



## General Features

- High density cell design for ultra low  $R_{ds(on)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

## Application

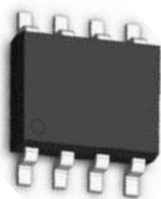
- Load switching
- Hard switched and high frequency circuits
- Uninterruptible power supply

## Product Summary



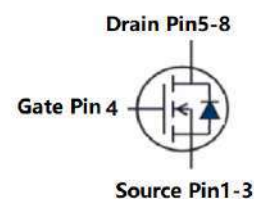
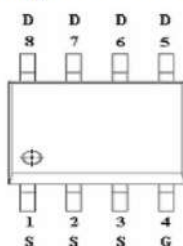
|                              |     |            |
|------------------------------|-----|------------|
| $V_{DS}$                     | 40  | V          |
| $R_{DS(on),Typ@ V_{GS}=10V}$ | 6.0 | m $\Omega$ |
| $I_D$                        | 15  | A          |

Top View



SOP-8

Simplified Outline



N-Channel

## Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter   | Symbol                   | Limit      | Unit             |
|---|--------------------------|------------|------------------|
| Drain-Source Voltage                                | $V_{DS}$                 | 40         | V                |
| Gate-Source Voltage                                 | $V_{GS}$                 | $\pm 20$   | V                |
| Drain Current-Continuous                            | $I_D$                    | 15         | A                |
| Drain Current-Continuous( $T_C=100^\circ\text{C}$ ) | $I_D(100^\circ\text{C})$ | 10.6       | A                |
| Pulsed Drain Current                                | $I_{DM}$                 | 60         | A                |
| Maximum Power Dissipation                           | $P_D$                    | 3.1        | W                |
| Operating Junction and Storage Temperature Range    | $T_J, T_{STG}$           | -55 To 150 | $^\circ\text{C}$ |

## Thermal Characteristic

|   |                 |    |                    |
|---|-----------------|----|--------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 50 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 20 | $^\circ\text{C/W}$ |



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

| Parameter                                 | Symbol       | Condition  | Min | Typ  | Max       | Unit       |
|---|--------------|--|-----|------|-----------|------------|
| <b>Off Characteristics</b>                |              |  |     |      |           |            |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$  | 40  | -    | -         | V          |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=32V, V_{GS}=0V$  | -   | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$  | -   | -    | $\pm 100$ | nA         |
| <b>On Characteristics</b> (Note 3)        |              |  |     |      |           |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$  | 1.2 | 1.6  | 2.5       | V          |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=10A$  | -   | 6.0  | 10        | m $\Omega$ |
|   |              | $V_{GS}=4.5V, I_D=8A$  | -   | 7.4  | 15        | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=5V, I_D=10A$   | -   | 80   | -         | S          |
| <b>Dynamic Characteristics</b> (Note 4)   |              |  |     |      |           |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=20V, V_{GS}=0V,$<br>$F=1.0\text{MHz}$                        | -   | 1718 | -         | PF         |
| Output Capacitance                        | $C_{oss}$    |  | -   | 182  | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |  | -   | 152  | -         | PF         |
| <b>Switching Characteristics</b> (Note 4) |              |  |     |      |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=20V, R_L=2\Omega$<br>$V_{GS}=10V, R_G=3\Omega$               | -   | 7    | -         | nS         |
| Turn-on Rise Time                         | $t_r$        |  | -   | 20   | -         | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |  | -   | 34   | -         | nS         |
| Turn-Off Fall Time                        | $t_f$        |  | -   | 19   | -         | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=20V, I_D=10A,$<br>$V_{GS}=10V$                               | -   | 60   | -         | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |  | -   | 8.1  | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |  | -   | 16.9 | -         | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |  |     |      |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=10A$   | -   | -    | 1.2       | V          |
| Diode Forward Current (Note 2)            | $I_S$        |  | -   | -    | 15        | A          |
| Reverse Recovery Time                     | $t_{rr}$     | $T_J = 25^\circ\text{C}, I_F = 10A$<br>$di/dt = 100A/\mu s$ (Note 3) | -   | 31   | -         | nS         |
| Reverse Recovery Charge                   | $Q_{rr}$     |  | -   | 33   | -         | 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



Typical Electrical and Thermal Characteristics (Curves)

