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FMS2027

DC-20GHz MMIC LOW LOSS SPDT ABSORPTIVE SWITCH

Package Style: Bare Die

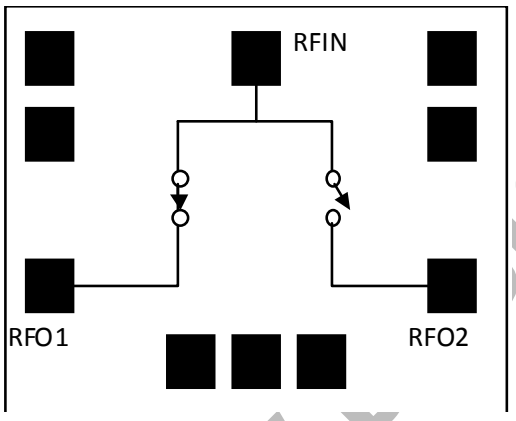
Product Description

The FMS2027 is a low loss, high isolation broadband single-pole double-throw Gallium Arsenide switch, designed on the FL05 0.5µm switch process from RFMD. It offers absorptive properties from the output (50Ω termination). This process technology offers leading-edge performance optimized for switch applications.

The FMS2027 is developed for the broadband communications, instrumentation, and electronic warfare markets.

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

- Low Insertion Loss: 2.1dB at 20GHz
- High Isolation: 42dB at 20GHz
- Absorptive Output in Off State
- Excellent Low Control Voltage Performance

Applications

- Broadband Communications
- Test Instrumentation
- Fiber Optics
- Electronic Warfare (ECM, ESM)

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Electrical Specifications (Small-Signal Unless Noted)					Based on on-wafer measurements. $T_{AMBIENT}$=25°C, V_{CTRL}=0V/-5V, Z_{IN}=Z_{OUT}=50Ω
Insertion Loss	-1	-0.85		dB	DC
	-1.5	-1.3		dB	10GHz
	-1.8	-1.6		dB	15GHz
	-2.3	-2.1		dB	20GHz
Isolation		-42	-40	dB	DC-20GHz
Input Return Loss (ON State)		-12	-10	dB	DC-20GHz
Output Return Loss (OFF State)		-16	-13	dB	DC-20GHz
Output Return Loss (OFF State)		-22	-12	dB	DC-20GHz
P1dB	23	23		dBm	2GHz
	21	22.5		dBm	10GHz
	19	21		dBm	18GHz

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Absolute Maximum Ratings

Parameter	Rating	Unit
Maximum Input Power (P_{IN})	+27	dBm
Control Voltage (V_{CTRL})		V
Operating Temperature (T_{OPER})	-40 to 85	°C
Storage Temperature (T_{STOR})	-55 to 150	°C

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.

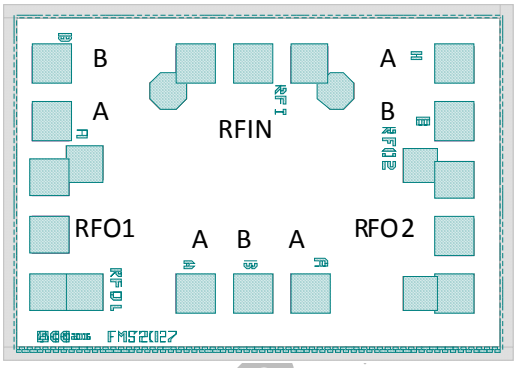
RoHS status based on EUDirective2002/95/EC (at time of this document revision).

Truth Table

Control Line		RF Path	
A	**B**	**RFIN-RFO1**	**RFIN-RFO2**
-5V	0V	On	Off
0V	-5V	Off	On

Notes: -5V±0.2V; -0V±0.2V

Pad Layout



Pad	Description
RFIN	**RFIN**
RFO1	**RFOUT1**
RFO2	**RFOUT2**
A	**VA1**
A	**VA2**
A	**VA3**
A	**VA4**
B	**VB1**
B	**VB2**
B	**VB3**

Note: Only one control line A and one control line B require connection.

