Silicon NPN Transistor

BC413

45V / 100mA

DATASHEET

OEM – Telefunken

Source: Telefunken Databook 1972/73

Datasheet Rev. 1.3 – 12/18 – data without warranty / liability

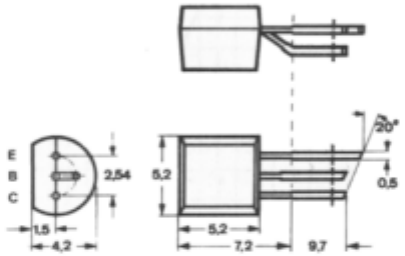
BC 413 · BC 414

Silizium-NPN-Epitaxial-Planar-Transistoren für rauscharme Vorstufen.

Silicon NPN epitaxial planar transistors for low noise input stages.

Abmessungen · Dimensions

Maße in mm
M 2:1

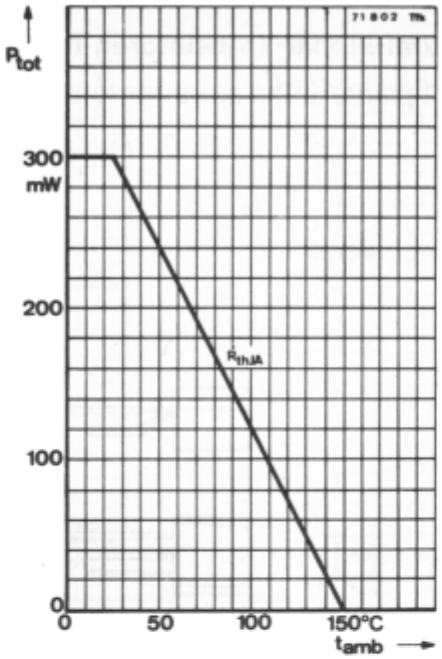


Kunststoffgehäuse
≈ JEDEC TO 92
Gewicht · Weight
max. 0,2 g

Absolute Grenzdaten · Absolute maximum ratings

		BC 413	BC 414	
Kollektor-Basis-Sperrspannung	U_{CBO}	45	50	V
Kollektor-Emitter-Sperrspannung	U_{CEO}	30	45	V
Emitter-Basis-Sperrspannung	U_{EBO}	5	5	V
Kollektorspitzenstrom	I_{CM}	100	100	mA
Basisspitzenstrom	I_{BM}	20	20	mA
Gesamtverlustleistung $t_{amb} \leqq 25°C$	P_{tot}	300	300	mW
Sperrschichttemperatur	t_j	150	150	°C
Lagerungstemperatur	t_{stg}	−55...+150	−65...+150	°C

BC 413 · BC 414



		Min.	Typ.	Max.	
Wärmewiderstand · Thermal resistance					
Sperrschicht-Umgebung	R_{thJA}			420	°C/W
Statische Kenngrößen · DC characteristics					
Umgebungstemperatur t_{amb} = 25° C, falls nicht anders angegeben					
Kollektorreststrom					
U_{CB} = 30 V	I_{CBO}			15	nA
U_{CB} = 30 V, t_{amb} = 125° C	I_{CBO}			5	µA
Emitterreststrom					
U_{EB} = 4 V	I_{EBO}			15	nA
Kollektor-Basis-Durchbruchspannung					
I_C = 10 µA **BC 413**	$U_{(BR)CBO}$	45			V
BC 414	$U_{(BR)CBO}$	50			V
Kollektor-Emitter-Durchbruchspannung					
I_C = 10 mA **BC 413**	$U_{(BR)CEO}$ [1]	30			V
BC 414	$U_{(BR)CEO}$ [1]	45			V
Emitter-Basis-Durchbruchspannung					
I_E = 10 µA	$U_{(BR)EBO}$	5			V

