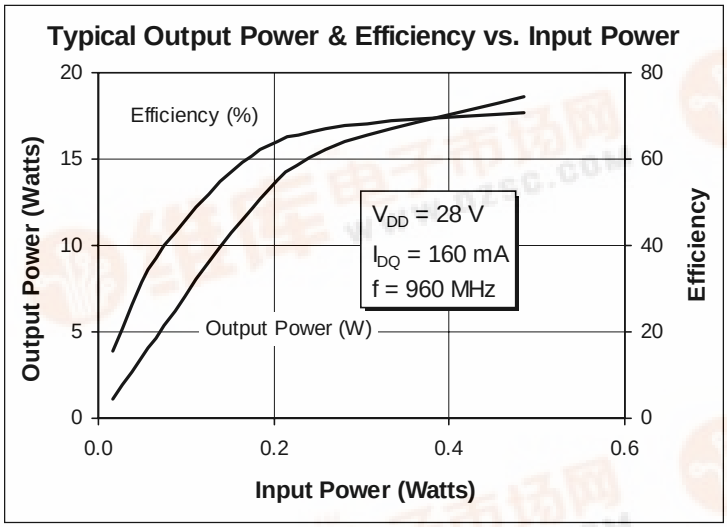
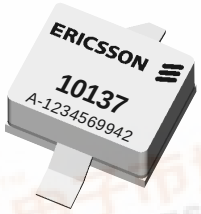
PTF 10137
12 Watts, 1.0 GHz
GOLDMOS™ Field Effect Transistor

Description

The PTF 10137 is a 12 Watt LDMOS FET intended for large signal amplifier applications to 1.0 GHz. It operates at 60% efficiency with 18 dB of gain. Nitride surface passivation and full gold metallization ensure excellent device lifetime and reliability.

- **Performance at 960 MHz, 28 Volts**
  - **Output Power = 12 Watts**
  - **Efficiency = 60% Typ**
  - **Power Gain = 18 dB Typ**
- **Full Gold Metallization**
- **Silicon Nitride Passivated**
- **Surface Mountable**
- **Available in Tape and Reel**
- **100% Lot Traceability**





Package 20244

RF Specifications (100% Tested)

Characteristic	Symbol	Min	Typ	Max	Units
Common Source Power Gain (V_{DD} = 28 V, P_{OUT} = 12 W, I_{DQ} = 160 mA, f = 960 MHz)	G_{ps}	16.5	18	—	dB
Power Output at 1 dB Compressed (V_{DD} = 28 V, I_{DQ} = 160 mA, f = 960 MHz)	P-1dB	12	15	—	Watts
Drain Efficiency (V_{DD} = 28 V, P_{OUT} = 12 W, I_{DQ} = 160 mA, f = 960 MHz)	η	55	60	—	%
Load Mismatch Tolerance (V_{DD} = 28 V, P_{OUT} = 12 W, I_{DQ} = 160 mA, f = 960 MHz —all phase angles at frequency of test)	Ψ	—	—	10:1	—

All published data at T_{CASE} = 25°C unless otherwise indicated.

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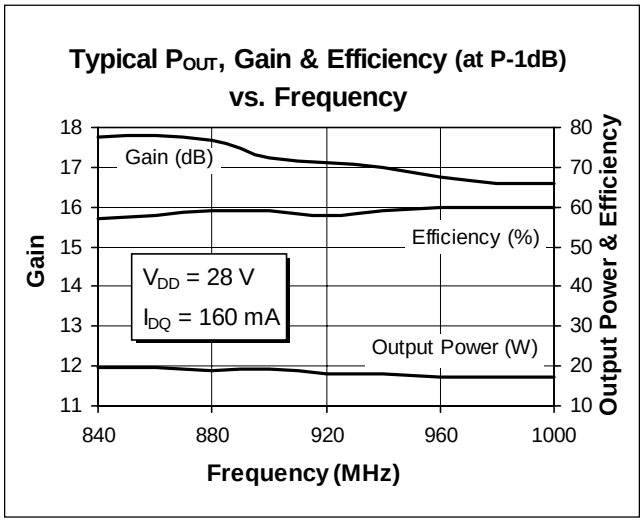
Electrical Characteristics (100% Tested)

