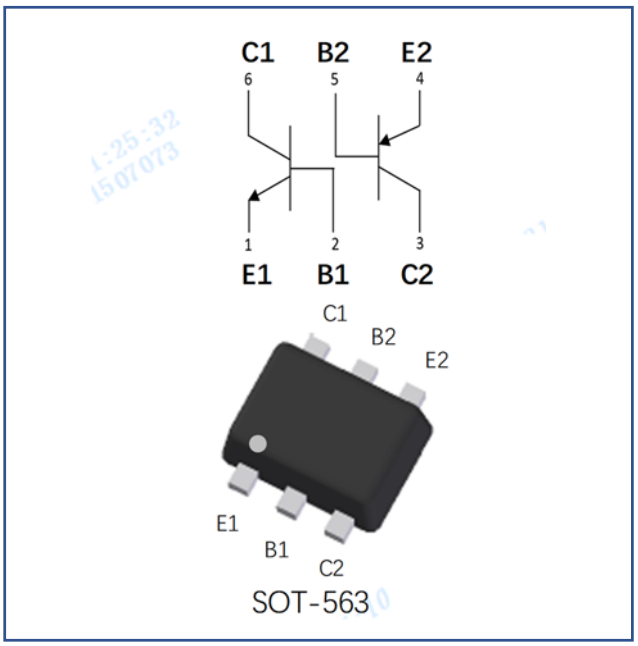
Dual NPN+PNP Small Signal Transistor



Features

- Moisture sensitivity level 1
- Halogen free and RoHS compliant
- Surface mount package ideally suited for auto matic 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** (T_a=25℃ Unless otherwise specified)

TR1-NPN

Item	Symbol	Unit	Conditions	Value
Device marking code				K46
Collector-base voltage	V_{CBO}	V	I_C=10uA,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=10uA,I_C=0	6
Collector current	I_C	mA		200
Power dissipation	P_D	mW		150
Junction temperature	T_J	℃		-55 to +150
Storage temperature	T_{STG}	℃		-55 to +150

TR2-PNP

Item	Symbol	Unit	Conditions	Value
Collector-base voltage	V_{CBO}	V	I_C=-10uA,I_E=0	-40
Collector-emitter voltage	V_{CEO}	V	I_C=-1mA,I_B=0	-40
Emitter-base voltage	V_{EBO}	V	I_E=-10uA,I_C=0	-5
Collector current	I_C	mA		-200
Power dissipation	P_D	mW		150
Junction temperature	T_J	℃		-55 to +150
Storage temperature	T_{STG}	℃		-55 to +150

■ Electrical Characteristics (Ta=25℃ Unless otherwise specified)

TR1-NPN

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	$V_{(BR)CBO}$	V	I_C=10uA,I_E=0	60		
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	V	I_C=1mA,I_B=0	40		
Emitter-base breakdown voltage	$V_{(BR)EBO}$	V	I_E=10uA,I_C=0	6		
Collector cut-off current	I_{CBO}	nA	V_{CB}=30V,I_E=0			50
Collector cut-off current	I_{CEO}	nA	V_{CE}=30V,I_B=0			50
Collector cut-off current	I_{EBO}	nA	V_{EB}=5V, I_C=0			50
DC current gain	h_{FE1}		V_{CE}=1V, I_C=0.1mA	40		
	h_{FE2}		V_{CE}=1V, I_C=1mA	70		
	h_{FE3}		V_{CE}=1V, I_C=10mA	100		300
	h_{FE4}		V_{CE}=1V, I_C=50mA	60		
	h_{FE5}		V_{CE}=1V, I_C=100mA	30		
Collector-emitter saturation voltage	$V_{CE(sat)1}$	V	I_C=10mA,I_B=1mA			0.2
	$V_{CE(sat)2}$	V	I_C=50mA,I_B=5mA			0.3
Base-emitter saturation voltage	$V_{BE(sat)1}$	V	I_C=10mA,I_B=1mA	0.65		0.85
	$V_{BE(sat)2}$	V	I_C=50mA,I_B=5mA			0.95
Collector-base Output Capacitance	Cob	pF	V_{CB}=5.0V, f=1.0MHz, I_E=0			4

