Fast Switching

SPDT RF Switch

50Ω 0.3 - 4500 MHz

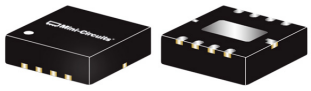
Absorptive RF Switch with internal driver
Single Supply Voltage, +3V to +5V

Product Features

- High Isolation, 52 dB at 1 GHz
- Low insertion loss, 0.8 dB typ. at 1 GHz
- Low supply current consumption, 50 µA typ.
- Fast Rise/Fall time, 16 ns typ.

Typical Applications

- Defense
- Communication Infrastructure
- Test and Measurements



Generic photo used for illustration purposes only

M3SWA-2-50DRA+

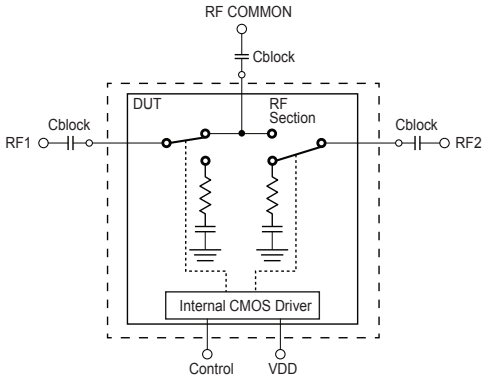
CASE STYLE: DL805

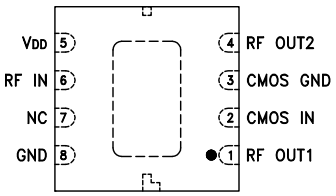
+RoHS Compliant
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

General Description

M3SWA-2-50DRA+ is a high isolation fast switching absorptive SPDT switch with integral CMOS driver, operates with single positive supply voltage while consuming, 50 µA typical. It has been designed for wide-band operation. It is packaged in a tiny 3.25mm x 3.25mm, 8-lead package passes 250V for ESD (HBM).

Simplified Schematic and Pad Description





Function	Pad Number	Description
RF IN	6	RF common/ SUM port, requires external DC block
RF OUT1	1	RF out #1/In port #1, requires external DC block
RF OUT2	4	RF out #1/In port #2, requires external DC block
CONTROL	2	CMOS Control IN
VDD	5	Supply voltage
NC	7	No Connection
CMOS GND	3	CMOS ground
GND	8 &, paddle	RF ground

RF Electrical Specifications[1], T_{AMB}=25°C, 50Ω, V_{DD}= +5V

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency range		10		4500	MHz
Insertion loss[2,3]	10		0.6	1.0	dB
	100		0.7	1.0	
	1000		0.8	1.2	
	2000		1.0	1.4	
	4500		1.2	1.9	
Isolation between Common port and RF1/RF2 Ports	10		74.0		dB
	100		59.3		
	1000		61.5		
	2000		50.8		
	4500		39.5		
Isolation between RF1 and RF2 ports	10		74.3		dB
	100		61.0		
	1000		51.8		
	2000		46.5		
	4500		37.4		
Return loss (ON STATE)	10		24.3		dB
	100		24.1		
	1000		20.8		
	2000		16.7		
	4500		17.0		
Return loss (OFF STATE)	500		12.9		dB
	1000		20.1		
	2000		28.6		
	4500		12.8		
Input 0.2 dB Compression	500-1000		30		dBm
	1000-2000		30		
	2000-4500		27		

DC Electrical Specifications

Parameter	Min.	Typ.	Max.	Units
Supply voltage, V_{DD}	3.0		5.0	V
Supply current		50	200	µA
Control voltage Low	0		0.5	V
Control voltage High	0.7 V_{DD}		V_{DD}	V
Control current		0.2	10	µA

Notes:
1. Tested on Mini-Circuits' test board TB-159+, using Agilent's N5230A network analyzer (see Characterization test circuit, Fig.1).
2. Insertion loss values are de-embedded from test board loss.
3. Needs external blocking capacitors on all RF ports. (Suggested value=47pF)

Switching Specifications

Parameter	Condition	Min.	Typ.	Max.	Units
Switching time 50% Control to 90%/10% RF	RF Pin=0dBm RF Freq.=500 MHz Control Freq.=500 KHz Control High=3.7V Control Low=0V		29		nS
Video Leakage	RF Pin=0dBm RF Freq.=500 MHz Control Freq.=500 KHz Control High=3.7V Control Low=0V		24.8		mV
Rise/Fall Time 10 to 90% or 90 to 10%	RF Pin=0dBm RF Freq.=500 MHz Control Freq.=500 KHz Control High=3.7V Control Low=0V		16		nS

Absolute Maximum Ratings[5]

Parameter	Ratings
Operating temperature	-55°C to +100°C
Storage temperature	-55°C to +100°C
V_{DD}, Supply voltage (V)	2.7 Min., 5.5 Max.
Voltage control (V)	-0.2V Min., V_{DD} Max
RF Input power (dBm)	+30 dBm

5. 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
Hi	OFF	ON
Low	ON	OFF

ON- low insertion loss state OFF- Isolation State

Characterization Test Circuit

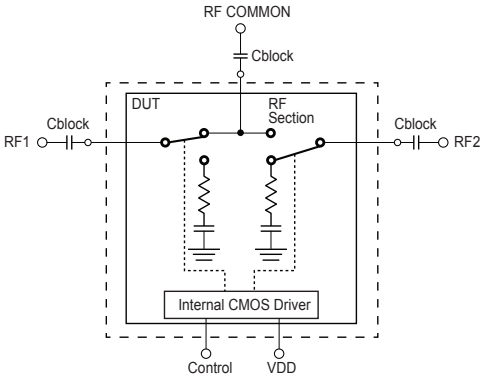


Figure 1. Block Diagram of test Circuit used for characterization (DUT soldered on Mini-Circuit's TB-159A+)

Frequency (MHz)	Cblock (Suggested Value)
0.3-500	0.1 µF
500-4500	47 pF

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.

