

# SMD Transient Voltage Suppressor

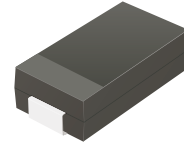
## TV50C110-HF Thru. TV50C441-HF

**Working Voltage: 11 to 440 V**

**Peak Pulse Power: 5000 W**

**RoHS Device**

**Halogen Free**

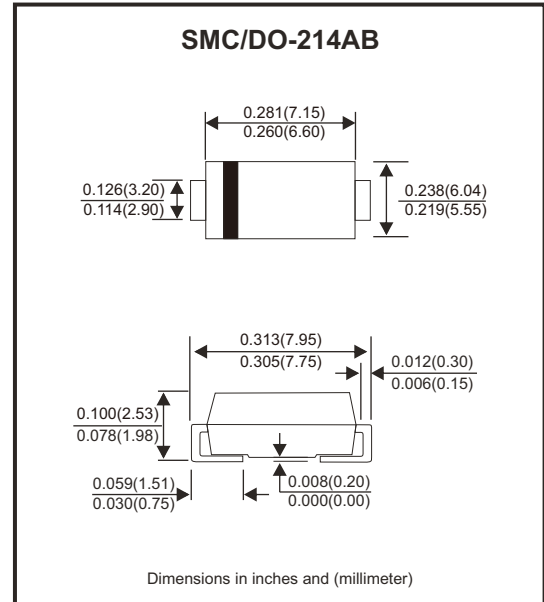


### Features

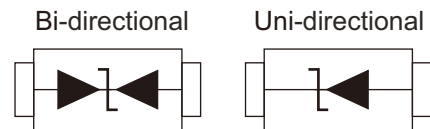
- Glass passivated chip.
- 5000W peak pulse power capability with a 10/1000 $\mu$ s waveform, repetitive rate (duty cycle):0.01%
- Low leakage.
- Uni and Bidirectional unit.
- Excellent clamping capability.
- Very fast response time.
- UL recognized file # E349157 

### Mechanical Data

- Case: DO-214AB/SMC molded plastic.
- Epoxy: UL 94V-0 rate flame retardant
- Lead: Solderable per MIL-STD-750, method 2026.
- Polarity: Color band denoted cathode end except bipolar.
- Mounting position: Any



### Circuit Diagram



### Maximum Ratings and Electrical Characteristics

Rating at 25°C ambient temperature unless otherwise specified.  
Single phase, half wave, 60Hz, resistive or inductive load.  
For capacitive load, derate current by 20%.

| Parameter                                                                            | Symbol         | Value          | Units              |
|--------------------------------------------------------------------------------------|----------------|----------------|--------------------|
| Peak power dissipation with a 10/1000 $\mu$ s waveform (Note 1)                      | $P_{PP}$       | 5000           | W                  |
| Peak pulse current with a 10/1000 $\mu$ s waveform (Note 1)                          | $I_{PP}$       | See Next Table | A                  |
| Power dissipation on infinite heatsink at $T_L=75^{\circ}\text{C}$                   | $P_D$          | 6.5            | W                  |
| Peak forward surge current, 8.3ms single half sine-wave unidirectional only (Note 2) | $I_{FSM}$      | 300            | A                  |
| Maximum instantaneous forward voltage at 100A for unidirectional only (Note 3)       | $V_F$          | 3.5/5.0        | V                  |
| Operation junction and storage temperature range                                     | $T_J, T_{STG}$ | -65 to +150    | $^{\circ}\text{C}$ |

Notes: 1. Non-repetitive current pulse, per Fig.5 and derated above  $T_A=25^{\circ}\text{C}$ , per Fig.1  
2. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum.  
3.  $V_F<3.5\text{V}$  for devices of  $V_{BR}<200\text{V}$  and  $V_F<5.0\text{V}$  for devices of  $V_{BR}>201\text{V}$

