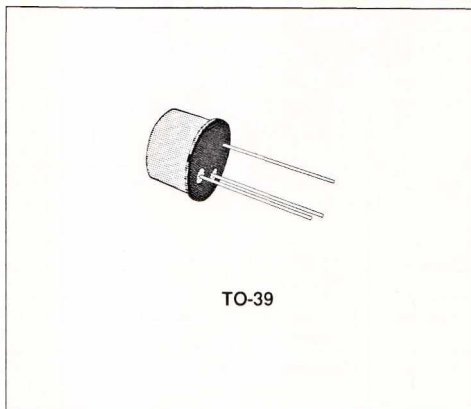




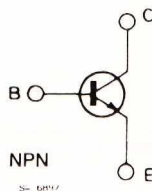
## GENERAL PURPOSE AMPLIFIERS AND SWITCHES

### DESCRIPTION

The 2N3107, 2N3108, 2N3109 and 2N3110 are silicon planar epitaxial NPN transistors in Jedec TO-39 metal case primarily intended for large signal, low noise industrial applications.



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		2N 3109 2N 3110	2N 3107 2N 3108	
$V_{CBO}$	Collector-base Voltage ( $I_E = 0$ )	80	100	V
$V_{CEO}$	Collector-emitter Voltage ( $I_B = 0$ )	40	60	V
$V_{EBO}$	Emitter-base Voltage ( $I_C = 0$ )	7		V
$I_C$	Collector Current	1		A
$P_{Tot}$	Total Power Dissipation at $T_{amb} \leq 25^\circ C$ at $T_{case} \leq 25^\circ C$	0.8		W
		5		W
$T_{stg}, T_J$	Storage and Junction Temperature	- 65 to 200		$^\circ C$

## THERMAL DATA

$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	35	°C/W
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	219	°C/W

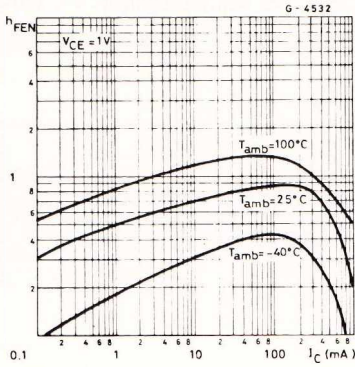
ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ °C}$  unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector Cutoff Current ( $I_E = 0$ )	$V_{CB} = 60\text{ V}$ $T_{amb} = 150\text{ °C}$			10	$\mu\text{A}$
$I_{CES}$	Collector Cutoff Current ( $V_{BE} = 0$ )	$V_{CE} = 60\text{ V}$			10	nA
$I_{EBO}$	Emitter Cutoff Current ( $I_C = 0$ )	$V_{EB} = 5\text{ V}$			10	nA
$V_{(BR)CBO}$	Collector-base Breakdown Voltage ( $I_E = 0$ )	$I_C = 100\text{ }\mu\text{A}$ For <b>2N 3109</b> and <b>2N 3110</b> For <b>2N 3107</b> and <b>2N 3108</b>	80 100			V V
$V_{(BR)CEO}^*$	Collector-emitter Breakdown Voltage ( $I_B = 0$ )	$I_C = 30\text{ mA}$ For <b>2N 3109</b> and <b>2N 3110</b> For <b>2N 3107</b> and <b>2N 3108</b>	40 60			V V
$V_{(BR)EBO}$	Emitter-base Breakdown Voltage ( $I_C = 0$ )	$I_E = 100\text{ }\mu\text{A}$	7			V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 150\text{ mA}$ $I_B = 15\text{ mA}$ $I_C = 1\text{ A}$ $I_B = 100\text{ mA}$			0.25 1	V V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 150\text{ mA}$ $I_B = 15\text{ mA}$ $I_C = 1\text{ A}$ $I_B = 100\text{ mA}$			1.1 2	V V
$h_{FE}^*$	DC Current Gain	For <b>2N 3107</b> and <b>2N 3109</b> $I_C = 150\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 0.1\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}$ $V_{CE} = 10\text{ V}$ For <b>2N 3108</b> and <b>2N 3110</b> $I_C = 150\text{ mA}$ $V_{CE} = 10\text{ V}$ $T_{amb} = -55\text{ °C}$ $I_C = 150\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 0.1\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 150\text{ mA}$ $V_{CE} = 10\text{ V}$ $T_{amb} = -55\text{ °C}$	100 35 40 30 40 20 25 15		300 120	
$f_T$	Transition Frequency	$I_C = 50\text{ mA}$ $V_{CE} = 10\text{ V}$ $f = 20\text{ MHz}$ For <b>2N 3107</b> and <b>2N 3109</b> For <b>2N 3108</b> and <b>2N 3110</b>	70 60			MHz MHz
$C_{EBO}$	Emitter-base Capacitance	$I_C = 0$ $V_{EB} = 0.5\text{ V}$ $f = 1\text{ MHz}$			80	pF
$C_{CBO}$	Collector-base Capacitance	$I_E = 0$ $V_{CB} = 10\text{ V}$ $f = 1\text{ MHz}$ For <b>2N 3107</b> and <b>2N 3108</b> For <b>2N 3109</b> and <b>2N 3110</b>			20 25	pF pF
NF	Noise Figure	$I_C = 30\text{ }\mu\text{A}$ $V_{CE} = 10\text{ V}$ $f = 1\text{ kHz}$ $R_g = 1\text{ K}\Omega$			8	dB
$t_{on}^{**}$	Turn-on Time	$I_C = 150\text{ mA}$ $V_{CC} = 20\text{ V}$ $I_{B1} = 7.5\text{ mA}$			200	ns
$t_{off}^{**}$	Turn-off Time	$I_C = 150\text{ mA}$ $V_{CC} = 20\text{ V}$ $I_{B1} = -I_{B2} = 7.5\text{ mA}$			1000	ns

