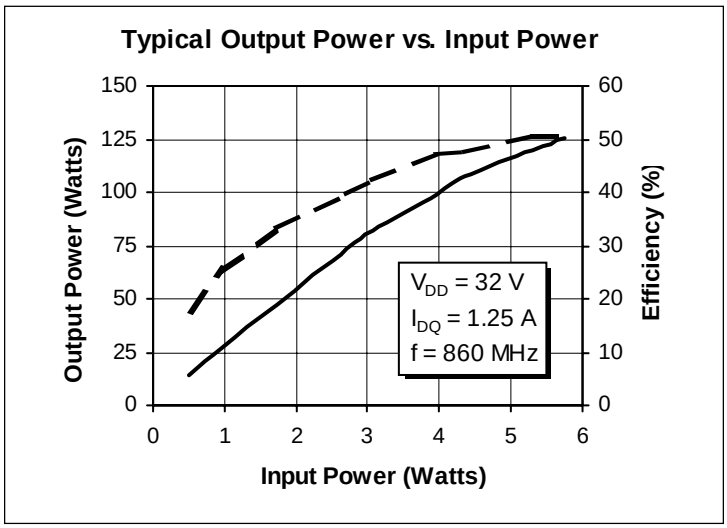
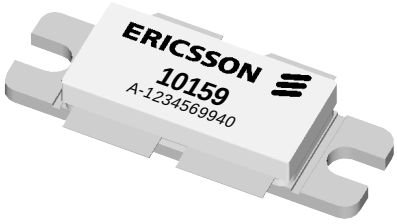
PTF 10159
120 Watts, 470–860 MHz
GOLDMOS™ Field Effect Transistor

Description

The PTF 10159 is an internally matched, LDMOS FET intended for large signal television amplifier applications from 470 to 860 MHz. It is rated at 130 watts power output. Nitride surface passivation and full gold metallization ensure excellent device lifetime and reliability.

- ***INTERNALLY MATCHED***
- **Performance at 860 MHz, 32 Volts**
  - **Output Power = 130 Watts Typ**
  - **Power Gain = 14.0 dB Typ**
  - **Efficiency = 50% Typ**
- **Performance at 860 MHz, 28 Volts**
  - **Output Power = 100 Watts**
  - **Power Gain = 14.0 dB Typ**
  - **Efficiency = 50% 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} = 32 V, P_{OUT} = 120 W, I_{DQ} = 1.3 A Total, f = 860 MHz)	G_{ps}	12.0	14.0	—	dB
Drain Efficiency (V_{DD} = 32 V, P_{OUT} = 120 W, I_{DQ} = 1.3 A Total, f = 860 MHz)	η	45	50	—	%
Power Output at 1 dB Compression (V_{DD} = 32 V, I_{DQ} = 1.3 A Total, f = 860 MHz)	P-1dB	115	130	—	Watts
Load Mismatch Tolerance (V_{DD} = 32 V, P_{OUT} = 120 W, I_{DQ} = 1.3 A Total, f = 860.0 MHz— all phase angles at frequency of test)	Ψ	—	—	5:1	—

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

ERICSSON

Electrical Characteristics (100% Tested—characteristics, conditions and limits shown per side)

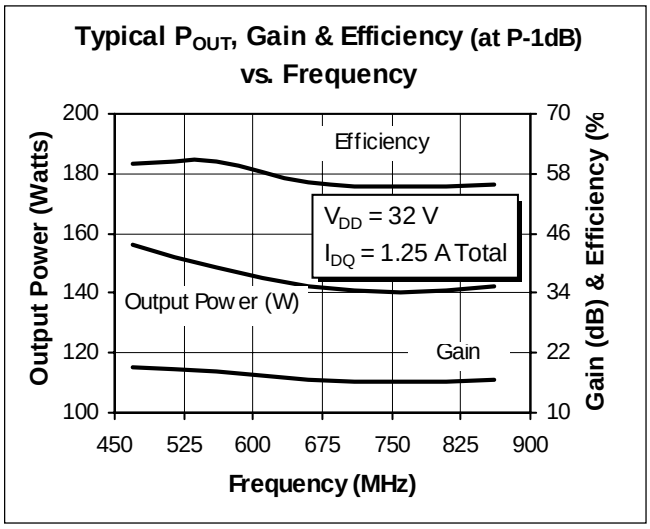
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 5 mA	$V_{(BR)DSS}$	65	—	—	Volts
Drain-Source Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 75 mA	$V_{GS(th)}$	3.0	—	5.0	Volts
Forward Transconductance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

