

SOT-363 Plastic-Encapsulate Transistors

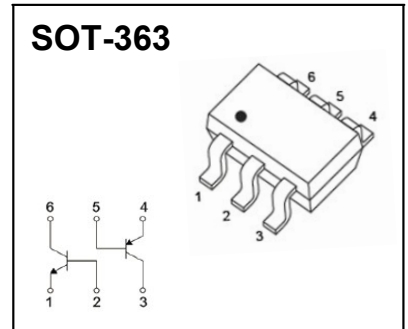
MMDT3946 DUAL TRANSISTOR(NPN+PNP)

FEATURES

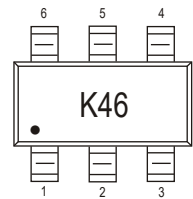
- Complementary Pair
- Epitaxial Planar Die Construction
- Ideal for low Power Amplification and Switching
- One 3904(NPN), one 3906(PNP)

MAXIMUM RATINGS of TR1(NPN)3904($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{CB0}	Collector-Base Voltage	60	V
V_{CE0}	Collector-Emitter Voltage	40	V
V_{EB0}	Emitter-Base Voltage	5	V
I_C	Collector Current	200	mA
P_C	Collector Power Dissipation	200	mW
$R_{\theta JA}$	Thermal Resistance From Junction To Ambient	625	$^{\circ}\text{C/W}$
T_j	Junction Temperature	150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature	-55~+150	$^{\circ}\text{C}$



MARKING: K46



ELECTRICAL CHARACTERISTICS of TR1(NPN)3904($T_a=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C=10\mu\text{A}$, $I_E=0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C=1\text{mA}$, $I_B=0$	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=10\mu\text{A}$, $I_C=0$	5			V
Collector cut-off current	I_{CEO}	$V_{CE}=30\text{V}$, $I_B=0$			500	nA
Collector cut-off current	I_{CBO}	$V_{CB}=30\text{V}$, $I_E=0$			50	nA
Emitter cut-off current	I_{EBO}	$V_{EB}=5\text{V}$, $I_C=0$			50	nA
DC current gain	$h_{FE(1)}$	$V_{CE}=1\text{V}$, $I_C=0.1\text{mA}$	40			
	$h_{FE(2)}$	$V_{CE}=1\text{V}$, $I_C=1\text{mA}$	70			
	$h_{FE(3)}$	$V_{CE}=1\text{V}$, $I_C=10\text{mA}$	100		300	
	$h_{FE(4)}$	$V_{CE}=1\text{V}$, $I_C=50\text{mA}$	60			
	$h_{FE(5)}$	$V_{CE}=1\text{V}$, $I_C=100\text{mA}$	30			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=10\text{mA}$, $I_B=1\text{mA}$			0.2	V
		$I_C=50\text{mA}$, $I_B=5\text{mA}$			0.3	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C=10\text{mA}$, $I_B=1\text{mA}$	0.65		0.85	V
		$I_C=50\text{mA}$, $I_B=5\text{mA}$			0.95	V
Transition frequency	f_T	$V_{CE}=20\text{V}$, $I_C=20\text{mA}$, $f=100\text{MHz}$	300			MHz
Collector output capacitance	C_{ob}	$V_{CB}=5\text{V}$, $I_E=0$, $f=1\text{MHz}$			4	pF
Noise figure	NF	$V_{CE}=5\text{V}$, $I_C=0.1\text{mA}$, $f=1\text{KHz}$, $R_g=1\text{K}\Omega$, $\Delta f=200\text{MHz}$			5	dB
Delay time	t_d	$V_{CC}=3\text{V}$, $V_{BE(off)}=0.5\text{V}$, $I_C=10\text{mA}$, $I_{B1}=1\text{mA}$			35	ns
Rise time	t_r	$V_{CC}=3\text{V}$, $V_{BE(off)}=0.5\text{V}$, $I_C=10\text{mA}$, $I_{B1}=1\text{mA}$			35	ns
Storage time	t_s	$V_{CC}=3\text{V}$, $I_C=10\text{mA}$, $I_{B1}=I_{B2}=1\text{mA}$			200	ns
Fall time	t_f	$V_{CC}=3\text{V}$, $I_C=10\text{mA}$, $I_{B1}=I_{B2}=1\text{mA}$			50	ns

Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2.0\%$

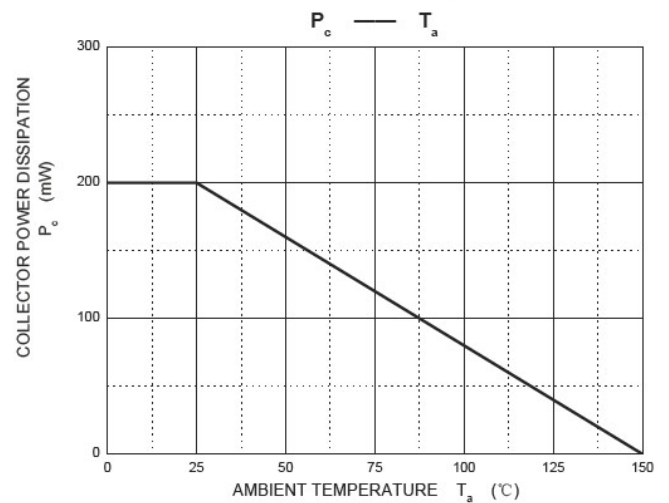
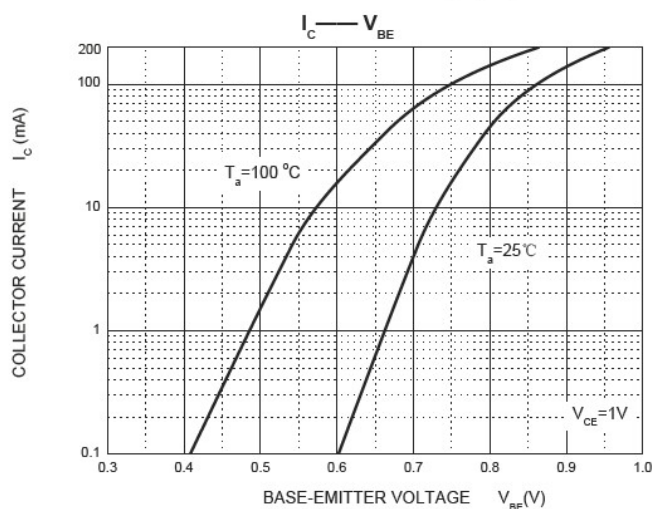
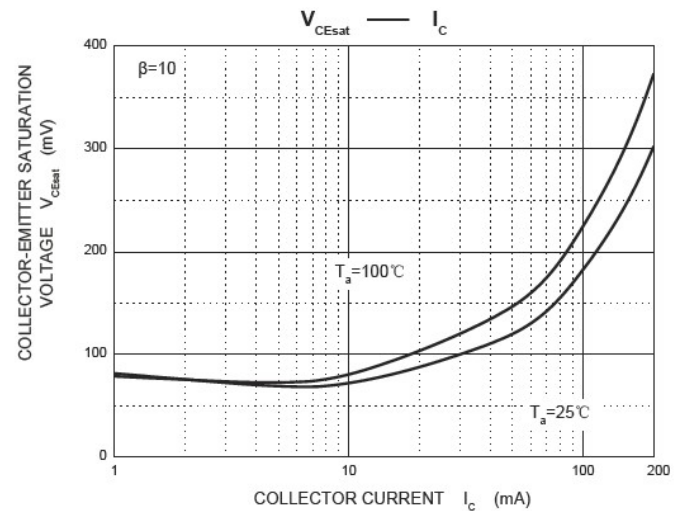
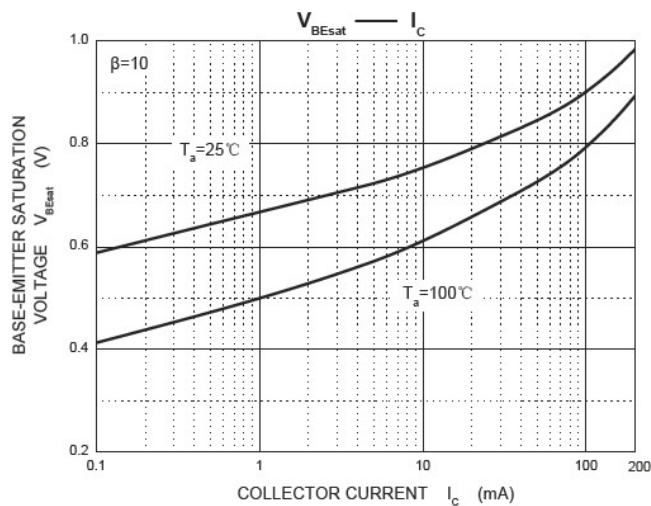
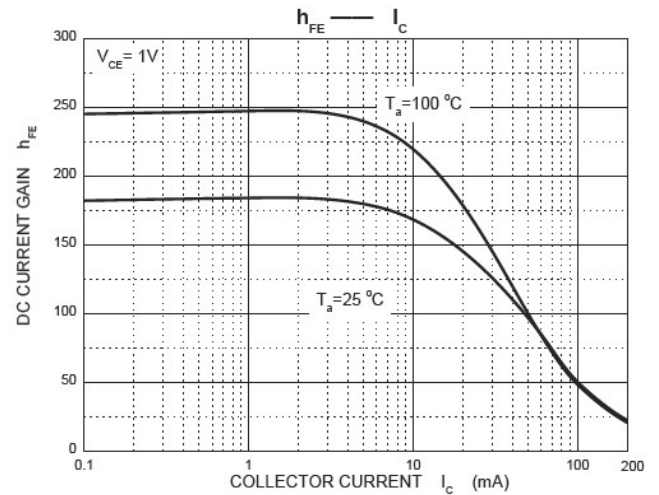
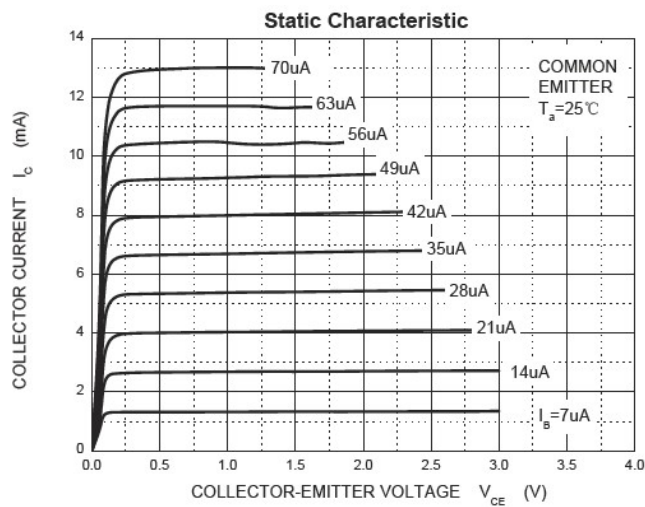
MAXIMUM RATINGS of TR2(NPN)3906(T_a=25°C unless otherwise noted)

