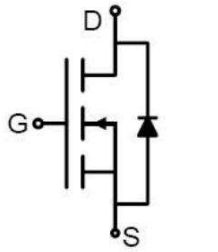
# TPG180N10S

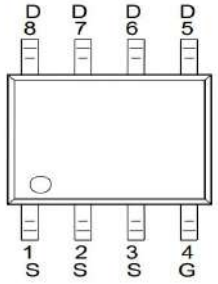
## N-Channel Enhancement Mosfet

## Features

- 100V,10A
  $R_{DS(ON)}$ <18mΩ @$V_{GS}$=10V TYP:15mΩ
  $R_{DS(ON)}$ <28mΩ @$V_{GS}$=4.5V TYP:18.5mΩ
- Split Gate Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge




Schematic Diagram




Marking and pin Assignment

## Applications

- DC/DC converter
- Load Switch for Portable Devices
- Synchronous Rectification

## ABSOLUTE MAXIMUM RATINGS ($T_J$=25℃ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current (Tc=25℃) (1) | $I_D$ | 10 | A |
| Continuous Drain Current (Tc=100℃) | $I_D$ | 7 | A |
| Pulsed Drain Current (1) | $I_{DM}$ | 40 | A |
| Drain Power Dissipation | $P_D$ | 3.1 | W |
| Single Pulsed Avalanche Energy (2) | $E_{AS}$ | 64 | mJ |
| Thermal Resistance from Junction to Ambient (3) | $R_{\theta JA}$ | 40 | ℃/W |
| Junction Temperature | $T_J$ | -55~ +150 | ℃ |
| Storage Temperature | $T_{STG}$ | -55~ +150 | ℃ |

**Notes:**

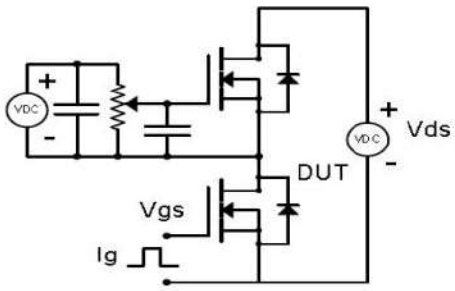
1) Repetitive Rating: pulse width limited by maximum junction temperature
2) EAS condition : $T_J$=25℃, $V_{DD}$=30V, $V_G$=10V, L=0.5mH, $R_g$=25Ω, $I_{AS}$=16A
3) The value of RθJA Mounted on FR4 Board（25.4mm*25.4mm*t1.6mm）With 2oz Copper TA=25℃

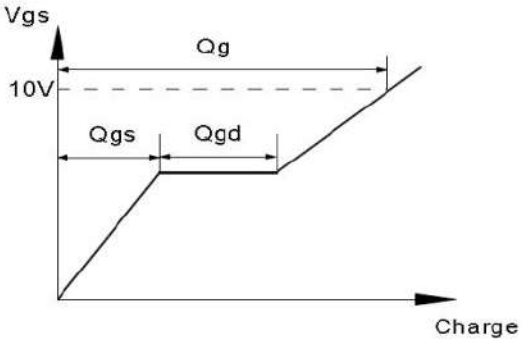
# MOSFET ELECTRICAL CHARACTERISTICS($T_J$=25℃ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ =250μA | 100 | - | - | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ =100V, $V_{GS}$ = 0V | - | - | 1 | μA |
| Gate-body leakage current | $I_{GSS}$ | $V_{GS}$ =±20V, $V_{DS}$ = 0V | - | - | ±100 | nA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250μA | 1.0 | 1.7 | 2.5 | V |
| Drain-source on-resistance | $R_{DS(on)}$ | $V_{GS}$ =10V, $I_D$ =10A | - | 15 | 18 | mΩ |
| | | $V_{GS}$ =4.5V, $I_D$ =10A | - | 18.5 | 25 | |
| Forward transconductance | $R_g$ | f=1.0MHz | - | 1.5 | - | Ω |
| **Dynamic characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =50V, VGS=0V, f=1MHz | - | 1016 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 194 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 3.4 | - | |
| **Switching characteristics** | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=50V, $I_D$=10A, $R_G$=3Ω, $V_{GS}$=10V | - | 27 | - | ns |
| Turn-on rise time | $t_r$ | | - | 49 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 225 | - | |
| Turn-off fall time | $t_f$ | | - | 94 | - | |
| Total Gate Charge | Qg | $V_{DS}$=50V, $I_D$=10A, $V_{GS}$=10V | - | 13.8 | - | nC |
| Gate-Source Charge | Qgs | | - | 4 | - | |
| Gate-Drain Charge | Qgd | | - | 2.3 | - | |
| **Source-Drain Diode characteristics** | | | | | | |
| Diode Forward voltage | $V_{SD}$ | $T_J$=25℃, $V_{GS}$ =0V, $I_S$=10A | - | 0.9 | 1.2 | V |
| Diode Forward current | $I_S$ | $T_C$=25℃ | - | - | 10 | A |
| Body Diode Reverse Recovery Time | Trr | di/dt=100A/us,IF=10A | - | 32 | - | ns |
| Body Diode Reverse Recovery Charge | Qrr | di/dt=100A/us,IF=10A | - | 33 | - | nC |

