High Power

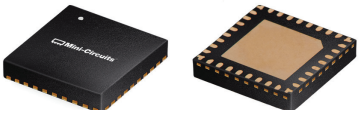
SPDT RF Switch

HSW2-272VHDR+

RF Switch with internal driver
Single Supply Voltage, +2.3V to +5.5V

The Big Deal

- High power handling, 32W @ 850 MHz - Pulsed
- High IIP3, +81 dBm
- Immune to latch-up



CASE STYLE: JY2179

Product Overview

Mini-Circuits' HSW2-272VHDR+ is a MMIC SPDT reflective switch with an internal driver designed for wideband operation from 30 to 2700 MHz with high RF input power handling. This model provides high linearity, low insertion loss, fast switching speed and low current consumption in a tiny 5x5mm 32-lead MCLP package. Produced using a unique CMOS process on silicon, it offers the performance of GaAs with the advantages of conventional CMOS devices. HSW2-272VHDR+ provides a high level of ESD protection and excellent repeatability. The switch operates on a single positive supply voltage with very low current consumption of 120µA (typical).

Key Features

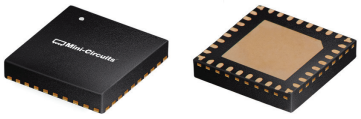
Feature	Advantages
Wideband, 30 to 2700 MHz	One model can be used in many applications, saving component count. Also ideal for wideband applications such as military and instrumentation.
High power: • 32W @ 850 MHz Pulsed • 20W @ 850 MHz CW	Suitable for signal routing applications with high power requirement such as antenna feeds in transmit systems and more.
Low insertion loss: • 0.25 dB @ 850 MHz • 0.4 dB @ 2000 MHz	Provides excellent transmission of signal power from input to output and minimizes overall system loss.
High isolation: • 34 dB at 1000 MHz • 27 dB at 2700 MHz	High isolation significantly reduces leakage of power into OFF ports.
High linearity, +85 dBm IIP3	High linearity minimizes unwanted inter-modulation products which are difficult or impossible to filter in multi-carrier environments, or in the presence of strong interfering signal from adjacent circuitry or received by antenna.
Small size, 5 x 5mm QFN package	Small footprint for a high power switch saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.

High Power

SPDT RF Switch

50Ω 30 - 2700 MHz

RF Switch with internal driver
Single Supply Voltage, +2.3V to +5.5V



Generic photo used for illustration purposes only

HSW2-272VHDR+

CASE STYLE: JY2179

+RoHS Compliant
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Product Features

- High Power
  45 dBm (32W) at 850 MHz, 44 dBm (25W) at 2 GHz - Pulsed
- High IIP3
  85 dBm at 850 MHz, 81 dBm at 2.7 GHz
- Low Insertion Loss
  0.25 dB at 850 MHz, 0.4 dB at 2 GHz
- Low current consumption, 120 µA typ.
- Immune to latch up

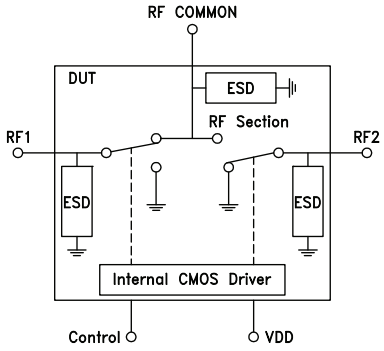
Typical Applications

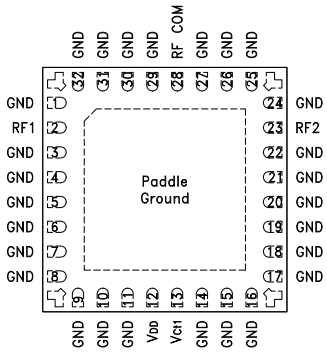
- Defense
- Communication Infrastructure
- Test and Measurements

General Description

HSW2-272VHDR+ is a high power reflective SPDT switch with integral CMOS driver, operates with single positive supply voltage while consuming, 120 µA typical. It has been designed for wideband operation. It is packaged in a tiny 5mm x 5mm, 32-lead package and is rated MSL3 and passes 1.5KV for ESD (HBM).

Simplified Schematic and Pad Description





Function	Pad Number	Description
RF COM	28	RF common/ SUM port*
RF1	2	RF out #1/In port #1*
RF2	23	RF out #1/In port #2*
Control	13	CMOS Control IN
VDD	12	Supply voltage
GND	1,3-11,14-22, 24-27, 29-32, paddle	RF ground

*Must be held at 0V DC. If required add DC blocking capacitors on these ports.

RF Electrical Specifications[1], T_{AMB}=25°C, 50Ω, V_{DD}= +3.3V

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency range		30		2700	MHz
Insertion loss[2,4]	30 - 1000	—	0.3	0.45	dB
	1000 - 2000	—	0.4	0.60	
	2000 - 2700	—	0.7	0.95	
Isolation between Common port and RF1/RF2 Ports	30 - 1000	34	35	—	dB
	1000 - 2000	27	28	—	
	2000 - 2700	23	24	—	
Isolation between RF1 and RF2 ports	30 - 1000	34	37	—	dB
	1000 - 2000	27	30	—	
	2000 - 2700	23	26	—	
Return loss (ON STATE)	30 - 1000	—	30	—	dB
	1000 - 2000	—	20	—	
	2000 - 2700	—	20	—	
Harmonics	2f=+45 dBm pulsed at 1 GHz	—	-94	-90	dBc
	3f=+45 dBm pulsed at 1 GHz	—	-84	-80	
Input IP3	850	—	85	—	dBm
	2700	—	81	—	
Input 0.1 dB Compression[3]	30 - 2000	—	35.5	—	W
	2000 - 2700	—	28.2	—	
RF Input Power Operating CW[6] (Cold Switching)	30 - 2000	—	—	20.0	W
	2000 - 2700	—	—	15.8	
Hot Switching	30 - 2700	—	—	1.0	
RF Input Power Operating pulsed[5,7]	30 - 2000	—	—	31.6	W
	2000 - 2700	—	—	25.1	
Thermal Resistance Junction to case	—		35.6		°C/W
Operating Juction Temperature			—	140	°C

Notes:
1. Tested on Mini-Circuits' test board TB-923+, using Agilent's N5230A network analyzer (see Characterization test circuit, Fig.1).
2. Insertion loss values are de-embedded from test board loss.
3. 0.1 dB Compression is a measure of linearity. For continuous operation do not exceed RF input power operating specs.
4. Insertion loss and return loss are improved by external matching, see Test board drawing.
5. 10% duty cycle, 4620 µ period.
6. Derate linearly to 10W (over 30-2000 MHz) and 8W (over 2000-2700 MHz) at 85°C
7. Derate linearly to 15.8W (over 30-2000 MHz) and 12.5W (over 2000-2700 MHz) at 85°C
8. Maximum control voltage high also cannot exceed V_{DD}

DC Electrical Specifications

Parameter	Min.	Typ.	Max.	Units
Supply voltage, V_{DD}	2.3		5.5	V
Supply current	—	130	200	µA
Control voltage Low	-0.3		0.6	V
Control voltage High[8]	1.17		3.6	V
Control current	—	2.0	—	µA

Switching Specifications

Parameter	Condition	Min.	Typ.	Max.	Units
Switching time 50% Control to 90%/10% RF	Control 0 to 3.4V Frequency: 10 kHz V_{DD}=2.3/3 4/5.5V	—	15	25	µSec
Switching time 50% Control to 0.01 dB	V_{CTRL}=100Hz, 0 to 3V V_{DD}=3.3V	—	41	—	µSec
Video feed-through	Control 0 to 3.4V Frequency: 10 kHz V_{DD}=2.3/3 4/5.5V	—	27	—	mV_{P-P}
Rise/Fall Time 10 to 90% or 90 to 10%	Control 0 to 3.4V Frequency: 10 kHz V_{DD}=2.3/3 4/5.5V	—	14	—	µSec