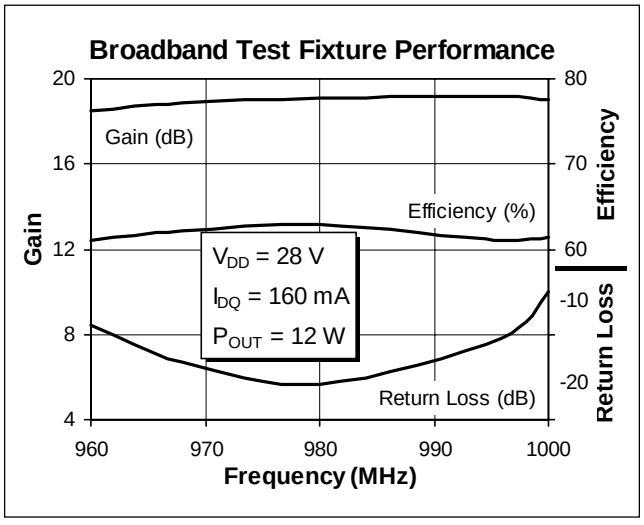
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 25 mA	$V_{(BR)DSS}$	65	—	—	Volts
Drain-Source Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 75 mA	$V_{GS(th)}$	3.0	—	5.0	Volts
Forward Transconductance	V_{DS} = 10 V, I_D = 0.5 A	g_{fs}	—	0.9	—	Siemens

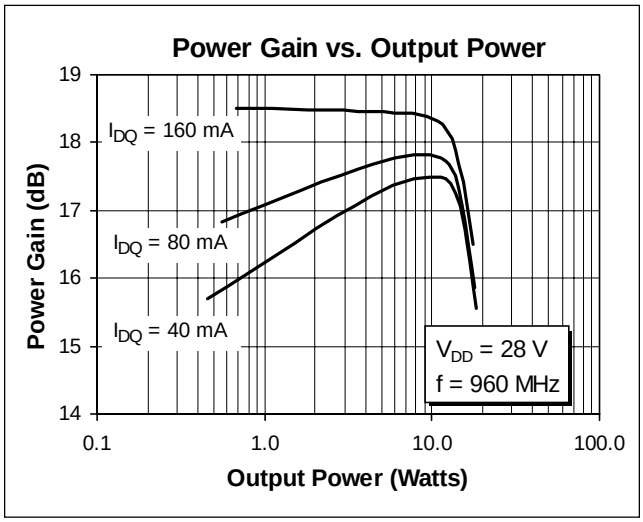
Maximum Ratings

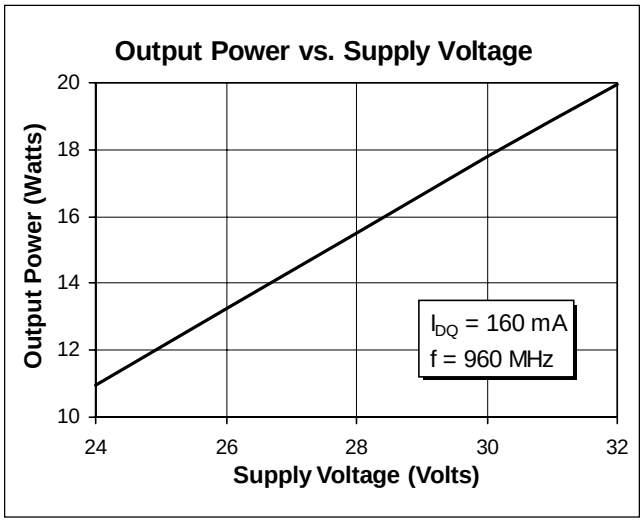
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Vdc
Gate-Source Voltage	V_{GS}	±20	Vdc
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation Above 25°C derate by	P_D	58 0.33	Watts W/°C
Storage Temperature Range	T_{STG}	–40 to 150	°C
Thermal Resistance (T_{CASE} = 70°C)	$R_{\theta JC}$	3.0	°C/W

