

TOSHIBA

Leading Innovation >>>

Semiconductor Catalog Mar. 2013

Bipolar Power Transistors



Transistors

Transistors

Transistors

Transistors

Transistor

Toshiba Bipolar Power Transistors

Thank you for purchasing Toshiba semiconductor products. Semiconductor products are used in a wide range of fields, including commercial and industrial applications. This product guide includes a list of products categorized by functions and applications, a list of packages, tape packing information, a list of lead-formed products, an overall list of devices and a set of package diagrams. We hope that this guide will assist you in selecting products. For further details of specific devices, please refer to the relevant technical datasheets.

Bipolar Power Transistors for Switching Power Supplies

Using a crystal mesh pattern, Toshiba has reduced the storage time (tstg) and fall time (tf) of 400-V and 800-V power transistors for switching power supplies. In addition, we have developed power transistors in a low-profile package. These types of transistor are suitable for low-output AC adapters and ballast lamp applications.

Bipolar Power Transistor

Bipolar Power Transistors SMD Series

With smaller and thinner electronic devices fuelling demand for SMD-type power transistors, Toshiba provides the following packages to meet manufacturers' needs.

- PW-Mini • PW-Mold
- TSM • VS-6 • PS-8 • SMV

Bipolar Power Transistors for Audio Power Amplifiers

Using a minute pattern and a high-density MET design, Toshiba has achieved high levels of current efficiency.

Package type can be selected to yield collector power output ranging from 60 W to 220 W. A wide selection of packages, including the TO-3P(N) and TO-3P(L), is available.

Low- $V_{CE(sat)}$ Bipolar Transistor Series

Toshiba power transistors feature a V_{CEO} of 10 V to 100 V and an I_C of 1 A to 7 A, with various surface-mount packages. Ultra-high-speed switching transistors and transistors with an SBD or S-MOS are also available.

CONTENTS

Selection Guide by Functions and Applications ...4

- Radio-Frequency Switching Power Transistors
(2SA*****/2SC*****/TTA*****/TTC*****) 4
- Low-Frequency Power Transistors
(2SB*****/2SD*****/TTB*****/TTD*****) 5
- Audio Power Amplifiers 6
- Switching Power Supplies 7
 - AC-DC Converters 7
- Low $V_{CE(sat)}$ Series 8
- Ultra-High-Speed Switching Series 9
- Transistors for MOS Gate Drivers/
Compact Motor Drivers 10

Recommended Transistors for Various Application Circuits.....11

- Inverter Circuits for LCD Backlighting 11
- Strobe Circuits for DSCs / Cameras 11
- Battery Charge Circuits 12
- General-Purpose Load Switches 12
- HDD Dropper Power Supplies 13
- DC-DC Converters for Various Information Devices 13
- Self-Excited DC-DC Converters for AC Adapters Used in
Cell Phones / Amusement Equipment 14
- Audios 14
- For High-Voltage Power Supplies 15

Product Lineup by Packages.....16

- TO-126N 16
- TO-220 Series 16
- TO-3P Series 16
 - TO-3P(N) 16
 - TO-3P(L) 17
- PW-Mini(SC-62) 17
- TFP 18
- PW-Mold(SC-63/64) 18
- TSM 19
- SMV 19
- VS-6 20
- PS-8 20

Standard Tape Packing for Automated Pick-and-Place Assembly21

Package Lineup22

Product Lineup23

Product Obsolescence24

Selection Guide by Functions and Applications

▶ Radio-Frequency Switching Power Transistors (2SA**** / 2SC**** / TTA**** / TTC****)

V _{CE0} (V) I _c (A)	10/(15)	20	30	45	50
0.2					2SA1483 (◎)
1	TPC6D02 (15 V) (&)(Δ)		HN4B101J (NPN: 1.2A) (M)(V)		2SA2070 (◎) TPC6701 (W)(Δ) 2SC5810 (◎) TPC6901A (PNP: 0.7A) (M)(Δ) TPCP8901 (PNP: 0.8A) (M)(P) TTA007 (T) TPC6604 (T) TTC007 (T) TPC6504 (Δ)
1.2		TPC6D03 (&)(Δ)	TPCP8801 (W)(P)		
1.5	2SA2058 (T)	2SA2065 (T) 2SA2069 (◎) 2SC5784 (◎) 2SC5819 (◎) TPC6503 (Δ)			
2	2SA2066 (◎) 2SC5755 (T) 2SC5785 (◎) TPC6501 (Δ) TPC6602 (Δ) TPCP8504 (P)		TPCP8902 (M)(P) TPC6902 (M)(Δ) HN4B102J (PNP: 1.8A) (M)(V)		2SA1241 (◇) 2SA2056 (T) TPC6601 (Δ) 2SA2060 (W)(P) 2SC3076 (◎) TPCP8701 (◎)
2.5		2SA2061 (T)			2SC5692 (T) 2SC6033 (T) TPCP8602 (P)
3		2SA2059 (◎) TPCP8F01 (\$)(P) TPC6603 (Δ) TPCP8G01 (\$)(P)		2SC5976 (T) TPCP8H02 (\$)(P)	2SC5712 (◎) TPC6502 (Δ) TPCP8505 (P) 2SC6126 (◎)
3.5			2SC5738 (T)		
4	2SC5713 (◎)	TPCP8601 (◎) 2SC5714 (◎) 2SC6125 (◎) (P)		2SC5906 (T)	2SC5703 (T)
5					2SA1244 (◇) 2SA2097 (◇) 2SC5886A (◇)
7					2SC6000 (◇)

V _{CE0} (V) I _c (A)	80	100	120	140	160
1			TPCP8603 (P) TPCP8507 (P) TPCP8510 (P) 2SC6061 (T)		
1.5					2SA1225 (◇) TTA004B (◎) TTC004B (◎)
2	TTA008B (◎) 2SA2206 (◎)	TTC015B (◎) 2SC6124 (◎)	TPCP8501 (P)		
3	TTA003 (◇)	2SC6076 (◇)			
5		2SC3303 (◇)			
10				2SA1941 (▽) 2SC5198 (▽)	
12	TTA1452B (▲)	TTC3710B (▲)			2SA1942 (※) 2SC5199 (※)
18					TTA0001 (▽) TTA0002 (※) TTC0001 (▽) TTC0002 (※)

Part number in red signifies a new product. ■ : Being planned

Legend

(◎) TO-126N	(▲) TO-220SIS	(▽) TO-3P(N)	(※) TO-3P(L)	(◎) PW-Mini	(◇) PW-Mold	(T) TSM	(Δ) VS-6
(P) PS-8	(V) SMV	(W) 2 in 1 NPN(or PNP)×2	(&) 2-in-1 (Transistor + Diode)	(M) 2 in 1 NPN+PNP			
(\$) Transistor + S-MOS		Part number in italic signifies built-in damper diode		2SA**** / 2SC****: complementary			

V _{CE0} (V)	200			230			285			400(370)			(550)600		
I _C (A)															
0.3										TPCP8604		(P)			
0.5										2SA1971	TTC013 (350 V)	(◎) (◎)	2SA2142		(◇)
1				■TTA006B	■TTC011B	(@)				TTC005		(◎)	2SA2184 (550 V)		(◇)
1.5										TTC008		(◇)	2SC6142 (375 V)		(◇)
2										2SA2034	2SC5548A TTC012 (375 V)	(◇) (◇)			
12	2SA2120	2SC5948	(▽)												
15	2SA2121	2SC5949	(※)	2SA1943 TTA1943	2SC5200 TTC5200	(※) (※)									
				2SA1962	2SC5242	(▽)									
				2SA1986	2SC5358	(▽)									
				2SA1987	2SC5359	(※)									
				2SA1943N	2SC5200N	(▽)									

V _{CE0} (V)	800		
I _C (A)			
0.05	■TTC5460B		(@)
	2SC6127		(◇)
5	2SC5354		(▽)

Part number in red signifies a new product. ■ : Being planned

Legend

(@) TO-126N	(▲) TO-220SIS	(▽) TO-3P(N)	(※) TO-3P(L)	(◎) PW-Mini	(◇) PW-Mold	(T) TSM	(△) VS-6
(P) PS-8	(V) SMV	(W) 2 in 1 NPN(or PNP)×2	(&) 2-in-1 (Transistor + Diode)	(M) 2 in 1 NPN+PNP			
(\$) Transistor + S-MOS	Part number in italic signifies built-in damper diode			2SA**** / 2SC****: complementary			

► Low-Frequency Power Transistors (2SB**** / 2SD**** / TTB**** / TTD****)

V _{CE0} (V)	60			80			100			120		
I _C (A)												
0.8	2SD2719		(¥)(%)(T)									
0.9										TPCP8L01		(&)(H)(P)
1	2SD2686		(¥)(%)(◎)									
2				■TTB1067B	■TTD1509B	(%)(@)						
3	2SB906 TTB001 TTB002		(◇) (♣) (◇)									
4					2SD1223	(%)(◇)						
7							TTB1020B	TTD1415B	(%)(▲)			

V _{CE0} (V)	250			400		
I _C (A)						
6		TTD1410B	(▲)		TTD1409B	(▲)

Part number in red signifies a new product. ■ : Being planned

Legend

(@) TO-126N	(▲) TO-220SIS	(▽) TO-3P(N)	(※) TO-3P(L)	(◎) PW-Mini	(◇) PW-Mold	(¥) Built-in zener diode	(%) Darlington
(T) TSM	(P) PS-8	(♣) TFP	(H) Built-in HED	Part number in italic signifies built-in freewheel diode			
2SB**** / 2SD****: complementary		(&) Transistor + Diode					

▶ Audio Power Amplifiers

Single Transistors

P _c (W)	Absolute Maximum Ratings		Polarity	New Product	Discontinued Product		Package
	V _{CE0} (V)	I _c (A)					
100	140	10	NPN	2SC5198	2SC3182N	2SD1148	TO-3P(N)
			PNP	2SA1941	2SA1265N	2SB863	
120	160	12	NPN	2SC5199	2SC3280		TO-3P(L)
			PNP	2SA1942	2SA1301		
130	230 (180)	15 (12)	NPN	2SC5242	2SC3907		TO-3P(N)
			PNP	2SA1962	2SA1516		
150	160	18	NPN	TTC0001			TO-3P(N)
			PNP	TTA0001			
150	230	15	NPN	2SC5358			TO-3P(N)
			PNP	2SA1986			
150	230	15	NPN	2SC5200N			TO-3P(N)
			PNP	2SA1943N			
150	230 (200)	15	NPN	2SC5200	2SC3281		TO-3P(L)
			PNP	2SA1943	2SA1302		
150	230	15	NPN	TTC5200			TO-3P(L)
			PNP	TTA1943			
180	160	18	NPN	TTC0002			TO-3P(L)
			PNP	TTA0002			
180	230	15	NPN	2SC5359			TO-3P(L)
			PNP	2SA1987			
200	200	12	NPN	2SC5948			TO-3P(N)
			PNP	2SA2120			
220	200	15	NPN	2SC5949			TO-3P(L)
			PNP	2SA2121			

(): Absolute maximum rating of discontinued products

	Driver Amplifier					Output Amplifier				
	P _c (W)	NPN	PNP	Package		P _c (W)	NPN	PNP	Package	
Single Bipolar Transistors	1	2SC2881	2SA1201	PW-Mini	Single Bipolar Transistors	Non-isolation type	100	2SC5198	2SA1941	TO-3P(N)
	10	■ TTC004B	■ TTA004B	TO-126N			120	2SC5199	2SA1942	TO-3P(L)
		■ TTC011B	■ TTA006B				130	2SC5242	2SA1962	TO-3P(N)
							150	2SC5358	2SA1986	
	■ TTC0001	■ TTA0001	150	2SC5200N			2SA1943N	TO-3P(L)		
	2SC5200	2SA1943	180	TTC5200			TTA1943			
2SC5359	2SA1987	200	TTC0002	TTA0002						
220	2SC5948	2SA2120	TO-3P(N)	220	2SC5949		2SA2121	TO-3P(L)		

Part number in red signifies a new product. ■ : Being planned

► Switching Power Supplies

AC-DC Converters

Application	Part Number	Absolute Maximum Ratings (Ta = 25°C)				Package
		V _{CEO} (V)	V _{CE0} (V)	I _C (A)	P _C (W) (T _C = 25°C *Ta = 25°C)	
Switching Regulators	TTC005	600	285	1	1.1*	PW-Mini
	TTC008			1.5	1.1*	PW-Mold
	TTC013		350	0.5	1*	PW-Mini
	2SC5548A		400	2	15	PW-Mold(SC-63/64)
	2SC6142	800	375	1.5	1.1*	PW-Mold(SC-64)
	TTC012			2	1.1*	PW-Mold
	2SC5354	900	800	5	100	TO-3P(N)

Part number in red signifies a new product.

