



Features

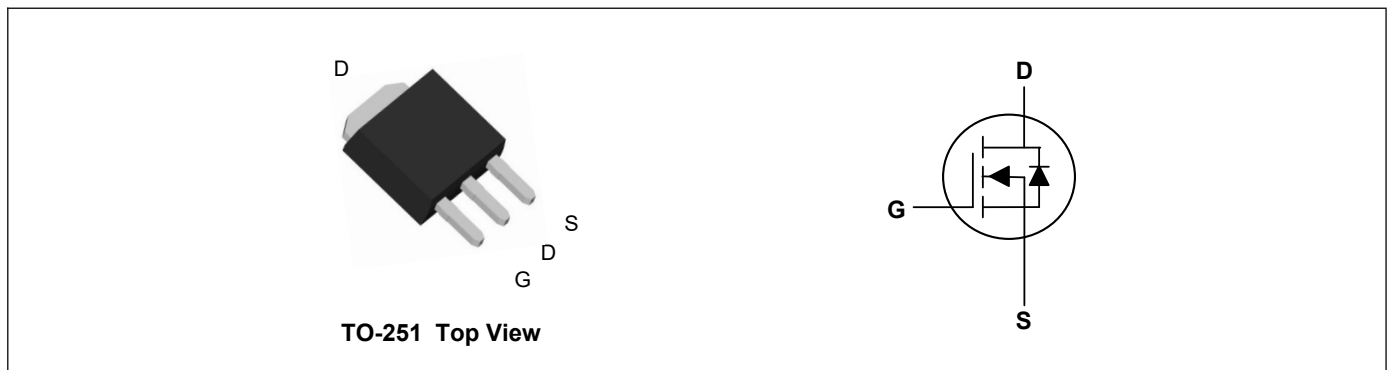
- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

Product Summary

| | | |
|----------------------------------|----|------------|
| V_{DS} | 30 | V |
| I_D | 30 | A |
| $R_{DS(ON)}$ (at $V_{GS}=10V$) | 18 | m Ω |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$) | 30 | m Ω |

Applications

- High Frequency Point-of-Load, Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch



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

| Parameter | Symbol | Rating | Units |
|--|-------------------------------|------------|------------------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current, $V_{GS} @ 10V^1$ | $I_D @ T_C=25^\circ\text{C}$ | 30 | A |
| Continuous Drain Current, $V_{GS} @ 10V^1$ | $I_D @ T_C=100^\circ\text{C}$ | 18 | A |
| Continuous Drain Current, $V_{GS} @ 10V^1$ | $I_D @ T_A=25^\circ\text{C}$ | 8.2 | A |
| Continuous Drain Current, $V_{GS} @ 10V^1$ | $I_D @ T_A=70^\circ\text{C}$ | 6.5 | A |
| Pulsed Drain Current ² | I_{DM} | 60 | A |
| Single Pulse Avalanche Energy ³ | EAS | 22 | mJ |
| Avalanche Current | I_{AS} | 21 | A |
| Total Power Dissipation ⁴ | $P_D @ T_C=25^\circ\text{C}$ | 25 | W |
| Total Power Dissipation ⁴ | $P_D @ T_A=25^\circ\text{C}$ | 2 | W |
| Storage Temperature Range | T_{STG} | -55 to 150 | $^\circ\text{C}$ |
| Operating Junction Temperature Range | T_J | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Unit |
|---|-----------------|-----|-----|---------------------------|
| Thermal Resistance Junction-Ambient ¹ (Steady State) | $R_{\theta JA}$ | --- | 62 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance Junction-Case ¹ | $R_{\theta JC}$ | --- | 5 | $^\circ\text{C}/\text{W}$ |

