

N and P-Channel Enhancement Mode Power MOSFET

Description

The SLP240C03D uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

General Features

- **N-Channel**

$$V_{DS} = 30V, I_D = 8.5A$$

$$R_{DS(ON)} < 21m\Omega @ V_{GS}=10V$$

$$R_{DS(ON)} < 32m\Omega @ V_{GS}=4.5V$$

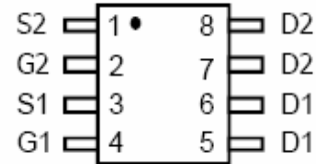
- **P-Channel**

$$V_{DS} = -30V, I_D = -7.0A$$

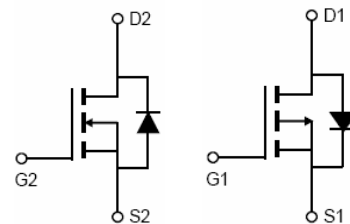
$$R_{DS(ON)} < 45m\Omega @ V_{GS}=-10V$$

$$R_{DS(ON)} < 60m\Omega @ V_{GS}=-4.5V$$

- High power and current handing capability
- Lead free product is acquired
- Surface mount package



Marking and pin assignment



N-channel

P-channel

Schematic diagram

Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

| Parameter | | Symbol | N-Channel | P-Channel | Unit |
|--|------------------|----------------|------------|------------|------------|
| Drain-Source Voltage | | V_{DS} | 30 | -30 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | ± 20 | V |
| Continuous Drain Current | $T_A=25^\circ C$ | I_D | 8.5 | -7.0 | A |
| Pulsed Drain Current ^(Note 1) | | I_{DM} | 34 | -26 | A |
| Maximum Power Dissipation | $T_A=25^\circ C$ | P_D | 2.0 | 2.0 | W |
| Operating Junction and Storage Temperature Range | | T_J, T_{STG} | -55 To 150 | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | | |
|---|-----------------|------|------|--------------|
| Thermal Resistance, Junction-to-Ambient ^(Note 2) | $R_{\theta JA}$ | N-Ch | 63.5 | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Ambient ^(Note 2) | $R_{\theta JA}$ | P-Ch | 63.5 | $^\circ C/W$ |

N-CH Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------------------|------------|-----------------------------|-----|-----|-----------|---------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 30 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=24V, V_{GS}=0V$ | - | - | 50 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |

On Characteristics (Note 3)

| | | | | | | |
|----------------------------------|--------------|-------------------------------|-----|-----|-----|-----------|
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.2 | 1.6 | 2.4 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=8.5A$ | - | 19 | 21 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=5A$ | - | 29 | 32 | $m\Omega$ |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=5.0A$ | 5 | - | - | S |

Dynamic Characteristics (Note 4)

| | | | | | | |
|------------------------------|-----------|--|---|-----|---|----|
| Input Capacitance | C_{iss} | $V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$ | - | 398 | - | PF |
| Output Capacitance | C_{oss} | | - | 67 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 61 | - | PF |

Switching Characteristics (Note 4)

| | | | | | | |
|---------------------|--------------|---|---|------|---|----|
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=15V, R_L=15\Omega$ $V_{GS}=10V, R_{GEN}=6\Omega$ $I_D=1.0A$ | - | 8.0 | - | nS |
| Turn-on Rise Time | t_r | | - | 11.5 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 17 | - | nS |
| Turn-Off Fall Time | t_f | | - | 7.5 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=10V, I_D=1.0A,$ $V_{GS}=10V$ | - | 7.5 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 1.7 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 1.3 | - | nC |

Drain-Source Diode Characteristics

| | | | | | | |
|--------------------------------|----------|---------------------|---|------|-----|---|
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=2A$ | - | 0.75 | 1.0 | V |
|--------------------------------|----------|---------------------|---|------|-----|---|

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Characteristics Curve(N-Channel)

