Micro Commercial Components

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MMDT3946

NPN/PNP Small Signal Surface Mount Transistors

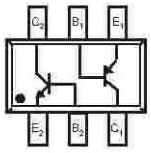
Features

- Lead Free Finish/RoHS Compliant ("P" Suffix designates RoHS Compliant. See ordering information)
- Complementary Pari: NPN(3904), PNP(3906)
- Ideal for Low Power Amplification and Switching
- Ultra-small Surface Mount Package
- Epitaxial Planar Die Construction
- Marking:K46
- Epoxy meets UL 94 V-0 flammability rating
- Moisure Sensitivity Level 1

Maximum Ratings @ 25°C Unless Otherwise Specified

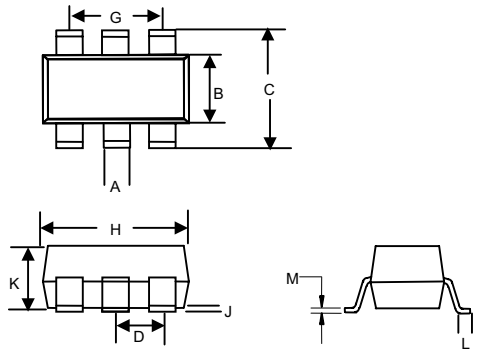
Symbol	Rating	Rating(NPN)	Unit
V_{CEO}	Collector-Emitter Voltage	40	V
V_{CBO}	Collector-Base Voltage	60	V
V_{EBO}	Emitter-Base Voltage	6	V
I_C	Collector Current-Continuous	0.2	A
P_C	Collector Dissipation	0.2	W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	625	℃/W
T_J	Operating Junction Temperature	-55 to +150	℃
T_{STG}	Storage Temperature	-55 to +150	℃

Symbol	Rating	Rating(PNP)	Unit
V_{CEO}	Collector-Emitter Voltage	-40	V
V_{CBO}	Collector-Base Voltage	-40	V
V_{EBO}	Emitter-Base Voltage	-5	V
I_C	Collector Current-Continuous	-0.2	A
P_C	Collector Dissipation	0.2	W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	625	℃/W
T_J	Operating Junction Temperature	-55 to +150	℃
T_{STG}	Storage Temperature	-55 to +150	℃



E_1, B_1, C_1 = PNP3906 Section
E_2, B_2, C_2 = NPN3904 Section

SOT-363



DIMENSIONS					
	INCHES		MM		
DIM	MIN	MAX	MIN	MAX	NOTE
A	.006	.014	0.15	0.35	
B	.045	.053	1.15	1.35	
C	.085	.096	2.15	2.45	
D	.026		0.65Nominal		
G	.047	.055	1.20	1.40	
H	.071	.087	1.80	2.20	
J	---	.004	---	0.10	
K	.035	.043	0.90	1.10	
L	.010	.018	0.26	0.46	
M	.003	.006	0.08	0.15	

