

# SOT-363 Plastic-Encapsulate Transistors

MMDT3946DW DUAL TRANSISTOR (NPN+PNP)

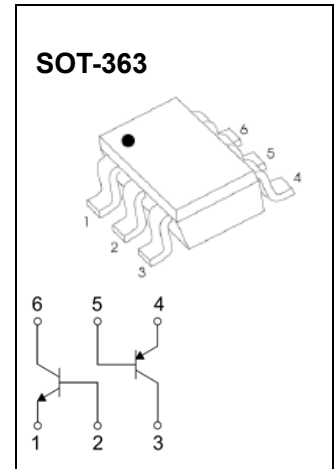
## FEATURES

- Complementary Pair
- One 3904-Type NPN  
One 3906-Type PNP
- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching

MAKING: K46

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

Symbol	Parameter	Value	Units
$V_{CBO}$	Collector-Base Voltage	60	V
$V_{CEO}$	Collector-Emitter Voltage	40	V
$V_{EBO}$	Emitter-Base Voltage	5	V
$I_C$	Collector Current -Continuous	0.2	A
$P_C$	Collector Power Dissipation	0.2	W
$T_J$	Junction Temperature	150	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature	-55-150	$^{\circ}\text{C}$



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

Parameter	Symbol	Test conditions	Min	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	$I_{CBO}$	$V_{CB} = 30\text{V}, I_E = 0$		0.05	$\mu\text{A}$
Collector cut-off current	$I_{CEO}$	$V_{CE} = 30\text{V}, I_B = 0$		0.5	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 5\text{V}, I_C = 0$		0.05	$\mu\text{A}$
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	$V_{CE(sat)1}$	$I_C = 10\text{mA}, I_B = 1\text{mA}$		0.2	V
	$V_{CE(sat)2}$	$I_C = 50\text{mA}, I_B = 5\text{mA}$		0.3	V
Base-emitter saturation voltage	$V_{BE(sat)1}$	$I_C = 10\text{mA}, I_B = 1\text{mA}$	0.65	0.85	V
	$V_{BE(sat)2}$	$I_C = 50\text{mA}, I_B = 5\text{mA}$		0.95	V
Transition frequency	$f_T$	$V_{CE} = 20\text{V}, I_C = 20\text{mA}, f = 100\text{MHz}$	300		MHz
Noise figure	NF	$V_{CE} = 5\text{V}, I_C = 0.1\text{mA}, f = 1\text{KHz}, R_g = 1\text{K}\Omega$		5	dB
Output capacitance	$C_{ob}$	$V_{CB} = 5\text{V}, I_E = 0, f = 1\text{MHz}$		4	pF
Delay time	$t_d$	$V_{CC} = 3\text{V}, V_{BE} = 0.5\text{V}$		35	nS
Rise time	$t_r$	$I_C = 10\text{mA}, I_{B1} = -I_{B2} = 1\text{mA}$		35	nS
Storage time	$t_s$	$V_{CC} = 3\text{V}, I_C = 10\text{mA}$		200	nS
Fall time	$t_f$	$I_{B1} = -I_{B2} = 1\text{mA}$		50	nS



**MAXIMUM RATINGS( $T_a=25^\circ\text{C}$  unless otherwise noted)**

Symbol	Parameter	Value	Units
$V_{CBO}$	Collector-Base Voltage	-40	V
$V_{CEO}$	Collector-Emitter Voltage	-40	V
$V_{EBO}$	Emitter-Base Voltage	-5	V
$I_C$	Collector Current -Continuous	-0.2	A
$P_C$	Collector Power Dissipation	0.2	W
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{stg}$	Storage Temperature	-55-150	$^\circ\text{C}$

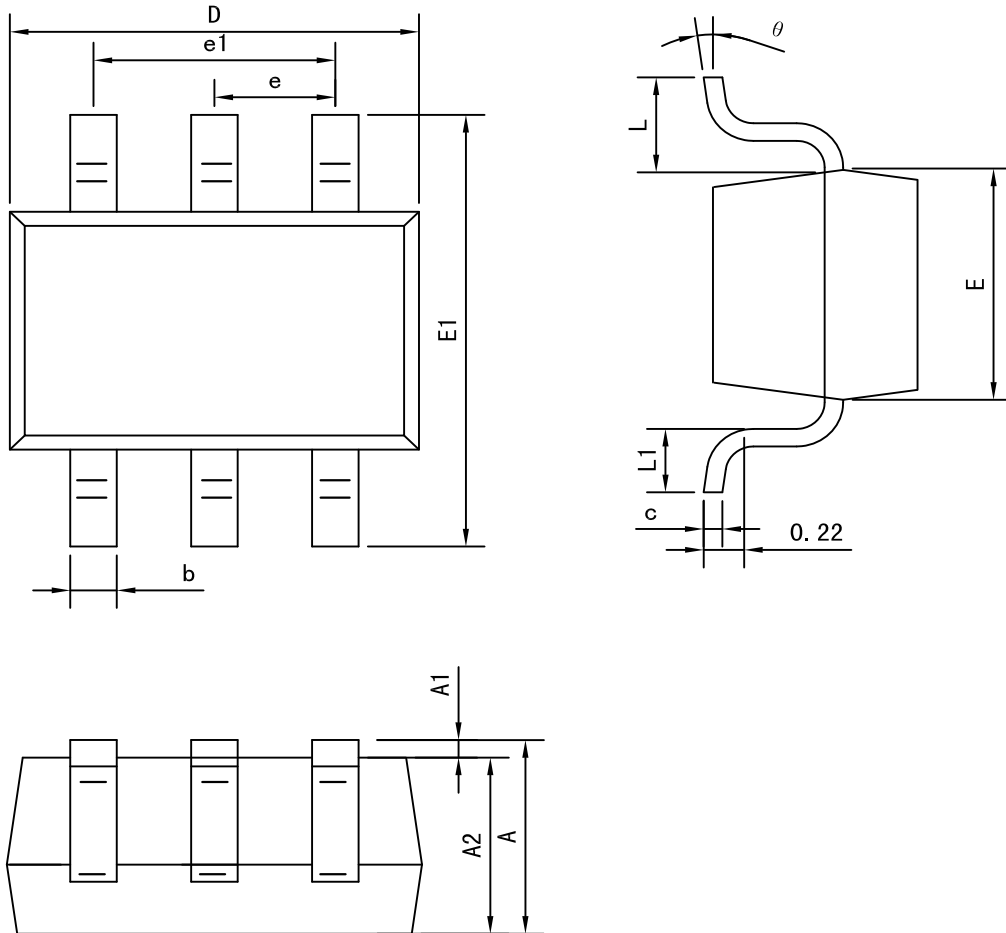
**PNP 3906 ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$  unless otherwise specified)**

