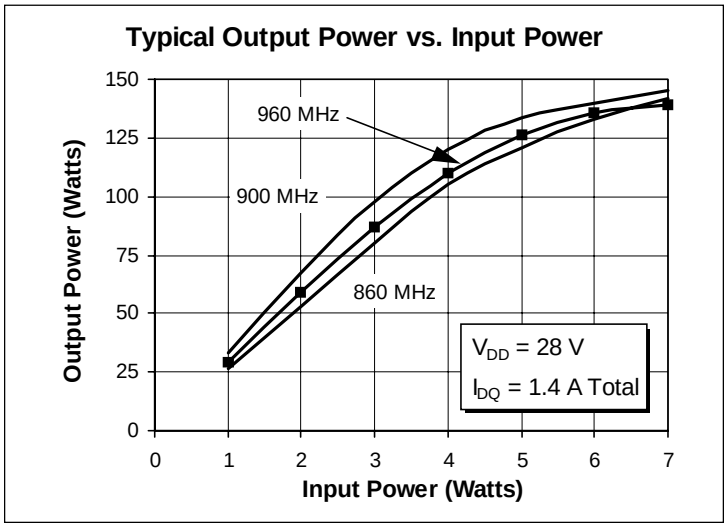
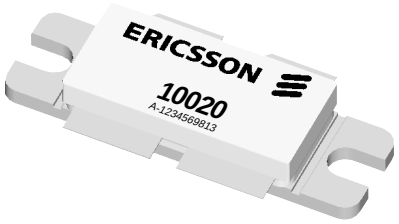
PTF 10020
125 Watts, 860–960 MHz
GOLDMOS™ Field Effect Transistor

Description

The PTF 10020 is an internally matched, 125 Watt LDMOS FET intended for large signal amplifier applications from 860 to 960 MHz. Nitride surface passivation and gold metallization ensure excellent device lifetime and reliability.

- ***INTERNALLY MATCHED***
- **Performance at 960 MHz, 28 Volts**
  - Output Power = 125 Watts
  - Power Gain = 12.5 dB Typ
  - Efficiency = 55% Typ
- **Full Gold Metallization**
- **Silicon Nitride Passivated**
- **Back Side Common Source**
- **100% Lot Traceability**





Package 20240

RF Specifications (100% Tested)

Characteristic	Symbol	Min	Typ	Max	Units
Gain (V_{DD} = 28 V, P_{OUT} = 125 W, I_{DQ} = 1.4 A Total, f = 960 MHz)	G_{ps}	11.0	12.5	—	dB
Power Output at 1 dB Compression (V_{DD} = 28 V, I_{CQ} = 1.4 A Total, f = 960 MHz)	P-1dB	125	130	—	Watts
Drain Efficiency (V_{DD} = 28 V, P_{OUT} = 125 W, I_{DQ} = 1.4 A Total, f = 960 MHz)	η	50	55	—	%
Load Mismatch Tolerance (V_{DD} = 28 V, P_{OUT} = 125 W(PEP), I_{DQ} = 1.4 A Total, f = 959.9, 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—characteristics, conditions and limits shown per side)

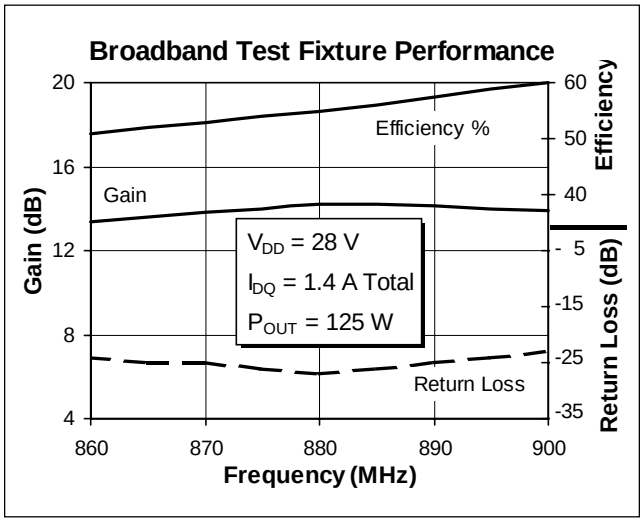
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 5 mA	$V_{(BR)DSS}$	65	—	—	Volts
Drain-Source Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 75 mA	$V_{GS(th)}$	3.0	4.3	5.0	Volts
Forward Transconductance	V_{DS} = 10 V, I_D = 3 A	g_{fs}	—	2.5	—	Siemens