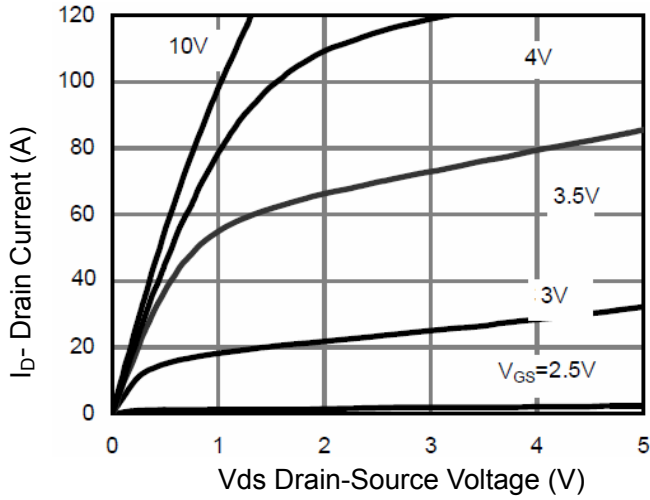


Figure 1 Output Characteristics

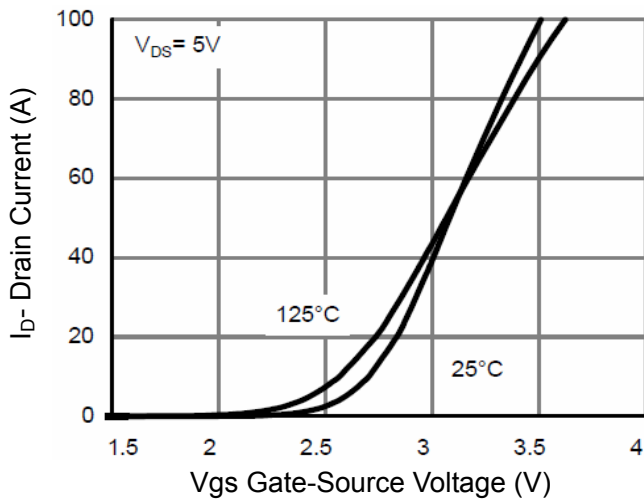


Figure 2 Transfer Characteristics

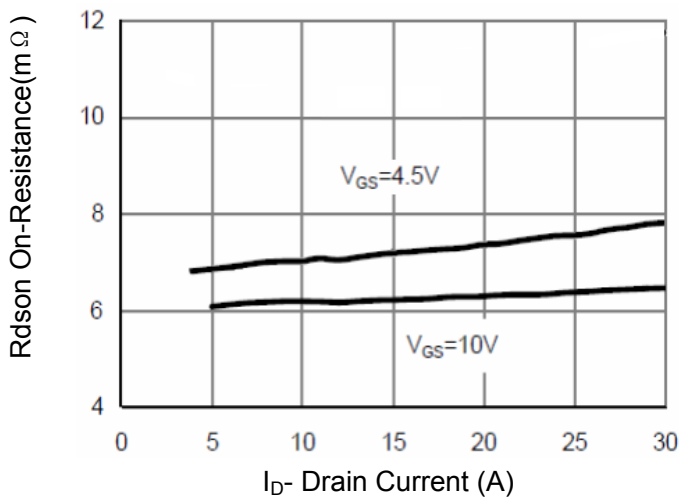


Figure 3 Rdson- Drain Current

