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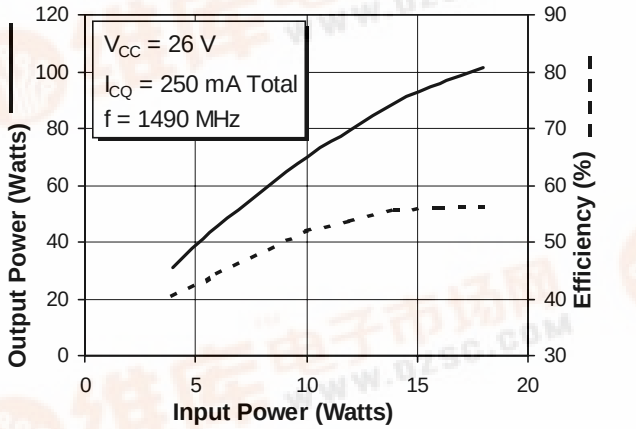
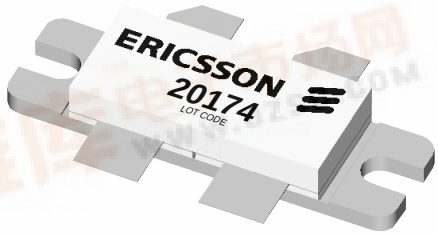
PTB 20174
90 Watts, 1400–1600 MHz
RF Power Transistor

Description

The 20174 is an NPN, common emitter RF power transistor intended for 26 Vdc class AB operation from 1400 to 1600 MHz. Rated at 90 watts minimum output power, it may be used for both CW and PEP applications. Ion implantation, nitride surface passivation and gold metallization are used to ensure excellent device reliability. 100% lot traceability is standard.

- Class AB Characteristics
- Specified 26 Volts, 1490 MHz
  - Output Power = 90 Watts
  - IMD at 90 Watts = -28 dBc max.
  - Gain at 90 Watts = 7.5 dB min.
- Gold Metallization
- Silicon Nitride Passivated





Package 20224

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage (collector shorted)	V_{CES}	52	Vdc
Collector-Base Voltage (emitter open)	V_{CBO}	50	Vdc
Emitter-Base Voltage (collector open)	V_{EBO}	4.0	Vdc
Collector Current (continuous)	I_C	15	Adc
Total Device Dissipation at T_{flange} = 25°C Above 25°C derate by	P_D	290 1.67	Watts W/°C
Storage Temperature	T_{STG}	150	°C
Thermal Resistance (T_{flange} = 70°C)	$R\theta_{JC}$	0.6	°C/W

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Electrical Characteristics (100% Tested)

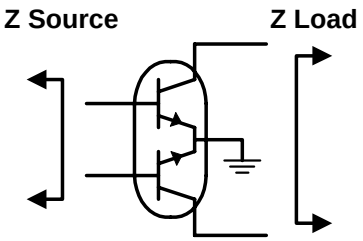
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Breakdown Voltage C to E	I_B = 0 A, I_C = 100 mA	$V_{(BR)CEO}$	21	—	—	Volts
Breakdown Voltage C to E	V_{BE} = 0 V, I_C = 100 mA	$V_{(BR)CES}$	52	70	—	Volts
Breakdown Voltage E to B	I_C = 0 A, I_E = 5 mA	$V_{(BR)EBO}$	3.5	5	—	Volts
DC Current Gain	V_{CE} = 5 V, I_C = 1 A	h_{FE}	20	50	100	—

RF Specifications (100% Tested)

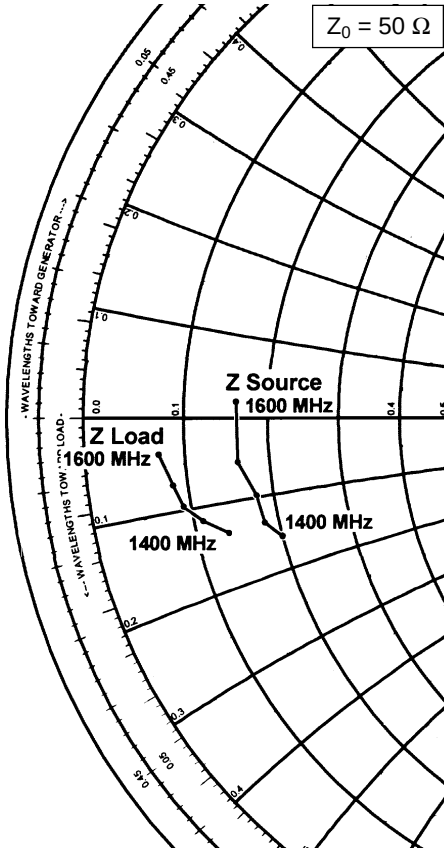
Characteristic	Symbol	Min	Typ	Max	Units
Gain (V_{CC} = 26 Vdc, P_{out} = 90 W, I_{CQ} = 250 mA Total, f = 1491 MHz)	G_{pe}	7.5	8.3	—	dB
Collector Efficiency (V_{CC} = 26 Vdc, P_{out} = 90 W, I_{CQ} = 250 mA Total, f = 1491 MHz)	η_C	40	45	—	%
Load Mismatch Tolerance (V_{CC} = 26 Vdc, P_{out} = 45 W, I_{CQ} = 250 mA Total, f = 1491 MHz—at all phase angles)	Ψ	—	—	3:1	—

