



# Selection Guide according to Function and Application

## For High-Frequency Devices (2SA\*\*\*\* / 2SC\*\*\*\*)

V <sub>CE0</sub> (V) I <sub>c</sub> (A)	10/(15)	(18)/20	(25)/30	40	45	50
0.2					2SA1483 2SC3803 (○)	
0.5		2SC3613 (18V) (@)	2SA1811 2SC4707 (*)			
0.6		2SC4200 (18V) (@)				
0.8			2SA1426 (S) 2SA1404 2SC2884 (○) 2SC2703 (*) 2SC3666 (S)	2SA1356 2SC3419 (@)		TPC6801 (Δ[V])
1			2SA1734 2SC4539 2SA966 2SC2236			2SA1735 2SC4540 (○) 2SA2070 (○) TPC6701 (Δ[V]) 2SC5810 (○)
1.2			2SA1203 2SC2883 (○)			
1.5	2SA2058 [T]	2SA2065 2SC5784 [T] 2SA2069 (○)				
2	2SA1160 2SC2500 (*) 2SA1430 2SC3670 (S) 2SA1314 2SC2982 (○) 2SA2066 (○) 2SC5755 [T] 2SC5785 (○) TPC6501 [V]			2SC3225 (*) 2SC3673 (S) 2SC3964 (@)		2SA1735 2SC4540 (*) 2SA1020 2SC2655 (○) 2SA1241 2SC3076 (◇) 2SA1382 (*) 2SA2056 [T] TPC6601 [V] 2SA2060 (○) 2SA1428 2SC3668 (S) 2SA1680 2SC4408 (*) 2SA1681 2SC4409 (○) 2SA1891 2SC5028 (□)
2.5		2SA2061 [T] 2SA2059 (○)				2SC5692 [T]
3	2SA1802 2SC4681 (◇) 2SC4682 (*) (15V) 2SC4683 (S) (15V)			2SA1359 2SC3422 (@)		2SA1761 2SC4604 (*) 2SA1869 2SC4935 (▲) 2SA1892 2SC5029 (□) 2SA1736 2SC4541 (○) 2SC5712 (○)
3.5		2SC5738 [T]				
4	2SC4781 (*) 2SC5713 (○)	2SC5714 (○)				2SC5703 [T]
5		2SA1242 (◇) 2SA1357 (@) 2SA1431 (S) 2SA1893 (□) 2SC3072 (◇) 2SC3420 (@) 2SC3671 (S) 2SC4684 (◇) 2SC4685 (@) 2SC5030 (□)				2SA1244 2SC3074 (◇) 2SA1905 2SC5076 (□) 2SA1931 2SC4881 (▲) 2SA1933 2SC5175 (■)
10		2SA1327A (▲)				2SA1887 2SC5000 (▲)
12						2SA1451A 2SC3709A (▲)

V <sub>CE0</sub> (V) I <sub>c</sub> (A)	80	100	120	(140)/150	160
0.05				2SA1145 2SC2705 (*) 2SA1360 2SC3423 (@) 2SA1200 2SC2880 (○) 2SA949 2SC2229 (*)	
0.1					2SC2230 (*)
0.2					2SC3963 (@)
0.3				2SC4439 (@)	
0.4	2SA817A 2SC1627A (*) 2SA1202 2SC2882 (○)				
0.5		2SC4479 (@) 2SC4605 (▲)			
0.8			2SA965 2SC2235 (*) 2SA1201 2SC2881 (○) 2SA1425 2SC3665 (S) 2SA1899 2SC5052 (S)		
1			2SA1358 2SC3421 (@)		2SA1013 2SC2383 (*)
1.5				2SA940A 2SC2073A (▲) 2SA1408 2SC3621 (@)	2SA1225 2SC2983 (◇) 2SC5154 (□)
2	2SA1315 2SC3328 (*) 2SA1429 2SC3669 (S) 2SC3474 (◇)				
3	2SA1926 (S)				
5	2SA1934 2SC5176 (■) 2SC3303 (◇)				
6	2SA1803 2SC4688 (▼) 2SA1939 2SC5196 (▽)				
8			2SA1804 2SC4689 (▼) 2SA1940 2SC5197 (▽)		
10				2SA1805 2SC4690 (140V) (▼) 2SA1941 2SC5198 (140V) (▽)	
12	2SA1452A 2SC3710A (▲) 2SA1771 (▲)				2SA1942 2SC5199 (※)

$V_{CE0}(V)$ $I_c(A)$	(180)/200	230	250	300	400(370)
0.05			2SA1321 2SC3334 (*)	2SC4678 (▲) 2SC4679 (@)	2SC5122 (*) 2SC5307 (◎)
0.1	2SC2230A (*) (180V)			2SA1432 2SC3672 (§) 2SC2482 (*) 2SC3619 (@) 2SC3620 (@) 2SC3805 (◇) 2SC4544 (▲) 2SC5027 (□) 2SC5173 (■) 2SA1384 2SC3515 (@)	
0.15			2SC4448 (▲)	2SC5360 (▲)	
0.5					2SA1923 (◇) 2SA1924 (@) 2SA1925 (□) 2SA1971 (◎)
0.8					2SC3075 (◇) 2SC3425 (@) 2SC5208 (□) 2SC5458 (◇)
1		2SA1837 2SC4793 (▲) 2SA1932 2SC5174 (■)			2SA1822 (▲) 2SC5549 (*) 2SC5550 (@)
2	2SA1930 2SC5171 (▲) (180V)				2SC3233 (◇) 2SC4754 (○) 2SC5075 (□) 2SC5279 (■) 2SC5548 (◇) 2SC5548A (370V) (◇)
3					2SC5459 (▲)
5					2SC5172 (▲) 2SC5266A (■) 2SC5355 (◆)
10					2SC5352 (▽)
15		2SA1943 2SC5200 (※) 2SA1962 2SC5242 (▽) 2SA1986 2SC5358 (▽) 2SA1987 2SC5359 (※)			

$V_{CE0}(V)$ $I_c(A)$	450	600	800	1000/(1200)	1500
0.02					2SC5563 (▲)
0.05		2SC5201 (*)	2SC5460 (@) 2SC5466 (▲)	2SC4686 (▲) 2SC4686A (▲) (1200V)	
0.5		2SA1937 (◇)			
0.8			2SC3405 (◇) 2SC5465 (◇) 2SC5562 (□)		
2	2SC5351 (□) 2SC5368 (@)				
3			2SC3376 (▽) 2SC5353 (▲) 2SC5361 (○) 2SC5356 (◆)		
4			2SC3657 (▽)		
5			2SC5354 (▽)		
8	2SC5439 (▲)				
9					
10	2SC4157 (▽)		2SC3307 (※)		

## Package Code

(*) LSTM	(§) MSTM	(@) TO-126IS	(▲) TO-220NIS	(○) TO-220FL	(●) TO-220SM	(◆) DP	(▽) TO-3P(N)
(▼) TO-3P(N)IS	(※) TO-3P(L)	(□) TPS	(■) TPL	(◎) PW-MINI	(◇) PW-MOLD	[T] TSM	[V] VS-6
(△) 2-in-1	[#] 2-in-1 (Transistor + Diode)						
Product number in italic signifies built-in damper diode			2SA****/2SC****: complementary				

## For Low-Frequency Devices (2SB\*\*\*\* / 2SD\*\*\*\*)

V <sub>CE0</sub> (V) I <sub>c</sub> (A)	20	30	40	50	60
1.5		2SD1140 (%) (*) 2SD1224 (%) (◇) 2SD1508 (%) (@) 2SD1631 (%) (§) 2SD1784 (%) (◎) 2SD2481 (%) (□)			
2	2SD1160 (◇)				2SD1658 (¥) (%) (@) 2SD2088 (¥) (%) (*) 2SD2352 (▲) 2SD2461 (□)
3			2SB907 2SD1222 (%) (◇)		2SB906 2SD1221 (◇) 2SB1375 2SD2012 (▲) 2SD2462 (□) 2SB1640 2SD2525 (■) 2SD2127 (¥) (▲) 2SD2353 (▲) 2SB1667 (●)
4					2SB1642 2SD2531 (▲) 2SD2130 (¥) (%) (@) 2SD2204 (¥) (%) (▲) (65V) 2SD2131 (¥) (%) (▲)
5					2SD2440 (▼)
6				2SD1412A (▲)	
7					
10					2SD2075A (¥) (▲)