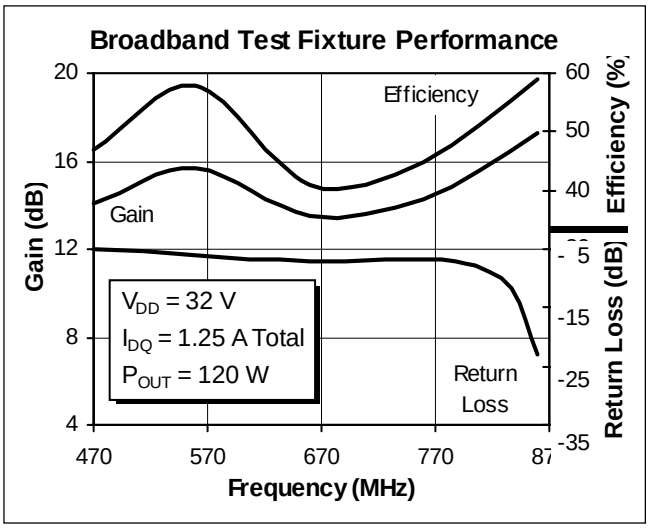
Maximum Ratings

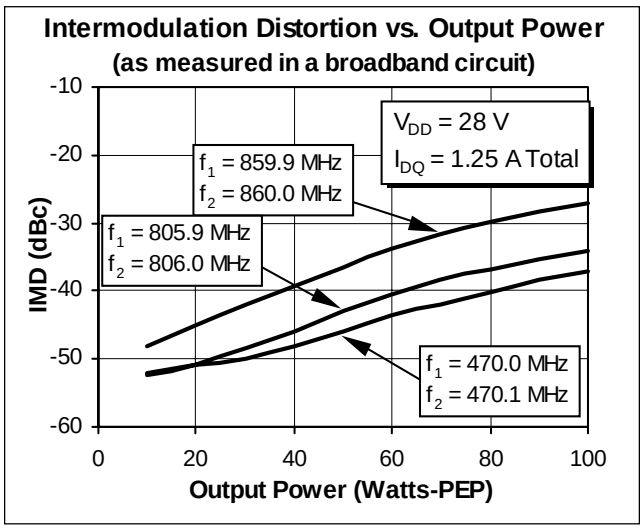
Parameter	Symbol	Value	Unit
Drain-Source Voltage(1)	V_{DSS}	65	Vdc
Gate-Source Voltage(1)	V_{GS}	±20	Vdc
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation at Above 25°C derate by	P_D	290 1.67	Watts W/°C
Storage Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C)	$R_{\theta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

