

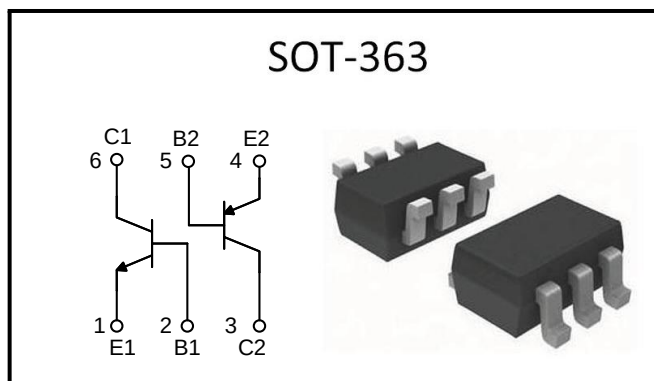
MMDT3946

Plastic-Encapsulate Transistor

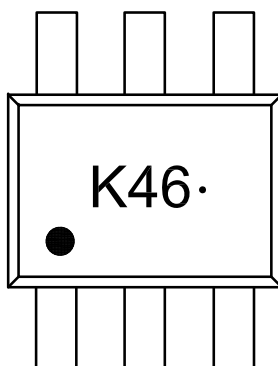
Features

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

Package



Marking



Ordering information

Order code	Package	Marking	Base qty	Delivery mode
MMDT3946	SOT-363	K46	3K	Tape and reel

Absolute Maximum Ratings @T_A=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	0.2	A
P _C	Collector Power Dissipation	200	mW
R _{θJA}	Thermal resistance From junction to ambient	625	°C/W
T _J , T _{stg}	Operation Junction And Storage Temperature Range	-55 to + 150	°C



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Electrical Characteristics (T_A=+25°C, unless otherwise specified)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V _{(BR)CBO}	Collector-base breakdown voltage	I _C =10μA, I _E =0	60	—	—	V
V _{(BR)CEO}	Collector-emitter breakdown voltage	I _C =1mA, I _B =0	40	—	—	
V _{(BR)EBO}	Emitter-base breakdown voltage	I _E =10μA, I _C =0	5	—	—	
I _{CEO}	Collector cut-off current	V _{CE} =30V, I _B =0	—	—	0.05	uA
I _{CBO}	Collector cut-off current	V _{CB} =30V, I _E =0	—	—	0.05	
I _{EBO}	Emitter cut-off current	V _{EB} =5V, I _C =0	—	—	0.05	
h _{FE(1)}	DC current gain	V _{CE} =1V, I _C =100μA	40	—	—	
h _{FE(2)}	DC current gain	V _{CE} =1V, I _C =1mA	70	—	—	
h _{FE(3)}	DC current gain	V _{CE} =1V, I _C =10mA	100	—	300	
h _{FE(4)}	DC current gain	V _{CE} =1V, I _C =50mA	60	—	—	
h _{FE(5)}	DC current gain	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 _{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	
f _T	Transition frequency	V _{CE} =20V, I _C =10mA, f=100MHZ	300	—	—	MHZ
C _{ob}	Collector output capacitance	V _{CB} =5V, I _E =0V, f=1MHZ	—	—	4	PF
NF	Noise figure	V _{CE} =5V, I _C =0.1mA, f=1kHz, R _g =1KΩ	—	—	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	
t _s	Storage time	V _{CC} =3V, I _C =10mA, I _{B1} =I _{B2} =1mA	—	—	225	ns
t _f	Fall time		—	—	75	

Pulse test: pulse width ≤300μs, duty cycle ≤2.0%.



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Absolute Maximum Ratings @ $T_A=25^{\circ}\text{C}$ 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	-0.2	A
P_C	Collector Power Dissipation	200	mW
$R_{\theta JA}$	Thermal Resistance From Junction To Ambient	625	$^{\circ}\text{C/W}$
T_J, T_{stg}	Operation Junction And Storage Temperature Range	-55 to + 150	$^{\circ}\text{C}$

Electrical Characteristics ($T_A=+25^{\circ}\text{C}$, unless otherwise specified)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_{(BR)CBO}$	Collector-base breakdown voltage	$I_C=-10\mu\text{A}, I_E=0$	-40	—	—	V
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_C=-1\text{mA}, I_B=0$	-40	—	—	
$V_{(BR)EBO}$	Emitter-base breakdown voltage	$I_E=-10\mu\text{A}, I_C=0$	-5	—	—	
I_{CBO}	Collector cut-off current	$V_{CB}=-30\text{V}, I_E=0$	—	—	-0.05	μA
I_{CEX}	Collector cut-off current	$V_{CE}=-30\text{V}, V_{EB}=-3\text{V}$	—	—	-0.05	
I_{EBO}	Emitter cut-off current	$V_{EB}=-5\text{V}, I_C=0$	—	—	-0.05	
$h_{FE(1)}$	DC current gain	$V_{CE}=-1\text{V}, I_C=-0.1\text{mA}$	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	—	—	
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_C=-10\text{mA}, I_B=-1\text{mA}$	—	—	-0.25	V
		$I_C=-50\text{mA}, I_B=-5\text{mA}$	—	—	-0.40	
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=-10\text{mA}, I_B=-1\text{mA}$	-0.65	—	-0.85	V
		$I_C=-50\text{mA}, I_B=-5\text{mA}$	—	—	-0.95	
f_T	Transition frequency	$V_{CE}=-20\text{V}, I_C=-10\text{mA}, f=100\text{MHz}$	250	—	—	MHZ
C_{ob}	Collector output capacitance	$V_{CB}=-5\text{V}, I_E=0\text{V}, f=1\text{MHz}$	—	—	4.5	PF
NF	Noise figure	$V_{CE}=-5\text{V}, I_C=-0.1\text{mA}, f=1\text{kHz}, R_g=1\text{K}\Omega$	—	—	4	dB
t_d	Delay time	$V_{CC}=-3\text{V}, V_{BE(off)}=-0.5\text{V}, I_C=-10\text{mA}, I_{B1}=I_{B2}=-1\text{mA}$	—	—	35	nS
t_r	Rise time		—	—	35	
t_s	Storage time	$V_{CC}=-3\text{V}, I_C=-10\text{mA}, I_{B1}=I_{B2}=-15\text{mA}$	—	—	225	
t_f	Fall time		—	—	75	