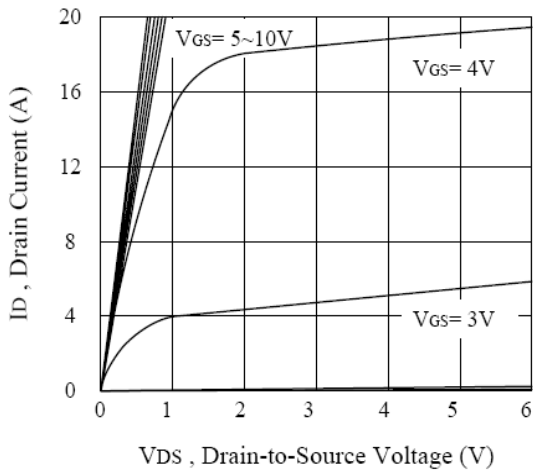


Figure 1. Output Characteristics

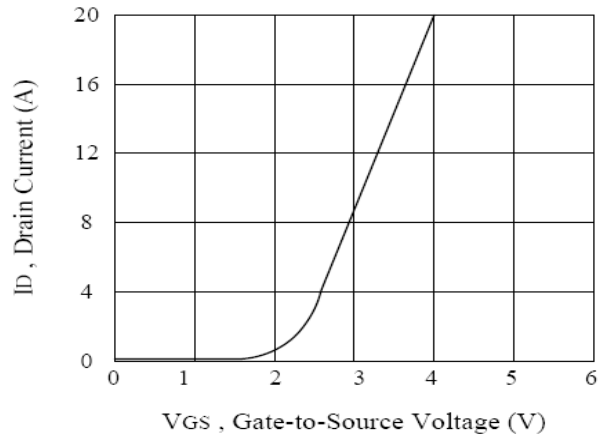


Figure 2. Transfer Characteristics

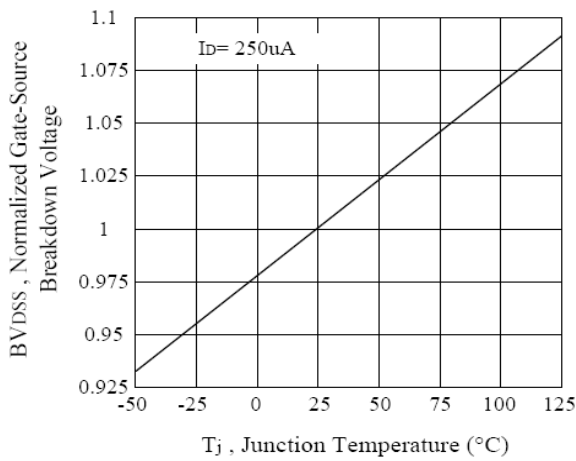


Figure 3. Breakdown Voltage Variation with Temperature

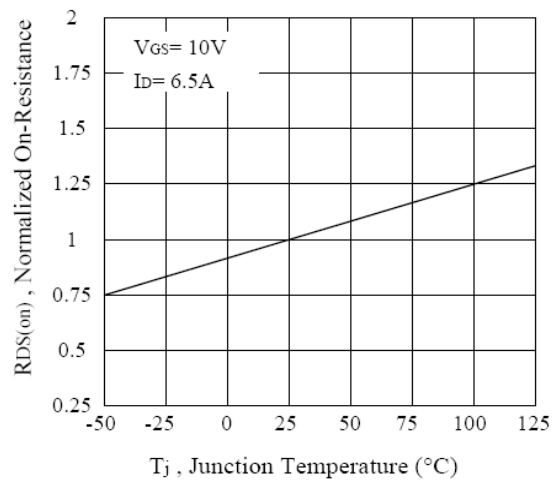


Figure 4. On-Resistance Variation with Temperature

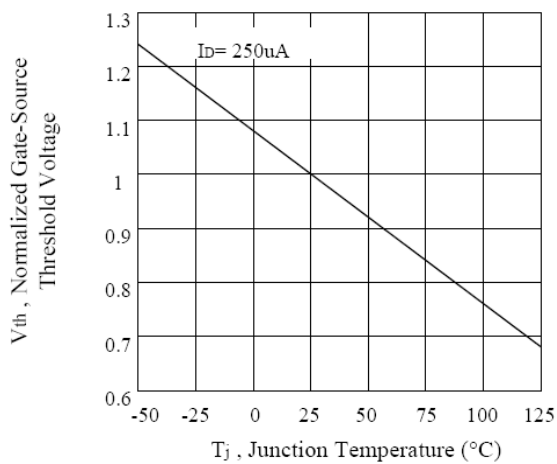
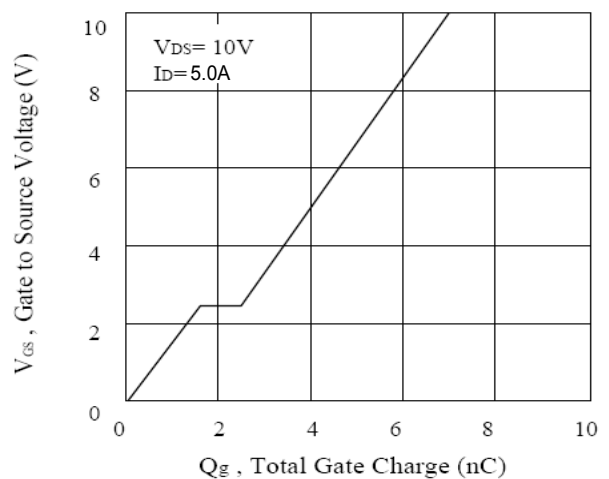
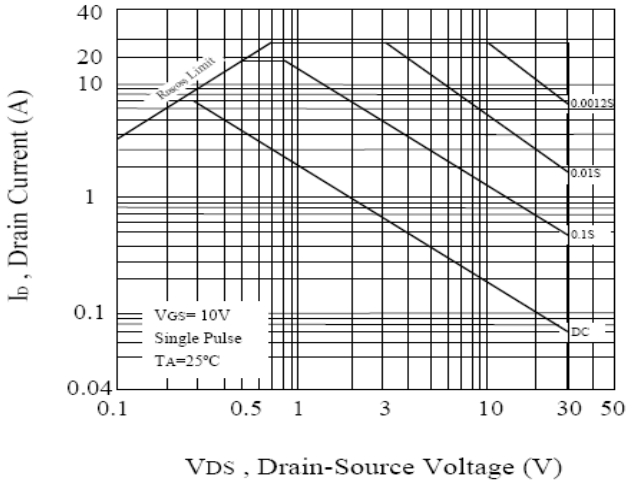


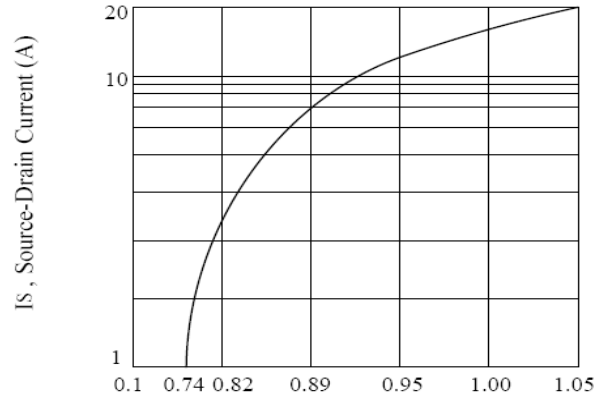
Figure 5. Gate Threshold Variation with Temperature



Characteristics Curve(N-Channel)



VDS, Drain-Source Voltage (V)
