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Leading Innovation >>>

PRODUCT GUIDE**Power MOSFETs****Datasheet Directory**

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POWER MOSFETs

Toshiba's power MOSFET devices meet the needs of a wide range of ultra-high-density applications.

CONTENTS

1.Features and Structure.....	2
2.New Power MOSFET Products	3
3.Selection Guide	4
4.Power MOSFET Characteristics	
1.Compact Package TPC Series	8
2.TO-220SM (W) Series	12
3.U-MOSIII (Trench Type) Series	13
4.U-MOS Series for Synchronous Rectification ($V_{DSS} = 60\text{ V to }150\text{ V}$)	14
5. π -MOSVII Series ($V_{DSS} = 500\text{ V to }600\text{ V}$)	15
6.Super-Junction DTMOS Series ($V_{DSS} = 600\text{ V}$).....	16
7.High-Speed π -MOS Series ($V_{DSS} = 450\text{ V to }600\text{ V}$).....	17
8. π -MOS Series.....	18
5.Product Index	21
6.End-of-Life and Obsolete Product List.....	25
7.Package List	28

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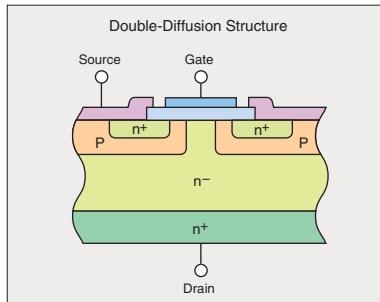
Features and Structure

Power MOSFETs

All Power MOSFETs have the following features:

- 1) No carrier storage effect; superior frequency and switching characteristics
- 2) Ruggedness, no current concentration
- 3) Voltage-controlled device, hence low drive power
- 4) Easy parallel connection

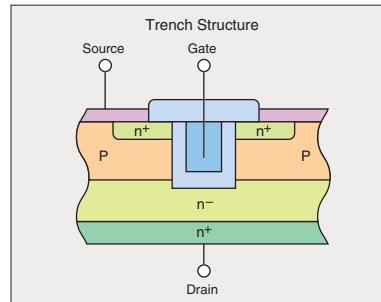
■ Structure of Toshiba Power MOSFETs



● π -MOS

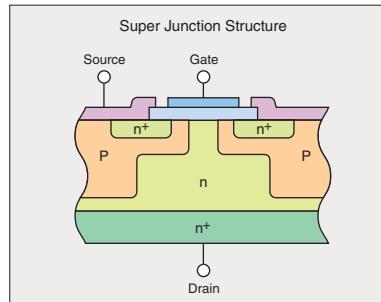
Toshiba Power MOSFETs use a double-diffusion MOS (D-MOS) structure, which produces high-withstand voltage, to form channels. This structure is especially well suited to high-withstand voltage and high-current devices.

A high level of integration yields a high-performance power MOSFET with low ON-resistance and low power loss.



● U-MOS

Higher channel density is achieved by connecting channels vertically to form a U-groove at the gate region, a structure that yields a lower ON-resistance than other MOSFET structures.



● DTMOS

The super junction structure, which has P-type pillar layers as shown above, realizes high withstand voltage and ON-resistance lower than the theoretical limit of silicon.

New Power MOSFET Products

VS and PS Series ($V_{DSS} = 12\text{ V to }40\text{ V}$)

Very compact and thin, the VS and PS Series products are suitable for use in various electronic devices.

■ Applications

- Cell phones
- Notebook PCs
- Portable electronic devices

STP Series ($V_{DSS} = 20\text{ V to }30\text{ V}$)

The STP Series is housed in an ultra-small and thin package and is suitable for use in lithium-ion secondary battery protection circuits in various portable electronic devices.

■ Applications

- Lithium-ion secondary battery protection circuits

SOP Series ($V_{DSS} = 20\text{ V to }60\text{ V}$)

The SOP Series products are compact and thin, and require only a small mounting area. They are suitable for lithium-ion secondary battery protection and for notebook PCs.

■ Applications

- Lithium-ion secondary battery protection circuits
- Notebook PCs
- Portable electronic devices
- DC-DC converters

TO-220SM(W) Series ($V_{DSS} = 40\text{ V to }150\text{ V}$)

The TO-220SM package, which uses Cu connectors and a wide source terminal, realizes low ON-resistance and a high current carrying capability.

■ Applications

- Motor drivers
- Switching power supplies

U-MOSIII Series ($V_{DSS} = 40\text{ V to }100\text{ V}$)

High-integration is achieved using a trench structure technique. Low-voltage driving ($V_{GS} = 4\text{ V}$) is possible due to ultra-low ON-resistance.

■ Applications

- Motor drivers
- Solenoids and lamp drivers

U-MOS Series for Synchronous Rectification ($V_{DSS} = 60\text{ V to }150\text{ V}$)

Fabricated using a trench technology, the U-MOS Series is ideal for synchronous rectification on the secondary side of power supply circuits.

■ Applications

- Switching power supplies
- AC adapters
- Motor drivers

New π -MOSVII Series ($V_{DSS} = 500\text{ V to }600\text{ V}$)

The latest addition to the π -MOS portfolio, the π -MOSVII Series offers reduced capacitances due to optimized chip design and is available with a greatly wider range of electrical characteristics.

■ Applications

- Switching power supplies
- AC adapters

Super-Junction DTMOS Series ($V_{DSS} = 600\text{ V}$)

Achieves low ON-resistance and low gate charge (Q_g) due to the use of the latest super junction structure.

■ Applications

- Switching power supplies
- AC adapters
- Motor drivers

High-Speed π -MOS Series ($V_{DSS} = 450\text{ V to }600\text{ V}$)

The new High-Speed π -MOSV Series achieves higher switching speed than the π -MOSV Series, which is currently well established in the market. Two series are available: high-speed switching series and high-speed diode series.

■ Applications

- Inverters
- AC adapters
- Motor drivers
- Switching power supplies

Part Numbering Scheme

■ Multi-Pin Series

TPCM8 0 01 -H

- H: High-speed type
None: Low ON-resistance type
- Serial number of the products
- 0: N-channel single
1: P-channel single
2: N-channel dual
3: P-channel dual
- 4: N-channel and P-channel dual
A: N-channel and SBD
B: P-channel and SBD
J: P-channel and NPN
- TPC6: VS-6 Series
TPCF8: VS-8 Series
TPCP8: PS-8 Series
TPCS8: TSSOP-8 Series
TPCM8: TSSOP Advance Series
TPC8: SOP-8 Series
TPCA8: SOP Advance Series
TPCT4: STP Series

■ New Series

TK 55 A 10 J 1

- Additional information
1: Low-capacitance type
3: Low ON-resistance type
5: Fast body diode type
- Series
C: π -MOSVI
D: π -MOSVII
J: U-MOSIII
- T: DTMOSI
U: DTMOSII
- Voltage: 10% of the V_{DSS}
- Package
A: TO-220SIS
D: TO-220(W)
F: TO-220SM(W)
- J: TO-3P(N)
N: PW-Mold(SMD)
X: TFP
- Current
TK: N-channel
TJ: P-channel

■ Conventional Series

2SK****

- N-channel MOS

2SJ****

- P-channel MOS

V _{DSS} (V) I _D (A)	12	16	20	30	40	50	60	100	150	180	200	250	400	450	500	600	700	800	900	1000	V _{DSS} (V) I _D (A)
0.5															▲ 2SK2998 (20)② ☆ 2SK3302 (18)② ◇ 2SK3471 (18)②					0.5	
1								◊ 2SJ360 (0.73)④ ▲ 2SJ507 (0.7)④ ◇ 2SK2963 (0.7)④ ▲ 2SK2962 (0.7)④ ◇ 2SJ508 (1.9)④ ▲ 2SJ509 (1.9)④	◊ 2SK3670 (1.7) ▲ 2SK3670 (1.7) ◆ 2SJ313 (5.0) ▼ 2SJ338 (5.0) ◆ 2SK2013 (5.0) ▼ 2SK2162 (5.0)	◆ 2SK3670 (1.7) ▲ 2SK3670 (1.7) ◆ 2SJ313 (5.0) ▼ 2SJ338 (5.0) ◆ 2SK2013 (5.0) ▼ 2SK2162 (5.0)	◊ 2SK2992 (3.5)② ▼ 2SK3498 (5.5)②			▼ 2SK3498 (5.5)② □ 2SK4023 (4.6)② ☆ 2SK3374 (4.6)② ▼ 2SK3472 (4.6)②		J 2SK3371 (9)② J 2SK4026 (9)②			■ 2SK2733 (9.0)① ▽ 2SK2845 (9)① ▼ 2SK3301 (20)①	1	
1.3																					1.3
1.7															N X TPCS8008-H (0.58)②					1.7	
1.8															★ TPC8012-H (0.4)⑥					1.8	
1.9															N X TPCS8007-H (0.45)②					1.9	
2								◊ 2SK2615 (0.3)④ ▲ 2SK2961 (0.3)④ ◇ 2SK3658 (0.3)④					▼ 2SJ610 (2.55)②		⊗ 2SK3757 (2.45)③ ⊗ 2SK3766 (2.45)③	☆ 2SK2599 (3.2)② J 2SK3373 (3.2)②	☆ 2SK2846 (5.0)② J 2SK2865 (5.0)② ⊗ 2SK3767 (4.5)③ J 2SK4002 (5)②			2	
2.1									N X TPCS8009-H (0.35)②											2.1	
2.2									N X TPC6006-H (0.075)⑥				J 2SJ567 (2.0)② J 2SJ680 (2.0)②							2.2	
2.5																		⊗ 2SK3566 (6.4)⑧		2.5	
2.7				P#;♥ TPC6105 (0.11)⑥ P#; TPCF8301 (0.11)⑥ PS#; TPCF8B01 (0.11)⑥ P#; TPCF8103 (0.11)⑥																	2.7
3			N#; TPCF8201 (0.49)⑥ NS#; TPCF8A01 (0.49)⑥ P#; TPCF8302 (0.059)⑥ P#; TPCF8303 (0.058)⑥						☆ 2SK2200 (0.35)④ J 2SK2201 (0.35)④ J 2SK4018 (0.35)④				J 2SK3462 (1.7)② J 2SK4022 (1.7)②		♦ 2SK2862 (3.2)②	J 2SK4003 (2.2)② J 2SK3975 (2.2)②		■ 2SK2603 (3.6)① ○ 2SK2883 (3.6)① ⊗ 2SK3567 (2.2)③	■ 2SK2608 (4.3)① □ 2SK2719 (4.3)① ⊗ 2SK3564 (4.3)⑧	3	
3.2			C P; TPCF8402 (0.077)⑥ P; TPCF8304 (0.072)⑥																		3.2
3.4			C P; TPCP8402 (0.072)⑥ P; TPCP8403 (0.070)⑥																		3.4
3.5																	■ 2SK3085 (2.2)② ⊗ 2SK3567 (2.2)③			3.5	
4			C N; TPCF8402 (0.05)⑥										N ▷ TPCA8008-H (0.58)②						⊗ 2SK3798 (3.5)⑧	■ 2SK1119 (3.8) ○ 2SK1930 (3.8)	4
4.2			N A; TPCP8201 (0.05)⑥ C N; TPCP8402 (0.077)⑥																		4.2
4.5			P#;♥ TPC6107 (0.055)⑥ P;♥ TPC6108 (0.06)⑥ CP★ TPC8405 (0.033)⑥											J 2SK3342 (1.0)② J 2SK4021 (1.0)②							4.5
4.7			N A; TPCP8403 (0.040)⑥ N A; TPCP8203 (0.040)⑥																		4.7
4.8			P; TPCP8103-H (0.040)⑥																		4.8
5			★ TPC8208 (0.05)⑥ X TPCS8209 (0.03)⑥ N J; TPCF8210 (0.03)⑥ P#; X TPCS8303 (0.021)⑥ P; X TPCS8302 (0.035)⑥ P; A; TPCP8301 (0.031)⑥ P; A; TPCP8302 (0.033)⑥		X TPCS8209 (0.05)⑥ N J; TPCF8001 (0.032)⑥ P★ TPC8104-H (0.065)⑥ N; X TPC8303 (0.021)⑥ P; X TPC8302 (0.035)⑥ P; A; TPCP8301 (0.031)⑥ P; A; TPCP8302 (0.033)⑥	▲ 2SK2989 (0.15)④ ▲ 2SJ537 (0.19)④	J 2SJ668 (0.17)⑥ J 2SJ681 (0.17)⑥ J 2SK2399 (0.23)④ J 2SK4019 (0.23)④	▼ 2SK3205 (0.52)		◆ 2SJ407 (1.0)② ◆ 2SK2381 (0.8)② ☆ 2SK2835 (0.8)② J 2SK2920 (0.8)② J 2SK4020 (0.8)②	◆ 2SJ512 (1.25)②		○ 2SK2991 (1.5)② ◆ 2SK3466 (1.5)② ▽ 2SK3863 (1.5)③ J 2SK4103 (1.5)③ ⊗ 2SK2563 (1.5)③ Y O 2SK3417 (1.8)② Y ⊗ 2SK3868 (1.7)③	♦ 2SK2274 (1.7)	□ 2SK2604 (2.2)① ◆ 2SK2605 (2.2)① ○ 2SK2884 (2.2)① ⊗ 2SK3742 (2.5)⑧	□ 2SK3565 (2.5)⑧ ○ 2SK2602 (2.2)① □ 2SK3700 (2.5)⑧ ⊗ 2SK2884 (2.2)①	□ 2SK1359 (3.8)	5			
5.5	P; D; A; TPC8401 (0.038)⑥ P; H; TPC6103 (0.035)⑥	P; H; TPC6104 (0.04)⑥	N★ TPC8211 (0.036)⑥ N A; TPCP8202 (0.023)⑥										N ▷ TPCA8010-H (0.45)②		○ 2SK2838 (1.2)② ♦ 2SK2679 (1.2)②					5.5	
5.6	P; H; TPC8101 (0.030)⑥																				5.6
6	P; H; TPCF8101 (0.028)⑥		N; ▷ TPCF4201 (0.031)⑥ N; ▷ TPCF4202 (0.038)⑥ N; ▷ TPCF4203 (0.031)⑥ N; ▷ TPC4204 (0.038)⑥ N; #; H; TPC6004 (0.024)⑥ N; ▷ TPC6003 (0.024)⑥ P; H; TPCF8102 (0.030)⑥ N; #; V; TPC6005 (0.028)⑥ ★ TPC8201 (0.02)⑥ PD; A; TPCP8101 (0.035)③; 32V⑥ ★ TPC8211 (0.024)⑥ P; ▷ TPCF8104 (0.028)⑥ X TPCS8204 (0.017)⑥ N; X TPC8214 (0.135)⑥ P; X TPCS8102 (0.02)⑥ NS; A; TPC8A01 (0.025)⑥ P; X TPCS8302 (0.035)⑥ ★ TPC8212-H (0.021)⑥ N; #; TPCS8212 (0.024)⑥ CN; ★ TPC8405 (0.026)⑥ N; X TPCS8208 (0.017)⑥ N; X TPCS8213 (0.013)⑥											◆ 2SJ516 (0.8)②		□ 2SK2602 (1.25)② ○ 2SK2777 (1.25)② ○ 2SK3312 (1.25)② ⊗ TK6A60D (1.25)⑦ Y ⊗ 2SK3947 (1.4)③		⊗ 2SK4013 (1.7)⑧ ⊗ 2SK4014 (2.0)⑧			6
6.5			N★ TPC8216-H (0.020)⑥															○ 2SK3879 (1.7)⑧ ○ 2SK3880 (1.7)⑧			6.5
7			N; J; TPCF8001 (0.023)⑥ CN; TPC8406-H (0.027)⑥ CP; TPC8406-H (0.023)⑥					N ▷ TPCA8009-H (0.35)②										□ 2SK3633 (1.7)⑧	□ 2SK4115 (2.0)⑧	○ 2SK1365 (1.8)	7
7.2			P; H; TPCP8102 (0.018)⑥ N A; TPCP8001-H (0.016)⑥																		7.2
7.5			N; ▷ TPC8202-H (0.027)⑥ N; ▷ TPC8022-H (0.027)⑥ P★ TPC8116-H (0.03)⑥ P; ▷ TPC8107-H (0.03)⑥										♦ 2SK2417 (0.5)② ■ 2SK2914 (0.5)②							7.5	
8			N★ TPC8210 (0.015)⑥ N★ TPC8021-H (0.017)⑥	P★ TPC8110 (0.025)⑥														○ 2SK2606 (1.2)①	○ 2SK2847 (1.4)① ⊗ 2SK3799 (1.3)⑧	□ 2SK2613 (1.7)①	8
8.3			N A; TPCP8004 (0.009)⑥																		8.3
8.5			NS; A; TPC8A01 (0.018)⑤																		8.5
9			N; A; TPCP8002 (0.0137)⑥ N A; TPCP8006 (0.0137)⑥										♦ 2SK2350 (0.4)②		♦ 2SK2952 (0.55)②			□ 2SK2607 (1.2)①	□ 2SK3473 (1.6)⑧ □ 2SK3878 (1.3)⑧	9	
10			P★ TPC8115 (0.01)⑥ P★ TPC8109 (0.02)⑥ P★ TPC8119 (0.013)⑥					J 2SK3669 (0.125)⑦		□ 2SJ200 (0.83) ○ 2SK1529 (0.83) □ 2SK3497 (0.15) □ 2SJ618 (0.37)			■ 2SK2841 (0.55)② ○ 2SK3309 (0.65)② ♦ 2SK3310 (0.65)② ◆ 2SK3407 (0.65)② ⊗ 2SK3869 (0.6								

