

# MT3055L

## N-Channel Enhancement Mode Field Effect Transistor

### Product Summary

| PRODUCT SUMMARY  |                |                              |
|------------------|----------------|------------------------------|
| V <sub>DSS</sub> | I <sub>D</sub> | R <sub>DS(ON)</sub> (mΩ) Typ |
| 25V              | 15A            | 55 @ V <sub>GS</sub> =4.5V   |
|                  |                | 60 @ V <sub>GS</sub> =2.5V   |

### Features

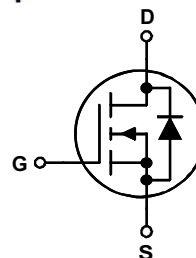
- Super high dense cell design for low R<sub>DS(ON)</sub>
- Rugged and reliable
- Simple drive requirement



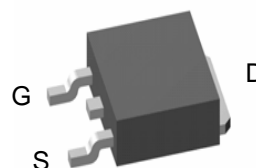
**MT Semiconductor®**

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### Simplified Schematic



### MARKING DIAGRAM & PIN ASSIGNMENT



**D-PAK  
TO-252-2L**

### Absolute Maximum Ratings (T<sub>A</sub> = 25°C unless otherwise noted)

| Parameter   | Symbol                            | Limit      | Unit |
|---|-----------------------------------|------------|------|
| Drain-Source Voltage  | V <sub>DS</sub>                   | 25         | V    |
| Gate-Source Voltage   | V <sub>GS</sub>                   | ±12        | V    |
| Drain Current-Continuous <sup>a</sup> @T <sub>j</sub> =125°C<br>- Pulse $d^b$ | I <sub>D</sub>                    | 15         | A    |
|   | I <sub>DM</sub>                   | 48         | 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>                    | 55         | 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>th JA</sub> | 50 | °C/W |
|--|--------------------|----|------|

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

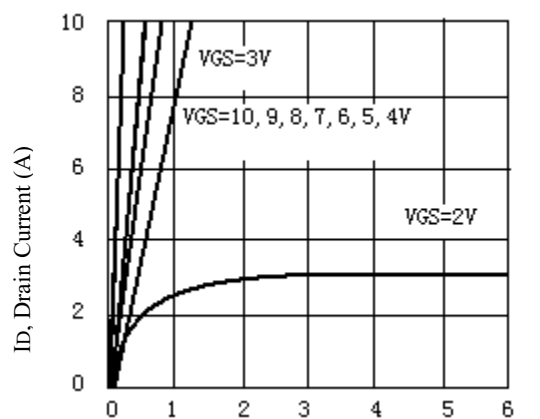
| Parameter                        | Symbol              | Condition  | Min | Typ  | Max  | Unit |
|----------------------------------|---------------------|--|-----|------|------|------|
| OFF CHARACTERISTICS              |                     |  |     |      |      |      |
| Drain-Source Breakdown Voltage   | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V,I <sub>D</sub> =250μA  | 25  |      |      | V    |
| Zero Gate Voltage Drain Current  | I <sub>DSS</sub>    | V <sub>DS</sub> =16V,V <sub>GS</sub> =0V   |     |      | 1    | μA   |
| Gate-Body Leakage                | I <sub>GSS</sub>    | V <sub>GS</sub> =±8V,V <sub>DS</sub> =0V   |     |      | ±100 | nA   |
| ON CHARACTERITICS                |                     |  |     |      |      |      |
| Gate Threshold Voltage           | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250μA  | 0.8 | 1.1  | 2.0  | V    |
| Drain-Source On-State Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.5V,I <sub>D</sub> =2.8A   |     | 50   | 65   | m Ω  |
|                                  |                     | V <sub>GS</sub> =2.5V,I <sub>D</sub> =2.0A   |     | 60   | 85   |      |
| Forward Transconductance         | g <sub>FS</sub>     | V <sub>GS</sub> =7V,I <sub>D</sub> =5A   |     | 5    |      | S    |
| DAYNAMIC CHARACTERISTICS         |                     |  |     |      |      |      |
| Input Capacitance                | C <sub>ISS</sub>    | V <sub>DS</sub> =10V,V <sub>GS</sub> =0V<br>f=1.0MHz   |     | 608  |      | pF   |
| Output Capacitance               | C <sub>OSS</sub>    |  |     | 101  |      | pF   |
| Reverse Transfer Capacitance     | C <sub>RSS</sub>    |  |     | 59   |      | pF   |
| SWITCHING CHARACTERISISTICS      |                     |  |     |      |      |      |
| Turn-On Delay Time               | t <sub>D(ON)</sub>  | V <sub>DD</sub> =10V<br>I <sub>D</sub> =15A,<br>V <sub>GEN</sub> =4.5V<br>R <sub>L</sub> =10ohm<br>R <sub>GEN</sub> =10ohm |     | 6.5  |      | ns   |
| Rise Time                        | tr                  |  |     | 32.1 |      | ns   |
| Turn-Off Delay Time              | t <sub>D(OFF)</sub> |  |     | 58.4 |      | ns   |
| Fall Time                        | tf                  |  |     | 48   |      | ns   |
| Total Gate Charge                | Q <sub>g</sub>      | V <sub>DS</sub> =10V,I <sub>D</sub> =1A<br>V <sub>GS</sub> =4.5V   |     | 6    |      | nC   |
| Gate-Source Charge               | Q <sub>gs</sub>     |  |     | 1.35 |      | nC   |
| Gate-Drain Charge                | Q <sub>gd</sub>     |  |     | 1.5  |      | nC   |

## ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

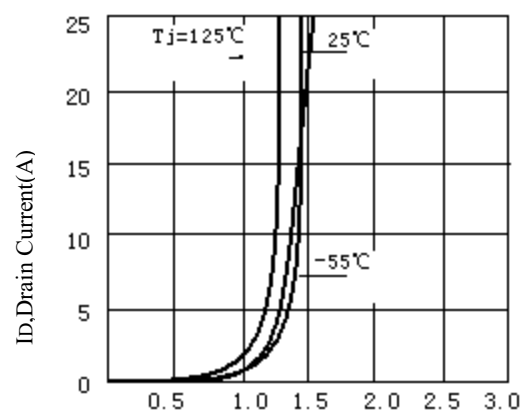
| Parameter                          | Symbol          | Condition                                  | Min | Typ  | Max | Unit |
|------------------------------------|-----------------|--|-----|------|-----|------|
| DRAIN-SOURCE DIODE CHARACTERISTICS |                 |  |     |      |     |      |
| Diode Forward Voltage              | V <sub>SD</sub> | V <sub>GS</sub> =0V, I <sub>S</sub> =1.25A |     | 0.84 | 1.2 | V    |

## Notes

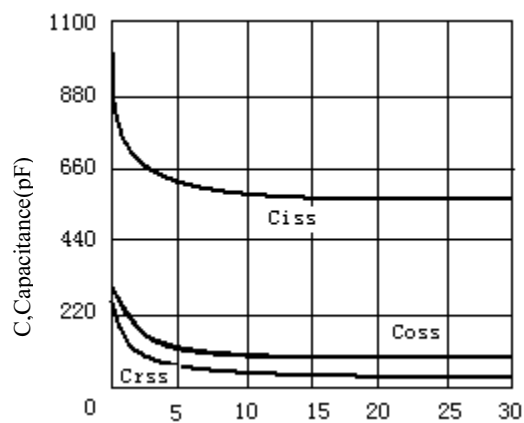
- Surface Mounted on FR4 Board,  $t \leq 10\text{sec}$
- Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$
- Guaranteed by design, not subject to production testing.



