

SE40150G

**N-Channel Enhancement-Mode MOSFET**

Revision: A

**General Description**

Thigh Density Cell Design For Ultra Low On-Resistance Fully Characterized Avalanche Voltage and Current Improved Shoot-Through FOM

- Simple Drive Requirement
- Small Package Outline
- Surface Mount Device

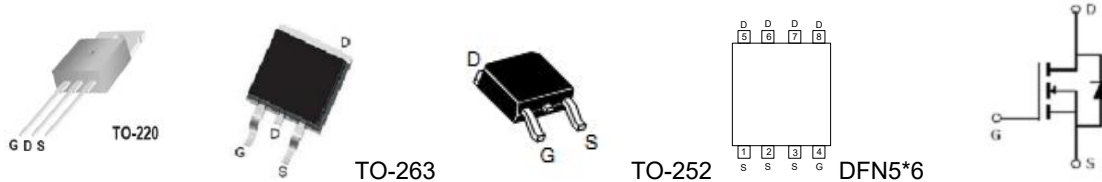
**Features**

For a single MOSFET

- $V_{DS} = 40V$
- $R_{DS(ON)} = 1.9m\Omega @ V_{GS}=10V$

**Pin configurations**

See Diagram below



**Absolute Maximum Ratings**

| Parameter                            |            | Symbol   | Rating     | Units |
|--------------------------------------|------------|----------|------------|-------|
| Drain-Source Voltage                 |            | $V_{DS}$ | 40         | V     |
| Gate-Source Voltage                  |            | $V_{GS}$ | $\pm 20$   | V     |
| Drain Current                        | Continuous | $I_D$    | 150        | A     |
|                                      | Pulsed     |          | 340        |       |
| Total Power Dissipation              | @TA=25°C   | $P_D$    | 310        | W     |
| Operating Junction Temperature Range |            | $T_J$    | -55 to 175 | °C    |

**SE40150G**

| Electrical Characteristics (TJ=25°C unless otherwise noted) |                                   |                                                                    |     |       |     |       |
|-------------------------------------------------------------|-----------------------------------|--------------------------------------------------------------------|-----|-------|-----|-------|
| Symbol                                                      | Parameter                         | Test Conditions                                                    | Min | Typ   | Max | Units |
| OFF CHARACTERISTICS (Note 2)                                |                                   |                                                                    |     |       |     |       |
| BV <sub>DSS</sub>                                           | Drain-Source Breakdown Voltage    | I <sub>D</sub> =250μA, V <sub>GS</sub> =0 V                        | 40  |       |     | V     |
| I <sub>DSS</sub>                                            | Drain to Source Leakage Current   | V <sub>DS</sub> =40V, V <sub>GS</sub> =0V                          |     |       | 1   | μA    |
| I <sub>GSS</sub>                                            | Gate-Body Leakage Current         | V <sub>GS</sub> =20V                                               |     |       | 100 | nA    |
| V <sub>GS(th)</sub>                                         | Gate Threshold Voltage            | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA          | 1.3 | 1.8   | 2.5 | V     |
| R <sub>DS(ON)</sub>                                         | Static Drain-Source On-Resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                          | -   | 1.9   | 2.4 | mΩ    |
| DYNAMIC PARAMETERS                                          |                                   |                                                                    |     |       |     |       |
| C <sub>iss</sub>                                            | Input Capacitance                 | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz                  |     | 10331 |     | pF    |
| C <sub>oss</sub>                                            | Output Capacitance                |                                                                    |     | 1160  |     | pF    |
| C <sub>rss</sub>                                            | Reverse Transfer Capacitance      |                                                                    |     | 1045  |     | pF    |
| SWITCHING PARAMETERS                                        |                                   |                                                                    |     |       |     |       |
| Q <sub>g</sub>                                              | Total Gate Charge <sup>2</sup>    | V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, I <sub>D</sub> =20A    |     | 239   |     | nC    |
| Q <sub>gs</sub>                                             | Gate Source Charge                |                                                                    |     | 23.5  |     | nC    |
| Q <sub>gd</sub>                                             | Gate Drain Charge                 |                                                                    |     | 49.6  |     | nC    |
| t <sub>d(on)</sub>                                          | Turn-On Delay Time                | V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, R <sub>GEN</sub> =2.5Ω |     | 41    |     | ns    |
| t <sub>d(off)</sub>                                         | Turn-Off Delay Time               |                                                                    |     | 145   |     | ns    |
| t <sub>d(r)</sub>                                           | Turn-On Rise Time                 |                                                                    |     | 40    |     | ns    |
| t <sub>d(f)</sub>                                           | Turn-Off Fall Time                |                                                                    |     | 65    |     | ns    |

