

### ● General Description

The 50N06 combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . This device is ideal for load switch and battery protection applications.

### ● Features

Advance high cell density Trench technology

Low  $R_{DS(ON)}$  to minimize conductive loss

Low Gate Charge for fast switching

Low Thermal resistance

### ● Application

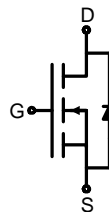
MB/VGA Vcore

SMPS 2<sup>nd</sup> Synchronous Rectifier

POL application

BLDC Motor driver

### ● Product Summary



$V_{DS} = 60V$      $I_D = 50A$

$R_{DS(ON)}(10V \text{ typ}) = 14m\Omega$

$R_{DS(ON)}(4.5V \text{ typ}) = 18m\Omega$



**TO-252**

### ● Absolute Maximum Ratings ( $T_C = 25^\circ C$ )

| Parameter                                  | Symbol               | Rating     | Unit       |
|--|----------------------|------------|------------|
| Drain-Source Voltage                       | $V_{DS}$             | 60         | V          |
| Gate-Source Voltage                        | $V_{GS}$             | 20         | V          |
| Continuous Drain Current                   | $I_D@TC=25^\circ C$  | 50         | A          |
|  | $I_D@TC=75^\circ C$  | 35         | A          |
|  | $I_D@TC=100^\circ C$ | 30         | A          |
| Pulsed Drain Current <sup>①</sup>          | $I_{DM}$             | 104        | A          |
| Total Power Dissipation( $TC=25^\circ C$ ) | $P_D@TC=25^\circ C$  | 70         | W          |
| Total Power Dissipation( $TA=25^\circ C$ ) | $P_D@TA=25^\circ C$  | 2.8        | W          |
| Operating Junction Temperature             | $T_J$                | -55 to 150 | $^\circ C$ |
| Storage Temperature                        | $T_{STG}$            | -55 to 150 | $^\circ C$ |
| Avalanche Current                          | $I_{AS} I_{AR}$      | 40         | A          |

●Thermal resistance

| Parameter                                    | Symbol     | Min. | Typ. | Max. | Unit  |
|--|------------|------|------|------|-------|
| Thermal resistance, junction - case          | $R_{thJC}$ | -    | -    | 2.8  | ° C/W |
| Thermal resistance, junction - ambient       | $R_{thJA}$ | -    | -    | 55   | ° C/W |
| Soldering temperature, wavesoldering for 10s | $T_{sold}$ | -    | -    | 265  | ° C   |

●Electronic Characteristics

| Parameter                         | Symbol       | Condition                         | Min. | Typ | Max.      | Unit       |
|-----------------------------------|--------------|-----------------------------------|------|-----|-----------|------------|
| Drain-Source Breakdown Voltage    | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$     | 60   |     |           | V          |
| Gate Threshold Voltage            | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$ | 1.0  | 1.5 | 2.2       | V          |
| Drain-Source Leakage Current      | $I_{DSS}$    | $V_{DS} = 60V, V_{GS} = 0V$       |      |     | 1.0       | $\mu A$    |
| Gate- Source Leakage Current      | $I_{GSS}$    | $V_{GS} = \pm 20V, V_{DS} = 0V$   |      |     | $\pm 100$ | nA         |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 20A$         |      | 14  | 21        | m $\Omega$ |
|                                   |              | $V_{GS} = 4.5V, I_D = 15A$        |      | 18  | 25        | m $\Omega$ |
| Forward Transconductance          | $g_{FS}$     | $V_{DS} = 25V, I_D = 10A$         |      | 20  |           | S          |
| Source-drain voltage              | $V_{SD}$     | $I_S = 20A$                       |      |     | 1.20      | V          |

●Electronic Characteristics

| Parameter                    | Symbol    | Condition                                     | Min. | Typ   | Max. | Unit |
|------------------------------|-----------|---|------|-------|------|------|
| Input capacitance            | $C_{iss}$ | $V_{DS} = 25V$<br>$V_{GS} = 0V$<br>$f = 1MHz$ | -    | 1000  | -    | pF   |
| Output capacitance           | $C_{oss}$ |   | -    | 108.5 | -    |      |
| Reverse transfer capacitance | $C_{rss}$ |   | -    | 96.9  | -    |      |