V<sub>DS</sub>, Drain-to-Source Voltage (V)  
Figure 1. Output Characteristics



V<sub>GS</sub>, Gate-to-source Voltage (V)  
Figure 2. Transfer Characteristics



V<sub>GS</sub>, Drain-to Source Voltage

Figure3. Capacitance

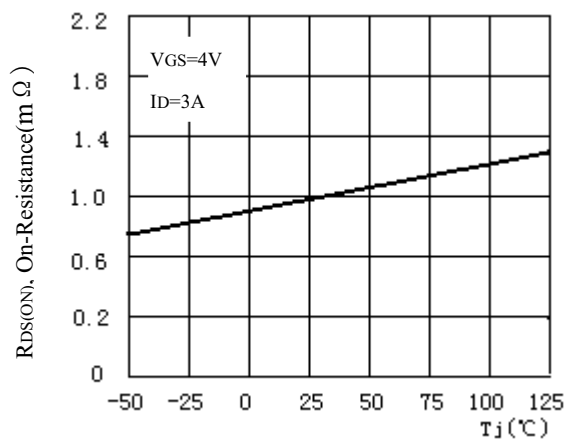


Figure4. On-Resistance Variation with Temperature

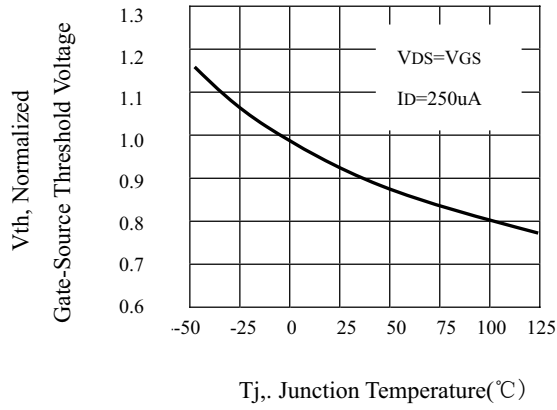


Figure 5. Gate Threshold Variation With Temperature

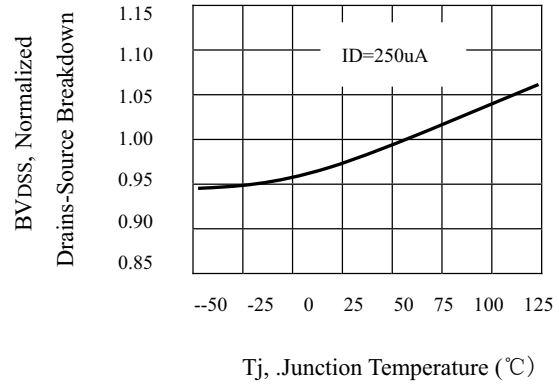


Figure 6. Breakdown Voltage Variation With Temperature

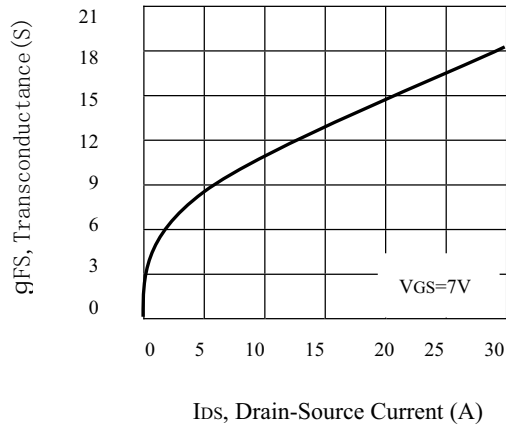


Figure 7. Transconductance Variation With Drain Current

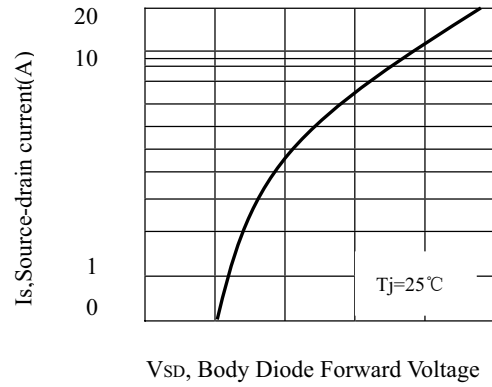


Figure 8. Body Diode Forward Voltage Variation with Source Current

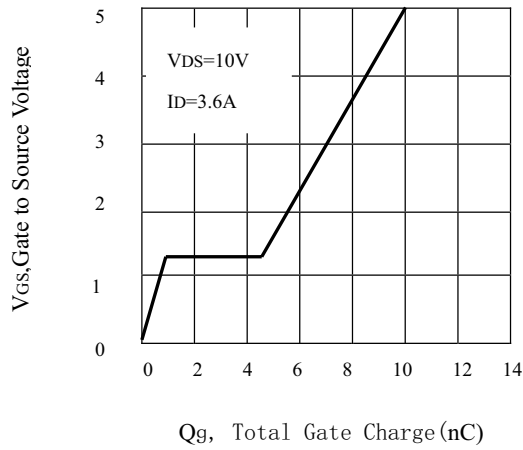


Figure 9. Gate Charge

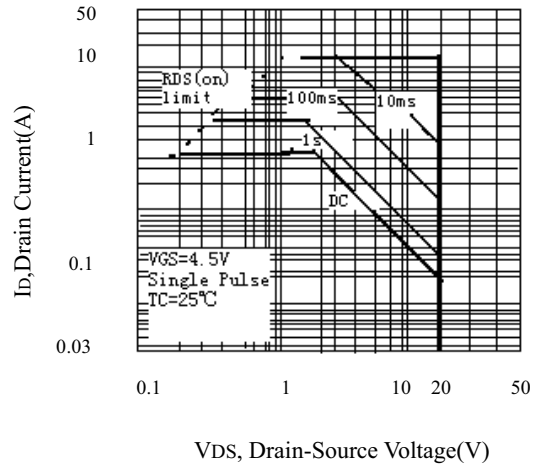


Figure 10. Maximum Safe Operating Area

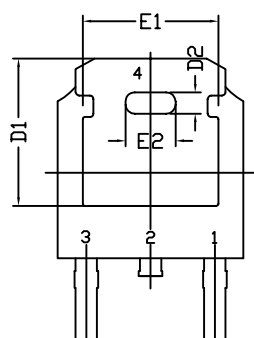
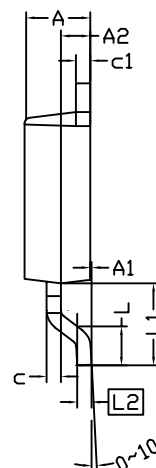
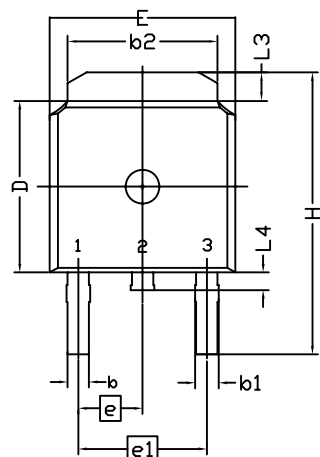
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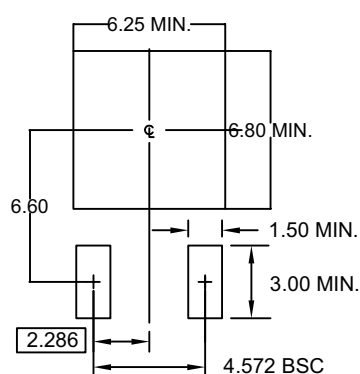
Version

S

## TO252(DPAK) PACKAGE OUTLINE



## RECOMMENDED LAND PATTERN



UNIT: mm

| SYMBOL | DIMENSION IN MILLIMETERS |        |        | DIMENSIONS IN INCHES |       |       |
|--------|--------------------------|--------|--------|----------------------|-------|-------|
|        | MIN.                     | NOM.   | MAX.   | MIN.                 | NOM.  | MAX.  |
| A      | 2.184                    | 2.286  | 2.388  | 0.086                | 0.090 | 0.094 |
| A1     | 0.000                    | -----  | 0.127  | 0.000                | ----- | 0.005 |
| A2     | 0.889                    | 1.041  | 1.143  | 0.035                | 0.041 | 0.045 |
| b      | 0.635                    | 0.762  | 0.889  | 0.025                | 0.030 | 0.035 |
| b1     | 0.762                    | 0.840  | 1.143  | 0.030                | 0.033 | 0.045 |
