GaAs monolithic integrated single-pole four-throw switch

DC～20GHz

key indicator

- Frequency range: DC～20GHz
- Isolation: >35dB@18GHz
- Insertion loss: 2.2dB TYP.
- Absorption
- Chip size: 1.32mm×1.32mm×0.1mm

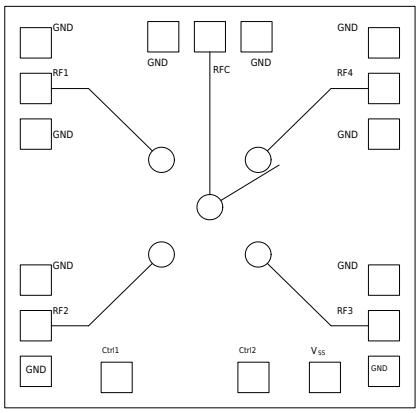
typical application

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

Product Introduction

AY1776 is a gallium arsenide absorption single-pole four-throw MMIC switch, covering the frequency range from DC to 20GHz. The chip provides greater than 35dB isolation and typical 2.2dB insertion loss in the entire operating frequency band. Using 0/5V logic control, the switch has a compact size and fast switching, which can be used in many integrated circuits.

Functional block diagram



Electrical performance (T_A=+25°C, V_{SS}=-4.5V, control level=0/+5V, Z_o=50Ω)

index	Minimum	Typical value	Max	unit
Insertion loss	—	2.2	3.5	dB
Isolation	35	50	—	dB
Standing Wave Ratio RFC	—	1.5	2	:1
Standing wave ratio RF1,2,3,4 (on state)	—	1.4	1.5	:1
Switching time (speed)	—	30	—	ns
Enter IP3	—	30	—	dBm

Absolute maximum ratings

RF input power (0.5~20GHz)	+28dBm	Operating temperature	-55 ℃ ～ + 85 ℃
Control voltage range	0~5V	Storage temperature	-65 ℃ ～ + 150 ℃
Channel temperature	150 ℃	Electrostatic protection level (HBM)	Class1A