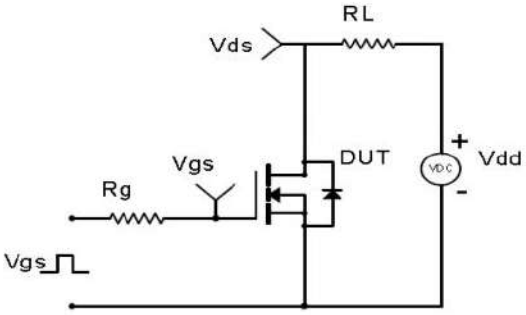
## Test Circuit & Waveform

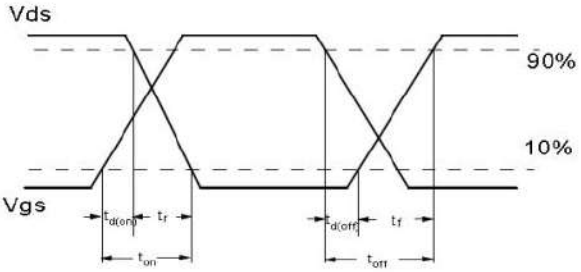
### Gate Charge Test Circuit & Waveform



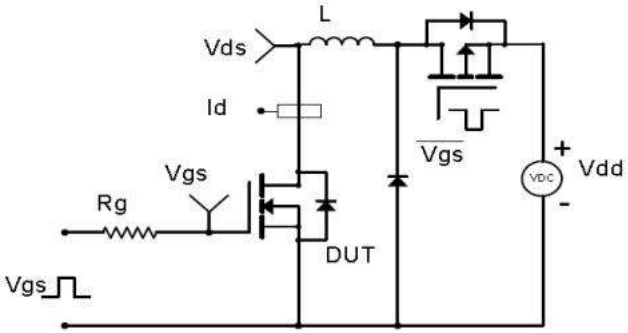



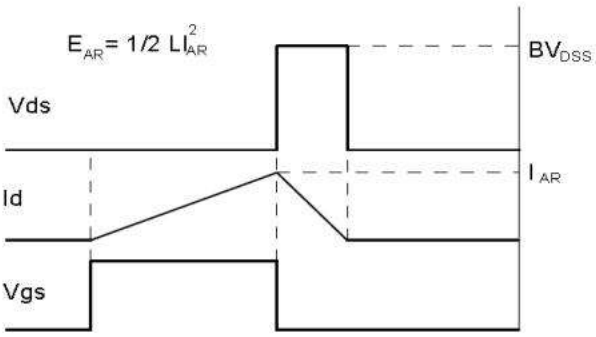

### Resistive Switching Test Circuit & Waveforms



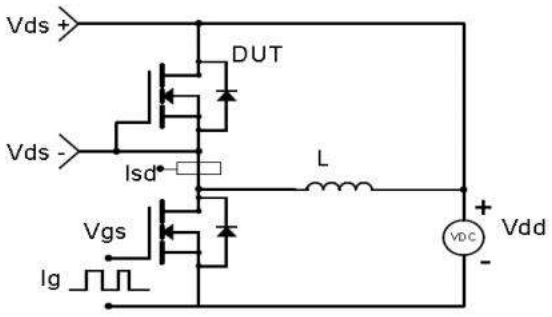



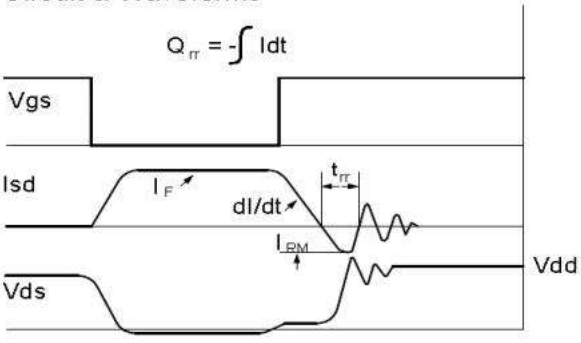

### Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