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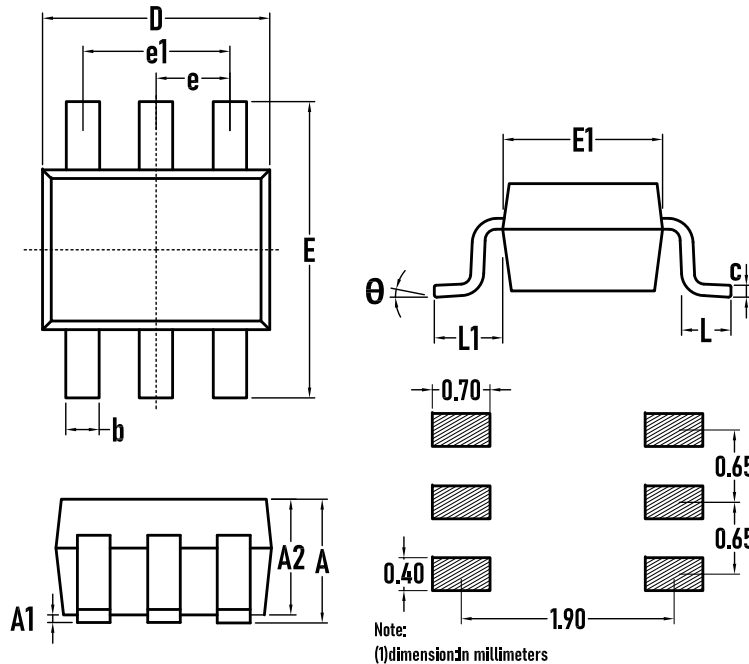
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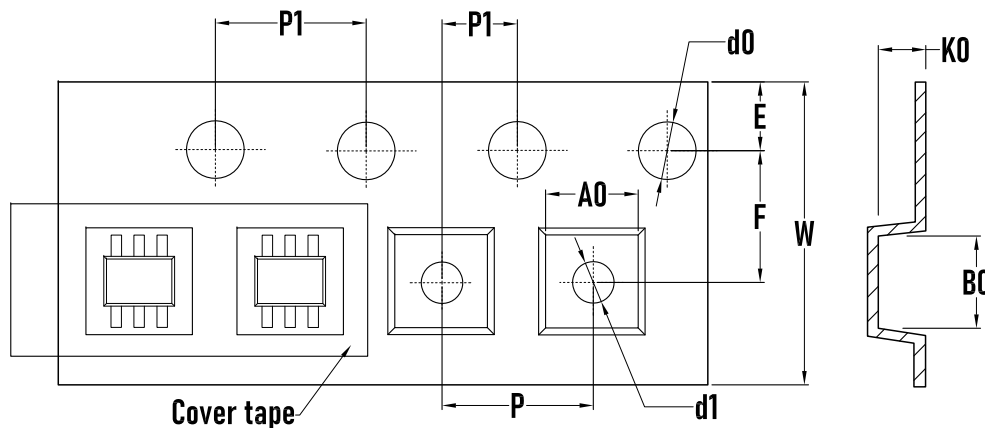
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Outline Drawing - SOT-363



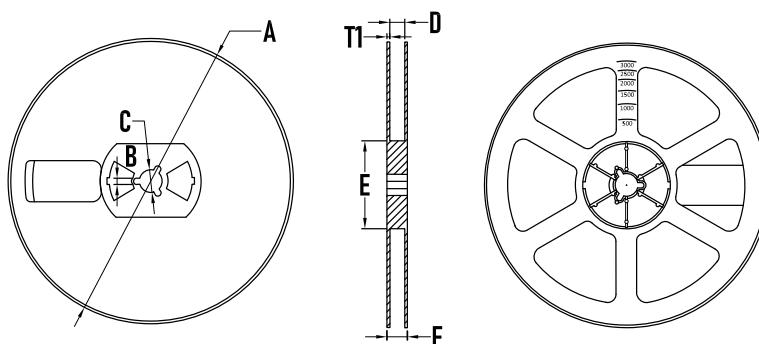
SYMBOL	MILLIMETER		
	MIN	TYP	MAX
A	0.90	1.00	1.10
A1	0.00	0.05	0.10
A2	0.90	0.95	1.00
b	0.15	0.25	0.35
C	0.08	0.12	0.15
D	2.00	2.10	2.20
E	2.15	2.30	2.45
E1	1.15	1.25	1.35
e	0.65(TYP)		
e1	1.20	1.30	1.40
L	0.26	0.36	0.46
L1	0.525(REF)		
θ	0°	4°	8°

Packaging Tape - SOT-363



SYMBOL	MILLIMETER
A0	2.25±0.1
B0	2.55±0.1
E	1.75±0.1
F	3.50±0.1
K0	1.20±0.1
P	4.00±0.1
P0	4.00±0.1
P1	2.00±0.1
W	8.00±0.2

Packaging Reel



SYMBOL	MILLIMETER
A	177.8±0.2
B	2.7±0.2
C	13.5±0.2
D	9.6±0.3
E	54.5±0.2
F	12.3±0.3
T1	1.0±0.2
Quantity	3000PCS

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