

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 | -57 | A |
| $R_{DS(ON)}$ (at $V_{GS}=-10V$) | 10.5 | m Ω |
| $R_{DS(ON)}$ (at $V_{GS}=-4.5V$) | 18.5 | 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($T_A=25^{\circ}C$, unless otherwise noted)

| Parameter | Symbol | Rating | Units |
|--|------------------------|------------|-------------|
| Drain-Source Voltage | V_{DS} | -30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current ¹ | $I_D@T_C=25^{\circ}C$ | -57 | A |
| Continuous Drain Current ¹ | $I_D@T_C=100^{\circ}C$ | -36 | A |
| Pulsed Drain Current ² | I_{DM} | -180 | A |
| Single Pulse Avalanche Energy ³ | EAS | 408 | mJ |
| Avalanche Current | I_{AS} | -55.4 | A |
| Total Power Dissipation ⁴ | $P_D@T_C=25^{\circ}C$ | 52.1 | W |
| Storage Temperature Range | T_{STG} | -55 to 150 | $^{\circ}C$ |
| Operating Junction Temperature Range | T_J | -55 to 150 | $^{\circ}C$ |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Unit |
|---|-----------------|-----|-----|---------------|
| Thermal Resistance Junction-Ambient ¹ | $R_{\theta JA}$ | --- | 62 | $^{\circ}C/W$ |
| Thermal Resistance Junction-Ambient ¹ ($t \leq 10s$) | | --- | 25 | $^{\circ}C/W$ |
| Thermal Resistance Junction-Case ¹ | $R_{\theta JC}$ | --- | 2.4 | $^{\circ}C/W$ |

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 | --- | -0.018 | --- | V/°C |
| Static Drain-Source On-Resistance ² | R _{DS(ON)} | V _{GS} =-10V, I _D =-30A | --- | 8 | 10.5 | mΩ |
| | | V _{GS} =-4.5V, I _D =-15A | --- | 14 | 18.5 | 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)} | | --- | 5.04 | --- | 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 | uA |
| Gate-Source Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| Forward Transconductance | g _{fs} | V _{DS} =-5V, I _D =-30A | --- | 26.4 | --- | S |
| Gate Resistance | R _g | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 6 | --- | Ω |
| Total Gate Charge | Q _g | V _{DS} =-15V, V _{GS} =-4.5V, I _D =-15A | --- | 33 | --- | nC |
| Gate-Source Charge | Q _{gs} | | --- | 10.7 | --- | |
| Gate-Drain Charge | Q _{gd} | | --- | 12.8 | --- | |
| Turn-On Delay Time | T _{d(on)} | V _{DD} =-15V, V _{GS} =-10V, R _G =3.3Ω, I _D =-15A | --- | 8 | --- | ns |
| Rise Time | T _r | | --- | 17.8 | --- | |
| Turn-Off Delay Time | T _{d(off)} | | --- | 78.4 | --- | |
| Fall Time | T _f | | --- | 43.6 | --- | |
| Input Capacitance | C _{iss} | V _{DS} =-15V, V _{GS} =0V, f=1MHz | --- | 3448 | --- | pF |
| Output Capacitance | C _{oss} | | --- | 508 | --- | |
| Reverse Transfer Capacitance | C _{rss} | | --- | 421 | --- | |

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 | --- | --- | -57 | A |
| Pulsed Source Current ^{2,5} | I _{SM} | | --- | --- | -180 | A |
| Diode Forward Voltage ² | V _{SD} | V _{GS} =0V, I _S =-1A, T _J =25°C | --- | --- | -1.2 | V |
| Reverse Recovery Time | t _{rr} | I _F =-15A, di/dt=100A/μs, T _J =25°C | --- | 29 | --- | nS |
| Reverse Recovery Charge | Q _{rr} | | --- | 15 | --- | nC |

