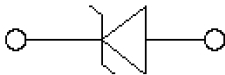
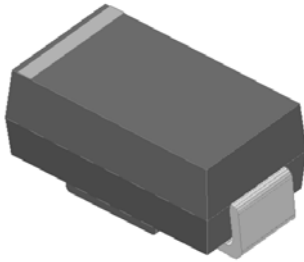
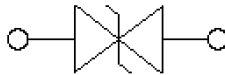
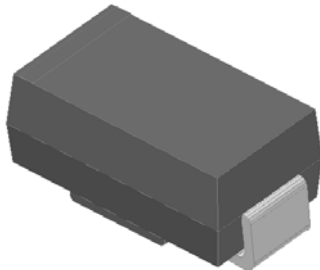


## Surface Mount Transient Voltage Suppressor Diodes

### Uni-directional



### Bi-directional



### Features

- For surface mounted applications
- Low-profile package
- Ideal for automated placement
- Available in Unidirectional and Bidirectional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Low incremental surge resistance, excellent clamping capability
- Very fast response time
- High temperature soldering guaranteed: 260 °C/10 s at terminals
- Meets MSL level 1
- Component in accordance to RoHS

### Typical Applications

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, telecommunication.

### Mechanical Data

- **Package:** DO-214AC (SMA)  
Molding compound meets UL 94 V-0 flammability rating, RoHS-compliant, halogen-free
- **Terminals:** Tin plated leads, solderable per J-STD-002 and JESD22-B102
- **Polarity:** For uni-directional types the band denotes cathode end, no marking on bi-directional types

### ■Maximum Ratings ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

| PARAMETER   | SYMBOL         | UNIT             | Max            |
|---|----------------|------------------|----------------|
| Peak power dissipation, with a 10/1000us waveform <sup>(1) (2)</sup><br>(Fig.1)             | $P_{PPM}$      | W                | 400            |
| Peak pulse current, with a 10/1000us waveform <sup>(1)</sup>                                | $I_{PPM}$      | A                | See Next Table |
| Power dissipation, on infinite heat sink at $T_L=75^\circ\text{C}$                          | $P_D$          | W                | 1.0            |
| Peak forward surge current, 8.3 ms single half sine-wave unidirectional only <sup>(2)</sup> | $I_{FSM}$      | A                | 40             |
| Operating junction and storage temperature range  | $T_J, T_{STG}$ | $^\circ\text{C}$ | -55 to +150    |

### ■Electrical Characteristics ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

| PARAMETER   | SYMBOL | UNIT | VALUE   |
|---|--------|------|---------|
| Maximum instantaneous forward voltage @ at 25A for unidirectional only <sup>(3)</sup> | $V_F$  | V    | 3.5/5.0 |
| Maximum instantaneous forward voltage @ at 1A for unidirectional only                 | $V_F$  | V    | 1.5     |



# SMAJ SERIES

## ■ Thermal Characteristics (T<sub>a</sub>=25°C Unless otherwise specified)

| PARAMETER                   | SYMBOL           | UNIT | Conditions          | VALUE |
|-----------------------------|------------------|------|---------------------|-------|
| Thermal resistance(Typical) | R <sub>θJC</sub> | °C/W | junction to case    | 20    |
|                             | R <sub>θJL</sub> | °C/W | junction to lead    | 30    |
|                             | R <sub>θJA</sub> | °C/W | junction to ambient | 120   |

Notes:

- (1) Non-repetitive current pulse, per Fig. 3 and derated above T<sub>A</sub> = 25°C per Fig.2.
- (2) Mounted on 0.2 x 0.2" (5.0 x 5.0 mm) copper pads to each terminal
- (3) V<sub>F</sub><3.5V for devices of V<sub>BR</sub><200V and V<sub>F</sub><5.0V for devices of V<sub>BR</sub>>201V