## Typical Characteristics

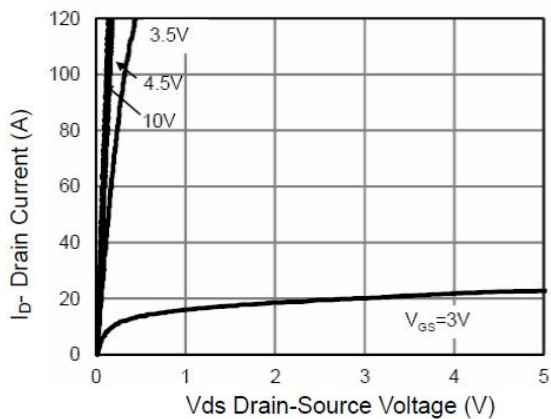


Figure 1 Output Characteristics

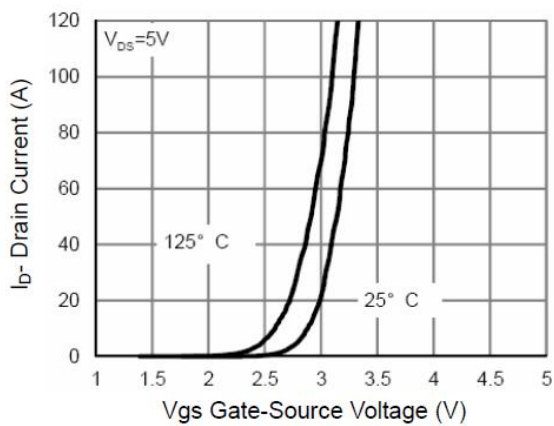


Figure 2 Transfer Characteristics

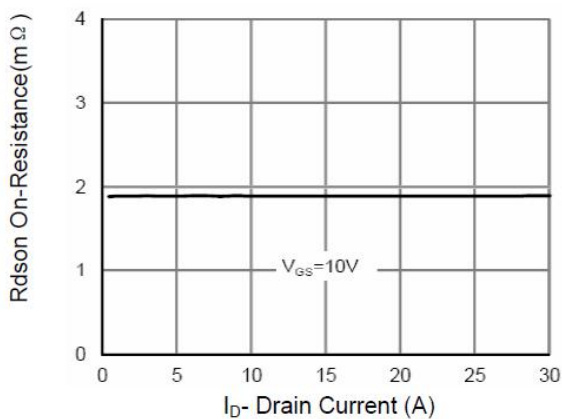
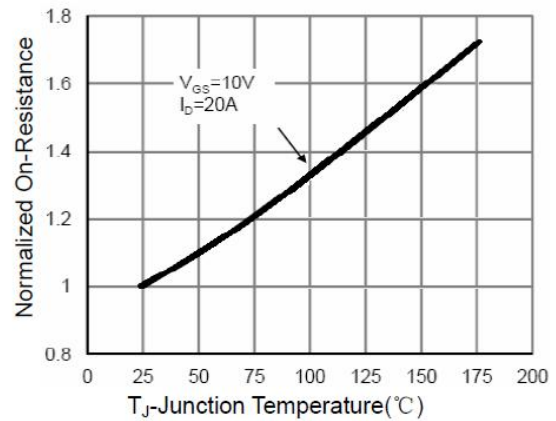
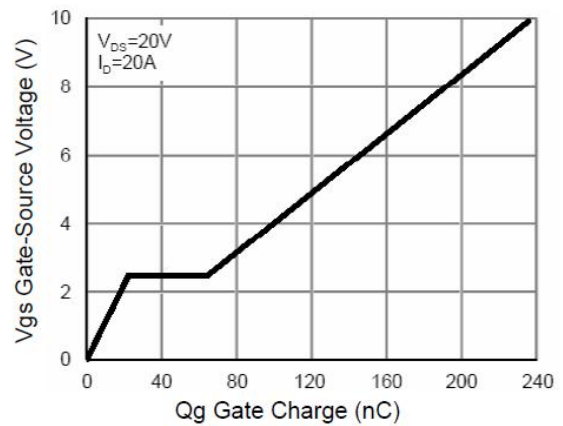
Figure 3  $R_{DS(on)}$ - Drain CurrentFigure 4  $R_{DS(on)}$ -Junction Temperature