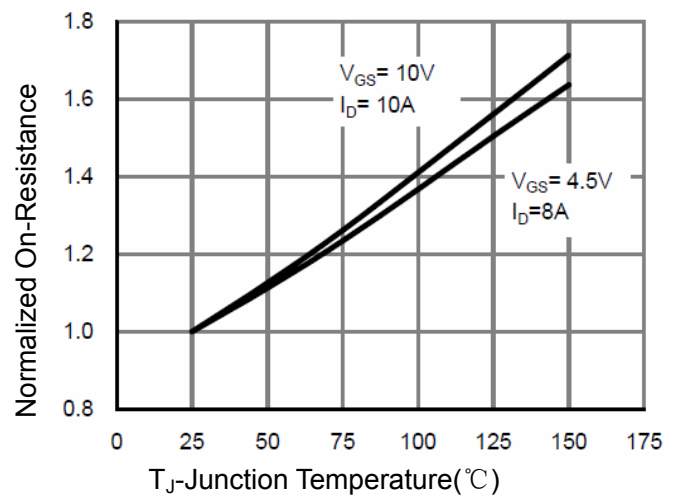


Figure 4 Rdson-Junction Temperature

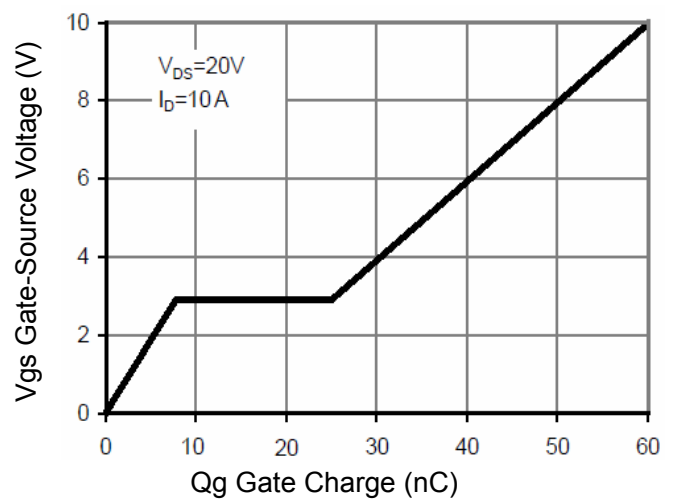


Figure 5 Gate Charge

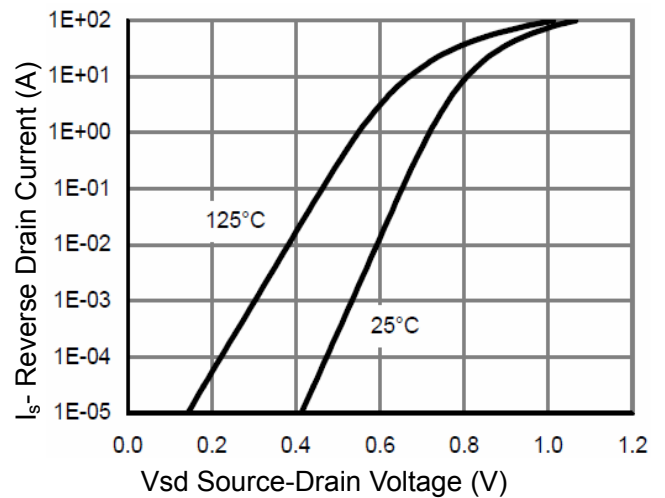
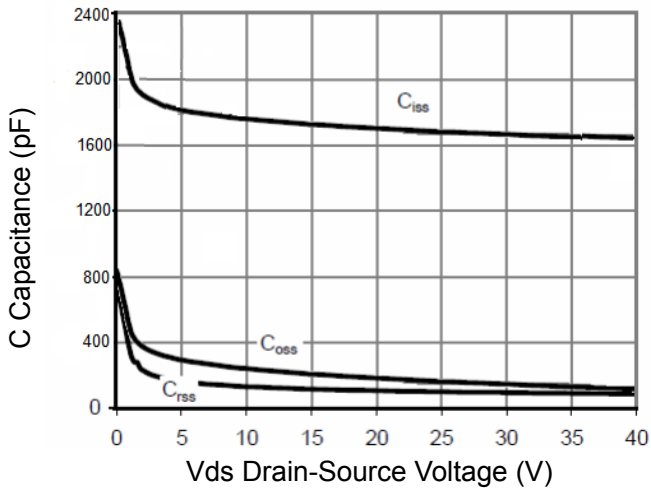
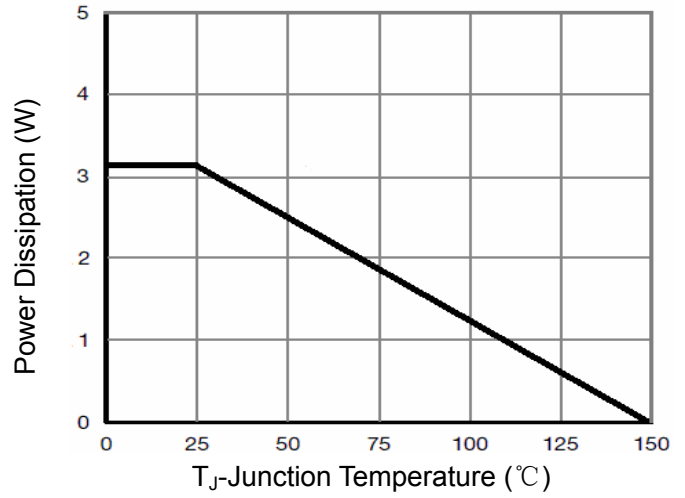