## ■ Electrical Characteristics (T<sub>a</sub>=25°C Unless otherwise specified)

| Part Number (Uni) | Part Number (Bi) | Breakdown Voltage V <sub>BR</sub> @I <sub>T</sub> |         |                                    | Maximum Reverse Leakage I <sub>R</sub> <sup>(6)</sup> @ V <sub>RWM</sub> (μA) | Working Peak Reverse Voltage V <sub>RWM</sub> (V) | Maximum Reverse Surge Current I <sub>PP</sub> <sup>(5)</sup> (A) | Maximum Clamping Voltage V <sub>c</sub> @ I <sub>PP</sub> (V) |
|-------------------|------------------|---|---------|------------------------------------|---|---|--|---|
|                   |                  | Min(V)  | Max (V) | I <sub>T</sub> <sup>(4)</sup> (mA) |   |   |  |   |
| SMAJ5.0A          | SMAJ5.0CA        | 6.40  | 7.07    | 10                                 | 800   | 5.0   | 43.38  | 9.2   |
| SMAJ6.0A          | SMAJ6.0CA        | 6.67  | 7.37    | 10                                 | 800   | 6.0   | 38.83  | 10.3  |
| SMAJ6.5A          | SMAJ6.5CA        | 7.22  | 7.98    | 10                                 | 500   | 6.5   | 35.71  | 11.2  |
| SMAJ7.0A          | SMAJ7.0CA        | 7.78  | 8.60    | 10                                 | 200   | 7.0   | 33.33  | 12.0  |
| SMAJ7.5A          | SMAJ7.5CA        | 8.33  | 9.21    | 1                                  | 100   | 7.5   | 31.01  | 12.9  |
| SMAJ8.0A          | SMAJ8.0CA        | 8.89  | 9.83    | 1                                  | 50  | 8.0   | 29.41  | 13.6  |
| SMAJ8.5A          | SMAJ8.5CA        | 9.44  | 10.40   | 1                                  | 10  | 8.5   | 27.78  | 14.4  |
| SMAJ9.0A          | SMAJ9.0CA        | 10.00   | 11.10   | 1                                  | 5   | 9.0   | 25.97  | 15.4  |
| SMAJ10A           | SMAJ10CA         | 11.10   | 12.30   | 1                                  | 5   | 10.0  | 23.53  | 17.0  |
| SMAJ11A           | SMAJ11CA         | 12.20   | 13.50   | 1                                  | 5   | 11.0  | 21.98  | 18.2  |
| SMAJ12A           | SMAJ12CA         | 13.30   | 14.70   | 1                                  | 1   | 12.0  | 20.10  | 19.9  |
| SMAJ13A           | SMAJ13CA         | 14.40   | 15.90   | 1                                  | 1   | 13.0  | 18.60  | 21.5  |
| SMAJ14A           | SMAJ14CA         | 15.60   | 17.20   | 1                                  | 1   | 14.0  | 17.24  | 23.2  |
| SMAJ15A           | SMAJ15CA         | 16.70   | 18.50   | 1                                  | 1   | 15.0  | 16.39  | 24.4  |
| SMAJ16A           | SMAJ16CA         | 17.80   | 19.70   | 1                                  | 1   | 16.0  | 15.40  | 26.0  |
| SMAJ17A           | SMAJ17CA         | 18.90   | 20.90   | 1                                  | 1   | 17.0  | 14.49  | 27.6  |
| SMAJ18A           | SMAJ18CA         | 20.00   | 22.10   | 1                                  | 1   | 18.0  | 13.70  | 29.2  |
| SMAJ19A           | SMAJ19CA         | 21.10   | 23.30   | 1                                  | 1   | 19.0  | 13.00  | 30.8  |
| SMAJ20A           | SMAJ20CA         | 22.20   | 24.50   | 1                                  | 1   | 20.0  | 12.35  | 32.4  |
| SMAJ22A           | SMAJ22CA         | 24.40   | 26.90   | 1                                  | 1   | 22.0  | 11.27  | 35.5  |
| SMAJ24A           | SMAJ24CA         | 26.70   | 29.50   | 1                                  | 1   | 24.0  | 10.28  | 38.9  |
| SMAJ26A           | SMAJ26CA         | 28.90   | 31.90   | 1                                  | 1   | 26.0  | 9.50   | 42.1  |
| SMAJ28A           | SMAJ28CA         | 31.10   | 34.40   | 1                                  | 1   | 28.0  | 8.81   | 45.4  |
| SMAJ30A           | SMAJ30CA         | 33.3  | 36.8    | 1                                  | 1   | 30.0  | 8.26   | 48.4  |
| SMAJ33A           | SMAJ33CA         | 36.7  | 40.6    | 1                                  | 1   | 33.0  | 7.5  | 53.3  |
| SMAJ36A           | SMAJ36CA         | 40  | 44.2    | 1                                  | 1   | 36.0  | 6.88   | 58.1  |
| SMAJ40A           | SMAJ40CA         | 44.4  | 49.1    | 1                                  | 1   | 40.0  | 6.2  | 64.5  |
| SMAJ43A           | SMAJ43CA         | 47.8  | 52.8    | 1                                  | 1   | 43.0  | 5.76   | 69.4  |
| SMAJ45A           | SMAJ45CA         | 50  | 55.3    | 1                                  | 1   | 45.0  | 5.5  | 72.7  |
| SMAJ48A           | SMAJ48CA         | 53.3  | 58.9    | 1                                  | 1   | 48.0  | 5.17   | 77.4  |



