

این دیتاشیت توسط توکل الکترونیک تهیه و ارائه شده است.  
جهت مشاهده قیمت، موجودی و ثبت سفارش این قطعه به وبسایت توکل الکترونیک مراجعه فرمایید.



مشاهده قیمت و خرید

برای خرید و مشاهده سایر محصولات کلیک کنید



**TOSHIBA**

2SK3878

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type ( $\pi$ -MOSIV)

**2SK3878**

### Switching Regulator Applications

- Low drain-source ON-resistance:  $R_{DS(ON)} = 1.0 \Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 7.0 S$  (typ.)
- Low leakage current:  $I_{DSS} = 100 \mu A$  (max) ( $V_{DS} = 720 V$ )
- Enhancement model:  $V_{th} = 2.0$  to  $4.0 V$  ( $V_{DS} = 10 V$ ,  $I_D = 1 mA$ )

### Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

| Characteristic                                 |                | Symbol    | Rating     | Unit       |
|------------------------------------------------|----------------|-----------|------------|------------|
| Drain-source voltage                           |                | $V_{DSS}$ | 900        | V          |
| Drain-gate voltage ( $R_{GS} = 20 k\Omega$ )   |                | $V_{DGR}$ | 900        | V          |
| Gate-source voltage                            |                | $V_{GSS}$ | $\pm 30$   | V          |
| Drain current                                  | DC (Note 1)    | $I_D$     | 9          | A          |
|                                                | Pulse (Note 1) | $I_{DP}$  | 27         |            |
| Drain power dissipation ( $T_c = 25^\circ C$ ) |                | $P_D$     | 150        | W          |
| Single pulse avalanche energy (Note 2)         |                | $E_{AS}$  | 778        | mJ         |
| Avalanche current                              |                | $I_{AR}$  | 9          | A          |
| Repetitive avalanche energy (Note 3)           |                | $E_{AR}$  | 15         | mJ         |
| Channel temperature                            |                | $T_{ch}$  | 150        | $^\circ C$ |
| Storage temperature range                      |                | $T_{stg}$ | -55 to 150 | $^\circ C$ |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

### Thermal Characteristics

| Characteristic                         | Symbol         | Max   | Unit         |
|----------------------------------------|----------------|-------|--------------|
| Thermal resistance, channel to case    | $R_{th(ch-c)}$ | 0.833 | $^\circ C/W$ |
| Thermal resistance, channel to ambient | $R_{th(ch-a)}$ | 50    | $^\circ C/W$ |

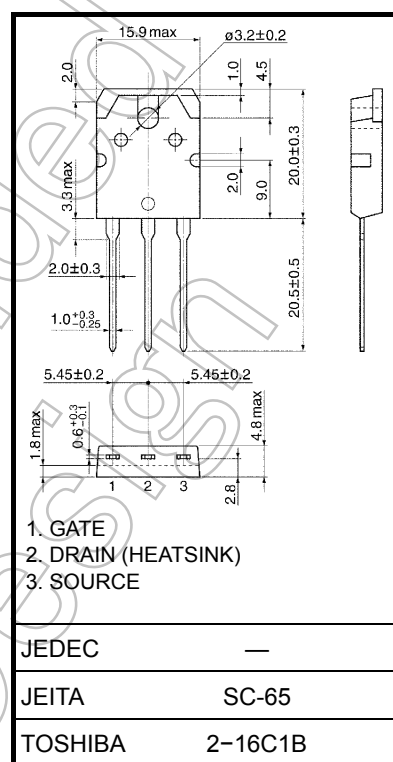
Note 1: Ensure that the channel temperature does not exceed  $150^\circ C$  during use of the device.