Die Size (μm)	Die Thickness (μm)	Min. Bond Pad Pitch (μm)	Min. Bond Pad Opening (μmxμm)
1336x934	100	146	94x94

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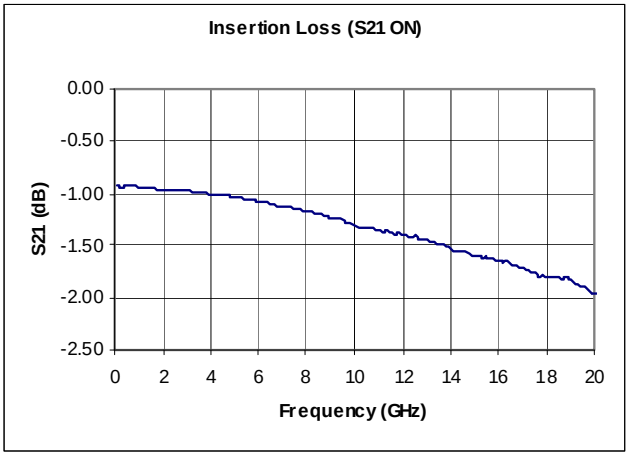
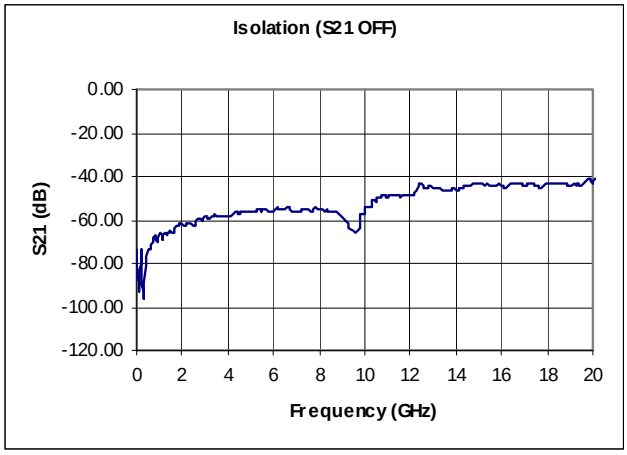
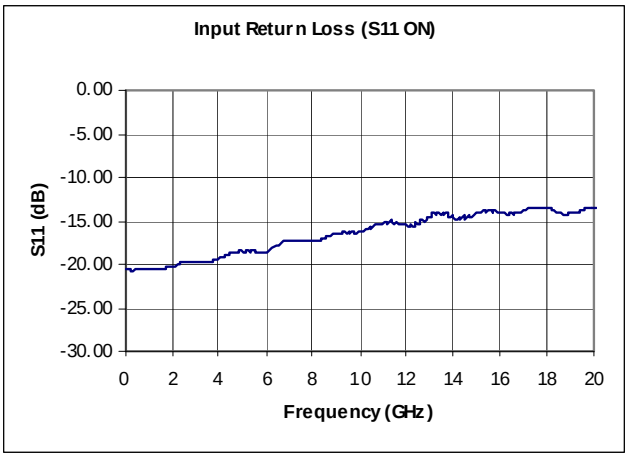
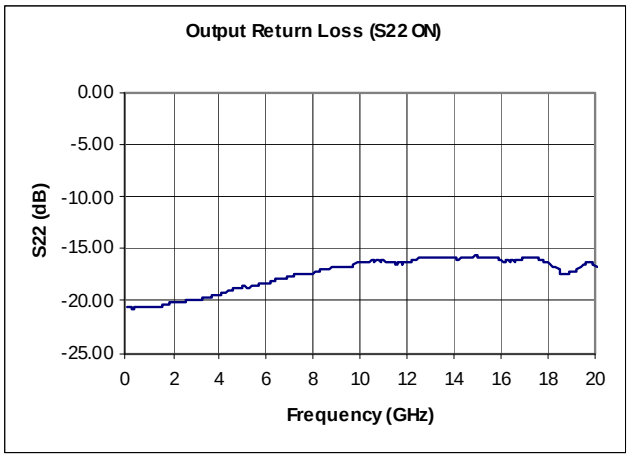
Typical Measured Performance On Wafer

