## ● General Description

The CH60N03D 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

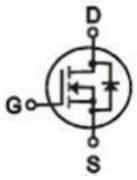
■MB/VGA Vcore

■SMPS 2nd Synchronous Rectifier

■POL application

■BLDC Motor driver

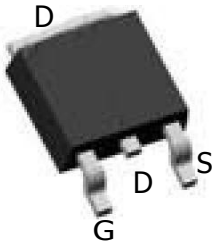
## ● Product Summary




$V_{DS}$ =30V

$R_{DS(ON)}$ <11 mΩ

$I_D$ =60A




TO-252

## ●Ordering Information:

| | |
|---|---|
| Part NO. | CH60N03D |
| Marking | CH60N03D |
| Packing Information | REEL TAPE |
| Basic ordering unit (pcs) | 2500 |

## ●Absolute Maximum Ratings ($T_C$ =25℃)

| **Parameter** | **Symbol** | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | 20 | V |
| Continuous Drain Current | $I_{D@}$TC=25℃ | 60 | A |
| | $I_{D@}$TC=75℃ | 40 | A |
| | $I_{D@}$TC=100℃ | 20 | A |
| Pulsed Drain Current ① | $I_{DM}$ | 120 | A |
| Total Power Dissipation(TC=25℃) | $P_{D@}$TC=25℃ | 60 | W |
| Total Power Dissipation(TA=25℃) | $P_{D@}$TA=25℃ | 2.0 | W |
| Operating Junction Temperature | $T_J$ | -55 to 150 | ℃ |
| Storage Temperature | $T_{STG}$ | -55 to 150 | ℃ |
| Single Pulse Avalanche Energy@L=0.1mH | $E_{AS}$ | 150 | mJ |
| Avalanche Current@L=0.1mH | $I_{AS}$ | 55 | A |

## ●Thermal resistance

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Thermal resistance, junction - case | $R_{thJC}$ | - | - | 2.1 | °C/W |
| Thermal resistance, junction - ambient | $R_{thJA}$ | - | - | 62.5 | °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,$I_D$ =250uA | 30 | | | V |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ =$V_{DS}$, $I_D$ =250uA | 1 | | 3.0 | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=20V, $V_{GS}$ =0V | | | 1.0 | uA |
| Gate- Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±12V ,$V_{DS}$ =0V | | | ±100 | nA |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=30A | | 9.0 | 11 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=20A | | 10.5 | 15 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ =15V, $I_D$=10A | | 16 | | s |
| Source-drain voltage | $V_{SD}$ | Is=20A | | | 1.30 | V |

## ●Electronic Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{iss}$ | f = 1MHz | - | 1800 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 280 | - | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 140 | - | |

## ●Gate Charge characteristics($T_a$ = 25℃)

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| Total gate charge | $Q_g$ | $V_{DS}$ =10V | - | 23 | - | nC |
| Gate - Source charge | $Q_{gs}$ | $I_D$ = 25A | - | 7 | - | |
| Gate - Drain charge | $Q_{gd}$ | $V_{GS}$ = 10V | - | 4.5 | - | |

Note: ① Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2% ;

