
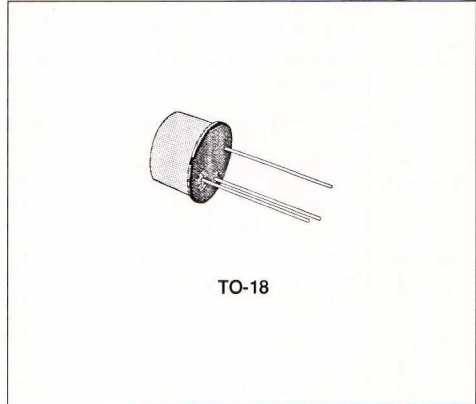


HIGH-SPEED SATURATED SWITCHES

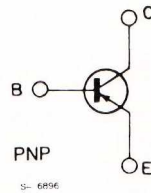
DESCRIPTION

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.



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 $T_{amb} \leq 25^\circ\text{C}$ at $T_{case} \leq 25^\circ\text{C}$	0.36		W
		1.2		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	146	$^{\circ}C/W$
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	486	$^{\circ}C/W$

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current ($I_E = 0$) (for 2N2894 only)	$V_{CB} = -6\ V$ $T_{amb} = 125\ ^{\circ}C$			- 10	μA
I_{CES}	Collector Cutoff Current ($V_{BE} = 0$)	for 2N2894 $V_{CE} = -6\ V$ for 2N3209 $V_{CE} = -10\ V$ $V_{CE} = -10\ V$ $T_{amb} = 125\ ^{\circ}C$			- 80 - 80 - 10	nA nA μA
$V_{(BR)CBO}$	Collector-base Breakdown Voltage ($I_E = 0$)	$I_C = -10\ \mu A$ for 2N2894 for 2N3209	- 12 - 20			V V
$V_{(BR)CES}$	Collector-emitter Breakdown Voltage ($V_{BE} = 0$)	$I_C = -10\ \mu A$ 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
$V_{(BR)EBO}$	Emitter-base Breakdown Voltage ($I_C = 0$)	$I_E = -100\ \mu A$	- 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 $I_C = -30\ mA$ $V_{CE} = -0.5\ V$ $T_{amb} = -55\ ^{\circ}C$ 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

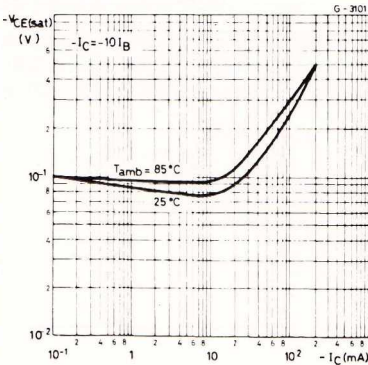
* Pulsed : pulse duration = 300 μs , duty cycle = 1 %.

ELECTRICAL CHARACTERISTICS (continued)

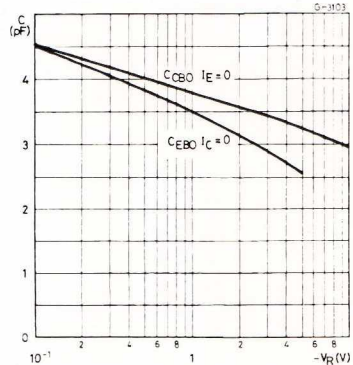
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{CBO}	Collector-base Capacitance	$I_E = 0$ $f = 1 \text{ MHz}$ for 2N2894 for 2N3209 $V_{CB} = -5 \text{ V}$			6 5	pF pF
t_{on}^{**}	Turn-on Time	$I_C = -30 \text{ mA}$ $I_{B1} = -1.5 \text{ mA}$ $V_{CC} = -2 \text{ V}$			60	ns
t_{off}^{**}	Turn-off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

** See test circuit.

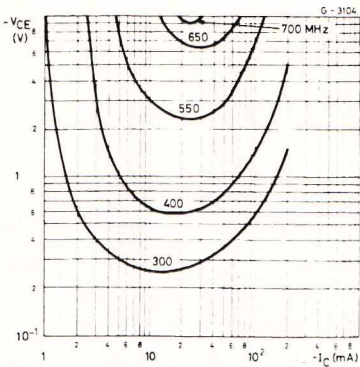
Collector-emitter Saturation Voltage.



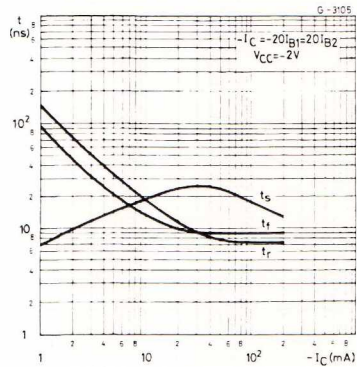
Emitter-base and Collector-base capacitance.



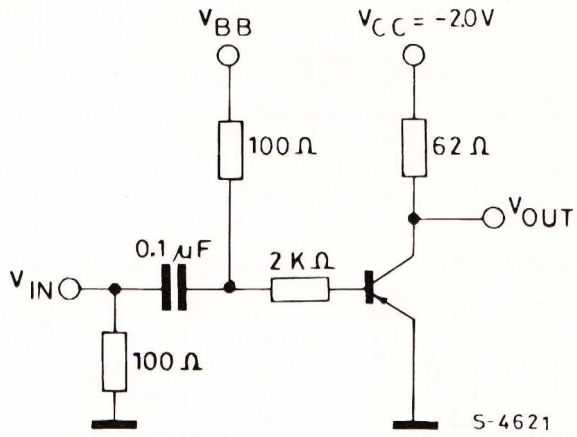
Contours of Constant Transition Frequency.



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 :

$t_r < 1.0\ ns$
 $Z_{IN} \geq 100\ K\ \Omega$