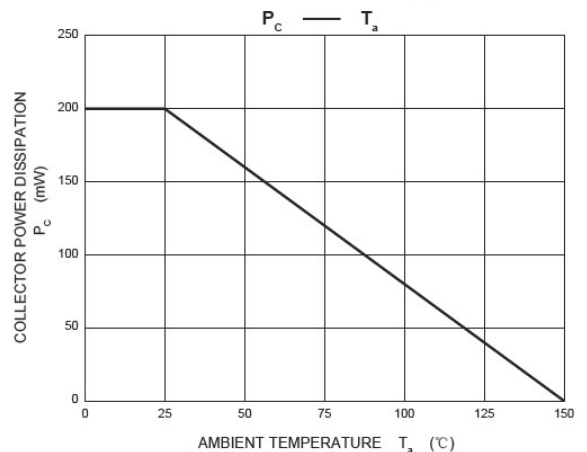
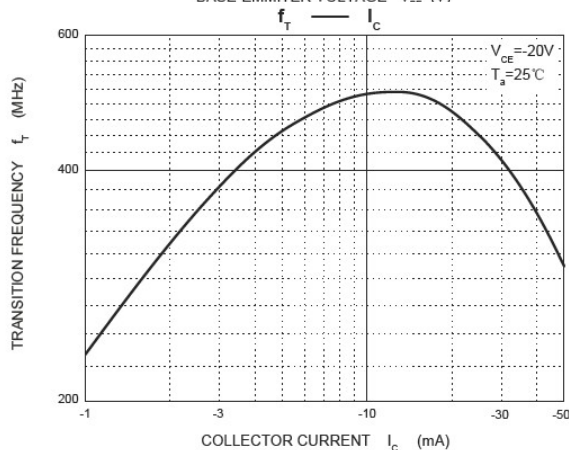
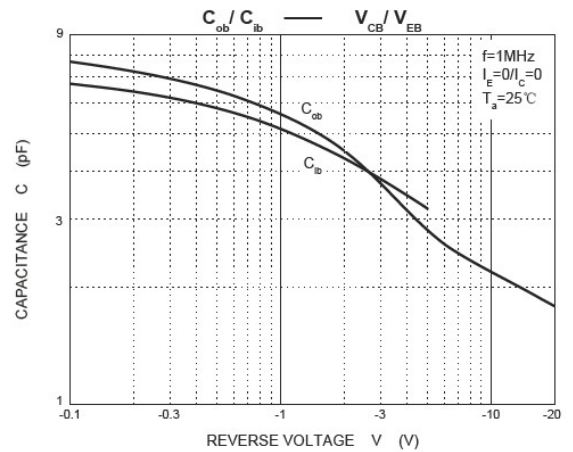
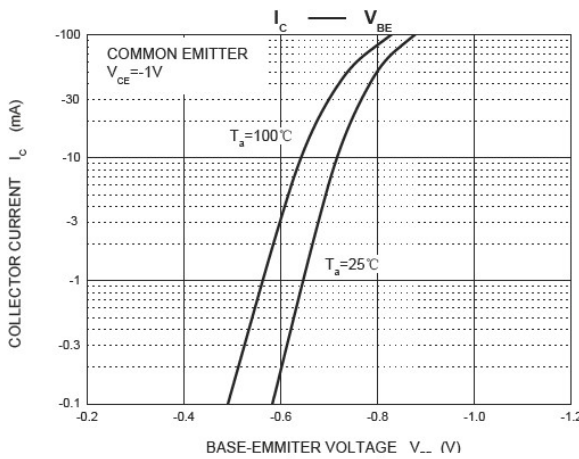
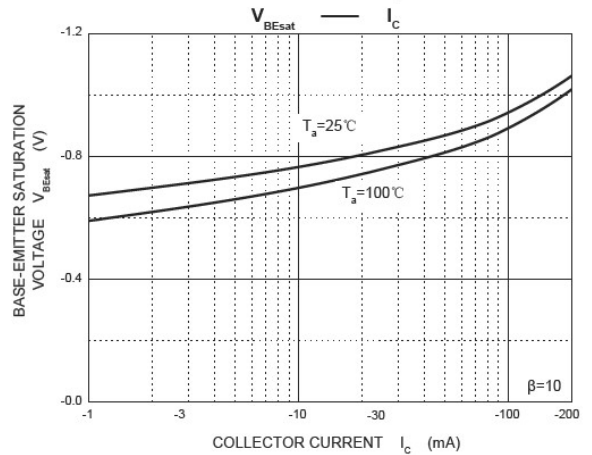
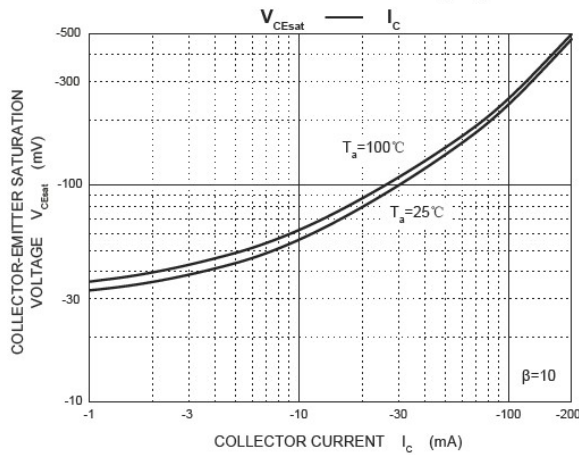
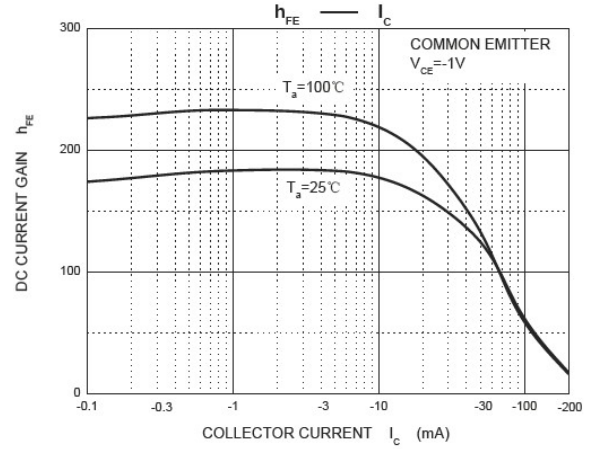
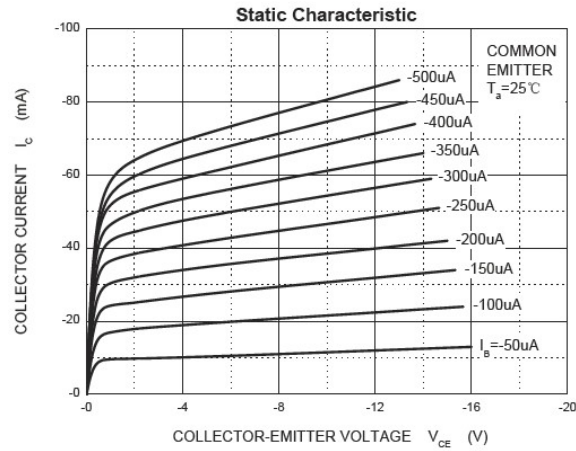
Symbol	Parameter	Value	Unit
V _{CBO}	Collector-Base Voltage	-40	V
V _{CEO}	Collector-Emitter Voltage	-40	V
V _{EBO}	Emitter-Base Voltage	-5	V
I _C	Collector Current	-200	mA
P _C	Collector Power Dissipation	200	mW
R _{ΘJA}	Thermal Resistance From Junction To Ambient	625	°C/W
T _j	Junction Temperature	150	°C
T _{stg}	Storage Temperature	-55~+150	°C