Electrical Characteristics (T_J=25°C, unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|--|-------------------------------------|--|-----|-------|------|-------|
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V, I _D =250uA | 30 | --- | --- | V |
| BV _{DSS} Temperature Coefficient | ΔBV _{DSS} /ΔT _J | Reference to 25°C, I _D =1mA | --- | 0.023 | --- | V/°C |
| Static Drain-Source On-Resistance ² | R _{DS(ON)} | V _{GS} =10V, I _D =10A | --- | --- | 18 | mΩ |
| | | V _{GS} =4.5V, I _D =5A | --- | --- | 30 | mΩ |
| Gate Threshold Voltage | V _{GS(th)} | V _{GS} =V _{DS} , I _D =250uA | 1.0 | --- | 2.5 | V |
| V _{GS(th)} Temperature Coefficient | ΔV _{GS(th)} | | --- | -5.2 | --- | mV/°C |
| Drain-Source Leakage Current | I _{DSS} | V _{DS} =24V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =24V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| Gate-Source Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| Forward Transconductance | g _{fs} | V _{DS} =5V, I _D =10A | --- | 10 | --- | S |
| Gate Resistance | R _g | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2.5 | 5 | Ω |
| Total Gate Charge | Q _g | V _{DS} =20V, V _{GS} =4.5V, I _D =12A | --- | 7.2 | --- | nC |
| Gate-Source Charge | Q _{gs} | | --- | 1.4 | --- | |
| Gate-Drain Charge | Q _{gd} | | --- | 2.2 | --- | |
| Turn-On Delay Time | T _{d(on)} | V _{DD} =12V, V _{GS} =10V, R _G =3.3Ω, I _D =5A | --- | 4.1 | --- | ns |
| Rise Time | T _r | | --- | 9.8 | --- | |
| Turn-Off Delay Time | T _{d(off)} | | --- | 15.5 | --- | |
| Fall Time | T _f | | --- | 6 | --- | |
| Input Capacitance | C _{iss} | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 572 | --- | pF |
| Output Capacitance | C _{oss} | | --- | 80 | --- | |
| Reverse Transfer Capacitance | C _{rss} | | --- | 65 | --- | |

Drain-Source Diode Characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|--|-----------------|---|-----|-----|-----|------|
| Continuous Source Current ^{1,5} | I _S | V _G =V _D =0V, Force Current | --- | --- | 30 | A |
| Pulsed Source Current ^{2,5} | I _{SM} | | --- | --- | 60 | A |
| Diode Forward Voltage ² | V _{SD} | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1.2 | V |

Note:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
3. The EAS data shows Max. rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