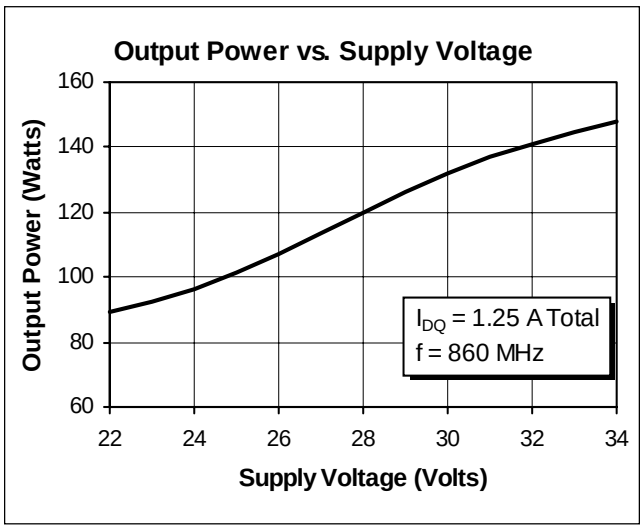
(1) per side

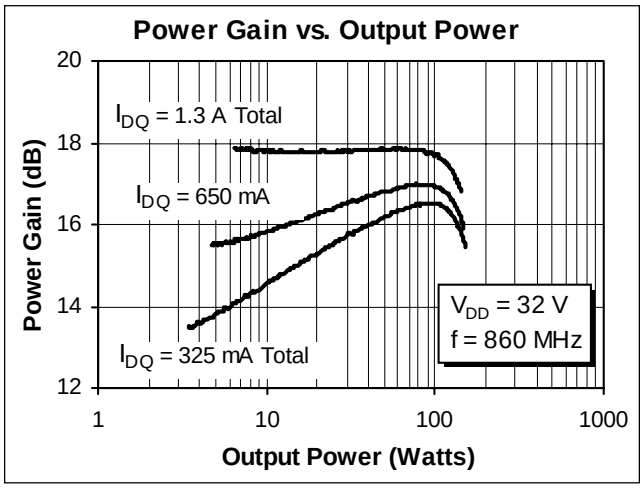
Typical Performance

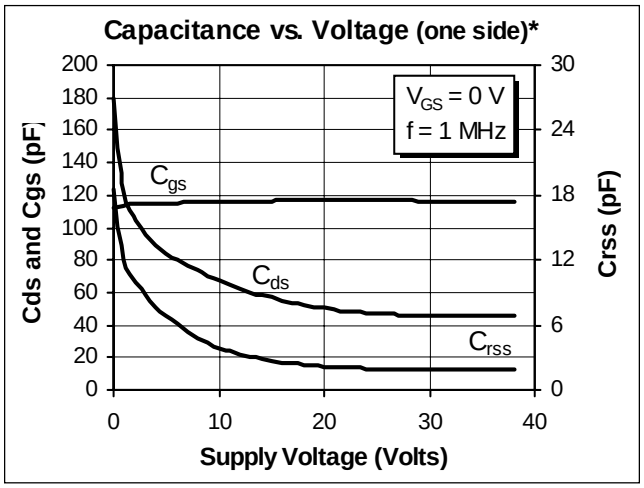




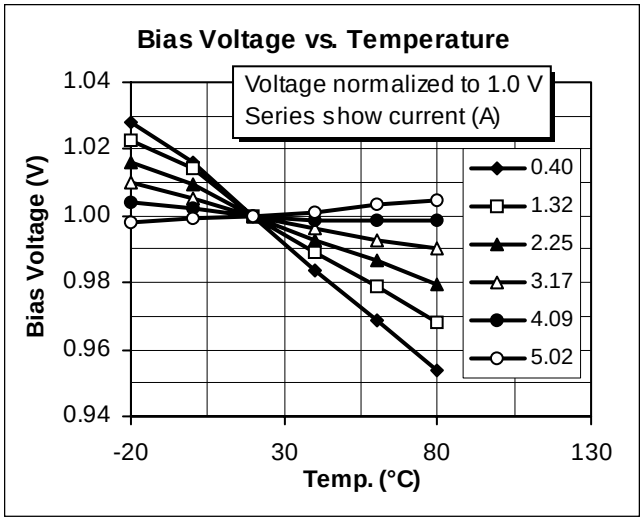








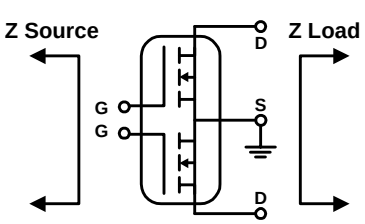
*This part is internally matched. Measurements of the finished product will not yield these figures.



