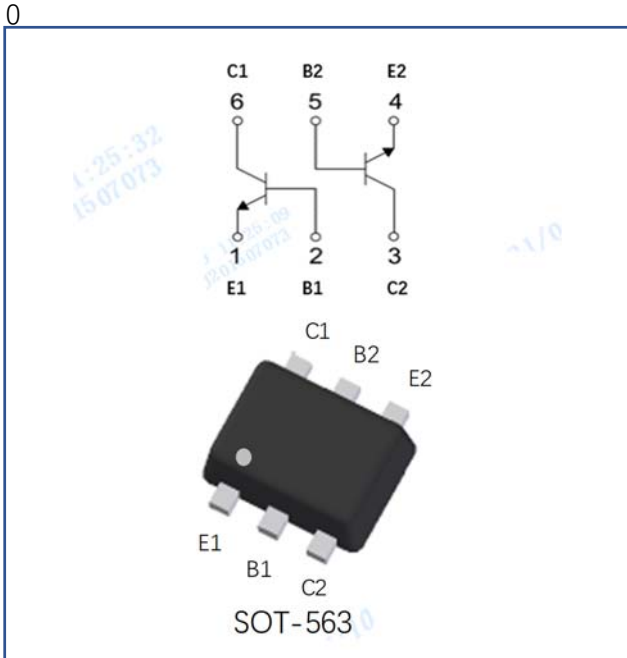


## Dual NPN Small Signal Transistor



### Features

- Moisture sensitivity level 1
- Halogen free and RoHS compliant
- 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

RoHS  
COMPLIANT

## ■ Electrical Characteristics (T<sub>a</sub>=25°C Unless otherwise specified)

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	V <sub>(BR)CBO</sub>	V	I <sub>C</sub> =10μA, I <sub>E</sub> =0	60		
Collector-emitter breakdown voltage	V <sub>(BR)CEO</sub>	V	I <sub>C</sub> =1mA, I <sub>B</sub> =0	40		
Emitter-base breakdown voltage	V <sub>(BR)EBO</sub>	V	I <sub>E</sub> =10μA, I <sub>C</sub> =0	6		
Base cutoff current	I <sub>BL</sub>	nA	V <sub>CE</sub> =30V, V <sub>EB(OFF)</sub> =3V			50
Collector-emitter cut-off current	I <sub>CEX</sub>	nA	V <sub>CE</sub> =30V, V <sub>EB(OFF)</sub> =3V			50
DC current gain	h <sub>FE1</sub>		V <sub>CE</sub> =1V, I <sub>C</sub> =0.1mA	40		
	h <sub>FE2</sub>		V <sub>CE</sub> =1V, I <sub>C</sub> =1mA	70		
	h <sub>FE3</sub>		V <sub>CE</sub> =1V, I <sub>C</sub> =10mA	100		300
	h <sub>FE4</sub>		V <sub>CE</sub> =1V, I <sub>C</sub> =50mA	60		
	h <sub>FE5</sub>		V <sub>CE</sub> =1V, I <sub>C</sub> =100mA	30		
Collector-emitter saturation voltage	V <sub>CE(sat)1</sub>	V	I <sub>C</sub> =10mA, I <sub>B</sub> =1mA			0.2
	V <sub>CE(sat)2</sub>	V	I <sub>C</sub> =50mA, I <sub>B</sub> =5mA			0.3
Base-emitter saturation voltage	V <sub>BE(sat)1</sub>	V	I <sub>C</sub> =10mA, I <sub>B</sub> =1mA	0.65		0.85
	V <sub>BE(sat)2</sub>	V	I <sub>C</sub> =50mA, I <sub>B</sub> =5mA			0.95
Collector-base Output Capacitance	C <sub>ob</sub>	pF	V <sub>CB</sub> =5.0V, f=1.0MHz, I <sub>E</sub> =0			4
Transition frequency	f <sub>T</sub>	MHz	V <sub>CE</sub> =20V, I <sub>C</sub> =10mA, f=100MHz	300		
Noise figure	N <sub>F</sub>	dB	V <sub>CE</sub> =5V, I <sub>C</sub> =0.1mA, f=1kHz, R <sub>g</sub> =1KΩ			5
Delay time	t <sub>d</sub>	ns	V <sub>CC</sub> =3V, I <sub>C</sub> =10mA, V <sub>BE</sub> =0.5V, I <sub>B1</sub> =1mA			35
Rise time	t <sub>r</sub>	ns				35
Storage time	t <sub>s</sub>	ns	V <sub>CC</sub> =3V, I <sub>C</sub> =10mA, I <sub>B1</sub> =-I <sub>B2</sub> =1mA			200
Fall time	t <sub>f</sub>	ns				50