Typical Characteristics

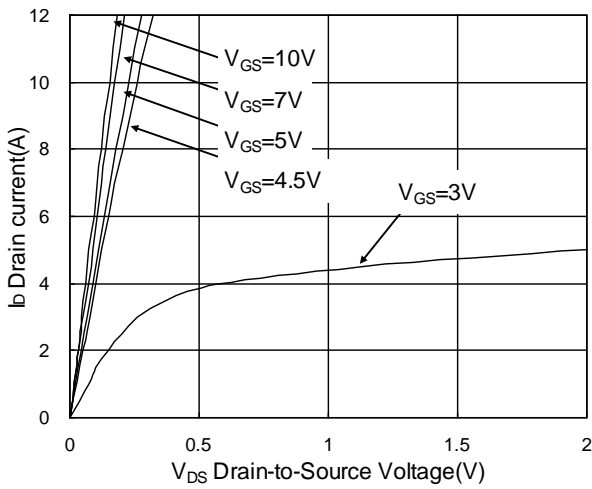


Fig.1 Typical Output Characteristics

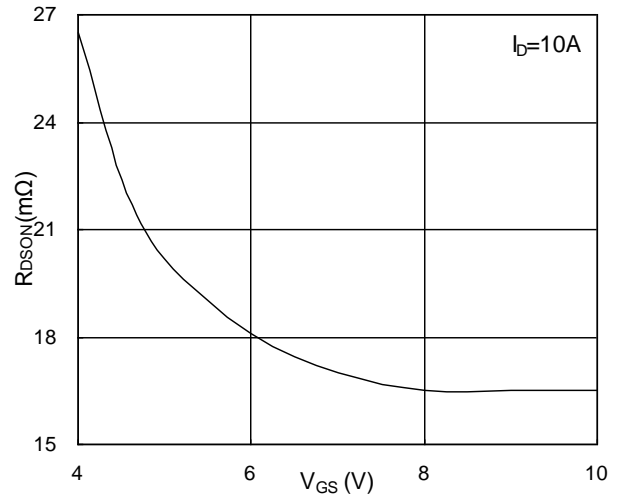


Fig.2 On-Resistance v.s Gate-Source

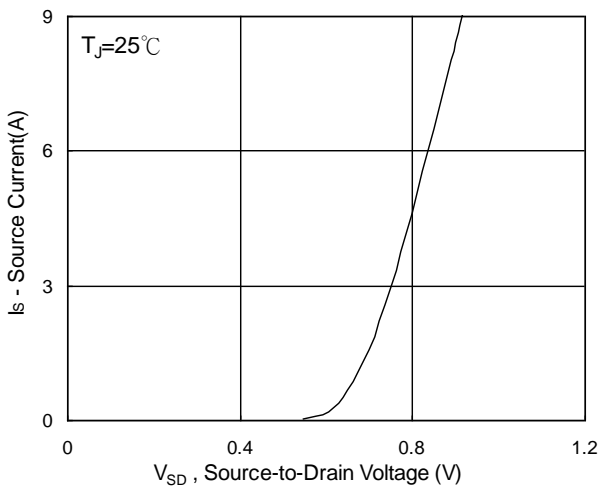


Fig.3 Forward Characteristics Of Reverse

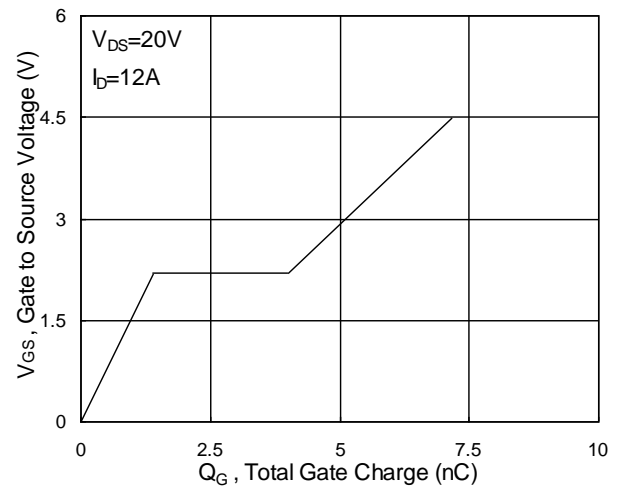


Fig.4 Gate-Charge Characteristics

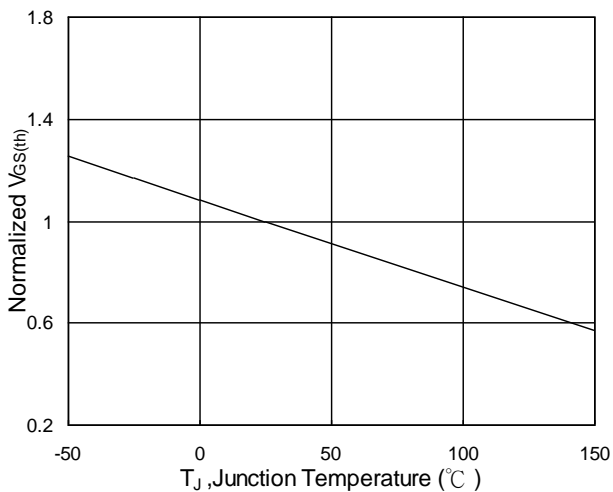


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

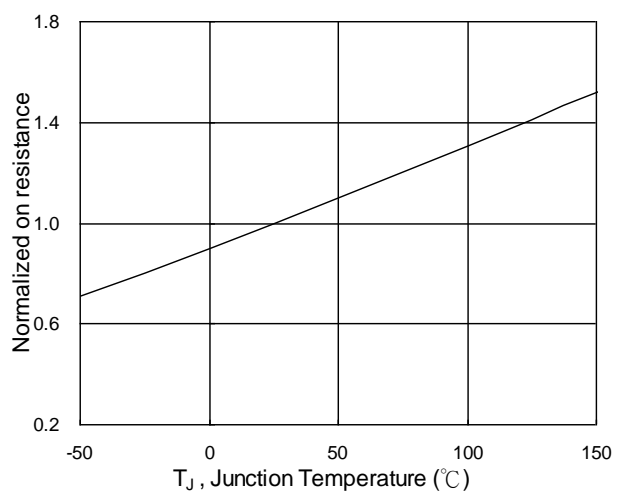


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