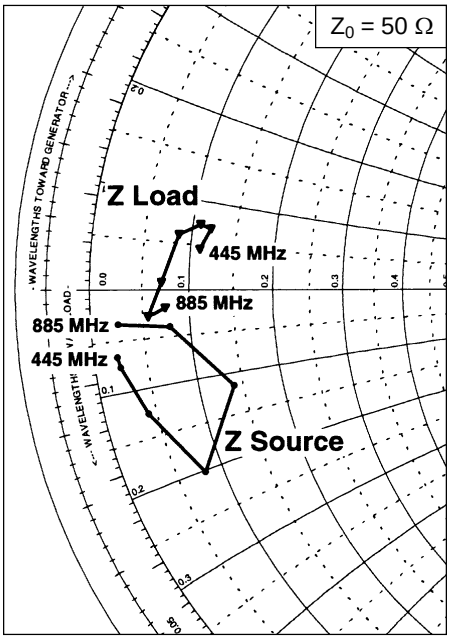
ERICSSON

Impedance Data

V_{DD} = 32 V, P_{OUT} = 120 W, I_{DQ} = 1.3 A Total



Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
445	1.1	-3.3	5.5	2.3
470	1.2	-3.8	6.0	3.5
560	2.1	-6.3	5.4	3.7
660	4.0	-10.1	4.3	3.0
760	7.0	-5.8	3.5	0.4
860	3.9	-2.0	2.8	-1.4
885	1.3	-1.7	3.7	-1.0

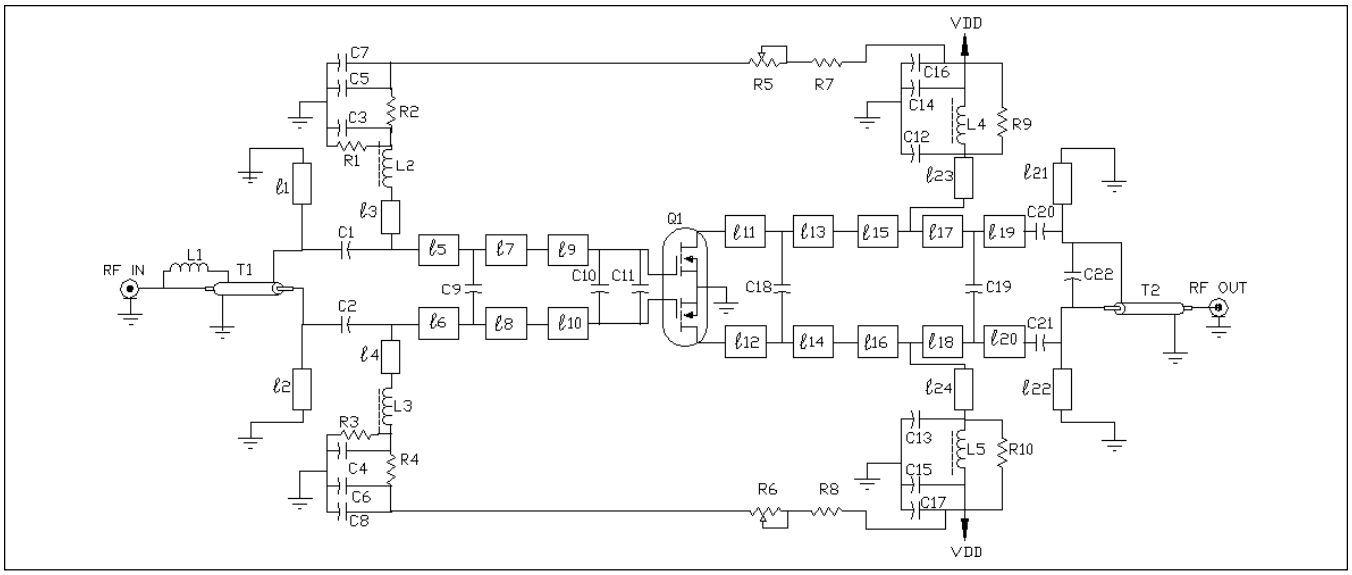


Typical Scattering Parameters (one side)

