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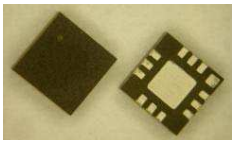
FMS2020-001

10W GaAs WIDEBAND SPDT SWITCH



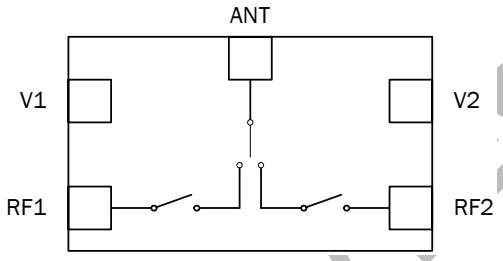
Package: 3mmx3mm QFN

Product Description

The FMS2020-001 is a 10-Watt, low loss, single-pole, dual-throw, Gallium Arsenide antenna switch. The die is fabricated using the RFMD FL05 0.5µm switch process technology, which offers leading edge performance optimized for switch applications. The FMS2020-001 is designed for use in WiMax, L-, S-, and C-band wireless applications and WLAN access points where high linearity switching is required.

Optimum Technology Matching® Applied

- ☐ GaAs HBT
- ☐ GaAs MESFET
- ☐ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ☐ SiGe HBT
- ☑ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ InP HBT
- ☐ RF MEMS
- ☐ LDMOS



Features

- High Isolation: 25dB Typ. at 2.5GHz
- Low Insertion Loss: 0.5dB Typ. at 2.5GHz
- Low Insertion Loss: 1.0dB Typ. at 6GHz
- P_{1dB} 42dBm at 5GHz
- Operates from a Single Positive Voltage
- Less than 10µA Control Current at 35dBm Input Power

Applications

- WiMax
- L-, S-, and C-band Digital Cellular
- WLAN Applications

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Electrical Specifications					$T_{AMBIENT}$=25°C, V_{CTRL}=0V/2.7V, $Z_{IN}=Z_{OUT}$=50Ω
Insertion Loss		0.4	0.5	dB	1.0GHz
		0.6	0.75	dB	3.5GHz
		0.75		dB	5.0GHz
Return Loss		18		dB	0.5GHz to 2.5GHz
		16		dB	2.5GHz to 5.0GHz
Isolation	27	29		dB	1.0GHz
	22	25		dB	2.5GHz
		18		dB	6.0GHz
P_{IN} at 0.1dB Compression Point		41		dBm	1.0GHz
		39.5		dBm	2.5GHz
		38.5		dBm	5.0GHz
P_{IN} at 0.5dB Compression Point		>42		dBm	2.5GHz
		40.5		dBm	5.0GHz
EVM (Contribution Due to Switch)		Δ0.5		%	35dBm at 5GHz (OFDM WLAN 54)
OIP3		>69		dBm	1GHz
		>66		dBm	2GHz
2nd Harmonic Level		-74	-69	dBc	1GHz, P_{IN}=+35dBm, 100% duty cycle
3rd Harmonic Level		-77	-70	dBc	1GHz, P_{IN}=+35dBm, 100% duty cycle
Switching Speed: T_{RISE}, T_{FALL}		<300		ns	10% to 90% RF and 90% to 10% RF
Switching Speed: T_{ON}, T_{OFF}		<800		ns	50% control to 90% RF and 50% control to 10% RF
Control Current		1.5	3	µA	+20dBm RF input @ 3.8GHz

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Absolute Maximum Ratings[1]

Parameter	Rating	Unit
Maximum Input Power (P_{IN})	+41	dBm
Control Voltage (V_{CTRL})	+6	V
Operating Temperature (T_{OPER})	-40 to 85	°C
Maximum Junction Temperature (T_{JMAX})	125	°C
Storage Temperature (T_{STOR})	-55 to 150	°C

Notes:
At high powers, the dissipation in the switch can be significant and the resulting thermal effects need to be taken in to account. The device should be mounted with appropriate heat sinking to take this into account.
The maximum allowable junction temperature is T_{JMAX}=125°C and for the thermal calculation, the dissipation within the switch should be taken as η = 5.5%. This should include the power input to the switch and anything reflected back from an external mismatch.
The thermal resistance of the FET should be taken as R_{TH}=70°C/W.
$T_J = T_{OP} + P_{IN} . \eta . R_{TH}$, where $T_J < T_{JMAX}$

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EUDirective2002/95/EC (at time of this document revision).