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

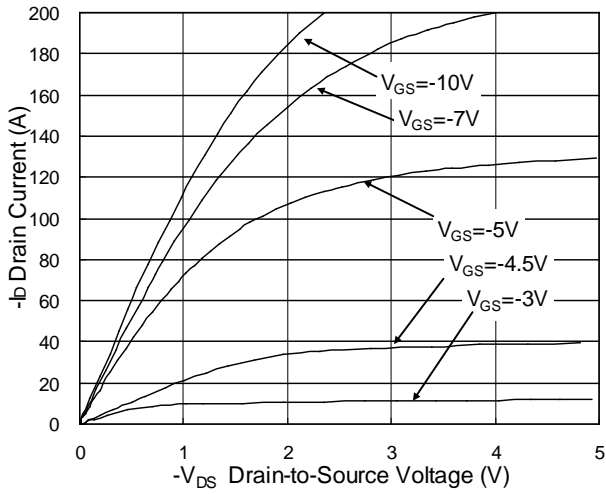


Fig.1 Typical Output Characteristics

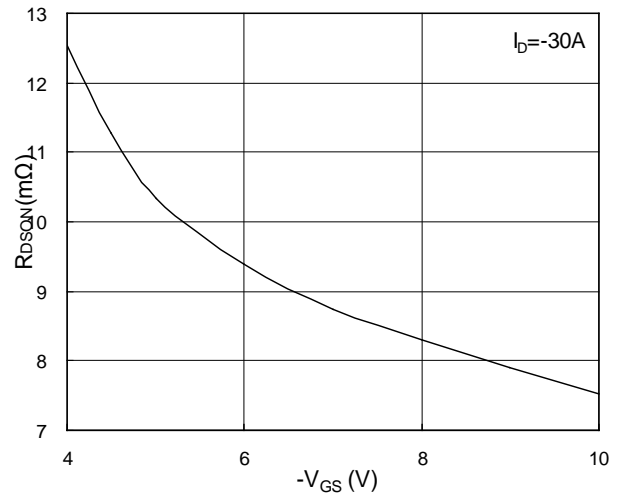


Fig.2 On-Resistance v.s Gate-Source

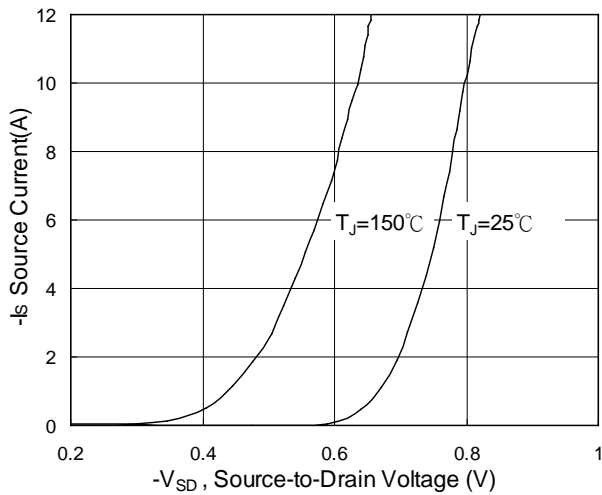


Fig.3 Forward Characteristics Of Reverse

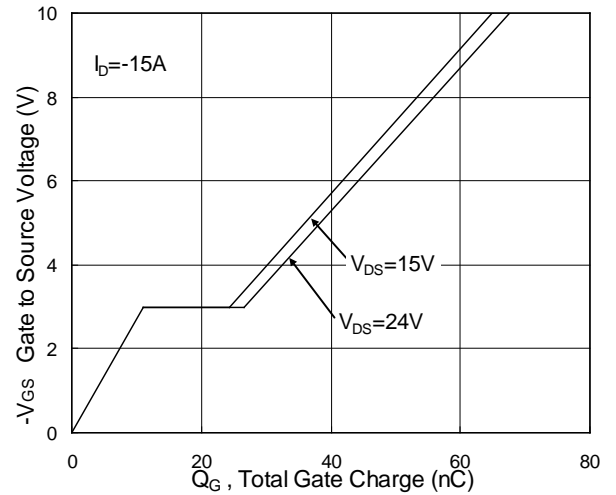


Fig.4 Gate-Charge Characteristics

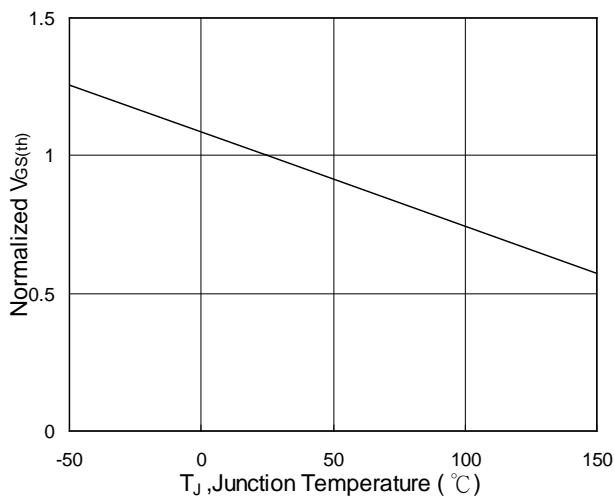


