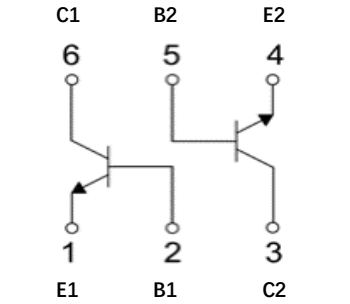
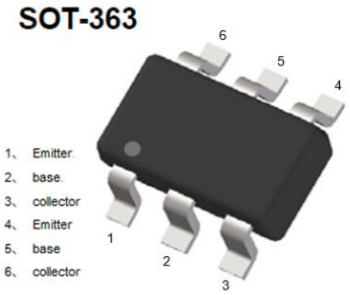
RoHS COMPLIANT

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

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

Item	Symbol	Unit	Conditions	Value
Device marking code				K2X
Collector-base voltage	V_{CBO}	V	I_C =100uA,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=100uA,I_C=0	6
Collector current	I_C	mA		600
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)

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	$V_{(BR)CBO}$	V	I_C=100μA,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=100μA,I_C=0	6		
Collector-base cut-off current	I_{CBO}	nA	V_{CE}=50V,I_E=0			100
Collector-emitter cut-off current	I_{CEO}	nA	V_{CE}=35V,I_B=0			500
Emitter-base cut-off current	I_{EBO}	nA	V_{BE}=3V,I_C=0			100
DC current gain	h_{FE1}		V_{CE}=1V,I_C=0.1mA	20		
	h_{FE2}		V_{CE}=1V,I_C=1mA	40		
	h_{FE3}		V_{CE}=1V,I_C=10mA	80		
	h_{FE4}		V_{CE}=1V,I_C=150mA	100		300
	h_{FE5}		V_{CE}=1V,I_C=500mA	40		
Collector-emitter saturation voltage	$V_{CE(sat)1}$	V	I_C=150mA,I_B=15mA			0.4
	$V_{CE(sat)2}$		I_C=500mA,I_B=50mA			0.75
Base-emitter saturation voltage	$V_{BE(sat)1}$	V	I_C=150mA,I_B=15mA			0.95
	$V_{BE(sat)2}$		I_C=500mA,I_B=50mA			1.2
Transition frequency	f_T	MHz	V_{CE}=10V,I_C=20mA,f=100MHz	250		
Delay time	td	ns	V_{CC}=30V, I_C=150mA, V_{BE}=2V, I_{B1}=15mA			15
Rise time	tr	ns				20
Storage time	ts	ns	V_{CC}=30V, I_C=150mA, I_{B1}=-I_{B2}=5mA			225
Fall time	tf	ns				30

■ Thermal Characteristics

Parameter	Symbol	Unit	Value
Thermal resistance, junction-to-ambient	RθJ-A(1)	℃/W	625
Thermal resistance, junction-to-case	RθJ-C(1)	℃/W	500

Note:

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

■ Characteristics

Fig 1：Static Characteristics

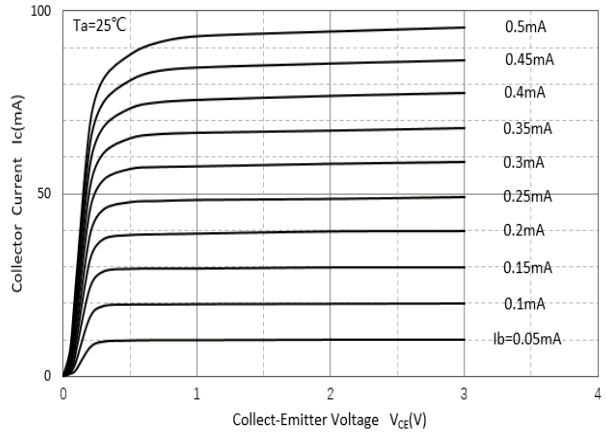


Fig 2：Dc Current Gain

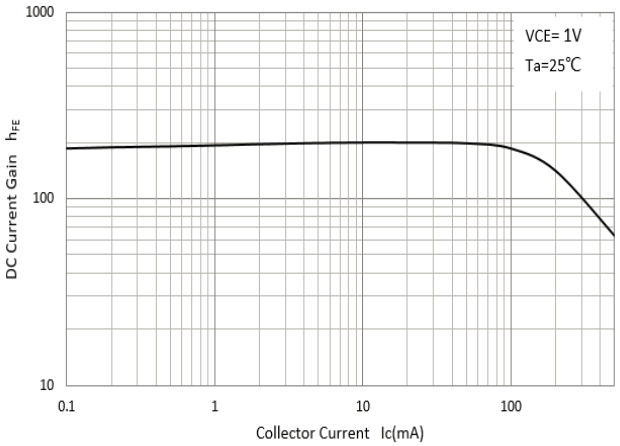


Fig 3：Collector-Emitter Saturation Voltage

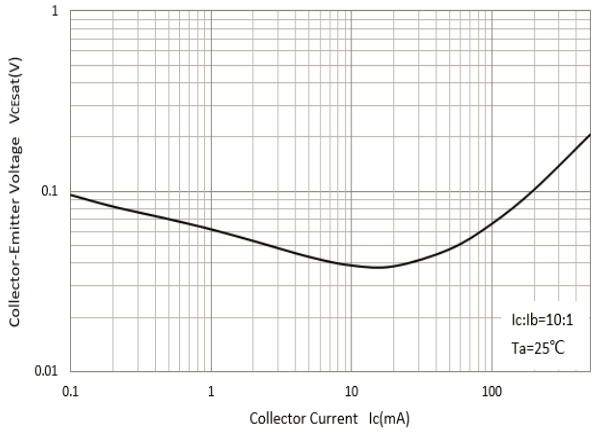


Fig 4：Base-Emitter Saturation Voltage

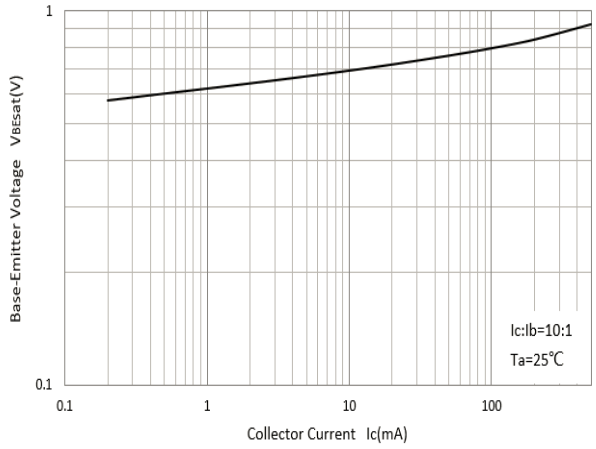


Fig 5：Base-Emitter Voltage

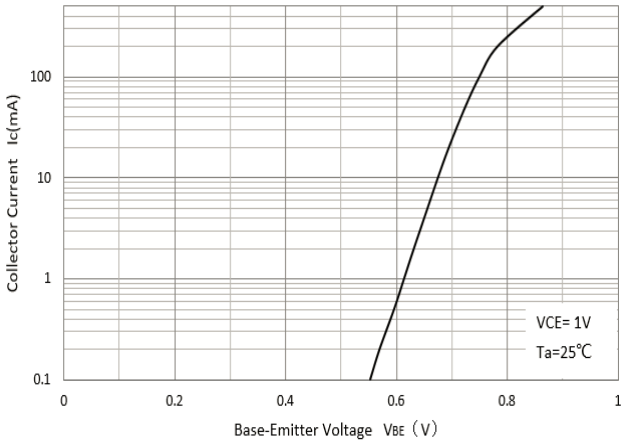


Fig 6：Cob/Cib-V_{CB}/V_{EB}

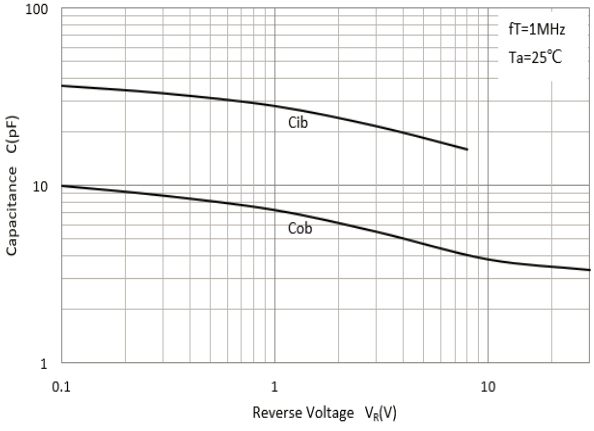
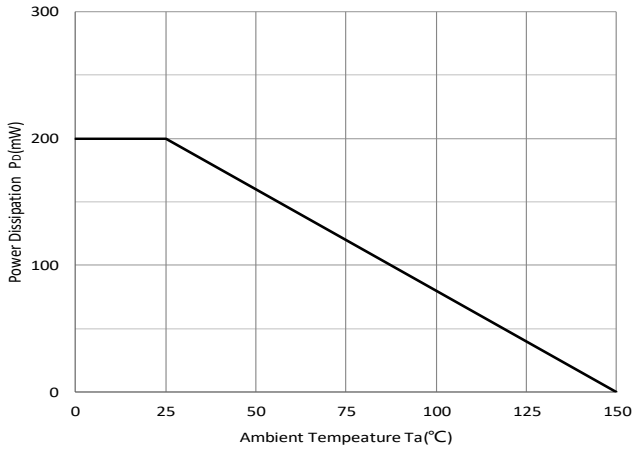


