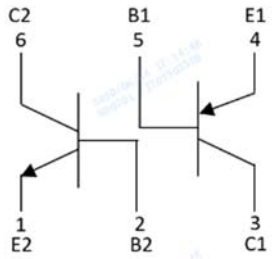
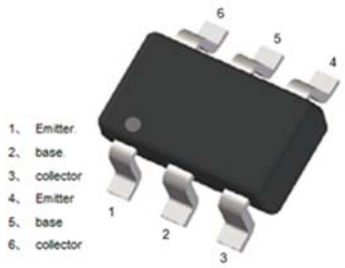
NPN+PNP General Purpose Amplifier





Features

- Moisture sensitivity level 1
- Halogen free and RoHS compliant
- Surface mount package ideally suited for automatic insertion

Application

- General switching and amplification

Mechanical data

- **Package：** SOT-363S
- **Terminals：** Tin plated leads, solderable per J-STD-002 and JESD22-B102

■ **Maximum Ratings** (T_a=25℃ Unless otherwise specified)

TR1 NPN Pin1、2、6

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		200
Operation junction temperature	T_J	℃		-55 to +150
Storage temperature	T_{STG}	℃		-55 to +150

TR2 PNP Pin3、4、5

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		200
Operation junction temperature	T_J	℃		-55 to +150
Storage temperature	T_{STG}	℃		-55 to +150

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

TR1 NPN Pin1、2、6

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	$V_{(BR)CBO}$	V	I_C=10μA,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=10μA,I_C=0	6		
Collector-base cut-off current	I_{CBO}	nA	V_{CE}=30V,I_E=0			50
Collector-emitter cut-off current	I_{CEO}	nA	V_{CE}=30V,I_B=0			50
Emitter-base cut-off current	I_{EBO}	nA	V_{BE}=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
	$V_{CE(sat)2}$		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
	$V_{BE(sat)2}$		I_C=50mA,I_B=5mA			0.95
Collector-base output capacitance	Cob	pF	V_{CB}=5V,I_C=0,f=1.0MHz			4

Item	Symbol	Unit	Conditions	Min	Typ	Max
Transition frequency	f_T	MHz	V_{CE}=20V,I_C=10mA,f=100MHz	300		
Delay time	td	ns	V_{CC}=3V, I_C=10mA, V_{BE}=0.5V, IB1=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 Pin3、4、5

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	$V_{(BR)CBO}$	V	I_C=-10μA,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=-10μA,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}=-5.0V, 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, IB1=-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	625
Thermal resistance, junction-to-case	$R_{\theta J-C}$(1)	℃/W	500

Note:

（1）Device mounted on PCB, single-sided copper， with standard footprint

■Characteristics

TR1 NPN Pin1、2、6

Fig 1：Static Characteristics

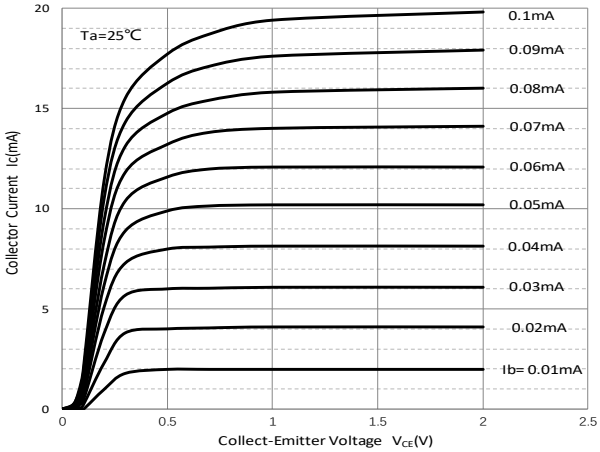


Fig 2：DC Current Gain

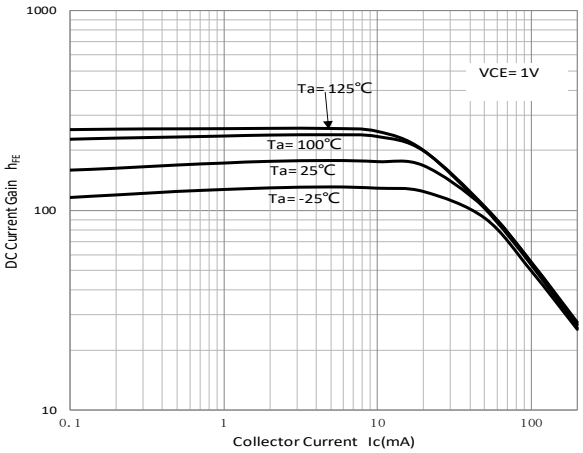


Fig 3：Collector-Emitter Saturation Voltage

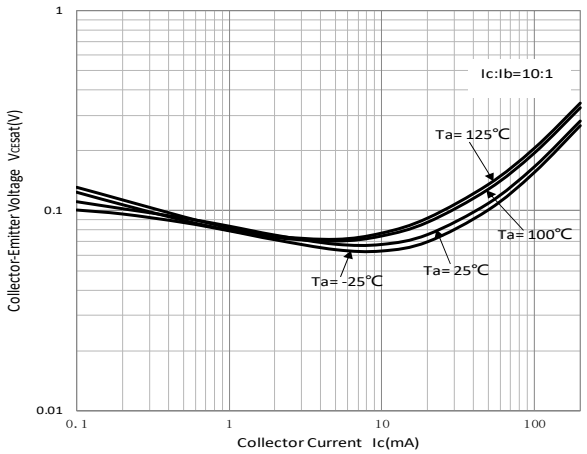


Fig 4：Base-Emitter Saturation Voltage

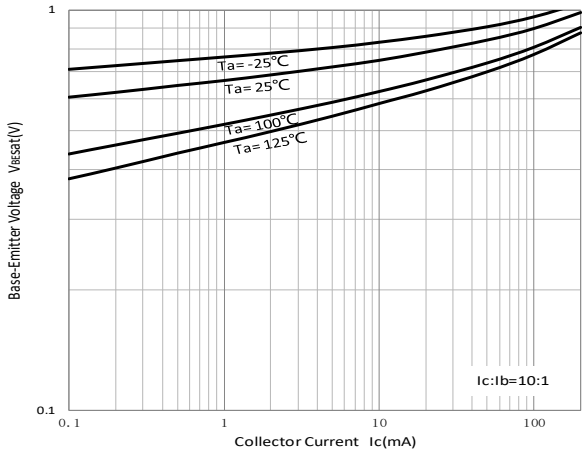


Fig 5：Base-Emitter Voltage

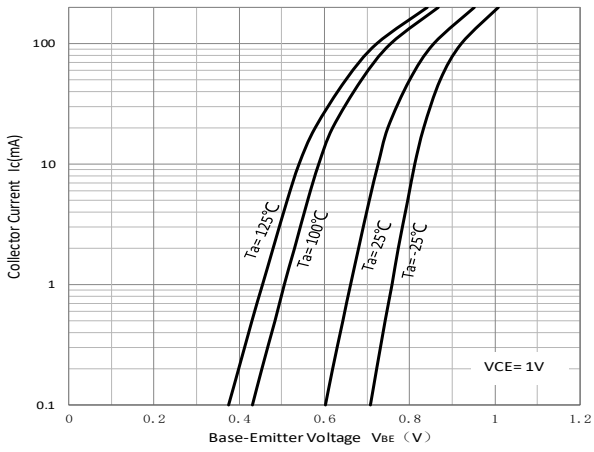


Fig 6：Cob/Cib-V_{CB}/V_{EB}

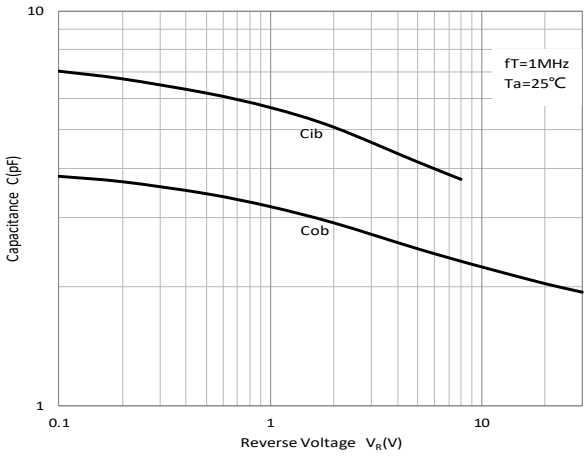
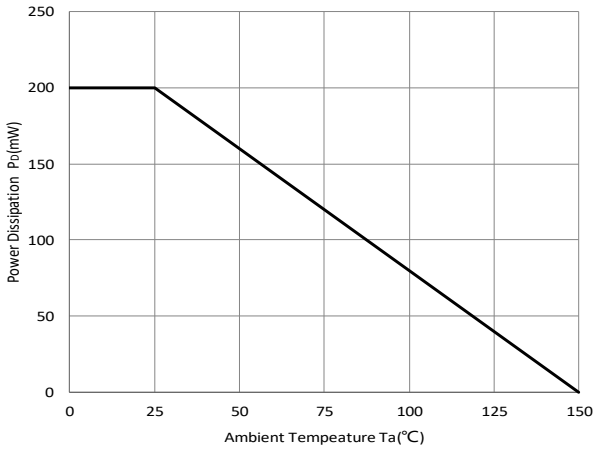


