**Alfa-MOS Technology**

# AFN5295S

## 100V N-Channel Enhancement Mode MOSFET

## General Description

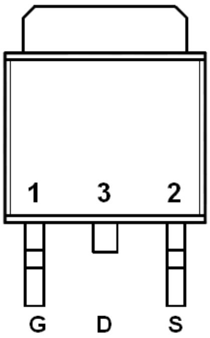
AFN5295S, N-Channel enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent $R_{DS(ON)}$, low gate charge.

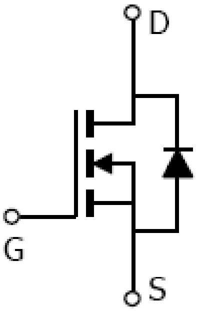
These devices are particularly suited for low voltage power management, and low in-line power loss are needed in commercial industrial surface mount applications.

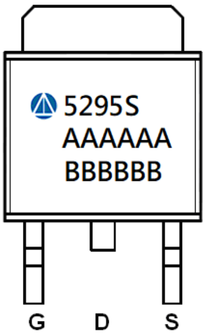
## Features

- $I_D=20A, R_{DS(ON)}= 9.5m\Omega@V_{GS}=10V$
- $I_D=15A, R_{DS(ON)}=12m\Omega@V_{GS}=4.5V$
- Super high density cell design for extremely low $R_{DS\ (ON)}$
- TO-252-2L package design

## Pin Description ( TO-252-2L )







## Application

- Primary Side Switch
- POL Synchronous buck converter
- LED Backlight for LCD TV

## Pin Define

| Pin | Symbol | Description |
|---|---|---|
| 1 | G | Gate |
| 2 | S | Source |
| 3 | D | Drain |

## Ordering Information

| Part Ordering No. | Part Marking | Package | Unit | Quantity |
|---|---|---|---|---|
| AFN5295ST252RG | 5295S | TO-252-2L | Tape & Reel | 2500 EA |

※ A Lot code
※ B Date code
※ AFN5295ST252RG : 13” Tape & Reel ; Pb- Free ; Halogen –Free

## Absolute Maximum Ratings

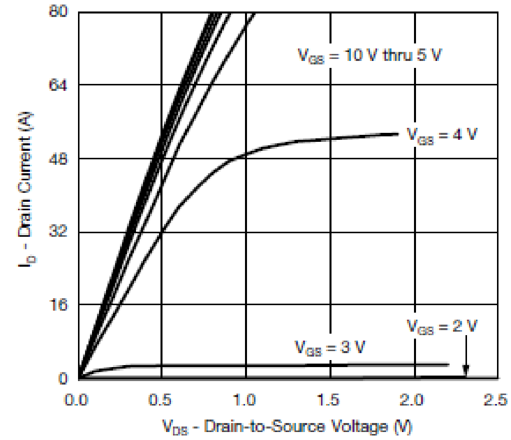
($T_A$=25℃ Unless otherwise noted)

| Parameter | | Symbol | Typical | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 100 | V |
| Gate –Source Voltage | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current($T_J$=150℃) | $T_C$=25℃ | $I_D$ | 50 | A |
| | $T_C$=70℃ | | 30 | |
| | $T_A$=25℃ | | 15 | |
| | $T_A$=70℃ | | 12 | |
| Pulsed Drain Current | | $I_{DM}$ | 120 | |
| Continuous Source Current(Diode Conduction) | $T_A$=25℃ | $I_S$ | 16 | |
| Single Pulse Avalanche Current | | $I_{AS}$ | 25 | |
| Power Dissipation | $T_C$=25℃ | $P_D$ | 80 | W |
| | $T_C$=70℃ | | 30 | |
| Operating Junction Temperature | | $T_J$ | 150 | ℃ |
| Storage Temperature Range | | $T_{STG}$ | -55/150 | ℃ |
| Thermal Resistance-Junction to Ambient | | $R_{\theta JA}$ | 62.5 | ℃/W |

