

- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

### Product Summary

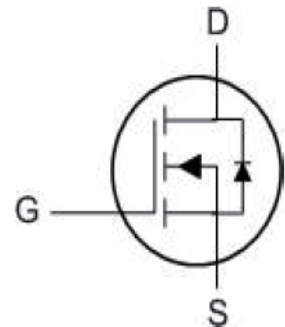
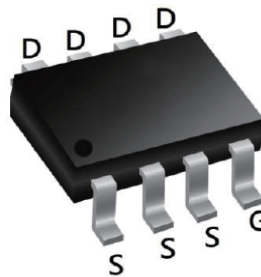
| BVDSS | RDS(on) | ID |
|-------|---------|----|
| 20V   | 13mΩ    | 8A |

### Description

The 2010S is the high cell density trenched N-ch MOSFETs, which provide excellent RDS(on) and gate charge for most of the synchronous buck converter applications.

The 2010S meet the RoHS and Green Product, requirement 100% EAS guaranteed with full function reliability approved.

### SOP8 Pin Configuration



### Absolute Maximum Ratings

| Symbol                            | Parameter                                 |                       | Max.       | Units |
|-----------------------------------|---|-----------------------|------------|-------|
| V <sub>DSS</sub>                  | Drain-Source Voltage                      |                       | 20         | V     |
| V <sub>GSS</sub>                  | Gate-Source Voltage                       |                       | ±12        | V     |
| I <sub>D</sub>                    | Continuous Drain Current                  | T <sub>C</sub> = 25°C | 8          | A     |
| I <sub>DM</sub>                   | Pulsed Drain Current <small>note1</small> |                       | 28         | A     |
| P <sub>D</sub>                    | Power Dissipation                         | T <sub>C</sub> = 25°C | 2.25       | W     |
| T <sub>J</sub> , T <sub>STG</sub> | Operating and Storage Temperature Range   |                       | -55 To 150 | °C    |

### Thermal Data

| Symbol           | Parameter  | Max. | Unit |
|------------------|--|------|------|
| R <sub>θJA</sub> | Thermal Resistance Junction-ambient <sub>2</sub> | 80   | °C/W |

**Electrical Characteristics ( $T_J = 25^\circ\text{C}$  unless otherwise specified)**

| Symbol                                    | Parameter                                     | Test Condition   | Min. | Typ. | Max.      | Units      |
|---|---|--|------|------|-----------|------------|
| <b>Static Characteristics</b>             |   |  |      |      |           |            |
| $BV_{DSS}$                                | Drain-Source Breakdown Voltage                | $V_{GS} = 0V, I_D = 250\mu A$                              | 20   | -    | -         | V          |
| $I_{GSS}$                                 | Gate Leakage Current                          | $V_{GS} = \pm 12V, V_{DS} = 0V$                            | -    | -    | $\pm 100$ | nA         |
| $I_{DSS}$                                 | Drain Cut-off Current                         | $V_{DS} = 20V, V_{GS} = 0V$                                | -    | -    | 1         | $\mu A$    |
| $V_{GS(th)}$                              | Gate Threshold Voltage                        | $V_{GS} = V_{DS}, I_D = 250\mu A$                          | 0.45 | 0.7  | 1         | V          |
| $R_{DS(on)}$                              | Drain-Source On-State Resistance <sup>3</sup> | $V_{GS} = 4.5V, I_D = 5A$                                  | -    | 13   | 20        | m $\Omega$ |
|   |   | $V_{GS} = 2.5V, I_D = 4.7A$                                | -    | 18   | 30        |            |
|   |   | $V_{GS} = 1.8V, I_D = 4.3A$                                | -    | 28   | 57        |            |
| <b>Dynamic Characteristics:</b>           |   |  |      |      |           |            |
| $C_{iss}$                                 | Input Capacitance                             | $V_{GS} = 0V, V_{DS} = 10V,$<br>$f = 1MHz$                 | -    | 700  | -         | pF         |
| $C_{oss}$                                 | Output Capacitance                            |  | -    | 120  | -         |            |
| $C_{riss}$                                | Reverse Transfer Capacitance                  |  | -    | 105  | -         |            |
| <b>Switching Characteristics:</b>         |   |  |      |      |           |            |
| $Q_g$                                     | Total Gate Charge                             | $V_{GS} = 4.5V, V_{DS} = 10V,$<br>$I_D = 5A$               | -    | 10.5 | -         | nC         |
| $Q_{gs}$                                  | Gate-Source Charge                            |  | -    | 2    | -         |            |
| $Q_{gd}$                                  | Gate-Drain Charge                             |  | -    | 2.5  | -         |            |
| $t_{d(on)}$                               | Turn-On Time                                  | $V_{GS} = 5V, V_{DD} = 10V,$<br>$I_D = 5A, R_G = 3\Omega,$ | -    | 10   | -         | ns         |
| $t_r$                                     | Rise Time                                     |  | -    | 20   | -         |            |
| $t_{d(off)}$                              | Turn-Off Time                                 |  | -    | 32   | -         |            |
| $t_f$                                     | Fall Time                                     |  | -    | 12   | -         |            |
| <b>Source-Drain Diode Characteristics</b> |   |  |      |      |           |            |
| $V_{SD}$                                  | Body Diode Voltage <sup>3</sup>               | $I_S = 4A, V_{GS} = 0V$                                    | -    | -    | 1.2       | V          |
| $I_S$                                     | Continuous Source Current                     |  | -    | -    | 8         | A          |

