



## NPN 2N1613 – 2N1711

### SILICON PLANAR EPITAXIAL TRANSISTORS

The 2N1613 and 2N1711 are NPN transistors mounted in TO-39 metal package with the collector connected to the 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.

Compliance to RoHS.

#### ABSOLUTE MAXIMUM RATINGS

Symbol	Ratings	Value	Unit	
$V_{CBO}$	Collector-Base Voltage	75	V	
$V_{CER}$	Collector-Emitter Voltage ( $R_{BE} = 10\Omega$ )	50	V	
$V_{EBO}$	Emitter-Base Voltage	7	V	
$I_C$	Collector Current	5	mA	
$I_{CM}$	Peak Collector Current	1	A	
$I_{BM}$	Peak Base Current	200	mA	
$P_D$	Total Power Dissipation	@ $T_{case} = 25^\circ$	3	W
		@ $T_{case} = 100^\circ$	1.7	W
		@ $T_{amb} = 25^\circ$	0.8	W
$T_J$	Junction Temperature	200	$^\circ C$	
$T_{stg}$	Storage Temperature range	-65 to +150	$^\circ C$	

#### THERMAL CHARACTERISTICS

Symbol	Ratings	Value	Unit
$R_{thJ-c}$	Thermal Resistance, Junction-case	58	$^\circ C/W$
$R_{thJ-amb}$	Thermal Resistance, Junction-ambient	219	$^\circ C/W$

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### ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

Symbol	Ratings	Test Condition(s)	Min	Typ	Max	Unit	
$I_{CBO}$	Collector Cutoff Current	$V_{CE}=60\text{ V}, I_E=0$	-	-	10	nA	
		$V_{CE}=60\text{ V}, I_E=0$ $T_{amb} = 150^\circ\text{C}$	-	-	10	$\mu\text{A}$	
$I_{EBO}$	Emitter Cutoff Current	$V_{EB}=5\text{ V}$ 2N1613	-	-	10	nA	
		$V_{EB}=5\text{ V}$ 2N1711	-	-	5		
$V_{CBO}$	Collector Base Breakdown Voltage	$I_C=0.1\text{ mA}$	75	-	-	V	
$V_{EBO}$	Emitter Base Breakdown Voltage	$I_E=100\text{ }\mu\text{A}, I_C=0$	7	-	-	V	
$V_{CE(SAT)}(*)$	Collector-Emitter saturation Voltage	$I_C=150\text{ mA}, I_B=15\text{ mA}$	-	-	1.5	V	
$V_{BE(SAT)}(*)$	Base-Emitter saturation Voltage	$I_C=150\text{ mA}, I_B=15\text{ mA}$	-	-	1.3	V	
$h_{FE}(*)$	DC Current Gain	$I_C=0.1\text{ mA}, V_{CE}=10\text{ V}$	2N1613	20	-	-	-
		$I_C=10\text{ mA}, V_{CE}=10\text{ V}$		35	-	-	
		$I_C=150\text{ mA}, V_{CE}=10\text{ V}$		40	-	120	
		$I_C=500\text{ mA}, V_{CE}=10\text{ V}$		20	-	-	
		$I_C=10\text{ }\mu\text{A}, V_{CE}=10\text{ V}$	2N1711	20	-	-	
		$I_C=0.1\text{ mA}, V_{CE}=10\text{ V}$		35	-	-	
		$I_C=10\text{ mA}, V_{CE}=10\text{ V}$		75	-	-	
		$I_C=150\text{ mA}, V_{CE}=10\text{ V}$		100	-	300	
		$I_C=500\text{ mA}, V_{CE}=10\text{ V}$		40	-	-	

Symbol	Ratings	Test Condition(s)	Min	Typ	Mx	Unit
$f_T$	Transition Frequency	$I_C=50\text{ mA}, V_{CE}=10\text{ V}, f=100\text{ MHz}$ 2N1613	60	-	-	MHz
		2N1711	70	-	-	
$C_{CBO}$	Collector-Base Capacitance	$I_E=0, V_{CB}=10\text{ V}, f=1\text{ MHz}$	-	-	25	pF
$C_{EBO}$	Emitter-Base Capacitance	$I_C=0, V_{EB}=0.5\text{ V}, f=1\text{ MHz}$	-	-	80	pF
NF	Noise Figure	$I_C=0.3\text{ mA}, V_{CE}=10\text{ V}$ $f=1\text{ kHz}, R_g=510\text{ }\Omega$ 2N1613	-	-	12	dB
		$I_C=0.3\text{ mA}, V_{CE}=10\text{ V}$ $f=1\text{ kHz}, R_g=510\text{ }\Omega$ 2N1711	-	-	8	

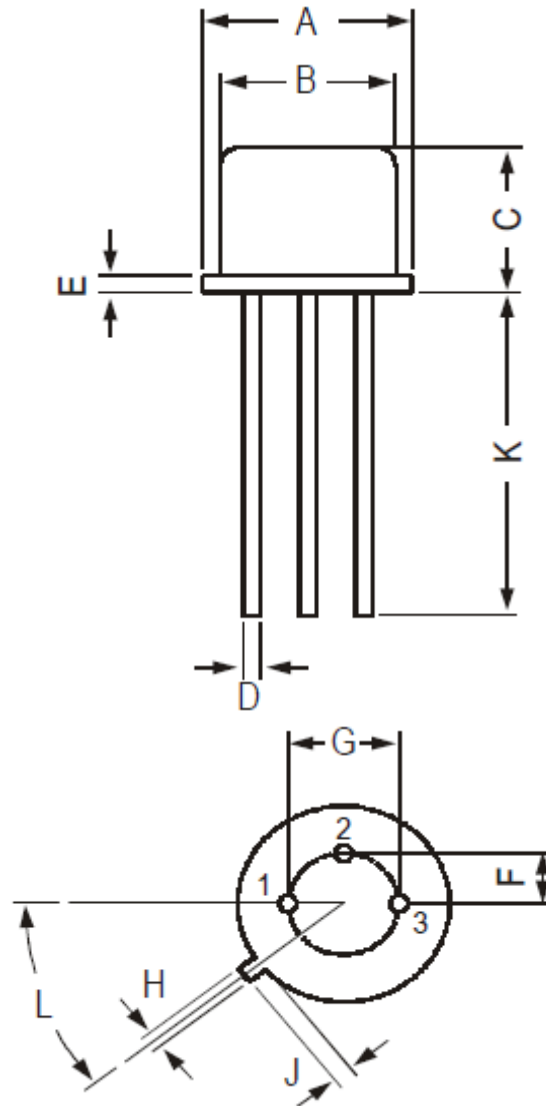
(\*) Pulse conditions :  $t_p < 300\text{ }\mu\text{s}, \delta = 2\%$ .

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### MECHANICAL DATA CASE TO-39

DIMENSIONS (mm)		
	min	max
A	8.50	9.39
B	7.74	8.50
C	6.09	6.60
D	0.40	0.53
E	-	0.88
F	2.41	2.66
G	4.82	5.33
H	0.71	0.86
J	0.73	1.02
K	12.70	-
L	42°	48°

Pin 1 :	Emitter
Pin 2 :	Base
Pin 3 :	Collector
Case :	Collector



Revised August 2012

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