 Figure 7. Maximum Safe Operating Area



VSD, Body Diode Forward Voltage (V)
 Figure 8. Body Diode Forward Voltage Variation with Source Current

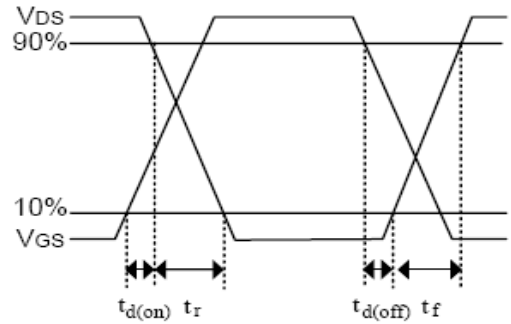
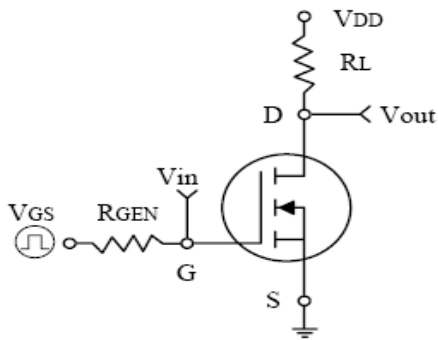


Figure 9. Switching Test Circuit and Switching Waveforms

P-CH Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------------------|------------|-----------------------------|-----|-----|-----------|---------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -30 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-24V, V_{GS}=0V$ | - | - | -50 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |

