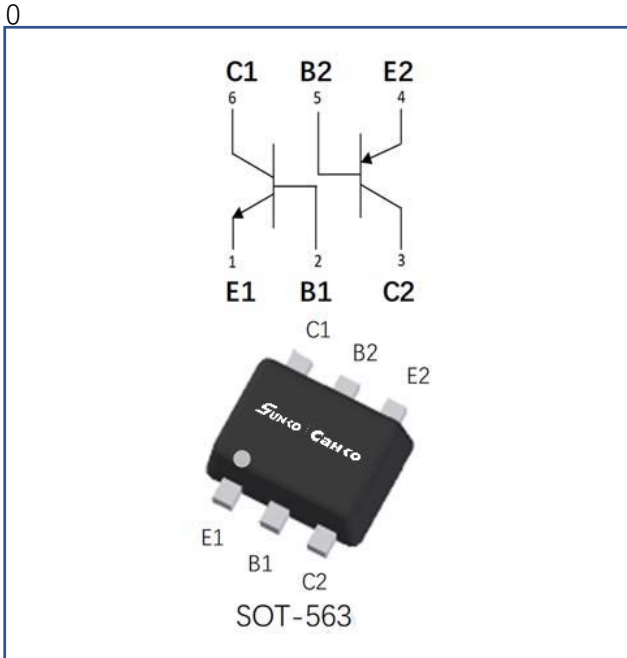


MMDT3904V

Dual NPN Small Signal Transistor



Features

- Moisture sensitivity level 1
- Halogen free and
- Surface mount package ideally suited for automatic Insertion

Application

- Signal amplification
- Switching circuit

Mechanical data

- **Package:** SOT-563
- **Terminals:** Tin plated leads, solderable per J-STD-002 and JESD22-B102

■ Maximum Ratings (Ta=25°C Unless otherwise specified)

Item	Symbol	Unit	Conditions	Value
Device marking code				KAP
Collector-base voltage	V_{CBO}	V	$I_C=10\mu A, I_E=0$	60
Collector-emitter voltage	V_{CEO}	V	$I_C=1mA, I_B=0$	40
Emitter-base voltage	V_{EBO}	V	$I_E=10\mu A, I_C=0$	6
Collector current	I_C	mA		200
Power dissipation	P_D	mW		200
Junction temperature	T_J	°C		-55 to +150
Storage temperature	T_{STG}	°C		-55 to +150

MMDT3904V

■ **Electrical Characteristics** ($T_a=25^\circ\text{C}$ Unless otherwise specified)

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	$V_{(BR)CBO}$	V	$I_C=10\mu\text{A}, I_E=0$	60		
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	V	$I_C=1\text{mA}, I_B=0$	40		
Emitter-base breakdown voltage	$V_{(BR)EBO}$	V	$I_E=10\mu\text{A}, I_C=0$	6		
Base cutoff current	I_{BL}	nA	$V_{CE}=30\text{V}, V_{EB(OFF)}=3\text{V}$			50
Collector-emitter cut-off current	I_{CEX}	nA	$V_{CE}=30\text{V}, V_{EB(OFF)}=3\text{V}$			50
DC current gain	h_{FE1}		$V_{CE}=1\text{V}, I_C=0.1\text{mA}$	40		
	h_{FE2}		$V_{CE}=1\text{V}, I_C=1\text{mA}$	70		
	h_{FE3}		$V_{CE}=1\text{V}, I_C=10\text{mA}$	100		300
	h_{FE4}		$V_{CE}=1\text{V}, I_C=50\text{mA}$	60		
	h_{FE5}		$V_{CE}=1\text{V}, I_C=100\text{mA}$	30		
Collector-emitter saturation voltage	$V_{CE(sat)1}$	V	$I_C=10\text{mA}, I_B=1\text{mA}$			0.2
	$V_{CE(sat)2}$	V	$I_C=50\text{mA}, I_B=5\text{mA}$			0.3
Base-emitter saturation voltage	$V_{BE(sat)1}$	V	$I_C=10\text{mA}, I_B=1\text{mA}$	0.65		0.85
	$V_{BE(sat)2}$	V	$I_C=50\text{mA}, I_B=5\text{mA}$			0.95
Collector-base Output Capacitance	C_{ob}	pF	$V_{CB}=5.0\text{V}, f=1.0\text{MHz}, I_E=0$			4
Transition frequency	f_T	MHz	$V_{CE}=20\text{V}, I_C=10\text{mA}, f=100\text{MHz}$	300		
Noise figure	N_F	dB	$V_{CE}=5\text{V}, I_C=0.1\text{mA},$ $f=1\text{kHz}, R_g=1\text{K}\Omega$			5
Delay time	t_d	ns	$V_{CC}=3\text{V}, I_C=10\text{mA},$ $V_{BE}=0.5\text{V}, I_{B1}=1\text{mA}$			35
Rise time	t_r	ns				35
Storage time	t_s	ns	$V_{CC}=3\text{V}, I_C=10\text{mA},$ $I_{B1}=-I_{B2}=1\text{mA}$			200
Fall time	t_f	ns				50