V <sub>CE0</sub> (V) I <sub>c</sub> (A)	80	100/(120)	140	150/(160)	200
1.5				2SB905 2SD1220 (◇)	
2	2SB1067 2SD1509 (%) 2SD2248 (¥) (%) (*)	2SB1411 (@) (%) (▲) 2SB1457 2SD2206 (%) (*) 2SD2206A (%) (*) (120V) 2SB1617 2SD2480 (%) (□) 2SD2536 (¥) (%) (*)			
3		2SB1495 2SD2257 (%) (▲) 2SD2092 (▲) 2SD2129 (%) (▲)			
4	2SB908 2SD1223 (%) (◇) 2SD2406 (▲)	2SB1481 2SD2241 (%) (▲)			
5		2SB1381 2SD2079 (%) (▲) 2SB1641 (%) (■) 2SD2526 (%) (■) 2SB1016A 2SD1407A (▲) 2SD2604 (¥) (%) (▲)			
7	2SD2414(SM) (●) 2SB1018A 2SD1411A (▲)	2SB1020A 2SD1415A (%) (▲) 2SD2584 (%) (◆)	2SB1555 2SD2384 (%) (※) 2SB1557 2SD2386 (%) (▽)		
8			2SB1556 2SD2385 (%) (※) 2SB1558 2SD2387 (%) (▽)	◆2SB1682 ◆2SD2636 (%) (▽) (160V)	
10		2SD1947A (▲)		2SB1594 2SD2449 (%) (※) (160V)	(%) (▲)
12					2SD2271
15		2SD1662 (%) (▽)			
30		2SD1525 (%) (※)			

V <sub>CE0</sub> (V)	250	350	400	450
3.5				
5				
6	2SD1410A (%) (▲)		2SD1409A (%) (▲)	
15				2SD1314 (%) (※)
25		2SD1313 (※)		

◆: Under development

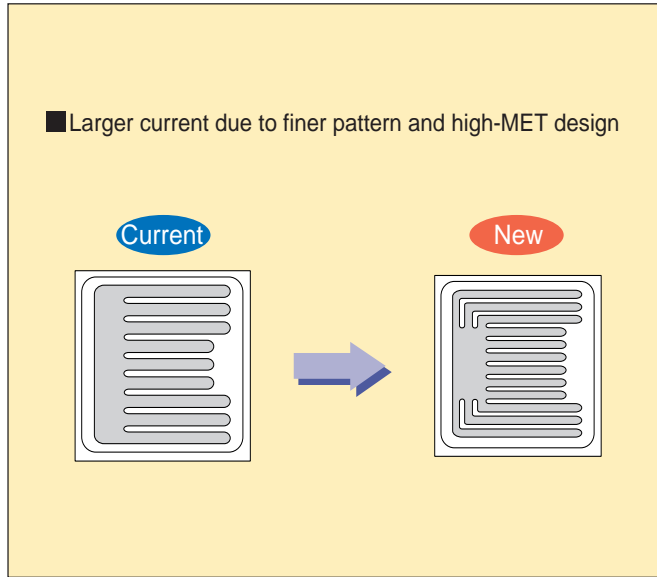
### Package code

(*) LSTM	(§) MSTM	(@) TO-126IS	(▲) TO-220NIS	(○) TO-220FL	(●) TO-220SM	(◆) DP	(▽) TO-3P(N)
(▼) TO-3P(N)IS	(※) TO-3P(L)	(□) TPS	(■) TPL	(◎) PW-MINI	(◇) PW-MOLD	(¥) Built-in zener diode	(%) darlington
Product number in italic signifies built-in damper diode			2SB****/ 2SD****: complementary				

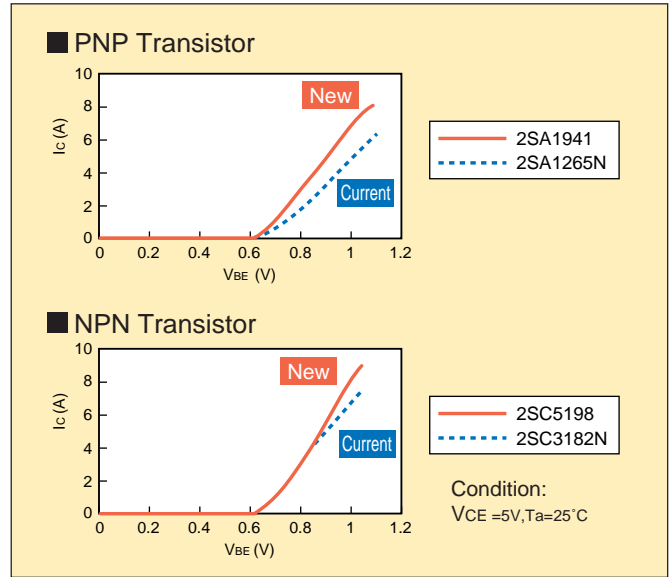
## For Audio Power Amp

### Improvements to the New Products

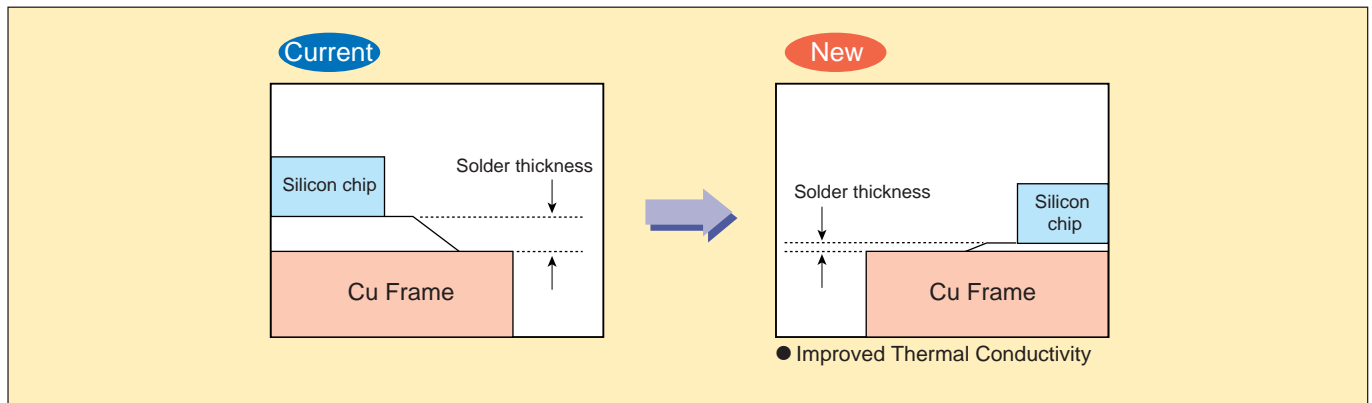
#### ● Using new pattern



#### ● $V_{BE}$ Linearity



#### ● Die Mount Solder



## Product Line-up

Pc (W)	Maximum Rating		Polarity	New Product No.	Discontinued Product No.		Package type
	V <sub>CEO</sub> (V)	I <sub>C</sub> (A)					
60	80 (100)	6	NPN	<b>2SC5196</b>	2SC3180N	2SD716	TO-3P(N)
			PNP	<b>2SA1939</b>	2SA1263N	2SB686	
80	120	8	NPN	<b>2SC5197</b>	2SC3181N	2SD718	TO-3P(N)
			PNP	<b>2SA1940</b>	2SC1264N	2SB688	
100	140	10	NPN	<b>2SC5198</b>	2SC3182N	2SD1148	TO-3P(N)
			PNP	<b>2SA1941</b>	2SA1265N	2SB863	
120	160	12	NPN	<b>2SC5199</b>	2SC3280		TO-3P(L)
			PNP	<b>2SA1942</b>	2SA1301		
130	230 (180)	15 (12)	NPN	<b>2SC5242</b>	2SC3907		TO-3P(N)
			PNP	<b>2SA1962</b>	2SA1516		
150	230	15	NPN	<b>2SC5358</b>			TO-3P(N)
			PNP	<b>2SA1986</b>			
150	230 (200)	15	NPN	<b>2SC5200</b>	2SC3281		TO-3P(L)
			PNP	<b>2SA1943</b>	2SA1302		
180	230	15	NPN	<b>2SC5359</b>			TO-3P(L)
			PNP	<b>2SA1987</b>			