Impedance Data (data shown for fixed-tuned broadband circuit)

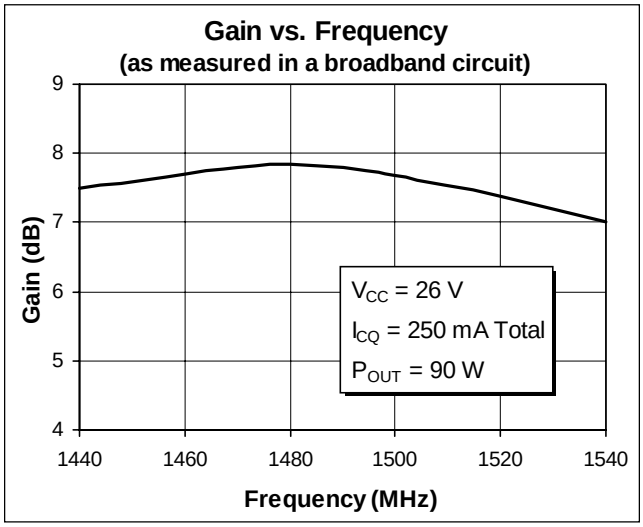
(V_{CC} = 26 Vdc, P_{out} = 90 W, I_{CQ} = 250 mA Total)

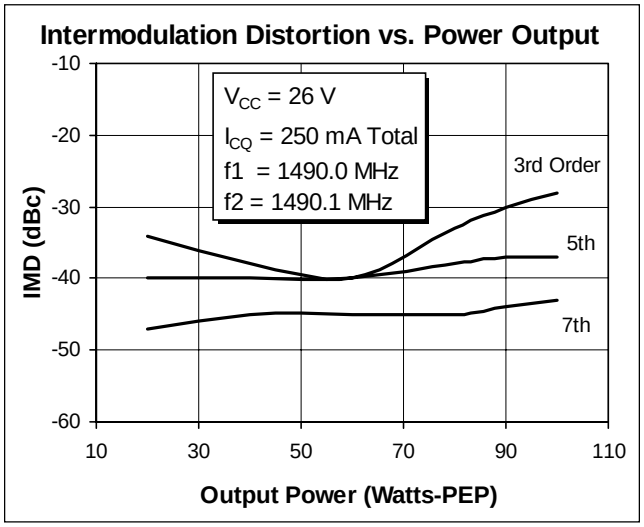


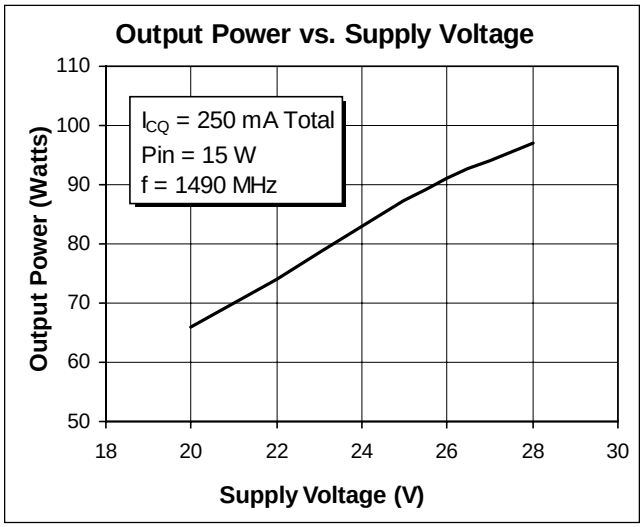
Frequency	Z Source		Z Load	
MHz	R	jX	R	jX
1400	10.0	-7.8	6.8	-6.8
1450	9.1	-6.7	5.5	-5.8
1500	8.9	-4.9	4.6	-4.8
1550	8.0	-2.7	4.2	-3.6
1600	8.0	1.0	3.6	-1.9



