



# SPN1024

## Dual N-Channel Enhancement Mode MOSFET

### DESCRIPTION

The SPN1024 is the Dual N-Channel enhancement mode power field effect transistors are produced using high cell density , DMOS trench technology. This high density process is especially tailored to minimize on-state resistance and provide superior switching performance. These devices are particularly suited for low voltage applications such as notebook computer power management and other battery powered circuits where high-side switching , low in-line power loss, and resistance to transients are needed.

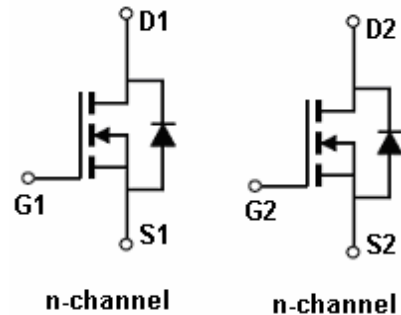
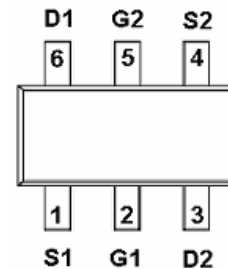
### FEATURES

- ◆ N-Channel  
20V/0.65A,  $R_{DS(ON)}=380m\Omega@V_{GS}=4.5V$   
20V/0.55A,  $R_{DS(ON)}=450m\Omega@V_{GS}=2.5V$   
20V/0.45A,  $R_{DS(ON)}=800m\Omega@V_{GS}=1.8V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ SOT-563 (SC-89-6L) package design

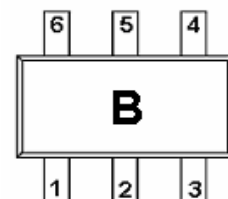
### APPLICATIONS

- Power Management in Note book
- Portable Equipment
- Battery Powered System
- DC/DC Converter
- Load Switch
- DSC
- LCD Display inverter

### PIN CONFIGURATION( SOT-563 / SC-89-6L)



### PART MARKING





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### PIN DESCRIPTION

| Pin | Symbol | Description |
|-----|--------|-------------|
| 1   | S1     | Source 1    |
| 2   | G1     | Gate 1      |
| 3   | D2     | Drain 2     |
| 4   | S2     | Source 2    |
| 5   | G2     | Gate 2      |
| 6   | D1     | Drain1      |

### ORDERING INFORMATION

| Part Number   | Package | Part Marking |
|---------------|---------|--------------|
| SPN1024S56RG  | SOT-563 | B            |
| SPN1024S56RGB | SOT-563 | B            |

※ SPN1024S56RG : Tape Reel ; Pb – Free

※ SPN1024S56RG : Tape Reel ; Pb – Free, Halogen – Free

### ABSOLUTE MAXIMUM RATINGS

( $T_A=25^{\circ}\text{C}$  Unless otherwise noted)

| Parameter   | Symbol    | Typical                  | Unit               |   |
|---|-----------|--------------------------|--------------------|---|
| Drain-Source Voltage                                  | $V_{DSS}$ | 20                       | V                  |   |
| Gate –Source Voltage                                  | $V_{GSS}$ | $\pm 12$                 | V                  |   |
| Continuous Drain Current( $T_J=150^{\circ}\text{C}$ ) | $I_D$     | $T_A=25^{\circ}\text{C}$ | 0.65               | A |
|   |           | $T_A=80^{\circ}\text{C}$ | 0.45               |   |
| Pulsed Drain Current                                  | $I_{DM}$  | 1.0                      | A                  |   |
| Continuous Source Current(Diode Conduction)           | $I_S$     | 0.3                      | A                  |   |
| Power Dissipation                                     | $P_D$     | $T_A=25^{\circ}\text{C}$ | 0.35               | W |
|   |           | $T_A=70^{\circ}\text{C}$ | 0.19               |   |
| Operating Junction Temperature                        | $T_J$     | -55/150                  | $^{\circ}\text{C}$ |   |
| Storage Temperature Range                             | $T_{STG}$ | -55/150                  | $^{\circ}\text{C}$ |   |



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### ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