# SMD Transient Voltage Suppressor

## Electrical Characteristics (TV50C110-HF Thru. TV50C441-HF)

| Part No.        | Breakdown voltage<br>VBR @ IT |             |            | Maximum<br>Reverse<br>Leakage<br>@VRWM<br>IR (μA) | Working<br>Peak<br>Reverse<br>Voltage<br>VRWM (V) | Maximum<br>Reverse<br>Surge<br>Current<br>IPP (A) | Maximum<br>Clamping<br>Voltage<br>@IPP<br>Vc (V) | Device<br>Marking<br>Code |      |
|-----------------|-------------------------------|-------------|------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|--------------------------------------------------|---------------------------|------|
|                 | Min.<br>(V)                   | Max.<br>(V) | IT<br>(mA) |                                                   |                                                   |                                                   |                                                  | UNI                       | BI   |
| TV50C110J(B)-HF | 12.20                         | 13.50       | 10         | 800                                               | 11.0                                              | 274.7                                             | 18.2                                             | 5PDX                      | 5BDX |
| TV50C120J(B)-HF | 13.30                         | 14.70       | 10         | 800                                               | 12.0                                              | 251.3                                             | 19.9                                             | 5PDZ                      | 5BDZ |
| TV50C130J(B)-HF | 14.40                         | 15.90       | 10         | 500                                               | 13.0                                              | 232.6                                             | 21.5                                             | 5PEE                      | 5BEE |
| TV50C140J(B)-HF | 15.60                         | 17.20       | 10         | 200                                               | 14.0                                              | 215.5                                             | 23.2                                             | 5PEG                      | 5BEG |
| TV50C150J(B)-HF | 16.70                         | 18.50       | 1          | 100                                               | 15.0                                              | 204.9                                             | 24.4                                             | 5PEK                      | 5BEK |
| TV50C160J(B)-HF | 17.80                         | 19.70       | 1          | 50                                                | 16.0                                              | 192.3                                             | 26.0                                             | 5PEM                      | 5BEM |
| TV50C170J(B)-HF | 18.90                         | 20.90       | 1          | 20                                                | 17.0                                              | 181.2                                             | 27.6                                             | 5PEP                      | 5BEP |
| TV50C180J(B)-HF | 20.00                         | 22.10       | 1          | 10                                                | 18.0                                              | 171.2                                             | 29.2                                             | 5PER                      | 5BER |
| TV50C190J(B)-HF | 21.10                         | 23.30       | 1          | 10                                                | 19.0                                              | 162.4                                             | 30.8                                             | 5PET                      | 5BET |
| TV50C200J(B)-HF | 22.20                         | 24.50       | 1          | 5                                                 | 20.0                                              | 154.3                                             | 32.4                                             | 5PEV                      | 5BEV |
| TV50C220J(B)-HF | 24.40                         | 26.90       | 1          | 5                                                 | 22.0                                              | 140.8                                             | 35.5                                             | 5PEX                      | 5BEX |
| TV50C240J(B)-HF | 26.70                         | 29.50       | 1          | 5                                                 | 24.0                                              | 128.5                                             | 38.9                                             | 5PEZ                      | 5BEZ |
| TV50C260J(B)-HF | 28.90                         | 31.90       | 1          | 5                                                 | 26.0                                              | 118.8                                             | 42.1                                             | 5PFE                      | 5BFE |
| TV50C280J(B)-HF | 31.10                         | 34.40       | 1          | 5                                                 | 28.0                                              | 110.1                                             | 45.4                                             | 5PFG                      | 5BFG |
| TV50C300J(B)-HF | 33.30                         | 36.80       | 1          | 5                                                 | 30.0                                              | 103.3                                             | 48.4                                             | 5PFK                      | 5BFK |
| TV50C330J(B)-HF | 36.70                         | 40.60       | 1          | 5                                                 | 33.0                                              | 93.8                                              | 53.3                                             | 5PFM                      | 5BFM |
| TV50C360J(B)-HF | 40.00                         | 44.20       | 1          | 5                                                 | 36.0                                              | 86.1                                              | 58.1                                             | 5PFP                      | 5BFP |
| TV50C400J(B)-HF | 44.40                         | 49.10       | 1          | 5                                                 | 40.0                                              | 77.5                                              | 64.5                                             | 5PFR                      | 5BFR |
| TV50C430J(B)-HF | 47.80                         | 52.80       | 1          | 5                                                 | 43.0                                              | 72.0                                              | 69.4                                             | 5PFT                      | 5BFT |