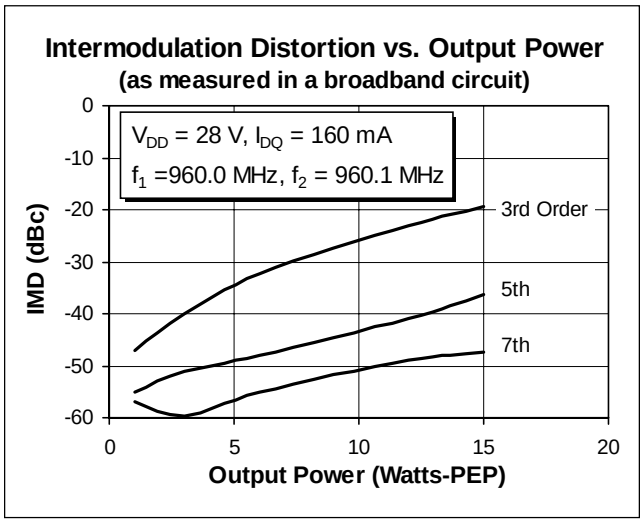
Typical Performance

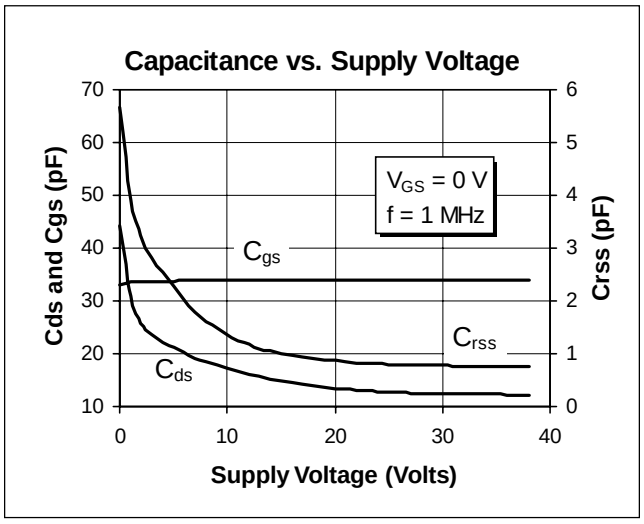


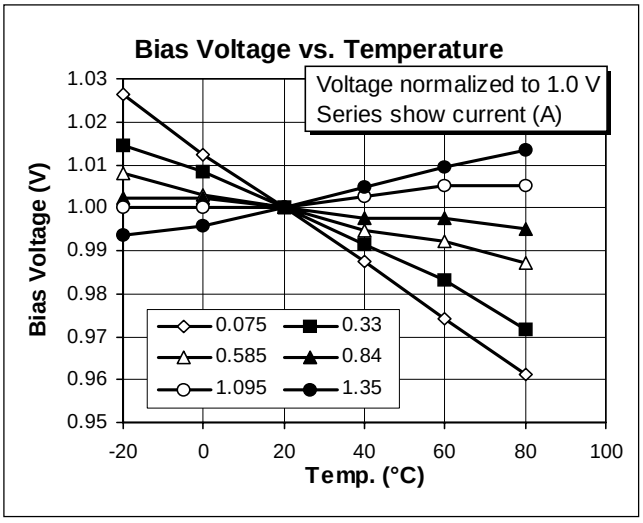



Power Gain vs. Output Power
Power Gain (dB)
Output Power (Watts)
I_{DQ} = 160 mA
I_{DQ} = 80 mA
I_{DQ} = 40 mA
V_{DD} = 28 V
f = 960 MHz
19
18
17
16
15
14
0.1
1.0
10.0
100.0


Output Power vs. Supply Voltage
Output Power (Watts)
Supply Voltage (Volts)
I_{DQ} = 160 mA
f = 960 MHz
20
18
16
14
12
10
24
26
28
30
32


Intermodulation Distortion vs. Output Power
(as measured in a broadband circuit)
IMD (dBc)
Output Power (Watts-PEP)
V_{DD} = 28 V, I_{DQ} = 160 mA
f_1 =960.0 MHz, f_2 = 960.1 MHz
3rd Order
5th
7th
0
-10
-20
-30
-40
-50
-60
0
5
10
15
20