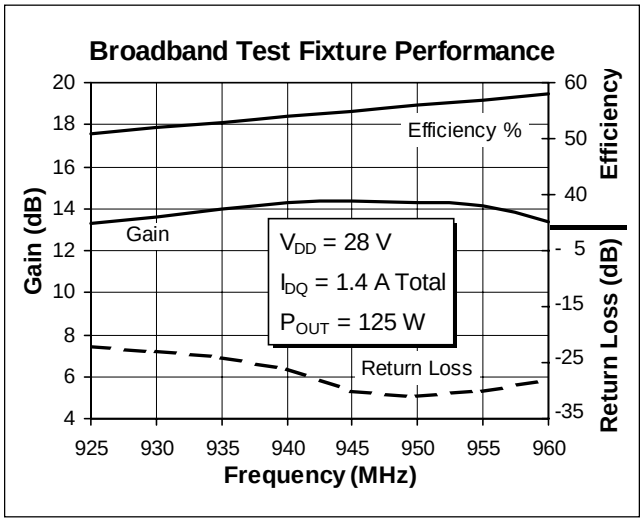
Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage (1)	V_{DSS}	65	Vdc
Gate-Source Voltage (1)	V_{GS}	±20	Vdc
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation at Above 25°C derate by	P_D	290 1.67	Watts W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C)	$R_{\theta JC}$	0.6	°C/W