●Gate Charge characteristics( $T_a = 25^\circ C$ )

| Parameter            | Symbol   | Condition                                       | Min. | Typ | Max. | Unit |
|----------------------|----------|---|------|-----|------|------|
| Total gate charge    | $Q_g$    | $V_{DD} = 25V$<br>$I_D = 10A$<br>$V_{GS} = 10V$ | -    | 15  | -    | nC   |
| Gate - Source charge | $Q_{gs}$ |   | -    | 4.5 | -    |      |
| Gate - Drain charge  | $Q_{gd}$ |   | -    | 7.5 | -    |      |

Note: ① Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$  ;

Fig.1 Power Dissipation

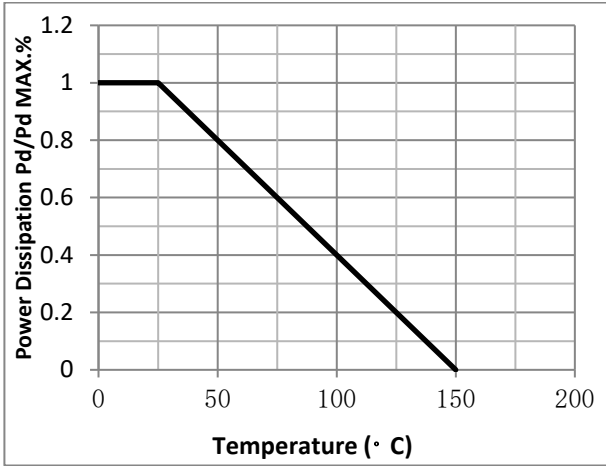


Fig.2 Typical output Characteristics

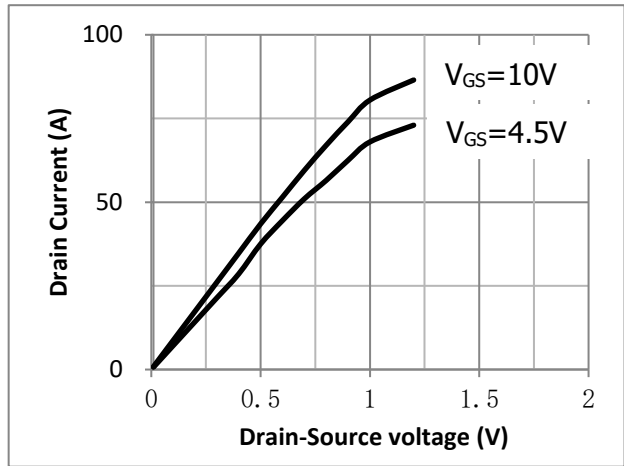


Fig.3 Threshold Voltage V.S Junction Temperature

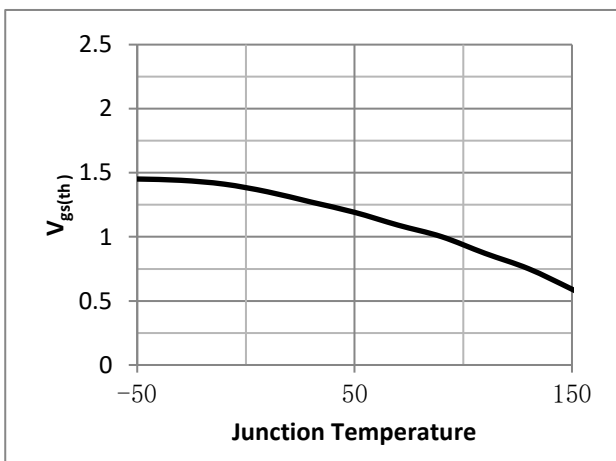


Fig.4 Resistance V.S Drain Current

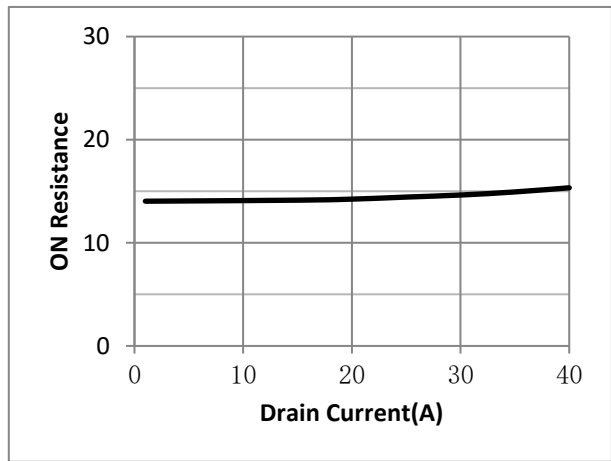


Fig.5 On-Resistance VS Gate Source Voltage

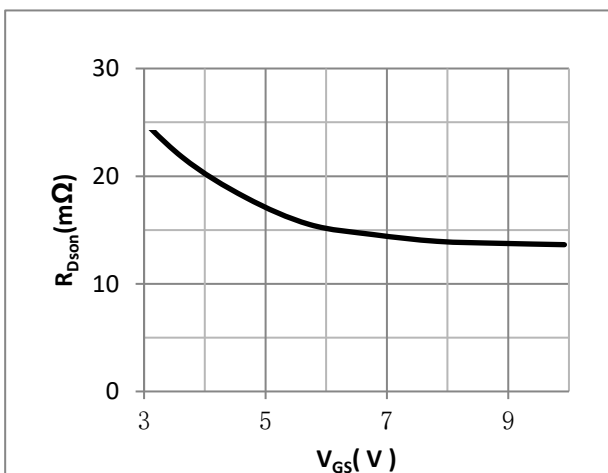


Fig.6 On-Resistance V.S Junction Temperature

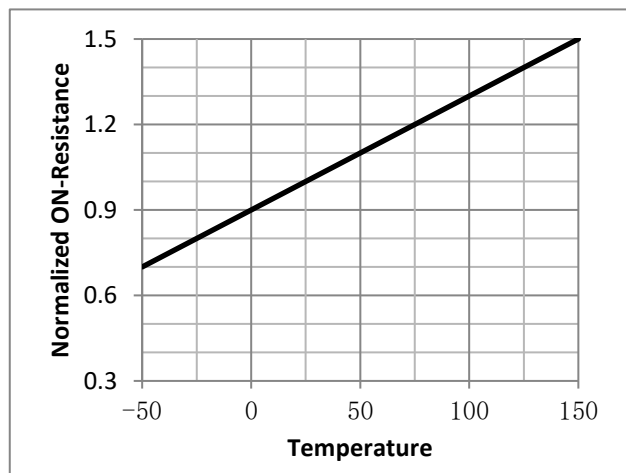


