

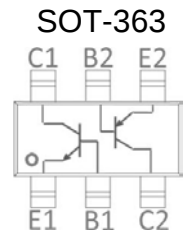
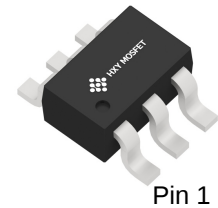


Features

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

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
MMDT4146-7-F	SOT-363	K46	3000



Maximum Ratings (Ta=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
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	200	mA
P_C	Collector Power Dissipation	200	mW
$R_{\theta JA}$	Thermal Resistance From Junction To Ambient	625	°C/W
T_J, T_{stg}	Operation Junction And Storage Temperature Range	-55~+150	°C

NPN Electrical Characteristics (Ta=25°C unless otherwise noted)

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



Maximum Ratings (Ta=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
$R_{\theta JA}$	Thermal Resistance From Junction To Ambient	625	°C/W
T_J, T_{stg}	Operation Junction And Storage Temperature Range	-55~+150	°C

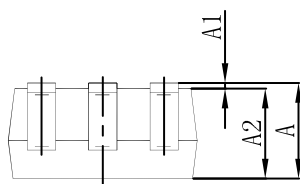
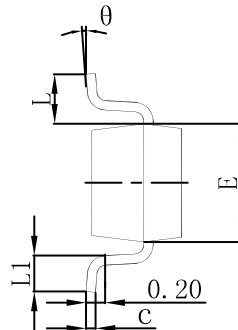
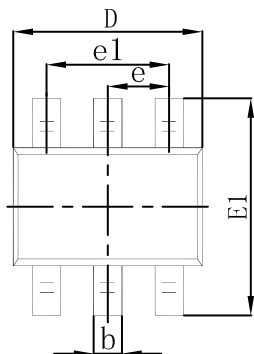
PNP Electrical Characteristics (Ta=25°C unless otherwise noted)

Symbol	Parameter	Test conditions	Min	Max	Unit
$V_{(BR)CBO}^*$	Collector-base breakdown voltage	$I_C=-10\mu A, I_E=0$	-40		V
$V_{(BR)CEO}^*$	Collector-emitter breakdown voltage	$I_C=-1mA, I_B=0$	-40		V
$V_{(BR)EBO}^*$	Emitter-base breakdown voltage	$I_E=-10\mu A, I_C=0$	-5		V
I_{CEX}^*	Collector cut-off current	$V_{CE}=-30V, V_{EB(off)}=-3V$		-50	nA
I_{CBO}	Collector cut-off current	$V_{CB}=-30V, I_E=0$		-50	nA
I_{EBO}	Base cut-off current	$V_{EB}=-5V, I_E=0$		-50	nA
$h_{FE(1)}^*$	DC current gain(1)	$V_{CE}=-1V, I_C=-100\mu A$	60		
$h_{FE(2)}^*$	DC current gain(2)	$V_{CE}=-1V, I_C=-1mA$	80		
$h_{FE(3)}^*$	DC current gain(3)	$V_{CE}=-1V, I_C=-10mA$	100	300	
$h_{FE(4)}^*$	DC current gain(4)	$V_{CE}=-1V, I_C=-50mA$	60		
$h_{FE(5)}^*$	DC current gain(5)	$V_{CE}=-1V, I_C=-100mA$	30		
$V_{CE(sat)}^*$	Collector-emitter saturation voltage	$I_C=-10mA, I_B=-1mA$		-0.25	V
		$I_C=-50mA, I_B=-5mA$		-0.4	V
$V_{BE(sat)}^*$	Base-emitter saturation voltage	$I_C=-10mA, I_B=-1mA$	-0.65	-0.85	V
		$I_C=-50mA, I_B=-5mA$		-0.95	V
f_T	Transition frequency	$V_{CE}=-20V, I_C=-10mA, f=100MHz$	250		MHz
C_{ob}	Collector output capacitance	$V_{CB}=-5V, I_E=0, f=1MHz$		4.5	pF
NF	Noise figure	$V_{CE}=-5V, I_C=-0.1mA, f=1kHz, R_g=1K\Omega$		4	dB
t_d	Delay time	$V_{CC}=-3V, V_{BE(off)}=-0.5V,$ $I_C=-10mA, I_{B1}=I_{B2}=-1mA$		35	ns
t_r	Rise time			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

*Pulse test: pulse width $\leq 300\mu s$, duty cycles $\leq 2.0\%$.

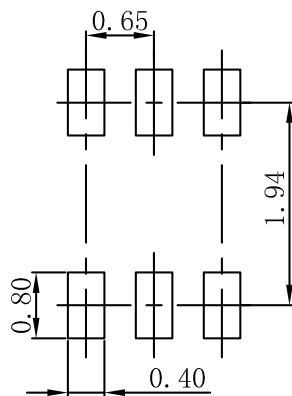


SOT-363 Package Outline Dimensions



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
theta	0°	8°	0°	8°

SOT-363 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.



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