

August 2012

# SEMICONDUCTOR GENERAL CATALOG

## Transistors

Bipolar Small-Signal Transistors  
Bipolar Power Transistors  
Junction FETs  
Combination Products of Different Type Devices  
MOSFETs  
Radio-Frequency Bipolar Small-Signal Transistors  
Radio-Frequency Small-Signal FETs  
Radio-Frequency Power MOSFETs  
IGBTs

# Bipolar Small-Signal Transistors

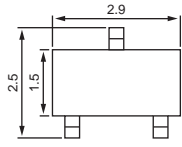
## General-Purpose Transistor (Single)

Classification	V <sub>CEO</sub> (V) Max	I <sub>c</sub> (mA) Max	(Surface-Mount Type)									
			CST3		VESM		SSM		USM		UFM	
			(mm)		(mm)		(mm)		(mm)		(mm)	
			NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP
General-purpose	50	100	2SC6026CT	2SA2154CT								
		150			2SC6026MFV	2SA2154MFV	2SC4738	2SA1832	TTC4116*	TTA1586*		
	30	500							2SC4118	2SA1588		
	50	500										
Low noise	120	100							2SC4117	2SA1587		
Low saturation voltage	12	400	2SC5376CT		2SC5376FV	2SA1955FV	2SC5376	2SA1955				
	12	500							2SC5233	2SA1954		
	15	800										
High current	25	800										
	30	800										
	10	2000										
	20	2000										
	20	1500										
	20	2500									2SC6133	2SA2214
	30	3000										2SA2215
	50	1000									2SC6134	
	50	1700									2SC6135	
	50	2500									2SA2195	
Strobe	10	5000 (3000)									2SC6100	
High breakdown voltage	80	300										
High h <sub>FE</sub>	50	150										
Muting	20	300							2SC4213			
High-speed switching	15	200										
High-voltage switching	200	50										
High breakdown voltage	250	50										
	300	100										
Darlington	40	300										

• For the PNP transistors, the minus sign (-) indicating a negative voltage is omitted.

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

S-MINI



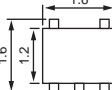
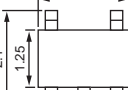
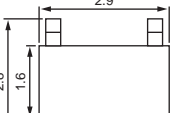


(mm)

NPN	PNP
2SC2712	2SA1162
2SC2859	2SA1182
2SC3325	2SA1313
2SC2713	2SA1163
2SC3324	2SA1312
2SC5232	2SA1953
	2SA1362
2SC3265	2SA1298
	2SA1621
	2SA1620
2SC3326	
2SC3138	
2SC4497	2SA1721

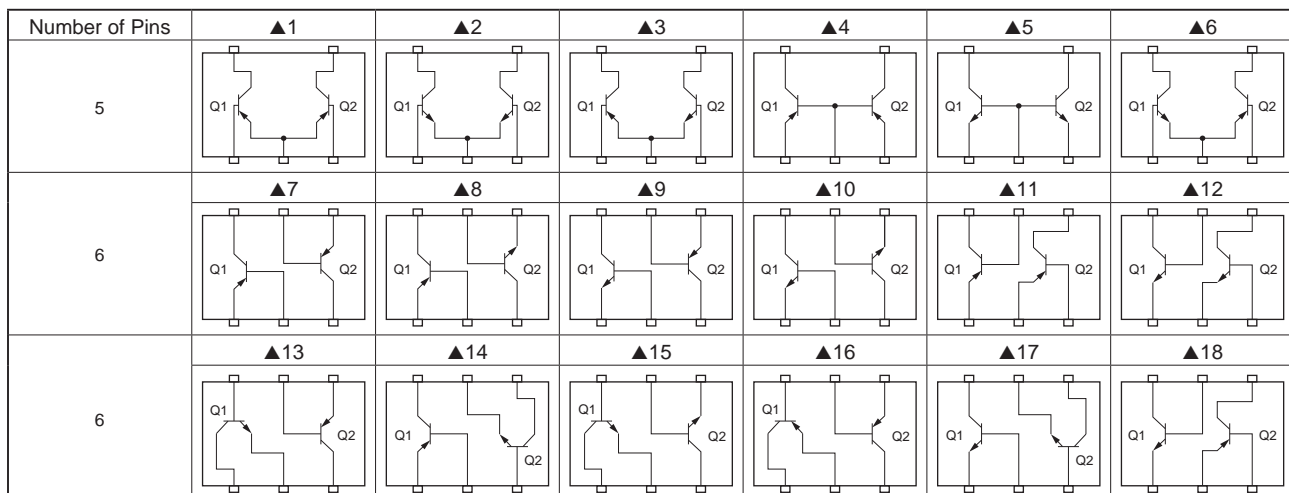
\*: New product

(Dual)

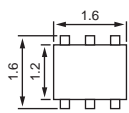
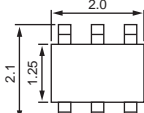
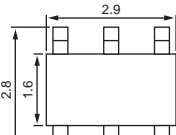
Classification	V <sub>CEO</sub> (V) Max	I <sub>c</sub> (mA) Max	Dual Type									
			CST6		fS6			ESV	USV	SMV		
												
NPN + PNP		NPN	PNP	NPN + PNP	PNP + NPN	NPN	PNP	NPN	PNP	PNP + NPN		
General-purpose	50	150 (100)	(HN2B26CT) (▲18)	(HN1C26FS) (▲10) (HN2C26FS) (▲12)	(HN1A26FS) (▲7) (HN2A26FS) (▲11)	(HN1B26FS) (▲9)	HN4B01JE (▲6)	2SC4944 (▲2)	2SA1873 (▲1) HN4A56JU (▲4)	2SC4207 (▲2)	2SA1618 (▲1)	
	30	500										HN4B04J (▲3) *
	50	500										
Low noise	120	100								HN4C06J (▲2) HN4C51J (▲5)	HN4A06J (▲1) HN4A51J (▲4)	HN4B06J (▲3)
High current	12	400						HN4C05JU (▲2)				
	12	500										
	15	800										
	30	800										
	10	2000										
	20	2000										
Strobe	10	5000										
High breakdown voltage	80	300										
High h <sub>FE</sub>	50	150										
Muting	20	300										
High-speed switching	15	200										
High-voltage switching	200	50										
High breakdown voltage	250	50										
	300	100										
Darlington	40	300										

- For the PNP transistors, the minus sign (-) indicating a negative voltage is omitted.
- The ratings enclosed in parenthesis are for those devices whose part numbers are enclosed in parentheses.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

### ◆Internal Connections

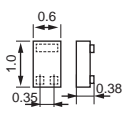

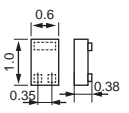
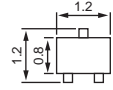
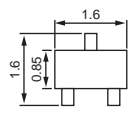


◆The internal connection diagrams only show the general configurations of the circuits.

ES6			US6			SM6		
 (mm)			 (mm)			 (mm)		
NPN	PNP	PNP + NPN	NPN	PNP	PNP + NPN	NPN	PNP	PNP + NPN
HN1C01FE (▲10)	HN1A01FE (▲7)		HN1C01FU (▲10)	HN1A01FU (▲7)	HN1B01FU (▲8)		HN1A01F (▲7)	HN1B01F (▲8)
HN2C01FE (▲12)	HN2A01FE (▲11)	HN1B04FE (▲9)	HN2C01FU (▲12)	HN2A01FU (▲11)	HN1B04FU (▲9)	HN1C01F (▲10)	HN3A56F (▲16)	HN3B01F (▲13)
HN3C67FE (▲17)			HN3C56FU (▲15)		HN3B02FU (▲14)			HN1B04F (▲8)
						HN1C07F (▲10)	HN1A07F (▲7)	
						HN3C51F (▲15)	HN3A51F (▲16)	
HN1C05FE (▲10)								
							HN1A02F (▲7)	
			HN1C03FU (▲10)			HN1C03F (▲10)		

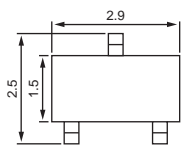
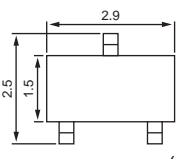
\*: New product

## Bias Resistor Built-in Transistors (Single, General-Purpose)

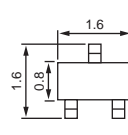
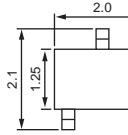
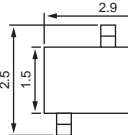
Ratings		20						50					
		50						100					
Internal Resistors (kΩ)		CST3		CST6				CST3		VESM		ESM	
													
R1	R2	(mm)		(mm)				(mm)		(mm)		(mm)	
		NPN	PNP	NPN	PNP	NPN + PNP	NPN	PNP	NPN	PNP	NPN	PNP	
4.7	4.7	RN1101CT	RN2101CT	RN1961CT	RN2961CT		RN1101ACT	RN2101ACT	RN1101MFV	RN2101MFV	RN1101F	RN2101F	
10	10	RN1102CT	RN2102CT	RN1962CT	RN2962CT		RN1102ACT	RN2102ACT	RN1102MFV	RN2102MFV	RN1102F	RN2102F	
22	22	RN1103CT	RN2103CT	RN1963CT	RN2963CT		RN1103ACT	RN2103ACT	RN1103MFV	RN2103MFV	RN1103F	RN2103F	
47	47	RN1104CT	RN2104CT	RN1964CT	RN2964CT		RN1104ACT	RN2104ACT	RN1104MFV	RN2104MFV	RN1104F	RN2104F	
2.2	47	RN1105CT	RN2105CT	RN1965CT	RN2965CT		RN1105ACT	RN2105ACT	RN1105MFV	RN2105MFV	RN1105F	RN2105F	
4.7	47	RN1106CT	RN2106CT	RN1966CT	RN2966CT	RN49P2ACT	RN1106ACT	RN2106ACT	RN1106MFV	RN2106MFV	RN1106F	RN2106F	
10	47	RN1107CT	RN2107CT	RN1967CT	RN2967CT		RN1107ACT	RN2107ACT	RN1107MFV	RN2107MFV	RN1107F	RN2107F	
22	47	RN1108CT	RN2108CT	RN1968CT	RN2968CT		RN1108ACT	RN2108ACT	RN1108MFV	RN2108MFV	RN1108F	RN2108F	
47	22	RN1109CT	RN2109CT	RN1969CT	RN2969CT		RN1109ACT	RN2109ACT	RN1109MFV	RN2109MFV	RN1109F	RN2109F	
4.7	∞	RN1110CT	RN2110CT	RN1970CT	RN2970CT		RN1110ACT	RN2110ACT	RN1110MFV	RN2110MFV	RN1110F	RN2110F	
10	∞	RN1111CT	RN2111CT	RN1971CT	RN2971CT		RN1111ACT	RN2111ACT	RN1111MFV	RN2111MFV	RN1111F	RN2111F	
22	∞	RN1112CT	RN2112CT	RN1972CT	RN2972CT		RN1112ACT	RN2112ACT	RN1112MFV	RN2112MFV	RN1112F	RN2112F	
47	∞	RN1113CT	RN2113CT	RN1973CT	RN2973CT		RN1113ACT	RN2113ACT	RN1113MFV	RN2113MFV	RN1113F	RN2113F	
1	10								RN1114MFV	RN2114MFV	RN1114F	RN2114F	
2.2	10								RN1115MFV	RN2115MFV	RN1115F	RN2115F	
4.7	10								RN1116MFV	RN2116MFV	RN1116F	RN2116F	
10	4.7								RN1117MFV	RN2117MFV	RN1117F	RN2117F	
47	10								RN1118MFV	RN2118MFV	RN1118F	RN2118F	
1	—								RN1119MFV	RN2119MFV			
100	100								RN1130MFV	RN2130MFV	RN1130F	RN2130F	
100	∞								RN1131MFV	RN2131MFV	RN1131F	RN2131F	
200	∞								RN1132MFV	RN2132MFV	RN1132F	RN2132F	

- For the PNP transistors, the minus sign (-) indicating a negative voltage is omitted.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

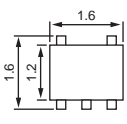
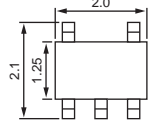
## (Single, High-Current/Muting Switch)

Ratings		High Current		Muting			
		50		20			
		800		300			
Internal Resistors (kΩ)		S-MINI				S-MINI	
							
R1	R2	(mm)		(mm)		(mm)	
		NPN	PNP	NPN			
1	1	RN1421	RN2421				
2.2	2.2	RN1422	RN2422				
4.7	4.7	RN1423	RN2423				
10	10	RN1424	RN2424				
0.47	10	RN1425	RN2425				
1	10	RN1426	RN2426				
2.2	10	RN1427	RN2427				
5.6	∞			RN1441			
10	∞			RN1442			
22	∞			RN1443			
2.2	∞			RN1444			

- For the PNP transistors, the minus sign (-) indicating a negative voltage is omitted.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

50					
100					
SSM		USM		S-MINI	
					
(mm)		(mm)		(mm)	
NPN	PNP	NPN	PNP	NPN	PNP
RN1101	RN2101	RN1301	RN2301	RN1401	RN2401
RN1102	RN2102	RN1302	RN2302	RN1402	RN2402
RN1103	RN2103	RN1303	RN2303	RN1403	RN2403
RN1104	RN2104	RN1304	RN2304	RN1404	RN2404
RN1105	RN2105	RN1305	RN2305	RN1405	RN2405
RN1106	RN2106	RN1306	RN2306	RN1406	RN2406
RN1107	RN2107	RN1307	RN2307	RN1407	RN2407
RN1108	RN2108	RN1308	RN2308	RN1408	RN2408
RN1109	RN2109	RN1309	RN2309	RN1409	RN2409
RN1110	RN2110	RN1310	RN2310	RN1410	RN2410
RN1111	RN2111	RN1311	RN2311	RN1411	RN2411
RN1112	RN2112	RN1312	RN2312	RN1412	RN2412
RN1113	RN2113	RN1313	RN2313	RN1413	RN2413
RN1114	RN2114	RN1314	RN2314	RN1414	RN2414
RN1115	RN2115	RN1315	RN2315	RN1415	RN2415
RN1116	RN2116	RN1316	RN2316	RN1416	RN2416
RN1117	RN2117	RN1317	RN2317	RN1417	RN2417
RN1118	RN2118	RN1318	RN2318	RN1418	RN2418

# Bias Resistor Built-in Transistors (Dual, General-Purpose)


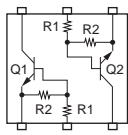
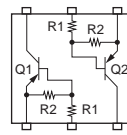
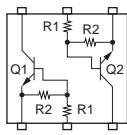
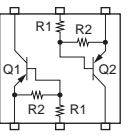
Classification	Absolute Maximum Ratings		Internal Resistors				ESV			USV			
	V <sub>CEO</sub> (V)	I <sub>c</sub> (mA)	Q1		Q2		(mm)			(mm)			
			R1 (kΩ)	R2 (kΩ)	R1 (kΩ)	R2 (kΩ)	NPN x 2	PNP x 2	NPN + PNP	NPN x 2	PNP x 2	NPN + PNP	
													
						Common emitter	Common emitter	Collector-base connection	Common emitter	Common emitter	Collector-base connection		
General-purpose	50	100	4.7	4.7	4.7	4.7	RN1701JE	RN2701JE		RN1701	RN2701		
			10	10	10	10	RN1702JE	RN2702JE	RN47A3JE	RN1702	RN2702	RN47A3	
			22	22	22	22	RN1703JE	RN2703JE	RN47A2JE	RN1703	RN2703	RN47A2	
			47	47	47	47	RN1704JE	RN2704JE		RN1704	RN2704		
			2.2	47	2.2	47	RN1705JE	RN2705JE		RN1705	RN2705		
			4.7	47	4.7	47	RN1706JE	RN2706JE		RN1706	RN2706		
			10	47	10	47	RN1707JE	RN2707JE		RN1707	RN2707		
			22	47	22	47	RN1708JE	RN2708JE		RN1708	RN2708		
			47	22	47	22	RN1709JE	RN2709JE		RN1709	RN2709		
			4.7	—	4.7	—	RN1710JE	RN2710JE	RN47A1JE	RN1710	RN2710	RN47A1	
			10	—	10	—	RN1711JE	RN2711JE		RN1711	RN2711		
			22	—	22	—		RN2712JE					
			47	—	47	—		RN2713JE					
			1	10	1	10					RN2714		
			2.2	10	2.2	10							
			4.7	10	4.7	10							
			10	4.7	10	4.7							
			47	10	47	10							
			47	47	10	47			RN47A4JE				RN47A4
			47	47	4.7	10			RN47A5JE				RN47A5
100	100	100	100							RN47A6			
10	10	47	10							RN47A7			
	Q1: 50	Q1: 100											
	Q2: 12	Q2: 100 (Lowsat)	10	10	4.7	10				RN47A7JE			
	Q1: 50	Q1: 100											
	Q2: 30	Q2: 100 (High hFE)	10	10	10	47				RN47A8JE			
Muting	20	300	2.2	—	2.2	—							

- For the PNP transistors, the minus sign (-) indicating a negative voltage is omitted.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

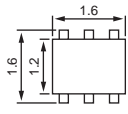




(Dual, General-Purpose) (Continued)

fs6																
																
Classification	Absolute Maximum Ratings		Internal Resistors				NPN	PNP	Absolute Maximum Ratings		Internal Resistors		NPN x 2	PNP x 2		
	V <sub>CEO</sub>	I <sub>c</sub>	Q1		Q2				V <sub>CEO</sub>	I <sub>c</sub>	Q1		Q2			
			(kΩ)		(kΩ)						(kΩ)		(kΩ)			
	(V)	(mA)	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2		
General-purpose	50	80	4.7	4.7	4.7	4.7	RN1901AFS	RN2901AFS	20	50	4.7	4.7	4.7	4.7	RN1901FS	RN2901FS
			10	10	10	10	RN1902AFS	RN2902AFS			10	10	10	10	RN1902FS	RN2902FS
			22	22	22	22	RN1903AFS	RN2903AFS			22	22	22	22	RN1903FS	RN2903FS
			47	47	47	47	RN1904AFS	RN2904AFS			47	47	47	47	RN1904FS	RN2904FS
			2.2	47	2.2	47	RN1905AFS	RN2905AFS			2.2	47	2.2	47	RN1905FS	RN2905FS
			4.7	47	4.7	47	RN1906AFS	RN2906AFS			4.7	47	4.7	47	RN1906FS	RN2906FS
			10	47	10	47	RN1907AFS	RN2907AFS			10	47	10	47	RN1907FS	RN2907FS
			22	47	22	47	RN1908AFS	RN2908AFS			22	47	22	47	RN1908FS	RN2908FS
			47	22	47	22	RN1909AFS	RN2909AFS			47	22	47	22	RN1909FS	RN2909FS
			4.7	—	4.7	—	RN1910AFS	RN2910AFS			4.7	—	4.7	—	RN1910FS	RN2910FS
			10	—	10	—	RN1911AFS	RN2911AFS			10	—	10	—	RN1911FS	RN2911FS
			22	—	22	—	RN1912AFS	RN2912AFS			22	—	22	—	RN1912FS	RN2912FS
			47	—	47	—	RN1913AFS	RN2913AFS			47	—	47	—	RN1913FS	RN2913FS

- For the PNP transistors, the minus sign (–) indicating a negative voltage is omitted. The internal connection diagrams only show the general configurations of the circuits.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

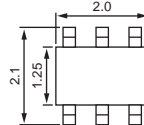
Classification	Absolute Maximum Ratings		Internal Resistors				ES6						
	V <sub>CEO</sub> (V)	I <sub>c</sub> (mA)	Q1		Q2		 (mm)						
			(kΩ)		(kΩ)								
			R1	R2	R1	R2	NPN x 2	PNP x 2	NPN x 2	PNP x 2	PNP + NPN	NPN + PNP	NPN + PNP
General-purpose	50	100	4.7	4.7	4.7	4.7							
			10	10	10	10							
			22	22	22	22							
			47	47	47	47							
			2.2	47	2.2	47							
			4.7	47	4.7	47							
			10	47	10	47							
			22	47	22	47							
			47	22	47	22							
			4.7	—	4.7	—							
			10	—	10	—							

• For the PNP transistors, the minus sign (-) indicating a negative voltage is omitted.

The internal connection diagrams only show the general configurations of the circuits.

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

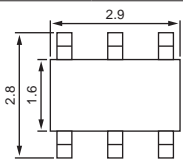
(Dual, General-Purpose) (Continued)

Classification	Absolute Maximum Ratings		Internal Resistors				US6					
	V <sub>CEO</sub> (V)	I <sub>c</sub> (mA)	Q1		Q2		 (mm)					
			(kΩ)		(kΩ)							
			R1	R2	R1	R2	NPN x 2	PNP x 2	NPN x 2	PNP x 2	PNP + NPN	NPN + PNP
General-purpose	50	100	4.7	4.7	4.7	4.7						
			10	10	10	10						
			22	22	22	22						
			47	47	47	47						
			2.2	47	2.2	47						
			4.7	47	4.7	47						
			10	47	10	47						
			22	47	22	47						
			47	22	47	22						
			4.7	—	4.7	—						
			10	—	10	—						

• For the PNP transistors, the minus sign (–) indicating a negative voltage is omitted.

The internal connection diagrams only show the general configurations of the circuits.