Absolute Maximum Ratings[9]

Parameter		Ratings
Operating temperature		-40°C to +85°C
Storage temperature		-65°C to 150°C
V_{DD}, Supply voltage		-0.3 to 5.5V
Voltage control		-0.3V Min. 3.6 Max.
RF Input power, CW	0.03 - 2 GHz	35.5W
	2 - 2.7 GHz	28.2W
Junction Temperature		200°C (10s max)

9. Operation of this device above any of these conditions may cause permanent damage.

Truth Table (State of control voltage selects the desired switch state)

State of Control voltage	RF common to	
	RF1	RF2
High	ON	OFF
Low	OFF	ON

ON- low insertion loss state OFF- Isolation State

Characterization Test Circuit

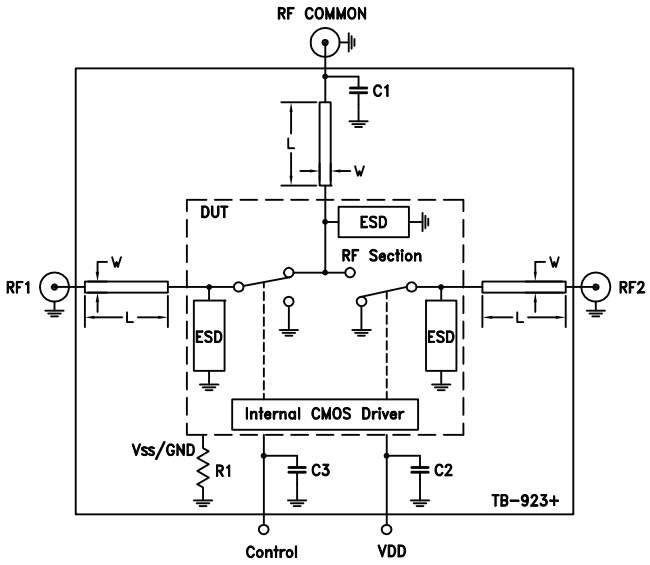
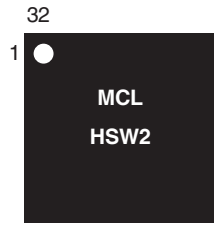


Figure 1. Block Diagram of test Circuit used for characterization (DUT soldered on Mini-Circuit's TB-923+)

Component	Value	Size	Manufacturer	Remarks
C1	0.2 pF	0402	Various	—
C2	0.01µF	0603	Various	—
C3	100 pF	0603	Various	—
R1	0Ω	0603	Various	—
L	—	0.195"	—	See PL drawing
W	—	0.012"	—	See PL drawing

Product Marking



Marking may contain other features or characters for internal lot control

Additional Detailed Technical Information

additional information is available on our dash board. To access this information click here

Performance Data	Data Table
	Swept Graphs
Case Style	JY2179 *Plastic package, exposed paddle*
Tape & Reel **Standard quantities available on reel**	F68 *7" reels with 20, 50, 100, 200, 500, 1000 devices* *13" reels with 3K devices*
Suggested Layout for PCB Design	PL-494
Evaluation Board	TB-923+
Environmental Ratings	ENV83

ESD Rating

Human Body Model (HBM): Class 1C (pass 1000V) in accordance with MIL-STD-883, Method 3015

MSL Rating

Moisture Sensitivity: MSL3 in accordance with IPC/JEDEC J-STD-020D

Additional Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

Typical Performance Data

RF FREQ (MHz)	INSERTION LOSS (dB)		RF FREQ (MHz)	ISOLATION (dB)			
	VDD=+3.4V			VDD=+3.4V		VDD=+3.4V	
	RF COM-RF1	RF COM-RF2		RF COM-RF1	RF COM-RF2	RF1-RF2 State LOW*	RF1-RF2 State HIGH*
10	0.18	0.17	10	74.33	74.48	75.35	76.30
30	0.18	0.18	30	65.90	65.73	67.70	68.13
50	0.18	0.18	50	61.36	61.53	63.42	63.96
70	0.18	0.18	70	58.57	58.45	60.43	61.07
100	0.19	0.18	100	55.45	55.43	57.42	58.13
200	0.20	0.19	200	49.42	49.30	51.52	52.18
400	0.21	0.21	400	43.30	43.24	45.59	46.23
600	0.24	0.23	600	39.77	39.60	42.06	42.76
800	0.25	0.25	800	37.13	37.06	39.51	40.22
1000	0.29	0.27	1000	35.07	35.03	37.51	38.21
1300	0.35	0.33	1300	32.54	32.55	35.01	35.68
1400	0.36	0.36	1400	31.80	31.83	34.23	34.90
1500	0.39	0.39	1500	31.08	31.14	33.51	34.16
1600	0.41	0.41	1600	30.40	30.45	32.78	33.41
1700	0.42	0.42	1700	29.74	29.81	32.08	32.69
1800	0.44	0.43	1800	29.10	29.15	31.37	31.96
1900	0.45	0.44	1900	28.45	28.51	30.65	31.24
2000	0.44	0.44	2000	27.81	27.89	29.94	30.53
2100	0.44	0.43	2100	27.15	27.29	29.25	29.86
2200	0.43	0.42	2200	26.51	26.67	28.60	29.20
2300	0.42	0.42	2300	25.86	26.10	27.95	28.58
2400	0.43	0.42	2400	25.23	25.56	27.32	27.99
2500	0.44	0.44	2500	24.64	24.99	26.72	27.42
2600	0.47	0.48	2600	24.04	24.47	26.16	26.88
2700	0.54	0.54	2700	23.52	24.00	25.65	26.45
2800	0.62	0.64	2800	23.03	23.55	25.14	25.95
2900	0.73	0.75	2900	22.59	23.12	24.64	25.51
3000	0.89	0.89	3000	22.16	22.79	24.20	25.06
3100	1.06	1.07	3100	21.81	22.39	23.80	24.70
3200	1.23	1.26	3200	21.50	22.05	23.43	24.35
3300	1.43	1.47	3300	21.19	21.75	23.05	23.98
3400	1.65	1.69	3400	20.88	21.44	22.71	23.63
3500	1.87	1.92	3500	20.61	21.16	22.39	23.33
3600	2.08	2.13	3600	20.38	20.90	22.18	23.07
3700	2.29	2.35	3700	20.10	20.63	21.86	22.78
3800	2.50	2.56	3800	19.86	20.38	21.60	22.48
3900	2.70	2.76	3900	19.68	20.18	21.43	22.22
4000	2.91	2.95	4000	19.51	20.00	21.21	21.94

***Note:**

State of Control Voltage	
LOW	RF COM-RF2 ON
HIGH	RF COM-RF1 ON
ON - Low insertion loss state	
OFF - Isolation state	