V _{DSS} (V) I _d (A)	20	30	40	50	60	75	100	150	180	200	250	300	400	450	500	600	700	900/1000	V _{DSS} (V) I _d (A)	
11		N★TPC8025 (0.009)⑥ N★TPC8021-H (0.017)⑥ N★TPC8014 (0.014)⑥ P★TPC8111 (0.012)⑥ P★TPC8113 (0.01)⑥ P‡TPCS8105 (0.015)⑥ P‡TPCS8104 (0.012)⑥ N★TPC8030 (0.0095) N★TPC8031-H (0.0133)⑥ N★TPC8005-H (0.0133)⑥ P★TPC8121 (0.012)⑥								◆2SK2965 (0.26)②									11	
12		N‡TPC8037-H (0.0114)⑥ N‡TPC8038-H (0.0114)⑥					◆2SJ380 (0.21)④			●2SJ201 (0.625) ●2SK1530 (0.625)					○2SK3068 (0.52)② ◆2SK3398 (0.52)② ⊗TK12A50D (0.52)② □TK12J60U (0.4)⑨ ¥◆2SK3313 (0.62)②	□2SK2699 (0.65)② ⊗TK12A60U (0.4)⑨ ■TK12D60U (0.4)⑨ □TK12J60U (0.4)⑨			1000V: ●2SK1489 (1.0)	12
13		N★TPC8041 (0.007)⑥ N★TPC8026 (0.0066)⑥ P★TPC8107 (0.007)⑥ P‡TPC8112 (0.006)⑥ P‡TPC8118 (0.007)								◆2SK2508 (0.25)② ○2SK2598 (0.25)②			◆2SK3743 (0.4)② ○2SK3403 (0.4)② ◆2SK3544 (0.4)②	○2SK4012 (0.4)③ ⊗TK13A60D (0.43)⑦ ¥⊗2SK4016 (0.5)③			900V: □2SK4207 (0.95)	13		
14				◆2SJ304 (0.12) ○2SJ312 (0.12)										○2SK2916 (0.4)②	□2SK3903 (0.44)③			14		
15		N○TPC8032-H (0.0065)⑥								◆2SK2382 (0.18)② ○2SK2401 (0.18)②				⊗TK15A50D (0.3)⑦ □2SK4107 (0.4)③ ¥□2SK3314 (0.49)②	○2SK2953 (0.4)② ⊗TK15A60U (0.3)⑩ ■TK15D60U (0.3)⑩ □TK15J60U (0.3)⑩			15		
16		NS★TPC8A02-H (0.0056)⑥							○2SJ412 (0.21)④ ◆2SJ619 (0.21)④							□2SK2915 (0.4)②		16		
17		N○TPC8033-H (0.0053)⑥ NS‡TPC8A03-H (0.0056)⑥ N○TPC8039-H (0.0059)⑥												○2SK3935 (0.25)③	□2SK3905 (0.31)③			17		
18		P‡TPC8114 (0.0045)⑥ N★TPC8027 (0.0027)⑥ N★TPC8028 (0.0043)⑥ N★TPC8029 (0.0038)⑥ N★TPC8030-H (0.0039)⑥ N★TPC8042 (0.0034)⑥ P‡TPC8117 (0.0039)⑥ P‡TPC8036-H (0.0042)⑥ NS‡TPC8A04-H (0.0036)⑥							◆2SJ464 (0.12)④ ◆2SJ620 (0.09)④ ►TPCA8006-H (0.067)	◆2SK2882 (0.12)② ◆2SK3387 (0.12)④						○2SK2917 (0.27)②		18		
19														□2SK3904 (0.26)③				19		
20					▽2SK2614 (0.046)④	◆2SJ349 (0.045)④ ○2SJ401 (0.045)④ ▽2SK2782 (0.055)④			◆2SK2391 (0.085)④					○2SK2993 (0.105)② ◆2SK3445 (0.105)② ◆2SK3994 (0.105)②	□2SK4108 (0.27)③ □2SK3911 (0.32)③ ⊗TK20A60U (0.19)⑩ ■TK20D60U (0.19)⑩ □TK20J60U (0.19)⑩ ¥□2SK3906 (0.33)③			20		
21		N►TPCM8007-H (0.0129)⑥																21		
22																		22		
23																□2SK3907 (0.23)③ ¥□2SK3936 (0.25)③		23		
24		N►TPCM8004-H (0.011)⑥ N►TPCA8030-H (0.011)⑥ N►TPCA8031-H (0.011)⑥																24		
25		P►TPCM8102 (0.0077)⑥ N►TPCM8006 (0.007)⑥			◆2SK2507 (0.046)④	◆2SK2232 (0.046)④ ○2SK2311 (0.046)④ ►TPCA8016-H (0.021)⑥				◆2SK3444 (0.082)② ○2SK3625 (0.082)②					●2SK1544 (0.2)②			25		
26					◆2SK3846 (0.016)④													26		
27									■2SK2314 (0.085)④ ○2SK2789 (0.085)④									27		
30		N►TPCA8018-H (0.0062)⑥ N►TPCM8002-H (0.0062)⑥		N►TPCA8014-H (0.009)⑥ N►TPCA8027-H (0.010)⑥			◆2SJ334 (0.038)④ ○2SJ402 (0.038)④ ⊗TK30A06J3A (0.026)⑥			◆2SK3443 (0.055)②		□2SK3176 (0.052)②	□2SK2967 (0.068)② ○2SK2995 (0.068)②					30		
32					○2SK3847 (0.016)⑥									●2SK1486 (0.095)				32		
34		NS►TPCA8002-H (0.0053)⑥ N►TPCA8039-H (0.0055)⑥																34		
35		N►TPCA8012-H (0.0049)⑥ N►TPCA8024 (0.0043)⑥		N►TPCA8015-H (0.0054)⑥			◆2SK3662 (0.0125)⑥											35		
36					◆2SK385 (0.03)④													36		
38		N►TPCA8036-H (0.0038)⑥																38		
40		N►TPCA8011-H (0.0035)⑥	P►TPCA8102 (0.006)⑥ P►TPCA8103 (0.0042)⑥ P►TPCA8106 (0.0037)⑥ N►TPCA8012-H (0.0045)⑥ N►TPCA8025 (0.0036)⑥	P►TPCA8108 (0.0095)⑥		P►TPCA8104 (0.016)⑥		田TK40D10J1 (0.015)⑥ ⊗TK40A10J1 (0.015)⑥							□TK40J60T (0.08)⑨		40			
42		NS►TPCA8044-H (0.002)⑥																42		
45		S□2SK3506 (0.02) N►TPCA8019-H (0.0031)⑥ N►TPCA8026 (0.0022)⑥ N►TPCA8042 (0.0033)⑥					\$□2SK2550 (0.03)④ ◆2SK2886 (0.02)④ S□2SK2744 (0.02)④ \$○2SK3051 (0.03)④ ◆2SK3844 (0.0058)⑥		□2SK2233 (0.03)④ ○2SK2266 (0.03)④ ○2SK2376 (0.017)④ \$□2SK2398 (0.03)④ ◆2SK3844 (0.0058)⑥										45	
50		N►TPCA8028-H (0.0028)⑥					\$□2SK2551 (0.011)④ □2SK2745 (0.0095)④	□2SK173 (0.017)④ □2SK2445 (0.018)②		□2SK1381 (0.032)② ◆2K50X15J1 (0.03)⑥ ◆2K50F15J1 (0.03)⑥					●2SK3132 (0.09)② ¥●2SK3131 (0.11)②			50		
55										田TK55D10J1 (0.0105)⑥ ⊗TK55A10J1 (0.0105)⑥									55	
60							□2SK3129 (0.007)③		●2SK2267 (0.011)④ □2SK2313 (0.011)④	田TK60D08J1 (0.0078)⑧ ⊗TK60A08J1 (0.0078)⑧	●2SK1382 (0.020)							60		
70					□TK70J04J3 (0.0038)⑥				□2SK3845 (0.0058)⑥ 田TK70D06J1 (0.0064)⑥ ⊗TK70A06J1 (0.0064)⑥ ○2SK70A06J3 (0.006)⑥										70	
75					◆2SK3843 (0.0035)⑥				◆2SK4034 (0.0058)⑥ ◆2SK3842 (0.0058)⑥									75		
80										⊗TK80A08K3 (0.0045)⑥ 田TK80D08K3 (0.0045)⑥									80	
100					♦TK100F04K3 (0.003)⑥				♦TK100F06K3 (0.005)⑥									100		
120									♦TK120F06J3 (0.008)⑥									120		
130									♦TK130F06K3 (0.004)⑥									130		
150									♦TK150F04K3 (0.0021)⑥									150		

Legend

Product series ① : π-MOSIII ② : π-MOSV ③ : π-MOSVI ④ : L²-π-MOSV ⑤ : L²-π-MOSVI
 ⑥ : U-MOS ⑦ : π-MOSVII ⑧ : π-MOSIV ⑨ : DTMOSI ⑩ : DTMOSII

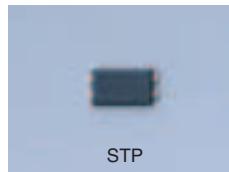
Package ◇PW-Mini ♪VS-8 ♥VS-6 ♡PS-8 ▲STP ▲TO-92MOD
 ◇SOP-8 Lead Clamp ►SOP Advance ◆TO-220NIS ○TO-220SIS ■TO-220AB 田TO-220(W)
 ♦TFP ○TO-220FL/SM ♦TO-220SM(W) □TO-3P(N) ○TO-3P(N)IS ●TO-3P(L)

Notes:
) = Region max
 * = 1.8-V drive
 \$ = 10-V drive
 # = 2.5-V drive
 N = N-ch
 P = P-ch
 CN = Complementary N-ch
 CP = Complementary P-ch
 NS = N-ch + SBD
 PD = P-ch + Driver (lead switch)
 PS = P-ch + SBD
 PN = P-ch + Driver (lead switch)

STP Series ... [Part Number: TPCTxxx]

■ Feature of the STP2

- 80% reduction in area ratio compared with the previous STP package contributes to further size reduction of end-products.
- A new chip design using Toshiba U-MOSIV process technology is housed in a pump structured new package. This realizes a small and thin package while offering low ON-resistance.



■ Product List

Part Number	Package	Absolute Maximum Ratings		Circuit Configuration	R _{DS(ON)} Max (mΩ)			Q _g Typ. (nC)	C _{iss} Typ. (pF)	Series
		V _{SSS} (V)	I _S (A)		2.5 V	4 V	4.5 V			
TPCT4201	STP	20	6	N-ch Dual	49	32	31	21	1740	U-MOSIII
TPCT4202	STP	30	6		52	39	38	21	1540	U-MOSIII
TPCT4203	STP2	20	6		49	32	31	11	790	U-MOSIV
TPCT4204	STP2	30	6		52	39	38	12	780	U-MOSIV

TSSOP Advance Series ... [Part Number: TPCM8xxx]

■ Product List

Part Number	Absolute Maximum Ratings		Circuit Configuration	R _{DS(ON)} Max (mΩ)		Q _g Typ. (nC)	C _{iss} Typ. (pF)	Series
	V _{DSS} (V)	I _D (A)		10 V	4.5 V			
TPCM8001-H	30	20	N-ch Single	9.5	14	19	1130	U-MOSIII-H
TPCM8003-H	30	21		12.9	15.7	11	1433	U-MOSV-H
TPCM8004-H	30	24		11	13.4	11	1433	U-MOSV-H
TPCM8006	30	25		7.0	13.5	26	1270	U-MOSIV
TPCM8002-H	30	30		6.2	8.2	18	2270	U-MOSV-H
TPCM8102	-30	-25		7.7	16*	60	2450	U-MOSV

*: 4 V



TSSOP-8 Series ... [Part Number: TPCS8xxx]

■ Features

- The TSSOP-8 achieves a 17 mΩ of R_{DS(ON)} for the TPCS8204 by adopting the U-MOSIII design.
- Common-drain types are available:
Ideal for use in lithium-ion battery protections and reverse current prevention circuits



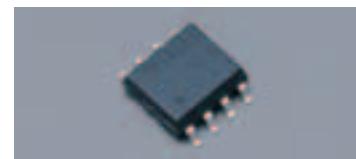
■ Product List

Part Number	Absolute Maximum Ratings		Circuit Configuration	R _{DS(ON)} Max (mΩ)				Q _g Typ. (nC)	C _{iss} Typ. (pF)	Series
	V _{DSS} (V)	I _D (A)		10 V	4 V	2.5 V	2.0 V			
TPCS8004	200	1.3	N-ch Single	800	—	—	—	12	380	π-MOSV
TPCS8009-H	150	2.1		350	—	—	—	10	600	π-MOSV MACHII
TPCS8007-H	200	1.9		450	—	—	—	10	600	π-MOSV MACHII
TPCS8008-H	250	1.7		580	—	—	—	10	600	π-MOSV MACHII
TPCS8104	-30	-11	P-ch Single	12	18	—	—	107	5710	U-MOSIV
TPCS8105	-30	-11		13.5	19.5	—	—	107	5710	U-MOSIV
TPCS8209	20	5	N-ch Dual	—	30	40	60	15	1280	U-MOSIII
TPCS8210 #	20	5		—	30	40	60	15	1280	U-MOSIII
TPCS8204	20	6		—	17	22	35	22	2160	U-MOSIII
TPCS8208 #	20	6		—	17	22	35	22	2160	U-MOSIII
TPCS8211	20	6		—	24	29	45	20	1590	U-MOSIII
TPCS8212 #	20	6		—	24	29	45	20	1590	U-MOSIII
TPCS8213	20	6	P-ch Dual	—	13	18	—	49	3140	U-MOSIII
TPCS8214	30	6		—	13.5	18.5	—	42	3240	U-MOSIII
TPCS8302	-20	-6		—	35*	60	95	28.5	1590	U-MOSIII
TPCS8303	-20	-5		—	21*	30	80	33	2560	U-MOSIV

#: Common drain *: V_{GS} = 4.5 V

SOP-8 Series ... [Part Number: TPC8xxx]**■ Features**

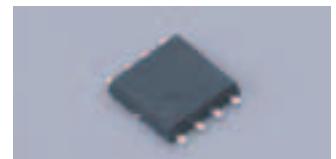
- Low ON-resistance and high-speed switching series are available.
- Low ON-resistance series: UMOSIV/V
- High-speed switching series: U-MOSIII-H and U-MOSV-H
- ON-resistance reduction through the use of an Al strap structure

**■ Product List**

Part Number	Absolute Maximum Ratings		Circuit Configuration	R _{DSON} Max (mΩ)				Q _G Typ. (nC)	C _{iss} Typ. (pF)	Series
	V _{DSS} (V)	I _D (A)		10 V	4.5 V	4 V	2.5 V			
TPC8021-H	30	11	N-ch Single	17	25	—	—	11	640	U-MOSIII-H
TPC8014	30	11		14	22	—	—	39	1860	U-MOSIII
TPC8020-H *	30	13		9	13	—	—	23	1395	U-MOSIII-H
TPC8017-H *	30	15		6.6	9.5	—	—	25	1465	U-MOSIII-H
TPC8018-H *	30	18		4.6	6.2	—	—	38	2265	U-MOSIII-H
TPC8031-H ☆	30	11		13.3	16.1	—	—	11	1433	U-MOSV-H
TPC8037-H *☆	30	12		11.4	13.9	—	—	11	1433	U-MOSV-H
TPC8038-H *☆	30	12		11.4	13.9	—	—	11	1433	U-MOSV-H
TPC8032-H *☆	30	15		6.5	8.6	—	—	17	2270	U-MOSV-H
TPC8033-H *☆	30	17		5.3	7.2	—	—	22	2900	U-MOSV-H
TPC8034-H *☆	30	18		3.5	4.5	—	—	35	4614	U-MOSV-H
TPC8039-H *☆	30	17		5.7	6.6	—	—	18	2600	U-MOSVI-H
TPC8036-H *☆	30	18		4.5	5.1	—	—	26	3500	U-MOSVI-H
TPC8035-H *☆	30	18		3.2	3.6	—	—	44	6000	U-MOSVI-H
TPC8022-H	40	7.5	N-ch Dual	27	35	—	—	11	650	U-MOSIII-H
TPC8012-H	200	1.8		400	—	—	—	11	440	π-MOSV
TPC8208	20	5		—	—	50	70	9.5	780	U-MOSIII
TPC8207	20	6		—	—	20	30	22	2010	U-MOSIII
TPC8211	30	5.5		36	44	—	—	25	1250	U-MOSIII
TPC8212-H	30	6		21	27	—	—	16	840	U-MOSIII-H
TPC8216-H ☆	30	6.4		20	22	—	—	7.6	900	U-MOSVI-H
TPC8210	30	8		15	20	—	—	75	3530	U-MOSIII
TPC8213-H	60	5		50	56	—	—	6	625	U-MOSIII-H
TPC8214-H	100	2.2		180	190	—	—	4.5	360	U-MOSIII-H
TPC8025 ☆	30	11	N-ch Single	9	14.5	—	—	26	1270	U-MOSIV
TPC8030 ☆	30	11		8.5	17	—	—	24	1140	U-MOSIV
TPC8041 *☆	30	13		7	13.5	—	—	27	1270	U-MOSIV
TPC8026 ☆	30	13		6.6	10	—	—	42	1800	U-MOSIV
TPC8028 *☆	30	18		4.3	8	—	—	45	1800	U-MOSIV
TPC8029 *☆	30	18		3.8	7	—	—	49	2200	U-MOSIV
TPC8042 *☆	30	18		3.4	6.5	—	—	56	2900	U-MOSIV
TPC8027 *☆	30	18		2.7	5.5	—	—	113	4200	U-MOSIV
TPC8109	-30	-10	P-ch Single	20	—	30	—	45	2260	U-MOSIII
TPC8119 *☆	-30	-10		13	—	28	—	40	1560	U-MOSV
TPC8121 *☆	-30	-11		12	—	24	—	42	1770	U-MOSV
TPC8111 *	-30	-11		12	—	18	—	107	5710	U-MOSIV
TPC8113 *	-30	-11		10	—	18	—	107	4500	U-MOSIV
TPC8122 *☆	-30	-12		8	—	16.5	—	62	2450	U-MOSV
TPC8107	-30	-13		7	—	15	—	130	5880	U-MOSIII
TPC8118 *☆	-30	-13		7	—	15	—	65	2700	U-MOSV
TPC8112 *	-30	-13		6	—	14	—	130	5880	U-MOSIII
TPC8114 *	-30	-18		4.5	—	6.8	—	180	7480	U-MOSIV
TPC8117 *☆	-30	-18		3.9	—	7.9	—	120	4600	U-MOSV
TPC8115	-20	-10		—	10	—	14	115	9130	U-MOSIV
TPC8110	-40	-8		25	—	35	—	48	2180	U-MOSIII
TPC8116-H	-40	-7.5		30	37	—	—	27	1190	U-MOSIII-H
TPC8405	30	6	N-ch/P-ch Dual	26	33	—	—	27	1240	U-MOSIII
	-30	-4.5		33	42	—	—	40	1540	U-MOSIV
TPC8406-H	40	6.5		27	35	—	—	11	650	U-MOSIII-H
	-40	-6.5		30	37	—	—	27	1190	U-MOSIII-H
TPC8A01	30	6	N-ch/N-ch + SBD	25	30	—	—	17	940	U-MOSIII
	30	8.5/1		18	21	—	—	49	2295	U-MOSIII
TPC8A02-H *	30	16/1		5.6	8.5	—	—	34	1970	U-MOSIII-H
TPC8A03-H *☆	30	17/1		5.6	7	—	—	19	2640	U-MOSV-H
TPC8A04-H *☆	30	18		3.6	4.5	—	—	TBD	4400	U-MOSV-H

