

### Description

The RSTP055N10G uses **Super Trench II** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of  $R_{DS(on)}$  and  $Q_g$ . This device is ideal for high-frequency switching and synchronous rectification.

### Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

### General Features

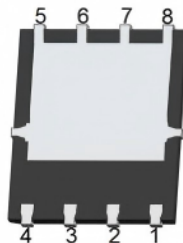
- $V_{DS} = 100V, I_D = 105A$   
 $R_{DS(on)} = 4.9m\Omega$  (typical) @  $V_{GS} = 10V$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating

**100% UIS TESTED!**  
**100%  $\Delta V_{ds}$  TESTED!**

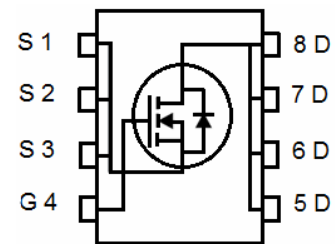
### DFN 5X6



Top View



Bottom View



Schematic Diagram

### Package Marking and Ordering Information

| Device Marking | Device      | Device Package | Reel Size | Tape width | Quantity |
|----------------|-------------|----------------|-----------|------------|----------|
| P055N10G       | RSTP055N10G | DFN5X6-8L      | -         | -          | -        |

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

| Parameter                                         | Symbol              | Limit      | Unit          |
|---------------------------------------------------|---------------------|------------|---------------|
| Drain-Source Voltage                              | $V_{DS}$            | 100        | V             |
| Gate-Source Voltage                               | $V_{GS}$            | $\pm 20$   | V             |
| Drain Current-Continuous                          | $I_D$               | 105        | A             |
| Drain Current-Continuous( $T_C = 100^\circ C$ )   | $I_D (100^\circ C)$ | 78         | A             |
| Pulsed Drain Current                              | $I_{DM}$            | 420        | A             |
| Maximum Power Dissipation                         | $P_D$               | 120        | W             |
| Derating factor                                   |                     | 0.96       | W/ $^\circ C$ |
| Single pulse avalanche energy <sup>(Note 5)</sup> | $E_{AS}$            | 605        | mJ            |
| Operating Junction and Storage Temperature Range  | $T_J, T_{STG}$      | -55 To 150 | $^\circ C$    |

### Thermal Characteristic

|                                                          |                 |      |              |
|----------------------------------------------------------|-----------------|------|--------------|
| Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup> | $R_{\theta JC}$ | 1.04 | $^\circ C/W$ |
|----------------------------------------------------------|-----------------|------|--------------|

