

# STG8209

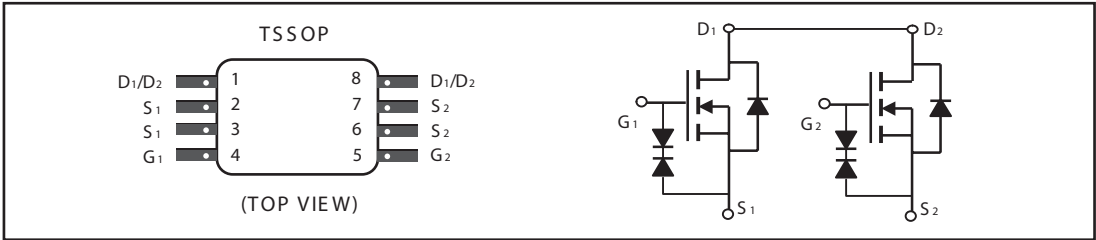
## Dual N-Channel Enhancement Mode Field Effect Transistor

### PRODUCT SUMMARY

| V <sub>DS</sub> | I <sub>D</sub> | R <sub>DS(ON)</sub> ( mΩ ) Max                             |
|-----------------|----------------|------------------------------------------------------------|
| 20V             | 6A             | 26 @ V <sub>GS</sub> = 4.0V<br>40 @ V <sub>GS</sub> = 2.5V |

### FEATURES

- Super high dense cell design for low R<sub>DS(ON)</sub>.
- Rugged and reliable.
- Surface Mount Package.
- ESD Protected.



### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25° C unless otherwise noted)

| Parameter                                                     | Symbol                            | Limit      | Unit |
|---------------------------------------------------------------|-----------------------------------|------------|------|
| Drain-Source Voltage                                          | V <sub>DS</sub>                   | 20         | V    |
| Gate-Source Voltage                                           | V <sub>GS</sub>                   | ±12        | V    |
| Drain Current-Continuous <sup>a</sup><br>-Pulsed <sup>b</sup> | I <sub>D</sub>                    | 6          | A    |
|                                                               | I <sub>DM</sub>                   | 24         | A    |
| Drain-Source Diode Forward Current <sup>a</sup>               | I <sub>S</sub>                    | 1.7        | A    |
| Maximum Power Dissipation <sup>a</sup>                        | P <sub>D</sub>                    | 1.5        | W    |
| Operating Junction and Storage Temperature Range              | T <sub>J</sub> , T <sub>STG</sub> | -55 to 150 | °C   |

### THERMAL CHARACTERISTICS

|                                                      |                  |    |      |
|------------------------------------------------------|------------------|----|------|
| Thermal Resistance, Junction-to-Ambient <sup>a</sup> | R <sub>θJA</sub> | 85 | °C/W |
|------------------------------------------------------|------------------|----|------|

# STG8209

www.DataSheet4U.com

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25 °C unless otherwise noted)