*: Al straps ☆: No protection zener diode between gate and source

SOP Advance Series ... [Part Number: TPCA8xxx]



■ Features

- Low ON-resistance and high-speed switching series are available.
Low ON-resistance series: UMOSIV/V
High-speed switching series: U-MOSIII-H and U-MOSIV-H
- High current, thin and thermally enhanced package

■ Product List

Part Number	Absolute Maximum Ratings		Circuit Configuration	R _{DSON} Max (mΩ)					Q _g Typ. (nC)	C _{iss} Typ. (pF)	Series
	V _{DSS} (V)	I _D (A)		10 V	4.5 V	4.0 V	2.5 V	1.8 V			
TPCA8011-H	20	40	N-ch Single	—	3.5	—	7.5	—	32	2900	U-MOSIII-H
TPCA8023-H ☆	30	21		12.9	15.7	—	—	—	11	1433	U-MOSV-H
TPCA8030-H *☆	30	24		11.0	13.4	—	—	—	83	1433	U-MOSV-H
TPCA8031-H *☆	30	24		11.0	13.4	—	—	—	83	1433	U-MOSV-H
TPCA8005-H	30	27		9	13	—	—	—	24	1395	U-MOSIII-H
TPCA8018-H ☆	30	30		6.2	8.2	—	—	—	18	2270	U-MOSV-H
TPCA8039-H *☆	30	34		5.7	6.6	—	—	—	19	2600	U-MOSVI-H
TPCA8003-H	30	35		6.6	9.5	—	—	—	25	1465	U-MOSIII-H
TPCA8024 ☆	30	35		4.3	7.8	—	—	—	45	1800	U-MOSIV
TPCA8036-H *☆	30	38		4.2	4.8	—	—	—	26	3500	U-MOSVI-H
TPCA8004-H	30	40		4.6	6.2	—	—	—	37	2265	U-MOSIII-H
TPCA8012-H ☆	30	40		4.9	6.8	—	—	—	22	2900	U-MOSV-H
TPCA8025 ☆	30	40		3.5	6.0	—	—	—	49	2200	U-MOSIV
TPCA8042 *☆	30	45		3.3	5.7	—	—	—	56	2900	U-MOSIV
TPCA8019-H ☆	30	45		3.1	4.1	—	—	—	34	4614	U-MOSV-H
TPCA8026 ☆	30	45		2.2	4.5	—	—	—	113	4200	U-MOSIV
TPCA8028-H ☆	30	50		2.8	3.2	—	—	—	46	6000	U-MOSVI-H
TPCA8A01-H	30	36	MOSBD	5.6	8.5	—	—	—	19	1970	U-MOSIII-H
TPCA8A02-H ☆	30	34		5.3	6.7	—	—	—	19	2640	U-MOSV-H
TPCA8A04-H *☆	30	42		3.2	4.1	—	—	—	30	4400	U-MOSV-H
TPCA8020-H	40	7.5	N-ch Single	27	35	—	—	—	11	650	U-MOSIII-H
TPCA8014-H	40	30		9	14	—	—	—	22	1365	U-MOSIII-H
TPCA8027-H	40	30		10	—	—	—	—	23	1430	U-MOSIII-H
TPCA8015-H	40	35		5.4	7.9	—	—	—	37	2155	U-MOSIII-H
TPCA8016-H	60	25		21	26	—	—	—	22	1375	U-MOSIII-H
TPCA8006-H	100	18		67	—	—	—	—	12	780	π-MOSVII
TPCA8022-H	100	22		26	—	—	—	—	38	2330	U-MOSIII-H
TPCA8009-H	150	7		350	—	—	—	—	10	600	π-MOSV MACHII
TPCA8010-H	200	5.5		450	—	—	—	—	10	600	π-MOSV MACHII
TPCA8008-H	250	4		580	—	—	—	—	10	600	π-MOSV MACHII
TPCA8105	-12	-6	P-ch Single	—	33	—	51	92	18	1600	U-MOSIV
TPCA8106 ☆	-30	-40		3.7	—	7.8	—	—	120	4600	U-MOSV
TPCA8102	-30	-40		6	—	14	—	—	109	4600	U-MOSIII
TPCA8103	-30	-40		4.2	—	6.8	—	—	184	7880	U-MOSIV
TPCA8107-H	-40	-7.5		30	37	—	—	—	27	1190	U-MOSIII-H
TPCA8108	-40	-40		9.5	—	—	—	—	100	4820	U-MOSIII
TPCA8104	-60	-40		16	—	24	—	—	90	4300	U-MOSIII

*: Al straps ☆: No protection zener diode between gate and source

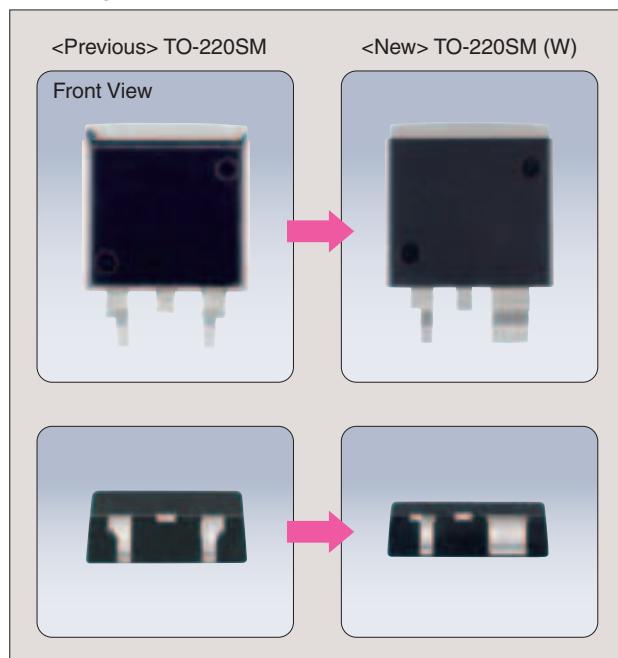
2. TO-220SM(W) Series

The TO-220SM(W) package, which uses Cu connectors and a wide source terminal, realizes low ON-resistance and a high current carrying capability.

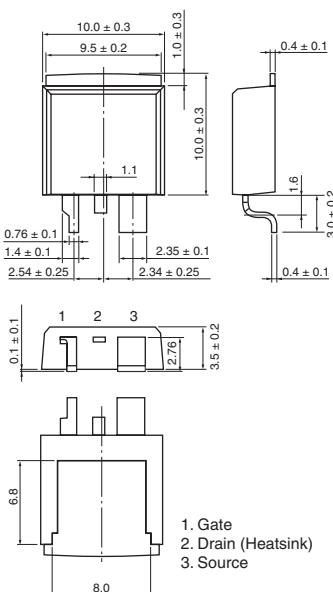
■ Features

- Achieves low ON-resistance, low package inductance and low thermal resistance due to the use of Cu connectors.
- Achieves a high current carrying capability due to the use of a wide source terminal (I_D (DC) = 150 A max)
- AEC-Q101-qualified at a channel temperature (T_{ch}) of 175°C
- Thin package: 3.7-mm (max) thick, much thinner than the previous TO-220SM package with a thickness of 4.7 mm (max)

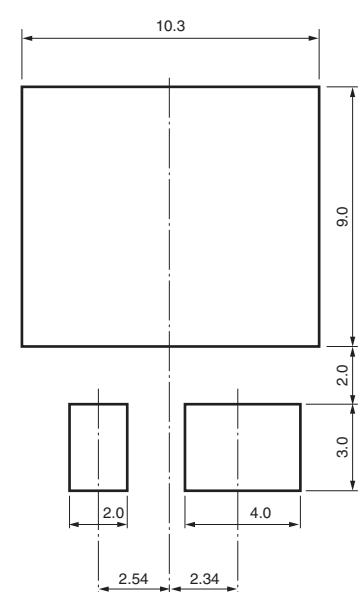
■ Package



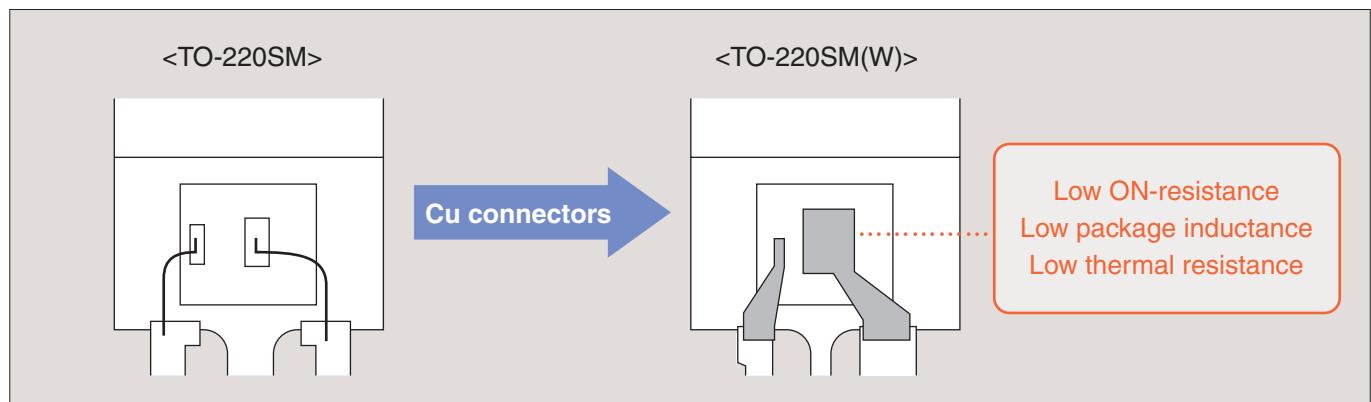
■ Package Dimensions



■ Land Pattern Example



■ Characteristics of the WARP Series

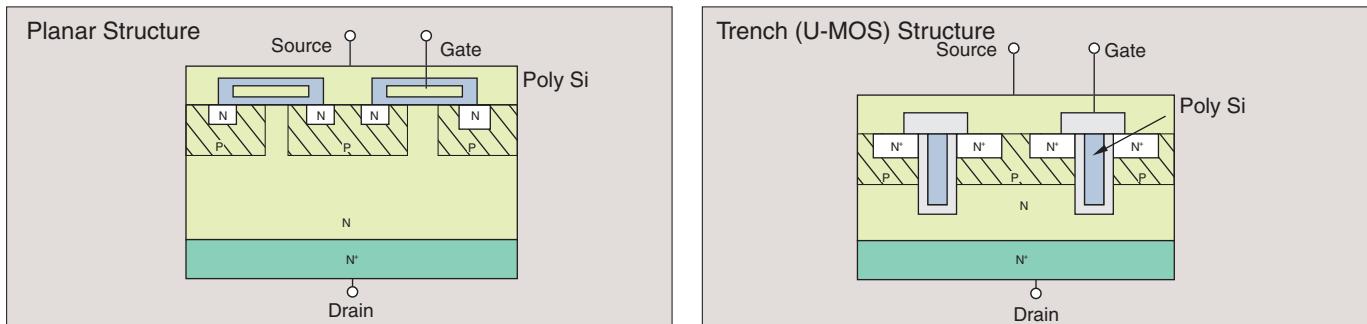


■ Product List

Part Number	Absolute Maximum Ratings		R _{DSS(ON)} Max (mΩ)		C _{iss} Typ. (pF)	Q _g Typ. (nC)
	V _{DSS} (V)	I _D (A)	Typ.	Max		
TJ120F06J3	-60	-120	5.5	8.0	11500	258
TK100F04K3	40	100	2.5	3.0	4500	102
TK150F04K3	40	150	1.7	2.1	7500	166
TK100F06K3	60	100	4.0	5.0	4500	98
TK130F06K3	60	130	2.6	3.4	8400	170
TK50F15J1	150	50	22	30	4300	75

3. U-MOSIII (Trench Type) Series

By employing a trench structure, this ultra-low ON-resistance series achieves extremely high integration.



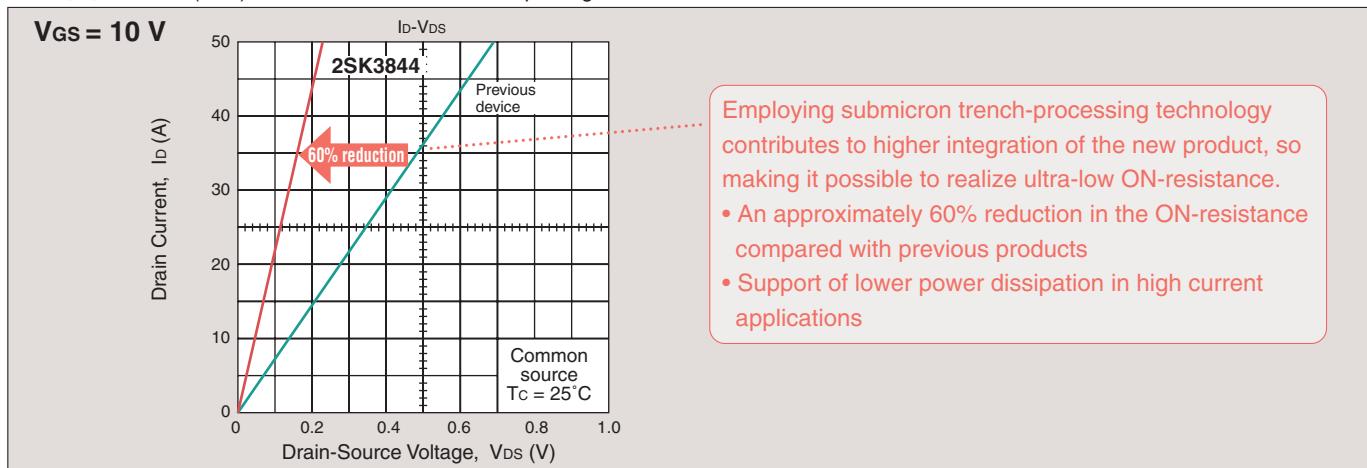
■ Features

- High density through the use of submicron technology
- 60 % R_{D(S)}(ON) reduced by per unit area (as compared with the maximum R_{D(S)}(ON) of the L²-π-MOSV)
- Guaranteed avalanche capability and improved in di/dt capability
- Protection zener diode between gate and source

■ Product List

Applications	Part Number	Absolute Maximum Ratings			Package	R _{D(S)} (ON) Max (mΩ)			R _{D(S)} (ON) Max (mΩ)			Q _g Typ. (nC)
		V _{DSS} (V)	I _D (A)	P _D (W)		V _{GSS} (V)	I _D (A)	V _{GSS} (V)	I _D (A)	V _{GSS} (V)	I _D (A)	
Motor drive solenoids Lamp drivers DC-DC converters	2SJ668	-60	-5	20	PW-Mold	170	-10	-2.5	250	-4	-2.5	15
	2SJ681	-60	-5	20	New PW-Mold2	170	-10	-2.5	250	-4	-2.5	15
	2SJ669	-60	-5	1.2	TPS	170	-10	-2.5	250	-4	-2.5	15
	TPCA8104	-60	-40	45	SOP Advance	16	-10	-20	24	-4	-20	90
	TJ120F06J3	-60	-120	300	TO-220SM(W)	8.0	-10	-60	—	—	—	258
	2SK3754	30	5	25	TO-220NIS	89	10	2.5	99	4.5	2.5	2.5
	2SK3846	40	26	25	TO-220NIS	16	10	13	28	4.5	13	40
	2SK3847	40	32	30	TO-220SM	16	10	16	28	4.5	16	40
	2SK3843	40	75	125	TFP	3.5	10	38	8.0	4.5	38	210
	TK70J04J3	40	70	150	TO-3P(N)	3.8	10	35	8.3	4.5	35	210
	2SK4017	60	5	20	New PW-Mold2	100	10	2.5	150	4	2.5	15
	2SK4033	60	5	20	New PW-Mold	100	10	2.5	150	4	2.5	15
	TK30A06J3A	60	30	25	TO-220SIS	26	10	15	35	4.5	15	36
	2SK3662	60	35	35	TO-220NIS	12.5	10	18	19	4	18	91
	2SK3842	60	75	125	TFP	5.8	10	38	—	—	—	196
	2SK4034	60	75	125	TFP	5.8	10	38	10	4.5	38	196
	2SK3844	60	45	45	TO-220NIS	5.8	10	23	—	—	—	196
	2SK3845	60	70	125	TO-3P(N)	5.8	10	23	—	—	—	196
	2SK3940	75	70	150	TO-3P(N)	7.0	10	35	—	—	—	200

■ R_{D(S)}(ON) = 5.8 mΩ(max) MOSFET housed in TO-220 package



4. U-MOS Series for Synchronous Rectification ($V_{DSS} = 60 \text{ V to } 150 \text{ V}$)

Fabricated using a trench technology, the U-MOS Series is ideal for synchronous rectification on the secondary side of power supply circuits.

