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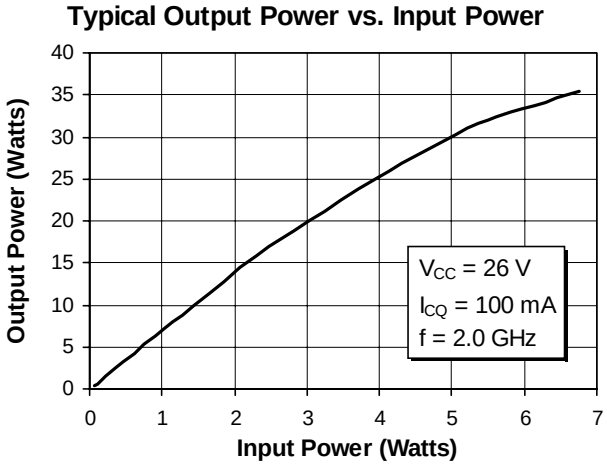
PTB 20170
30 Watts, 1.8–2.0 GHz
Cellular Radio RF Power Transistor

Description

The 20170 is a class AB, NPN, common emitter RF power transistor intended for 26 Vdc operation from 1.8 to 2.0 GHz. Rated at 30 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.

- 30 Watts, 1.8–2.0 GHz
- Class AB Characteristics
- Gold Metallization
- Silicon Nitride Passivated



Package 20209

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CER}	55	Vdc
Collector-Emitter Voltage	V_{CES}	55	Vdc
Emitter-Base Voltage (collector open)	V_{EBO}	4.0	Vdc
Collector Current (continuous)	I_C	6.7	Adc
Total Device Dissipation at T_{flange} = 25°C Above 25°C derate by	P_D	123 0.7	Watts W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{flange} = 70°C)	$R_{\theta JC}$	1.43	°C/W

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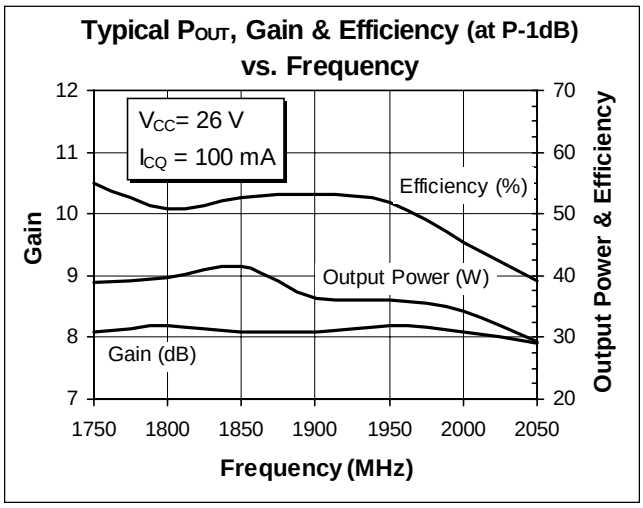
Electrical Characteristics (100% Tested)

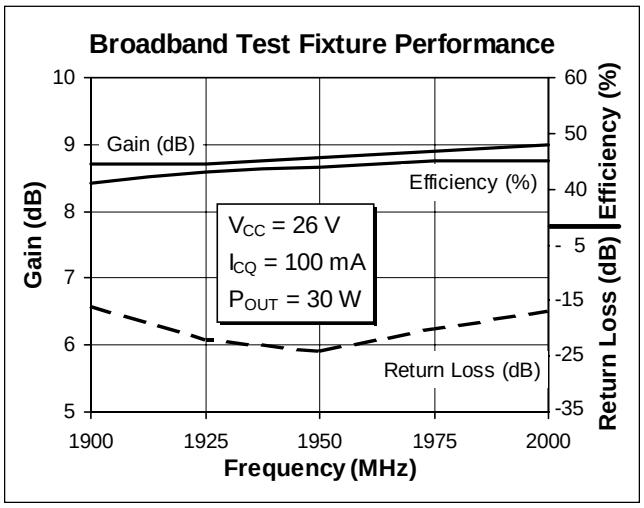
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Breakdown Voltage C to E	I_C = 50 mA, R_{BE} = 27 Ω	$V_{(BR)CER}$	55	—	—	Volts
Breakdown Voltage C to E	V_{BE} = 0 V, I_C = 50 mA	$V_{(BR)CES}$	55	—	—	Volts
Breakdown Voltage E to B	I_C = 0 A, I_E = 5 mA	$V_{(BR)EBO}$	4	5	—	Volts
DC Current Gain	V_{CE} = 5 V, I_C = 250 mA	h_{FE}	20	50	120	—