**Notes:**

- 1.Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ\text{C}$ .
- 2.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper, The value in any given application depends on the user's specific board design.
- 3.Pulse Test: Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- 4.This value is guaranteed by design hence it is not included in the production test.

Typical Performance Characteristics

Figure 1: Output Characteristics

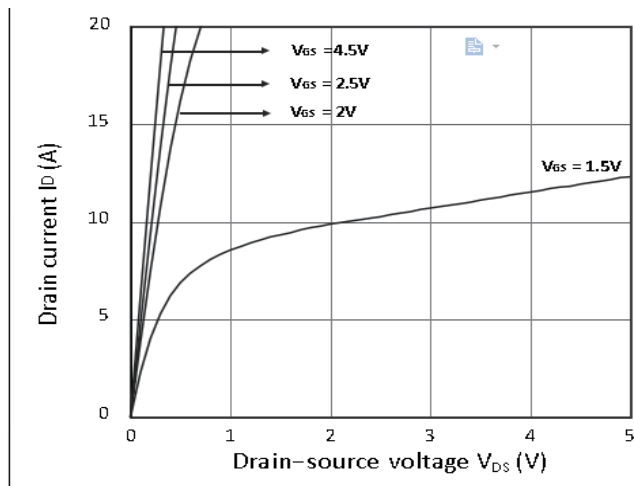


Figure 2: Typical Transfer Characteristics

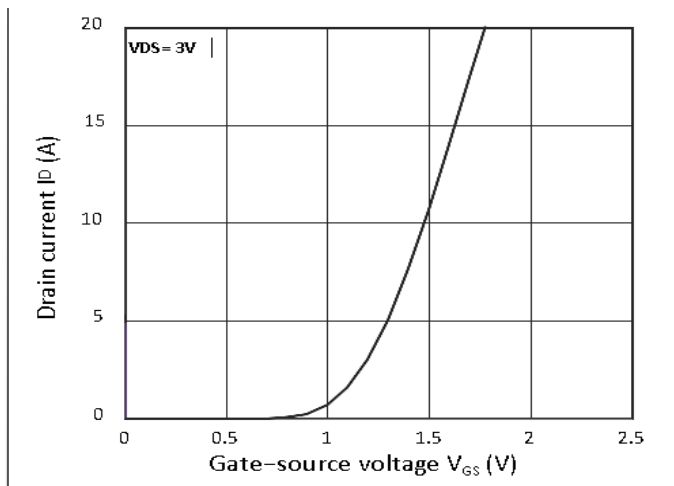


Figure 3: Forward Characteristics of Reverse

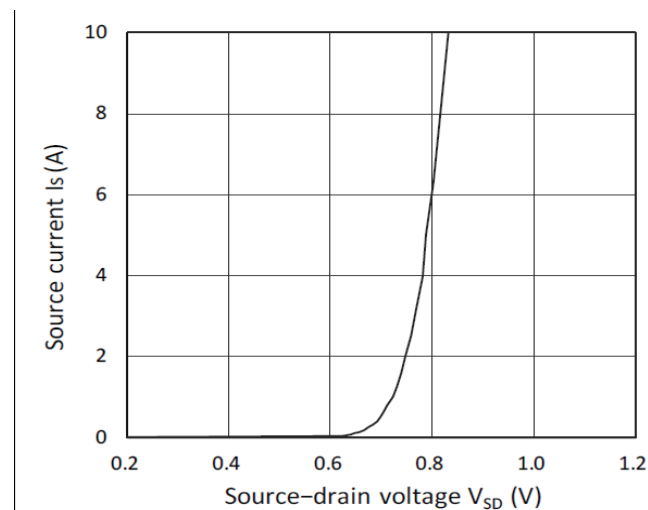


Figure 4: RDS(ON) vs. VGS

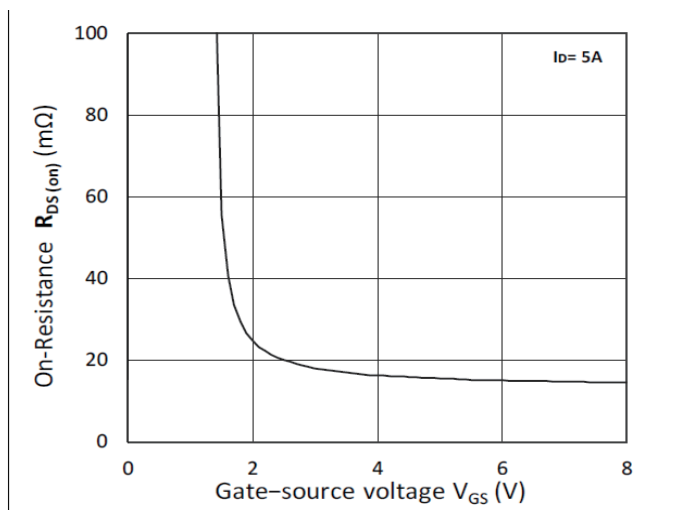


Figure 5: RDS(ON) vs. ID

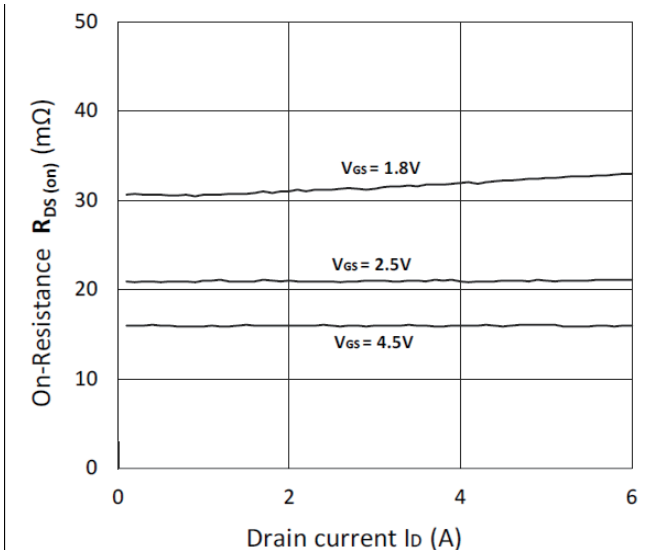
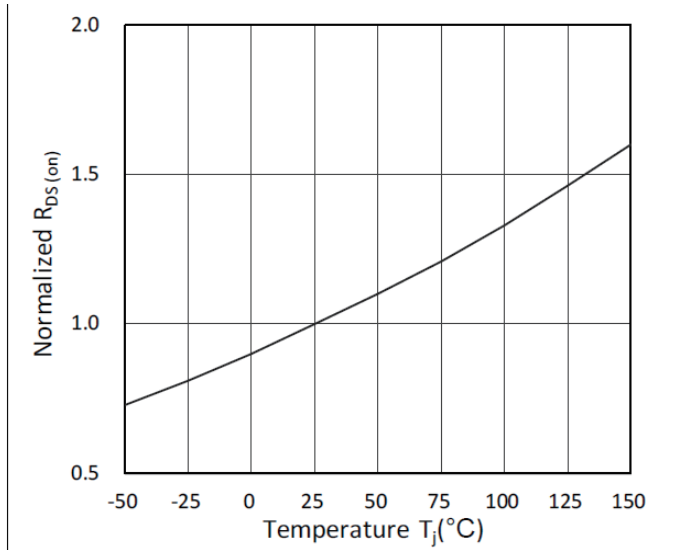


