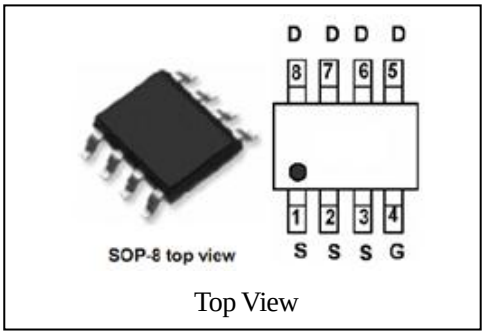
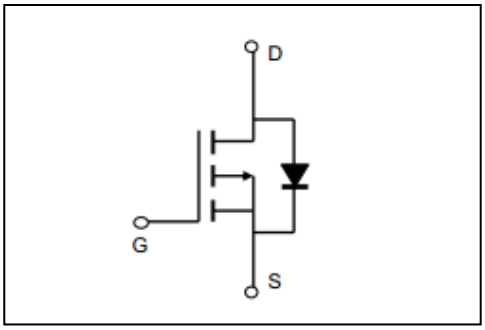
# Silicon P-Channel Power MOSFET

## CS11P03 AE-G

| | | |
|---|---|---|
| $V_{DSS}$ | -30 | V |
| $I_D$ | -11 | A |
| $R_{DS(ON)Typ}$ | 13.1 | mΩ |



Top View




## General Description:

CS11P03 AE-G the silicon P-channel Enhanced VDMOSFETs, is obtained by the high density Trench technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. This device is suitable for use as a load switch and PWM applications. The package form is SOP8, which accords with the RoHS standard.

## Features:

- **Fast Switching**
- **Low ON Resistance(Rdson≤18 mΩ)**
- **Low Gate Charge**
- **Low Reverse transfer capacitances**
- **100% Single Pulse avalanche energy Test**
- **Halogen Free**

## Applications:

Power switch circuit of adaptor and charger.

**Absolute**（$T_A$= 25℃ unless otherwise specified）

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | -30 | V |
| $I_D$ | Continuous Drain Current | -11 | A |
| | Continuous Drain Current $T_A$ = 100 ℃ | -8.1 | A |
| $I_{DM}$ [a1] | Pulsed Drain Current | -44 | A |
| $V_{GS}$ | Gate-to-Source Voltage | ±20 | V |
| $E_{AS}$ [a2] | Avalanche Energy | 85.5 | mJ |
| $P_D$ | Power Dissipation | 3.1 | W |
| $T_J$, $T_{stg}$ | Operating Junction and Storage Temperature Range | 150，–55 to 150 | ℃ |

**Electrical Characteristics**（$T_j$= 25℃ unless otherwise specified）：

| **OFF Characteristics** | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $V_{DSS}$ | Drain to Source Breakdown Voltage | $V_{GS}$=0V, $I_D$= -250μA | -30 | -- | -- | V |
| $I_{DSS}$ | Drain to Source Leakage Current | $V_{DS}$ = - 30V, $V_{GS}$= 0V, Tj = 25℃ | -- | -- | -1 | μA |
| | | $V_{DS}$ = -24V, $V_{GS}$= 0V, Tj = 125℃ | -- | -- | -100 | |
| $I_{GSS(F)}$ | Gate to Source Forward Leakage | $V_{GS}$=20V | -- | -- | 100 | nA |
| $I_{GSS(R)}$ | Gate to Source Reverse Leakage | $V_{GS}$ = -20V | -- | -- | -100 | nA |

| **ON Characteristics** | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $R_{DS(ON)}$ | Drain-to-Source On-Resistance | $V_{GS}$= -10V,$I_D$= -10A | -- | 13.1 | 18 | mΩ |
| | | $V_{GS}$= -5V,$I_D$= -8A | -- | 20 | 25 | mΩ |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = -250μA | -1.5 | -2.2 | -3 | V |
| Pulse width tp≤300μs, δ ≤2% | | | | | | |

| **Dynamic Characteristics** | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0V $V_{DS}$ = -15V f = 1.0MHz | -- | 1827 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 222 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 139 | -- | |

