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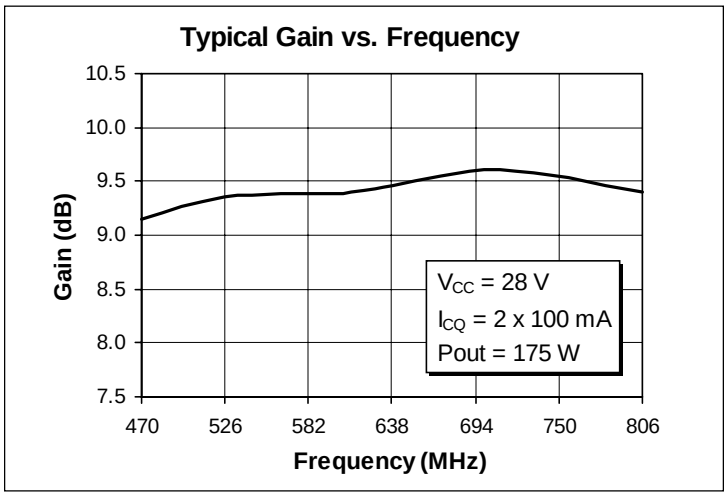
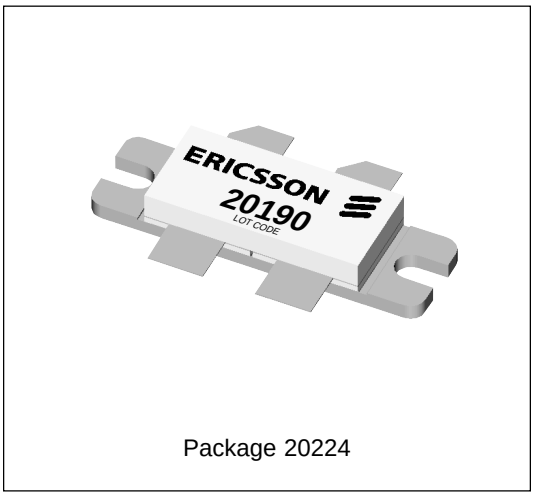
PTB 20190
175 Watts, 470–806 MHz
Digital Television Power Transistor

Description

The 20190 is a class AB, NPN, common emitter RF power transistor intended for 28 Vdc operation across the 470 to 806 MHz UHF TV frequency band. Rated at 175 watts output power, it is specifically intended to operate uncorrected at 125 watts P-Sync (tested to EIA Standard 4.1.3, Section 5, Method B for class AB transmitters at 125 watts P-sync) or at a minimum of 175 watts in PEP applications. It may also be operated at comparable power levels for ATV broadcasting. Ion implantation, nitride surface passivation and gold metallization ensure excellent device reliability. 100% lot traceability is standard.

- 175 Watts, 470–806 MHz
- Class AB Characteristics
- 50% Collector Efficiency at 175 Watts
- Gold Metallization
- Silicon Nitride Passivated





Package 20224

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CER}	40	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage (collector open)	V_{EBO}	4.0	Vdc
Collector Current (continuous)	I_C	25.0	Adc
Total Device Dissipation at T_{flange} = 25°C Above 25°C derate by	P_D	330 1.89	Watts W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{flange} = 70°C)	$R_{\theta JC}$	0.53	°C/W

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Electrical Characteristics (100% Tested)

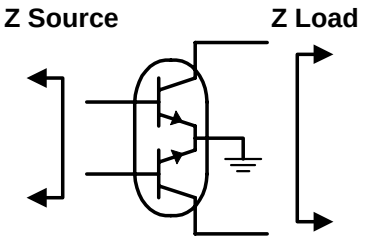
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Breakdown Voltage C to E	I_B = 0 A, I_C = 100 mA	$V_{(BR)CEO}$	25	30	—	Volts
Breakdown Voltage C to E	V_{BE} = 0 V, I_C = 100 mA	$V_{(BR)CES}$	55	60	—	Volts
Breakdown Voltage E to B	I_C = 0 A, I_E = 5 mA	$V_{(BR)EBO}$	3.5	5	—	Volts
DC Current Gain	V_{CE} = 5 V, I_C = 1.0 A	h_{FE}	20	50	100	—

RF Specifications (100% Tested)