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

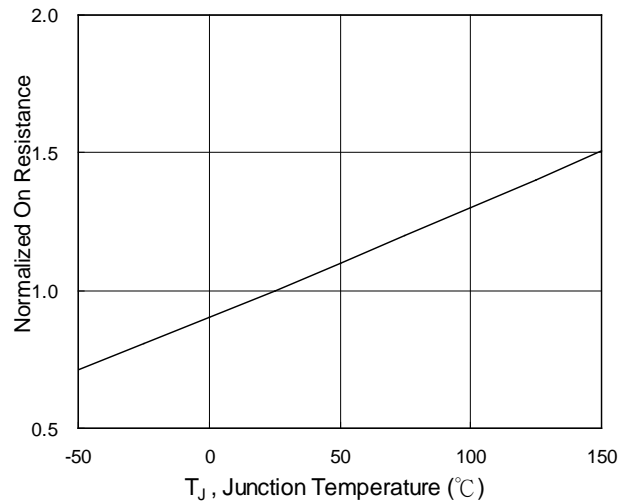


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

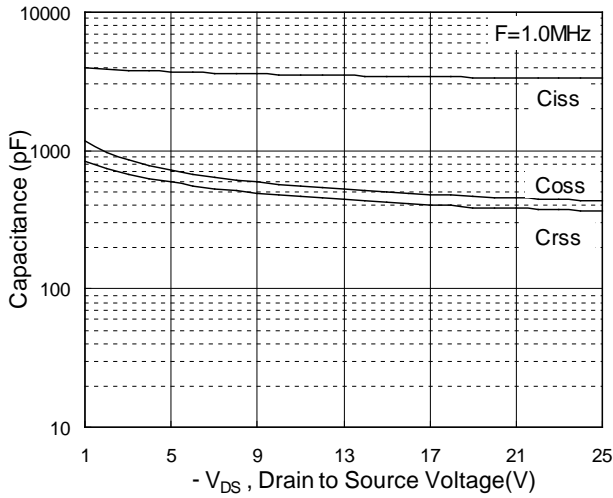


Fig.7 Capacitance

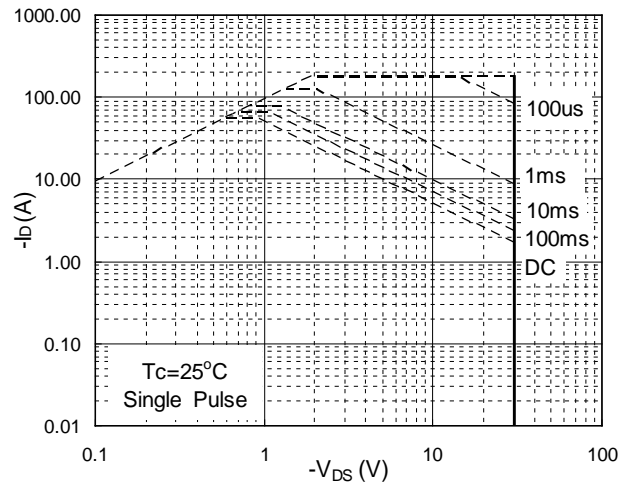


Fig.8 Safe Operating Area

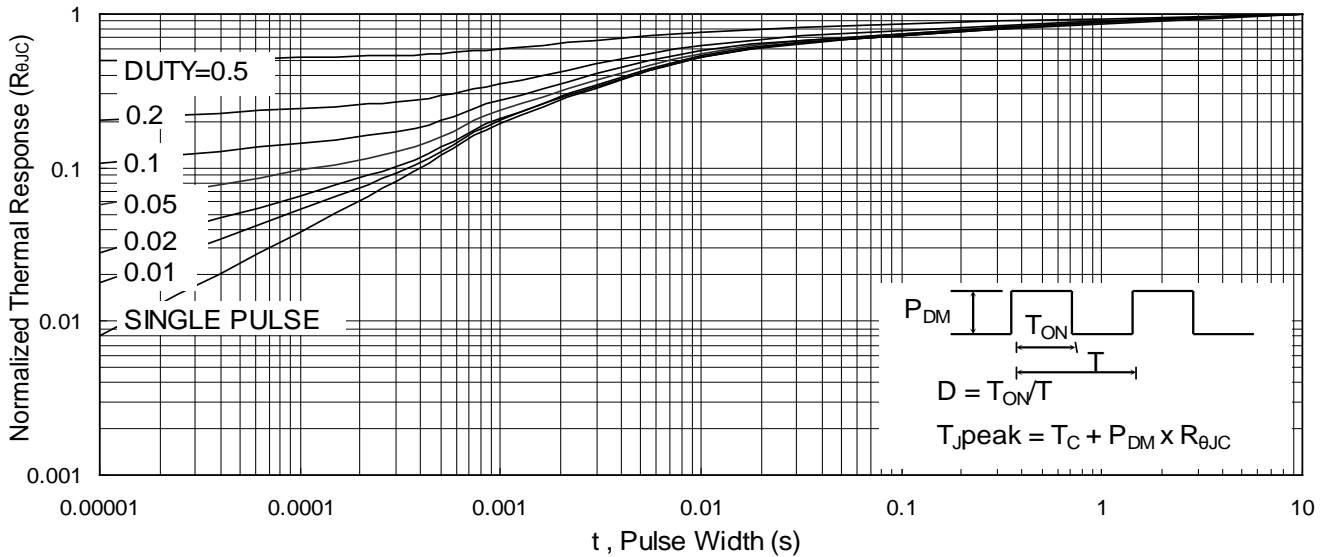


Fig.9 Normalized Maximum Transient Thermal Impedance

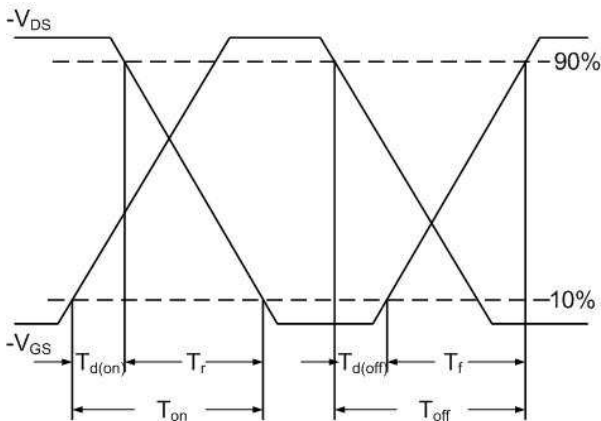


Fig.10 Switching Time Waveform

