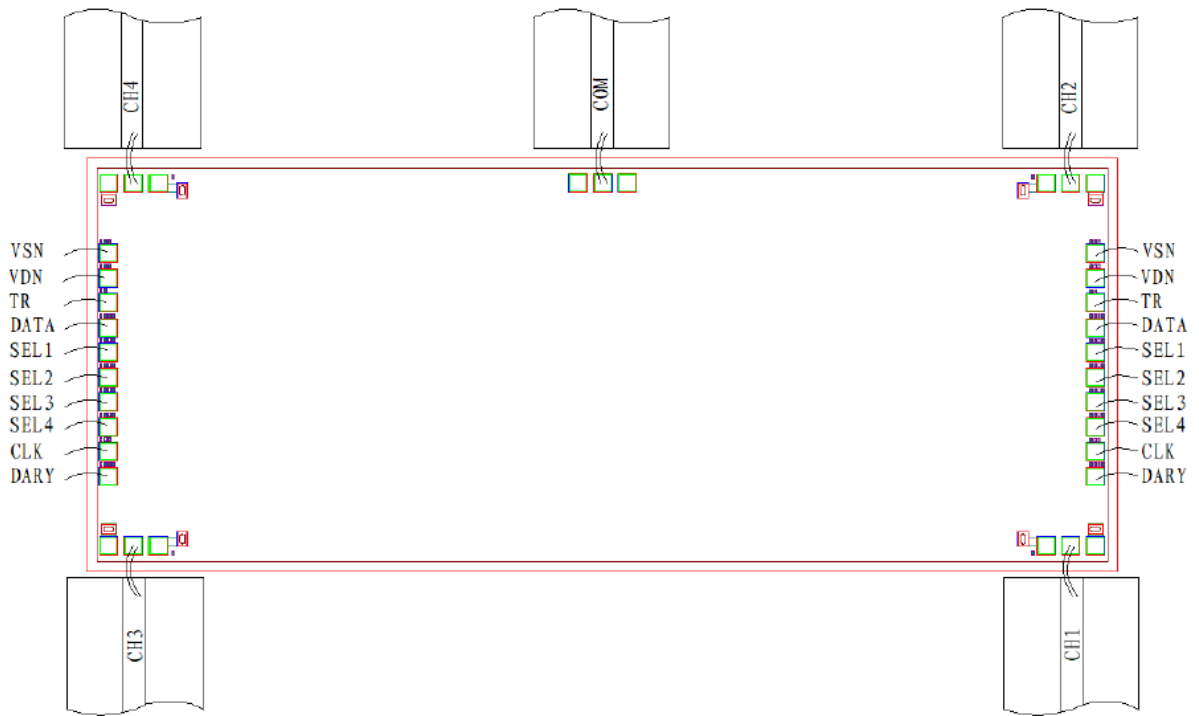
Internal Functional Block Diagram



Chip Dimensions (Unit : μm)



Chip Layout Diagram



Note, the solder pads in both sides of the chip have the same definition, either one can be used.

Solder Pad Definition

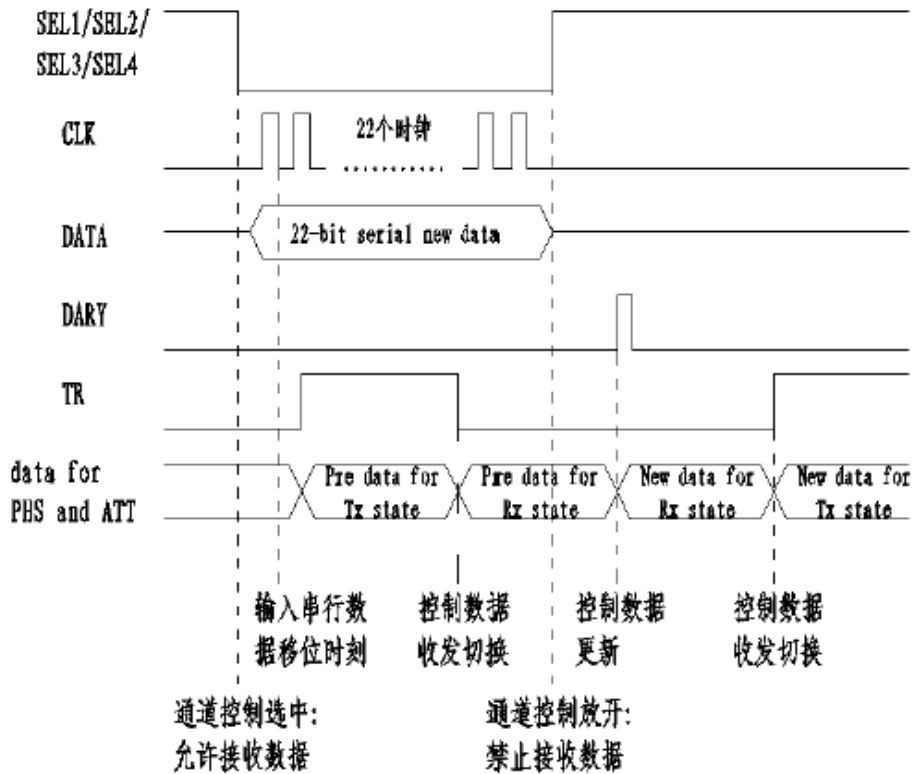
Name	Dimension	Explanation
COM / CH1 / CH2 / CH3 / CH4	100μm x 100μm	RF port
VSN / VDN	100μm x 100μm	Control circuit supply voltage solder pad : -3V/+3V
CLK / DATA / DARY / TR	100μm x 140μm	TTL, control signal input, speed 10M
SEL1 / SEL2 / SEL3 / SEL4	100μm x 140μm	TTL, chip select signal

Control Description

Signal Function Definition

No.	Signal		Level	Function		Remark
				"0"	"1"	
1	TR		Input (TTL Level)	Receive	Transmit	Transmit, receive control signal
2	SEL1 / SEL2 / SEL3 / SEL4		Input (TTL Level)	Load data	Hold data	Chip select signal, low level 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 0 – Bit 21	Input (TTL Level)	Off	On	Phase shift attenuation control signal : On means Phase Shifter and Attenuator in control.

Timing Diagram



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 Data Definition

BIT	Description
BIT0	Transmit 0.5 dB
BIT1	Receive 0.5 dB
BIT2	Transmit 1 dB
BIT3	Receive 1 dB
BIT4	Transmit 2 dB
BIT5	Receive 2 dB
BIT6	Transmit 4 dB
BIT7	Receive 4 dB
BIT8	Transmit 8 dB
BIT9	Receive 8 dB
BIT10	Transmit 5.625 °
BIT11	Receive 5.625 °
BIT12	Transmit 11.25 °
BIT13	Receive 11.25 °
BIT14	Transmit 22.5 °
BIT15	Receive 22.5 °
BIT16	Transmit 45 °
BIT17	Receive 45 °
BIT18	Transmit 90 °
BIT19	Receive 90 °
BIT20	Transmit 180 °
BIT21	Receive 180 °

Please see Appendix A for details.