Performance Data	Data Table
	Swept Graphs
Case Style	DL805 *Plastic package, exposed paddle , lead finish=Matte-Tin*
Tape & Reel **Standard quantities available on reel**	F58 *7" reels with 1000 devices* *13" reels with 2000, 4000 devices*
Suggested Layout for PCB Design	PL-120A
Evaluation Board	TB-159A+
Environmental Ratings	ENV16

ESD Rating

Human Body Model (HBM): Class 1A (250 to 500V) in accordance with ESD STM5.1-2001

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

FREQ (MHz)	INSERTION LOSS @ Vdd=+5V OVER TEMPERATURE					
	RF COM-RF1 (dB) *STATE 2**			RF COM-RF2 (dB) *STATE 1**		
	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C
10	0.543	0.664	0.764	0.505	0.608	0.717
50	0.57	0.68	0.78	0.52	0.63	0.74
100	0.57	0.69	0.78	0.52	0.63	0.73
500	0.58	0.72	0.84	0.51	0.65	0.78
1000	0.59	0.74	0.88	0.50	0.67	0.81
1300	0.63	0.80	0.94	0.51	0.70	0.85
1500	0.67	0.86	1.01	0.53	0.73	0.89
1700	0.66	0.86	1.02	0.54	0.75	0.91
2000	0.64	0.85	1.01	0.54	0.76	0.93
2100	0.64	0.84	1.01	0.55	0.77	0.94
2200	0.63	0.84	1.01	0.54	0.76	0.94
2300	0.64	0.85	1.03	0.55	0.77	0.96
2400	0.65	0.86	1.04	0.56	0.78	0.97
2500	0.63	0.85	1.03	0.54	0.77	0.97
2600	0.63	0.85	1.03	0.53	0.77	0.97
2700	0.63	0.85	1.04	0.53	0.77	0.97
2800	0.62	0.85	1.04	0.52	0.77	0.97
2900	0.61	0.84	1.03	0.50	0.76	0.96
3000	0.61	0.85	1.04	0.49	0.76	0.95
3100	0.61	0.84	1.03	0.47	0.74	0.94
3200	0.60	0.83	1.03	0.46	0.73	0.93
3300	0.61	0.84	1.04	0.47	0.73	0.94
3400	0.60	0.84	1.03	0.46	0.73	0.93
3500	0.59	0.83	1.02	0.45	0.72	0.92
3600	0.59	0.83	1.02	0.44	0.71	0.92
3700	0.59	0.83	1.03	0.44	0.71	0.93
3800	0.59	0.83	1.04	0.44	0.72	0.93
3900	0.60	0.85	1.05	0.43	0.72	0.94
4000	0.59	0.84	1.06	0.43	0.73	0.95
4100	0.59	0.85	1.07	0.43	0.73	0.96
4200	0.61	0.87	1.09	0.44	0.75	0.98
4300	0.60	0.87	1.10	0.44	0.75	0.99
4400	0.60	0.88	1.12	0.44	0.76	1.00
4500	0.62	0.89	1.13	0.45	0.77	1.02
4700	0.65	0.93	1.18	0.48	0.82	1.08
5000	0.88	1.19	1.45	0.71	1.09	1.37

FREQ (MHz)	ISOLATION @ Vdd=+5V OVER TEMPERATURE											
	RF COM-RF1 (dB) *STATE 1**			RF COM-RF2 (dB) *STATE 2**			RF1-RF2 (dB) *STATE 2**			RF1-RF2 (dB) *STATE 1**		
	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C
10	78.65	79.40	80.04	71.01	72.05	71.50	72.26	73.10	70.76	79.38	79.49	82.85
50	71.14	70.77	71.19	60.85	61.82	62.70	62.36	62.15	64.44	70.16	72.54	70.24
100	66.52	66.71	66.68	58.29	59.43	60.03	59.65	60.89	62.01	66.63	67.01	67.35
500	64.53	65.39	65.87	58.16	59.47	60.65	56.99	57.28	57.45	60.25	60.64	60.93
1000	65.00	69.59	75.80	59.36	61.85	64.27	51.83	51.97	52.06	55.50	55.30	55.19
1300	54.32	55.96	57.67	58.23	60.80	64.09	49.79	49.79	49.88	53.01	52.06	52.01
1500	50.03	50.40	51.44	57.16	59.50	62.18	49.08	48.99	49.08	55.78	53.25	52.61
1700	49.76	49.50	49.70	55.22	57.33	59.54	48.03	48.16	48.33	73.16	68.00	61.77
2000	51.16	50.26	49.95	52.08	53.90	55.83	46.26	46.69	47.05	53.32	56.36	58.21
2100	51.35	50.36	49.94	50.96	52.80	54.56	45.90	46.33	46.71	51.66	54.40	55.95
2200	50.93	49.88	49.55	49.89	51.65	53.16	45.39	45.91	46.46	50.23	52.68	54.12
2300	50.37	49.39	49.12	48.84	50.54	52.12	45.12	45.70	46.17	49.19	51.45	52.79
2400	49.55	48.74	48.46	47.80	49.32	50.75	45.00	45.64	46.07	48.08	50.18	51.33
2500	48.82	48.11	47.85	46.96	48.38	49.44	44.43	45.28	45.90	47.18	49.08	50.23
2600	48.04	47.59	47.28	45.78	47.15	48.25	44.35	45.02	45.60	46.20	47.83	48.73
2700	47.24	47.13	47.01	44.65	46.18	47.43	43.98	44.42	44.90	44.90	46.28	47.30
2800	46.62	46.70	46.71	44.43	45.58	46.60	43.68	44.22	44.38	44.64	45.77	46.37
2900	46.19	46.61	46.56	43.83	45.15	46.02	42.71	43.26	43.48	43.62	44.87	45.36
3000	46.04	46.70	46.49	43.42	44.76	45.68	41.97	42.43	42.74	42.72	43.99	44.61
3100	45.37	46.09	46.33	43.13	44.46	45.26	41.21	41.72	42.23	41.96	43.19	43.98
3200	44.88	45.80	46.14	42.49	43.80	44.93	41.12	41.62	41.78	41.85	43.08	43.65
3300	44.73	45.74	45.83	42.18	43.33	44.51	40.71	41.31	41.41	41.55	42.87	43.19
3400	43.72	44.72	45.31	41.71	42.92	43.99	40.35	40.90	41.15	40.50	41.75	42.64
3500	43.66	44.87	45.41	41.40	42.59	43.66	39.80	40.36	40.60	40.18	41.38	42.20
3600	42.73	44.03	44.56	40.87	42.11	43.18	39.55	40.12	40.52	39.74	41.00	41.75
3700	42.46	43.79	44.42	40.74	41.95	42.85	39.29	39.88	40.26	39.51	40.74	41.44
3800	42.85	44.03	44.26	40.37	41.59	42.50	38.75	39.44	39.84	38.62	39.71	40.82
3900	41.27	42.88	44.44	40.27	41.54	42.41	38.30	38.78	39.18	38.82	39.93	40.91
4000	41.19	42.94	43.84	39.84	40.98	41.91	38.07	38.70	39.13	38.29	39.46	40.20
4100	40.68	42.31	43.21	39.64	40.75	41.58	37.76	38.40	38.93	37.89	38.91	39.76
4200	39.94	41.78	43.18	39.43	40.55	41.72	37.54	38.16	38.47	37.62	38.66	39.62
4300	39.68	41.35	42.76	39.34	40.37	41.34	37.12	37.90	38.28	37.15	38.18	39.03
4400	39.11	41.01	42.29	38.69	39.90	41.01	37.05	37.69	38.09	36.73	37.63	38.46
4500	38.92	40.84	42.12	38.48	39.62	40.57	36.64	37.31	37.77	36.32	37.30	38.19
4700	37.91	39.92	41.46	37.95	39.09	40.22	36.34	37.08	37.55	35.71	36.52	37.35
5000	37.04	39.09	40.50	37.59	38.98	40.19	35.82	36.43	36.88	34.83	35.39	36.07