Note 2:  $V_{DD} = 90 V$ ,  $T_{ch} = 25^\circ C$ ,  $L = 17.6 mH$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 9 A$

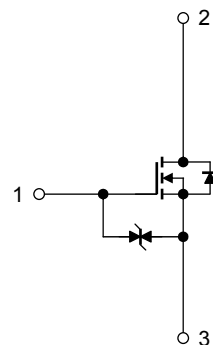
Note 3: Repetitive rating: pulse width limited by max junction temperature

This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm

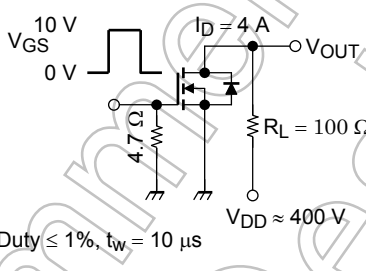


Weight: 4.6 g (typ.)



Start of commercial production  
2008-10

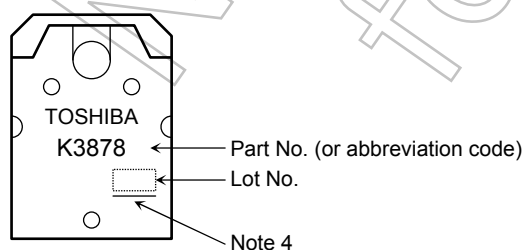
## Electrical Characteristics (Ta = 25°C)

| Characteristic                                  |               | Symbol        | Test Condition                                                                      | Min      | Typ. | Max      | Unit          |
|-------------------------------------------------|---------------|---------------|-------------------------------------------------------------------------------------|----------|------|----------|---------------|
| Gate leakage current                            |               | $I_{GSS}$     | $V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$                                   | —        | —    | $\pm 10$ | $\mu\text{A}$ |
| Gate-source breakdown voltage                   |               | $V_{(BR)GSS}$ | $I_G = \pm 10 \mu\text{A}, V_{DS} = 0 \text{ V}$                                    | $\pm 30$ | —    | —        | V             |
| Drain cutoff current                            |               | $I_{DSS}$     | $V_{DS} = 720 \text{ V}, V_{GS} = 0 \text{ V}$                                      | —        | —    | 100      | $\mu\text{A}$ |
| Drain-source breakdown voltage                  |               | $V_{(BR)DSS}$ | $I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$                                         | 900      | —    | —        | V             |
| Gate threshold voltage                          |               | $V_{th}$      | $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$                                         | 2.0      | —    | 4.0      | V             |
| Drain-source ON resistance                      |               | $R_{DS(ON)}$  | $V_{GS} = 10 \text{ V}, I_D = 4 \text{ A}$                                          | —        | 1.0  | 1.3      | $\Omega$      |
| Forward transfer admittance                     |               | $ Y_{fs} $    | $V_{DS} = 15 \text{ V}, I_D = 4 \text{ A}$                                          | 3.5      | 7.0  | —        | S             |
| Input capacitance                               |               | $C_{iss}$     | $V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$                    | —        | 2200 | —        | pF            |
| Reverse transfer capacitance                    |               | $C_{rss}$     |                                                                                     | —        | 45   | —        |               |
| Output capacitance                              |               | $C_{oss}$     |                                                                                     | —        | 190  | —        |               |
| Switching time                                  | Rise time     | $t_r$         |  | —        | 25   | —        | ns            |
|                                                 | Turn-on time  | $t_{on}$      |                                                                                     | —        | 65   | —        |               |
|                                                 | Fall time     | $t_f$         |                                                                                     | —        | 20   | —        |               |
|                                                 | Turn-off time | $t_{off}$     |                                                                                     | —        | 120  | —        |               |
| Total gate charge (gate-source plus gate-drain) |               | $Q_g$         | $V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 9 \text{ A}$            | —        | 60   | —        | nC            |
| Gate-source charge                              |               | $Q_{gs}$      |                                                                                     | —        | 34   | —        |               |
| Gate-drain ("Miller") charge                    |               | $Q_{gd}$      |                                                                                     | —        | 26   | —        |               |