MMDT3904V

■ Thermal Characteristics

Parameter	Symbol	Unit	Value
Thermal resistance, junction-to-ambient	$R_{\theta J-A}^{(1)}$	$^{\circ}C/W$	625
Thermal resistance, junction-to-case	$R_{\theta J-C}^{(1)}$	$^{\circ}C/W$	500

Note:

(1) Thermal resistance from junction to ambient and from junction to lead mounted on P.C.B. with 25.4mm*25.4mm copper pad areas

■ Characteristics

Fig 1: Static Characteristics

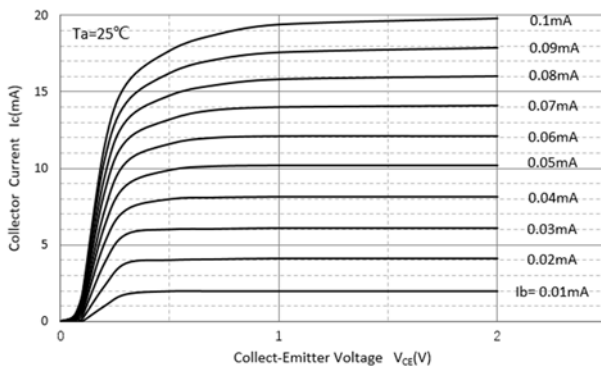


Fig 2: DC Current Gain

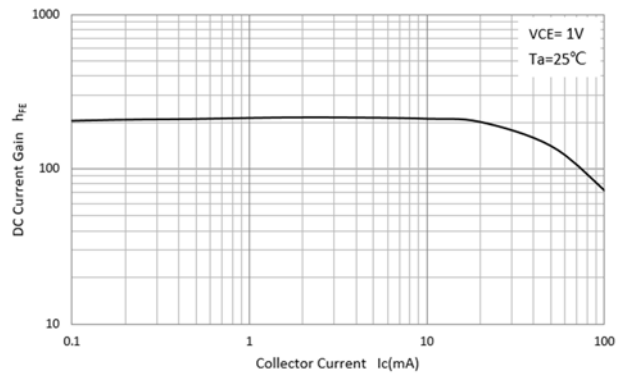


Fig 3: Collector-Emmitter Saturation Voltage

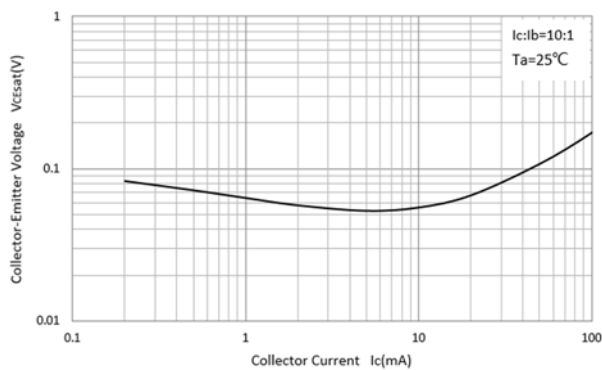
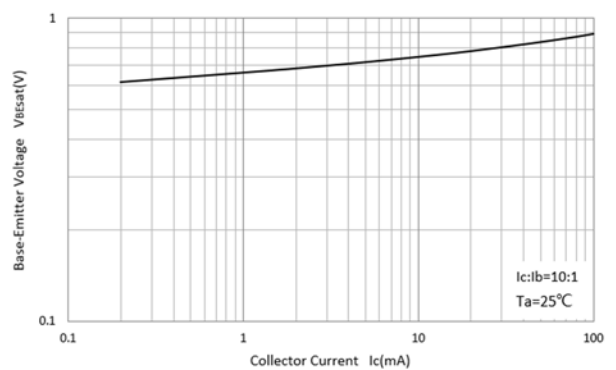