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Classification	Absolute Maximum Ratings		Internal Resistors				SM6			
	V <sub>CEO</sub> (V)	I <sub>c</sub> (mA)	Q1		Q2		 (mm)			
			(kΩ)		(kΩ)					
			R1	R2	R1	R2	NPN x 2	PNP x 2	NPN x 2	PNP + NPN
General-purpose	50	100	4.7	4.7	4.7	4.7	RN1601	RN2601		RN4601
			10	10	10	10	RN1602	RN2602		RN4602
			22	22	22	22	RN1603	RN2603		RN4603
			47	47	47	47	RN1604	RN2604		RN4604
			2.2	47	2.2	47	RN1605	RN2605		RN4605
			4.7	47	4.7	47	RN1606	RN2606		RN4606
			10	47	10	47	RN1607	RN2607		RN4607
			22	47	22	47	RN1608	RN2608		RN4608
			47	22	47	22	RN1609	RN2609		RN4609
			4.7	—	4.7	—	RN1610	RN2610		RN4610
			10	—	10	—	RN1611	RN2611		RN4611

- For the PNP transistors, the minus sign (–) indicating a negative voltage is omitted.
- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

# Bipolar Power Transistors

## Radio-Frequency Switching Power Transistors (2SA/2SC/TTA/TTC Series)

$V_{CE0}$ (V) $I_C$ (A)	10/(15)	(18)/20	(25)/30	40/(45)	50/(60)
1	TPC6D02 (15 V) (&)( $\Delta$ )		HN4B101J (NPN: 1.2 A) (M)(V)		2SA2070 ( $\odot$ ) TPC6701 (W)( $\Delta$ ) 2SC5810 ( $\odot$ ) TPC6901A (M)( $\Delta$ ) (PNP: 0.7 A) TPCP8901 (M)(P) (PNP: 0.8 A) TTA007 * TTC007 * ( $\spadesuit$ ) TPC6604 * TPC6504 * ( $\Delta$ )
1.2		TPC6D03 (&)( $\Delta$ )			
1.5	2SA2058 ( $\spadesuit$ )	2SA2065 ( $\spadesuit$ ) 2SC5784 ( $\spadesuit$ ) 2SA2069 ( $\odot$ ) 2SC5819 ( $\odot$ ) TPC6503 ( $\Delta$ )			
2	2SA2066 ( $\odot$ ) 2SC5755 ( $\spadesuit$ ) 2SC5785 ( $\odot$ ) TPC6501 ( $\Delta$ ) TPC6602 ( $\Delta$ ) TPCP8504 (P)		TPCP8902 (M)(P) (NPN+PNP) TPC6902 (M)( $\Delta$ ) (NPN+PNP) : PNP-1.7A HN4B102J (M)(V) (NPN+PNP)		2SA1241 2SC3076 ( $\diamond$ ) 2SA2056 ( $\spadesuit$ ) TPC6601 ( $\Delta$ ) TPCP8701 (W)(P) 2SA2060 ( $\odot$ )
2.5		2SA2061 ( $\spadesuit$ )			2SC5692 ( $\spadesuit$ ) 2SC6033 ( $\spadesuit$ ) TPCP8602 (P)
3		2SA2059 ( $\odot$ ) TPCP8F01 ( $\$$ )(P) TPC6603 ( $\Delta$ ) TPCP8G01* ( $\$$ )(P)	2SC5976 ( $\spadesuit$ ) TPCP8H02 ( $\$$ )(P)		2SC5712 ( $\odot$ ) TPC6502 ( $\Delta$ ) TPCP8505 (P) 2SC6126 ( $\odot$ ) TPCP8511* (P)
3.5		2SC5738 ( $\spadesuit$ )			
4	2SC5713 ( $\odot$ )	2SC5714 ( $\odot$ ) 2SC6125 ( $\odot$ ) TPCP8601 (P)	2SC5906 ( $\spadesuit$ )		2SC5703 ( $\spadesuit$ )
5					2SA1244 2SA2097 ( $\diamond$ ) TTA005 * ( $\diamond$ ) 2SC5886A ( $\diamond$ ) TPCP8H01 ( $\$$ )(P)
7					2SC6000 ( $\diamond$ )

\* Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

\*: New product

### Legend

Package		Surface-Mount Package	Other Remarks
Through-Hole Package	Ammo Packaging		
( $\diamond$ ) PW-Mold	×	( $\spadesuit$ ) TSM	(%) Darlington
( $\nabla$ ) TO-3P(N)	×	( $\odot$ ) PW-Mini	(#) Built-in zener diode
( $\times$ ) TO-3P(L)	×	( $\diamond$ ) PW-Mold	Part number in italic signifies built in Freewheel diode.
		( $\Delta$ ) VS-6	2SA****/2SC****: Complementary
		(P) PS-8	(&) 2-in-1 (transistor + diode)
		(V) SMV	( $\$$ ) 2-in-1 (transistor + S-MOS)
		( $\heartsuit$ ) TFP	(W) 2-in-1 (NPN (or PNP) x 2)
			(M) 2-in-1 (NPN + PNP)

V <sub>CEO</sub> I <sub>c</sub> (A)	80	120	(140)/150	160	(180)/200
1		TPCP8507 (P) TPCP8510 * (P) 2SC6061 (♣)			
1.5				2SA1225 (◇)	
2	2SA2206 2SC6124 (◎)				
3	TTA003 (◇) 2SC6076 (◇)				
5	2SC3303 (◇)				
10			2SA1941 2SC5198 (▽) (140 V)		
12				2SA1942 2SC5199 (※)	2SA2120 2SC5948 (▽)
15					2SA2121 2SC5949 (※)
18				TTA0001 * TTC0001 * (▽) TTA0002 * TTC0002 * (※)	

V <sub>CEO</sub> I <sub>c</sub> (A)	230	300	(370)/400	(550)/600	800
0.05					2SC6127 (◇)
0.3			TPCP8604 (P)		
0.5			TTC013 * (◎) (350 V) 2SA1971 (◎)	2SA2142 (◇)	
0.8			2SC5458 (◇)		
1	TTC011 * (@)	TTC005 * (◎) (285 V)		2SA2184 (◇) (550 V)	
1.5		TTC008 * (◇) (285 V)	2SC6142 (◇) (375 V)		
2			2SA2034 TTC012 * (◇) (375 V)		
5					2SC5354 (▽)
12					
15	2SA1943 2SC5200 (※) <b>2SA1962 2SC5242</b> (▽) 2SA1986 2SC5358 (▽) 2SA1987 2SC5359 (※) TTA1943 * TTC5200 * (※)				

• The products shown in bold are also manufactured in offshore fabs.

\*: New product

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

#### Legend

Package			Other Remarks
Through-Hole Package	Ammo Packaging	Surface-Mount Package	
(◇) PW-Mold	×	(♣) TSM	(%) Darlington
(▽) TO-3P(N)	×	(◎) PW-Mini	(#) Built-in zener diode
(※) TO-3P(L)	×	(◇) PW-Mold	Part number in italic signifies built in Freewheel diode.
		(△) VS-6	2SA****/2SC****: Complementary
		(P) PS-8	(&) 2-in-1 (transistor + diode)
		(V) SMV	(\$) 2-in-1 (transistor + S-MOS)
		(♥) TFP	(W) 2-in-1 (NPN (or PNP) × 2)
			(M) 2-in-1 (NPN + PNP)

## Low-Frequency Power Transistors (2SB/2SD/TTB/TTD Series)

$V_{CE0}$ (V)	60/(65)		120
$I_C$ (A)			
0.8	2SD2719	(#)(%)(♠)	
0.9			<b>TPCP8L01</b> (1) (&)(P)
1	2SD2686	(#)(%)(◎)	
3	2SB906	(◇)	
	TTB001 *	(♥)	
	TTB002 *	(◇)	

(1) NPN + HED (200 V/1 A)

\*: New product

• The products shown in bold are also manufactured in offshore fabs.

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

### Legend

Through-Hole Package	Package		Other Remarks
	Ammo Packaging	Surface-Mount Package	
(◇) PW-Mold	×	(♠) TSM	(%) Darlington
(▽) TO-3P(N)	×	(◎) PW-Mini	(#) Built-in zener diode
(※) TO-3P(L)	×	(◇) PW-Mold	Part number in italic signifies built in Freewheel diode.
		(△) VS-6	2SA****/2SC****: Complementary
		(P) PS-8	(&) 2-in-1 (transistor + diode)
		(V) SMV	(\$) 2-in-1 (transistor + S-MOS)
		(♥) TFP	(W) 2-in-1 (NPN (or PNP) × 2)
			(M) 2-in-1 (NPN + PNP)



## Transistors for Power Amps (Output Stage)

Part Number		Ic (A)	V <sub>CEO</sub> (V)	Pc (W) T <sub>C</sub> = 25°C	fr (MHz) Typ. (NPN/PNP)	V <sub>CE</sub> (V)	Ic (A)	Package
NPN	PNP							
2SC5198	2SA1941	10	140	100	30	5	1	TO-3P(N)
TTC0001 *	TTA0001 *	18	160	150	30	10	1	
2SC5242	2SA1962	15	230	130	30	5	1	
2SC5358	2SA1986	15	230	150	30	5	1	
2SC5948	2SA2120	12	200	200	30/25	5	1	
2SC5199	2SA1942	12	160	120	30	5	1	TO-3P(L)
TTC0002 *	TTA0002 *	18	160	180	30	10	1	
2SC5200	2SA1943	15	230	150	30	5	1	
TTC5200 *	TTA1943 *	15	230	150	30	5	1	
2SC5359	2SA1987	15	230	180	30	5	1	
2SC5949	2SA2121	15	200	220	30/25	5	1	

\* Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

\*: New product

## Transistors for MOS Gate Drivers (1-in-1 Transistors for Small-Motor Driver Applications)

Part Number	Polarity	Absolute Maximum Ratings			h <sub>FE</sub>		V <sub>CE(sat)</sub>			Complementary	Package	Remarks		
		V <sub>CEO</sub> (V)	I <sub>C</sub> (A)	P <sub>C</sub> (Note 1) (mW)	Min	Max	V <sub>CE</sub> (V)	I <sub>C</sub> (A)	V <sub>CE(sat)</sub> (V)				I <sub>C</sub> (A)	I <sub>B</sub> (mA)
2SA2058	PNP	-10	-1.5	500	200	500	-2	-0.2	-0.19	-0.6	-20	2SC5755	<p>TSM (mm)</p>	
2SA2065		-20	-1.5	500	200	500	-2	-0.15	-0.14	-0.5	-17	2SC5784		
2SA2061		-20	-2.5	625	200	500	-2	-0.5	-0.19	-1.6	-53	2SC5735		
TTA007 *		-50	-1	700	200	500	-2	-0.1	-0.2	-0.3	-10	TTC007 *		
2SC52056		-50	-2	625	200	500	-2	-0.3	-0.20	-1.0	-33	2SC5692		
2SC5755	NPN	10	2	500	400	1000	2	0.2	0.12	0.6	12	2SA2058		
2SC5784		20	1.5	500	400	1000	2	0.15	0.12	0.5	10	2SA2065		
2SC5738		20	3.5	625	400	1000	2	0.5	0.15	1.6	32	2SA2061		
2SC6062		30	5	800	250	400	2	0.5	0.12	1.6	53	—		(Note 2)
TTC007 *		50	1	700	400	1000	2	0.1	0.12	0.3	6	TTA007 *		
2SC5692		50	2.5	625	400	1000	2	0.3	0.14	1.0	20	2SA2056		
2SA2066	PNP	-10	-2	1000	200	500	-2	-0.2	-0.19	-0.6	-20	2SC5785	<p>PW-Mini (mm)</p>	
2SA2069		-20	-1.5	1000	200	500	-2	-0.15	-0.14	-0.5	-17	2SC5819		
2SA2059		-20	-3	1000	200	500	-2	-0.5	-0.19	-1.6	-53	2SC5714		
2SA2070		-50	-1	1000	200	500	-2	-0.1	-0.20	-0.3	-10	2SC5810		
2SA2060		-50	-2	1000	200	500	-2	-0.3	-0.20	-1.0	-33	2SC5712		
2SC5785	NPN	10	2	1000	400	1000	2	0.2	0.12	0.6	12	2SA2066		
2SC5819		20	1.5	1000	400	1000	2	0.15	0.12	0.5	10	2SC2069		
2SC5714		20	4	1000	400	1000	2	0.5	0.15	1.6	32	2SA2059		
2SC5810		50	1	1000	400	1000	2	0.1	0.17	0.3	6	2SA2070		
2SC5712		50	3	1000	400	1000	2	0.3	0.14	1	20	2SA2060		
2SC6126		50	3	1000	250	400	2	0.3	0.18	1	33	—	(Note 2)	

Note 1: The rating applies when the transistor is mounted on an FR4 board (Cu area = 645 mm<sup>2</sup>, t = 1.6 mm).

\*: New product

Note 2: Ultra-high-speed using by the Super Hi-Met process and Low V<sub>CE(sat)</sub> products.

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## (2-in-1 Transistors for Small-Motor Driver Applications)

Part Number	Polarity	Absolute Maximum Ratings				h <sub>FE</sub>		V <sub>CE(sat)</sub>			Package	Circuit Configuration (Top View)			
		V <sub>CEO</sub> (V)	I <sub>C</sub> (A)	I <sub>CP</sub> (A)	P <sub>C</sub> (Note 1) (mW)	Min	Max	V <sub>CE</sub> (V)	I <sub>C</sub> (A)	V <sub>CE(sat)</sub> (V)			I <sub>C</sub> (A)	I <sub>B</sub> (mA)	
															Max
HN4B101J	PNP	-30	-1.0	-5	550	200	500	-2	-0.12	-0.2	-0.4	-13	SMV		
	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	PNP	-50	-0.7	-5	400	200	500	-2	-0.1	-0.23	-0.3	-10	VS-6		
	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	PNP	-50	-0.8	-5	830	200	500	-2	-0.1	-0.2	-0.3	-10	PS-8		
	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			

Note 1: The rating applies when the transistor is mounted on an FR4 board (Cu area = 645 mm<sup>2</sup>, glass-epoxy, t = 1.6 mm) and is in single-device operation.

Copper thickness: 35 μm for the TPC6901A and 70 μm for the other transistors

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## Transistors for Switching Power Supplies (For AC/DC Converters)

Part Number	Applications	Absolute Maximum Ratings (Ta = 25°C)				Package
		V <sub>CB0</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)	
TTC005 *	Switching regulator	600	285	1	1.1 ♣ (Note 1)	PW-Mini
TTC008 *				1.5	1.1 ♣	PW-Mold
TTC013 *			0.5	1 ♣ (Note 1)	PW-Mini	
2SC5548A			400	2	15	PW-Mold
2SC6142		800	375	1.5	1.1 ♣	PW-Mold
TTC012 *				2	1.1 ♣	PW-Mold
2SC5354		900	800	5	100	TO-3P(N)

Note 1: The rating applies when the transistor is mounted on an FR4 board (Cu area = 645 mm<sup>2</sup>, glass-epoxy, t = 1.6 mm).

\*: New product

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## Transistors for High-Voltage Power Supplies (For DC/DC Converters)

Part Number	Absolute Maximum Ratings				hFE				VCE(sat) (V)			Package
	VCEX(V)	VCEO(V)	Ic(A)	Pc (W)	Min	Max	VCE(V)	Ic(A)	Max	Ic(A)	Ib(mA)	
2SC6061	150	120	1	0.625 (Note 1)	120	300	2	0.1	0.14	0.3	10	TSM
TPCP8510 *	150	120	1	1.1 (Note 1)	120	300	2	0.1	0.14	0.3	10	PS-8
TPCP8507	150	120	1	1.25 (Note 1)	120	300	2	0.1	0.14	0.3	10	PS-8
2SC6076	160	80	3	10 (Note 2)	180	450	2	0.5	0.5	1	100	PW-Mold
2SC6124	160	80	2	1 (Note 1)	100	200	2	0.5	0.5	1	100	PW-Mini

Note 1: The rating applies when the transistor is mounted on an FR4 board (Cu area = 645 mm<sup>2</sup>, glass-epoxy, t = 1.6 mm).

\*: New product

Note 2: Tc = 25°C

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## (Transistors for Droppers)

Part Number	Absolute Maximum Ratings			hFE				VCE(sat)(V)			Package
	VCEO(V)	Ic(A)	Pc (W) Tc = 25°C	Min	Max	VCE(V)	Ic(A)	Max	Ic(A)	Ib(mA)	
2SB906	-60	-3	20	60	200	-5	-0.5	-1.7	-3	-300	PW-Mold
TTB001 *	-60	-3	36	100	250	-5	-0.5	-1.7	-3	-300	TFP
TTB002 *	-60	-3	30	100	250	-5	-0.5	-1.7	-3	-300	PW-Mold
TTA005 *	-50	-5	24	200	500	-2	-0.5	-0.27	-1.6	-53	PW-Mold

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

\*: New product

## (High-Voltage Transistors)

Part Number	Absolute Maximum Ratings			Package	Circuit Configuration (Top View)	Remarks
	VCEO(V)	Ic(A)	Pc(W)			
2SA1971	-400	-0.5	1	PW-Mini		
TPCP8604	-400	-0.3	1	PS-8		SMD
2SA2184	-550	-1	1	PW-Mold		SMD only
2SA2142	-600	-0.5	10	PW-Mold		SMD only
2SC6127	800	0.05	10	PW-Mold		SMD only

- The circuit configuration diagrams only show the general configurations of the circuits.

- Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## Low Saturation Voltage Transistors (Small Surface-Mount Packages for Personal Equipments)

Part Number	Configuration	Absolute Maximum Ratings					h <sub>FE</sub>				V <sub>CE(sat)</sub> (V)			Marking	Package
		V <sub>CEO</sub> (V)	I <sub>C</sub> (A)	I <sub>CP</sub> (A)	P <sub>C</sub> (mW) (Note 1)	P <sub>C</sub> (mW) (Note 1) t = 10 s	Min	Max	V <sub>CE</sub> (V)	I <sub>C</sub> (A)	Max	I <sub>C</sub> (A)	I <sub>B</sub> (mA)		
2SA2058	PNP single	-10	-1.5	-2.5	500	750	200	500	-2	-0.2	-0.19	-0.6	-20	WM	TSM equivalent to SC-59 SOT-23
2SA2065		-20	-1.5	-2.5	500	750	200	500	-2	-0.15	-0.14	-0.5	-17	WK	
2SA2061		-20	-2.5	-4	625	1000	200	500	-2	-0.5	-0.19	-1.6	-53	WE	
TTA007 *		-50	-1	-2	700	1100	200	500	-2	-0.1	-0.2	-0.3	-10	WH	
2SA2056		-50	-2	-3.5	625	1000	200	500	-2	-0.3	-0.20	-1.0	-33	WF	
2SC5755	NPN single	10	2	3.5	500	750	400	1000	2	0.2	0.12	0.6	12	WL	
2SC5784		20	1.5	2.5	500	750	400	1000	2	0.15	0.12	0.5	10	WJ	
2SC5738		20	3.5	6	625	1000	400	1000	2	0.5	0.15	1.6	32	WD	
2SC5976		30	3	5	625	1000	250	400	2	0.3	0.14	1.0	33	WW	
2SC5906		30	4	7	800	1250	200	500	2	0.5	0.2	1.6	53	WP	
TTC007 *		50	1	2	700	1100	400	1000	2	0.1	0.12	0.3	6	WG	
2SC5692		50	2.5	4	625	1000	400	1000	2	0.3	0.14	1.0	20	WB	
2SC6033		50	2.5	5	625	1000	250	400	2	0.3	0.18	1.0	33	WX	
2SC5703		50	4	7	800	1250	400	1000	2	0.5	0.12	1.6	32	WA	
2SC6061		120	1	2	625	1000	120	300	2	0.1	0.14	0.3	10	WN	
HN4B101J	PNP + NPN	±30	-1/1.2	±5	550	850	200	500	±2	±0.12	-0.2/0.17	±0.4	±13	5K	SMV
HN4B102J		±30	-1.8/2	±8	750	750	200	500	±2	±0.2	-0.2/0.14	±0.6	±20	5L	
2SA2066	PNP single	-10	-2	-3.5	1000	2000	200	500	-2	-0.2	-0.19	-0.6	-20	4E	PW-Mini equivalent to SC-62 SOP-89
2SA2069		-20	-1.5	-2.5	1000	2000	200	500	-2	-0.15	-0.14	-0.5	-17	4D	
2SA2059		-20	-3	-5	1000	2500	200	500	-2	-0.5	-0.19	-1.6	-53	4F	
2SA2070		-50	-1	-2	1000	2000	200	500	-2	-0.1	-0.2	-0.3	-10	4C	
2SA2060		-50	-2	-3.5	1000	2500	200	500	-2	-0.3	-0.20	-1.0	-33	4G	
2SA2206		-80	-2	-4	1000	2500	100	200	-2	-0.5	-0.5	-1.0	-100	4K	
2SC5785	NPN single	10	2	3.5	1000	2000	400	1000	2	0.2	0.12	0.6	12	3E	
2SC5713		10	4	7	1000	2500	400	1000	2	0.5	0.15	1.6	32	2C	
2SC5819		20	1.5	2.5	1000	2000	400	1000	2	0.15	0.12	0.5	10	3D	
2SC6125		20	4	8	1000	2500	180	390	2	0.5	0.2	1.6	53	4L	
2SC5714		20	4	7	1000	2500	400	1000	2	0.5	0.15	1.6	32	2E	
2SC5810		50	1	2	1000	2000	400	1000	2	0.1	0.17	0.3	6	3C	
2SC6126		50	3	6	1000	2500	250	400	2	0.3	0.18	1.0	33	4M	
2SC5712		50	3	5	1000	2500	400	1000	2	0.3	0.14	1	20	2A	
2SC6124		80	2	4	1000	2500	100	200	2	0.5	0.5	1.0	100	4J	
TPC6501		NPN single	10	2	3.5	800	1600	400	1000	2	0.2	0.12	0.6	12	H2A
TPC6502	50		3	5	800	1600	400	1000	2	0.3	0.14	1	20	H2B	
TPC6503	20		1.5	2.5	800	1600	400	1000	2	0.15	0.12	0.5	10	H2C	
TPC6504 *	50		1	2	800	1600	400	1000	2	0.1	0.17	0.3	6	H2D	
TPC6601	PNP single	-50	-2	-3.5	800	1600	200	500	-2	-0.3	-0.20	-1.0	-33	H3A	
TPC6602		-10	-2	-3.5	800	1600	200	500	-2	-0.2	-0.19	-0.6	-20	H3B	
TPC6603		-20	-3	-5	800	1600	200	500	-2	-0.5	-0.19	-1.6	-53	H3C	
TPC6604 *		-50	-1	-2	800	1600	200	500	-2	-0.1	-0.23	-0.3	-10	H3D	
TPC6701	NPN/dual	50	1	2	660 (Note 2)	—	400	1000	2	0.1	0.17	0.3	6	H4A	
TPC6901A	PNP + NPN	±50	-0.7/1.0	±5	400	500	200/400	500/1000	±2	±0.1	-0.23/0.17	±0.3	-10/6	H6B	
TPC6902		±30	-1.7/2	±8	700	1000	200	500	±2	±0.2	-0.2/0.14	±0.6	±20	H6C	

Note 1: The rating applies when the transistor is mounted on an FR4 board (Cu area = 645 mm<sup>2</sup>, glass-epoxy, t = 1.6 mm).