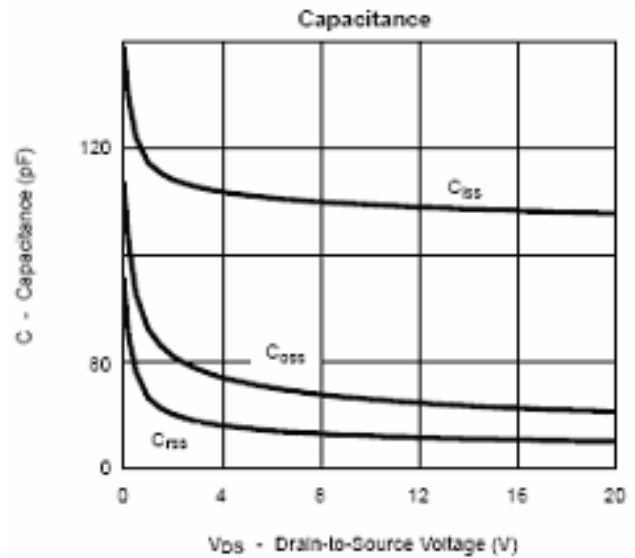
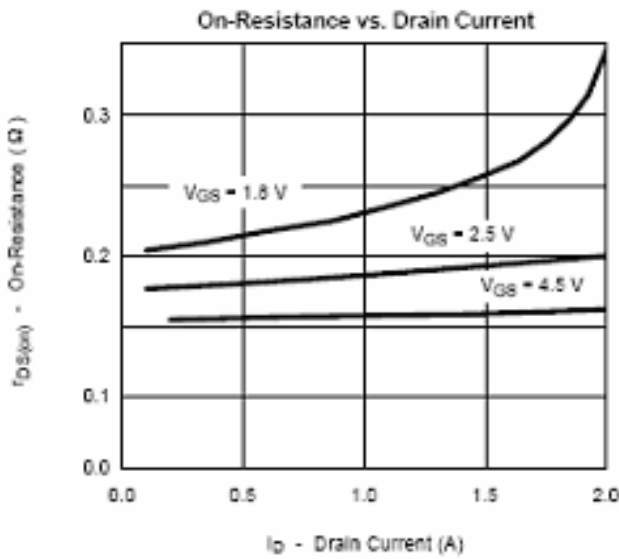
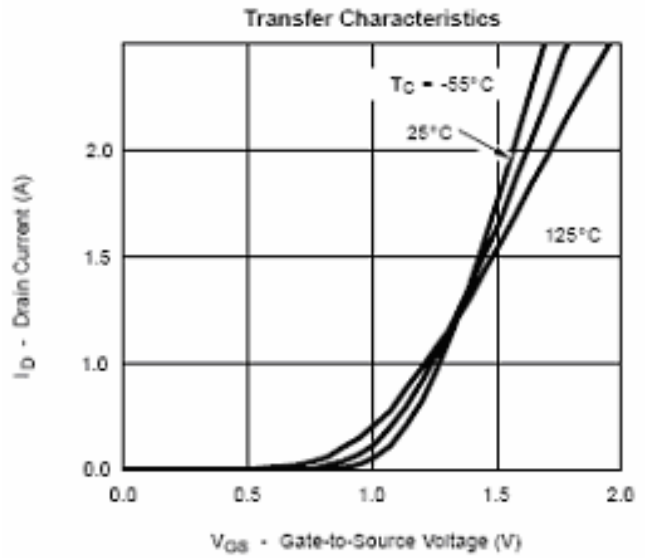
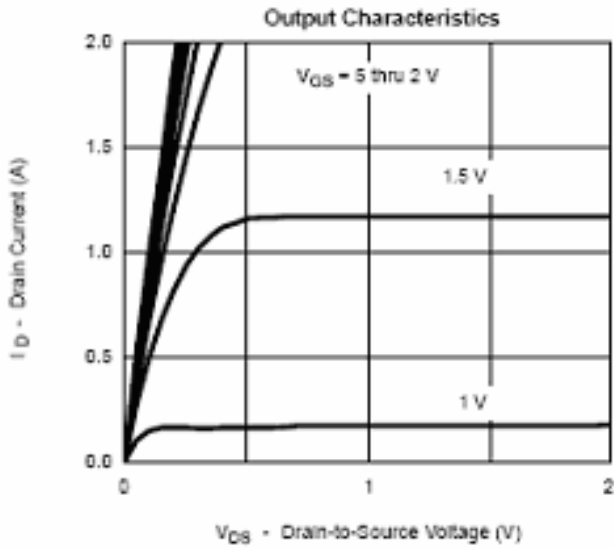
| Parameter                       | Symbol        | Conditions   | Min. | Typ  | Max. | Unit     |
|---------------------------------|---------------|--|------|------|------|----------|
| <b>Static</b>                   |               |  |      |      |      |          |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$  | 20   |      |      | V        |
| Gate Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$  | 0.35 |      | 1.0  |          |
| Gate Leakage Current            | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 12V$  |      |      | 100  | nA       |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=20V, V_{GS}=0V$  |      |      | 1    | uA       |
|                                 |               | $V_{DS}=20V, V_{GS}=0V$<br>$T_J=55^\circ C$                              |      |      | 5    |          |
| On-State Drain Current          | $I_{D(on)}$   | $V_{DS} \geq 4.5V, V_{GS}=5V$  | 0.7  |      |      | A        |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=4.5V, I_D=0.65A$   |      | 0.26 | 0.38 | $\Omega$ |
