

# STUP06I - STUP5G4

## SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSOR

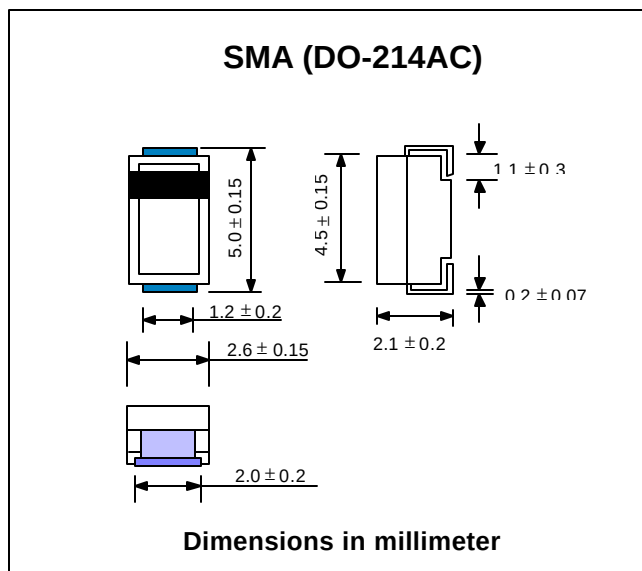
**V<sub>BR</sub> : 6.8 - 440 Volts**  
**P<sub>PK</sub> : 400 Watts**

### FEATURES :

- \* 400W surge capability at 1ms
- \* Excellent clamping capability
- \* Low zener impedance
- \* Fast response time : typically less than 1.0 ps from 0 volt to V<sub>BR(min.)</sub>
- \* Typical I<sub>R</sub> less than 1μA above 10V

### MECHANICAL DATA

- \* Case : SMA Molded plastic
- \* Epoxy : UL94V-O rate flame retardant
- \* Lead : Lead Formed for Surface Mount
- \* Polarity : Color band denotes cathode end except Bipolar.
- \* Mounting position : Any
- \* Weight : 0.064 grams



### DEVICES FOR BIPOLAR APPLICATIONS

For bi-directional altered the third letter of type from "U" to be "B".  
Electrical characteristics apply in both directions

### MAXIMUM RATINGS

Rating at 25 °C ambient temperature unless otherwise specified.

| Rating                                                                                                     | Symbol                            | Value         | Unit  |
|------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------|-------|
| Peak Power Dissipation at Ta = 25 °C, Tp=1ms (Note1)                                                       | P <sub>PK</sub>                   | 400           | Watts |
| Steady State Power Dissipation at T <sub>L</sub> = 75 °C                                                   | P <sub>D</sub>                    | 1.0           | Watt  |
| Peak Forward Surge Current, 8.3ms Single Half Sine-Wave Superimposed on Rated Load (JEDEC Method) (Note 3) | I <sub>FSM</sub>                  | 40            | Amps. |
| Operating and Storage Temperature Range                                                                    | T <sub>J</sub> , T <sub>STG</sub> | - 55 to + 150 | °C    |

### Note :

- (1) Non-repetitive Current pulse, per Fig. 5 and derated above Ta = 25 °C per Fig. 1
- (2) Mounted on copper Lead area at 5.0 mm<sup>2</sup> ( 0.013 mm thick ).
- (3) 8.3 ms single half sine-wave, duty cycle = 4 pulses per Minutes maximum.