\*: New product

Note 2: Total loss of dual-device operation

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## Low Saturation Voltage Transistors (Small Surface-Mount Packages for Personal Equipments) (Continued)

Part Number	Configuration	Absolute Maximum Ratings					hFE				V <sub>CE(sat)</sub> (V)			Marking	Package
		V <sub>CEO</sub> (V)	I <sub>C</sub> (A)	I <sub>CP</sub> (A)	P <sub>C</sub> (mW) (Note 1)	P <sub>C</sub> (mW) (Note 1) t = 10 s	Min	Max	V <sub>CE</sub> (V)	I <sub>C</sub> (A)	V <sub>CE(sat)</sub> (V)				
											Max	I <sub>C</sub> (A)	I <sub>B</sub> (mA)		
2SA2097	PNP single	-50	-5	-10	20 (Note 3)	—	200	500	-2	-0.5	-0.27	-1.6	-53	A2097	PW-Mold SC-63
TTA005 *		-50	-5	-10	24 (Note 3)	—	200	500	-2	-0.5	-0.27	-1.6	-53	A005	
2SA1241		-50	-2	-3	10 (Note 3)	—	70	240	-2	-0.5	-0.5	-1	-50	A1241	
2SA1244		-50	-5	-8	20 (Note 3)	—	70	240	-1	-1	-0.4	-3	-150	A1244	
TTA003 *		-80	-3	-5	10 (Note 3)	—	100	200	-2	-0.5	-0.5	-1	-100	A003	
2SC6076	NPN single	80	3	5	10 (Note 3)	—	180	450	2	0.5	0.5	1	100	C6076	
2SC5886A		50	5	10	20 (Note 3)	—	400	1000	2	0.5	0.22	1.6	32	C5886A	
2SC3076		50	2	3	10 (Note 3)	—	70	240	2	0.5	0.5	1	50	C3076	
2SC3303		80	5	8	20 (Note 3)	—	70	240	1	1	0.4	3	150	C3303	
2SC6000		50	7	10	20 (Note 3)	—	250	400	2	2.5	0.18	2.5	83	C6000	
TPCP8507	NPN single	120	1	2	1250	3000	120	300	2	0.1	0.14	0.3	10	8507	PS-8
TPCP8510 *		120	1	2	1100	2250	120	300	2	0.1	0.14	0.3	10	8510	
TPCP8511 *		50	3	5	1250	3000	250	400	2	0.3	0.18	1	33	8511	
TPCP8505		50	3	5	1250	3000	400	1000	2	0.3	0.14	1	20	8505	
TPCP8504		10	2	3.5	1200	2800	400	1000	2	0.2	0.12	0.6	12	8504	
TPCP8601	PNP single	-20	-4	-7	1300	3300	200	500	-2	-0.6	-0.19	-2	-67	8601	
TPCP8602		-50	-2.5	-4	1250	3000	200	500	-2	-0.3	-0.2	-1	-33	8602	
TPCP8701	NPN/dual	50	3	5	940	1770	400	1000	2	0.3	0.14	1	20	8701	
TPCP8H01 (Note 2)	NPN+ S-MOS	50	5	7	1000	2000	250	400	2	0.5	0.13	1.6	53	8H01	
TPCP8H02 (Note 2)		30	3	5	1000	2000	250	400	2	0.3	0.14	1	33	8H02	
TPCP8F01 (Note 2)	PNP+ S-MOS	-20	-3	-5	1000	—	200	500	-2	-0.5	-0.19	-1.6	-53	8F01	
TPCP8901	PNP + NPN	±50	-0.8/1.0	±5	830	1480	200/400	500/1000	±2	±0.1	-0.2/0.17	±0.3	-10/6	8901	
TPCP8902		±30	±2	±8	890	1670	200	500	±2	±0.2	-0.2/0.14	±0.6	±20	8902	
TPCP8L01 (Note 4)	NPN Darlington + HED	120	0.9	2	900	—	2000	9000	2	1	1.5	1	1	8L01	
TPCP8G01 (Note 5) *	PNP + Pch	-20	-3	-5	940	1770	200	500	-2	-0.5	-0.19	-1.6	-53	8G01	

Note 1: The rating applies when the transistor is mounted on an FR4 board (Cu area = 645 mm<sup>2</sup>, glass-epoxy, t = 1.6 mm).

\*: New product

Note 2: Built-in SBD, V<sub>RRM</sub> = 30 V, I<sub>O</sub> = 0.7 A, V<sub>F</sub> = 0.4 V (MAX)@I<sub>F</sub> = 0.5 A, I<sub>R</sub> = 100 μA (MAX)@V<sub>R</sub> = 10 V

Note 3: T<sub>C</sub> = 25°C

Note 4: Built-in HED, V<sub>RRM</sub> = 200 V, I<sub>F(AV)</sub> = 1 A

Note 5: Pch MOS V<sub>DSS</sub> = -20 V, I<sub>D</sub> = -2 A, R<sub>ON</sub> = 130 mΩ Max

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

(Power-Mold Transistors (SC-63/64) )

Part Number	Applications	Absolute Maximum Ratings (Ta = 25°C)				Complementary	Equivalent Product	Remarks
		V <sub>CEO</sub> (V)	I <sub>c</sub> (A)	P <sub>c</sub> (W)	★P <sub>c</sub> (W)			
2SA1241	Power amplification	-50	-2.0	1.0	10	2SC3076	2SA1892	
2SC3076		50	2.0	1.0	10	2SA1241	2SC5029	
2SA1244	High-current switching	-50	-5.0	1.0	20	2SC3074	2SA1905	
2SA2097		-50	-5.0	1.0	20	—	—	High β
TTA005 *		-50	-5	1.2	24	—	—	T <sub>j</sub> = 175°C
2SC5886A		50	5	1.0	20	—	—	High β, V <sub>CEO</sub> = 120 V
2SB906	Low-frequency power amplification	-60	-3.0	1.0	20	2SD1221	2SB834	
TTB002 *		-60	-3.0	1.0	30	—	—	
TTA003 *		-80	-3.0	—	10	—	—	
2SC6076	Switching, power amplification	80	3	—	10	—	—	
2SC3303	Switching	80	5.0	1.0	20	—	2SC3258	
2SA2034	High-voltage switching	-400	-2	1.0	15	—	—	
2SA2184		-550	-1	—	10	—	—	
2SA2142		-600	-0.5	—	15	—	—	
2SC5548A		400	2	1.0	15	—	—	
2SC6127		800	0.05	1.0	10	—	—	
2SC6142		375	1.5	1.1	—	—	—	
TTC008 *		285	1.5	1.1	—	—	—	
TTC012 *		375	2	1.1	—	—	—	
2SC6000	High-speed switching	50	7	1.0	20	—	—	

★: TC = 25°C

\*: New product

· Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

(PW-Mini Transistors (SC-62) )

Part Number		Absolute Maximum Ratings					Electrical Characteristics										Marking		Equivalent to TO-92MOD (TO-92)		Remarks/ Applications	
		P <sub>c</sub> (W)	P <sub>c</sub> (W)	P <sub>c</sub> (W)	V <sub>CEO</sub> (V)	I <sub>c</sub> (A)	h <sub>FE</sub>		V <sub>CE(sat)</sub>			f <sub>r</sub>										
							(Note 1)	(Note 2)	Min	Max	V <sub>CE</sub> (V)	I <sub>c</sub> (mA)	(V)	I <sub>c</sub> (mA)	I <sub>B</sub> (mA)	(MHz)	V <sub>CE</sub> (V)	I <sub>c</sub> (mA)				
NPN	PNP																					
2SC2881	2SA1201	0.5	1.0	—	120	0.8	80	240	5	100	1.0	500	50	120	5	100	C □	D □	2SC2235	2SA965	Audio driver	
—	2SA1971	0.5	1.0	—	-400	-0.5	140	400	-5	-100	-1.0	-100	-10	35	-5	-50	—	AL	—	2SA1972	High-voltage	
2SC5785	—	—	—	1	10	2	400	1000	2	200	0.12	600	12	—	—	—	3E	—	—	—	Low saturation	
—	2SA2066	—	—	1	-10	-2	200	500	-2	-200	-0.19	-600	-20	—	—	—	—	4E	—	—	Low saturation	
2SC5713	—	—	—	1	10	4	400	1000	2	500	0.15	1600	32	—	—	—	2C	—	—	—	Low saturation	
2SC5819	—	—	—	1	20	1.5	400	1000	2	150	0.12	500	10	—	—	—	3D	—	—	—	Low saturation	
—	2SA2069	—	—	1	-20	-1.5	200	500	-2	-150	-0.14	-500	-17	—	—	—	—	4D	—	—	Low saturation	
2SC6125	—	—	—	1	20	4	180	390	2	500	0.20	1600	53	—	—	—	4L	—	—	—	High-speed switching	
2SC5714	—	—	—	1	20	4	400	1000	2	500	0.15	1600	32	—	—	—	2E	—	—	—	Low saturation	
—	2SA2059	—	—	1	-20	-3	200	500	-2	-500	-0.19	-1600	-53	—	—	—	—	4F	—	—	Low saturation	
2SC6126	—	—	—	1	50	3	250	400	2	300	0.18	1000	33	—	—	—	4M	—	—	—	High-speed switching	
2SC5712	—	—	—	1	50	3	400	1000	2	300	0.14	1000	20	—	—	—	2A	—	—	—	Low saturation	
—	2SA2060	—	—	1	-50	-2	200	500	-2	-300	-0.20	-1000	-33	—	—	—	—	4G	—	—	Low saturation	
2SC5810	—	—	—	1	50	1	400	1000	2	100	0.17	300	6	—	—	—	3C	—	—	—	Low saturation	
—	2SA2070	—	—	1	-50	-1	200	500	-2	-100	-0.2	-300	-10	—	—	—	—	4C	—	—	Low saturation	
2SD2686	—	—	—	1	60±10	1	2000	—	2	1000	1.5	1000	1	—	—	—	3H	—	—	—	Darlington	
2SC6124	2SA2206	—	—	1	80	2	100	200	2	500	0.5	1000	100	150/100	2	500	4J	4K	—	—	—	Low saturation
TTC005 *	—	—	—	1.1	285	1	100	200	5	100	1.0	600	75	—	—	—	4N	—	—	—	LED backlight	
TTC013 *	—	—	—	1	350	0.5	100	200	5	50	0.3	160	20	—	—	—	4R	—	—	—	LED backlight	

Note: The h<sub>FE</sub> classification that appears instead of the □ shown in the Marking column will be one of the following:

\*: New product

A, B, C, D, O, R or Y, according to the rank.

Note 1: The rating applies when the transistor is mounted on a ceramic board (250 mm<sup>2</sup> x 0.8 mm).

Note 2: The rating applies when the transistor is mounted on a glass-epoxy board (645 mm<sup>2</sup> x 1.6 mm).

· Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## Low Saturation Voltage Transistors (TSM Transistors)

Part Number	Absolute Maximum Ratings					hFE				VCE(sat)(V)			Marking	Remarks/ Applications
	NPN	VCEO(V)	IC(A)	ICP(A)	PC(mW) (Note 1)	PC(mW) (Note 1) t=10s	Min	Max	VCE(V)	IC(A)	Max	IC(A)		
2SA2058	-10	-1.5	-2.5	500	750	200	500	-2	-0.2	-0.19	-0.6	-20	WM	Low saturation
2SA2065	-20	-1.5	-2.5	500	750	200	500	-2	-0.15	-0.14	-0.5	-17	WK	Low saturation
2SA2061	-20	-2.5	-4	625	1000	200	500	-2	-0.5	-0.19	-1.6	-53	WE	Low saturation
TTA007 *	-50	-1	-2	700	1100	200	500	-2	-0.1	-0.2	-0.3	-10	WH	Low saturation
2SA2056	-50	-2	-3.5	625	1000	200	500	-2	-0.3	-0.20	-1.0	-33	WF	Low saturation
2SC5755	10	2	3.5	500	750	400	1000	2	0.2	0.12	0.6	12	WL	Low saturation
2SC5784	20	1.5	2.5	500	750	400	1000	2	0.15	0.12	0.5	10	WJ	Low saturation
2SC5738	20	3.5	6	625	1000	400	1000	2	0.5	0.15	1.6	32	WD	Low saturation
2SC5976	30	3	5	625	1000	250	400	2	0.3	0.14	1.0	33	WW	Ultra-high-speed switching Low saturation voltage
2SC5906	30	4	7	800	1250	200	500	2	0.5	0.2	1.6	53	WP	Ultra-high-speed switching Low saturation voltage
TTC007 *	50	1	2	700	1100	400	1000	2	0.1	0.12	0.3	6	WG	Low saturation
2SC5692	50	2.5	4	625	1000	400	1000	2	0.3	0.14	1.0	20	WB	Low saturation
2SC6033	50	2.5	5	625	1000	250	400	2	0.3	0.18	1.0	33	WX	Ultra-high-speed switching Low saturation voltage
2SC5703	50	4	7	800	1250	400	1000	2	0.5	0.12	1.6	32	WA	Low saturation
2SD2719	60±10	0.8	3	800	1250	2000	—	2	1.0	1.5	1	1	WV	Darlington
2SC6061	120	1	2	625	1000	120	300	2	0.1	0.14	0.3	10	WN	Low saturation

Note 1: The rating applies when the transistor is mounted on an FR4 board (Cu area = 645 mm<sup>2</sup>, glass-epoxy, t = 1.6 mm).

\*: New product

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.



# Junction FETs

## Junction FETs (Surface-Mount Type)

Classification	V <sub>GDS</sub> (V) Max	I <sub>G</sub> (mA) Max	I <sub>DSS</sub> (mA)	Y <sub>fs</sub>   (mS) Min	S-MINI (SC-59)		USM (SC-70)	
					Nch	Pch	Nch	Pch
General-purpose	-50	10	0.3 to 6.5	1.2	2SK208	—	2SK879	—
	50	-10	-1.2 to -14	1	—	2SJ106	—	2SJ144
	-50	10	1.2 to 14	4	2SK209	—	2SK880	—

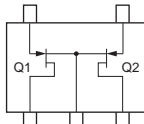
• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## (Surface-Mount Type) (Electret Condense Microphone)

Characteristics	V <sub>GDS</sub> (V) Max	I <sub>G</sub> (mA) Max	I <sub>DSS</sub> Rank ( $\mu$ A)	Y <sub>fs</sub>   (mS) Min	C <sub>iss</sub> (pF) Typ.	VESM
Very Low Noise Small C <sub>iss</sub>	-20	10	A = 140 to 240 B = 210 to 350	0.9	1.8	TTK101MFV
High gain	-20	10	A = 140 to 280 B = 240 to 450	1.0	4.0	TTK501MFV

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

## Junction FETs (Dual) (Surface-Mount Type)

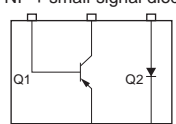
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					Nch x 2	Pch x 2	Nch x 2	Pch x 2	
General-purpose	-50	10	1.2 to 14	4	2SK2145	—	2SK3320	—	

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

◆The internal connection diagrams only show the general configurations of the circuits.

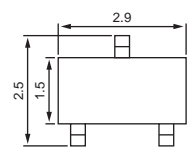
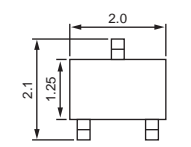
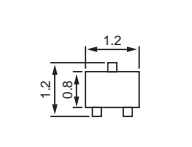
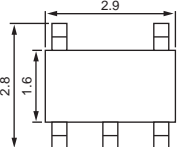
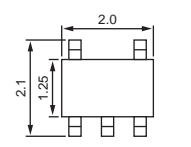
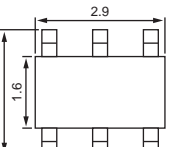
# Combination Products of Different Type Devices

## Combination Products of Different Type Devices

Features	Component Devices		Ratings				SM6	◆Internal Connections
			Breakdown Voltage (V)		Current (mA)			
High breakdown voltage PNP	Q1	2SA1587	V <sub>CEO</sub>	-120	I <sub>c</sub>	-100	HN2E04F	
Standard high-speed switching	Q2	1SS352	V <sub>R</sub>	80	I <sub>o</sub>	100		

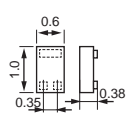
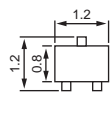
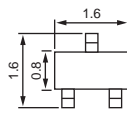
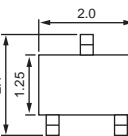
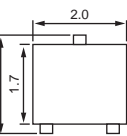
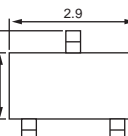
◆The internal connection diagrams only show the general configurations of the circuits.

## Package Lineup

S-MINI (SC-59)	USM (SC-70)	VESM	SMV	USV	SM6
					
(mm)	(mm)	(mm)	(mm)	(mm)	(mm)

# MOSFETs

## Small-Signal MOSFETs (Single-Type)

Polarity	Absolute Maximum Ratings			Package					
	V <sub>bss</sub> (V)	V <sub>gss</sub> (V)	I <sub>D</sub> (mA)	CST3  (mm)	VESM  (mm)	SSM  (mm)	USM (SC-70)  (mm)	UFM  (mm)	S-MINI (SC-59)  (mm)
Nch	20	±10	200	SSM3K37CT *		SSM3K37FS *			
	20	±10	250		SSM3K37MFV *				
	20	±10	100				SSM3K16FU		
	20	±10	180	SSM3K35CT	SSM3K35MFV	SSM3K35FS			
	20	±10	500		SSM3K36MFV	SSM3K36FS		SSM3K36TU	
	20	±10	500			SSM3K43FS # *			
	30	±20	100						SSM3K15F
	30	±20	100	SSM3K15ACT *	SSM3K15AMFV *	SSM3K15AFS *	SSM3K15AFU *		
	30	±20	100		SSM3K44MFV # *	SSM3K44FS # *			
	30	±20	200						2SK2009
	30	±20	400				SSM3K09FU		
	50	±7	100				SSM3K17FU		
	60	±20	200			SSM3K7002BFS *	SSM3K7002BFU *		SSM3K7002BF *
	60	±20	200						2SK1062
Pch	-20	±8	-330		SSM3J36MFV	SSM3J36FS		SSM3J36TU	
	-20	±10	-100	SSM3J16CT	SSM3J16FV	SSM3J16FS	SSM3J16FU		
	-20	±10	-100	SSM3J35CT	SSM3J35MFV	SSM3J35FS			
	-30	±20	-100	SSM3J15CT	SSM3J15FV	SSM3J15FS	SSM3J15FU		SSM3J15F
	-30	±20	-200						2SJ305
	-30	±20	-200				SSM3J09FU		
	-50	-7	-50				2SJ344		2SJ343
	-60	±20	-200						2SJ168

#: High ESD protection

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

V <sub>th</sub> (V)		R <sub>on</sub> (Ω)			ton (ns) Typ.	toff (ns) Typ.
Min	Max	Typ.	Max	@V <sub>GS</sub> (V)		
0.35	1.0	3.07	5.6	1.5	18	36
0.35	1.0	3.07	5.6	1.5	18	36
0.6	1.1	5.2	15	1.5	70	125
0.4	1.0	5	20	1.2	115	300
0.35	1.0	0.95	1.52	1.5	30	75
0.35	1.0	0.95	1.52	1.5	30	75
0.8	1.5	4	7	2.5	50	180
0.8	1.5	3.5	6.0	2.5	5.5	35
0.8	1.5	4.0	7.0	2.5	50	200
0.5	1.5	1.2	2.0	2.5	60	120
1.1	1.8	0.8	1.2	4	72	68
0.9	1.5	22	40	2.5	100	40
1.5	3.1	2.1	3.3	4.5	3.3	14.5
2.0	3.5	0.6	1.0	10	14	75
-0.3	-1.0	2.23	3.60	-1.5	90	200
-0.6	-1.1	18	45	-1.5	130	190
-0.4	-1.0	11	44	-1.2	175	251
-1.1	-1.7	14	32	-2.5	65	175
-0.5	-1.5	2.4	4.0	-2.5	60	150
-1.1	-1.8	3.3	4.2	-4	85	85
-0.8	-2.5	20	50	-4	150	130
-2.0	-3.5	1.3	2.0	-10	14	100

\*: New product

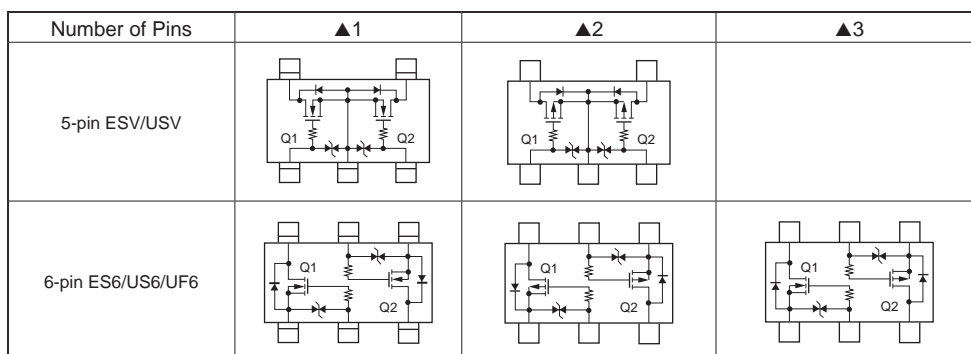
## Small-Signal MOSFETs (Dual Type)

Polarity	Absolute Maximum Ratings			Package					Internal FETs	V <sub>th</sub> (V)		R <sub>on</sub> (Ω)		@V <sub>GS</sub> (V)
	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (mA)	ESV	ES6	USV	US6	UF6		Min	Max	Typ.	Max	
				(mm)	(mm)	(mm)	(mm)	(mm)						
Nch x 2	20	±10	100	SSM5N16FE ▲1		SSM5N16FU ▲1			SSM3K16FU x 2	0.6	1.1	5.2	15	1.5
	20	±10	250		SSM6N37FE ▲1		SSM6N37FU ▲1 *		SSM3K37MFV x 2	0.35	1.0	3.07	5.6	1.5
	20	±10	180		SSM6N35FE ▲1		SSM6N35FU ▲1		SSM3K35MFV x 2	0.4	1.0	5	20	1.2
	20	±10	500		SSM6N36FE ▲1			SSM6N36TU ▲1	SSM3K36TU x 2	0.35	1.0	0.95	1.52	1.5
	20	±10	500					SSM6N43FU ▲1	SSM3K43FS x 2	0.35	1.0	0.95	1.52	1.5
	30	±20	100	SSM5N15FE ▲1		SSM5N15FU ▲1			SSM3K15FU x 2	0.8	1.5	4	7	2.5
	30	±20	100		SSM6N15AFE ▲1 *		SSM6N15AFU ▲1 *		SSM3K15AMFV x 2	0.8	1.5	3.5	6.0	2.5
	30	±20	100		SSM6N44FE ▲1		SSM6N44FU ▲1		SSM3K44FS x 2	0.8	1.5	4.0	7.0	2.5
	30	±20	400					SSM6N09FU ▲1	SSM3K09FU x 2	1.1	1.8	0.8	1.2	4
Pch x 2	50	±7	100					SSM6N17FU ▲1	SSM3K17FU x 2	0.9	1.5	22	40	2.5
	60	±20	200		SSM6N7002BFE ▲1 *		SSM6N7002BFU ▲1 *		SSM3K7002BF x 2	1.5	3.1	2.1	3.3	4.5
	-20	±10	-100	SSM5P16FE ▲2	SSM6P16FE ▲2	SSM5P16FU ▲2	SSM6P16FU ▲2		SSM3J16FU x 2	-0.6	-1.1	18	45	-1.5
	-20	±10	-100		SSM6P35FE ▲2		SSM6P35FU ▲2		SSM3J35FU x 2	-0.4	-1.0	11	44	-1.2
	-20	±8	-330		SSM6P36FE ▲2 *			SSM6P36TU ▲2 *	SSM3J36TU x 2	-0.3	-1.0	2.23	3.6	-1.5
Nch + Pch	-30	±20	-200				SSM6P09FU ▲2		SSM3J09FU x 2	-1.1	-1.8	3.3	4.2	-4
	-30	±20	-100	SSM5P15FE ▲2	SSM6P15FE ▲2	SSM5P15FU ▲2	SSM6P15FU ▲2		SSM3J15FU x 2	-1.1	-1.7	14	32	-2.5
	20	±10	180		SSM6L35FE ▲3		SSM6L35FU ▲3		SSM3K35FU + SSM3J35FU	0.4	1.0	5	20	1.2
	-20	±10	-100							-0.4	-1.0	11	4.4	-1.2
	20	±10	500		SSM6L36FE ▲3 *			SSM6L36TU ▲3 *	SSM3K36TU + SSM3J36TU	0.35	1.0	0.95	1.52	1.5
30	±20	400				SSM6L09FU ▲3		SSM3K09FU	1.1	1.8	0.8	1.2	4	
-30	±20	-200						SSM3J09FU	-1.1	-1.8	3.3	4.2	-4	

\* Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

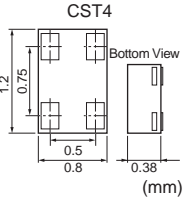
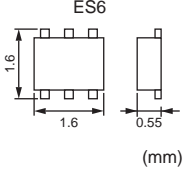
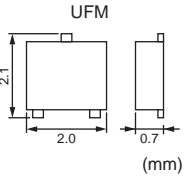
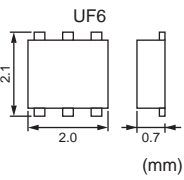
\*: New product

### ◆ Internal Connections



◆ The internal connection diagrams only show the general configurations of the circuits.

