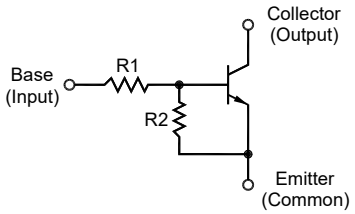
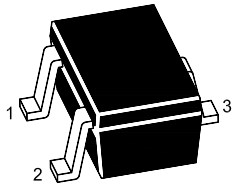
MMDT5210W…MMDT521ZW

NPN Silicon Epitaxial Planar Digital Transistor





1.Base 2.Emitter 3.Collector
SOT-323 Plastic Package

Resistance Values

Type	R1 (KΩ)	R2 (KΩ)	Type	R1 (KΩ)	R2 (KΩ)
MMDT5210W	47	-	MMDT521DW	47	10
MMDT5211W	10	10	MMDT521EW	47	22
MMDT5212W	22	22	MMDT521FW	4.7	10
MMDT5213W	47	47	MMDT521KW	10	4.7
MMDT5214W	10	47	MMDT521LW	4.7	4.7
MMDT5215W	10	-	MMDT521MW	2.2	47
MMDT5216W	4.7	-	MMDT521NW	4.7	47
MMDT5217W	22	-	MMDT521TW	22	47
MMDT5218W	0.51	5.1	MMDT521VW	2.2	2.2
MMDT5219W	1	10	MMDT521ZW	4.7	22

Absolute Maximum Ratings (T_a = 25℃)

Parameter	Symbol	Value	Unit
Collector Base Voltage	V_{CBO}	50	V
Collector Emitter Voltage	V_{CEO}	50	V
Collector Current	I_C	100	mA
Total Power Dissipation	P_{tot}	200	mW
Junction Temperature	T_j	150	℃
Storage Temperature Range	T_{stg}	- 55 to + 150	℃

Dated: 27/02/2021 Rev: 04

Characteristics at T_a = 25°C

Parameter		Symbol	Min.	Typ.	Max.	Unit
DC Current Gain						
at V_{CE} = 5 V, I_C = 10 mA	MMDT5218/521K/521L/521VW		20	-	-	-
	MMDT5219/521D/521FW		30	-	-	-
	MMDT5211W		35	-	-	-
	MMDT5212/521EW	h_{FE}	60	-	-	-
	MMDT521ZW		60	-	200	-
	MMDT5213/5214/521MW		80	-	-	-
	MMDT521N/521TW		80	-	400	-
	MMDT5210/5215/5216/5217W [1]		160	-	460	-
Collector Base Cutoff Current at V_{CB} = 50 V		I_{CBO}	-	-	100	nA
Emitter Base Cutoff Current						
at V_{EB} = 6 V	MMDT5210/5215/5216/5217W		-	-	0.01	
	MMDT5213W		-	-	0.1	
	MMDT5212/5214/521D/521E/521M/521N/521TW		-	-	0.2	
	MMDT521ZW	I_{EBO}	-	-	0.4	mA
	MMDT5211W		-	-	0.5	
	MMDT521F/521KW		-	-	1	
	MMDT5219W		-	-	1.5	
	MMDT5218/521L/521VW		-	-	2	
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 Emitter Saturation Voltage at I_C = 10 mA, I_B = 0.5 mA		V_{CEsat}	-	-	0.3	V
Transition Frequency at V_{CB} = 10 V, $-I_E$ = 5 mA, f = 100 MHz		f_T	-	250	-	MHz
Input Voltage (ON)						
at V_O = 0.3 V, I_O = 20 mA	MMDT521V/521L/5219/5218W		-	-	3	
at V_O = 0.3 V, I_O = 20 mA	MMDT521FW		-	-	2.5	
at V_O = 0.3 V, I_O = 2 mA	MMDT521TW		-	-	2.5	
at V_O = 0.3 V, I_O = 2 mA	MMDT521DW		-	-	5	
at V_O = 0.3 V, I_O = 2 mA	MMDT521EW		-	-	4	
at V_O = 0.3 V, I_O = 10 mA	MMDT5211W	$V_{I(ON)}$	-	-	3	V
at V_O = 0.2 V, I_O = 5 mA	MMDT5212W		-	-	3	
at V_O = 0.3 V, I_O = 2 mA	MMDT5213/521KW		-	-	3	
at V_O = 0.3 V, I_O = 5 mA	MMDT521MW		-	-	1.1	
at V_O = 0.2 V, I_O = 5 mA	MMDT521ZW		-	-	1.7	
at V_O = 0.3 V, I_O = 5 mA	MMDT521NW		-	-	1.3	
at V_O = 0.3 V, I_O = 1 mA	MMDT5214W		-	-	1.4	