**UPDATE : JULY 13, 1998**



## ELECTRICAL CHARACTERISTICS

Rating at = 25 °C ambient temperature unless otherwise specified

| TYPE    | Breakdown Voltage @ It<br>( Note 1 ) |      |      | Working Peak<br>Reverse<br>Voltage | Maximum<br>Reverse Leakage<br>@ VRWM | Maximum<br>Reverse<br>Current | Maximum<br>Clamping<br>Voltage @ IRSM | Maximum<br>Temperature<br>Co-efficient<br>of VBR<br>of VBR<br>(% / °C) |
|---------|--------------------------------------|------|------|------------------------------------|--------------------------------------|-------------------------------|---------------------------------------|------------------------------------------------------------------------|
|         | VBR (V)                              |      | It   |                                    |                                      |                               |                                       |                                                                        |
|         | Min.                                 | Max. | (mA) | (V)                                | (μA)                                 | (A)                           | (V)                                   |                                                                        |
| STUP06I | 6.12                                 | 7.48 | 10   | 5.50                               | 1000                                 | 38.0                          | 10.8                                  | 0.057                                                                  |
| STUP56I | 6.45                                 | 7.14 | 10   | 5.80                               | 1000                                 | 40.0                          | 10.5                                  | 0.057                                                                  |
| STUP07F | 6.75                                 | 8.25 | 10   | 6.05                               | 500                                  | 36.0                          | 11.7                                  | 0.061                                                                  |
| STUP57F | 7.13                                 | 7.88 | 10   | 6.40                               | 500                                  | 37.0                          | 11.3                                  | 0.061                                                                  |
| STUP08C | 7.38                                 | 9.02 | 10   | 6.63                               | 200                                  | 33.0                          | 12.5                                  | 0.065                                                                  |
| STUP58C | 7.79                                 | 8.61 | 10   | 7.02                               | 200                                  | 35.0                          | 12.1                                  | 0.065                                                                  |
| STUP09B | 8.19                                 | 10.0 | 1.0  | 7.37                               | 50                                   | 30.0                          | 13.8                                  | 0.068                                                                  |
| STUP59B | 8.65                                 | 9.55 | 1.0  | 7.78                               | 50                                   | 31.0                          | 13.4                                  | 0.068                                                                  |
| STUP010 | 9.00                                 | 11.0 | 1.0  | 8.10                               | 10                                   | 28.0                          | 15.0                                  | 0.073                                                                  |
| STUP510 | 9.50                                 | 10.5 | 1.0  | 8.55                               | 10                                   | 29.0                          | 14.5                                  | 0.073                                                                  |
| STUP011 | 9.90                                 | 12.1 | 1.0  | 8.92                               | 5.0                                  | 26.0                          | 16.2                                  | 0.075                                                                  |
| STUP511 | 10.5                                 | 11.6 | 1.0  | 9.40                               | 5.0                                  | 27.0                          | 15.6                                  | 0.075                                                                  |
| STUP012 | 10.8                                 | 13.2 | 1.0  | 9.72                               | 5.0                                  | 24.0                          | 17.3                                  | 0.078                                                                  |
| STUP512 | 11.4                                 | 12.6 | 1.0  | 10.2                               | 5.0                                  | 25.0                          | 16.7                                  | 0.078                                                                  |
| STUP013 | 11.7                                 | 14.3 | 1.0  | 10.5                               | 5.0                                  | 22.0                          | 19.0                                  | 0.081                                                                  |
| STUP513 | 12.4                                 | 13.7 | 1.0  | 11.1                               | 5.0                                  | 23.0                          | 18.2                                  | 0.081                                                                  |
| STUP015 | 13.5                                 | 16.5 | 1.0  | 12.1                               | 5.0                                  | 19.0                          | 22.0                                  | 0.084                                                                  |
| STUP515 | 14.3                                 | 15.8 | 1.0  | 12.8                               | 5.0                                  | 20.0                          | 21.2                                  | 0.084                                                                  |
| STUP016 | 14.4                                 | 17.6 | 1.0  | 12.9                               | 5.0                                  | 18.0                          | 23.5                                  | 0.086                                                                  |
| STUP516 | 15.2                                 | 16.8 | 1.0  | 13.6                               | 5.0                                  | 19.0                          | 22.5                                  | 0.086                                                                  |
| STUP018 | 16.2                                 | 19.8 | 1.0  | 14.5                               | 5.0                                  | 16.0                          | 26.5                                  | 0.088                                                                  |