[1] $\frac{t_p}{T}$ = 0,01, t_p = 0,3 ms

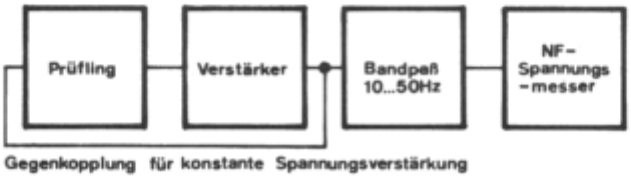
BC 413 · BC 414

			Min.	Typ.	Max.	
Kollektor-Sättigungsspannung						
I_C = 10 mA, I_B = 0,5 mA		U_{CEsat}		90	250	mV
I_C = 10 mA, (U_{CE} = 1 V, I_C' = 11 mA)		U_{CEsat} 2)		300	600	mV
I_C = 100 mA, I_B = 5 mA		U_{CEsat} 1)		200	600	mV
Basis-Sättigungsspannung						
I_C = 10 mA, I_B = 0,5 mA		U_{BEsat}		700		mV
I_C = 100 mA, I_B = 5 mA		U_{BEsat} 1)		900		mV
Basis-Emitterspannung						
U_{CE} = 5 V, I_C = 10 µA		U_{BE}		520		mV
U_{CE} = 5 V, I_C = 100 µA		U_{BE}		550		mV
U_{CE} = 5 V, I_C = 2 mA		U_{BE}	550	620	700	mV
Kollektor-Basis-Gleichstromverhältnis						
U_{CE} = 5 V, I_C = 10 µA	**Gruppe B**	h_{FE}	100	150		
	Gruppe C	h_{FE}		270		
U_{CE} = 5 V, I_C = 2 mA	**Gruppe B**	h_{FE}	180	290	460	
	Gruppe C	h_{FE}	380	500	800	

Dynamische Kenngrößen · AC characteristics

Umgebungstemperatur t_{amb} = 25° C

Transitfrequenz					
U_{CE} = 5 V, I_C = 10 mA, f = 100 MHz	f_T		250		MHz
Kollektor-Basis-Kapazität					
U_{CB} = 10 V, f = 1 MHz	C_{CBO}		2,5		pF
Rauschmaß					
U_{CE} = 5 V, I_C = 200 µA, R_G = 2 kΩ, f = 30 Hz...15 kHz	F			3	dB
Rauschspannung am Eingang des Transistors					
U_{CE} = 5 V, I_C = 200 µA, R_G = 2 kΩ, f = 10 Hz...50 Hz	U_n 3)			0,135	µV