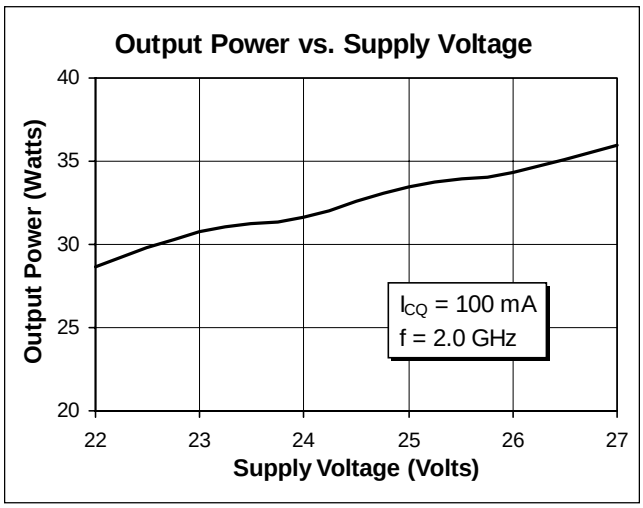
RF Specifications (100% Tested)

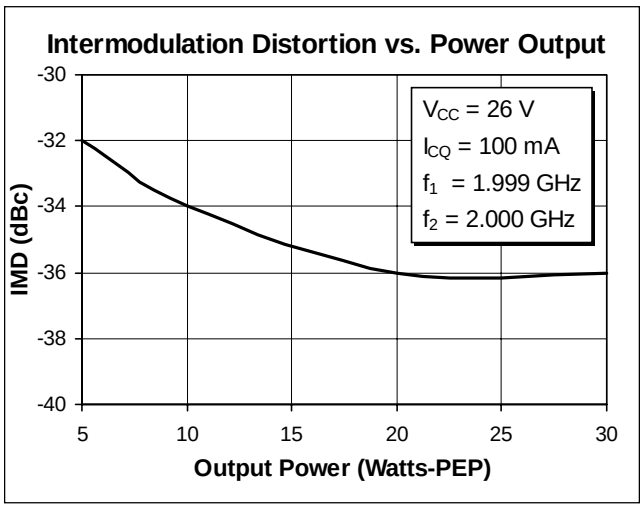
Characteristic	Symbol	Min	Typ	Max	Units
Gain (V_{CC} = 26 Vdc, P_{out} = 30 W, I_{CQ} = 100 mA, f = 2.0 GHz)	G_{pe}	7.0	8.5	—	dB
Collector Efficiency (V_{CC} = 26 Vdc, P_{out} = 30 W, I_{CQ} = 100 mA, f = 2.0 GHz)	η_C	38	46	—	%
Load Mismatch Tolerance (V_{CC} = 26 Vdc, P_{out} = 30 W(PEP), I_{CQ} = 100 mA, f = 2.0 GHz—all phase angles at frequency of test)	Ψ	—	—	5:1	—