ELECTRICAL CHARACTERISTICS of TR2(NPN)3906 (T_a= 25°C unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	V _{(BR)CBO}	I _C =-10μA, I _E =0	-40			V
Collector-emitter breakdown voltage	V _{(BR)CEO}	I _C =-1mA, I _B =0	-40			V
Emitter-base breakdown voltage	V _{(BR)EBO}	I _E =-10μA, I _C =0	-5			V
Collector cut-off current	I _{CBO}	V _{CB} =-30V, I _E =0			-50	nA
Emitter cut-off current	I _{EBO}	V _{EB} =-5V, I _C =0			-50	nA
DC current gain	h _{FE(1)}	V _{CE} =-1V, I _C =-0.1mA	60			
	h _{FE(2)}	V _{CE} =-1V, I _C =-1mA	80			
	h _{FE(3)}	V _{CE} =-1V, I _C =-10mA	100		300	
	h _{FE(4)}	V _{CE} =-1V, I _C =-50mA	60			
	h _{FE(5)}	V _{CE} =-1V, I _C =-100mA	30			
Collector-emitter saturation voltage	V _{CE(sat)}	I _C =-10mA, I _B =-1mA			-0.25	V
		I _C =-50mA, I _B =-5mA			-0.40	V
Base-emitter saturation voltage	V _{BE(sat)}	I _C =-10mA, I _B =-1mA	-0.65		-0.85	V
		I _C =-50mA, I _B =-5mA			-0.95	V
Transition frequency	f _T	V _{CE} =-20V, I _C =-10mA, f=100MHz	250			MHz
Collector output capacitance	C _{ob}	V _{CB} =-5V, I _E =0, f=1MHz			4.5	pF
Noise figure	NF	V _{CE} =-5V, I _C =-0.1mA, f=1KHz, R _g =1KΩ, Δf=200MHz			4.0	dB
Delay time	t _d	V _{CC} =-3V, V _{BE(off)} =-0.5V I _C =10mA, I _{B1} =-1mA			35	ns
Rise time	t _r	V _{CC} =-3V, V _{BE(off)} =-0.5V I _C =10mA, I _{B1} =-1mA			35	ns
Storage time	t _s	V _{CC} =-3V, I _C =-10mA, I _{B1} = I _{B2} =-1mA			225	ns
Fall time	t _f	V _{CC} =-3V, I _C =-10mA, I _{B1} = I _{B2} =-1mA			75	ns