Transition frequency	f_T	MHz	V_{CE}=20V,I_C=20mA,f=100MHz	300		
Delay time	td	ns	V_{CC}=3V, I_C=10mA, V_{BE}=0.5V, I_{B1}=1mA			35
Rise time	tr	ns				35
Storage time	ts	ns	V_{CC}=3V, I_C=10mA, I_{B1}=-I_{B2}=1mA			200
Fall time	tf	ns				50

TR2-PNP

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	$V_{(BR)CBO}$	V	I_C=-10uA,I_E=0	-40		
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	V	I_C=-1mA,I_B=0	-40		
Emitter-base breakdown voltage	$V_{(BR)EBO}$	V	I_E=-10uA,I_C=0	-5		
Collector-base cut-off current	I_{CBO}	nA	V_{CB}=-30V,I_E=0			-50
Emitter-base cut-off current	I_{EBO}	nA	V_{EB}=-5V,I_C=0			-50
DC current gain	h_{FE1}		V_{CE}=-1V,I_C=-0.1mA	40		
	h_{FE2}		V_{CE}=-1V,I_C=-1mA	70		
	h_{FE3}		V_{CE}=-1V,I_C=-10mA	100		300
	h_{FE4}		V_{CE}=-1V,I_C=-50mA	60		
	h_{FE5}		V_{CE}=-1V,I_C=-100mA	30		
Collector-emitter saturation voltage	$V_{CE(sat)1}$	V	I_C=-10mA,I_B=-1mA			-0.25
	$V_{CE(sat)2}$	V	I_C=-50mA,I_B=-5mA			-0.4
Base-emitter saturation voltage	$V_{BE(sat)1}$	V	I_C=-10mA,I_B=-1mA	-0.65		-0.85
	$V_{BE(sat)2}$	V	I_C=-50mA,I_B=-5mA			-0.95
Collector-base Output Capacitance	Cob	pF	V_{CB}=-5.0Vdc, f=1.0MHz, I_E=0			4.5
Transition frequency	f_T	MHz	V_{CE}=-20V,I_C=-10mA, f=100MHz	250		
Delay time	td	ns	V_{CC}=-3V, I_C=-10mA, V_{BE}=-0.5V, I_{B1}=-1mA			35
Rise time	tr	ns				35
Storage time	ts	ns	V_{CC}=-3V, I_C=-10mA, I_{B1}=-I_{B2}=-1mA			225
Fall time	tf	ns				75

■ Thermal Characteristics

Parameter	Symbol	Unit	Value
Thermal resistance, junction-to-ambient	$R_{\theta J-A}$(1)	℃/W	833
Thermal resistance, junction-to-case	$R_{\theta J-C}$(1)	℃/W	667