# SMAJ SERIES

|         |          |      |      |   |   |      |      |      |
|---------|----------|------|------|---|---|------|------|------|
| SMAJ51A | SMAJ51CA | 56.7 | 62.7 | 1 | 1 | 51.0 | 4.85 | 82.4 |
| SMAJ54A | SMAJ54CA | 60   | 66.3 | 1 | 1 | 54.0 | 4.59 | 87.1 |

## ■Electrical Characteristics (T<sub>a</sub>=25°C Unless otherwise specified)

| Part Number (Uni) | Part Number (Bi) | Breakdown Voltage V <sub>BR</sub> @I <sub>T</sub> |         |                                    | Maximum Reverse Leakage I <sub>R</sub> <sup>(6)</sup> @ V <sub>RWM</sub> (μA) | Working Peak Reverse Voltage V <sub>RWM</sub> (V) | Maximum Reverse Surge Current I <sub>PP</sub> <sup>(5)</sup> (A) | Maximum Clamping Voltage V <sub>c</sub> @ I <sub>PP</sub> (V) |
|-------------------|------------------|---|---------|------------------------------------|---|---|--|---|
|                   |                  | Min(V)  | Max (V) | I <sub>T</sub> <sup>(4)</sup> (mA) |   |   |  |   |
| SMAJ58A           | SMAJ58CA         | 64.4  | 71.2    | 1                                  | 1   | 58.0  | 4.27   | 93.6  |
| SMAJ60A           | SMAJ60CA         | 66.7  | 73.7    | 1                                  | 1   | 60.0  | 4.13   | 96.8  |
| SMAJ64A           | SMAJ64CA         | 71.1  | 78.6    | 1                                  | 1   | 64.0  | 3.88   | 103   |
| SMAJ70A           | SMAJ70CA         | 77.8  | 86      | 1                                  | 1   | 70.0  | 3.54   | 113   |
| SMAJ75A           | SMAJ75CA         | 83.3  | 92.1    | 1                                  | 1   | 75.0  | 3.31   | 121   |
| SMAJ78A           | SMAJ78CA         | 86.7  | 95.8    | 1                                  | 1   | 78.0  | 3.17   | 126   |
| SMAJ80A           | SMAJ80CA         | 88.8  | 97.6    | 1                                  | 1   | 80.0  | 3.09   | 129   |
| SMAJ85A           | SMAJ85CA         | 94.4  | 104     | 1                                  | 1   | 85.0  | 2.92   | 137   |
| SMAJ90A           | SMAJ90CA         | 100   | 111     | 1                                  | 1   | 90.0  | 2.74   | 146   |
| SMAJ100A          | SMAJ100CA        | 111   | 123     | 1                                  | 1   | 100.0   | 2.47   | 162   |
| SMAJ110A          | SMAJ110CA        | 122   | 135     | 1                                  | 1   | 110.0   | 2.26   | 177   |
| SMAJ120A          | SMAJ120CA        | 133   | 147     | 1                                  | 1   | 120.0   | 2.07   | 193   |
| SMAJ130A          | SMAJ130CA        | 144   | 159     | 1                                  | 1   | 130.0   | 1.91   | 209   |
| SMAJ140A          | SMAJ140CA        | 155   | 171     | 1                                  | 1   | 140.0   | 1.76   | 226.8   |
| SMAJ150A          | SMAJ150CA        | 167   | 185     | 1                                  | 1   | 150.0   | 1.65   | 243   |
| SMAJ160A          | SMAJ160CA        | 178   | 197     | 1                                  | 1   | 160.0   | 1.54   | 259   |
| SMAJ170A          | SMAJ170CA        | 189   | 209     | 1                                  | 1   | 170.0   | 1.45   | 275   |
| SMAJ180A          | SMAJ180CA        | 200   | 220     | 1                                  | 1   | 180.0   | 1.37   | 291.6   |
| SMAJ190A          | SMAJ190CA        | 211   | 232     | 1                                  | 1   | 190.0   | 1.3  | 307.8   |
| SMAJ200A          | SMAJ200CA        | 224   | 247     | 1                                  | 1   | 200.0   | 1.23   | 324   |
| SMAJ220A          | SMAJ220CA        | 246   | 272     | 1                                  | 1   | 220.0   | 1.12   | 356   |
| SMAJ250A          | SMAJ250CA        | 279   | 309     | 1                                  | 1   | 250.0   | 0.99   | 405   |
| SMAJ300A          | SMAJ300CA        | 335   | 371     | 1                                  | 1   | 300.0   | 0.82   | 486   |
| SMAJ350A          | SMAJ350CA        | 391   | 432     | 1                                  | 1   | 350.0   | 0.71   | 567   |
| SMAJ400A          | SMAJ400CA        | 447   | 494     | 1                                  | 1   | 400.0   | 0.62   | 648   |
| SMAJ440A          | SMAJ440CA        | 492   | 543     | 1                                  | 1   | 440.0   | 0.56   | 713   |