On Characteristics (Note 3)

| | | | | | | |
|----------------------------------|--------------|--------------------------------|------|------|------|------------|
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -1.0 | -1.3 | -2.0 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=-10V, I_D=-7.0A$ | - | 42 | 45 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-5.0A$ | - | 55 | 60 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=-5V, I_D=-5.0A$ | 10 | - | - | S |

Dynamic Characteristics (Note 4)

| | | | | | | |
|------------------------------|-----------|--|---|-----|---|----|
| Input Capacitance | C_{iss} | $V_{DS}=-15V, V_{GS}=0V,$ $F=1.0\text{MHz}$ | - | 930 | - | PF |
| Output Capacitance | C_{oss} | | - | 121 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 102 | - | PF |

Switching Characteristics (Note 4)

| | | | | | | |
|---------------------|--------------|---|---|------|---|----|
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=-15V, R_L=5.0\Omega$ $V_{GS}=-10V, R_{GEN}=6\Omega$ $I_D=-3.0A$ | - | 9.5 | - | nS |
| Turn-on Rise Time | t_r | | - | 5.4 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 42.5 | - | nS |
| Turn-Off Fall Time | t_f | | - | 13.6 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=-15V, I_D=-3.0A$ $V_{GS}=-10V$ | - | 20 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 4.1 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 2.6 | - | nC |

Drain-Source Diode Characteristics

| | | | | | | |
|--------------------------------|----------|------------------------|---|------|------|---|
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=-2.0A$ | - | 0.75 | -1.0 | V |
|--------------------------------|----------|------------------------|---|------|------|---|

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Characteristics Curve(P-Channel)