Fig 4: Base-Emmitter Saturation Voltage



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Fig 5: Base-Emitter Voltage

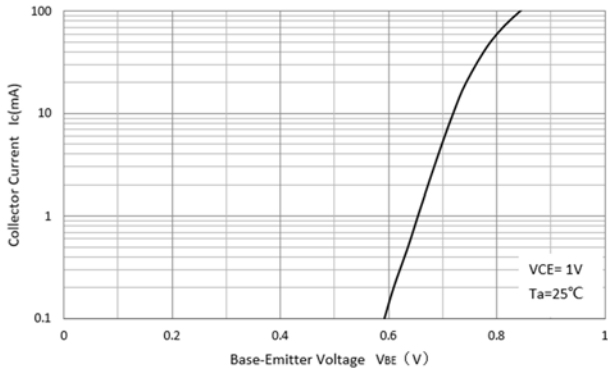


Fig 6: Cob/Cib- V_{CB}/V_{EB}

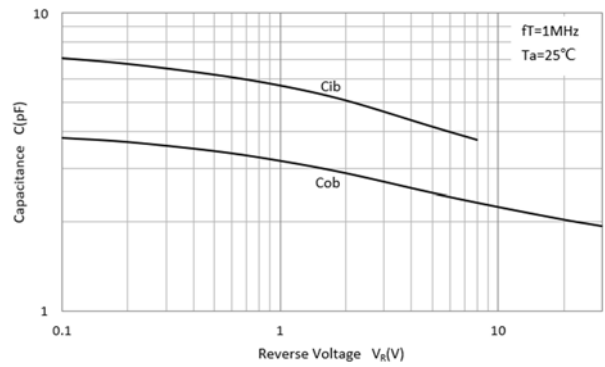
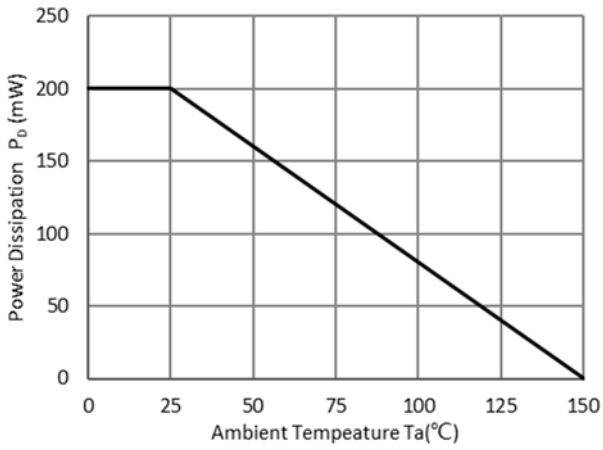


Fig 7: P_D - T_a Curve

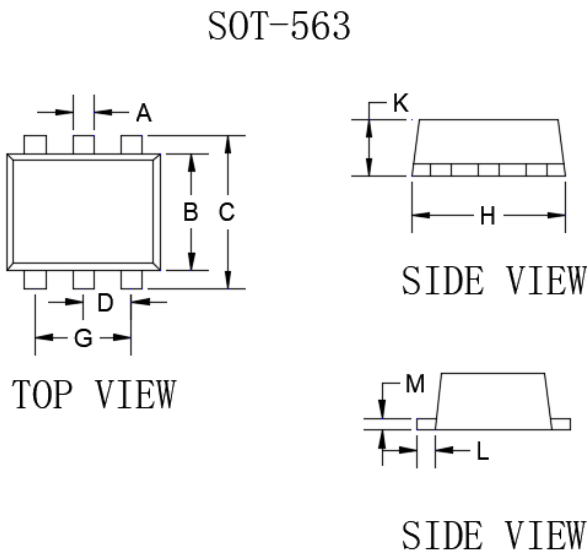


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■ Ordering Information

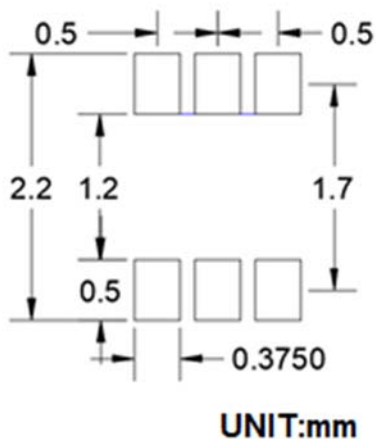
Preferred P/N	Packing code	Unit weight(g)	Minimum package(pcs)	Inner box quantity(pcs)	Outer carton quantity(pcs)	Delivery mode
MMDT3904V	F2	Approximate 0.0035	3000	30000	120000	7" reel

■ Outline Dimensions



DIM	DIMENSIONS			
	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.006	0.011	0.150	0.300
B	0.043	0.051	1.100	1.300
C	0.059	0.067	1.500	1.700
D	0.016	0.024	0.400	0.600
G	0.035	0.043	0.900	1.100
H	0.059	0.067	1.500	1.700
K	0.021	0.026	0.550	0.650
L	0.004	0.011	0.100	0.300
M	0.004	0.007	0.100	0.180

■ Suggested Pad Layout



MMDT3904V

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