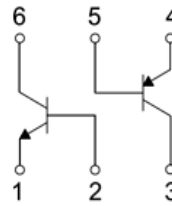


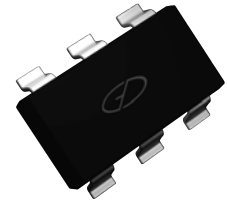
Complementary NPN+PNP Transistor

Features

- Complementary pair
- One 3904-Type NPN
- One 3906-Type PNP
- Epitaxial planar die construction
- Ideal for low power amplification and switching



Schematic Diagram



SOT-363

NPN Absolute Maximum Ratings

(T_A = 25 °C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	60	V
Collector-Emitter Voltage	V _{CE0}	40	V
Emitter-Base Voltage	V _{EB0}	5	V
Collector Current -Continuous	I _C	0.2	A
Collector Power Dissipation	P _C	0.2	W
Junction Temperature	T _J	-55 to +150	°C
Storage Temperature	T _{stg}	-55 to +150	°C

PNP Absolute Maximum Ratings

(T_A = 25 °C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	-40	V
Collector-Emitter Voltage	V _{CE0}	-40	V
Emitter-Base Voltage	V _{EB0}	-5	V
Collector Current -Continuous	I _C	-0.2	A
Collector Power Dissipation	P _C	0.2	W
Junction Temperature	T _J	-55 to +150	°C
Storage Temperature	T _{stg}	-55 to +150	°C

Complementary NPN+PNP Transistor

NPN Electrical Characteristics ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

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	μA
Collector Cut-off Current	I_{CEO}	$V_{CE} = 30\text{V}, I_B = 0$	-	0.5	μA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 5\text{V}, I_C = 0$	-	0.05	μA
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	
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	
Transition Frequency	f_r	$V_{CE} = 20\text{V}, I_C = 20\text{mA}, f = 100\text{MHz}$	300	-	MHz
Noise Figure	NF	$V_{CE} = 5\text{V}, I_C = 0.1\text{mA}, f = 1\text{KHz}, R_g = 1\text{KO}$	-	5	dB
Output Capacitance	C_{ob}	$V_{CB} = 5\text{V}, I_E = 0, f = 1\text{MHz}$	-	4	pF
Delay Time	t_d	$V_{CC} = 3\text{V}, V_{BE} = 0.5\text{V}$ $I_C = 10\text{mA}, I_{B1} = -I_{B2} = 1\text{mA}$	-	35	nS
Rise Time	t_r		-	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		-	50	nS

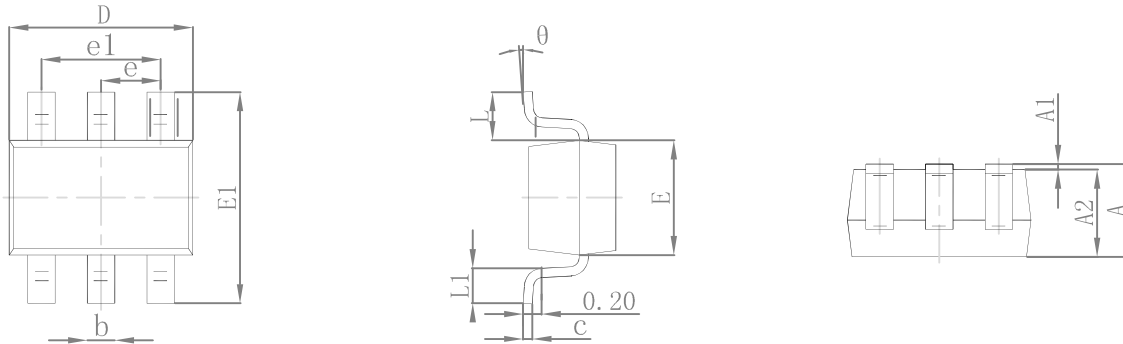
Complementary NPN+PNP Transistor

PNP Electrical Characteristics ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

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	μA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = -5\text{V}, I_C = 0$	-	-	-0.05	μA
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	
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	
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	$V_{CE} = -5\text{V}, I_C = -0.1\text{mA}, f = 1\text{KHz}, R_g = 1\text{KO}$	-	-	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	$V_{CC} = -3\text{V}, I_C = -10\text{mA}, I_{B1} = -I_{B2} = -1\text{mA}$	-	-	225	nS
Fall Time	t_f		-	-	75	nS

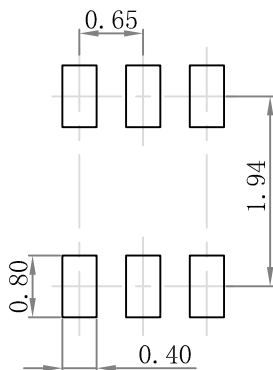
Complementary NPN+PNP Transistor

Package Outline Dimensions SOT-363



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	0.100	0.150	0.004	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.400	0.085	0.094
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°

Suggested Pad Layout



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

Marking and Ordering Information

Device	Package	Marking	Quantity	HSF Status
MMDT3946	SOT-363	K46	3000pcs / Reel	RoHS Compliant