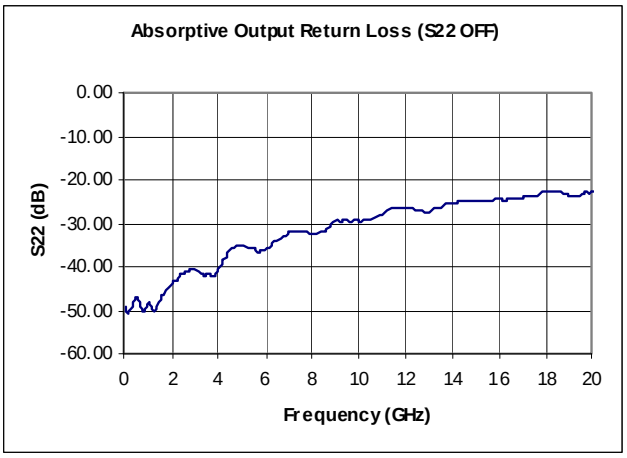
Measurement Conditions: V_{CTRL}=5V (low) and 0V (high), $T_{AMBIENT}$=25°C.
Both arms RFO1 and RFO2 are symmetrical.

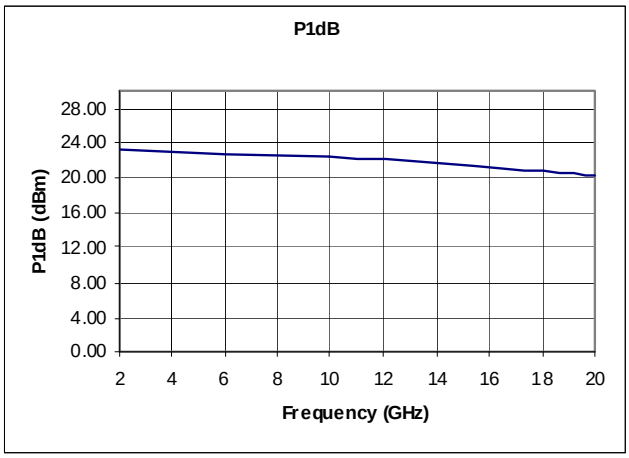










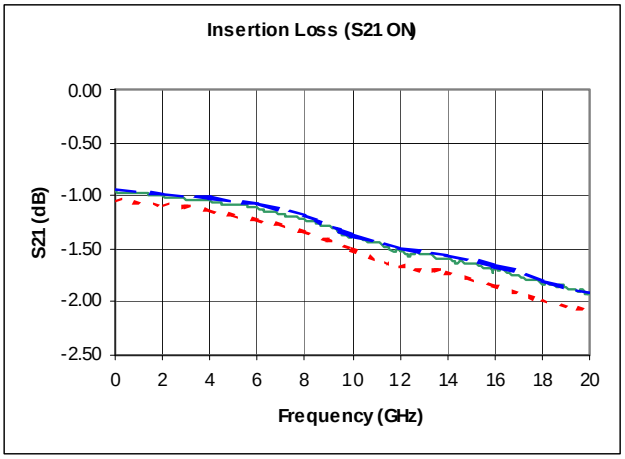


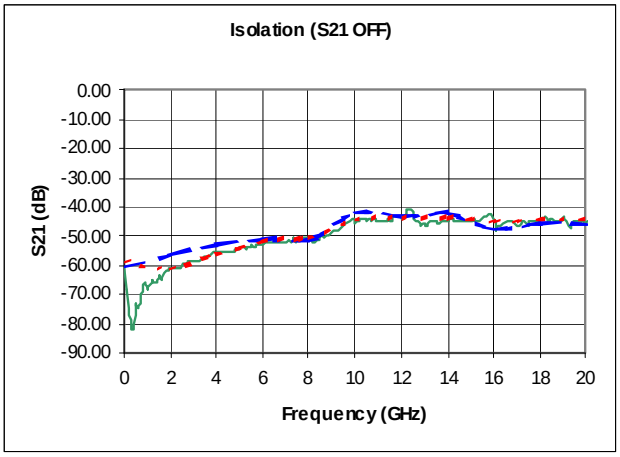
Typical Measured Performance On-Wafer Over Temperature

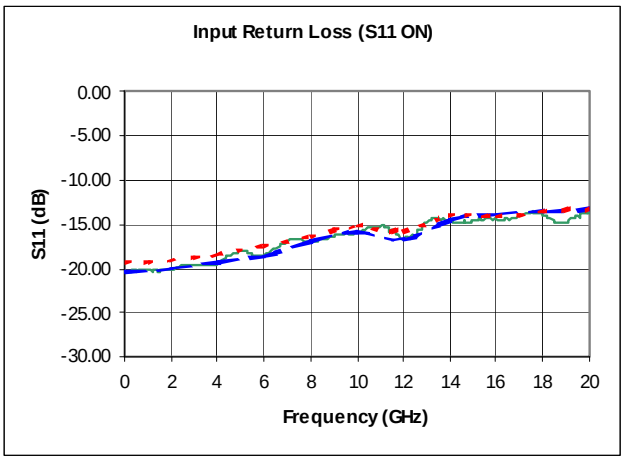
Measurement Conditions: V_{CTRL}=-5V (low) and 0V (high).