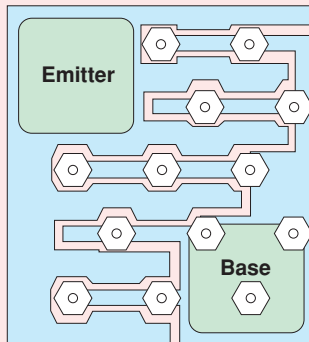
▶ Low $V_{CE(sat)}$ Series

■ Features

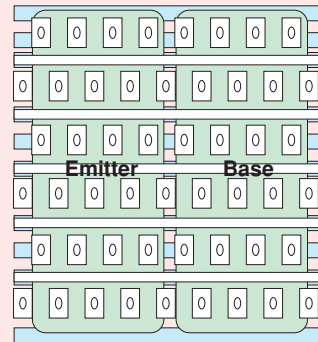
- Ultra-high-speed switching
- New package development

Super Hi-Met design

Low breakdown voltage Hi-Met III



Super Hi-Met

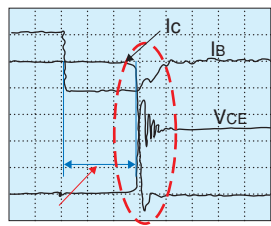


- Fine pattern
- Multi-layer wiring
- Ultra high speed

■ Switching Time Comparison

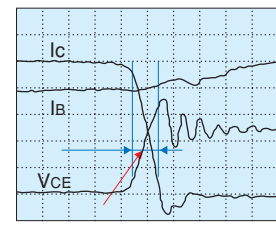
Ultra-high-speed product

Super Hi-Met
2SC5906
(30 V/4 A/TSM)



$t_{stg} = 280 \text{ ns}$ 100 ns/div

Enlarged view

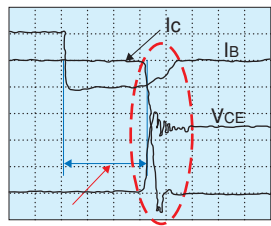


$t_f = 28 \text{ ns}$ 25 ns/div

Previous product

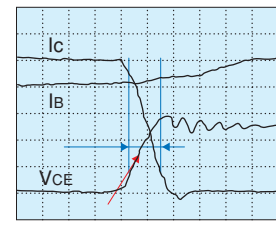
Low breakdown voltage Hi-Met III

I_B : 50 mA/div
 I_C : 320 mA/div
 V_{CE} : 5 V/div



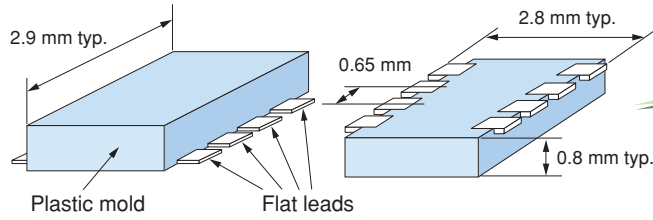
$t_{stg} = 310 \text{ ns}$ 100 ns/div

Enlarged view

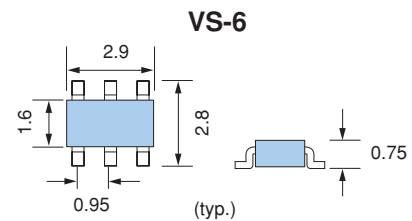
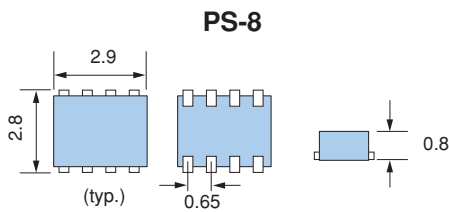


$t_f = 35 \text{ ns}$ 25 ns/div

■ New Package PS-8



Small thin package with power dissipation equivalent to the PW-Mini package (1 W)



Unit: mm

► Ultra-High-Speed Switching Series

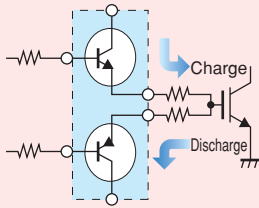
Part Number	Absolute Maximum Ratings			hFE	V _{CE(sat)} Max			Package	Remarks		
	V _{CEO} (V)	I _C (A)	P _C (W)		V _{CE} (V)	I _C (A)	I _B (mA)				
2SC6125	20	4	1.0	180 to 390	2	0.5	0.2	1.6	53	PW-Mini	
2SC5976	30	3	0.625	250 to 400	2	0.3	0.14	1.0	33	TSM	
2SC5906	30	4	0.8	200 to 500	2	0.5	0.2	1.6	53	TSM	
2SC6033	50	2.5	0.625	250 to 400	2	0.3	0.18	1.0	33	TSM	
2SC6126	50	3	1.0	250 to 400	2	0.3	0.18	1.0	33	PW-Mini	
2SC6000	50	7	20	250 to 400	2	2.5	0.18	2.5	83	PW-Mold	
TPCP8511	50	3	1.25	250 to 400	2	0.3	0.18	1.0	33	PS-8	
TPC6D02	-15	-1	0.6	250 to 400	-2	-0.15	-0.17	-0.5	-16.7	VS-6	Incorporating SBD
TPCP8H02	30	3	1.0	250 to 400	2	0.3	0.14	1.0	33	PS-8	Incorporating S-MOS

Part number in red signifies a new product.

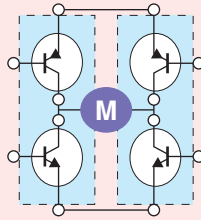
► Transistors for MOS Gate Drivers / Compact Motor Drivers

Low $V_{CE(sat)}$ PNP and NPN transistors are housed in a single package. This is ideal for high-speed gate drives for MOS gate devices such as high-power IGBTs and MOSFETs or compact motor drivers.

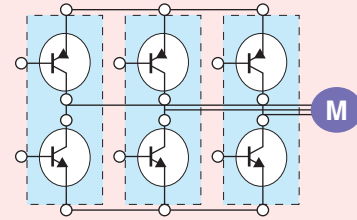
Example Application Circuits



MOS gate driver



H-bridge motor driver



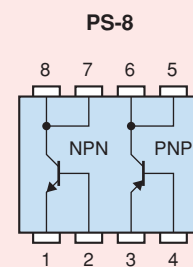
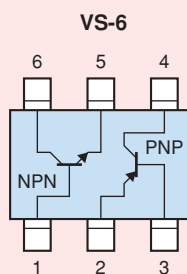
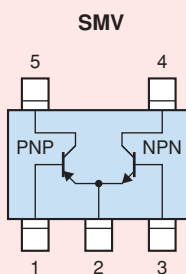
3-phase motor driver

■ Product Lineup

Part Number	Package	Polarity	Absolute Maximum Ratings				hFE		V_{CE} (V)	I_C (A)	$V_{CE(sat)}$ Max		
			V_{CEO} (V)	I_C (A)	I_{CP} (A)	P_C *1 (mW)	Min	Max			V_{CE} (V)	I_C (A)	I_B (mA)
HN4B101J	SMV	PNP	-30	-1.0	-5	550	200	500	-2	-0.12	-0.2	-0.4	-13
		NPN	30	1.2	5	550	200	500	2	0.12	0.17	0.4	13
HN4B102J		PNP	-30	-1.8	-8	750	200	500	-2	-0.2	-0.2	-0.6	-20
		NPN	30	2	8	750	200	500	2	0.2	0.14	0.6	20
TPC6901A	VS-6	PNP	-50	-0.7	-5	400	200	500	-2	-0.1	-0.23	-0.3	-10
		NPN	50	1	5	400	400	1000	2	0.1	0.17	0.3	6
TPC6902		PNP	-30	-1.7	-8	700	200	500	-2	-0.2	-0.2	-0.6	-20
		NPN	30	2	8	700	200	500	2	0.2	0.14	0.6	20
TPCP8901	PS-8	PNP	-50	-0.8	-5	830	200	500	-2	-0.1	-0.2	-0.3	-10
		NPN	50	1	5	830	400	1000	2	0.1	0.17	0.3	6
TPCP8902		PNP	-30	-2	-8	890	200	500	-2	-0.2	-0.2	-0.6	-20
		NPN	30	2	8	890	200	500	2	0.2	0.14	0.6	20

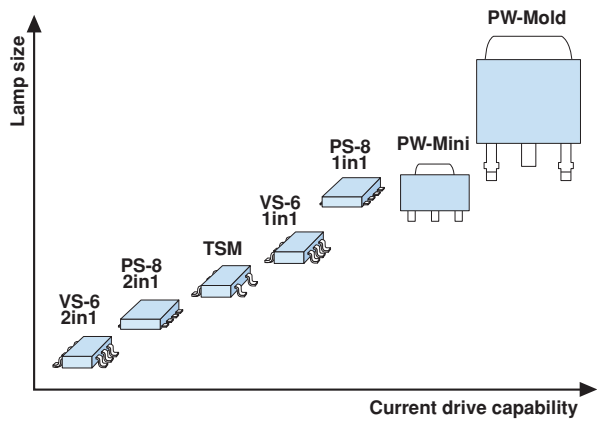
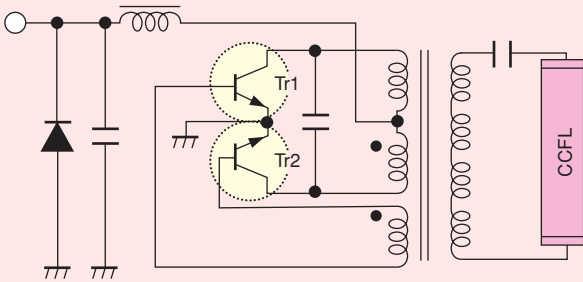
*1: The rating applies when the transistor is mounted on an FR4 board (Cu area = 645 mm², glass-epoxy, t = 1.6 mm) and is in single-device operation. Cu thickness: 35 μ m for TPC6901A; 70 μ m for the other parts.

Circuit Configuration (Top View)



Recommended Transistors for Various Application Circuits

► Inverter Circuits for LCD Backlighting

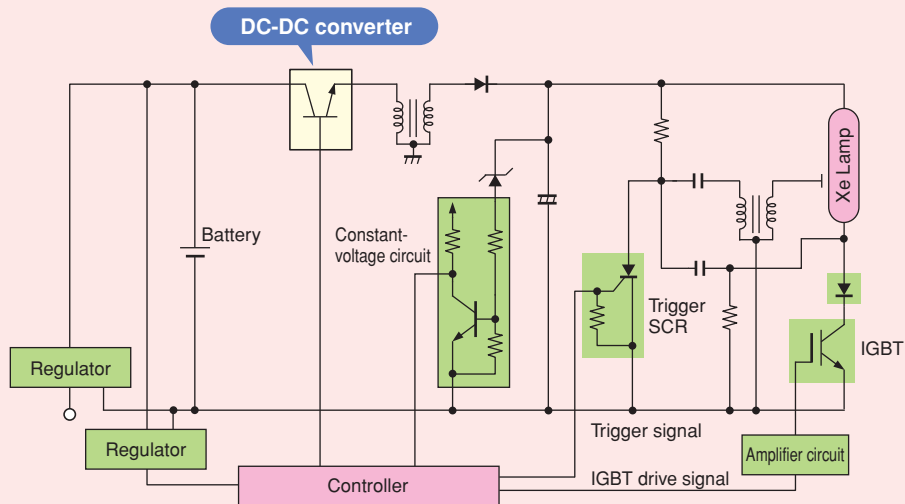


Package	Recommended Products
TSM	2SC5692, *2SC6033, 2SC5703
VS-6	TPC6502, TPC6701
PW-Mini	2SC5810, 2SC5712, *2SC6126, *2SC6125
PS-8	TPCP8505, TPCP8507, TPCP8701
PW-Mold	2SC5886A, *2SC6000, 2SC6076

- For small lamps, Toshiba recommends 2-in-1 power transistors housed in VS-6 and PS-8 packages.
- For LCD-TVs, Toshiba recommends power transistors housed in PW-Mold packages.
- Ultra-high-speed products are also available.

*Ultra-high-speed products

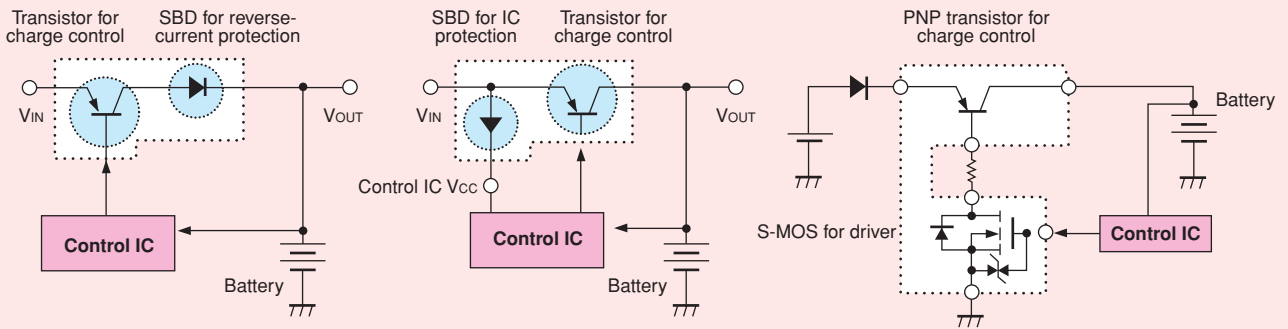
► Strobe Circuits for DSCs / Cameras



Polarity/Configuration	Package	Recommended Products
NPN/Single	TSM	2SC5738, *2SC5976, *2SC5906, *2SC6033
PNP/Single	TSM	2SA2061
PNP+S-MOS	PS-8	*TPCP8H02

*Ultra-high-speed products

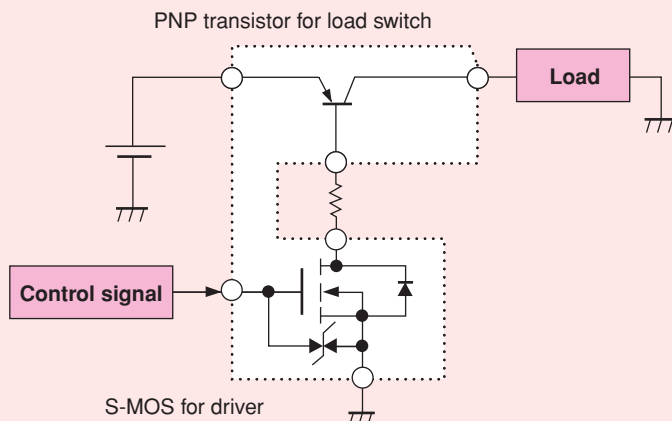
Battery Charge Circuits



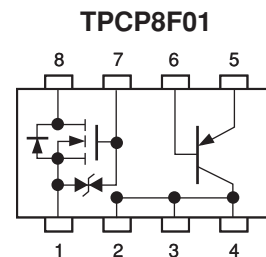
Package	Recommended Products
TSM	2SA2065, 2SA2061
VS-6	TPC6601, TPC6603, TPC6D02, TPC6D03
PW-Mini	2SA2069, 2SA2059
PS-8	TPCP8F01

General-Purpose Load Switches

A Low $V_{CE(sat)}$ PNP transistor and an S-MOS to drive it are housed in a single package. This is ideal for use in power supply switches to loads.