Figure 5 Gate Charge

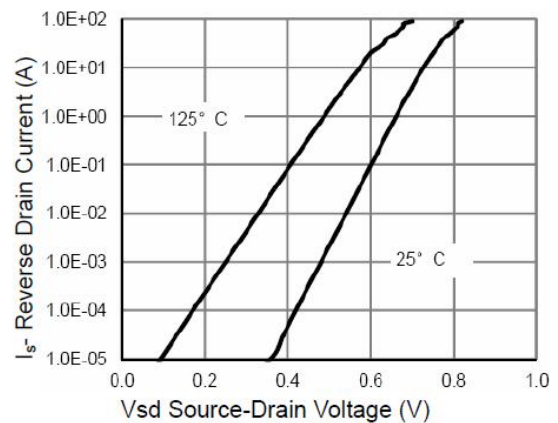


Figure 6 Source- Drain Diode Forward

## Typical Characteristics

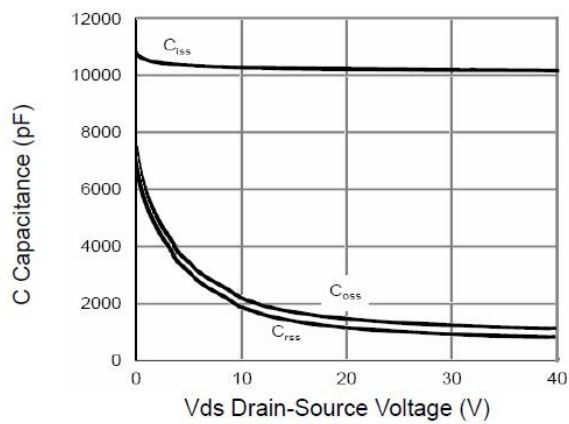


Figure 7 Capacitance vs Vds

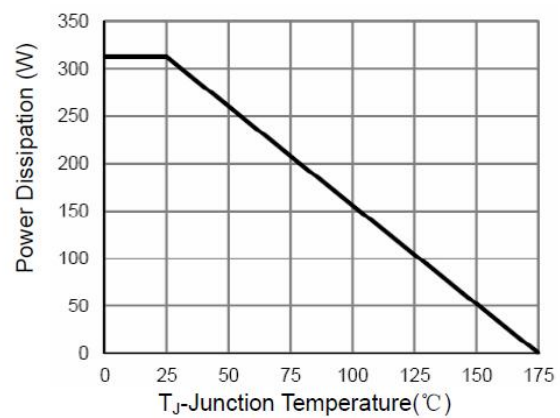