| STUP518 | 17.1                                 | 18.9 | 1.0  | 15.3                               | 5.0                                  | 17.0                          | 25.5                                  | 0.088                                                                  |
| STUP020 | 18.0                                 | 22.0 | 1.0  | 16.2                               | 5.0                                  | 14.0                          | 29.1                                  | 0.090                                                                  |
| STUP520 | 19.0                                 | 21.0 | 1.0  | 17.1                               | 5.0                                  | 15.0                          | 27.7                                  | 0.090                                                                  |
| STUP022 | 19.8                                 | 24.2 | 1.0  | 17.8                               | 5.0                                  | 13.0                          | 31.9                                  | 0.092                                                                  |
| STUP522 | 20.9                                 | 23.1 | 1.0  | 18.8                               | 5.0                                  | 14.0                          | 30.6                                  | 0.092                                                                  |
| STUP024 | 21.6                                 | 26.4 | 1.0  | 19.4                               | 5.0                                  | 12.0                          | 34.7                                  | 0.094                                                                  |
| STUP524 | 22.8                                 | 25.2 | 1.0  | 20.5                               | 5.0                                  | 13.0                          | 33.2                                  | 0.094                                                                  |
| STUP027 | 24.3                                 | 29.7 | 1.0  | 21.8                               | 5.0                                  | 11.0                          | 39.1                                  | 0.096                                                                  |
| STUP527 | 25.7                                 | 28.4 | 1.0  | 23.1                               | 5.0                                  | 11.2                          | 37.5                                  | 0.096                                                                  |
| STUP030 | 27.0                                 | 33.0 | 1.0  | 24.3                               | 5.0                                  | 10.0                          | 43.5                                  | 0.097                                                                  |
| STUP530 | 28.5                                 | 31.5 | 1.0  | 25.6                               | 5.0                                  | 10.0                          | 41.4                                  | 0.097                                                                  |
| STUP033 | 29.7                                 | 36.3 | 1.0  | 26.8                               | 5.0                                  | 9.0                           | 47.7                                  | 0.098                                                                  |
| STUP533 | 31.4                                 | 34.7 | 1.0  | 28.2                               | 5.0                                  | 9.0                           | 45.7                                  | 0.098                                                                  |
| STUP036 | 32.4                                 | 39.6 | 1.0  | 29.1                               | 5.0                                  | 8.0                           | 52.0                                  | 0.099                                                                  |
| STUP536 | 34.2                                 | 37.8 | 1.0  | 30.8                               | 5.0                                  | 8.4                           | 49.9                                  | 0.099                                                                  |
| STUP039 | 35.1                                 | 42.9 | 1.0  | 31.6                               | 5.0                                  | 7.4                           | 56.4                                  | 0.100                                                                  |
| STUP539 | 37.1                                 | 41.0 | 1.0  | 33.3                               | 5.0                                  | 7.8                           | 53.9                                  | 0.100                                                                  |
| STUP043 | 38.7                                 | 47.3 | 1.0  | 34.8                               | 5.0                                  | 6.8                           | 61.9                                  | 0.101                                                                  |
| STUP543 | 40.9                                 | 45.2 | 1.0  | 36.8                               | 5.0                                  | 7.1                           | 59.3                                  | 0.101                                                                  |
| STUP047 | 42.3                                 | 51.7 | 1.0  | 38.1                               | 5.0                                  | 6.2                           | 67.8                                  | 0.101                                                                  |
| STUP547 | 44.7                                 | 49.4 | 1.0  | 40.2                               | 5.0                                  | 6.5                           | 64.8                                  | 0.101                                                                  |
| STUP051 | 45.9                                 | 56.1 | 1.0  | 41.3                               | 5.0                                  | 5.7                           | 73.5                                  | 0.102                                                                  |
| STUP551 | 48.5                                 | 53.6 | 1.0  | 43.6                               | 5.0                                  | 6.0                           | 70.1                                  | 0.102                                                                  |
| STUP056 | 50.4                                 | 61.6 | 1.0  | 45.4                               | 5.0                                  | 5.2                           | 80.5                                  | 0.103                                                                  |
| STUP556 | 53.2                                 | 58.8 | 1.0  | 47.8                               | 5.0                                  | 5.5                           | 77.0                                  | 0.103                                                                  |
| STUP062 | 55.8                                 | 68.2 | 1.0  | 50.2                               | 5.0                                  | 4.7                           | 89.0                                  | 0.104                                                                  |

