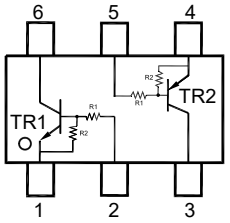
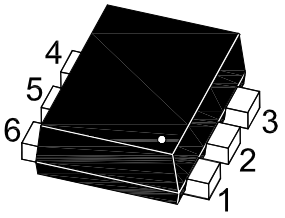
MMDTX241DE

Complementary NPN/PNP Silicon Epitaxial Planar Digital Transistors

Features

- With Built-in bias resistors
- Simplify circuit design





TR1: 1.Emitter 2.Base 6.Collector
TR2: 4.Emitter 5.Base 3.Collector
SOT-563 Plastic package

Resistor Values

R1 (KΩ)	R2 (KΩ)
22	22

Absolute Maximum Ratings at T_a = 25℃ (TR1)

Parameter	Symbol	Value	Unit
Collector Base Voltage	V_{CBO}	50	V
Collector Emitter Voltage	V_{CEO}	50	V
Emitter Base Voltage	V_{EBO}	6	V
Input Voltage	V_{IN}	40 to - 10	V
Collector Current	I_C	100	mA

Absolute Maximum Ratings at T_a = 25℃ (TR2)

Parameter	Symbol	Value	Unit
Collector Base Voltage	$-V_{CBO}$	50	V
Collector Emitter Voltage	$-V_{CEO}$	50	V
Emitter Base Voltage	$-V_{EBO}$	6	V
Input Voltage	V_{IN}	- 40 to 10	V
Collector Current	$-I_C$	100	mA

Absolute Maximum Ratings at T_a = 25℃ (TR1 and TR2)

Parameter	Symbol	Value	Unit
Total Power Dissipation [1)]	P_{tot}	500	mW
Thermal Resistance from Junction to Ambient [1)]	$R_{\theta JA}$	250	℃/W
Operating Junction and Storage Temperature Range	T_j, T_{stg}	- 55 to + 150	℃

[1)] Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.

Dated: 26/04/2023 Rev: 02

Characteristics at T_a = 25℃ (TR1:NPN)

Parameter	Symbol	Min.	Typ.	Max.	Unit
DC Current Gain at V_{CE} = 10 V, I_C = 5 mA	h_{FE}	60	-	-	-
Collector Base Breakdown Voltage at I_C = 10 μA	$V_{(BR)CBO}$	50	-	-	V
Collector Emitter Breakdown Voltage at I_C = 2 mA	$V_{(BR)CEO}$	50	-	-	V
Collector Base Cut-off Current at V_{CB} = 50 V	I_{CBO}	-	-	100	nA
Collector Emitter Cut-off Current at V_{CE} = 50 V	I_{CEO}	-	-	500	nA
Emitter Base Cutoff Current at V_{EB} = 6 V	I_{EBO}	-	-	200	μA
Collector Emitter Saturation Voltage at I_C = 10 mA, I_B = 0.3 mA	$V_{CE(sat)}$	-	-	250	mV
Input on Voltage at V_{CE} = 0.2 V, I_C = 5 mA	$V_{I(ON)}$	-	1.9	-	V
Input off Voltage at V_{CE} = 5 V, I_C = 0.1 mA	$V_{I(OFF)}$	-	1.2	-	V
Output on Voltage at V_{CC} = 5 V, V_B = 2.5 V, R_L = 1 KΩ	V_{OL}	-	-	0.2	V
Output off Voltage at V_{CC} = 5 V, V_B = 0.5 V, R_L = 1 KΩ	V_{OH}	4.9	-	-	V
Input Resistor	R1	15.4	22	28.6	KΩ
Resistor Ratio	R1/R2	0.8	1	1.2	-

Characteristics at T_a = 25℃ (TR2:PNP)