Typical Product



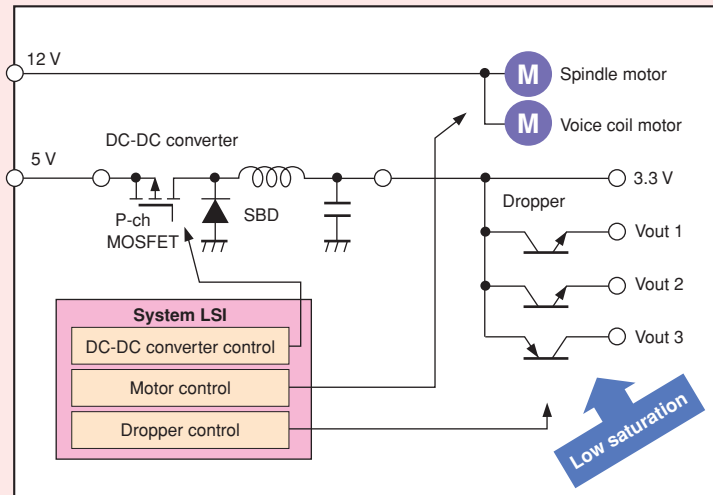
<Features>

- Low power dissipation due to low $V_{CE(sat)}$ PNP transistor
- Using an S-MOS to receive a signal allows the transistor to be operated directly from a microcontroller.

Polarity/Configuration	Part Number	Absolute Maximum Ratings			hFE		V _{CE0}		V _{CE(sat)} Max			Mass Production
		V _{CE0} (V)	I _c (A)	P _c (mW)	Min	Max	V _{CE0} (V)	I _c (A)	V _{CE(sat)} (V)	I _c (A)	I _B (mA)	
PNP+S-MOS	TPCP8F01	-20	-3	1000	200	500	-2	-0.5	-0.19	-1.6	-53	Available

The rating applies when the transistor is mounted on an FR4 board: Cu area = 645 mm², glass-epoxy, t = 1.6 mm. Incorporating N-ch S-MOS: V_{DSS} = 20 V, I_D = 0.1 A, R_{ON} = 4 Ω (max)

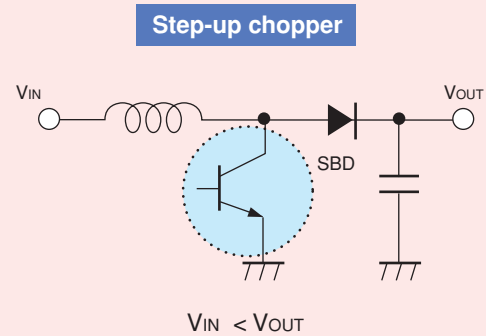
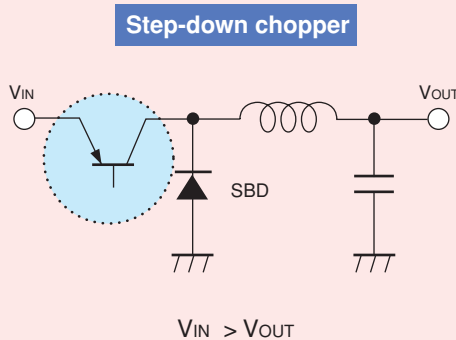
▶ HDD Dropper Power Supplies



Recommended Products

	V _{CEO} (V)	I _c (A)	2.5 inches or less	3.5 inches
NPN transistors	10	2	TPC6501	
	10	2	2SC5755	
	10	2	2SC5785	
	10	2	TPCP8504	
	20	1.5	2SC5819	
	20	4	2SC5714	2SC6125
	50	1	2SC5810	
	50	3		2SC5712
PNP transistors	50	3		2SC6126
	50	5		2SC5886A
	-10	-1.5	TPC6602	
	-10	-1.5	2SA2058	
	-10	-2	2SA2066	
	-20	-2.5	2SA2061	
	-20	-3	2SA2059	
	-20	-5	TPCP8601	
	-50	-1	2SA2070	
	-50	-2	2SA2060	
-50	-2.5	TPCP8602		
-50	-5		2SA2097	

▶ DC-DC Converters for Various Information Devices



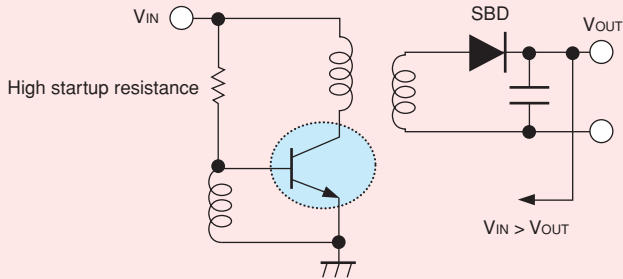
<Features>

- Ultra-high-speed products emphasizing efficiency are ideal for DC-DC converters used in information devices.
- The VS-6 package, which includes an SBD, is also available.

Application	Package	Recommended Products
Ultra-High-Speed Transistors	TSM	2SC6033, 2SC5976, 2SC6062
	VS-6	TPC6D02
	PW-Mold	2SC6000
	PS-8	TPCP8511
Standard Transistors	TSM	2SA2056, 2SC5703
	PW-Mini	2SA2059, 2SC5714

Part number in red signifies a new product.

► Self-Excited DC-DC Converters for AC Adapters Used in Cell Phones / Amusement Equipment



- Recommended to reduce standby power [High h_{FE} achievement at low collector current]
- Available in low-profile packages

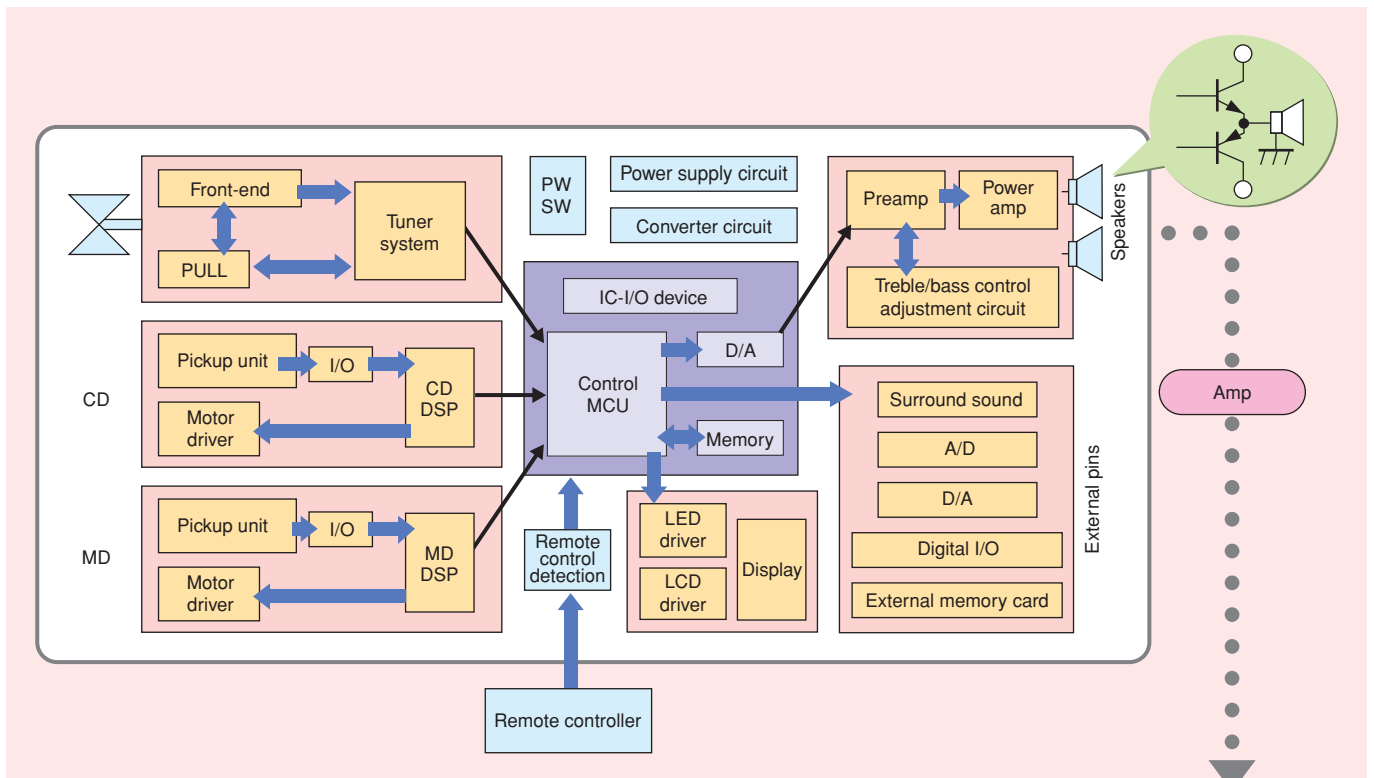


The PW-Mold package series is recommended.

Application	Package	Recommended Products	V_{CBO} (V)	V_{CEO} (V)	I_c (A)	h_{FE} Min (@ $V_{CE} = 5$ V, $I_c = 1$ mA)
100 V AC	PW-Mold	TTC008	600	285	1.5	80
		2SC5548A	600	400	2	20
2SC6142		800	375	1.5	80	
TTC012		800	375	2	80	

Part number in red signifies a new product.

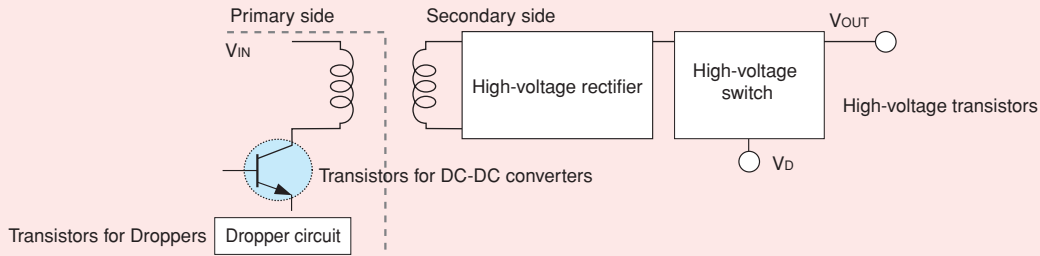
► Audios



Application	Package	Recommended Products	Remarks
High-power amps	TO-3PN	2SA2120, 2SC5948	$P_c = 200$ W
	TO-3PL	2SA2121, 2SC5949	$P_c = 220$ W
	TO-126N	■TTC011B, ■TTA006B	Bipolar transistor for driver stage

■ : Being planned

► For High-Voltage Power Supplies



■ Bipolar Transistors for DC-DC Converters

Toshiba recommends the transistors listed below for use in primary-side switches for power supplies with an input voltage of 24 V. ($V_{CE0} = 80$ V or higher)

The h_{FE} ratings are guaranteed even in the low current region. Example: 2SC6061 $h_{FE} = 100$ or higher (at $V_{CE} = 2$ V / $I_C = 1$ mA)

Part Number	Package	Absolute Maximum Ratings				h _{FE}		V _{CE} (V)	I _C (A)	V _{CE(sat)} Max		
		V _{CEX} (V)	V _{CEO} (V)	I _C (A)	P _C (W)	Min	Max			(V)	I _C (A)	I _B (mA)
		2SC6061	TSM	150	120	1	0.625 ^{*1}	120	300	2	0.1	0.14
TPCP8510	PS-8	150	120	1	1.1 ^{*1}	120	300	2	0.1	0.14	0.3	10
TPCP8507	PS-8	150	120	1	1.25 ^{*1}	120	300	2	0.1	0.14	0.3	10
2SC6076	PW-Mold	160	80	3	10 ^{*2}	180	450	2	0.5	0.5	1	100
2SC6124	PW-Mini	160	80	2	1 ^{*3}	100	200	2	0.5	0.5	1	100

*1: The rating applies when the transistors are mounted on an FR4 board : Cu area = 645 mm², glass-epoxy, t = 1.6 mm

*2: T_c = 25°C *3: T_a = 25°C

■ Bipolar Transistors for Droppers

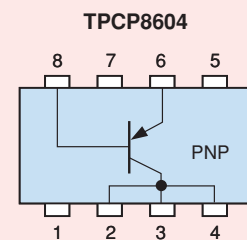
Part Number	Package	Absolute Maximum Ratings			h _{FE}		V _{CE} (V)	I _C (A)	V _{CE(sat)} (V)	I _C (A)	I _B (mA)
		V _{CEO} (V)	I _C (A)	P _C (T _c = 25°C) (W)	Min	Max					
		2SB906	PW-Mold	-60	-3	20	60	200	-5	-0.5	-1.7
TTB001	TFP	-60	-3	30	100	250	-5	-0.5	-1.7	-3	-300
TTB002	PW-Mold	-60	-3	25	100	250	-5	-0.5	-1.7	-3	-300

■ High-Voltage Bipolar Transistors

Part Number	Package	Absolute Maximum Ratings			Remarks
		V _{CEO} (V)	I _C (A)	P _C (W)	
2SA1971	PW-Mini	-400	-0.5	1	
TPCP8604	PS-8	-400	-0.3	1	SMD
2SA2184	PW-Mold	-550	-1	1	SMD only
2SA2142	PW-Mold	-600	-0.5	10	SMD only
■TTC5460B	TO-126N	800	0.05	10	

Part number in red signifies a new product. ■ : Being planned

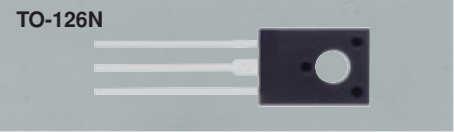
Circuit Configuration



Product Lineup by Packages

▶ TO-126N

(Weight: 0.82 g Typ.)



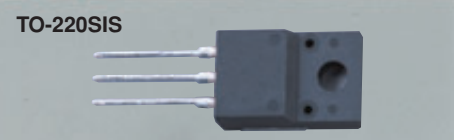
Part Number		Ic (A)	VCE0 (V)	Pc Tc = 25°C *Tc = 25°C (W)	hFE		VCE(sat) Max			fT Typ.			Remarks	
NPN	PNP				VCE (V)	Ic (A)	(V)	Ic (A)	Ib (mA)	(MHz)	VCE (V)	Ic (A)		
■TTC5460B	—	0.05	800	10	15 (min)	5	7 m	1.0	20 m	4	—	—	—	Dynamic focus
■TTC011B	■TTA006B	1	230	10	100 to 320	5	0.2	1.0	0.3	30	—	—	—	LCD backlighting
■TTC004B	■TTA004B	1.5	160	10	140 to 280	5	0.1	0.5	0.5	50	100	10	0.1	For audio
■TTC015B	■TTA008B	2	80	10	100 to 200	2	0.5	0.5	1	100	150	2	0.5	Low saturation voltage
■TTD1509B	■TTB1067B	2	80	10	2000 (min)	2	1	1.5	1	1	100/50	2	0.5	Darlington

■ : Being planned

▶ TO-220 Series

TO-220SIS

(Weight: 1.7 g Typ.)