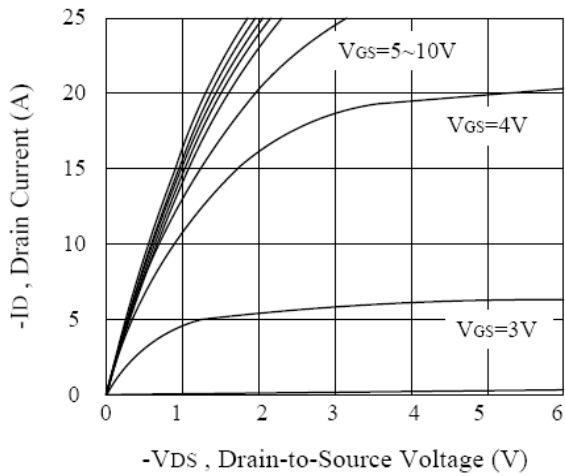


Figure 11. Output Characteristics

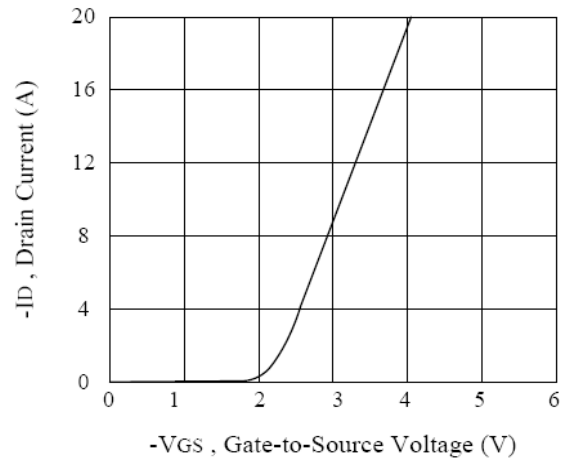


Figure 12. Transfer Characteristics

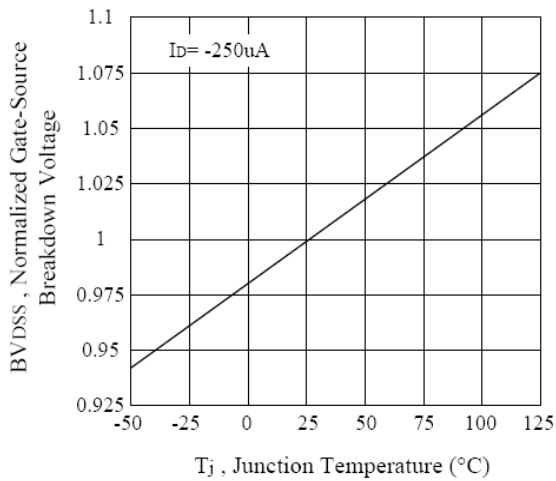


Figure 13. Breakdown Voltage Variation with

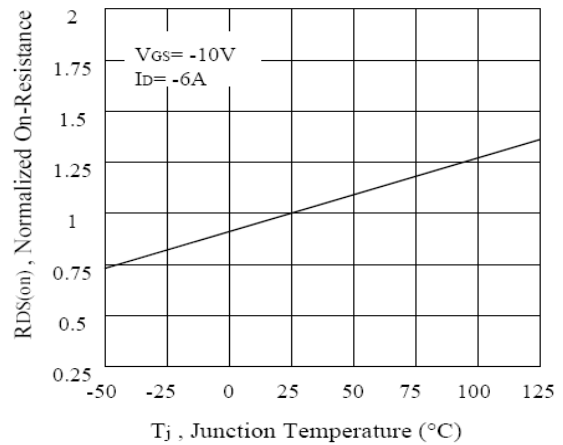


Figure 13. On-Resistance Variation with Temperature

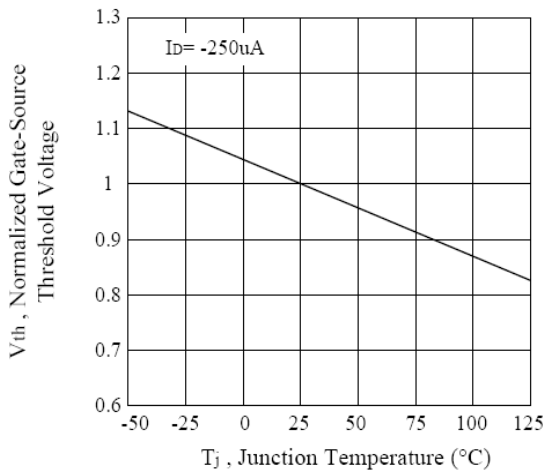


Figure 15. Gate Threshold Variation with Temperature

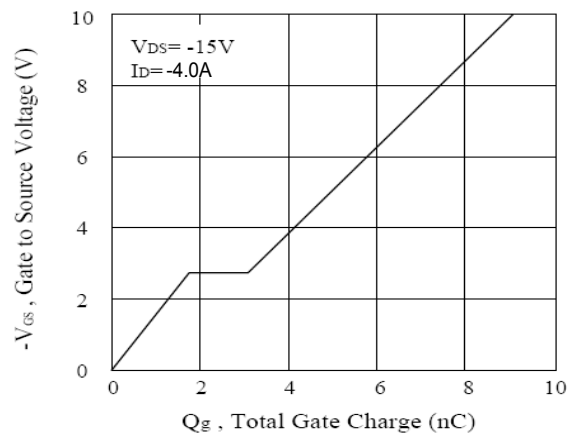
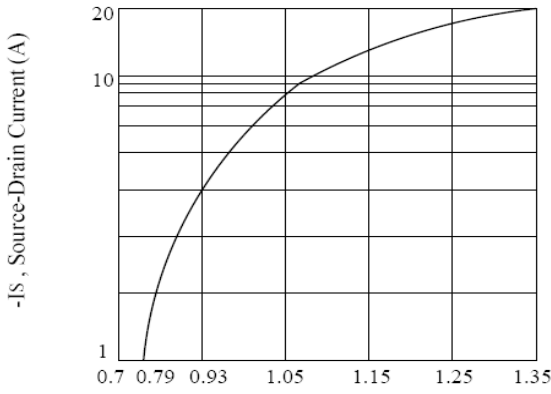
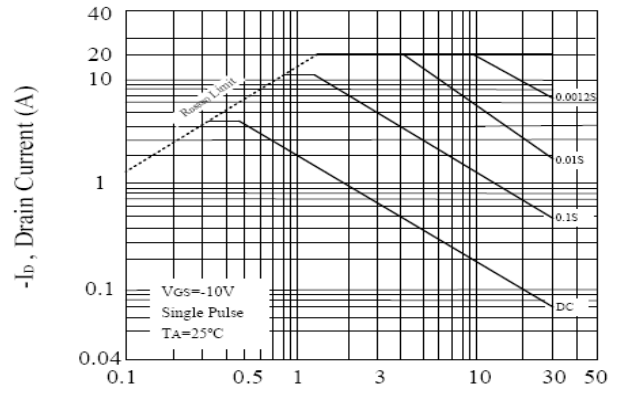