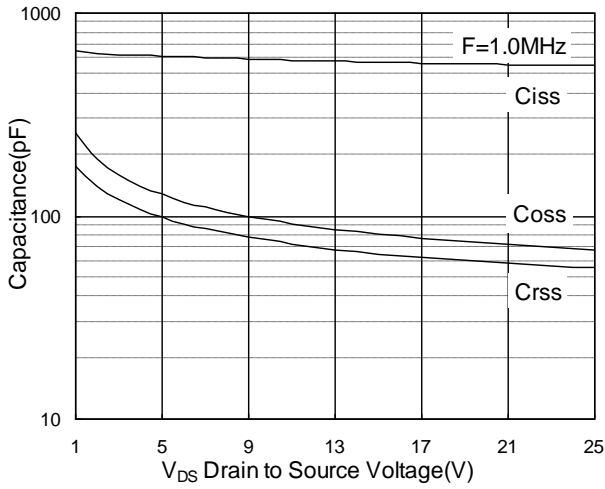


Fig.7 Capacitance

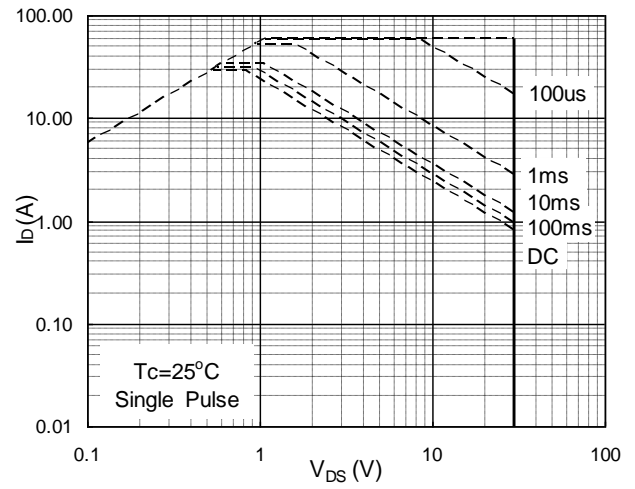


Fig.8 Safe Operating Area

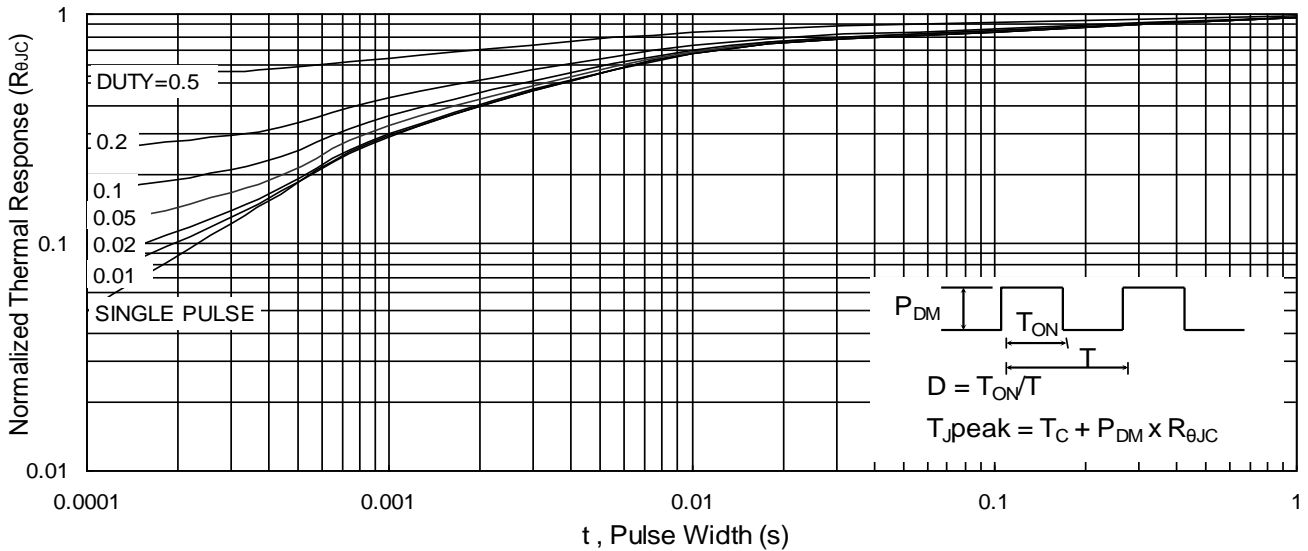


Fig.9 Normalized Maximum Transient Thermal Impedance

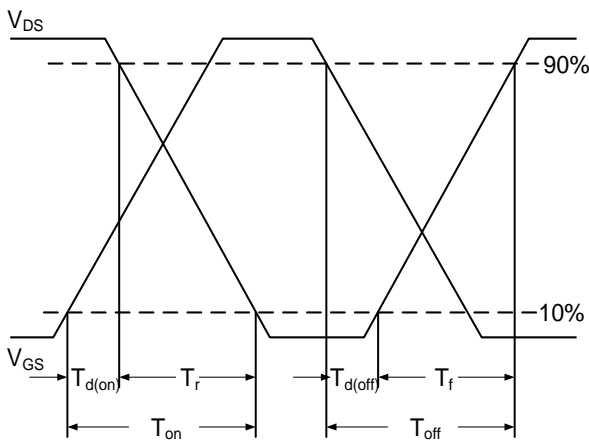


Fig.10 Switching Time Waveform

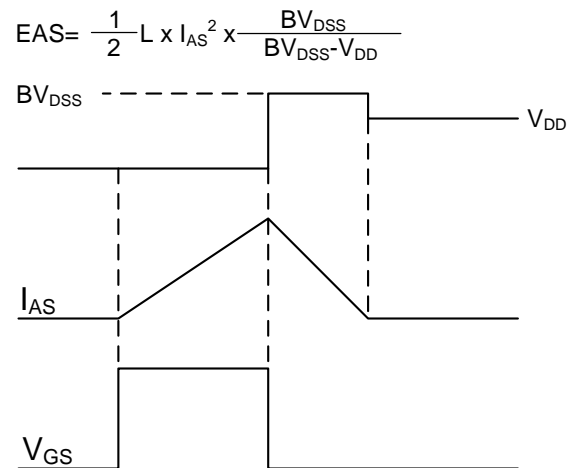
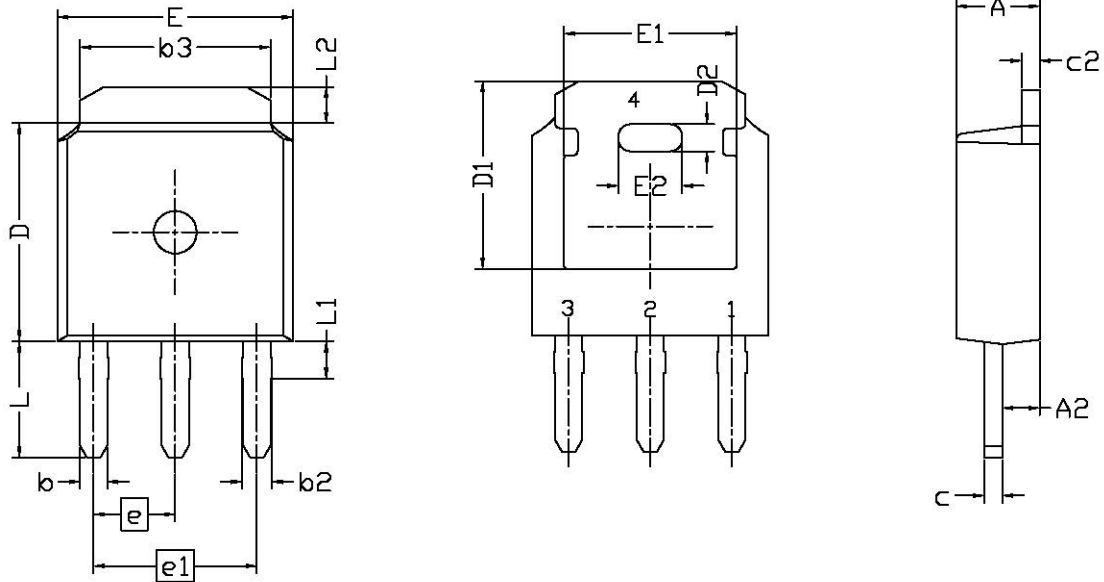


Fig.11 Unclamped Inductive Switching Waveform

TO-251 Package Outline Dimensions



| Symbol | Dimensions (unit:mm) | | | Symbol | Dimensions (unit:mm) | | |
|-----------|----------------------|------|------|-----------|----------------------|------|------|
| | Min | Typ | Max | | Min | Typ | Max |
| A | 2.20 | 2.30 | 2.39 | A2 | 0.90 | 1.00 | 1.14 |
| b | 0.63 | 0.76 | 0.85 | b2 | 0.76 | 0.85 | 1.05 |
| b3 | 5.10 | 5.40 | 5.60 | C | 0.46 | 0.51 | 0.61 |
| C2 | 0.46 | 0.51 | 0.61 | D | 5.90 | 6.10 | 6.30 |
| D1 | 5.25 REF | | | D2 | 0.508 BSC | | |
| E | 6.35 | 6.55 | 6.70 | E1 | 5.06 REF | | |
| E2 | 1.524 BSC | | | e | 2.29 BSC | | |
| e1 | 4.57 BSC | | | L | 3.70 | 4.00 | 4.40 |
| L1 | 1.15 REF | | | L2 | 0.90 | 1.06 | 1.20 |