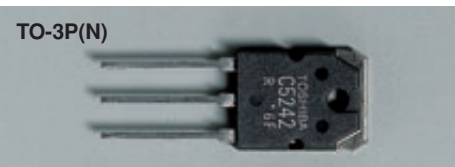
Part Number		Ic (A)	VCE0 (V)	Pc Tc = 25°C (W)	hFE		VCE(sat) Max			SW Time Typ.			Remarks	
NPN	PNP				VCE (V)	Ic (A)	(V)	Ic (A)	Ib (A)	ton (μs)	tstg (μs)	tr (μs)		
TTC3710B	TTA1452B	12	80	30	70 to 240	1	1	0.4	6	0.3	0.2/0.3	1.0	0.2/0.5	Low saturation voltage (For DC-DC converters)
TTD1415B	TTB1020B	7	100	25/30	2000 to 15000	3	3	1.5	3	6 m	0.3/0.8	5.1/2	0.6/2.5	Darlington
TTD1410B	—	6	250	25	2000 (min)	2	2	2.0	4	40 m	1.0	8.0	5.0	
TTD1409B	—	6	400	25	600 (min)	2	4	2.0	4	40 m	1.0	8.0	5.0	

Part number in red signifies a new product.

▶ TO-3P Series

TO-3P(N)

(Weight: 4.7 g Typ.)



Part Number		Ic (A)	VCE0 (V)	Pc Tc = 25°C (W)	hFE		VCE(sat) Max			fT Typ.			SW Time Typ.			Remarks	
NPN	PNP				VCE (V)	Ic (A)	(V)	Ic (A)	Ib (A)	(MHz)	VCE (V)	Ic (A)	ton (μs)	VCE (μs)	Ic (μs)		
2SC5198	2SA1941	10	140	100	55 to 160	5	1	2	7	0.7	30	5	1	—	—	Audio amp	
2SC5242	2SA1962		230	130	55 to 160	5	1	3	8	0.8	30	5	1	—	—		
2SC5358	2SA1986	15	230	150	55 to 160	5	1	3	8	0.8	30	5	1	—	—		
2SC5200N	2SA1943N		230	150	80 to 160	5	1	3	8	0.8	30	5	1	—	—		
TTC0001	TTA0001	18	160	150	55 to 160	5	1	2	9	0.9	30	5	1	—	—		
2SC5948	2SA2120	12	200	200	80 to 160	5	1	2/3	8	0.8	30/25	5	1	—	—		
2SC5354	—	5	800	100	15 (min)	5	0.5	1	2	0.4	—	—	—	▲*0.7	*4.0	*0.5	High breakdown voltage, Switching application

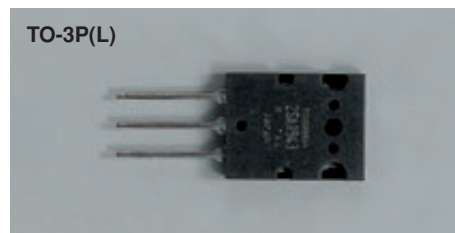
Part number in red signifies a new product.

▲ : tr. * : Max

TO-3P (L)

(Weight: 9.75 g Typ.)

TO-3P(L)

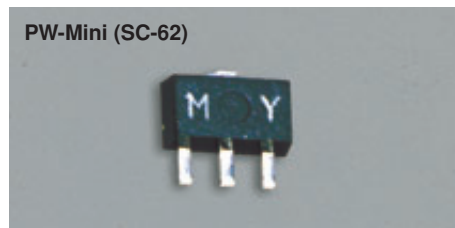


Part Number		Ic (A)	V _{CEO} (V)	P _C T _C = 25°C (W)	hFE			V _{CE(sat)} Max			f _T Typ.			Remarks
NPN	PNP				V _{CE} (V)	Ic (A)	(V)	Ic (A)	I _B (A)	(MHz)	V _{CE} (V)	Ic (A)		
2SC5199	2SA1942	12	160	120	55 to 160	5	1	2.5	8	0.8	30	5	1	Audio amp
2SC5200	2SA1943	15	230	150	55 to 160	5	1	3	8	0.8	30	5	1	
TTC5200	TTA1943	15	230	150	80 to 160	5	1	3	8	0.8	30	5	1	
TTC0002	TTA0002	18	160	180	80 to 160	5	1	2	9	0.9	30	5	1	
2SC5359	2SA1987	15	230	180	55 to 160	5	1	3	8	0.8	30	5	1	
2SC5949	2SA2121	15	200	220	55 to 160	5	1	3	10	1	30/25	5	1	

Part number in red signifies a new product.

▶ PW-Mini (SC-62)

PW-Mini (SC-62)



Part Number		P _C (W)	P _C * (W)	P _C ** (W)	V _{CEO} (V)	Ic (A)	hFE			V _{CE(sat)} Max			f _T Typ.			Marking		Equivalent to the TO-92		Remarks	
NPN	PNP						V _{CE} (V)	Ic (mA)	(V)	Ic (mA)	I _B (mA)	(MHz)	V _{CE} (V)	Ic (mA)	NPN	PNP	NPN	PNP			
2SC2881	2SA1201	0.5	1.0	—	120	0.8	80 to 240	5	100	1.0	500	50	120	5	100	C□	D□	(2SC2235)	(2SA965)	For audio	
—	2SA1483	0.5	1.0	—	45	0.2	40 to 240	1	10	0.3	100	10	200	10	10	V□	W□	—	—	Low saturation voltage	
—	2SA1971	0.5	1.0	—	-400	-0.5	140 to 400	-5	-100	-1.0	-100	-10	35	-5	-50	—	AL	—	2SA1972	High breakdown voltage	
2SC5785	—	—	—	1	10	2	400 to 1000	2	200	0.12	600	12	—	—	—	3E	—	—	—	Low saturation voltage	
—	2SA2066	—	—	1	-10	-2	200 to 500	-2	-200	-0.19	-600	-20	—	—	—	4E	—	—	—	Low saturation voltage	
2SC5713	—	—	—	1	10	4	400 to 1000	2	500	0.15	1600	32	—	—	—	2C	—	—	—	Low saturation voltage	
2SC5819	—	—	—	1	20	1.5	400 to 1000	2	150	0.12	500	10	—	—	—	3D	—	—	—	Low saturation voltage	
—	2SA2069	—	—	1	-20	-1.5	200 to 500	-2	-150	-0.14	-500	-17	—	—	—	4D	—	—	—	Low saturation voltage	
2SC5714	—	—	—	1	20	4	400 to 1000	2	500	0.15	1600	32	—	—	—	2E	—	—	—	Low saturation voltage	
—	2SA2059	—	—	1	-20	-3	200 to 500	-2	-500	-0.19	-1600	-53	—	—	—	4F	—	—	—	Low saturation voltage	
2SC5712	—	—	—	1	50	3	400 to 1000	2	300	0.14	1000	20	—	—	—	2A	—	—	—	Low saturation voltage	
—	2SA2060	—	—	1	-50	-2	200 to 500	-2	-300	-0.20	-1000	-33	—	—	—	4G	—	—	—	Low saturation voltage	
2SC5810	—	—	—	1	50	1	400 to 1000	2	100	0.17	300	6	—	—	—	3C	—	—	—	Low saturation voltage	
—	2SA2070	—	—	1	-50	-1	200 to 500	-2	-100	-0.2	-300	-10	—	—	—	4C	—	—	—	Low saturation voltage	
2SD2686	—	—	—	1	60±10	1	2000 (min)	2	1000	1.5	1000	1	—	—	—	3H	—	—	—	Darlington	
2SC6126	—	—	—	1	50	3	250 to 400	2	300	0.18	1000	33	—	—	—	4M	—	—	—	High-speed switching	
2SC6125	—	—	—	1	20	4	180 to 390	2	500	0.2	1600	53	—	—	—	4L	—	—	—	High-speed switching	
2SC6124	2SA2206	—	—	1	80	2	100 to 200	2	500	0.5	1000	100	150/100	2	0.5	4J	4K	—	—	—	Low saturation voltage
TTC005	—	—	—	1.1	285	1	100 to 200	5	100	1.0	600	75	—	—	—	4N	—	—	—	LCD backlighting	
TTC013	—	—	—	1	350	0.5	100 to 200	5	50	0.3	160	20	—	—	—	4R	—	—	—	LCD backlighting	

Remark: □ in device marking represents one of these hFE rank symbols listed below
(R rank → R, O rank → O, Y rank → Y)

*: The rating applies when the transistor is mounted on a ceramic board (250 mm² x 0.8 mm).

***: The rating applies when the transistor is mounted on a glass-epoxy board (645 mm² x 1.6 mm).

Part number in red signifies a new product.

▶ TFP

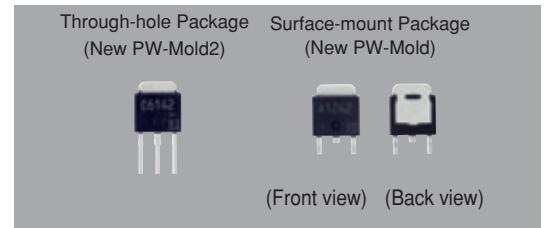


Part Number	V _{CEO} (V)	I _C (A)	P _C (W)	h _{FE}		V _{CE(sat)} Max			
				V _{CE} (V)	I _C (A)	(V)	I _C (A)	I _B (A)	
TTB001	-60	-3	36	100 to 250	-5	-0.5	-1.7	-3	-0.3

Part number **in red** signifies a new product.

▶ PW-Mold(SC-63/64)

(Weight: 0.36 g Typ.)



Part Number		I _C (A)	V _{CEO} *V _{CB0} (V)	I _C T _C = 25°C *I _a = 25°C (W)	h _{FE}		V _{CE(sat)} Max			f _T Typ.			Through-hole Package	Surface-mount Package	Remarks	
NPN	PNP				V _{CE} (V)	I _C (A)	(V)	I _C (A)	I _B (A)	(MHz)	V _{CE} (V)	I _C (A)				
2SC6127	-	0.05	800	10	15 (min)	5	0.007	1	0.02	4	15	10	0.003	-	○	High breakdown voltage, Switching application
-	2SA2142	0.5	600	15	100 to 400	5	0.05	1	0.1	10	35	5	0.05	-	○	
-	2SA2184	1	550	20	80 to 300	5	0.1	0.7	0.3	60	27	5	0.05	-	○	
-	2SA2034	2	400	15	80 to 240	5	0.1	1	0.5	100	-	-	-	-	○	
TTC008	-	1.5	285	*1.1	100 to 200	5	0.3	1	0.5	62.5	-	-	-	○	-	
2SC6142	-	1.5	375	*1.1	100 to 200	5	0.1	0.9	0.8	100	-	-	-	○	-	General-purpose
TTC012	-	2	375	*1.1	100 to 200	5	0.3	0.5	0.5	62.5	-	-	-	○	-	
2SC5548A	-	2	400	15	40 to 100	5	0.2	1	0.8	100	-	-	-	-	○	
-	2SB906	3	60	20	60 to 300/200	5	0.5	1/1.7	3	300	3/9	5	0.5	-	○	
-	TTB002	3	60	30	100 to 250	5	0.5	1.7	3	300	3	5	0.5	-	○	
-	2SA1225	1.5	160	15	70 to 240	5	0.1	1.5	0.5	50	100	10	0.1	-	○	Low saturation voltage
2SC3076	2SA1241	2	50	10	70 to 240	2	0.5	0.5	1	50	80/100	2	0.5	-	○	
2SC6076	-	3	80	10	180 to 450	2	0.5	0.5	1	100	150	2	0.5	-	○	
-	TTA003	3	80	10	100 to 200	2	0.5	0.5	1	100	100	2	0.5	-	○	
-	2SA1244	5	50	20	70 to 240	1	1	0.4	3	150	120/160	4	1	-	○	
-	2SA2097	5	50	20	200 to 500	2	0.5	0.27	1.6	53	-	-	-	-	○	T _J = 175°C
-	TTA005	5	50	24	200 to 500	2	0.5	0.27	1.6	53	-	-	-	-	○	
2SC5886A	-	5	50	20	400 to 1000	2	0.5	0.22	1.6	32	-	-	-	-	○	Low saturation voltage
2SC3303	-	5	80	20	70 to 240	1	1	0.4	3	150	120	4	1	-	○	
2SC6000	-	7	50	20	250 to 400	2	2.5	0.18	2.5	83	-	-	-	-	○	
2SD1223	-	4	80	15	2000 (min)	2	1	1.5	3	6	-	-	-	-	○	Darlington

Part number **in red** signifies a new product.

▶ TSM

(Weight: 0.01 g Typ.)

TSM



Part Number	V _{CE0} (V)	I _c (A)	I _{CP} (A)	h _{FE}		V _{CE(sat)} Max			Marking	
				V _{CE} (V)	I _c (A)	(V)	I _c (A)	I _B (mA)		
2SC5755	10	2	3.5	400 to 1000	2	0.2	0.12	0.6	12	WL
2SA2058	-10	-1.5	-2.5	200 to 500	-2	-0.2	-0.19	-0.6	-20	WM
2SC5784	20	1.5	2.5	400 to 1000	2	0.15	0.12	0.5	10	WJ
2SA2065	-20	-1.5	-2.5	200 to 500	-2	-0.15	-0.14	-0.5	-17	WK
2SC5738	20	3.5	6	400 to 1000	2	0.5	0.15	1.6	32	WD
2SA2061	-20	-2.5	-4	200 to 500	-2	-0.5	-0.19	-1.6	-53	WE
TTC007	50	1	2	400 to 1000	2	0.1	0.12	0.3	6	WG
TTA007	-50	-1	-2	200 to 500	-2	-0.1	-0.2	-0.3	-10	WH
2SC5976	30	3	5	250 to 400	2	0.3	0.14	1	33	WW
2SC5906	30	4	7	200 to 500	2	0.5	0.2	1.6	53	WP
2SC5692	50	2.5	4	400 to 1000	2	0.3	0.14	1	20	WB
2SC6033	50	2.5	5	250 to 400	2	0.3	0.18	1	33	WX
2SA2056	-50	-2	-3.5	200 to 500	-2	-0.3	-0.2	-1	-33	WF
2SC5703	50	4	7	400 to 1000	2	0.5	0.12	1.6	32	WA
2SC6061	120	1	2	120 to 300	2	0.1	0.14	0.3	10	WN
2SD2719	60 ± 10	0.8	3	2000 to 15000	2	1	1.5	1	1	WV

Part number in red signifies a new product.