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C=-10\mu\text{A}, I_E=0$	-40			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	$I_{CBO}$	$V_{CB}=-30\text{V}, I_E=0$			-0.05	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB}=-5\text{V}, I_C=0$			-0.05	$\mu\text{A}$
DC current gain	$h_{FE(1)}$	$V_{CE}=-1\text{V}, I_C=-0.1\text{mA}$	60			
	$h_{FE(2)}$	$V_{CE}=-1\text{V}, I_C=-1\text{mA}$	80			
	$h_{FE(3)}$	$V_{CE}=-1\text{V}, I_C=-10\text{mA}$	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	$V_{CE(sat)1}$	$I_C=-10\text{mA}, I_B=-1\text{mA}$			-0.25	V
	$V_{CE(sat)2}$	$I_C=-50\text{mA}, I_B=-5\text{mA}$			-0.4	V
Base-emitter saturation voltage	$V_{BE(sat)1}$	$I_C=-10\text{mA}, I_B=-1\text{mA}$	-0.65		-0.85	V
	$V_{BE(sat)2}$	$I_C=-50\text{mA}, I_B=-5\text{mA}$			-0.95	V
Transition frequency	$f_T$	$V_{CE}=-20\text{V}, I_C=-10\text{mA}, f=100\text{MHz}$	250			MHz
Collector output capacitance	$C_{ob}$	$V_{CB}=-5\text{V}, I_E=0, f=1\text{MHz}$			4.5	pF
Noise figure	NF	$V_{CE}=-5\text{V}, I_C=-0.1\text{mA}, f=1\text{KHz}, R_g=1\text{K}\Omega$			4	dB
Delay time	$t_d$	$V_{CC}=-3\text{V}, V_{BE}=-0.5\text{V}$			35	nS
Rise time	$t_r$	$I_C=-10\text{mA}, I_{B1}=-I_{B2}=-1\text{mA}$			35	nS
Storage time	$t_s$	$V_{CC}=-3\text{V}, I_C=-10\text{mA}$			225	nS
Fall time	$t_f$	$I_{B1}=-I_{B2}=-1\text{mA}$			75	nS



## Package outline dimensions

### SOT-363



Symbol	Dimension in Millimeters	
	Min	Max
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
c	0.080	0.150
D	2.000	2.200
E	1.150	1.350
E1	2.150	2.450
e	0.650 TYP	
e1	1.200	1.400
L	0.525 REF	
L1	0.260	0.460
θ	0°	8°

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Bipolar Transistors - BJT category](#):*

*Click to view products by [Hong Kong Chuangji manufacturer](#):*

Other Similar products are found below :

[619691C](#) [MCH4017-TL-H](#) [MMBT-2369-TR](#) [BC546/116](#) [BC557/116](#) [BSW67A](#) [NJVMJD148T4G](#) [NTE123AP-10](#) [NTE153MCP](#) [NTE16](#)  
[NTE195A](#) [NTE92](#) [2N4401-A](#) [2N6728](#) [2SA1419T-TD-H](#) [2SA2126-E](#) [2SB1204S-TL-E](#) [2SC2712S-GR,LF](#) [SP000011176](#) [2N2907A](#) [2N3904-](#)  
[NS](#) [2N5769](#) [2SC2412KT146S](#) [CPH6501-TL-E](#) [MCH4021-TL-E](#) [MJE340](#) [Jantx2N5416](#) [US6T6TR](#) [NJL0281DG](#) [732314D](#) [CPH3121-TL-E](#)  
[CPH6021-TL-H](#) [873787E](#) [IMZ2AT108](#) [MMST8098T146](#) [UMX21NTR](#) [MCH6102-TL-E](#) [NJL0302DG](#) [30A02MH-TL-E](#) [NTE13](#) [NTE26](#)  
[NTE282](#) [NTE323](#) [NTE350](#) [NTE81](#) [STX83003-AP](#) [JANTX2N2920L](#) [JANSR2N2222AUB](#) [CMLT3946EG TR](#) [2SA1371D-AE](#)