( ): Maximum rating of discontinued products

	Driver Amplifier				Output Amplifier				
Bipolar Transistor Single	Pc(W)	NPN	PNP	Package type	Non-isolation type	Pc(W)	NPN	PNP	Package type
	0.8	<b>2SC1627A</b>	<b>2SA817A</b>	LSTM		60	<b>2SC5196</b>	<b>2SA1939</b>	TO-3P(N)
	0.9	<b>2SC2235</b>	<b>2SA965</b>			80	<b>2SC5197</b>	<b>2SA1940</b>	
	1	<b>2SC3665</b>	<b>2SA1425</b>	MSTM		100	<b>2SC5198</b>	<b>2SA1941</b>	
	1.8	<b>2SC5174</b>	<b>2SA1932</b>	TPL		120	<b>2SC5199</b>	<b>2SA1942</b>	TO-3P(L)
	5	<b>2SC3423</b>	<b>2SA1630</b>	TO-126		130	<b>2SC5242</b>	<b>2SA1962</b>	TO-3P(N)
		<b>2SC3421</b>	<b>2SA1358</b>			150	<b>2SC5358</b>	<b>2SA1986</b>	
	15	<b>2SC2983</b>	<b>2SA1225</b>	PW MOLD		180	<b>2SC5200</b>	<b>2SA1943</b>	TO-3P(L)
	20	<b>2SC4793</b>	<b>2SA1837</b>	TO-220(NIS)			<b>2SC5359</b>	<b>2SA1987</b>	
		<b>2SC5171</b>	<b>2SA1930</b>				Isolation type	55	<b>2SC4688</b>
				70	<b>2SC4689</b>	<b>2SA1804</b>			
				80	<b>2SC4690</b>	<b>2SA1805</b>			
Bipolar Transistor Darlington					Non-isolation type	70	<b>2SD2386</b>	<b>2SB1557</b>	TO-3P(N)
						80	<b>2SD2387</b>	<b>2SB1558</b>	
						100	◆ <b>2SD2636</b>	◆ <b>2SB1682</b>	
						100	<b>2SD2384</b>	<b>2SB1555</b>	TO-3P(L)
						120	<b>2SD2385</b>	<b>2SB1556</b>	
				150	<b>2SD2449</b>	<b>2SB1594</b>			

◆ : Under development

## Horizontal-Deflection Output Transistors (HV-Tr)

### Outline

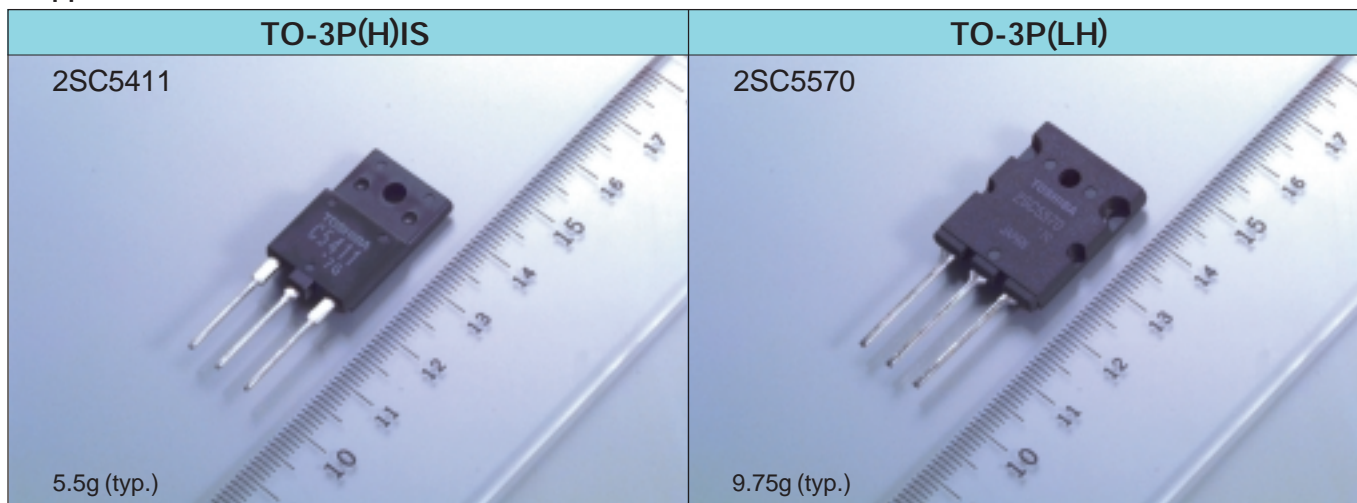
Toshiba has developed a range of fourth-generation horizontal-deflection output transistors (HV-Trs). Radical redesign of the emitter electrode and the contact pattern has yielded significant improvements, resulting in higher current density and superior electrical characteristics compared to those of fourth-generation products. Toshiba's propriety glass-mesa structure results in a high breakdown voltage.

Thanks to Toshiba's wealth of experience and the wide variety of products which the company can offer, Toshiba horizontal-deflection-output transistors are used World-wide in color TVs and video display monitors.

### Appearance, package and weight

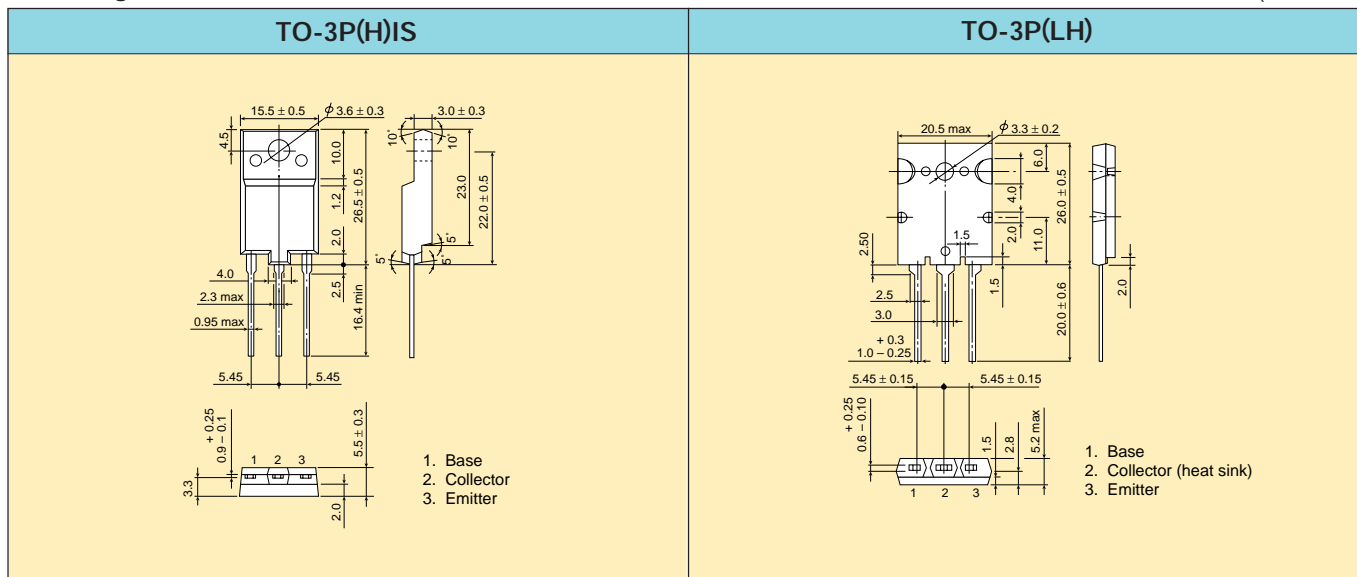
The photographs below show the products and their markings. The package shown are is the straight-lead packages used for standard products.