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Control voltage

state	Bias condition
Low	0 ~ 1V
high	4~5V

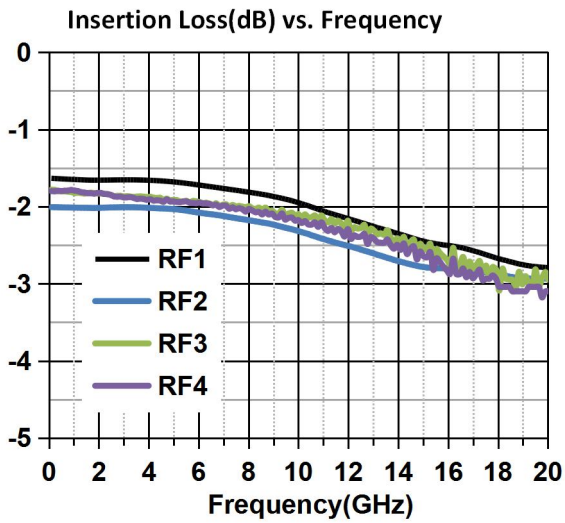
Bias voltage & current

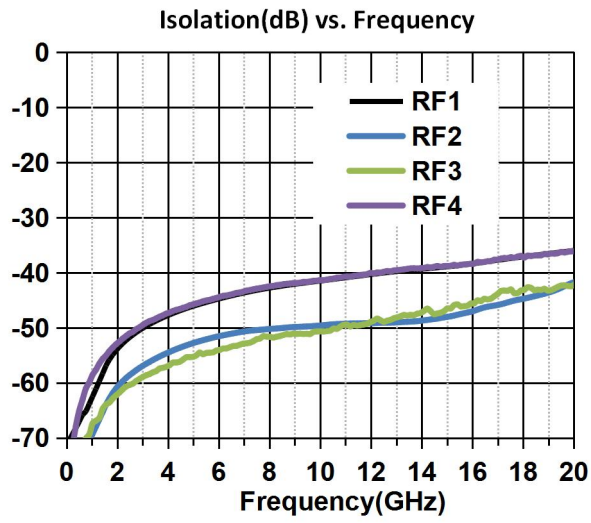
V_{ss}	I_{ss}
-4.5~-4.75V	4mA

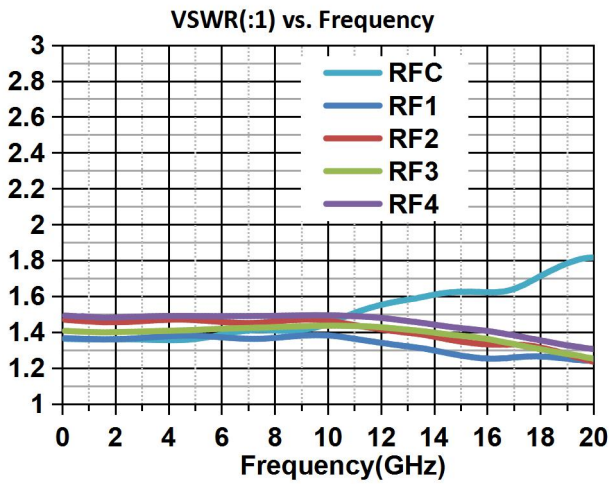
Truth table

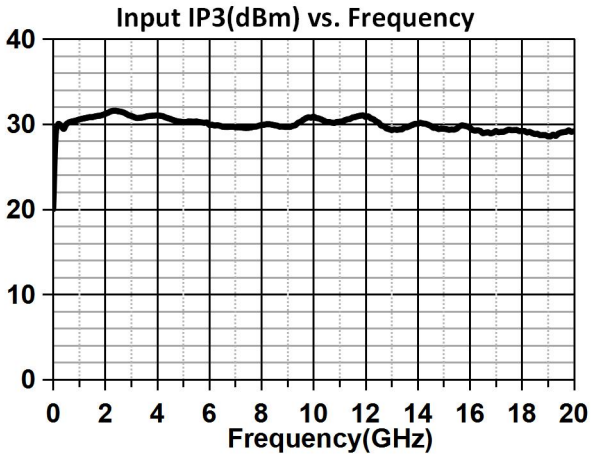
Control input		On-off state			
Ctrl1	Ctrl2	RFC-RF1	RFC-RF2	RFC-RF3	RFC-RF4
1	1	ON	OFF	OFF	OFF
0	1	OFF	ON	OFF	OFF
1	0	OFF	OFF	ON	OFF
0	0	OFF	OFF	OFF	ON

Typical performance test curve









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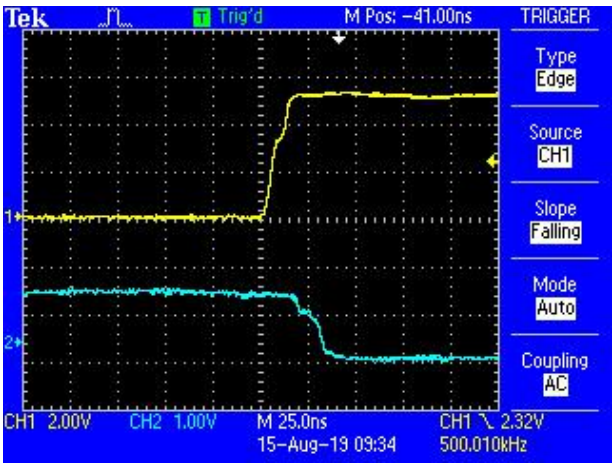
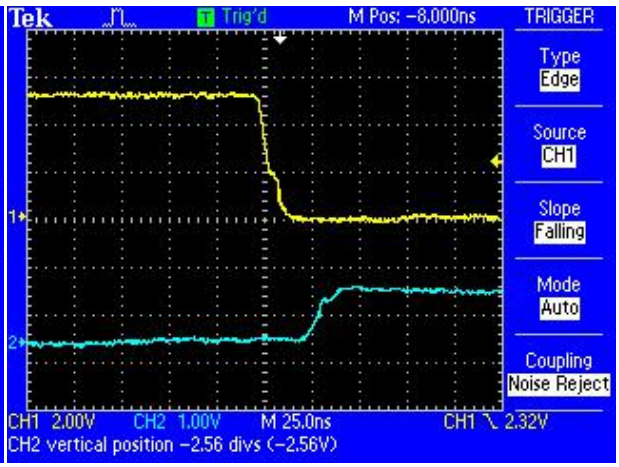
Switching time



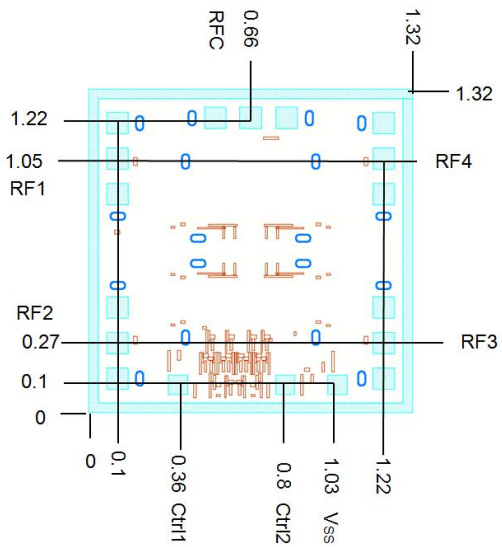
T_{ON}



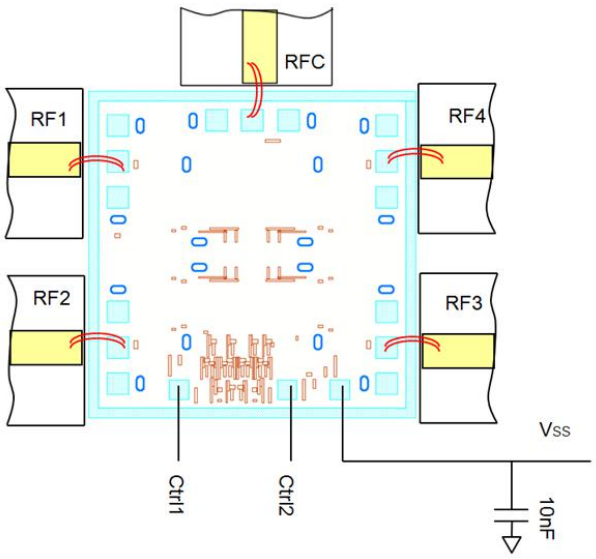
T_{OFF}

Shape and port size

(alldimensionsinmm)



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 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 chip's microwave port and the substrate should not exceed 0.05mm. Use Φ25μm double gold wire for bonding. The recommended length of gold wire is 250～400μm;
5. The chip is sensitive to static electricity, so pay attention to anti-static during storage and use.
6. The RF port needs an additional DC blocking capacitor