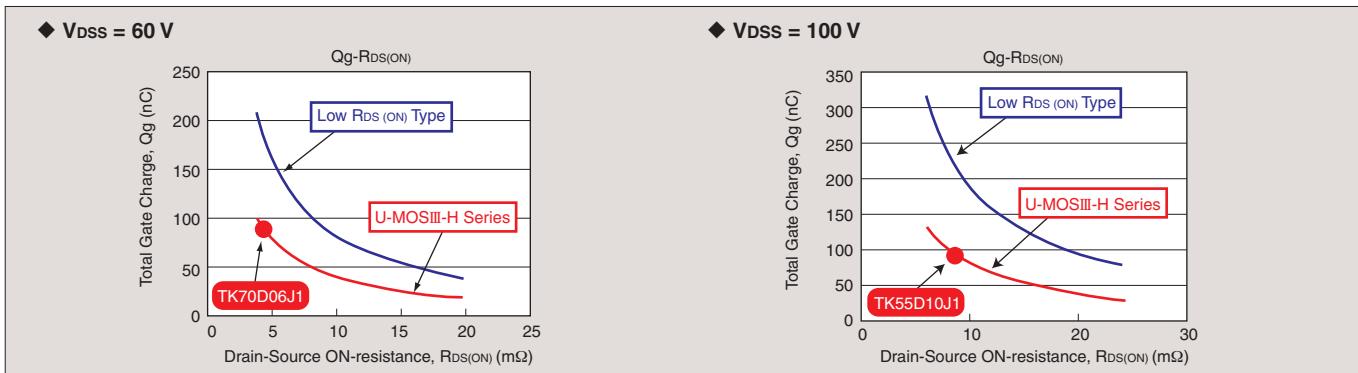
■ Features

- Low ON-resistance achieved by high density through the use of submicron technology
- Guaranteed avalanche capability
- High power dissipation achieved by having the series housed in the TO-220(W) package with an exposed heatsink on the bottom of the package

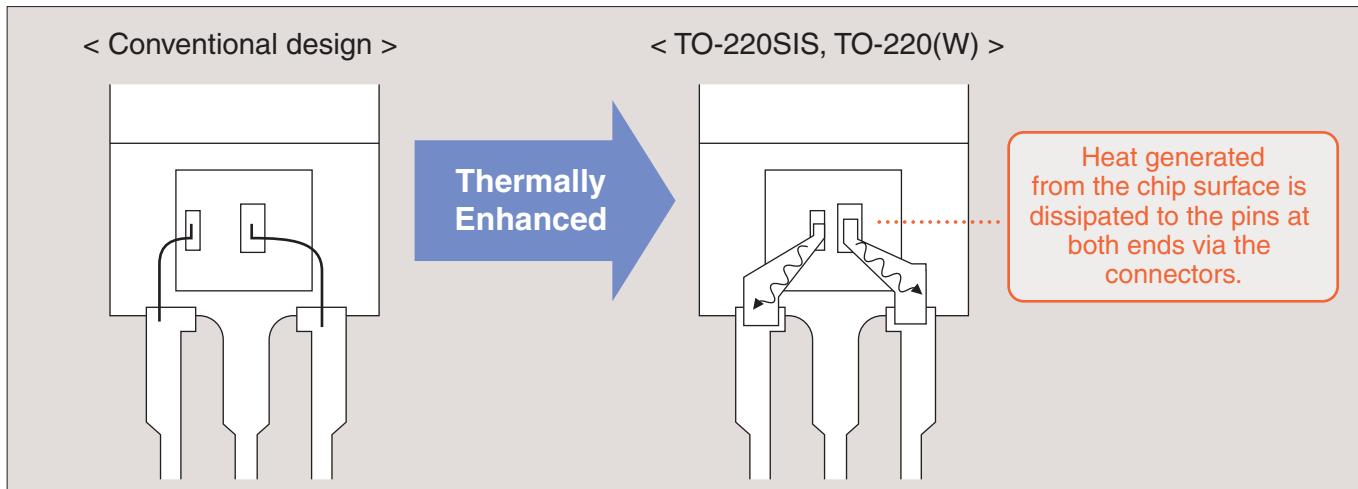
■ Product List

Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ (mΩ) @ $V_{GS} = 10 \text{ V}$	Q_g (nC) Typ.	Q_{sw} (nC) Typ.	Package
	V_{DSS} (V)	I_D (A)	P_D (W)	Typ.	Max	$V_{DS} = V_{DSS} \times 0.8, I_D = I_D(\text{DC})$	
TK70D06J1	60	70	140	5.1	6.4	87	30
TK70A06J1	60	70	45	5.1	6.4	87	TO-220SIS
TK60D08J1	75	60	140	6.2	7.8	86	27
TK60A08J1	75	60	45	6.2	7.8	86	TO-220SIS
TK80D08K3	75	80	100	3.6	4.5	175	80
TK80A08K3	75	80	40	3.6	4.5	175	TO-220SIS
TK40D10J1	100	40	100	11.5	15	76	25
TK40A10J1	100	40	40	11.5	15	76	TO-220SIS
TK55D10J1	100	55	140	8.4	10.5	110	33
TK55A10J1	100	55	45	8.4	10.5	110	TO-220SIS
TK50X15J1	150	50	125	22	30	75	33
							TFP

■ Q_g - $R_{DS(ON)}$ Trade-Off



■ Thermally Enhanced Package



5. π -MOSVII Series ($V_{DSS} = 500$ V to 600 V)

The latest addition to the π -MOS portfolio, the π -MOSVII Series offers reduced capacitances due to optimized chip design and is available with a greatly wider range of electrical characteristics.

■ Features

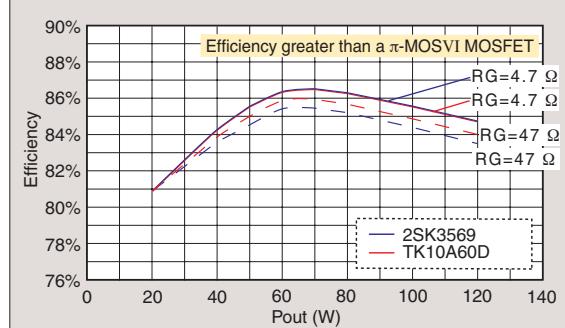
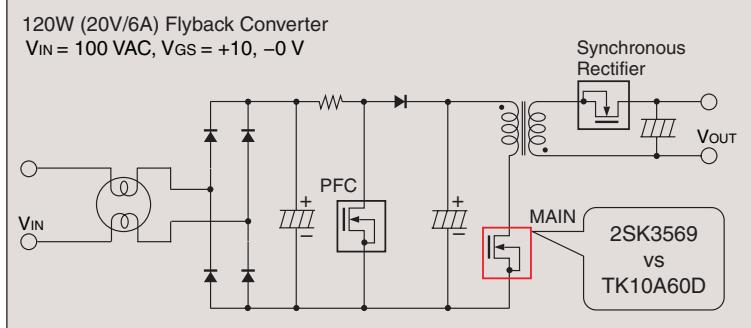
- 15% reduction in Q_g from π -MOSVI due to optimized chip design
- Available at 50-V steps of V_{DSS} and at finer steps of $R_{DS(ON)}$.
- Rated avalanche and reverse recovery current capabilities

■ Performance Comparisons Between π -MOSVII and π -MOSVI Devices (600 V/10 A)

Series		π -MOSVII			π -MOSVI				
Part Number	TK10A60D				2SK3569				
Ratings	600 V/10 A			600 V/10 A					
Package	TO-220SIS			TO-220SIS					
Characteristic	Symbol	Test Conditions	Min	Typ.	Max	Min	Typ.	Max	Unit
Gate leakage current	$\pm I_{GSS}$	$V_{GS} \text{ condition}^*, V_{DS} = 0 \text{ V}$	—	—	± 1	—	—	± 10	μA
Drain cut-off current	I_{DSS}	$V_{DS} = 600 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	—	—	100	μA
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = +10 \text{ mA}, V_{GS} = 0 \text{ V}$	600	—	—	600	—	—	V
Gate threshold voltage	V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	2.0	—	4.0	2.0	—	4.0	V
Drain-source ON-resistance	$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	—	—	0.75	—	—	0.75	Ω
Total gate charge	Q_g	$V_{DD} = 400 \text{ V}, V_{GS} = 10 \text{ V}$ $I_D = 10 \text{ A}$	—	25	—	—	42	—	nC
Diode forward voltage	V_{DF}	$I_{DR} = 10 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	—	—	-1.7	V

*1: Test conditions: TK10A60D : $V_{GS} = \pm 30 \text{ V}$, 2SK3569 : $V_{GS} = \pm 25 \text{ V}$

■ Efficiency Test Circuit



■ Product List

Part Number	Absolute Maximum Ratings		Existing Equivalent Part Number	Package	Part Number	Absolute Maximum Ratings		$R_{DS(ON)}$ (Ω)	Existing Equivalent Part Number	Package
	V_{DSS} (V)	I_D (A)				V_{DSS} (V)	I_D (A)			
TK5A50D *	500	5	1.5	2SK3563	TO-220SIS	550	11	0.63	—	TO-220SIS
TK7A50D *		7	1.2	—	TO-220SIS		14	0.37	—	TO-220SIS
TK8A50D		8	0.85	2SK3561	TO-220SIS	600	3.5	2.2	2SK3567	TO-220SIS
TK10A50D *		10	0.7	—	TO-220SIS		4	1.7	—	TO-220SIS
TK12A50D		12	0.52	2SK3568	TO-220SIS		6	1.25	2SK3562	TO-220SIS
TK13A50DA *		12.5	0.47	—	TO-220SIS		7.5	1	2SK3667	TO-220SIS
TK13A50D *		13	0.4	2SK4012	TO-220SIS		10	0.75	2SK3569	TO-220SIS
TK15J50D *		15	0.4	2SK4107	TO-3P(N)		11	0.65	—	TO-220SIS
TK15A50D		15	0.3	2SK3934	TO-220SIS		12	0.55	—	TO-220SIS
TK20J50D *		20	0.27	2SK4108	TO-3P(N)		13	0.43	2SK3797	TO-220SIS

*: Under development

6. Super-Junction DTMOS Series ($V_{DSS} = 600$ V)

The DTMOS devices employ a new super junction structure that enables an ultra-low ON-resistance with the maximum V_{BSS} rating of 600 V. The DTMOS Series aids in reduction of power consumption and miniaturization of electronics equipment.

■ Features

- Low ON-resistance TK40J60T: 80 mΩ (max) @ $V_{GS} = 10$ V, $I_D = 20$ A
- Low gate charge TK20A60U: $Q_g = 27$ nC typ., 600 V / 20 A
- Avalanche capability guaranteed up to the rated maximum current e.g.) TK20A60U $I_{AR} = 20$ A @ $V_{DD} = 90$ V, $R_G = 25 \Omega$, $L = 0.63$ mH
- The rugged internal drain-source diode is not damaged at $dI/dt = 500$ A/μs (@ $V_{DS} = 400$ V, 150°C).

■ Product List

Part Number	Absolute Maximum Ratings		$R_{DS(ON)}$ Max (Ω) $V_{GS} = 10$ V	Q_g Typ. (nC)	C_{iss} Typ. (pF)	Package	Series
	V_{DSS} (V)	I_D (A)					
TK12A60U	600	12	0.4	14	720	TO-220SIS TO-220(W) TO-3P(N)	DTMOSII
TK12D60U							
TK12J60U		15	0.3	21	1200	TO-3P(N)	DTMOSI
TK15J60T		15	0.3	17	950	TO-220SIS TO-220(W) TO-3P(N)	DTMOSII
TK15A60U							
TK15D60U		20	0.19	30	1580	TO-220SIS TO-220(W) TO-3P(N)	DTMOSI
TK15J60U							
TK20A60T		20	0.19	27	1470	TO-220SIS TO-220(W) TO-3P(N)	DTMOSII
TK20D60T							
TK20J60T		40	0.08	67	3900	TO-3P(N)	DTMOSI

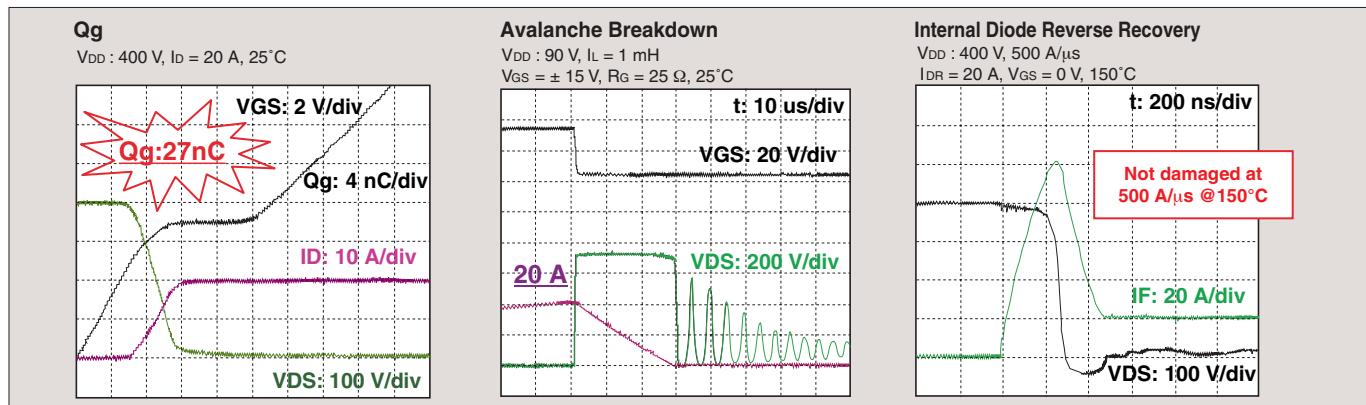
■ Performance Comparisons Between the New DTMOS and Conventional MOSFET (π -MOSVI) Devices (600 V/20 A)

Characteristic	Symbol	Test Conditions	DTMOSII			π -MOSVI		
			Part Number			Ratings		
			TK20J60U			600 V/20 A		
Gate leakage current	$\pm I_{GSS}$	V_{GS} condition ^{*1} , $V_{DS} = 0$ V	—	—	± 1	—	—	± 10 μ A
Drain cut-off current	I_{BS}	$V_{DS} = 600$ V, $V_{GS} = 0$ V	—	—	100	—	—	100 μ A
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 10$ mA, $V_{GS} = 0$ V	600	—	—	600	—	— V
Gate threshold voltage	V_{th}	$V_{DS} = 10$ V, $I_D = 1$ mA	3.0	—	5.0	2.0	—	4.0 V
Drain-source ON-resistance	$R_{DS(ON)}$	$V_{GS} = 10$ V, $I_D = 10$ A	—	0.165	0.19	—	0.22	0.32 Ω
Total gate charge	Q_g	$V_{DD} = 400$ V, $V_{GS} = 10$ V $I_D = 20$ A	—	27	—	—	60	— nC
Diode forward voltage	V_{DSF}	$I_{DR} = 20$ A, $V_{GS} = 0$ V	—	—	-1.7	—	—	-1.7 V

*1: Test conditions: TK20J60U: $V_{GS} = \pm 30$ V, 2SK3911: $V_{GS} = \pm 25$ V

■ Performance Characteristics of the New DTMOS Series

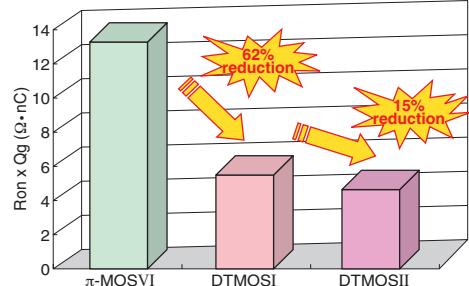
TK20A60U Electrical Characteristics



■ Figure-of-Merit (FOM) Comparison

$R_{on} \times Q_g$, the product of ON-resistance and total gate charge, is reduced by 62%, compared with the conventional MOSFETs with the same chip size.

* $R_{on} \times Q_g$ is a figure-of-merit index for the switching speed of MOSFETs.



7. High-speed π -MOS Series ($V_{DSS} = 450$ V to 600 V)

To foster the development of high-efficiency equipment, Toshiba has developed two series of high-speed Power MOSFETs: a high-speed switching series for AC adapters and switching power supplies; and a high-speed diode series for motor controllers and inverter circuits.

- MACH Series: Achieves a higher switching speed than the existing π -MOS Series, which is currently well established in the market.
- High-Speed Diode Series: Achieves a higher internal diode speed by using lifetime control.