**Electrical Characteristics ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)**

| Parameter                                     | Symbol              | Condition                                                                              | Min | Typ  | Max  | Unit |
|-----------------------------------------------|---------------------|----------------------------------------------------------------------------------------|-----|------|------|------|
| Off Characteristics                           |                     |                                                                                        |     |      |      |      |
| Drain-Source Breakdown Voltage                | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                              | 100 |      | -    | V    |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>    | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V                                             | -   | -    | 1    | μA   |
| Gate-Body Leakage Current                     | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                             | -   | -    | ±100 | nA   |
| On Characteristics <sup>(Note 3)</sup>        |                     |                                                                                        |     |      |      |      |
| Gate Threshold Voltage                        | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 2   | 3    | 4    | V    |
| Drain-Source On-State Resistance              | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =50A                                              | -   | 4.9  | 5.5  | mΩ   |
| Forward Transconductance                      | g <sub>FS</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =50A                                               |     | 80   | -    | S    |
| Dynamic Characteristics <sup>(Note4)</sup>    |                     |                                                                                        |     |      |      |      |
| Input Capacitance                             | C <sub>iss</sub>    | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                 | -   | 3500 | -    | PF   |
| Output Capacitance                            | C <sub>oss</sub>    |                                                                                        | -   | 400  | -    | PF   |
| Reverse Transfer Capacitance                  | C <sub>rss</sub>    |                                                                                        | -   | 19   | -    | PF   |
| Switching Characteristics <sup>(Note 4)</sup> |                     |                                                                                        |     |      |      |      |
| Turn-on Delay Time                            | t <sub>d(on)</sub>  | V <sub>DD</sub> =50V, I <sub>D</sub> =50A,<br>V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω | -   | 19   | -    | nS   |
| Turn-on Rise Time                             | t <sub>r</sub>      |                                                                                        | -   | 12   | -    | nS   |
| Turn-Off Delay Time                           | t <sub>d(off)</sub> |                                                                                        | -   | 38   | -    | nS   |
| Turn-Off Fall Time                            | t <sub>f</sub>      |                                                                                        | -   | 10   | -    | nS   |
| Total Gate Charge                             | Q <sub>g</sub>      | V <sub>DS</sub> =50V, I <sub>D</sub> =50A,<br>V <sub>GS</sub> =10V                     | -   | 58   | -    | nC   |
| Gate-Source Charge                            | Q <sub>gs</sub>     |                                                                                        | -   | 22   |      | nC   |
| Gate-Drain Charge                             | Q <sub>gd</sub>     |                                                                                        | -   | 14   |      | nC   |
| Drain-Source Diode Characteristics            |                     |                                                                                        |     |      |      |      |
| Diode Forward Voltage <sup>(Note 3)</sup>     | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =50A                                               | -   |      | 1.2  | V    |
| Diode Forward Current <sup>(Note 2)</sup>     | I <sub>S</sub>      |                                                                                        | -   | -    | 105  | A    |
| Reverse Recovery Time                         | t <sub>rr</sub>     | T <sub>J</sub> = 25°C, I <sub>F</sub> =50A                                             | -   | 59   | -    | nS   |
| Reverse Recovery Charge                       | Q <sub>rr</sub>     | di/dt = 100A/μs <sup>(Note3)</sup>                                                     | -   | 104  | -    | nC   |

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition :  $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=0.5\text{mH}, R_g=25\Omega$