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

TR1-NPN

Fig 1：Static Characteristics

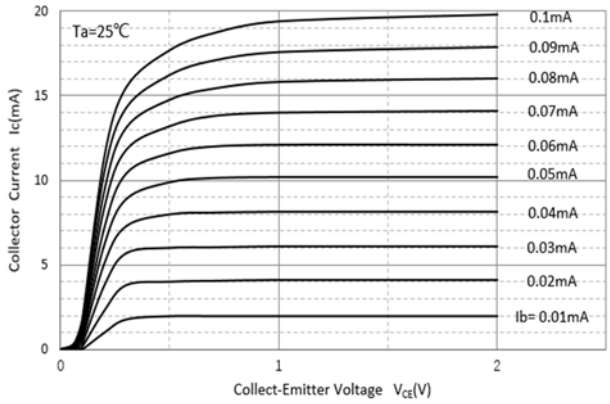


Fig 2：DC Current Gain

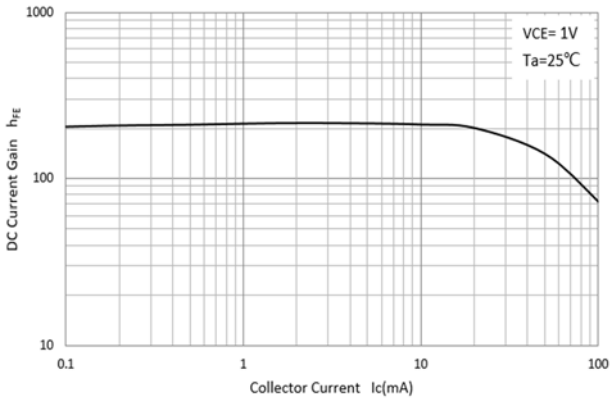


Fig 3：Collector-Emitter Saturation Voltage

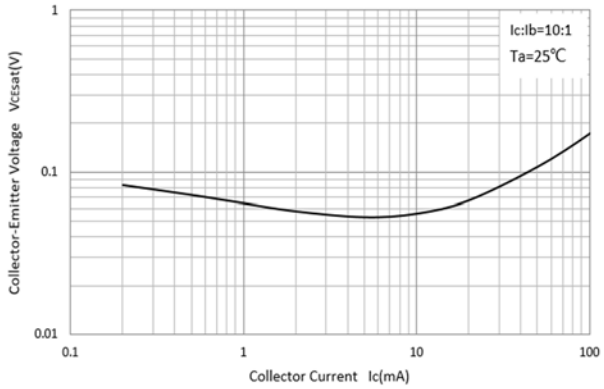
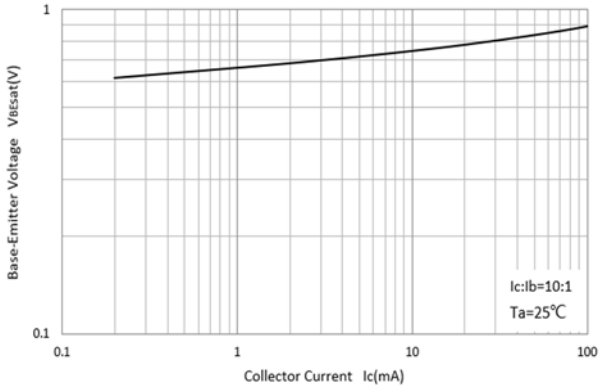
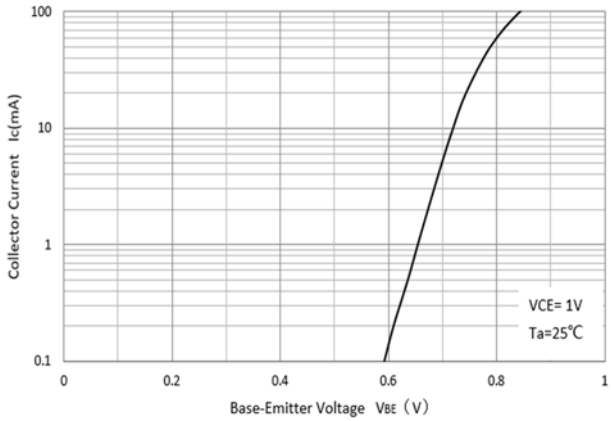


Fig 4：Base-Emitter Saturation Voltage





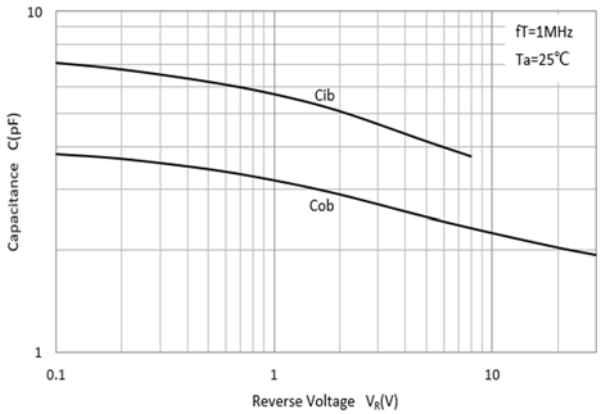
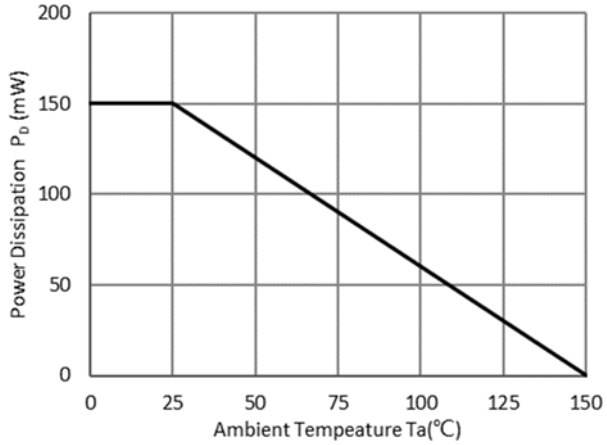