Figure 6: Normalized RDS(on) vs. Temperature



Typical Performance Characteristics

Figure 7: Capacitance Characteristics

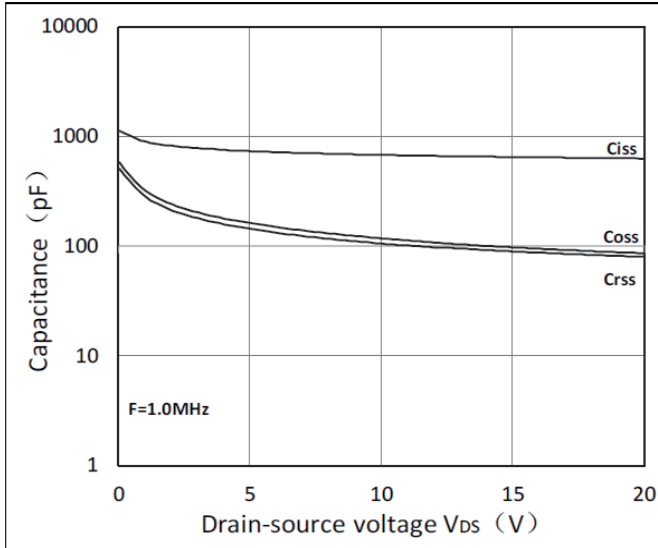
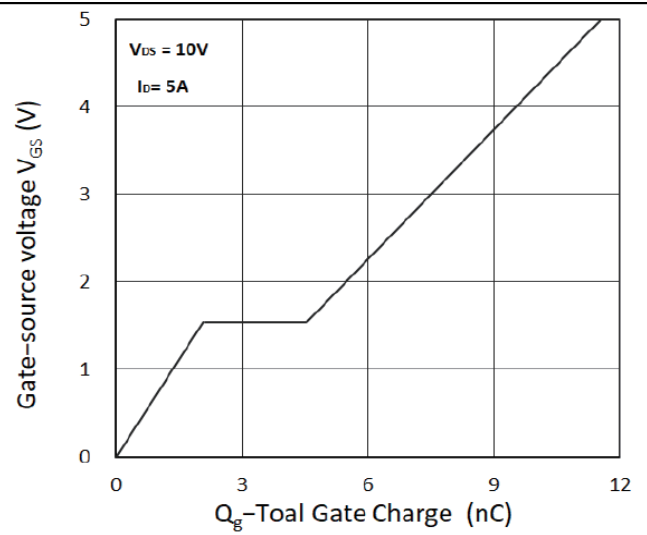
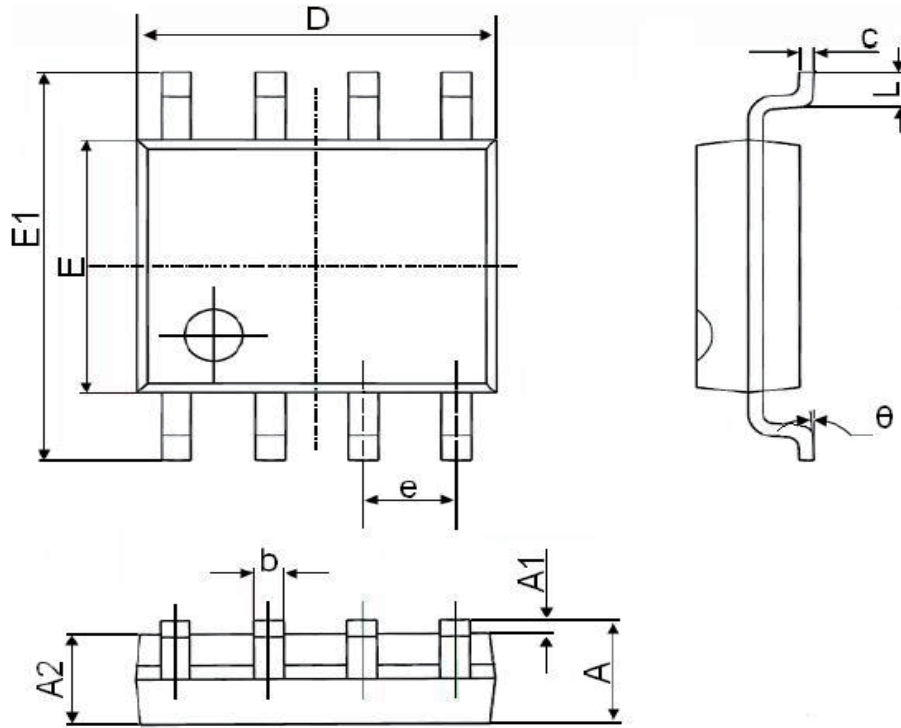


Figure 8: Gate Charge Characteristics



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 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |

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