***Note**

STATE	CONTROL INPUT	RF Com to RF1	RF Com to RF2
1	High	OFF	ON
2	Low	ON	OFF

Typical Performance Data

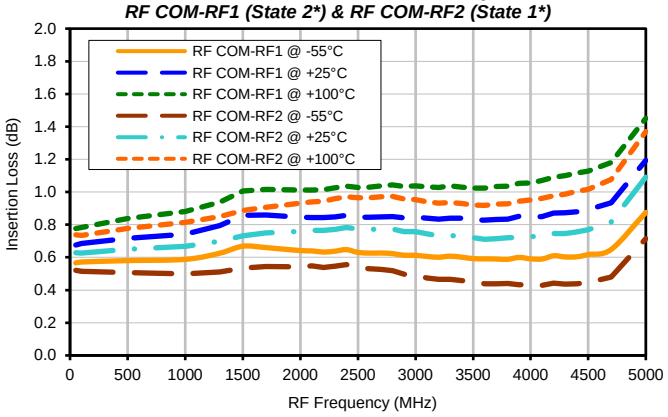
FREQ (MHz)	RETURN LOSS @ Vdd=+5V OVER TEMPERATURE																	
	RF COM (dB) *STATE 2**			RF COM (dB) *STATE 1**			RF1 (dB) *STATE 2**			RF1 (dB) *STATE 1**			RF2 (dB) *STATE 2**			RF2 (dB) *STATE 1**		
	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C
10	26.07	24.10	22.44	23.29	22.69	20.99	26.46	24.31	22.71	0.10	0.11	0.10	0.10	0.10	0.10	26.09	24.19	22.62
50	27.37	24.66	22.80	26.68	24.23	22.54	27.21	24.75	23.06	0.66	0.74	0.82	0.61	0.70	0.78	25.51	24.15	22.60
100	27.70	24.63	22.63	27.51	24.38	22.63	26.72	24.57	23.15	1.91	2.20	2.46	1.83	2.13	2.39	24.78	24.02	22.63
500	24.34	23.53	22.68	23.90	23.21	22.38	25.58	23.72	22.28	12.01	13.20	13.14	11.62	12.75	12.68	25.12	23.32	21.87
1000	25.15	24.57	23.71	26.24	25.43	24.30	22.81	22.09	20.81	17.85	21.73	19.97	17.31	19.86	18.31	21.93	21.25	19.97
1300	25.34	24.56	23.39	26.40	25.85	24.42	22.11	20.78	20.01	19.32	26.57	22.21	19.52	23.37	20.09	20.47	19.61	19.01
1500	25.64	24.59	23.06	25.47	25.32	24.10	21.39	19.91	19.36	20.50	31.13	22.68	21.33	26.10	20.64	19.35	18.60	18.31
1700	24.23	24.14	23.39	22.86	23.50	23.60	19.74	18.82	18.51	21.90	38.34	22.38	23.33	29.01	20.63	17.85	17.39	17.30
2000	22.15	22.54	23.21	21.18	21.59	22.57	18.41	17.47	17.31	22.74	28.73	20.95	25.09	28.93	19.93	16.91	16.23	16.08
2100	21.69	22.66	23.17	20.86	21.79	22.45	17.79	17.29	16.98	22.13	25.92	20.31	24.81	27.39	19.61	16.41	16.14	15.80
2200	22.08	22.53	23.04	21.38	21.73	22.19	17.71	17.07	16.62	21.10	23.75	19.66	23.84	25.77	19.31	16.42	16.00	15.52
2300	20.95	21.43	22.04	20.31	20.80	21.25	17.41	16.87	16.38	19.81	21.96	19.02	22.45	24.20	19.00	16.22	15.88	15.34
2400	19.40	20.08	20.74	18.95	19.56	20.06	16.52	16.25	15.94	18.37	20.45	18.39	20.75	22.80	18.69	15.57	15.39	15.01
2500	20.84	21.58	21.98	20.40	20.99	21.19	16.98	16.49	16.03	17.02	19.17	17.79	19.30	21.60	18.44	15.98	15.61	15.16
2600	20.52	21.32	21.27	20.15	20.97	20.72	17.22	16.81	16.16	15.89	18.07	17.23	17.95	20.56	18.24	16.36	16.03	15.45
2700	20.23	20.71	20.60	20.02	20.50	20.26	17.18	16.70	16.03	14.97	17.12	16.71	16.94	19.67	18.08	16.55	16.07	15.49
2800	20.01	20.13	20.01	19.86	20.05	19.89	17.30	16.72	16.10	14.22	16.31	16.23	16.06	18.86	17.96	16.80	16.22	15.77
2900	20.93	20.94	20.62	21.04	20.99	20.76	17.75	17.04	16.33	13.61	15.60	15.81	15.32	18.14	17.86	17.52	16.57	16.12