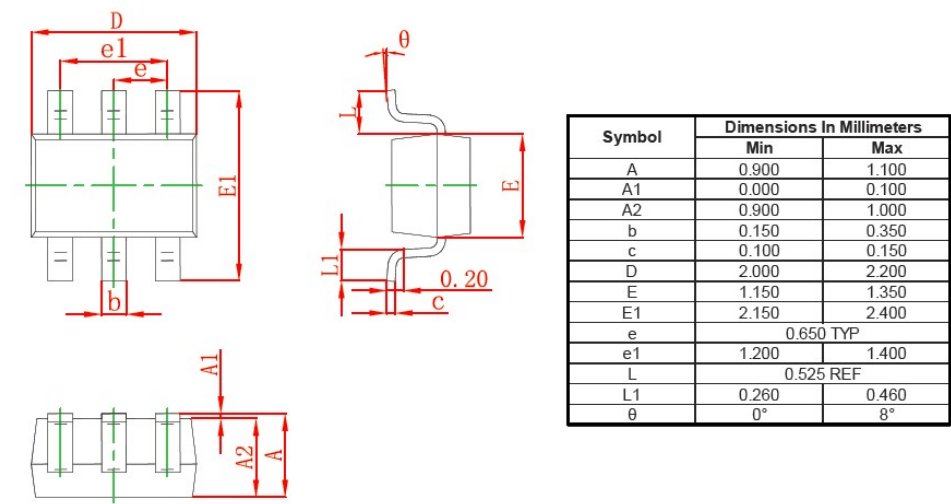
Pulse test: pulse width≤300us,duty cycles≤2.0%

Typical Characteristics(3904)


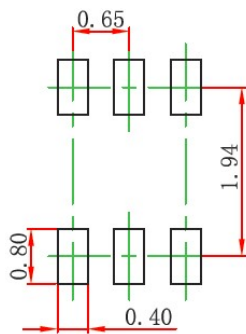
Typical Characteristics(3906)


Outlitne Drawing

SOT-363 Package Outline Dimensions



Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.