■ Product List

- MACH Series

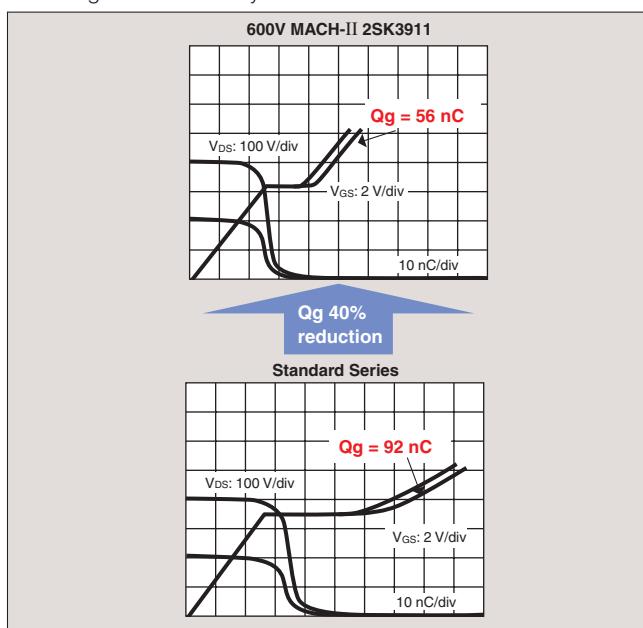
Applications	Part Number	Absolute Maximum Ratings			Package	$R_{DS(ON)}$ Max (Ω)	V_{GS} (V)	I_D (A)	Q_g Typ. (nC)	Standard Type	Series
		V_{DSS} (V)	I_D (A)	P_D (W)							
AC adapters Switching power supplies	2SK3310	450	10	40	TO-220NIS	0.65	10	5	23	2SK3126	MACH-I
	2SK3309	450	10	65	TO-220FL/SM	0.65	10	5	23	—	
	2SK3743	450	13	40	TO-220NIS	0.4	10	6	34	—	
	2SK3403	450	13	100	TO-220FL/SM	0.4	10	6	34	—	
	2SK3312	600	6	65	TO-220FL/SM	1.25	10	3	25	2SK2777	
	2SK3437	600	10	80	TO-220FL/SM	1	10	5	28	2SK2996	
	2SK3399	600	10	100	TO-220FL/SM	0.75	10	5	35	2SK2866	
	2SK3907	500	23	150	TO-3P(N)	0.23	10	11.5	60	—	MACH-II
	2SK3911	600	20	150	TO-3P(N)	0.32	10	10	60	—	

- High-Speed Diode Series (HSD Series)

Applications	Part Number	Absolute Maximum Ratings			Package	$R_{DS(ON)}$ Max (Ω)	V_{GS} (V)	I_D (A)	t_{rr} Typ. (ns)	Standard Type
		V_{DSS} (V)	I_D (A)	P_D (W)						
Motor control Inverter Switching power supplies	2SK3868	500	5	35	TO-220SIS	1.7	10	2.5	150	2SK3563
	2SK3417	500	5	50	TO-220FL/SM	1.8	10	2.5	60	2SK2991
	2SK4042	500	8	40	TO-220SIS	0.97	10	4	185	2SK3561
	2SK3313	500	12	40	TO-220NIS	0.62	10	6	90	2SK2842
	2SK3314	500	15	150	TO-3P(N)	0.49	10	7	105	2SK2698
	2SK3131	500	50	250	TO-3P(L)	0.11	10	25	105	2SK3132
	2SK3936	500	23	150	TO-3P(N)	0.25	10	11.5	380	2SK3907
	2SK3947	600	6	40	TO-220SIS	1.4	10	3	150	2SK3562
	2SK4015	600	10	45	TO-220SIS	0.86	10	5	170	2SK3569
	2SK4016	600	13	50	TO-220SIS	0.50	10	6.5	160	2SK3797
	2SK3906	600	20	150	TO-3P(N)	0.33	10	10	400	2SK3911

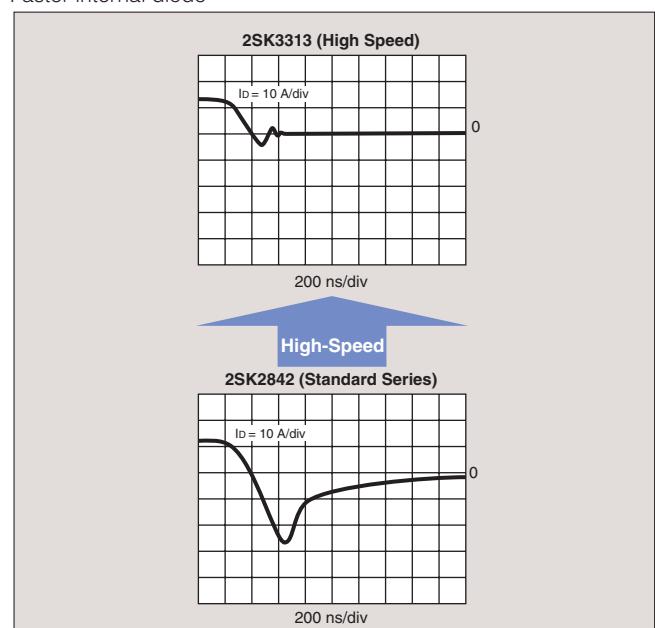
■ Characteristics of MACHII Series

Switching loss reduced by 40%



■ Characteristics of High-Speed Diode Series

Faster internal diode



Part Number	Series	Package	Main Characteristics			Page
			V _{DSS} (V)	I _D (A)	R _{DS(ON)} Max (Ω)	
2SK3743	MACH	TO-220NIS	450	13	0.6	P 17
2SK3754	U-MOSIII	TO-220NIS	30	5	0.089	P 12
2SK3757	π-MOSVI	TO-220SIS	450	2	2.45	P 18
2SK3766	π-MOSVI	TO-220SIS	450	2	2.45	P 18
2SK3767	π-MOSVI	TO-220SIS	600	2	4.5	P 18
2SK3797	π-MOSVI	TO-220SIS	600	13	0.43	P 18
2SK3798	π-MOSIV	TO-220SIS	900	4	3.5	P 18
2SK3799	π-MOSIV	TO-220SIS	900	8	1.3	P 18
2SK3842	U-MOSIII	TFP	60	75	0.0058	P 13
2SK3843	U-MOSIII	TFP	40	75	0.0035	P 13
2SK3844	U-MOSIII	TO-220NIS	60	45	0.0058	P 13
2SK3845	U-MOSIII	TO-3P (N)	60	70	0.0058	P 13
2SK3846	U-MOSIII	TO-220NIS	40	26	0.018	P 13
2SK3847	U-MOSIII	TO-220SM	40	26	0.018	P 13
2SK3863	π-MOSVI	DP	500	5	1.5	P 18
2SK3868	π-MOSVI(HSD)	TO-220SIS	500	5	1.7	P 17
2SK3869	π-MOSVI	TO-220SIS	450	10	0.68	P 18
2SK3878	π-MOSIV	TO-3P (N)	900	9	1.3	P 18
2SK3879	π-MOSIV	TO-220FL/SM	800	6.5	1.7	P 18
2SK3880	π-MOSIV	TO-3P (N)IS	800	6.5	1.7	P 18
2SK3903	π-MOSVI	TO-3P (N)	600	14	0.44	P 18
2SK3904	π-MOSVI	TO-3P (N)	450	19	0.26	P 18
2SK3905	π-MOSVI	TO-3P (N)	500	17	0.31	P 18
2SK3906	MACH (HSD)	TO-3P (N)	600	20	0.33	P 17
2SK3907	MACH	TO-3P (N)	500	23	0.23	P 17
2SK3911	MACH	TO-3P (N)	600	20	0.32	P 17
2SK3934	π-MOSVI	TO-220SIS	500	15	0.3	P 18
2SK3935	π-MOSVI	TO-220SIS	450	17	0.25	P 18
2SK3936	MACH (HSD)	TO-3P (N)	500	23	0.25	P 17
2SK3947	π-MOSVI(HSD)	TO-220SIS	600	6	1.4	P 17
2SK3975	π-MOSV	New PW-Mold	600	3	2.2	P 20
2SK3994	π-MOSV	TO-220NIS	250	20	0.105	P 19
2SK4002	π-MOSV	New PW-Mold2	600	2	5	P 20
2SK4003	π-MOSV	New PW-Mold2	600	3	2.2	P 20
2SK4012	π-MOSVI	TO-220SIS	500	13	0.4	P 18
2SK4013	π-MOSIV	TO-220SIS	800	6	1.7	P 18
2SK4014	π-MOSIV	TO-220SIS	900	6	2.0	P 17
2SK4015	π-MOSVI(HSD)	TO-220SIS	600	10	0.86	P 17
2SK4016	π-MOSVI(HSD)	TO-220SIS	600	13	0.5	P 17
2SK4017	U-MOSIII	New PW-Mold2	60	5	0.1	P 13
2SK4018	L ² -π-MOSV	New PW-Mold2	100	3	0.35	P 19
2SK4019	L ² -π-MOSV	New PW-Mold2	100	5	0.23	P 19
2SK4020	π-MOSV	New PW-Mold2	200	5	0.8	P 19
2SK4021	π-MOSV	New PW-Mold2	250	4.5	1	P 19
2SK4022	π-MOSV	New PW-Mold2	250	3	1.7	P 19
2SK4023	π-MOSV	New PW-Mold2	450	1	4.6	P 20
2SK4026	π-MOSV	New PW-Mold2	600	1	9	P 20
2SK4033	U-MOSIII	New PW-Mold	60	5	0.1	P 13
2SK4034	U-MOSIII	TFP	60	75	0.0058	P 13
2SK4042	π-MOSVI(HSD)	TO-220SIS	500	8	0.97	P 17

Part Number	Series	Package	Main Characteristics			Page
			V _{DSS} (V)	I _D (A)	R _{DS(ON)} Max (Ω)	
2SK4103	π-MOSVI	New PW-Mold	500	5	1.5	P 18
2SK4107	π-MOSVI	TO-3P (N)	500	15	0.4	P 18
2SK4108	π-MOSVI	TO-3P (N)	500	20	0.27	P 18
2SK4115	π-MOSIV	TO-3P (N)	900	7	2	P 18
2SK4207	π-MOSIV	TO-3P(N)	900	13	0.95	P 18
TK6A60D	π-MOSVII	TO-220SIS	600	6	1.25	P 15
TK8A50D	π-MOSVII	TO-220SIS	500	8	0.85	P 15
TK10A60D	π-MOSVII	TO-2220SIS	600	10	0.75	P 15
TK12A50D	π-MOSVII	TO-220SIS	500	12	0.52	P 15
TK12A60U	DTMOSII	TO-220SIS	600	12	0.4	P 16
TK12D60U	DTMOSII	TO-220(W)	600	12	0.4	P 16
TK12J60U	DTMOSII	TO-3P (N)	600	12	0.4	P 16
TK13A60D	π-MOSVII	TO-220SIS	600	13	0.43	P 15
TK15A50D	π-MOSVII	TO-220SIS	500	15	0.3	P 15
TK15A60U	DTMOSII	TO-220SIS	600	15	0.3	P 16
TK15D60U	DTMOSII	TO-220(W)	600	15	0.3	P 16
TK15J60T	DTMOSI	TO-3P (N)	600	15	0.28	P 16
TK15J60U	DTMOSII	TO-3P (N)	600	15	0.3	P 16
TK20A60T	DTMOSI	TO-220SIS	600	20	0.19	P 16
TK20A60U	DTMOSII	TO-220SIS	600	20	0.19	P 16
TK20D60T	DTMOSI	TO-220 (W)	600	20	0.19	P 16
TK20D60U	DTMOSII	TO-220 (W)	600	20	0.19	P 16
TK20J60T	DTMOSI	TO-3P (N)	600	20	0.19	P 16
TK20J60U	DTMOSII	TO-3P (N)	600	20	0.19	P 16
TK30A06J3A	U-MOSIII	TO-220SIS	60	30	0.026	P 13
TK40A10J1	U-MOSIII-H	TO-220SIS	100	40	0.015	P 14
TK40D10J1	U-MOSIII-H	TO-220 (W)	100	40	0.015	P 14
TK40J60T	DTMOSI	TO-3P (N)	600	40	0.08	P 16
TK50X15J1	U-MOSIII-H	TFP	150	50	0.03	P 14
TK50F15J1	U-MOSIII	TO-220SM(W)	150	50	0.03	P 12
TK55A10J1	U-MOSIII-H	TO-220SIS	100	55	0.0105	P 14
TK55D10J1	U-MOSIII-H	TO-220 (W)	100	55	0.0105	P 14
TK60A08J1	U-MOSIII-H	TO-220SIS	75	60	0.0078	P 14
TK60D08J1	U-MOSIII-H	TO-220 (W)	75	60	0.0078	P 14
TK70A06J1	U-MOSIII-H	TO-220SIS	60	70	0.0064	P 14
TK70D06J1	U-MOSIII-H	TO-220 (W)	60	70	0.0064	P 14
TK70J04J3	U-MOSIII	TO-3P (N)	40	70	0.0038	P 13
TK80A08K3	U-MOSIV	TO-220SIS	75	80	0.0045	P 14
TK80D08K3	U-MOSIV	TO-220 (W)	75	80	0.0045	P 14
TK100F04K3	U-MOSIV	TO-220SM(W)	40	100	0.003	P 12
TK100F06K3	U-MOSIV	TO-220SM(W)	60	100	0.005	P 12
TK130F06K3	U-MOSIV	TO-220SM(W)	60	130	0.0034	P 12
TK150F04K3	U-MOSIV	TO-220SM(W)	40	150	0.0021	P 12
TPC6003	U-MOSIII	VS-6	30	6	0.024	P 8
TPC6004	U-MOSIII	VS-6	20	6	0.024	P 8
TPC6005	U-MOSIII	VS-6	30	6	0.028	P 8
TPC6006-H	U-MOSIII-H	VS-6	40	3.9	0.075	P 8
TPC6007-H	U-MOSIII-H	VS-6	30	5	0.054	P 8
TPC6103	U-MOSIII	VS-6	-12	-5.5	0.035	P 8
TPC6104	U-MOSIII	VS-6	-20	-5.5	0.04	P 8

Part Number	Series	Package	Main Characteristics			Page
			V _{DSS} (V)	I _D (A)	R _{DSON} Max (Ω)	
TPCF8102	U-MOSIII	VS-8	-20	-6	0.03	P 8
TPCF8103	U-MOSIII	VS-8	-20	-2.7	0.11	P 8
TPCF8104	U-MOSIII	VS-8	-30	-6	0.028	P 8
TPCF8201	U-MOSIII	VS-8	20	3	0.049	P 8
TPCF8301	U-MOSIII	VS-8	-20	-2.7	0.11	P 8
TPCF8302	U-MOSIII	VS-8	-20	-3	0.059	P 8
TPCF8303	U-MOSIII	VS-8	-20	-3	0.058	P 8
TPCF8304	U-MOSIV	VS-8	-30	-3.2	0.072	P 8
TPCF8402	U-MOSIII	VS-8	-30/30	-3.2/4	0.072/0.05	P 8
TPCF8A01	U-MOSIII	VS-8	20	3	0.049	P 8
TPCF8B01	U-MOSIII	VS-8	-20	-2.7	0.11	P 8
TPCP8001-H	U-MOSIII-H	PS-8	30	7.2	0.016	P 8
TPCP8002	U-MOSIV	PS-8	20	9.1	0.01	P 8
TPCP8003-H	U-MOSIII-H	PS-8	100	2.2	0.19	P 8
TPCP8004	U-MOSIV	PS-8	30	8.3	0.009	P 8
TPCP8005-H	U-MOSV-H	PS-8	30	11	0.0133	P 8

Part Number	Series	Package	Main Characteristics			Page
			V _{DSS} (V)	I _D (A)	R _{DSON} Max (Ω)	
TPCP8101	U-MOSIII	PS-8	-20	-5.6	0.030	P 8
TPCP8102	U-MOSIV	PS-8	-20	-7.6	0.018	P 8
TPCP8103-H	U-MOSIII-H	PS-8	-40	-4.8	0.040	P 8
TPCP8201	U-MOSIII	PS-8	30	4.2	0.05	P 8
TPCP8202	U-MOSIV	PS-8	30	5.5	0.023	P 8
TPCP8203	U-MOSIII	PS-8	40	4.7	0.04	P 8
TPCP8301	U-MOSIV	PS-8	-20	-5	0.031	P 8
TPCP8302	U-MOSIV	PS-8	-20	-5	0.033	P 8
TPCP8401	U-MOSIII	PS-8	-12/20	-5.5/0.1	0.038/3	P 8
TPCP8402	U-MOSIII	PS-8	-30/30	-3.4/4.2	0.048/0.072	P 8
TPCP8403	U-MOSIV/U-MOSIII	PS-8	-40/40	-3.4/4.7	0.170/0.040	P 8
TPCP8J01	U-MOSIV	PS-8	-32/50	-6/0.1	0.035	P 8
TPCT4201	U-MOSIII	STP	20	6	0.031	P 9
TPCT4202	U-MOSIII	STP	30	6	0.038	P 9
TPCT4203	U-MOSIV	STP2	20	6	0.031	P 9
TPCT4204	U-MOSIV	STP2	30	6	0.038	P 9

6

End-of-Life and Obsolete Product List

1. End-of-Life Products

The part numbers in the left-hand column below are end-of-life, final-phase or obsolete products. When ordering, please choose from among the recommended products in the right-hand column.

