

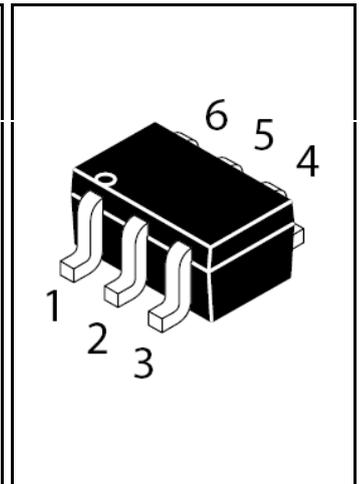
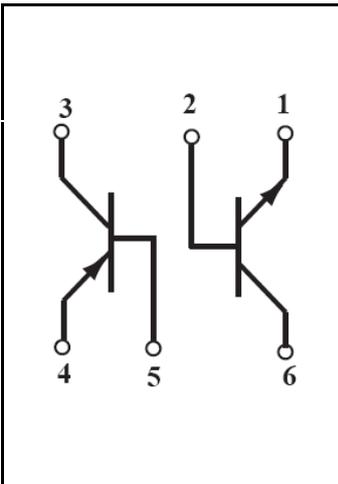
NPN/PNP Multi-Chip Transistor

FEATURES

- Ideal for low power amplification and switching
- Complementary Pair
 - One 3904-Type NPN
 - One 3906-Type PNP

MECHANICAL DATA

- Case: SOT-363 Plastic
- Case material: "Green" molding compound, UL flammability classification 94V-0, (No Br. Sb. Cl)
- Lead Free in RoHS 2002/95/EC Compliant



NPN 3904_ Maximum Ratings @ T_A = 25°C

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	60	V
Collector-Emitter Voltage	V _{CEO}	40	V
Emitter-Base Voltage	V _{EBO}	5	V
Collector Current -Continuous	I _C	200	mA
Collector Power Dissipation	P _C	200	mW
Junction Temperature	T _J	150	°C
Storage Temperature Range	T _{STG}	-55~+150	°C

NPN 3904_ Electrical Characteristics @ T_A = 25°C unless otherwise specified

Characteristic	Test Condition	Symbol	Min.	Typ.	Max.	Unit
Collector-base breakdown voltage	I _C =10μA, I _E =0	V _{CB0}	60			V
Collector-emitter breakdown voltage	I _C =1mA, I _B =0	V _{CEO}	40			V
Emitter-base breakdown voltage	I _E =10μA, I _C =0	V _{EBO}	5			V
Collector-base cut-off current	V _{CB} =30V, I _E =0	I _{CB0}			0.05	uA
Collector-base cut-off current	V _{CE} =30V, I _B =0	I _{CEO}			0.5	uA
Emitter-base cut-off current	V _{EB} =5V, I _C =0	I _{EBO}			0.05	uA
DC current gain	V _{CE} =1V, I _C =0.1mA	h _{FE1}	40			
	V _{CE} =1V, I _C =1mA	h _{FE2}	70			
	V _{CE} =1V, I _C =10mA	h _{FE3}	100		300	
	V _{CE} =1V, I _C =50mA	h _{FE4}	60			
	V _{CE} =1V, I _C =100mA	h _{FE5}	30			
Collector-emitter saturation voltage	I _C =10mA, I _B =1mA	V _{CE(sat)1}			0.2	V
	I _C =50mA, I _B =5mA	V _{CE(sat)2}			0.3	V
Base-emitter saturation voltage	I _C =10mA, I _B =1mA	V _{BE(sat)1}	0.65		0.85	V
	I _C =50mA, I _B =5mA	V _{BE(sat)2}			0.95	V
Transition frequency	V _{CE} =20V, I _C =20mA, f=100MHz	f _T	300			MHz
Collector output capacitance	V _{CB} =5V, I _E =0, f=1MHz	Cob			4	pF
Noise figure	V _{CE} =5V, I _C =0.1mA, f=1kHz, R _S =1KΩ	NF			5	dB
Delay time	V _{CC} =3V, V _{BE} =-0.5V	T _d			35	nS
Rise time	I _C =10mA, I _{B1} =-I _{B2} =1mA	T _r			35	nS
Storage time	V _{CC} =3V, I _C =10mA	T _s			200	nS
Fall time	I _{B1} =-I _{B2} =1mA	T _f			50	nS