Typical Performance Data

RF FREQ (MHz)	VSWR (:1) VDD=+3.4V RF COM State LOW*	RF COM State HIGH*	RF1 State HIGH*	RF2 State LOW*	RF FREQ (MHz)	VSWR (:1) VDD=+3.4V RF1 State LOW*	RF2 State HIGH*
10	1.04	1.04	1.04	1.03	10	2.52	2.64
30	1.04	1.04	1.04	1.03	30	2.52	2.63
50	1.04	1.04	1.04	1.04	50	2.51	2.63
70	1.04	1.04	1.04	1.04	70	2.51	2.63
100	1.04	1.04	1.04	1.04	100	2.50	2.62
200	1.05	1.05	1.04	1.04	200	2.49	2.61
400	1.05	1.06	1.03	1.03	400	2.46	2.57
600	1.06	1.07	1.01	1.01	600	2.45	2.56
800	1.08	1.09	1.02	1.02	800	2.45	2.56
1000	1.12	1.13	1.07	1.06	1000	2.49	2.60
1300	1.21	1.21	1.17	1.16	1300	2.62	2.72
1400	1.25	1.25	1.20	1.19	1400	2.69	2.79
1500	1.28	1.28	1.23	1.23	1500	2.77	2.87
1600	1.31	1.31	1.25	1.26	1600	2.85	2.95
1700	1.33	1.32	1.27	1.28	1700	2.94	3.05
1800	1.33	1.33	1.28	1.28	1800	3.03	3.15
1900	1.33	1.33	1.28	1.28	1900	3.13	3.25
2000	1.30	1.31	1.26	1.27	2000	3.22	3.36
2100	1.27	1.28	1.23	1.24	2100	3.31	3.46
2200	1.24	1.24	1.20	1.20	2200	3.40	3.56
2300	1.21	1.21	1.16	1.17	2300	3.48	3.66
2400	1.20	1.18	1.14	1.16	2400	3.55	3.76
2500	1.21	1.18	1.16	1.18	2500	3.62	3.83
2600	1.27	1.23	1.22	1.24	2600	3.67	3.89
2700	1.36	1.32	1.32	1.34	2700	3.70	3.93
2800	1.46	1.43	1.44	1.46	2800	3.71	3.95
2900	1.58	1.56	1.58	1.58	2900	3.69	3.95
3000	1.74	1.72	1.74	1.75	3000	3.65	3.95
3100	1.92	1.90	1.91	1.94	3100	3.60	3.92
3200	2.09	2.07	2.09	2.12	3200	3.54	3.87
3300	2.28	2.25	2.28	2.32	3300	3.45	3.81
3400	2.48	2.44	2.47	2.53	3400	3.34	3.72
3500	2.68	2.63	2.66	2.72	3500	3.22	3.60
3600	2.86	2.81	2.85	2.90	3600	3.11	3.50
3700	3.02	2.97	3.02	3.08	3700	2.97	3.38
3800	3.17	3.12	3.18	3.24	3800	2.84	3.26
3900	3.32	3.28	3.35	3.38	3900	2.73	3.15
4000	3.43	3.40	3.50	3.52	4000	2.62	3.03

***Note:**

State of Control Voltage	
LOW	RF COM-RF2 ON
HIGH	RF COM-RF1 ON
ON - Low insertion loss state	
OFF - Isolation state	

Typical Performance Data

RF FREQ (MHz)	INSERTION LOSS (dB) @ VDD=+3.4V OVER TEMPERTURE					
	RF COM-RF1			RF COM-RF2		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
10	0.14	0.18	0.21	0.14	0.18	0.21
30	0.14	0.18	0.21	0.14	0.18	0.21
50	0.14	0.18	0.21	0.14	0.18	0.21
70	0.14	0.18	0.22	0.14	0.18	0.22
100	0.14	0.19	0.22	0.14	0.19	0.22
200	0.13	0.20	0.24	0.13	0.20	0.24
400	0.12	0.21	0.27	0.12	0.21	0.27
600	0.11	0.24	0.31	0.11	0.24	0.31
800	0.10	0.25	0.34	0.10	0.25	0.34
1000	0.10	0.29	0.38	0.10	0.29	0.38
1300	0.12	0.35	0.46	0.12	0.35	0.46
1400	0.12	0.36	0.49	0.12	0.36	0.49
1500	0.14	0.39	0.53	0.14	0.39	0.53
1600	0.15	0.41	0.56	0.15	0.41	0.56
1700	0.15	0.42	0.58	0.15	0.42	0.58
1800	0.15	0.44	0.59	0.15	0.44	0.59
1900	0.15	0.45	0.60	0.15	0.45	0.60
2000	0.14	0.44	0.60	0.14	0.44	0.60
2100	0.14	0.44	0.60	0.14	0.44	0.60
2200	0.12	0.43	0.59	0.12	0.43	0.59
2300	0.11	0.42	0.58	0.11	0.42	0.58
2400	0.12	0.43	0.60	0.12	0.43	0.60
2500	0.12	0.44	0.61	0.12	0.44	0.61
2600	0.14	0.47	0.66	0.14	0.47	0.66
2700	0.19	0.54	0.74	0.19	0.54	0.74
2800	0.25	0.62	0.84	0.25	0.62	0.84
2900	0.32	0.73	0.97	0.32	0.73	0.97
3000	0.44	0.89	1.15	0.44	0.89	1.15
3100	0.59	1.06	1.33	0.59	1.06	1.33
3200	0.75	1.23	1.53	0.75	1.23	1.53
3300	0.92	1.43	1.75	0.92	1.43	1.75
3400	1.13	1.65	1.96	1.13	1.65	1.96
3500	1.33	1.87	2.17	1.33	1.87	2.17
3600	1.54	2.08	2.39	1.54	2.08	2.39
3700	1.76	2.29	2.59	1.76	2.29	2.59
3800	1.95	2.50	2.80	1.95	2.50	2.80
3900	2.17	2.70	2.99	2.17	2.70	2.99
4000	2.40	2.91	3.18	2.40	2.91	3.18

