

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

Product Summary



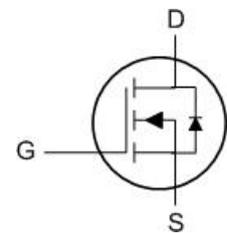
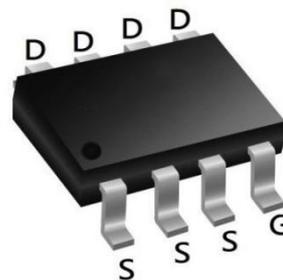
| BVDSS | RDSON | ID |
|-------|--------|-----|
| 20V | 4.8 mΩ | 20A |

Description

The XR2020S is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XR2020S meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

SOP8 Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---------------------------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | 20 | V |
| V _{GS} | Gate-Source Voltage | ±12 | V |
| I _D @T _C =25°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 20 | A |
| I _D @T _C =100°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 11 | A |
| I _{DM} | Pulsed Drain Current ² | 80 | A |
| EAS | Single Pulse Avalanche Energy ³ | 48 | mJ |
| I _{AS} | Avalanche Current | 11 | A |
| P _D @T _C =25°C | Total Power Dissipation ⁴ | 38 | W |
| T _{STG} | Storage Temperature Range | -55 to 150 | °C |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|------------------|---|------|------|------|
| R _{θJC} | Thermal Resistance Junction-Case ¹ | --- | 4.2 | °C/W |

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

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|------|------|-----------|------------|
| Off Characteristic | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 20 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=20V, V_{GS}=0V,$ | - | - | 1.0 | μA |
| I_{GSS} | Gate to Body Leakage Current | $V_{DS}=0V, V_{GS}=\pm 12V$ | - | - | ± 100 | nA |
| On Characteristics | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 0.4 | 0.7 | 1.0 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance <small>note3</small> | $V_{GS}=4.5V, I_D=10A$ | - | 4.8 | 6.5 | m Ω |
| | | $V_{GS}=2.5V, I_D=5A$ | - | 6.8 | 10 | |
| Dynamic Characteristics | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS}=10V, V_{GS}=0V,$ $f=1.0MHz$ | - | 1832 | - | pF |
| C_{oss} | Output Capacitance | | - | 289 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 271 | - | pF |
| Q_g | Total Gate Charge | $V_{DS}=10V, I_D=10A,$ $V_{GS}=4.5V$ | - | 23 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 4.5 | - | nC |
| Q_{gd} | Gate-Drain("Miller") Charge | | - | 7.3 | - | nC |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}=10V,$ $I_D=10A, R_{GEN}=3\Omega,$ $V_{GS}=4.5V$ | - | 15 | - | ns |
| t_r | Turn-on Rise Time | | - | 37 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 52 | - | ns |
| t_f | Turn-off Fall Time | | - | 21 | - | ns |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I_S | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 20 | A |
| I_{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 80 | A |
| V_{SD} | Drain to Source Diode Forward Voltage | $V_{GS}=0V, I_S=10A$ | - | - | 1.2 | V |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=25A, dI/dt=100A/\mu s$ | - | 25 | - | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | | - | 21 | - | nC |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: $T_J=25^\circ\text{C}$, $V_{DD}=10V$, $V_G=4.5V$, $L=0.5mH$, $R_G=25\Omega$, $I_{AS}=4.8A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