## Typical Electrical and Thermal Characteristics (Curves)

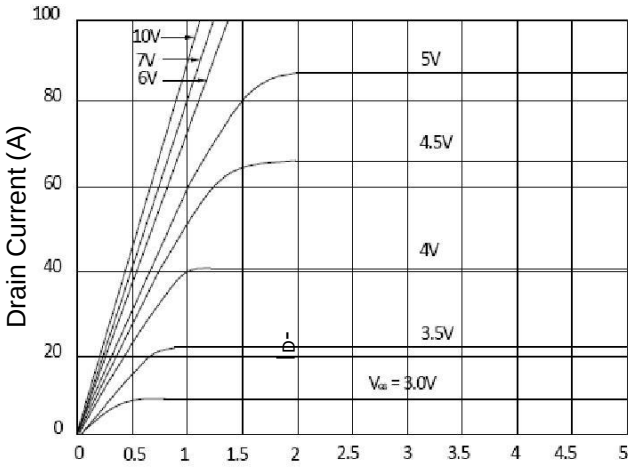



**Figure 1 Output Characteristics**

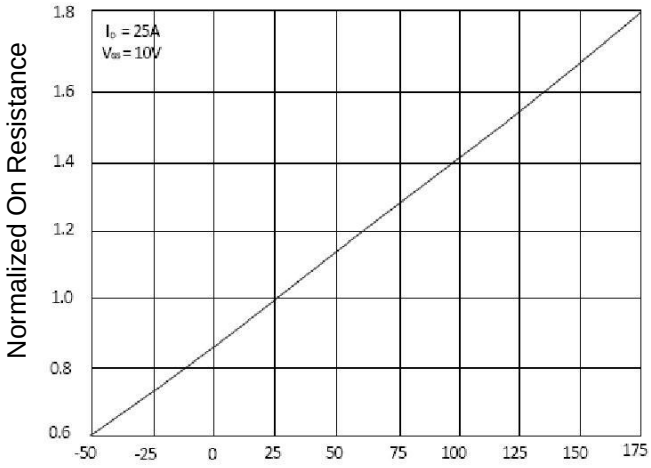



**Figure 4 Rdson-JunctionTemperature**

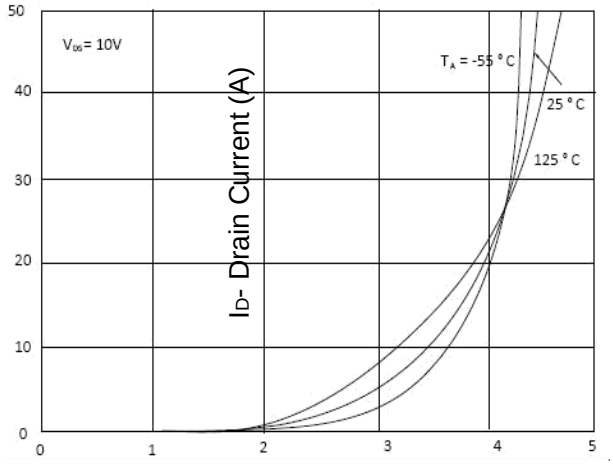



**Figure 2 Transfer Characteristics**

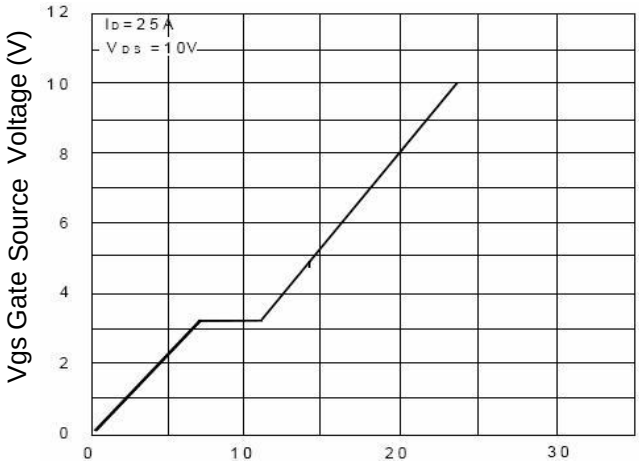