[1] h_{FE} Rank Classification: Q: 160~260, R: 210~340, S: 290~460, No-rank: 160~460

Characteristics at T_a = 25℃

Parameter		Symbol	Min.	Typ.	Max.	Unit
Input Voltage (OFF) at V_{CC} = 5 V, I_O = 100 μA	MMDT521V/521L/5211/5212/5213W	$V_{I(OFF)}$	0.5	-	-	V
	MMDT5218/5219/521M/521Z/521NW		0.5	-	-	
	MMDT521F/5214W		0.3	-	-	
	MMDT521TW		0.4	-	-	
	MMDT521DW		1	-	-	
	MMDT521K/521EW		0.8	-	-	
Input Resistance	MMDT5218W	R1	- 30%	0.51	+ 30%	KΩ
	MMDT5219W			1		
	MMDT521M/521V			2.2		
	MMDT5216/521F/521L/521N/521ZW			4.7		
	MMDT5211/5214/5215/521KW			10		
	MMDT5212/5217/521TW			22		
	MMDT5210/5213/521D/521EW			47		
Resistance Ratio	MMDT521MW	R1/R2	-	0.047	-	-
	MMDT521NW		-	0.1	-	-
	MMDT5218/5219W		0.08	0.1	0.12	-
	MMDT521ZW		-	0.21	-	-
	MMDT5214W		0.17	0.21	0.25	-
	MMDT521TW		-	0.47	-	-
	MMDT521FW		0.37	0.47	0.57	-
	MMDT521VW		-	1	-	-
	MMDT5211/5212/5213/521LW		0.8	1	1.2	-
	MMDT521KW		1.7	2.13	2.6	-
	MMDT521EW		1.7	2.14	2.6	-
	MMDT521DW		3.7	4.7	5.7	-

Electrical Chara cteristics Curves (MMDT5211W)