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

f	S11		S21		S12		S22	
(MHz)	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
400	0.966	179	1.56	14	0.003	-46.5	0.919	-165
410	0.965	178	1.54	12.7	0.003	-47.5	0.922	-165
420	0.964	178	1.51	11.5	0.003	-49.2	0.925	-165
430	0.964	178	1.49	10.3	0.003	-50.4	0.929	-166
440	0.963	178	1.46	9	0.003	-50.8	0.933	-166
450	0.962	178	1.45	7.7	0.003	-49.9	0.937	-166
460	0.961	177	1.43	6.6	0.003	-51.7	0.941	-166
470	0.958	177	1.42	5.4	0.003	-50.9	0.944	-167
480	0.956	177	1.41	4.3	0.003	-51.4	0.946	-167
490	0.955	177	1.41	3.1	0.003	-52.8	0.948	-167
500	0.953	176	1.41	1.8	0.003	-54.9	0.951	-167
510	0.951	176	1.41	0.5	0.003	-53.1	0.955	-167
520	0.949	176	1.42	-1	0.003	-56.5	0.957	-167
530	0.947	176	1.43	-2.6	0.003	-55.8	0.959	-168
540	0.944	175	1.44	-4.2	0.003	-53.3	0.961	-168
550	0.942	175	1.46	-6	0.003	-57.1	0.963	-168
560	0.936	175	1.48	-8	0.003	-58.2	0.966	-168
570	0.931	174	1.50	-10	0.003	-59.6	0.967	-169
580	0.926	174	1.52	-12.2	0.003	-61.1	0.969	-169
590	0.918	174	1.55	-14.4	0.003	-64.9	0.973	-169
600	0.911	174	1.59	-16.7	0.003	-67.7	0.977	-169
610	0.904	173	1.63	-19.3	0.003	-74.1	0.98	-169
620	0.893	173	1.68	-22.2	0.003	-74	0.985	-170
630	0.882	173	1.74	-25.6	0.003	-78.8	0.986	-170
640	0.869	173	1.81	-29.4	0.003	-83.7	0.991	-170
650	0.854	173	1.88	-33.9	0.003	-87.4	0.993	-171
660	0.836	173	1.95	-38.9	0.004	-94.1	0.996	-171
670	0.817	173	2.02	-44.5	0.004	-101	0.997	-171
680	0.798	174	2.08	-51	0.004	-109	0.998	-172
690	0.781	175	2.12	-58.1	0.004	-116	0.998	-172
700	0.768	177	2.14	-66.1	0.004	-125	0.998	-173
710	0.764	179	2.11	-74.3	0.004	-135	0.995	-173
720	0.769	-179	2.05	-82.6	0.004	-146	0.991	-174
730	0.783	-177	1.95	-90.6	0.004	-156	0.986	-174
740	0.804	-175	1.83	-98.2	0.004	-165	0.98	-174
750	0.828	-175	1.69	-105	0.004	-173	0.975	-174
760	0.851	-174	1.55	-112	0.004	175	0.97	-174
770	0.871	-174	1.41	-117	0.004	169	0.967	-174
780	0.889	-174	1.29	-122	0.003	160	0.964	-174
790	0.906	-175	1.17	-127	0.003	155	0.963	-174
800	0.919	-175	1.06	-131	0.003	147	0.96	-174
810	0.93	-176	0.966	-134	0.003	142	0.96	-174
820	0.94	-176	0.88	-137	0.003	138	0.959	-174
830	0.948	-177	0.804	-140	0.003	135	0.958	-174
840	0.953	-177	0.734	-143	0.003	130	0.958	-174
850	0.96	-177	0.672	-145	0.003	127	0.958	-174
860	0.963	-178	0.616	-147	0.003	123	0.958	-174
870	0.966	-178	0.566	-148	0.003	120	0.958	-174
880	0.97	-179	0.523	-150	0.003	121	0.96	-174
890	0.972	-179	0.485	-151	0.003	116	0.961	-174
900	0.973	-179	0.452	-152	0.003	118	0.962	-174
910	0.976	-180	0.421	-154	0.003	114	0.962	-175
920	0.978	-180	0.394	-155	0.003	110	0.963	-175
930	0.979	180	0.368	-156	0.003	108	0.961	-175
940	0.982	180	0.346	-157	0.003	108	0.962	-175
950	0.983	179	0.325	-158	0.003	106	0.962	-175
960	0.983	179	0.305	-159	0.003	107	0.961	-175
970	0.985	179	0.287	-160	0.003	105	0.963	-175
980	0.985	179	0.269	-161	0.003	106	0.964	-175
990	0.984	178	0.254	-162	0.003	107	0.964	-175
1000	0.987	178	0.239	-162	0.003	105	0.965	-175