**Figure 5 Gate Charge**

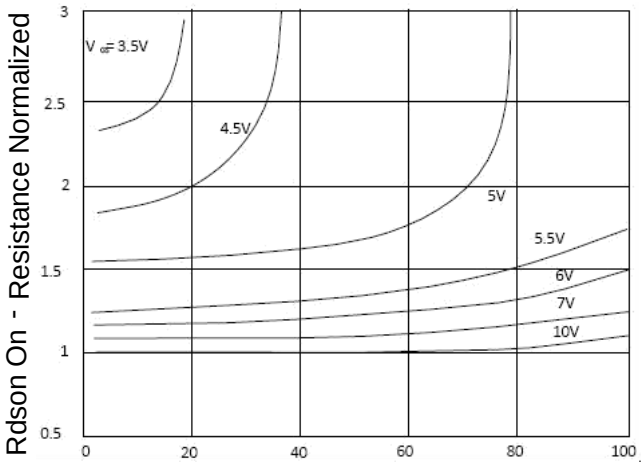



**Figure 3 Rdson- Drain Current**

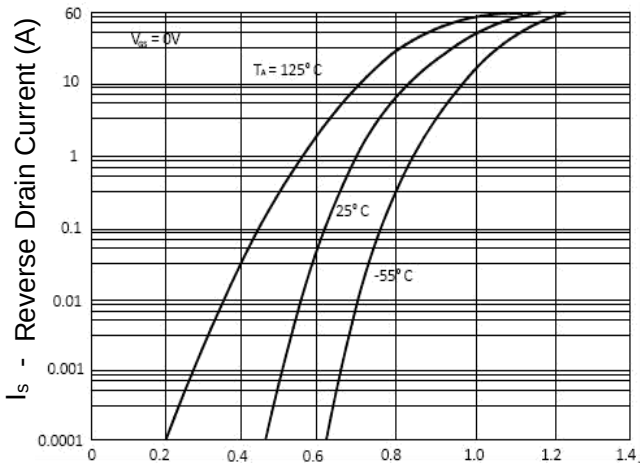



**Figure 6 Source- Drain Diode Forward**

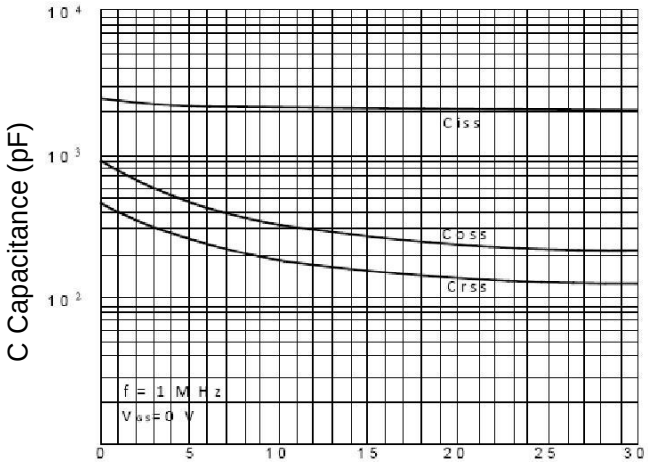



**Figure 7 Capacitance vs Vds**

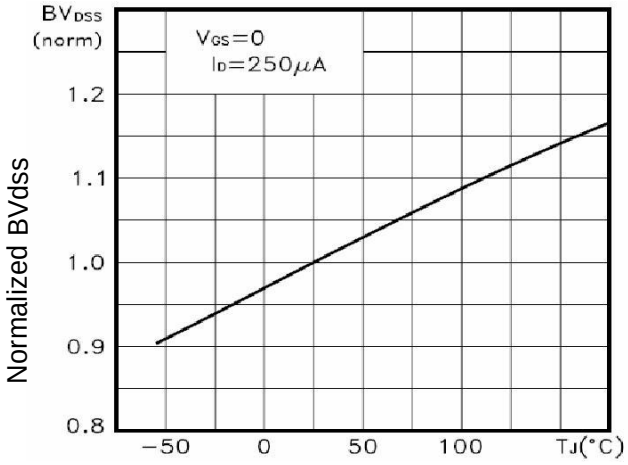