| **Resistive Switching Characteristics** | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{GS}$=-10V， $R_G$=3Ω $V_{DD}$=-15V， $I_D$=-10A | -- | 8.8 | -- | ns |
| tr | Rise Time | | -- | 4.2 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | -- | 65.5 | -- | |
| $t_f$ | Fall Time | | -- | 14.4 | -- | |
| $Q_g$ | Total Gate Charge | $I_D$ =-10A $V_{DD}$ =-15V $V_{GS}$ =- 10V | | 27 | | nC |
| $Q_{gs}$ | Gate to Source Charge | | | 5.85 | | |
| $Q_{gd}$ | Gate to Drain (“Miller”)Charge | | | 4.3 | | |

| Source-Drain Diode Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $I_S$ | Continuous Source Current (Body Diode) | | -- | -- | -11 | A |
| $I_{SM}$ | Maximum Pulsed Current (Body Diode) | | -- | -- | -44 | A |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=-10A,$V_{GS}$=0V | -- | -- | -1.2 | V |
| trr | Reverse Recovery Time | di/dt=100A/us IF=-10A | -- | 25 | | ns |
| Qrr | Reverse Recovery Charge | | -- | 15.1 | | nC |
| Pulse width tp≤300μs, δ ≤2% | | | | | | |

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $R_{\theta JA}$ | Junction-to-Ambient | 40 | ℃/W |

[a1]: Repetitive rating; pulse width limited by maximum junction temperature
[a2]: L=0.5mH, $V_{DD}$=-20V, Ias=-18.5A,Start $T_J$=25℃
[a3]: Recommend soldering temperature defined by IPC/JEDEC J-STD 020