Parameter	Symbol	Min.	Typ.	Max.	Unit
DC Current Gain at $-V_{CE}$ = 10 V, $-I_C$ = 5 mA	h_{FE}	60	-	-	-
Collector Base Breakdown Voltage at $-I_C$ = 10 μA	$-V_{(BR)CBO}$	50	-	-	V
Collector Emitter Breakdown Voltage at $-I_C$ = 2 mA	$-V_{(BR)CEO}$	50	-	-	V
Collector Base Cut-off Current at $-V_{CB}$ = 50 V	$-I_{CBO}$	-	-	100	nA
Collector Emitter Cut-off Current at $-V_{CE}$ = 50 V	$-I_{CEO}$	-	-	500	nA
Emitter Base Cutoff Current at $-V_{EB}$ = 6 V	$-I_{EBO}$	-	-	200	μA
Collector Emitter Saturation Voltage at $-I_C$ = 10 mA, $-I_B$ = 0.3 mA	$-V_{CE(sat)}$	-	-	250	mV
Input on Voltage at $-V_{CE}$ = 0.2 V, $-I_C$ = 5 mA	$-V_{I(ON)}$	-	2	-	V
Input off Voltage at $-V_{CE}$ = 5 V, $-I_C$ = 0.1 mA	$-V_{I(OFF)}$	-	1.2	-	V
Output on Voltage at $-V_{CC}$ = 5 V, $-V_B$ = 2.5 V, R_L = 1 KΩ	$-V_{OL}$	-	-	0.2	V
Output off Voltage at $-V_{CC}$ = 5 V, $-V_B$ = 0.5 V, R_L = 1 KΩ	$-V_{OH}$	4.9	-	-	V
Input Resistor	R1	15.4	22	28.6	KΩ
Resistor Ratio	R1/R2	0.8	1	1.2	-

Electrical Characteristics Curves(TR1 NPN)