**Figure 9 $BV_{DSS}$ vs Junction Temperature**

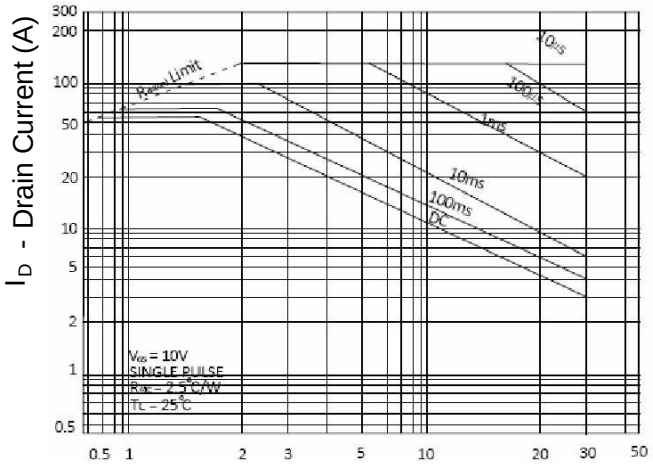



**Figure 8 Safe Operation Area**

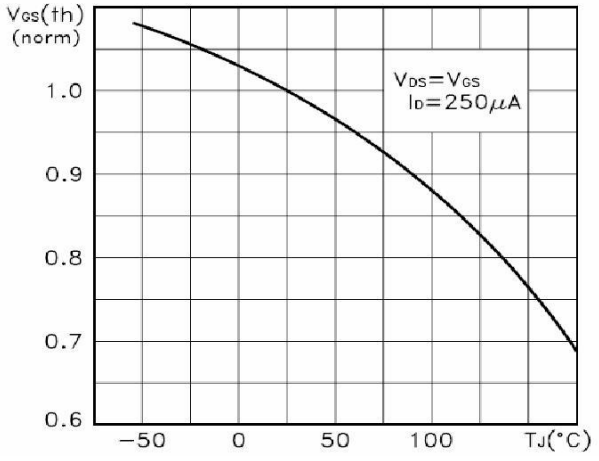



**Figure 10 $V_{GS(th)}$ vs Junction Temperature**

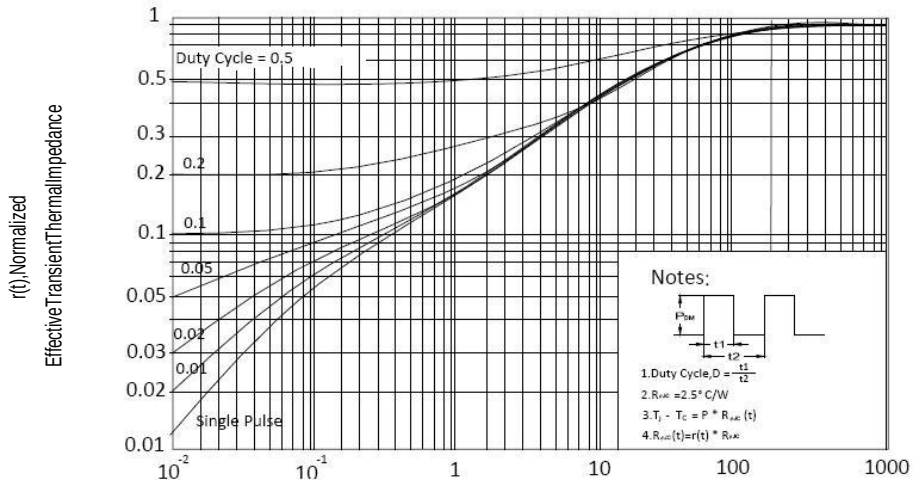
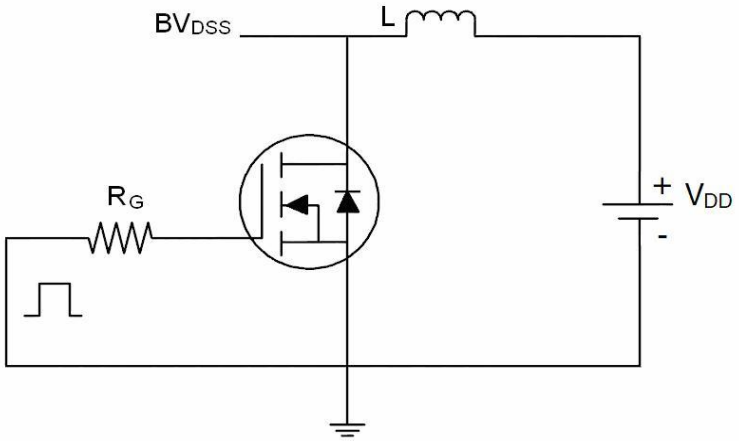


