


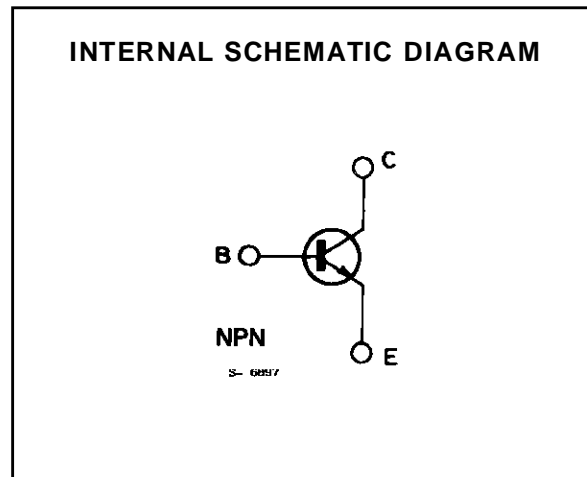
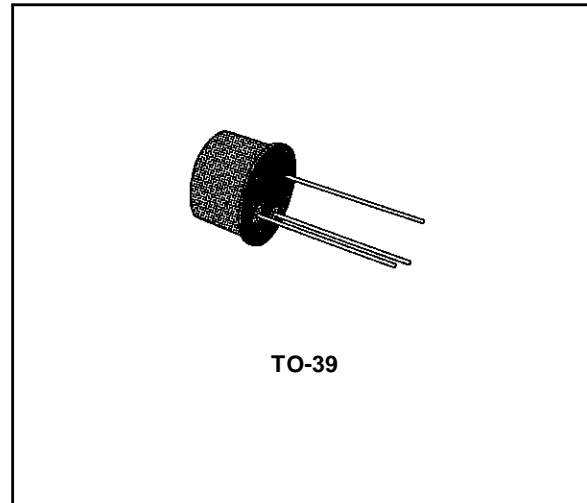
SWITCHES AND UNIVERSAL AMPLIFIERS

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.



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 $T_{amb} \leq 25 \text{ }^\circ\text{C}$	0.8	W
	at $T_{case} \leq 25 \text{ }^\circ\text{C}$	3	W
	at $T_{case} \leq 100 \text{ }^\circ\text{C}$	1.7	W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200	$^\circ\text{C}$

2N1613-2N1711

THERMAL DATA

$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	58	$^{\circ}C/W$
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	219	$^{\circ}C/W$

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current ($I_E = 0$)	$V_{CB} = 60\ V$			10	nA
		$V_{CB} = 60\ V$ $T_{amb} = 150\ ^{\circ}C$			10	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 ($R_{BE} \leq 10\ \Omega$)	$I_C = 10\ mA$	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				
		$I_C = 0.01\ mA$ $V_{CE} = 10\ V$		35		
		$I_C = 0.1\ mA$ $V_{CE} = 10\ V$	20	50		
		$I_C = 10\ mA$ $V_{CE} = 10\ V$	35	80		
		$I_C = 150\ mA$ $V_{CE} = 10\ V$	40	80	120	
		$I_C = 500\ mA$ $V_{CE} = 10\ V$	20	55		
		$I_C = 10\ mA$ $V_{CE} = 10\ V$				
		$T_{amb} = -55\ ^{\circ}C$	20	35		
h_{FE}^*	DC Current Gain	for 2N1711				
		$I_C = 0.01\ mA$ $V_{CE} = 10\ V$	20	60		
		$I_C = 0.1\ mA$ $V_{CE} = 10\ V$	35	80		
		$I_C = 10\ mA$ $V_{CE} = 10\ V$		130		
		$I_C = 150\ mA$ $V_{CE} = 10\ V$		130	300	
		$I_C = 500\ mA$ $V_{CE} = 10\ V$		75		
		$I_C = 10\ mA$ $V_{CE} = 10\ V$				
		$T_{amb} = 55\ ^{\circ}C$		65		
h_{fe}	Small Signal Current Gain	for 2N1613				
		$I_C = 1\ mA$ $V_{CE} = 10\ V$ $f = 1\ kHz$	30	70	150	
		for 2N1711				
		$I_C = 1\ mA$ $V_{CE} = 10\ V$ $f = 1\ kHz$	70	135	300	
f_t	Transition Frequency	$I_C = 50\ mA$ $V_{CE} = 10\ V$				
		$f = 20\ MHz$ for 2N1613 for 2N1711	60 70	80 100		MHz MHz
C_{EBO}	Emitter-base Capacitance	$I_C = 0$ $V_{EB} = 0.5\ V$ $f = 1\ MHz$		50	80	pF
C_{CBO}	Collector-base Capacitance	$I_E = 0$ $V_{CB} = 10\ V$ $f = 1\ MHz$		18	25	pF

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

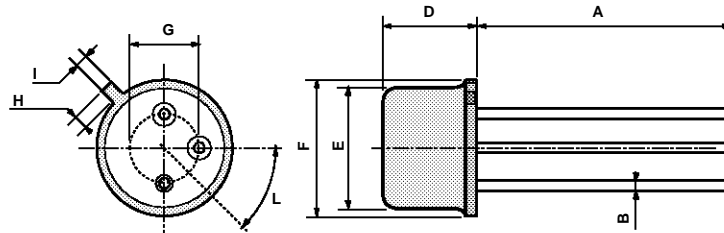
ELECTRICAL CHARACTERISTICS (continued)

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 %.

TO39 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	12.7			0.500		
B			0.49			0.019
D			6.6			0.260
E			8.5			0.334
F			9.4			0.370
G	5.08			0.200		
H			1.2			0.047
I			0.9			0.035
L	45° (typ.)					



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