



MASWSS0199 V1

GaAs SP3T 2.6 V CDMA-GPS Switch DC - 2.5 GHz

Features

- Unbalanced (asymmetric) RF Paths
- Low Cross Modulation
- Low Insertion Loss: 0.5 dB at 1.0 GHz
- High Isolation: 20 dB at 2.0 GHz
- 0.5 micron GaAs PHEMT Process
- Lead-Free 3 mm 12-lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of MASWSS0065

Description

M/A-COM's MASWSS0199 is an industry leading GaAs PHEMT MMIC single pole three throw (SP3T) CDMA-GPS switch in a lead-free 3 mm 12-lead PQFN package.

The MASWSS0199 is uniquely configured to enable switching from a common antenna port to CDMA cellular, CDMA PCS, or GPS ports. The design is asymmetric and has been fully optimized for excellent cross modulation performance in CELL and PCS paths while still maintaining excellent insertion loss and isolation.

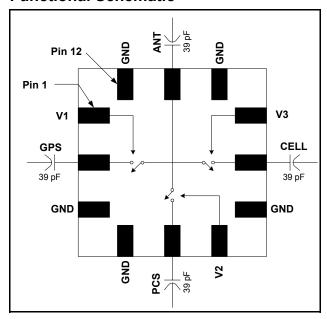
The MASWSS0199 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

Ordering Information

Part Number	Package
MASWSS0199TR-3000	3000 Piece Reel
MASWSS0199SMB	Sample Test Board

Note: Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

Pin No.	Pin Name	Description	
1	V1	Control 1	
2	GPS	GPS Receive	
3	GND	RF Ground	
4	GND	RF Ground	
5	PCS	PCS Transmit/Receive	
6	V2	Control 2	
7	GND	RF Ground	
8	CELL	Cellular Transmit/Receive	
9	V3	Control 3	
10	GND	RF Ground	
11	ANT	Antenna Port	
12	GND	RF Ground	
13	GND (paddle) 1	RF Ground	

 The exposed pad centered on the package bottom must be connected to RF and DC ground.

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

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[•] Europe Tel: 44.1908.574.200 / Fax: 44.1908.574.300

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Electrical Specifications: $T_A = 25$ °C, $V_C = 0 \text{ V/2.6 V}$, $Z_0 = 50 \text{ Ohms}^2$

Parameter	Test Conditions		Min.	Тур.	Max.
Insertion Loss ³ CELL Path GPS Path PCS Path	820 MHz 1.5 GHz 1.9 GHz	dB dB dB		0.5 0.75 0.5	0.7 0.95 0.7
Isolation (CELL Path)	820 MHz 1.5 GHz 1.9 GHz	dB dB dB	27 — —	30 26 24	_ _ _
Isolation (GPS Path)	820 MHz 1.5 GHz 1.9 GHz	dB dB dB	29 — —	32 27 25	_ _ _
Isolation (PCS Path)	820 MHz 1.5 GHz 1.9 GHz	dB dB dB	25 — —	27 22 20	_ _ _
Return Loss	All RF ports, DC – 2.5 GHz		_	20	_
IP3 CELL Path PCS Path	Two Tones, +22 dBm / tone, 1 MHz Spacing, 820 MHz Two Tones, +22 dBm / tone, 1 MHz Spacing, 1880 MHz		_	58 59	_
Cross Modulation CELL Path	Cell Band: Two-tone signal input: Tx1 = +22 dBm @ 820 MHz, Tx2 = +22 dBm @ 821 MHz, RX interfere = -30 dBm @ 869 MHz.		_	-113	_
Cross Modulation PCS Path	PCS Band: Two-tone signal input: Tx1 = +18 dBm @ 1880 MHz, Tx2 = +18 dBm @ 1881 MHz, RX interfere = -30 dBm @ 1960 MHz.		_	-115	_
P0.1 dB CELL Path GPS Path PCS Path	820 MHz 1.5 GHz 1.9 GHz	dBm dBm dBm		37 35 35	_ _ _
Trise, Tfall	10% to 90% RF, 90% to 10% RF		_	0.05	_
Ton, Toff	50% control to 90% RF, and 50% control to 10% RF		_	0.07	_
Transients	In Band	mV	_	50	_
Control Current	Vc = 2.6 V	μA	_	5	20

^{2.} For positive voltage control, external DC blocking capacitors are required on all RF ports.