Figure 9 Power De-rating

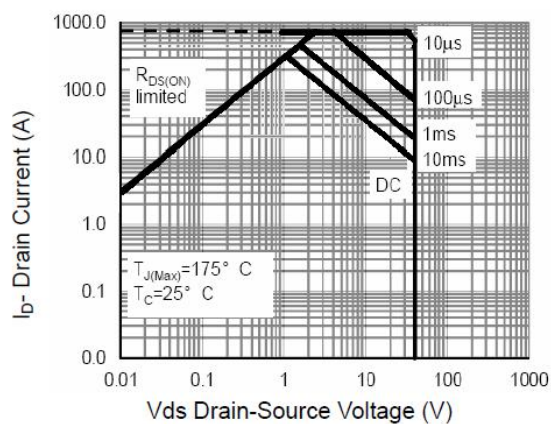


Figure 8 Safe Operation Area

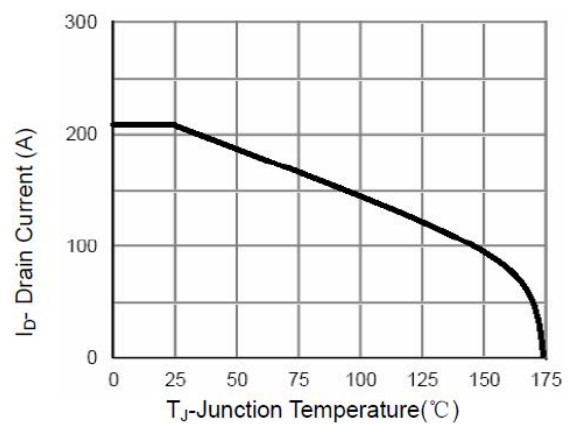


Figure 10 Current De-rating

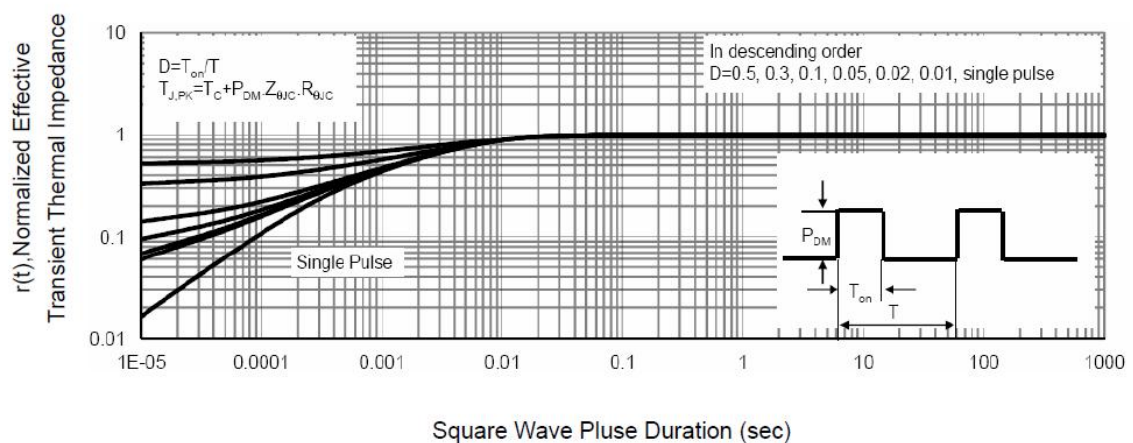
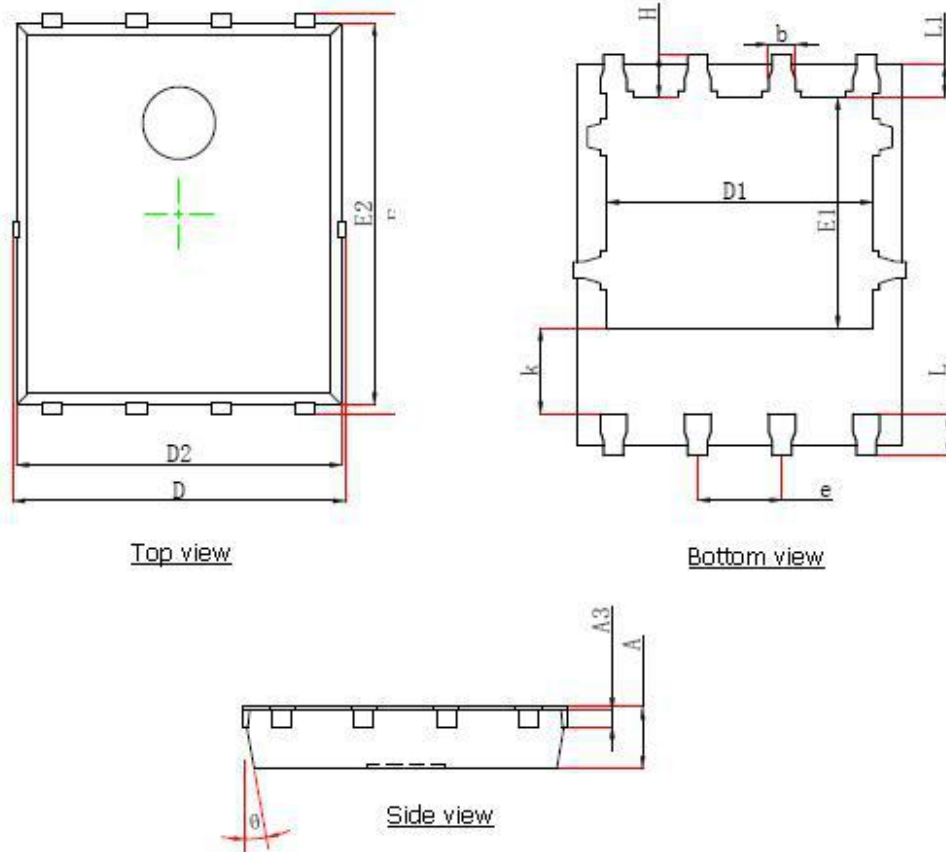