#### ■ Appearance



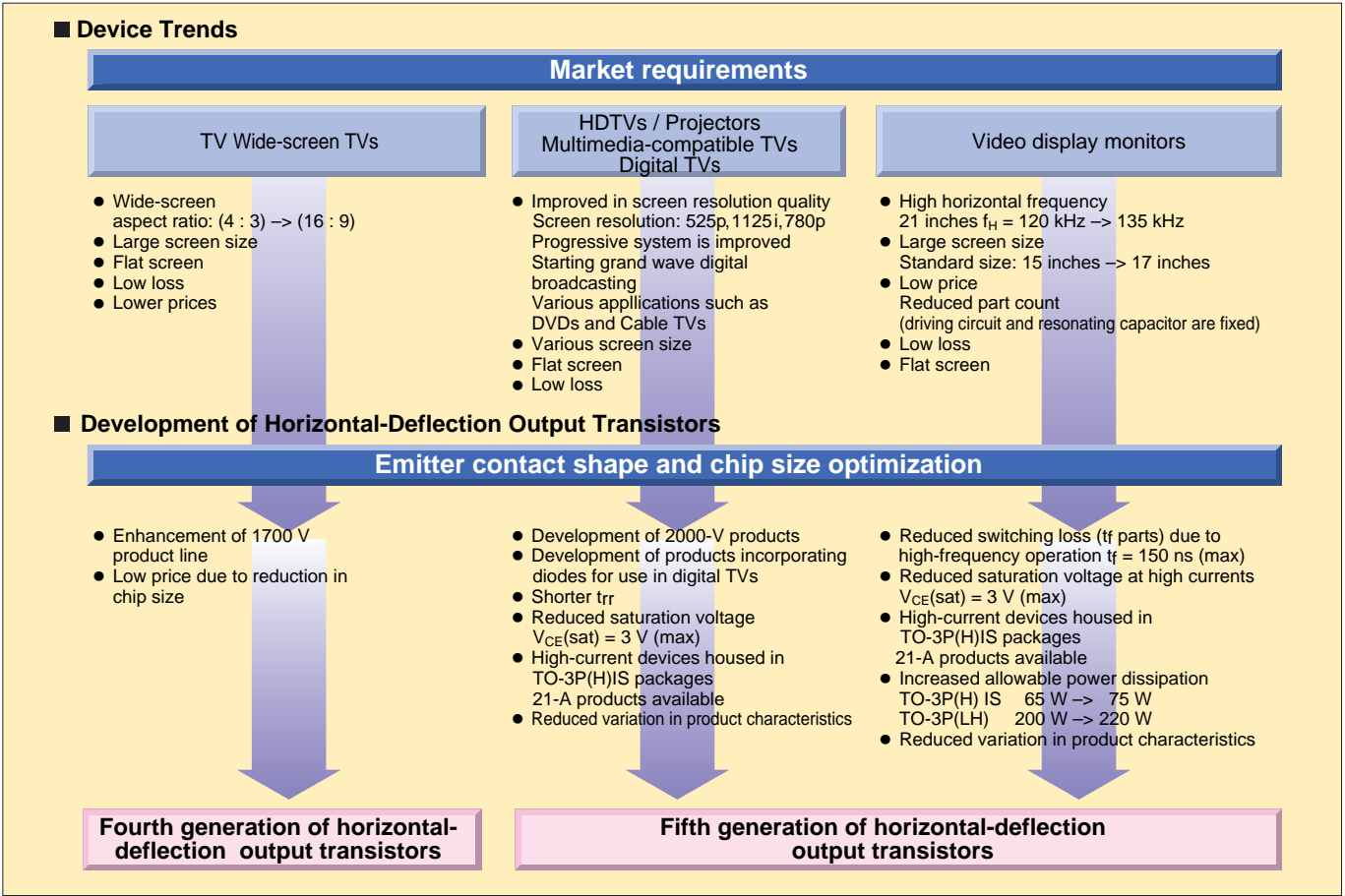
#### ■ Package Dimensions

(Unit: mm)



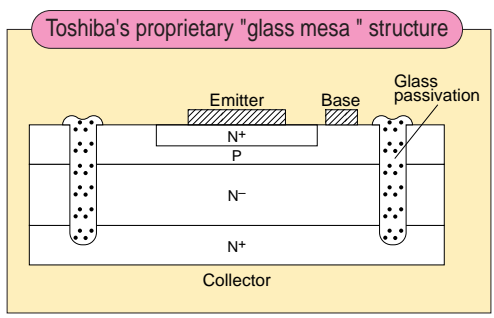
## Device Trends

### Market trends and the development of horizontal deflection output transistors



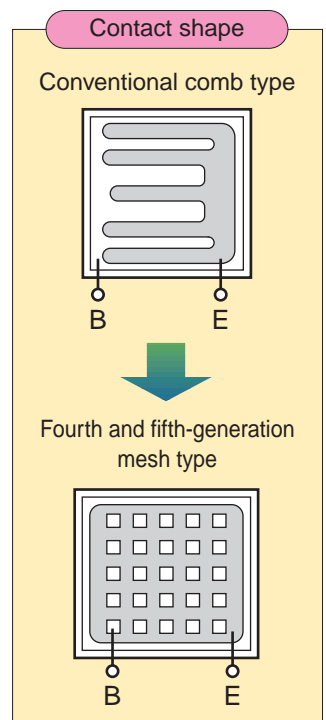
## Features of Fourth and Fifth Generation

- 1. High breakdown capability**  
The product features a glass mesa structure, the use of which yields a wide forward- and reverse-biased safe operating area.
- 2. Low saturation voltage**  
 $V_{CE(sat)} = 3 \text{ V (max)}$   
Note: Used for 2SC-Series devices without damper diodes.

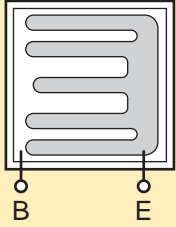
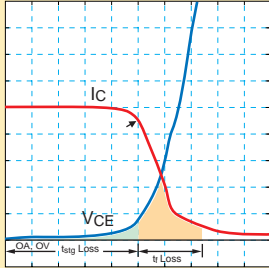
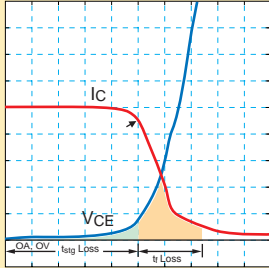
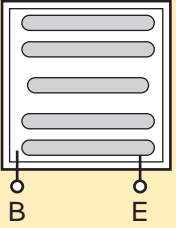
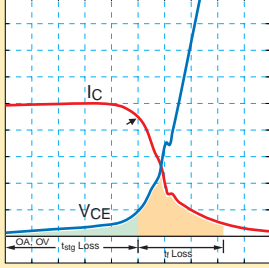
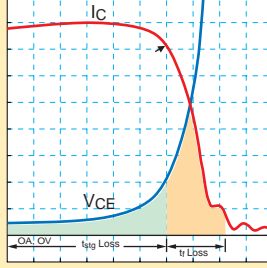
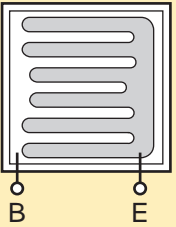
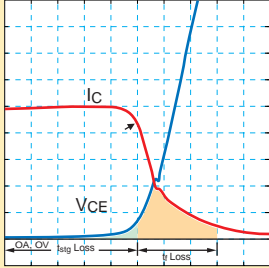
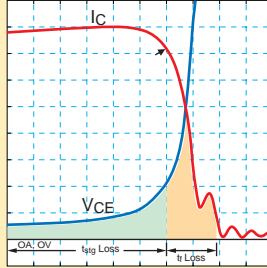
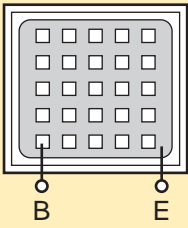
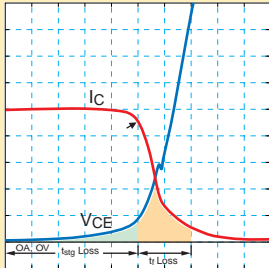
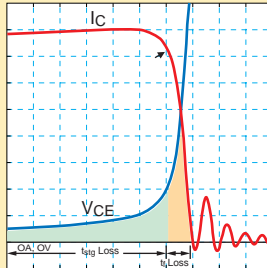
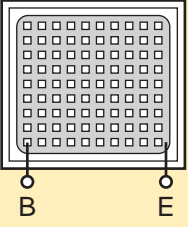
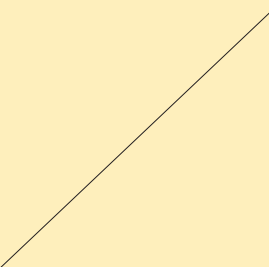
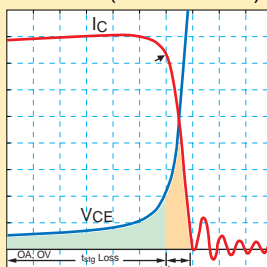


