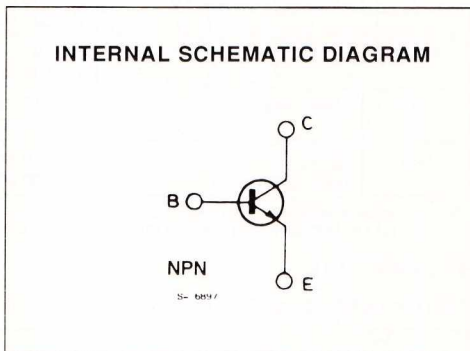
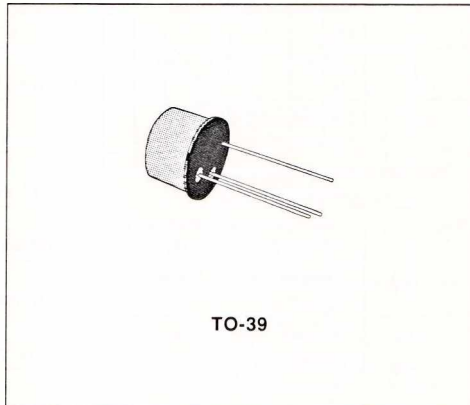


EPITAXIAL PLANAR NPN
CATV ULTRA-LINEAR HIGH GAIN TRANSISTOR

The 2N5109 is a multi-emitter silicon planar epitaxial NPN transistor in Jedec TO-39 metal case. It is designed for CATV-MATV amplifier applications over a wide frequency range (40 to 860 MHz).


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base Voltage ($I_E = 0$)	40	V
V_{CER}	Collector-emitter Voltage ($R_{BE} \leq 10 \Omega$)	40	V
V_{CEO}	Collector-emitter Voltage ($I_B = 0$)	20	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	3	V
I_C	Collector Current	0.4	A
I_B	Base Current	0.4	A
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25^\circ\text{C}$	1	W
	at $T_{case} \leq 75^\circ\text{C}$	2.5	W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200	$^\circ\text{C}$

THERMAL DATA

$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	175	°C/W
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	50	°C/W

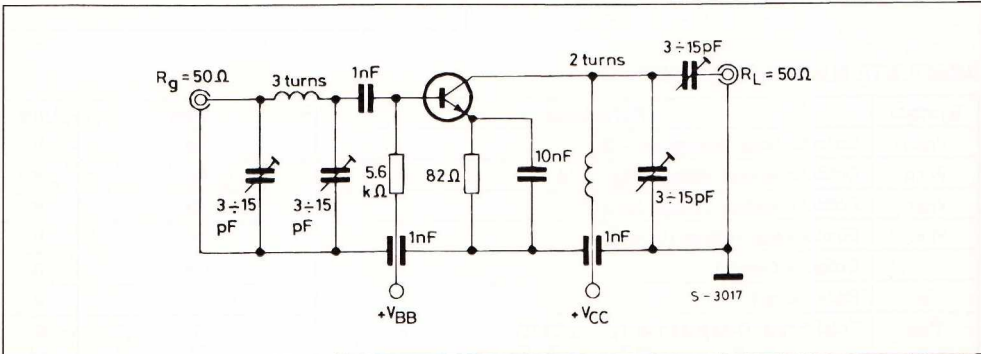
ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ °C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEX}	Collector Cutoff Current ($V_{BE} = -1.5\text{ V}$)	$V_{CE} = 35\text{ V}$ $V_{CE} = 15\text{ V}$ $T_{amb} = 150\text{ °C}$			5 5	mA mA
I_{CEO}	Collector Cutoff Current ($I_B = 0$)	$V_{CE} = 15\text{ V}$			20	μA
I_{EBO}	Emitter Cutoff Current ($I_C = 0$)	$V_{EB} = 3\text{ V}$			0.1	mA
$V_{(BR)\ CBO}$	Collector-base Breakdown Voltage ($I_E = 0$)	$I_C = 0.1\text{ mA}$	40			V
$V_{CER(sus)}^*$	Collector-emitter Sustaining Voltage ($R_{BE} = 10\ \Omega$)	$I_C = 5\text{ mA}$	40			V
$V_{CEO(sus)}$	Collector-emitter Sustaining Voltage ($I_B = 0$)	$I_C = 5\text{ mA}$	20			V
$V_{CE(sat)}$	Collector-emitter Saturation Voltage	$I_C = 100\text{ mA}$ $I_B = 10\text{ mA}$			0.5	V
h_{FE}^*	DC Current Gain	$I_C = 50\text{ mA}$ $V_{CE} = 15\text{ V}$ $I_C = 360\text{ mA}$ $V_{CE} = 5\text{ V}$	70 5		210	
f_T	Transition Frequency	$I_C = 50\text{ mA}$ $V_{CE} = 15\text{ V}$ $f = 200\text{ MHz}$	1.2			GHz
C_{CBO}	Collector-base Capacitance	$I_E = 0$ $V_{CB} = 15\text{ V}$ $f = 1\text{ MHz}$			3.5	pF
NF	Noise Figure	$I_C = 10\text{ mA}$ $V_{CE} = 15\text{ V}$ $R_g = 50\ \Omega$ $f = 200\text{ MHz}$		3		dB
G_{pe}	Power Gain (see test circuit)	$I_C = 10\text{ mA}$ $V_{CE} = 15\text{ V}$ $f = 200\text{ MHz}$ $P_i = -10\text{ dBm}$	11			dB