Truth Table

Switch State	VC1	VC2	ANT - RF1	ANT - RF2
A	High	Low	Insertion loss	Isolation
B	Low	High	Isolation	Insertion Loss

General Test Conditions

Bias Voltages	Low=0V to 0.2V, High=2.5V to 5V
Port Impedances	50Ω
Off-Arm Termination	50Ω

Note: External DC blocking capacitors are required on all RF ports (typ: 47pF). All unused ports terminated in 50Ω.

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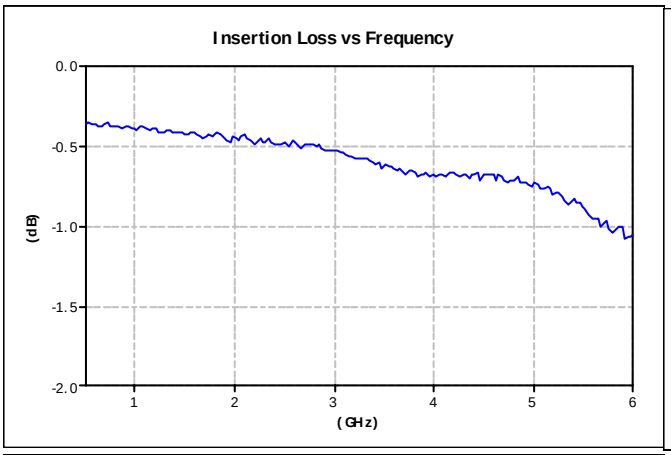
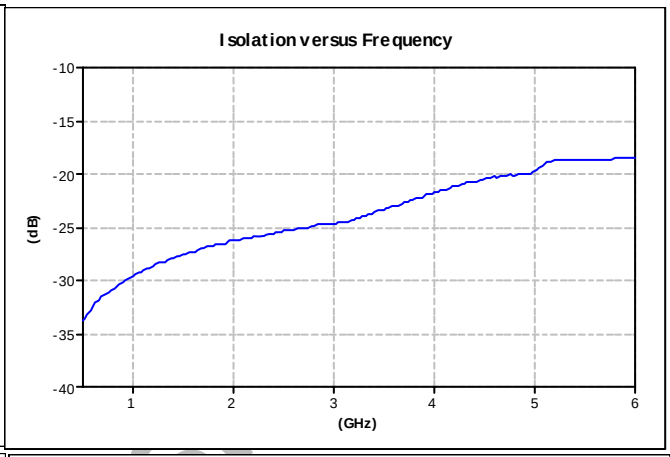
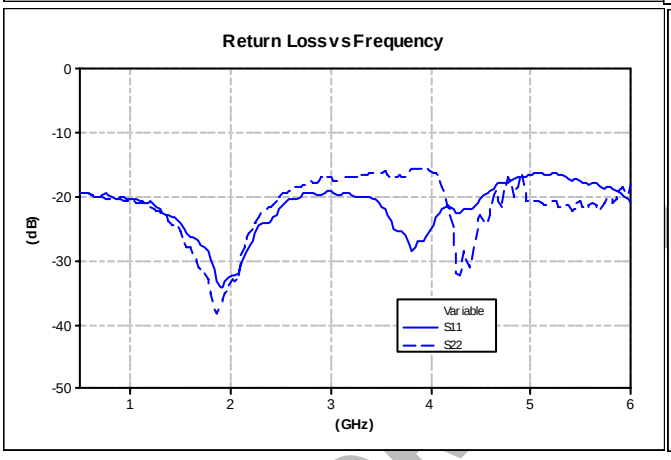
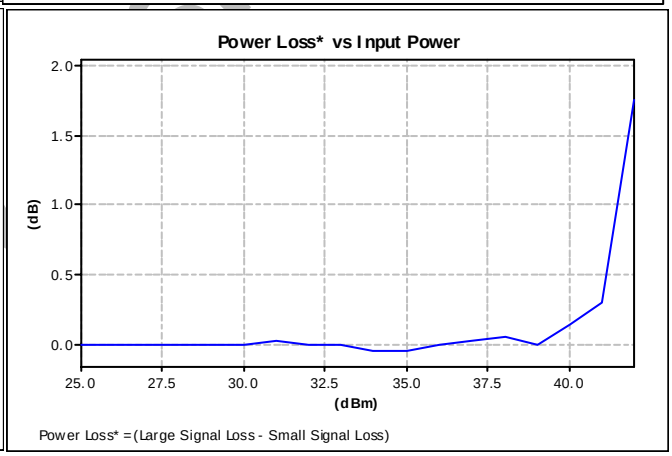
Typical Measured Performance on Evaluation Board (De-embedded)