(1)per side

Typical Performance





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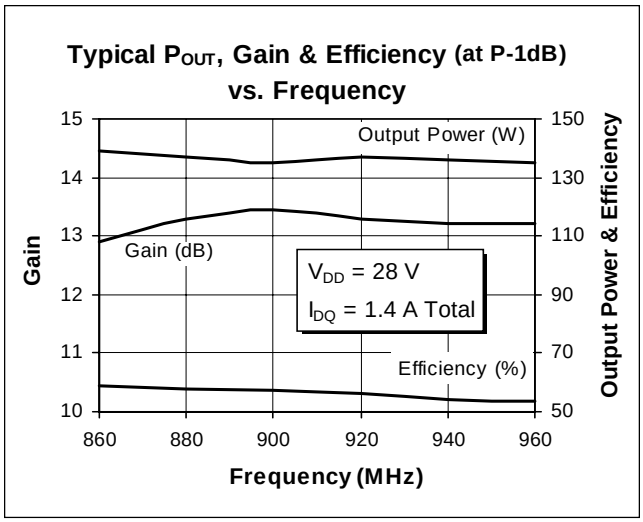
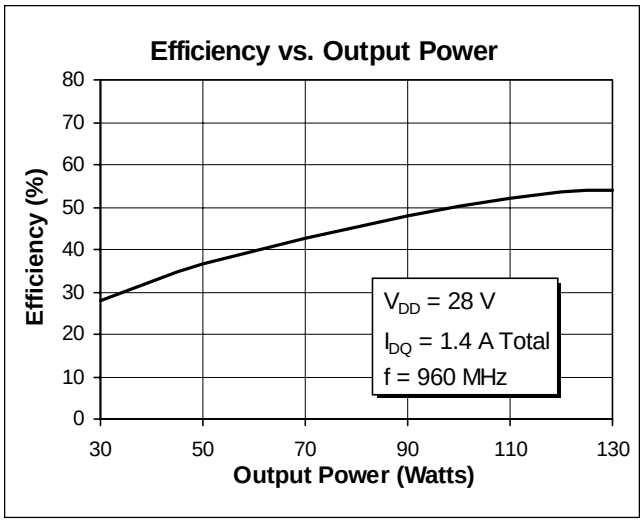
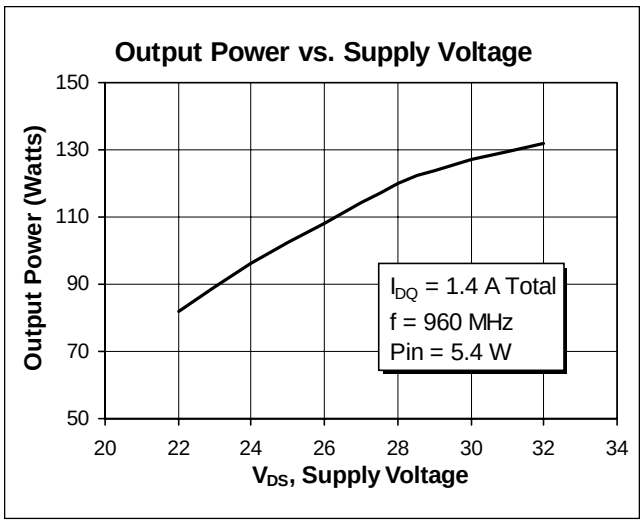
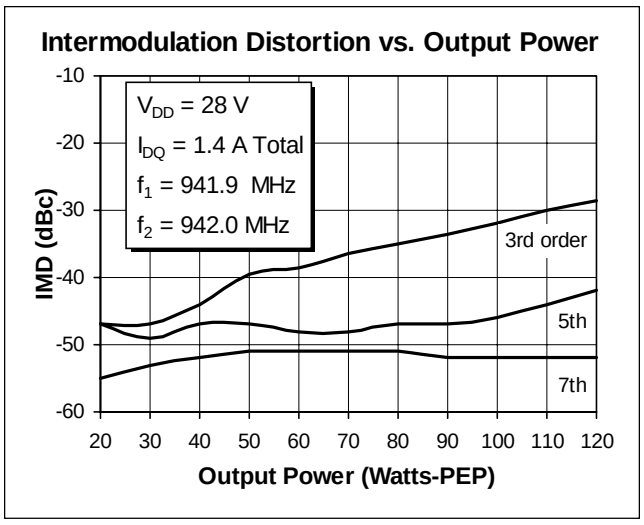
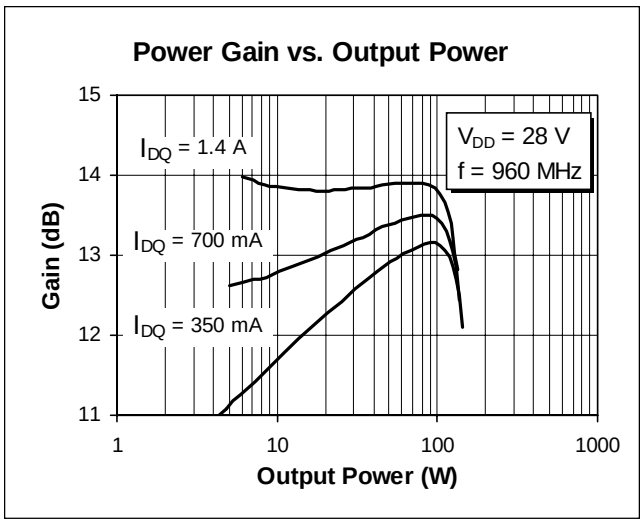
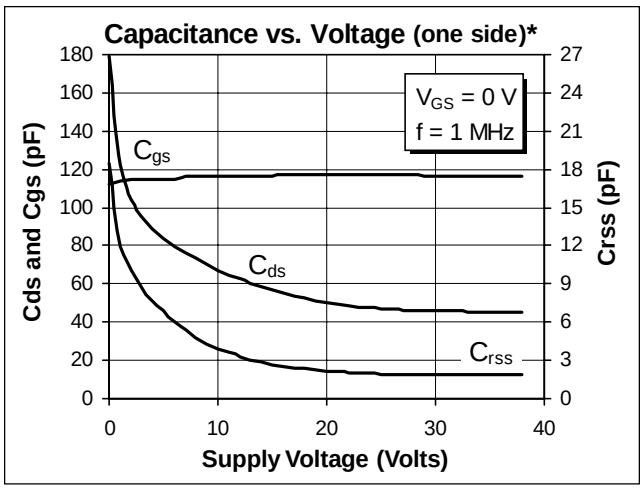