RF FREQ (MHz)	ISOLATION (dB) @ VDD=+3.4V OVER TEMPERTURE											
	RF COM-RF1			RF COM-RF2			RF1-RF2 State LOW*			RF1-RF2 State HIGH*		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
10	75.37	74.33	72.55	75.76	74.48	73.41	75.37	75.35	74.03	77.04	76.30	74.94
30	66.97	65.90	64.76	66.90	65.73	64.96	66.97	67.70	66.54	69.80	68.13	67.12
50	62.49	61.36	60.54	62.53	61.53	60.68	62.49	63.42	62.29	65.25	63.96	62.93
70	59.61	58.57	57.77	59.63	58.45	57.66	59.61	60.43	59.49	62.44	61.07	60.09
100	56.49	55.45	54.63	56.41	55.43	54.65	56.49	57.42	56.36	59.49	58.13	57.04
200	50.40	49.42	48.56	50.35	49.30	48.58	50.40	51.52	50.41	53.61	52.18	51.04
400	44.29	43.30	42.58	44.26	43.24	42.50	44.29	45.59	44.53	47.47	46.23	45.19
600	40.62	39.77	39.02	40.59	39.60	38.93	40.62	42.06	41.12	43.86	42.76	41.76
800	37.94	37.13	36.44	37.92	37.06	36.43	37.94	39.51	38.70	41.20	40.22	39.35
1000	35.79	35.07	34.44	35.78	35.03	34.43	35.79	37.51	36.76	39.08	38.21	37.44
1300	33.17	32.54	31.98	33.16	32.55	31.99	33.17	35.01	34.36	36.36	35.68	35.02
1400	32.39	31.80	31.24	32.39	31.83	31.30	32.39	34.23	33.64	35.53	34.90	34.27
1500	31.65	31.08	30.53	31.64	31.14	30.62	31.65	33.51	32.91	34.77	34.16	33.54
1600	30.92	30.40	29.88	30.91	30.45	29.95	30.92	32.78	32.20	33.97	33.41	32.81
1700	30.22	29.74	29.22	30.21	29.81	29.31	30.22	32.08	31.52	33.18	32.69	32.12
1800	29.57	29.10	28.59	29.57	29.15	28.67	29.57	31.37	30.80	32.42	31.96	31.39
1900	28.89	28.45	27.98	28.88	28.51	28.03	28.89	30.65	30.12	31.68	31.24	30.67
2000	28.23	27.81	27.33	28.22	27.89	27.41	28.23	29.94	29.43	30.95	30.53	29.99
2100	27.55	27.15	26.67	27.55	27.29	26.83	27.55	29.25	28.75	30.26	29.86	29.35
2200	26.87	26.51	26.05	26.86	26.67	26.23	26.87	28.60	28.10	29.62	29.20	28.69
2300	26.21	25.86	25.41	26.20	26.10	25.66	26.21	27.95	27.48	28.97	28.58	28.09
2400	25.57	25.23	24.80	25.56	25.56	25.12	25.57	27.32	26.87	28.37	27.99	27.51
2500	24.92	24.64	24.22	24.91	24.99	24.58	24.92	26.72	26.32	27.77	27.42	26.99
2600	24.32	24.04	23.68	24.31	24.47	24.10	24.32	26.16	25.78	27.17	26.88	26.48
2700	23.69	23.52	23.18	23.69	24.00	23.65	23.69	25.65	25.31	26.70	26.45	26.08
2800	23.17	23.03	22.75	23.16	23.55	23.24	23.17	25.14	24.86	26.18	25.95	25.63
2900	22.66	22.59	22.36	22.65	23.12	22.87	22.66	24.64	24.43	25.65	25.51	25.24
3000	22.22	22.16	21.99	22.23	22.79	22.54	22.22	24.20	24.05	25.10	25.06	24.87
3100	21.79	21.81	21.70	21.78	22.39	22.23	21.79	23.80	23.69	24.68	24.70	24.52
3200	21.39	21.50	21.44	21.39	22.05	21.96	21.39	23.43	23.38	24.26	24.35	24.22
3300	20.98	21.19	21.15	20.98	21.75	21.71	20.98	23.05	23.08	23.86	23.98	23.93
3400	20.64	20.88	20.94	20.65	21.44	21.43	20.64	22.71	22.80	23.46	23.63	23.64
3500	20.29	20.61	20.72	20.29	21.16	21.17	20.29	22.39	22.55	23.09	23.33	23.39
3600	19.95	20.38	20.47	19.95	20.90	20.95	19.95	22.18	22.26	22.80	23.07	23.12
3700	19.66	20.10	20.28	19.66	20.63	20.73	19.66	21.86	22.03	22.49	22.78	22.87
3800	19.35	19.86	20.07	19.35	20.38	20.51	19.35	21.60	21.83	22.12	22.48	22.62
3900	19.08	19.68	19.89	19.08	20.18	20.35	19.08	21.43	21.64	21.84	22.22	22.36
4000	18.89	19.51	19.73	18.90	20.00	20.16	18.89	21.21	21.44	21.54	21.94	22.09

***Note:**

State of Control Voltage	
LOW	RF COM-RF2 ON
HIGH	RF COM-RF1 ON

ON - Low insertion loss state
OFF - Isolation state

Typical Performance Data

RF FREQ (MHz)	VSWR (:1) @ VDD=+3.4V OVER TEMPERTURE											
	VDD=+3.4V						RF1			RF2		
	State LOW*			State HIGH*			ON			ON		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
10	1.03	1.04	1.05	1.03	1.04	1.05	1.03	1.04	1.04	1.03	1.03	1.04
30	1.03	1.04	1.05	1.03	1.04	1.05	1.03	1.04	1.04	1.03	1.03	1.04
50	1.03	1.04	1.05	1.03	1.04	1.05	1.03	1.04	1.04	1.03	1.04	1.04
70	1.03	1.04	1.05	1.03	1.04	1.05	1.03	1.04	1.04	1.03	1.04	1.04
100	1.03	1.04	1.05	1.03	1.04	1.05	1.03	1.04	1.04	1.03	1.04	1.04
200	1.04	1.05	1.06	1.04	1.05	1.06	1.03	1.04	1.05	1.03	1.04	1.05
400	1.05	1.05	1.07	1.05	1.06	1.08	1.03	1.03	1.05	1.03	1.03	1.05
600	1.07	1.06	1.08	1.07	1.07	1.08	1.03	1.01	1.04	1.02	1.01	1.05
800	1.10	1.08	1.09	1.10	1.09	1.09	1.06	1.02	1.01	1.05	1.02	1.01
1000	1.13	1.12	1.13	1.13	1.13	1.13	1.09	1.07	1.06	1.07	1.06	1.05
1300	1.20	1.21	1.23	1.20	1.21	1.24	1.17	1.17	1.18	1.15	1.16	1.17
1400	1.22	1.25	1.28	1.22	1.25	1.28	1.18	1.20	1.22	1.18	1.19	1.22
1500	1.25	1.28	1.32	1.25	1.28	1.31	1.21	1.23	1.25	1.21	1.23	1.26
1600	1.26	1.31	1.35	1.26	1.31	1.35	1.23	1.25	1.29	1.23	1.26	1.29
1700	1.27	1.33	1.37	1.27	1.32	1.37	1.24	1.27	1.31	1.24	1.28	1.32
1800	1.27	1.33	1.38	1.27	1.33	1.37	1.24	1.28	1.31	1.24	1.28	1.32
1900	1.27	1.33	1.37	1.27	1.33	1.37	1.24	1.28	1.32	1.24	1.28	1.32
2000	1.25	1.30	1.35	1.25	1.31	1.35	1.22	1.26	1.29	1.23	1.27	1.30
2100	1.23	1.27	1.31	1.23	1.28	1.32	1.20	1.23	1.26	1.22	1.24	1.27
2200	1.21	1.24	1.27	1.21	1.24	1.27	1.18	1.20	1.22	1.20	1.20	1.22
2300	1.19	1.21	1.23	1.19	1.21	1.23	1.16	1.16	1.17	1.18	1.17	1.18
2400	1.19	1.20	1.20	1.19	1.18	1.18	1.16	1.14	1.13	1.18	1.16	1.15
2500	1.21	1.21	1.20	1.21	1.18	1.18	1.20	1.16	1.14	1.21	1.18	1.16
2600	1.26	1.27	1.26	1.26	1.23	1.23	1.26	1.22	1.21	1.27	1.24	1.23
2700	1.34	1.36	1.35	1.34	1.32	1.31	1.34	1.32	1.31	1.36	1.34	1.34
2800	1.44	1.46	1.46	1.44	1.43	1.43	1.45	1.44	1.43	1.48	1.46	1.46
2900	1.55	1.58	1.60	1.55	1.56	1.58	1.57	1.58	1.59	1.59	1.58	1.60
3000	1.69	1.74	1.76	1.69	1.72	1.74	1.71	1.74	1.76	1.73	1.75	1.77
3100	1.88	1.92	1.93	1.88	1.90	1.91	1.90	1.91	1.92	1.92	1.94	1.95
3200	2.06	2.09	2.11	2.06	2.07	2.09	2.08	2.09	2.11	2.11	2.12	2.13
3300	2.23	2.28	2.30	2.23	2.25	2.28	2.27	2.28	2.30	2.30	2.32	2.34
3400	2.43	2.48	2.49	2.43	2.44	2.45	2.49	2.47	2.46	2.54	2.53	2.51
3500	2.64	2.68	2.65	2.64	2.63	2.61	2.69	2.66	2.64	2.76	2.72	2.68
3600	2.85	2.86	2.82	2.85	2.81	2.78	2.91	2.85	2.81	2.97	2.90	2.86
3700	3.04	3.02	2.97	3.04	2.97	2.91	3.14	3.02	2.94	3.20	3.08	3.00
3800	3.22	3.17	3.08	3.22	3.12	3.04	3.32	3.18	3.08	3.39	3.24	3.12
3900	3.45	3.32	3.19	3.45	3.28	3.15	3.55	3.35	3.22	3.60	3.38	3.24
4000	3.66	3.43	3.27	3.65	3.40	3.24	3.79	3.50	3.31	3.82	3.52	3.34

