MASW-008955

GaAs SP3T Switch
DC - 3.5 GHz

Rev. V2

Features

- Low Insertion Loss: 0.55 dB @ 2.45 GHz
- High P1dB: 35 dBm @ 2.6 V
- 0.5 micron GaAs pHEMT Process
- Lead-Free 2 mm 8-Lead PDFN Package
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- Low gate lag for timing sensitive applications
- 1.8 V Operation with 1.8 V on Voltage Pull Up

Description

M/A-COM's MASW-008955 is a GaAs pHEMT MMIC single pole three throw (SP3T) switch in a lead-free 2 mm 8-lead PDFN package. The MASW-008955 is ideally suited for applications where low control voltage, low insertion loss, high isolation, small size, and low cost are required.

Typical applications are for filter and antenna switching in WLAN or Bluetooth systems that connect separate receive functions to a common antenna This part can be used in all systems operating up to 3.5 GHz requiring low control voltage.

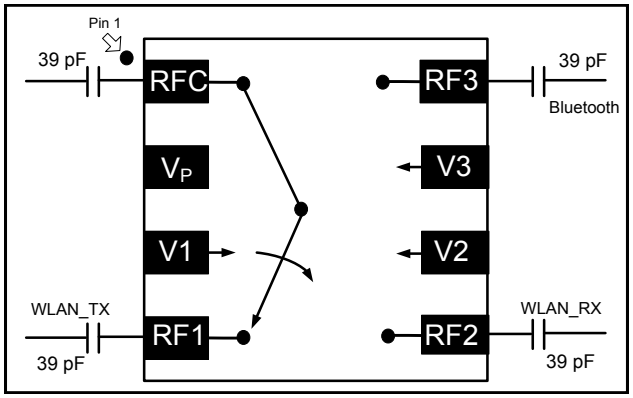
The MASW-008955 is fabricated using a 0.5 micron gate length GaAs pHEMT process. The process features full passivation for performance and reliability.

Ordering Information[1,2]

Part Number	Package
MASW-008955-TR1000	1000 piece reel
MASW-008955-TR3000	3000 piece reel
MASW-008955-001SMB	Sample Test Board

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

Application Schematic



Pin Configuration

Pin No.	Function	Description
1	RFC	RF In/Out
2	V_P[3,4]	Optional Voltage Pull Up
3	V1[3]	Control 1
4	RF1	RF In/Out
5	RF2	RF In/Out
6	V2[3]	Control 2
7	V3[3]	Control 3
8	RF3	RF In/Out

3. Depending on system sensitivity optional DC line bypass capacitors (22 pF) may be used.
4. Improved linearity at low control voltage can be obtained by tying pin 2 to the most positive control voltage. Otherwise, leave pin 2 unconnected.

Absolute Maximum Ratings [5,6]

Parameter	Absolute Maximum
Max Input Power (0.5-3.5 GHz, 2.6 V Control) RFC – RF1 RFC – RF2 RFC – RF3	 35 dBm 31 dBm 31 dBm
$\|V_{HI}-V_{LO}\|$	8.5 volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. M/A-COM does not recommend sustained operation near these survivability limits.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

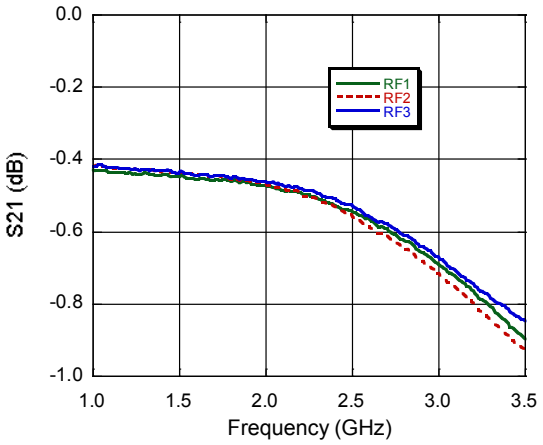
Electrical Specifications: T_A = 25°C, V_C = 0 V / 2.6 V, Z_0 = 50 Ω [7,9]