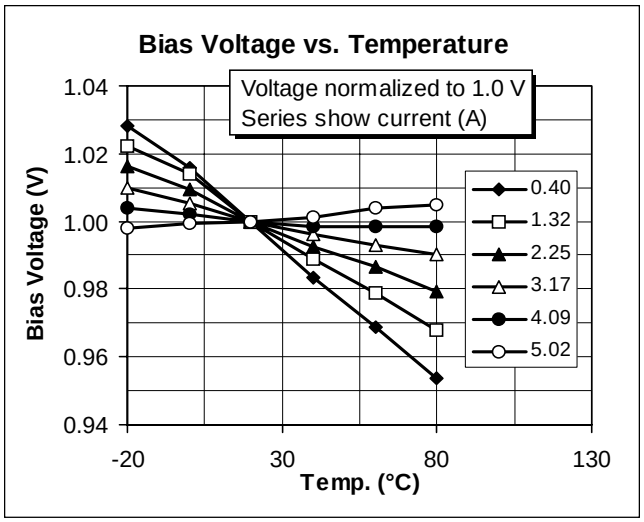






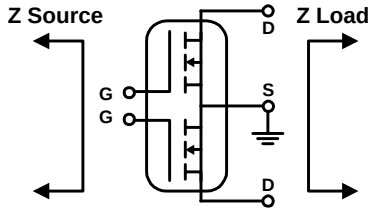
*This part is internally matched. Measurements of the finished product will not yield these figures.

Typical Performance

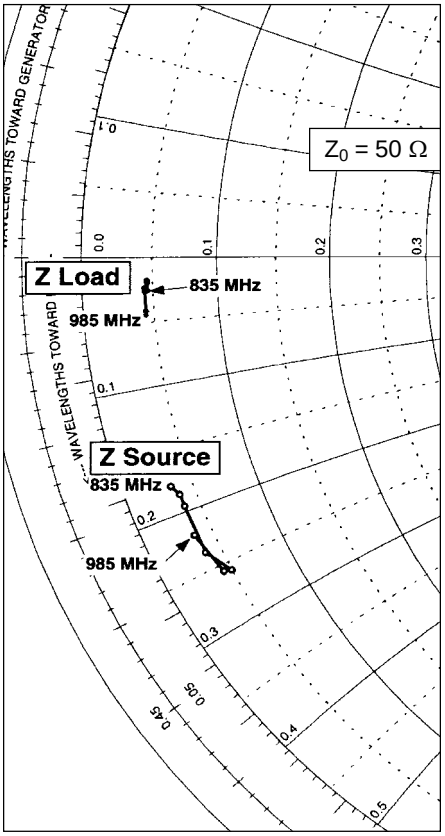


Impedance Data

(V_{DD} = 28 V, I_{DQ} = 1.4 A, P_{OUT} = 125 W)



Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
835	1.7	-8.9	2.3	-1.3
860	1.9	-9.3	2.3	-0.9
885	1.9	-9.8	2.3	-1.0
910	1.9	-11.8	2.2	-1.2
935	2.5	-12.9	2.2	-1.3
960	2.2	-12.8	2.2	-2.1
985	1.8	-11.0	2.2	-2.2