## Source-Drain Ratings and Characteristics (Ta = 25°C)

| Characteristic                            | Symbol    | Test Condition                                | Min | Typ. | Max  | Unit          |
|-------------------------------------------|-----------|-----------------------------------------------|-----|------|------|---------------|
| Continuous drain reverse current (Note 1) | $I_{DR}$  | —                                             | —   | —    | 9    | A             |
| Pulse drain reverse current (Note 1)      | $I_{DRP}$ | —                                             | —   | —    | 27   | A             |
| Forward voltage (diode)                   | $V_{DSF}$ | $I_{DR} = 9 \text{ A}, V_{GS} = 0 \text{ V}$  | —   | —    | -1.7 | V             |
| Reverse recovery time                     | $t_{rr}$  | $I_{DR} = 9 \text{ A}, V_{GS} = 0 \text{ V},$ | —   | 1.4  | —    | $\mu\text{s}$ |
| Reverse recovery charge                   | $Q_{rr}$  | $dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$      | —   | 16   | —    | $\mu\text{C}$ |

## Marking

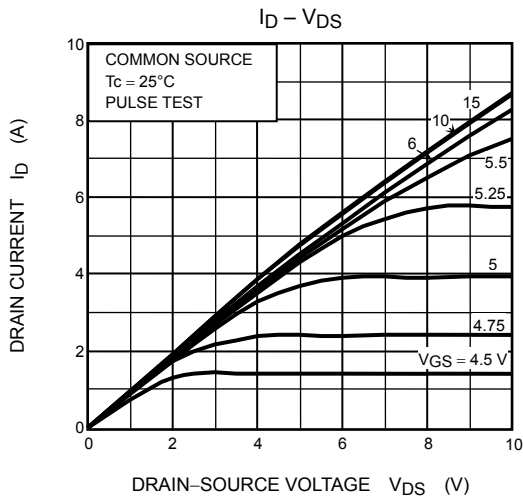
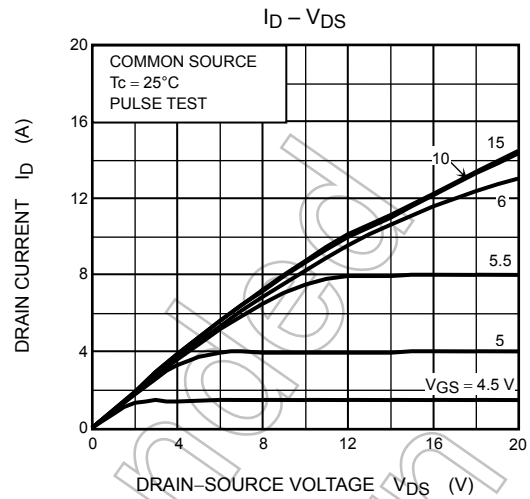
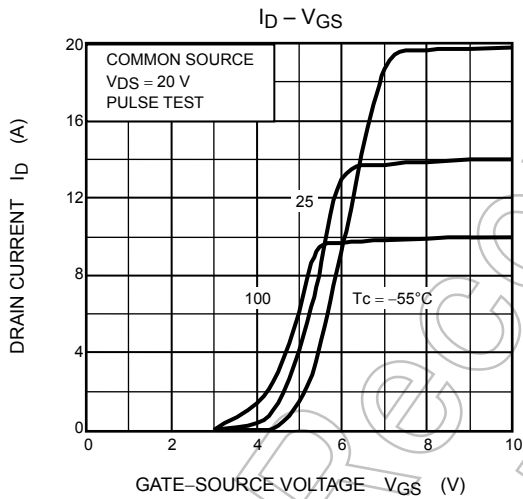
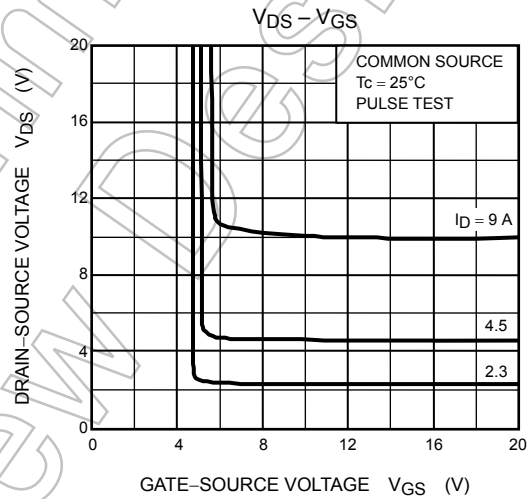
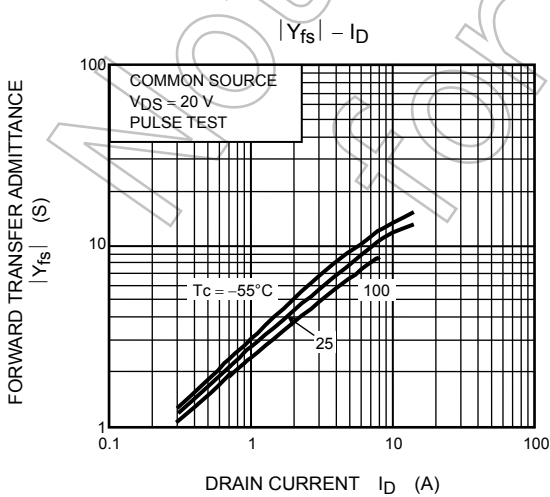
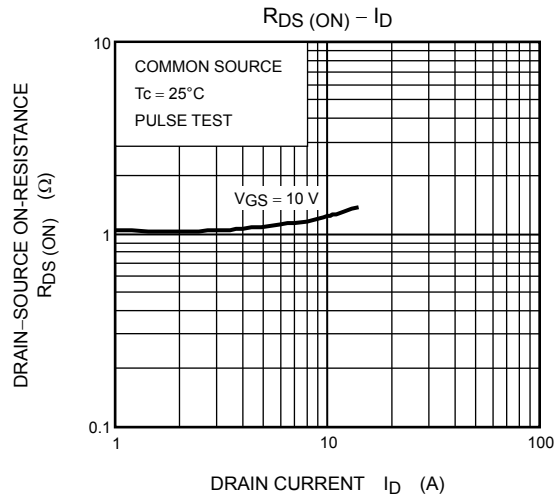