▶ SMV

(Weight: 0.014 g Typ.)

SMV



Part Number	Configuration	V _{CE0} (V)	I _c (A)	I _{CP} (A)	h _{FE}		V _{CE(sat)} Max			
					V _{CE} (V)	I _c (A)	(V)	I _c (A)	I _B (mA)	
HN4B101J	NPN+PNP	30/-30	1.2/-1	5/-5	200 to 500	2/-2	0.12/-0.12	0.17/-0.2	0.4/-0.4	13/-13
HN4B102J	NPN+PNP	30/-30	2/-1.8	8/-8	200 to 500	2/-2	0.2/-0.2	0.14/-0.2	0.6/-0.6	20/-20

▶ VS-6

(Weight: 0.011 g Typ.)

VS-6



Part Number	Polarity/ Configuration	V _{CEO} (V)	I _c (A)	I _{CP} (A)	hFE	hFE		V _{CE(sat)} Max			Marking
						V _{CE} (V)	I _c (A)	(V)	I _c (A)	I _B (mA)	
TPC6501	NPN/Single	10	2	3.5	400 to 1000	2	0.2	0.12	0.6	12	H2A
TPC6502	NPN/Single	50	3	5	400 to 1000	2	0.3	0.14	1	20	H2B
TPC6503	NPN/Single	20	1.5	2.5	400 to 1000	2	0.15	0.12	0.5	10	H2C
TPC6504	NPN/Single	50	1	2	400 to 1000	2	0.1	0.17	0.3	6	H2D
TPC6601	PNP/Single	-50	-2	-3.5	200 to 500	-2	-0.3	-0.2	-1	-33	H3A
TPC6602	PNP/Single	-10	-2	-3.5	200 to 500	-2	-0.2	-0.19	-0.6	-20	H3B
TPC6603	PNP/Single	-20	-3	-5	200 to 500	-2	-0.5	-0.19	-1.6	-53	H3E
TPC6604	PNP/Single	-50	-1	-2	200 to 500	-2	-0.1	-0.23	-0.3	-10	H3D
TPC6701	NPN/Dual	50	1	2	400 to 1000	2	0.1	0.17	0.3	6	H4A
TPC6901A	NPN+PNP	50/-50	1/-0.7	5/-5	400 to 1000/200 to 500	2/-2	0.1/-0.1	0.17/-0.23	0.3/-0.3	6/-10	H6B
TPC6902	NPN+PNP	30/-30	2/-1.7	8/-8	200 to 500	2/-2	0.2/-0.2	0.14/-0.2	0.6/-0.6	20/-20	H6C

Part Number	Polarity/ Configuration	Transistor			Diode		Transistor					Diode				Marking	
		V _{CE} (V)	I _c (A)	I _{CP} (A)	V _{RRM} (V)	I _o (A)	hFE	V _{CE} (V)	I _c (A)	V _{CE(sat)} Max (V)	I _c (A)	I _B (mA)	V _F Max (V)	I _F (A)	I _R Max (μA)		V _R (V)
TPC6D02	PNP+Di	-15	-1	-3	30	0.7	250 to 400	-2	-0.15	-0.17	-0.5	-16.7	0.5	0.7	100	10	H8B
TPC6D03	PNP+Di	-20	-1.2	-2	30	0.7	140 to 350	-2	-0.15	-0.17	-0.5	-16.7	0.43	0.7	100	10	H8C

Part number in red signifies a new product.

▶ PS-8

(Weight: 0.0173 g Typ.)

PS-8



Part Number	Polarity/ Configuration	V _{CEO} (V)	I _c (A)	P _c *1 (W)	hFE	hFE		V _{CE(sat)} Max		
						V _{CE} (V)	I _c (A)	(V)	I _c (A)	I _B (mA)
TPCP8507	NPN/Single	120	1	1.25	120 to 300	2	0.1	0.14	0.3	10
TPCP8510	NPN/Single	120	1	1.1	120 to 300	2	0.1	0.14	0.3	10
TPCP8505	NPN/Single	50	3	1.25	400 to 1000	2	0.3	0.14	1	20
TPCP8511	NPN/Single	50	3	1.25	250 to 400	2	0.3	0.18	1	33
TPCP8504	NPN/Single	10	2	1.2	400 to 1000	2	0.2	0.12	0.6	12
TPCP8604	PNP/Single	-400	-0.3	1.1	140 to 450	-5	-0.02	-1.0	-0.1	-10
TPCP8602	PNP/Single	-50	-2.5	1.25	200 to 500	-2	-0.3	-0.2	-1	-33
TPCP8601	PNP/Single	-20	-4	1.3	200 to 500	-2	-0.6	-0.19	-2	-67
TPCP8701	NPN/Dual	50	3	0.94	400 to 1000	2	0.3	0.14	1	20
TPCP8901	NPN+PNP	50/-50	1/-0.8	0.83	400 to 1000/200 to 500	2/-2	0.1/-0.1	0.17/-0.2	0.3/-0.3	6/-10
TPCP8902	NPN+PNP *2	30/-30	2/-2	0.89	200 to 500	2/-2	0.2/-0.2	0.14/-0.2	0.6/-0.6	20/-20
TPCP8F01	PNP+S-MOS *4	-20	-3	1	200 to 500	-2	-0.5	-0.19	-1.6	-53
TPCP8G01	PNP+Pch *2	-20	-3	0.94	200 to 500	-2	-0.5	-0.19	-1.6	-53
TPCP8H02	NPN+S-MOS *3	30	3	1	250 to 400	2	0.3	0.14	1	33
TPCP8L01	NPN darlington + HED	120	0.9	0.9	2000 to 9000	2	1	1.5	1	1

Part number in red signifies a new product.

*1: The rating applies when the transistor is mounted on an FR4 board (Cu area: 645 mm², glass-epoxy, t = 1.6 mm).

*2: N-ch S-MOS, V_{DSS} = 20 V, I_D = 0.1 A, R_{on} = 3 Ω Max

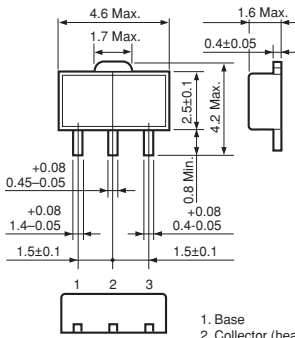
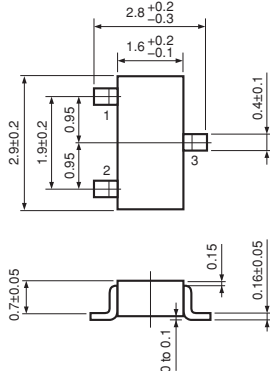
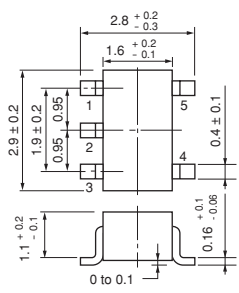
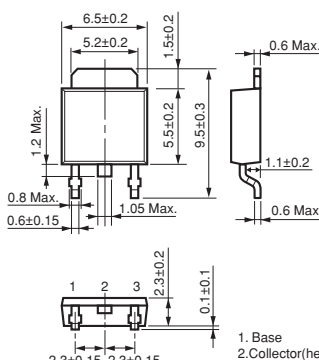
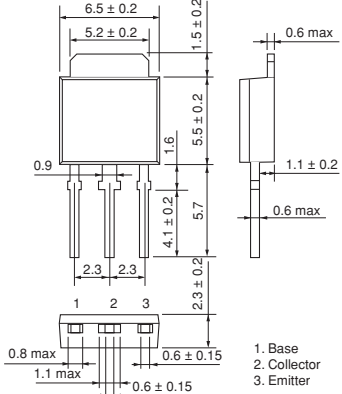
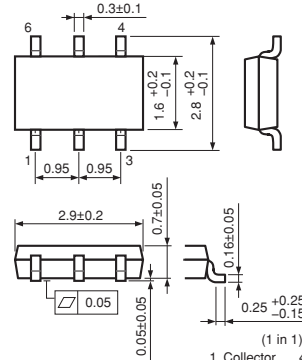
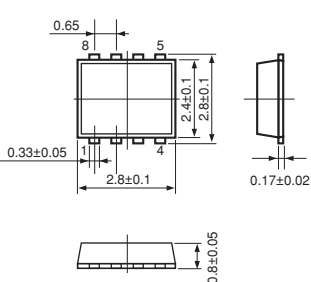
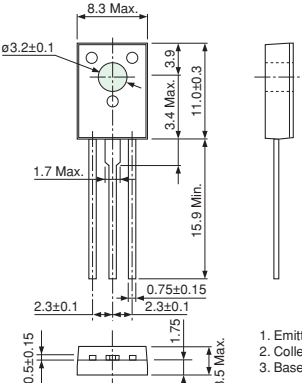
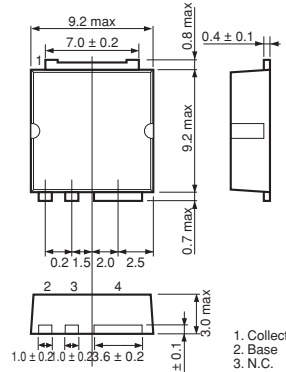
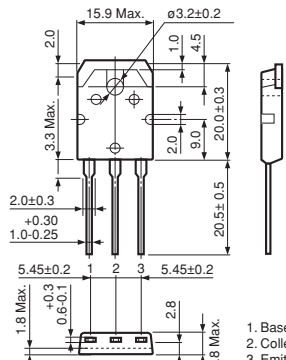
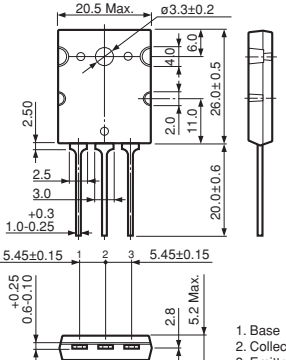
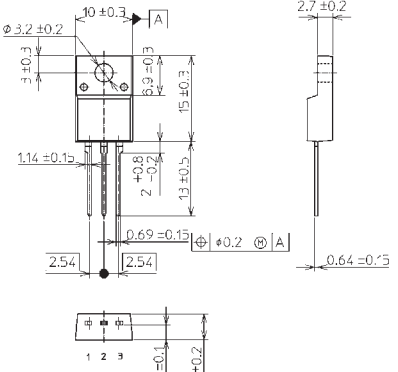
*3: Incorporating HED V_{RRM} = 200 V, I_{F(AV)} = 1 A

*4: P-ch MOS V_{DSS} = -20 V, I_D = -2 A, R_{on} = 130 mΩ Max

Standard Tape Packing for Automated Pick-and-Place Assembly

Tape Appearance	Tape Type Suffix	Packing Type	Packing Quantity
 <p>TSM</p>	TE85L	Embossed Type	3000 pcs/reel
 <p>VS-6</p>	TE85L	Embossed Type	3000 pcs/reel
 <p>PS-8</p>	TE85L	Embossed Type	3000 pcs/reel
 <p>PW-Mini(SOT-89)</p>	TE12L	Embossed Type	1000 pcs/reel
 <p>New-PW-Mold</p>	TE16L1, N	Embossed Type	2000 pcs/reel
 <p>SMV</p>	TE85L	Embossed Type	3000 pcs/reel

Package Lineup

PW-Mini	TSM	SMV
 <p>1. Base 2. Collector (heatsink) 3. Emitter</p>	 <p>1. Base 2. Emitter 3. Collector</p>	 <p>1. Tr1 Base 2. Emitter (common) 3. Tr2 Base 4. Tr2 Collector 5. Tr1 Collector</p>
New PW-Mold	New PW-Mold 2	VS-6
 <p>1. Base 2. Collector(heatsink) 3. Emitter</p>	 <p>1. Base 2. Collector 3. Emitter</p>	 <p>1. Collector 2. Collector 3. Base 4. Emitter 5. Collector 6. Collector</p>
PS-8	TO-126N	TFP
 <p>1. Collector 2. Collector 3. Collector 4. Base 5. Emitter 6. Collector 7. Collector 8. Collector</p>	 <p>1. Emitter 2. Collector 3. Base</p>	 <p>1. Collector (heatsink) 2. Base 3. N.C. 4. Emitter</p>
TO-3P/TO-3P(N)	Large TO-3/TO-3P(L)	TO-220SIS
 <p>1. Base 2. Collector (heatsink) 3. Emitter</p>	 <p>1. Base 2. Collector (heatsink) 3. Emitter</p>	