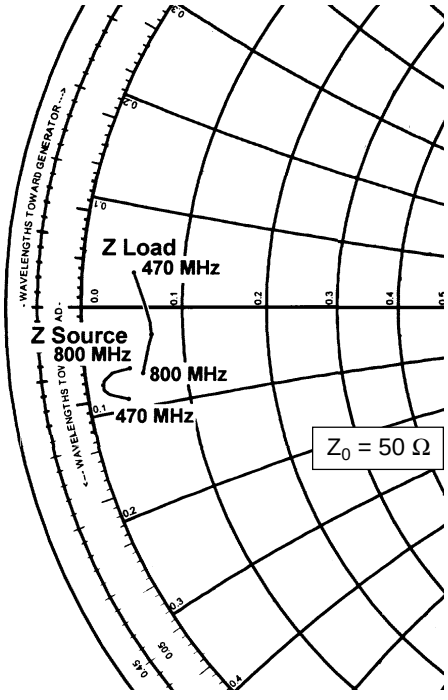
Characteristic	Symbol	Min	Typ	Max	Units
Gain (V_{CC} = 28 Vdc, P_{OUT} = 50 W, I_{CQ} = 2 x 100 mA, f = 800 MHz)	G_{pe}	8.0	9.5	—	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{OUT} = 125 W, I_{CQ} = 2 x 100 mA, f = 800 MHz)	η_C	—	45	—	%
Intermodulation Distortion (Two Tone) (V_{CC} = 28 Vdc, P_{OUT} = 125 W(PEP), I_{CQ} = 2 x 100 mA, f = 800 MHz, Δf = 1.0 MHz)	IMD	—	40	—	dBc
In-Channel Intermodulation Distortion (P-Sync = 125 W + Aural, EIA Std 4.1.3 Sect 5 Method B)	IM Product +/- 920 kHz	—	-52	—	dB P-sync
Load Mismatch Tolerance (V_{CC} = 28 Vdc, P_{OUT} = 125 W(PEP), I_{CQ} = 2 x 100 mA, f = 800 MHz—all phase angles at frequency of test)	Ψ	—	—	3:1	—

Impedance Data

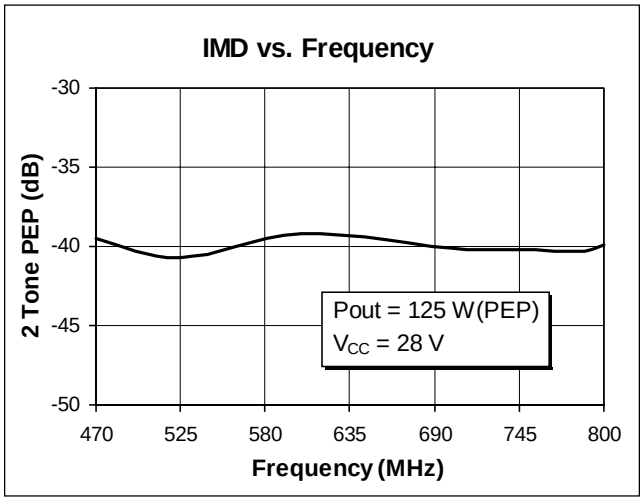
V_{CC} = 28 Vdc, P_{OUT} = 175 W, I_{CQ} = 2 x 100 mA



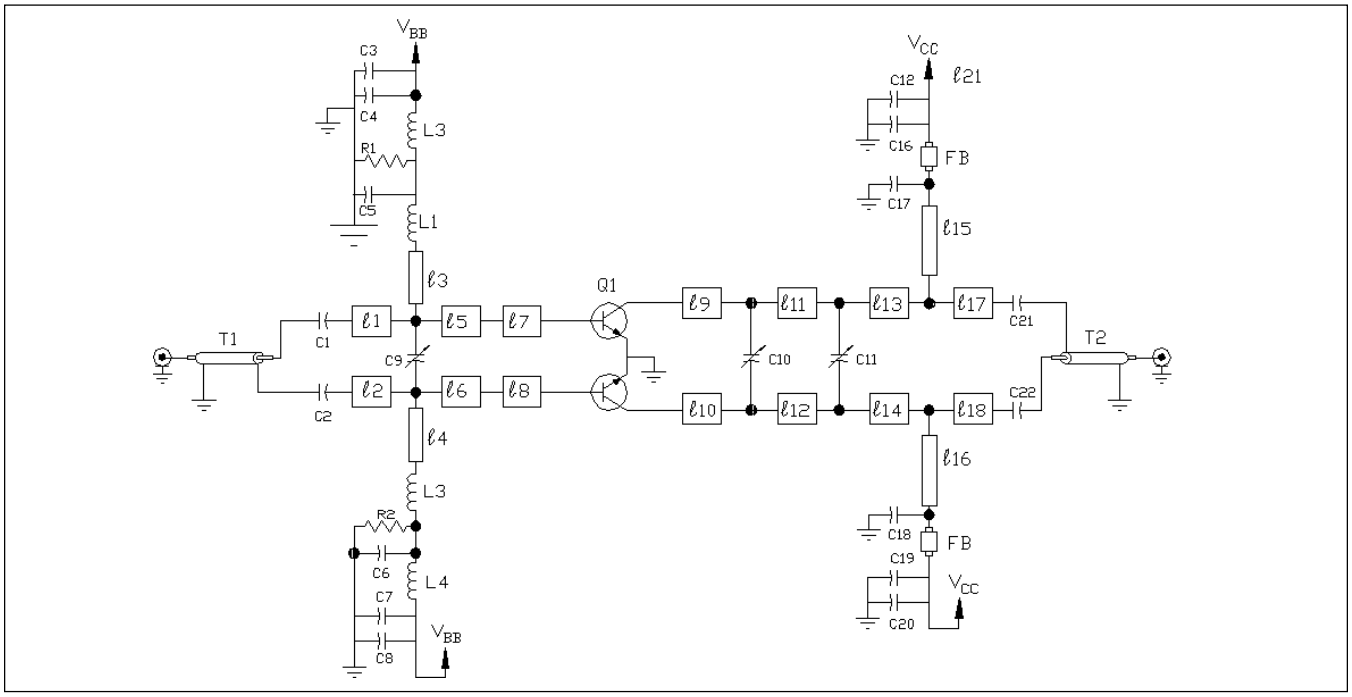
Frequency	Z Source		Z Load	
MHz	R	jX	R	jX
470	1.87	-4.1	2.42	1.74
630	0.76	-3.9	3.34	-1.49
800	2.12	-3.8	2.72	-3.36