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss [8]	2.45 GHz, RFC - RF1 2.45 GHz, RFC - RF2 2.45 GHz, RFC - RF3	dB	— — —	0.55 0.6 0.6	0.85 0.85 0.85
Isolation	2.45 GHz, RFC - RF1 2.45 GHz, RFC - RF2 2.45 GHz, RFC - RF3	dB	20 20 19	22 22 20	— — —
Return Loss	2.45 GHz	dB	—	20	—
IP3	Two Tone, +10 dBm/tone, 10 MHz Spacing, 2.45 GHz	dBm	—	54	—
IP2	Two Tone, +10 dBm/tone, 10 MHz Spacing, 2.45 GHz	dBm	—	98	—
P0.1dB	2.45 GHz (RF1), 2.6 V 2.45 GHz (RF2), 2.6 V 2.45 GHz (RF3), 2.6 V 2.45 GHz (RF1), 3 V 2.45 GHz (RF2), 3 V 2.45 GHz (RF3), 3 V	dBm	—	29 25 25 32 28 28	—
P1dB	2.45 GHz (RF1), 2.6 V 2.45 GHz (RF2), 2.6 V 2.45 GHz (RF3), 2.6 V 2.45 GHz (RF1), 3 V 2.45 GHz (RF2), 3 V 2.45 GHz (RF3), 3 V	dBm	—	35 31 31 36 34 34	—
2nd Harmonic	900 MHz, 2.6 V, +10 dBm 900 MHz, 2.6 V, +20 dBm 900 MHz, 3 V,+20 dBm 2.45 GHz, 2.6 V, +10 dBm 2.45 GHz, 2.6 V,+20 dBm 2.45 GHz, 3 V,+20 dBm	dBc	—	-94 -75 -80 -86 -70 -99	—
3rd Harmonic	900 MHz, 2.6 V, +10 dBm 900 MHz, 2.6 V, +20 dBm 900 MHz, 3 V,+20 dBm 2.45 GHz, 2.6 V, +10 dBm 2.45 GHz, 2.6 V,+20 dBm 2.45 GHz, 3 V,+20 dBm	dBc	—	-102 -80 -100 -94 -70 -78	—
Trise, Tfall	10% to 90% RF 90% to 10% RF	ns	—	25 14	—
Ton, Toff	50% control to 90% RF 50% control to 10% RF	ns	—	30 26	—
Gate Lag	50% control to 100% RF	µs		4	
Control Current	$\|V_C\|$ = 2.6V	µA	—	4	20
Thermal Resistance	Junction to case	°C/W	—	96	—

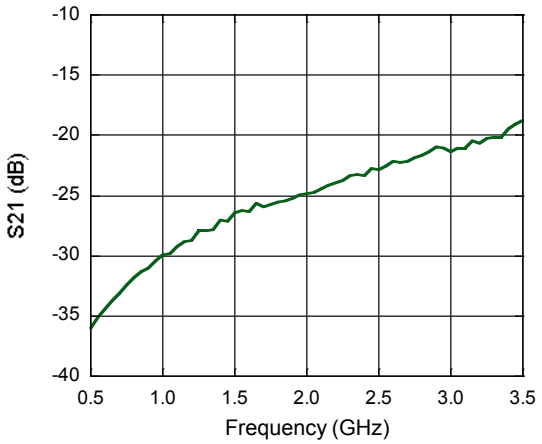
7. For positive control voltage, external DC blocking capacitors are required on all RF ports.
8. Insertion loss can be optimized by varying the DC blocking capacitor value, e.g. 100 pF for 100 - 500 MHz, 39 pF for 2.45 GHz.
9. Specifications apply with no connection to pin 2 (V_P).