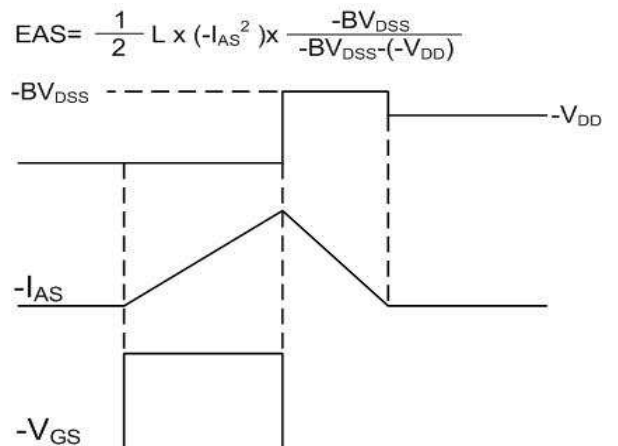
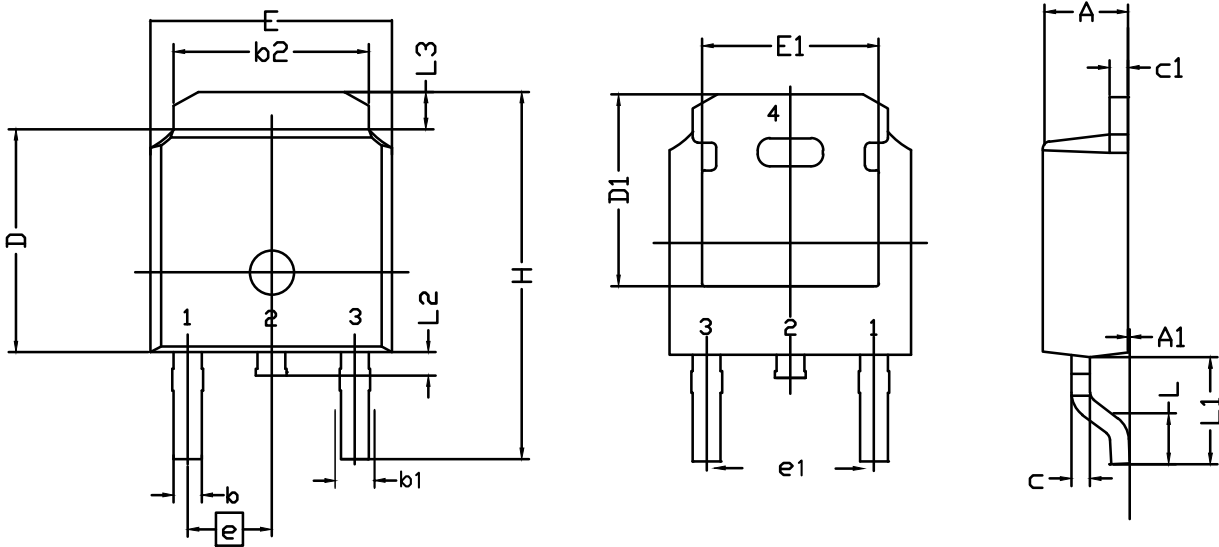


Fig.11 Unclamped Inductive Switching Waveform

TO-252 Package Outline Dimensions



| Symbol | Dimensions (unit:mm) | | | Symbol | Dimensions (unit:mm) | | |
|----------------------|----------------------|-------|-------|----------------------|----------------------|-------|-------|
| | Min | Typ | Max | | Min | Typ | Max |
| A | 2.20 | 2.30 | 2.38 | E | 6.40 | 6.60 | 6.731 |
| A₁ | 0.00 | 0.10 | 0.20 | E₁ | 4.40 | -- | -- |
| b | 0.64 | 0.76 | 0.89 | e | 2.286 BSC | | |
| b₁ | 0.77 | 0.85 | 1.14 | e₁ | 4.572 BSC | | |
| b₂ | 5.00 | 5.33 | 5.46 | H | 9.40 | 10.00 | 10.40 |
| c | 0.458 | 0.508 | 0.610 | L | 1.40 | 1.52 | 1.77 |
| C₁ | 0.458 | 0.508 | 0.620 | L₁ | -- | 2.743 | -- |
| D | 5.98 | 6.10 | 6.223 | L₂ | 0.60 | 0.80 | 1.01 |
| D₁ | 5.20 | 5.25 | 5.38 | L₃ | 0.90 | 1.06 | 1.25 |