Fig 7：P_D-Ta Curve



TR2-PNP

Fig 1：Static Characteristics

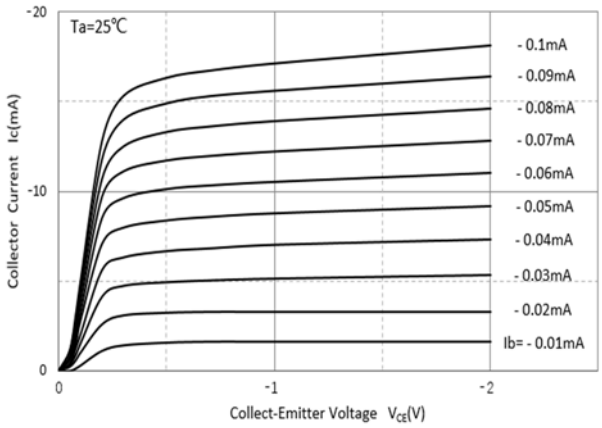


Fig 2：DC Current Gain



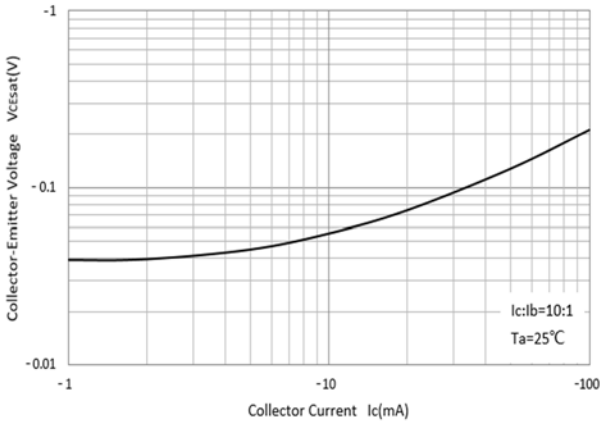


Fig 5：Base-Emitter Voltage

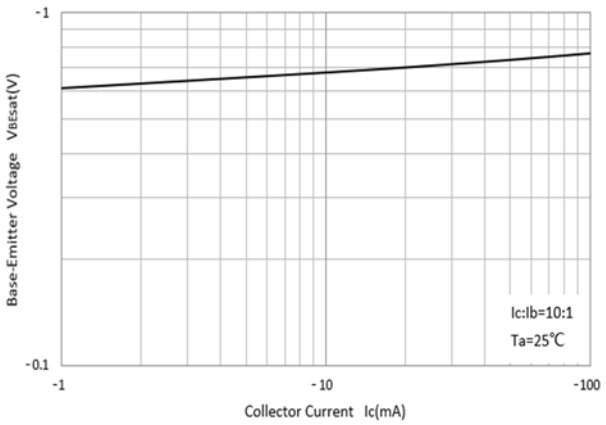
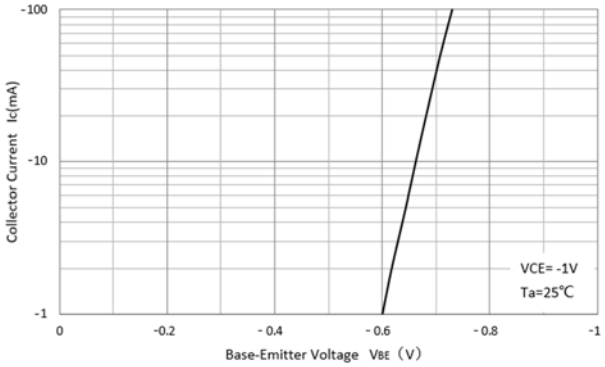