# Characteristics Curve:

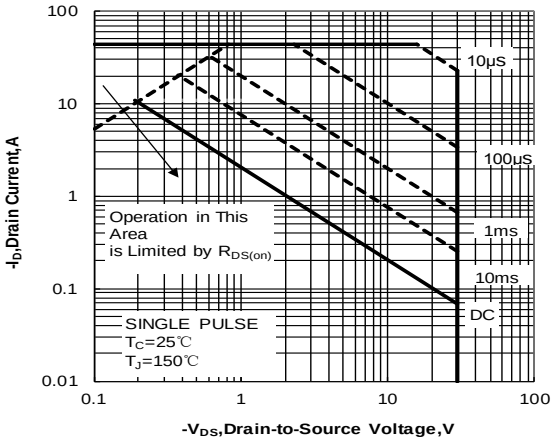



Figure 1 . Maximum Safe Operating Area

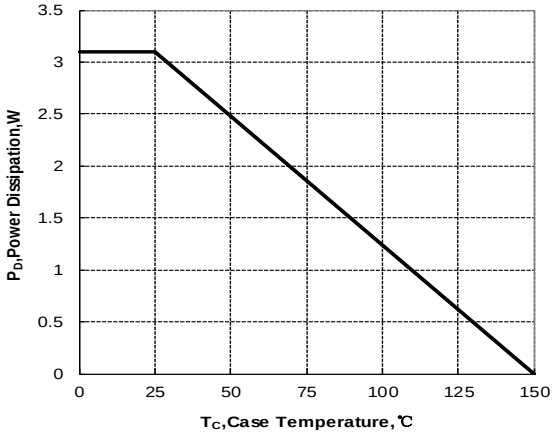



Figure 2. Maximum Power Dissipation vs Case Temperature

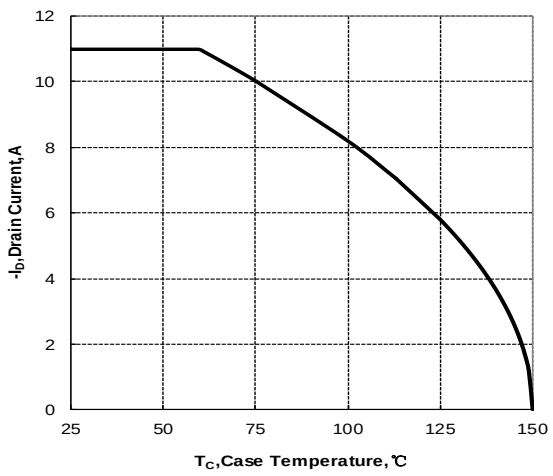



Figure 3. Maximum Continuous Drain Current vs Case Temperature

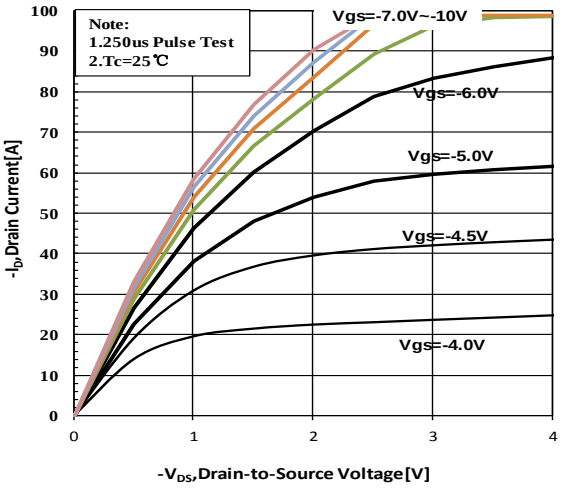



Figure 4. Typical output Characteristics

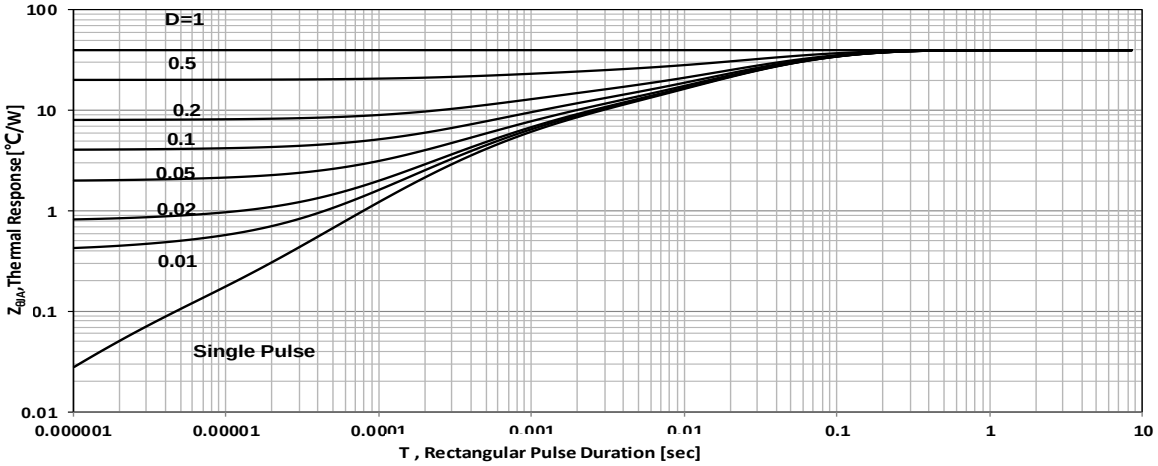



Figure 5 Maximum Effective Thermal Impedance , Junction to Ambient

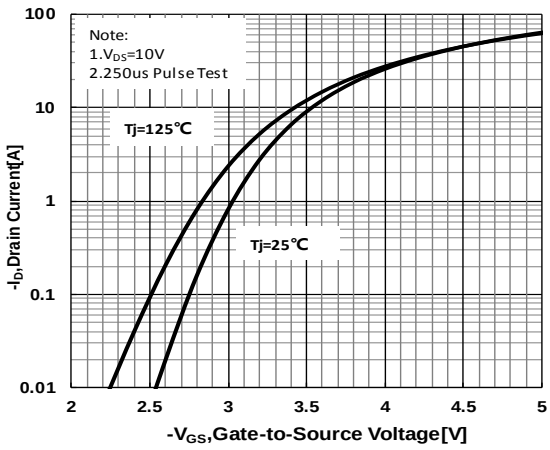



Figure 6 Typical Transfer Characteristics

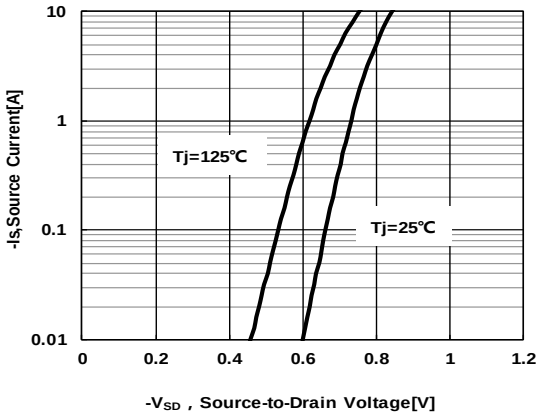



Figure 7 Typical Body Diode Transfer Characteristics

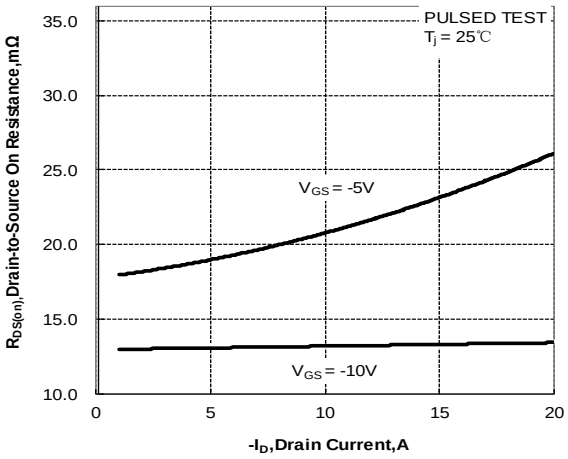