3000	20.51	20.17	19.79	21.17	20.47	20.32	17.82	17.19	16.62	13.09	15.02	15.47	14.94	17.56	17.82	18.18	16.96	16.64
3100	21.12	20.74	20.10	22.48	21.36	21.00	18.32	17.78	17.21	12.59	14.50	15.19	14.66	17.08	17.81	18.97	17.67	17.38
3200	21.65	21.20	20.35	23.57	22.28	21.72	19.01	18.71	18.12	12.12	14.06	14.99	14.29	16.66	17.87	19.98	18.92	18.54
3300	20.52	19.97	19.38	22.48	21.23	20.95	18.73	18.71	18.45	11.75	13.72	14.85	13.91	16.34	17.94	20.01	19.35	19.14
3400	21.10	20.26	19.75	23.41	21.83	21.64	19.02	19.08	19.12	11.45	13.42	14.77	13.68	16.13	18.07	20.29	19.92	19.84
3500	21.61	20.85	20.18	24.52	23.10	22.74	19.79	20.23	20.62	11.13	13.20	14.76	13.36	16.03	18.27	21.28	21.54	21.43
3600	21.75	20.86	20.09	25.33	23.83	23.22	20.26	21.15	21.81	10.86	13.03	14.77	13.00	15.95	18.46	22.36	23.08	22.87
3700	21.26	20.12	19.42	24.90	23.17	22.54	20.42	21.32	22.39	10.65	12.92	14.84	12.81	15.96	18.70	23.19	24.03	23.90
3800	21.94	20.74	19.99	27.20	24.92	23.91	21.91	23.20	24.77	10.57	12.88	14.96	12.71	16.01	18.94	26.84	27.10	25.91
3900	21.15	19.84	19.26	26.59	23.90	23.02	22.05	23.39	25.30	10.50	12.88	15.10	12.72	16.09	19.14	28.80	29.37	27.98
4000	20.93	19.75	19.07	26.69	24.10	23.10	22.60	23.99	26.19	10.49	12.90	15.25	12.77	16.20	19.35	32.37	31.60	28.70
4100	21.18	19.88	19.23	28.35	24.86	23.76	23.45	24.79	27.17	10.55	12.99	15.47	12.87	16.30	19.47	31.60	31.54	28.48
4200	19.98	18.94	18.40	25.88	23.50	22.62	23.09	24.37	26.51	10.64	13.10	15.68	12.81	16.37	19.57	36.61	33.69	29.36
4300	20.23	18.88	18.17	26.54	23.69	22.30	23.50	24.30	25.70	10.70	13.23	15.92	12.86	16.43	19.57	34.15	33.13	30.11
4400	19.87	18.69	17.85	25.76	23.53	21.94	23.60	24.31	25.12	10.70	13.35	16.18	12.62	16.44	19.53	34.06	30.99	29.41
4500	18.85	18.24	17.78	23.32	22.60	21.76	22.49	23.55	24.48	10.68	13.49	16.46	12.49	16.38	19.36	30.98	28.76	27.96
4700	17.57	17.39	17.11	20.88	21.13	20.32	21.00	22.62	23.77	10.74	13.68	16.68	12.20	16.18	18.95	31.48	31.21	30.01
5000	16.49	16.70	16.44	19.05	19.60	18.66	19.80	22.04	23.22	10.73	13.62	16.04	12.34	15.79	18.14	23.15	25.15	25.61

***Note:**

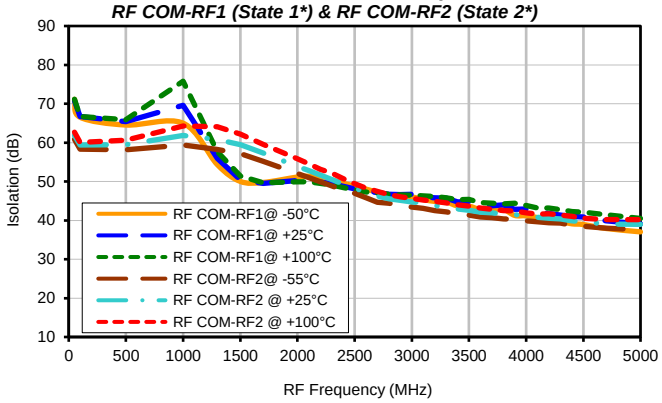
STATE	CONTROL INPUT	RF Com to RF1	RF Com to RF2
1	High	OFF	ON
2	Low	ON	OFF

Typical Performance Curves

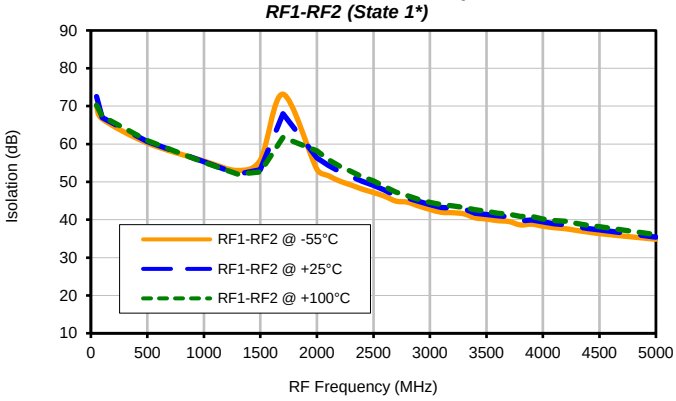
Insertion Loss @ Vdd=+5V over Temperature
RF COM-RF1 (State 2*) & RF COM-RF2 (State 1*)