Blockschaltbild der Meßschaltung für: U_n

72482 Tfk

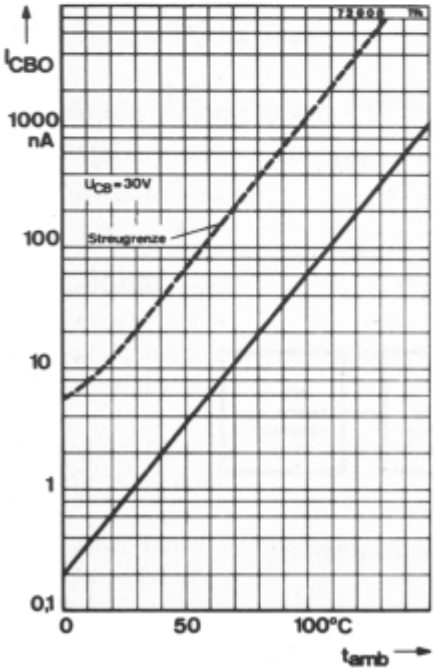
1) $\frac{t_p}{T}$ = 0,01, t_p = 0,3 ms

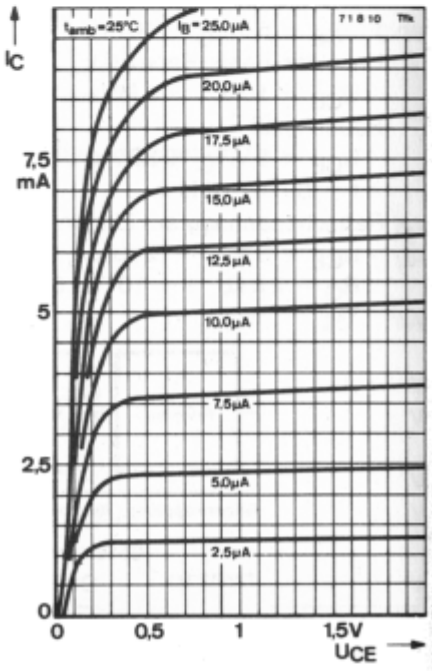
2) Siehe Seite / See page A 67

3) Siehe Blockschaltbild / See diagram

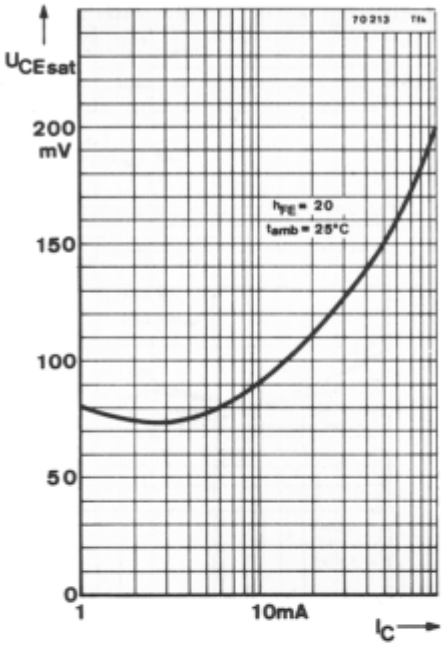
BC 413 · BC 414

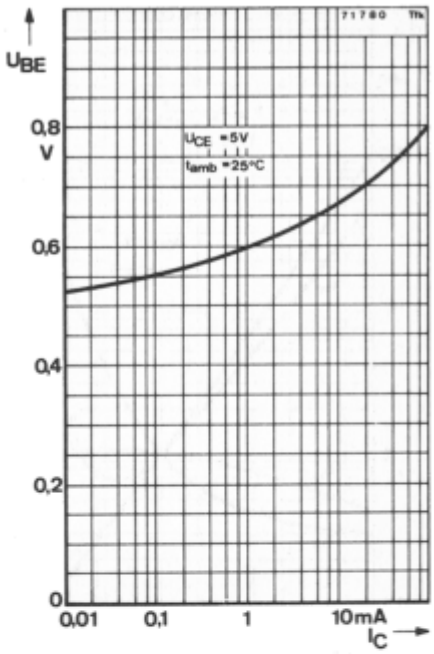
			Min.	Typ.	Max.	
Vierpol Kenngrößen · Two port characteristics						
Umgebungstemperatur t_{amb} = 25° C						
Emitterschaltung						
U_{CE} = 5 V, I_C = 2 mA, **f = 1 kHz**						
Kurzschluß-Eingangswiderstand						
	Gruppe B	h_{ie}	3,2	4,5	8,5	kΩ
	Gruppe C	h_{ie}	6	8,7	15	kΩ
Leerlauf-Spannungsrückwirkung						
	Gruppe B	h_{re}		$2 \cdot 10^{-4}$		
	Gruppe C	h_{re}		$3 \cdot 10^{-4}$		
Kurzschluß-Stromverstärkung						
	Gruppe B	h_{fe}	240	330	500	
	Gruppe C	h_{fe}	450	600	900	
Leerlauf-Ausgangsleitwert						
	Gruppe B	h_{oe}		30	60	µS
	Gruppe C	h_{oe}		60	110	µS

