SGS-THOMSON
MICROELECTRONICS

2N1613
2N1711

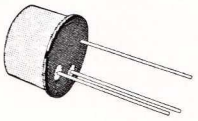
SWITCHES AND UNIVERSAL AMPLIFIERS

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.

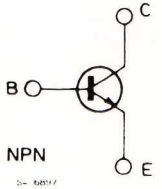
The 2N1711 is also used to advantage in amplifiers where low noise is an important factor.

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 $T_{amb} \leq 25$ °C at $T_{case} \leq 25$ °C at $T_{case} \leq 100$ °C	0.8 3 1.7	W 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	58	°C/W
$R_{th\ j\text{-}amb}$	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				10	nA
		V_{CB} = 60 V	T_{amb} = 150 °C			10	µA
I_{EBO}	Emitter Cutoff Current (I_C = 0)	V_{EB} = 5 V	for **2N1613**			10	nA
			for **2N1711**			5	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 °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 °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**	60	80		MHz
			for **2N1711**	70	100		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)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
NF	Noise Figure	I_C = 0.3 mA R_g = 510 Ω	V_{CE} = 10 V f = 1 kHz for **2N1613** for **2N1711**		 6 3.5	 12 8	 dB dB
h_{ie}	Input Impedance	I_C = 1 mA f = 1 KHz	V_{CE} = 5 V for **2N1613** for **2N1711**		 2.2 4.4		 kΩ kΩ
h_{re}	Reverse Voltage Ratio	I_C = 1 mA f = 1 kHz	V_{CE} = 5 V for **2N1613** for **2N1711**		 $3.6x10^{-4}$ $7.3x10^{-4}$		
h_{oe}	Output Admittance	I_C = 1 mA f = 1 kHz	V_{CE} = 5 V for **2N1613** for **2N1711**		 12.5 23.8		 µS µS

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