| TV50C450J(B)-HF | 50.00                         | 55.30       | 1          | 5                                                 | 45.0                                              | 68.8                                              | 72.7                                             | 5PFV                      | 5BFV |
| TV50C480J(B)-HF | 53.30                         | 58.90       | 1          | 5                                                 | 48.0                                              | 64.6                                              | 77.4                                             | 5PFX                      | 5BFX |
| TV50C510J(B)-HF | 56.70                         | 62.70       | 1          | 5                                                 | 51.0                                              | 60.7                                              | 82.4                                             | 5PFZ                      | 5BFZ |
| TV50C540J(B)-HF | 60.00                         | 66.30       | 1          | 5                                                 | 54.0                                              | 57.4                                              | 87.1                                             | 5PGE                      | 5BGE |
| TV50C580J(B)-HF | 64.40                         | 71.20       | 1          | 5                                                 | 58.0                                              | 53.4                                              | 93.6                                             | 5PGG                      | 5BGG |
| TV50C600J(B)-HF | 66.70                         | 73.70       | 1          | 5                                                 | 60.0                                              | 51.7                                              | 96.8                                             | 5PGK                      | 5BGK |
| TV50C640J(B)-HF | 71.10                         | 78.60       | 1          | 5                                                 | 64.0                                              | 48.5                                              | 103.0                                            | 5PGM                      | 5BGM |
| TV50C700J(B)-HF | 77.80                         | 86.00       | 1          | 5                                                 | 70.0                                              | 44.2                                              | 113.0                                            | 5PGP                      | 5BGP |
| TV50C750J(B)-HF | 83.30                         | 92.10       | 1          | 5                                                 | 75.0                                              | 41.3                                              | 121.0                                            | 5PGR                      | 5BGR |
| TV50C780J(B)-HF | 86.70                         | 95.80       | 1          | 5                                                 | 78.0                                              | 39.7                                              | 126.0                                            | 5PGT                      | 5BGT |
| TV50C800J(B)-HF | 88.80                         | 97.60       | 1          | 5                                                 | 80.0                                              | 38.6                                              | 129.6                                            | 5PGB                      | 5BGB |
| TV50C850J(B)-HF | 94.40                         | 104.0       | 1          | 5                                                 | 85.0                                              | 36.5                                              | 137.0                                            | 5PGV                      | 5BGV |
| TV50C900J(B)-HF | 100.0                         | 111.0       | 1          | 5                                                 | 90.0                                              | 34.2                                              | 146.0                                            | 5PGX                      | 5BGX |
| TV50C101J(B)-HF | 111.0                         | 123.0       | 1          | 5                                                 | 100.0                                             | 30.9                                              | 162.0                                            | 5PGZ                      | 5BGZ |
| TV50C111J(B)-HF | 122.0                         | 135.0       | 1          | 5                                                 | 110.0                                             | 28.2                                              | 177.0                                            | 5PHE                      | 5BHE |
| TV50C121J(B)-HF | 133.0                         | 147.0       | 1          | 5                                                 | 120.0                                             | 25.9                                              | 193.0                                            | 5PHG                      | 5BHG |
| TV50C131J(B)-HF | 144.0                         | 159.0       | 1          | 5                                                 | 130.0                                             | 23.9                                              | 209.0                                            | 5PHK                      | 5BHK |
| TV50C141J(B)-HF | 155.0                         | 171.0       | 1          | 5                                                 | 140.0                                             | 22.0                                              | 226.8                                            | 5PHB                      | 5BHB |
| TV50C151J(B)-HF | 167.0                         | 185.0       | 1          | 5                                                 | 150.0                                             | 20.6                                              | 243.0                                            | 5PHM                      | 5BHM |
| TV50C161J(B)-HF | 178.0                         | 197.0       | 1          | 5                                                 | 160.0                                             | 19.3                                              | 259.0                                            | 5PHP                      | 5BHP |
| TV50C171J(B)-HF | 189.0                         | 209.0       | 1          | 5                                                 | 170.0                                             | 18.2                                              | 275.0                                            | 5PHR                      | 5BHR |