Fig 1. Output Characteristics

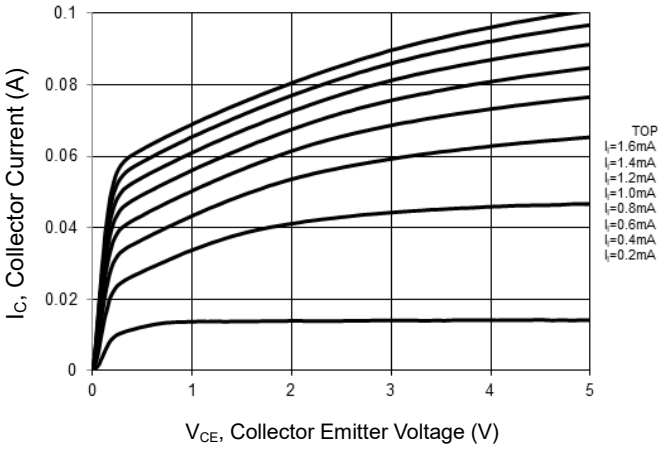


Fig 2. Collector Current vs. $V_{I(ON)}$

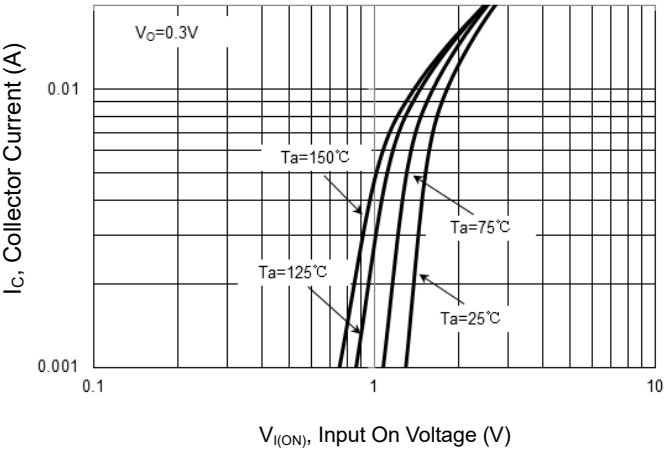


Fig 3. Collector Current vs. $V_{I(off)}$

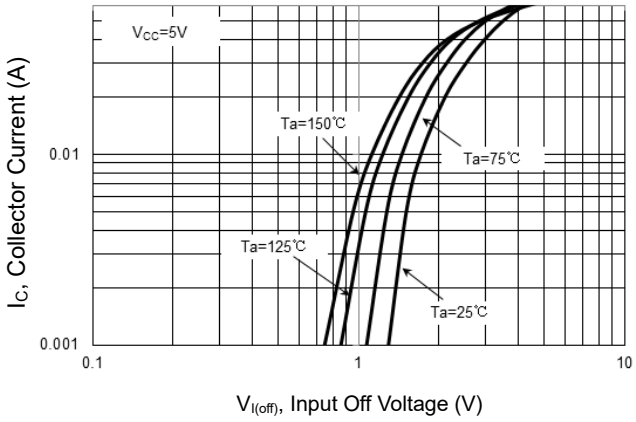


Fig 4. DC Current Gain vs. Collector Current

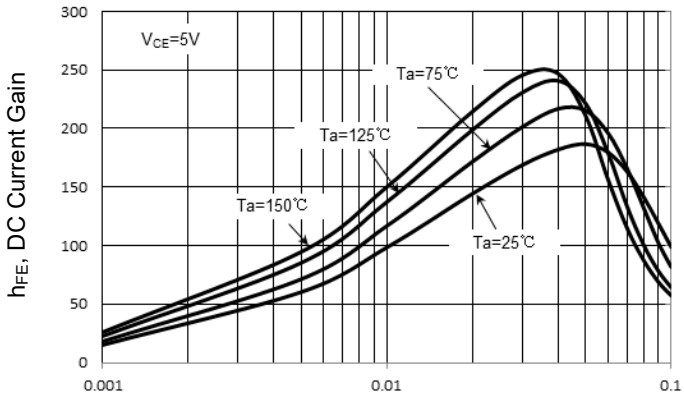
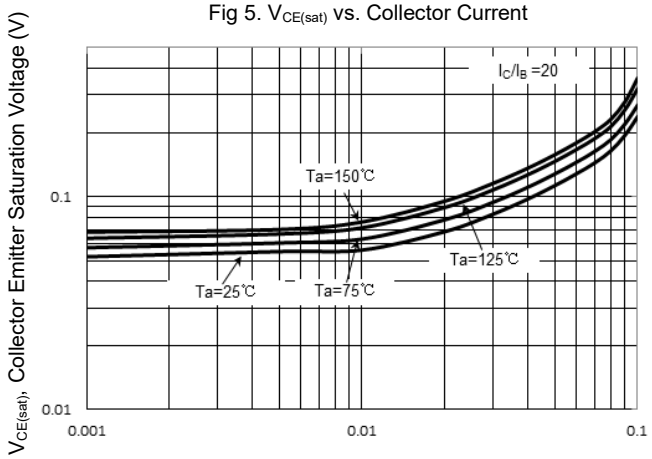


Fig 5. $V_{CE(sat)}$ vs. Collector Current



Electrical Characteristics Curves (MMDT5213W)

