GaAs IC SPST Switch Chip With Integral Driver DC–6 GHz

Alpha

AK006L1-00, AK006M1-00, AK006R1-00

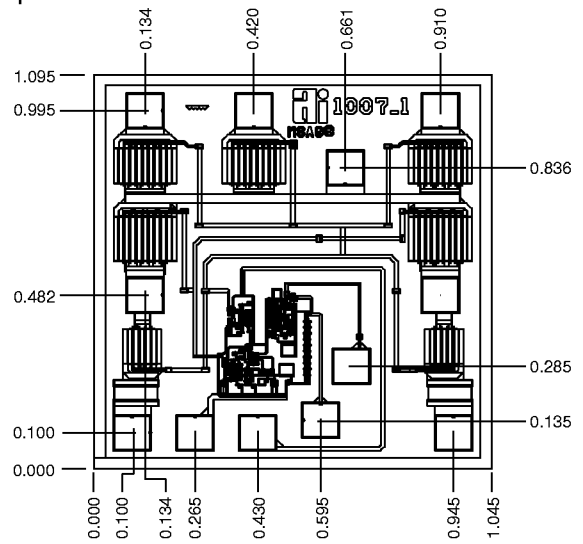
Features

- On-Chip Integral Driver
- CMOS and TTL Compatible
- Non-Reflective or Reflective Option
- Fully Passivated

Description

This group of SPST switches with integral drivers are designed for applications up to 6 GHz. The driver simplifies the external circuit, saving PCB space and component count. The chip is a rugged .008" thick and has a fully passivated surface, allowing for ease of handling for MCM assemblies. Ti/W/Au gate metal makes this product ideal for commercial, SatCom and military applications. All devices are 100% tested on-wafer and inspected to MIL-STD-883 MT 2010.

Chip Outline



Dimensions indicated in mm.
All bonding pads are 0.1 x 0.1 mm.
Chip thickness = 0.2 mm.

Electrical Specifications at 25°C

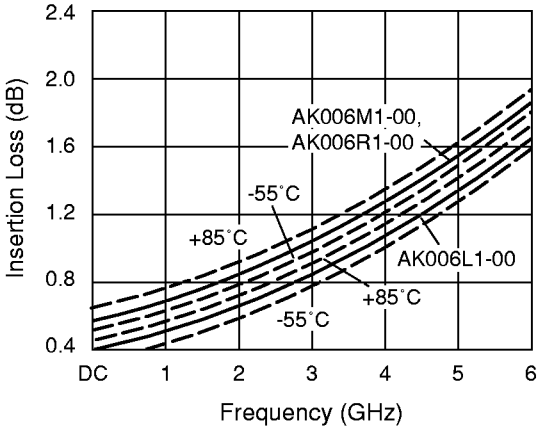
Parameter[1]	Frequency[6]	AK006L1-00		AK006M1-00		AK006R1-00		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Insertion Loss[2]	DC–1.0 GHz		0.6		0.8		0.8	dB
	DC–2.0 GHz		0.8		1.0		1.0	dB
	DC–4.0 GHz		1.2		1.5		1.5	dB
	DC–6.0 GHz		1.7		2.0		2.0	dB
Isolation	DC–1.0 GHz	40		50		45		dB
	DC–2.0 GHz	35		45		40		dB
	DC–4.0 GHz	30		45		40		dB
	DC–6.0 GHz	24		40		35		dB
VSWR (I/O)	DC–1.0 GHz		1.2:1		1.2:1		1.2:1	
	DC–2.0 GHz		1.3:1		1.3:1		1.3:1	
	DC–4.0 GHz		1.5:1		1.5:1		1.3:1	
	DC–6.0 GHz		1.8:1		1.8:1		1.8:1	

