SGS-THOMSON MICROELECTRONICS

S G S-THOMSON

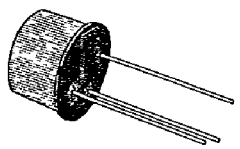
2N2894
2N3209

HIGH-SPEED SATURATED SWITCHES

DESCRIPTION

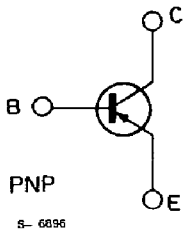
The 2N2894, and 2N3209 are silicon planar epitaxial PNP transistors in Jedec TO-18 metal case, intended for high speed, low saturation switching applications up to 100 mA.

Products approved to CECC 50004-022/023 available on request.



TO-18

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		2N2894	2N3209	
V_{CBO}	Collector-base Voltage ($I_E = 0$)	– 12	– 20	V
V_{CES}	Collector-emitter Voltage ($V_{BE} = 0$)	– 12	– 20	V
V_{CEO}	Collector-emitter Voltage ($I_B = 0$)	– 12	– 20	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	– 4		V
I_C	Collector Current	– 200		mA
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25$ °C at $T_{case} \leq 25$ °C	0.36 1.2		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	146	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	486	°C/W

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current (I_E = 0) (for **2N2894** only)	V_{CB} = – 6 V T_{amb} = 125 °C			– 10	µA
I_{CES}	Collector Cutoff Current (V_{BE} = 0)	for **2N2894** V_{CE} = – 6 V for **2N3209** V_{CE} = – 10 V V_{CE} = – 10 V T_{amb} = 125 °C			 – 80 – 80 – 10	 nA nA µA
$V_{(BR)\ CBO}$	Colllector-base Breakdown Voltage (I_E = 0)	I_C = – 10 µA for **2N2894** for **2N3209**	 – 12 – 20			 V V
$V_{(BR)CES}$	Collector-emitter Breakdown Voltage (V_{BE} = 0)	I_C = – 10 µA for **2N2894** for **2N3209**	 – 12 – 20			 V V
$V_{(BR)CEO}$*	Collector-emitter Breakdown Voltage (I_B = 0)	I_C = – 10 mA for **2N2894** for **2N3209**	 – 12 – 20			 V V
$V_{(BR)EBO}$	Emittter-base Breakdown Voltage (I_C = 0)	I_E = – 100 µA	– 4			V
$V_{CE\ (sat)}$*	Collector-emitter Saturation Voltage	for **2N2894** I_C = – 10 mA I_B = – 1 mA I_C = – 30 mA I_B = – 3 mA I_C = – 100 mA I_B = – 10 mA for **2N3209** I_C = – 10 mA I_B = – 1 mA I_C = – 30 mA I_B = – 3 mA I_C = – 100 mA I_B = – 10 mA			 – 0.15 – 0.2 – 0.5 – 0.15 – 0.2 – 0.6	 V V V V V V
$V_{BE\ (sat)}$*	Base-emitter Saturation Voltage	I_C = – 10 mA I_B = – 1 mA I_C = – 30 mA I_B = – 3 mA I_C = – 100 mA I_B = – 10 mA	– 0.78 – 0.85		– 0.98 – 1.2 – 1.7	V V V
h_{FE}*	DC Current Gain	I_C = – 10 mA V_{CE} = – 0.3 V for **2N2894** for **2N3209** I_C = – 30 mA V_{CE} = – 0.5 V for **2N2894** for **2N3209** I_C = – 100 mA V_{CE} = – 1 V for **2N2894** for **2N3209** I_C = – 30 mA V_{CE} = – 0.5 V T_{amb} = – 55 °C for **2N2894** for **2N3209**	 30 25 40 30 25 15 17 12		 150 120	
f_T	Transition Frequency	I_C = – 30 mA V_{CE} = – 10 V f = 100 MHz	400			MHz
C_{EBO}	Emitter-base Capacitance	I_C = 0 V_{EB} = – 0.5 V f = 1 MHz			6	pF

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

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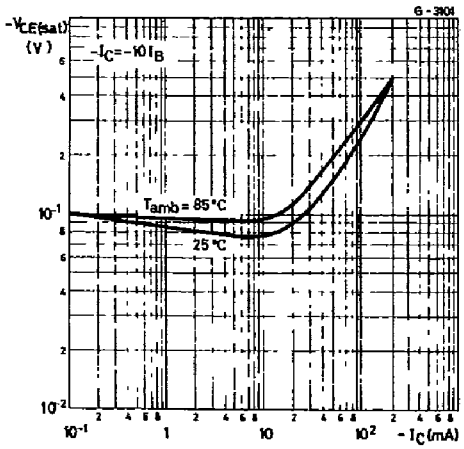
ELECTRICAL CHARACTERISTICS (continued)