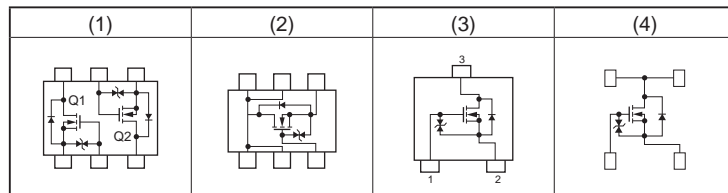
Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60 \text{ V}$ )  
(Nch MOSFET)

Package	Polarity	Part Number	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$P_D$ (W)	$R_{DS(ON)}$ Max ( $m\Omega$ )				$C_{iss}$ (pF)	$Q_g(nc)$ (typ.)	Internal FETs	Internal Connections
							$V_{GS} = 1.5 \text{ V}$	$V_{GS} = 1.8 \text{ V}$	$V_{GS} = 2.5 \text{ V}$	$V_{GS} = 4.0 \text{ V}$				
	Nch	SSM4K27CT	20	$\pm 12$	0.5	0.4	—	390	260	205	174	—	—	(4)
	Nch	SSM6K211FE	20	$\pm 10$	3.2	0.5	118	82	59	47(@4.5 V)	510	10.8	—	(2)
		SSM6K202FE	30	$\pm 12$	2.3	0.5	—	145	101	85	270	—	—	(2)
		SSM6K204FE	20	$\pm 10$	2.0	0.5	307	214	164	126	195	3.4	—	(2)
		SSM6K208FE	30	$\pm 12$	1.9	0.5	—	296	177	133	123	1.9	—	(2)
		SSM6K210FE	30	$\pm 20$	1.4	0.5	—	—	—	371	57	2.8	—	(2)
	Nch x 2	SSM6K30FE	20	$\pm 20$	1.2	0.5	—	—	—	420	60	—	—	(2)
	Nch	SSM6N42FE *	20	$\pm 10$	0.8	0.15	600	450	330	240(@4.5 V)	90	2	—	(1)
		SSM3K123TU	20	$\pm 10$	4.2	0.5	66	43	32	28	1010	13.6	—	(3)
		SSM3K121TU	20	$\pm 10$	3.2	0.5	140	93	63	48	400	5.9	—	(3)
		SSM3K119TU	30	$\pm 12$	2.5	0.5	—	134	90	74	270	—	—	(3)
		SSM3K116TU	30	$\pm 12$	2.2	0.5	—	—	135	100(@4.5 V)	245	—	—	(3)
		SSM3K122TU	20	$\pm 10$	2.0	0.5	304	211	161	123	195	3.4	—	(3)
		SSM3K127TU	30	$\pm 12$	2.0	0.5	—	286	167	123	123	1.5	—	(3)
		SSM3K131TU	30	$\pm 20$	6.0	0.5	—	—	—	41.5(@4.5 V)	450	10.1	—	(3)
		SSM3K124TU	30	$\pm 20$	2.4	0.5	—	—	—	120	180	—	—	(3)
SSM3K106TU	20	$\pm 20$	1.2	0.5	—	—	—	530	36	—	—	(3)		
	Nch	SSM6K403TU	20	$\pm 10$	4.2	0.5	66	43	32	28	1050	16.8	—	(2)
		SSM6K411TU *	20	$\pm 12$	10	0.5	—	—	23.8	12(@4.5 V)	710	9.2	—	(2)
		SSM6K404TU	20	$\pm 10$	3.0	0.5	147	100	70	55	400	5.9	—	(2)
		SSM6K405TU	20	$\pm 10$	2.0	0.5	307	214	164	126	195	3.4	—	(2)
		SSM6K406TU	30	$\pm 20$	4.4	0.5	—	—	—	38.5(@4.5 V)	490	12.4	—	(2)
		SSM6K407TU	60	$\pm 20$	2.0	0.5	—	—	—	440	150	6	—	(2)
	Nch x 2	SSM6N39TU	20	$\pm 10$	1.6	0.5	247	190	139	119	260	7.5	—	(1)
		SSM6N24TU	30	$\pm 12$	0.5	0.5	—	—	180	145(@4.5 V)	245	—	SSM6K24FE x 2	(1)
		SSM6N40TU	30	$\pm 20$	1.6	0.5	—	—	—	182	180	5.1	—	(1)

\* Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

\*: New product

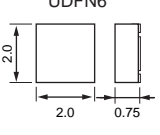
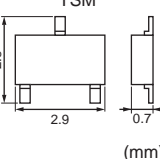
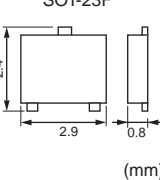
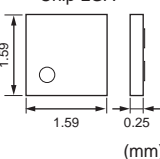
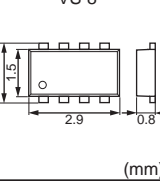
◆ Internal Connections



Note: Some MOSFETs do not have a Zener diode between gate and source.

◆ The internal connection diagrams only show the general configurations of the circuits.

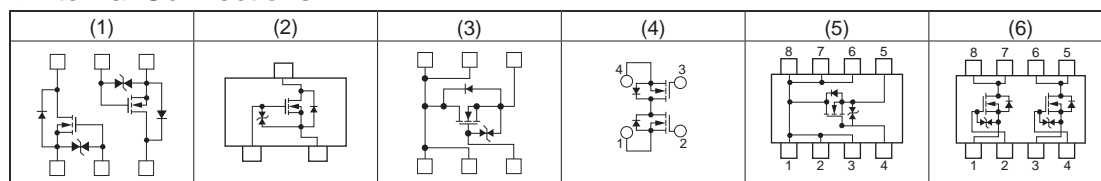
Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60$  V)  
(Nch MOSFET) (Continued)

Package	Polarity	Part Number	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$P_D$ (W)	$R_{DS(ON)}$ Max ( $m\Omega$ )							$C_{iss}$ (pF)	$Q_g$ (nC) (typ.)	Internal Connections
							$V_{GS} =$ 1.5 V	$V_{GS} =$ 1.8 V	$V_{GS} =$ 2.0 V	$V_{GS} =$ 2.5 V	$V_{GS} =$ 4 V	$V_{GS} =$ 4.5 V	$V_{GS} =$ 10 V			
 UDFN6 (mm)	Nch	SSM6K504NU *	30	$\pm 20$	9	2	—	—	—	—	—	26	19.5	620	4.8	(3)
	Nch x 2	SSM6N55NU *	30	$\pm 20$	4	2	—	—	—	—	—	64	43	270	2.5	(1)
 TSM (mm)	Nch	SSM3K310T	20	$\pm 10$	5.0	0.7	66	43	—	32	28	—	—	1120	14.8	(2)
		SSM3K309T	20	$\pm 12$	4.7	0.7	—	47	—	35	31	—	—	1020	—	(2)
		SSM3K301T	20	$\pm 12$	3.5	0.7	—	110	—	74	56	—	—	320	4.8	(2)
		SSM3K316T	30	$\pm 12$	4.0	1.25	—	131	—	87	—	65	53	270	4.3	(2)
		SSM3K320T	30	$\pm 20$	4.2	1.4	—	—	—	—	—	77	50	190	4.6	(2)
		SSM3K318T *	60	$\pm 20$	2.5	0.7	—	—	—	—	—	145	107	235	7	(2)
 SOT-23F (mm)	Nch	SSM3K329R *	30	$\pm 12$	3.5	2	—	289	—	170	—	126	—	123	1.5	(2)
		SSM3K333R *	30	$\pm 20$	6	2	—	—	—	—	—	42	28	436	3.4	(2)
		SSM3K335R *	30	$\pm 20$	6	2	—	—	—	—	—	56	38	340	2.7	(2)
		SSM3K336R *	30	$\pm 20$	3	2	—	—	—	—	—	140	95	126	1.7	(2)
 Chip LGA (mm)	Nch x 2	TPCL4201	20	$\pm 12$	6	1.65	—	—	—	52	33	31	—	720	11.5	(4)
		TPCL4203	24	$\pm 12$	6	1.65	—	—	—	55	38	36	—	685	10	(4)
		TPCL4202	30	$\pm 12$	6	1.65	—	—	—	64	42	40	—	780	10	(4)
 VS-8 (mm)	Nch	TPCF8003	20	$\pm 12$	7	2.5	—	—	—	34	—	18	—	500	9.5	(5)
		TPCF8002	30	$\pm 20$	7	2.5	—	—	—	—	—	32	21	500	11.5	(5)
		TPCF8004	30	$\pm 20$	7	2.5	—	—	—	—	—	30	24	610	9	(5)
	Nch x 2	TPCF8201	20	$\pm 12$	3	1.35	—	—	100	66	—	49	—	590	7.5	(6)

\* Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

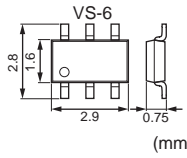
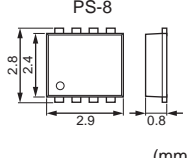
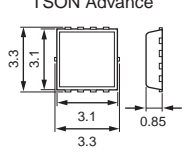
\*: New product

◆ Internal Connections



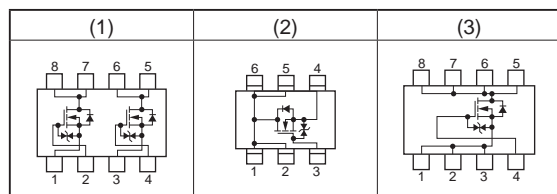
Note: Some MOSFETs do not have a Zener diode between gate and source.

◆ The internal connection diagrams only show the general configurations of the circuits.

Package	Polarity	Part Number	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)					Q <sub>g</sub> (nC) (typ.)	Internal Connections
							V <sub>GS</sub> = 2.0 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 4 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V		
 (mm)	Nch	TPC6012	20	±12	6	2.2	—	38	—	20	—	9	(2)
		TPC6008-H	30	±20	5.9	2.2	—	—	—	74	60	4.8	(2)
		TPC6067	30	±20	6	2.2	—	—	—	29	23	8	(2)
		TPC6011	30	±20	6	2.2	—	—	—	32	20	14	(2)
		TPC6009-H	40	±20	5.3	2.2	—	—	—	98	81	4.7	(2)
		TPC6010-H	60	±20	6.1	2.2	—	—	—	63	59	12	(2)
 (mm)	Nch	TPCP8006	20	±12	9.1	1.68	—	13.7	—	10	—	22	(3)
		TPCP8008-H	30	±20	8	1.68	—	—	—	23	20	14.7	(3)
		TPCP8004	30	±20	8.3	1.68	—	—	—	14	8.5	26	(3)
		TPCP8005-H	30	±20	11	1.68	—	—	—	15.7	12.9	20	(3)
		TPCP8009	40	±20	10	2.01	—	—	—	—	11.9	25.1	(3)
		TPCP8010	40	±20	6	1.96	—	—	—	—	24.8	13.1	(3)
		TPCP8011	40	±20	5	1.96	—	—	—	—	33.2	11.8	(3)
		TPCP8207	40	±20	5	1.77	—	—	—	—	37.8	11.8	(1)
		TPCP8007-H	60	±20	5	1.68	—	—	—	64	57	11	(3)
	Nch x 2	TPCP8206	20	±12	6	1.48	—	35	—	24	—	5.8	(1)
		TPCP8204	30	±20	4.2	1.48	—	—	—	77	50	4.6	(1)
TPCP8205-H		30	±20	6.5	1.48	—	—	—	29	26	13.8	(1)	
 (mm)	Nch	TPCC8093	20	±12	21	30	—	9.5	—	5.8	—	16	(3)
		TPCC8007	20	±12	27	30	—	8.7	—	4.6	—	26	(3)
		TPCC8061-H	30	±20	8	15	—	—	—	29	26	11	(3)
		TPCC8067-H	30	±20	9	15	—	—	—	33	25	9.5	(3)
		TPCC8066-H	30	±20	11	17	—	—	—	19	15	15	(3)
		TPCC8003-H	30	±20	13	22	—	—	—	19.3	16.9	17	(3)
		TPCC8065-H	30	±20	13	18	—	—	—	14.5	11.4	20	(3)
		TPCC8068-H	30	±20	13	17	—	—	—	12	11.6	14	(3)
		TPCC8064-H	30	±20	19	30	—	—	—	10.6	8.2	23	(3)
		TPN6R303NC	30	±20	43	19	—	—	—	8.4	6.3	24	(3)
		TPCC8074	30	±20	20	30	—	—	—	8.5	6.3	25	(3)
		TPCC8006-H	30	±20	22	27	—	—	—	9.3	8	27	(3)
		TPN4R203NC	30	±20	54	22	—	—	—	6.4	4.2	24	(3)
		TPCC8009	30	±20	24	27	—	—	—	—	7	26	(3)
		TPCC8005-H	30	±20	26	30	—	—	—	7.4	6.4	35	(3)
		TPCC8062-H	30	±20	27	39	—	—	—	7.1	5.6	34	(3)
		TPCC8073	30	±20	27	39	—	—	—	5.9	4.5	37	(3)
		TPCC8008	30	±25	25	30	—	—	—	13	6.8	30	(3)
		TPCC8084	33	±20	21	32	—	—	—	9	6.7	27	(3)
		TPCC8076	33	±20	27	39	—	—	—	6.2	4.6	34	(3)
TPN2R503NC	30	±20	85	35	—	—	—	4.1	2.5	40	(3)		

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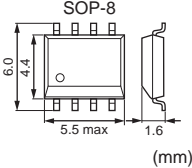
## ◆Internal Connections



Note: Some MOSFETs do not have a Zener diode between gate and source.

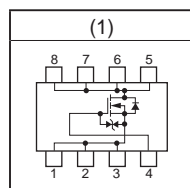
◆The internal connection diagrams only show the general configurations of the circuits.

Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60 \text{ V}$ )  
(Nch MOSFET) (Continued)

Package	Polarity	Part Number	$V_{DSS}(V)$	$V_{GS}(V)$	$I_D(A)$	$P_D(W)$	$R_{DS(ON)} \text{ Max (m}\Omega\text{)}$					$Q_g(nC)$ (typ.)	Internal Connections
							$V_{GS} = 2.0 \text{ V}$	$V_{GS} = 2.5 \text{ V}$	$V_{GS} = 4 \text{ V}$	$V_{GS} = 4.5 \text{ V}$	$V_{GS} = 10 \text{ V}$		
	Nch	TPC8061-H	30	$\pm 20$	8	1.9	—	—	—	29	26	11	(1)
		TPC8067-H	30	$\pm 20$	9	1.9	—	—	—	33	25	9.5	(1)
		TPC8066-H	30	$\pm 20$	11	1.9	—	—	—	19	16	15	(1)
		TPC8037-H	30	$\pm 20$	12	1.9	—	—	—	13.9	11.4	21	(1)
		TPC8038-H	30	$\pm 20$	12	1.9	—	—	—	13.9	11.4	21	(1)
		TPC8065-H	30	$\pm 20$	13	1.9	—	—	—	14.7	11.6	20	(1)
		TPC8040-H	30	$\pm 20$	13	1.9	—	—	—	11.1	9.7	24	(1)
		TPC8064-H	30	$\pm 20$	16	1.9	—	—	—	10.8	8.4	23	(1)
		TPC8063-H	30	$\pm 20$	17	1.9	—	—	—	8.9	7	27	(1)
		TPC8039-H	30	$\pm 20$	17	1.9	—	—	—	6.9	6	36	(1)
		TPC8062-H	30	$\pm 20$	18	1.9	—	—	—	7.3	5.8	34	(1)
		TPC8036-H	30	$\pm 20$	18	1.9	—	—	—	5.1	4.5	49	(1)
		TPC8059-H	30	$\pm 20$	18	1.9	—	—	—	5	4	41	(1)
		TPC8060-H	30	$\pm 20$	18	1.9	—	—	—	4.2	3.7	65	(1)
		TPC8058-H	30	$\pm 20$	18	1.9	—	—	—	4	3.2	51	(1)
		TPC8057-H	30	$\pm 20$	18	1.9	—	—	—	3.4	2.8	61	(1)
		TPC8056-H	30	$\pm 20$	18	1.9	—	—	—	2.9	2.4	74	(1)
		TPC8055-H	30	$\pm 20$	18	1.9	—	—	—	2.5	2.1	91	(1)
		TPC8041	30	$\pm 20$	13	1.9	—	—	—	13.5	7	27	(1)
		TPC8092	30	$\pm 20$	15	1.9	—	—	—	11.1	9	25	(1)
		TPC8074	30	$\pm 20$	17	1.9	—	—	—	8.7	6.5	25	(1)
		TPC8086	30	$\pm 20$	17	1.9	—	—	—	8.5	6.4	26	(1)
		TPC8073	30	$\pm 20$	18	1.9	—	—	—	6.1	4.7	37	(1)
		TPC8085	30	$\pm 20$	18	1.9	—	—	—	6.1	4.7	37	(1)
		TPC8028	30	$\pm 20$	18	1.9	—	—	—	8	4.3	45	(1)
		TPC8082	30	$\pm 20$	18	1.9	—	—	—	5	4	41	(1)
		TPC8029	30	$\pm 20$	18	1.9	—	—	—	7	3.8	49	(1)
		TPC8042	30	$\pm 20$	18	1.9	—	—	—	6.5	3.4	56	(1)
		TPC8081	30	$\pm 20$	18	1.9	—	—	—	4	3.2	51	(1)
		TPC8080	30	$\pm 20$	18	1.9	—	—	—	3.4	2.8	61	(1)
		TPC8027	30	$\pm 20$	18	1.9	—	—	—	5.5	2.7	113	(1)
		TPC8088	30	$\pm 20$	18	1.9	—	—	—	2.9	2.4	74	(1)
		TPC8087	30	$\pm 20$	18	1.9	—	—	—	2.5	2.1	91	(1)
		TPC8084	33	$\pm 20$	17	1.9	—	—	—	9.2	6.9	27	(1)
		TPC8076	33	$\pm 20$	18	1.9	—	—	—	6.5	4.9	34	(1)
		TPC8075	33	$\pm 20$	18	1.9	—	—	—	3.3	2.6	70	(1)
		TPC8078	33	$\pm 20$	18	1.9	—	—	—	2.8	2.2	90	(1)
		TPC8052-H	40	$\pm 20$	12	1.9	—	—	—	13.3	11.5	25	(1)
		TPC8047-H	40	$\pm 20$	16	1.9	—	—	—	8.8	7.6	43	(1)
		TPC8046-H	40	$\pm 20$	18	1.9	—	—	—	6.6	5.7	57	(1)
TPC8045-H	40	$\pm 20$	18	1.9	—	—	—	4.4	3.9	90	(1)		
TPC8053-H	60	$\pm 20$	9	1.9	—	—	—	24.2	22.5	25	(1)		
TPC8050-H	60	$\pm 20$	11	1.9	—	—	—	15.6	14.5	41	(1)		
TPC8049-H	60	$\pm 20$	13	1.9	—	—	—	11.5	10.7	56	(1)		
TPC8048-H	60	$\pm 20$	16	1.9	—	—	—	7.4	6.9	87	(1)		

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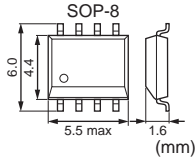
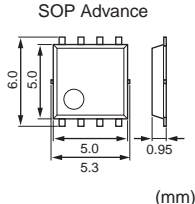
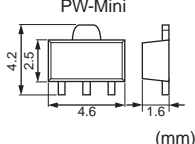
◆ Internal Connections



Note: Some MOSFETs do not have a Zener diode between gate and source.

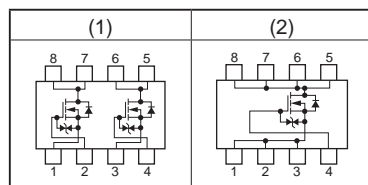
◆ The internal connection diagrams only show the general configurations of the circuits.