### Diode Recovery Test Circuit & Waveforms



# Typical Characteristics

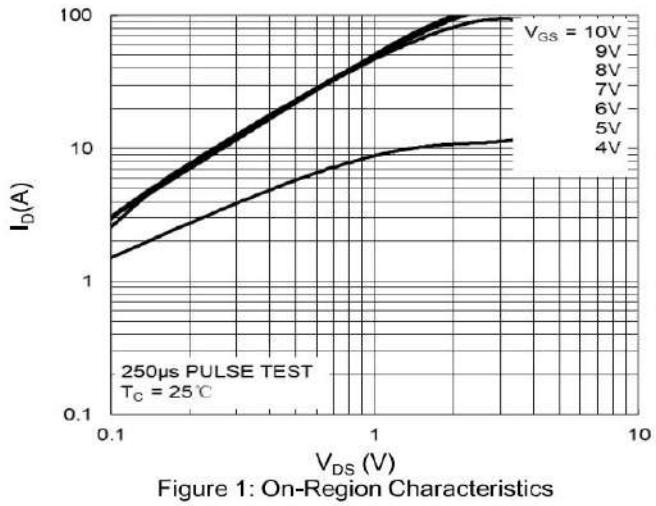


Figure 1: On-Region Characteristics

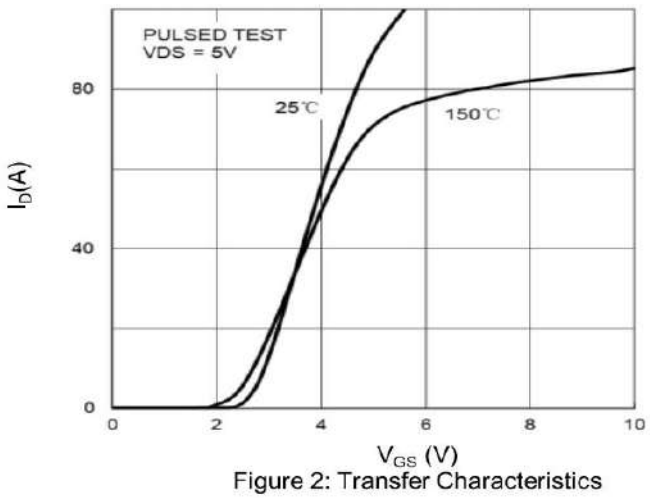


Figure 2: Transfer Characteristics

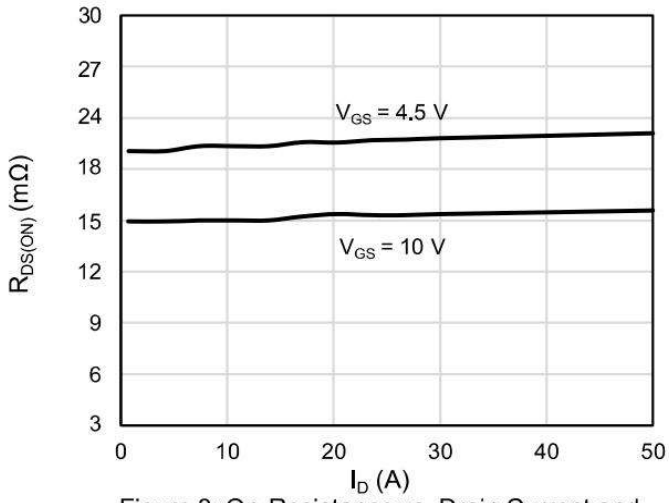


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

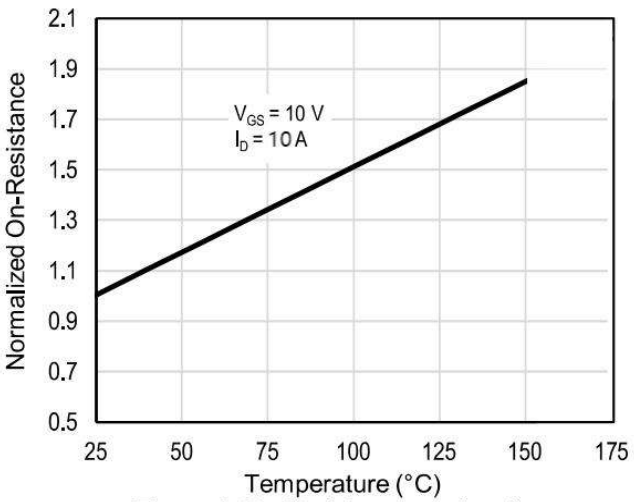


Figure 4: On-Resistance vs. Junction Temperature