### Typical Electrical and Thermal Characteristics

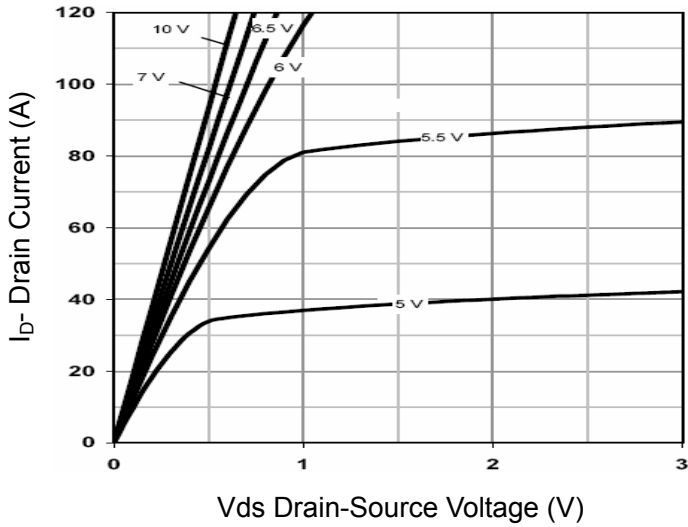


Figure 1 Output Characteristics

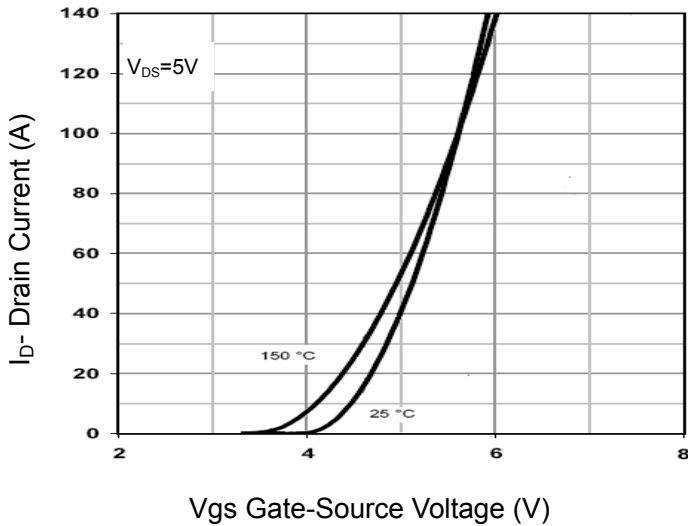


Figure 2 Transfer Characteristics

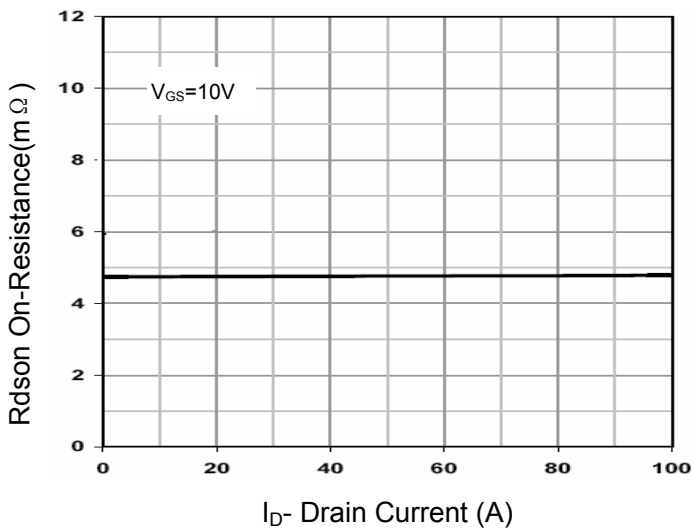


Figure 3 Rdson- Drain Current

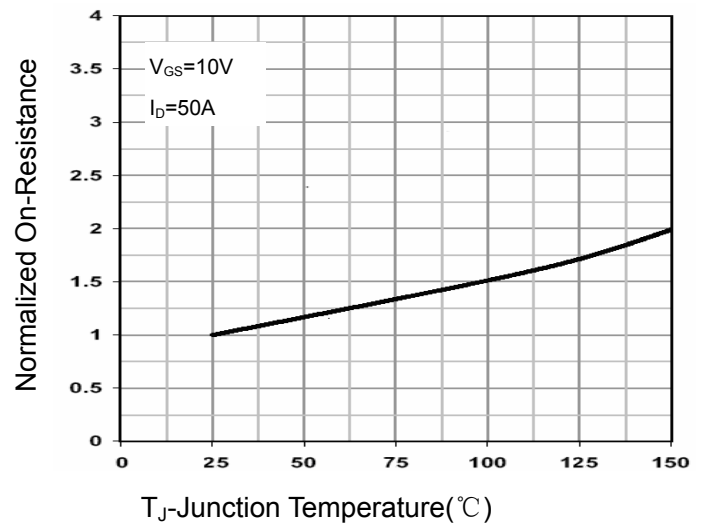


Figure 4 Rdson-Junction Temperature

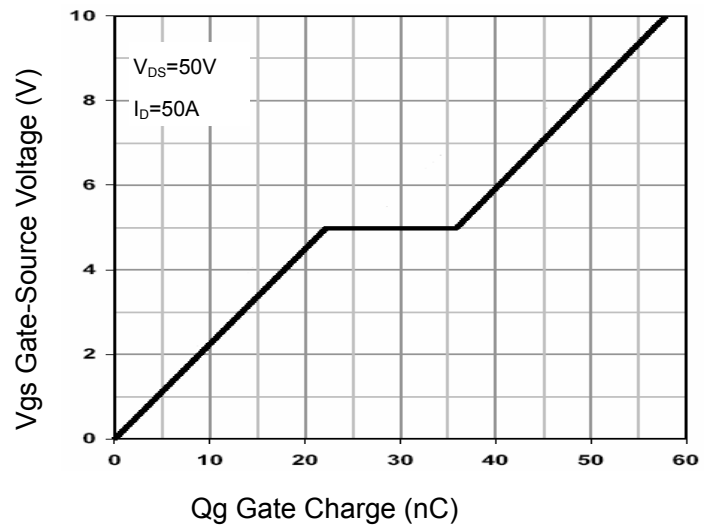


Figure 5 Gate Charge

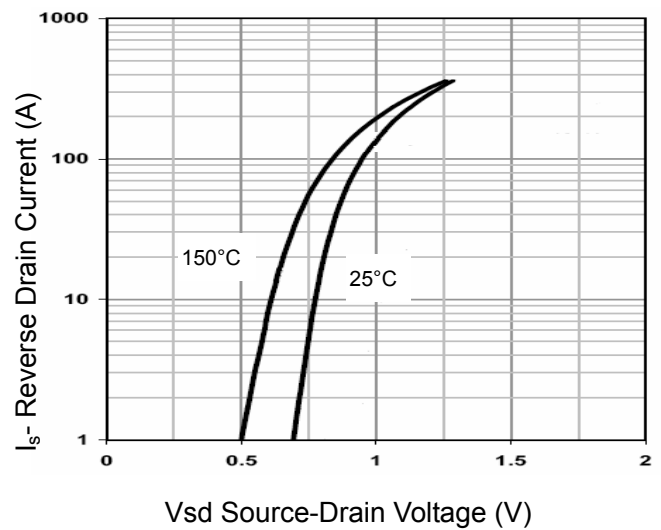


Figure 6 Source- Drain Diode Forward

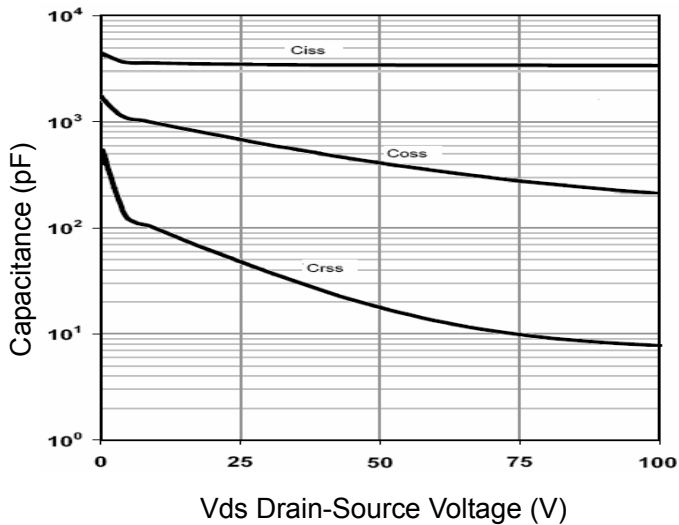


Figure 7 Capacitance vs Vds

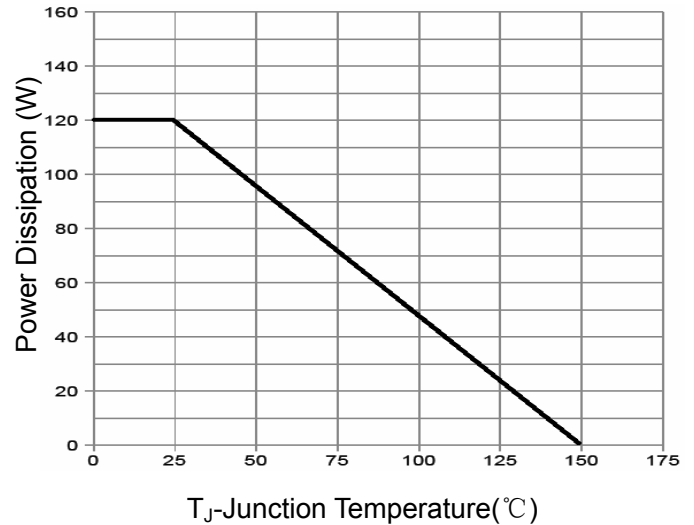


Figure 9 Power De-rating

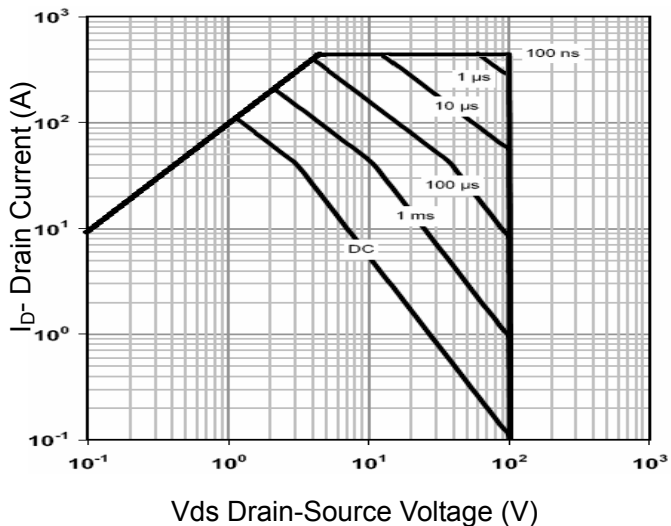