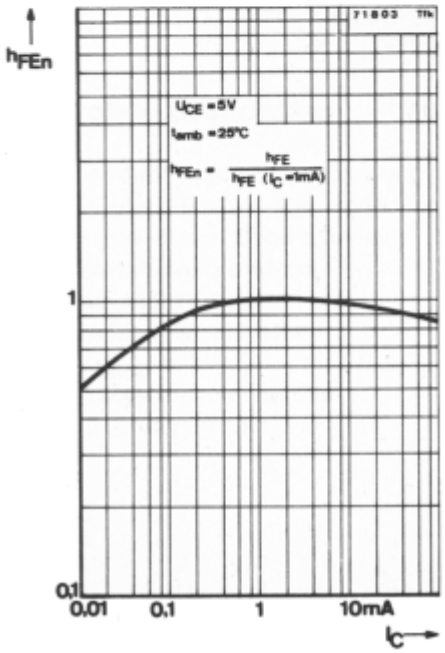


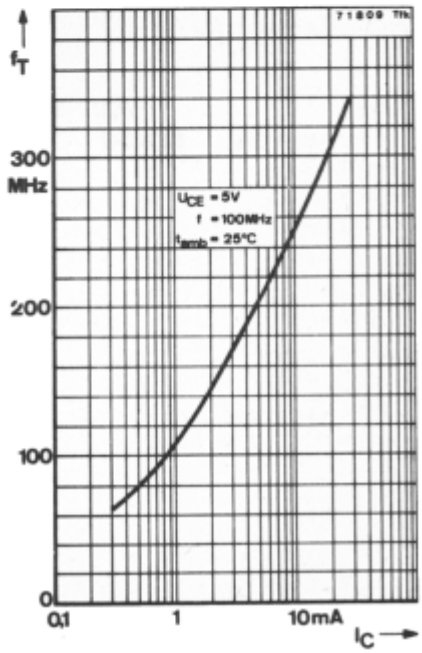


BC 413 · BC 414

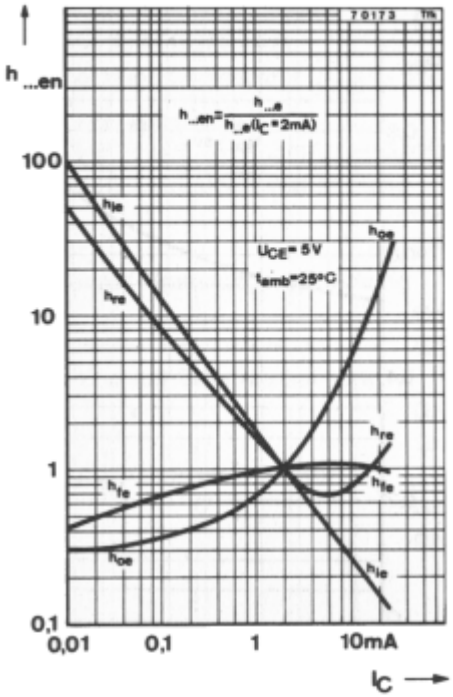

70213 Tfk
UCEsat
200
mV
150
100
50
0
1
10mA
IC
hFE = 20
tamb = 25°C

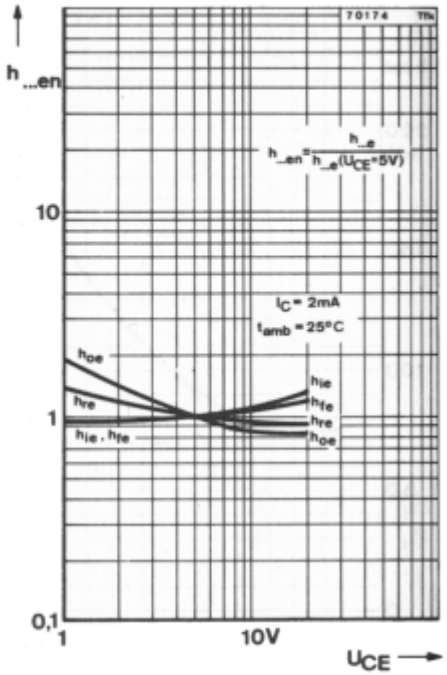

71760 Tfk
UBE
0,8
V
0,6
0,4
0,2
0
0,01
0,1
1
10mA
IC
UCE = 5V
tamb = 25°C


71803 Tfk
hFEn
1
0,1
0,01
0,1
1
10mA
IC
UCE = 5V
tamb = 25°C
hFEn = hFE / hFE (IC = 1mA)


71809 Tfk
fT
300
MHz
200
100
0
0,1
1
10mA
IC
UCE = 5V
f = 100MHz
tamb = 25°C

BC 413 · BC 414


70173
h ...en
h...en = h...e / h...e(IC = 2mA)
100
10
1
0,1
0,01
0,1
1
10mA
IC
UCE = 5V
tamb = 25°C
hie
hre
hfe
hoe


70174
h ...en
h...en = h...e / h...e(UCE = 5V)
10
1
0,1
1
10V
UCE
IC = 2mA
tamb = 25°C
hoe
hre
hie, hfe
hie
hfe
hre
hoe