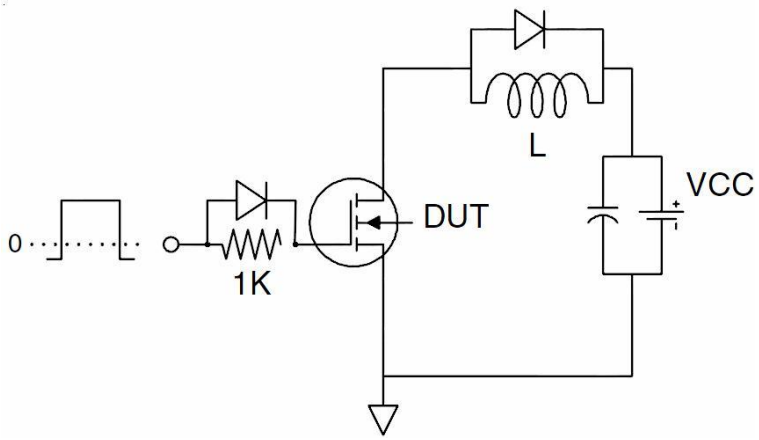

**Figure 11 Normalized Maximum Transient Thermal Impedance**

# Test circuit

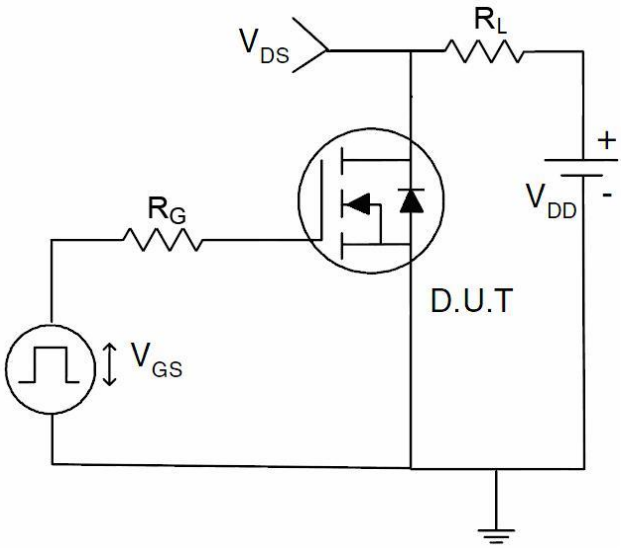
**1） $E_{AS}$ test Circuits**



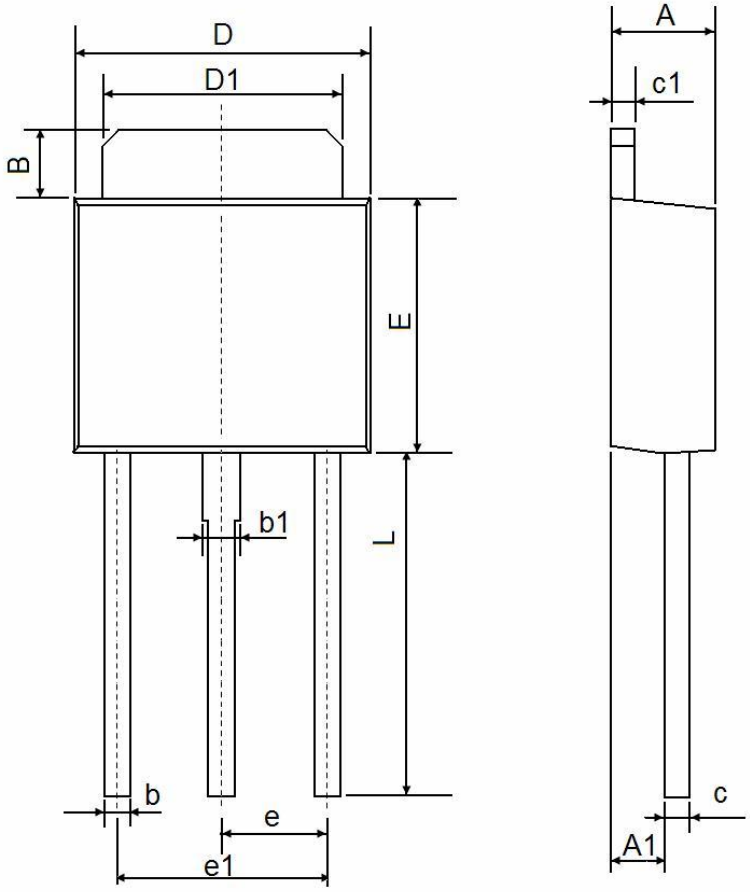

**2）Gate charge test Circuit:**




**3）Switch Time Test Circuit：**

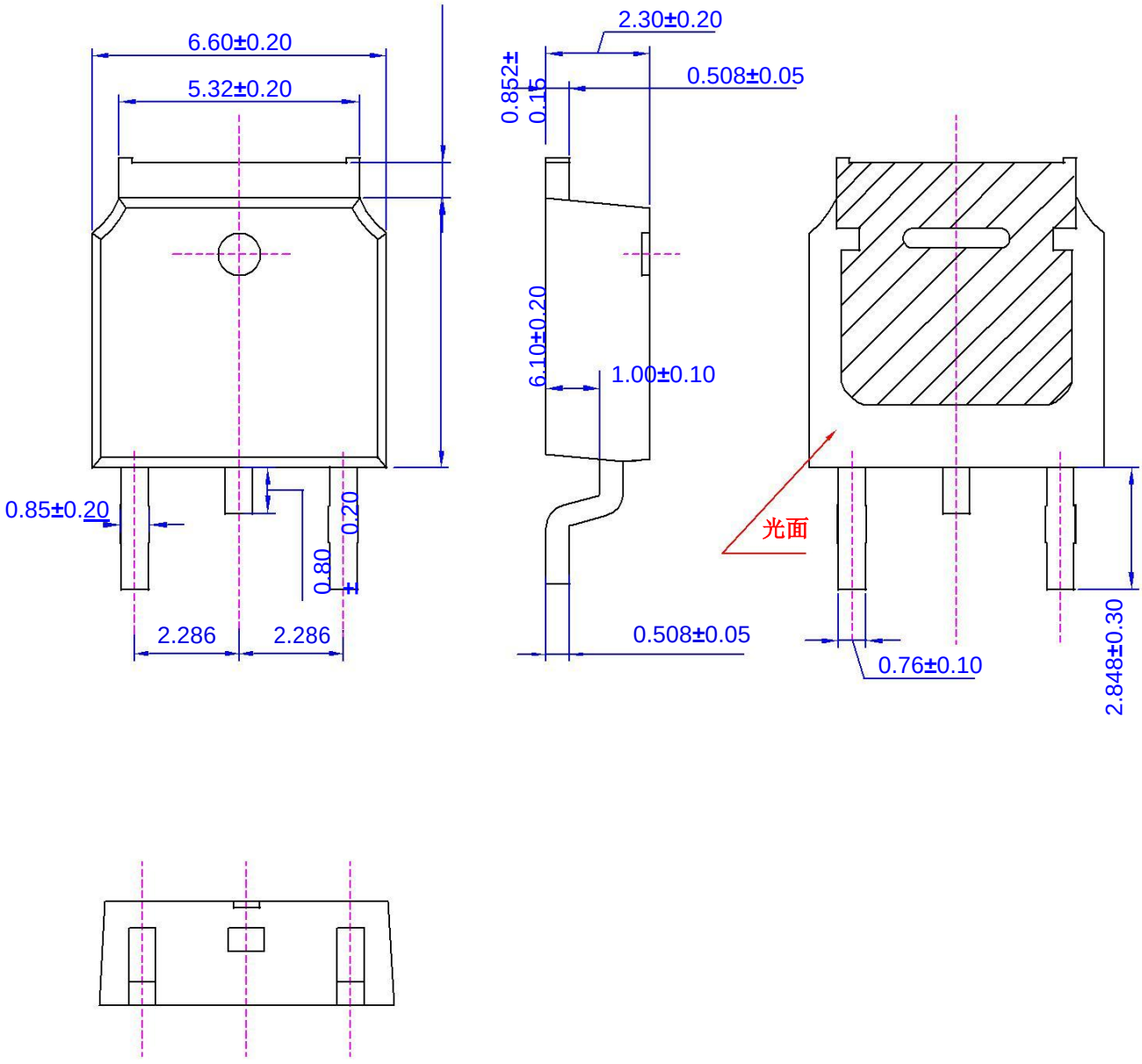


## TO-251 Package Information




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 1.050 | 1.350 | 0.042 | 0.054 |
| B | 1.350 | 1.650 | 0.053 | 0.065 |
| b | 0.500 | 0.700 | 0.020 | 0.028 |
| b1 | 0.700 | 0.900 | 0.028 | 0.035 |
| c | 0.430 | 0.580 | 0.017 | 0.023 |
| c1 | 0.430 | 0.580 | 0.017 | 0.023 |
| D | 6.350 | 6.650 | 0.250 | 0.262 |
| D1 | 5.200 | 5.400 | 0.205 | 0.213 |
| E | 5.400 | 5.700 | 0.213 | 0.224 |
| e | 2.300 TYP. | | 0.091 TYP. | |
| e1 | 4.500 | 4.700 | 0.177 | 0.185 |
| L | 7.500 | 7.900 | 0.295 | 0.311 |

## ●Dimensions(TO-252)




注：

1.塑封体未标注为光面 Ra=0.1;亚光面 Ra=0.8

2.未注公差±0.15,未标注圆角 Rmax=0.25

3.塑封体无缺损、缩孔、裂纹、气泡等不良缺陷

4.标注单位 mm