Fig.7 Switching Time Measurement Circuit

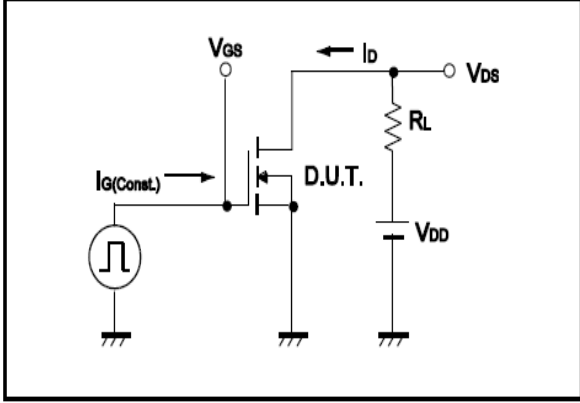


Fig.8 Gate Charge Waveform

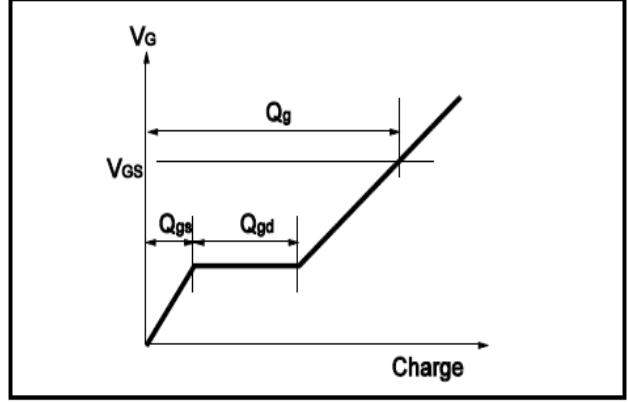


Fig.9 Switching Time Measurement Circuit

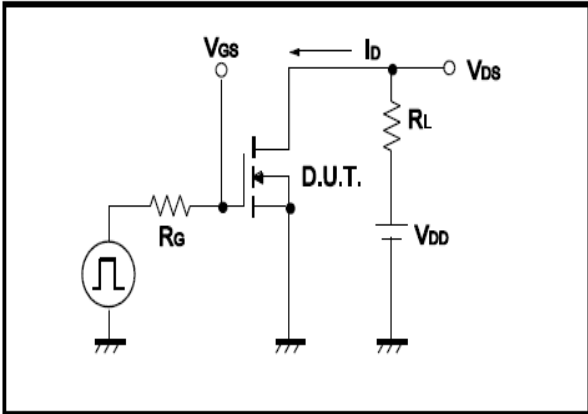


Fig.10 Gate Charge Waveform

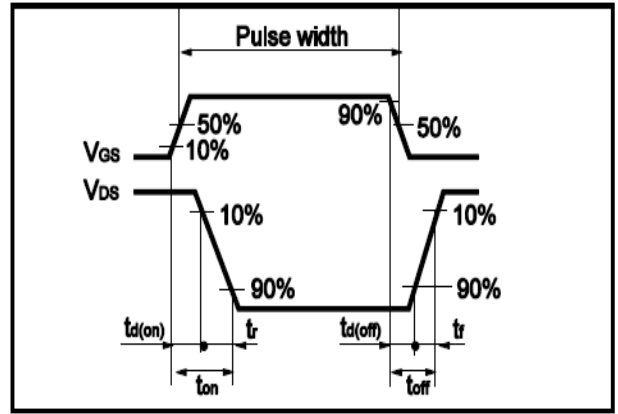


Fig.11 Avalanche Measurement Circuit

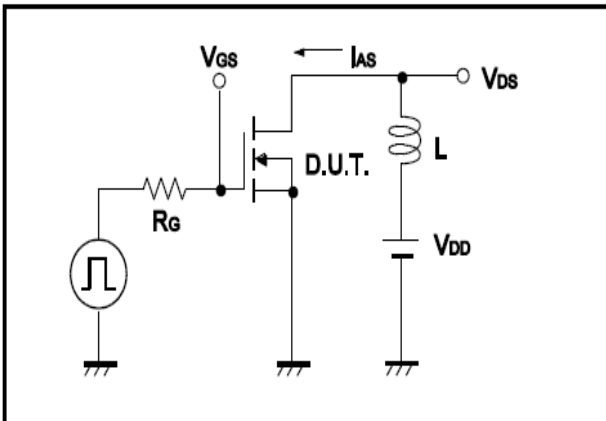
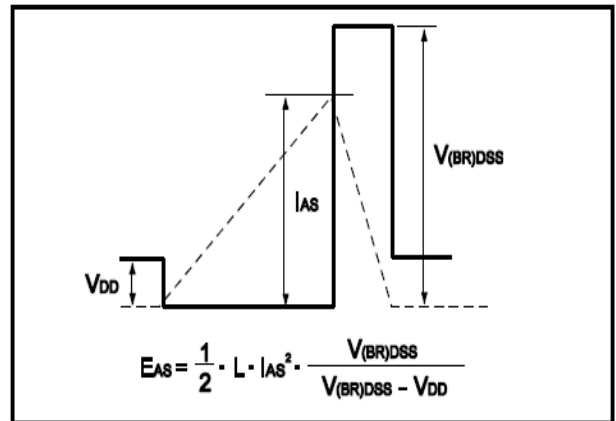
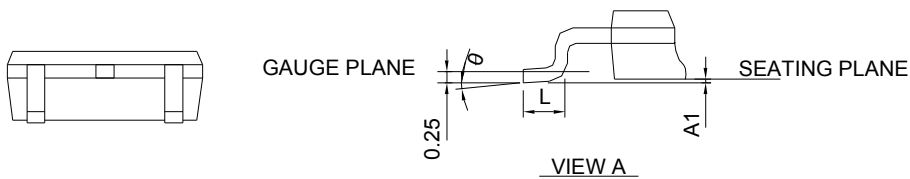
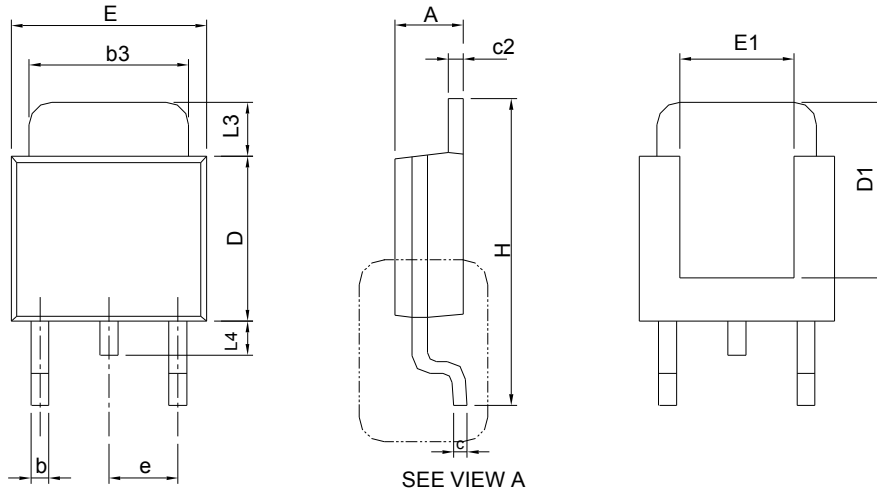


