

PTB 20190

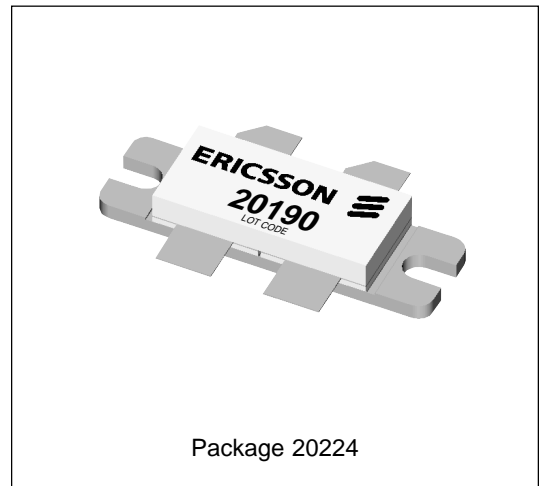
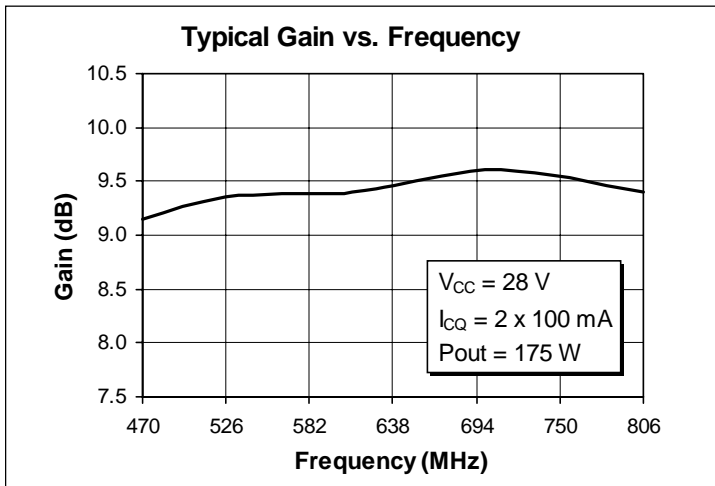
175 Watts, 470–806 MHz

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



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 $T_{flange} = 25^{\circ}C$ Above $25^{\circ}C$ derate by	P_D	330 1.89	Watts W/ $^{\circ}C$
Storage Temperature Range	T_{STG}	-40 to +150	$^{\circ}C$
Thermal Resistance ($T_{flange} = 70^{\circ}C$)	$R_{\theta JC}$	0.53	$^{\circ}C/W$

Electrical Characteristics (100% Tested)

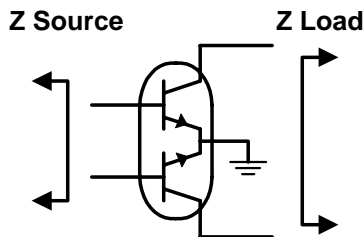
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Breakdown Voltage C to E	$I_B = 0\text{ A}, I_C = 100\text{ mA}$	$V_{(BR)CEO}$	25	30	—	Volts
Breakdown Voltage C to E	$V_{BE} = 0\text{ V}, I_C = 100\text{ mA}$	$V_{(BR)CES}$	55	60	—	Volts
Breakdown Voltage E to B	$I_C = 0\text{ A}, I_E = 5\text{ mA}$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

RF Specifications (100% Tested)

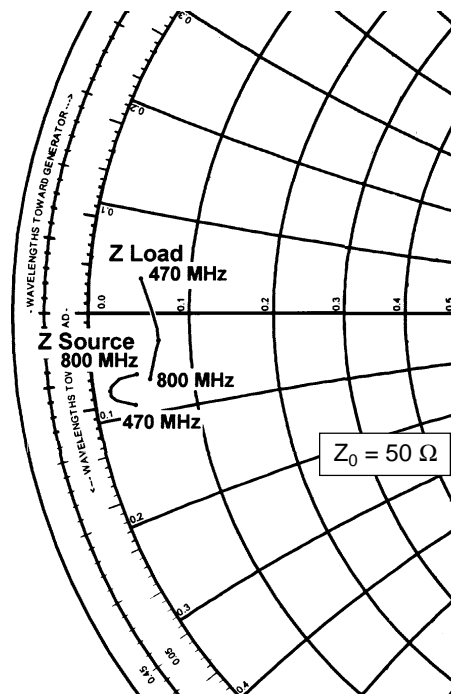
Characteristic	Symbol	Min	Typ	Max	Units
Gain ($V_{CC} = 28\text{ Vdc}, P_{OUT} = 50\text{ W}, I_{CQ} = 2 \times 100\text{ mA}, f = 800\text{ MHz}$)	G_{pe}	8.0	9.5	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}, P_{OUT} = 125\text{ W}, I_{CQ} = 2 \times 100\text{ mA}, f = 800\text{ MHz}$)	η_C	—	45	—	%
Intermodulation Distortion (Two Tone) ($V_{CC} = 28\text{ Vdc}, P_{OUT} = 125\text{ W(PEP)}, I_{CQ} = 2 \times 100\text{ mA}, f = 800\text{ MHz}, \Delta f = 1.0\text{ MHz}$)	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 ($V_{CC} = 28\text{ Vdc}, P_{OUT} = 125\text{ W(PEP)}, I_{CQ} = 2 \times 100\text{ mA}, f = 800\text{ MHz}$ —all phase angles at frequency of test)	Ψ	—	—	3:1	—