End-of-Life Products				Replacement Products					
Part Number	Electrical Characteristics			Package	Part Number	Electrical Characteristics			Package
	V _{DSS} (V)	I _D (A)	R _{DSON} Max(Ω)			V _{DSS} (V)	I _D (A)	R _{DSON} Max(Ω)	
2SJ465	-16	-2	0.71	PW-Mini	TPC6105	-20	-2.7	0.11	VS-6
2SJ511	-30	-2	0.76	PW-Mini	TPC6108	-30	-4.5	0.006	VS-6
2SJ525	-30	-5	0.12	TPS	TPCF8104	-30	-6	0.028	VS-8
2SK1120	1000	8	1.8	TO-3P(N)	2SK2613	1000	8	1.7	TO-3P(N)
2SK2312	60	45	0.017	TO-220NIS	2SK3844	60	45	0.0058	TO-220NIS
2SK2466	100	30	0.046	TO-220NIS	TK55D10J1	100	55	0.0105	TO-220(W)
2SK2543	500	8	0.85	TO-220NIS	2SK3561	500	8	0.85	TO-220SIS
2SK2544	600	6	1.25	TO-220AB	2SK3761	600	6	1.25	TO-220AB
2SK2545	600	6	1.25	TO-220NIS	2SK3562	600	6	1.25	TO-220SIS
2SK2549	16	2	0.29	PW-Mini	TPC6004	20	6	0.024	VS-6
2SK2611	900	9	1.4	TO-3P(N)	2SK3878	900	9	1.3	TO-3P(N)
2SK2661	500	5	1.5	TO-220AB	2SK3758	500	5	1.5	TO-220AB
2SK2662	500	5	1.5	TO-220NIS	2SK3563	500	5	1.5	TO-220SIS
2SK2698	500	15	0.4	TO-3P(N)	2SK4107	500	15	0.4	TO-3P(N)

End-of-Life Products				Replacement Products					
Part Number	Electrical Characteristics			Package	Part Number	Electrical Characteristics			Package
	V _{DSS} (V)	I _D (A)	R _{DSON} Max(Ω)			V _{DSS} (V)	I _D (A)	R _{DSON} Max(Ω)	
2SK2700	900	3	4.3	TO-220NIS	2SK3564	900	3	4.3	TO-220SIS
2SK2717	900	5	2.5	TO-220NIS	2SK3565	900	5	2.5	TO-220SIS
2SK2718	900	2.5	6.4	TO-220NIS	2SK3566	900	2.5	6.4	TO-220SIS
2SK2746	800	7	1.7	TO-3P(N)	2SK3633	800	7	1.7	TO-3P(N)
2SK2749	900	7	2.0	TO-3P(N)	2SK4115	900	7	2.0	TO-3P(N)
2SK2750	600	3.5	2.2	TO-220NIS	2SK3567	600	3.5	2.2	TO-220SIS
2SK2837	500	20	0.27	TO-3P(N)	2SK4108	500	20	0.27	TO-3P(N)
2SK2842	500	12	0.52	TO-220NIS	2SK3568	500	12	0.52	TO-220SIS
2SK2843	600	10	0.75	TO-220NIS	2SK3569	600	10	0.75	TO-220SIS
2SK2844	30	35	0.02	TO-220AB	TK70D06J1	60	70	0.0064	TO-220(W)
2SK2964	30	2	0.18	PW-Mini	TPC6003	30	6	0.024	VS-6
2SK3067	600	2	5.0	TO-220NIS	2SK3767	600	2	4.5	TO-220SIS
2SK3084	100	30	0.046	TO-220FL/SM	—	—	—	—	—
2SK3089	30	40	0.03	TO-220FL/SM	2SK3847	40	32	0.018	TO-220SM
2SK3090	30	45	0.02	TO-220FL/SM	2SK3847	40	32	0.018	TO-220SM
2SK3125	30	70	0.007	TO-3PSM	2SK3843	40	75	0.0035	TFP
2SK3127	30	45	0.012	TO-220FL/SM	2SK3847	40	32	0.018	TO-220SM
2SK3128	30	60	0.012	TO-3P(N)	2SK3843	40	75	0.0035	TFP
2SK3236	60	35	0.02	TO-220NIS	2SK3662	60	35	0.0125	TO-220NIS
2SK3316	500	5	1.8	TO-220NIS	2SK3868	500	5	1.7	TO-220NIS
2SK3389	30	75	0.005	TFP	2SK3843	40	75	0.008	TFP
2SK3397	30	75	0.006	TFP	2SK3843	40	75	0.0035	TFP
2SK3439	30	75	0.005	TFP	2SK3843	40	75	0.0035	TFP
2SK3440	60	50	0.008	TFP	2SK3842	60	75	0.0058	TFP
2SK3441	60	75	0.0058	TFP	2SK4034	60	75	0.0058	TFP
2SK3442	100	45	0.02	TFP	TK40D10J1	100	40	0.015	TO-220(W)
2SK3543	450	2	2.45	TO-220NIS	2SK3757	450	2	2.45	TO-220SIS
TPC6106	-40	-3.9	0.08	VS-6	—	—	—	—	—
TPC6201	30	2.5	0.095	VS-6	TPCP8202	30	5.5	0.023	PS-8
TPC8301	-30	-3.5	0.12	SOP-8	TPCF8304	-30	3.2	0.105	SOP-8
TPC8303	-30	-4.5	0.035	SOP-8	—	—	—	—	—

2. Final-Phase Products

Part Number	Replacement Product
2SJ239*	2SJ681
2SJ239**	2SJ668
2SJ377*	2SJ681
2SJ377**	2SJ668
2SK851	2SK2967
2SK940	2SK2961
2SK1347	2SK2314
2SK1349	2SK2391
2SK1357	2SK3700
2SK1643	2SK3565
2SK1652	2SK4107
2SK1720	2SK2266
2SK1854	2SK2952
2SK1856	2SK4107
2SK1864	2SK2776
2SK1882	2SK2232
2SK1915	2SK2777
2SK1928	2SK2789
2SK1997	2SK2385
2SK1998	2SK2233

Part Number	Replacement Product
2SK2231*	2SK4017
2SK2231**	2SK4033
2SK2235	2SK3462
2SK2387	2SK2542
2SK2741	2SK4033
2SK2742	2SK2201
2SK2836	2SK3371
2SK2839	TPCF8001
2SK2985	2SK3844
2SK2986	2SK3842
2SK2987	2SK3845
TPC6001	TPC6004
TPC6002	TPC6003
TPC6101	TPC6107
TPC6102	TPC6108
TPC6201	TPCP8202
TPC8003	TPC8017-H
TPC8004	TPC8014
TPC8006-H	TPC8022-H
TPC8009-H	TPC8020-H

Part Number	Replacement Product
TPC8010-H	TPC8021-H
TPC8013-H	TPC8017-H
TPC8015-H	TPC8020-H
TPC8016-H	TPC8018-H
TPC8104-H	TPCS8015
TPC8105-H	TPC8116-H
TPC8108	TPC8111
TPC8203	TPC8212-H
TPC8206	TPC8213-H
TPC8302	TPCP8301
TPC8305	TPCS8303
TPC8401	TPC8405
TPC8402	TPC8405
TPC8403	TPC8405
TPCS8101	TPCS8105
TPCS8102	TPCP8101
TPCS8205	TPCS8210

*: Straight lead **: SMD

3. Obsolete Products

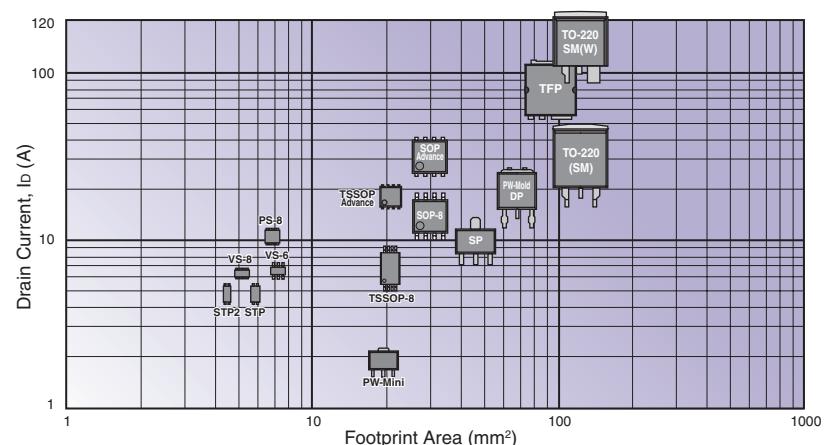
Part Number	Replacement Product
2SJ91	2SJ200
2SJ92	2SJ200
2SJ123	2SJ304
2SJ124	2SJ304
2SJ126	2SJ304
2SJ147	2SJ304
2SJ183	2SJ668/681
2SJ224	2SJ312
2SJ238	2SJ360
2SJ240	2SJ349
2SJ241	2SJ401
2SJ315	2SJ668/681
2SJ359	2SJ378
2SK271	2SK1529
2SK272	2SK1529
2SK324	2SK4107
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2SK355	2SK387
2SK356	2SK388
2SK357	2SK2381
2SK358	2SK2417
2SK385	2SK4107
2SK386	2SK4107
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2SK405	2SK1529
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2SK532	2SK2232
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2SK539	2SK3700
2SK568	2SK3407
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2SK672	2SK2232
2SK673	2SK2232
2SK674	2SK2232
2SK678	2SK4107
2SK693	2SK4107
2SK694	2SK4107
2SK708	2SK4107
2SK788	2SK4107
2SK789	2SK4107
2SK790	2SK4107
2SK791	2SK2608
2SK792	2SK2608
2SK793	2SK3700

Part Number	Replacement Product
2SK794	2SK3700
2SK849	2SK2233
2SK850	2SK2466
2SK856	2SK2385
2SK857	2SK2233
2SK858	2SK3567
2SK888	2SK2350
2SK889	2SK2314
2SK890	2SK2350
2SK891	2SK2382
2SK892	2SK3563
2SK893	2SK2386
2SK894	2SK2542
2SK895	2SK2601
2SK896	2SK2695
2SK941	2SK2962
2SK942	2SK2232
2SK943	2SK2232
2SK944	2SK2967
2SK945	2SK2599
2SK1029	2SK4107
2SK1078	2SK2615
2SK1079	2SK2963
2SK1112	2SK4017/4033
2SK1113	2SK2201
2SK1114	2SK2232
2SK1115	2SK232
2SK1116	2SK2314
2SK1117	2SK2544
2SK1118	2SK3562
2SK1124	2SK2233
2SK1213	2SK2602
2SK1251	2SK4017/4033
2SK1252	2SK2201
2SK1333	2SK4107
2SK1344	2SK2232
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2SK1346	2SK2232
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2SK1488	2SK2601
2SK1513	2SK2601
2SK1531	2SK4107
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2SK1574	2SK2542
2SK1600	2SK2603
2SK1601	2SK2608
2SK1602	2SK2603
2SK1603	2SK3566
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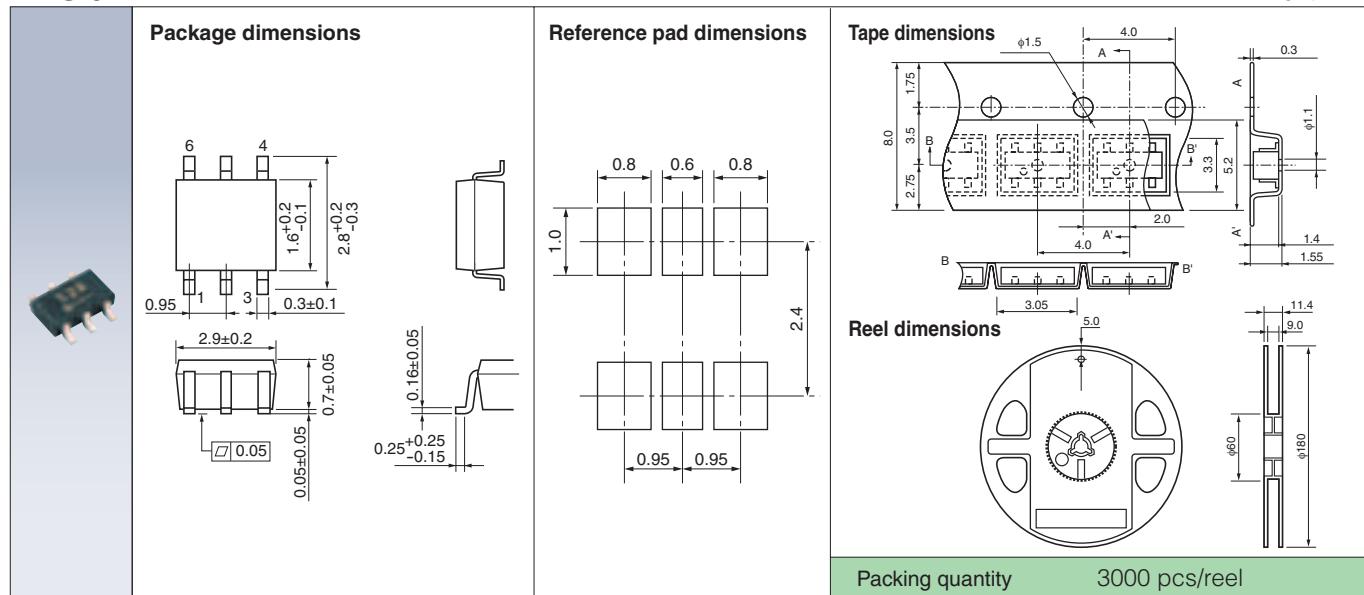
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2SK1723	2SK2699
2SK1745	2SK4108
2SK1746	2SK2865
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2SK1855	2SK4107
2SK1858	2SK2883
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2SK1913	2SK3567
2SK1927	2SK2789
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2SK1929	2SK2884
2SK2030	2SK2231
2SK2038	2SK2604
2SK2039	2SK3700
2SK2056	2SK2605
2SK2057	2SK4108
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2SK2078	2SK2607
2SK2088	2SK2401
2SK2089	2SK2884
2SK2107	2SK2401
2SK2149	2SK2601
2SK2150	2SK4107
2SK2222	2SK2604
2SK2228	2SK2229
2SK2230	2SK3462
2SK2235	2SK3462
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2SK2274	2SK2746
2SK2319	2SK2746
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2SK2402	2SK3567
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TPC8002	TPC8014
TPC8005-H	TPC8021-H
TPC8007-H	TPC8020-H
TPC8102	TPC8109
TPC8103	TPC8111
TPC8106-H	TPC8109
TPC8201	TPC8211
TPC8202	TPC8208
TPC8204	TPC8207
TPCA8101	TPCA8102
TPCS8201	TPCS8209
TPCS8203	TPCS8211
TPCS8206	TPCS8210
TPCS8207	TPCS8212

1. Compact Surface-Mount Packages

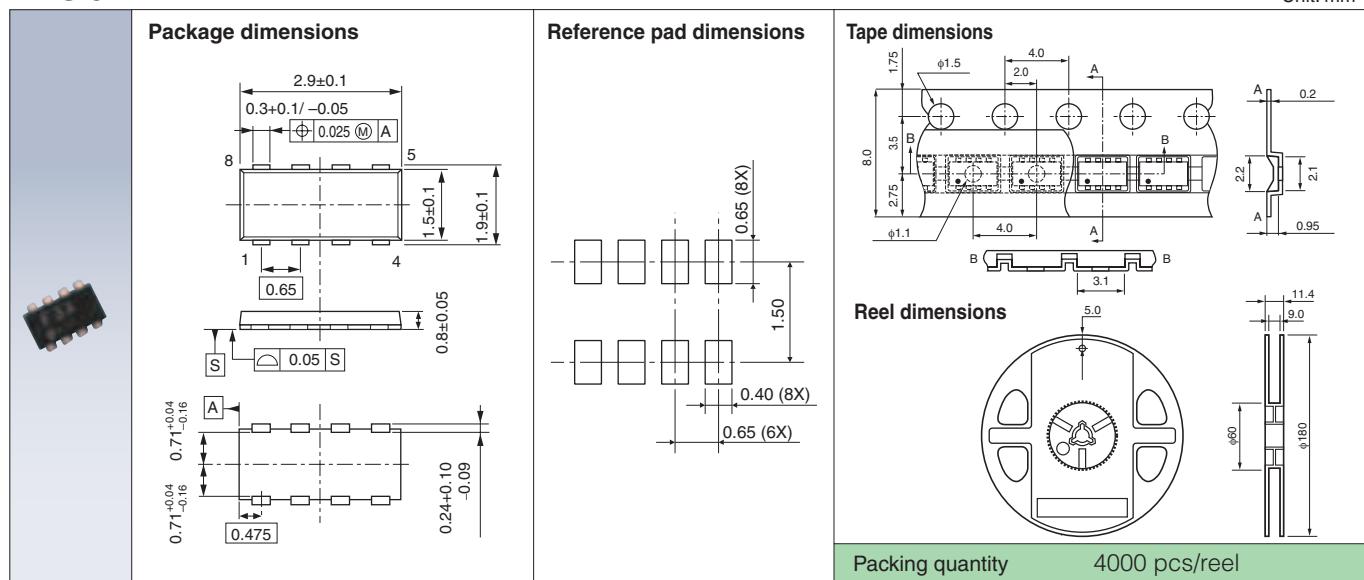
To meet requirements for compact and thin equipment, Toshiba offers various packages with a power dissipation of 1 to 300 W and a drain current of 1 to 120 A.