Product Lineup

Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks	Page
2SA1201	PW-Mini(SC-62)	-120	-0.8		17
2SA1225	PW-Mold(SC-63)	-160	-1.5		18
2SA1241	PW-Mold(SC-63)	-50	-2		18
2SA1244	PW-Mold(SC-63)	-50	-5		18
2SA1483	PW-Mini(SC-62)	-45	-0.2		17
2SA1941	TO-3P(N)	-140	-10		16
2SA1942	TO-3P(L)	-160	-12		17
2SA1943	TO-3P(L)	-230	-15		17
2SA1962	TO-3P(N)	-230	-15		16
2SA1971	PW-Mini(SC-62)	-400	-0.5		17
2SA1986	TO-3P(N)	-230	-15		16
2SA1987	TO-3P(L)	-230	-15		17
2SA2034	PW-Mold(SC-63)	-400	-2		18
2SA2056	TSM	-50	-2	Low-saturation voltage	19
2SA2058	TSM	-10	-1.5	Low-saturation voltage	19
2SA2059	PW-Mini(SC-62)	-20	-3	Low-saturation voltage	17
2SA2060	PW-Mini(SC-62)	-50	-2	Low-saturation voltage	17
2SA2061	TSM	-20	-2.5	Low-saturation voltage	19
2SA2065	TSM	-20	-1.5	Low-saturation voltage	19
2SA2066	PW-Mini(SC-62)	-10	-2	Low-saturation voltage	17
2SA2069	PW-Mini(SC-62)	-20	-1.5	Low-saturation voltage	17
2SA2070	PW-Mini(SC-62)	-50	-1	Low-saturation voltage	17
2SA2097	PW-Mold(SC-63)	-50	-5	Low-saturation voltage	18
2SA2120	TO-3P(N)	-200	-12		16
2SA2121	TO-3P(L)	-200	-15		17
2SA2142	PW-Mold(SC-63)	-600	-0.5		18
2SA2184	PW-Mold(SC-63)	-550	-1		18
2SA2206	PW-Mini(SC-62)	-80	-2		17
2SB906	PW-Mold(SC-63)	-60	-3		18
2SC2881	PW-Mini(SC-62)	120	0.8		17
2SC3076	PW-Mold(SC-63)	50	2		18
2SC3303	PW-Mold(SC-63)	80	5		18
2SC5198	TO-3P(N)	140	10		16
2SC5199	TO-3P(L)	160	12		17
2SC5200	TO-3P(L)	230	15		17
2SC5242	TO-3P(N)	230	15		16
2SC5354	TO-3P(N)	800	5		16
2SC5358	TO-3P(N)	230	15		16
2SC5359	TO-3P(L)	230	15		17
2SC5548A	PW-Mold(SC-63)	400	2		18
2SC5692	TSM	50	2.5	Low-saturation voltage	19
2SC5703	TSM	50	4	Low-saturation voltage	19
2SC5712	PW-Mini(SC-62)	50	3	Low-saturation voltage	17
2SC5713	PW-Mini(SC-62)	10	4	Low-saturation voltage	17
2SC5714	PW-Mini(SC-62)	20	4	Low-saturation voltage	17
2SC5738	TSM	20	3.5	Low-saturation voltage	19
2SC5755	TSM	10	2	Low-saturation voltage	19
2SC5784	TSM	20	1.5	Low-saturation voltage	19
2SC5785	PW-Mini(SC-62)	10	2	Low-saturation voltage	17
2SC5810	PW-Mini(SC-62)	50	1	Low-saturation voltage	17
2SC5819	PW-Mini(SC-62)	20	1.5	Low-saturation voltage	17
2SC5886A	PW-Mold(SC-63)	50	5	V _{EBO} = 9 V	18
2SC5906	TSM	30	4	For RF	19
2SC5948	TO-3P(N)	200	12		16
2SC5949	TO-3P(L)	200	15		17
2SC5976	TSM	30	3	For RF	19
2SC6000	PW-Mold(SC-63)	50	7	For RF	18
2SC6033	TSM	50	2.5	For RF	19
2SC6061	TSM	120	1		19
2SC6076	PW-Mold(SC-63)	80	3		18
2SC6124	PW-Mini(SC-62)	80	2		17

Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks	Page
2SC6125	PW-Mini(SC-62)	20	4		17
2SC6126	PW-Mini(SC-62)	50	3		17
2SC6127	PW-Mold(SC-63)	800	0.05		18
2SC6142	PW-Mold(SC-64)	375	1.5		18
2SD1223	PW-Mold(SC-63)	80	4	Darlington	18
2SD2686	PW-Mini(SC-62)	60±10	1	Darlington	17
2SD2719	TSM	60±10	0.8	Darlington	19
HN4B101J	SMV	30/-30	1.2/-1	NPN+PNP	19
HN4B102J	SMV	30/-30	2/-1.8	NPN+PNP	19
TPC6501	VS-6(1in1)	10	2	1-in-1 transistor	20
TPC6502	VS-6(1in1)	50	3	1-in-1 transistor	20
TPC6503	VS-6(1in1)	20	1.5	1-in-1 transistor	20
TPC6504	VS-6(1in1)	50	1	1-in-1 transistor	20
TPC6601	VS-6(1in1)	-50	-2	1-in-1 transistor	20
TPC6602	VS-6(1in1)	-10	-2	1-in-1 transistor	20
TPC6603	VS-6(1in1)	-20	-3	1-in-1 transistor	20
TPC6604	VS-6(1in1)	-50	-1	1-in-1 transistor	20
TPC6701	VS-6(2in1)	50	1	2-in-1 transistor	20
TPC6901A	VS-6(2in1)	50/-50	1/-0.7	NPN+PNP	20
TPC6902	VS-6(2in1)	30/-30	2/-1.7	NPN+PNP	20
TPC6D02	VS-6(2in1)	-15	-1.0	Transistor + Diode	20
TPC6D03	VS-6(2in1)	-20	-1.2	Transistor + Diode	20
TPCP8504	PS-8(1in1)	10	2	1-in-1 transistor	20
TPCP8505	PS-8(1in1)	50	3	1-in-1 transistor	20
TPCP8507	PS-8(1in1)	120	1	1-in-1 transistor	20
TPCP8510	PS-8(1in1)	120	1	1-in-1 transistor	20
TPCP8511	PS-8(1in1)	50	3	1-in-1 transistor	20
TPCP8601	PS-8(1in1)	-20	-4	1-in-1 transistor	20
TPCP8602	PS-8(1in1)	-50	-2.5	1-in-1 transistor	20
TPCP8604	PS-8(1in1)	-400	-0.3	1-in-1 transistor	20
TPCP8701	PS-8(2in1)	50	2	2-in-1 transistor	20
TPCP8901	PS-8(2in1)	50/-50	1/-0.8	NPN+PNP	20
TPCP8902	PS-8(2in1)	30/-30	2/-2	NPN+PNP	20
TPCP8F01	PS-8(2in1)	-20	-3	Transistor + S-MOS	20
TPCP8G01	PS-8(2in1)	-20	-3	Transistor + Pch	20
TPCP8H02	PS-8(2in1)	30	3	Transistor + S-MOS	20
TPCP8L01	PS-8(2in1)	120	0.9	Darlington + HED	20
TTA0001	TO-3P(N)	-160	-18		16
TTA0002	TO-3P(L)	-160	-18		17
TTA003	PW-Mold(SC-63)	-80	-3		18
TTA005	PW-Mold(SC-63)	-50	-5		18
TTA007	TSM	-50	-1		19
TTA1452B	TO-220SIS	-80	-12		16
TTA1943	TO-3P(L)	-230	-15		17
TTA1943N	TO-3P(N)	-230	-15		16
TTB001	TFP	-60	-3		18
TTB002	PW-Mold(SC-63)	-60	-3		18
TTB1020B	TO-220SIS	-100	-7		16
TTC0001	TO-3P(N)	160	18		16
TTC0002	TO-3P(L)	160	18		17
TTC005	PW-Mini(SC-62)	285	1		17
TTC007	TSM	50	1		19
TTC008	PW-Mold(SC-64)	285	1.5		18
TTC012	PW-Mold(SC-64)	375	2		18
TTC013	PW-Mini(SC-62)	350	0.5		17
TTC3710B	TO-220SIS	80	12		16
TTC5200	TO-3P(L)	230	15		17
TTC5200N	TO-3P(N)	230	15		16
TTD1409B	TO-220SIS	400	6		16
TTD1410B	TO-220SIS	250	6		16
TTD1415B	TO-220SIS	100	7		16

Product Obsolescence

The products to be discontinued are listed in the left-hand column below.
When ordering, please choose from the replacement products in the right-hand column.

To Be Discontinued					Replacement Products				
Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks	Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks
2SA817A	LSTM	-80	-0.4		2SA1201	PW-Mini(SC-62)	-120	-0.8	
2SA940A	TO-220NIS	-150	-1.5		■TTA004B	TO-126NIS	-160	-1.5	
2SA949	LSTM	-150	-0.05		—	—	—	—	
2SA965	LSTM	-120	-0.8		2SA1201	PW-Mini(SC-62)	-120	-0.8	
2SA966	LSTM	-30	-1.5		2SA2060	PW-Mini(SC-62)	-50	-2	
2SA968B	TO-220AB	-200	-1.5		■TTA004B	TO-126NIS	-160	-1.5	
2SA1012	TO-220AB	-50	-5		2SA2097	PW-Mold(SC-63)	-50	-5	
2SA1013	LSTM	-160	-1		■TTA004B	TO-126NIS	-160	-1.5	
2SA1020	LSTM	-50	-2		2SA2060	PW-Mini(SC-62)	-50	-2	
2SA1145	LSTM	-150	-0.05		—	—	—	—	
2SA1160	LSTM	-10	-2		2SA2066	PW-Mini(SC-62)	-10	-2	
2SA1200	PW-Mini(SC-62)	-150	-0.05		—	—	—	—	
2SA1202	PW-Mini(SC-62)	-80	-0.4		2SA1201	PW-Mini(SC-62)	-120	-0.8	
2SA1203	PW-Mini(SC-62)	-30	-1.5		2SA2060	PW-Mini(SC-62)	-50	-2	
2SA1204	PW-Mini(SC-62)	-30	-0.8		2SA2070	PW-Mini(SC-62)	-50	-1	
2SA1242	PW-Mold(SC-63)	-20	-5		2SA2097	PW-Mold(SC-63)	-50	-5	
2SA1315	LSTM	-80	-2		2SA2206	PW-Mini(SC-62)	-80	-2	
2SA1321	LSTM	-250	-0.05		—	—	—	—	
2SA1327A	TO-220NIS	-20	-10		TTA1452B	TO-220SIS	-80	-12	
2SA1356	TO-126	-40	-0.8		2SA2070	PW-Mini(SC-62)	-50	-1	
2SA1358	TO-126	-120	-1		■TTA004B	TO-126NIS	-160	-1.5	
2SA1360	TO-126	-150	-0.05		—	—	—	—	
2SA1382	LSTM	-50	-2		2SA2060	PW-Mini(SC-62)	-50	-2	
2SA1384	PW-Mini(SC-62)	-300	-0.1		2SA1971	PW-Mini(SC-62)	-400	-0.5	
2SA1387	TO-220IS	-50	-5		2SA2097	PW-Mold(SC-63)	-50	-5	
2SA1408	TO-126	-150	-1.5		■TTA004B	TO-126NIS	-160	-1.5	
2SA1425	MSTM	-120	-0.8		2SA1201	PW-Mini(SC-62)	-120	-0.8	
2SA1426	MSTM	-30	-0.8		2SA2070	PW-Mini(SC-62)	-50	-1	
2SA1428	MSTM	-50	-2		2SA2060	PW-Mini(SC-62)	-50	-2	
2SA1429	MSTM	-80	-2		2SA2206	PW-Mini(SC-62)	-80	-2	
2SA1430	MSTM	-10	-2		2SA2066	PW-Mini(SC-62)	-10	-2	
2SA1431	MSTM	-20	-5		2SA2059	PW-Mini(SC-62)	-20	-3	
2SA1432	MSTM	-300	-0.1		2SA1971	PW-Mini(SC-62)	-400	-0.5	
2SA1451	TO-220IS	-50	-12		TTA1452B	TO-220SIS	-80	-12	
2SA1451A	TO-220NIS	-50	-12		TTA1452B	TO-220SIS	-80	-12	
2SA1452	TO-220IS	-80	-12		TTA1452B	TO-220SIS	-80	-12	
2SA1452A	TO-220NIS	-80	-12		TTA1452B	TO-220SIS	-80	-12	
2SA1553	TO-3P(L)	-230	-15		TTA1943	TO-3P(L)	-230	-15	
2SA1680	LSTM	-50	-2		2SA2060	PW-Mini(SC-62)	-50	-2	
2SA1761	LSTM	-50	-3		2SA2060	PW-Mini(SC-62)	-50	-2	
2SA1771	TO-220NIS	-80	-12		TTA1452B	TO-220SIS	-80	-12	
2SA1803	TO-3P(N)	-80	-6		2SA1941	TO-3P(N)	-140	-10	
2SA1804	TO-3P(N)	-120	-8		2SA1941	TO-3P(N)	-140	-10	
2SA1805	TO-3P(N)	-140	-10		2SA1941	TO-3P(N)	-140	-10	
2SA1822	TO-220NIS	-400	-1		—	—	—	—	
2SA1837	TO-220NIS	-230	-1		■TTA006B	TO-126NIS	-230	-1	
2SA1869	TO-220NIS	-50	-3		2SA2097	PW-Mold(SC-63)	-50	-5	
2SA1887	TO-220NIS	-50	-10		TTA1452B	TO-220SIS	-80	-12	
2SA1891	TPS	-50	-2		2SA1241	PW-Mold(SC-63)	-50	-2	
2SA1892	TPS	-50	-3		2SA2097	PW-Mold(SC-63)	-50	-5	
2SA1905	TPS	-50	-5		2SA2097	PW-Mold(SC-63)	-50	-5	
2SA1923	PW-Mold(SC-63)	-400	-0.5		2SA1971	PW-Mini(SC-62)	-400	-0.5	
2SA1924	TO-126	-400	-0.5		2SA1971	PW-Mini(SC-62)	-400	-0.5	
2SA1925	TPS	-400	-0.5		2SA1971	PW-Mini(SC-62)	-400	-0.5	
2SA1926	MSTM	-80	-3		2SA2206	PW-Mini(SC-62)	-80	-2	
2SA1931	TO-220NIS	-50	-5		2SA2097	PW-Mold(SC-63)	-50	-5	
2SA1932	TPL	-230	-1		■TTA006B	TO-126NIS	-230	-1	
2SA1933	TPL	-50	-5		2SA2097	PW-Mold(SC-63)	-50	-5	
2SA1934	TPL	-80	-5		TTA1452B	TO-220SIS	-80	-12	
2SA1937	PW-Mold(SC-64)	-600	-0.5		2SA2142	PW-Mold(SC-63)	-600	-0.5	
2SA1939	TO-3P(N)	-80	-6		2SA1941	TO-3P(N)	-140	-10	
2SA1940	TO-3P(N)	-120	-8		2SA1941	TO-3P(N)	-140	-10	
2SA1972	LSTM	-400	-0.5		2SA1971	PW-Mini(SC-62)	-400	-0.5	
2SA2182	TO-220SIS	-230	-1		■TTA006B	TO-126NIS	-230	-1	
2SA2183	TO-220SIS	-60	-5		TTB002	PW-Mold(SC-63)	-60	-3	
2SA2190	TO-220SIS	-180	-2		■TTA004B	TO-126NIS	-160	-1.5	
2SA2219	MSTM	-160	-1.5		■TTA004B	TO-126NIS	-160	-1.5	
2SA2220	TPL	-160	-1.5		■TTA004B	TO-126NIS	-160	-1.5	
2SB553	TO-220AB	-50	-7		TTA1452B	TO-220SIS	-80	-12	
2SB595	TO-220AB	-100	-5		TTA1452B	TO-220SIS	-80	-12	
2SB596	TO-220AB	-80	-4		TTA003	PW-Mold(SC-63)	-80	-3	
2SB753	TO-220AB	-80	-7		TTA1452B	TO-220SIS	-80	-12	
2SB834	TO-220AB	-60	-3		TTB002	PW-Mold(SC-63)	-60	-3	
2SB863	TO-3P	-140	-10		2SA1941	TO-3P(N)	-140	-10	
2SB905	PW-Mold(SC-63)	-150	-1.5		2SA1225	PW-Mold(SC-63)	-160	-1.5	
2SB907	PW-Mold(SC-63)	-40	-3	Darlington	—	—	—	—	
2SB908	PW-Mold(SC-63)	-80	-4	Darlington	—	—	—	—	
2SB1015	TO-220IS	-60	-3		TTB002	PW-Mold(SC-63)	-60	-3	
2SB1015A	TO-220NIS	-60	-3		TTB002	PW-Mold(SC-63)	-60	-3	