Figure 11 Normalized Maximum Transient Thermal Impedance

## SE40150G

### Package Outline Dimension

#### DFN5\*6

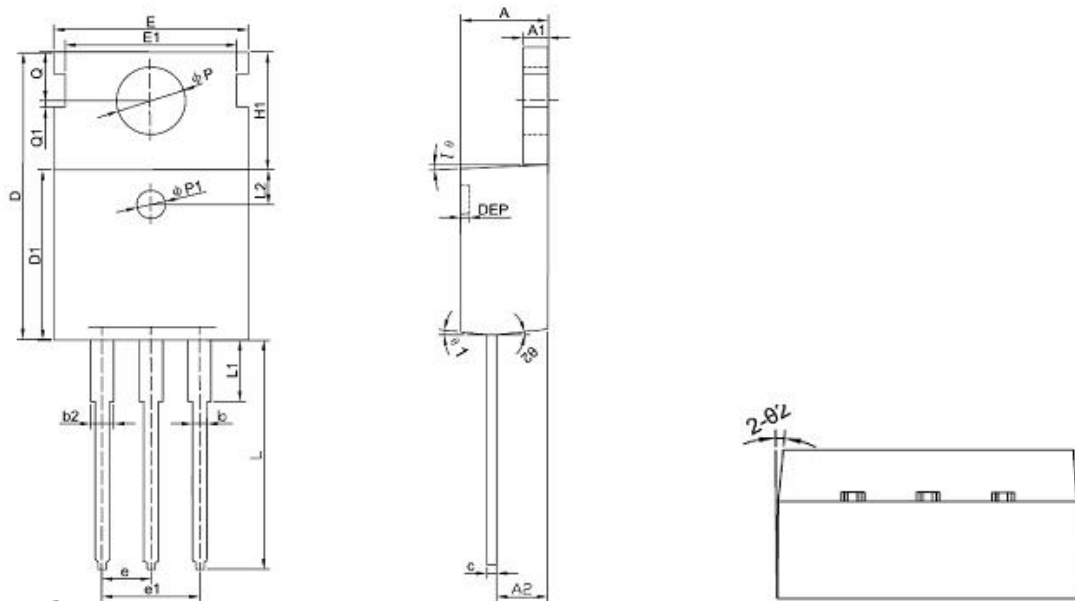


| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.900                     | 1.000 | 0.035                | 0.039 |
| A3     | 0.254REF.                 |       | 0.010REF.            |       |
| D      | 4.944                     | 5.096 | 0.195                | 0.201 |
| E      | 5.974                     | 6.126 | 0.235                | 0.241 |
| D1     | 3.910                     | 4.110 | 0.154                | 0.162 |
| E1     | 3.375                     | 3.575 | 0.133                | 0.141 |
| D2     | 4.824                     | 4.976 | 0.190                | 0.196 |
| E2     | 5.674                     | 5.826 | 0.223                | 0.229 |
| k      | 1.190                     | 1.390 | 0.047                | 0.055 |
| b      | 0.350                     | 0.450 | 0.014                | 0.018 |
| e      | 1.270TYP.                 |       | 0.050TYP.            |       |
| L      | 0.559                     | 0.711 | 0.022                | 0.028 |
| L1     | 0.424                     | 0.576 | 0.017                | 0.023 |
| H      | 0.574                     | 0.726 | 0.023                | 0.029 |
| θ      | 10°                       | 12°   | 10°                  | 12°   |