- 3. Wider range of optimum drive conditions**  
Fluctuation in optimum drive conditions due to variation in device quality has been minimized for ease of design.

- 4. Revised emitter contact shape and optimized chip size**  
Chip design has been optimized using Toshiba simulation technology. The emitter's contact area has been widened by changing the contact shape below the emitter electrode from comb type to the new mesh type. As a result, the saturation voltage ( $V_{CE(sat)}$ ) and fall time ( $t_f$ ) have both been reduced, thus reducing switching loss.



## Comparison of Product Characteristic Curve, Features and Emitter-Contact Design

<b>Generation</b>	<b>Design</b>	<b>Typical Products and Waveforms</b>	
<ul style="list-style-type: none"> <li>● Main application</li> <li>● Features</li> </ul>	Emitter contact shape	TVs	Video displays
	@ $f_H$ , $I_{CP}$ , $I_{B1(end)}$ , $V_{CP}$	@15.75 kHz, 5 A, 1 A, 1200 V	@100 kHz, 8 A, 1 A, 1200 V
	(t, $I_C$ , $V_{CE}$ ) / div	(200 ns, 1 A, 10 V) / div	(50 ns, 1 A, 10 V) / div
<div style="background-color: #fff9c4; padding: 5px; border: 1px solid black;"> <b>First Generation</b> <ul style="list-style-type: none"> <li>● TVs</li> <li>● High-voltage 1400V → 1500 V</li> <li>● Improved R-SOA</li> <li>● Improved switching speeds <math>f_H(max) = 32</math> kHz</li> <li>● Development of TO-3P(H)IS Package</li> </ul> </div>	Comb type I	2SD1556 (1500 V / 6A)	2SD1556 (1500 V / 6A)
			
<div style="background-color: #4caf50; color: white; padding: 5px; border: 1px solid black;"> <b>Second Generation</b> <ul style="list-style-type: none"> <li>● TVs</li> <li>● High-current devices products</li> <li>● Video displays</li> <li>● Improved switching speeds <math>f_H(max) = 64</math> kHz</li> <li>● Development of TO-3P(LH) Package</li> </ul> </div>	STRIP type	2SD2253 (1700 V / 6A)	2SC4290A (1500 V / 20A)
			
<div style="background-color: #9e9e9e; color: white; padding: 5px; border: 1px solid black;"> <b>Third Generation</b> <ul style="list-style-type: none"> <li>● TVs</li> <li>● Improvements over first-generation products</li> <li>● Video displays</li> <li>● Improvements over second-generation products</li> <li>● Improved switching speeds <math>f_H(max) = 80</math> kHz</li> </ul> </div>	Comb type II	2SD2553 (1700 V / 8A)	2SC5142 (1500 V / 20A)
			
<div style="background-color: #0070c0; color: white; padding: 5px; border: 1px solid black;"> <b>Fourth Generation</b> <ul style="list-style-type: none"> <li>● TVs</li> <li>● Improvements over first- and third-generation products</li> <li>● Digital TVs</li> <li>● Development of new 2000-V products</li> <li>● Video displays</li> <li>● Improvements over third-generation products</li> <li>● Improved switching speeds <math>f_H(max) = 130</math> kHz</li> </ul> </div>	Mesh type I or Crystal-mesh type	2SD2638 (1700 V / 7A)	2SC5445 (1500 V / 20A)
			
<div style="background-color: #e91e63; color: white; padding: 5px; border: 1px solid black;"> <b>Fifth Generation</b> <ul style="list-style-type: none"> <li>● Digital TVs</li> <li>● Enhanced 2000-V product line</li> <li>● Improved speeds for products incorporating damper diodes</li> <li>● Video displays</li> <li>● Improvements over fourth-generation products</li> <li>● Reduced loss</li> <li>● Improvement in drivability</li> </ul> </div>	Mesh type II	2SC5695 (1500 V / 22A)	2SC5695 (1500 V / 22A)
			



## Product Line-up (new products)

### 1. For video displays

Product No.	Maximum Ratings			Target Use	Remarks	Note
	V <sub>CB0</sub> (V)	I <sub>C</sub> (A)	P <sub>C</sub> (W)			
2SC5570	1700	28	220	21-inch, 130 kHz	Device with highest I <sub>C</sub> (max) ratings	
2SC5587	1500	17	75	19-inch, 110 kHz	High-current version of 2SC5411	
2SC5588	1700	15	75	19-inch, 90 kHz	1700-V version of 2SC5411	
2SC5589	1500	18	200	19-inch, 120 kHz	2SC5587 and 2SC5589 use same chip.	
2SC5590	1700	16	200	19-inch, 100 kHz	2SC5588 and 2SC5590 use same chip.	
2SC5695	1500	22	200	21-inch, 130 kHz	Equivalent to 2SC5445	
2SC5717	1500	21	75	19-inch, 120 kHz	2SC5717 and 2SC5695 use same chip.	
*S3D20	1500	14	55	19-inch, 92 kHz	Equivalent to 2SC5411	★
*S3D21	1700	28	210	21-inch, 130 kHz	Equivalent to 2SC5570	★
*S3E25	1500	10	50	17-inch, 69 kHz	Equivalent to 2SC5387	★
*S3E30	1700	22	210	32-inch, 32 kHz	Low-current version of 2SC5570	★

★: Production schedules are provisional.

### 2. For color TVs

Product No.	Maximum Ratings			Target Use	Remarks	Note
	V <sub>CB0</sub> (V)	I <sub>C</sub> (A)	P <sub>C</sub> (W)			
2SD2638	1700	7	50	28-inch, 15.75 kHz	Equivalent to 2SD2553	

### 3. For digital TVs

Product No.	Maximum Ratings			Target Use	Remarks	Note
	V <sub>CB0</sub> (V)	I <sub>C</sub> (A)	P <sub>C</sub> (W)			
2SC5570	1700	28	220	32-inch, 32 kHz~	Device with highest I <sub>C</sub> (max) ratings	
2SC5588	1700	15	50	24-inch, 32 kHz	1700-V version of 2SC5411	
2SC5590	1700	16	50	28-inch, 32 kHz~	2SC5588 and 2SC5590 use same chip.	
2SC5612	2000	22	220	32-inch, 32 kHz	V <sub>CB0</sub> = 2000 V series	
2SC5716	1700	8	55	32-inch, 32 kHz	Built-in damper diode (High-current version of 2SC5143)	
*2SC5748	2000	16	210	32-inch, 32 kHz	V <sub>CB0</sub> = 2000 V series	★
*2SC5749	2000	16	210	32-inch, 32 kHz	V <sub>CB0</sub> = 2000 V series (built-in damper diode)	★
*S3D21	1700	28	210	32-inch, 32 kHz~	Equivalent to 2SC5570	★

★: Production schedules are provisional.