NPN 3904 Electrical Characteristics @ 25°C Unless Otherwise Specified

Symbol	Parameter		Min	Typ	Max	Units
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage (I_C=1mAdc, I_B=0)		40	---	---	Vdc
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage (I_C=10uAdc, I_E=0)		60	---	---	Vdc
$V_{(BR)EBO}$	Collector-Emitter Breakdown Voltage (I_E=10uAdc, I_C=0)		5	---	---	Vdc
I_{CBO}	Collector Cutoff Current (V_{CB}=30Vdc,I_E=0)		---	---	50	nAdc
I_{CEO}	Collector Cutoff Current (V_{CE}=30Vdc,I_B=0)		---	---	500	nAdc
I_{EBO}	Emitter Cutoff Current (V_{EB}=5Vdc,I_C=0)		---	---	50	nAdc
h_{FE}	DC Current Gain (I_C=0.1mAdc, V_{CE}=1Vdc) (I_C=1mAdc, V_{CE}=1Vdc) (I_C=10mAdc, V_{CE}=1Vdc) (I_C=50mAdc, V_{CE}=1Vdc) (I_C=100mAdc, V_{CE}=1Vdc)		 40 70 100 60 30	 --- --- --- --- ---	 --- --- 300 --- ---	---
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage (I_C=10mAdc, I_B=1mAdc) (I_C=50mAdc, I_B=5mAdc)		 --- ---	 --- ---	 0.2 0.3	Vdc
$V_{BE(sat)}$	Base-Emitter Saturation Voltage (I_C=10mAdc, I_B=1mAdc) (I_C=50mAdc, I_B=5mAdc)		 0.65 ---	 --- ---	 0.85 0.95	Vdc
f_T	Current Gain-Bandwidth Product (V_{CE}=20Vdc, I_C=20mAdc, f=100MHz)		300	---	---	MHz
C_{ob}	Output Capacitance (V_{CB}=5Vdc, f=1.0MHz, I_E=0)		---	---	4	pF
NF	Noise Figure (V_{CE}=5V,I_C=0.1mA, f=1KHz, R_S=1kΩ)		---	---	5	dB
t_d	Delay Time	V_{CC}=3V, I_C=10mA, V_{BE}=0.5V, I_{B1}=1mA	---	---	35	ns
t_r	Rise Time		---	---	35	ns
t_S	Storage Time	V_{CC}=3V, I_C=10mA, I_{B1}=I_{B2}=1mA	---	---	200	ns
t_f	Fall Time		---	---	50	ns

PNP 3906 Electrical Characteristics @ 25°C Unless Otherwise Specified

Symbol	Parameter		Min	Typ	Max	Units
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage (I_C=-1mAdc, I_B=0)		-40	---	---	Vdc
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage (I_C=-10uAdc, I_E=0)		-40	---	---	Vdc
$V_{(BR)EBO}$	Collector-Emitter Breakdown Voltage (I_E=-10uAdc, I_C=0)		-5	---	---	Vdc
I_{CBO}	Collector Cutoff Current (V_{CB}=-30Vdc,I_E=0)		---	---	-50	nAdc
I_{EBO}	Emitter Cutoff Current (V_{EB}=-5Vdc,I_C=0)		---	---	-50	nAdc
h_{FE}	DC Current Gain (I_C=-0.1mAdc, V_{CE}=-1Vdc) (I_C=-1mAdc, V_{CE}=-1Vdc) (I_C=-10mAdc, V_{CE}=-1Vdc) (I_C=-50mAdc, V_{CE}=-1Vdc) (I_C=-100mAdc, V_{CE}=-1Vdc)		 40 70 100 60 30	 --- --- --- --- ---	 --- --- 300 --- ---	---
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage (I_C=-10mAdc, I_B=-1mAdc) (I_C=-50mAdc, I_B=-5mAdc)		 --- ---	 --- ---	 -0.25 -0.4	Vdc
$V_{BE(sat)}$	Base-Emitter Saturation Voltage (I_C=-10mAdc, I_B=-1mAdc) (I_C=-50mAdc, I_B=-5mAdc)		 -0.65 ---	 --- ---	 -0.85 -0.95	Vdc
f_T	Current Gain-Bandwidth Product (V_{CE}=-20Vdc, I_C=-10mAdc, f=100MHz)		250	---	---	MHz
C_{ob}	Output Capacitance (V_{CB}=-5Vdc, f=1.0MHz, I_E=0)		---	---	4.5	pF
NF	Noise Figure (V_{CE}=-5V,I_C=-0.1mA, f=1KHz, R_S=1kΩ)		---	---	4	dB
t_d	Delay Time	V_{CC}=-3V, I_C=-10mA, V_{BE}=-0.5V,	---	---	35	ns
t_r	Rise Time	I_{B1}=-I_{B2}=-1mA	---	---	35	ns
t_S	Storage Time	V_{CC}=-3V, I_C=-10mA, I_{B1}=-I_{B2}=-1mA	---	---	225	ns
t_f	Fall Time		---	---	75	ns

