

GaAs monolithic integrated switch
DC~18GHz

key indicator

- Frequency range: DC~18GHz
- Isolation: >30dB@18GHz
- Insertion loss: 3.1dB@18GHz
- Nanosecond switch
- Chip size: 1.4mm×1.25mm×0.1mm

typical application

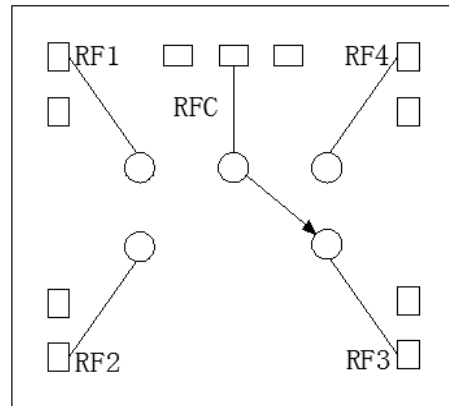
- Wireless communication equipment
- Radar and electronic countermeasures
- Military and aerospace
- Instruments and meters
- Test and measure

Product Introduction

AY1778 is a gallium arsenide pHEMT single-pole four-throw MMIC switch chip, covering the frequency range from DC to 18GHz. The chip provides greater than 30dB isolation and less than 3.1dB insertion loss in the entire operating frequency band. Using 0/-5v logic control, it has excellent switching characteristics and port standing wave characteristics in the working frequency band, which is suitable for microwave hybrid integrated circuits, multi-chip modules and low-power systems.

The switch chip uses an on-chip through-hole metallization process to ensure good grounding. The back of the chip is metallized, which is suitable for eutectic sintering or conductive adhesive bonding process.

Functional block diagram



Electrical performance (T_A=25°C, control level=0/-5V, 50Ω system)

parameter name	Test frequency	Minimum	Typical value	Max	unit
Insertion loss	DC~18GHz	-	-3.1	-	dB
Isolation	DC~18GHz	-	-30	-	dB
Return loss RFC	DC~18GHz	-	-12	-	dB
Return loss RF1,2,3,4(ON)	DC~18GHz	-	-12	-	dB
Enter P ₁ dB	DC~18GHz	-	15	-	dBm
Enter IP ₃	DC~18GHz	-	27	-	dBm
Switching time	DC~18GHz	-	40	-	ns

Absolute maximum ratings

RF input power	+28dBm	Operating temperature	-55 °C ~ + 85 °C
Control voltage range	-6~0.2V	Storage temperature	-65 °C ~ + 150 °C
Channel temperature	150 °C	Electrostatic protection level (HBM)	Class 1A

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Control voltage

state	Bias condition
Low	0~0.2V
high	-4 ~ -6V

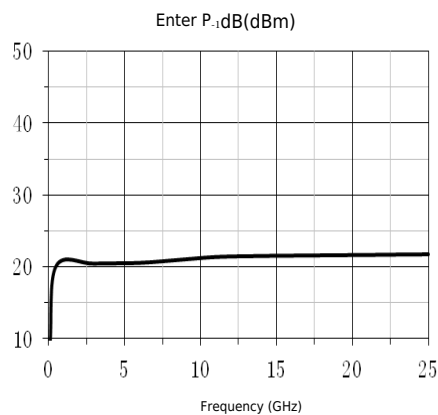
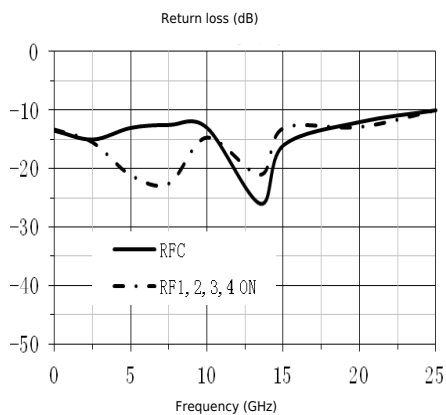
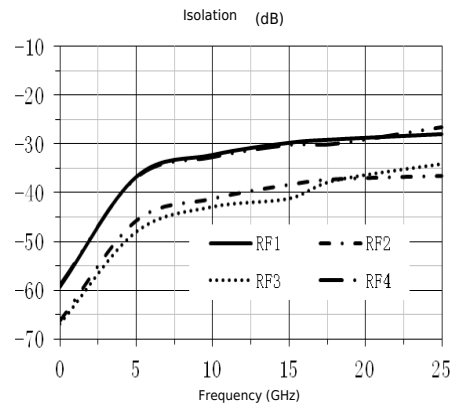
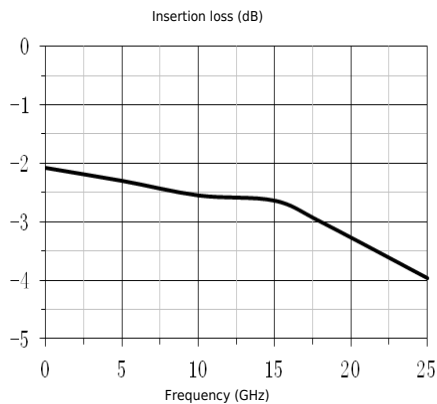
Bias voltage & current

