

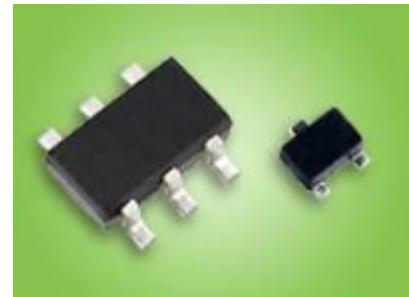
Introduction to Toshiba small package Bipolar Transistors

Toshiba offers a wide range of Bipolar Transistors (BJT : Bipolar junction transistor) mounted in small packages, including single-type and combined-type diodes.

Toshiba, a leading company in transistors

Since Toshiba succeeded in developing a transistor in 1951, it has been one of the major transistor vendors [Note] who have continued to market products as a pioneer in the industry since the early days of semiconductors. We will continue to provide a wide range of highly reliable transistor products based on our experience in delivering products to many customers.

[Note] according to a survey by Toshiba (as of November 25th, 2021)



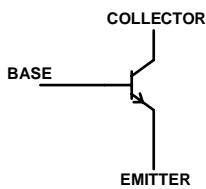
High-quality, safe and secure delivery at plants in Japan and Thailand

Our transistor products are mainly surface-mount type small packages. High-quality, stable production at plants in Japan and Thailand enables safe and safety delivery. We will respond quickly and seriously to sudden delivery problems as well.

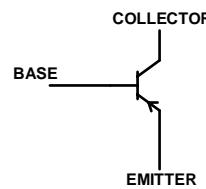
Transistor overview

A bipolar transistor is one of the typical semiconductors that controls the current flowing through the collector by the base current, and to operate as "amplification" and "switching" on the electric circuit. As shown in the figure below, there are two types, NPN type and PNP type.

NPN Transistor



PNP Transistor



When selecting a transistor product, it is necessary to consider the breakdown voltage (VCEO: collector-emitter withstand voltage), current (IC: collector current), hFE: DC current amplification factor, package / mounting area, etc.

Features of bipolar transistor

Bipolar transistors have the following advantages and disadvantages compared to MOSFETs. We recommend the optimum usage according to the circuit to be used.

	Bipolar transistor	MOSFET
Advantages	<ul style="list-style-type: none">- Strong ESD susceptibility- High breakdown voltage (VCEO)- The transistor turns on even if the base voltage is low.	<ul style="list-style-type: none">- There are a few external parts- Switching speed is fast- Current does not flow into the gate terminal
Disadvantages	<ul style="list-style-type: none">- Switching speed is slow- Large number of external parts	<ul style="list-style-type: none">- ESD susceptibility is relatively weak- The gate voltage (V_{th}) required to turn on the MOSFET is generally higher than bipolar transistors- It is necessary to pay attention to the influence of the body diode when using it

• Bipolar Transistors selection table
[Single product]

Classification	V _{CEO} (V)	I _c (mA)	CST3 (SOT-883)	Bottom View	VESM (SOT-723)	SSM (SOT-416)
			Part Number			
			NPN	PNP	NPN	PNP
General Purpose	50	100	2SC6026CT	2SA2154CT		
	50	150			2SC6026MFV	2SA2154MFV
					2SC4738	2SA1832

Classification	V _{CEO} (V)	I _c (mA)	USM (SOT-323)	UFM (SOT-323F)	S-Mini (SOT-346)	SOT23 (SOT-23)	SOT-23F	
			Part Number					
			NPN	PNP	NPN	PNP	NPN	PNP
General Purpose	30	500				2SA1182		
	50	150	2SC4116	2SA1586		2SC2712	2SA1162	TBC847
			TTC4116FU	TTA1586FU				TBC857
	50	500					TMBT3904	TMBT3906
						2SC3325	2SA1313	
Low Saturation Noise	120	100	2SC4117	2SA1587		2SC2713	2SA1163	
	15	800					2SA1362	
Muting	20	300	2SC4213			2SC3326		
High Current	20	2500			2SA2215			TTA502
	25	800			2SC3265	2SA1298		
	50	1000		2SC6135				TTC500
	50	1700			2SA2195			TTA500
	50	2000						TTA501
	50	2500		2SC6100				
High Breakdown	120	1000					TTC501	
	300	100				2SA1721		

☆ New Products

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