| b2     | 4.953                    | 5.340  | 5.461  | 0.195                | 0.210 | 0.215 |
| c      | 0.450                    | 0.508  | 0.610  | 0.018                | 0.020 | 0.024 |
| c1     | 0.450                    | 0.508  | 0.610  | 0.018                | 0.020 | 0.024 |
| D      | 5.969                    | 6.096  | 6.223  | 0.235                | 0.240 | 0.245 |
| D1     | 5.210                    | 5.249  | 5.380  | 0.205                | 0.207 | 0.212 |
| D2     | 0.662                    | 0.762  | 0.862  | 0.026                | 0.030 | 0.034 |
| E      | 6.350                    | 6.604  | 6.731  | 0.250                | 0.260 | 0.265 |
| E1     | 4.318                    | 4.826  | 4.901  | 0.170                | 0.190 | 0.193 |
| E2     | 1.678                    | 1.778  | 1.878  | 0.066                | 0.070 | 0.074 |
| e      | 2.286 BSC                |        |        | 0.090 BSC            |       |       |
| e1     | 4.572 BSC                |        |        | 0.180 BSC            |       |       |
| H      | 9.398                    | 10.033 | 10.414 | 0.370                | 0.395 | 0.410 |
| L      | 1.270                    | 1.520  | 2.032  | 0.050                | 0.060 | 0.080 |
| L1     | 2.921 REF.               |        |        | 0.115REF.            |       |       |
| L2     | 0.408                    | 0.508  | 0.608  | 0.016                | 0.020 | 0.024 |
| L3     | 0.889                    | 1.016  | 1.270  | 0.035                | 0.040 | 0.050 |
| L4     | 0.635                    | -----  | 1.016  | 0.025                | ----- | 0.040 |

## NOTE

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH SHOULD BE LESS THAN 6 MILS.
2. DIMENSION L IS MEASURED IN GAUGE PLANE
3. TOLERANCE 0.10 mm UNLESS OTHERWISE SPECIFIED
4. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. REFER TO JEDEC TO-252 (AA)

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