

Features

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

Product Summary



| | | |
|----------------------------------|-----|------------|
| V_{DS} | 30 | V |
| I_D | 3.9 | A |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$) | 40 | m Ω |
| $R_{DS(ON)}$ (at $V_{GS}=2.5V$) | 47 | 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} | ± 12 | V |
| Continuous Drain Current, V_{GS} @ 4.5V ¹ | $I_D@T_A=25^{\circ}C$ | 3.9 | A |
| Continuous Drain Current, V_{GS} @ 4.5V ¹ | $I_D@T_A=70^{\circ}C$ | 3.1 | A |
| Pulsed Drain Current ² | I_{DM} | 16 | A |
| Total Power Dissipation ³ | $P_D@T_A=25^{\circ}C$ | 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 | $R_{\theta JA}$ | --- | 125 | $^{\circ}C/W$ |
| Thermal Resistance Junction-Case ¹ | $R_{\theta JC}$ | --- | 80 | $^{\circ}C/W$ |

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 | --- | 0.029 | --- | V/°C |
| Static Drain-Source On-Resistance ² | R _{DS(ON)} | V _{GS} =4.5V, I _D =3A | --- | 32 | 40 | mΩ |
| | | V _{GS} =2.5V, I _D =2A | --- | 38 | 47 | mΩ |
| Gate Threshold Voltage | V _{GS(th)} | V _{GS} =V _{DS} , I _D =250uA | 0.5 | 0.7 | 1.2 | V |
| V _{GS(th)} Temperature Coefficient | ΔV _{GS(th)} | | --- | -2.82 | --- | 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 =3A | --- | 19 | --- | S |
| Gate Resistance | R _g | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 1.5 | 3 | Ω |
| Total Gate Charge (4.5V) | Q _g | V _{DS} =15V, V _{GS} =4.5V, I _D =3A | --- | 8.34 | --- | nC |
| Gate-Source Charge | Q _{gs} | | --- | 1.26 | --- | |
| Gate-Drain Charge | Q _{gd} | | --- | 1.88 | --- | |
| Turn-On Delay Time | T _{d(on)} | V _{DD} =15V, V _{GS} =4.5V, R _G =3.3Ω, I _D =3A | --- | 3.2 | --- | ns |
| Rise Time | T _r | | --- | 41.8 | --- | |
| Turn-Off Delay Time | T _{d(off)} | | --- | 21.2 | --- | |
| Fall Time | T _f | | --- | 6.4 | --- | |
| Input Capacitance | C _{iss} | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 662 | --- | pF |
| Output Capacitance | C _{oss} | | --- | 51.3 | --- | |
| Reverse Transfer Capacitance | C _{rss} | | --- | 43.6 | --- | |

Drain-Source Diode Characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|------------------------------------------|-----------------|---------------------------------------------------------------|-----|-----|-----|------|
| Continuous Source Current ^{1,4} | I _S | V _G =V _D =0V, Force Current | --- | --- | 3.9 | A |
| Pulsed Source Current ^{2,4} | I _{SM} | | --- | --- | 16 | 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 =3A, di/dt=100A/μs, T _J =25°C | --- | 6.8 | --- | nS |
| Reverse Recovery Charge | Q _{rr} | | --- | 2.3 | --- | nC |

Note:

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

Typical Characteristics

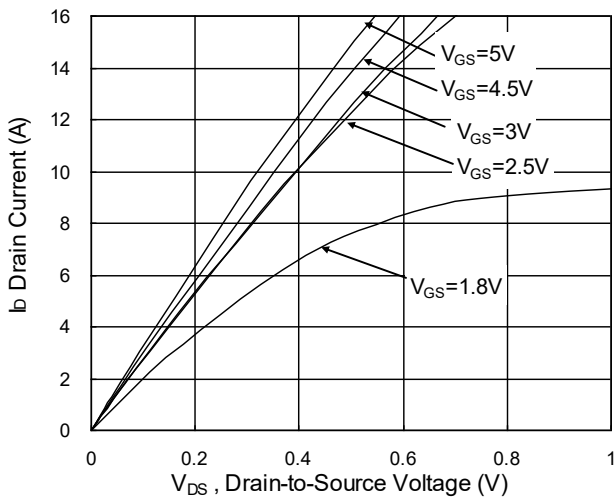


Fig.1 Typical Output Characteristics

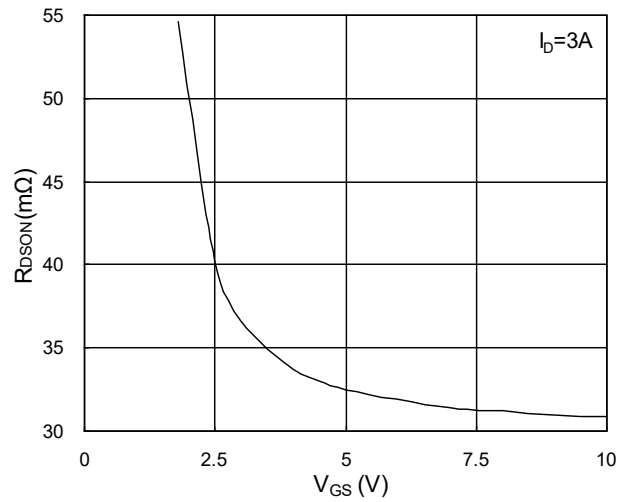


Fig.2 On-Resistance vs. Gate-Source

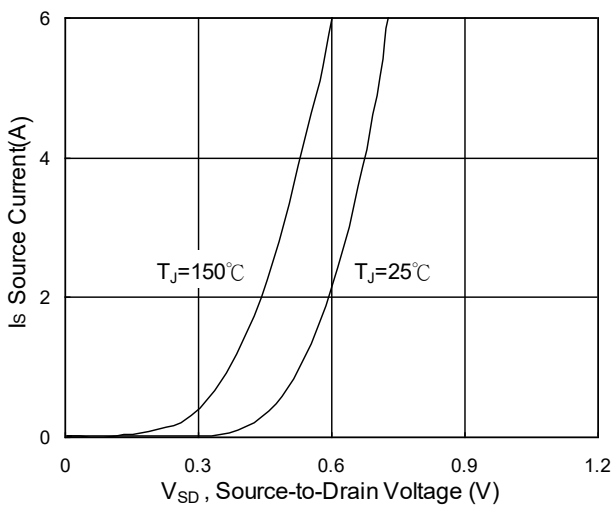


Fig.3 Forward Characteristics Of Reverse

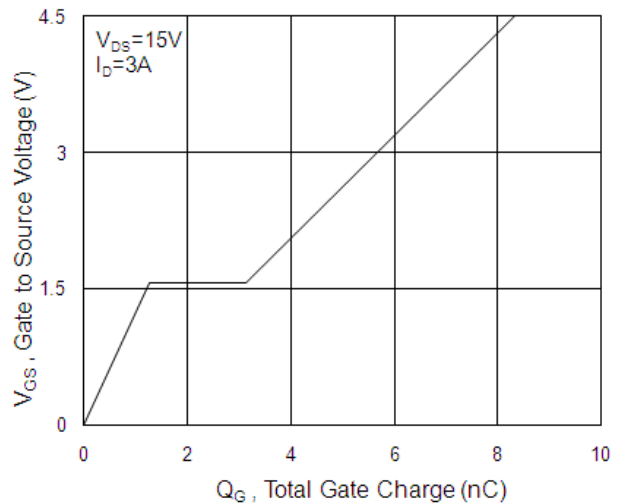


Fig.4 Gate-Charge Characteristics

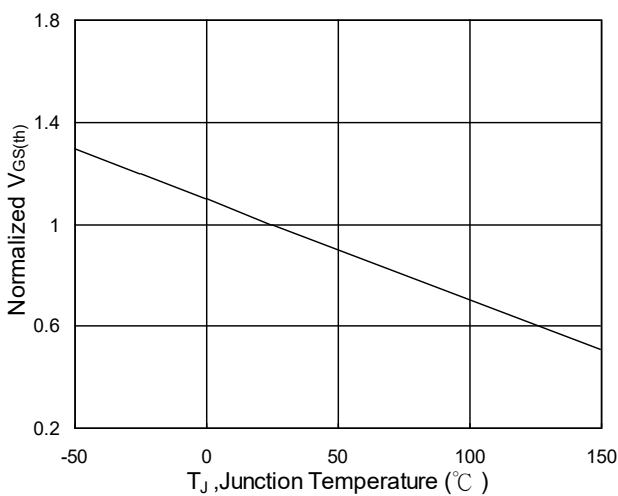


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

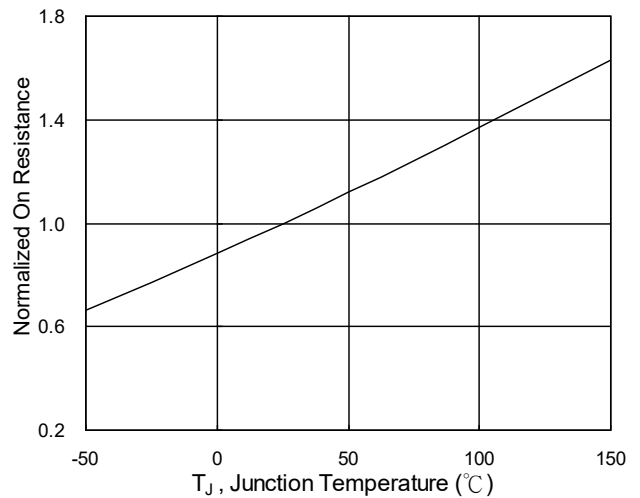