Package	Polarity	Part Number	V <sub>bss</sub> (V)	V <sub>gss</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> (nC) (typ.)	Internal Connections
							V <sub>GS</sub> = 2.0 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 4 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 6.5 V	V <sub>GS</sub> = 10 V		
	Nch x 2	TPC8221-H	30	±20	6	1.5	—	—	—	29	—	25	12	(1)
		TPC8224-H	30	±20	8	1.6	—	—	—	34	—	26	9.5	(1)
		TPC8223-H	30	±20	9	1.5	—	—	—	21	—	17	17	(1)
	Nch	TPCA8068-H	30	±20	15	21	—	—	—	—	16	11.6	14	(2)
		TPCA8065-H	30	±20	16	25	—	—	—	14.5	—	11.4	20	(2)
		TPCA8063-H	30	±20	22	35	—	—	—	8.7	—	6.8	27	(2)
		TPCA8040-H	30	±20	23	30	—	—	—	10.8	—	9.4	23	(2)
		TPCA8030-H	30	±20	24	30	—	—	—	13.4	—	11	21	(2)
		TPCA8031-H	30	±20	24	30	—	—	—	13.4	—	11	21	(2)
		TPCA8064-H	30	±20	20	32	—	—	—	10.6	—	8.2	23	(2)
		TPCA8062-H	30	±20	28	42	—	—	—	7.1	—	5.6	34	(2)
		TPCA8059-H	30	±20	32	45	—	—	—	4.8	—	3.8	41	(2)
		TPCA8039-H	30	±20	34	45	—	—	—	6.6	—	5.7	36	(2)
		TPCA8058-H	30	±20	38	52	—	—	—	3.8	—	3	51	(2)
		TPCA8036-H	30	±20	38	45	—	—	—	4.8	—	4.2	50	(2)
		TPCA8057-H	30	±20	42	57	—	—	—	3.2	—	2.6	61	(2)
		TPCA8060-H	30	±20	45	45	—	—	—	3.9	—	3.4	66	(2)
		TPCA8056-H	30	±20	48	63	—	—	—	2.7	—	2.2	74	(2)
		TPCA8028-H	30	±20	50	45	—	—	—	3.2	—	2.8	88	(2)
		TPCA8055-H	30	±20	56	70	—	—	—	2.3	—	1.9	91	(2)
		TPCA8082	30	±20	32	45	—	—	—	4.8	—	3.8	41	(2)
		TPCA8024	30	±20	35	45	—	—	—	7.8	—	4.3	45	(2)
		TPCA8081	30	±20	38	52	—	—	—	3.8	—	3	51	(2)
		TPCA8025	30	±20	40	45	—	—	—	6	—	3.5	49	(2)
		TPCA8080	30	±20	42	57	—	—	—	3.2	—	2.6	61	(2)
		TPCA8026	30	±20	45	45	—	—	—	4.5	—	2.2	113	(2)
		TPCA8042	30	±20	45	45	—	—	—	5.7	—	3.3	56	(2)
		TPCA8088	30	±20	48	63	—	—	—	2.7	—	2.2	74	(2)
		TPCA8087	30	±20	56	70	—	—	—	2.3	—	1.9	91	(2)
		TPCA8075	33	±20	48	63	—	—	—	3.1	—	2.4	70	(2)
		TPCA8078	33	±20	54	70	—	—	—	2.6	—	2.1	90	(2)
		TPCA8052-H	40	±20	20	30	—	—	—	13.1	—	11.3	25	(2)
		TPCA8047-H	40	±20	32	45	—	—	—	8.5	—	7.3	43	(2)
TPCA8046-H	40	±20	38	45	—	—	—	6.3	—	5.4	55	(2)		
TPCA8045-H	40	±20	46	45	—	—	—	4.1	—	3.6	90	(2)		
TPH14006NH	60	±20	34	32	—	—	—	—	33	14	16	(2)		
TPCA8053-H	60	±20	15	30	—	—	—	24	—	22.3	25	(2)		
TPH7R506NH	60	±20	55	45	—	—	—	—	19	7.5	31	(2)		
TPCA8050-H	60	±20	24	45	—	—	—	15.3	—	14.2	41	(2)		
TPCA8049-H	60	±20	28	45	—	—	—	11.2	—	10.4	55	(2)		
TPH5R906NH	60	±20	71	57	—	—	—	—	14	5.9	38	(2)		
TPH4R606NH	60	±20	85	63	—	—	—	—	11	4.6	49	(2)		
TPCA8048-H	60	±20	35	45	—	—	—	7.1	—	6.6	90	(2)		
	Nch	2SK2615	60	—	2	1.5	—	—	440	—	—	300	6	
		2SK3658	60	—	2	1.5	—	—	440	—	—	300	5	

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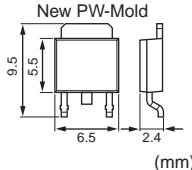
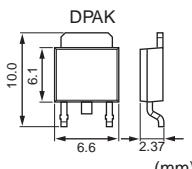
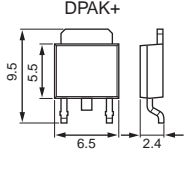
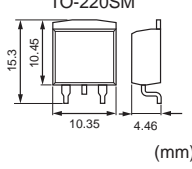
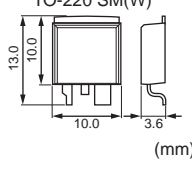
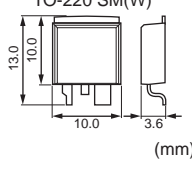
### ◆ Internal Connections



Note: Some MOSFETs do not have a Zener diode between gate and source.

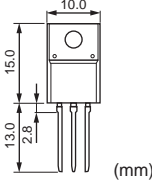
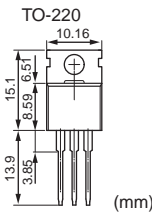
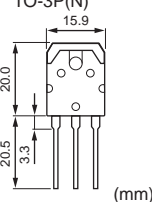
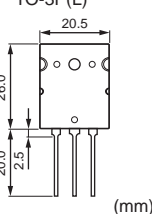
◆ The internal connection diagrams only show the general configurations of the circuits.

Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60 \text{ V}$ )  
(Nch MOSFET) (Continued)

Package	Polarity	Part Number	$V_{DSS}(V)$	$V_{GS}(V)$	$I_D(A)$	$P_D(W)$	$R_{DS(ON)} \text{ Max (m}\Omega\text{)}$						$Q_g(nC)$ (typ.)	Internal Connections
							$V_{GS} = 2.0 \text{ V}$	$V_{GS} = 2.5 \text{ V}$	$V_{GS} = 4 \text{ V}$	$V_{GS} = 4.5 \text{ V}$	$V_{GS} = 6 \text{ V}$	$V_{GS} = 10 \text{ V}$		
 New PW-Mold (mm)	Nch	2SK2493	16	—	5	20	—	120	100	—	—	—	23	
 DPAK (mm)	Nch	TK40P03M1	30	$\pm 20$	40	33	—	—	—	14.4	—	10.8	9.4	
		TK45P03M1	30	$\pm 20$	45	39	—	—	—	12	—	9.7	13	
		TK50P03M1	30	$\pm 20$	50	47	—	—	—	9.8	—	7.5	13.3	
		TK60P03M1	30	$\pm 20$	60	63	—	—	—	7.8	—	6.4	21	
		TK20P04M1	40	$\pm 20$	20	27	—	—	—	34	—	29	7.6	
		TK40P04M1	40	$\pm 20$	40	47	—	—	—	13.4	—	11	15	
 DPAK+ (mm)	Nch	TK50P04M1	40	$\pm 20$	50	60	—	—	—	10.2	—	8.7	20	
		TK10S04K3L	40	$\pm 20$	10	25	—	—	—	—	54	28	10	
		TK20S04K3L	40	$\pm 20$	20	38	—	—	—	—	26	14	18	
		TK35S04K3L	40	$\pm 20$	35	58	—	—	—	—	15	10.3	28	
		TK50S04K3L	40	$\pm 20$	50	68	—	—	—	—	10	5.4	42	
		TK65S04K3L	40	$\pm 20$	65	88	—	—	—	—	7.9	4.5	63	
 TO-220SM (mm)	Nch	TK80S04K3L	40	$\pm 20$	80	100	—	—	—	—	4.8	3.1	87	
		TK8S06K3L	60	$\pm 20$	8	25	—	—	—	—	80	54	10	
		TK20S06K3L	60	$\pm 20$	20	38	—	—	—	—	40	29	18	
		TK30S06K3L	60	$\pm 20$	30	58	—	—	—	—	30	18	28	
		TK45S06K3L	60	$\pm 20$	45	68	—	—	—	—	16.4	10.5	41	
		TK60S06K3L	60	$\pm 20$	60	88	—	—	—	—	12.3	8	60	
 TO-220 SM(W) (mm)	Nch	TK80S06K3L	60	$\pm 20$	80	100	—	—	—	—	7.8	5.5	85	
		TK80F04K3L	40	$\pm 20$	80	125	—	—	—	—	5.7	4.5	75	
		TK100F04K3	40	$\pm 20$	100	200	—	—	—	—	—	3	102	
		TK100F04K3L	40	$\pm 20$	100	200	—	—	—	—	4.5	3	105	
		TK150F04K3	40	$\pm 20$	150	300	—	—	—	—	—	2.1	166	
		TK150F04K3L	40	$\pm 20$	150	300	—	—	—	—	3.2	2.1	190	
 TO-220 SM(W) (mm)	Nch	TK80F06K3L	60	$\pm 20$	80	125	—	—	—	—	9.3	7.8	74	
		TK100F06K3	60	$\pm 20$	100	200	—	—	—	—	—	5	98	
		TK130F06K3	60	$\pm 20$	130	300	—	—	—	—	—	3.4	170	

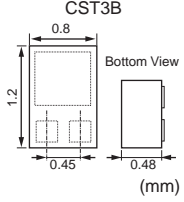
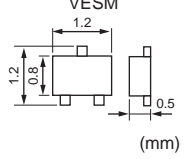
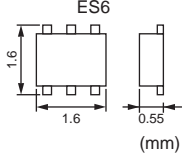
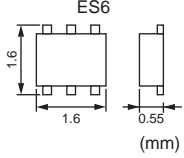
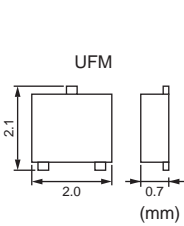
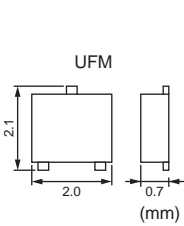
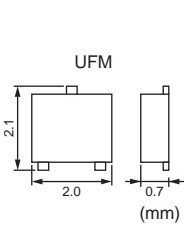
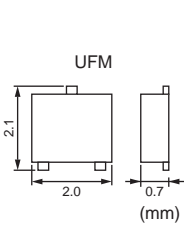
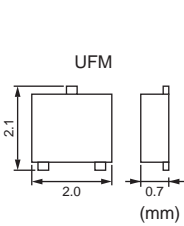
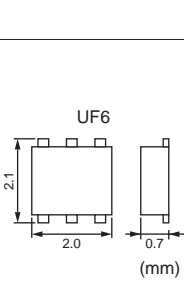
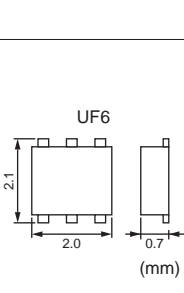
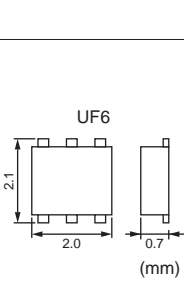
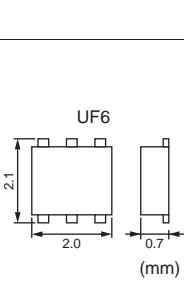
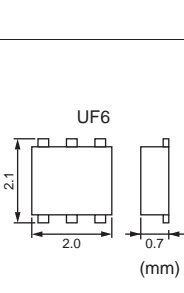
• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

\*\* : Under development

Package	Polarity	Part Number	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)					Q <sub>g</sub> (nC) (typ.)	Internal Connections
						V <sub>GS</sub> = 2.0 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 4 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V		
 <p>TO-220SIS (mm)</p>	Nch	TK50A04K3	40	50	42	—	—	—	—	3.5	102	
		TK30A06N1	60	43	25	—	—	—	—	15	16	
		TK40A06N1	60	60	30	—	—	—	—	10.4	23	
		TK75A06K3	60	75	35	—	—	—	—	5.5	85	
		TK58A06N1	60	105	35	—	—	—	—	5.4	46	
		TK100A06N1	60	263	45	—	—	—	—	2.7	140	
 <p>TO-220 (mm)</p>	Nch	TK25E06K3	60	25	60	—	—	—	—	18	29	
		TK30E06N1	60	43	53	—	—	—	—	15	16	
		TK50E06K3A	60	50	104	—	—	—	—	8.5	54	
		TK40E06N1	60	60	67	—	—	—	—	10.4	23	
		TK80E06K3A	60	80	125	—	—	—	—	5.8	90	
		TK58E06N1	60	105	110	—	—	—	—	5.4	46	
		TK100E06N1	60	263	255	—	—	—	—	2.3	140	
 <p>TO-3P(N) (mm)</p>	Nch	TK70J04K3Z	40	70	125	—	—	—	—	3.9	100	
		TK75J04K3Z	40	75	150	—	—	—	—	3.0	190	
		TK70J06K3	60	70	125	—	—	—	—	6	98	
 <p>TO-3P(L) (mm)</p>	Nch	2SK2267	60	60	150	—	—	15	—	11	170	

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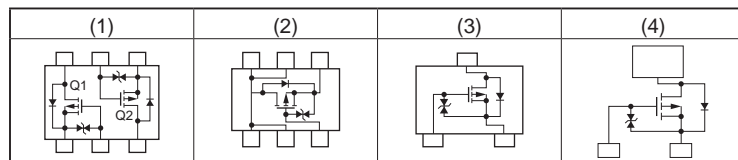
Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60 \text{ V}$ )  
(Pch MOSFET)

Package	Polarity	Part Number	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$R_{DS(ON)}$ Max ( $m\Omega$ )						$C_{iss}$ (pF)	Internal FETs	Internal Connections
						$V_{GS} =$ -1.2 V	$V_{GS} =$ -1.5 V	$V_{GS} =$ -1.8 V	$V_{GS} =$ -2.5 V	$V_{GS} =$ -4.0 V	$V_{GS} =$ -4.5 V			
	Pch	SSM3J46CTB *	-20	$\pm 8$	-2	—	250	178	133	—	103	290	—	(4)
		SSM3J56MFV *	-20	$\pm 8$	-0.8	4000	900	660	480	—	390	100	—	(3)
	Pch	SSM6J212FE *	-20	$\pm 8$	-4.0	—	94	65.4	49	—	40.7	970	—	(2)
		SSM6J215FE *	-20	$\pm 8$	-3.4	—	154	104	79	—	59	630	—	(2)
	Pch	SSM6J214FE *	-30	$\pm 12$	-3.6	—	—	149.6	77.6	—	57	560	—	(2)
		SSM6J213FE *	-20	$\pm 8$	-2.6	—	250	178	133	—	103	290	—	(2)
	Pch x 2	SSM6J207FE	-30	$\pm 20$	-1.4	—	—	—	—	491	—	137	—	(2)
		SSM6P41FE *	-20	$\pm 8$	-0.72	—	1040	670	440	—	300	110	—	(1)
	Pch	SSM3J132TU *	-12	$\pm 6$	-5.4	94	39	29	21	—	17	2700	—	(3)
		SSM3J130TU *	-20	$\pm 8$	-4.4	—	63.2	41.1	31.0	—	25.8	1800	—	(3)
	Pch	SSM3J129TU *	-20	$\pm 8$	-4.6	—	137	88	62	—	46	640	—	(3)
		SSM3J113TU	-20	$\pm 12$	-1.7	—	—	449 (@-2.0V)	249	169	—	370	—	(3)
	Pch	SSM3J133TU *	-20	$\pm 8$	-5.5	—	88.4	56.0	39.7	—	29.8	840	—	(3)
		SSM3J134TU *	-20	$\pm 8$	-3.2	—	240	168	123	—	93	290	—	(3)
	Pch	SSM3J135TU *	-20	$\pm 8$	-3.0	—	260	180	132	—	103	270	—	(3)
		SSM3J117TU	-30	$\pm 20$	-2.0	—	—	—	—	225	—	280	—	(3)
	Pch	SSM3J118TU	-30	$\pm 20$	-1.4	—	—	—	—	480	—	137	—	(3)
		SSM3J112TU	-30	$\pm 20$	-1.1	—	—	—	—	790	—	86	—	(3)
	Pch	SSM6J414TU *	-20	$\pm 8$	-6	—	54	36	26	—	22.5	1650	—	(2)
		SSM6J412TU *	-20	$\pm 8$	-4.0	—	99.6	67.8	51.4	—	42.7	840	—	(2)
	Pch	SSM6J50TU	-20	$\pm 10$	-2.5	—	—	205 (@-2.0V)	100	—	64	800	—	(2)
		SSM6J401TU	-30	$\pm 20$	-2.5	—	—	—	—	145	—	730	—	(2)
	Pch	SSM6J402TU	-30	$\pm 20$	-2.0	—	—	—	—	225	—	280	—	(2)
		SSM6J410TU *	-30	$\pm 20$	-2.1	—	—	—	—	393	—	120	—	(2)
	Pch x 2	SSM6P54TU	-20	$\pm 8$	-1.2	—	555	350	228	—	—	331	—	(1)
		SSM6P39TU	-20	$\pm 8$	-1.5	—	—	430	294	213	—	250	—	(1)
	Pch x 2	SSM6P25TU	-20	$\pm 12$	-0.5	—	—	—	430	260	—	218	SSM6J25FE x 2	(1)
		SSM6P40TU	-30	$\pm 20$	-1.4	—	—	—	—	403	—	120	—	(1)

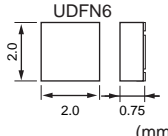
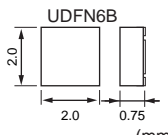
\* Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

\*: New product

◆ Internal Connections



◆ The internal connection diagrams only show the general configurations of the circuits.

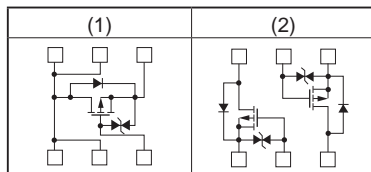
Package	Polarity	Part Number	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (mΩ)					C <sub>iss</sub> (pF)	Internal FETs	Internal Connections
						V <sub>GS</sub> = -1.2 V	V <sub>GS</sub> = -1.5 V	V <sub>GS</sub> = -1.8 V	V <sub>GS</sub> = -2.5 V	V <sub>GS</sub> = -4.5 V			
 UDFN6 2.0 2.0 0.75 (mm)	Pch x 2	SSM6P47NU *	-20	±8	-4	—	242	170	125	95	290	—	(2)
		SSM6P49NU *	-20	±12	-4	—	—	157	76	56	480	—	(2)
 UDFN6B 2.0 2.0 0.75 (mm)	Pch	SSM6J505NU **	-12	±6	-10	61	30	21	16	12	2700	—	(1)
		SSM6J501NU *	-20	±8	-10	—	43	26.5	19	15.3	2600	—	(1)
		SSM6J502NU *	-20	±8	-6	—	60.5	38.4	28.3	23.1	1800	—	(1)
		SSM6J503NU *	-20	±8	-6	—	89.6	57.9	41.7	32.4	840	—	(1)

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\*: New product

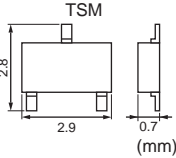
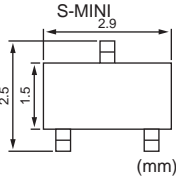
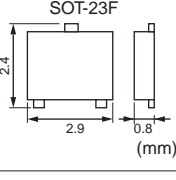
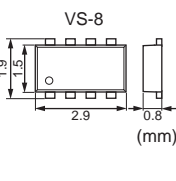
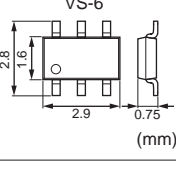
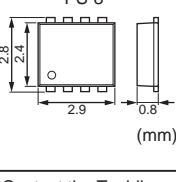
\*\* : Under development

### ◆ Internal Connections



◆ The internal connection diagrams only show the general configurations of the circuits.

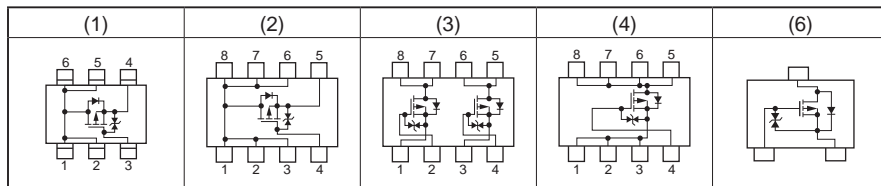
Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60$  V)  
(Pch MOSFET) (Continued)

Package	Polarity	Part Number	$V_{DSS}(V)$	$V_{GS}(V)$	$I_D(A)$	$P_D(W)$	$R_{DS(ON)}$ Max ( $m\Omega$ )								$C_{iss}$ (pF)	$Q_g(nC)$ (typ.)	Internal Connections
							$V_{GS} = -1.5V$	$V_{GS} = -1.8V$	$V_{GS} = -2.0V$	$V_{GS} = -2.5V$	$V_{GS} = -4V$	$V_{GS} = -4.5V$	$V_{GS} = -7V$	$V_{GS} = -10V$			
 TSM 2.8 2.9 0.7 (mm)	Pch	SSM3J326T *	-30	$\pm 12$	-5.6	1.25	—	115	—	62.5	—	45.7	—	650	9.3	(6)	
		SSM3J314T	-30	$\pm 20$	-3.5	0.7	—	—	—	—	100	—	—	—	505	11.5	(6)
		SSM3J306T	-30	$\pm 20$	-2.4	0.7	—	—	—	—	225	—	—	—	280	2.5	(6)
		SSM3J305T	-30	$\pm 20$	-1.7	0.7	—	—	—	—	477	—	—	—	137	1.3	(6)
 S-MINI 2.9 2.5 1.5 (mm)	Pch	SSM3J325F *	-20	$\pm 8$	-2	1.2	311	231	—	179	—	150	—	270	4.6	(6)	
 SOT-23F 2.4 2.9 0.8 (mm)	Pch	SSM3J328R *	-20	$\pm 8$	-6	2	88.4	56	—	39.7	—	29.8	—	840	12.8	(6)	
		SSM3J331R *	-20	$\pm 8$	-4	2	150	100	—	75	—	55	—	630	10.4	(6)	
		SSM3J327R *	-20	$\pm 8$	-3.9	2	240	168	—	123	—	93	—	290	4.6	(6)	
		SSM3J332R *	-30	$\pm 12$	-6	2	—	144	—	72	—	50	—	47	560	8.2	(6)
		SSM3J334R *	-30	$\pm 20$	-4	2	—	—	—	—	—	105	—	71	280	5.9	(6)
 VS-8 1.9 1.5 2.9 0.8 (mm)	Pch	TPCF8101	-12	$\pm 8$	-6	2.5	—	85	—	40	—	28	—	1600	18	(2)	
		TPCF8105	-20	$\pm 12$	-6	2.5	—	100	—	41	—	30	—	1100	17	(2)	
		TPCF8108	-20	$\pm 12$	-7	2.5	—	95	—	37	—	26	—	1320	19	(2)	
		TPCF8107	-30	-25/+20	-6	2.5	—	—	—	—	—	38	—	28	970	22	(2)
	Pch x 2	TPCF8305	-20	$\pm 12$	-4	1.35	—	265	160	83	—	58	—	680	9.2	(3)	
		TPCF8306	-30	-25/+20	-3.2	1.35	—	—	—	—	—	72	—	120	390	10	(3)
		TPCF8304	-30	$\pm 20$	-3.2	1.35	—	—	—	—	—	105	—	72	600	14	(3)
 VS-6 2.8 1.6 2.9 0.75 (mm)	Pch	TPC6103	-12	$\pm 8$	-5.5	2.2	—	90	—	55	—	35	—	1520	20	(1)	
		TPC6130	-20	$\pm 12$	-2.8	2.2	—	—	—	164	—	106	—	360	5.1	(1)	
		TPC6113	-20	$\pm 12$	-5	2.2	—	—	—	85	—	55	—	690	10	(1)	
		TPC6111	-20	$\pm 8$	-5.5	2.2	—	80	—	57	—	40	—	700	10	(1)	
		TPC6110	-30	-25/+20	-4.5	2.2	—	—	—	—	—	77	—	56	510	14	(1)
		TPC6109-H	-30	$\pm 20$	-5	2.2	—	—	—	—	—	83	—	59	490	12.3	(1)
		 PS-8 2.8 2.4 2.9 0.8 (mm)	Pch	TPCP8105	-20	$\pm 12$	-5.2	1.68	—	60	45	23	—	17	—	2280	28
TPCP8102	-20			$\pm 12$	-7.2	1.68	—	—	80	30	—	18	—	2560	33	(4)	
TPCP8106	-30			-25/+20	-7.2	1.68	—	—	—	—	—	44	—	33	870	19	(4)
TPCP8103-H	-40			$\pm 20$	-4.8	1.68	—	—	—	—	—	54	—	40	800	19	(4)
Pch x 2	TPCP8303		-20	$\pm 8$	-3.8	1.48	144	90	—	60	—	46	—	640	10	(3)	
	TPCP8306		-20	$\pm 12$	-4	1.48	—	265	160	83	—	58	—	680	9.2	(3)	
	TPCP8305		-20	$\pm 12$	-6	1.48	—	—	—	42	—	30	—	1500	21.5	(3)	

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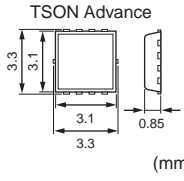
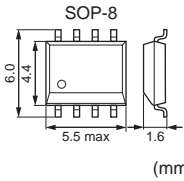
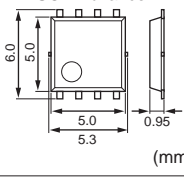
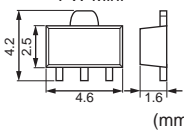
\*: New product

◆ Internal Connections



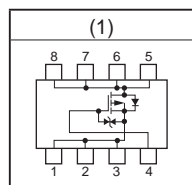
Note: Some MOSFETs do not have a Zener diode between gate and source.