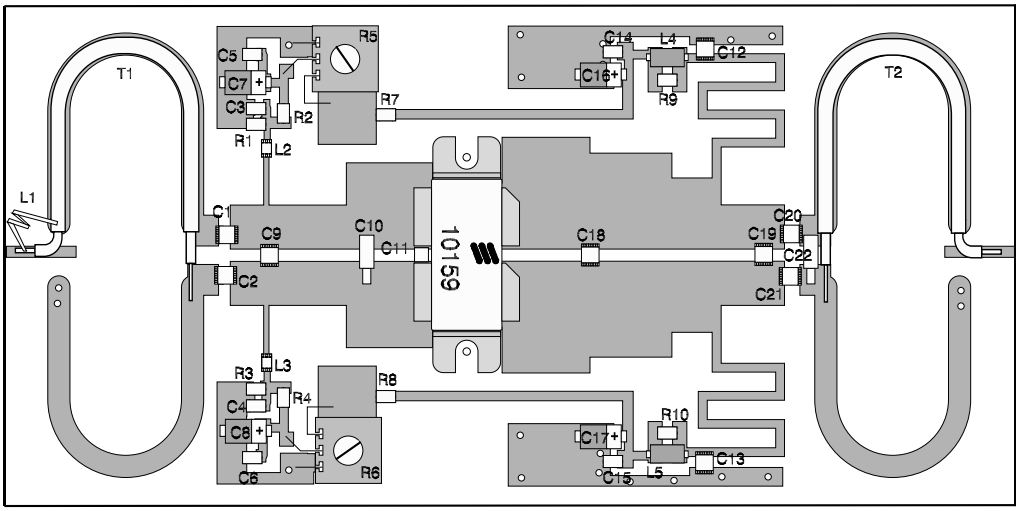
Test Circuit



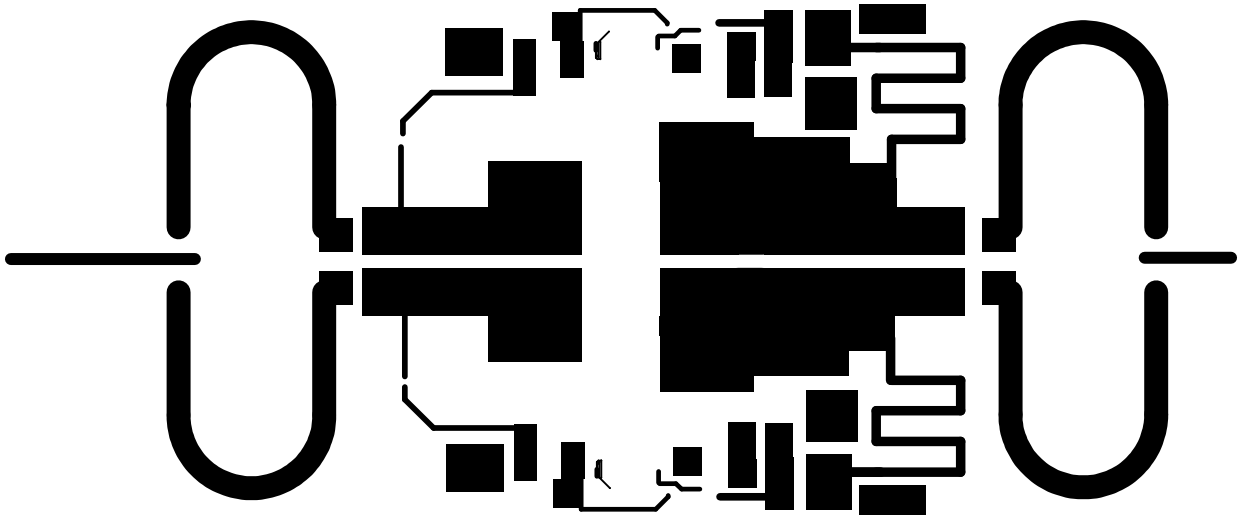
Block diagram for f = 470–860 MHz broadband circuit