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

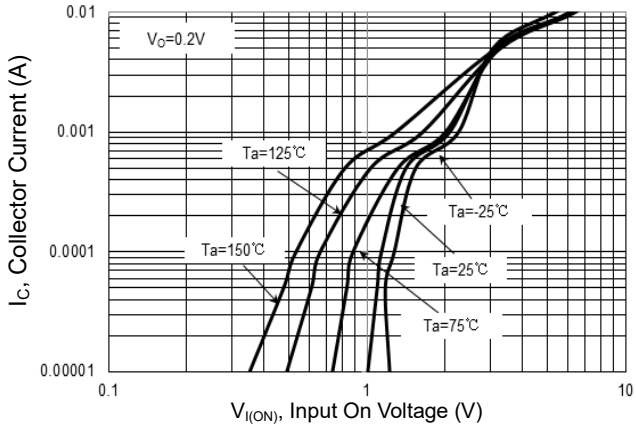


Fig 2. Collector Current vs. $V_{I(off)}$

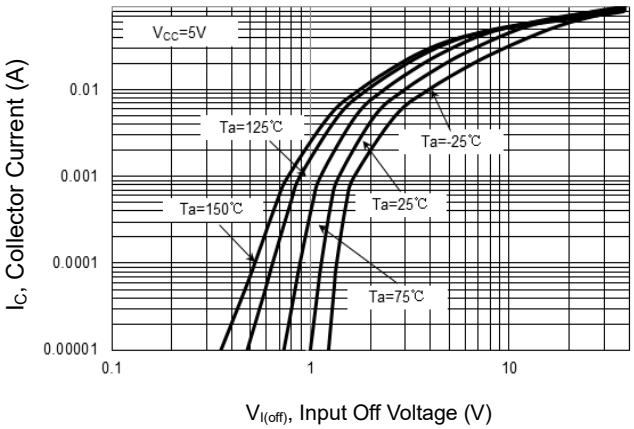


Fig 3. DC Current Gain vs. Collector Current

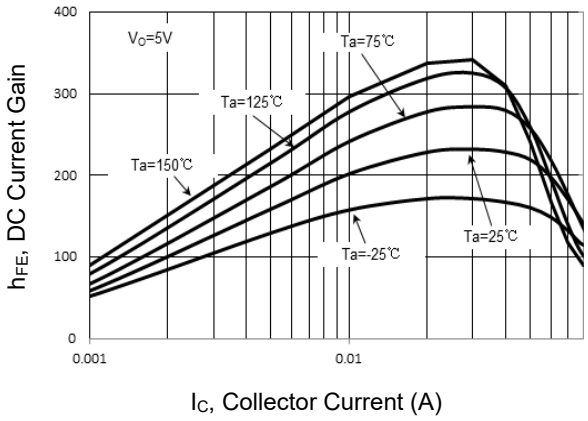
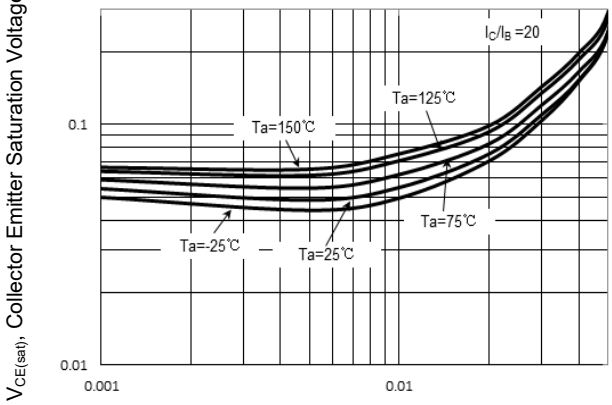


Fig 4. $V_{CE(sat)}$ vs. Collector Current



Electrical Characteristics Curves (MMDT521NW)