## Electrical Characteristics (TV50C110-HF Thru. TV50C441-HF)

| Part No.        | Breakdown voltage<br>V <sub>BR</sub> @ I <sub>T</sub> |             |                        | Maximum<br>Reverse<br>Leakage<br>@V <sub>RWM</sub><br>I <sub>R</sub> (μA) | Working<br>Peak<br>Reverse<br>Voltage<br>V <sub>RWM</sub> (V) | Maximum<br>Reverse<br>Surge<br>Current<br>I <sub>PP</sub> (A) | Maximum<br>Clamping<br>Voltage<br>@I <sub>PP</sub><br>V <sub>C</sub> (V) | Device<br>Marking<br>Code |      |
|-----------------|-------------------------------------------------------|-------------|------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------|------|
|                 | Min.<br>(V)                                           | Max.<br>(V) | I <sub>T</sub><br>(mA) |                                                                           |                                                               |                                                               |                                                                          | UNI                       | BI   |
| TV50C181J(B)-HF | 200.0                                                 | 220.0       | 1                      | 5                                                                         | 180.0                                                         | 17.1                                                          | 291.6                                                                    | 5PHT                      | 5BHT |
| TV50C191J(B)-HF | 211.0                                                 | 232.0       | 1                      | 5                                                                         | 190.0                                                         | 16.2                                                          | 307.8                                                                    | 5PHV                      | 5BHV |
| TV50C201J(B)-HF | 224.0                                                 | 247.0       | 1                      | 5                                                                         | 200.0                                                         | 15.4                                                          | 324.0                                                                    | 5PHW                      | 5BHW |
| TV50C221J(B)-HF | 246.0                                                 | 272.0       | 1                      | 5                                                                         | 220.0                                                         | 14.0                                                          | 356.0                                                                    | 5PHX                      | 5BHX |
| TV50C251J(B)-HF | 279.0                                                 | 309.0       | 1                      | 5                                                                         | 250.0                                                         | 12.3                                                          | 405.0                                                                    | 5PHZ                      | 5BHZ |
| TV50C301J(B)-HF | 335.0                                                 | 371.0       | 1                      | 5                                                                         | 300.0                                                         | 10.3                                                          | 486.0                                                                    | 5PJE                      | 5BJE |
| TV50C351J(B)-HF | 391.0                                                 | 432.0       | 1                      | 5                                                                         | 350.0                                                         | 8.8                                                           | 567.0                                                                    | 5PJG                      | 5BJG |
| TV50C401J(B)-HF | 447.0                                                 | 494.0       | 1                      | 5                                                                         | 400.0                                                         | 7.7                                                           | 648.0                                                                    | 5PJK                      | 5BJK |
| TV50C441J(B)-HF | 492.0                                                 | 543.0       | 1                      | 5                                                                         | 440.0                                                         | 7.0                                                           | 713.0                                                                    | 5PJM                      | 5BJM |

- Notes: 1. Suffix J denotes 5% tolerance devices.  
2. Suffix B after part number to specify bi-directional devices.  
3. For Bi-Directional devices having V<sub>R</sub> of 20 volts and under, the I<sub>R</sub> limit is double.