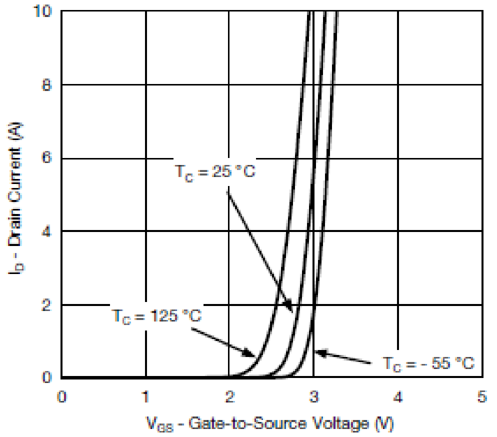
## Electrical Characteristics ($T_A$=25℃ Unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V,$I_D$=250uA | 100 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250uA | 1.0 | | 2.5 | |
| Gate Leakage Current | $I_{GSS}$ | $V_{DS}$=0V,$V_{GS}$=±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=100V,$V_{GS}$=0V | | | 1 | uA |
| | | $V_{DS}$=100,$V_{GS}$=0V<br>$T_J$=85℃ | | | 30 | |
| On-State Drain Current | $I_{D(on)}$ | $V_{DS}$≧5V,$V_{GS}$=10V | 30 | | | A |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V,$I_D$=20A | | 7.8 | 9.5 | mΩ |
| | | $V_{GS}$=4.5V,$I_D$=15A | | 9.8 | 12 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=10,$I_D$=20A | | 54 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=5A,$V_{GS}$=0V | | 0.75 | 1.2 | V |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=50V,$V_{GS}$=4.5V<br>$I_D$≡10A | | 16 | 25 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 7.5 | | |
| Gate Resistance | $R_g$ | f=1MHz | 0.2 | 0.8 | 1.6 | Ω |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=50V,$V_{GS}$=0V<br>f=1MHz | | 1650 | | pF |
| Output Capacitance | $C_{oss}$ | | | 720 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 50 | | |
| Turn-On Time | $t_{d(on)}$ | $V_{DD}$=50V,$R_L$=5Ω<br>$I_D$≡10A,$V_{GEN}$=10V<br>$R_G$=1Ω | | 12 | 24 | ns |
| | $t_r$ | | | 8 | 16 | |
| Turn-Off Time | $t_{d(off)}$ | | | 28 | 55 | |
| | $t_f$ | | | 8 | 16 | |