### Notes:

- (4) Pulse test: t<sub>p</sub>≤50ms
- (5) Surge current waveform per Fig. 3 and derated per Fig.2.
- (6) For bi-directional types having V<sub>RWM</sub> of 10 V and less, the I<sub>R</sub> limit is doubled.



## ■ Characteristics (Typical)

FIG1: Peak Pulse Power Rating Curve

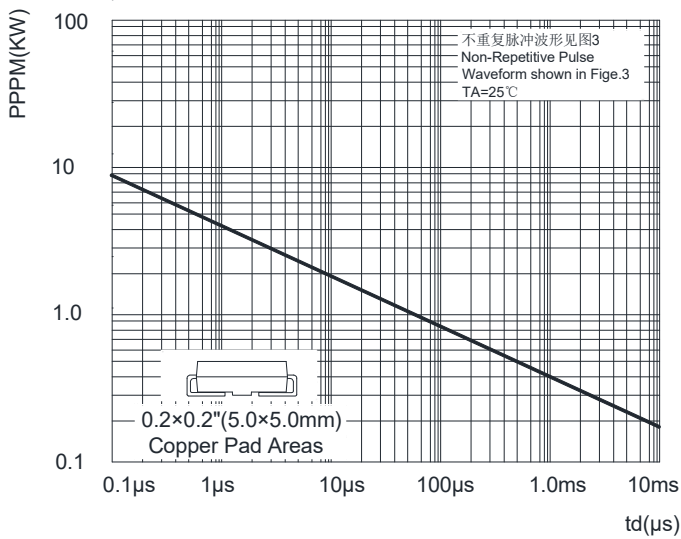