Measurement Conditions: V_{CTRL} = 2.5V (high) and 0V (low), $T_{AMBIENT}$ = 25°C unless otherwise stated.



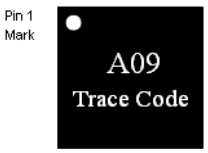






Part Identification

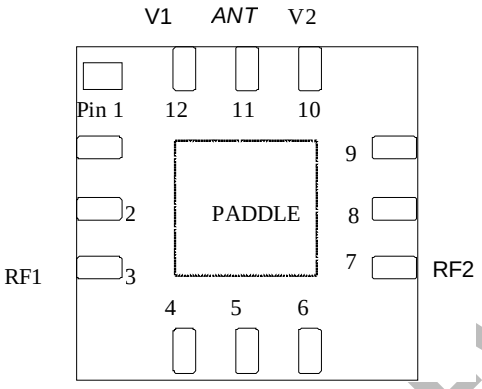
Marking



1st row Device code 'A09'

2nd row Trace Code to be assigned by SubCon

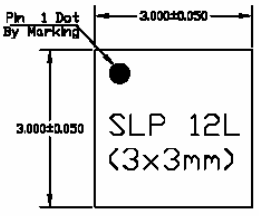
Pad Layout



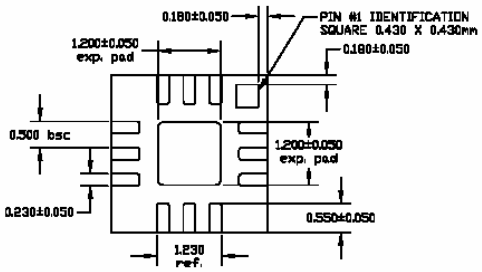
Pin	Description
1	NC
2	NC
3	RF1
4	NC
5	NC
6	NC
7	RF2
8	NC
9	NC
10	V2
11	ANT RF
12	V1
Paddle	Ground