Figure 8. Drain-to-Source On Resistance vs Drain Current

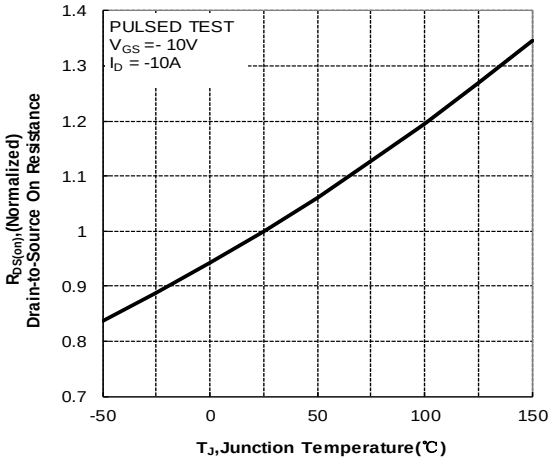



Figure 9. Normalized On Resistance vs Junction Temperature

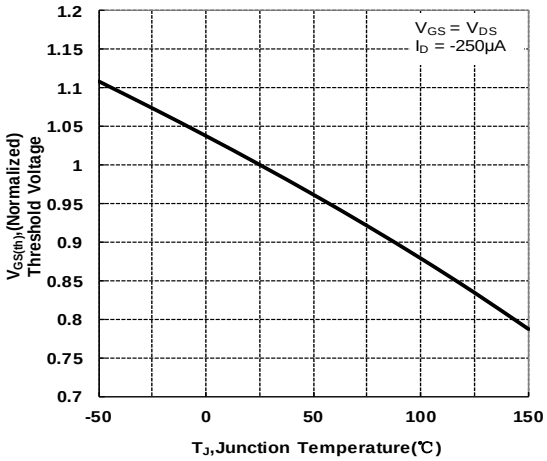



Figure10. Normalized Threshold Voltage vs Junction Temperature

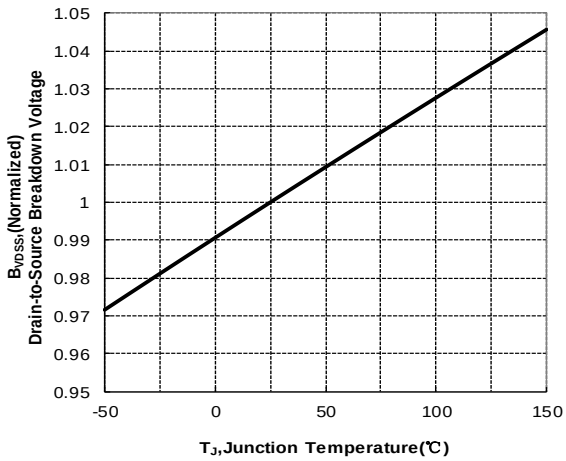



Figure 11. Normalized Breakdown Voltage vs Junction Temperature

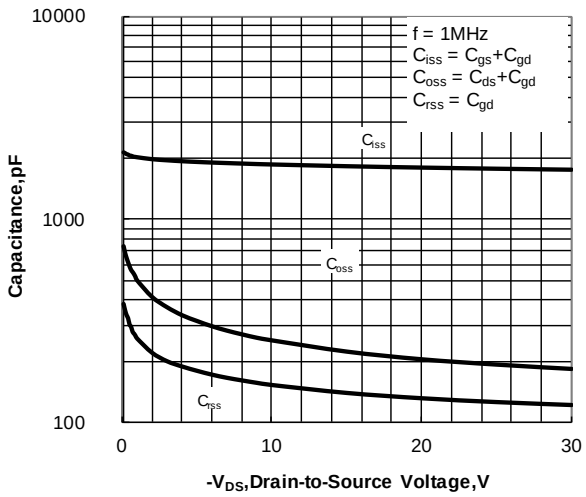



Figure 12. Capacitance Characteristics

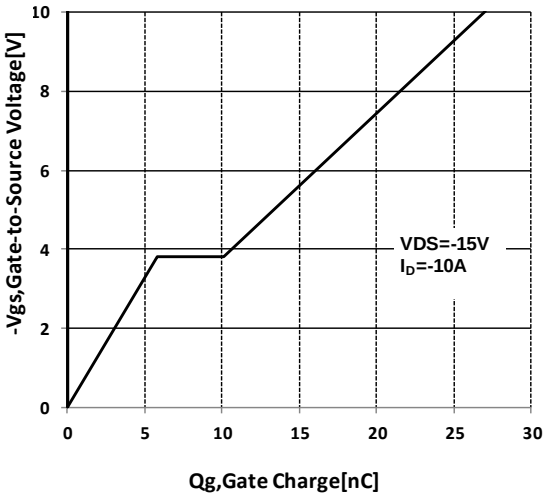



Figure 13 Typical Gate Charge vs Gate to Source Voltage

## Test Circuit and Waveform

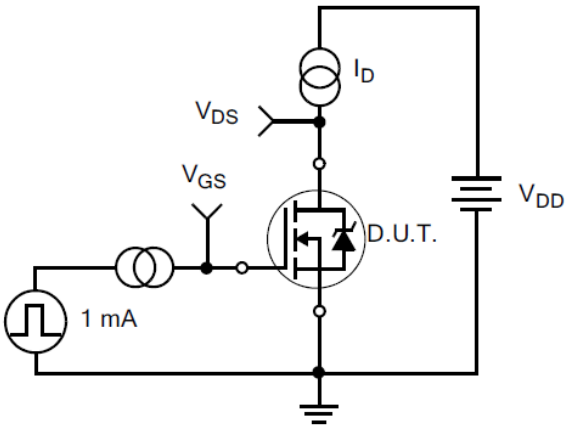



Figure 14. Gate Charge Test Circuit

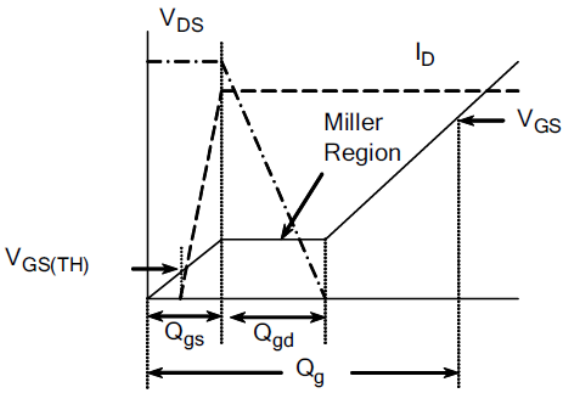



Figure 15. Gate Charge Waveforms