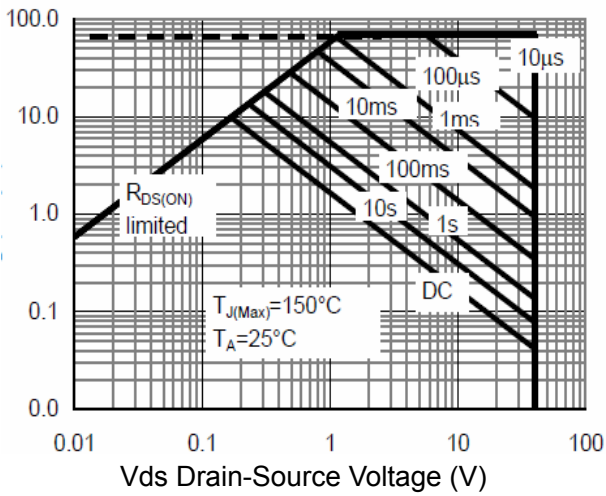
Figure 6 Source- Drain Diode Forward



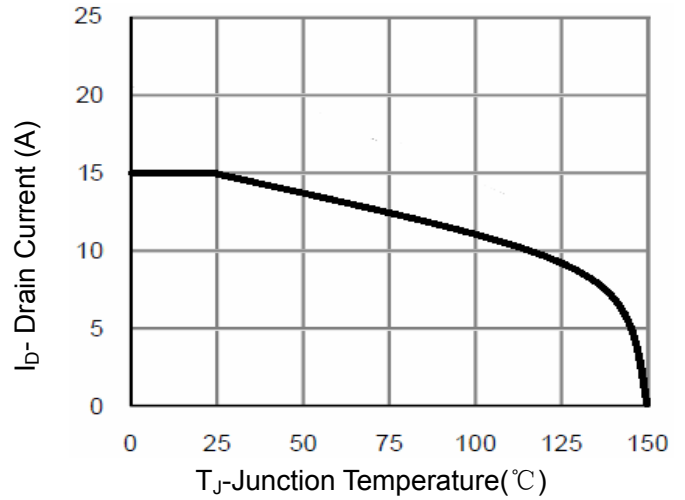
**Figure 7 Capacitance vs Vds**



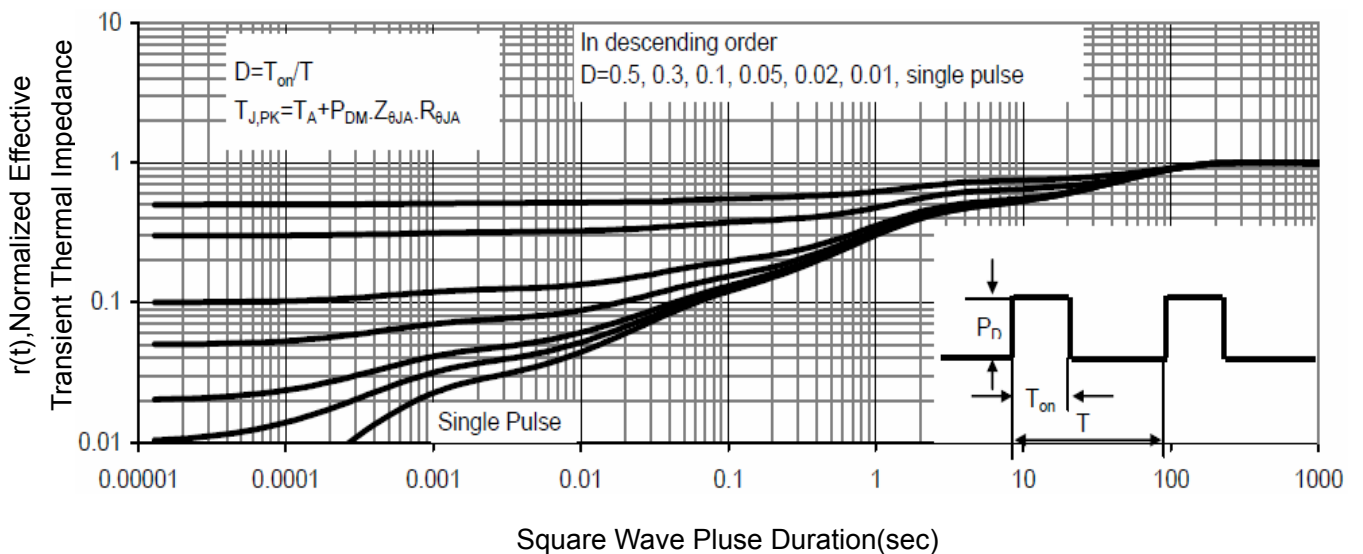
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area**