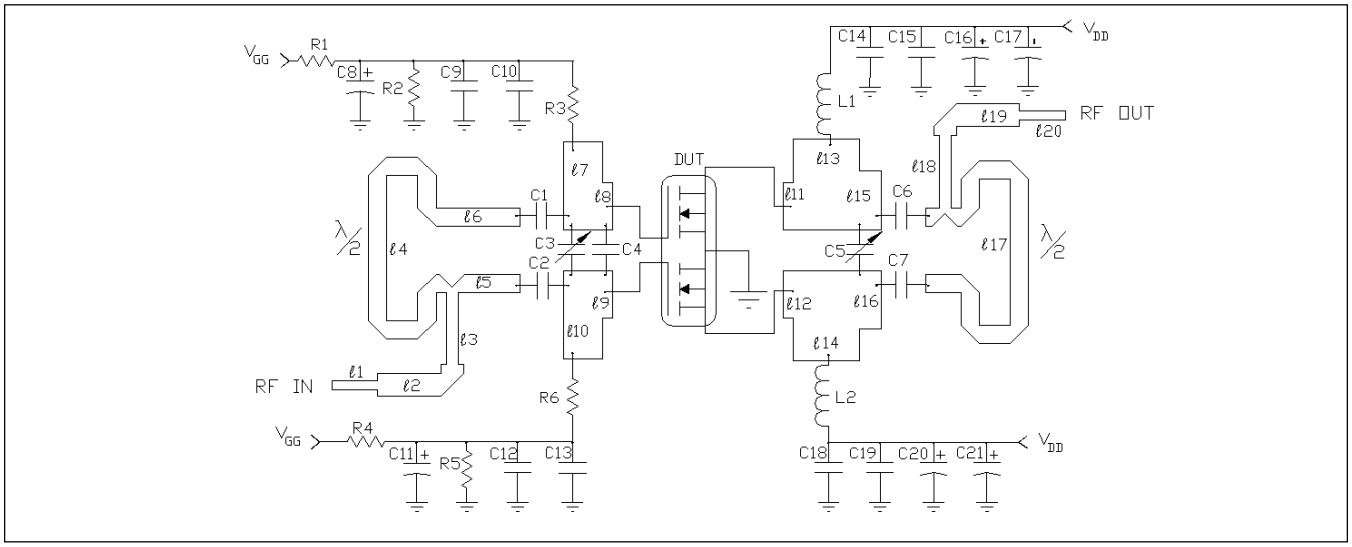


Typical Scattering Parameters (one side only)

(V_{DS} = 28 V, I_D = 4 A)

f	S11		S21		S12		S22	
(MHz)	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
800	0.974	176	0.657	-10.6	0.002	50.9	0.97	-172
810	0.974	175.9	0.66	-11.5	0.002	49	0.971	-172.1
820	0.974	175.7	0.662	-12.7	0.002	52.9	0.971	-172.3
830	0.974	175.6	0.666	-13.6	0.002	53.4	0.972	-172.4
840	0.972	175.4	0.669	-14.8	0.002	52.6	0.972	-172.5
850	0.972	175.4	0.672	-16	0.002	54.9	0.972	-172.7
860	0.971	175.2	0.674	-16.9	0.002	56.1	0.972	-172.8
870	0.969	175	0.679	-18	0.002	52.5	0.972	-172.8
880	0.968	174.9	0.686	-19.1	0.002	53.4	0.973	-173
890	0.966	174.8	0.695	-20.2	0.002	56.2	0.975	-173.1
900	0.964	174.7	0.705	-21.4	0.002	58.1	0.977	-173.2
910	0.963	174.6	0.716	-23	0.002	55.5	0.977	-173.4
920	0.961	174.3	0.729	-24.6	0.002	57.7	0.976	-173.6
930	0.958	174.2	0.743	-26.3	0.002	57	0.977	-173.6
940	0.956	174.1	0.757	-28.2	0.002	56.7	0.978	-173.8
950	0.953	174	0.774	-30.3	0.002	58.7	0.979	-174
960	0.95	173.8	0.791	-32.7	0.002	60.2	0.979	-173.9
970	0.946	173.8	0.807	-35.4	0.002	60	0.981	-174.1
980	0.942	173.7	0.821	-38.1	0.002	59.5	0.982	-174.2
990	0.937	173.6	0.838	-41	0.002	62	0.983	-174.3
1000	0.933	173.6	0.853	-44	0.002	62.2	0.983	-174.4

Test Circuit



Schematic for f = 960 MHz

DUT	PTF 10020
C1-2	15 pF, Capacitor ATC 100 B
C3	0.35–3.5 pF, Variable Capacitor
C4	7.5 pF, Capacitor ATC 100 A
C5	1–9 pF, Variable Capacitor
C6-7, C10, C13-14, C18	33 pF, Capacitor ATC 100 B
C8, C11	10 µF, +10 V Electrolytic Capacitor
C9, C12, C15, C19	0.01 µF, Capacitor ATC 100 B
C16, C17, C20, C21	10 µF, +30 V Electrolytic Capacitor
L1. L2	4 Turn, #20 AWG, .120" I.D.
R1, R2, R4, R5	1.0 K, Ω Resistor
R3, R6	5.1 K, 1/4 Ω Resistor