RF FREQ (MHz)	VSWR (:1) @ VDD=+3.4V OVER TEMPERTURE					
	RF1			RF2		
	OFF			OFF		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
10	3.02	2.52	2.16	3.14	2.64	2.27
30	3.01	2.52	2.15	3.13	2.63	2.26
50	3.01	2.51	2.15	3.13	2.63	2.26
70	3.00	2.51	2.16	3.12	2.63	2.27
100	2.99	2.50	2.16	3.11	2.62	2.27
200	2.98	2.49	2.14	3.10	2.61	2.26
400	2.98	2.46	2.11	3.09	2.57	2.21
600	2.99	2.45	2.07	3.11	2.56	2.17
800	3.04	2.45	2.06	3.16	2.56	2.18
1000	3.11	2.49	2.09	3.23	2.60	2.18
1300	3.32	2.62	2.21	3.40	2.72	2.29
1400	3.40	2.69	2.27	3.50	2.79	2.36
1500	3.49	2.77	2.33	3.60	2.87	2.44
1600	3.60	2.85	2.43	3.71	2.95	2.52
1700	3.70	2.94	2.51	3.82	3.05	2.61
1800	3.81	3.03	2.59	3.92	3.15	2.70
1900	3.92	3.13	2.69	4.05	3.25	2.79
2000	4.02	3.22	2.78	4.17	3.36	2.90
2100	4.13	3.31	2.85	4.30	3.46	3.00
2200	4.25	3.40	2.94	4.43	3.56	3.09
2300	4.31	3.48	3.02	4.51	3.66	3.19
2400	4.39	3.55	3.07	4.62	3.76	3.26
2500	4.50	3.62	3.13	4.72	3.83	3.32
2600	4.51	3.67	3.18	4.77	3.89	3.38
2700	4.55	3.70	3.19	4.85	3.93	3.41
2800	4.59	3.71	3.21	4.88	3.95	3.42
2900	4.53	3.69	3.21	4.85	3.95	3.43
3000	4.51	3.65	3.16	4.86	3.95	3.41
3100	4.49	3.60	3.11	4.86	3.92	3.37
3200	4.38	3.54	3.08	4.79	3.87	3.34
3300	4.28	3.45	2.99	4.74	3.81	3.28
3400	4.14	3.34	2.89	4.66	3.72	3.18
3500	3.95	3.22	2.81	4.50	3.60	3.09
3600	3.80	3.11	2.71	4.41	3.50	3.00
3700	3.60	2.97	2.60	4.29	3.38	2.88
3800	3.36	2.84	2.51	4.11	3.26	2.79
3900	3.22	2.73	2.43	4.01	3.15	2.70
4000	3.03	2.62	2.34	3.85	3.03	2.60

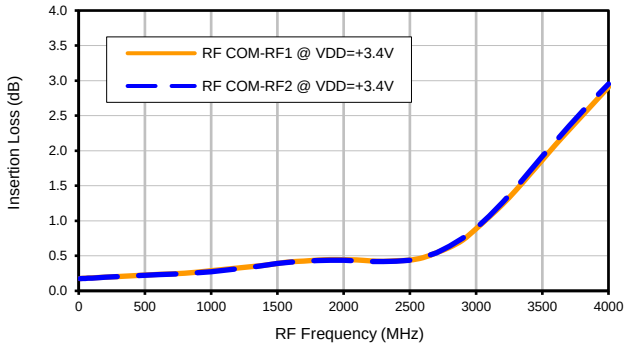
***Note:**

State of Control Voltage	
LOW	RF COM-RF2 ON
HIGH	RF COM-RF1 ON

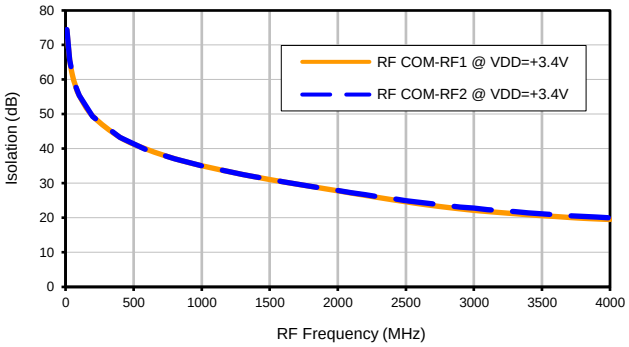
ON - Low insertion loss state
OFF - Isolation state

Typical Performance Curves

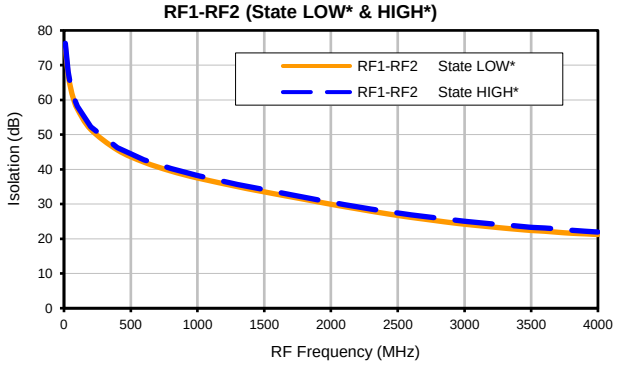
INSERTION LOSS
RF COM-RF1 & RF COM-RF2



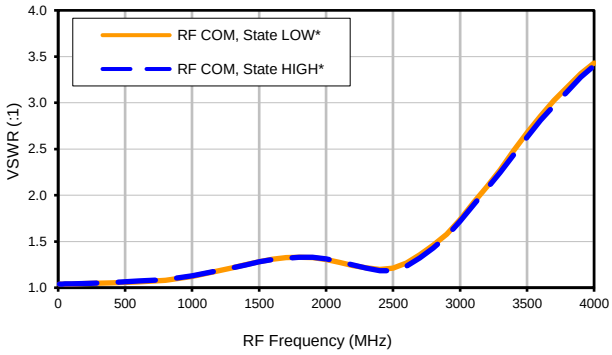
ISOLATION
RF COM-RF1 & RF COM-RF2



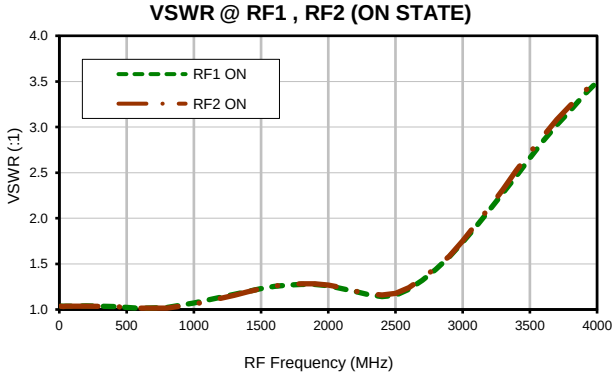
ISOLATION
RF1-RF2 (State LOW* & HIGH*)