Fig 6：Cob/Cib-V_{CB}/V_{EB}



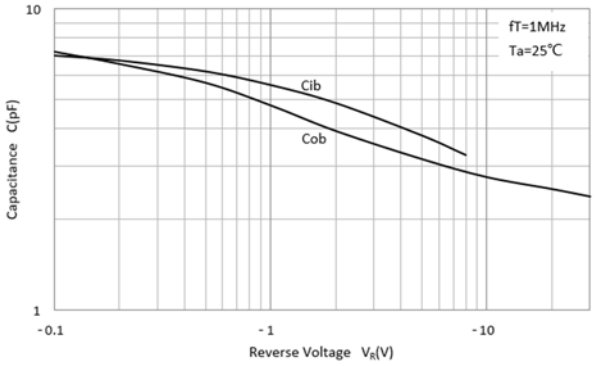
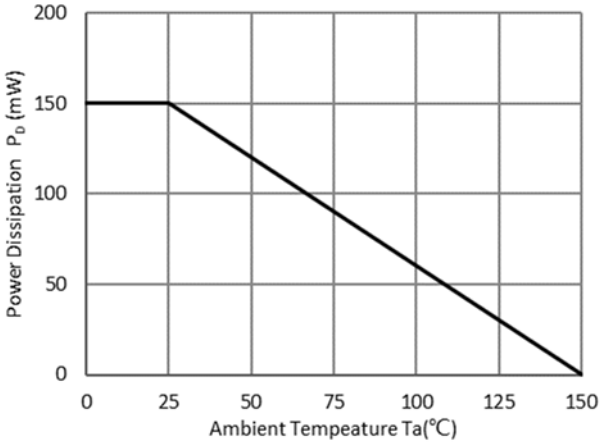


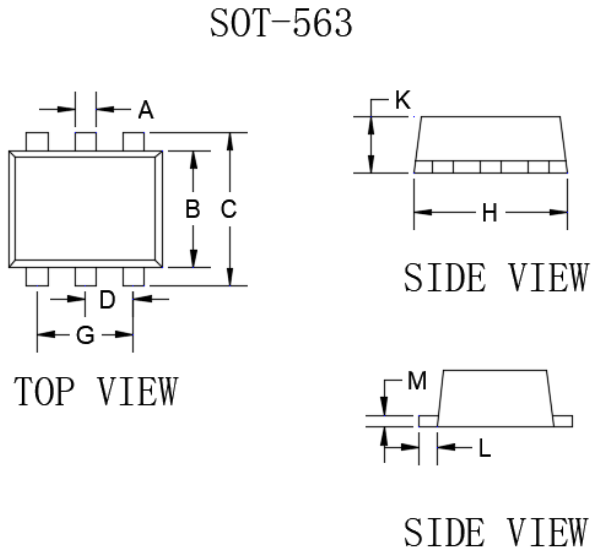
Fig 7：P_D-Ta Curve



■Ordering Information

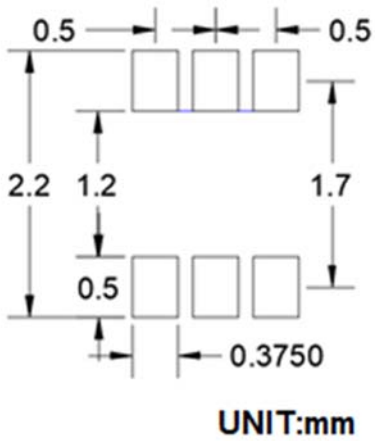
Preferred P/N	Packing code	Unit weight(g)	Minimum package(pcs)	Inner box quantity(pcs)	Outer carton quantity(pcs)	Delivery mode
MMDT3946V	F2	Approximate 0.0035	3000	30000	120000	7” reel

■ Outline Dimensions



DIMENSIONS				
DIM	INCHES		MM	
	MIN	MAX	MN	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

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