|                                 |               | $V_{GS}=2.5V, I_D=0.55A$   |      | 0.32 | 0.45 |          |
|                                 |               | $V_{GS}=1.8V, I_D=0.45A$   |      | 0.42 | 0.80 |          |
| Forward Transconductance        | $g_{fs}$      | $V_{DS}=10V, I_D=0.4A$   |      | 1.0  |      | S        |
| Diode Forward Voltage           | $V_{SD}$      | $I_S=0.15A, V_{GS}=0V$   |      | 0.8  | 1.2  | V        |
| <b>Dynamic</b>                  |               |  |      |      |      |          |
| Total Gate Charge               | $Q_g$         | $V_{DS}=10V, V_{GS}=4.5V,$<br>$I_D=0.6A$                                 |      | 1.2  | 1.5  | nC       |
| Gate-Source Charge              | $Q_{gs}$      |  |      | 0.2  |      |          |
| Gate-Drain Charge               | $Q_{gd}$      |  |      | 0.3  |      |          |
| Turn-On Time                    | $t_{d(on)}$   | $V_{DD}=10V, R_L=10\Omega,$<br>$I_D=0.5A$<br>$V_{GEN}=4.5V, R_G=6\Omega$ |      | 5    | 10   | ns       |
|                                 | $t_r$         |  |      | 8    | 15   |          |
| Turn-Off Time                   | $t_{d(off)}$  |  |      | 10   | 18   |          |
|                                 | $t_f$         |  |      | 1.2  | 2.8  |          |