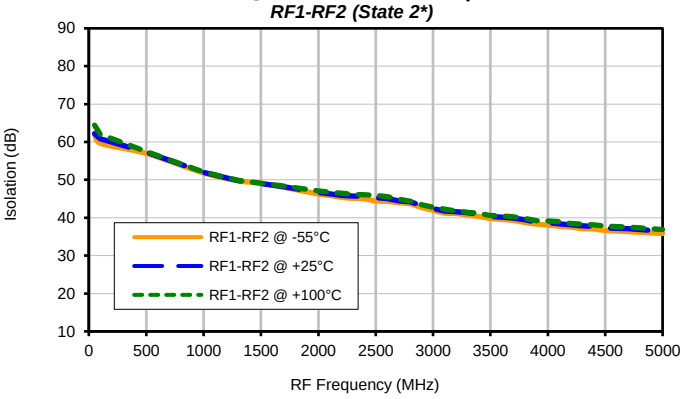
Isolation @ Vdd=+5V over Temperature
RF COM-RF1 (State 1*) & RF COM-RF2 (State 2*)



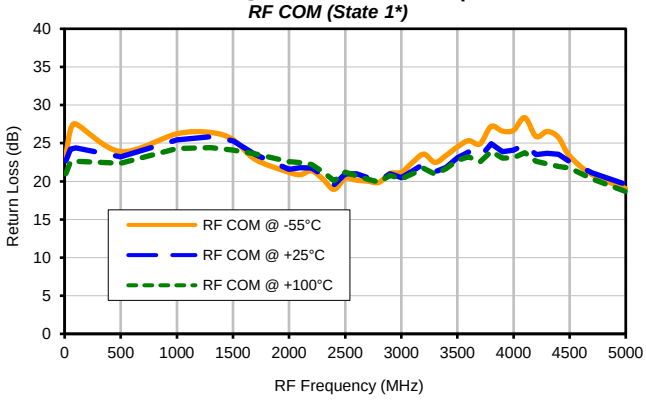
Isolation @ Vdd=+5V over Temperature
RF1-RF2 (State 1*)



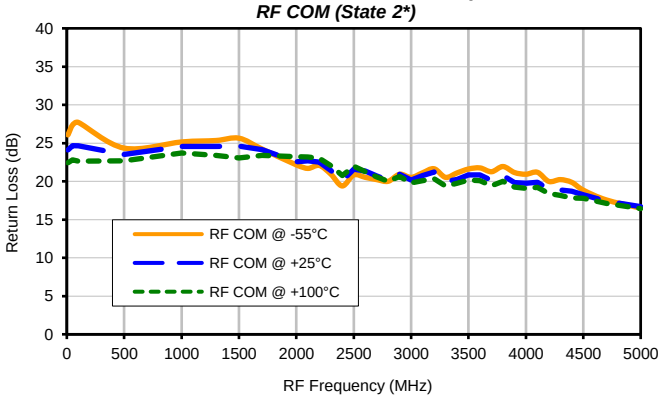
Isolation @ Vdd=+5V over Temperature
RF1-RF2 (State 2*)



Return Loss @ Vdd=+5V over Temperature
RF COM (State 1*)



Return Loss @ Vdd=+5V over Temperature
RF COM (State 2*)

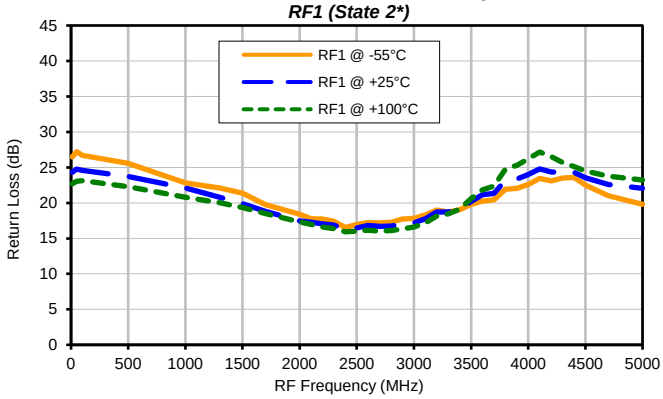


***Note:**

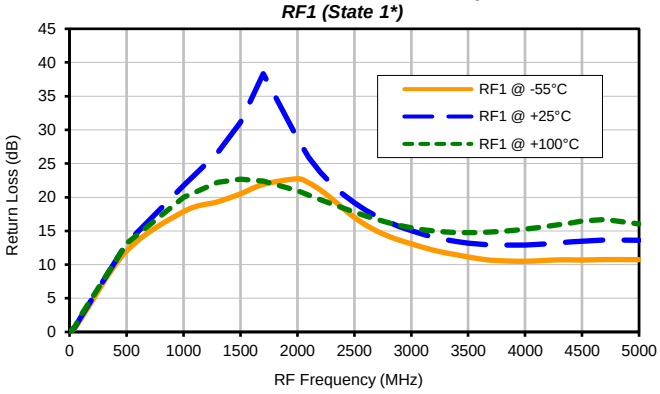
STATE	CONTROL INPUT	RF Com to RF1	RF Com to RF2
1	High	OFF	ON
2	Low	ON	OFF

Typical Performance Curves

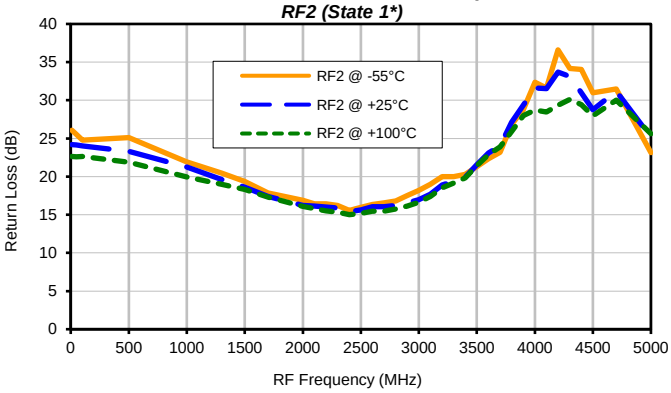
Return Loss @ Vdd=+5V over Temperature
RF1 (State 2*)