Capacitance vs. Supply Voltage
Cds and Cgs (pF)
Crss (pF)
Supply Voltage (Volts)
V_{GS} = 0 V
f = 1 MHz
C_{gs}
C_{rss}
C_{ds}
70
60
50
40
30
20
10
6
5
4
3
2
1
0
0
10
20
30
40


Bias Voltage vs. Temperature
Voltage normalized to 1.0 V
Series show current (A)
Bias Voltage (V)
Temp. (°C)
0.075
0.33
0.585
0.84
1.095
1.35
1.03
1.02
1.01
1.00
0.99
0.98
0.97
0.96
0.95
-20
0
20
40
60
80
100

PTF 10137

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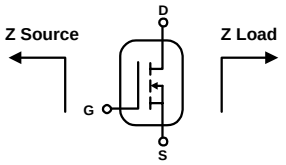
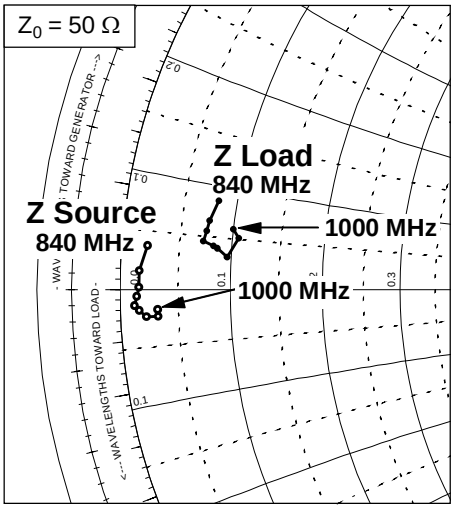
Impedance Data

V_{DD} = 28 V, I_{DQ} = 160 mA, P-1dB = 18 W



Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
840	1.1	1.9	4.1	4.3
860	0.8	0.8	3.8	3.3
880	0.8	0.1	3.7	2.8
900	0.7	-0.3	3.6	2.3
920	0.6	-0.7	4.1	2.1
940	0.8	-0.9	4.3	2.0
960	1.1	-1.2	4.8	1.6
980	1.6	-1.2	5.3	2.6
1000	1.6	-0.9	5.0	3.7

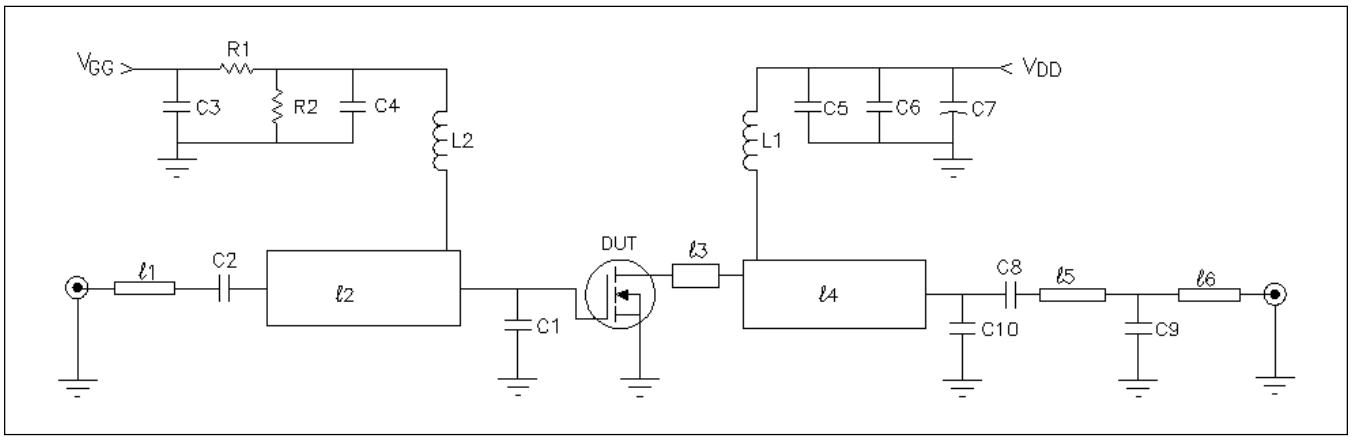


Typical Scattering Parameters

(V_{DS} = 28 V, I_D = 450 mA)