| Parameter                              | Symbol              | Condition                                                                                               | Min | Typ <sup>c</sup> | Max | Unit  |
|----------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------|-----|------------------|-----|-------|
| OFF CHARACTERISTICS                    |                     |                                                                                                         |     |                  |     |       |
| Drain-Source Breakdown Voltage         | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                                              | 20  |                  |     | V     |
| Zero Gate Voltage Drain Current        | I <sub>DSS</sub>    | V <sub>DS</sub> =16V, V <sub>GS</sub> =0V                                                               |     |                  | 1   | uA    |
| Gate-Body Leakage                      | I <sub>GSS</sub>    | V <sub>GS</sub> = ±12V, V <sub>DS</sub> =0V                                                             |     |                  | ±10 | uA    |
| ON CHARACTERISTICS <sup>b</sup>        |                     |                                                                                                         |     |                  |     |       |
| Gate Threshold Voltage                 | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = 250uA                                               | 0.5 | 0.8              | 1.5 | V     |
| Drain-Source On-State Resistance       | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.0V, I <sub>D</sub> = 5A                                                              |     | 22               | 26  | m ohm |
|                                        |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> = 3A                                                              |     | 30               | 40  | m ohm |
| Forward Transconductance               | g <sub>FS</sub>     | V <sub>DS</sub> = 5V, I <sub>D</sub> =5A                                                                |     | 19               |     | S     |
| DYNAMIC CHARACTERISTICS <sup>c</sup>   |                     |                                                                                                         |     |                  |     |       |
| Input Capacitance                      | C <sub>ISS</sub>    | V <sub>DS</sub> =8V, V <sub>GS</sub> = 0V<br>f =1.0MHz                                                  |     | 693              |     | pF    |
| Output Capacitance                     | C <sub>OSS</sub>    |                                                                                                         |     | 189              |     | pF    |
| Reverse Transfer Capacitance           | C <sub>RSS</sub>    |                                                                                                         |     | 136              |     | pF    |
| SWITCHING CHARACTERISTICS <sup>c</sup> |                     |                                                                                                         |     |                  |     |       |
| Turn-On Delay Time                     | t <sub>D(ON)</sub>  | V <sub>DD</sub> = 10V,<br>I <sub>D</sub> = 1A,<br>V <sub>GEN</sub> = 4.0V,<br>R <sub>GEN</sub> = 10 ohm |     | 31               |     | ns    |
| Rise Time                              | t <sub>r</sub>      |                                                                                                         |     | 62               |     | ns    |
| Turn-Off Delay Time                    | t <sub>D(OFF)</sub> |                                                                                                         |     | 96               |     | ns    |
| Fall Time                              | t <sub>f</sub>      |                                                                                                         |     | 40               |     | ns    |
| Total Gate Charge                      | Q <sub>g</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> = 5A,<br>V <sub>GS</sub> =4.0V                                     |     | 11               |     | nC    |
| Gate-Source Charge                     | Q <sub>gs</sub>     |                                                                                                         |     | 1.8              |     | nC    |
| Gate-Drain Charge                      | Q <sub>gd</sub>     |                                                                                                         |     | 4.9              |     | nC    |

# STG8209

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25 °C unless otherwise noted)

| Parameter                                       | Symbol          | Condition                                    | Min | Typ | Max | Unit |
|-------------------------------------------------|-----------------|----------------------------------------------|-----|-----|-----|------|
| DRAIN-SOURCE DIODE CHARACTERISTICS <sup>b</sup> |                 |                                              |     |     |     |      |
| Diode Forward Voltage                           | V <sub>SD</sub> | V <sub>GS</sub> = 0 V, I <sub>s</sub> = 1.7A |     | 0.8 | 1.2 | V    |

Notes

- a.Surface Mounted on FR4 Board, t ≤ 10sec.
- b.Pulse Test:Pulse Width ≤ 300us, Duty Cycle ≤ 2%.
- c.Guaranteed by design, not subject to production testing.

