

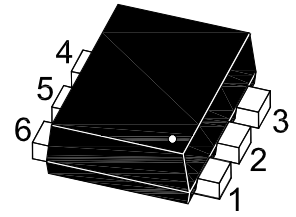
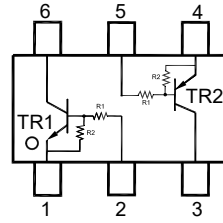
# MMDTX141DE

## Complementary NPN/PNP Silicon Epitaxial Planar Digital Transistor

For switching and interface circuit and drivecircuit applications

### Features

- With Built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process



1. Emitter 2. Base 3. Collector  
4. Emitter 5. Base 6. Collector  
SOT-563 Plastic package

### Resistor Values

R1 (KΩ)	R2 (KΩ)
10	10

### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$ (TR1)

Parameter	Symbol	Value	Unit
Collector Base Voltage	$V_{CBO}$	50	V
Collector Emitter Voltage	$V_{CEO}$	50	V
Input Voltage	$V_{IN}$	30 to -10	V
Collector Current	$I_c$	100	mA

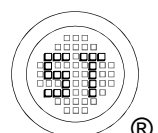
### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$ (TR2)

Parameter	Symbol	Value	Unit
Collector Base Voltage	$-V_{CBO}$	50	V
Collector Emitter Voltage	$-V_{CEO}$	50	V
Input Voltage	$V_{IN}$	-30 to 10	V
Collector Current	$-I_c$	100	mA

### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$ (TR1 and TR2)

Parameter	Symbol	Value	Unit
Total Power Dissipation	$P_{tot}$	200	mW
Thermal Resistance from Junction to Ambient <sup>1)</sup>	$R_{\theta JA}$	625	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	- 55 to + 150	$^\circ\text{C}$

<sup>1)</sup> Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.



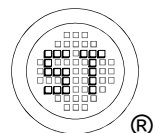
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## Characteristics at $T_a = 25^\circ\text{C}$ (TR1:NPN)

Parameter	Symbol	Min.	Typ.	Max.	Unit
DC Current Gain at $V_{CE} = 5\text{ V}$ , $I_C = 10\text{ mA}$	$h_{FE}$	50	-	-	-
Collector Base Breakdown Voltage at $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)CBO}$	50	-	-	V
Collector Emitter Breakdown Voltage at $I_C = 100\text{ }\mu\text{A}$	$V_{(BR)CEO}$	50	-	-	V
Collector Emitter Cut-off Current at $V_{CE} = 50\text{ V}$	$I_{CEO}$	-	-	500	nA
Emitter Base Cutoff Current at $V_{EB} = 5\text{ V}$	$I_{EBO}$	-	-	0.88	mA
Collector Emitter Saturation Voltage at $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$	$V_{CEsat}$	-	-	0.3	V
Input on Voltage at $V_{CE} = 0.2\text{ V}$ , $I_C = 5\text{ mA}$	$V_{I(ON)}$	-	-	2.4	V
Input off Voltage at $V_{CE} = 5\text{ V}$ , $I_C = 0.1\text{ mA}$	$V_{I(OFF)}$	1	-	-	V
Transition Frequency at $V_{CE} = 10\text{ V}$ , $I_C = 5\text{ mA}$	$f_T$	-	200	-	MHz

## Characteristics at $T_a = 25^\circ\text{C}$ (TR2:PNP)

Parameter	Symbol	Min.	Typ.	Max.	Unit
DC Current Gain at $-V_{CE} = 5\text{ V}$ , $-I_C = 10\text{ mA}$	$h_{FE}$	50	-	-	-
Collector Base Breakdown Voltage at $-I_C = 10\text{ }\mu\text{A}$	$-V_{(BR)CBO}$	50	-	-	V
Collector Emitter Breakdown Voltage at $-I_C = 100\text{ }\mu\text{A}$	$-V_{(BR)CEO}$	50	-	-	V
Collector Emitter Cut-off Current at $-V_{CE} = 50\text{ V}$	$-I_{CEO}$	-	-	500	nA
Emitter Base Cutoff Current at $-V_{EB} = 5\text{ V}$	$-I_{EBO}$	-	-	0.88	mA
Collector Emitter Saturation Voltage at $-I_C = 10\text{ mA}$ , $-I_B = 0.5\text{ mA}$	$-V_{CEsat}$	-	-	0.3	V
Input on Voltage at $-V_{CE} = 0.2\text{ V}$ , $-I_C = 5\text{ mA}$	$-V_{I(ON)}$	-	-	2.4	V
Input off Voltage at $-V_{CE} = 5\text{ V}$ , $-I_C = 0.1\text{ mA}$	$-V_{I(OFF)}$	1	-	-	V
Transition Frequency at $-V_{CE} = 10\text{ V}$ , $-I_C = 5\text{ mA}$	$f_T$	-	200	-	MHz