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

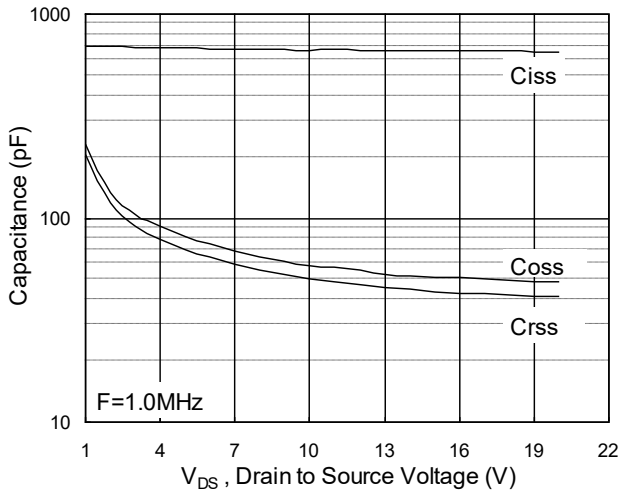


Fig.7 Capacitance

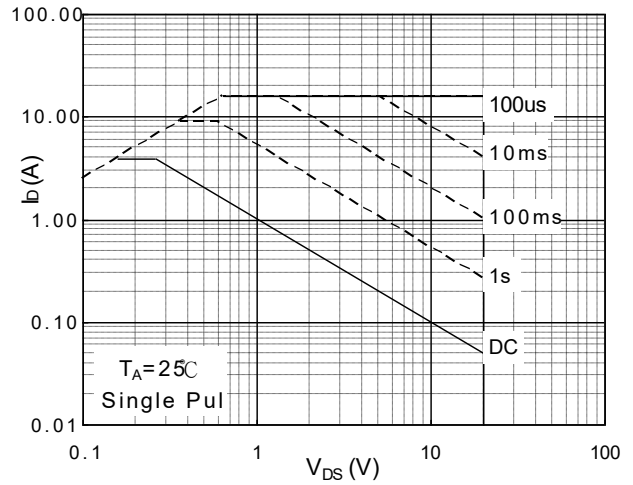


Fig.8 Safe Operating Area

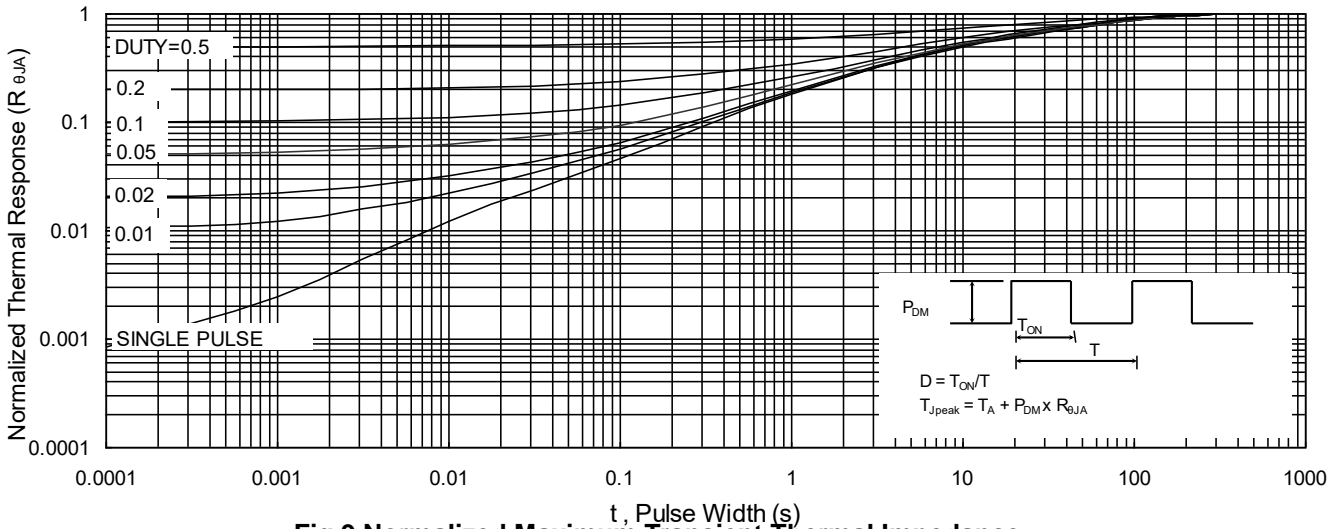


Fig.9 Normalized Maximum Transient Thermal Impedance

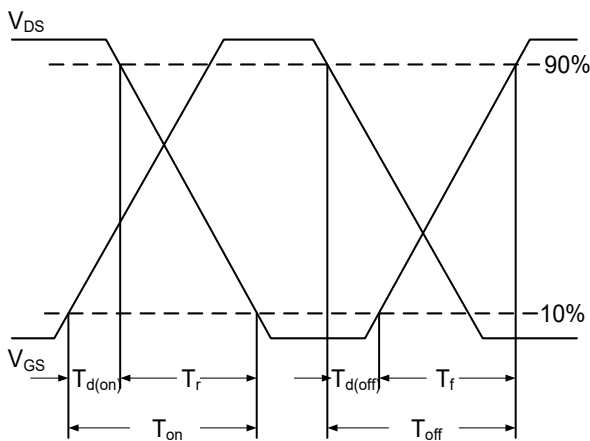


Fig.10 Switching Time Waveform

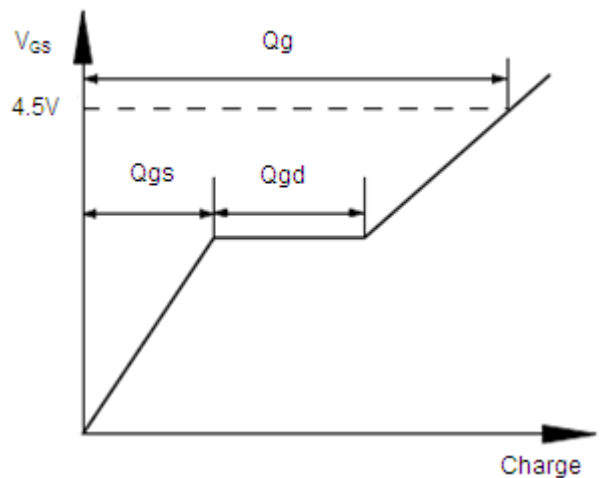


Fig.11 Gate Charge Waveform

SOT23-3L Package Outline Dimensions



| Symbol | Dimensions (unit:mm) | | | Symbol | Dimensions (unit:mm) | | |
|----------------------|----------------------|------|------|----------------------|----------------------|------|------|
| | Min | Typ | Max | | Min | Typ | Max |
| A | 0.90 | 1.07 | 1.25 | e₁ | -- | 0.95 | -- |
| A₁ | 0.01 | 0.05 | 0.10 | H_E | 2.50 | 2.80 | 3.00 |
| b_p | 0.30 | 0.40 | 0.50 | L_p | 0.30 | 0.45 | 0.60 |
| c | 0.10 | 0.15 | 0.20 | Q | 0.23 | 0.28 | 0.33 |
| D | 2.70 | 2.90 | 3.10 | V | -- | 0.20 | -- |
| E | 1.40 | 1.55 | 1.75 | W | -- | 0.20 | -- |
| e | -- | 1.90 | -- | | | | |