◆ The internal connection diagrams only show the general configurations of the circuits.

Package	Polarity	Part Number	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> (nC) (typ.)	Internal Connections	
							V <sub>GS</sub> = -1.8 V	V <sub>GS</sub> = -2.0 V	V <sub>GS</sub> = -2.5 V	V <sub>GS</sub> = -4 V	V <sub>GS</sub> = -4.5 V	V <sub>GS</sub> = -7 V			V <sub>GS</sub> = -10 V
 (mm)	Pch	TPCC8136	-20	±12	-9.4	18	60	37	22	—	16	—	—	36	(1)
		TPCC8137	-20	±12	-13	30	52	30	16	—	10	—	—	43	(1)
		TPCC8138	-20	±12	-18	39	42	21	11	—	7.5	—	—	63	(1)
		TPCC8131	-30	-25/+20	-10	20	—	—	—	—	23	—	17.6	40	(1)
		TPCC8102	-30	±20	-15	26	—	—	—	33.2	—	—	18.9	26	(1)
		TPCC8103	-30	±20	-18	27	—	—	—	25	—	—	12	38	(1)
		TPCC8104	-30	-25/+20	-20	27	—	—	—	—	12.4	—	8.8	58	(1)
		TPCC8105	-30	-25/+20	-23	30	—	—	—	—	10.4	—	7.8	76	(1)
 (mm)	Pch	TPC8129	-30	-25/+20	-9	1.9	—	—	—	—	22	—	28	39	(1)
		TPC8119	-30	±20	-10	1.9	—	—	—	28	—	—	13	40	(1)
		TPC8125	-30	-25/+20	-10	1.9	—	—	—	—	17	—	13	64	(1)
		TPC8121	-30	±20	-10	1.9	—	—	—	24	—	—	12	42	(1)
		TPC8126	-30	-25/+20	-11	1.9	—	—	—	—	14	—	10	56	(1)
		TPC8123	-30	-25/+20	-11	1.9	—	—	—	—	12.5	—	9	68	(1)
		TPC8122	-30	±20	-12	1.9	—	—	—	16.5	—	—	8	62	(1)
		TPC8118	-30	±20	-13	1.9	—	—	—	15	—	—	7	65	(1)
		TPC8127	-30	-25/+20	-13	1.9	—	—	—	—	8.9	—	6.5	92	(1)
		TPC8128	-30	-25/+20	-16	1.9	—	—	—	—	6.9	—	5	115	(1)
		TPC8117	-30	±20	-18	1.9	—	—	—	7.9	—	—	3.9	130	(1)
		TPC8120	-30	-25/+20	-18	1.9	—	—	—	—	4.2	—	3.2	180	(1)
		TPC8134	-40	-25/+20	-5	1.9	—	—	—	—	66	—	52	20	(1)
		TPC8132	-40	-25/+20	-7	1.9	—	—	—	—	33	—	25	34	(1)
		TPC8133	-40	-25/+20	-9	1.9	—	—	—	—	18	—	15	64	(1)
		TPC8124	-40	-25/+20	-12	1.9	—	—	—	—	10	—	8	104	(1)
 (mm)	Pch	TPCA8105	-12	±8	-6	20	92	—	51	—	33	—	—	18	(1)
		TPCA8131	-30	-25/+20	-13	27	—	—	—	—	22	—	17	40	(1)
		TPCA8109	-30	-25/+20	-24	30	—	—	—	—	13	—	9	56	(1)
		TPCA8128	-30	-25/+20	-34	45	—	—	—	—	6.7	—	4.8	115	(1)
		TPCA8106	-30	±20	-40	45	—	—	—	7.8	—	—	3.7	130	(1)
		TPCA8120	-30	-25/+20	-45	45	—	—	—	—	4.0	—	3.0	190	(1)
 (mm)	Pch	2SJ360	-60	—	-1	1.5	—	—	—	1200	—	—	730	6.5	

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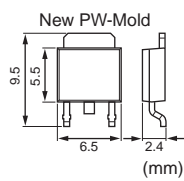
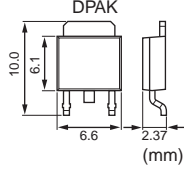
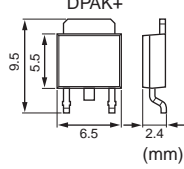
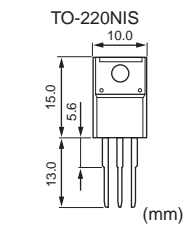
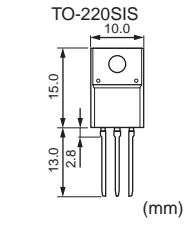
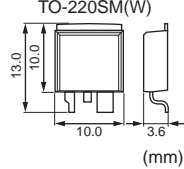
## ◆Internal Connections



Note: Some MOSFETs do not have a Zener diode between gate and source.

◆The internal connection diagrams only show the general configurations of the circuits.

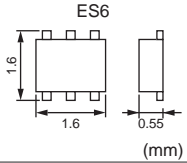
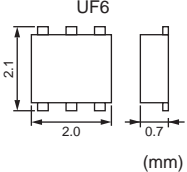
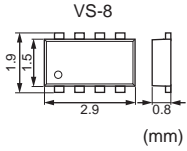
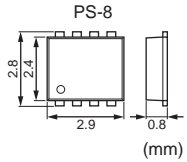
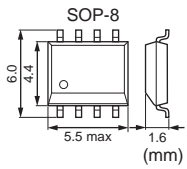
Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60 \text{ V}$ )  
(Pch MOSFET) (Continued)

Package	Polarity	Part Number	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$P_D$ (W)	$R_{DS(ON)}$ Max ( $m\Omega$ )								$Q_g$ (nC) (typ.)	Internal Connections	
							$V_{GS} =$ -1.8 V	$V_{GS} =$ -2.0 V	$V_{GS} =$ -2.5 V	$V_{GS} =$ -4 V	$V_{GS} =$ -4.5 V	$V_{GS} =$ -6 V	$V_{GS} =$ -7 V	$V_{GS} =$ -10 V			
	Pch	2SJ439	-16	$\pm 8$	-5	20	—	—	280	200	—	—	—	—	24		
	Pch	TJ15P04M3	-40	$\pm 20$	-15	29	—	—	—	—	48	—	—	36	26		
	Pch	TJ10S04M3L	-40	+10/-20	-10	27	—	—	—	—	—	62	—	44	19		
		TJ20S04M3L	-40	+10/-20	-20	41	—	—	—	—	—	32	—	22.2	37		
		TJ40S04M3L	-40	+10/-20	-40	68	—	—	—	—	—	13	—	9.1	83		
		TJ60S04M3L	-40	+10/-20	-60	90	—	—	—	—	—	9.4	—	6.3	125		
		TJ80S04M3L	-40	+10/-20	-80	100	—	—	—	—	—	7.9	—	5.2	158		
		TJ8S06M3L	-60	+10/-20	-8	27	—	—	—	—	—	130	—	104	19		
		TJ15S06M3L	-60	+10/-20	-15	41	—	—	—	—	—	63	—	50	36		
		TJ30S06M3L	-60	+10/-20	-30	68	—	—	—	—	—	28	—	21.8	80		
		TJ50S06M3L	-60	+10/-20	-50	90	—	—	—	—	—	17.4	—	13.8	124		
TJ60S06M3L	-60	+10/-20	-60	100	—	—	—	—	—	14.5	—	11.2	156				
	Pch	2SJ438	-60	$\pm 20$	-5	25	—	—	—	280	—	—	—	190	22		
	Pch	TJ70A06J3	-60	—	-70	54	—	—	—	—	10	—	—	8	246		
	Pch	TJ100F04M3L	-40	-100	250	—	—	—	—	—	—	5.4	—	3.6	250		
		TJ150F04M3L	-40	-150	300	—	—	—	—	—	—	—	4.2	—	2.8	390	
		TJ100F06M3L	-60	-100	250	—	—	—	—	—	—	—	10.7	—	7.1	250	
		TJ150F06M3L	-60	-150	300	—	—	—	—	—	—	—	6.1	—	5.6	420	

\* Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.



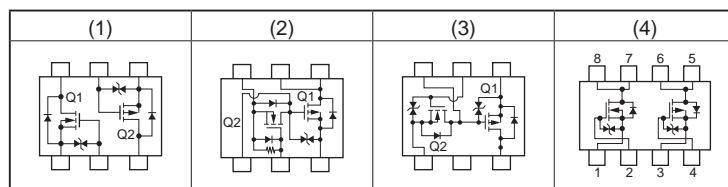
Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60 \text{ V}$ )  
(Complementary MOSFETs)

Package	Polarity	Part Number	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$R_{DS(ON)}$ Max ( $m\Omega$ )						$C_{iss}$ (pF)	$Q_g$ (nC) (typ.)	Internal FETs	Internal Connections	
						$ V_{GS}  = 1.5 \text{ V}$	$ V_{GS}  = 1.8 \text{ V}$	$ V_{GS}  = 2.5 \text{ V}$	$ V_{GS}  = 4.0 \text{ V}$	$ V_{GS}  = 4.5 \text{ V}$	$ V_{GS}  = 10 \text{ V}$					
 ES6 (mm)	Nch + Pch	SSM6L14FE *	20	$\pm 10$	0.8	600	450	330	—	240	—	90	2.0	SSM6N42FE	(1)	
			-20	$\pm 8$	-0.72	1040	670	440	—	300	—	110	1.76	SSM6P41FE	(1)	
 UF6 (mm)	Nch + Pch	SSM6L39TU	20	$\pm 10$	1.6	247	190	139	119	—	—	265	—	SSM6N39TU + SSM6P39TU	(1)	
			-20	$\pm 8$	-1.5	—	430	294	213	—	—	250	—	—	—	
		SSM6L12TU	30	$\pm 12$	0.5	—	—	180	145	—	—	245	—	—	SSM6K24FE + SSM6J25FE	(1)
			-20	$\pm 12$	-0.5	—	—	430	260	—	—	218	—	—	—	
		SSM6L40TU	30	$\pm 20$	1.6	—	—	—	182	—	—	180	—	—	SSM6N40TU + SSM6P40TU	(1)
			-30	$\pm 20$	-1.4	—	—	—	403	—	—	120	—	—	—	
SSM6E03TU	20	$\pm 10$	0.1	15 $\Omega$	—	4.0 $\Omega$	3.0 $\Omega$	—	—	9.3	—	—	SSM3K16FU	(3)		
	-20	$\pm 8$	-1.8	—	335	180	144	—	—	335	—	—	SSM3J109TU	(3)		
SSM6E01TU	20	$\pm 10$	0.05	—	—	10 $\Omega$	—	—	—	11	—	—	SSM3K04FE	(2)		
	-12	$\pm 12$	-1	—	—	240	160	—	—	310	—	—	—			
 VS-8 (mm)	Nch + Pch	TPCF8402	30	$\pm 20$	4	—	—	—	77	—	50	470	10	—	(4)	
			-30	$\pm 20$	-3.2	—	—	—	105	—	72	600	14	—	—	(4)
 PS-8 (mm)	Nch + Pch	TPCP8404	30	$\pm 20$	4	—	—	—	—	80	50	190	4.6	—	(4)	
			-30	$\pm 20$	-4	—	—	—	—	80	50	510	13	—	—	
		TPCP8403	40	$\pm 20$	4.7	—	—	—	—	60	40	770	16	—	—	(4)
			-40	$\pm 20$	-3.4	—	—	—	—	105	70	680	15	—	—	
TPCP8405	30	$\pm 20$	6.5	—	—	—	—	29	26	830	13.8	—	—	(4)		
	-30	$\pm 20$	-6	—	—	—	—	42	31.3	1075	24.1	—	—			
TPCP8406	40	$\pm 20$	6	—	—	—	—	36	32	850	13.7	—	—	(4)		
	-40	$\pm 20$	-5	—	—	—	—	53.4	43.2	1105	24.2	—	—			
 SOP-8 (mm)	Nch + Pch	TPC8407	30	$\pm 20$	9	—	—	—	—	21	17	1190	17	—	(4)	
			-30	$\pm 20$	-7.4	—	—	—	—	29	23	1650	39	—	—	
		TPC8408	40	$\pm 20$	6.1	—	—	—	—	36	32	850	14	—	—	(4)
			-40	$\pm 20$	-5.3	—	—	—	—	53	43	1105	24	—	—	

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

\*: New product

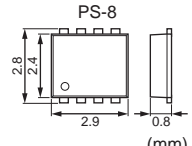
◆ Internal Connections



Note: Some MOSFETs do not have a Zener diode between gate and source.

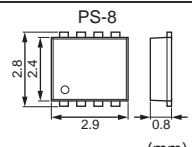
◆ The internal connection diagrams only show the general configurations of the circuits.

Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60 \text{ V}$ )  
(Load SW)

Package	Polarity	Part Number	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$P_D$ (W)	$R_{DS(ON)}$ Max ( $m\Omega$ )								Ciss (pF)	Qg(nC) (typ.)	Internal Connections
							$ V_{GS}  = 1.5 \text{ V}$	$ V_{GS}  = 1.8 \text{ V}$	$ V_{GS}  = 2.0 \text{ V}$	$ V_{GS}  = 2.5 \text{ V}$	$ V_{GS}  = 4 \text{ V}$	$ V_{GS}  = 4.5 \text{ V}$	$ V_{GS}  = 7 \text{ V}$	$ V_{GS}  = 10 \text{ V}$			
 PS-8 (mm)	Load SW	TPCP8401	-12	$\pm 8$	-5.5	1.96	—	103	—	58	—	38	—	—	1520	20	(1)

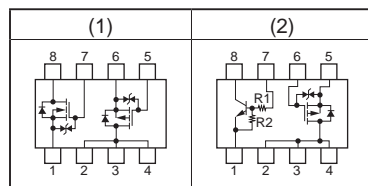
• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

(MOSFET + BipTr)

Package	Polarity	Part Number	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$P_D$ (W)	$R_{DS(ON)}$ Max ( $m\Omega$ )								Ciss (pF)	Qg(nC) (typ.)	Internal Connections
							$V_{GS} = -1.5 \text{ V}$	$V_{GS} = -1.8 \text{ V}$	$V_{GS} = -2.0 \text{ V}$	$V_{GS} = -2.5 \text{ V}$	$V_{GS} = -4 \text{ V}$	$V_{GS} = -4.5 \text{ V}$	$V_{GS} = -7 \text{ V}$	$V_{GS} = -10 \text{ V}$			
 PS-8 (mm)	Pch + BipTr	TPCP8J01	-32	$\pm 20$	-5.5	2.14	—	—	—	—	49	—	—	35	1760	34	(2)

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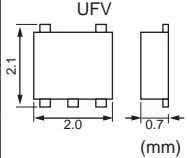
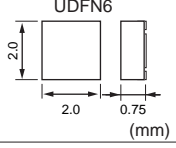
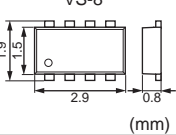
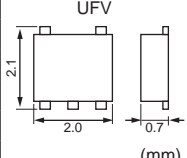
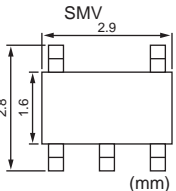
◆ Internal Connections



Note: Some MOSFETs do not have a Zener diode between gate and source.

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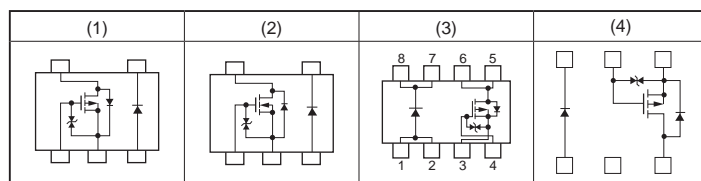
Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60 \text{ V}$ )  
(MOSFET + SBD)

Package	Polarity	Part Number	MOSFET										SBD				Qg(nC) (typ.)	Internal Connections			
			$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$P_D$ (W)	$R_{DS(ON)}$ Max ( $m\Omega$ )						$C_{iss}$ (pF)	$V_R$ (V)	$I_O$ (A)	$V_F$ Max (V)					
							$ V_{GS}  = 1.8 \text{ V}$	$ V_{GS}  = 2.0 \text{ V}$	$ V_{GS}  = 2.5 \text{ V}$	$ V_{GS}  = 4.0 \text{ V}$	$ V_{GS}  = 4.5 \text{ V}$	$ V_{GS}  = 10 \text{ V}$				$I_F = 1.0 \text{ A}$			$I_F = 0.5 \text{ A}$	$I_F = 0.3 \text{ A}$	$I_F = 0.1 \text{ A}$
 (mm)	Pch + SBD	SSM5G10TU	-20	$\pm 8$	-1.5	—	430	—	294	213	—	—	250	20	0.7	—	0.39	—	—	—	(1)
		SSM5G09TU	-12	$\pm 8$	-1.5	—	—	—	200	130	—	—	550	12	0.5	—	0.43	0.39	—	—	(1)
		SSM5G02TU	-12	$\pm 12$	-1	—	—	—	240	160	—	—	310	12	0.5	—	0.43	0.39	—	—	(1)
		SSM5G11TU	-30	$\pm 20$	-1.4	—	—	—	—	403	—	226	120	30	0.7	—	0.41	—	—	—	(1)
 (mm)	Pch + SBD	SSM6G18NU *	-20	$\pm 8$	-2	2	185	—	143	—	112	—	270	30	1	0.58	0.45	—	—	4.6	(4)
 (mm)		TPCF8B01	-20	$\pm 8$	-2.7	1.35	300	—	160	—	110	—	20	1	0.49	—	—	—	6	(3)	
 (mm)	Nch + SBD	SSM5H10TU	20	$\pm 10$	1.6	—	190	—	139	119	—	—	260	20	0.7	—	0.39	—	—	—	(2)
		SSM5H08TU	20	$\pm 12$	1.5	—	—	—	220	160	—	—	125	20	0.5	—	—	0.45	—	—	(2)
		SSM5H11TU	30	$\pm 20$	1.6	—	—	—	—	182	—	122	180	30	0.7	—	0.41	—	—	—	(2)
		SSM5H16TU	30	$\pm 12$	1.9	—	296	—	177	133	—	—	123	30	0.8	—	0.45	—	0.36	—	(2)
		SSM5H01TU	30	$\pm 20$	1.4	—	—	—	—	450	—	200	106	20	0.5	—	—	0.45	—	—	(2)
		SSM5H07TU	20	$\pm 20$	1.2	—	—	—	—	540	—	300	36	12	0.5	—	0.43	0.39	—	—	(2)
 (mm)		SSM5H14F	30	$\pm 12$	3	—	138	—	94	78	—	—	270	45	0.1	—	—	—	0.6	—	(2)

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\*: New product

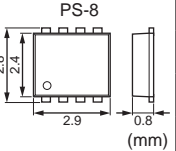
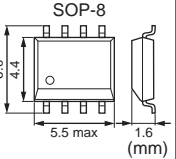
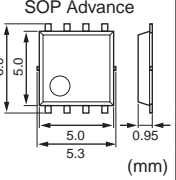
◆ Internal Connections



Note: Some MOSFETs do not have a Zener diode between gate and source.

◆ The internal connection diagrams only show the general configurations of the circuits.