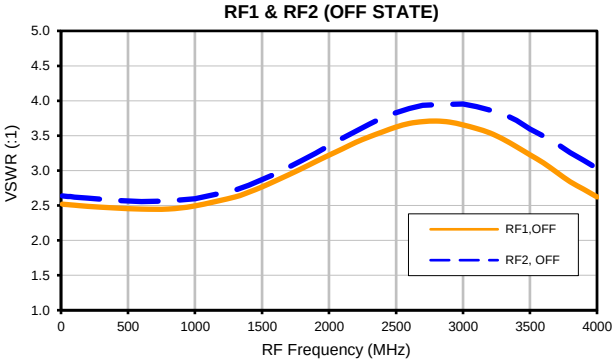
VSWR @ RF COM



VSWR @ RF1 , RF2 (ON STATE)



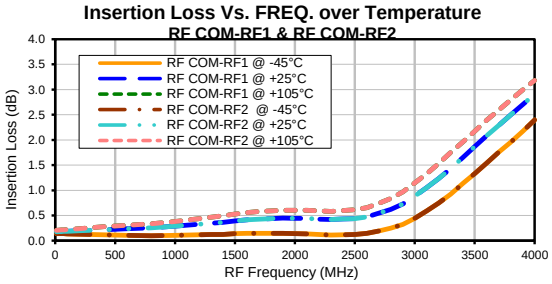
VSWR
RF1 & RF2 (OFF STATE)

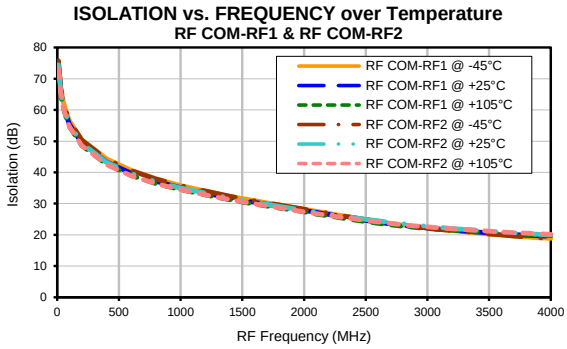


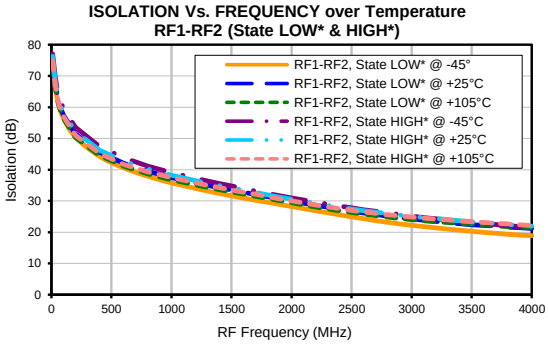
***Note:**

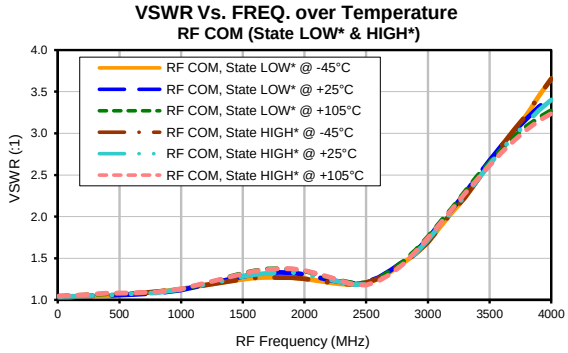
State of Control Voltage	RF Common to RF1	RF Common to RF2
HIGH	ON	OFF
LOW	OFF	ON
ON - Low insertion loss state		
OFF - Isolation state		

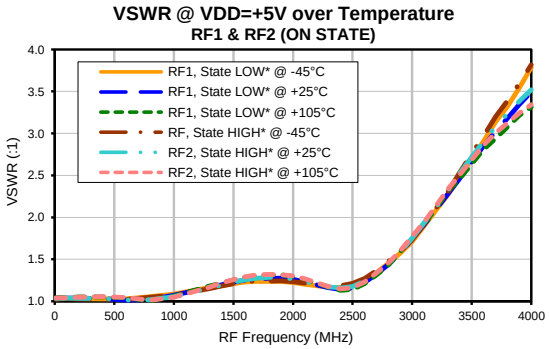
Typical Performance Curves

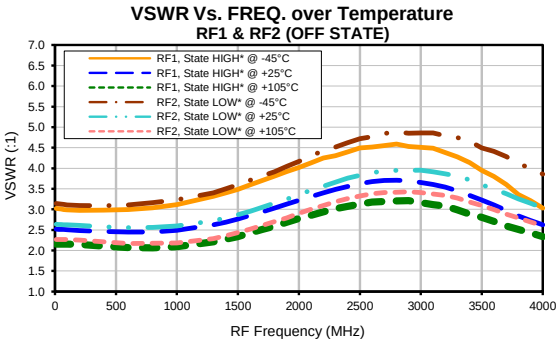










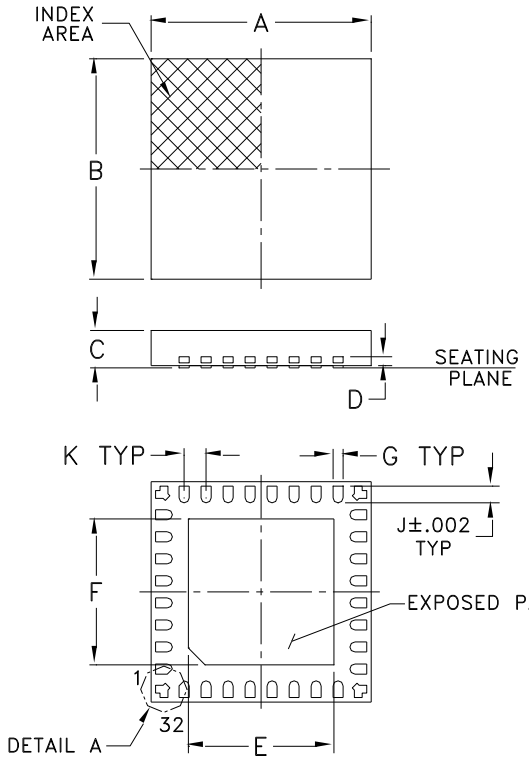


***Note:**

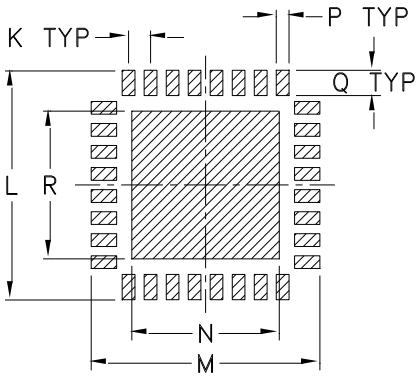
State of Control Voltage	RF Common to	
	RF1	RF2
HIGH	ON	OFF
LOW	OFF	ON
ON - Low insertion loss state OFF - Isolation state		

Case Style JY

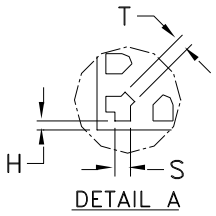
Outline Dimensions JY2179



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002



CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N
JY2179	.197 (5.00)	.197 (5.00)	.033 (0.85)	.008 (0.20)	.130 (3.30)	.130 (3.30)	.009 (0.24)	.004 (0.10)	.015 (0.375)	.020 (0.50)	.205 (5.20)	.205 (5.20)	.132 (3.35)

CASE #	P	Q	R	S	T	WT, GRAM
JY2179	.011 (0.290)	.023 (.575)	.132 (3.35)	.007 (0.18)	.006 (0.15)	.065

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

Notes:

1. Case material: Ceramic.
2. Termination finish:
   For RoHS Case Styles: 0.25 µinches of Gold (Au) over 2.4 µinched of Palladium (Pd) over 40 µinches of Nickel (Ni). All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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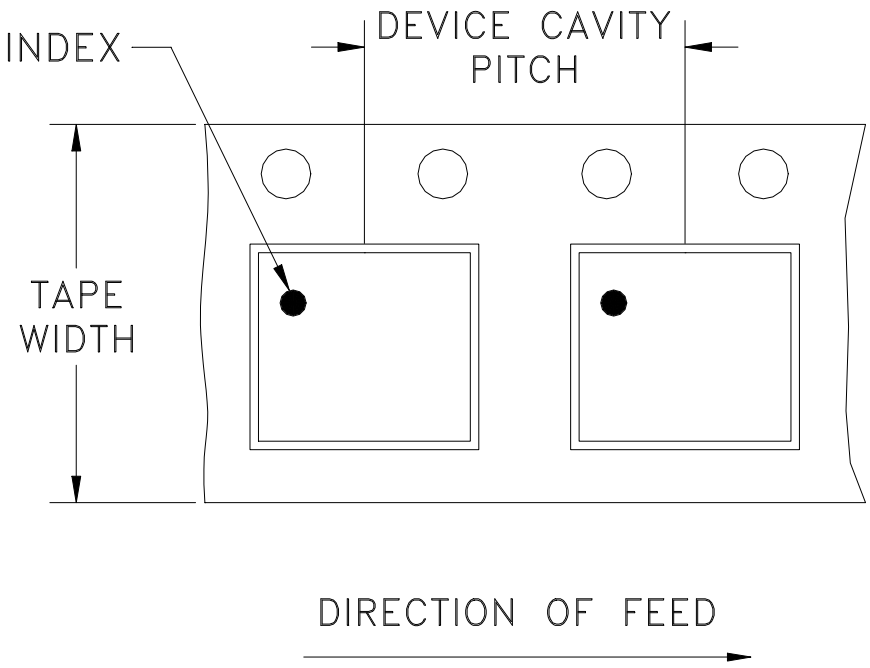
Mini-Circuits ISO 9001 & ISO 14001 Certified

Tape & Reel Packaging TR-F68

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
12	8	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000
		13	Standard	2000
				3000
				4000

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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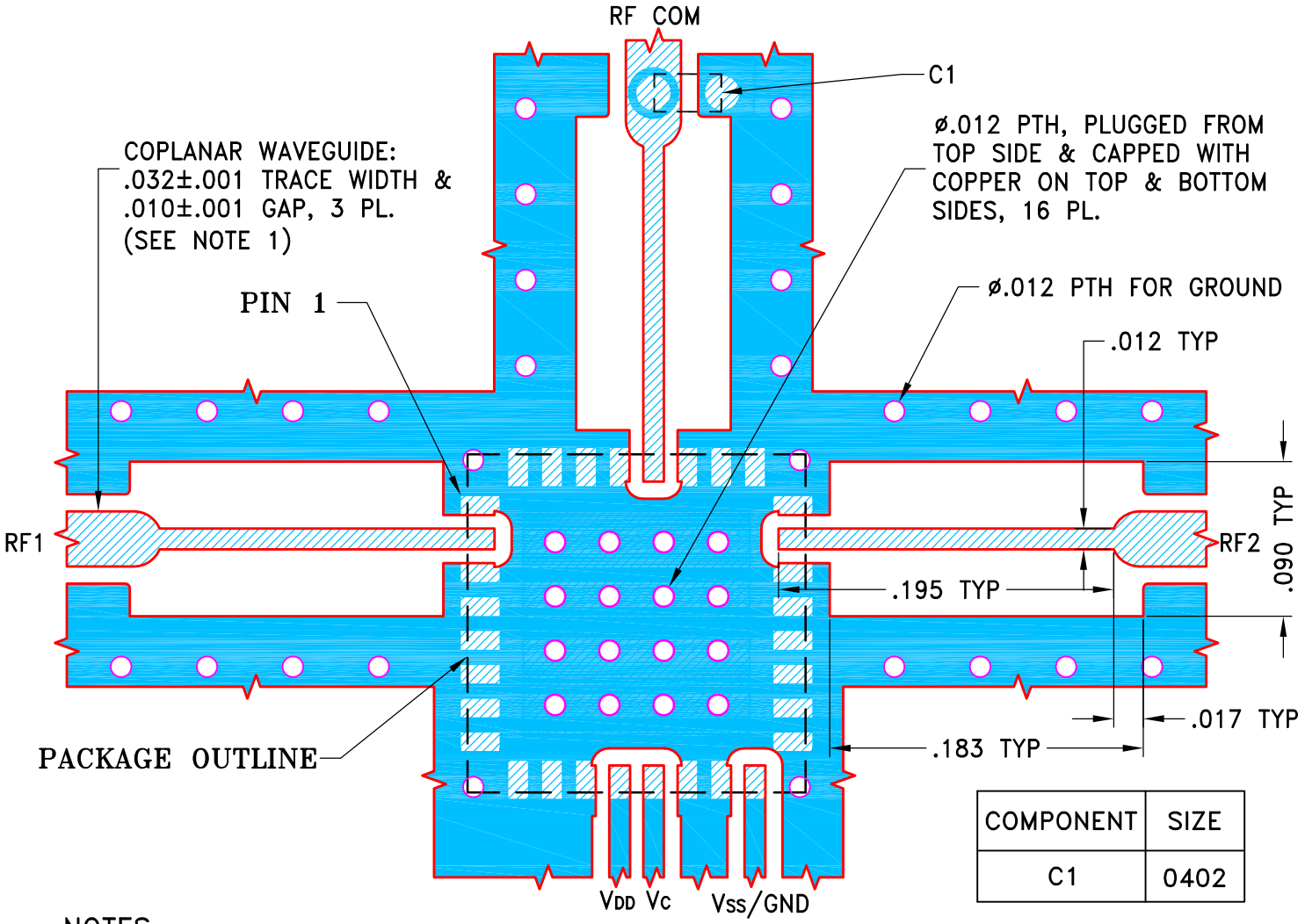
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M158704	NEW RELEASE	11/27/16	ITG	RS

SUGGESTED MOUNTING CONFIGURATION FOR JY2179 CASE STYLE, "32SW01" PIN CODE



COMPONENT	SIZE
C1	0402

NOTES:

1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS .028"±.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	ITG	11/23/16
TOLERANCES ON:	CHECKED	GF	11/23/16
2 PL DECIMALS ±	APPROVED	RS	11/27/16
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