## Typical Rating and Characteristic Curves (TV50C110-HF Thru. TV50C441-HF)

Fig.1 - Pulse Derating Curve

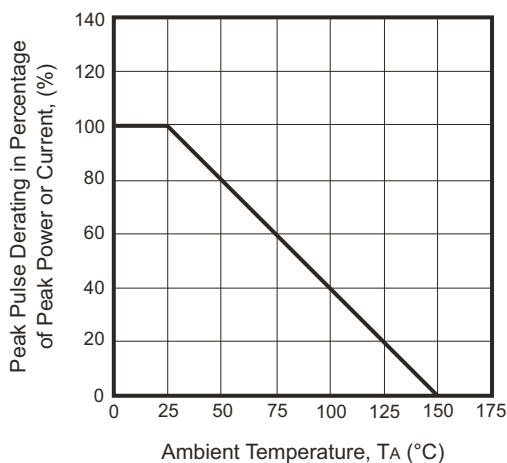


Fig.2 - Maximum Non-Repetitive Surge Current

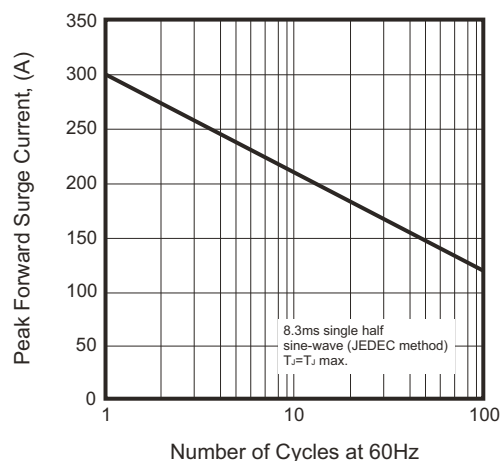


Fig.3 - Steady State Power Derating Curve