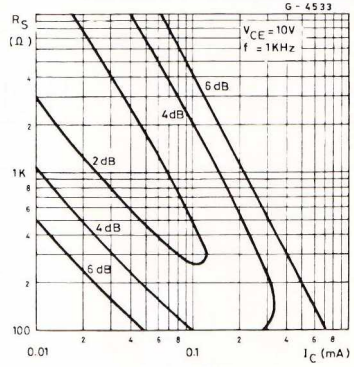
\* Pulsed : pulse duration = 300  $\mu\text{s}$ , duty cycle = 1 %.

\*\* See test circuit.

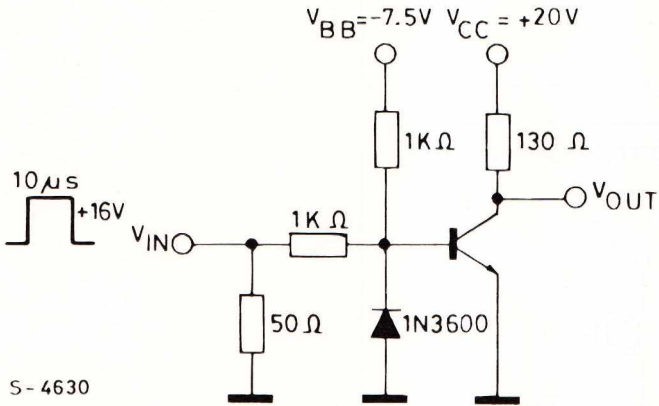
Normalized DC Current Gain.



Contours of Constant Narrow Band Noise Figure.



Test Circuit for  $t_{on}$ ,  $t_{off}$ .



S-4630

PULSE GENERATOR :  
 $t_r$  of input pulse < 15 ns  
 $t_f$  of input pulse < 15 ns

TO OSCILLOSCOPE :  
 $t_r > 15$  ns  
 $Z_N = 100 K\Omega$