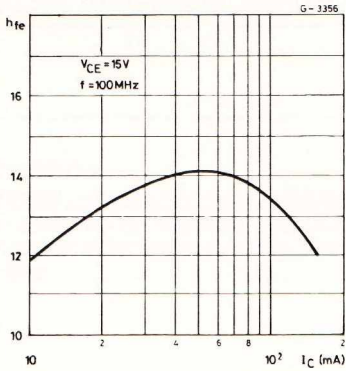
* Pulsed : pulse duration = 300 μs, duty cycle = 1 %.

TEST CIRCUIT

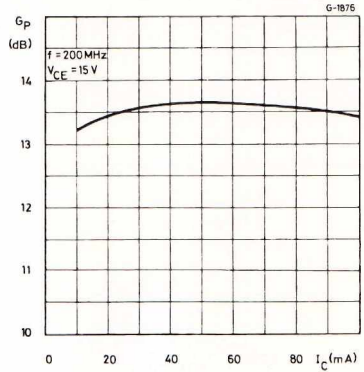
Test Circuit for Power Gain Measurement ($f = 200\text{ MHz}$).



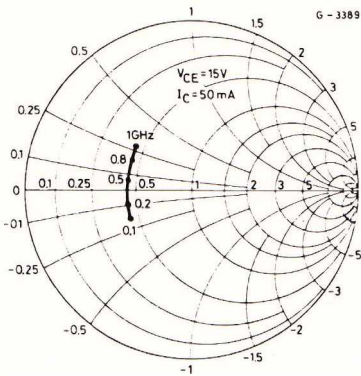
High Frequency Current Gain.



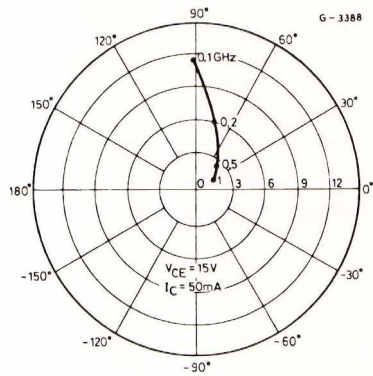
Power Gain vs. Collector Current.



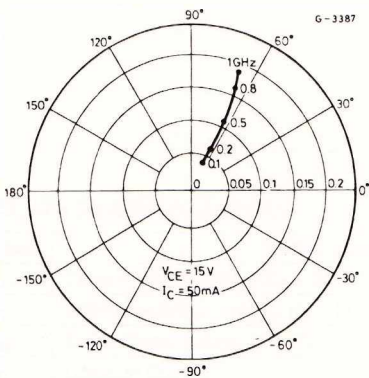
Input Impedance S_{11e} (normalized 50 Ω).



Forward Transfer Coefficient S_{21e} .



Reverse Transfer Coefficient S_{12e} .



Output Impedance S_{22e} (normalized 50 Ω).