Fig 1. Output Characteristics

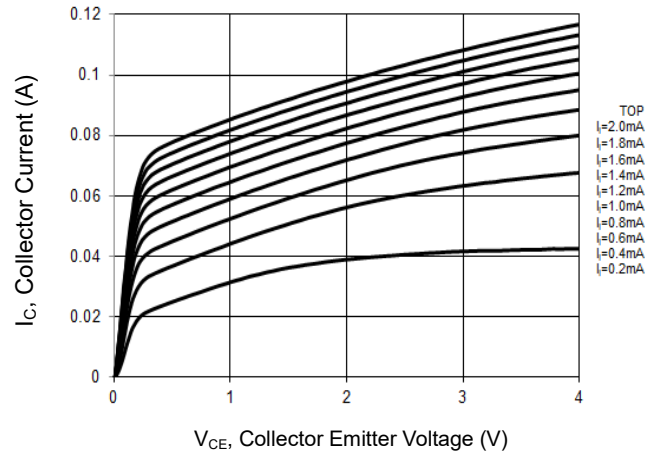


Fig 2. Collector Current vs. $V_{I(ON)}$

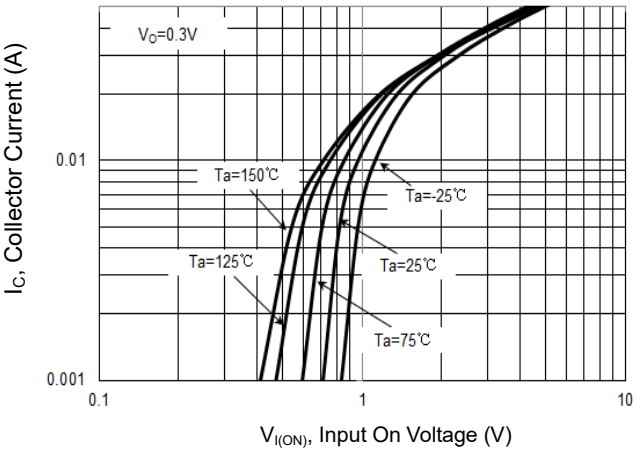


Fig 3. Collector Current vs. $V_{I(off)}$

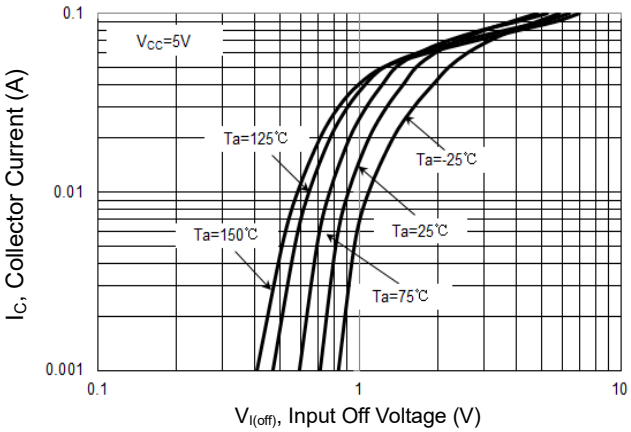


Fig 4. DC Current Gain vs. Collector Current

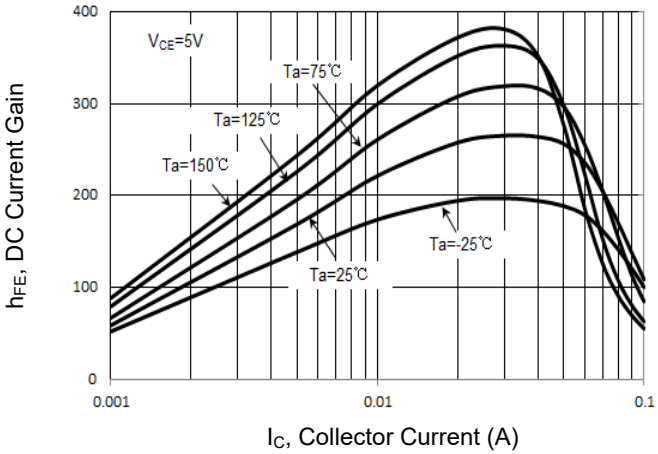
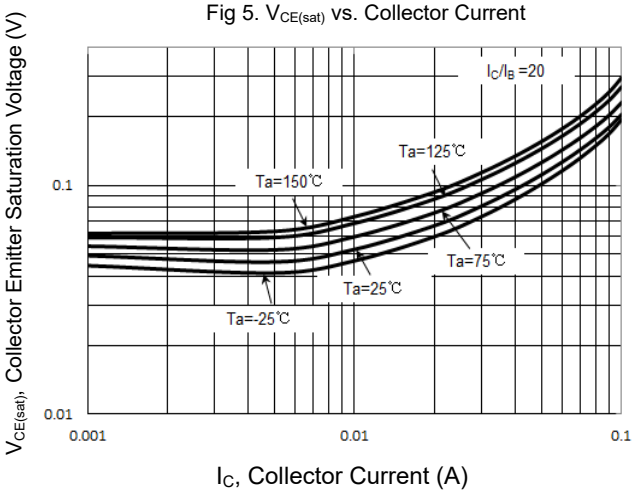


Fig 5. $V_{CE(sat)}$ vs. Collector Current



Electrical Characteristics Curves (MMDT521TW)

