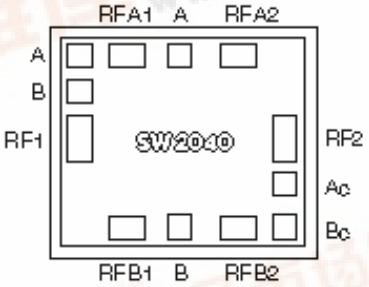
GaAs DPDT Switch
DC - 2 GHz

MASW2040

V 2.00

- Cascadable
- Low Insertion Loss
- Low DC Power Consumption
- Low Distortion Operation (Quiet Mode)
- Useful as a Building Block for
  - Digital Attenuators
  - Digital Delay Lines
  - Digital Phase Shifters
  - Digital Switched Filter Elements



Guaranteed Specifications** -55°C to +85°C

Frequency Range		DC – 2.0 GHz
Insertion Loss		
	DC – 0.5 GHz	0.4 dB Max
	DC – 1.0 GHz	0.4 dB Max
	DC – 2.0 GHz	0.6 dB Max
VSWR		
	DC – 0.5 GHz	1.1:1 Max
	DC – 1.0 GHz	1.2:1 Max
	DC – 2.0 GHz	1.2:1 Max
Isolation		
	DC – 0.5 GHz	25 dB Min
	DC – 1.0 GHz	20 dB Min
	DC – 2.0 GHz	15 dB Min

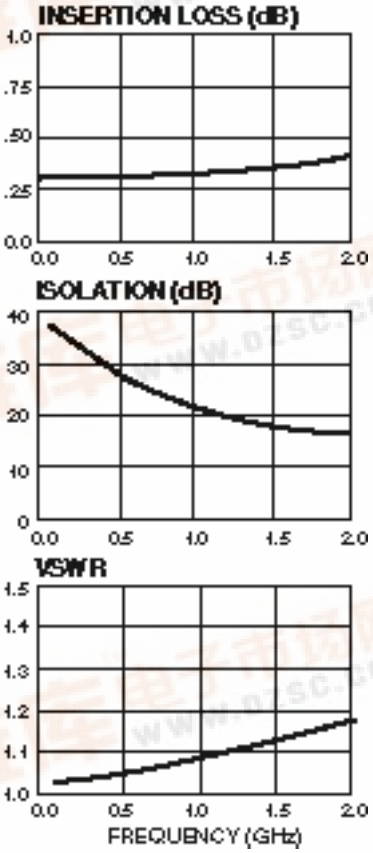
Operating Characteristics

Impedance		50 Ω Nominal
Switching Characteristics		
t_{RISE}, t_{FALL} (10/90% or 90/10% RF)		3 ns Typ
t_{ON}, t_{OFF} (50% CTL to 90/10% RF)		6 ns Typ
Transients (In-Band)		20 mV Typ
Input Power for 1dB Compression		
Control Voltages (Vdc)	0/–5	0/–8
0.05 GHz	+24 dBm	+25 dBm Typ
0.5 - 2 GHz	+30 dBm	+33 dBm Typ
Intermodulation Intercept Point (for two-tone input power up to +5 dBm)		
Intercept Points	IP2	IP3
0.05 GHz	+62	+39 dBm Typ
0.5 - 2 GHz	+68 dBm	+46 dBm Typ
Control Voltages (Complementary Logic)		
V_{IN}Low		0 to –0.2V @ 9 µA Max
V_{IN}Hi		–5V @ 25 µA Typ to –8V @ 75 µA Max
Die Size		0.045″ x 0.038″ x 0.010″ (1.13mm x 0.97mm x 0.25mm)

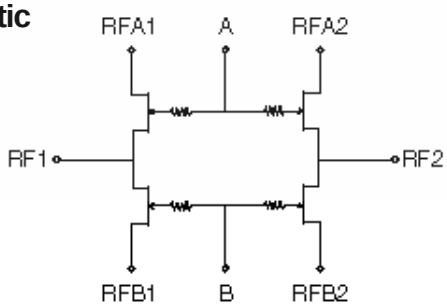
**All specifications apply with 50 Ω impedance connected to all RF ports, 0 and –5 Vdc control voltages.

*** Loss change 0.0025dB/°C (-55°C to +85°C)

Typical Performance @ +25°C



Schematic



Handling Precautions

Permanent damage to the MASW2040 may occur if the following precautions are not adhered to:

A. Cleanliness — The MASW2040 should be handled in a clean environment. DO NOT attempt to clean unit after the MASW2040 is installed.

B. Static Sensitivity — All chip handling equipment and personnel should be DC grounded.

C. Transient — Avoid instrument and power supply transients while bias is applied to the MASW2040.Use shielded signal and bias cables to minimize inductive pick-up.

D. Bias — Apply voltage to either control port A or B only when the other is grounded. Neither port should be allowed to "float".

E. General Handling — It is recommended that the MASW2040 chip be handled along the long side of the die with a sharp pair of bent tweezers. DO NOT touch the surface of the chip with fingers or tweezers.

Mounting

The MASW2040 is back-metallized with Pd/Ni/Au(100/1,000/10,000Å) metallization. It can be die-mounted with AuSn eutectic preforms or with thermally conductive epoxy. The package surface should be clean and flat before attachment.

Eutectic Die Attach:

A. A 80/20 gold/tin preform is recommended with a work surface temperature of approximately 255°C and a tool temperature of 265°C. When hot 90/10 nitrogen/hydrogen gas is applied, tool tip temperature should be approximately 290°C.

B. DO NOT expose the MASW2040 to a temperature greater than 320°C for more than 20 seconds. No more than 3 seconds of scrubbing should be required for attachment.

Epoxy Die Attach:

A. Apply a minimum amount of epoxy and place the MASW2040 into position. A thin epoxy fillet should be visible around the perimeter of the chip.

B. Cure epoxy per manufacturer's recommended schedule.

C. Electrically conductive epoxy may be used but is not required.

Wire Bonding

A. Ball or wedge with 1.0 mil diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150°C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Ultrasonic energy and time should be adjusted to the minimum levels achieve reliable wirebonds.

B. Wirebonds should be started on the chip and terminated on the package. GND bonds should be as short as possible; at least three and no more than four bond wires from ground

Truth Table

Control Inputs		Condition of Switch			
A	B	RF1 - RFA1	RF1 - RFB1	RF2 - RFA2	RF2 - RFB2
$V_{IN}H_I$	$V_{IN}L_{OW}$	OFF	ON	OFF	ON
$V_{IN}L_{OW}$	$V_{IN}H_I$	ON	OFF	ON	OFF

$V_{IN}L_{OW}$ = 0.0 TO -0.2V

$V_{IN}H_I$ = -0.5V

Maximum Ratings	
A. Control Value (A or B):	–8.5 Vdc
B. Max Input RF Power:	+34 dBm (500 MHz– 4 GHz)
C. Storage Temperature:	–65°C to +175°C
D. Max Operating Temperature:	+175°C

BondPad Dimensions — Inches (mm)	
RF1, RF2	0.004 x 0.008 (0.100 x 0.200)
RFA1, RFB1	0.004 x 0.005 (0.100 x 0.125)
RFA2, RFB2	0.004 x 0.005 (0.100 x 0.125)
A, B, Ac, Bc	0.004 x 0.004 (0.100 x 0.100)

Die Size — Inches (mm)
0.045 x 0.038 x 0.010 (1.13 x 0.97 x 0.25)