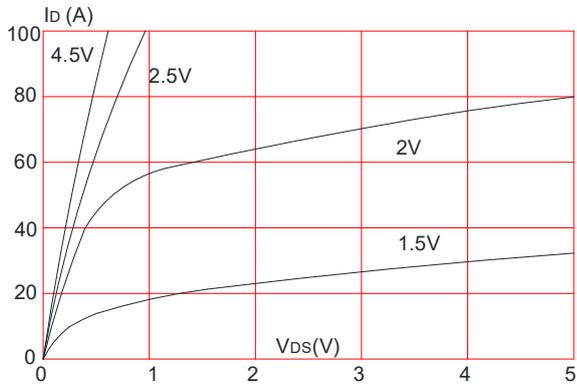


Figure 2: Typical Transfer Characteristics

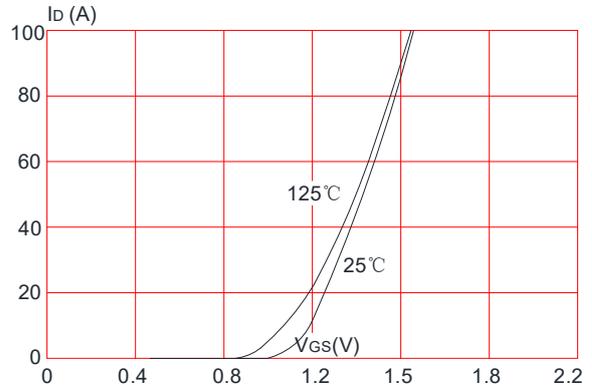


Figure 3: On-resistance vs. Drain Current

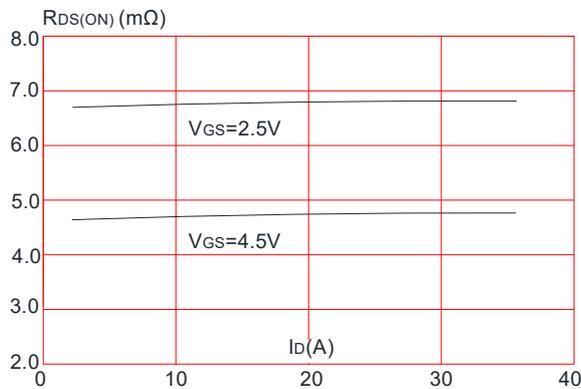


Figure 4: Body Diode Characteristics

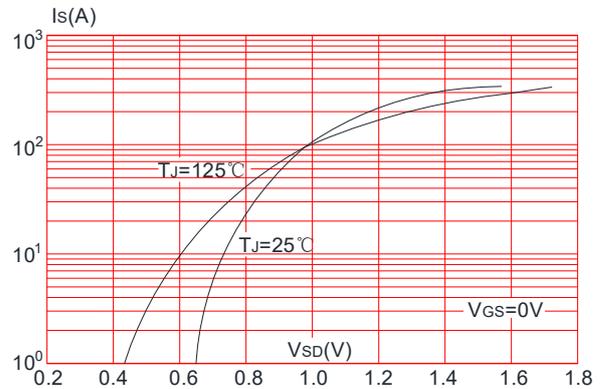


Figure 5: Gate Charge Characteristics

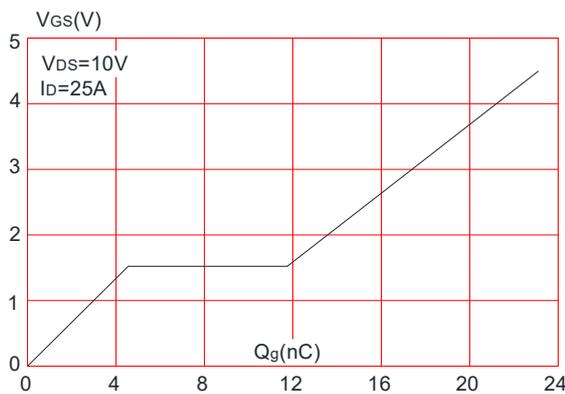
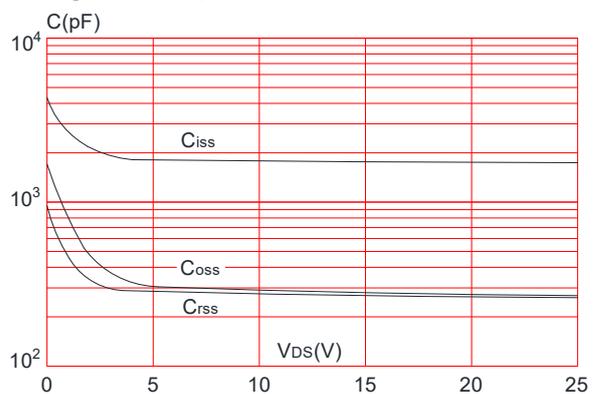