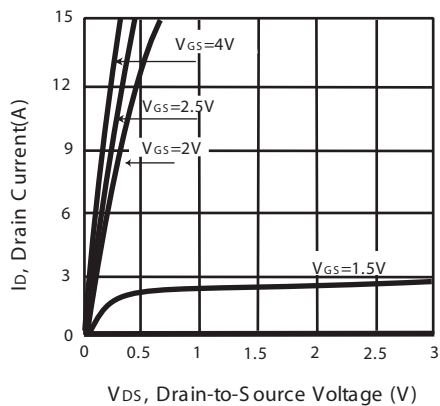


Figure 1. Output Characteristics

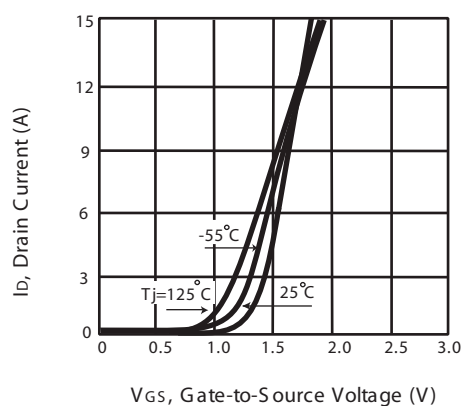


Figure 2. Transfer Characteristics

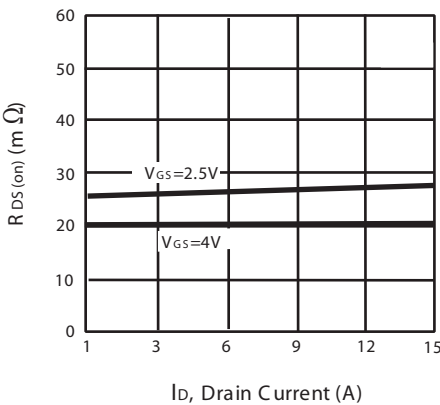


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

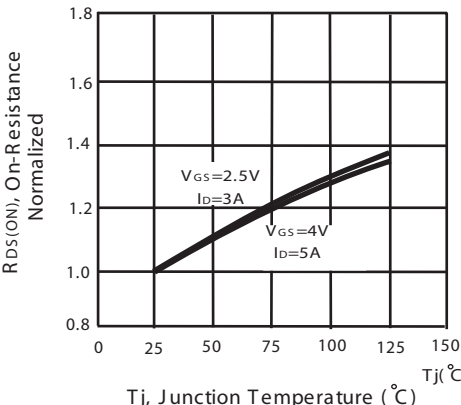


Figure 4. On-Resistance Variation with Drain Current and Temperature

# STG8209

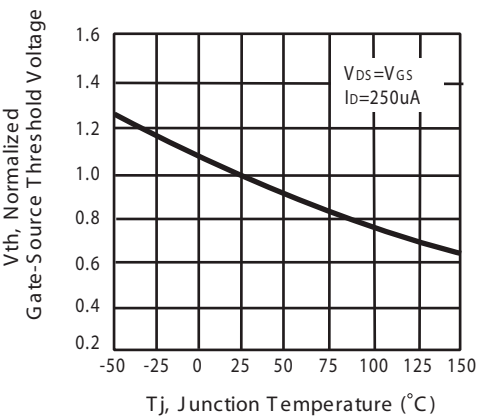