PNP 3906_Maximum Ratings @ $T_A = 25^\circ\text{C}$

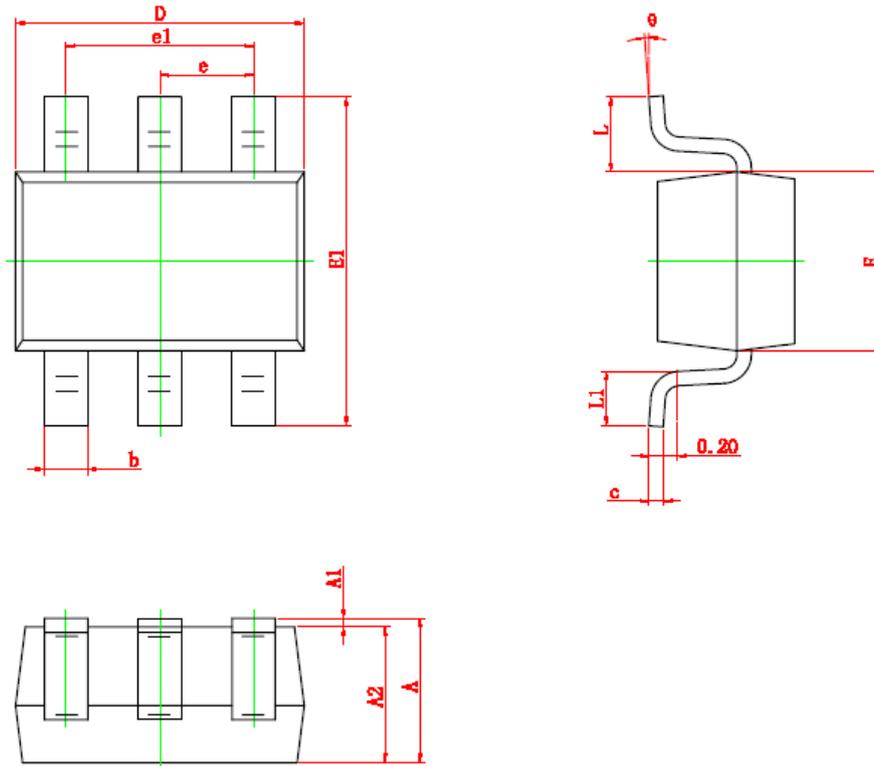
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-5	V
Collector Current -Continuous	I_C	-200	mA
Collector Power Dissipation	P_C	200	mW
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55~+150	$^\circ\text{C}$

PNP 3906_Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Test Condition	Symbol	Min.	Typ.	Max.	Unit
Collector-base breakdown voltage	$I_C = -10\mu\text{A}, I_E = 0$	V_{CBO}	-40			V
Collector-emitter breakdown voltage	$I_C = -1\text{mA}, I_B = 0$	V_{CEO}	-40			V
Emitter-base breakdown voltage	$I_E = -10\mu\text{A}, I_C = 0$	V_{EBO}	-5			V
Collector-base cut-off current	$V_{CB} = -30\text{V}, I_C = 0$	I_{CBO}			-50	nA
Emitter-base cut-off current	$V_{EB} = -5\text{V}, I_C = 0$	I_{EBO}			-50	nA
DC current gain	$V_{CE} = -1\text{V}, I_C = -0.1\text{mA}$	h_{FE1}	60			
	$V_{CE} = -1\text{V}, I_C = -1\text{mA}$	h_{FE2}	80			
	$V_{CE} = -1\text{V}, I_C = -10\text{mA}$	h_{FE3}	100		300	
	$V_{CE} = -1\text{V}, I_C = -50\text{mA}$	h_{FE4}	60			
	$V_{CE} = -1\text{V}, I_C = -100\text{mA}$	h_{FE5}	30			
Collector-emitter saturation voltage	$I_C = -10\text{mA}, I_B = -1\text{mA}$	$V_{CE(sat)1}$			-0.25	V
	$I_C = -50\text{mA}, I_B = -5\text{mA}$	$V_{CE(sat)2}$			-0.4	V
Base-emitter saturation voltage	$I_C = -10\text{mA}, I_B = -1\text{mA}$	$V_{BE(sat)1}$	-0.65		-0.85	V
	$I_C = -50\text{mA}, I_B = -5\text{mA}$	$V_{BE(sat)2}$			-0.95	V
Transition frequency	$V_{CE} = -20\text{V}, I_C = -10\text{mA}, f = 100\text{MHz}$	f_T	250			MHz
Collector output capacitance	$V_{CB} = -5\text{V}, I_E = 0, f = 1\text{MHz}$	C_{ob}			4.5	pF
Noise figure	$V_{CE} = -5\text{V}, I_C = -0.1\text{mA}, f = 1\text{kHz}, R_g = 1\text{K}\Omega$	NF			4	dB
Delay time	$V_{CC} = -3\text{V}, V_{BE} = -0.5\text{V}$	T_d			35	nS
Rise time	$I_C = -10\text{mA}, I_{B1} = -I_{B2} = -1\text{mA}$	T_r			35	nS
Storage time	$V_{CC} = -3\text{V}, I_C = -10\text{mA}$	T_s			225	nS
Fall time	$I_{B1} = -I_{B2} = -1\text{mA}$	T_f			75	nS