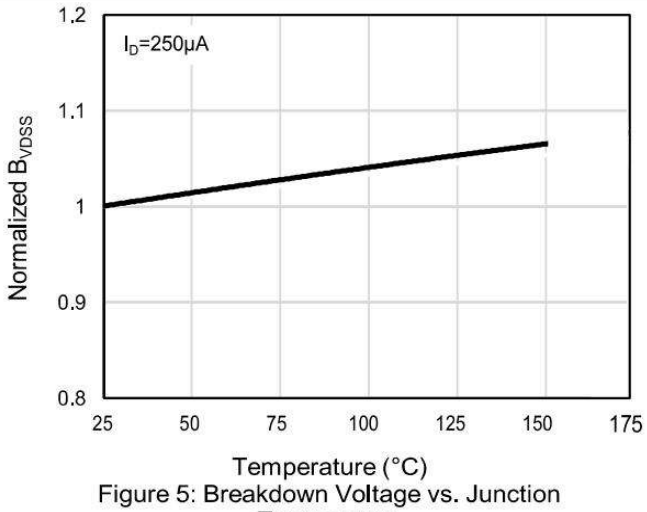


Figure 5: Breakdown Voltage vs. Junction Temperature

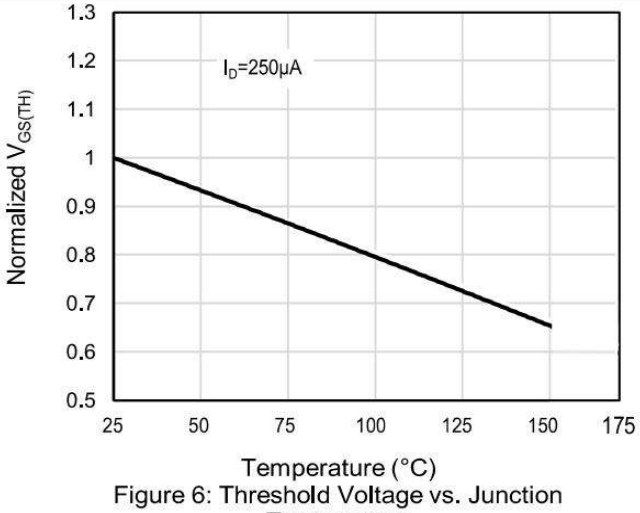


Figure 6: Threshold Voltage vs. Junction Temperature

# Typical Characteristics

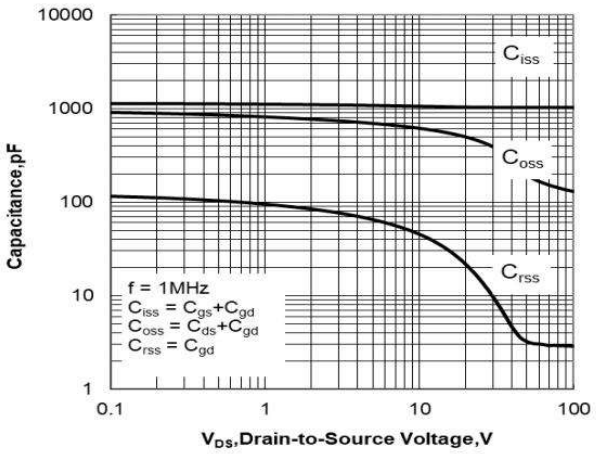



Figure 7. Capacitance Characteristics

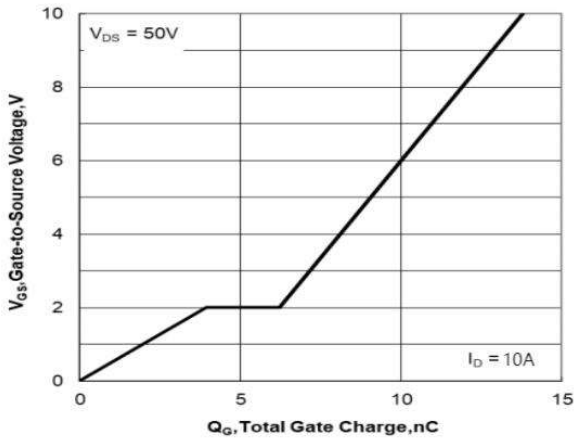



Figure 8. Gate Charge Characteristics