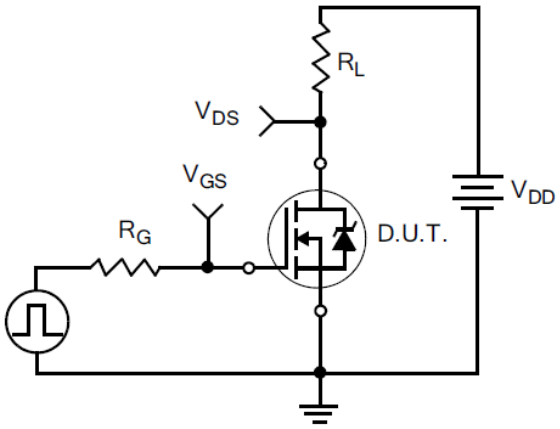



Figure 16. Resistive Switching Test Circuit

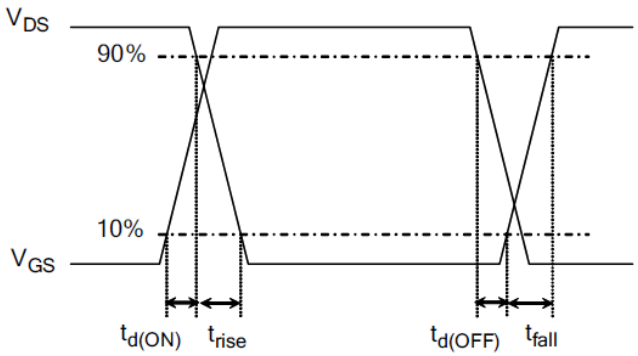



Figure 17. Resistive Switching Waveforms

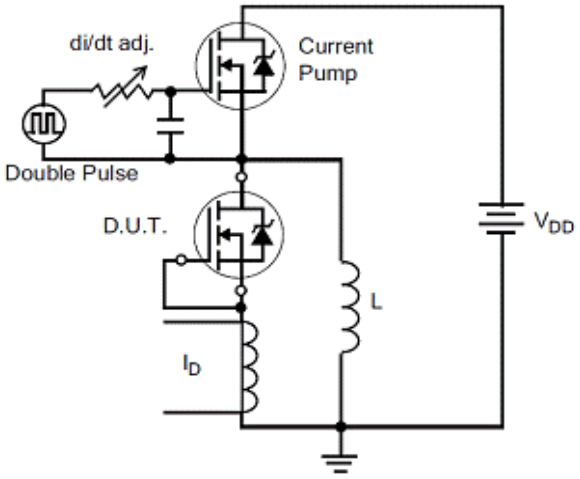



Figure 18. Diode Reverse Recovery Test Circuit

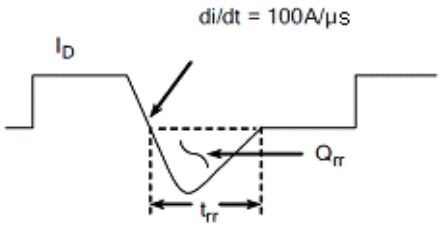



Figure 19. Diode Reverse Recovery Waveform

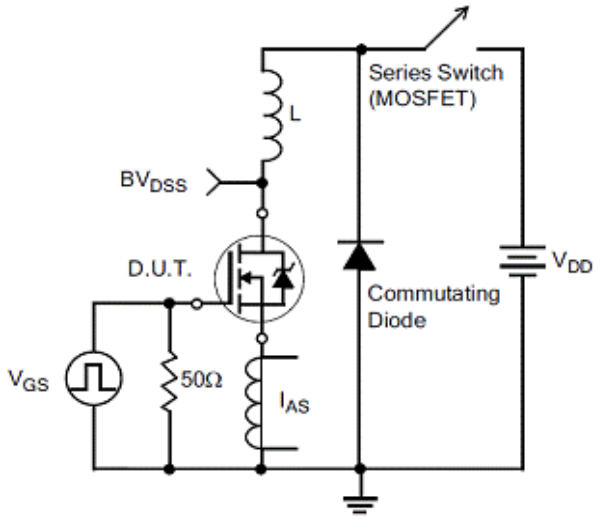



Figure20.Unclamped Inductive Switching Test Circuit

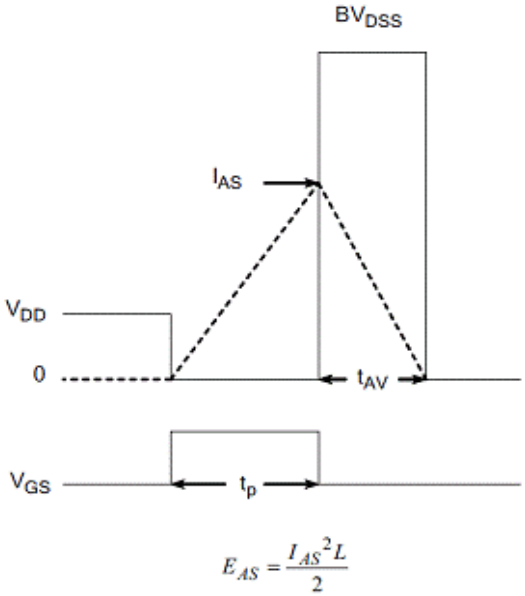
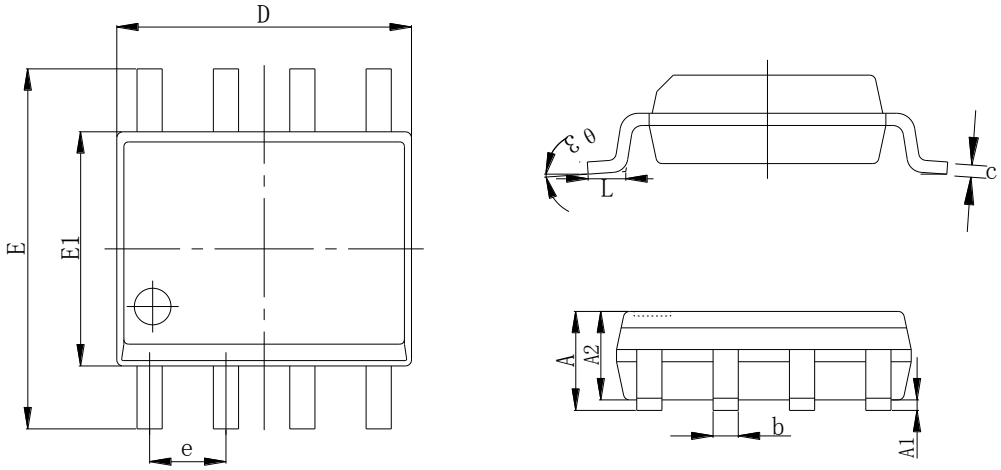



Figure21.Unclamped Inductive Switching Waveform

## Package Information：




| Items | Values(mm) | |
|---|---|---|
| | MIN | MAX |
| A | 1.30 | 1.80 |
| A1 | 0.10 | 0.25 |
| A2 | 1.30 | 1.50 |
| E | 5.80 | 6.20 |
| E1 | 3.80 | 4.00 |
| D | 4.80 | 5.00 |
| L | 0.40 | 0.90 |
| e | 1.27 TYP | |
| b | 0.37 | 0.47 |
| c | 0.20 TYP | |
| θ3 | 0° | 8° |

SOP8 Package

## The name and content of poisonous and harmful material in products

| Part's Name | Hazardous Substance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Pb | Hg | Cd | Cr(VI) | PBB | PBDE | DIBP | DEHP | DBP | BBP |
| Limit | ≤ 0.1% | ≤ 0.1% | ≤ 0.01% | ≤0.1% | ≤0.1% | ≤0.1% | ≤0.1% | ≤0.1% | ≤0.1% | ≤0.1% |
| Lead Frame | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Molding | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Chip | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Wire Bonding | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Solder | × | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Note | ○: Means the hazardous material is under the criterion of 2011/65/EU.<br>×: Means the hazardous material exceeds the criterion of 2011/65/EU.<br>The plumbum element of solder exist in products presently, but within the allowed range of Eurogroup's RoHS. | | | | | | | | | |

## Warnings

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. It is suggested to be used under 80 percent of the maximum ratings of the device.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. VDMOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. This publication is made by Huajing Microelectronics and subject to regular change without notice.

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