**Figure 10 Current De-rating**

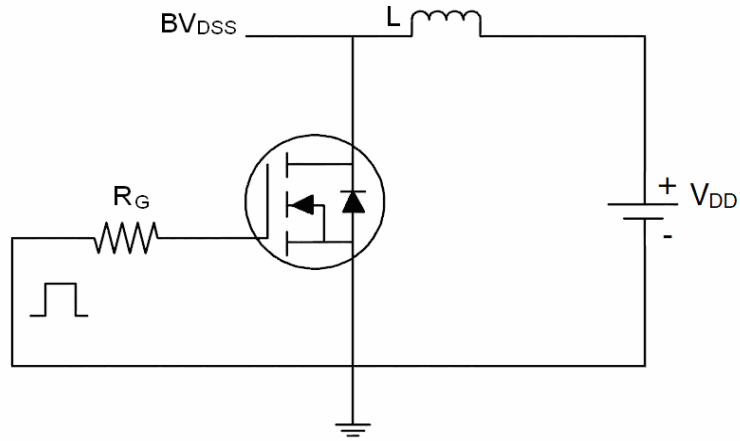


**Figure 11 Normalized Maximum Transient Thermal Impedance**

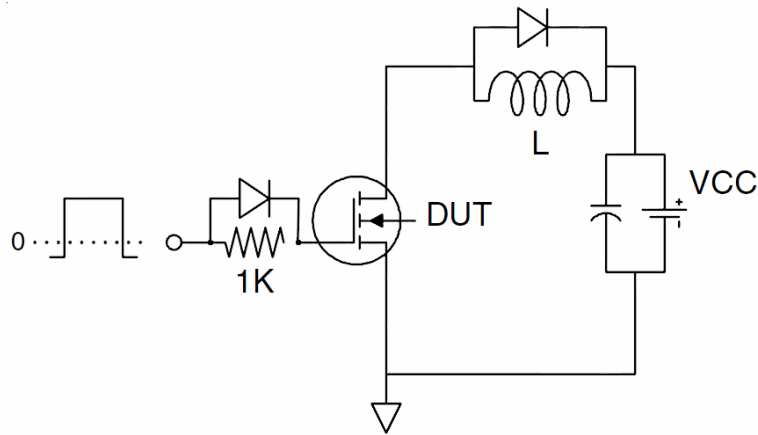


### Test circuit

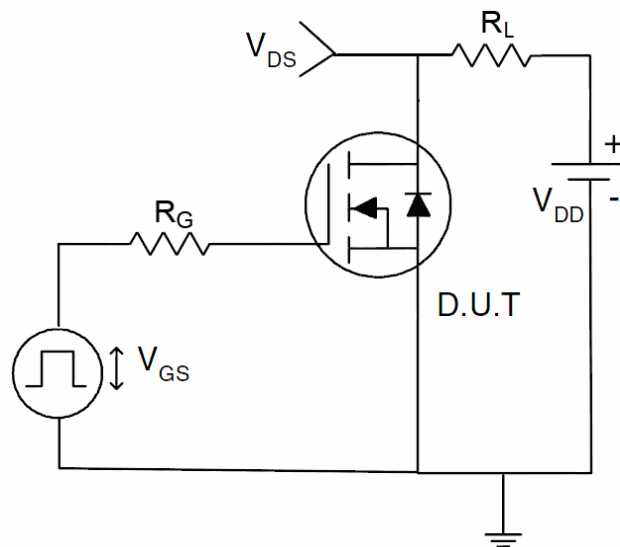
#### 1) $E_{AS}$ Test Circuit



#### 2) Gate Charge Test Circuit

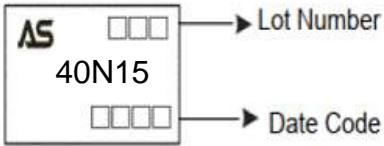


#### 3) Switch Time Test Circuit

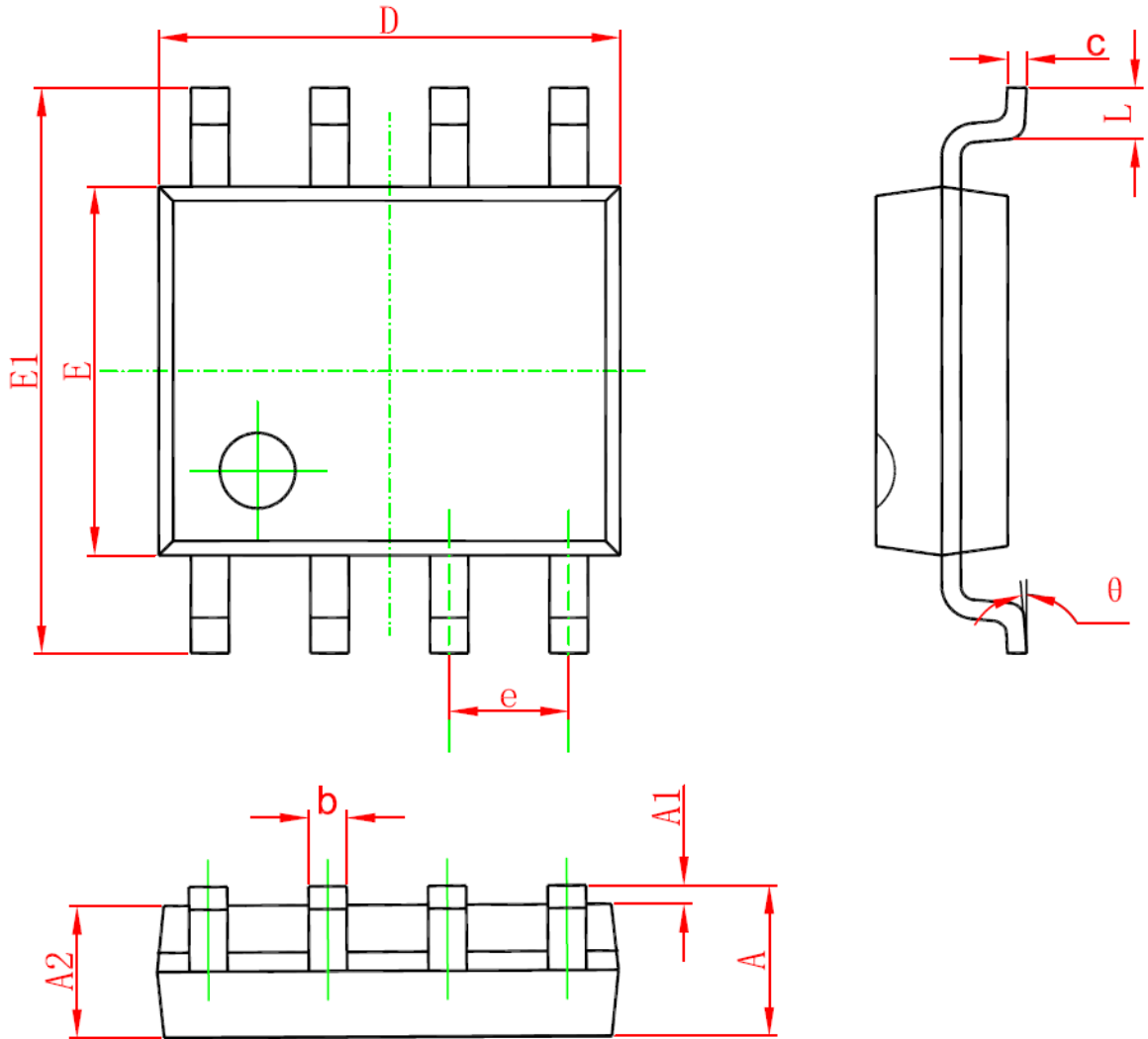


## Ordering and Marking Information

| Ordering Device No. | Marking | Package | Packing   | Quantity  |
|---------------------|---------|---------|-----------|-----------|
| ASDM40N15S-R        | 40N15   | SOP-8   | Tape&Reel | 4000/Reel |

| PACKAGE | MARKING  |
|---------|--|
| SOP-8   |  |

## SOP-8 PACKAGE IN FORMATION



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| c      | 0.170                     | 0.250 | 0.006                | 0.010 |
| D      | 4.700                     | 5.100 | 0.185                | 0.200 |
| E      | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1     | 5.800                     | 6.200 | 0.228                | 0.244 |
| e      | 1.270 (BSC)               |       | 0.050 (BSC)          |       |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

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