# SE40150G

## Package Outline Dimension

### TO-220

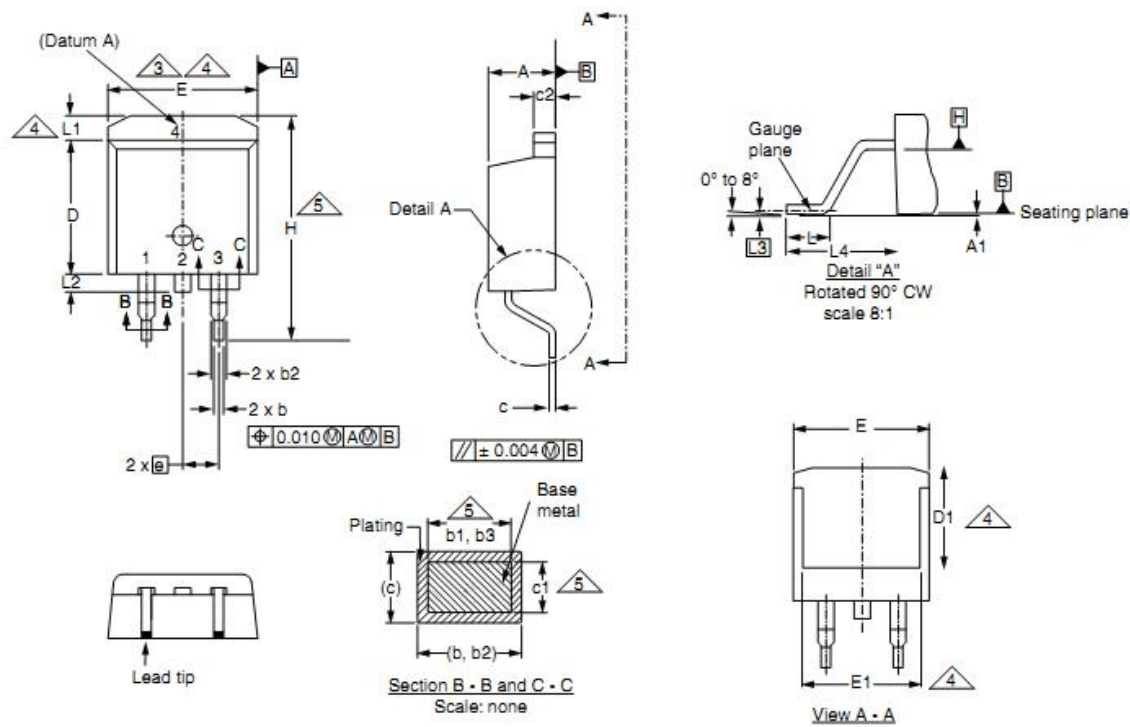


| Symbol | Dimension In Millimeters |        |        | Dimension In Inches |       |       |
|--------|--------------------------|--------|--------|---------------------|-------|-------|
|        | Min                      | Nom    | Max    | Min                 | Nom   | Max   |
| A      | 4.400                    | 4.550  | 4.700  | 0.173               | 0.179 | 0.185 |
| A1     | 1.270                    | 1.300  | 1.330  | 0.050               | 0.051 | 0.052 |
| A2     | 2.590                    | 2.690  | 2.790  | 0.102               | 0.106 | 0.110 |
| b      | 0.770                    | -      | 0.900  | 0.030               | -     | 0.035 |
| b2     | 1.230                    | -      | 1.360  | 0.048               | -     | 0.054 |
| c      | 0.480                    | 0.500  | 0.520  | 0.019               | 0.020 | 0.020 |
| D      | 15.100                   | 15.400 | 15.700 | -                   | 0.606 | -     |
| D1     | 9.000                    | 9.100  | 9.200  | 0.354               | 0.358 | 0.362 |
| DEP    | 0.050                    | 0.285  | 0.520  | 0.002               | 0.011 | 0.020 |