Typical Performance







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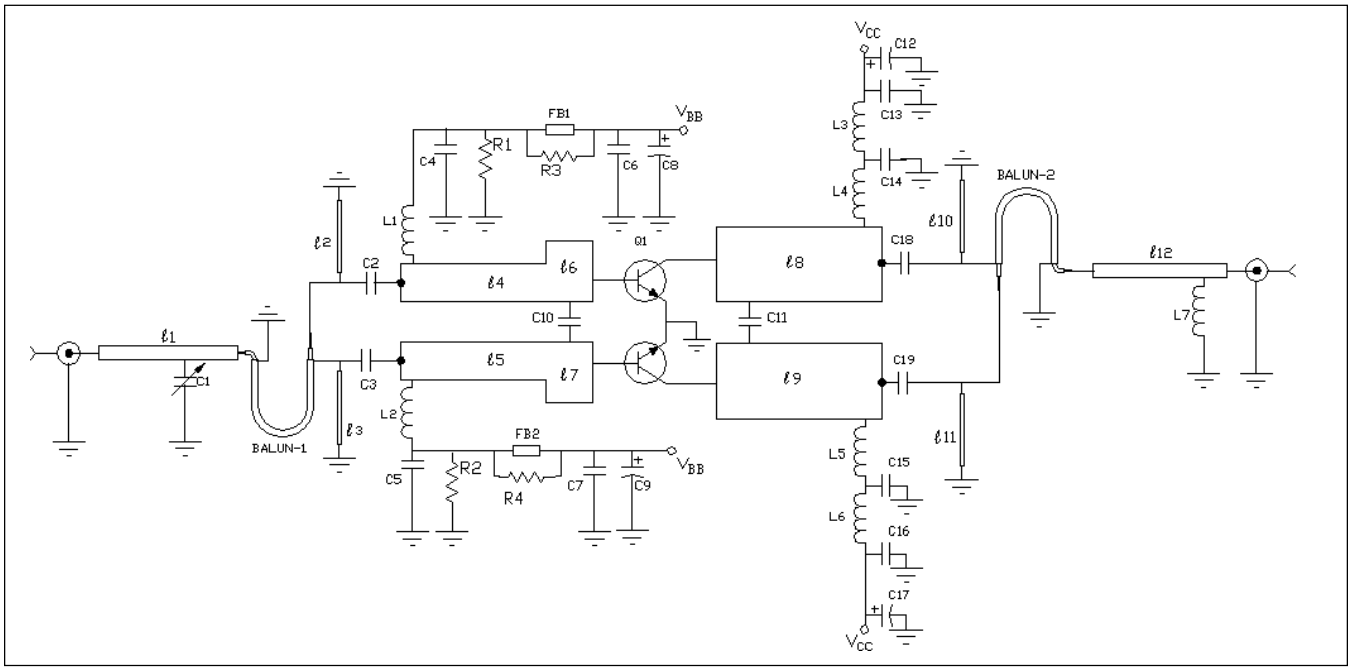
Test Circuit



Block Diagram for f = 1.49 GHz

Q1	PTB 20174 — NPN RF Transistor	
ℓ1	.410λ 1.49 GHz	Microstrip 50 Ω
ℓ2, ℓ3, ℓ10, ℓ11	.250λ 1.49 GHz	Microstrip 50 Ω
ℓ4, ℓ5	.190λ 1.49 GHz	Microstrip 22 Ω
ℓ6, ℓ7	.083λ 1.49 GHz	Microstrip 11.5 Ω
ℓ8, ℓ9	.225λ 1.49 GHz	Microstrip 10.5 Ω
ℓ12	.210λ 1.49 GHz	Microstrip 50 Ω
Balun 1, 2	50 Ω Coax, Semi-Rigid, .047 O.D., 1.5” long	
C1	0.3 - 3.5 pF, Variable Capacitor Jaco 5801-PC	
C2, C3	18 pF, ATC 100 B	
C4, C5, C14, C15	33 pF, ATC 100 B	
C6, C7, C13, C16	1200 pF, ATC 100 B	
C8, C9	10 µF, 35 V Electrolytic Capacitor	
C10	0.3 pF, ATC 100 B	
C11	1.1 pF, ATC 100 B	
C12, C17	100 µF, 50 V Electrolytic Capacitor	
C18, C19	22 pF, ATC 100 B	
L1, L2, L4, L5	4 Turn, 24 AWG, .120” ID	
L3, L6	7 Turn, 24 AWG, .120” ID	
L7	1 Turn, 24 AWG, .100” ID	
R1, R2	22 Ω, 1/4 Watt Resistor	
R3, R4	12 Ω, 1/8 Watt Resistor	
FB1, FB2	Ferrite Bead	
Circuit Board	Copper Clad PTFE εr = 2.5, .031” Thick	

Ericsson Components
RF Power Products
675 Jarvis Drive
Morgan Hill, CA 95037 USA
Telephone: 408-778-9434

1-877-GOLDMOS
(1-877-465-3667)
e-mail: rfpower@ericsson.com
www.ericsson.com/rfpower

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