Figure 5. Gate Threshold Variation with Temperature

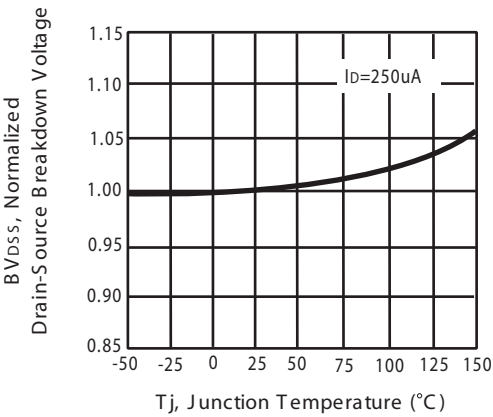


Figure 6. Breakdown Voltage Variation with Temperature

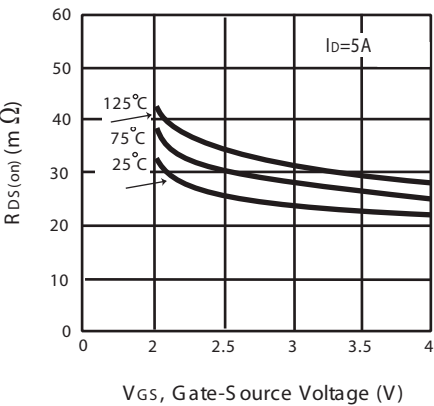


Figure 7. On-Resistance vs. Gate-Source Voltage

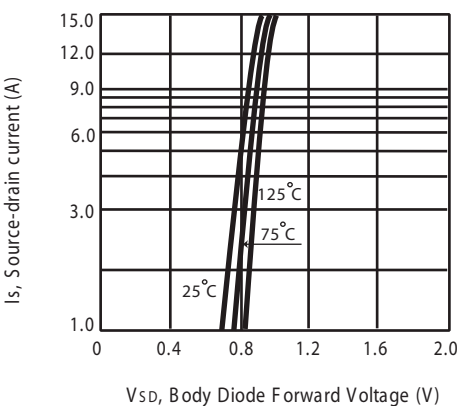


Figure 8. Body Diode Forward Voltage Variation with Source Current

# STG8209

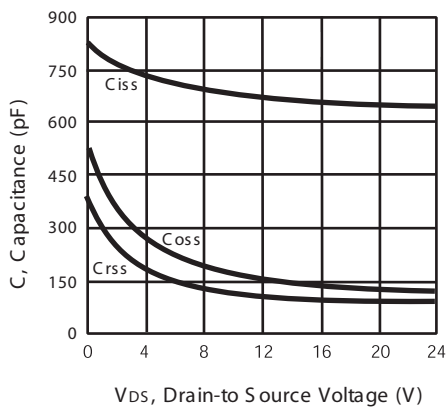


Figure 9. Capacitance