| E      | 10.060                   | 10.160 | 10.260 | 0.396               | 0.400 | 0.404 |
| E1     | -                        | 8.700  | -      | -                   | 0.343 | -     |
| ØP1    | 1.400                    | 1.500  | 1.600  | 0.055               | 0.059 | 0.063 |
| e      | 2.54BSC                  |        |        | 0.1BSC              |       |       |
| e1     | 5.08BSC                  |        |        | 0.2BSC              |       |       |
| H1     | 6.100                    | 6.300  | 6.500  | 0.240               | 0.248 | 0.256 |
| L      | 12.750                   | 12.960 | 13.170 | 0.502               | 0.510 | 0.519 |
| L1     | -                        | -      | 3.950  | -                   | -     | 0.156 |
| L2     | 1.85REF                  |        |        | 0.073REF            |       |       |
| ØP     | 3.570                    | 3.600  | 3.630  | 0.141               | 0.142 | 0.143 |
| Q      | 2.730                    | 2.800  | 2.870  | 0.107               | 0.110 | 0.113 |
| Q1     | -                        | 0.200  | -      | -                   | 0.008 | -     |
| Ø1     | 5°                       | 7°     | 9°     | 5°                  | 7°    | 9°    |
| Ø2     | 1°                       | 3°     | 5°     | 1°                  | 3°    | 5°    |

SE40150G

Package Outline Dimension

TO-263



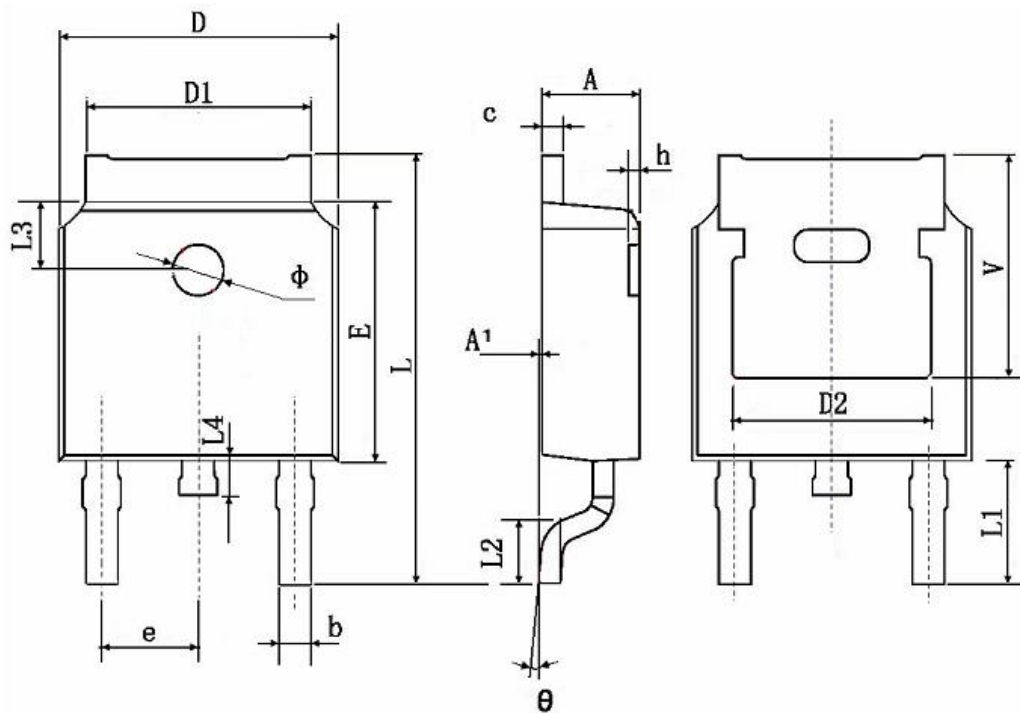
| DIM. | MILLIMETERS |      | INCHES |       |
|------|-------------|------|--------|-------|
|      | MIN.        | MAX. | MIN.   | MAX.  |
| A    | 4.06        | 4.83 | 0.160  | 0.190 |
| A1   | 0.00        | 0.25 | 0.000  | 0.010 |
| b    | 0.51        | 0.99 | 0.020  | 0.039 |
| b1   | 0.51        | 0.89 | 0.020  | 0.035 |
| b2   | 1.14        | 1.78 | 0.045  | 0.070 |
| b3   | 1.14        | 1.73 | 0.045  | 0.068 |
| c    | 0.38        | 0.74 | 0.015  | 0.029 |
| c1   | 0.38        | 0.58 | 0.015  | 0.023 |
| c2   | 1.14        | 1.65 | 0.045  | 0.065 |
| D    | 8.38        | 9.65 | 0.330  | 0.380 |

| DIM. | MILLIMETERS |       | INCHES    |       |
|------|-------------|-------|-----------|-------|
|      | MIN.        | MAX.  | MIN.      | MAX.  |
| D1   | 6.86        | -     | 0.270     | -     |
| E    | 9.65        | 10.67 | 0.380     | 0.420 |
| E1   | 6.22        | -     | 0.245     | -     |
| e    | 2.54 BSC    |       | 0.100 BSC |       |
| H    | 14.61       | 15.88 | 0.575     | 0.625 |
| L    | 1.78        | 2.79  | 0.070     | 0.110 |
| L1   | -           | 1.65  | -         | 0.066 |
| L2   | -           | 1.78  | -         | 0.070 |
| L3   | 0.25 BSC    |       | 0.010 BSC |       |
| L4   | 4.78        | 5.28  | 0.188     | 0.208 |

# SE40150G

## Package Outline Dimension

### TO-252



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 0.483 TYP.                |        | 0.190 TYP.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 TYP.                |        | 0.211 TYP.           |       |

**The SINO-IC logo is a registered trademark of ShangHai Sino-IC Microelectronics Co., Ltd.**

**© 2005 SINO-IC – Printed in China – All rights reserved.**

**SHANGHAI SINO-IC MICROELECTRONICS CO., LTD**

**Add:** Building 3, Room 3401-03, No.200 Zhangheng Road, ZhangJiang Hi-Tech Park, Pudong,  
Shanghai 201203, China

**Phone:** +86-21-33932402 33932403 33932405 33933508 33933608

**Fax:** +86-21-33932401

**Email:** webmaster@sino-ic.net

**Website:** <http://www.sino-ic.net>