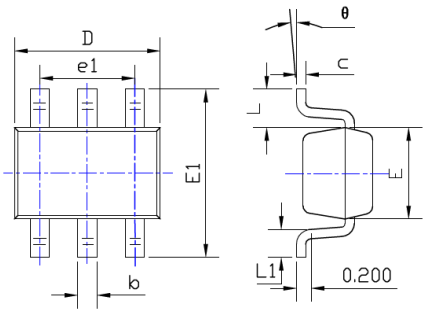
Fig 7：P_D-Ta Curve

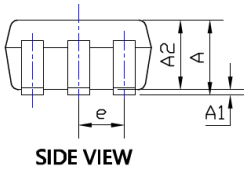


■ Ordering Information

Preferred P/N	Packing code	Unit weight(g)	Minimum package(pcs)	Inner box quantity(pcs)	Outer carton quantity(pcs)	Delivery mode
MMDT4401	F2	Approximate 0.009	3000	30000	120000	7” reel
MMDT4401	F3	Approximate 0.009	10000	/	210000	7” reel

■ Outline Dimensions

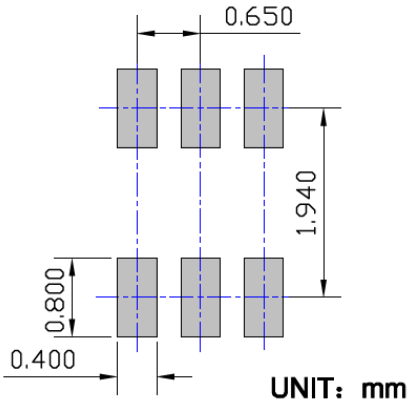




SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A	0.035	0.043	0.900	1.100
A1	0.000	0.004	0.000	0.100
A2	0.035	0.039	0.900	1.000
b	0.006	0.014	0.150	0.350
c	0.004	0.010	0.100	0.250
D	0.071	0.087	1.800	2.200
E	0.045	0.053	1.150	1.350
E1	0.085	0.096	2.150	2.450
e	0.026TYP		0.650TYP	
e1	0.047	0.055	1.200	1.400
L	0.021REF		0.525REF	
L1	0.010	0.018	0.260	0.460
θ	0°	8°	0°	8°

Note:
1. All dimensions are in millimeters (mm) unless otherwise specified.
[所有尺寸均以毫米为单位，除非另有说明]
2. General tolerances: ±0.10mm unless otherwise specified.
[通用公差为±0.10mm，除非另有说明]
3. Dimensions and tolerances per ASME Y14.5M-2018.
[尺寸和公差遵循 ASME Y14.5M-2018 标准]
4.All dimensions shown are exclusive of burrs and gate residues.
Burrs and gate vestiges shall not exceed 0.15 mm in maximum.
[所有尺寸均不包括毛刺和浇口残留。毛刺与浇口残留的尺寸最大不得超过 0.15mm]
5.Dimension b does not include dambar protrusion of max 0.100 mm per side.
[尺寸b不包括单边最大0.100 MM的中筋凸出部分]
6.Dimensions D and E are the overall extreme outer dimensions of the mold compound. These dimensions exclude mold flash, lead flash, protrusions and burrs but include the maximum allowable mold mismatch.
[D和E是塑封体的外部极限尺寸，不包括包封溢料、内引线溢料、凸出部分以及胶体毛刺，但是包含了包封错位的最大尺寸]
7.Formed leads shall be planar with respect to one another within a maximum of 0.076 mm relative to the seating plane.
[成型的管脚应为同一平面，共面性最大为0.1mm]

■ Suggested Pad Layout



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