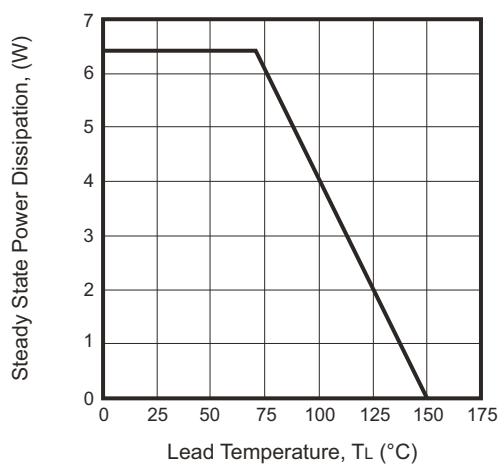


Fig.4 - Peak Pulse Power Rating Curve

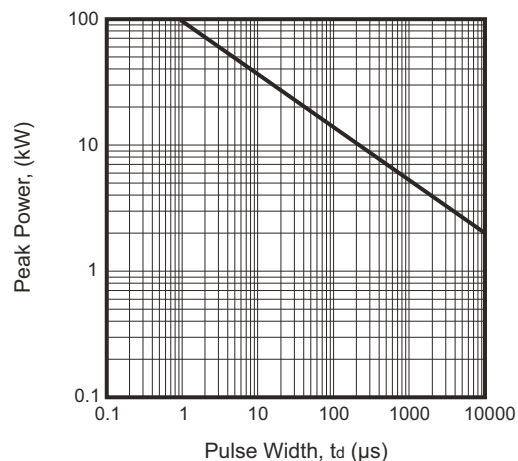


Fig.5 - Pulse Waveform

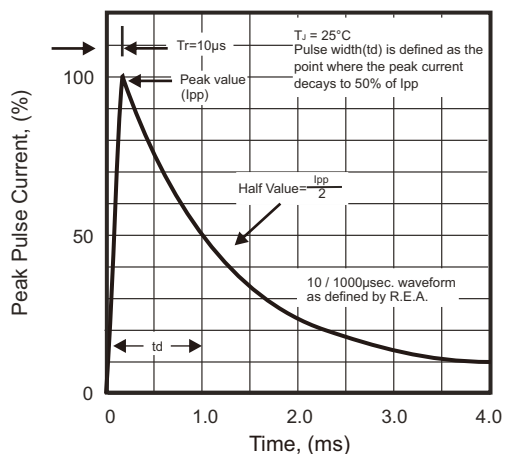
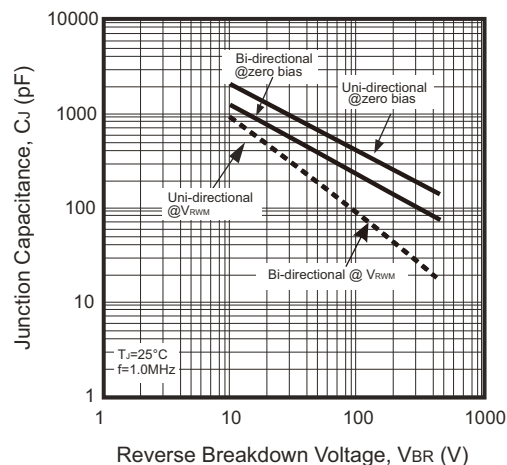
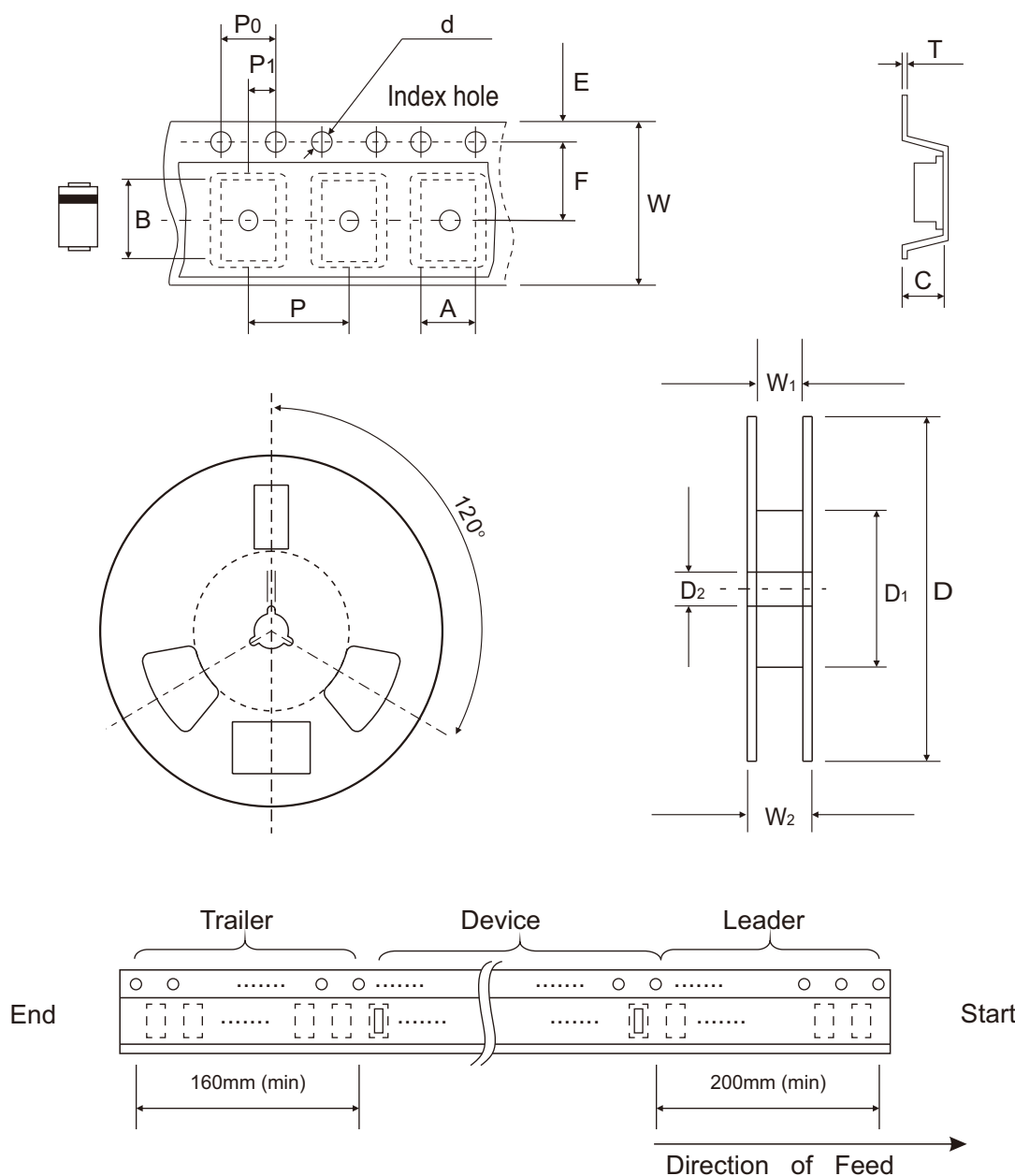