Fig.12 Avalanche Waveform



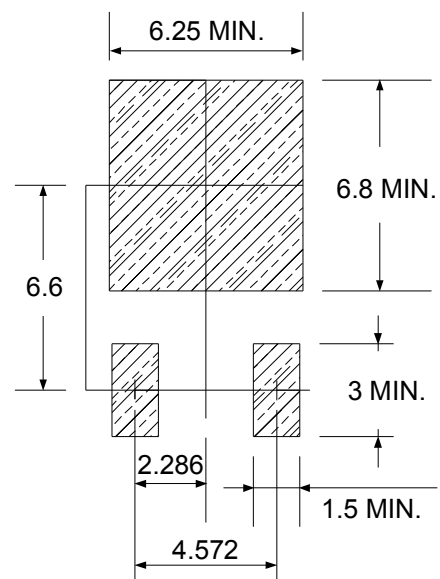
## Package Information

TO-252



| DIMENSIONS | TO-252      |       |           |       |
|------------|-------------|-------|-----------|-------|
|            | MILLIMETERS |       | INCHES    |       |
|            | MIN.        | MAX.  | MIN.      | MAX.  |
| A          | 2.18        | 2.39  | 0.086     | 0.094 |
| A1         |             | 0.13  |           | 0.005 |
| b          | 0.50        | 0.89  | 0.020     | 0.035 |
| b3         | 4.95        | 5.46  | 0.195     | 0.215 |
| c          | 0.46        | 0.61  | 0.018     | 0.024 |
| c2         | 0.46        | 0.89  | 0.018     | 0.035 |
| D          | 5.33        | 6.22  | 0.210     | 0.245 |
| D1         | 4.57        | 6.00  | 0.180     | 0.236 |
| E          | 6.35        | 6.73  | 0.250     | 0.265 |
| E1         | 3.81        | 6.00  | 0.150     | 0.236 |
| e          | 2.29 BSC    |       | 0.090 BSC |       |
| H          | 9.40        | 10.41 | 0.370     | 0.410 |
| L          | 0.90        | 1.78  | 0.035     | 0.070 |
| L3         | 0.89        | 2.03  | 0.035     | 0.080 |
| L4         |             | 1.02  |           | 0.040 |
| θ          | 0°          | 8°    | 0°        | 8°    |

### RECOMMENDED LAND PATTERN



UNIT: mm