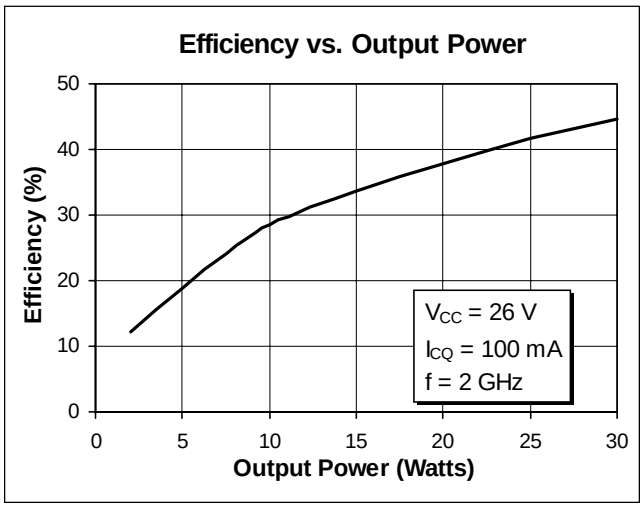
Typical Performance

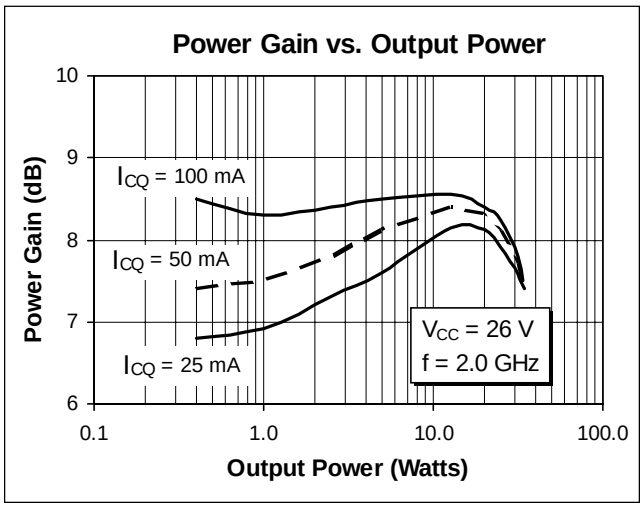






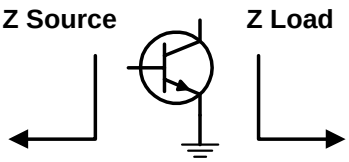




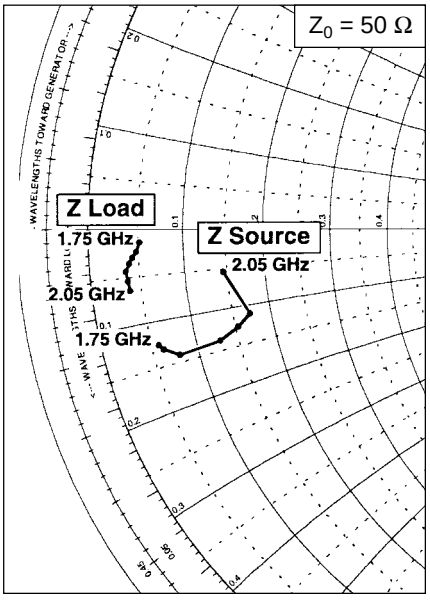


Impedance Data

(V_{CC} = 26 Vdc, Pout = 30 W, I_{CQ} = 100 mA)



Frequency	Z Source		Z Load	
GHz	R	jX	R	jX
1.75	2.9	-6.3	2.60	-0.7
1.80	3.1	-6.6	2.40	-1.2
1.85	3.9	-7.1	2.20	-1.5
1.90	6.4	-7.8	2.00	-1.8
1.95	7.7	-6.3	1.80	-2.2
2.00	8.6	-5.6	1.85	-2.7
2.05	7.3	-2.7	1.92	-3.2