Figure 15. Gate Charge

Characteristics Curve(P-Channel)



-VSD , Body Diode Forward Voltage (V)
Figure 16 Body Diode Forward Voltage Variation with Source Current



-VDS , Drain-Source Voltage (V)
Figure 17. Maximum Safe Operating Area

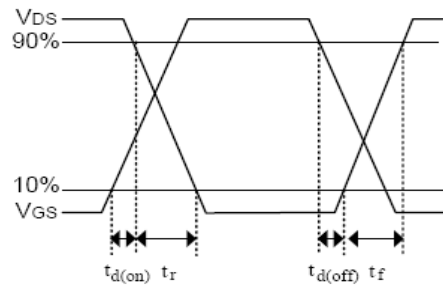
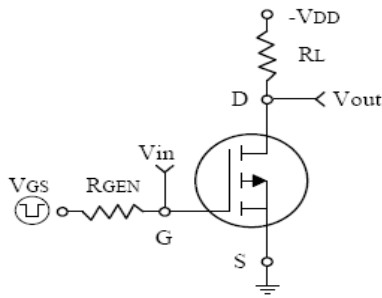
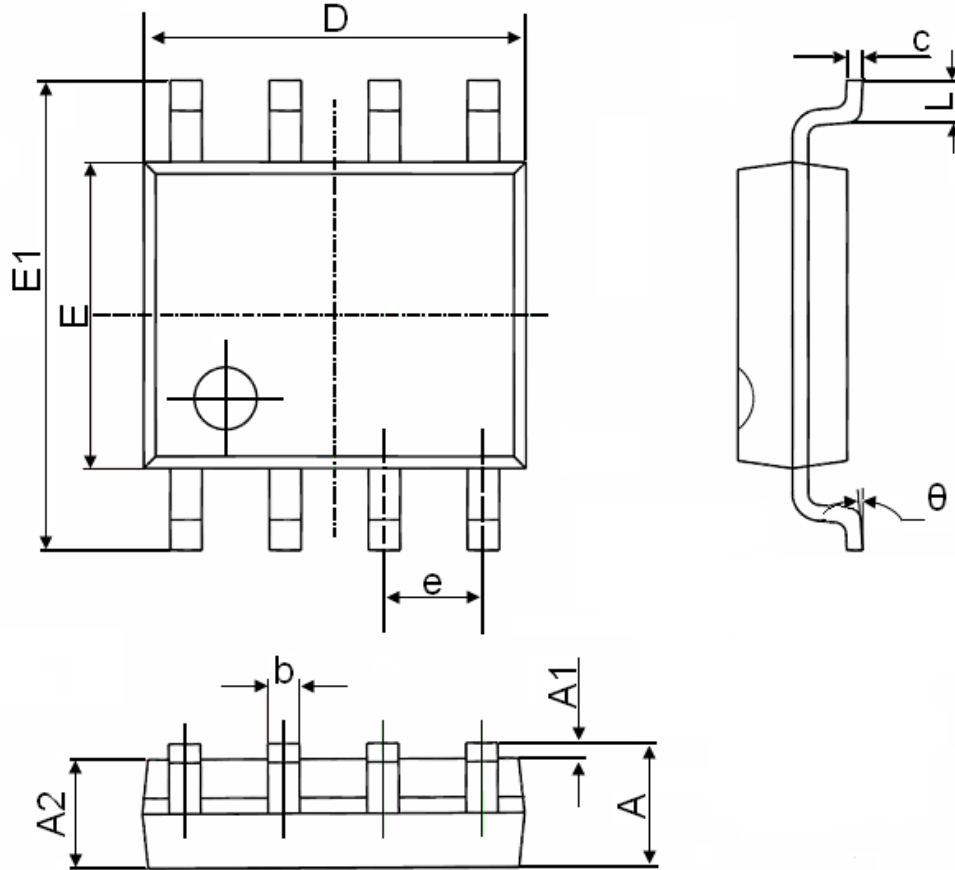


Figure 18 Switching Test Circuit and Switching Waveforms

SOP-8 Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

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[MCQ7328-TP](#) [SSM3J143TU,LXHF](#) [DMN12M3UCA6-7](#) [PJMF280N65E1_T0_00201](#) [PJMF380N65E1_T0_00201](#)
[PJMF280N60E1_T0_00201](#) [PJMF600N65E1_T0_00201](#) [PJMF900N65E1_T0_00201](#)