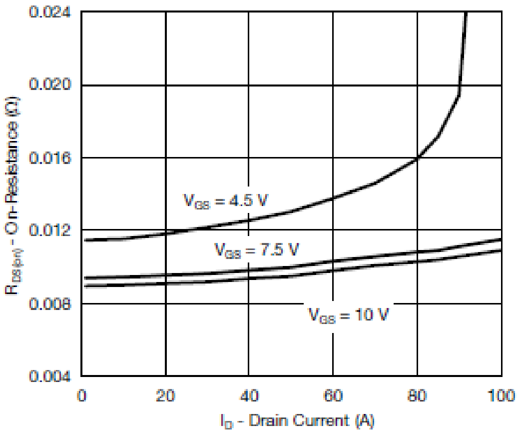
## Typical Characteristics



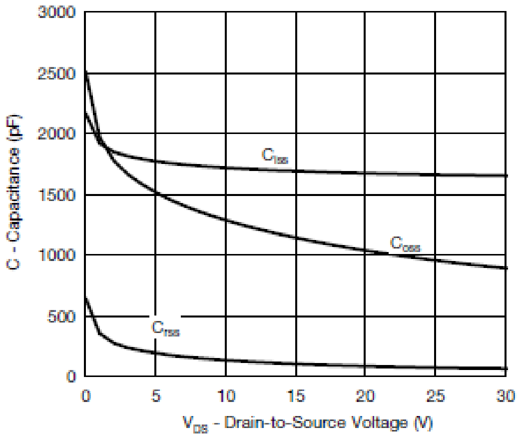
**Output Characteristics**



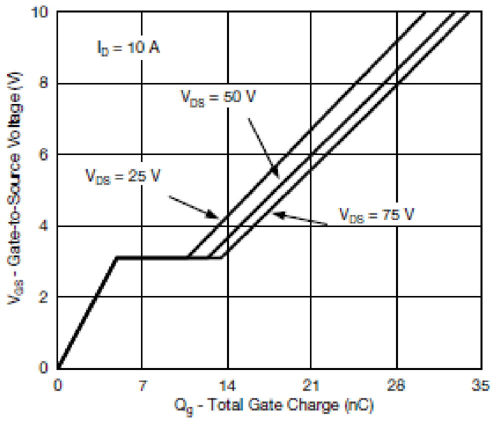
**Transfer Characteristics**



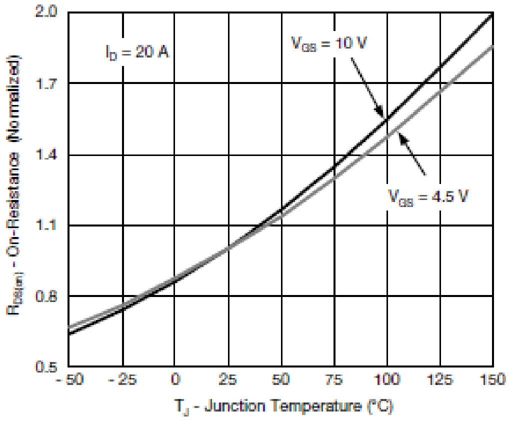
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**