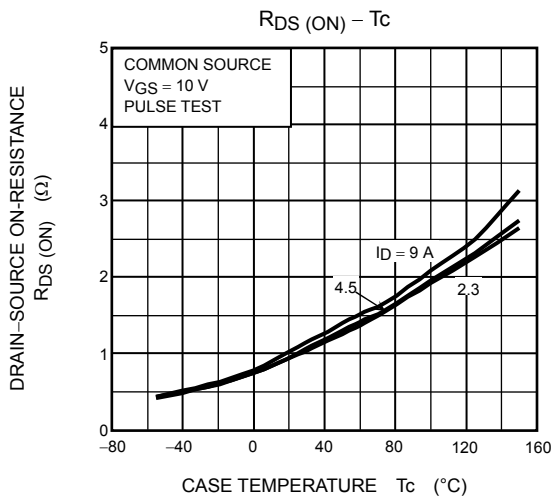
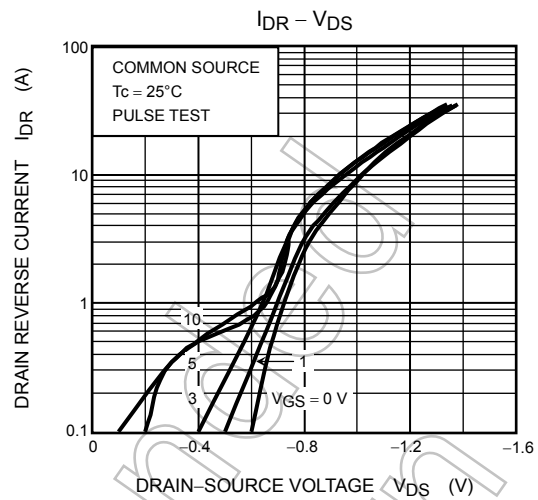
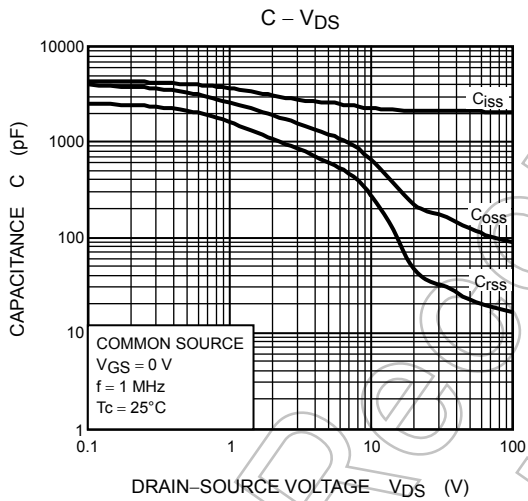
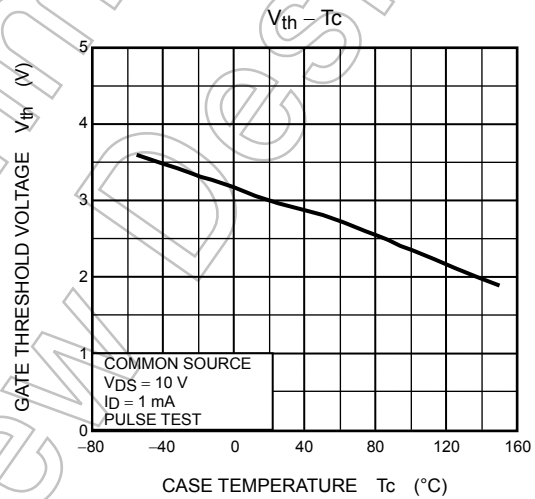
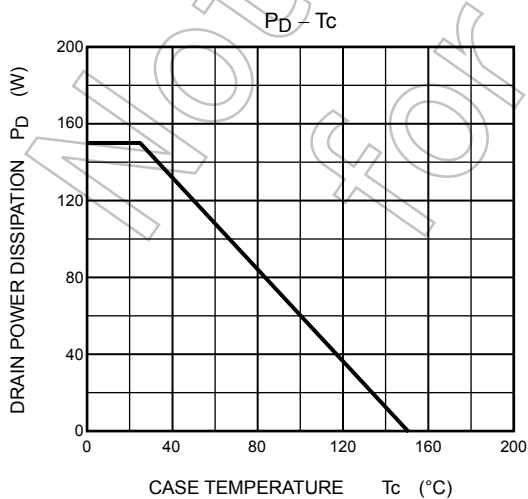
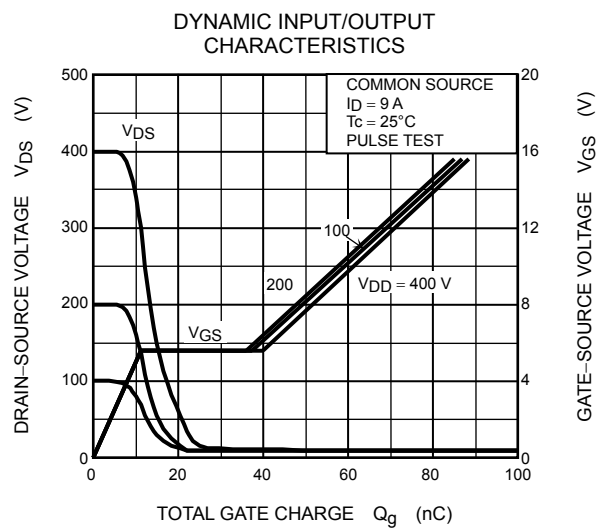
Note 4: A line under a Lot No. identifies the indication of product Labels.