REV. 2, Jun-2012, KSTR04

SOT-363 Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

Device Marking :

Device P/N	Marking code
MMDT3946	K46

Electrical characteristic curves

Fig.1 Power Derating Curve

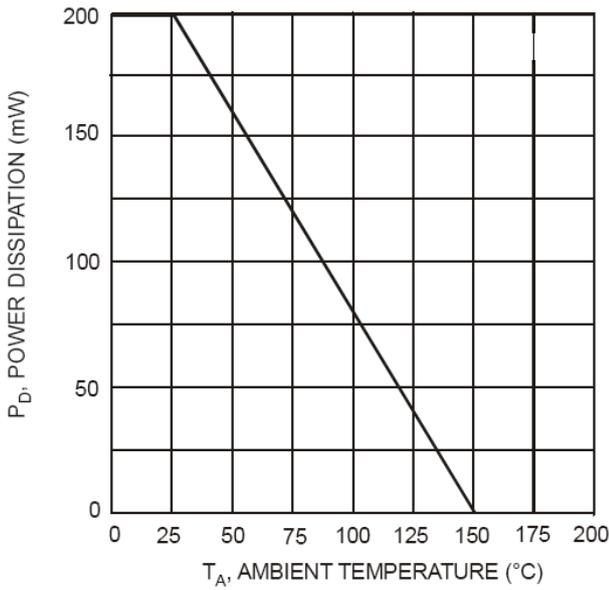


Fig.2 Input and Output Capacitance vs. Collector-Base Voltage (NPN-3904)

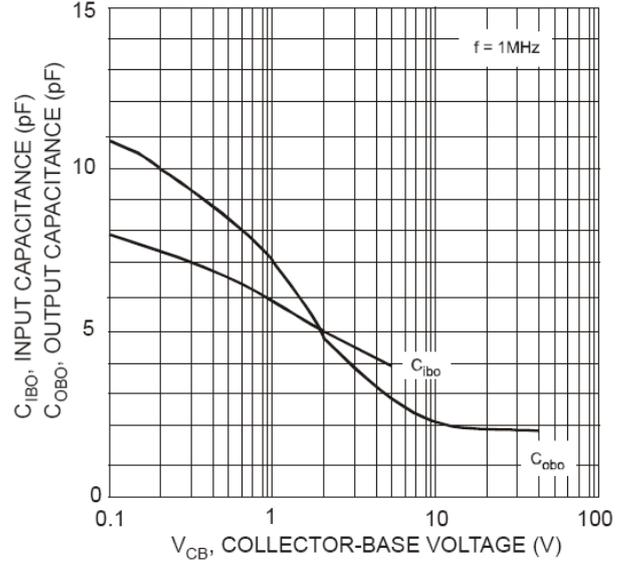


Fig.3 DC Current Gain vs. Collector Current (NPN-3904)