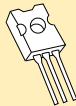
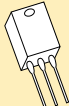
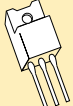
Package	V <sub>CB0</sub> = 1500 V			V <sub>CB0</sub> = 1700 V		V <sub>CB0</sub> = 2000 V		
	TO-3P(H)IS		TO-3P(LH)	TO-3P(H)IS		TO-3P(LH)	TO-3P(LH)	
	40 W to 75 W		180 W to 220 W	40 W to 75 W		180 W to 220 W	180 W to 220 W	
**I <sub>C</sub> (sat)	Built-in damper diode	No built-in damper diode	No built-in damper diode	Built-in damper diode	No built-in damper diode	No built-in damper diode	Built-in damper diode	No built-in damper diode
3 A	2SD2599			2SD2550				
3.5 A	2SD2586							
4 A	2SD2499	2SD2498		2SD2551				
4.5 A	S2055N	S2000N						
5 A	2SD2539							
	2SC5339							
5.5 A				2SD2638				
6 A	2SC5280	2SD2500		2SD2553				
	2SD2559	2SC5386		2SC5716				
7 A		2SC5404						
8 A		2SC5387						
		*S3E25						
11 A		2SC5411	2SC5421			2SC5422		
		*S3D20						
12 A				2SC5588	2SC5590	*2SC5749	*2SC5748	
14 A		2SC5587	2SC5589		2SC5446			
15 A			2SC5445					
17 A		2SC5717	2SC5695					2SC5612
22 A						*S3E30		
						2SC5570		
						*S3D21		

Notes: \*\*: I<sub>C</sub>(sat) is value of I<sub>C</sub> for V<sub>CE</sub>(sat).

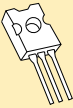
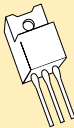
- : 3rd generation (old design)
- : 4th generation (new design)
- : 5th generation (new design)
- : 5th generation (new design under development)

## For Video Output


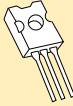
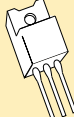
### For ordinary color TVs

Characteristics	Polarity	Package type	TO-92	TO-92MOD	PW-MOLD (SC-63/64)	TPS	TO-126 (IS)	TPL	TO-220 (NIS)	Remarks
$V_{CE0} = 150\text{ V}$ $I_c = 50\text{ mA}$ $f_T = 120\text{ to }200\text{ MHz}$	NPN			<b>2SC2229</b> <b>2SC2705</b>			<b>2SC3423</b>			
	PNP			<b>2SA949</b> <b>2SA1145</b>			<b>2SA1360</b>			
$V_{CE0} = 250\text{ V}$ $I_c = 50\text{ mA}$ $f_T = 120\text{ MHz}$	NPN		<b>2SC3333</b>	<b>2SA3334</b>						
	PNP		<b>2SA1320</b>	<b>2SA1321</b>						
$V_{CE0} = 250\text{ V to }300\text{ V}$ $I_c = 100\text{ to }150\text{ mA}$ $f_T = 240\text{ MHz}$	NPN						<b>2SC4679</b>		<b>2SC4448</b> <b>2SC4678</b>	For HDTV
$V_{CE0} = 300\text{ V}$ $I_c = 50\text{ to }100\text{ mA}$ $f_T = 80\text{ to }120\text{ MHz}$	NPN		<b>2SC2551</b>	<b>2SC2482</b>	<b>2SC3805 (LB)</b>	<b>2SC5027</b>	<b>2SC3619</b> <b>2SC3620</b>	<b>2SC5173</b>	<b>2SC4544</b>	
	PNP		<b>2SA1091</b>							
Package Shape										


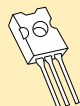
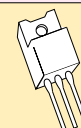
### For high-precision displays

Characteristics	Polarity	Package type	TO-126(IS)	TO-220(NIS)	Remarks
$V_{CE0} = 18\text{ V}$ $I_c = 0.5\text{ A}$ $f_T = 3.5\text{ GHz}$	NPN		<b>2SC3613</b>		For high-resolution VDT video drivers
$V_{CE0} = 18\text{ V}$ $I_c = 0.6\text{ A}$ $f_T = 2.5\text{ GHz}$	NPN		<b>2SC4200</b>		For ultra-high-resolution VDT video drivers
$V_{CE0} = 100\text{ V}$ $I_c = 0.5\text{ A}$ $f_T = 1.1\text{ GHz}$	NPN		<b>2SC4479</b>	<b>2SC4605</b>	For ultra-high-resolution VDT
$V_{CE0} = 150\text{ V}$ $I_c = 300\text{ mA}$ $f_T = 400\text{ MHz}$	NPN		<b>2SC4439</b>		For high-resolution VDT
Package Shape					

## For Vertical-Deflection Output

Characteristics	Package type	TO-92MOD	TO-126(IS)	TO-220(NIS)
$V_{CE0} = 160\text{ V}$ , $I_c = 1\text{ A}$		<b>2SC2383</b> <b>2SA1013</b>	—	—
$V_{CE0} = 150\text{ V}$ , $I_c = 1.5\text{ A}$		—	<b>2SC3621</b> <b>2SA1408</b>	<b>2SC2073A</b> <b>2SA940A</b>
Package Shape				

## For Sound Output

Characteristics	Package type	TO-92MOD	TO-126(IS)	TO-220(NIS)
$V_{CE0} = 160V, I_c = 1A$		<b>2SC2383</b> <b>2SA1013</b>	–	–
$V_{CE0} = 150V, I_c = 1.5A$		–	<b>2SC3621</b> <b>2SA1408</b>	<b>2SC2073A</b> <b>2SA940A</b>
$V_{CE0} = 160V$ $I_c = 0.1 \text{ to } 0.2A$		<b>2SC2230</b> x 2	<b>2SC3963</b> x 2	–
$V_{CE0} = 180V$ $I_c = 0.1 \text{ to } 0.2A$		<b>2SC2230A</b> x 2	–	–
Package Shape				

## For Speed Modulation

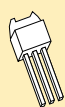

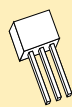
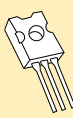
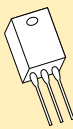
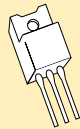

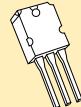
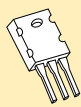
Product No.		Ic (A)	VCE0 (V)	Pc (W)	hFE		VCE(sat) Max			ft Typ.			Cob Typ.		Package type	
NPN	PNP				VCE (V)	Ic (A)	V (V)	Ic (mA)	Ib (mA)	(MHz)	VCE (V)	Ic (A)	(pF)	Vcb (V)		
<b>2SC4793</b>	–	1.0	230	20	100 to 320	5	0.1	1.5	500	50	100	10	0.1	20	10	TO-220(NIS)
–	<b>2SA1837</b>										70			30		

## For Dynamic Focus

Product No.	Ic (mA)	VCE0 (V)	Vcbo (V)	Pc (W)	hFE		VCE(sat) Max			ft Typ.			Cob Typ.		Package type	
					VCE (V)	Ic (mA)	V (V)	Ic (mA)	Ib (mA)	(MHz)	VCE (V)	Ic (mA)	(pF)	Vcb (V)		
<b>2SC4686</b>	50	1000	1500	10	15 to 60	5	3	1.5	10	2	5.5	10	3	2.2	100	TO-220(NIS)
<b>2SC4686A</b>		1200														
<b>2SC5460</b>	50	800	800	10	15min.	5	7	1.0	20	4	–	–	–	–	–	TO-126(IS)
<b>2SC5466</b>																TO-220(NIS)
<b>2SC5563</b>	20	1500	1500	10	10 to 60	5	1	5.0	10	2	–	–	–	2.0	100	TO-220(NIS)