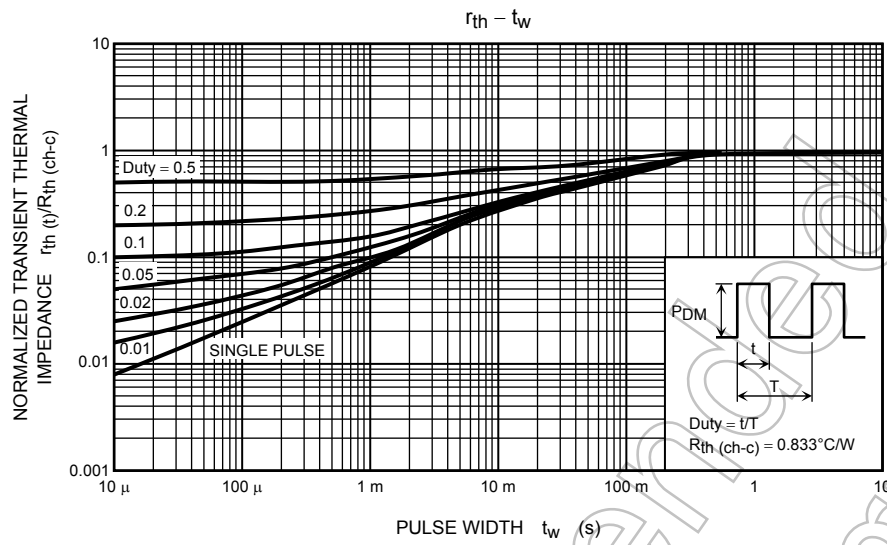
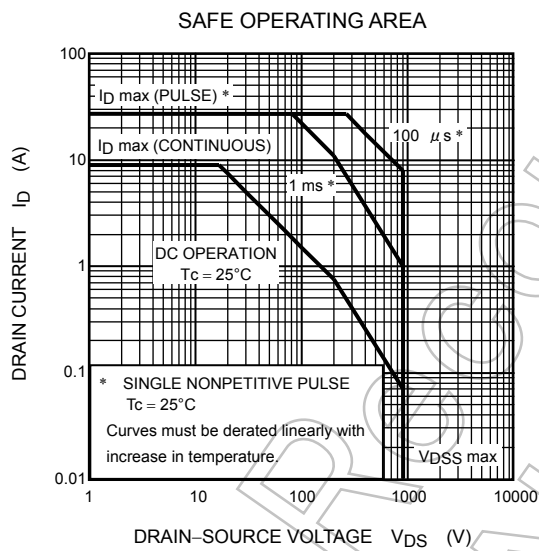
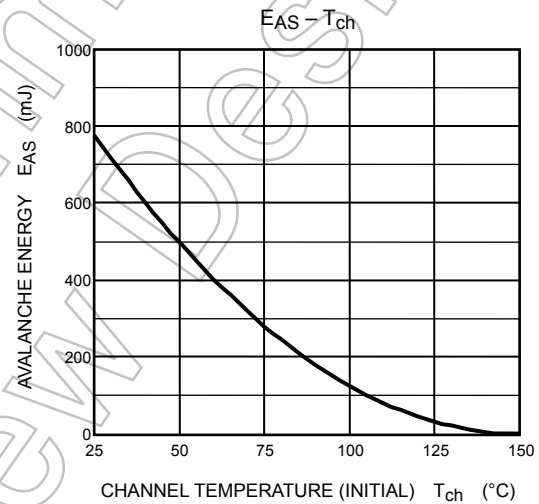
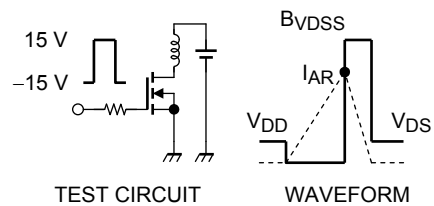
Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.







$$R_G = 25 \, \Omega$$

$$V_{DD} = 90 \, V, L = 17.6 \, mH$$

$$EAS = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{BVDSS}{BVDSS - V_{DD}} \right)$$

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