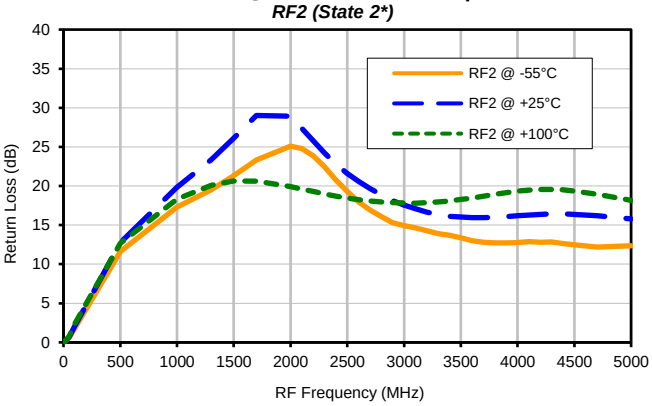
Return Loss @ Vdd=+5V over Temperature
RF1 (State 1*)



Return Loss @ Vdd=+5V over Temperature
RF2 (State 1*)



Return Loss @ Vdd=+5V over Temperature
RF2 (State 2*)



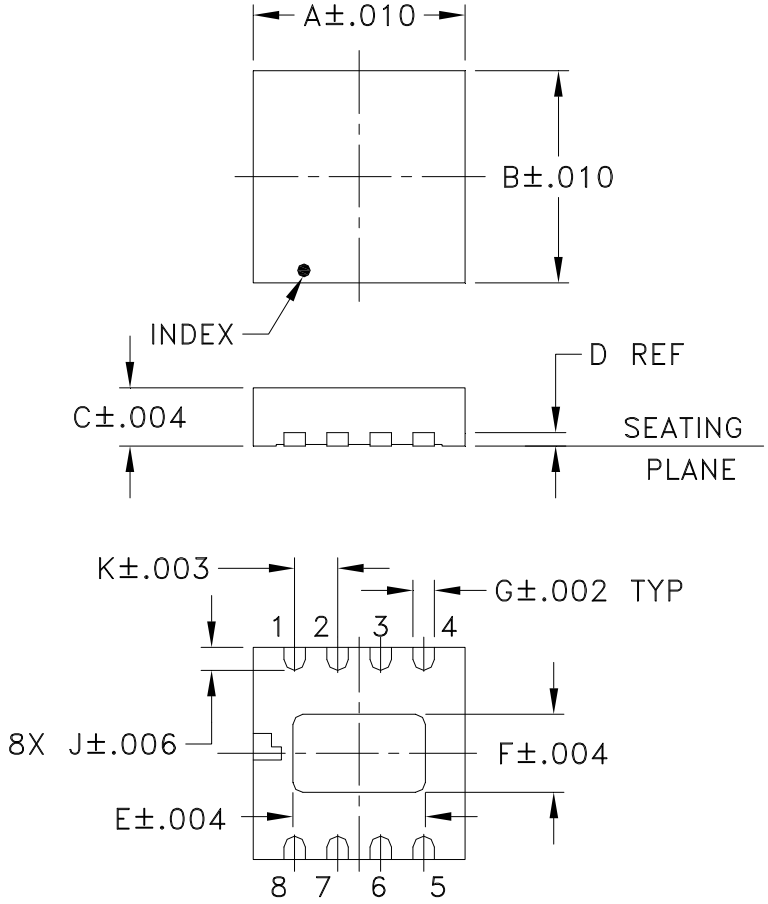
***Note:**

STATE	CONTROL INPUT	RF Com to RF1	RF Com to RF2
1	High	OFF	ON
2	Low	ON	OFF

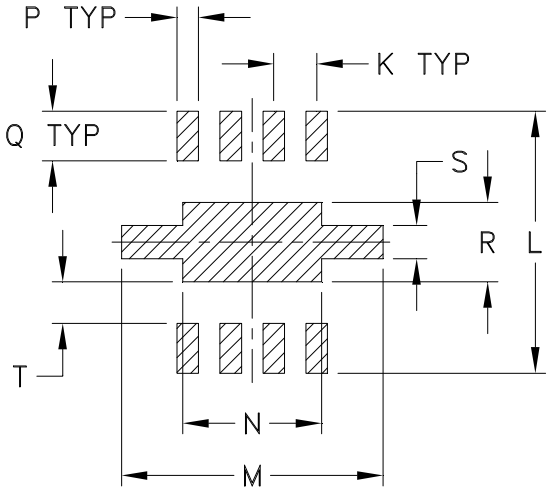
Case Style DL

DL805

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N
DL805	.128 (3.25)	.128 (3.25)	.035 (0.90)	.008 (0.20)	.080 (2.03)	.047 (1.19)	.013 (0.33)	-- --	.014 (0.36)	.026 (0.66)	.158 (4.01)	.158 (4.01)	.084 (2.13)