## ELECTRICAL CHARACTERISTICS

Rating at = 25 °C ambient temperature unless otherwise specified

| TYPE    | Breakdown Voltage @ It<br>( Note 1 ) |      |      | Working Peak<br>Reverse<br>Voltage | Maximum<br>Reverse Leakage<br>@ VRWM | Maximum<br>Reverse<br>Current | Maximum<br>Clamping<br>Voltage @ IRSM | Maximum<br>Temperature<br>Co-efficient<br>of VBR<br>of VBR |
|---------|--------------------------------------|------|------|------------------------------------|--------------------------------------|-------------------------------|---------------------------------------|------------------------------------------------------------|
|         | VBR (V)                              |      | It   |                                    |                                      |                               |                                       |                                                            |
|         | Min.                                 | Max. | (mA) | (V)                                | (μA)                                 | (A)                           | (V)                                   | (% / °C)                                                   |
| STUP562 | 58.9                                 | 65.1 | 1.0  | 53.0                               | 5.0                                  | 5.0                           | 85.0                                  | 0.104                                                      |
| STUP068 | 61.2                                 | 74.8 | 1.0  | 55.1                               | 5.0                                  | 4.3                           | 98.0                                  | 0.104                                                      |
| STUP568 | 64.6                                 | 71.4 | 1.0  | 58.1                               | 5.0                                  | 4.6                           | 92.0                                  | 0.104                                                      |
| STUP075 | 67.5                                 | 82.5 | 1.0  | 60.7                               | 5.0                                  | 3.9                           | 108                                   | 0.105                                                      |
| STUP575 | 71.3                                 | 78.8 | 1.0  | 64.1                               | 5.0                                  | 4.1                           | 103                                   | 0.105                                                      |
| STUP082 | 73.8                                 | 90.2 | 1.0  | 66.4                               | 5.0                                  | 3.6                           | 118                                   | 0.105                                                      |
| STUP582 | 77.9                                 | 86.1 | 1.0  | 70.1                               | 5.0                                  | 3.7                           | 113                                   | 0.105                                                      |
| STUP091 | 81.9                                 | 100  | 1.0  | 73.7                               | 5.0                                  | 3.2                           | 131                                   | 0.106                                                      |
| STUP591 | 86.5                                 | 95.5 | 1.0  | 77.8                               | 5.0                                  | 3.4                           | 125                                   | 0.106                                                      |
| STUP0B0 | 90.0                                 | 110  | 1.0  | 81.0                               | 5.0                                  | 2.9                           | 144                                   | 0.106                                                      |
| STUP5B0 | 95.0                                 | 105  | 1.0  | 85.5                               | 5.0                                  | 3.1                           | 137                                   | 0.106                                                      |
| STUP0B1 | 99.0                                 | 121  | 1.0  | 89.2                               | 5.0                                  | 2.7                           | 158                                   | 0.107                                                      |
| STUP5B1 | 105                                  | 116  | 1.0  | 94.0                               | 5.0                                  | 2.8                           | 152                                   | 0.107                                                      |
| STUP0B2 | 108                                  | 132  | 1.0  | 97.2                               | 5.0                                  | 2.4                           | 173                                   | 0.107                                                      |
| STUP5B2 | 114                                  | 126  | 1.0  | 102                                | 5.0                                  | 2.5                           | 165                                   | 0.107                                                      |
| STUP0B3 | 117                                  | 143  | 1.0  | 105                                | 5.0                                  | 2.2                           | 187                                   | 0.107                                                      |
| STUP5B3 | 124                                  | 137  | 1.0  | 111                                | 5.0                                  | 2.3                           | 179                                   | 0.107                                                      |
| STUP0B5 | 135                                  | 165  | 1.0  | 121                                | 5.0                                  | 2.0                           | 215                                   | 0.108                                                      |