Typical Characteristics



Test Circuit



Block Diagram for f = 800 MHz

Q1	PTB 20190	NPN RF Transistor
ℓ1, ℓ2	.0280 λ 800 MHz	Microstrip 18.5 Ω
ℓ5, ℓ6	.0522 λ 800 MHz	Microstrip 18.5 Ω
ℓ3, ℓ4	.0654 λ 800 MHz	Microstrip 70 Ω
ℓ7, ℓ8	.0632 λ 800 MHz	Microstrip 10.2 Ω
ℓ9, ℓ10	.0652 λ 800 MHz	Microstrip 8 Ω
ℓ11, ℓ12	.0652 λ 800 MHz	Microstrip 9 Ω
ℓ13, ℓ14	.0300 λ 800 MHz	Microstrip 11.5 Ω
ℓ15, ℓ16	.0250 λ 800 MHz	Microstrip 60 Ω
ℓ17, ℓ18	.0454 λ 800 MHz	Microstrip 18.5 Ω
T1, T2	UT85-25	Balun

C1, C2	5.1 pF	
C3, C12, C8, C20	10 µF, 35 V	SMT Capacitor
C4, C7, C19, C16		0.1 µF
C5, C6, C17, C18, C21, C22		75 pF
C9, C10	0-10 pF	
C11	0-20 pF	
R1, R2	15 Ω, 1/4 W	
FB	4 mm.	SMT Ferrite
L1, L3	12 nh	SMT Inductor
L2, L4	68 nh	SMT Inductor
Circuit Board	.031 G-200, Solid Copper Bottom	

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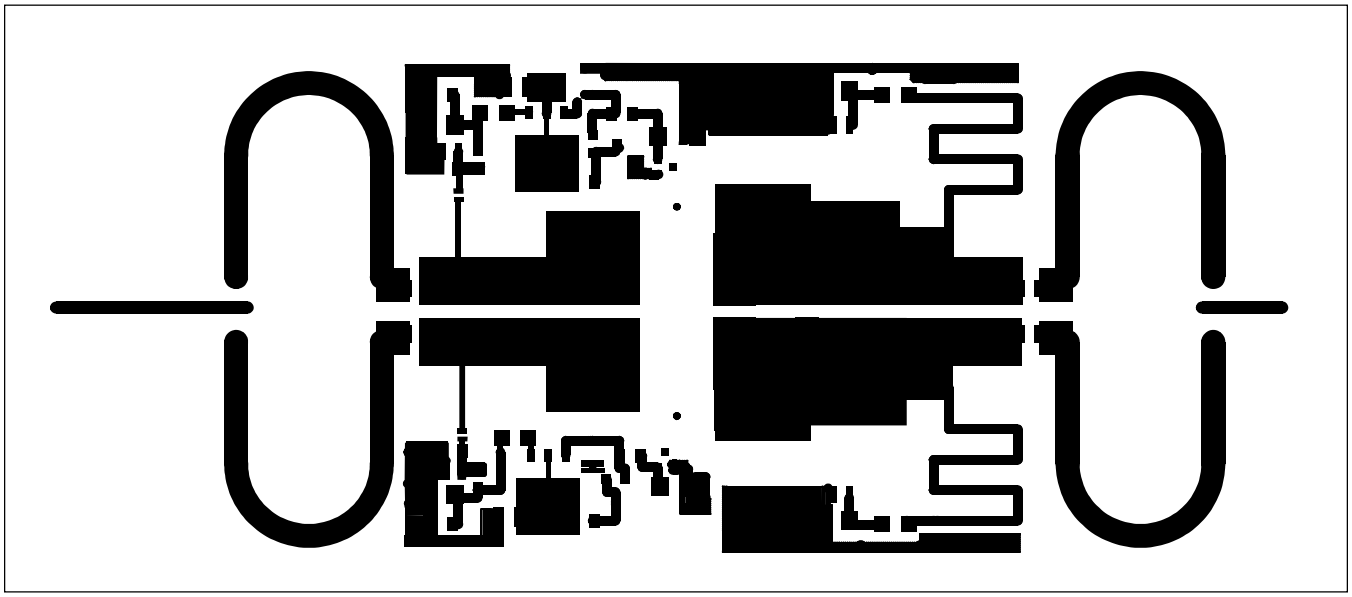

Artwork (1 inch)

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