Typical Performance Curves

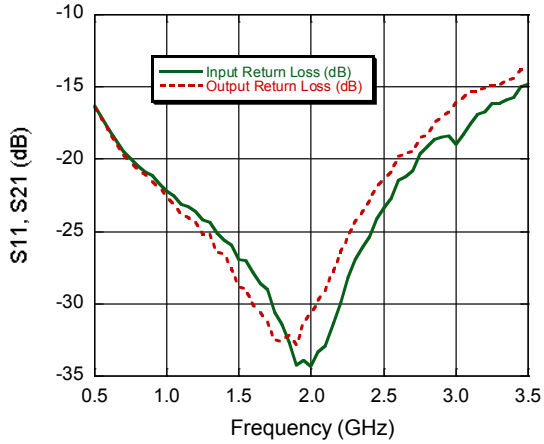
Insertion Loss



Isolation



Return Loss



Truth Table [10,11,12]

V1	V2	V3	RFC - RF1	RFC - RF2	RFC - RF3
1	0	0	On	Off	Off
0	1	0	Off	On	Off
0	0	1	Off	Off	On

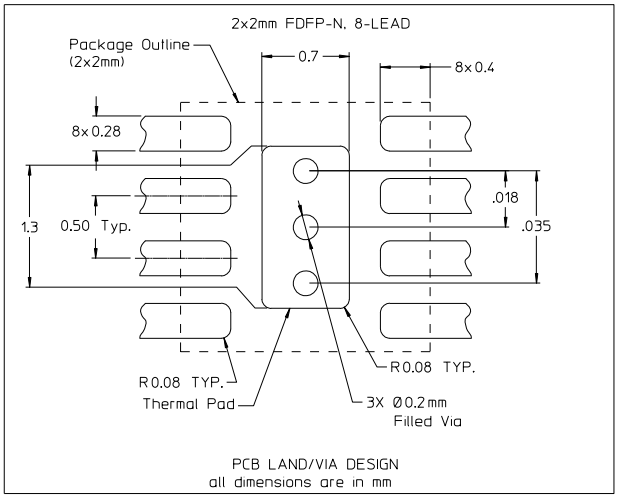
10. 0 = 0 V ± 0.2 V, 1 = 1.8 V to +5 V, minimum V_{HI}-V_{LO} = 1.8 V, maximum V_{HI}-V_{LO} = 8.5 V.
11. For use at low voltage, M/A-COM recommends connecting pin 2 to a voltage equal to the most positive control voltage.
12. Negative control voltage may be used. The '1' in the table would be the most positive (0 V) and the '0' would be the most negative (-3 V for example).

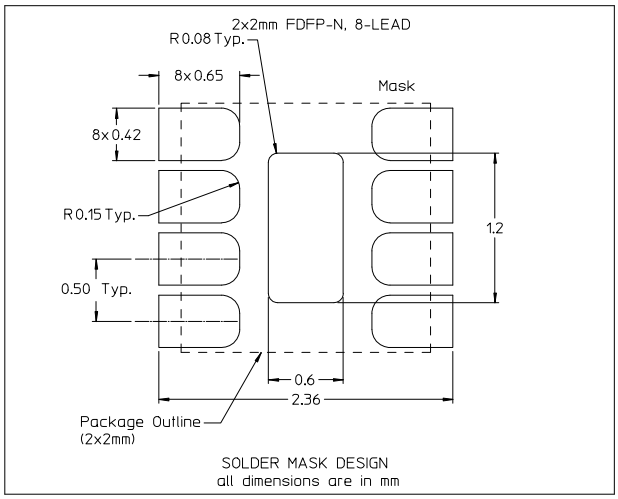
Handling Procedures

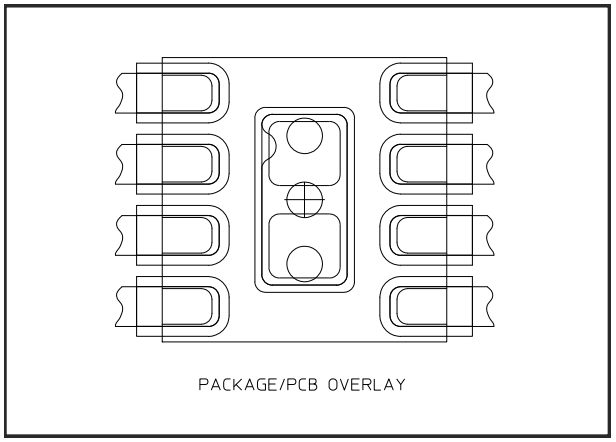
Please observe the following precautions to avoid damage:

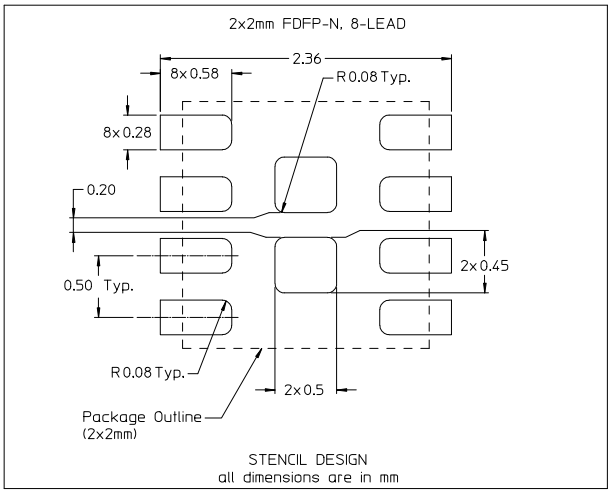
Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

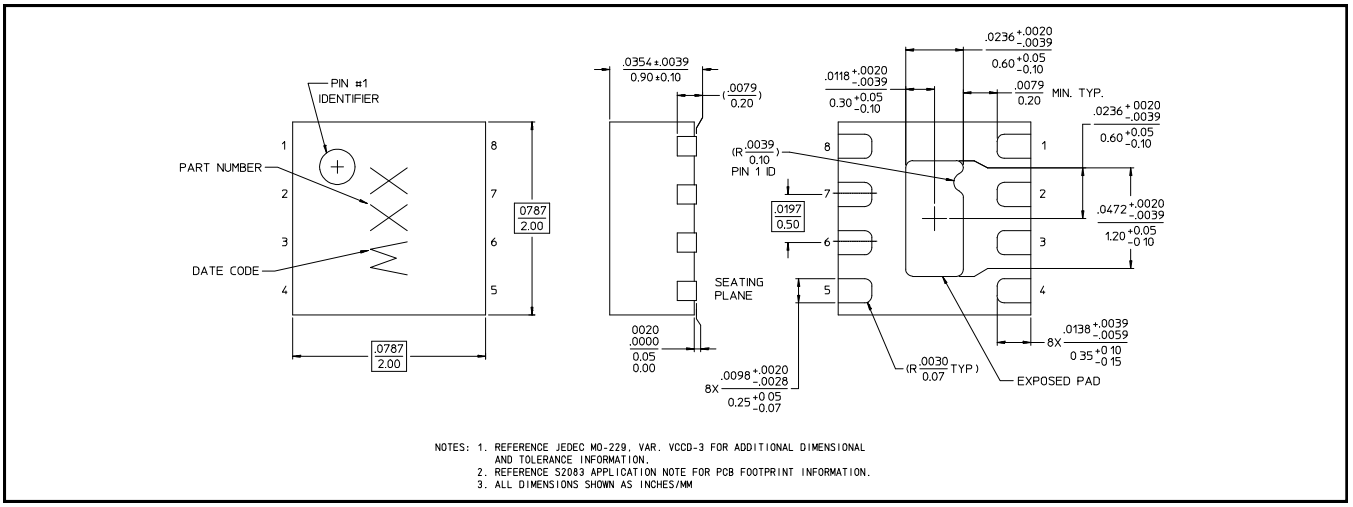








Lead Free 2 mm 8-lead PDFN †



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.