Fig.6 - Typical Junction Capacitance



## Reel Taping Specification



| DO-214AB<br>(SMC) | SYMBOL | A          | B | C | d             | T            | D      | D <sub>1</sub> | D <sub>2</sub>                            |
|-------------------|--------|------------|---|---|---------------|--------------|--------|----------------|-------------------------------------------|
|                   | (mm)   | See Note 1 |   |   | 1.55 ± 0.05   | 0.40 (Max.)  | 330.00 | 50.00 (Min.)   | 13.00 <sup>+0.50</sup> <sub>-0.20</sub>   |
|                   | (inch) |            |   |   | 0.061 ± 0.002 | 0.016 (Max.) | 13.000 | 1.969 (Min.)   | 0.512 <sup>+0.020</sup> <sub>-0.008</sub> |

| DO-214AB<br>(SMC) | SYMBOL | E             | F             | P             | P <sub>0</sub> | P <sub>1</sub> | W             | W <sub>1</sub>                            | W <sub>2</sub> |
|-------------------|--------|---------------|---------------|---------------|----------------|----------------|---------------|-------------------------------------------|----------------|
|                   | (mm)   | 1.75 ± 0.10   | 7.50 ± 0.05   | 8.00 ± 0.10   | 4.00 ± 0.10    | 2.00 ± 0.05    | 16.00 ± 0.10  | 16.40 <sup>+2.00</sup> <sub>-0.00</sub>   | 22.40 (Max.)   |
|                   | (inch) | 0.069 ± 0.004 | 0.295 ± 0.002 | 0.315 ± 0.004 | 0.157 ± 0.004  | 0.079 ± 0.002  | 0.630 ± 0.004 | 0.646 <sup>+0.079</sup> <sub>-0.000</sub> | 0.882 (Max.)   |

Notes: 1. A, B, and C the clearance between the component and the cavity must be within 0.5 mm max.  
for 8 mm tape and 12 mm tape, 1.0 mm max. for 16mm tape and 24 mm tape.

## Marking Code

| Part Number     | Marking Code  |
|-----------------|---------------|
| TV50C-HF Series | See Page. 2~3 |

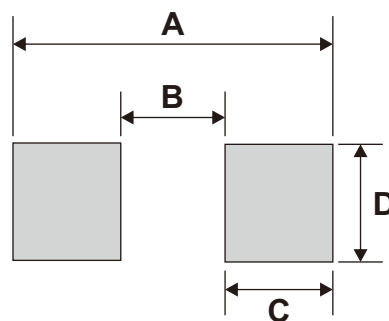


1. XXXX = Marking code (see Page.2~3)

2.  = Cathode band

## Suggested P.C.B. PAD Layout

| SIZE | DO-214AB(SMC) |           |
|------|---------------|-----------|
|      | (mm)          | (inch)    |
| A    | 8.13          | 0.320     |
| B    | 4.69 MAX      | 0.185 MAX |
| C    | 1.52 MIN      | 0.060 MIN |
| D    | 3.20 MIN      | 0.126 MIN |



## Standard Packaging

| Case Type         | REEL PACK       |                     |
|-------------------|-----------------|---------------------|
|                   | REEL<br>( pcs ) | Reel Size<br>(inch) |
| DO-214AB<br>(SMC) | 3,000           | 13                  |