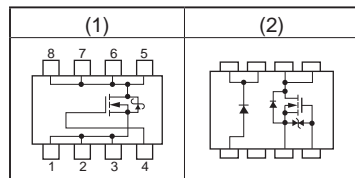
Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60$  V)  
(MOSFET + SBD) (Continued)

Package	Polarity	Part Number	MOSFET										SBD				Qg(nC) (typ.)	Internal Connections				
			V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)						C <sub>iss</sub> (pF)	V <sub>R</sub> (V)	I <sub>O</sub> (A)	V <sub>F</sub> Max (V)						
							V <sub>GS</sub>   = 1.8 V	V <sub>GS</sub>   = 2.0 V	V <sub>GS</sub>   = 2.5 V	V <sub>GS</sub>   = 4.0 V	V <sub>GS</sub>   = 4.5 V	V <sub>GS</sub>   = 10 V				I <sub>F</sub> = 1.0 A			I <sub>F</sub> = 0.5 A	I <sub>F</sub> = 0.3 A	I <sub>F</sub> = 0.1 A	
 PS-8 2.8, 2.4, 2.9, 0.8 (mm)	Nch + SBD	TPCP8AA1	20	±12	1.6	—	—	—	140	105	—	—	306	25	0.7	—	0.41	—	—	—	—	(2)
		TPCP8A05-H ◇	30	±20	8	1.68	—	—	—	—	21.9	17.5	1300	—	—	—	—	—	—	—	16	(1)
 SOP-8 6.0, 4.4, 5.5 max, 1.6 (mm)		TPC8A05-H ◇	30	±20	10	1.9	—	—	—	—	17.6	13.3	—	—	—	—	—	—	—	15	(1)	
		TPC8A06-H ◇	30	±20	12	1.9	—	—	—	—	12.9	10.1	1400	—	—	—	—	—	—	19	(1)	
 SOP Advance 6.0, 5.0, 5.0, 5.3, 0.95 (mm)		TPC8A03-H ◇	30	±20	17	1.9	—	—	—	—	7	5.6	—	—	—	—	—	—	—	36	(1)	
		TPC8A04-H ◇	30	±20	18	1.9	—	—	—	—	4.5	3.6	—	—	—	—	—	—	—	56	(1)	
		TPCA8A05-H ◇	30	±20	20	30	—	—	—	—	17.2	12.9	—	—	—	—	—	—	—	15	(1)	
		TPCA8A02-H ◇	30	±20	34	45	—	—	—	—	6.7	5.3	—	—	—	—	—	—	—	36	(1)	
		TPCA8A11-H ◇	30	±20	35	52	—	—	—	—	4.6	3.6	3200	—	—	—	—	—	—	46	(1)	
		TPCA8A10-H ◇	30	±20	40	58	—	—	—	—	3.8	3	4000	—	—	—	—	—	—	57	(1)	
TPCA8A09-H ◇	30	±20	51	70	—	—	—	—	2.8	2.3	5900	—	—	—	—	—	—	82	(1)			

◇: Monolithic

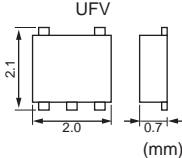
• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

◆Internal Connections



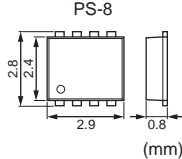
◆The internal connection diagrams only show the general configurations of the circuits.

Low Voltage Power MOSFETs ( $|V_{DSS}| \leq 60 \text{ V}$ )  
(MOSFET + Switching Diodes)

Package	Polarity	Part Number	MOSFET										Di				Qg(nC) (typ.)	Internal Connections			
			V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)						C <sub>iss</sub> (pF)	V <sub>R</sub> (V)	I <sub>O</sub> (A)	t <sub>rr</sub> (ns)			V <sub>F</sub> Max (V)		
							V <sub>GS</sub> = 1.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 4.0 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V							I <sub>F</sub> = 1 mA	I <sub>F</sub> = 10 mA	I <sub>F</sub> = 0.1 A
 UFV (mm)	N-ch + Switching diodes	SSM5H90TU	20	±10	2.4	—	157	110	80	65	—	—	400	80	0.1	1.6	—	—	1.2	—	(1)

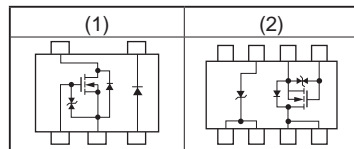
• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

(MOSFET + Zener Diodes)

Package	Polarity	Part Number	MOSFET										Ze-Di				Qg(nC) (typ.)	Internal Connections				
			V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)						C <sub>iss</sub> (pF)	V <sub>Z</sub> (V) @I <sub>Z</sub> (mA)	I <sub>R</sub> (μA) @V <sub>R</sub> (V)	V <sub>F</sub> Max (V)						
							V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 2.0 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 4.0 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V				I <sub>F</sub> = 1.0 A			I <sub>F</sub> = 0.5 A	I <sub>F</sub> = 0.3 A		
 PS-8 (mm)	N-ch + Zener diodes	TPCP8R01	60	±20	2.0	—	—	—	—	440	—	300	140	43	2	0.5	33	—	—	—	—	(2)

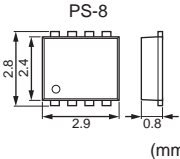
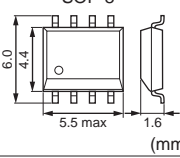
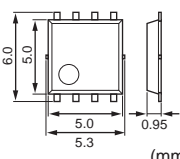
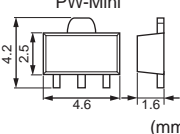
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◆ Internal Connections



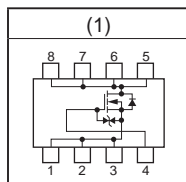
◆ The internal connection diagrams only show the general configurations of the circuits.

## Low Voltage Power MOSFETs (60 V < |V<sub>DSS</sub>| ≤ 300 V) (Nch MOSFET)

Package	Polarity	Part Number	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> (nC) (typ.)	Internal Connections		
							V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 2.0 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 4 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 7 V			V <sub>GS</sub> = 10 V	
 (mm)	Nch	TPCP8003-H	100	±20	2.2	1.68	—	—	—	—	190	—	180	7.5	(1)	
 (mm)	Nch	TPC8051-H	80	±20	13	1.9	—	—	—	—	10.1	—	9.7	85	(1)	
		TPC8012-H	200	±20	1.8	1.9	—	—	—	—	—	—	—	400	11	(1)
 (mm)	Nch	TPCA8051-H	80	±20	28	45	—	—	—	—	9.8	—	9.4	91	(1)	
		TPCA8006-H	100	±20	18	45	—	—	—	—	—	—	—	67	12	(1)
		TPCA8010-H	200	±20	5.5	45	—	—	—	—	—	—	—	450	10	(1)
		TPCA8008-H	250	±20	4	45	—	—	—	—	—	—	—	580	10	(1)
 (mm)	Nch	2SK2963	100	—	1	1.5	—	—	—	950	—	—	700	6.3		
		2SK2992	200	—	1	1.5	—	—	—	—	—	—	—	3500	3	

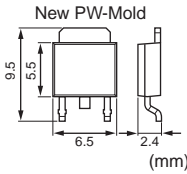
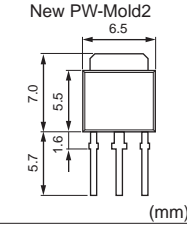
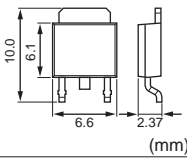
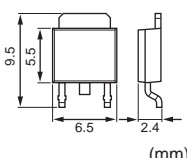
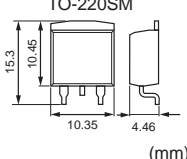
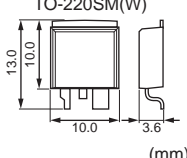
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### ◆Internal Connections



Note: Some MOSFETs do not have a Zener diode between gate and source.

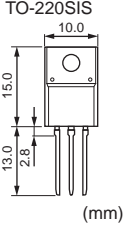
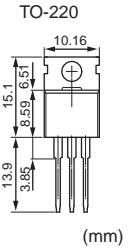
◆The internal connection diagrams only show the general configurations of the circuits.

Package	Polarity	Part Number	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)							Q <sub>g</sub> (nC) (typ.)	Internal Connections
						V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 2.0 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 4 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 6 V	V <sub>GS</sub> = 10 V		
 <p>New PW-Mold (mm)</p>	Nch	2SK2201	100	3	20	—	—	—	450	—	—	350	13.5	
		2SK2399	100	5	20	—	—	—	300	—	—	230	22	
		2SK3669	100	10	20	—	—	—	—	—	—	125	8.0	
		2SK3205	150	5	20	—	—	—	750	—	—	500	12	
		2SK2920	200	5	20	—	—	—	—	—	—	800	10	
		2SK3462	250	3	20	—	—	—	—	—	—	1700	12	
		2SK3342	250	4.5	20	—	—	—	—	—	—	1000	10	
 <p>New PW-Mold2 (mm)</p>	Nch	2SK4018	100	3	20	—	—	—	450	—	—	350	13.5	
		2SK4019	100	5	20	—	—	—	300	—	—	230	22	
		2SK4020	200	5	20	—	—	—	—	—	—	800	10	
		2SK4022	250	3	20	—	—	—	—	—	—	1700	12	
		2SK4021	250	4.5	20	—	—	—	—	—	—	1000	10	
 <p>DPAK (mm)</p>	Nch	TK8P25DA	250	7.5	55	—	—	—	—	—	500	16		
		TK13P25D	250	13	96	—	—	—	—	—	—	250	25	
 <p>DPAK+ (mm)</p>	Nch	TK40S10K3Z	100	40	93	—	—	—	—	—	18	61		
 <p>TO-220SM (mm)</p>	Nch	TK100G08N1 **	80	(224)	250	—	—	—	—	—	(2.8)	—		
		TK65G10N1 **	100	(151)	192	—	—	—	—	—	—	(4.5)	81	
		TK100G10N1 **	100	(212)	250	—	—	—	—	—	—	(3.1)	—	
		TK100G12N1 **	120	(181)	250	—	—	—	—	—	—	(4.1)	—	
 <p>TO-220SM(W) (mm)</p>	Nch	TK55F08K3L	75	55	125	—	—	—	—	—	12	10.2	67	
		TK60F08K3	75	60	150	—	—	—	—	—	—	8.5	75	
		TK80F08K3	75	80	300	—	—	—	—	—	—	4.3	175	

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\*\* : Under development

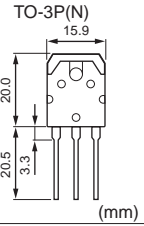
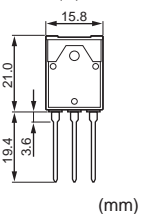
Low Voltage Power MOSFETs (60 V < |V<sub>DSS</sub>| ≤ 300 V)  
(Nch MOSFET) (Continued)

Package	Polarity	Part Number	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)							Q <sub>g</sub> (nC) (typ.)	Internal Connections
							V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 2.0 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 4 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 7 V	V <sub>GS</sub> = 10 V		
 <p>TO-220SIS (mm)</p>	Nch	TK40A08K3	75	±20	40	42	—	—	—	—	—	—	9	80	
		TK80A08K3	75	±20	80	40	—	—	—	—	—	—	4.5	175	
		TK35A08N1	80	±20	55	30	—	—	—	—	—	—	12.2	25	
		TK46A08N1	80	±20	80	35	—	—	—	—	—	—	8.4	37	
		TK72A08N1	80	±20	157	45	—	—	—	—	—	—	4.5	81	
		TK100A08N1	80	±20	214	45	—	—	—	—	—	—	3.2	130	
		TK8A10K3	100	±20	8	18	—	—	—	—	—	—	120	12.9	
		TK12A10K3	100	±20	12	20	—	—	—	—	—	—	80	18	
		TK22A10N1	100	±20	52	30	—	—	—	—	—	—	13.8	28	
		TK25A10K3	100	±20	25	25	—	—	—	—	—	—	40	34	
		TK34A10N1	100	±20	75	35	—	—	—	—	—	—	9.5	38	
		TK40A10J1	100	±20	40	40	—	—	—	—	17	—	15	76	
		TK40A10K3	100	±20	40	40	—	—	—	—	—	—	15	85	
		TK40A10N1	100	±20	90	35	—	—	—	—	—	—	8.2	49	
		TK65A10N1	100	±20	148	45	—	—	—	—	—	—	4.8	81	
		TK100A10N1	100	±20	207	45	—	—	—	—	—	—	3.8	140	
		TK32A12N1 **	120	±20	(58)	30	—	—	—	—	—	—	(14.5)	—	
		TK42A12N1 **	120	±20	(84)	35	—	—	—	—	—	—	(9.9)	—	
		TK56A12N1 **	120	±20	(109)	45	—	—	—	—	—	—	(7.8)	—	
		TK72A12N1 **	120	±20	(179)	45	—	—	—	—	—	—	(4.8)	—	
		TK9A20DA	200	±20	8.5	30	—	—	—	—	—	—	400	14	
		TK15A20D	200	±20	15	35	—	—	—	—	—	—	180	26	
		TK20A20D	200	±20	20	45	—	—	—	—	—	—	109	43	
		TK25A20D	200	±20	25	45	—	—	—	—	—	—	70	60	
		TK8A25DA	250	±20	7.5	30	—	—	—	—	—	—	500	16	
		TK13A25D	250	±20	13	35	—	—	—	—	—	—	250	25	
		TK17A25D	250	±20	17	45	—	—	—	—	—	—	150	43	
		TK20A25D	250	±20	20	45	—	—	—	—	—	—	100	55	
TK18A30D	300	±20	18	45	—	—	—	—	—	—	139	60			
 <p>TO-220 (mm)</p>	Nch	TK50E08K3	75	±20	50	104	—	—	—	—	—	12	55		
		TK60E08K3	75	±20	60	128	—	—	—	—	—	—	9	75	
		TK35E08N1	80	±20	55	72	—	—	—	—	—	—	12.2	25	
		TK46E08N1	80	±20	80	103	—	—	—	—	—	—	8.4	37	
		TK72E08N1	80	±20	157	192	—	—	—	—	—	—	4.3	81	
		TK100E08N1	80	±20	214	255	—	—	—	—	—	—	3.2	130	
		TK18E10K3	100	±20	18	71	—	—	—	—	—	—	42	33	
		TK22E10N1	100	±20	52	72	—	—	—	—	—	—	13.8	28	
		TK34E10N1	100	±20	75	103	—	—	—	—	—	—	9.5	38	
		TK40E10K3	100	±20	40	147	—	—	—	—	—	—	15	84	
		TK40E10N1	100	±20	90	126	—	—	—	—	—	—	8.2	49	
		TK65E10N1	100	±20	148	192	—	—	—	—	—	—	4.8	81	
		TK100E10N1	100	±20	207	255	—	—	—	—	—	—	3.4	140	
		TK32E12N1 **	120	±20	(58)	(96)	—	—	—	—	—	—	(14.5)	—	
		TK42E12N1 **	120	±20	(84)	(132)	—	—	—	—	—	—	(9.9)	—	
		TK56E12N1 **	120	±20	(109)	(166)	—	—	—	—	—	—	(7.4)	—	
		TK72E12N1 **	120	±20	(179)	255	—	—	—	—	—	—	(4.4)	—	
		TK13E25D	250	±20	13	102	—	—	—	—	—	—	250	25	

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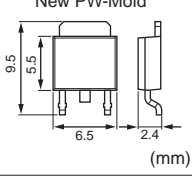
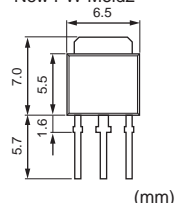
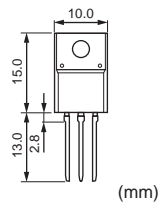
\*\* : Under development



Package	Polarity	Part Number	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (mΩ)							Q <sub>g</sub> (nC) (typ.)	Internal Connections
							V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 2.0 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 4 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 7 V	V <sub>GS</sub> = 10 V		
 TO-3P(N) (mm)	Nch	2SK3940	75	—	70	150	—	—	—	—	—	—	7	200	
		TK40J20D	200	±20	40	260	—	—	—	—	—	—	44	100	
		TK70J20D	200	±20	70	410	—	—	—	—	—	—	27	160	
		TK30J25D	250	±20	30	260	—	—	—	—	—	—	60	100	
		TK60J25D	250	±20	60	410	—	—	—	—	—	—	38	160	
		TK50J30D	300	±20	50	410	—	—	—	—	—	—	52	160	
 TO-3P(N)IS (mm)	Nch	2SK2995	250	—	30	90	—	—	—	—	—	—	68	132	

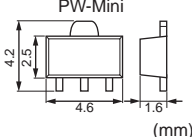
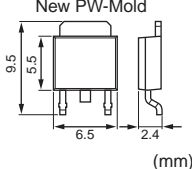
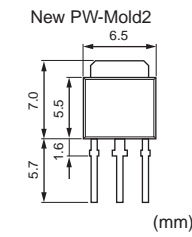
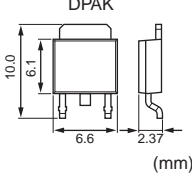
• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Low Voltage Power MOSFETs ( $60\text{ V} < |V_{DSS}| \leq 300\text{ V}$ )  
(Pch MOSFET)

Package	Polarity	Part Number	$V_{DSS}(V)$	$V_{GS}(V)$	$I_D(A)$	$P_D(W)$	$R_{DS(ON)} \text{ Max (m}\Omega\text{)}$						$Q_g(nC)$ (typ.)	Internal Connections		
							$V_{GS} = -1.8\text{ V}$	$V_{GS} = -2.0\text{ V}$	$V_{GS} = -2.5\text{ V}$	$V_{GS} = -4\text{ V}$	$V_{GS} = -4.5\text{ V}$	$V_{GS} = -7\text{ V}$			$V_{GS} = -10\text{ V}$	
 <p>New PW-Mold (mm)</p>	Pch	2SJ567	-200	—	-2.5	20	—	—	—	—	—	—	2000	10		
		2SJ610	-250	—	-2	20	—	—	—	—	—	—	—	2550	24	
 <p>New PW-Mold2 (mm)</p>	Pch	2SJ680	-200	—	-2.5	20	—	—	—	—	—	—	2000	10		
 <p>TO-220SIS (mm)</p>	Pch	TJ9A10M3	-100	$\pm 20$	-9	19	—	—	—	—	—	—	170	47		
		TJ11A10M3	-100	$\pm 20$	-11	24	—	—	—	—	—	—	—	130	69	
		TJ20A10M3	-100	$\pm 20$	-20	35	—	—	—	—	—	—	—	90	120	

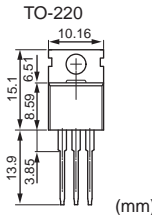
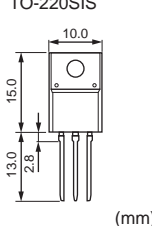
• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Middle-high Voltage Power MOSFETs (300 V < |V<sub>DSS</sub>| ≤ 700 V)  
(Nch MOSFET)

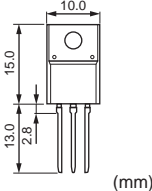
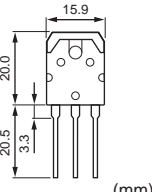
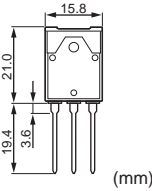
Package	Polarity	Part Number	V <sub>bss</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (Ω)	Q <sub>g</sub> (nC) (typ.)	Internal Connections
						V <sub>GS</sub> = 10 V		
 <p>PW-Mini (mm)</p>	Nch	2SK3471	500	0.5	1.5	18	3.8	
 <p>New PW-Mold (mm)</p>	Nch	TK2P60D	600	2	60	4.3	7	
 <p>New PW-Mold2 (mm)</p>	Nch	2SK4023	450	1	20	4.6	5	
		2SK4026	600	1	20	9.0	9	
		TK2Q60D	600	2	60	4.3	7	
		2SK4003	600	3	20	2.2	15	
		TK4Q60DA	600	3.5	80	2.2	11	
 <p>DPAK (mm)</p>	Nch	TK3P50D	500	3	60	3.0	7	
		TK4P50D	500	4	80	2.0	9	
		TK5P50D	500	5	80	1.5	11	
		TK7P50D	500	7	100	1.22	12	
		TK5P53D	525	5	80	1.5	11	
		TK6P53D	525	6	100	1.3	12	
		TK4P55DA	550	3.5	80	2.45	9	
		TK4P55D	550	4	80	1.88	11	
		TK4P60DA	600	3.5	80	1.7	11	
		TK4P60DB	600	3.7	80	2.0	11	

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Middle-high Voltage Power MOSFETs (300 V < |V<sub>DSS</sub>| ≤ 700 V)  
(Nch MOSFET) (Continued)

Package	Polarity	Part Number	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	R <sub>DS(ON)</sub> Max (Ω)	Q <sub>g</sub> (nC) (typ.)	Internal Connections
						V <sub>GS</sub> = 10 V		
	Nch	TK12E60U	600	12	144	0.4	14	
		TK15E60U	600	15	170	0.3	17	
		TK20E60U	600	20	190	0.19	27	
	Nch	TK5A45DA	450	4.5	30	1.75	9	
		TK6A45DA	450	5.5	35	1.35	11	
		TK7A45DA	450	6.5	35	1.2	11	
		TK8A45DA	450	7.5	35	1.1	12	
		TK8A45D	450	8	35	0.9	16	
		TK9A45D	450	9	40	0.77	16	
		TK11A45D	450	11	40	0.62	20	
		TK12A45D	450	12	45	0.52	24	
		TK13A45D	450	13	45	0.46	25	
		TK14A45DA	450	13.5	45	0.41	28	
		TK14A45D	450	14	45	0.34	38	
		TK16A45D	450	16	50	0.27	40	
		TK19A45D	450	19	50	0.25	45	
		TK4A50D	500	4	30	2.0	9	
		TK5A50D	500	5	35	1.5	11	
		TK6A50D	500	6	35	1.4	11	
		TK7A50D	500	7	35	1.22	12	
		TK8A50DA	500	7.5	35	1.04	16	
		TK8A50D	500	8	40	0.85	16	
		TK10A50D	500	10	45	0.72	20	
		TK11A50D	500	11	45	0.6	38	
		TK12A50D	500	12	45	0.52	25	
		TK13A50DA	500	12.5	45	0.47	28	
		TK13A50D	500	13	45	0.4	32	
		TK15A50D	500	15	50	0.3	40	
		TK18A50D	500	18	50	0.27	45	
		TK4A53D	525	4	35	1.7	11	
		TK5A53D	525	5	35	1.5	11	
		TK6A53D	525	6	35	1.3	12	
		TK12A53D	525	12	45	0.58	25	
		TK4A55DA	550	3.5	30	2.45	9	
		TK4A55D	550	4	35	1.88	11	
		TK5A55D	550	5	35	1.7	11	
		TK6A55DA	550	5.5	35	1.48	12	
		TK7A55D	550	7	35	1.25	16	
		TK8A55DA	550	7.5	40	1.07	16	
		TK9A55DA	550	8.5	40	0.86	20	
		TK10A55D	550	10	45	0.72	24	
		TK11A55D	550	11	45	0.63	25	
		TK12A55D	550	12	45	0.57	28	
TK13A55DA	550	12.5	45	0.48	38			
TK14A55D	550	14	50	0.37	40			
TK16A55D	550	16	50	0.33	45			
TK3A60DA	600	2.5	30	2.8	9			
TK4A60DA	600	3.5	35	2.2	11			
TK4A60DB	600	3.7	35	2	11			