Impedance Data

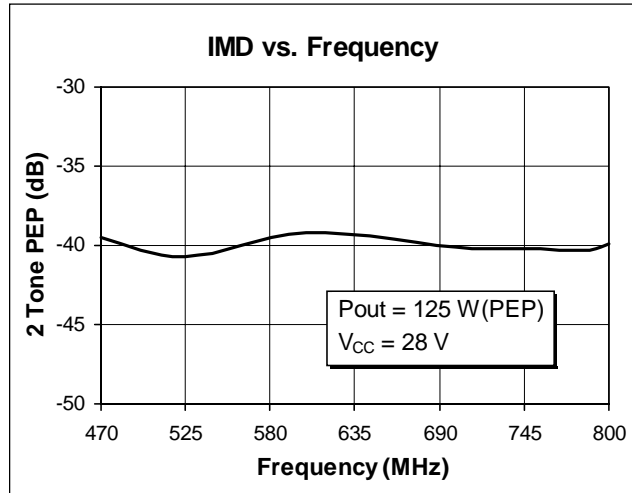
$V_{CC} = 28\text{ Vdc}, P_{OUT} = 175\text{ W}, I_{CQ} = 2 \times 100\text{ mA}$



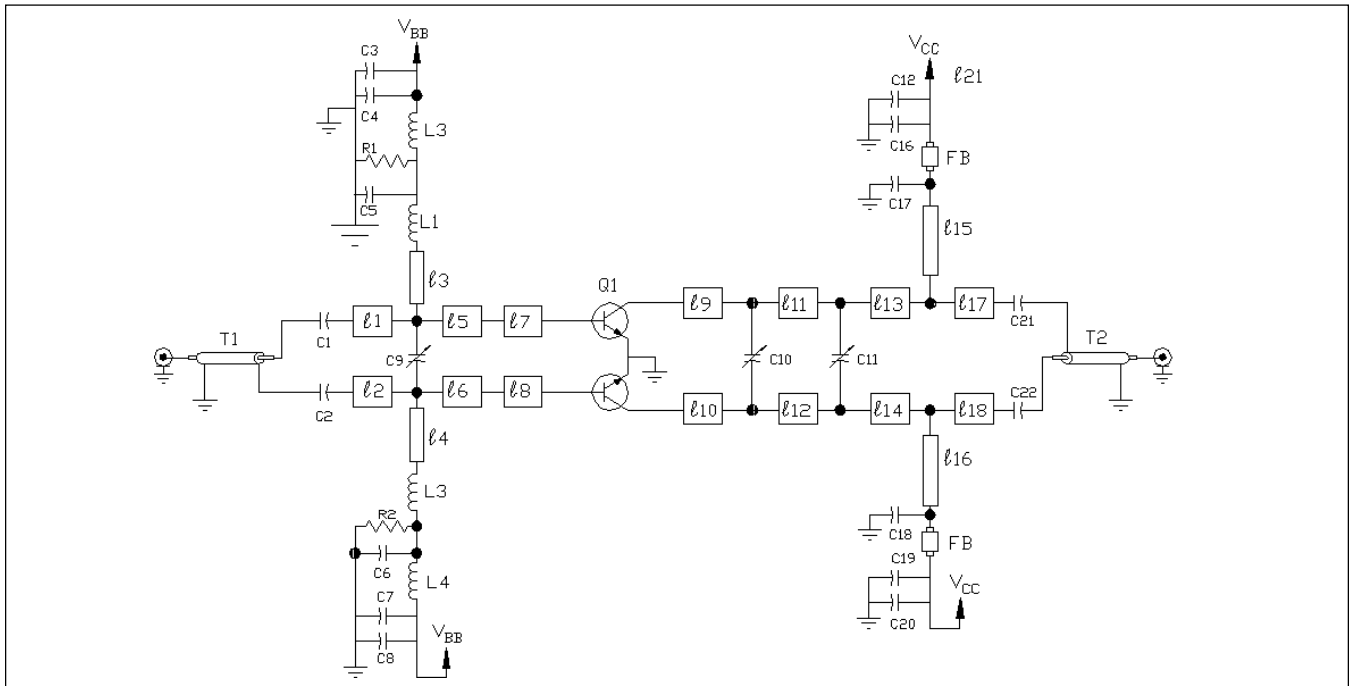
Frequency MHz	Z Source		Z Load	
	R	jX	R	jX
470	1.87	-4.1	2.42	1.74
630	0.76	-3.9	3.34	-1.49
800	2.12	-3.8	2.72	-3.36



Typical Characteristics



Test Circuit



Block Diagram for $f = 800$ MHz

Q1	PTB 20190	NPN RF Transistor	C1, C2	5.1 pF	
l1, l2	.0280 λ 800 MHz	Microstrip 18.5 Ω	C3, C12, C8, C20	10 μ F, 35 V	SMT Capacitor
l5, l6	.0522 λ 800 MHz	Microstrip 18.5 Ω	C4, C7, C19, C16		0.1 μ F
l3, l4	.0654 λ 800 MHz	Microstrip 70 Ω	C5, C6, C17, C18, C21, C22		75 pF
l7, l8	.0632 λ 800 MHz	Microstrip 10.2 Ω	C9, C10	0-10 pF	
l9, l10	.0652 λ 800 MHz	Microstrip 8 Ω	C11	0-20 pF	
l11, l12	.0652 λ 800 MHz	Microstrip 9 Ω	R1, R2	15 Ω , 1/4 W	
l13, l14	.0300 λ 800 MHz	Microstrip 11.5 Ω	FB	4 mm.	SMT Ferrite
l15, l16	.0250 λ 800 MHz	Microstrip 60 Ω	L1, L3	12 nh	SMT Inductor
l17, l18	.0454 λ 800 MHz	Microstrip 18.5 Ω	L2, L4	68 nh	SMT Inductor
T1, T2	UT85-25	Balun	Circuit Board	.031 G-200, Solid Copper Bottom	



Artwork (1 inch )

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