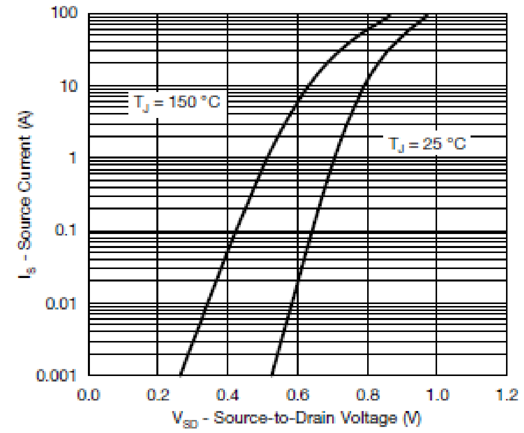


**Gate Charge**

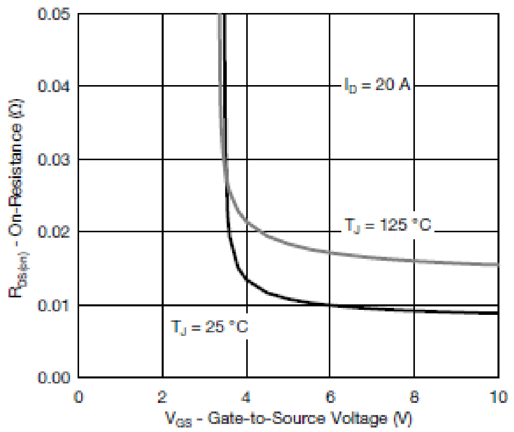


**On-Resistance vs. Junction Temperature**

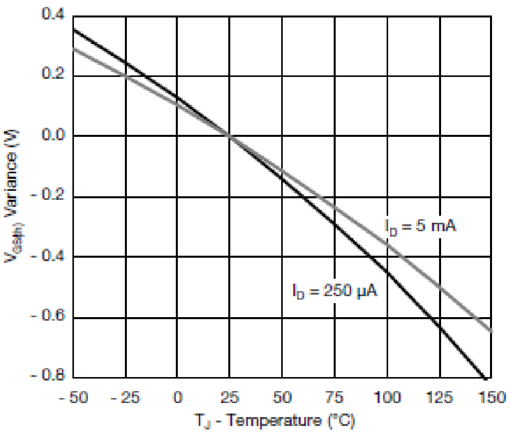
## Typical Characteristics



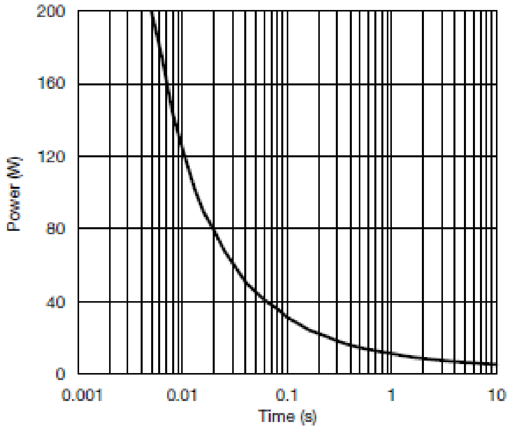
**Source-Drain Diode Forward Voltage**



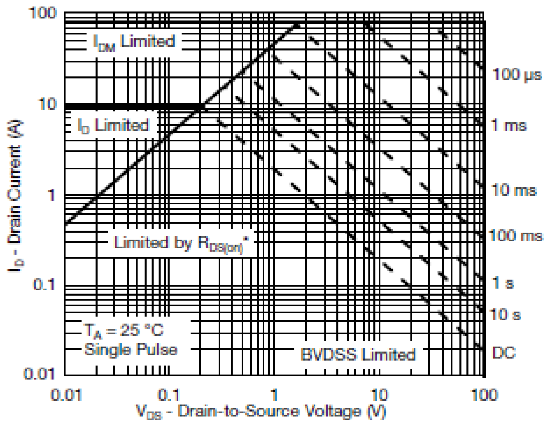
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**

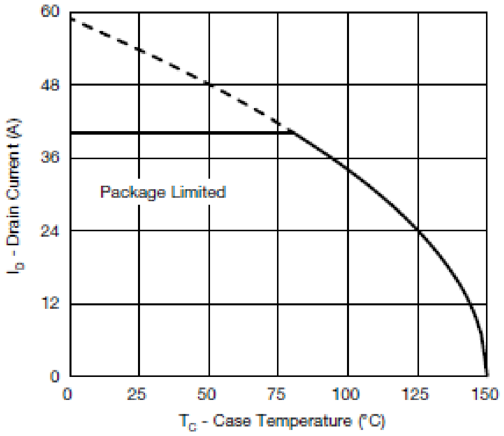


**Single Pulse Power, Junction-to-Ambient**



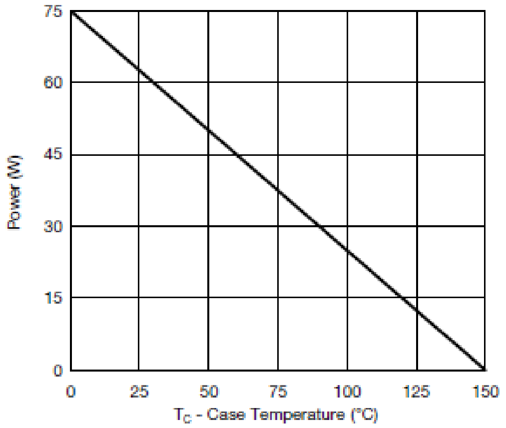
* $V_{GS}$ > minimum $V_{GS}$ at which $R_{DS(on)}$ is specified