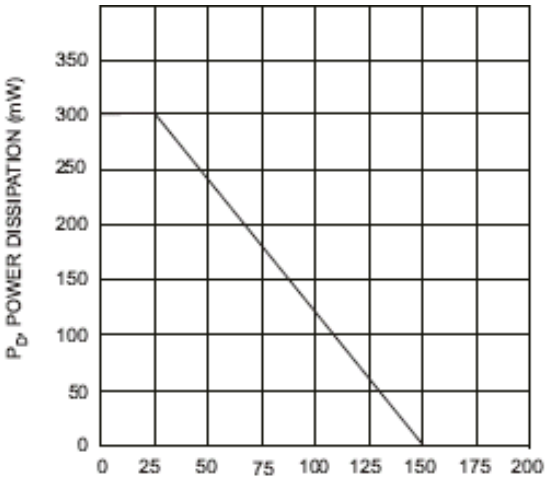


Fig. 1, Max Power Dissipation vs Ambient Temperature (Total Device)

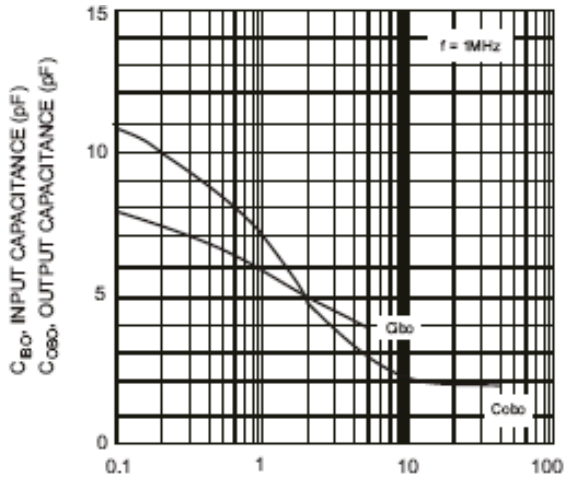


Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage (NPN-3904)

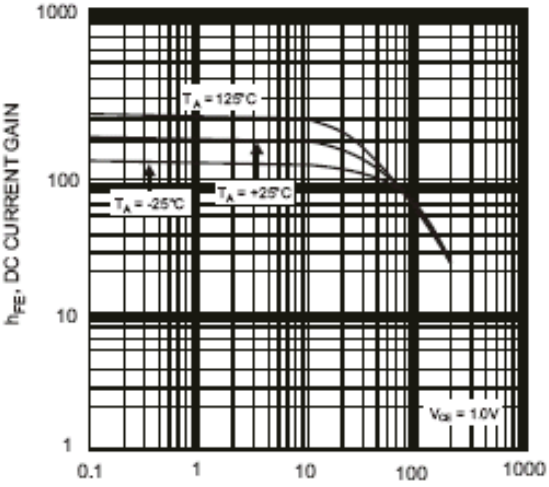


Fig. 3, Typical DC Current Gain vs Collector Current (NPN-3904)

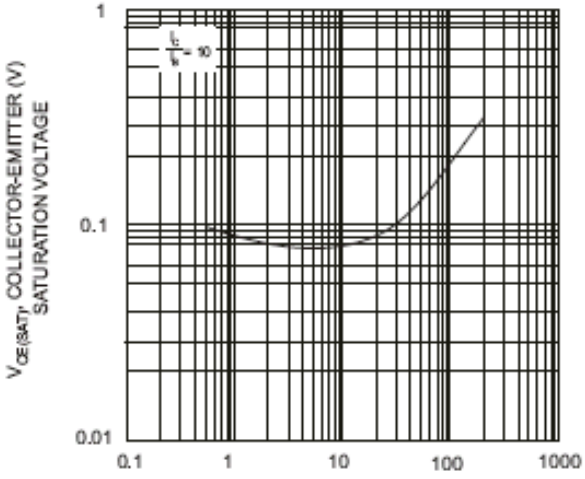


Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current (NPN-3904)

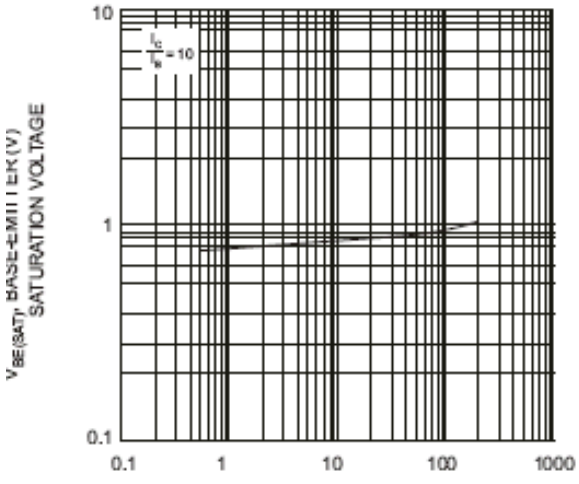


Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current (NPN-3904)