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## Electrical Characteristics Curves(TR1)

Fig. 1 Output Characteristics Curve

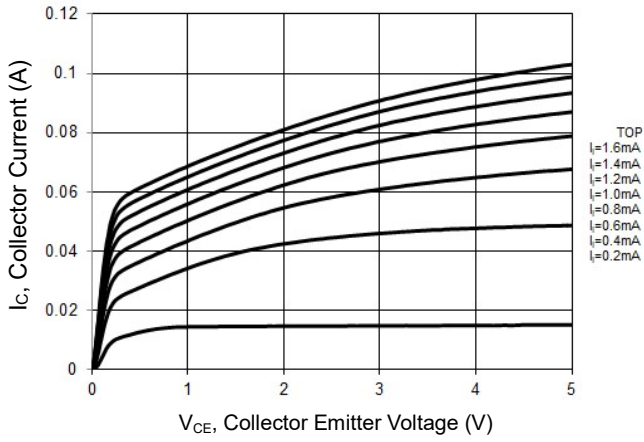


Fig. 2 Collector Current vs. Input on Voltage

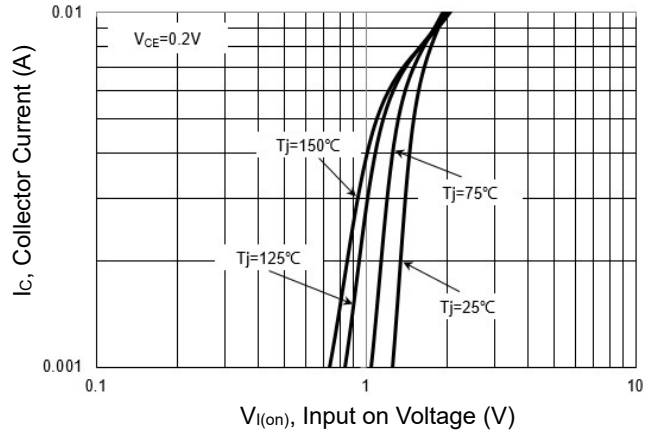


Fig. 3 Collector Current vs. Input off Voltage

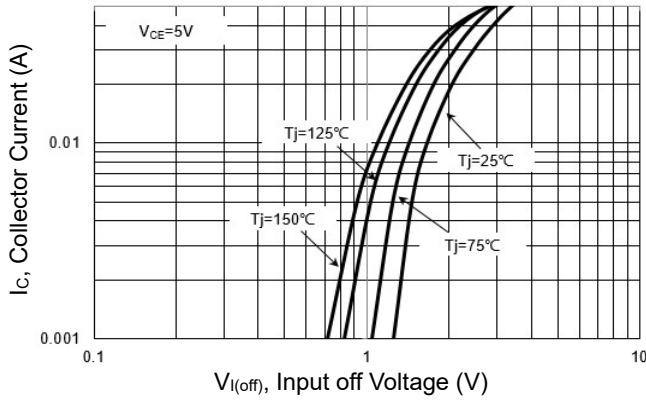


Fig. 4 DC Current Gain vs. Collector Current

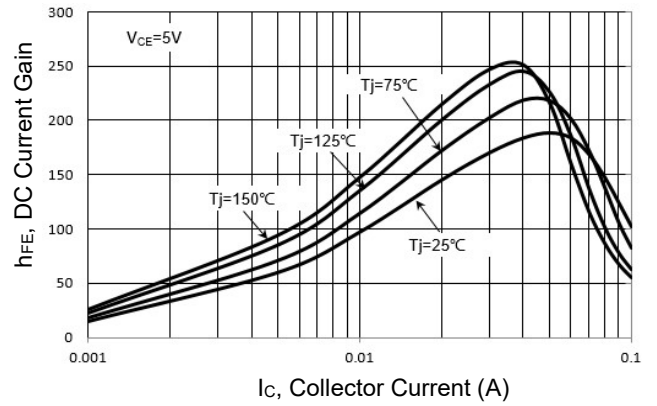
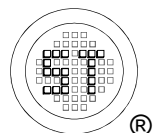
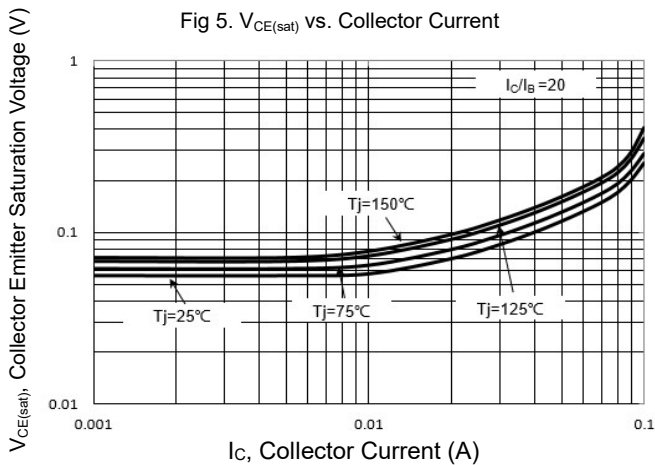


Fig 5.  $V_{CE(sat)}$  vs. Collector Current



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## Electrical Characteristics Curves(TR2)