## ■ Thermal Characteristics

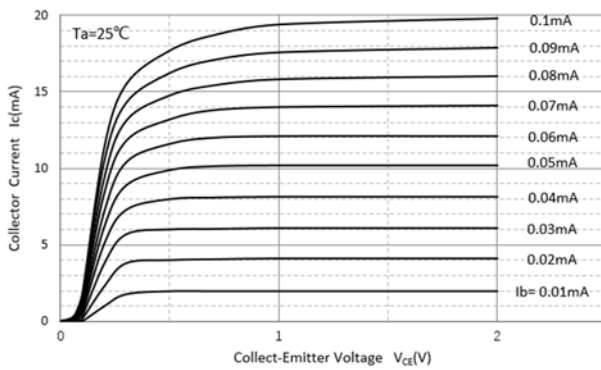
Parameter	Symbol	Unit	Value
Thermal resistance, junction-to-ambient	$R_{\theta J-A}^{(1)}$	$^{\circ}\text{C}/\text{W}$	625
Thermal resistance, junction-to-case	$R_{\theta J-C}^{(1)}$	$^{\circ}\text{C}/\text{W}$	500

### Note:

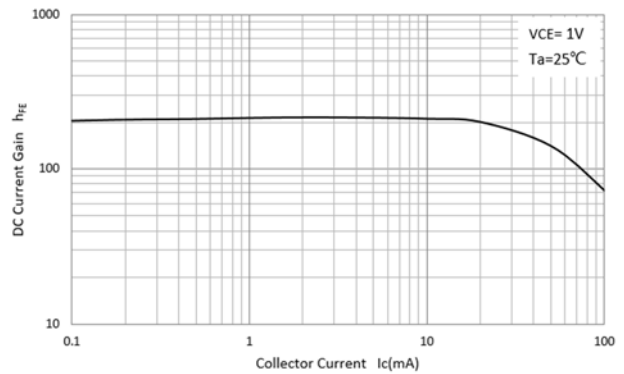
(1) Thermal resistance from junction to ambient and from junction to lead mounted on P.C.B. with 25.4mm\*25.4mm copper pad areas

