

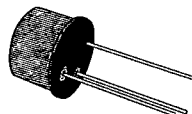
SWITCHES AND UNIVERSAL AMPLIFIERS

DESCRIPTION

The 2N1613 and 2N1711 are silicon planar epitaxial NPN transistors in Jedec TO-39 metal case. They are designed for use in high-performance amplifier, oscillator and switching circuits.

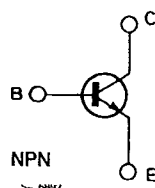
The 2N1711 is also used to advantage in amplifiers where low noise is an important factor.

≡ Products approved to CECC 50002-104 available on request.



TO-39

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base Voltage ($I_E = 0$)	75	V
V_{CER}	Collector-emitter Voltage ($R_{BE} \leq 10 \Omega$)	50	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	7	V
I_C	Collector Current	500	mA
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25^\circ C$	0.8	W
	at $T_{case} \leq 25^\circ C$	3	W
	at $T_{case} \leq 100^\circ C$	1.7	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	58	°C/W
R _{th j-amb}	Thermal Resistance Junction-ambient	Max	219	°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)	V _{CB} = 60 V V _{CB} = 60 V T _{amb} = 150 °C			10 10	nA μA
I _{EBO}	Emitter Cutoff Current (I _C = 0)	V _{EB} = 5 V for 2N1613 for 2N1711			10 5	nA nA
V _{(BR) CBO}	Collector-base Breakdown Voltage	I _C = 0.1 mA	75			V
V _{(BR) CER} *	Collector-emitter Breakdown Voltage (R _{BE} ≤ 10 Ω)	I _C = 10 mA	50			V
V _{(BR) EBO}	Emitter-base Breakdown Voltage (I _C = 0)	I _E = 0.1 mA	7			V
V _{CE (sat)} *	Collector-emitter Saturation Voltage	I _C = 150 mA I _B = 15 mA		0.5	1.5	V
V _{BE (sat)} *	Base-emitter Saturation Voltage	I _C = 150 mA I _B = 15 mA		0.95	1.3	V
h _{FE} *	DC Current Gain	for 2N1613 I _C = 0.01 mA I _C = 0.1 mA I _C = 10 mA I _C = 150 mA I _C = 500 mA I _C = 10 mA T _{amb} = -55 °C V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V	20 35 35 40 20 20	35 50 80 80 55 35	120	
h _{FE} *	DC Current Gain	for 2N1711 I _C = 0.01 mA I _C = 0.1 mA I _C = 10 mA I _C = 150 mA I _C = 500 mA I _C = 10 mA T _{amb} = 55 °C V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V	20 35	60 80 130 130 75 65	300	
h _{fe}	Small Signal Current Gain	for 2N1613 I _C = 1 mA f = 1 kHz for 2N1711 I _C = 1 mA f = 1 kHz V _{CE} = 10 V V _{CE} = 10 V	30 70	70 135	150 300	
f _t	Transition Frequency	I _C = 50 mA f = 20 MHz V _{CE} = 10 V for 2N1613 for 2N1711	60 70	80 100		MHz MHz
C _{EBO}	Emitter-base Capacitance	I _C = 0 f = 1 MHz V _{EB} = 0.5 V		50	80	pF
C _{CBO}	Collector-base Capacitance	I _E = 0 f = 1 MHz V _{CB} = 10 V		18	25	pF

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

ELECTRICAL CHARACTERISTICS (continued)

T-35-19

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
NF	Noise Figure	$I_C = 0.3 \text{ mA}$ $R_g = 510 \Omega$	$V_{CE} = 10 \text{ V}$ $f = 1 \text{ kHz}$ for 2N1613 for 2N1711		6 3.5	12 8	dB dB
h_{ie}	Input Impedance	$I_C = 1 \text{ mA}$ $f = 1 \text{ kHz}$	$V_{CE} = 5 \text{ V}$ for 2N1613 for 2N1711		2.2 4.4		k Ω k Ω
h_{re}	Reverse Voltage Ratio	$I_C = 1 \text{ mA}$ $f = 1 \text{ kHz}$	$V_{CE} = 5 \text{ V}$ for 2N1613 for 2N1711		3.6×10^{-4} 7.3×10^{-4}		
h_{oe}	Output Admittance	$I_C = 1 \text{ mA}$ $f = 1 \text{ kHz}$	$V_{CE} = 5 \text{ V}$ for 2N1613 for 2N1711		12.5 23.8		μS μS

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