Fig. 1 Output Characteristics Curve

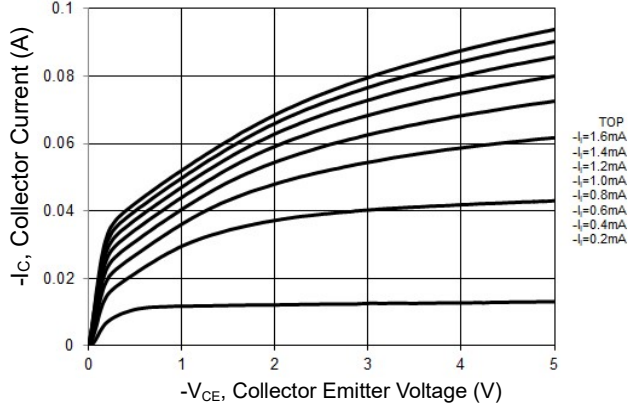


Fig. 2 Collector Current vs. Input on Voltage

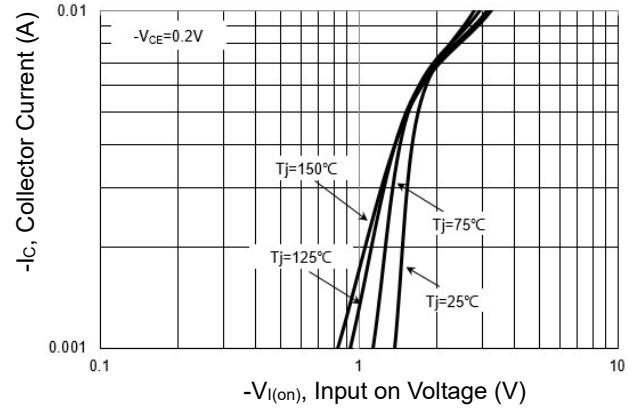


Fig. 3 Collector Current vs. Input off Voltage

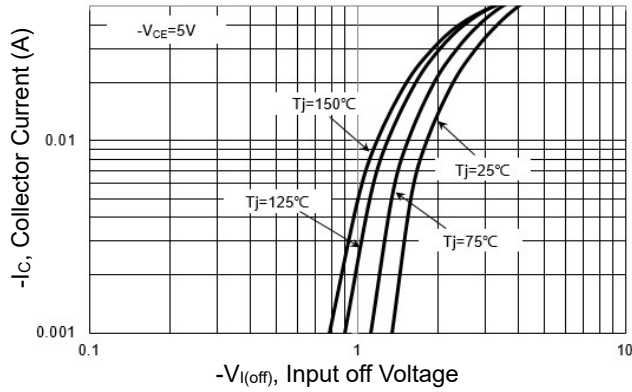


Fig 4. DC Current Gain vs. Collector Current

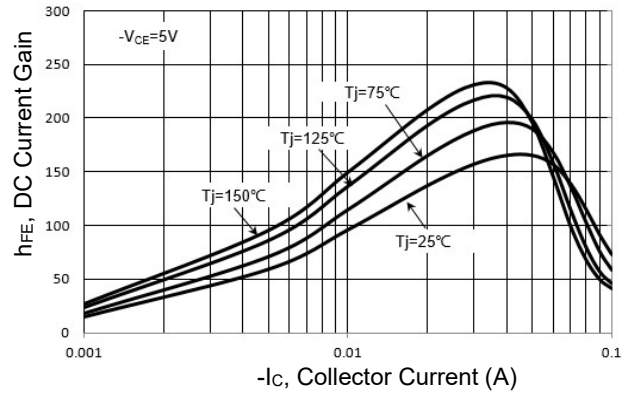
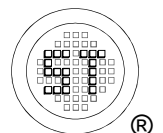
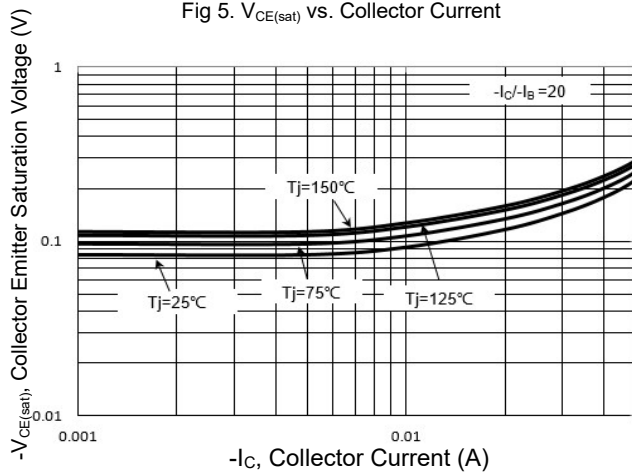


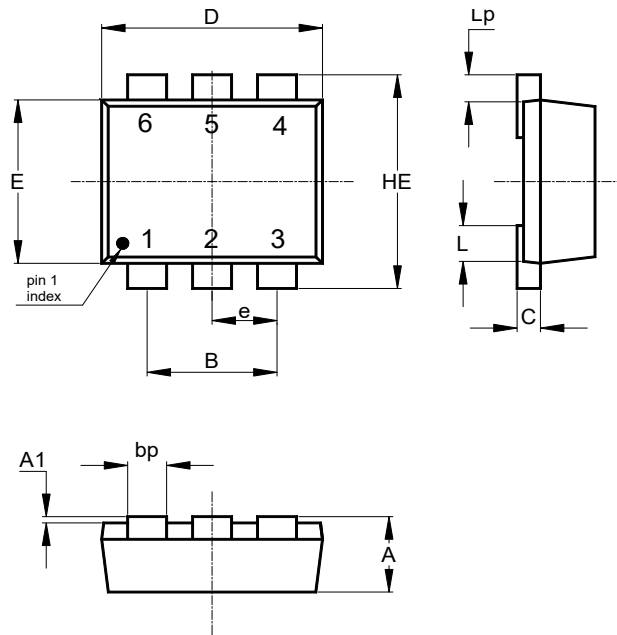
Fig 5. V<sub>CE(sat)</sub> vs. Collector Current



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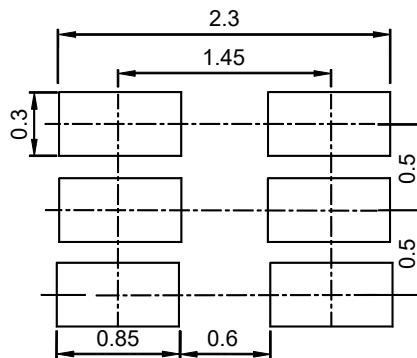
## Package Outline (Dimensions in mm)

SOT-563



Unit	A	A1	B	C	D	E	HE	e	L	Lp	bp
mm	0.6	0.05	1.0	0.18	1.7	1.25	1.7	0.5	0.15	0.3	0.3
	0.5	0	typ.	0.1	1.5	1.1	1.55	Typ.	0.02	0.1	0.15

## Recommended Soldering Footprint



## Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-563	8	4 ± 0.1	0.157 ± 0.004	178	7	4,000

## Marking information

- " D1 " = Part No.
- " YM " = Date Code Marking
- " Y " = Year
- " M " = Month
- Font type: Arial