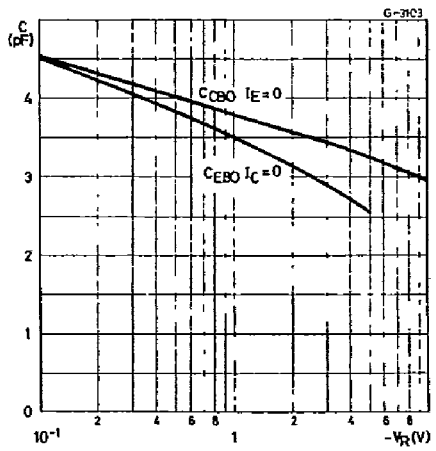
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{CBO}	Collector-base Capacitance	$I_E = 0$ f = 1 MHz $V_{CB} = -5$ V for **2N2894** for **2N3209**			6 5	pF pF
t_{on} **	Turn-on Time	$I_C = -30$ mA $V_{CC} = -2$ V $I_{B1} = -1.5$ mA			60	ns
t_{off} **	Turn-off Time	$I_C = -30$ mA $V_{CC} = -2$ V $I_{B1} = -I_{B2} = -1.5$ mA			90	ns

** See test circuit.

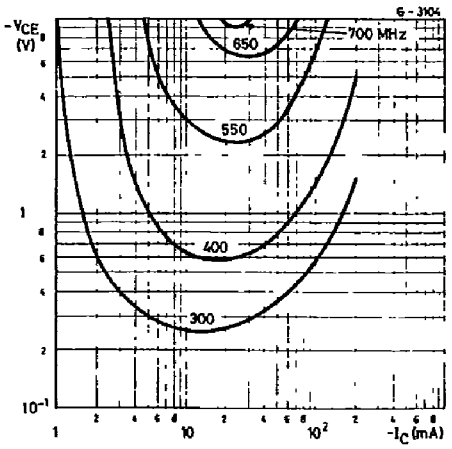
Collector-emitter Saturation Voltage.



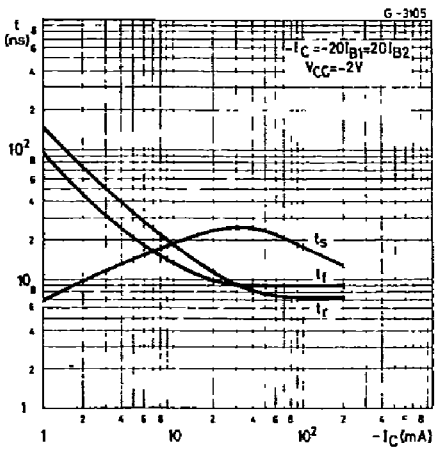
Emitter-base and Collector-base capacitance.



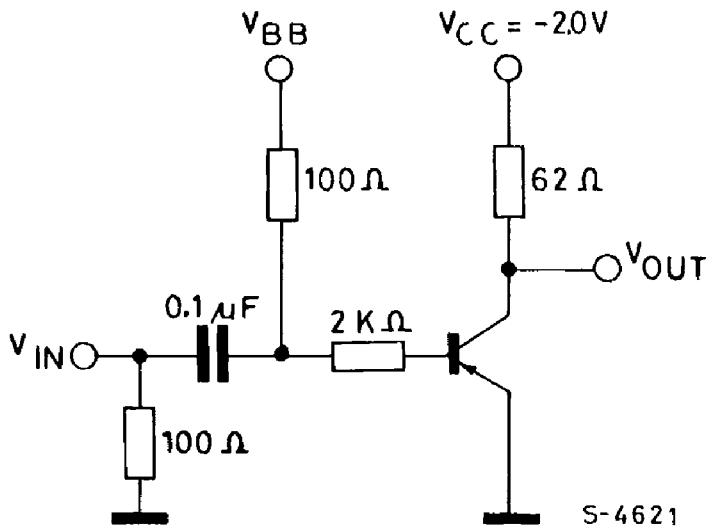
Contours of Constant Transition Frequency.



Switching Characteristics.



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



PULSE GENERATOR :
$t_r \leq 1.0$ ns
DC < 2 %
PW ≈ 400 ns
$Z_{IN} = 50\ \Omega$
t_{on} $V_{BB} = +3.0$ V, $V_{IN} = -7.0$ V
t_{off} $V_{BB} = -4$ V, $V_{IN} = +6$ V

TO OSCILLOSCOPE :
$t_r < 1.0$ ns
$Z_{IN} \geq 100$ KΩ