| STUP5B5 | 143                                  | 158  | 1.0  | 128                                | 5.0                                  | 2.0                           | 207                                   | 0.108                                                      |
| STUP0B6 | 144                                  | 176  | 1.0  | 130                                | 5.0                                  | 1.8                           | 230                                   | 0.108                                                      |
| STUP5B6 | 152                                  | 168  | 1.0  | 136                                | 5.0                                  | 1.9                           | 219                                   | 0.108                                                      |
| STUP0B7 | 153                                  | 187  | 1.0  | 138                                | 5.0                                  | 1.7                           | 244                                   | 0.108                                                      |
| STUP5B7 | 162                                  | 179  | 1.0  | 145                                | 5.0                                  | 1.8                           | 234                                   | 0.108                                                      |
| STUP0B8 | 162                                  | 198  | 1.0  | 146                                | 5.0                                  | 1.6                           | 258                                   | 0.108                                                      |
| STUP5B8 | 171                                  | 189  | 1.0  | 154                                | 5.0                                  | 1.7                           | 246                                   | 0.108                                                      |
| STUP0D0 | 180                                  | 220  | 1.0  | 162                                | 5.0                                  | 1.5                           | 287                                   | 0.108                                                      |
| STUP5D0 | 190                                  | 210  | 1.0  | 171                                | 5.0                                  | 1.53                          | 274                                   | 0.108                                                      |
| STUP0D2 | 198                                  | 242  | 1.0  | 175                                | 5.0                                  | 1.16                          | 344                                   | 0.108                                                      |
| STUP5D2 | 209                                  | 231  | 1.0  | 185                                | 5.0                                  | 1.22                          | 328                                   | 0.108                                                      |
| STUP0D5 | 225                                  | 275  | 1.0  | 202                                | 5.0                                  | 1.11                          | 360                                   | 0.110                                                      |
| STUP5D5 | 237                                  | 263  | 1.0  | 214                                | 5.0                                  | 1.16                          | 344                                   | 0.110                                                      |
| STUP0E0 | 270                                  | 330  | 1.0  | 243                                | 5.0                                  | 0.93                          | 430                                   | 0.110                                                      |
| STUP5E0 | 285                                  | 315  | 1.0  | 256                                | 5.0                                  | 0.97                          | 414                                   | 0.110                                                      |
| STUP0E5 | 315                                  | 385  | 1.0  | 284                                | 5.0                                  | 0.79                          | 504                                   | 0.110                                                      |
| STUP5E5 | 332                                  | 368  | 1.0  | 300                                | 5.0                                  | 0.83                          | 482                                   | 0.110                                                      |
| STUP0G0 | 360                                  | 440  | 1.0  | 324                                | 5.0                                  | 0.70                          | 574                                   | 0.110                                                      |
| STUP5G0 | 380                                  | 420  | 1.0  | 342                                | 5.0                                  | 0.73                          | 548                                   | 0.110                                                      |
| STUP0G4 | 396                                  | 484  | 1.0  | 356                                | 5.0                                  | 0.95                          | 631                                   | 0.110                                                      |
| STUP5G4 | 418                                  | 462  | 1.0  | 376                                | 5.0                                  | 1.00                          | 602                                   | 0.110                                                      |

### Note:

- (1)  $V_{BR}$  measured after  $I_t$  applied for 300  $\mu s$ .  $I_t$  = square wave pulse or equivalent.
- (2)  $V_F = 3.5 V_{max}$ ,  $I_F = 25$  Amps. ( 6.8 Volts thru 91Volts )  
 $V_F = 5.0 V_{max}$ ,  $I_F = 25$  Amps. ( 100 Volts thru 440 Volts ) per 1/2 square or equivalent sine wave.  
 PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.
- (3) For Bipolar totes moving  $V_R$  of 10 Volts and under, the  $I_R$  limit is doubled.
- (4) "STU" will be omitted in marking on the diode.

