

CASE TO-92F

THE BC413, BC414, BC415, BC416 ARE SILICON PLANAR EPITAXIAL TRANSISTORS FOR AF LOW NOISE PREAMPLIFIER APPLICATIONS. THE BC413, BC414 ARE NPN AND ARE COMPLEMENTARY TO THE PNP BC415, BC416 RESPECTIVELY.



CEB

ABSOLUTE MAXIMUM RATINGS

For p-n-p devices, voltage and current values are negative.

		BC413 (NPN)	BC414 (NPN)	BC415 (PNP)	BC416 (PNP)
Collector-Base Voltage	V _{CBO}	45V	50V	45V	50V
Collector-Emitter Voltage	V _{CEO}	30V	45V	35V	45V
Emitter-Base Voltage	V _{EBO}		5V		
Collector Current	I _C		100mA		
Total Power Dissipation @ T _A ≤ 25°C	P _{tot}		300mW		
			derate 2.4mW/°C above 25°C		
Operating Junction & Storage Temperature	T _j , T _{stg}		-55 to 150°C		

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITIONS
Collector-Base Breakdown Voltage	BV _{CBO}					I _C = 10μA I _E = 0
BC413		45			V	
BC414		50			V	
BC415		45			V	
BC416		50			V	
Collector-Emitter Breakdown Voltage	LV _{CEO}					I _C = 10mA (Pulsed) I _B = 0
BC413		30			V	
BC414		45			V	
BC415		35			V	
BC416		45			V	
Emitter-Base Breakdown Voltage	BV _{EBO}	5			V	I _E = 10μA I _C = 0
Collector Cutoff Current	I _{CBO}			15	nA	V _{CB} = 30V I _E = 0
				5	μA	V _{CB} = 30V I _E = 0 T _A = 150°C
Emitter Cutoff Current	I _{EBO}			15	nA	V _{EB} = 4V I _C = 0
Collector-Emitter Saturation Voltage	V _{CE(sat)}		0.08	0.25	V	I _C = 10mA I _B = 0.5mA
			0.25	0.6	V	I _C = 100mA I _B = 5mA (Pulsed)

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PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITIONS
Collector-Emitter Knee Voltage	V_{CEK}		0.3	0.6	V	$I_C=10mA$, I_B =value at which $I_C=11mA$ $V_{CE}=1V$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		0.92		V	$I_C=100mA$ $I_B=5mA$ (Pulsed)
Base-Emitter Voltage	V_{BE}	0.55	0.64	0.75	V	$I_C=2mA$ $V_{CE}=5V$
			0.57		V	$I_C=0.1mA$ $V_{CE}=5V$
Current Gain-Bandwidth Product	f_T		200		MHz	$I_C=10mA$ $V_{CE}=5V$
Collector-Base Capacitance	C_{ob}					$V_{CB}=10V$ $I_E=0$
BC413, BC414			2.7		pF	$f=1MHz$
BC415, BC416			3.2		pF	
Noise Figure	NF					$I_C=0.2mA$ $V_{CE}=5V$
BC413, BC414		1.2	2.5		dB	$R_G=2K\Omega$ $f=30Hz-15KHz$
BC415, BC416		1.2	2.0		dB	
Flicker Noise Voltage Referred to Base	$\bar{E}_n$					$I_C=0.2mA$ $V_{CE}=5V$
BC413, BC414				0.135	μV	$R_G=2K\Omega$ $f=10Hz-50Hz$
BC415, BC416				0.11	μV	

D.C. CURRENT GAIN (HFE) AT $V_{CE}=5V$ $T_A=25^\circ C$

@ I_C	HFE GROUP A			HFE GROUP B			HFE GROUP C		
	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
0.01mA	40	100		100	170		100	290	
2mA	120	170	220	180	300	460	380	520	800
100mA		100			160			270	

h - PARAMETERS AT $I_C=2mA$ $V_{CE}=5V$ $f=1kHz$ $T_A=25^\circ C$

h - PARAMETER	SYMBOL	HFE GROUP A			HFE GROUP B			HFE GROUP C			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
Input Impedance	h_{ie}	1.6	2.7	4.5	3.2	4.5	8.5	6	8.7	15	$K\Omega$
Voltage Feedback Ratio	h_{re}		1.5			2			3		$\times 10^{-4}$
Small Signal Current Gain	h_{fe}	125	190	260	240	330	500	450	580	900	
Output Admittance	h_{oe}		18	30		30	60		60	110	μS