**Safe Operating Area, Junction-to-Ambient**

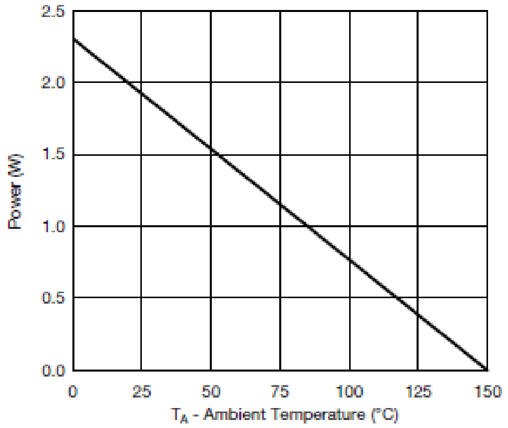


**Current Derating [a]**

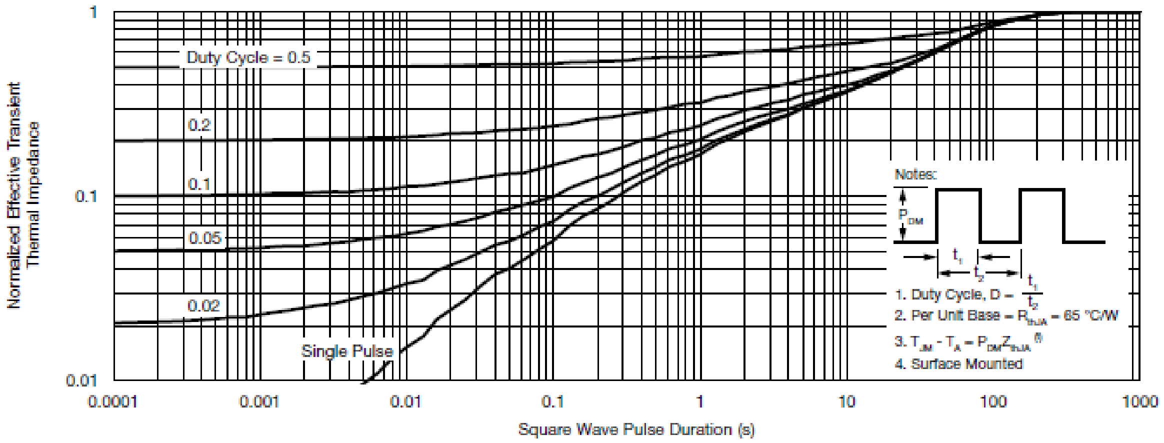
## Typical Characteristics



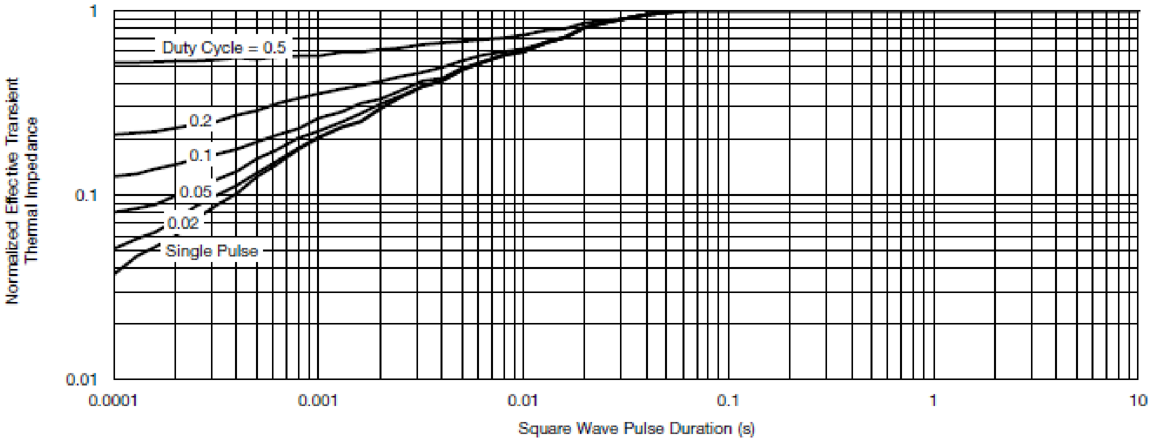
Power, Junction-to-Case



Power, Junction-to-Ambient



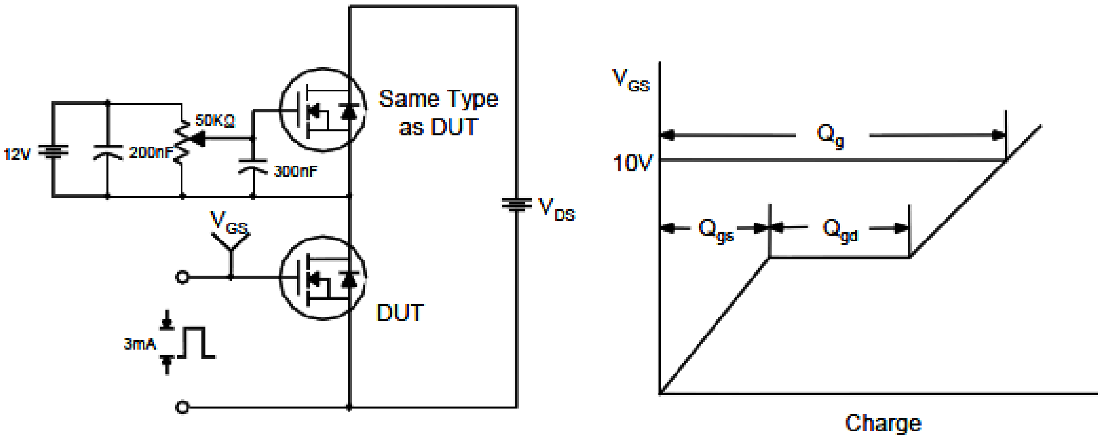
Normalized Thermal Transient Impedance, Junction-to-Ambient