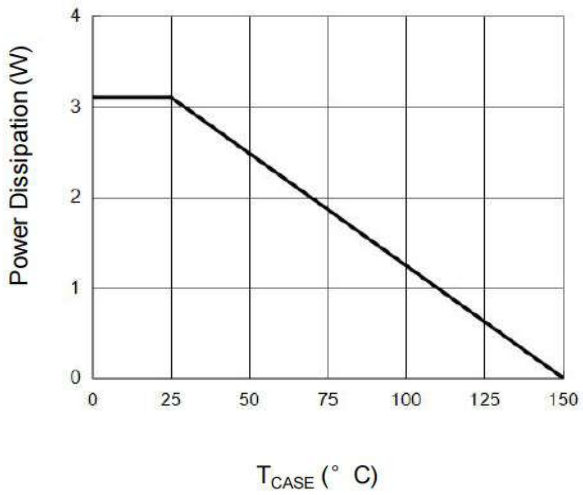



Figure 9. Maximum Continuous Drain Current vs Case Temperature

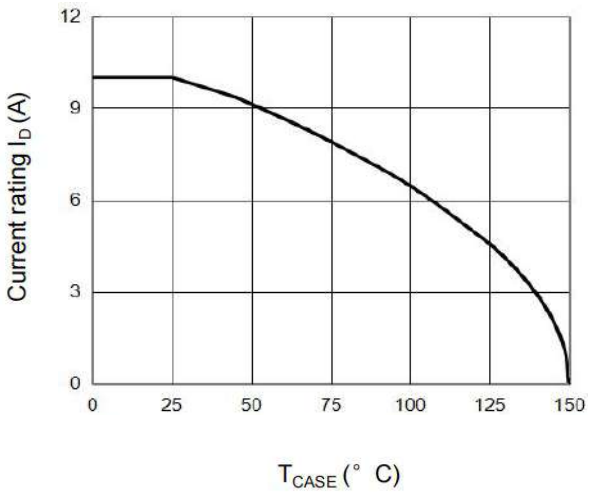



Figure 10. Maximum Power Dissipation vs Case Temperature

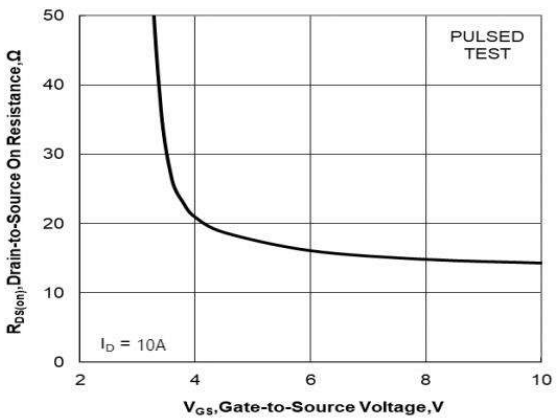



Figure11. Drain-to-Source On Resistance vs Gate Voltage and Drain Current

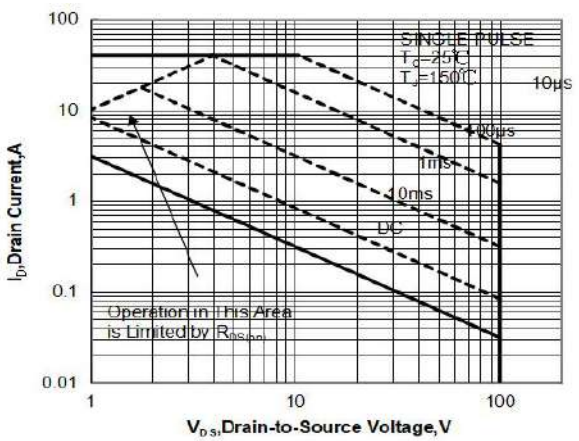
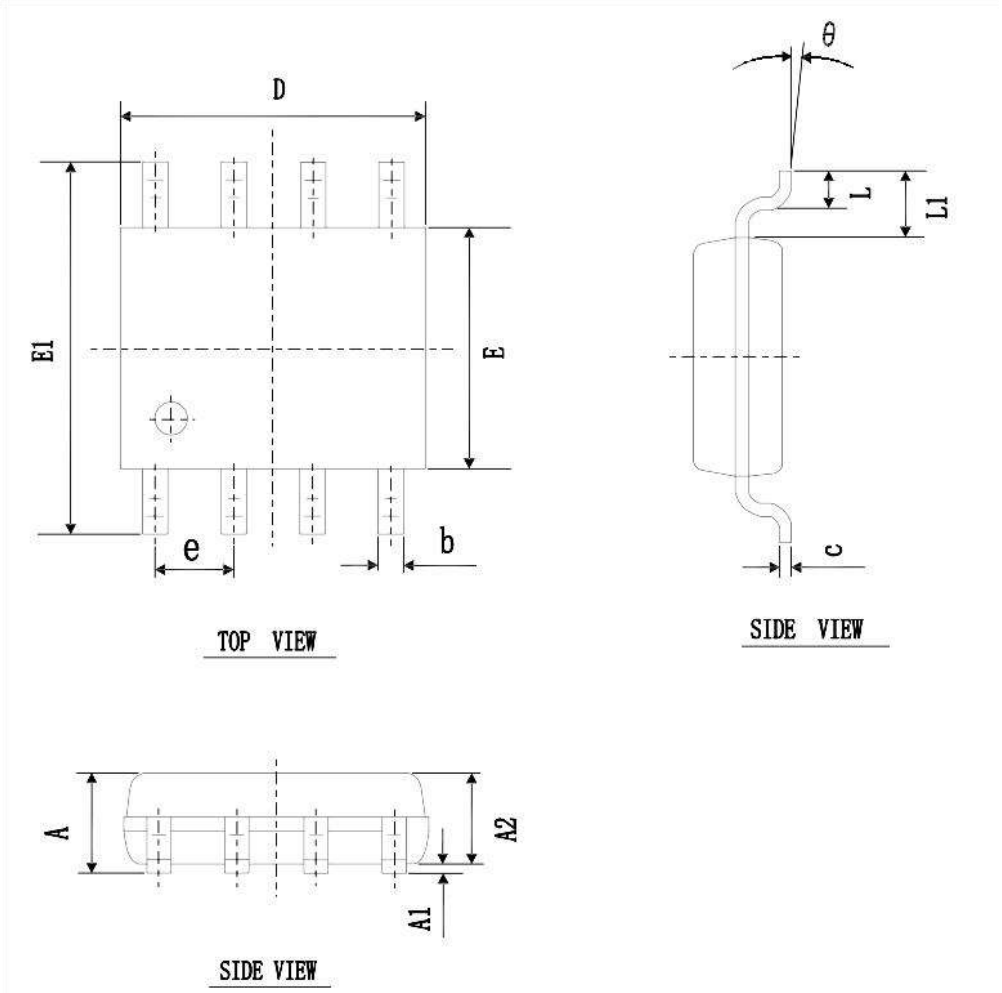



Figure 12. Maximum Safe Operating Area

# SOP-8 Package Information




COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 1.35 | 1.60 | 1.80 |
| A1 | 0.05 | 0.15 | 0.25 |
| A2 | 1.30 | 1.45 | 1.60 |
| b | 0.30 | 0.40 | 0.50 |
| C | 0.153 | 0.203 | 0.253 |
| D | 4.80 | 4.90 | 5.00 |
| E | 3.80 | 3.90 | 4.00 |
| E1 | 5.80 | 6.00 | 6.20 |
| L | 0.40 | 0.70 | 1.25 |
| θ | 0° | | 7° |
| L1 | 1.04 REF | | |
| e | 1.27 BSC | | |