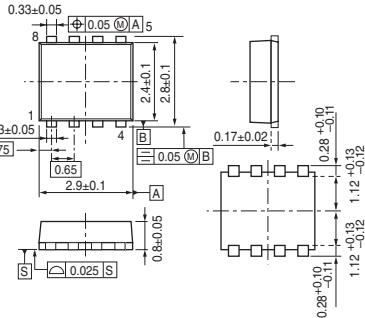
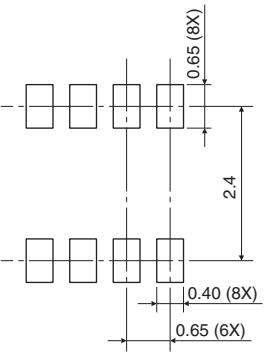
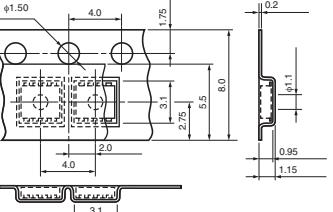
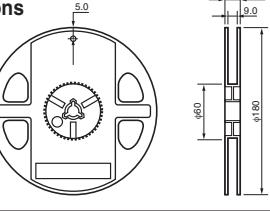
■ VS-6



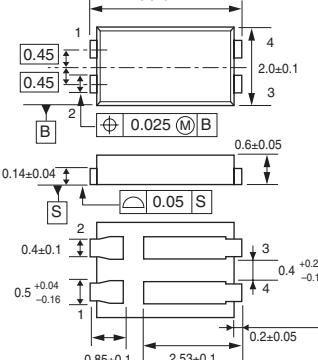
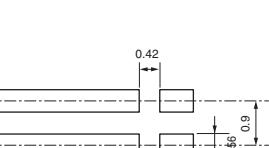
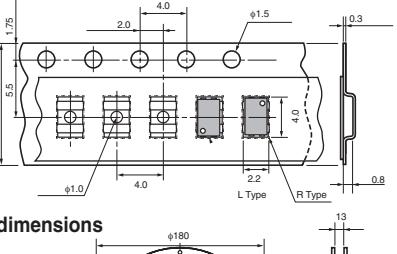
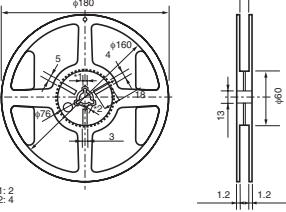
■ VS-8



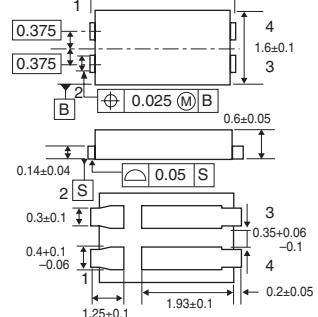
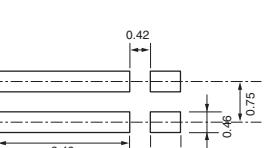
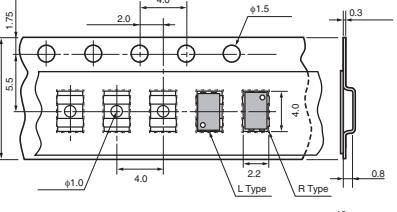
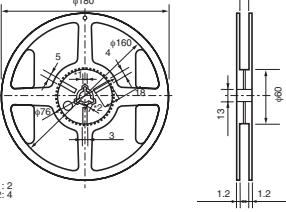
■ PS-8

			Unit: mm
Package dimensions 			
			
Reference pad dimensions 			
Tape dimensions 			
Reel dimensions 			
Packing quantity			3000 pcs/reel

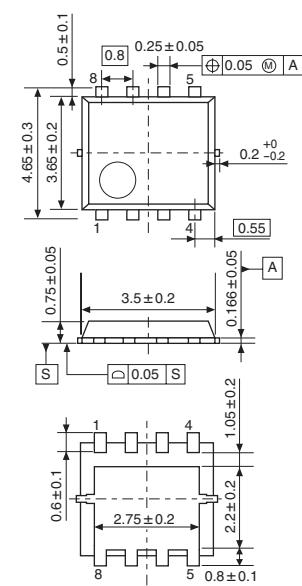
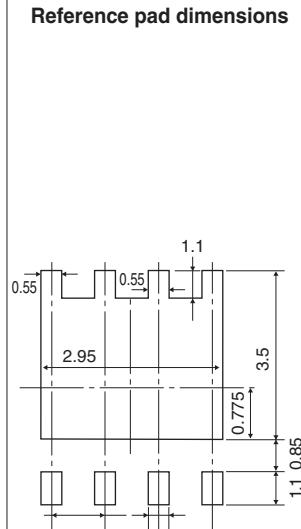
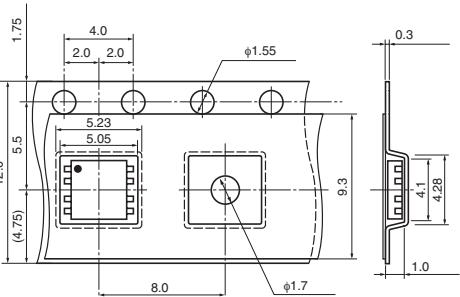
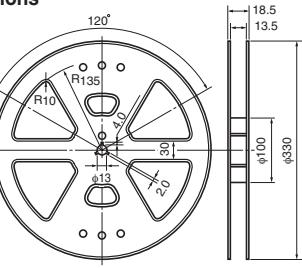
■ STP

			Unit: mm
Package dimensions 			
			
Reference pad dimensions 			
Tape dimensions 			
Reel dimensions 			
Packing quantity			4000 pcs/reel

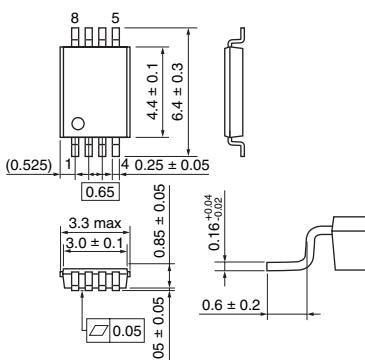
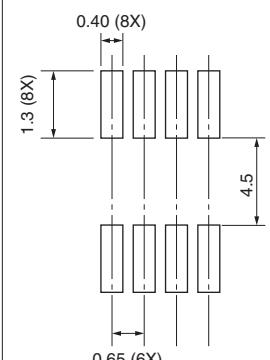
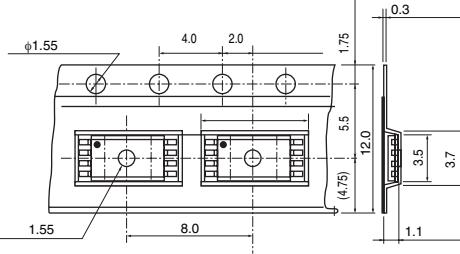
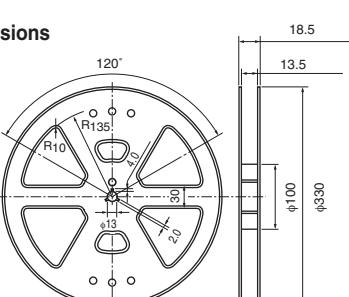
■ STP2

			Unit: mm
Package dimensions 			
			
Reference pad dimensions 			
Tape dimensions 			
Reel dimensions 			
Packing quantity			4000 pcs/reel

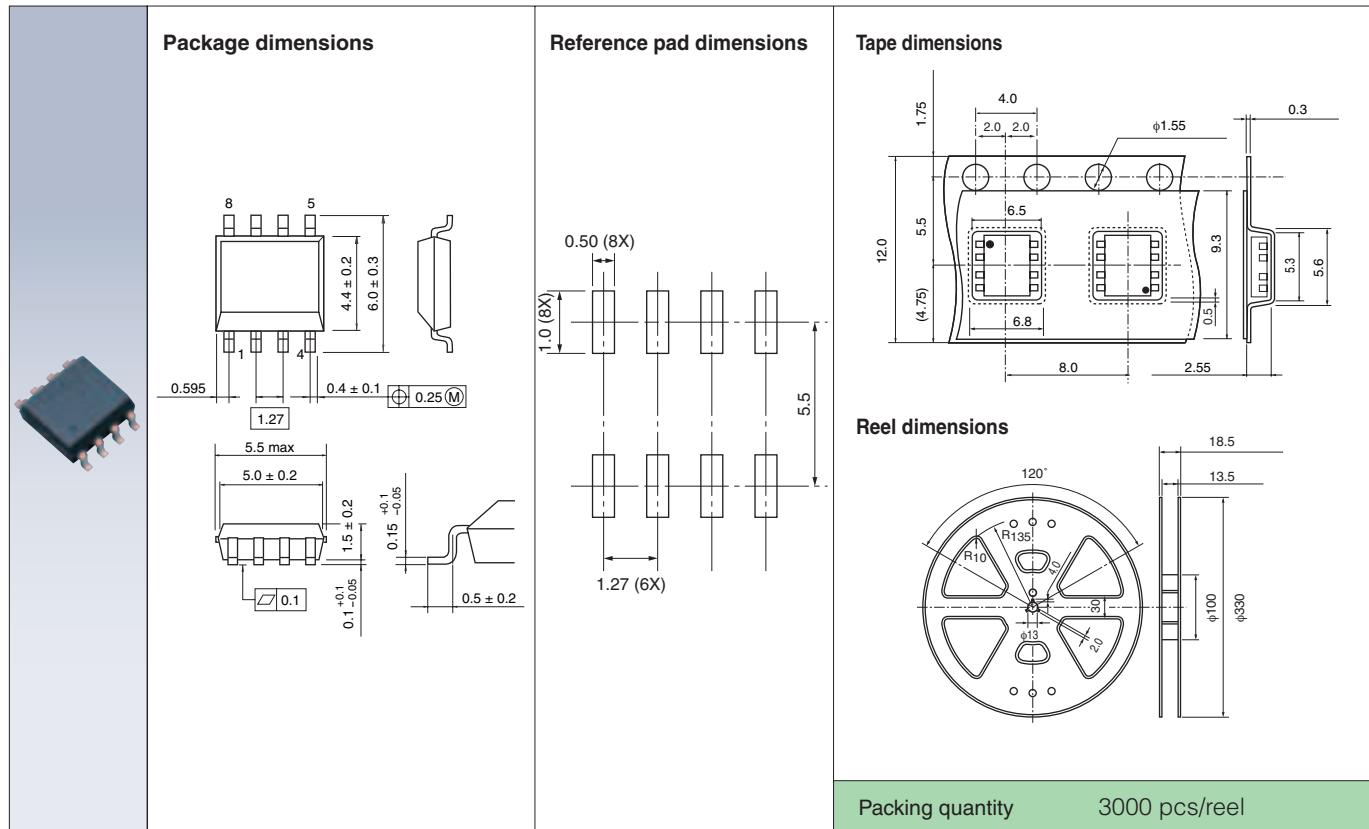
■ TSSOP Advance

	Package dimensions	Reference pad dimensions	Tape dimensions
	Unit: mm		
	 <p>Package dimensions</p> <p>Front view dimensions:</p> <ul style="list-style-type: none"> Total width: 4.65 ± 0.3 Total height: 0.75 ± 0.05 Pin pitch: 0.5 ± 0.1 Pin height: 0.25 ± 0.05 Pin thickness: 0.05 ± 0.01 Pin lead length: 0.2 ± 0.02 Pin lead width: 0.55 Pin lead thickness: 0.05 ± 0.01 Pin lead angle: A <p>Bottom view dimensions:</p> <ul style="list-style-type: none"> Total width: 3.5 ± 0.2 Total height: 0.6 ± 0.1 Pin pitch: 0.5 ± 0.1 Pin height: 0.25 ± 0.02 Pin lead length: 0.166 ± 0.05 Pin lead width: 0.05 ± 0.01 Pin lead thickness: 0.05 ± 0.01 	 <p>Reference pad dimensions</p> <p>Front view dimensions:</p> <ul style="list-style-type: none"> Total width: 1.1 Total height: 0.55 Pad width: 0.55 Pad height: 0.775 Pad thickness: 0.105 ± 0.05 Pad lead length: 0.55 Pad lead width: 0.8 Pad lead thickness: 0.05 <p>Bottom view dimensions:</p> <ul style="list-style-type: none"> Total width: 1.1 Total height: 0.85 Pad width: 0.55 Pad height: 0.775 Pad thickness: 0.105 ± 0.05 Pad lead length: 0.55 Pad lead width: 0.8 Pad lead thickness: 0.05 	 <p>Tape dimensions</p> <p>Front view dimensions:</p> <ul style="list-style-type: none"> Total width: 12.0 Total height: 5.5 Pad width: 4.0 Pad height: 2.0 Pad thickness: 0.3 Pad lead length: 0.55 Pad lead width: 0.8 Pad lead thickness: 0.05 <p>Bottom view dimensions:</p> <ul style="list-style-type: none"> Total width: 12.0 Total height: 5.5 Pad width: 4.0 Pad height: 2.0 Pad thickness: 0.3 Pad lead length: 0.55 Pad lead width: 0.8 Pad lead thickness: 0.05
			Reel dimensions  <p>Front view dimensions:</p> <ul style="list-style-type: none"> Outer diameter: 18.5 Inner diameter: 13.5 Reel height: 1.1 Reel thickness: 0.3 Reel lead length: $\phi 330$ Reel lead width: $\phi 100$ <p>Bottom view dimensions:</p> <ul style="list-style-type: none"> Outer diameter: 18.5 Inner diameter: 13.5 Reel height: 1.1 Reel thickness: 0.3 Reel lead length: $\phi 330$ Reel lead width: $\phi 100$
			Packing quantity 3000 pcs/reel

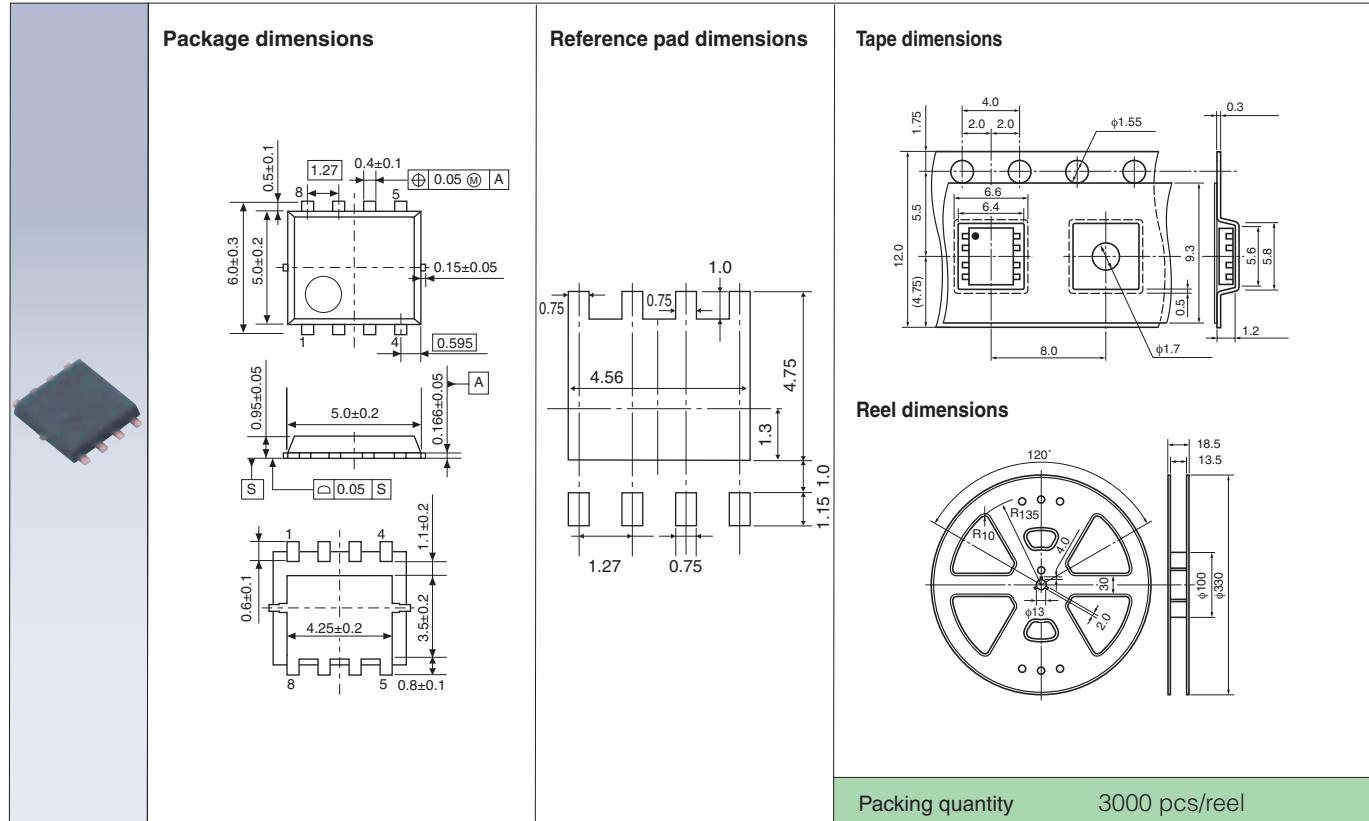
■ TSSOP-8

	Package dimensions	Reference pad dimensions	Tape dimensions
	Unit: mm		
	 <p>Package dimensions</p> <p>Front view dimensions:</p> <ul style="list-style-type: none"> Total width: 6.4 ± 0.3 Total height: 0.65 Pin pitch: 0.25 ± 0.05 Pin height: $0.16^{+0.04}_{-0.02}$ Pin lead length: 0.16 ± 0.05 Pin lead width: 0.6 ± 0.2 Pin lead thickness: 0.05 ± 0.01 Pin lead angle: (0.525) 	 <p>Reference pad dimensions</p> <p>Front view dimensions:</p> <ul style="list-style-type: none"> Total width: $1.3 (8X)$ Total height: $0.40 (8X)$ Pad width: $0.65 (8X)$ Pad height: 0.45 	 <p>Tape dimensions</p> <p>Front view dimensions:</p> <ul style="list-style-type: none"> Total width: 12.0 Total height: 5.5 Pad width: 4.0 Pad height: 2.0 Pad thickness: 0.3 Pad lead length: 0.55 Pad lead width: 0.8 Pad lead thickness: 0.05
			Reel dimensions  <p>Front view dimensions:</p> <ul style="list-style-type: none"> Outer diameter: 18.5 Inner diameter: 13.5 Reel height: 1.1 Reel thickness: 0.3 Reel lead length: $\phi 330$ Reel lead width: $\phi 100$
			Packing quantity 3000 pcs/reel