Figure 6: Capacitance Characteristics



N-Ch 20V Fast Switching MOSFETs

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

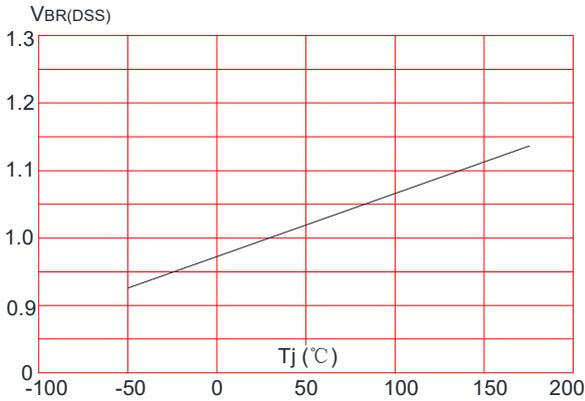


Figure 8: Normalized on Resistance vs. Junction Temperature

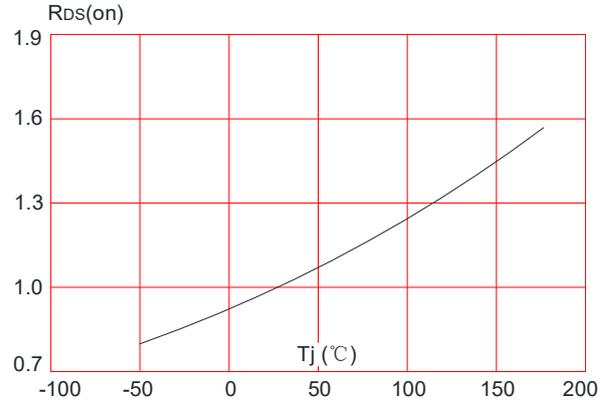


Figure 9: Maximum Safe Operating Area

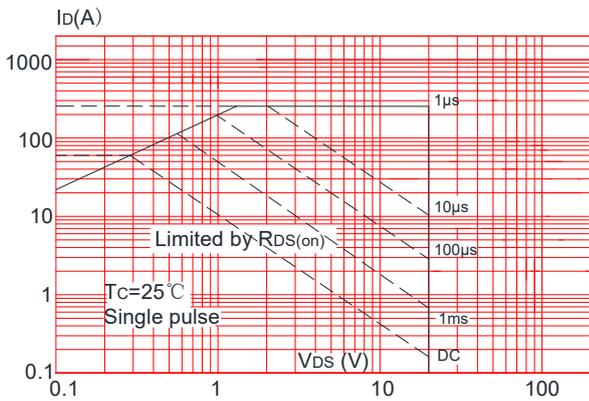


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

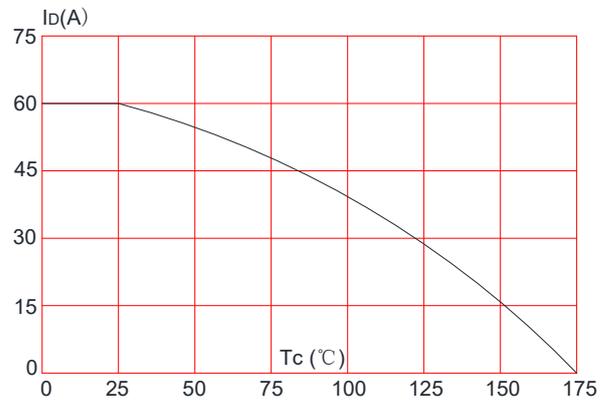
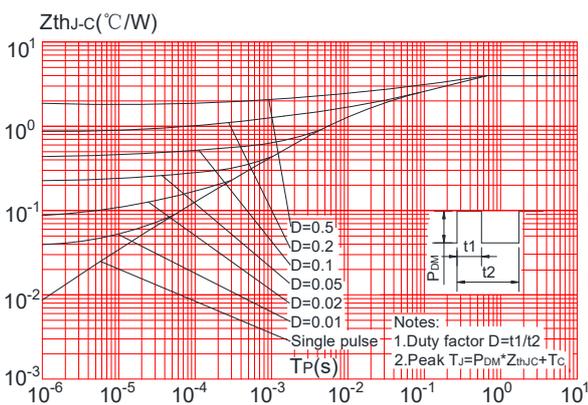
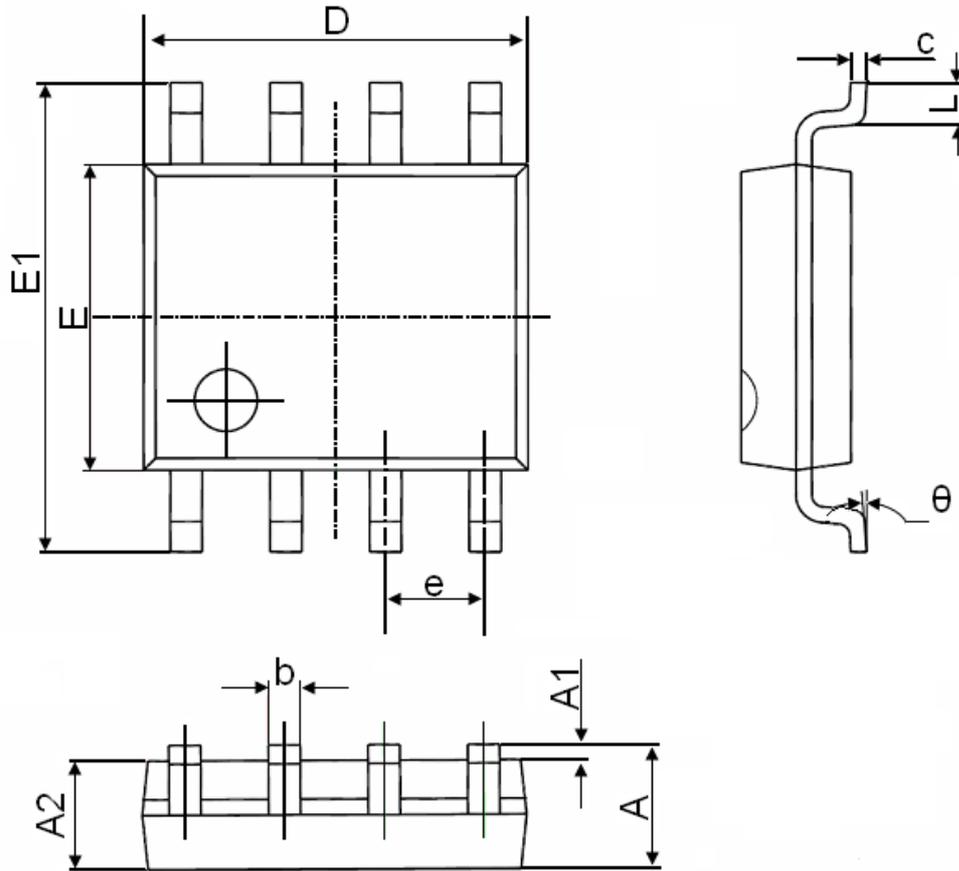


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Package Mechanical Data-SOP-8



| 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° |