■ : Being planned

To Be Discontinued					Replacement Products				
Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks	Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks
2SB1016A	TO-220NIS	-100	-5		TTA1452B	TO-220SIS	-80	-12	
2SB1017	TO-220IS	-80	-4		TTA003	PW-Mold(SC-63)	-80	-3	
2SB1018	TO-220IS	-80	-7		TTA1452B	TO-220SIS	-80	-12	
2SB1018A	TO-220NIS	-50	-7		TTA1452B	TO-220SIS	-80	-12	
2SB1019	TO-220IS	-50	-7		TTA1452B	TO-220SIS	-80	-12	
2SB1020	TO-220IS	-100	-7	Darlington	TTB1020B	TO-220SIS	-100	-7	Darlington
2SB1020A	TO-220NIS	-100	-7	Darlington	TTB1020B	TO-220SIS	-100	-7	Darlington
2SB1375	TO-220NIS	-60	-3		TTB002	PW-Mold(SC-63)	-60	-3	
2SB1381	TO-220NIS	-100	-5	Darlington	TTB1020B	TO-220SIS	-100	-7	Darlington
2SB1457	LSTM	-100	-2	Darlington	■TTB1067B	TO-126NIS	-80	-2	Darlington
2SB1481	TO-220NIS	-100	-4	Darlington	TTB1020B	TO-220SIS	-100	-7	Darlington
2SB1495	TO-220NIS	-100	-3	Darlington	TTB1020B	TO-220SIS	-100	-7	Darlington
2SB1617	TPS	-100	-2	Darlington	■TTB1067B	TO-126NIS	-80	-2	Darlington
2SB1640	TPL	-60	-3		TTB002	PW-Mold(SC-63)	-60	-3	
2SB1641	TPL	-100	-5	Darlington	TTB1020B	TO-220SIS	-100	-7	Darlington
2SB1642	TO-220NIS	-60	-4		TTB002	PW-Mold(SC-63)	-60	-3	
2SB1667	TO-220SM	-60	-3		TTB002	PW-Mold(SC-63)	-60	-3	
2SC1627A	LSTM	80	0.4		2SC2881	PW-Mini(SC-62)	120	0.8	
2SC2073A	TO-220NIS	150	1.5		■TTC004B	TO-126NIS	160	1.5	
2SC2229	LSTM	150	0.05		-	-	-	-	
2SC2230	LSTM	160	0.1		-	-	-	-	
2SC2230A	LSTM	180	0.1		-	-	-	-	
2SC2235	LSTM	120	0.8		2SC2881	PW-Mini(SC-62)	120	0.8	
2SC2236	LSTM	30	1.5		2SC5712	PW-Mini(SC-62)	50	3	
2SC2242	TO-220AB	300	0.15		-	-	-	-	
2SC2383	LSTM	160	1		■TTC004B	TO-126NIS	160	1.5	
2SC2482	LSTM	300	0.1		TTC013	PW-Mini(SC-62)	350	0.5	
2SC2500	LSTM	10	2		2SC5785	PW-Mini(SC-62)	10	2	
2SC2553	TO-220AB	400	5		2SC5354	TO-3P(N)	800	5	
2SC2562	TO-220AB	50	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC2655	LSTM	50	2		2SC5712	PW-Mini(SC-62)	50	3	
2SC2703	LSTM	30	1		2SC5810	PW-Mini(SC-62)	50	1	
2SC2705	LSTM	150	0.05		-	-	-	-	
2SC2880	PW-Mini(SC-62)	150	0.05		-	-	-	-	
2SC2882	PW-Mini(SC-62)	80	0.4		2SC2881	PW-Mini(SC-62)	120	0.8	
2SC2883	PW-Mini(SC-62)	30	1.5		2SC5712	PW-Mini(SC-62)	50	3	
2SC2884	PW-Mini(SC-62)	30	0.8		2SC5810	PW-Mini(SC-62)	50	1	
2SC2982	PW-Mini(SC-62)	10	2		2SC5785	PW-Mini(SC-62)	10	2	
2SC3072	PW-Mold(SC-63)	20	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC3074	PW-Mold(SC-63)	50	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC3075	PW-Mold(SC-63)	400	0.8		2SC5548A	PW-Mold(SC-63)	400	2	
2SC3180N	TO-3P(N)	80	6		2SC5198	TO-3P(N)	140	10	
2SC3225	LSTM	40	2		2SC5712	PW-Mini(SC-62)	50	3	
2SC3233	PW-Mold(SC-63)	400	2		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC3257	TO-220AB	200	10		2SC5948	TO-3P(N)	200	12	
2SC3281	TO-3P(L)	200	15		TTC5200	TO-3P(L)	230	15	
2SC3328	LSTM	80	2		2SC6124	PW-Mini(SC-62)	80	2	
2SC3334	LSTM	250	0.05		-	-	-	-	
2SC3346	TO-220AB	80	12		TTC3710B	TO-220SIS	80	12	
2SC3419	TO-126	40	0.8		2SC5810	PW-Mini(SC-62)	50	1	
2SC3420	TO-126	20	5		2SC5714	PW-Mini(SC-62)	20	4	
2SC3421	TO-126	120	1		■TTC004B	TO-126NIS	160	1.5	
2SC3422	TO-126	40	3		2SC5712	PW-Mini(SC-62)	50	3	
2SC3423	TO-126	150	0.05		-	-	-	-	
2SC3425	TO-126	400	0.8		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC3474	PW-Mold(SC-63)	80	2		2SC6076	PW-Mold(SC-63)	80	3	
2SC3515	PW-Mini(SC-62)	300	0.1		TTC013	PW-Mini(SC-62)	350	0.5	
2SC3559	TO-220IS	800	3		2SC5354	TO-3P(N)	800	5	
2SC3619	TO-126	300	0.05		TTC013	PW-Mini(SC-62)	350	0.5	
2SC3620	TO-126	300	0.1		TTC013	PW-Mini(SC-62)	350	0.5	
2SC3621	TO-126	150	1.5		■TTC004B	TO-126NIS	160	1.5	
2SC3657	TO-3P(N)	800	4		2SC5354	TO-3P(N)	800	5	
2SC3665	MSTM	120	0.8		2SC2881	PW-Mini(SC-62)	120	0.8	
2SC3666	MSTM	30	1		2SC5810	PW-Mini(SC-62)	50	1	
2SC3668	MSTM	50	2		2SC5712	PW-Mini(SC-62)	50	3	
2SC3669	MSTM	80	2		2SC6124	PW-Mini(SC-62)	80	2	
2SC3670	MSTM	10	2		2SC5785	PW-Mini(SC-62)	10	2	
2SC3671	MSTM	20	5		2SC5714	PW-Mini(SC-62)	20	4	
2SC3673	MSTM	40	2		2SC5712	PW-Mini(SC-62)	50	3	
2SC3709	TO-220IS	50	12		TTC3710B	TO-220SIS	80	12	
2SC3709A	TO-220NIS	50	12		TTC3710B	TO-220SIS	80	12	
2SC3710A	TO-220NIS	80	12		TTC3710B	TO-220SIS	80	12	
2SC3803	PW-Mini(SC-62)	45	0.2		2SC5810	PW-Mini(SC-62)	50	1	
2SC3963	TO-126	160	0.2		-	-	-	-	
2SC3964	TO-126	40	2		2SC5712	PW-Mini(SC-62)	50	3	
2SC4157	TO-3P(N)	450	10		-	-	-	-	
2SC4408	LSTM	50	2		2SC5712	PW-Mini(SC-62)	50	3	
2SC4439	TO-126	150	0.3		-	-	-	-	
2SC4539	PW-Mini(SC-62)	30	1.2		2SC5810	PW-Mini(SC-62)	50	1	

■ : Being planned

To Be Discontinued					Replacement Products				
Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks	Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks
2SC4544	TO-220NIS	300	0.1		TTC013	PW-Mini(SC-62)	350	0.5	
2SC4604	LSTM	50	3		2SC5712	PW-Mini(SC-62)	50	3	
2SC4682	LSTM	15	3		2SC5714	PW-Mini(SC-62)	20	4	
2SC4683	MSTM	15	3		2SC5714	PW-Mini(SC-62)	20	4	
2SC4684	PW-Mold(SC-63)	20	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC4685	TO-126	20	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC4686	TO-220NIS	1000	0.05		-	-	-	-	
2SC4686A	TO-220NIS	1200	0.05		-	-	-	-	
2SC4688	TO-3P(N)IS	80	6		2SC5198	TO-3P(N)	140	10	
2SC4689	TO-3P(N)IS	120	8		2SC5198	TO-3P(N)	140	10	
2SC4690	TO-3P(N)IS	140	10		2SC5198	TO-3P(N)	140	10	
2SC4754	TO-220FL	400	2		2SC5548A	PW-Mold(SC-63)	400	2	
2SC4793	TO-220NIS	230	1		■TTC011B	TO-126NIS	230	1	
2SC4881	TO-220NIS	50	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC4935	TO-220NIS	50	3		2SC5886A	PW-Mold(SC-63)	50	5	
2SC5000	TO-220NIS	50	10		TTC3710B	TO-220SIS	80	12	
2SC5027	TPS	300	0.1		TTC013	PW-Mini(SC-62)	350	0.5	
2SC5028	TPS	50	2		2SC3076	PW-Mold(SC-63)	50	2	
2SC5029	TPS	50	3		2SC5886A	PW-Mold(SC-63)	50	5	
2SC5075	TPS	400	2		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC5076	TPS	50	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC5122	LSTM	400	0.05		TTC013	PW-Mini(SC-62)	350	0.5	
2SC5144	TO-3P(L)	600	20		-	-	-	-	
2SC5171	TO-220NIS	180	2		■TTC004B	TO-126NIS	160	1.5	
2SC5172	TO-220NIS	400	5		2SC5354	TO-3P(N)	800	5	
2SC5173	TPL	300	0.1		TTC013	PW-Mini(SC-62)	350	0.5	
2SC5174	TPL	230	1		■TTC011B	TO-126NIS	230	1	
2SC5175	TPL	50	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC5176	TPL	80	5		TTC3710B	TO-220SIS	80	12	
2SC5196	TO-3P(N)	80	6		2SC5198	TO-3P(N)	140	10	
2SC5197	TO-3P(N)	120	8		2SC5198	TO-3P(N)	140	10	
2SC5201	LSTM	600	0.05		-	-	-	-	
2SC5208	TPS	400	0.8		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC5266A	TPL	400	5		TTC012	PW-Mold(SC-64)	375	2	
2SC5279	TPL	400	2		2SC5548A	PW-Mold(SC-63)	400	2	
2SC5331	TO-3P(L)	600	15		-	-	-	-	
2SC5332	TO-3P(L)	800	14		-	-	-	-	
2SC5351	TPS	450	2		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC5352	TO-3P(N)	400	10		-	-	-	-	
2SC5353	TO-220NIS	800	3		2SC5354	TO-3P(N)	800	5	
2SC5360	TO-220NIS	300	0.15		-	-	-	-	
2SC5361	TO-220FL	800	3		2SC5354	TO-3P(N)	800	5	
2SC5368	TO-126	450	2		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC5422	TO-3P(L)	600	15		-	-	-	-	
2SC5439	TO-220NIS	450	8		2SC5354	TO-3P(N)	800	5	
2SC5445	TO-3P(L)	600	20		-	-	-	-	
2SC5446	TO-3P(L)	600	18		-	-	-	-	
2SC5458	PW-Mold(SC-63)	400	0.8		2SC5548A	PW-Mold(SC-63)	400	2	
2SC5459	TO-220NIS	400	3		2SC5354	TO-3P(N)	800	5	
2SC5465	PW-Mold(SC-64)	800	0.8		-	-	-	-	
2SC5466	TO-220NIS	800	0.05		2SC6127	PW-Mold(SC-63)	800	0.05	
2SC5548	PW-Mold(SC-63)	370	2		2SC5548A	PW-Mold(SC-63)	400	2	
2SC5549	LSTM	400	1		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC5550	TO-126	400	1		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC5562	TPS	800	0.8		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC5563	TO-220NIS	1500	0.02		-	-	-	-	
2SC5570	TO-3P(L)	800	28		-	-	-	-	
2SC5589	TO-3P(L)	750	18		-	-	-	-	
2SC5590	TO-3P(L)	800	16		-	-	-	-	
2SC5695	TO-3P(L)	700	22		-	-	-	-	
2SC5859	TO-3P(L)	750	23		-	-	-	-	
2SC5886	PW-Mold(SC-63)	50	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC5930	MSTM	285	1		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC6010	MSTM	285	1		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC6034	MSTM	285	1		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC6040	MSTM	410	1		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC6042	MSTM	375	1		2SC6142	PW-Mold(SC-64)	375	1.5	
2SC6052	PW-Mold(SC-63)	20	5		2SC5886A	PW-Mold(SC-63)	50	5	
2SC6060	TO-220SIS	230	1		■TTC011B	TO-126NIS	230	1	
2SC6062	TSM	30	5		2SC5703	TSM	50	4	
2SC6072	TO-220SIS	180	2		■TTC004B	TO-126NIS	160	1.5	
2SC6075	TPS	80	2.5		2SC6076	PW-Mold(SC-63)	80	3	
2SC6077	TPL	80	3		2SC6076	PW-Mold(SC-63)	80	3	
2SC6078	TPL	80	3		2SC6076	PW-Mold(SC-63)	80	3	
2SC6079	MSTM	80	2		2SC6124	PW-Mini(SC-62)	80	2	
2SC6139	MSTM	160	1.5		■TTC004B	TO-126NIS	160	1.5	
2SC6087	TPS	80	2.5		2SC6076	PW-Mold(SC-63)	80	3	
2SC6140	TPL	160	1.5		■TTC004B	TO-126NIS	160	1.5	
2SD525	TO-220AB	100	5		TTC3710B	TO-220SIS	80	12	