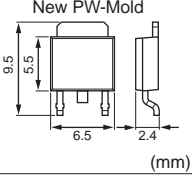
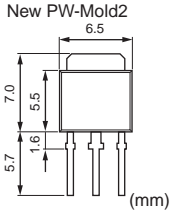
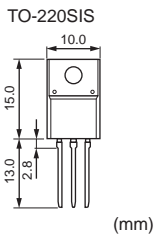
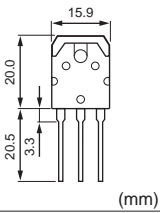
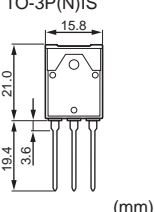
\* Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

Package	Polarity	Part Number	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	P <sub>b</sub> (W)	R <sub>Ds(ON)</sub> Max (Ω)	Q <sub>g</sub> (nC) (typ.)	Internal Connections
						V <sub>GS</sub> = 10 V		
TO-220SIS  (mm)	Nch	TK4A60D	600	4	35	1.7	12	
		TK5A60D	600	5	35	1.43	16	
		TK6A60D	600	6	40	1.25	16	
		TK6A60W **	600	6.2	30	0.75	12	
		TK8A60DA	600	7.5	45	1.0	20	
		TK9A60D	600	9	45	0.83	24	
		TK10A60D	600	10	45	0.75	25	
		TK10A60W **	600	9.7	30	0.38	20	
		TK11A60D	600	11	45	0.65	28	
		TK12A60D	600	12	45	0.55	38	
		TK12A60U	600	12	35	0.4	14	
		TK12A60W **	600	11.5	35	0.3	25	
		TK13A60D	600	13	40	0.43	40	
		TK15A60D	600	15	50	0.37	45	
		TK15A60U	600	15	40	0.3	17	
		TK16A60W **	600	15.8	40	0.19	38	
		TK18A60V	600	18	40	0.19	39	
		TK20A60U	600	20	45	0.19	27	
		TK2A65D	650	2	30	3.26	9	
		TK3A65DA	650	2.5	35	2.51	11	
		TK3A65D	650	3	35	2.25	11	
		TK4A65DA	650	3.5	35	1.9	12	
		TK5A65DA	650	4.5	35	1.67	16	
		TK5A65D	650	5	40	1.43	16	
		TK6A65D	650	6	45	1.11	20	
		TK7A65D	650	7	45	0.98	24	
		TK8A65D	650	8	45	0.84	25	
		TK11A65D	650	11	45	0.7	38	
		TK12A65D	650	12	50	0.54	40	
		TK13A65D	650	13	50	0.47	45	
		TK13A65U	650	13	40	0.38	17	
		TK17A65U	650	17	45	0.26	27	
TK31A60W **	600	30.8	45	0.088	87			
TO-3P(N)  (mm)	Nch	TK15J50D	500	15	210	0.4	32	
		TK20J50D	500	20	280	0.27	45	
		TK12J55D	550	12	190	0.57	28	
		TK16J55D	550	16	250	0.37	40	
		TK19J55D	550	19	280	0.33	45	
		TK12J60U	600	12	144	0.4	14	
		TK15J60U	600	15	170	0.3	17	
		TK20J60U	600	20	190	0.19	27	
		TK40J60U	600	40	320	0.08	55	
		TK50J60U	600	50	400	0.065	67	
		TK13J65U	650	13	170	0.38	17	
		TK17J65U	650	17	190	0.26	27	
		TK31J60W **	600	30.8	230	0.088	87	
		TK39J60W **	600	38.8	270	0.065	110	
TK62J60W **	600	61.8	400	0.04	178			
TO-3P(N)IS  (mm)	Nch	2SK2917	500	18	90	0.27	80	
		TK40M60U	600	40	90	0.08	55	

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

\*\* : Under development

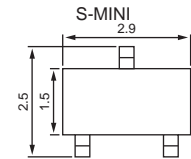
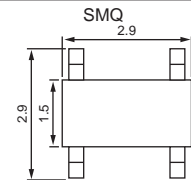
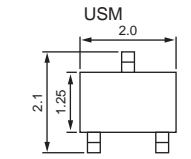
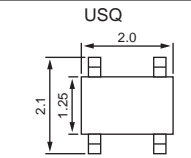
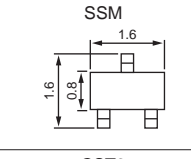
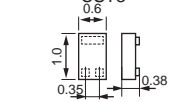
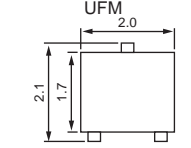
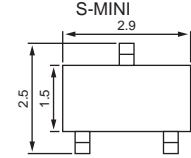
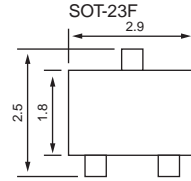
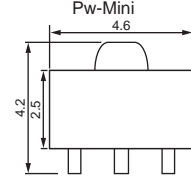
High Voltage Power MOSFETs ( $700\text{ V} < |V_{DSS}|$ )  
(Nch MOSFET)

Package	Polarity	Part Number	$V_{DSS}(V)$	$I_b(A)$	$P_D(W)$	$R_{DS(ON)} \text{ Max } (\Omega)$	$Q_g(nC)$ (typ.)	Internal Connections
						$V_{GS} = 10\text{ V}$		
 (mm)	Nch	TK1P90A	900	1	20	9.0	13	
 (mm)	Nch	TK1Q90A	900	1	20	9.0	13	
 (mm)	Nch	2SK4013	800	6	45	1.7	45	
		2SK3566	900	2.5	40	6.4	12	
		2SK3564	900	3	40	4.3	17	
		2SK3798	900	4	40	3.5	26	
		2SK3565	900	5	45	2.5	28	
		2SK3742	900	5	45	2.5	25	
		2SK4014	900	6	45	2.0	45	
		2SK3799	900	8	50	1.3	62	
 (mm)	Nch	2SK3633	800	7	150	1.7	35	
		2SK2719	900	3	125	4.3	25	
		2SK3700	900	5	150	2.5	28	
		2SK4115	900	7	150	2.0	45	
		2SK3473	900	9	150	1.6	38	
		2SK3878	900	9	150	1.3	62	
		2SK2968	900	10	150	1.25	70	
		2SK4207	900	13	150	0.95	45	
 (mm)	Nch	2SK3880	800	6.5	80	1.7	35	
		2SK2847	900	8	85	1.4	58	
		2SK3017	900	8.5	90	1.25	70	

• Contact the Toshiba sales representative for information about RoHS compliance before you purchase any components.

# Radio-Frequency Bipolar Small-Signal Transistors

## Radio-Frequency Bipolar Transistors

Part Number	Package	Applications	Absolute Maximum Ratings (Ta = 25°C)				Marking	TO-92 Equivalent Product	Remarks
			V <sub>CEO</sub> (V)	I <sub>C</sub> (mA)	P <sub>C</sub> (mW)	T <sub>J</sub> (°C)			
2SC5064		VHF/UHF-band low-noise amps	12	30	150	125	MA□	—	fr = 7 GHz
2SC5084		VHF/UHF-band low-noise amps	12	80	150	125	MC□	—	fr = 7 GHz
2SC5106		VHF/UHF-band oscillators	10	30	150	125	MF□	—	fr = 6 GHz
2SC5087		VHF/UHF-band low-noise amps	12	80	150	125	C□	—	fr = 7 GHz
2SC5087R		VHF/UHF-band low-noise amps	12	80	150	125	ZP	—	fr = 8 GHz
2SC5065		VHF/UHF-band low-noise amps	12	30	100	125	MA□	—	fr = 7 GHz
2SC5085		VHF/UHF-band low-noise amps	12	80	100	125	MC□	—	fr = 7 GHz
2SC5095		VHF/UHF-band low-noise amps	10	15	100	125	ME□	—	fr = 10 GHz
2SC5107		VHF/UHF-band oscillators	10	30	100	125	MF□	—	fr = 6 GHz
MT3S16U		UHF-band low-voltage oscillators and amps	5	60	100	125	T4	—	fr = 4 GHz
2SC5088		VHF/UHF-band low-noise amps	12	80	100	125	MC□	—	fr = 7 GHz
MT4S23U *		VHF/UHF-band low-noise amps	5	40	170 (Note 2)	150	MT	—	fr = 16 GHz
MT4S03BU		VHF/UHF-band low-noise amps	5	40	175 (Note 2)	150	MR	—	fr = 12 GHz
MT4S24U *		VHF/UHF-band low-noise amps	5	50	175 (Note 2)	150	R8	—	fr = 14.5 GHz
2SC4915		VHF/UHF-band oscillators	30	20	100	125	Q□	2SC1923	fr = 550 MHz
2SC5066		VHF/UHF-band low-noise amps	12	30	100	125	M1/M2	—	fr = 7 GHz
2SC5086		VHF/UHF-band low-noise amps	12	80	100	125	M5/M6	—	fr = 7 GHz
2SC5096		VHF/UHF-band low-noise amps	10	15	100	125	M9/MA	—	fr = 10 GHz
MT3S11CT			VHF/UHF-band low-voltage operation, low noise	6	40	105 (Note 1)	125	08	—
MT3S15TU		VHF/UHF-band low-noise amps, low-distortion amps	6	80	900 (Note 2)	150	T3	—	fr = 11.5 GHz
MT3S19TU		VHF/UHF-band low-noise amps, low-distortion amps	6	80	900 (Note 2)	150	T6	—	fr = 11 GHz
MT3S20TU		VHF/UHF-band low-noise amps, low-distortion amps	12	80	900 (Note 2)	150	MU	—	fr = 7 GHz
MT3S19		VHF/UHF-band low-noise amps, low-distortion amps	6	80	800 (Note 2)	150	T6	—	fr = 12 GHz
MT3S19R *		VHF/UHF-band low-noise amps, low-distortion amps	6	80	320 (Note 1)	150	T6	—	fr = 13.5 GHz
MT3S20R *		VHF/UHF-band low-noise amps, low-distortion amps	12	80	320 (Note 1)	150	MU	—	fr = 7.5 GHz
MT3S20P		VHF/UHF-band low-noise amps, low-distortion amps	12	80	1800 (Note 2)	150	MU	—	fr = 7 GHz
MT3S21P		VHF/UHF-band low-noise amps, low-distortion amps	6	80	1800 (Note 2)	150	T2	—	fr = 9 GHz
MT3S22P		VHF/UHF-band low-noise amps, low-distortion amps	6	80	1800 (Note 2)	150	T5	—	fr = 8.5 GHz

□: Denotes a hFE class.

\*: New product

Note 1: When mounted on a glass-epoxy PCB board

Note 2: Mounted on a ceramic board

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## SiGe HBTs

Part Number	Package	Applications	Absolute Maximum Ratings (Ta = 25°C)				Marking	Remarks
			V <sub>CEO</sub> (V)	I <sub>c</sub> (mA)	P <sub>c</sub> (mW)	T <sub>j</sub> (°C)		
MT4S102U		UHF/SHF-band low-noise amps	3	20	60	150	P8	f <sub>T</sub> = 24 GHz
MT4S300U *		UHF/SHF-band low-noise amps	4	50	100	150	P3	f <sub>T</sub> = 26.5 GHz, high ESD immunity
MT4S301U *		UHF/SHF-band low-noise amps	4	35	100	150	P4	f <sub>T</sub> = 27.5 GHz, high ESD immunity
MT4S102T		UHF/SHF-band low-noise amps	3	20	60	150	P8	f <sub>T</sub> = 25 GHz
MT4S300T *		UHF/SHF-band low-noise amps	4	50	100	150	P3	f <sub>T</sub> = 26.5 GHz, high ESD immunity
MT4S301T *		UHF/SHF-band low-noise amps	4	35	100	150	P4	f <sub>T</sub> = 27.5 GHz, high ESD immunity
MT3S111		VHF/UHF-band low-voltage operation, low-noise amps	6	100	700 (Note 1)	150	R5	f <sub>T</sub> = 11.5 GHz
MT3S113		VHF/UHF-band low-voltage operation, low-noise amps	5.3	100	800 (Note 1)	150	R7	f <sub>T</sub> = 12.5 GHz
MT3S111TU		VHF/UHF-band low-voltage operation, low-noise amps	6	100	800 (Note 1)	150	R5	f <sub>T</sub> = 10 GHz
MT3S113TU		VHF/UHF-band low-voltage operation, low-noise amps	5.3	100	900 (Note 1)	150	R7	f <sub>T</sub> = 11.2 GHz
MT3S111P		VHF/UHF-band low-voltage operation, low-noise amps	6	100	1000 (Note 1)	150	R5	f <sub>T</sub> = 8 GHz
MT3S113P		VHF/UHF-band low-voltage operation, low-noise amps	5.3	100	1600 (Note 1)	150	R7	f <sub>T</sub> = 7.7 GHz

Note 1: Mounted on a ceramic board

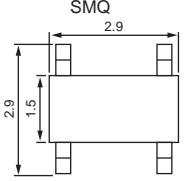
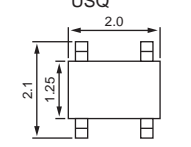
\*: New product

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# Radio-Frequency Small-Signal FETs

## Radio-Frequency MOSFETs

Part Number	Package	Applications	Electrical Characteristics (Ta = 25°C)					Marking	Equivalent Product (Leaded Type)
			V <sub>DS</sub> (V)	I <sub>D</sub> (mA)	P <sub>D</sub> (mW)	I <sub>DSS</sub> (mA)	Y <sub>fs</sub>   (mS) Typ.		
3SK291		UHF-band radio-frequency amps	12.5	30	150	0 to 0.1	26	UF	—
3SK292		VHF/UHF-band radio-frequency amps	12.5	30	150	0 to 0.1	23.5	UV	—
3SK293		UHF-band radio-frequency amps	12.5	30	100	0 to 0.1	26	UF	—
3SK294		VHF/UHF-band radio-frequency amps	12.5	30	100	0 to 0.1	23.5	UV	—

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# Radio-Frequency Power MOSFETs

## Radio-Frequency Power MOSFETs

Part Number	Package	Applications	Absolute Maximum Ratings (Tc = 25°C)			Min	Po (W)		
			V <sub>DSS</sub> (V)	P <sub>D</sub> (W)	I <sub>D</sub> (A)		Test Conditions		
							V <sub>DS</sub> (V)	f (MHz)	P <sub>i</sub> (W)
RFM08U9X	PW-X	UHF/VHF Professional radios	36	20	5	7.5	9.6	520	0.5
2SK3075	PW-X		30	20	5	7.5	9.6	520	0.5
2SK3074	PW-MINI		30	3	1	0.63	9.6	520	0.02
RFM12U7X	PW-X		20	20	4	11.5	7.2	520	1.0
RFM07U7X *	PW-X		16	20	3	7.0	7.2	450 to 530	0.5
RFM01U7P	PW-MINI		20	3	1	1.0	7.2	520	0.1
2SK3476	PW-X		20	20	3	7.0	7.2	520	0.5
2SK3475	PW-MINI		20	3	1	0.63	7.2	520	0.02
RFM04U6P	PW-MINI	GMRS	16	7	2	3.5	6.0	470	0.2
2SK4037	PW-X		12	20	3	3.55	6.0	470	0.3
2SK2854	PW-MINI	UHF and VHF radio	10	0.5	0.5	0.2	6.0	849	0.02
2SK3079A	PW-X	FRS/GMRS	10	20	3	2.24	4.5	470	0.1
2SK3756	PW-MINI		7.5	3	1	1.26	4.5	470	0.1
2SK3078A	PW-MINI		10	3	0.5	0.63	4.5	470	0.1
2SK3077	USQ	Driver	10	0.25	0.1	0.032	4.8	915	0.001
RFM03U3CT	RF-CST3	GMRS	16	7	2.5	2.3	3.6	520	0.1
RFM00U7U	USQ	Driver	20	0.25	0.1	0.1	7.2	520	0.01

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\*: New product

# IGBTs

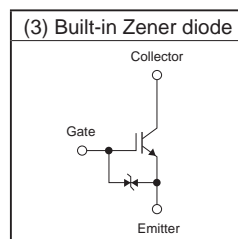
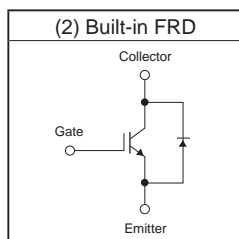
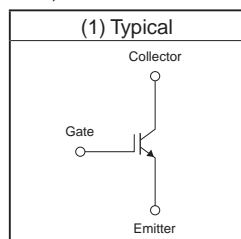
## IGBTs (Discrete IGBTs)

Part Number	Applications	Features	Absolute Maximum Ratings (Ta = 25°C)				Package		Circuit Configuration (Note)	V <sub>CE(sat)</sub> Typ. @ Ta = 25°C			tf Typ. @ Ta = 25°C		Remarks		
			V <sub>CES</sub> (V)	I <sub>c</sub>		P <sub>c</sub>		Type		I <sub>c</sub> (A)	V <sub>GE</sub> (V)	I <sub>c</sub> (A)	V <sub>GE</sub> (V)	I <sub>c</sub> (A)		Test Conditions	
				DC (A)	Pulsed (A)	Ta = 25°C (W)	Tc = 25°C (W)										
GT15J341 *	Power supplies (and UPS/PFC/Motor)	High-speed switching	600	15	60	—	30	TO-220SIS	Isolation, Through-hole	(2)	1.5	15	15	0.08	Inductive load	6th generation	
GT20J341 *				20	80	—	45	TO-220SIS	Isolation, Through-hole	(2)	1.5	20	15	0.05		6th generation	
GT30J121				30	60	—	170	TO-3P(N)	Through-hole	(1)	2.0	30	15	0.05			
GT30J126				30	60	—	90	TO-3P(N)IS	Isolation, Through-hole	(1)	1.95	30	15	0.05			
GT30J341 *				59	120	—	230	TO-3P(N)	Through-hole	(2)	1.5	30	15	0.04		6th generation, T <sub>J</sub> = 175°C	
GT50J121	Power factor correction	Low frequency switching	600	50	100	—	240	TO-3P(LH)	Through-hole	(1)	2.0	50	15	0.05	Partial switching converter		
GT30J122				30	100	—	75	TO-3P(N)IS	Isolation, Through-hole	(1)	2.1	50	15	0.25			
GT30J122A				30	100	—	120	TO-3P(N)	Through-hole	(1)	1.7	50	15	0.2			
GT40J121	IH rice cookers, IH cooktops, Microwave ovens, Induction heating equipment AC200 V	Current resonance	600	40	100	—	80	TO-3P(N)IS	Isolation, Through-hole	(1)	1.45	40	15	0.2	Resistive load		
GT30J322				30	100	—	75	TO-3P(N)IS	Isolation, Through-hole	(2)	2.1	50	15	0.25			
GT35J321				37	100	—	75	TO-3P(N)IS	Isolation, Through-hole	(2)	1.9	50	15	0.19			
GT40J324 *				40	100	—	200	TO-3P(N)	Through-hole	(2)	2.1	40	15	0.04		6th generation, T <sub>J</sub> = 175°C	
GT40J325 *				40	100	—	80	TO-3P(N)IS	Isolation, Through-hole	(2)	1.45	40	15	0.2		6th generation	
GT50J341 *	50	100	—	200	TO-3P(N)	Through-hole	(2)	1.6	50	15	0.15	6th generation, T <sub>J</sub> = 175°C					
GT35MR21 *	IH rice cookers, IH cooktops, Microwave ovens, Induction heating equipment AC100 V	Voltage resonance	900	35	100	—	82	TO-3P(N)IS	Isolation, Through-hole	(2)	1.6	35	15	0.20	Resistive load	6.5th generation	
GT50MR21 *				50	100	—	230	TO-3P(N)	Through-hole	(2)	1.7	50	15	0.18		6.5th generation, T <sub>J</sub> = 175°C	
GT60M324				60	120	—	254	TO-3P(N)	Through-hole	(2)	1.7	60	15	0.11		6th generation, T <sub>J</sub> = 175°C	
GT50N322A				1000	50	120	—	156	TO-3P(N)	Through-hole	(2)	2.2	60	15		0.1	Fast switching
GT50N324					50	120	—	150	TO-3P(N)	Through-hole	(2)	1.9	60	15		0.11	6th generation
GT50NR21 *				1050	50	100	—	230	TO-3P(N)	Through-hole	(2)	1.8	50	15		0.2	6.5th generation, T <sub>J</sub> = 175°C
GT60N321				1000	60	120	—	170	TO-3P(LH)	Through-hole	(2)	2.3	60	15		0.25	
GT40QR21 *				1200	40	80	—	230	TO-3P(N)	Through-hole	(2)	1.9	40	15		0.2	6.5th generation, T <sub>J</sub> = 175°C
GT40RR21 *				1350	40	80	—	230	TO-3P(N)	Through-hole	(2)	2.0	40	15		0.21	6.5th generation, T <sub>J</sub> = 175°C
GT40T321				1500	40	80	—	230	TO-3P(N)	Through-hole	(2)	2.15	40	15		0.24	6th generation, T <sub>J</sub> = 175°C
GT40WR21 *	1800	40	80	—	375	TO-3P(N)	Through-hole	(2)	2.9	40	15	0.15	6.5th generation, T <sub>J</sub> = 175°C				
GT10G131	Digital still cameras, single lens reflex cameras	Strobe flash (dimming control)	400	—	200	1.9	—	SOP-8	SMD	(3)	2.3	200	4.0	1.8	I <sub>CP</sub> = 200 A @ V <sub>GE</sub> = 4.0 V gate drive		
GT30F124	PDP-TV	PDP sustain, energy recovery and separation circuits	360	300	—	200	—	25	TO-220SIS	Isolation, Through-hole	(1)	2.3	120	15	0.15	6th generation	
GT30F126 *				330	—	200	—	18	—	TO-220SIS	Isolation, Through-hole	(1)	2.6	120	15	0.15	6th generation
GT30F131				—	200	—	140	TO-220SM (MXN)	SMD	(1)	1.9	120	15	0.17	6th generation		
GT30F132 *				—	250	—	140	TO-220SM (MXN)	SMD	(1)	1.8	120	15	0.15	7th generation		
GT45F132 *				—	200	—	140	TO-220SM (MXN)	SMD	(1)	1.6	120	15	0.22	7th generation		
GT30G124				430	—	200	—	25	—	TO-220SIS	Isolation, Through-hole	(1)	2.5	120	15	0.23	6th generation
GT30J127 *				600	—	200	—	25	—	TO-220SIS	Isolation, Through-hole	(1)	2.6	120	15	0.3	6th generation

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\*: New product

Note)



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