V_D	I_D
-5V	4mA

Truth table

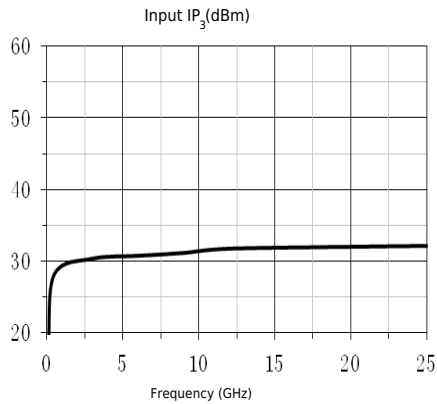
Control input		On-off state			
Ctrl1	Ctrl2	RFC-RF1	RFC-RF2	RFC-RF3	RFC-RF4
Low	Low	ON	OFF	OFF	OFF
high	Low	OFF	ON	OFF	OFF
Low	high	OFF	OFF	ON	OFF
high	high	OFF	OFF	OFF	ON

Typical test curve

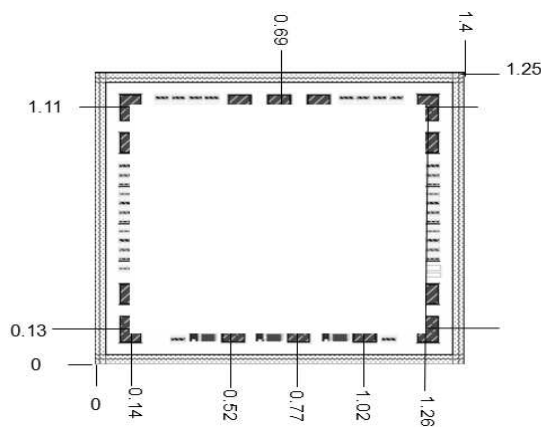


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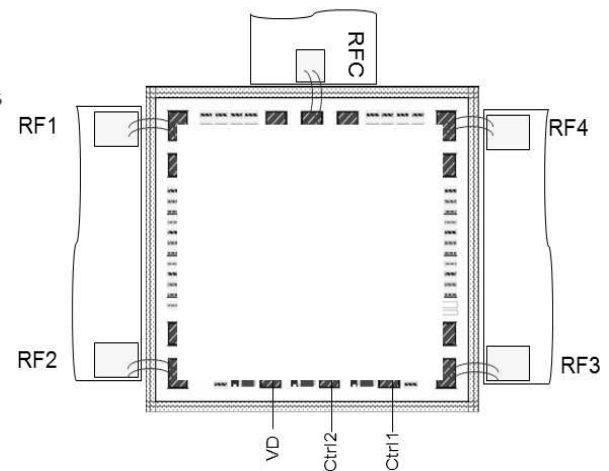
DC~18GHz



Shape and port size (mm)



Recommended assembly drawing



Precautions

1. The chip is stored in a dry, nitrogen environment and used in an ultra-clean environment;
2. GaAs material is relatively brittle and cannot touch the surface of the chip, so you must be careful when using it;
3. Chips are sintered with conductive glue or alloy (the alloy temperature cannot exceed 300°C, and the time cannot exceed 30 seconds) to make it fully grounded;
4. The gap between the microwave port of the chip and the substrate should not exceed 0.05mm. Use $\Phi 25\mu\text{m}$ double gold wire for bonding. The recommended length of gold wire is 250~400 μm ;
5. The chip is sensitive to static electricity, so pay attention to anti-static during storage and use.