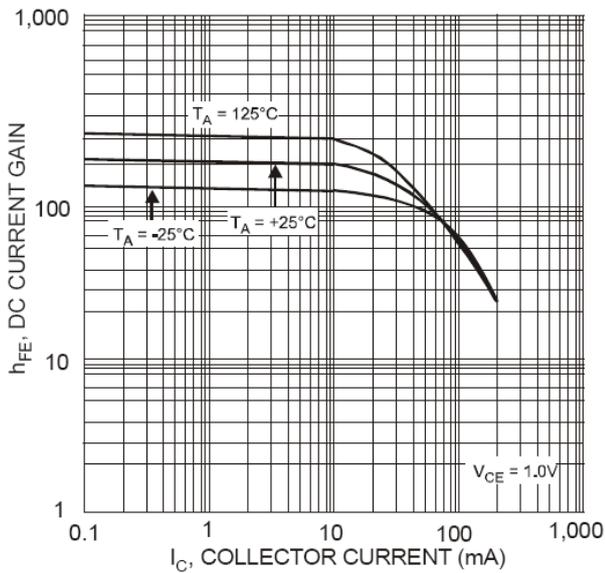


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current (NPN-3904)

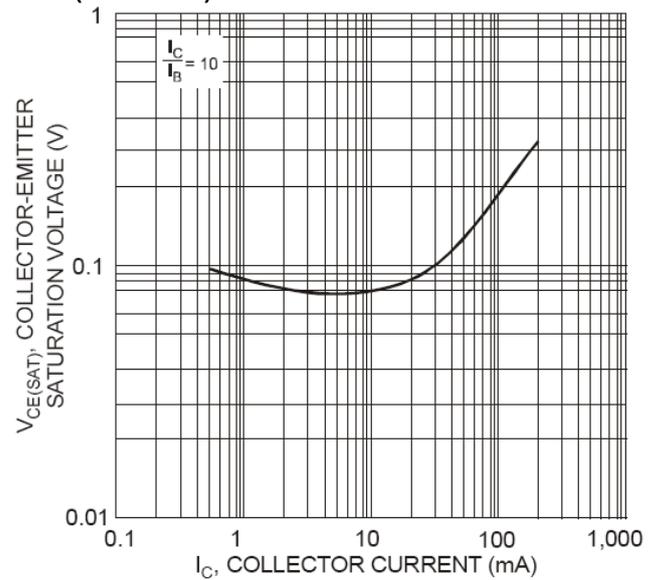


Fig.5 Base-Emitter Saturation Voltage vs. Collector Current (NPN-3904)

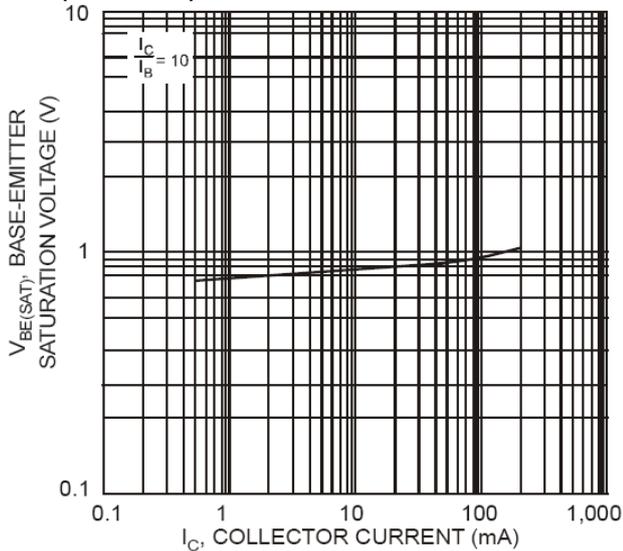


Fig.6 Input and Output Capacitance vs. Collector-Base Voltage (PNP-3906)

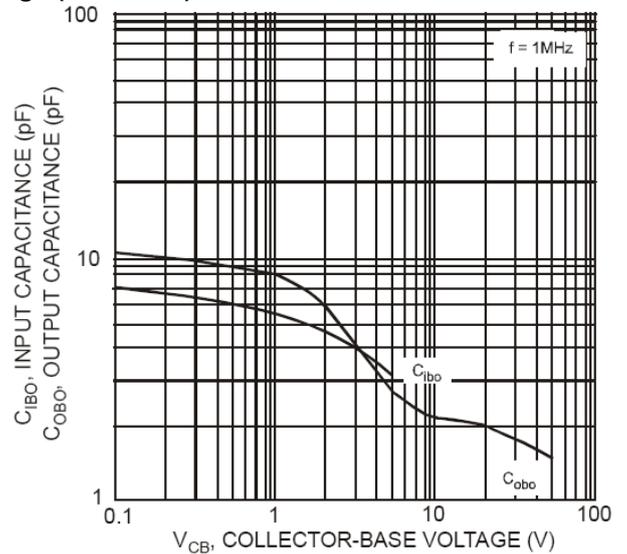


Fig.7 DC Current Gain vs. Collector Current (PNP-3906)