^{3.} Insertion loss can be optimized by varying the DC blocking capacitor value, e.g. 1000 pF for 100 MHz - 1 GHz, 39 pF for 0.5 GHz - 3 GHz.

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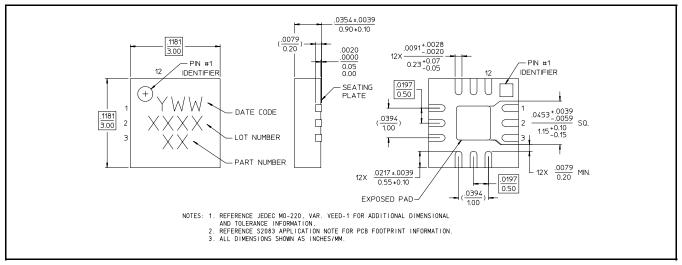




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Lead-Free 3 mm 12-Lead PQFN[†]



[†] Reference Application Note M538 for lead-free solder reflow recommendations.

Absolute Maximum Ratings 4,5

Parameter	Absolute Maximum		
Input Power (0.5 - 2.5 GHz, 2.6 V Control)	+35 dBm		
Operating Voltage	+8.5 volts		
Operating Temperature	-40°C to +85°C		
Storage Temperature	-65°C to +150°C		

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

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.

Truth Table ^{6,7,8}

V1	V2	V3	ANT- GPS	ANT - PCS	ANT - CELL
1	0	0	On	Off	Off
0	1	0	Off	On	Off
0	0	1	Off	Off	On

- For positive voltage control, external DC blocking capacitors are required on all RF ports.
- Differential voltage, V(state 1) V(state 0), must be +2.6 V minimum, but must not exceed +8.5 V.
- 8. 0 = -5 V to +2.4 V, 1 = -2.4 V to +5 V.

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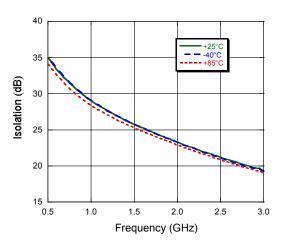


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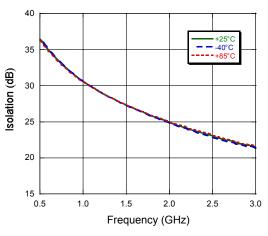
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Typical Performance Curves

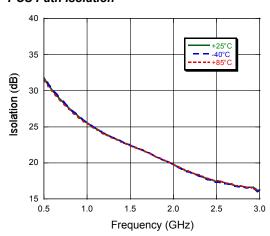
Cell Path Isolation



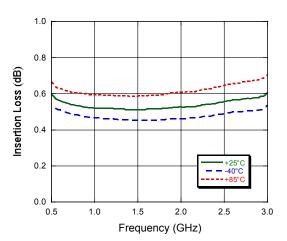
GPS Path Isolation



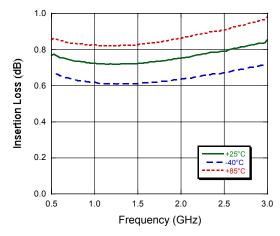
PCS Path Isolation



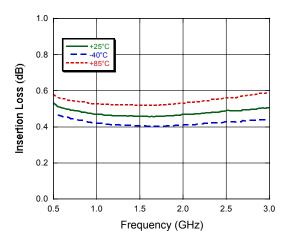
Cell Path Insertion Loss



GPS Path Insertion Loss



PCS Path Insertion Loss



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