Fig 1. $V_{I(ON)}$ vs. Collector Current

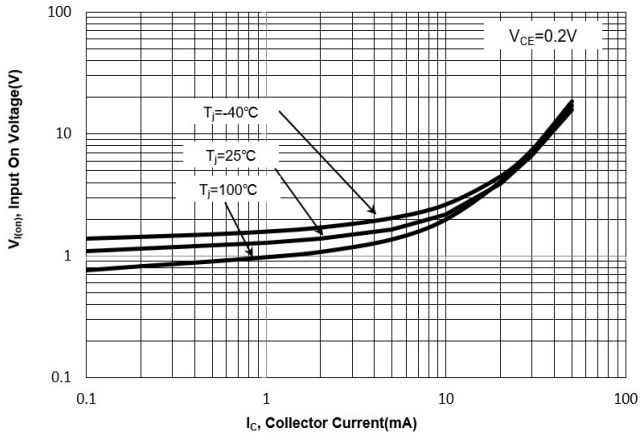


Fig 2. $V_{I(off)}$ vs. Collector Current

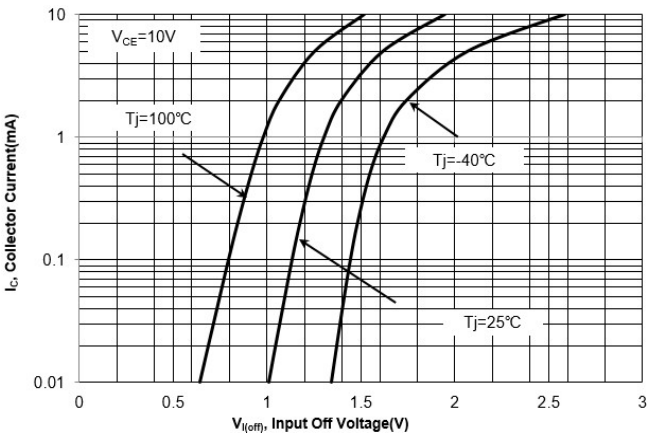


Fig 3. DC Current Gain vs. Collector Current

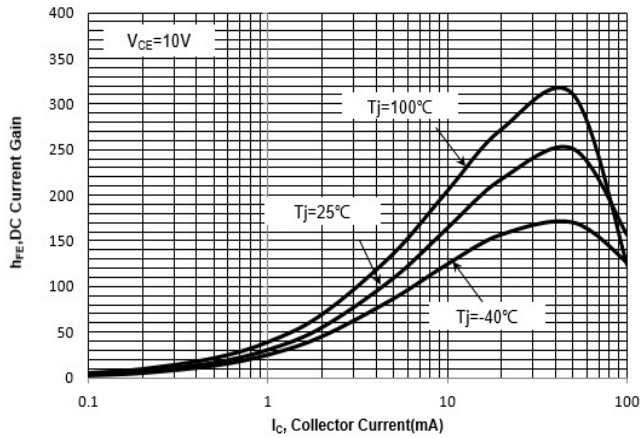
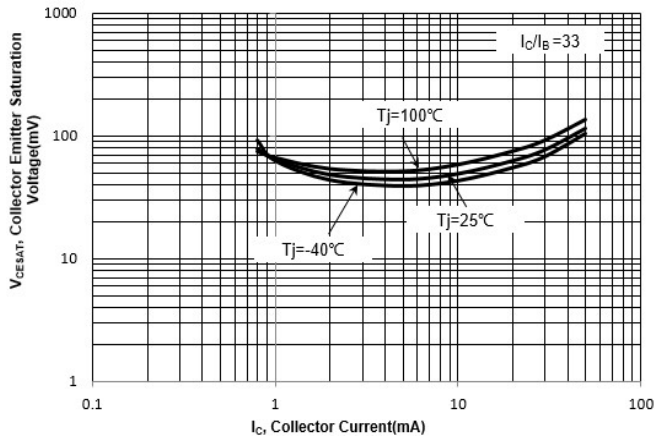


Fig 4. $V_{CE(sat)}$ vs. Collector Current



Electrical Characteristics Curves(TR2 PNP)