## For Power Supplies

( $V_{CE0} = 400 \text{ to } 450V$ )

Package type IC(A)	PW-MOLD (SC-63/64)	DP (SC-63/64)	TPS	TO-126(IS)	TPL	TO-220(N)IS	TO-220SM	TO-3P(N)	TO-3P(L)
0.8	<b>2SC5458</b> <b>2SC5465#</b>		<b>2SC5208</b> <b>2SC5562#</b>	<b>2SC3425</b>					
2	<b>2SC5548</b> <b>2SC5548A</b>		<b>2SC5075</b> <b>2SC5351</b>	<b>2SC5368</b>	<b>2SC5279</b>				
3		<b>2SC5356#</b>				<b>2SC5459</b> <b>2SC5353#</b>	<b>2SC5361#</b>		
4								<b>2SC3657#</b>	
5		<b>2SC5355</b>			<b>2SC5266A</b>	<b>2SC5172</b>		<b>2SC5354#</b>	
8						<b>2SC5439</b>			
10								<b>2SC5352</b>	<b>2SC3307#</b>
Package Shape									

#:800V series

**V<sub>CEO</sub> and I<sub>c</sub> Rating List**

I <sub>c</sub> (A) \ V <sub>CEO</sub> (V)	400	450	800
0.8	2SC3425 2SC5208 2SC5458		2SC5465 2SC5562
2 to 3	2SC5075 2SC5279 2SC5459 2SC5548 2SC5548A	2SC5351 2SC5357 2SC5368	2SC5353 2SC5356 2SC5361
4 to 5	2SC5172 2SC5266A 2SC5355		2SC3657 2SC5354
10	2SC5352		2SC3307

**For Switching Power Supplies**
**AC-DC converters**

Application	Product No.	Maximum Ratings (Ta = 25°C)				Package Type
		V <sub>CEO</sub> (V)	V <sub>CEO</sub> (V)	I <sub>c</sub> (A)	P <sub>c</sub> (W) (T <sub>c</sub> = 25°C *Ta = 25°C)	
Switching regulators	2SC3425	500	400	0.8	10	TO-126(IS)
	2SC5075			2	1.3*	TPS
	2SC5548	600	400	2	15	PW-MOLD(SC-63/64)
	2SC5548A			2	15	PW-MOLD(SC-63/64)
	2SC5208			0.8	1.3*	TPS
	2SC5458			0.8	10	PW-MOLD(SC-63/64)
	2SC5279			2	1.8*	TPL
	2SC4917			2	10	TO-126(IS)
	2SC5459			3	25	TO-220(N)IS
	2SC5266A			5	1.8*	TPL
	2SC5355			5	25	DP
	2SC5172			5	25	TO-220(N)IS
	2SC5352	10	80	TO-3P(N)		
	2SC5351	450	450	2	1.3*	TPS
	2SC5368			2	10	TO-126IS
	2SC5465	900	800	0.8	20	PW-MOLD(SC-63/64)
	2SC5562			0.8	1.3*	TPS
	2SC5353			3	25	TO-220(N)IS
	2SC5356				25	DP
	2SC5361				40	TO-220FL
2SC3657	4			80	TO-3P(N)	
2SC5354	5			100	TO-3P(N)	
2SC3307	10			150	TO-3P(L)	
2SC5439	1000	450	8	30	TO-220(N)IS	

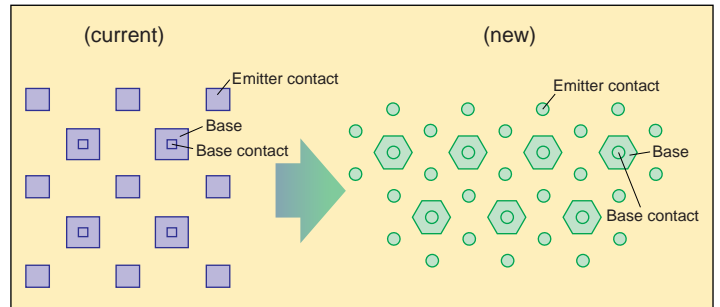
## Improvement of New Products Compared to Current Products

Achieved following improvements using Crystal Mesh pattern \*

- Relatively high minimum  $h_{FE}$  guaranteed at low current levels
- High-speed Switching
- Safe operating areas equivalent to that of previous product

		$h_{FE}$ Min		$t_f$ Max [μs]	R-SOA
		@ $I_C = 1\text{mA}$	@Min		
400V / 5A	<b>2SC5172</b> <sub>(new)</sub>	13	20	0.3	Equivalent
	<b>2SC3310</b> <sub>(current)</sub>	None	12	1.0	
800V / 3A	<b>2SC5353</b> <sub>(new)</sub>	10	15	0.5	Equivalent
	<b>2SC3559</b> <sub>(new)</sub>	None	10	1.0	

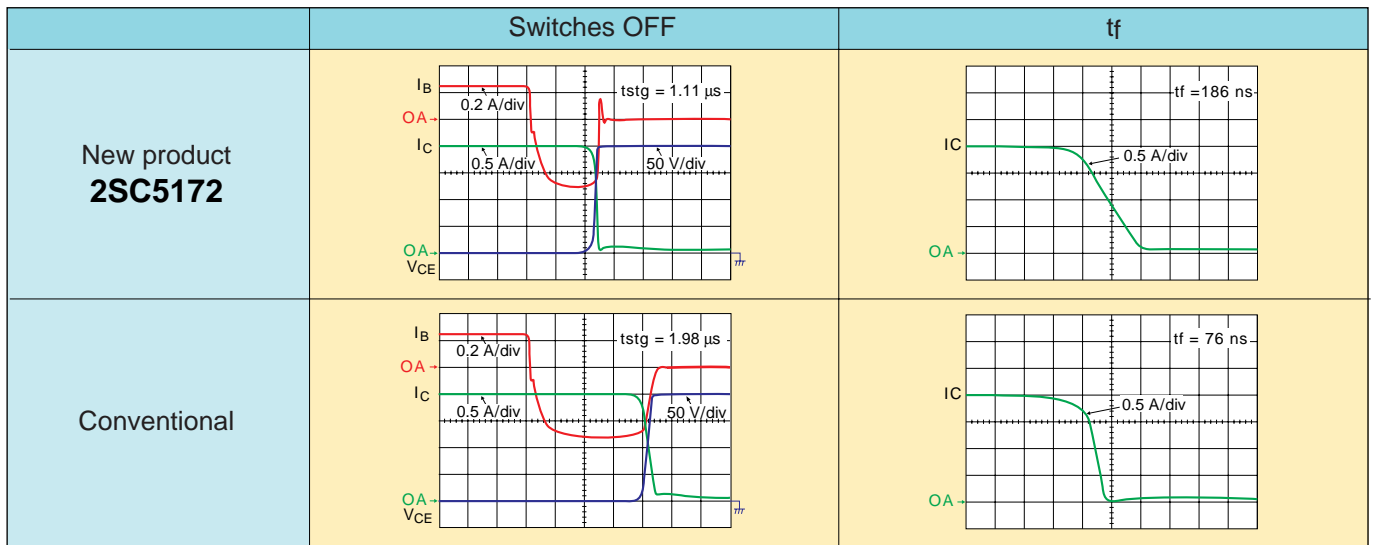
### ■ Newly developed Crystal Mesh pattern\*



