SGS-THOMSON MICROELECTRONICS

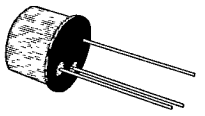
S G S-THOMSON

2N5109

EPITAXIAL PLANAR NPN

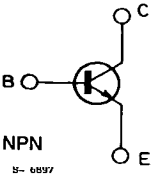
CATV ULTRA-LINEAR HIGH GAIN TRANSISTOR

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).



TO-39

INTERNAL SCHEMATIC DIAGRAM



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 $T_{amb} \leq 25$ °C at $T_{case} \leq 75$ °C	1 2.5	W W
T_{stg}, T_j	Storage and Junction Temperature	– 65 to 200	°C

THERMAL DATA

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

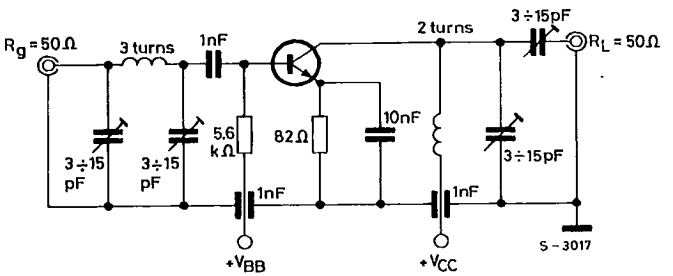
ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C unless otherwise specified)

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

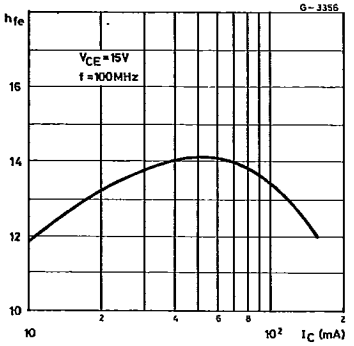
* Pulsed : pulse duration = 300 µs, duty cycle = 1 %.

TEST CIRCUIT

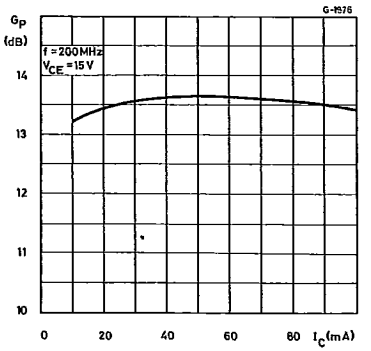
Test Circuit for Power Gain Measurement (f = 200 MHz).



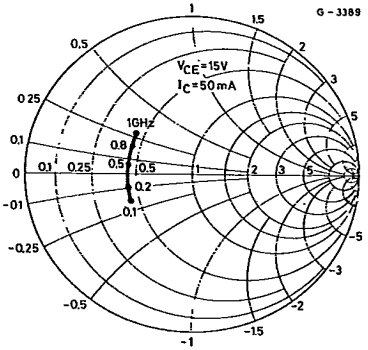
High Frequency Current Gain.



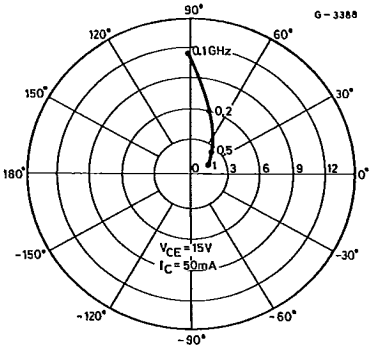
Power Gain vs. Collector Current.



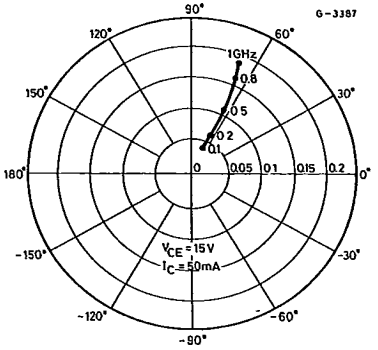
Input Impedance S_{11e} (normalized 50 Ω).



Forward Transfer Coefficient S_{21e}.



Reverse Transfer Coefficient S_{12e}.



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