Package Drawing

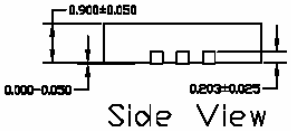
QFN 12-Lead 3mmx3mm



Top View



Btm View



Side View

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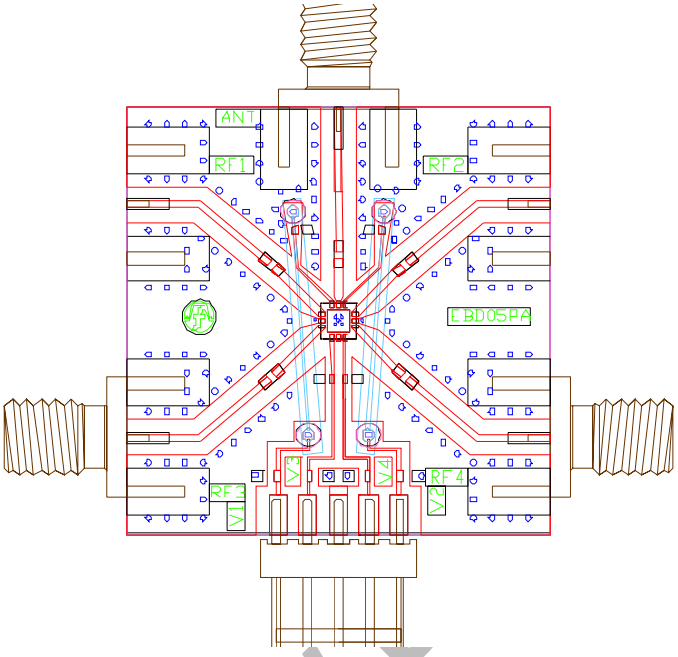
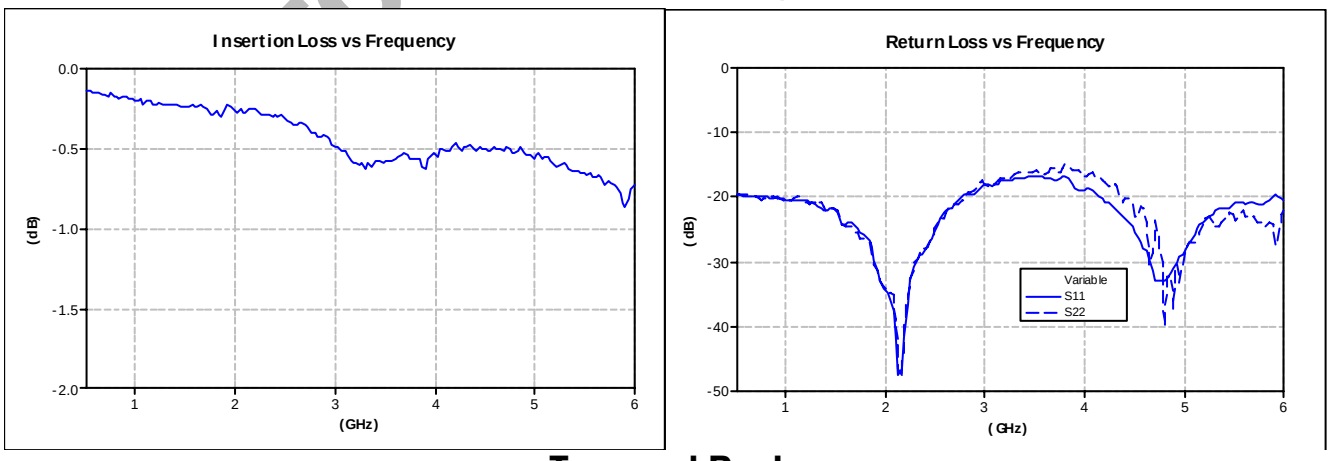
Evaluation Board Layout



Bill of Materials

Label	Component
C3, C4	Capacitor, 470pF, 0603
C1, C2, C7	Capacitor, 100pF, 0402
C5, C6	Capacitor, 47pF, 0402
Board	Preferred evaluation board material is 0.25mm thick ROGERS RT4350. All RF tracks should be 50Ω characteristic impedance.

Evaluation Board De-embedding Data (Measured)



Tape and Reel

Tape and reel information on this material is in accordance with EIA-481-1 except where exceptions are identified.

Preferred Assembly Instructions

This package is compatible with both lead-free and leaded solder reflow processes as defined within IPC/JEDEC J-STD-020.The maximum package temperature should not exceed 260°C.

Handling Precautions

To avoid damage to the devices, care should be exercised during handling. Proper Electrostatic Discharge (ESD) precautions should be observed at all stages of storage, handling, assembly, and testing.

ESD Rating

These devices should be treated as Class 1A (250V to 500V) as defined in JEDEC Standard No. 22-A114. Further information on ESD control measures can be found in MIL-STD-1686 and MIL-HDBK-263.

MSL Rating

The device has an MSL rating of Level 2. To determine this rating, prefonditioning was performed to the device per the Pb-Free solder profile defined within IPC/JEDEC J-STD-020C, Moisture/Reflow sensitivity classification for non-hermetic solid state surface mount devices.

Application Notes and Design Data

Application Notes and design data including S-parameters are available on request from www.RFMD.com.

Reliability

A MTTF of 4.2 million hours at a channel temperature of 150°C is achieved for the process used to manufacture this device.

Disclaimers

This product is not designed for use in any space-based or life-sustaining/supporting equipment.

Ordering Information

Delivery Quantity	Ordering Code
Reel of 1000	FMS2020-001
Reel of 100	FMS2020-001SR
Bag of 25	FMS2020-001SQ
Bag of 5	FMS2020-001SB
Packaged Die Mounted on Evaluation Board	FMS2020-001-EB

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