Figure 8 Safe Operation Area

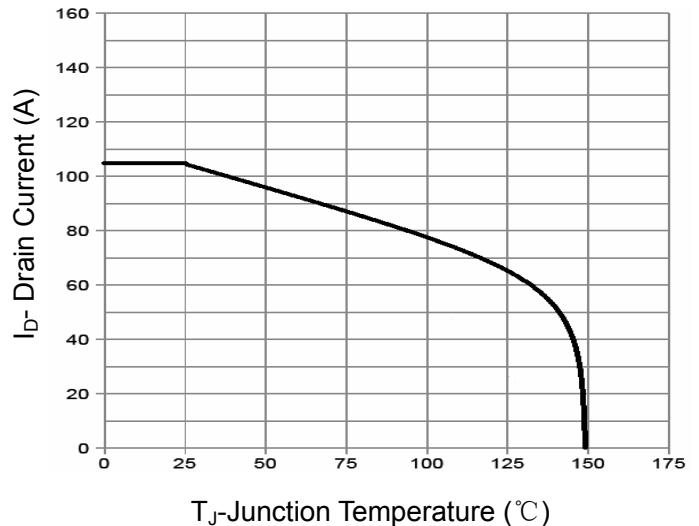


Figure 10 Current De-rating

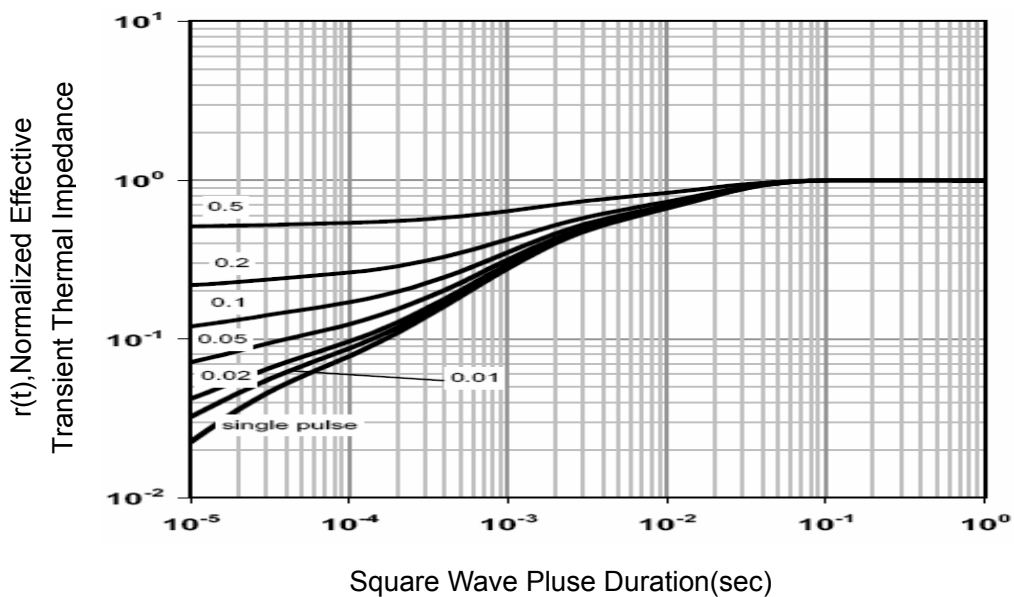
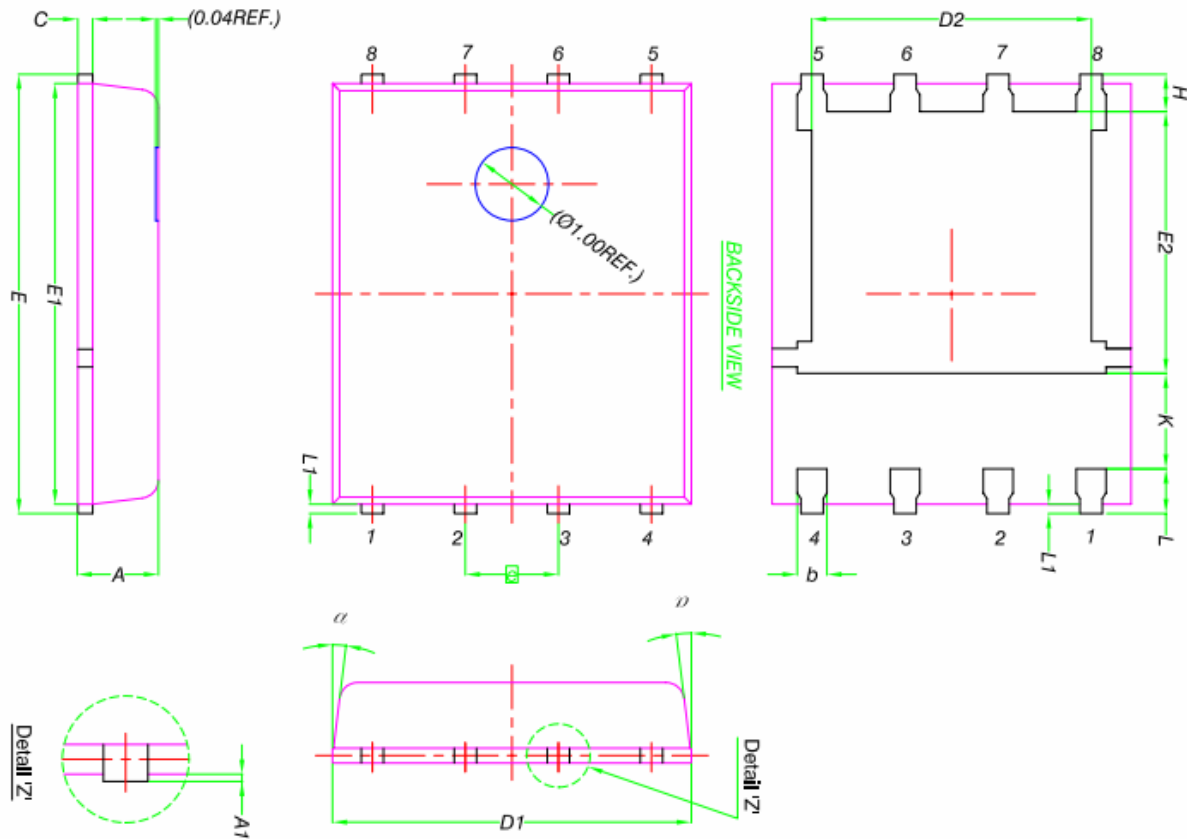


Figure 11 Normalized Maximum Transient Thermal Impedance

### DFN5X6-8L Package Information

Pb Free Product



| DIM.                                                          | MILLIMETERS |      |      |
|---------------------------------------------------------------|-------------|------|------|
|                                                               | MIN.        | NOM. | MAX. |
| A                                                             | 0.90        | 1.00 | 1.10 |
| A1                                                            | 0           | -    | 0.05 |
| b                                                             | 0.33        | 0.41 | 0.51 |
| C                                                             | 0.20        | 0.25 | 0.30 |
| D1                                                            | 4.80        | 4.90 | 5.00 |
| D2                                                            | 3.61        | 3.81 | 3.96 |
| E                                                             | 5.90        | 6.00 | 6.10 |
| E1                                                            | 5.70        | 5.75 | 5.80 |
| E2                                                            | 3.38        | 3.58 | 3.78 |
| <span style="border: 1px solid black; padding: 2px;">e</span> | 1.27 BSC    |      |      |
| H                                                             | 0.41        | 0.51 | 0.61 |
| K                                                             | 1.10        | -    | -    |
| L                                                             | 0.51        | 0.61 | 0.71 |
| L1                                                            | 0.06        | 0.13 | 0.20 |
| α                                                             | 0°          | -    | 12°  |