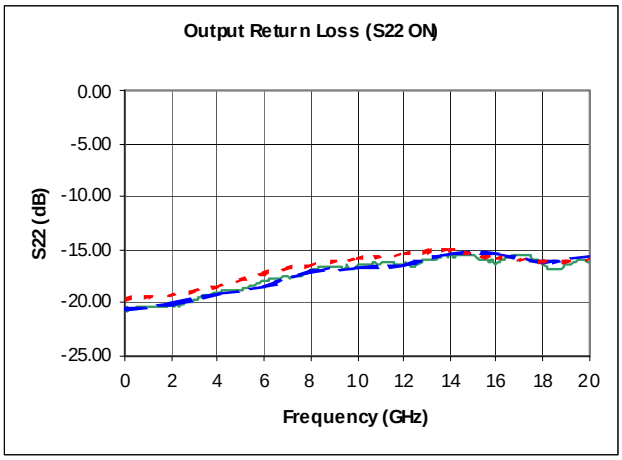
Both arms RFO1 and RFO2 are symmetrical.

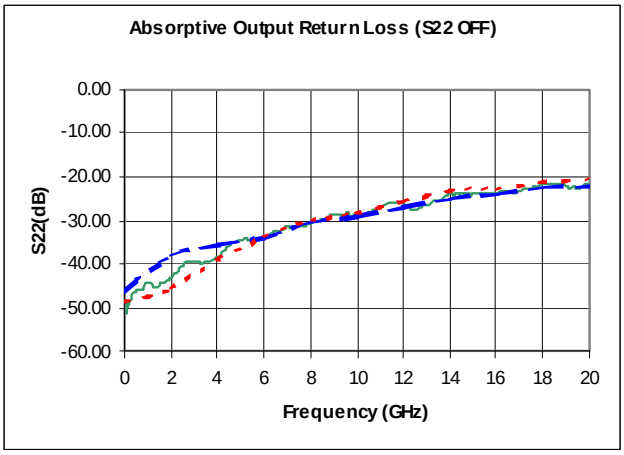
$T_{AMBIENT}$=25°C, T_{COLD}=-40°C, T_{HOT}=+85°C











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Preferred Assembly Instructions

GaAs devices are fragile and should be handled with great care. Specially designed collets should be used where possible.

The back of the die is metallized and the recommended mounting method is by the use of conductive epoxy. Epoxy should be applied to the attachment surface uniformly and sparingly to avoid encroachment of epoxy onto the top face of the die. Ideally it should not exceed half the chip height. For automated dispense Ablestick LMISR4 is recommended and for manual dispense Ablestick 84-1 LMI or 84-1 LMIT are recommended. These should be cured at a temperature of 150°C for one hour in an oven especially set aside for epoxy curing only. If possible the curing oven should be flushed with dry nitrogen. The gold-tin (80% Au 20% Sn) eutectic die attach has a melting point of approximately 280°C but the absolute temperature being used depends on the leadframe material used and the particular application. The maximum time at used should be kept to a minimum.

This part has gold (Au) bond pads requiring the use of gold (99.99% pure) bondwire. It is recommended that 25.4mm diameter gold wire be used. Recommended lead bond technique is thermocompression wedge bonding with 0.001" (25µm) diameter wire. Bond force, time stage temperature and ultrasonics are all critical parameters and the settings are dependent on the setup and application being used. Ultrasonic or thermosonic bonding is not recommended.

Bonds should be made from the die first and then to the mounting substrate or package. The physical length of the bondwires should be minimized especially when making RF or ground connections.

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/MSL Rating

These devices should be treated as Class 1A (250V to 500V) using the human body model 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. This is an unpackaged part and therefore no MSL rating applies.

Application Notes and Design Data

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

Reliability

An MTTF of in excess of 9 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
Full Pack (100)	FMS2027-000
Small Quantity (25)	FMS2027-000SQ
Sample Quantity (3)	FMS2027-000S3