CASE #	P	Q	R	S	T	WT. GRAM
DL805	.013 (0.33)	.030 (0.76)	.048 (1.22)	.020 (0.51)	.025 (0.64)	.02

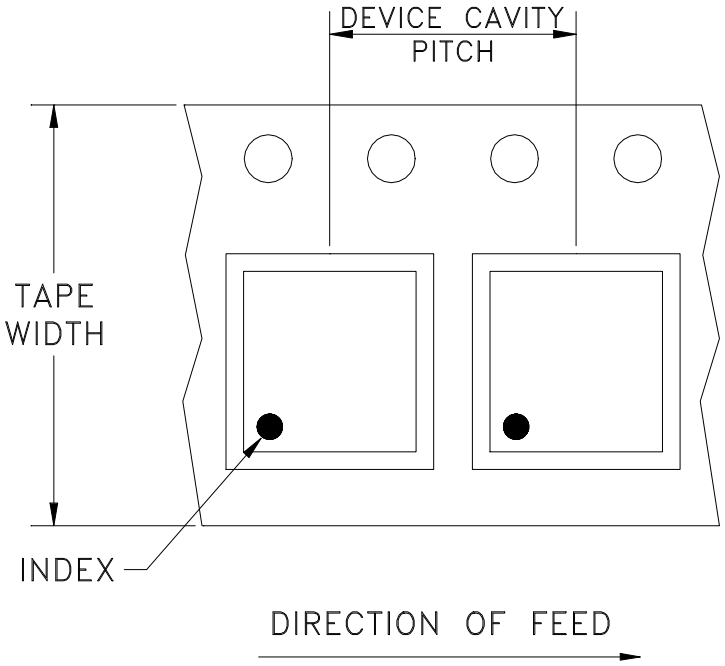
Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3Pl. ± .004

Notes:

1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. All models, (+) suffix. See model data sheet.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Tape & Reel Packaging TR-F58

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
12	8	7	1000
		13	2000, 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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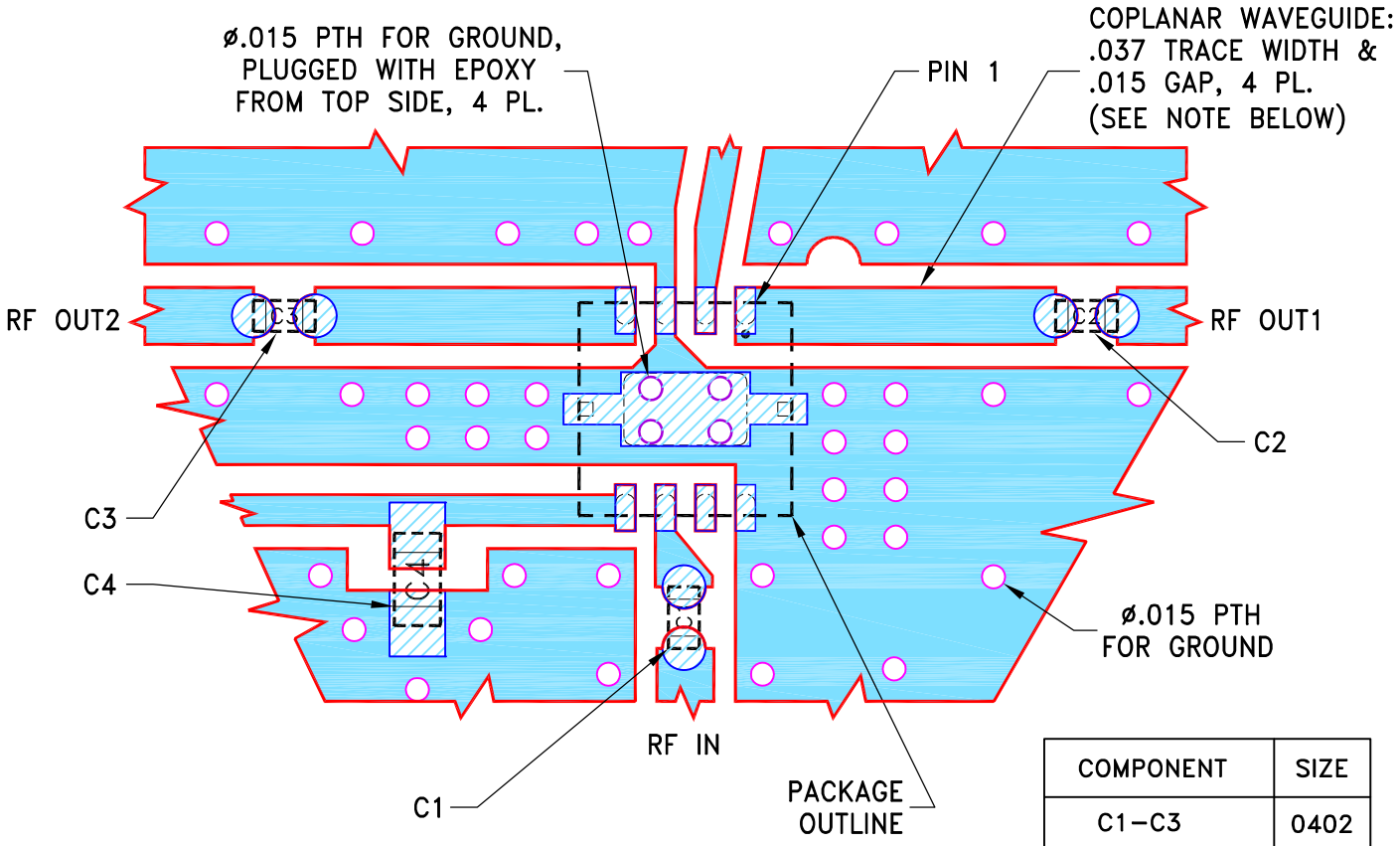
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M166926	NEW RELEASE	03/19/18	ITG	RS

SUGGESTED MOUNTING CONFIGURATION
FOR DL805 CASE STYLE, "08SW07" PIN CODE



COMPONENT	SIZE
C1–C3	0402
C4	0603

NOTES:

1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020"±.0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-159A+.
3. 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	03/16/18
TOLERANCES ON:	CHECKED	GF	03/19/18
2 PL DECIMALS ±	APPROVED	RS	03/19/18
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