Q1	PTF 10159	
L1	1 Turn, #22 AWG, 0.12" I.D.	
L2, L3	10 nH	SMT Coil
L4, L5	4x8 mm	Ferrite Bead
ℓ1, ℓ2, ℓ21, ℓ22	0.25 λ 680 MHz	Microstrip 25 Ω
ℓ3, ℓ4	0.065 λ 800 MHz	Microstrip 70 Ω
ℓ5, ℓ6	0.010 λ 800 MHz	Microstrip 18.5 Ω
ℓ7, ℓ8	0.07 λ 800 MHz	Microstrip 18.5 Ω
ℓ9, ℓ10	0.060 λ 800 MHz	Microstrip 10.2 Ω
ℓ11, ℓ12	0.0525 λ 800 MHz	Microstrip 8.1 Ω
ℓ13, ℓ14	0.061 λ 800 MHz	Microstrip 9.3 Ω
ℓ15, ℓ16	0.032 λ 800 MHz	Microstrip 12.13 Ω
ℓ17, ℓ18	0.021 λ 800 MHz	Microstrip 22.6 Ω
ℓ19, ℓ20	0.01 λ 800 MHz	Microstrip 22.6 Ω
ℓ23, ℓ24	0.25 λ 680 MHz	Microstrip 60 Ω
C1, C2, C20, C21	51 pF	Chip Cap ATC 100 B

C3, C4, C12, C13	91 pF	Chip Cap ATC 100 B
C5, C6, C14, C15	0.1 µF	SMT K1206
C7, C8, C16, C17	10 µF	Electrolytic Capacitor
C9	11 pF	Chip Cap ATC 100 B
C10, C22	0.6–6.0 pF	Variable Capacitor, Johanson Trimmer
C11	4.7 pF	Chip Cap ATC 100 A
C18	13.0 pF	Chip Cap ATC 100 B
C19	3.6 pF	Chip Cap ATC 100 B
R1, R3	200 Ω	1/8 W K 1206 SMT Resistor
R2, R4	200 Ω	1/8 W K 1206 SMT Resistor
R5, R6	1 K Ω	1/4 W Potentiometer
R7, R8	500 Ω	1/4 W Resistor
R9, R10	1.8 Ω	1/4 W Resistor
T1, T2	UT-85-25 Balun	Coaxial
Circuit Board	.028" Dielectric Thickness, ε_r = 4.0, AlliedSignal, G200, 2 oz. copper	



Components layout (not to scale)



Test circuit artwork (1 inch)

Ericsson Microelectronics
RF Power Products
Morgan Hill, CA 95037 USA

1-877-GOLDMOS (465-3667) United States
+46 8 757 4700 International
e-mail: rfpower@ericsson.com
www.ericsson.com/rfpower

EUS/KR 1301-PTF 10159 Uen Rev. A 01-08-2000

Notes: