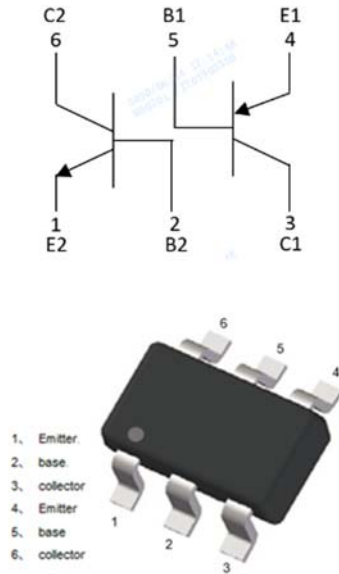


Dual NPN+PNP Small Signal Transistor



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-363S
- **Terminals:** Tin plated leads, solderable per J-STD-002 and JESD22-B102CC

■ Maximum Ratings ($T_a=25^\circ\text{C}$ Unless otherwise specified)

TR1 NPN Pin1、2、6

Item	Symbol	Unit	Conditions	Value
Device marking code				KNM
Collector-base voltage	V_{CB0}	V	$I_C = 100\mu\text{A}, I_E = 0$	180
Collector-emitter voltage	V_{CE0}	V	$I_C = 1\text{mA}, I_B = 0$	160
Emitter-base voltage	V_{EB0}	V	$I_E = 10\mu\text{A}, I_C = 0$	6
Collector current	I_C	mA		200
Power dissipation	P_D	mW		200
Operation junction temperature	T_J	$^\circ\text{C}$		-55 to +150
Storage temperature	T_{STG}	$^\circ\text{C}$		-55 to +150



MMDT5451S

RoHS
COMPLIANT

TR2 PNP Pin3、4、5

Item	Symbol	Unit	Conditions	Value
Collector-base voltage	V_{CBO}	V	$I_C = -100\mu A, I_E = 0$	-160
Collector-emitter voltage	V_{CEO}	V	$I_C = -1mA, I_B = 0$	-150
Emitter-base voltage	V_{EBO}	V	$I_E = -10\mu A, I_C = 0$	-5
Collector current	I_C	mA		-200
Power dissipation	P_D	mW		200
Operation junction temperature	T_J	°C		-55 to +150
Storage temperature	T_{STG}	°C		-55 to +150

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

TR1 NPN Pin1、2、6

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	$V_{(BR)CBO}$	V	$I_C = 100\mu A, I_E = 0$	180		
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	V	$I_C = 1mA, I_B = 0$	160		
Emitter-base breakdown voltage	$V_{(BR)EBO}$	V	$I_E = 10\mu A, I_C = 0$	6		
Collector-base cut-off current	I_{CBO}	nA	$V_{CB} = 120V, I_E = 0$			50
Emitter-base cut-off current	I_{EBO}	nA	$V_{BE} = 4V, I_C = 0$			50
DC current gain	h_{FE1}		$V_{CE} = 5V, I_C = 1mA$	80		
	h_{FE2}		$V_{CE} = 5V, I_C = 10mA$	100		300
	h_{FE3}		$V_{CE} = 5V, I_C = 50mA$	30		
Collector-emitter saturation voltage	$V_{CE(sat)1}$	V	$I_C = 10mA, I_B = 1mA$			0.15
	$V_{CE(sat)2}$	V	$I_C = 50mA, I_B = 5mA$			0.2
Base-emitter saturation voltage	$V_{BE(sat)1}$	V	$I_C = 10mA, I_B = 1mA$			1
	$V_{BE(sat)2}$	V	$I_C = 50mA, I_B = 5mA$			1
Transition frequency	f_T	MHZ	$V_{CE} = 10V, I_C = 20mA, f = 100MHz$	100		300
Output capacitance	C_{ob}	pF	$V_{CE} = 10V, I_E = 0, f = 1MHz$			6



MMDT5451S

RoHS
COMPLIANT

TR2 PNP Pin3、4、5

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	$V_{(BR)CBO}$	V	$I_C=-100\mu A, I_E=0$	-160		
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	V	$I_C=-1mA, I_B=0$	-150		
Emitter-base breakdown voltage	$V_{(BR)EBO}$	V	$I_E=-10\mu A, I_C=0$	-5		
Collector-base cut-off current	I_{CBO}	nA	$V_{CB}=-120V, I_E=0$			-50
Emitter-base cut-off current	I_{EBO}	nA	$V_{EB}=-3V, I_C=0$			-50
DC current gain	h_{FE1}		$V_{CE}=-5V, I_C=-1mA$	50		
	h_{FE2}		$V_{CE}=-5V, I_C=-10mA$	100		300
	h_{FE3}		$V_{CE}=-5V, I_C=-50mA$	50		
Collector-emitter saturation voltage	$V_{CE(sat)1}$	V	$I_C=-10mA, I_B=-1mA$			-0.2
	$V_{CE(sat)2}$	V	$I_C=-50mA, I_B=-5mA$			-0.5
Base-emitter saturation voltage	$V_{BE(sat)1}$	V	$I_C=-10mA, I_B=-1mA$			-1
	$V_{BE(sat)2}$	V	$I_C=-50mA, I_B=-5mA$			-1
Output capacitance	Cob	pF	$V_{CB}=-10V, I_E=0, f=1.0MHz$			6
Transition frequency	f_T	MHz	$V_{CE}=-10V, I_C=-20mA, f=100MHz$	100		300

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



■ Characteristics

TR1 NPN Pin1、2、6

Fig 1: Static Characteristics

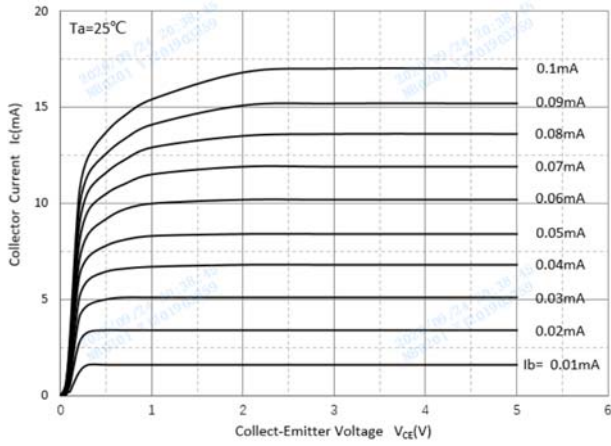


Fig 2: Dc Current Gain

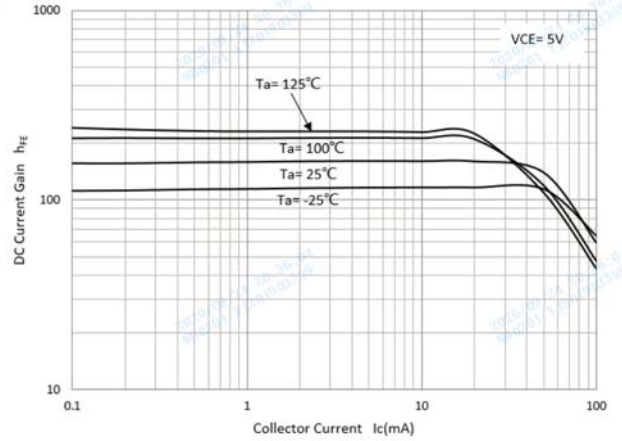


Fig 3: Collector-Emittor Saturation Voltage

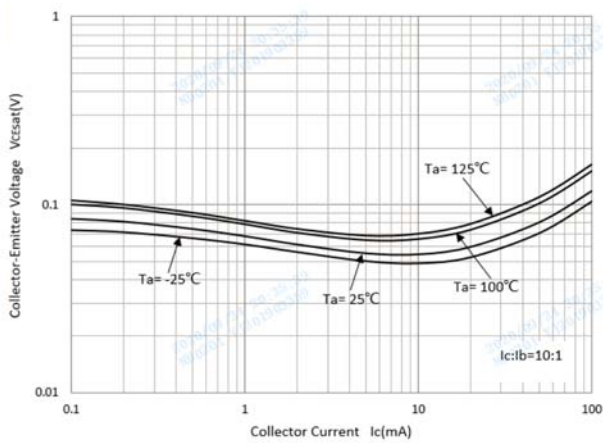


Fig 4: Base-Emittor Saturation Voltage

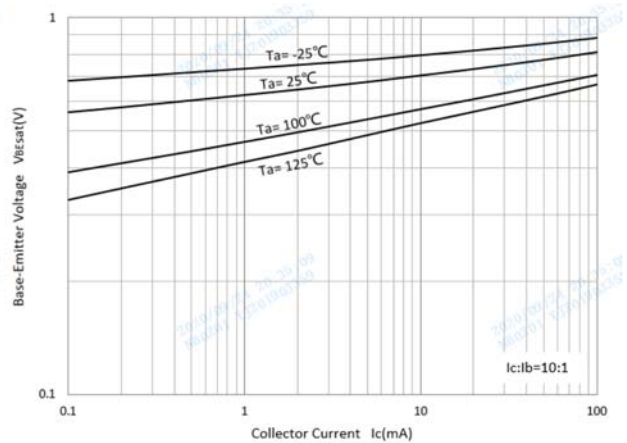


Fig 5: Base-Emittor Voltage

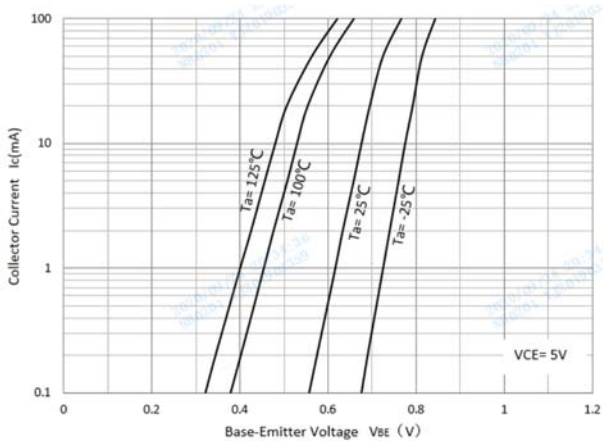


Fig 6: Cob/Cib-Vcb/Veb

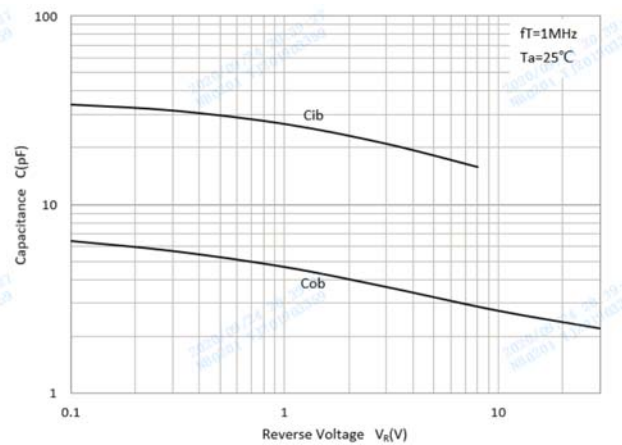
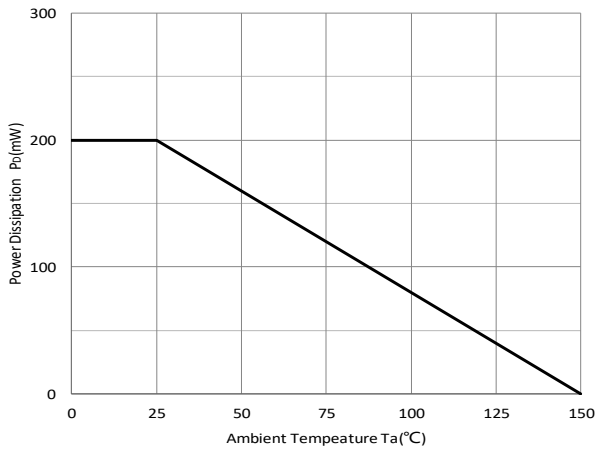




Fig 7: P_D - T_a Curve



TR2 PNP Pin3、4、5

Fig 1: Static Characteristics

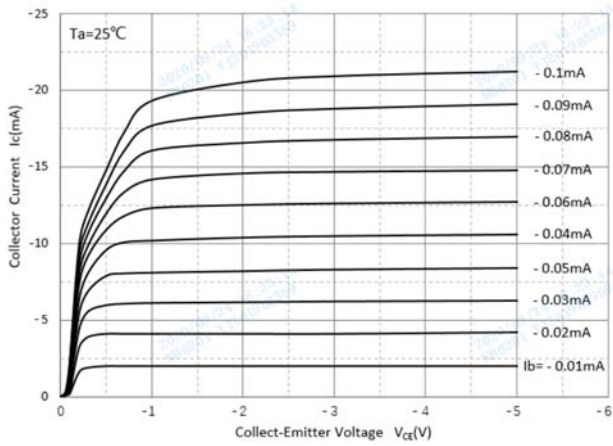


Fig 2: Dc Current Gain

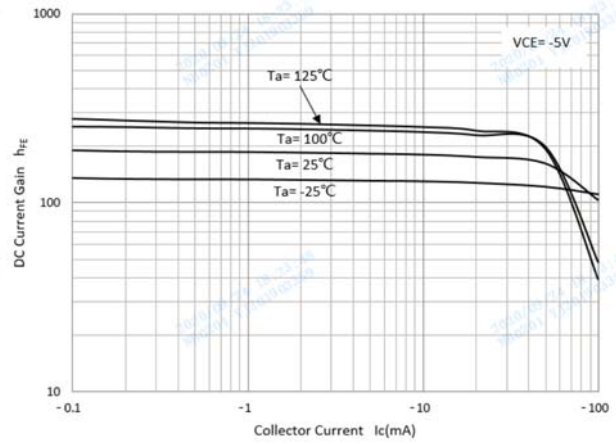


Fig 3: Collector-Emitter Saturation Voltage

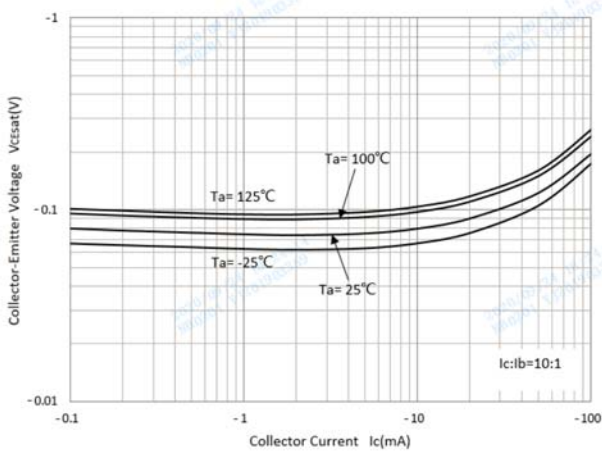


Fig 4: Base-Emitter Saturation Voltage

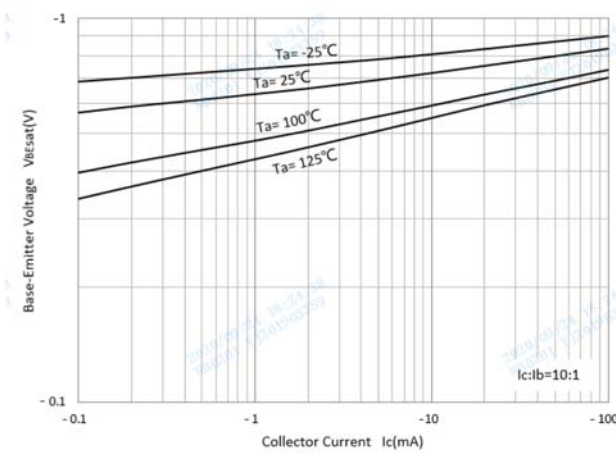
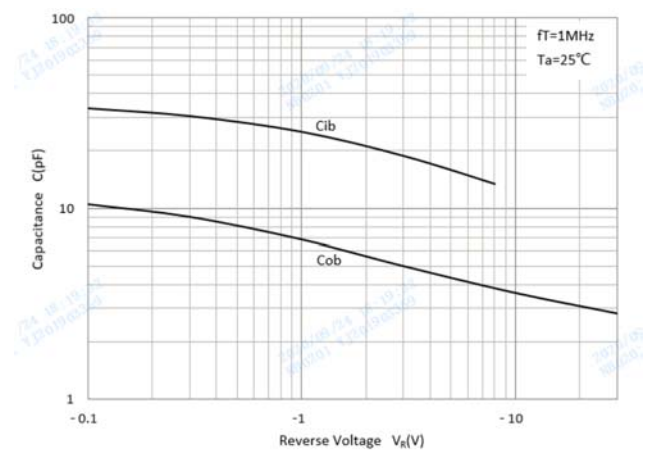
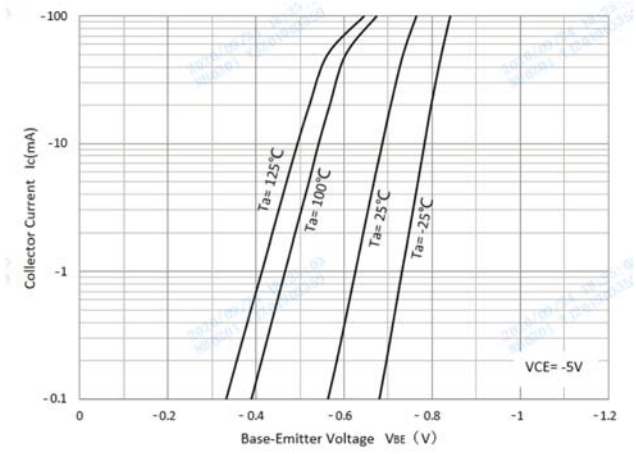




Fig 5: Base-Emitter Voltage

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