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### TYPICAL CHARACTERISTICS

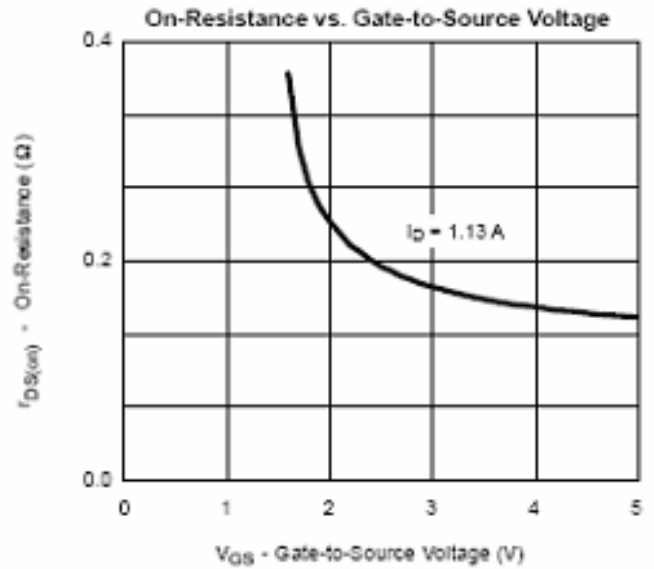
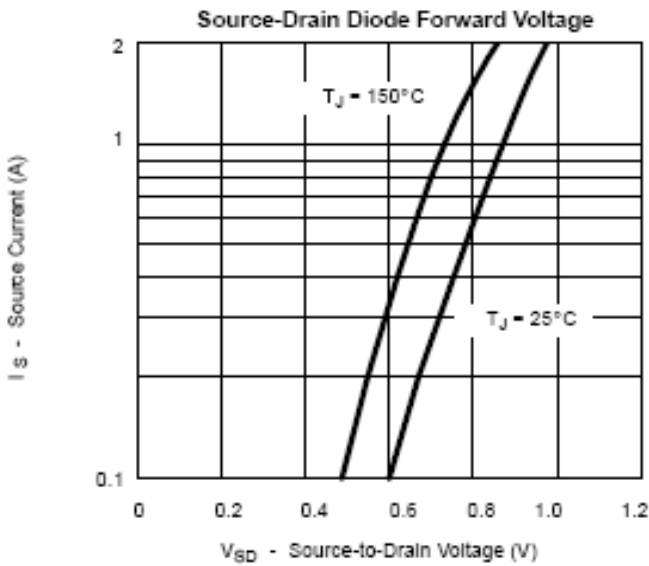
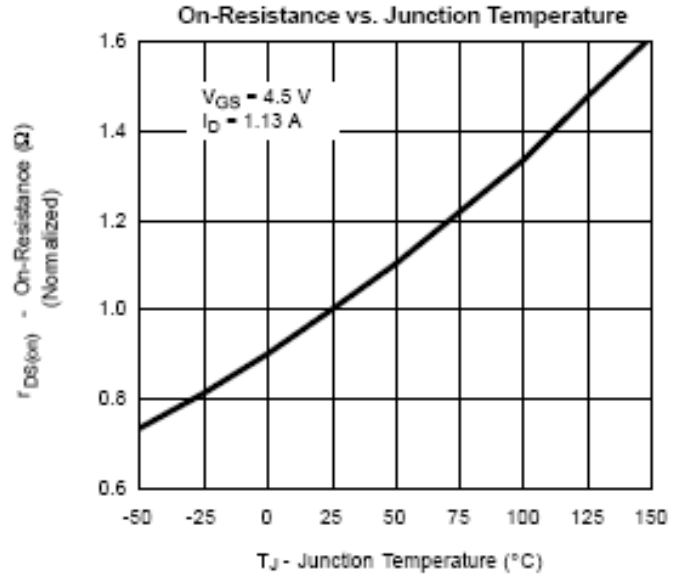
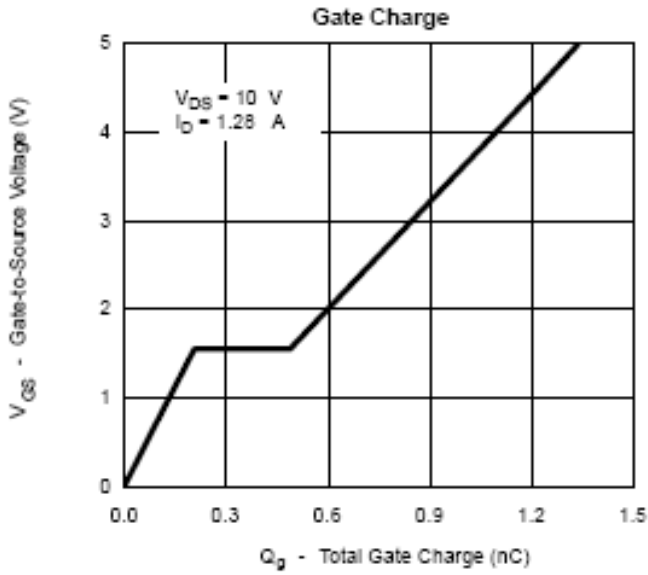




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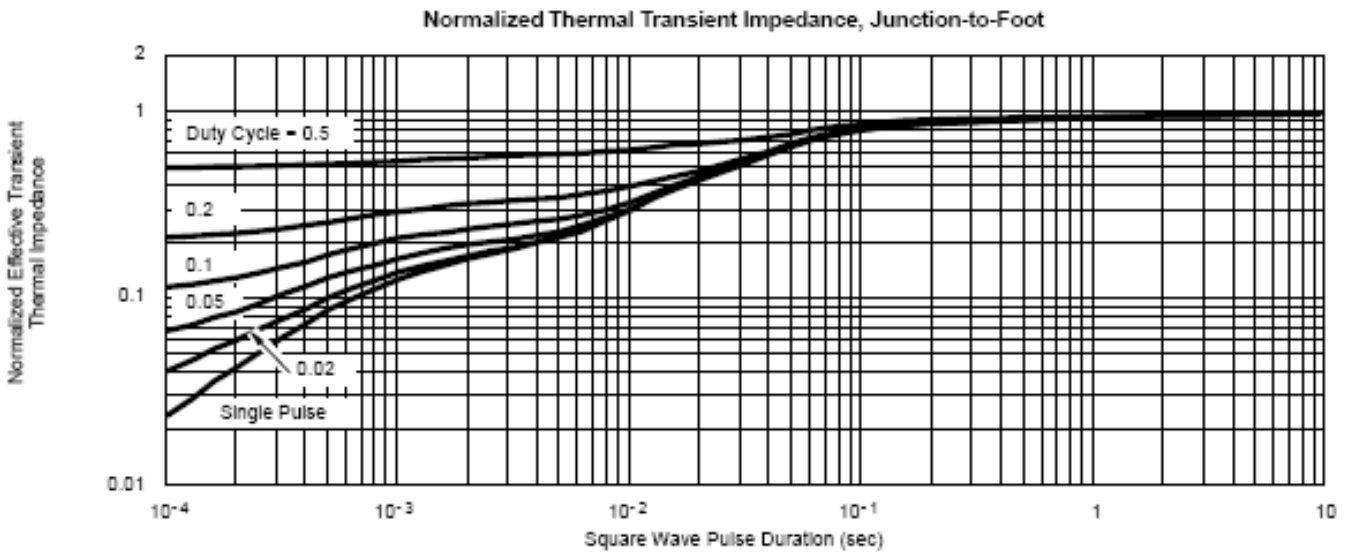
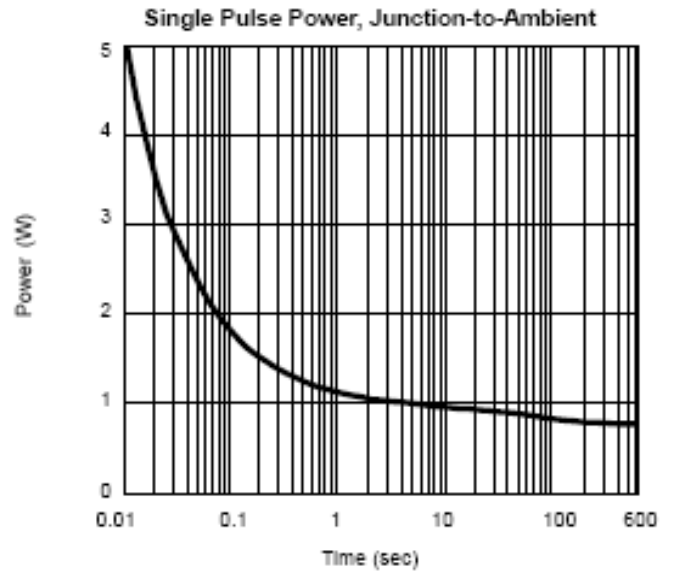
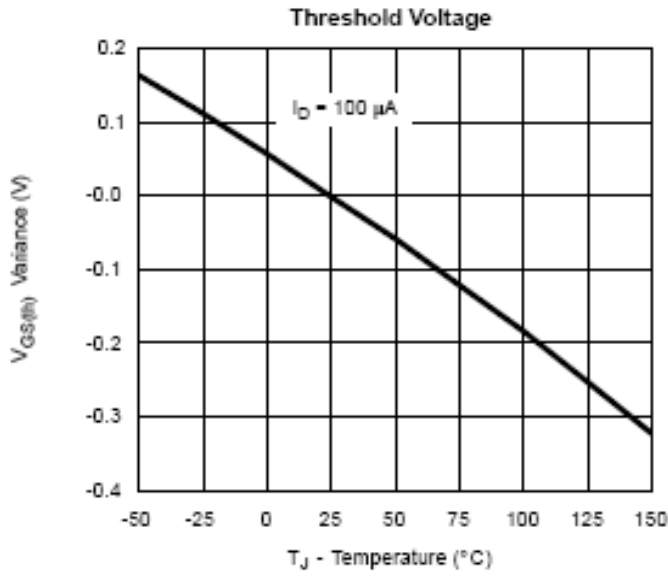