Fig 1. $V_{I(ON)}$ vs. Collector Current

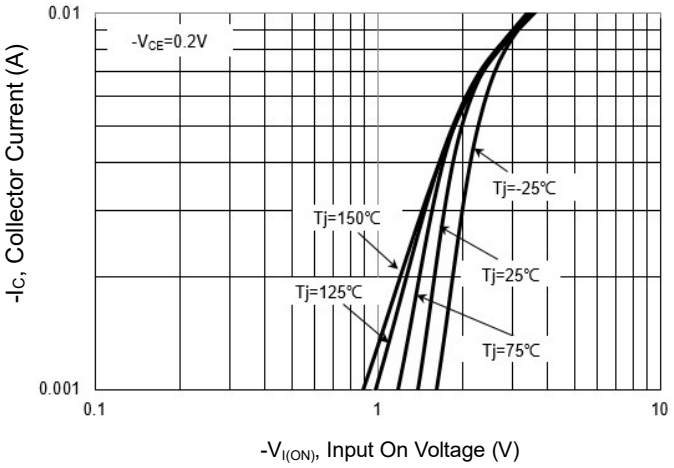


Fig 2. $V_{I(off)}$ vs. Collector Current

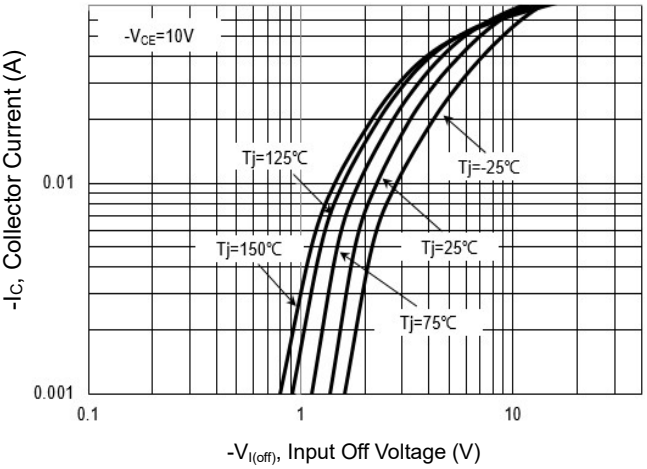


Fig 3. DC Current Gain vs. Collector Current

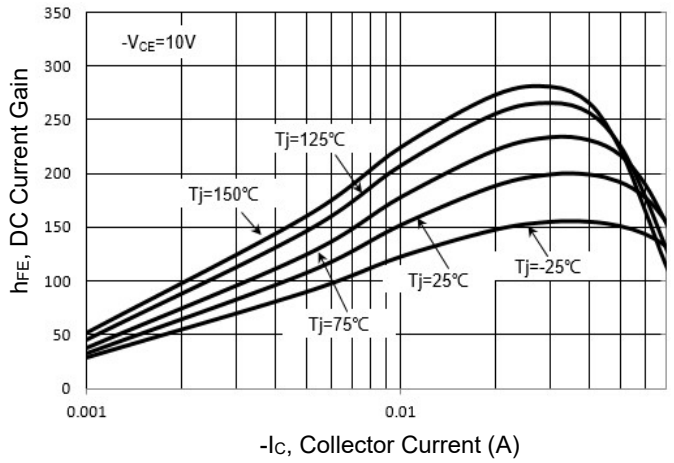
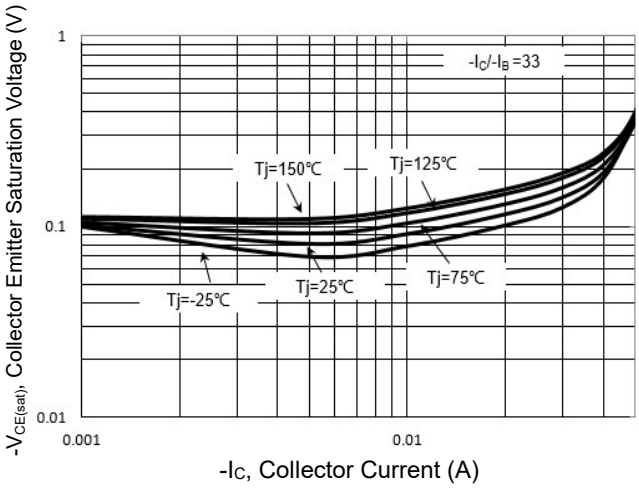
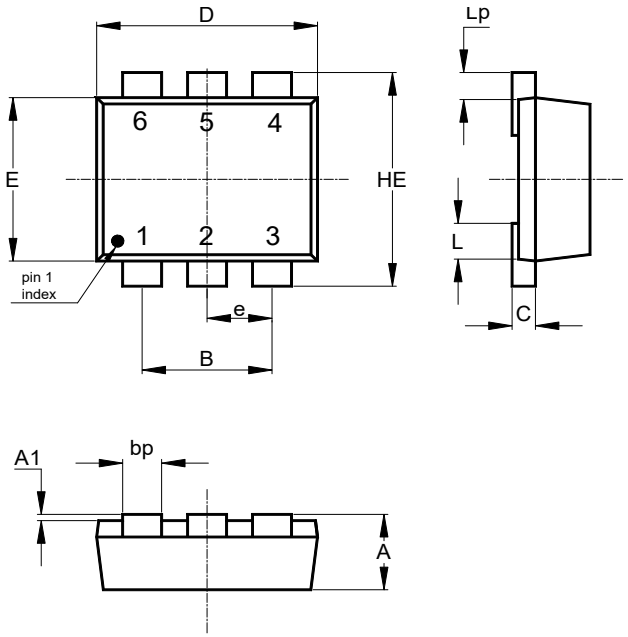


Fig 4. $V_{CE(sat)}$ vs. Collector Current

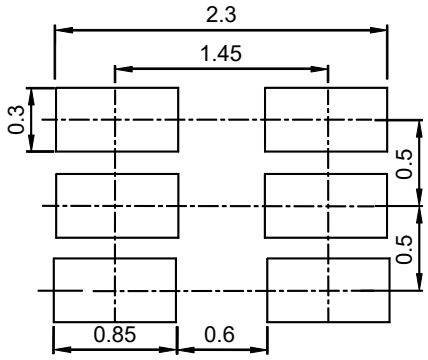


Package Outline (Dimensions in mm) SOT-563



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

" SB " = Part No.

" YM " = Date Code Marking

" Y " = Year

" M " = Month

Font type: Arial