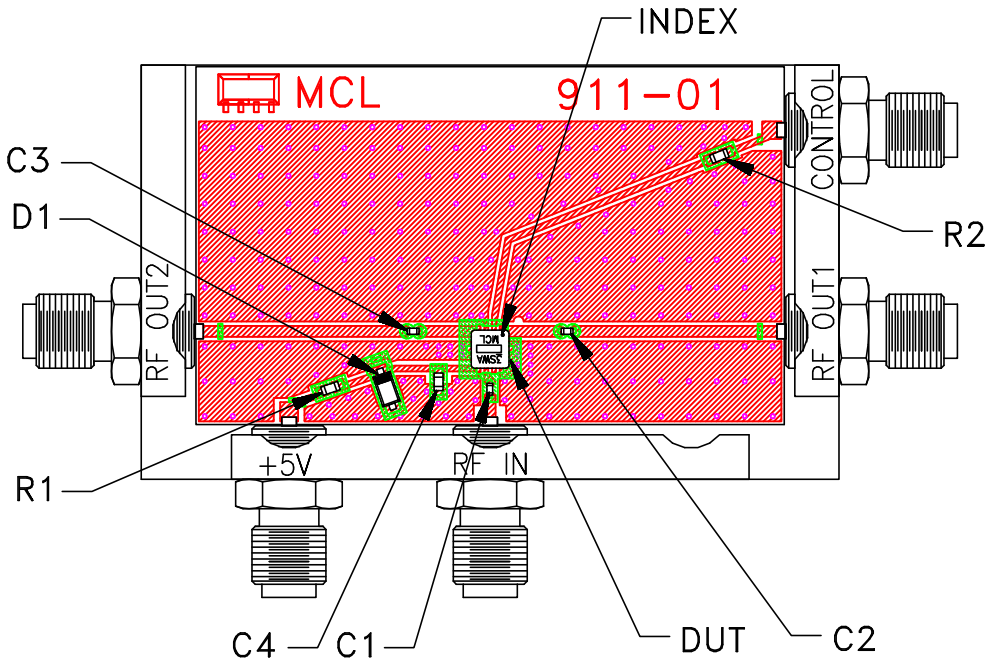
Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

PL, 08SW07, DL805, TB-159A+

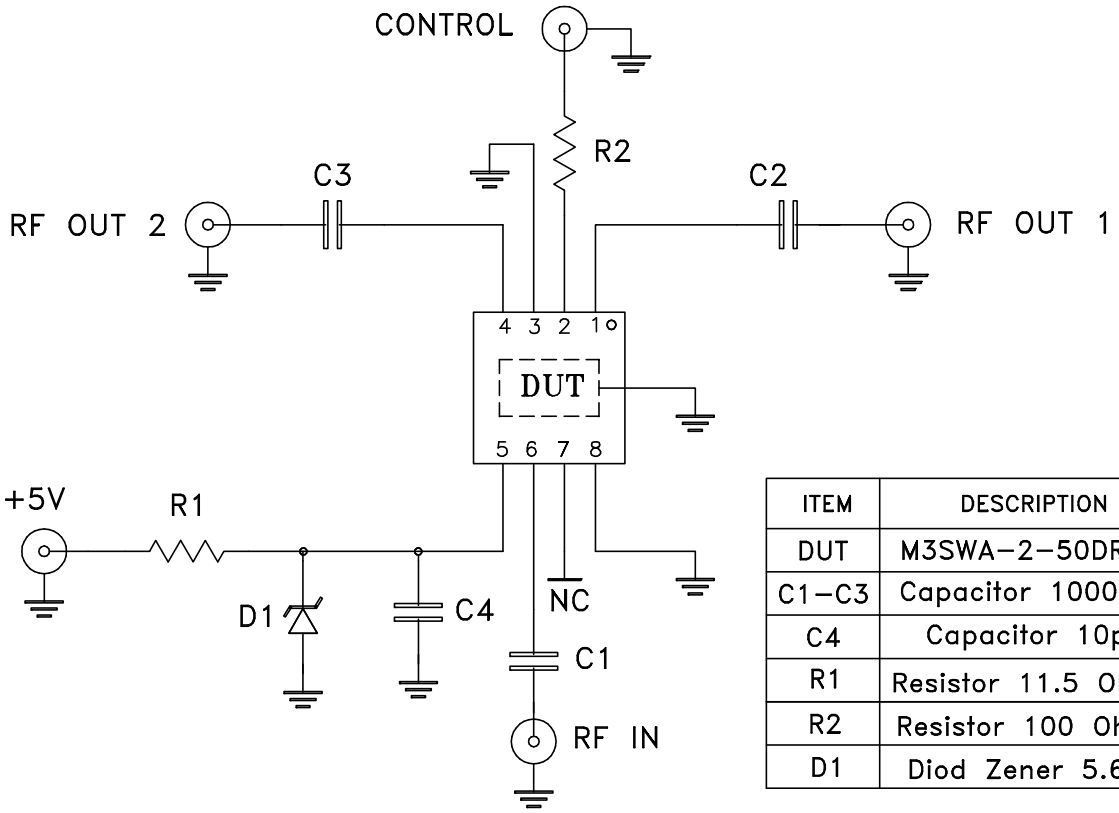
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-120A	OR

FILE:	SCALE:	SHEET:
98PL120A	8:1	1 OF 1

Evaluation Board and Circuit



TB-159A+



Schematic Diagram

ITEM	DESCRIPTION	SIZE
DUT	M3SWA-2-50DRA+	3.25X3.25 MM
C1-C3	Capacitor 1000 pF	0402
C4	Capacitor 10pF	0603
R1	Resistor 11.5 Ohm	
R2	Resistor 100 Ohm	
D1	Diod Zener 5.6V	SOT-123

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.

Mini-Circuits®

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Environmental Specifications ENV16

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	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Temperature Cycling	-55° to 100°C, 100 cycles	MIL-STD-883, Method 1010, Condition B, except 100°C
Solder Reflow Profile	Sn-Pb Eutetic Process: 240°C peak PB-Free Process: 250°C peak	J-STD-020, table 4-1,4-2 and 5-2; figure 5-1
Vibration (Variable Frequency)	50g peak	MIL-STD-883, Method 2007, Condition B
Mechanical Shock	1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only	MIL-STD-883, Method 2002, Condition B, except Y1 direction only
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours. Soak at 85°C/85%RH for 168 hours Reflow 3 cycles at 260°C peak	J-STD-020
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215