FIG2: Pulse Power or Current vs. Initial Junction Temperature

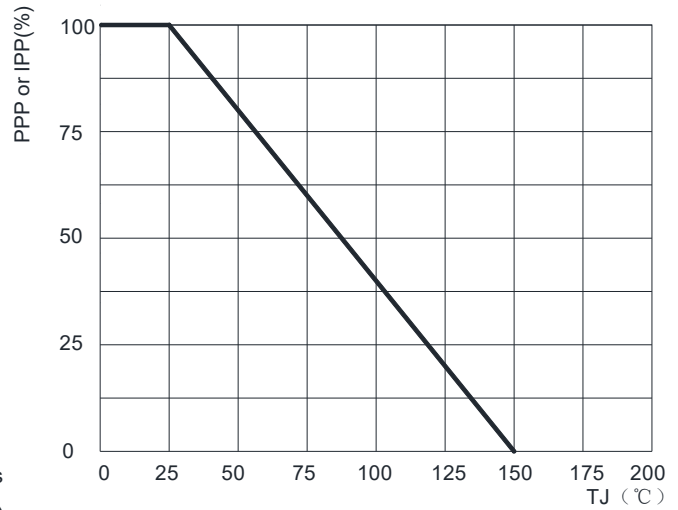


FIG3: Pulse Waveform

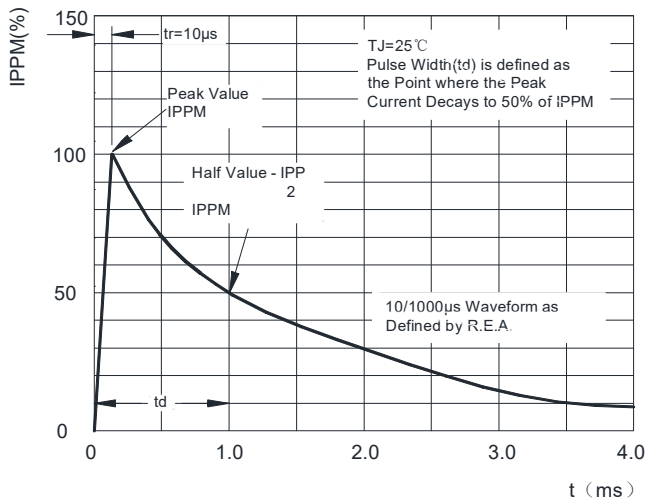


FIG4: Typical Transient Thermal Impedance

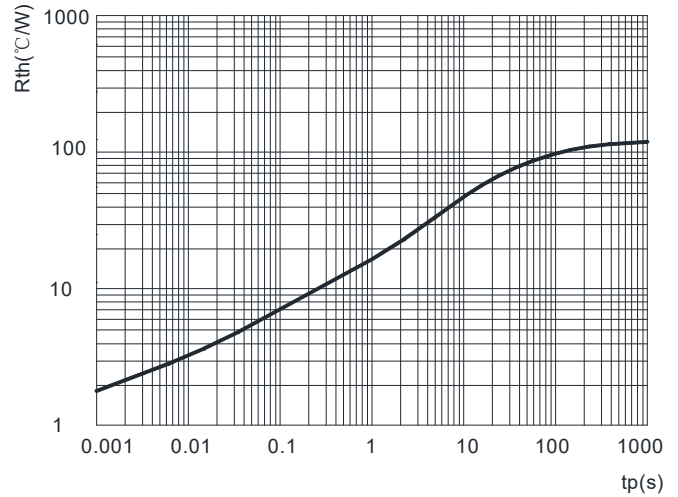
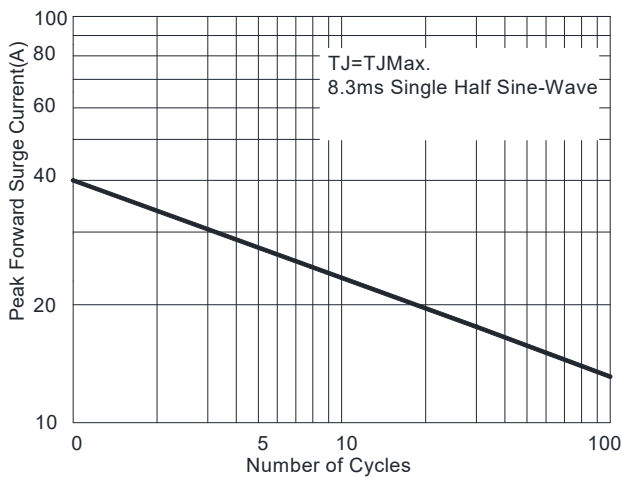