## RATING AND CHARACTERISTIC CURVES ( STUP06I - STUP5G4 )

FIG.1 - PULSE DERATING CURVE

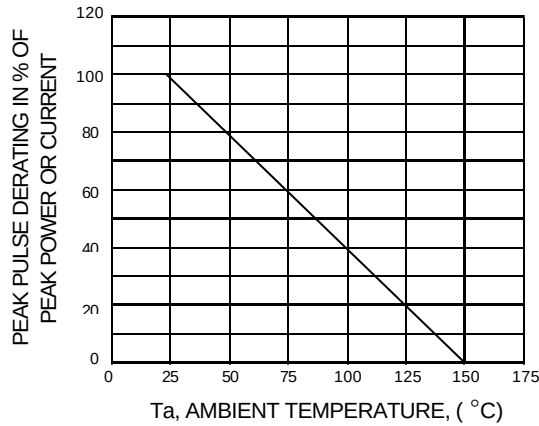


FIG.2 - MAXIMUM NON-REPETITIVE SURGE CURRENT

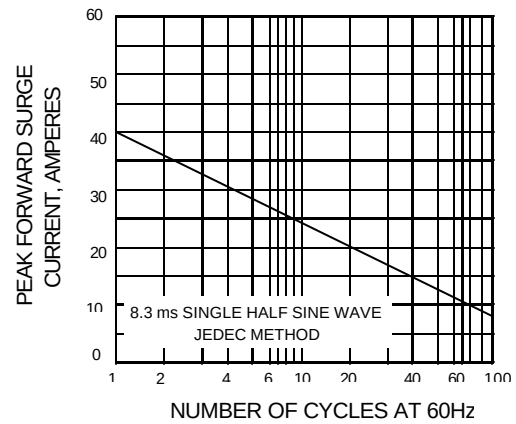


FIG.3 - STEADY STATE POWER DERATING

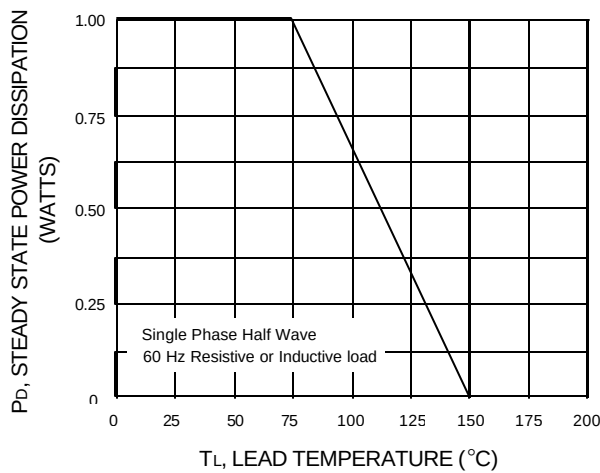


FIG.4 - PULSE RATING CURVE

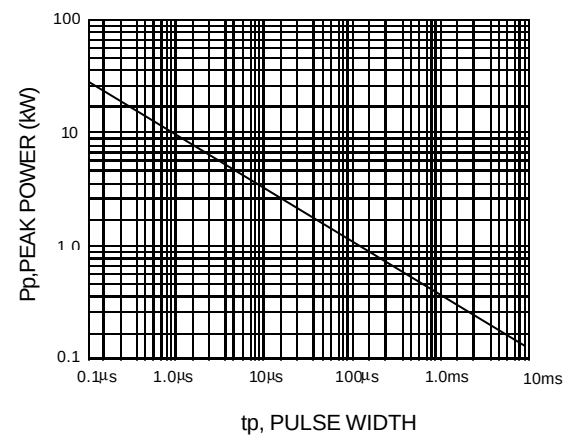


FIG.5 - PULSE WAVEFORM