ℓ1, ℓ20	50 Ω, .030 λ
ℓ2, ℓ19	20 Ω, .080 λ
ℓ3, ℓ18	32 Ω, .191 λ
ℓ4, ℓ17	25 Ω, .500 λ
ℓ5, ℓ6	25 Ω, .091 λ
ℓ7, ℓ10	7 Ω, .056 λ
ℓ8, ℓ9	13.0 Ω, .017 λ
ℓ11, ℓ12	13.0 Ω, .017 λ
ℓ13, ℓ14	7.0 Ω, .093 λ
ℓ15, ℓ16	10.2 Ω, .030 λ
Circuit Board	.028" Dielectric Thickness, ε_r = 4.0, AlliedSignal, G200, 2 oz. copper

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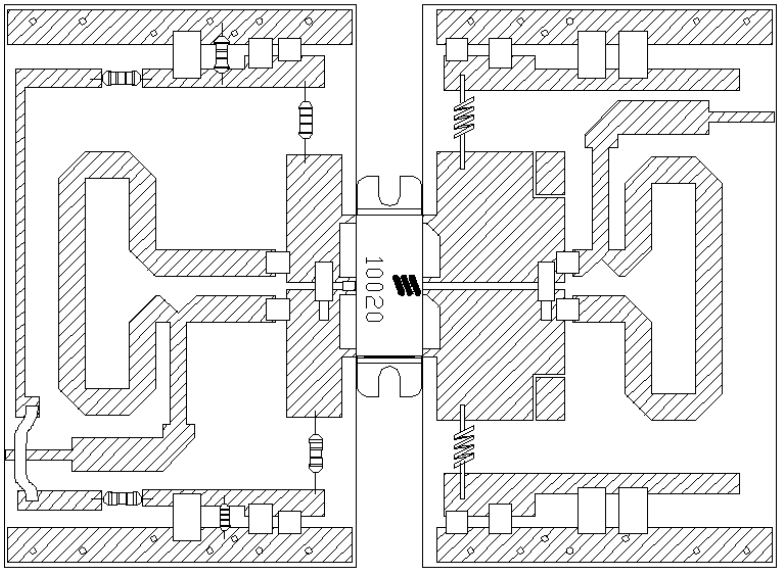
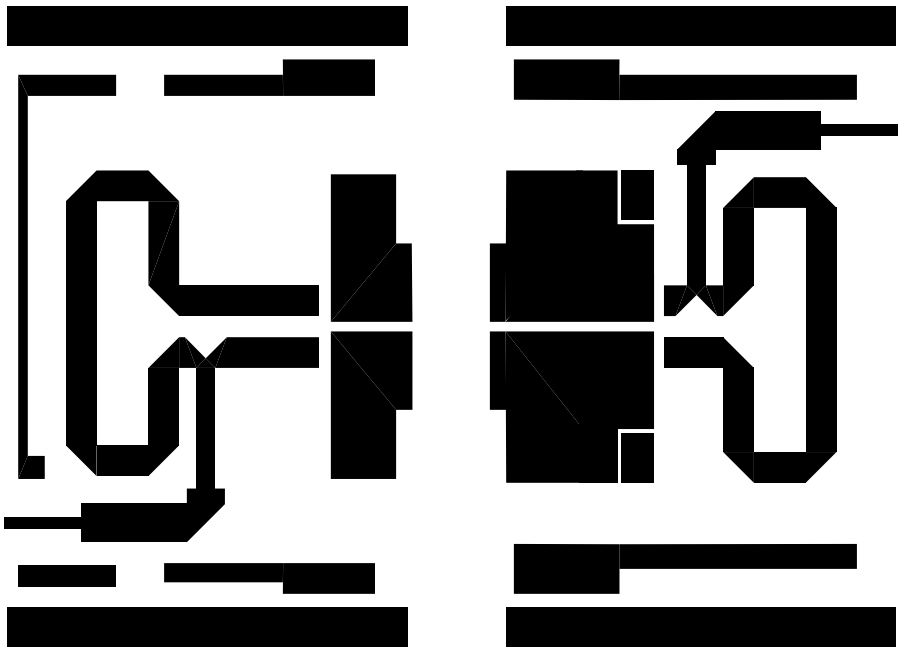


Components Layout (not to scale)



Artwork (1 inch)

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