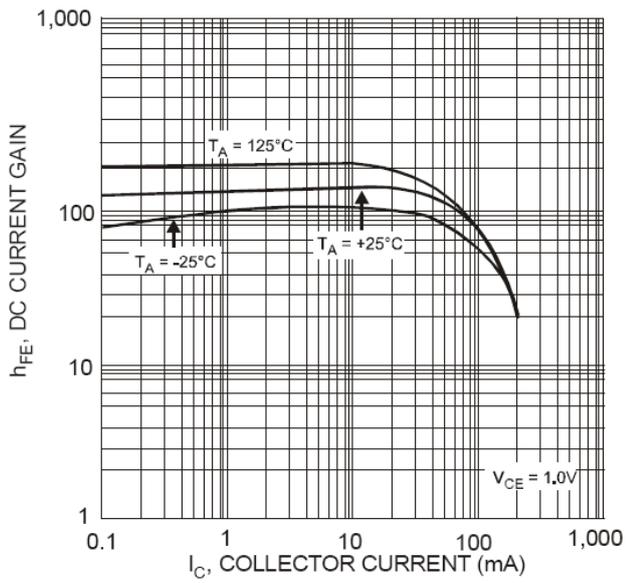


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (PNP-3906)

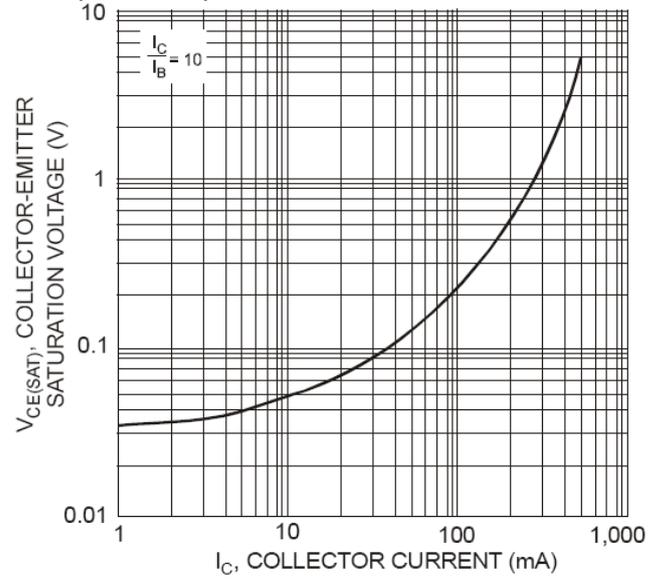
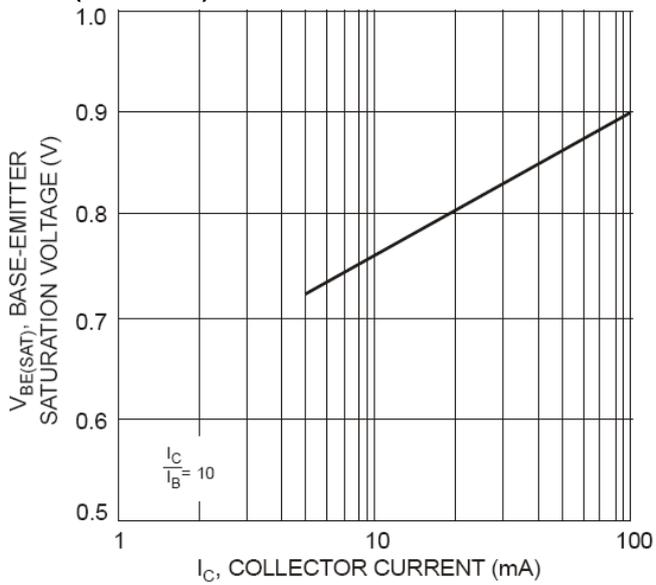


Fig.5 Base-Emitter Saturation Voltage vs. Collector Current (PNP-3906)



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