■ : Being planned

To Be Discontinued					Replacement Products				
Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks	Part Number	Package	V _{CEO} (V)	I _c (A)	Remarks
2SD526	TO-220AB	80	4		2SC3303	PW-Mold(SC-63)	80	5	
2SD553	TO-220AB	50	7		TTC3710B	TO-220SIS	80	12	Darlington
2SD686	TO-220AB	80	4	Darlington	TTD1415B	TO-220SIS	100	7	
2SD716	TO-3P	100	6		2SC5198	TO-3P(N)	140	10	
2SD843	TO-220AB	80	7		TTC3710B	TO-220SIS	80	12	
2SD880	TO-220AB	60	3		2SC6076	PW-Mold(SC-63)	80	3	
2SD1052A	TO-220AB	50	3		2SC6076	PW-Mold(SC-63)	80	3	Darlington
2SD1140	LSTM	30	1.5	Darlington	■TTD1509B	TO-126NIS	80	2	
2SD1160	PW-Mold(SC-63)	20	2		2SC3076	PW-Mold(SC-63)	50	2	
2SD1187	TO-3P	80	10		2SC5198	TO-3P(N)	140	10	
2SD1220	PW-Mold(SC-63)	150	1.5		—	—	—	—	
2SD1221	PW-Mold(SC-63)	60	3		2SC6076	PW-Mold(SC-63)	80	3	Darlington
2SD1222	PW-Mold(SC-63)	40	3	Darlington	2SD1223	PW-Mold(SC-63)	80	4	Darlington
2SD1224	PW-Mold(SC-63)	30	1.5	Darlington	■TTD1509B	TO-126NIS	80	2	
2SD1314	TO-3P(L)	450	15		—	—	—	—	
2SD1406	TO-220IS	60	3		2SC6076	PW-Mold(SC-63)	80	3	
2SD1407	TO-220IS	100	5		TTC3710B	TO-220SIS	80	12	
2SD1407A	TO-220NIS	100	5		TTC3710B	TO-220SIS	80	12	
2SD1408	TO-220IS	80	4		2SC3303	PW-Mold(SC-63)	80	5	Darlington
2SD1409	TO-220IS	400	6	Darlington	TTD1409B	TO-220SIS	400	6	Darlington
2SD1409A	TO-220NIS	400	6	Darlington	TTD1409B	TO-220SIS	400	6	Darlington
2SD1410A	TO-220NIS	250	6	Darlington	TTD1410B	TO-220SIS	250	6	
2SD1411	TO-220IS	80	7		TTC3710B	TO-220SIS	80	12	
2SD1411A	TO-220NIS	80	7		TTC3710B	TO-220SIS	80	12	
2SD1412	TO-220IS	50	7		TTC3710B	TO-220SIS	80	12	
2SD1412A	TO-220NIS	50	7		TTC3710B	TO-220SIS	80	12	Darlington
2SD1415	TO-220IS	100	7	Darlington	TTD1415B	TO-220SIS	100	7	Darlington
2SD1415A	TO-220NIS	100	7	Darlington	TTD1415B	TO-220SIS	100	7	Darlington
2SD1508	TO-126	30	1.5	Darlington	■TTD1509B	TO-126NIS	80	2	
2SD1525	TO-3P(L)	100	30	Darlington	—	—	—	—	Darlington
2SD1631	MSTM	30	1.5	Darlington	■TTD1509B	TO-126NIS	80	2	Darlington
2SD1658	TO-126	60±10	2	Darlington	■TTD1509B	TO-126NIS	80	2	
2SD1662	TO-3P(N)	100	15	Darlington	—	—	—	—	
2SD1784	PW-Mini(SC-62)	30	1.5	Darlington	—	—	—	—	
2SD1947	TO-220IS	100	10		TTC3710B	TO-220SIS	80	12	
2SD1947A	TO-220NIS	100	10		TTC3710B	TO-220SIS	80	12	
2SD2012	TO-220NIS	60	3		2SC6076	PW-Mold(SC-63)	80	3	
2SD2075A	TO-220NIS	60±10	10	Darlington	—	—	—	—	Darlington
2SD2079	TO-220NIS	100	5	Darlington	TTD1415B	TO-220SIS	100	7	Darlington
2SD2088	LSTM	60±10	2	Darlington	2SD2686	PW-Mini(SC-62)	60±10	1	
2SD2092	TO-220NIS	100	3		—	—	—	—	Darlington
2SD2127	TO-220NIS	60±10	3	Darlington	TTD1415B	TO-220SIS	100	7	Darlington
2SD2129	TO-220NIS	100	3	Darlington	TTD1415B	TO-220SIS	100	7	Darlington
2SD2130	TO-126	60±10	4	Darlington	■TTD1509B	TO-126NIS	80	2	Darlington
2SD2131	TO-220NIS	60±10	5	Darlington	TTD1415B	TO-220SIS	100	7	Darlington
2SD2204	TO-220NIS	60±10	4	Darlington	TTD1415B	TO-220SIS	100	7	Darlington
2SD2206	LSTM	100	2	Darlington	■TTD1509B	TO-126NIS	80	2	Darlington
2SD2241	TO-220NIS	100	4	Darlington	TTD1415B	TO-220SIS	100	7	Darlington
2SD2257	TO-220NIS	100	3	Darlington	TTD1415B	TO-220SIS	100	7	
2SD2271	TO-220NIS	200	12		—	—	—	—	
2SD2352	TO-220NIS	60	2	Darlington	—	—	—	—	
2SD2353	TO-220NIS	60	3	Darlington	—	—	—	—	
2SD2406	TO-220NIS	80	4		2SC3303	PW-Mold(SC-63)	80	5	
2SD2414	TO-220SM	80	7		TTC3710B	TO-220SIS	80	12	
2SD2440	TO-3P(N)	60	6		2SC5198	TO-3P(N)	140	10	
2SD2461	TPS	60	2	Darlington	—	—	—	—	
2SD2462	TPS	60	3	Darlington	—	—	—	—	Darlington
2SD2480	TPS	100	2	Darlington	■TTD1509B	TO-126NIS	80	2	Darlington
2SD2481	TPS	30	1.5	Darlington	■TTD1509B	TO-126NIS	80	2	
2SD2525	TPL	60	3		2SC6076	PW-Mold(SC-63)	80	3	Darlington
2SD2526	TPL	100	5	Darlington	TTD1415B	TO-220SIS	100	7	
2SD2531	TO-220NIS	60	4		2SC3303	PW-Mold(SC-63)	80	5	Darlington
2SD2536	LSTM	100±15	2	Darlington	■TTD1509B	TO-126NIS	80	2	Darlington
2SD2584	DP	100	7	Darlington	TTD1415B	TO-220SIS	100	7	Darlington
2SD2604	TO-220NIS	110±15	5	Darlington	TTD1415B	TO-220SIS	100	7	
2SD2636	TO-3P(N)	150	8		—	—	—	—	Darlington
2SD2695	LSTM	60±10	2	Darlington	2SD2686	PW-Mini(SC-62)	60±10	1	
TPCP8501	PS-8(1in1)	100	2	1-in-1 transistor	—	—	—	—	
TPCP8603	PS-8(1in1)	-120	-1	1-in-1 transistor	2SA1201	PW-Mini(SC-62)	-120	-0.8	
TPCP8H01	PS-8(2in1)	50	5	Transistor + S-MOS	—	—	—	—	
TTC003	PW-Mold(SC-64)	400	1.5		TTC012	PW-Mold(SC-64)	375	2	
TTC009	TO-220NIS	80	3		2SC6076	PW-Mold(SC-63)	80	3	
TTC13003L	LSTM	400	1.5		TTC012	PW-Mold(SC-64)	375	2	

■ : Being planned

Toshiba America**Electronic Components, Inc.**

- Irvine, Headquarters
Tel: (949)623-2900 Fax: (949)474-1330
- Buffalo Grove (Chicago)
Tel: (847)484-2400 Fax: (847)541-7287
- Duluth/Atlanta
Tel: (770)931-3363 Fax: (770)931-7602
- El Paso
Tel: (915)771-8156
- Marlborough
Tel: (508)481-0034 Fax: (508)481-8828
- Parsippany
Tel: (973)541-4715 Fax: (973)541-4716
- San Jose
Tel: (408)526-2400 Fax: (408)526-2410
- Wixom (Detroit)
Tel: (248)347-2607 Fax: (248)347-2602

Toshiba Electronics do Brasil Ltda.

Tel: (011)2936-6681 Fax: (011)2936-6675

Toshiba India Private Ltd.

- New Delhi Office
Tel: (0124)499-6600 Fax: (0124)499-6611
- Bangalore Office
Tel: (080)251-90800 Fax: (080)490-91945

Toshiba Electronics Europe GmbH

- Düsseldorf Head Office
Tel: (0211)5296-0 Fax: (0211)5296-400
- France Branch
Tel: (1)47282181
- Italy Branch
Tel: (039)68701 Fax: (039)6870205
- Munich Office
Tel: (089)20302030 Fax: (089)203020310
- Spain Branch
Tel: (91)660-6798 Fax: (91)660-6799
- Sweden Branch
Tel: (08)704-0900 Fax: (08)80-8459
- U.K. Branch
Tel: (1932)841600

Toshiba Vietnam Consumer Products Co.,Ltd.

Tel: (043)776-5950 Fax: (043)776-5956

Toshiba Electronics Asia (Singapore) Pte. Ltd.

Tel: (6278)5252 Fax: (6271)5155

Toshiba Electronics Service (Thailand) Co., Ltd.

Tel: (02)501-1634 Fax: (02)501-1638

Toshiba Electronics Trading (Malaysia)Sdn. Bhd.

- Kuala Lumpur Head Office
Tel: (03)5631-6311 Fax: (03)5631-6307
- Penang Office
Tel: (04)226-8523 Fax: (04)226-8515

Toshiba Electronics (Shanghai) Co., Ltd.

- Shanghai Head Office
Tel: (021)6139-3888 Fax: (021)6190-8288
- Beijing Branch
Tel: (010)6590-8796 Fax: (010)6590-8791
- Chengdu Branch
Tel: (028)8675-1773 Fax: (028)8675-1065
- Hangzhou Office
Tel: (0571)8717-5004 Fax: (0571)8717-5013
- Nanjing Office
Tel: (025)8689-0070 Fax: (025)8689-0125
- Qingdao Branch
Tel: (532)8579-3328 Fax: (532)8579-3329
- Shenzhen Branch
Tel: (0755)2399-6897 Fax: (0755)2399-5573
- Dalian Branch
Tel: (0411)8368-6882 Fax: (0411)8369-0822
- Xiamen Branch
Tel: (0592)226-1398 Fax: (0592)226-1399

Toshiba Electronics Asia, Ltd.

Tel: 2375-6111 Fax: 2375-0969

Toshiba Electronics Korea Corporation

Tel: (02)3484-4334 Fax: (02)3484-4302

Toshiba Electronics Taiwan Corporation

Tel: (02)2508-9988 Fax: (02)2508-9999

- ▶ Toshiba Corporation, and its subsidiaries and affiliates (collectively "TOSHIBA"), reserve the right to make changes to the information in this document, and related hardware, software and systems (collectively "Product") without notice.
- ▶ This document and any information herein may not be reproduced without prior written permission from TOSHIBA. Even with TOSHIBA's written permission, reproduction is permissible only if reproduction is without alteration/omission.
- ▶ Though TOSHIBA works continually to improve Product's quality and reliability, Product can malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. Before customers use the Product, create designs including the Product, or incorporate the Product into their own applications, customers must also refer to and comply with (a) the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the "TOSHIBA Semiconductor Reliability Handbook" and (b) the instructions for the application with which the Product will be used with or for. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this Product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. **TOSHIBA ASSUMES NO LIABILITY FOR CUSTOMERS' PRODUCT DESIGN OR APPLICATIONS.**
- ▶ **PRODUCT IS NEITHER INTENDED NOR WARRANTED FOR USE IN EQUIPMENTS OR SYSTEMS THAT REQUIRE EXTRAORDINARILY HIGH LEVELS OF QUALITY AND/OR RELIABILITY, AND/OR A MALFUNCTION OR FAILURE OF WHICH MAY CAUSE LOSS OF HUMAN LIFE, BODILY INJURY, SERIOUS PROPERTY DAMAGE AND/OR SERIOUS PUBLIC IMPACT ("UNINTENDED USE").** Except for specific applications as expressly stated in this document, Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. **IF YOU USE PRODUCT FOR UNINTENDED USE, TOSHIBA ASSUMES NO LIABILITY FOR PRODUCT.** For details, please contact your TOSHIBA sales representative.
- ▶ Do not disassemble, analyze, reverse-engineer, alter, modify, translate or copy Product, whether in whole or in part.
- ▶ Product shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.
- ▶ The information contained herein is presented only as guidance for Product use. No responsibility is assumed by TOSHIBA for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.
- ▶ **ABSENT A WRITTEN SIGNED AGREEMENT, EXCEPT AS PROVIDED IN THE RELEVANT TERMS AND CONDITIONS OF SALE FOR PRODUCT, AND TO THE MAXIMUM EXTENT ALLOWABLE BY LAW, TOSHIBA (1) ASSUMES NO LIABILITY WHATSOEVER, INCLUDING WITHOUT LIMITATION, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OR LOSS, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF OPPORTUNITIES, BUSINESS INTERRUPTION AND LOSS OF DATA, AND (2) DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES AND CONDITIONS RELATED TO SALE, USE OF PRODUCT, OR INFORMATION, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY OF INFORMATION, OR NON-INFRINGEMENT.**
- ▶ Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the applicable export laws and regulations including, without limitation, the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
- ▶ Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. Please use Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. **TOSHIBA ASSUMES NO LIABILITY FOR DAMAGES OR LOSSES OCCURRING AS A RESULT OF NONCOMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.**

TOSHIBA**TOSHIBA CORPORATION**

Semiconductor & Storage Products Company

Website: <http://www.semicon.toshiba.co.jp/eng>