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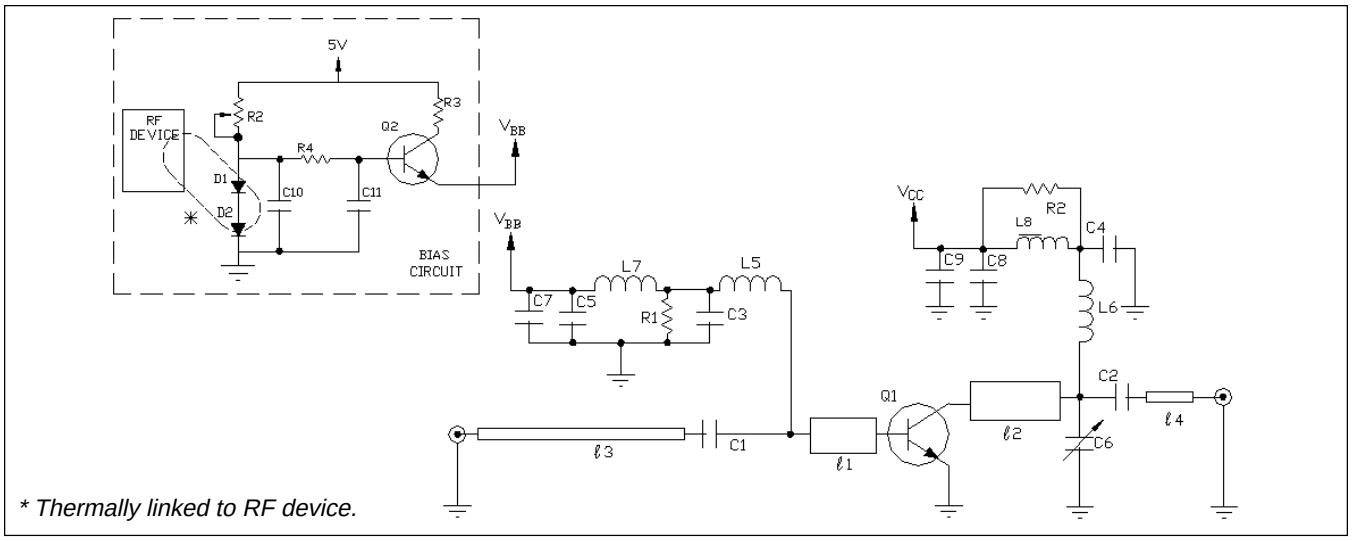
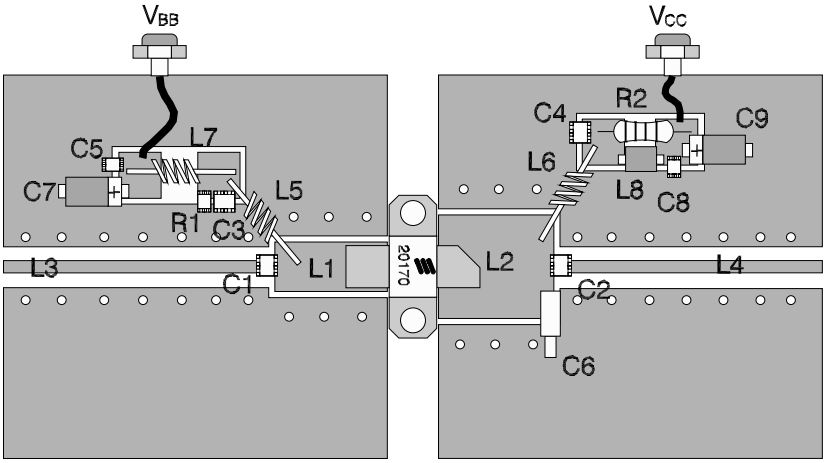
Test Circuit

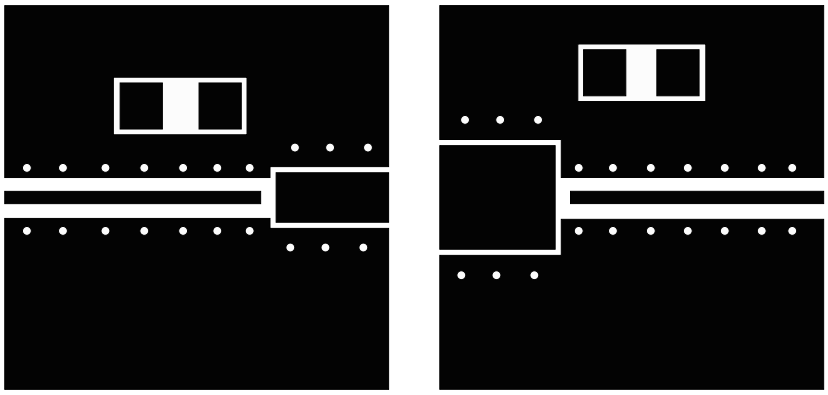


Schematic for f = 2 GHz

Q1	20170, NPN RF Transistor		R1	22 Ω 118 W SMT Resistor	
L1	.185 λ 2GHz, Microstrip 18 Ω		R2	12 Ω .5 W Axial Resistor	
L1	.195 λ 2GHz, Microstrip 9.5 Ω		Circuit Board	.031 G-200, Solid Copper Bottom AlliedSignal	
L5, L6	4 Turn #20 AWG, .120" I.D.				
L7	56 μA SMT Inductor				
L8	Ferrite Bead		*Bias Parts (not shown on layout)*		
C1, C2,	33 pF ATC-B		Q2	BCP 56	SMT NPN Transistor
C3, C4	33 pF ATC-B		D1	BAV 99	Diode
C5, C7	0.1 υF, 1206		C10, C11	0.1 pF	SMT Capacitor
C6, C8	10 pF SMT Electrolytic Capacitor		R2	2K	Potentiometer
C9	0–4 pF Johanson Variable Capacitor		R3, R4	10 Ω	1206 SMT Resistor



Board Assembly (not to scale)



Artwork (1 inch ———— *)*

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