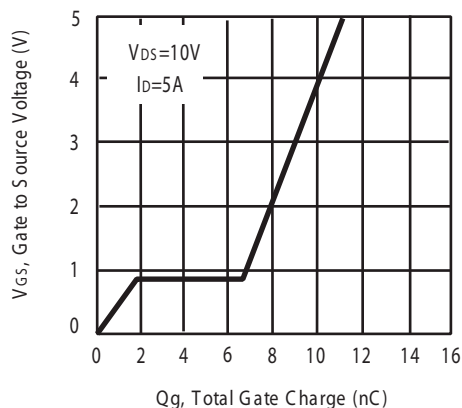


Figure 10. Gate Charge

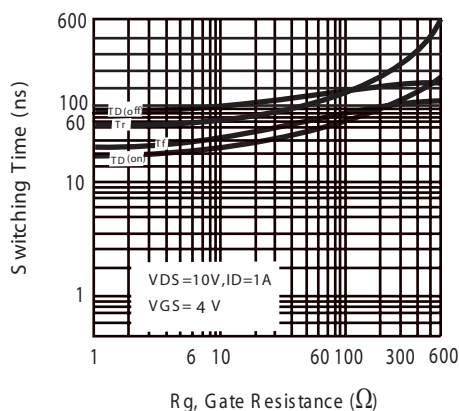


Figure 11. switching characteristics

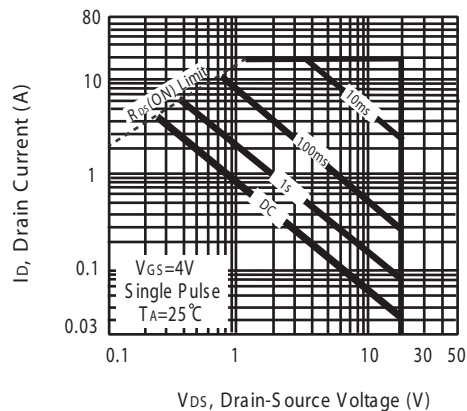


Figure 12. Maximum Safe Operating Area

# STG8209

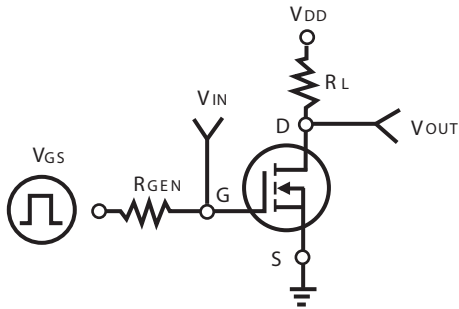


Figure 11. Switching Test Circuit

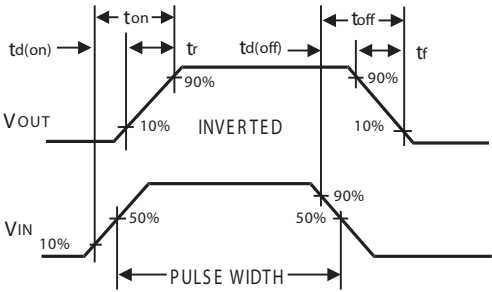
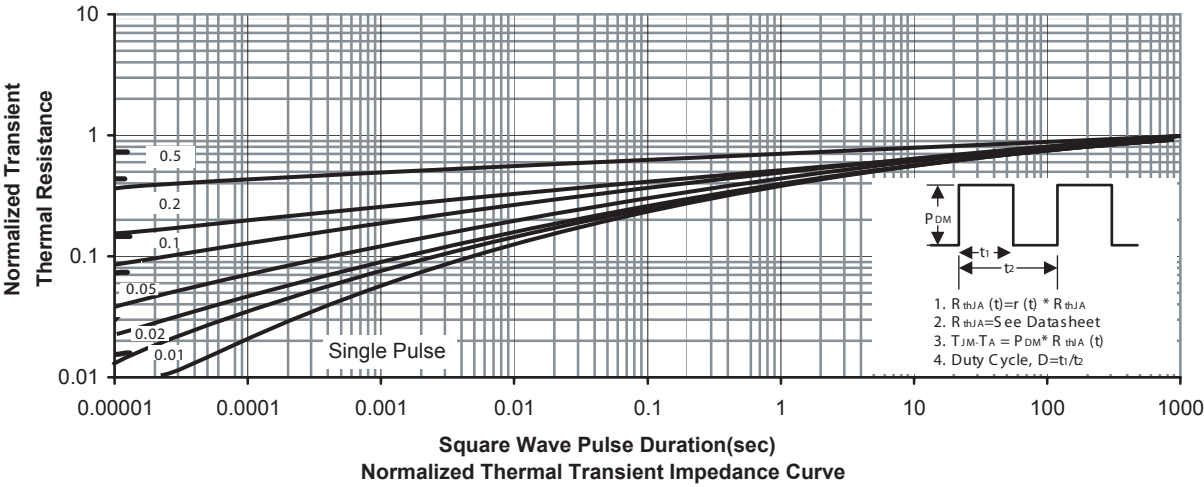
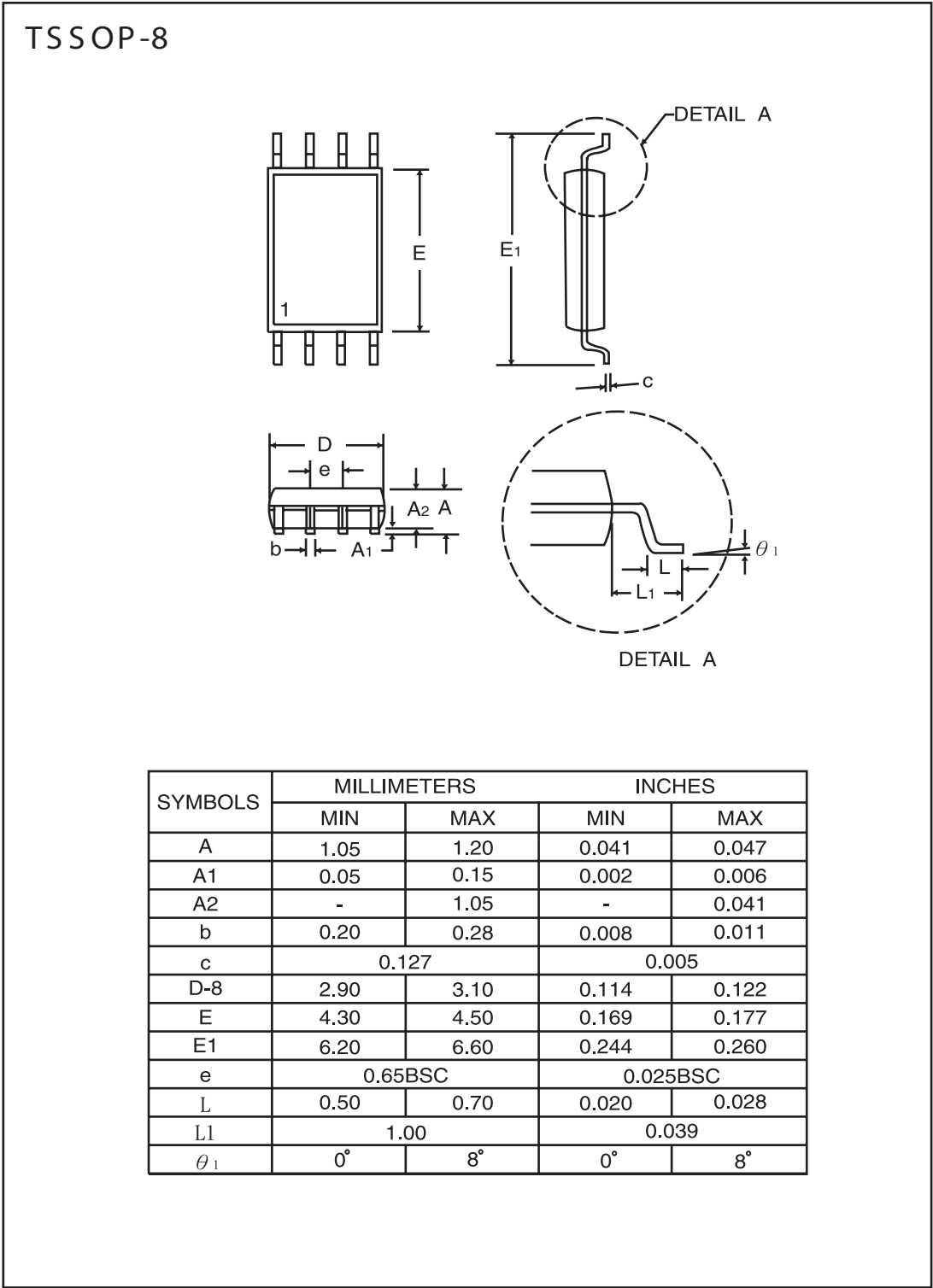