FIG5: Maximum Non-Repetitive Surge Current



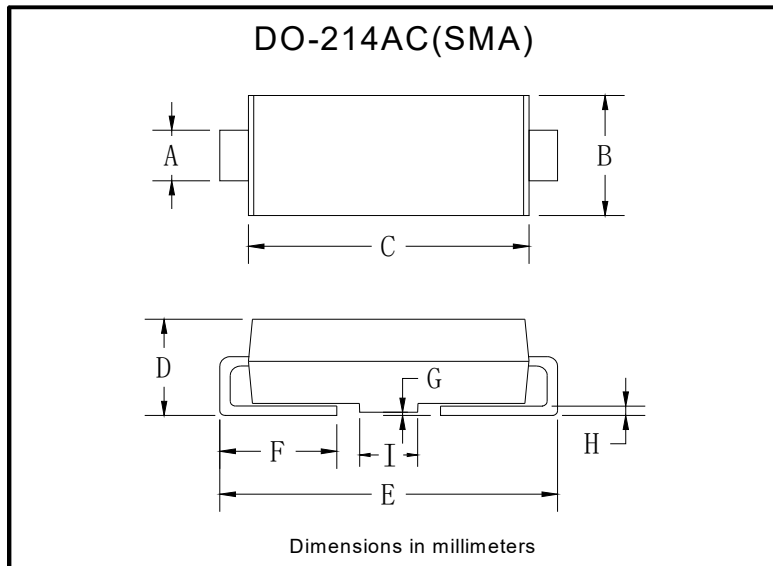


# SMAJ SERIES

## Ordering Information (Example)

| PREFERRED P/N | PACKAGE CODE | UNIT WEIGHT(g)    | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|-------------------|----------------------|-------------------------|----------------------------|---------------|
| SMAJ SERIES   | F1           | Approximate 0.059 | 5000                 | /                       | 80000                      | 13" reel      |
| SMAJ SERIES   | F2           | Approximate 0.059 | 7500                 | /                       | 120000                     | 13" reel      |
| SMAJ SERIES   | F3           | Approximate 0.059 | 7500                 | /                       | 60000                      | 13" reel      |
| SMAJ SERIES   | F4           | Approximate 0.059 | 1800                 | 7200                    | 57600                      | 7" reel       |
| SMAJ SERIES   | F5           | Approximate 0.059 | 2000                 | 8000                    | 64000                      | 7" reel       |
| SMAJ SERIES   | F6           | Approximate 0.059 | 5000                 | /                       | 100000                     | 13" reel      |

## Outline Dimensions

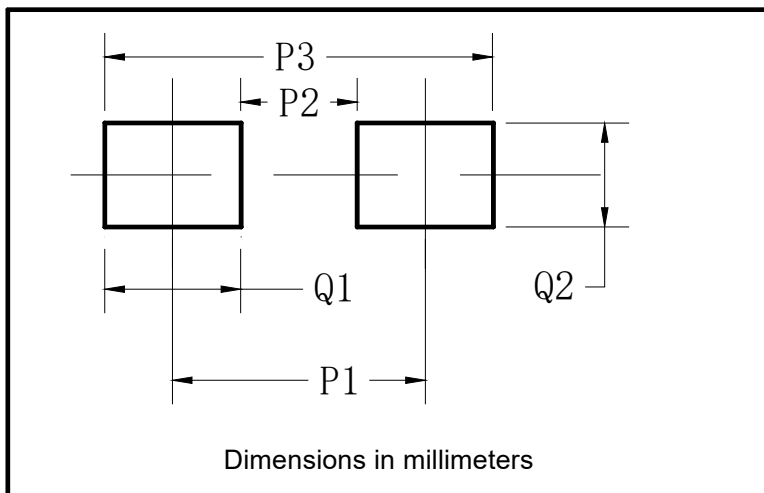


| DO-214AC(SMA) |      |      |
|---------------|------|------|
| Dim           | Min  | Max  |
| A             | 1.25 | 1.58 |
| B             | 2.40 | 2.83 |
| C             | 4.00 | 4.75 |
| D             | 1.90 | 2.30 |
| E             | 4.93 | 5.28 |
| F             | 0.76 | 1.41 |
| G             | 0.05 | 0.20 |
| H             | 0.15 | 0.31 |
| I             | 1.70 | 2.10 |



## SMAJ SERIES

### ■Suggested Pad Layout



| DO-214AC(SMA) |             |
|---------------|-------------|
| Dim           | Millimeters |
| P1            | 4.00        |
| P2            | 1.50        |
| P3            | 6.50        |
| Q1            | 2.50        |
| Q2            | 1.70        |

### Disclaimer

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