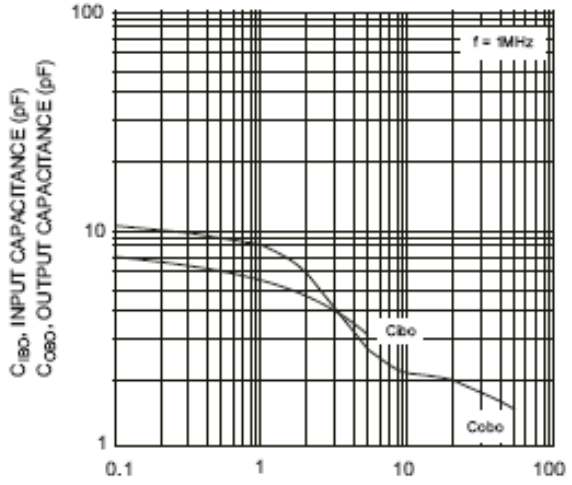


Fig. 6, Input and Output Capacitance vs. Collector-Base Voltage (PNP-3906)

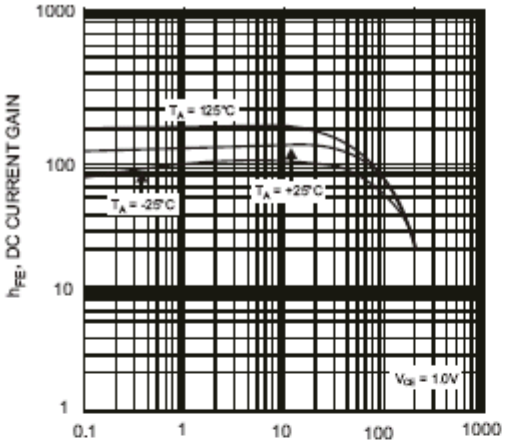


Fig. 7, Typical DC Current Gain vs Collector Current (PNP-3906)

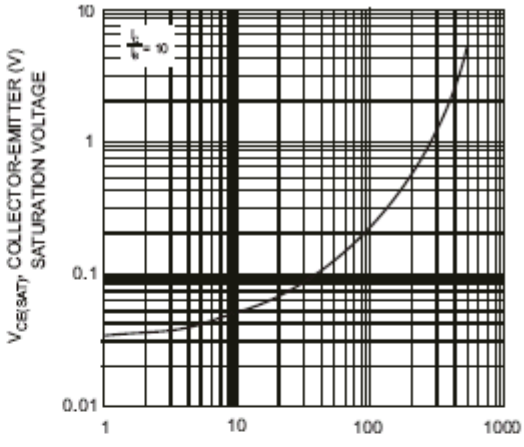


Fig. 8, Typical Collector-Emitter Saturation Voltage vs. Collector Current (PNP-3906)

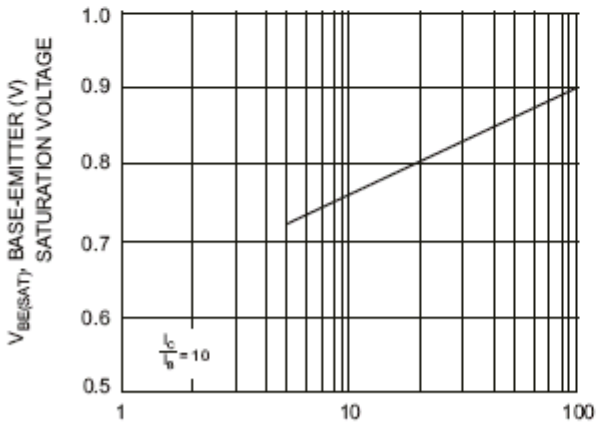


Fig. 9, Typical Base-Emitter Saturation Voltage vs. Collector Current (PNP-3906)

Ordering Information :

Device	Packing
Part Number-TP	Tape&Reel;3Kpcs/Reel

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