Figure 12. Switching Waveforms



# STG8209

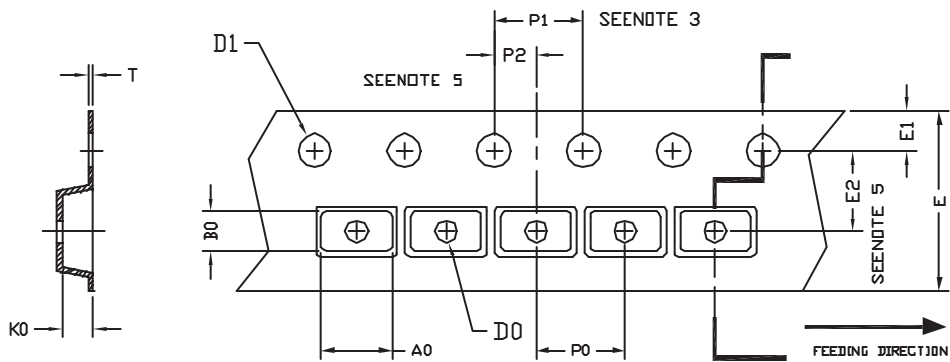
## PACKAGE OUTLINE DIMENSIONS



# STG8209

## TSSOP-8 Tape and Reel Data

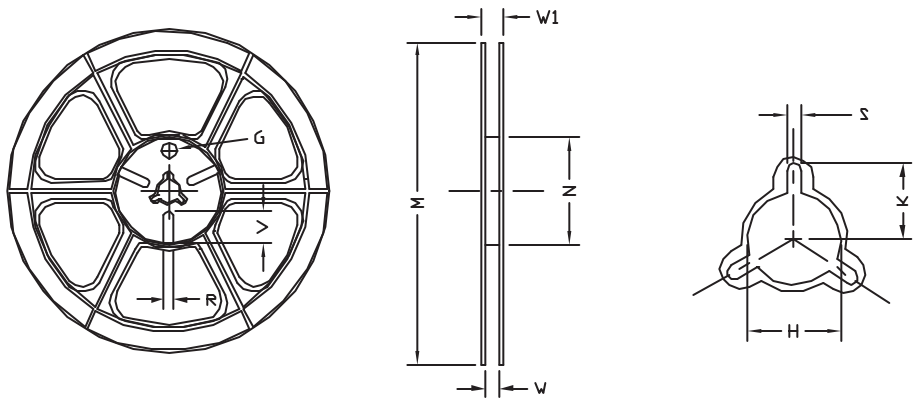
### TSSOP-8 Carrier Tape



UNIT : mm

| PACKAGE    | A0   | B0   | K0   | D0                            | D1                            | E                  | E1   | E2                 | P0   | P1   | P2                 | T                  |
|------------|------|------|------|-------------------------------|-------------------------------|--------------------|------|--------------------|------|------|--------------------|--------------------|
| TSSOP<br>8 | 6.08 | 4.40 | 1.60 | $\phi 1.50$<br>+ 0.1<br>- 0.0 | $\phi 1.50$<br>+ 0.1<br>- 0.0 | 12.00<br>$\pm 0.3$ | 1.75 | 5.50<br>$\pm 0.05$ | 8.00 | 4.00 | 2.00<br>$\pm 0.05$ | 0.30<br>$\pm 0.05$ |

### TSSOP-8 Reel



UNIT : mm

| TAPE SIZE | REEL SIZE  | M   | N   | W    | W1   | H                             | K    | S                | G   | R   | V   |
|-----------|------------|-----|-----|------|------|-------------------------------|------|------------------|-----|-----|-----|
| 12 mm     | $\phi 330$ | 330 | 100 | 12.5 | 16.0 | $\phi 13.0$<br>+ 0.5<br>- 0.2 | 10.6 | 2.0<br>$\pm 0.5$ | --- | --- | --- |