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

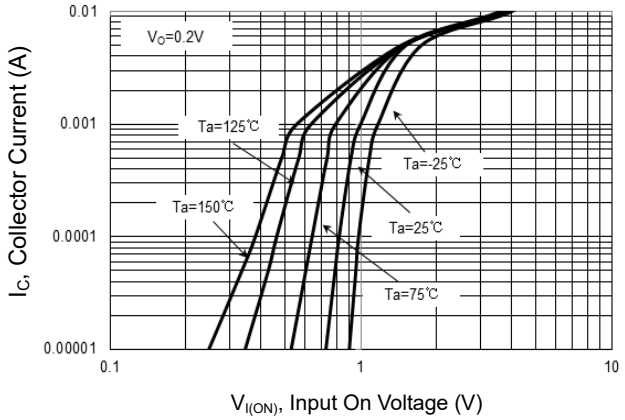


Fig 2. Collector Current vs. $V_{I(off)}$

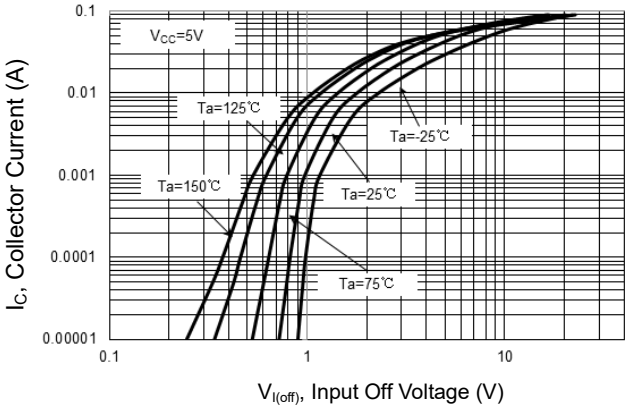


Fig 3. DC Current Gain vs. Collector Current

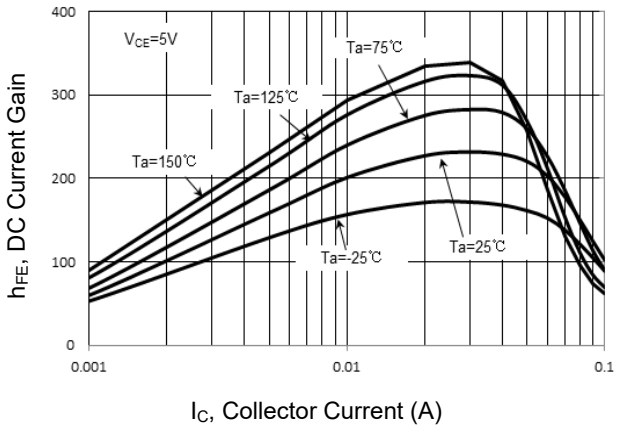
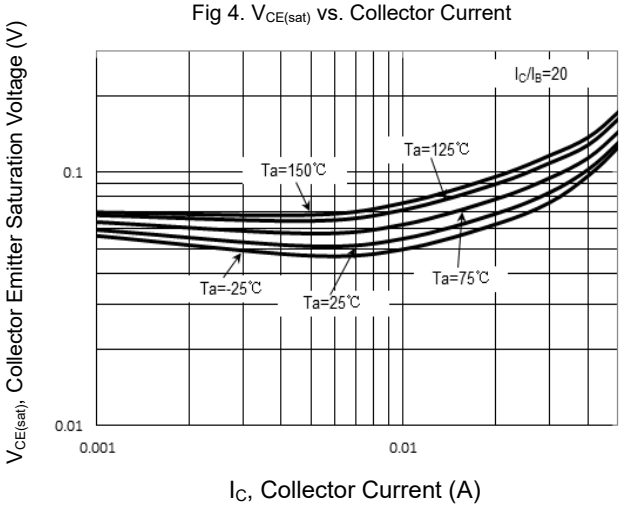
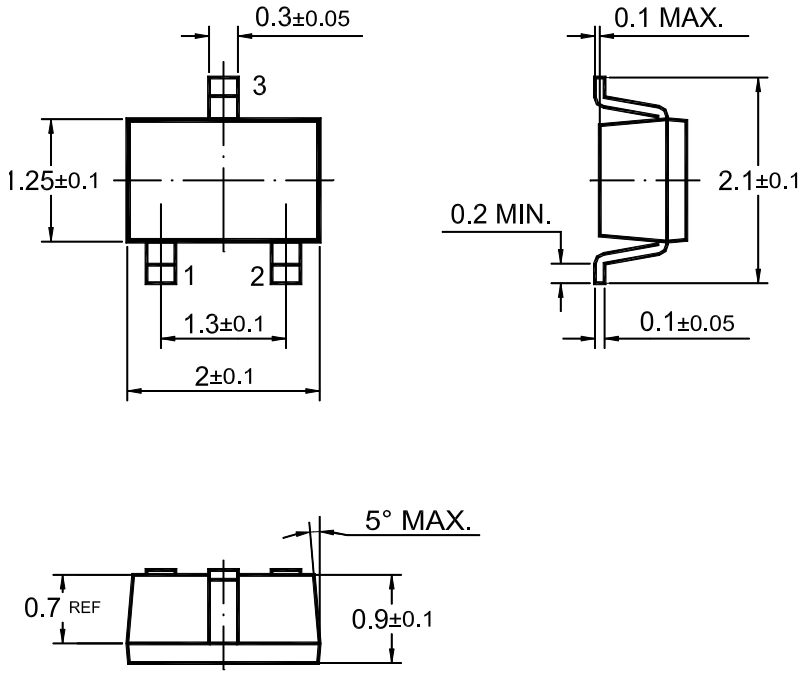


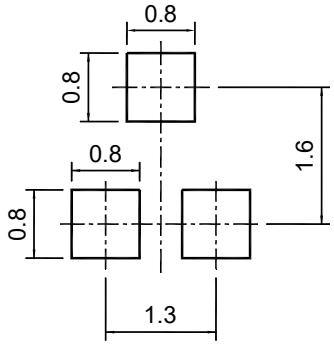
Fig 4. $V_{CE(sat)}$ vs. Collector Current



PACKAGE OUTLINE(Dimensions in mm) SOT-323



Recommended Soldering Footprint



Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-323	8	4 ± 0.1	0.157 ± 0.004	178	7	3,000

Marking information

" ** " = Part No.

" YM " = Date Code Marking

" Y " = Year

" M " = Month

Font type: Arial