\* Trademark application in process

### Switching Waveforms (1)

400-V series



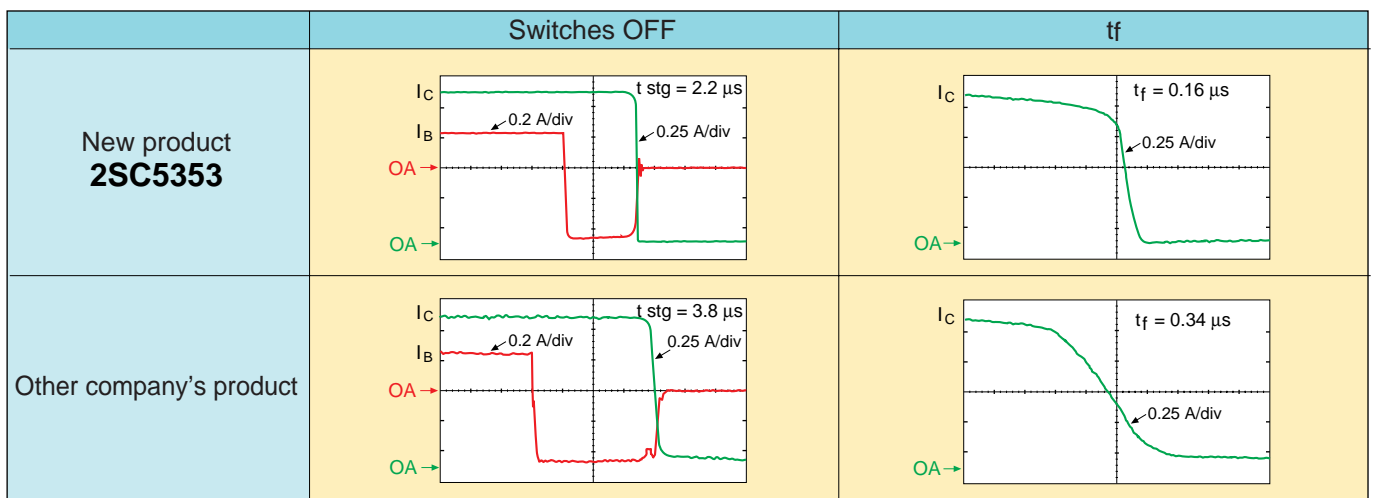
500 ns/div

100 ns/div

Condition:  $V_{CC} = 200\text{V}$   $I_C = 2\text{A}$   $I_B = 0.25/-0.5\text{A}$

### Switching Waveforms (2)

800-V series



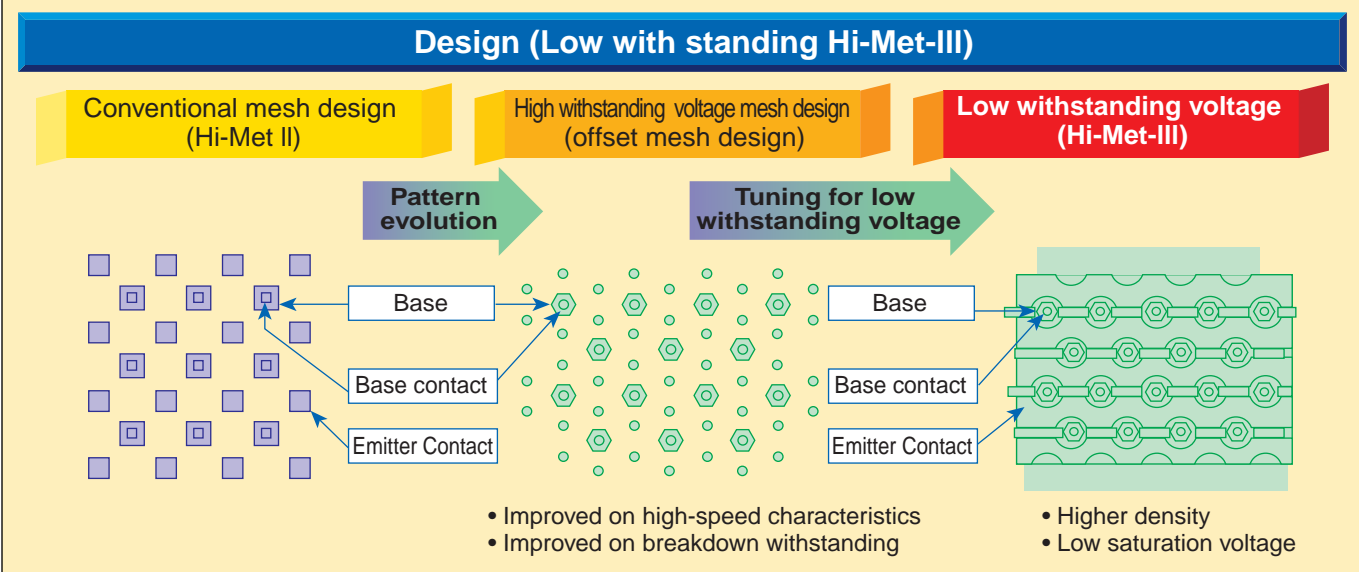
1 μs/div

200 ns/div

Condition:  $V_{CC} = 360\text{V}$   $I_C = 1.2\text{A}$   $I_B = 0.24/-0.48\text{A}$

## Low $V_{CE(sat)}$ series Feature

- Mesh design for low withstanding voltage archived low saturation voltage
- High DC amplification
- Small surface-mount package



### For DC-DC Converters (Low $V_{CE(sat)}$ )

Collector Current $I_c$ (A)	Collector-Emitter Breakdown Voltage $V_{CE0}$ (V)							
	10(V)		20(V)		50(V)		80(V)	
	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN
12					2SA1451A (▲)	2SC3709A (▲)	2SA1452A (▲)	2SC3710A (▲)
10			2SA1327A (▲)		2SA1887 (▲)	2SC5000 (▲)		
5			2SA1431 (§)	2SC3671 (§)	2SA1244 (◇)	2SC3074 (◇)	2SA1934 (■)	2SC5176 (■)
			2SA1242 (◇)	2SC4684 (◇)	2SA1931 (▲)	2SC4881 (▲)		2SC3303 (◇)
			2SA1357 (@)	2SC4685 (@)	2SA1905 (□)	2SC5076 (□)		
			2SA1893 (□)	2SC5030 (□)	2SA1993 (■)	2SC5175 (■)		
4		2SC5713 (◎)		2SC5714 (◎)		2SC5703 [T]		
3.5				2SC5738 [T]				
3			2SA1802(10V) (◇)	2SC4681(10V) (◇)	2SA1761 (*)	2SC4604 (*)	2SA1926 (§)	
			2SA2059 (◎)	2SC4682(15V) (*)	2SA1869 (▲)	2SC4935 (▲)		
				2SC4683(15V) (§)	2SA1892 (□)	2SC5029 (□)		
						2SC5712 (◎)		
2.5			2SA2061 [T]			2SC5692 [T]		
2	2SA2066 (◎)	2SC5755 [T] 2SC5785 (◎) TPC6501 [V]	2SA1430(10V) (§) 2SA1160(10V) (*)	2SC3670(10V) (§) 2SC2500(10V) (*)	2SA1020 (*) 2SA1241 (◇) 2SA1428 (§) 2SA1680 (*) 2SA1891 (□) TPC6601 [V] 2SA2056 [T] 2SA2060 (◎)	2SC2655 (*) 2SC3076 (◇) 2SC3668 (§) 2SC4408 (*) 2SC5028 (□)	2SA1315 (*) 2SA1429 (§)	2SC3328 (*) 2SC3669 (§) 2SC3474 (◇)
1.5	2SA2058 [T]		2SA2065 [T] 2SA2069 (◎)	2SC5784 [T]				
1.2					TPC6D02 [V] [#]			
1					2SA2070 (◎)	TPC6701 [V](△) 2SC5810 (◎)		
0.8					TPC6801 [V] (△)			

(*) LSTM	(§) MSTM	(@) TO-126IS	(▲) TO-220NIS	(◎) TO-220FL	(●) TO-220SM	(◆) DP	(▽) TO-3P(N)
(▼) TO-3P(N)IS	(※) TO-3P(L)	(□) TPSTPL	(■) PW-MINI	(◎) PW-MOLD	(◇) TSM	[T] VS-6	[V]
(△) 2-in-1	[#] Transistor + Diode						