f	S11		S21		S12		S22	
(MHz)	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
100	0.862	-126	25.8	101	0.018	11.5	0.575	-78.7
150	0.866	-135	21.1	93.6	0.018	3.96	0.583	-86.4
200	0.872	-146	15.5	80.9	0.018	-5.92	0.587	-97.4
250	0.881	-153	12.0	71.6	0.017	-13.4	0.613	-106
300	0.888	-157	9.57	63.7	0.016	-19.1	0.646	-113
350	0.896	-161	7.86	57.0	0.015	-24.0	0.679	-119
400	0.905	-164	6.55	51.0	0.013	-27.9	0.713	-124
450	0.910	-166	5.53	45.7	0.012	-31.0	0.742	-129
500	0.920	-168	4.74	40.8	0.011	-32.8	0.770	-133
550	0.927	-169	4.09	36.6	0.009	-34.0	0.792	-137
600	0.932	-171	3.57	32.4	0.008	-35.0	0.813	-141
650	0.940	-173	3.15	28.9	0.007	-34.2	0.834	-144
700	0.942	-174	2.79	25.5	0.006	-32.7	0.849	-147
750	0.948	-175	2.49	22.1	0.005	-27.9	0.865	-150
800	0.953	-177	2.23	19.3	0.004	-20.5	0.874	-152
850	0.955	-178	2.01	16.2	0.003	-8.60	0.884	-155
900	0.958	-179	1.83	13.6	0.003	10.9	0.896	-157
950	0.961	-180	1.66	11.1	0.003	32.3	0.902	-159
1000	0.963	179	1.52	8.52	0.003	47.7	0.912	-161
1050	0.967	178	1.39	6.44	0.004	57.8	0.917	-162
1100	0.967	177	1.27	4.07	0.004	63.1	0.921	-164
1150	0.967	176	1.18	1.96	0.005	68.8	0.929	-166
1200	0.970	175	1.09	0.12	0.006	70.7	0.932	-167
1250	0.970	174	1.01	-2.03	0.006	73.2	0.937	-169
1300	0.972	173	0.943	-3.66	0.007	74.5	0.943	-170
1350	0.973	172	0.874	-5.57	0.008	75.7	0.943	-172
1400	0.978	172	0.825	-7.37	0.009	75.8	0.950	-173
1450	0.978	171	0.772	-8.77	0.009	76.4	0.948	-174
1500	0.981	170	0.729	-10.7	0.010	76.6	0.952	-176
1550	0.981	169	0.689	-12.1	0.011	77.2	0.958	-177
1600	0.982	168	0.647	-13.9	0.012	76.3	0.958	-178
1650	0.983	167	0.615	-15.7	0.013	75.0	0.966	-179
1700	0.983	167	0.580	-16.9	0.013	74.7	0.964	-180
1750	0.983	166	0.549	-18.7	0.014	74.4	0.961	179
1800	0.983	165	0.525	-20.3	0.015	74.7	0.962	178
1850	0.981	164	0.499	-21.8	0.015	74.0	0.958	176
1900	0.981	163	0.478	-23.4	0.016	72.9	0.967	175
1950	0.981	162	0.454	-24.3	0.017	72.1	0.967	175
2000	0.981	161	0.431	-26.0	0.018	71.3	0.967	173
2050	0.981	161	0.414	-27.3	0.018	71.3	0.969	173
2100	0.979	160	0.395	-28.6	0.019	70.8	0.963	172
2150	0.979	159	0.382	-30.0	0.019	69.8	0.969	170
2200	0.975	158	0.371	-30.7	0.020	69.1	0.969	169