Fig 7：P_D-Ta Curve



TR2 PNP Pin3、4、5

Fig 1：Static Characteristics

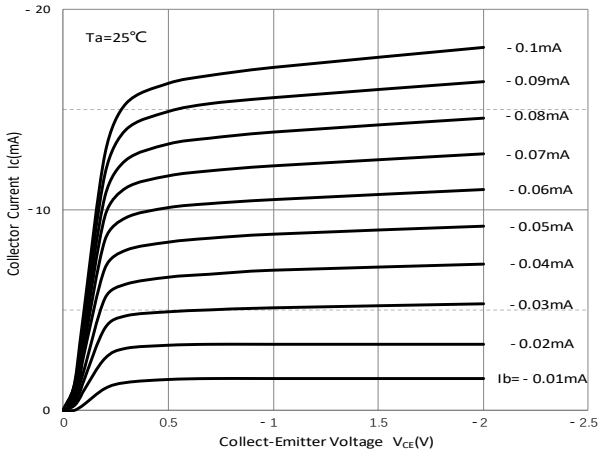


Fig 2：DC Current Gain

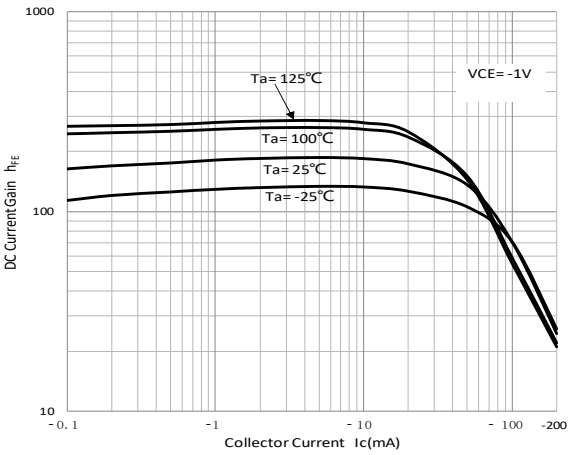


Fig 3：Collector-Emitter Saturation Voltage

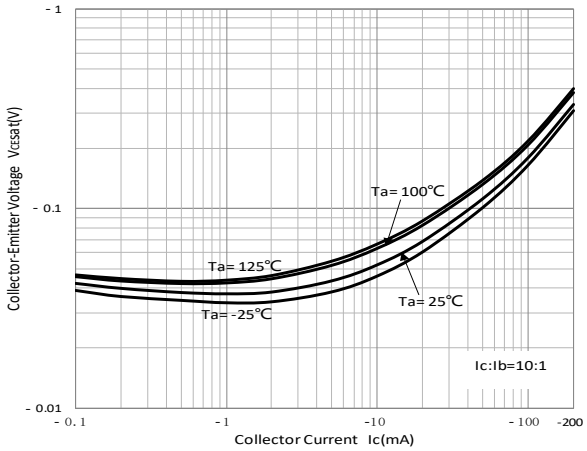


Fig 4：Base-Emitter Saturation Voltage

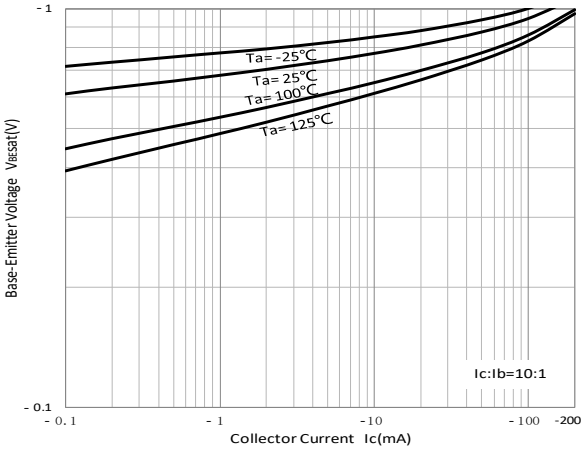


Fig 5：Base-Emitter Voltage

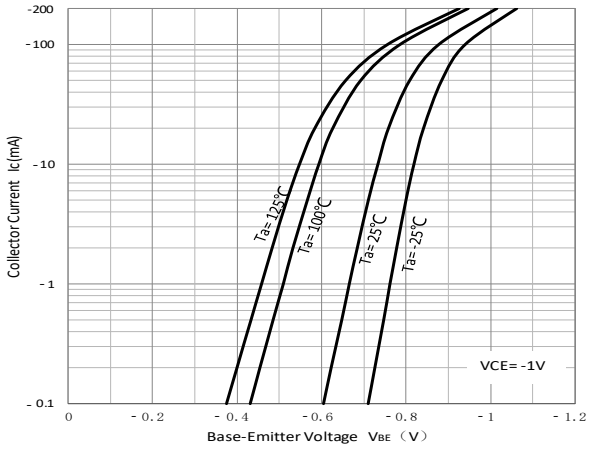
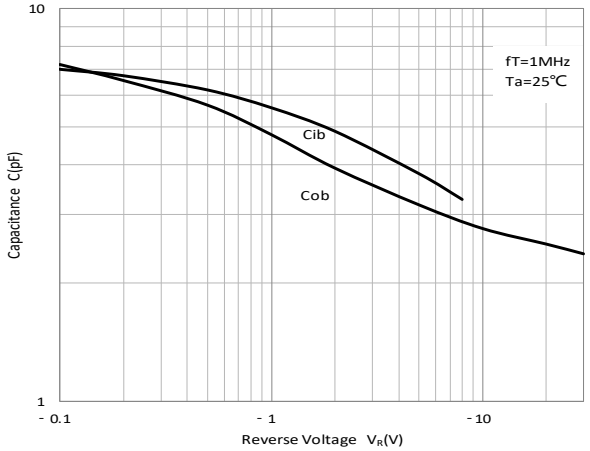


Fig 6：Cob/Cib-V_{CB}/V_{EB}

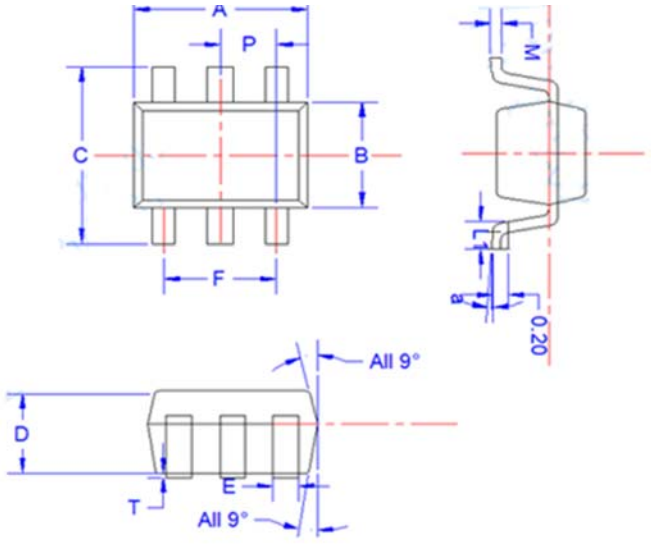


■Ordering Information

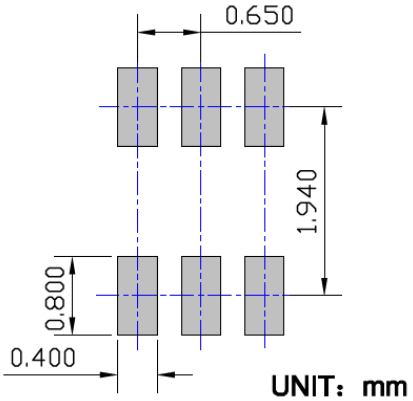
Preferred P/N	Packing code	Unit weight(g)	Minimum package(pcs)	Inner box quantity(pcs)	Outer carton quantity(pcs)	Delivery mode
MMDT3946S	F2	Approximate 0.009	3000	30000	120000	7” reel
MMDT3946S	F3	Approximate 0.009	10000	/	210000	7” reel

■ Outline Dimensions

■ Suggested Pad Layout



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
E	0.15	0.25	0.35
B	1.15	1.25	1.35
C	2.00	2.10	2.20
P		0.650BSC	
A	1.80	2.00	2.20
T	0.00	0.05	0.100
D	0.90	0.95	1.00
L1	0.20	0.30	0.40
a		4°±4°	
M	0.10	0.15	0.25



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