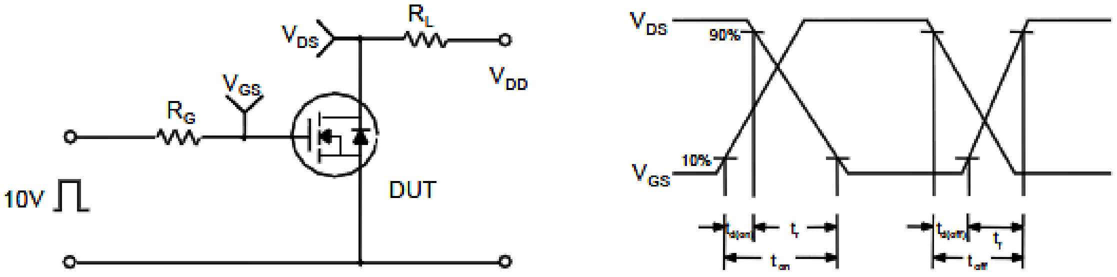
Normalized Thermal Transient Impedance, Junction-to-Case

## Typical Characteristics

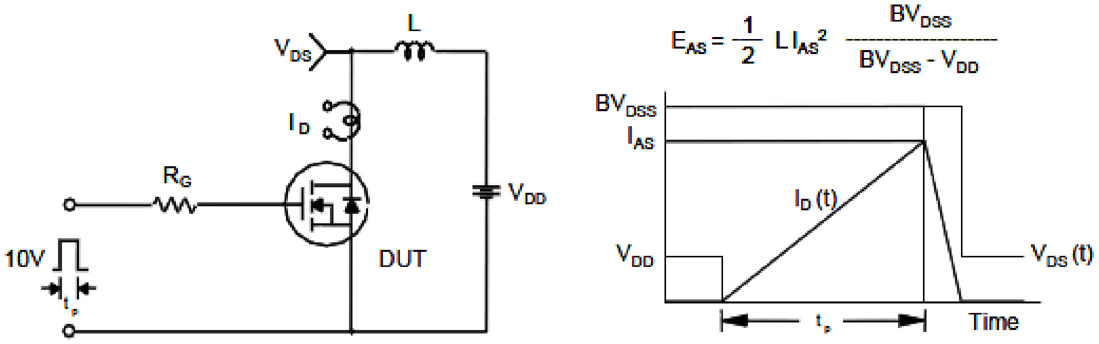
Gate Charge Test Circuit & Waveform



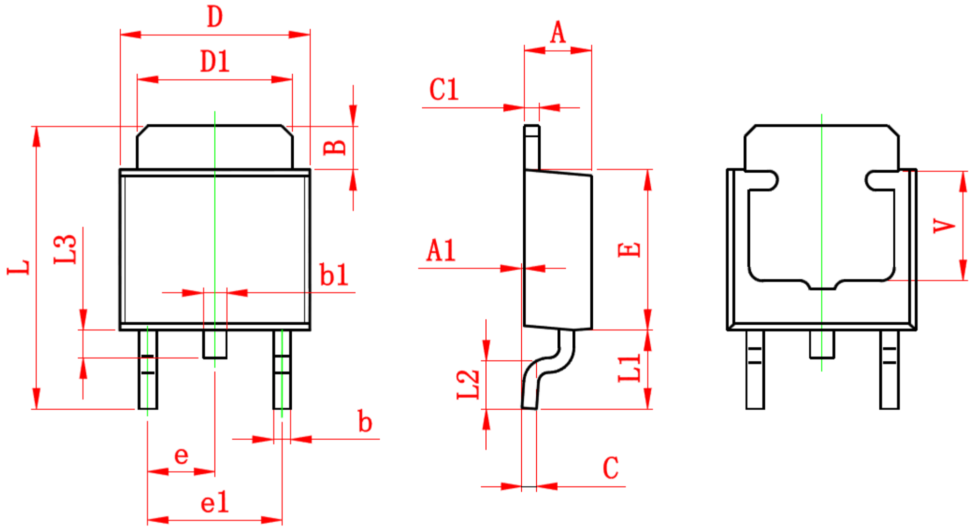
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



## Package Information ( TO-252-2L )



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| 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 | 9.500 | 9.900 | 0.374 | 0.390 |
| L1 | 2.550 | 2.900 | 0.100 | 0.114 |
| L2 | 1.400 | 1.780 | 0.055 | 0.070 |
| L3 | 0.600 | 0.900 | 0.024 | 0.035 |
| V | 3.800 REF. | | 0.150 REF. | |

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