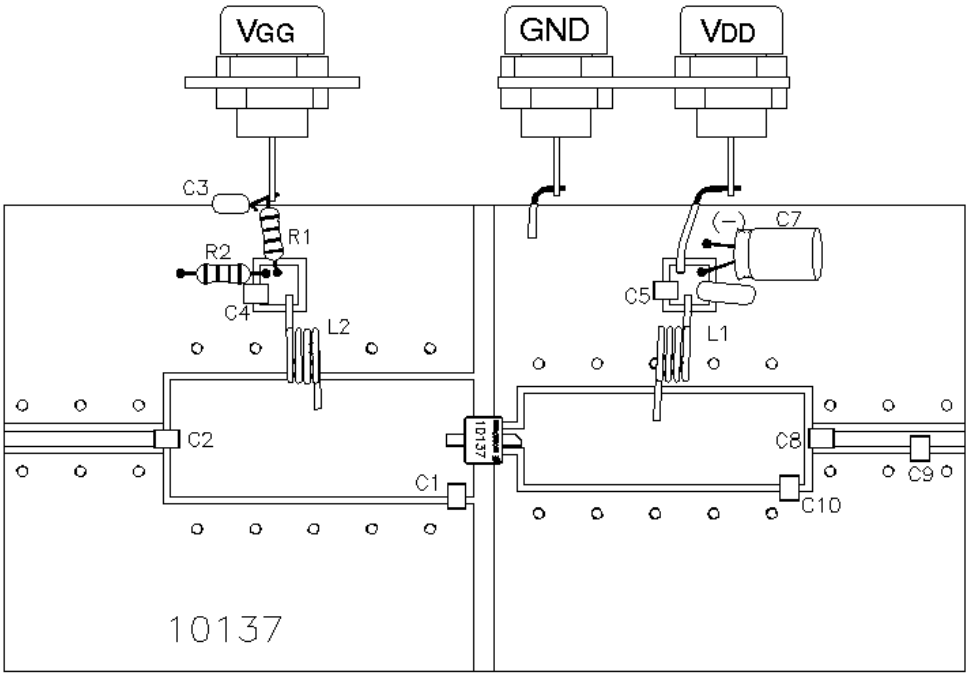
Test Circuit



Test Circuit Schematic for f = 960 MHz

DUT	PTF 10137	
ℓ1, ℓ6		Microstrip 50 Ω
ℓ2	0.197 λ 960 MHz	Microstrip 10 Ω
ℓ3	0.018 λ 960 MHz	Microstrip 44 Ω
ℓ4	0.184 λ 960 MHz	Microstrip 12.7 Ω
ℓ5	0.047 λ 960 MHz	Microstrip 50 Ω

C1	ATC 100 B	Capacitor, 8.2 pF, ATC 100 B
C2,C4,C5,C8	ATC 100 B	Capacitor, 36 pF, ATC 100 B
C3,C6	Digi-Key P4525-ND	Capacitor, 0.1 μF, 50V
C7	Digi-Key P5182-ND	Capacitor, 100 μF, 50V
C9, C10	ATC 100 B	2.0 pF Capacitor, ATC 100 B
R1, R2	Digi-Key 2.2 QBK	Resistor, 220 Ω, 1/4W
L1,L2	N/A	4 Turn, 20 AWG, .120 I.D.
Circuit Board	.028" Dielectric Thickness, ε_r = 4.0, AlliedSignal, G200, 2 oz. copper	



Assembly Diagram (not to scale)

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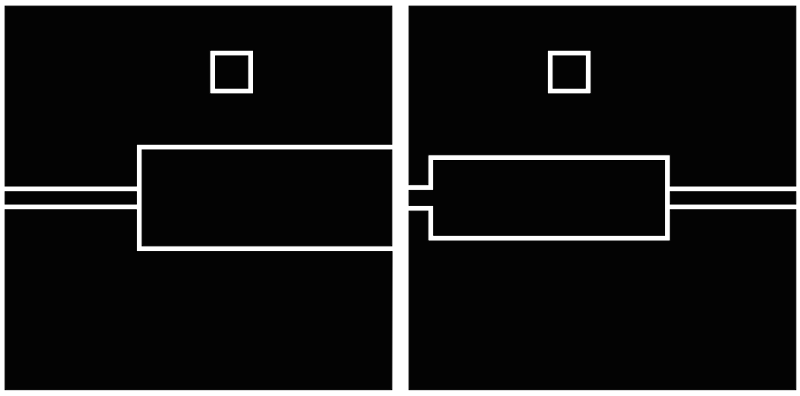
Test Circuit



Artwork (1 inch)

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