Operating Characteristics at 25°C

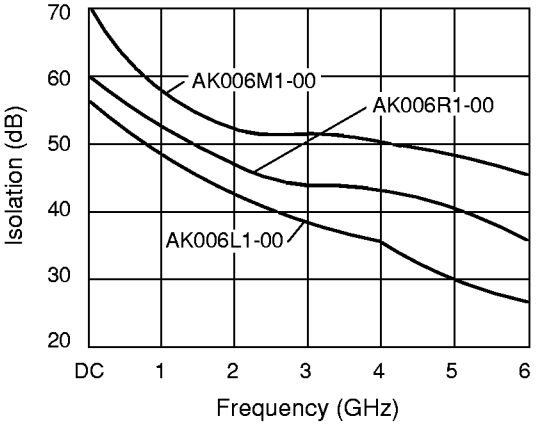
Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching Characteristics	Rise, Fall (10/90% or 90/10% RF)			5		ns
	On, Off (50% CTL to 90/10% RF)			15		ns
	Video Feedthru[3]			30		mV
Input Power for 1 dB Compression	0/-5 V	0.5–6 GHz		20		dBm
	0/-8 V	0.001 GHz		12		dBm
Intermodulation Intercept Point (IP3)	For Two-tone Input Power 13 dBm	0.5–6 GHz		37		dBm
		0.001 GHz		26		dBm
Control Voltages	V_{Low}		0		0.5	V
	V_{High}		4		5.0	V
Supply Voltages[4,5]	+5 V ± 0.5 V @ 1 mA Typ.					
	-5 V ± 0.25 V @ 4 mA Typ.					

1. All measurements made in a 50 Ω system, unless otherwise specified.
2. Insertion loss changes by 0.003 dB/°C.
3. Video feedthru measured with 1 ns risetime pulse and 500 MHz bandwidth.
4. The bias voltage and ground must be connected before TTL voltage is applied. To avoid voltage sequencing, refer to the Application Note section "Driver Protection Circuit."
5. Current increases from 4 mA to 5mA @ 85°C.
6. DC = 300 kHz.

Typical Performance Data

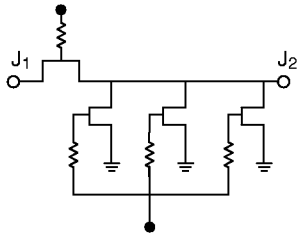


Insertion Loss vs. Frequency

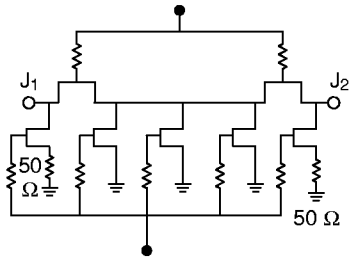


Isolation vs. Frequency

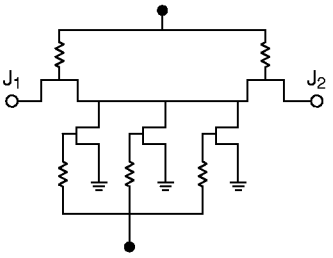
Truth Table and Bonding Options



A. Bonded as Low Loss Reflective Switch



B. Bonded as High Isolation Non-Reflective Switch



C. Bonded as High Isolation Reflective Switch

Option	J_1–J_2	A	B	C	D	E	TTL
AK006L1-00 (A)	Isolation	J_1	J_2	NC	NC	NC	0
	Insertion Loss	J_1	J_2	NC	NC	NC	1
AK006M1-00 (B)	Isolation	J_1	NC	J_2	GND	GND	0
	Insertion Loss	J_1	NC	J_2	GND	GND	1
AK006R1-00 (C)	Isolation	J_1	NC	J_2	NC	NC	0
	Insertion Loss	J_1	NC	J_2	NC	NC	1

Absolute Maximum Ratings

Characteristic	Value
RF Input Power (RF In)	0.5 W > 500 MHz 0.1 W @ 50 MHz
Bias Voltage (V_B)	+7.0 V, -6.0 V
Control Voltage (V_C)	7.0 V
Operating Temperature (T_{OP})	-40°C to +90°C
Storage Temperature (T_{ST})	-65°C to +150°C
Thermal Resistance (Θ_{JC})	30°C/W

Chip Layout