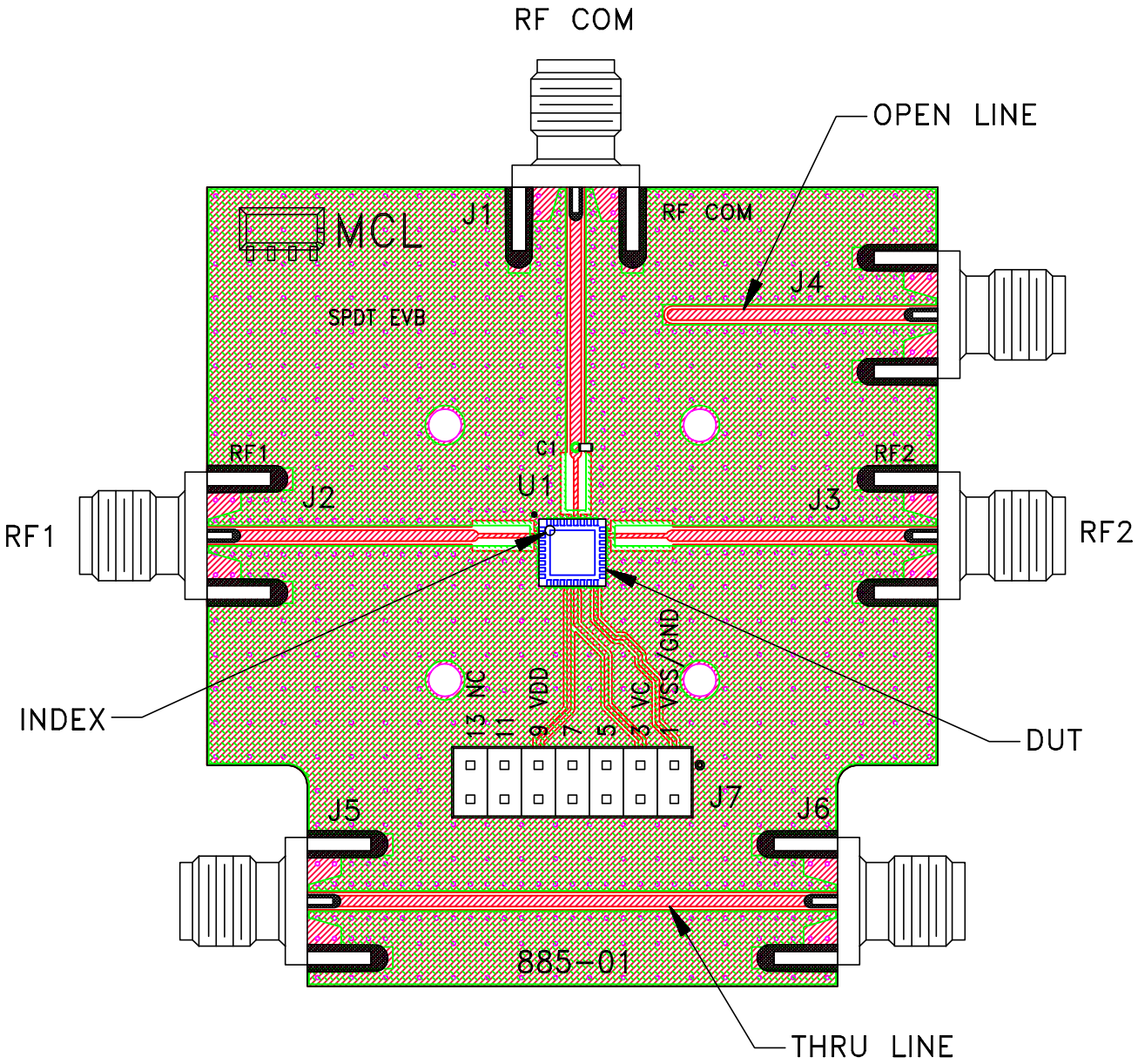
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 32SW01, JY2179, TB-923+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-494	OR

FILE:	SCALE:	SHEET:
98PL494	10:1	1 OF 1

Evaluation Board and Circuit



TB-923+

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: FR4 or equivalent,
   Dielectric Constant=4.6, Thickness=.028 inch.

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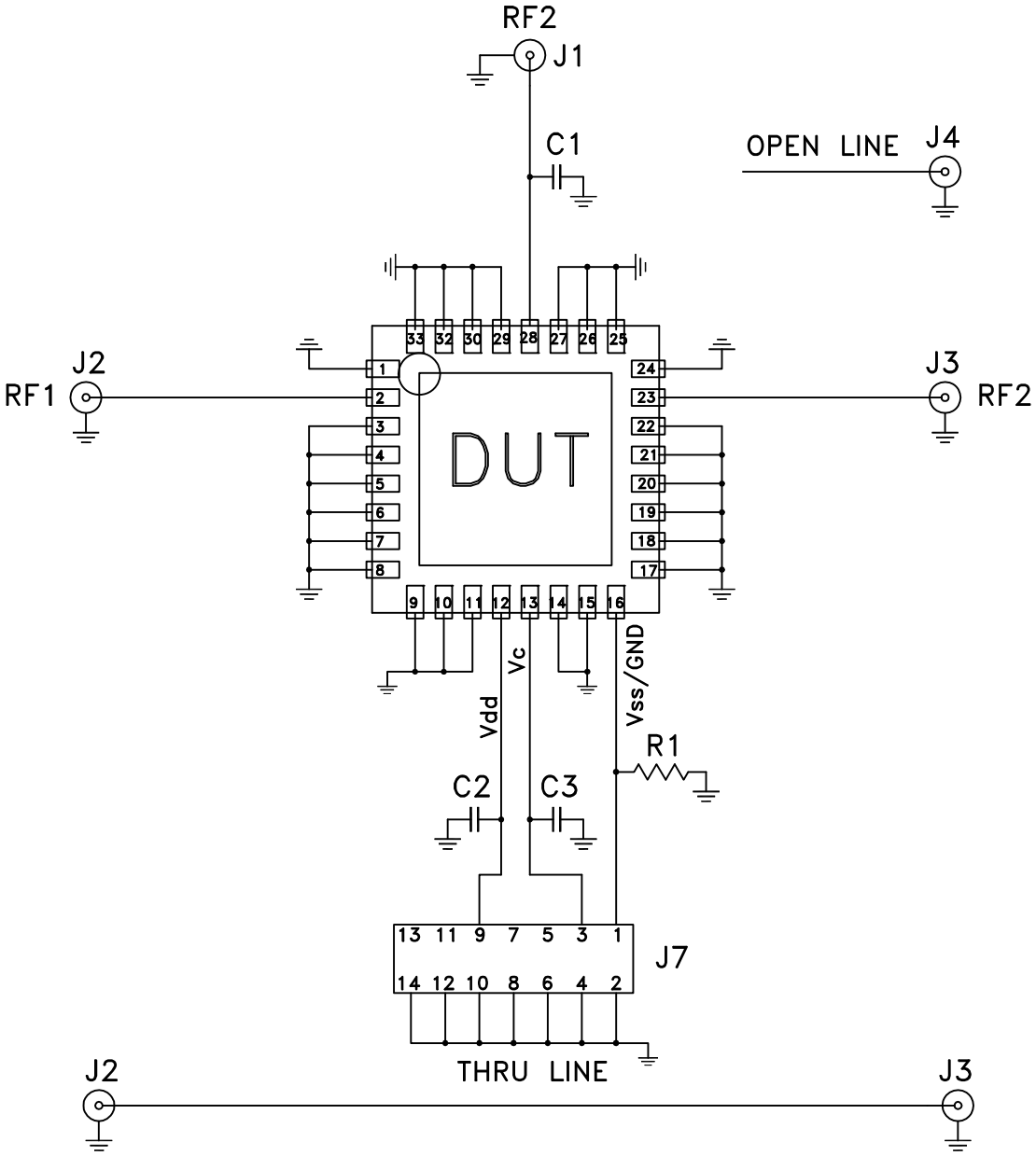
Evaluation Board and Circuit



COMPONENT	VALUE	SIZE
DUT	HSW2-272VHDR+	5X5 MM
C1	0.2 pF	0402
C2	0.01 uF	0603
C3	100 pF	
R1	0 Ohm	

SCHEMATIC DIAGRAM

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Environmental Specifications ENV83

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Temperature Cycling	-65° to 150°C, 500 cycles	JESD22-A104, condition C
HAST	130°C, 85% RH, 33 PSIA, 96 hours, nominal bias	JESD22-A110
High Temp Storage	150°C 1000 hours	JESD22-A103
Solderability	Per Reference Spec	JESD22-B102
Moisture Sensitivity: Level 3	Bake at 125°C for 24 hours. Soak at 30°C/60%RH for 192 hours, Reflow at 260°C peak	J-STD-020