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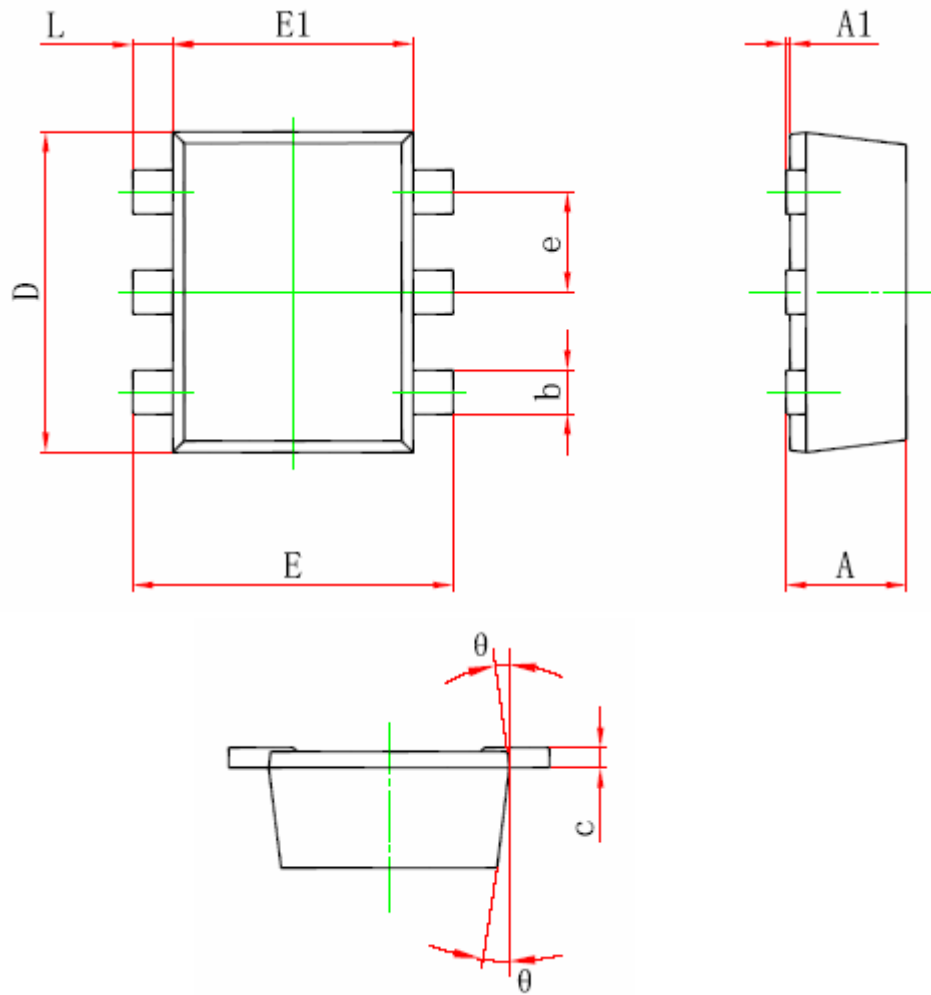




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### SOT-563 PACKAGE OUTLINE



| Symbol | Dimensions in Millimeters |       | Dimensions in Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.525                     | 0.600 | 0.021                | 0.024 |
| A1     | 0.000                     | 0.050 | 0.000                | 0.002 |
| e      | 0.450                     | 0.550 | 0.018                | 0.022 |
| c      | 0.090                     | 0.160 | 0.004                | 0.006 |
| D      | 1.500                     | 1.700 | 0.059                | 0.067 |
| b      | 0.170                     | 0.270 | 0.007                | 0.011 |
| E1     | 1.100                     | 1.300 | 0.043                | 0.051 |
| E      | 1.500                     | 1.700 | 0.059                | 0.067 |
| L      | 0.100                     | 0.300 | 0.004                | 0.012 |
| θ      | 7° REF.                   |       | 7° REF.              |       |



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