## ■ Characteristics

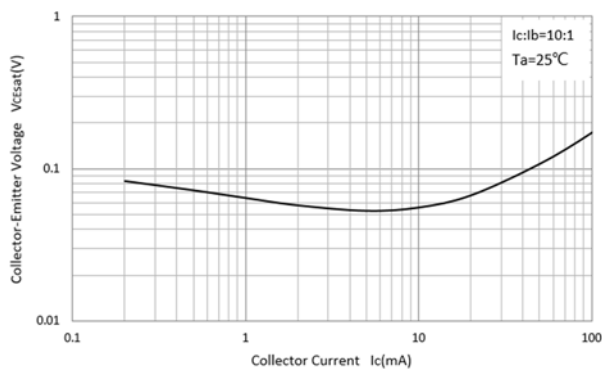
### Fig 1: Static Characteristics



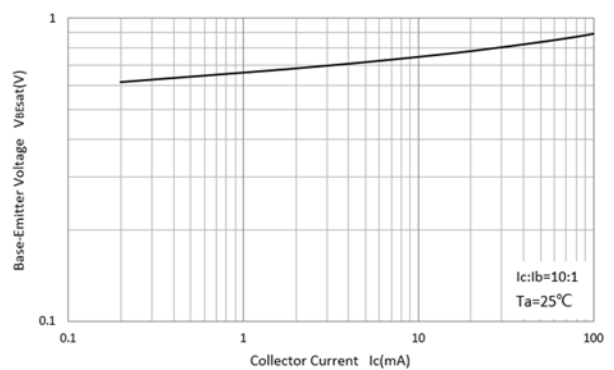
### Fig 2: DC Current Gain



### Fig 3: Collector-Emitter Saturation Voltage

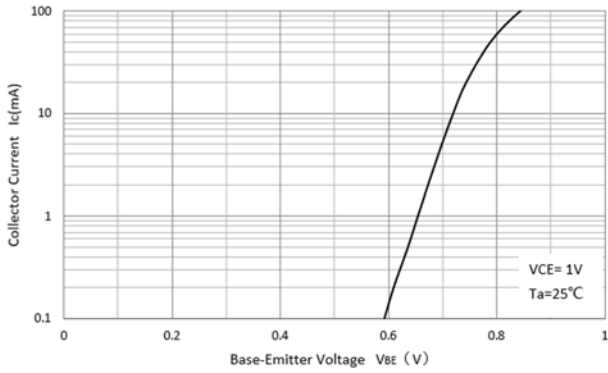


### Fig 4: Base-Emitter Saturation Voltage

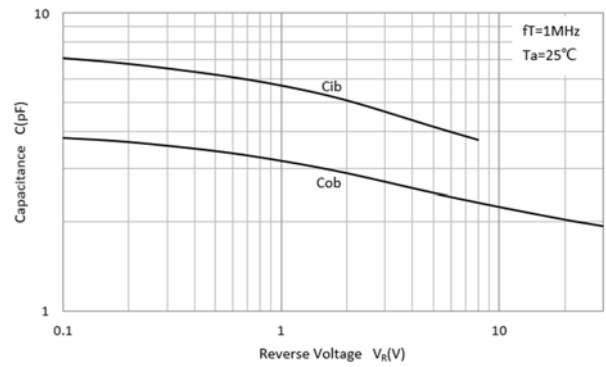




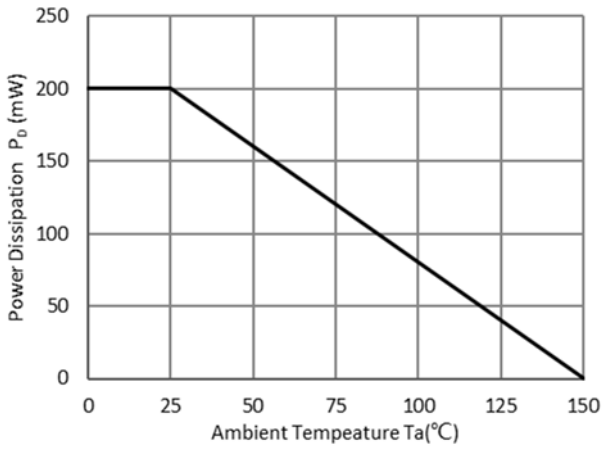
**Fig 5: Base-Emitter Voltage**



**Fig 6:  $C_{ob}/C_{ib}$ - $V_{CB}/V_{EB}$**



**Fig 7:  $P_D$ - $T_a$  Curve**





# MMDT3904V

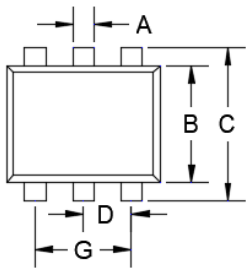
RoHS  
COMPLIANT

## Ordering Information

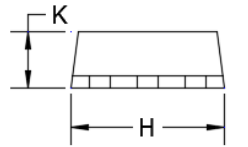
Preferred P/N	Packing code	Unit weight(g)	Minimum package(pcs)	Inner box quantity(pcs)	Outer carton quantity(pcs)	Delivery mode
MMDT3904V	F2	Approximate 0.0035	3000	30000	120000	7" reel

## Outline Dimensions

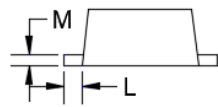
SOT-563



TOP VIEW



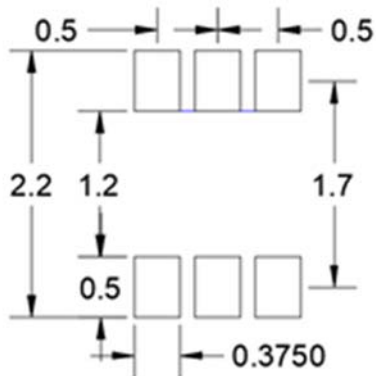
SIDE VIEW



SIDE VIEW

DIM	DIMENSIONS			
	INCHES		MM	
	MIN	MAX	MM	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



UNIT:mm



## Disclaimer

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