SOP-8

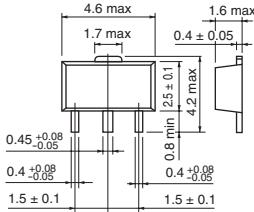
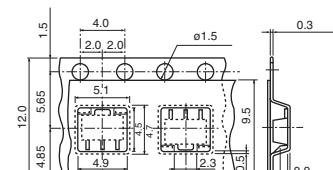
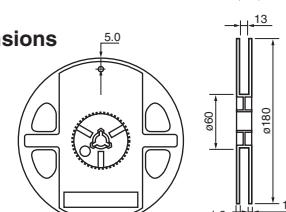


SOP Advance



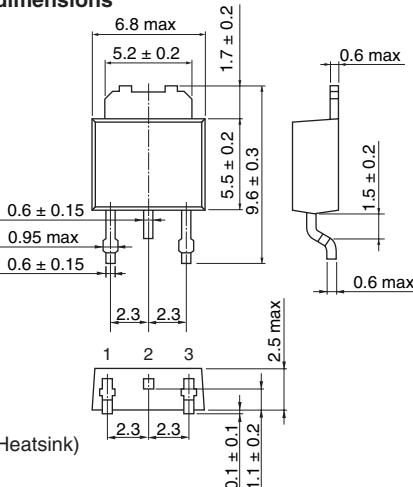
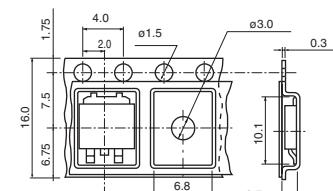
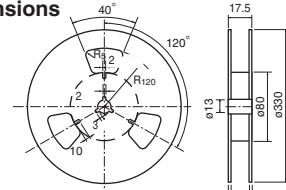
■ PW-Mini

Unit: mm

	Package dimensions	Tape dimensions	
	Reel dimensions	Packing quantity	
	 <p>1. Gate 2. Drain (Heatsink) 3. Source</p>	 	1000 pcs/reel

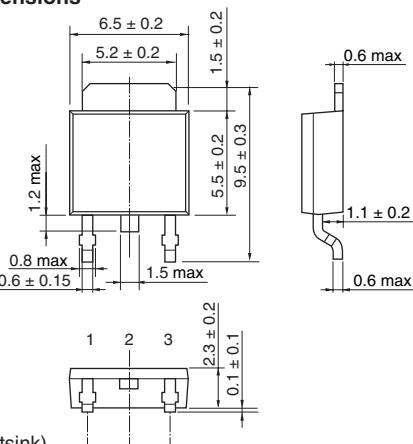
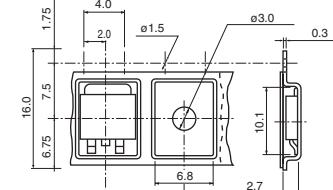
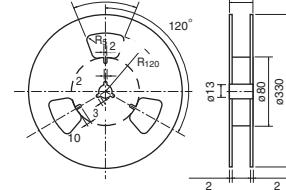
■ DP

Unit: mm

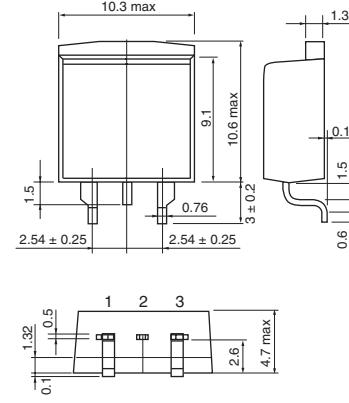
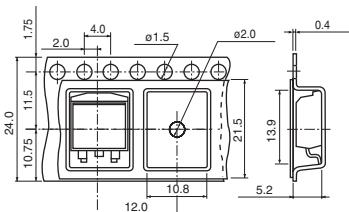
	Package dimensions	Tape dimensions	
	Reel dimensions	Packing quantity	
	 <p>1. Gate 2. Drain (Heatsink) 3. Source</p>	 	2000 pcs/reel

■ New PW-Mold

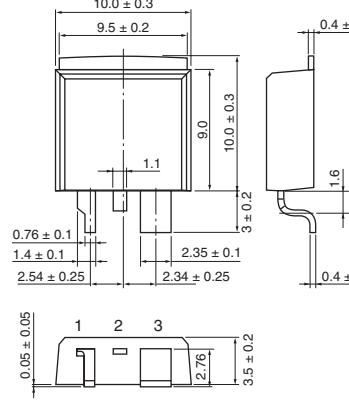
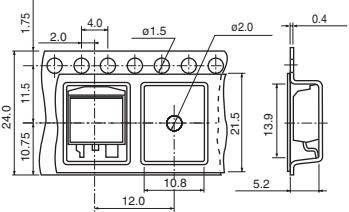
Unit: mm

	Package dimensions	Tape dimensions	
	Reel dimensions	Packing quantity	
	 <p>1. Gate 2. Drain (Heatsink) 3. Source</p>	 	2000 pcs/reel

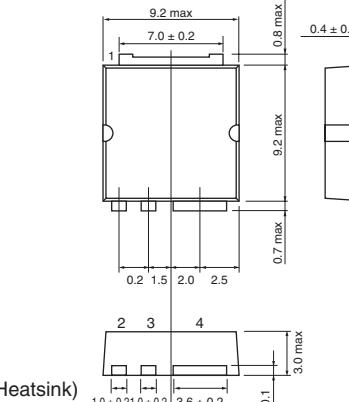
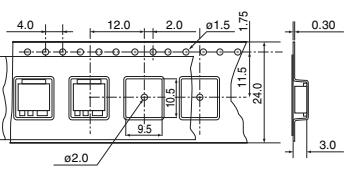
■ TO-220SM

 K3403 S+D	Package dimensions	Tape dimensions
	 <p>1. Gate 2. Drain (Heatsink) 3. Source</p>	
Packing quantity		1000 pcs/reel

■ TO-220SM(W)

	Package dimensions	Tape dimensions
	 <p>1. Gate 2. Drain (Heatsink) 3. Source</p>	
Packing quantity		1000 pcs/reel

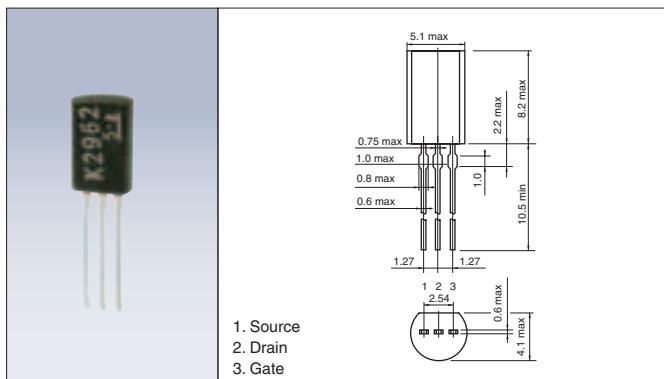
■ TFP

 K4034 S+D	Package dimensions	Tape dimensions
	 <p>1. Drain (Heatsink) 2. Gate 3. Source1 4. Source2</p>	
Packing quantity		1500 pcs/reel

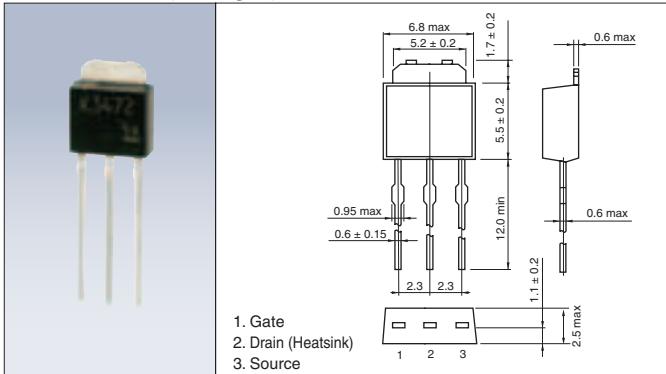
2. Through-Hole Package

Unit: mm

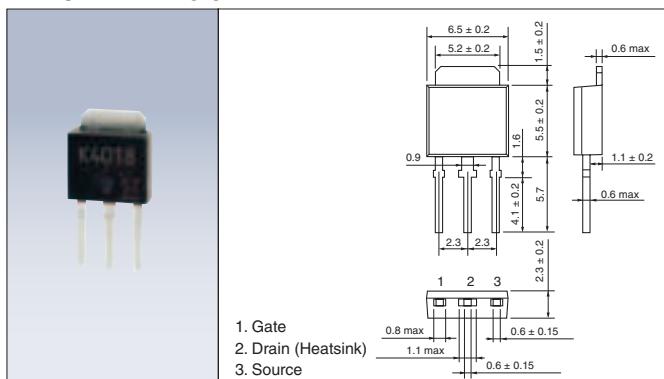
■ LSTM



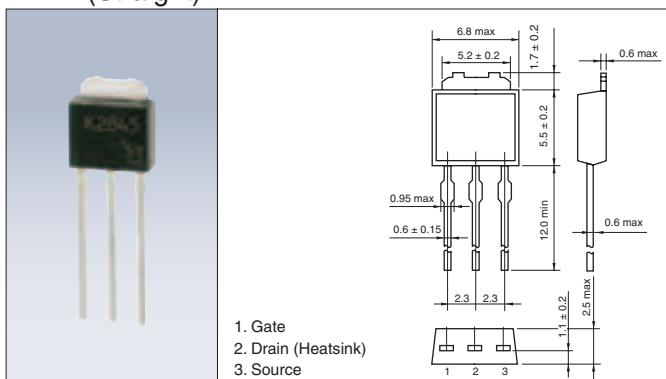
■ PW-Mold (Straight)



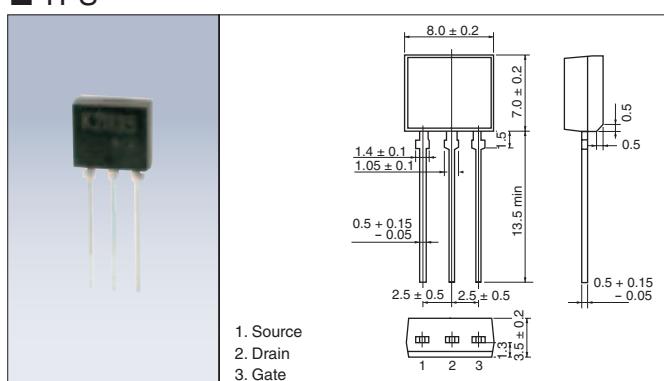
■ New PW-Mold2



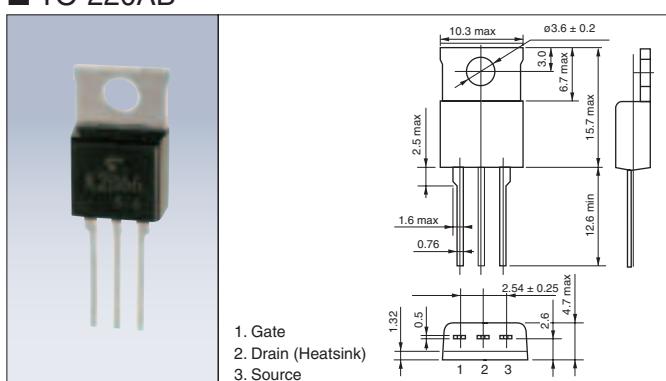
■ DP (Straight)



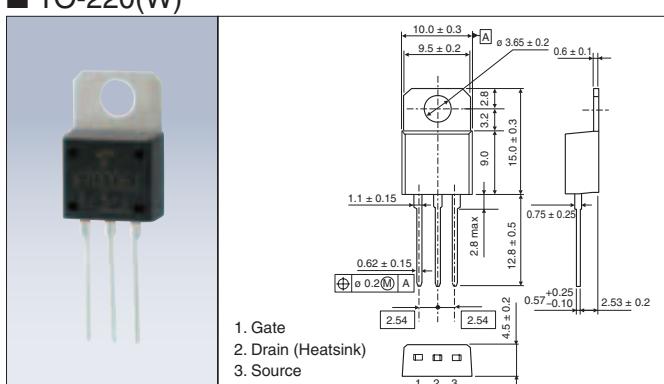
■ TPS



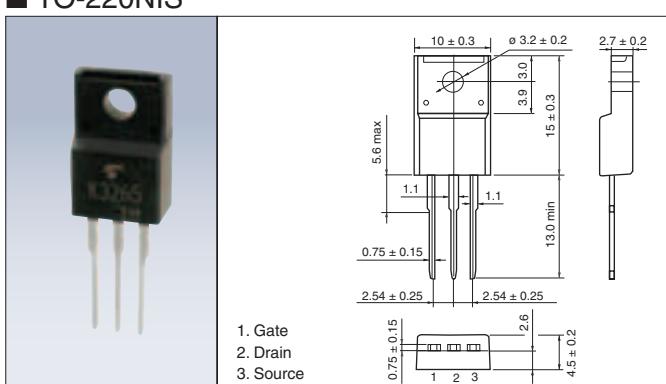
■ TO-220AB



■ TO-220(W)

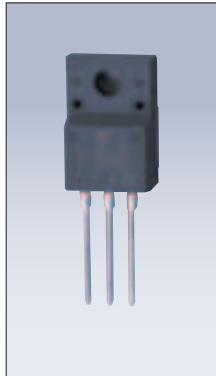


■ TO-220NIS

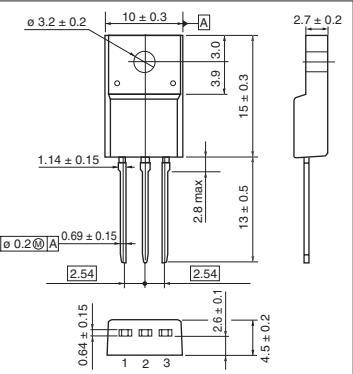


Unit: mm

■ TO-220SIS



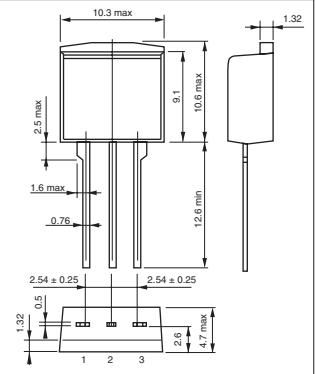
1. Gate
2. Drain
3. Source



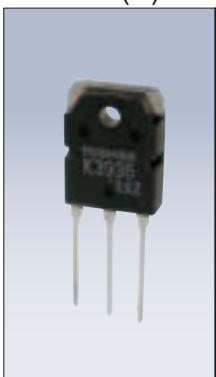
■ TO-220FL



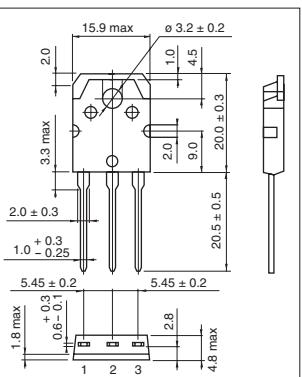
1. Gate
2. Drain (Heatsink)
3. Source



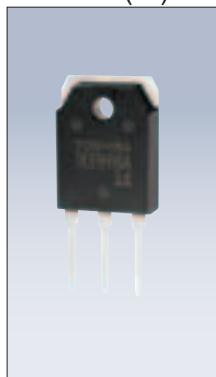
■ TO-3P(N)



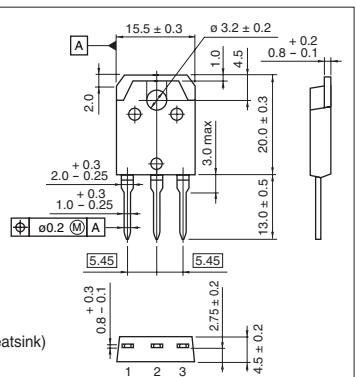
1. Gate
2. Drain (Heatsink)
3. Source



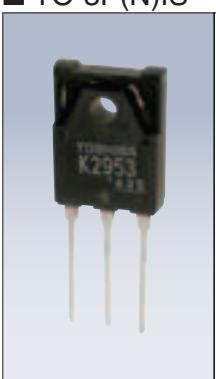
■ TO-3P(W)



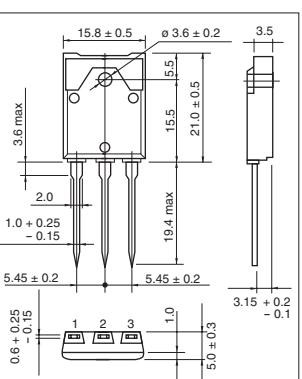
1. Gate
2. Drain (Heatsink)
3. Source



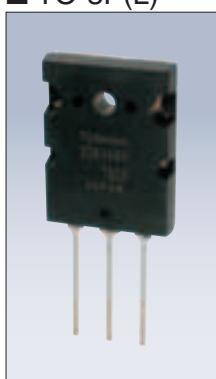
■ TO-3P(N)IS



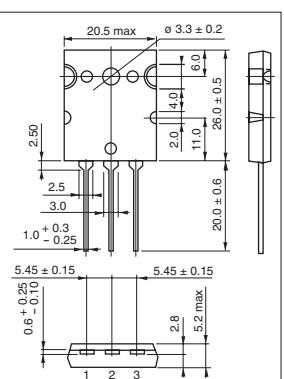
1. Gate
2. Drain
3. Source



■ TO-3P(L)



1. Gate
2. Drain (Heatsink)
3. Source



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(As of April 01, 2008)

2008-9

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