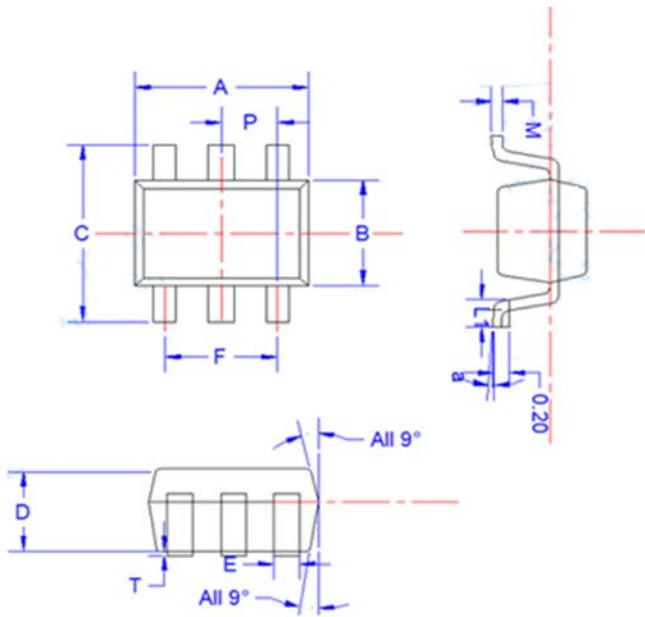




■ Ordering Information

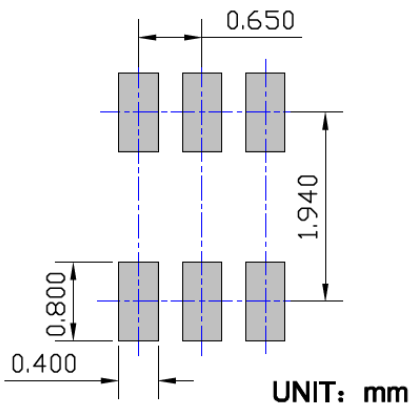
Preferred P/N	Packing code	Unit weight(g)	Minimum package(pcs)	Inner box quantity(pcs)	Outer carton quantity(pcs)	Delivery mode
MMDT5451S	F2	Approximate 0.009	3000	30000	120000	7" reel
MMDT5451S	F3	Approximate 0.009	10000	/	210000	7" reel

■ Outline Dimensions



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

■ Suggested Pad Layout





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