

General Description

The WSF30160 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The WSF30160 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Features

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

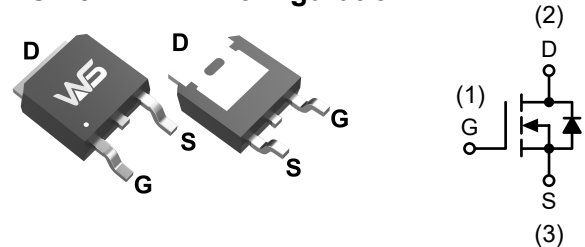
Product Summary

| BVDSS | RDSON | ID |
|-------|-------|------|
| 30V | 2.3mΩ | 160A |

Applications

- High Frequency Point-of-Load Synchronous Buck Converter
- Networking DC-DC Power System
- Power Tool Application

TO-252-2L Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|-----------------------------|--|------------|------------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^{1,7}$ | 160 | A |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^{1,7}$ | 100 | A |
| I_{DM} | Pulsed Drain Current ² | 330 | A |
| EAS | Single Pulse Avalanche Energy ³ | 385 | mJ |
| I_{AS} | Avalanche Current | 72 | A |
| $P_D@T_C=25^\circ\text{C}$ | Total Power Dissipation ⁴ | 92 | W |
| T_{STG} | Storage Temperature Range | -55 to 175 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 175 | $^\circ\text{C}$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | --- | 62 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 1.4 | $^\circ\text{C/W}$ |

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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|-------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 30 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25 °C, I _D =1mA | --- | 0.022 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =20A | --- | 2.3 | 3.0 | mΩ |
| | | V _{GS} =4.5V, I _D =15A | --- | 3.8 | 4.6 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.5 | 1.9 | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -6.1 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =24V, V _{GS} =0V, T _J =25 °C | --- | --- | 2 | uA |
| | | V _{DS} =24V, V _{GS} =0V, T _J =55 °C | --- | --- | 10 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =30A | --- | 50 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 0.9 | 1.8 | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =15V, V _{GS} =10V, I _D =30A | --- | 40.3 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 5 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 10.5 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =15V, V _{GEN} =10V, R _G =6Ω, I _D =1A, R _L =15Ω. | --- | 14 | --- | ns |
| T _r | Rise Time | | --- | 18 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 19 | --- | |
| T _f | Turn-Off Fall Time | | --- | 46 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 2450 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 590 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 245 | --- | |

Guaranteed Avalanche Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------|--|---|------|------|------|------|
| EAS | Single Pulse Avalanche Energy ⁵ | V _{DD} =25V, L=0.1mH, I _{AS} =20A | 85 | --- | --- | mJ |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I _S | Continuous Source Current ^{1,6} | V _G =V _D =0V, Force Current | --- | --- | 50 | A |
| I _{SM} | Pulsed Source Current ^{2,6} | | --- | --- | 330 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =A, 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,t<10sec.
- 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,I_{AS}=20A
- 4.The power dissipation is limited by 150 °C junction temperature
- 5.The Min. value is 100% EAS tested guarantee.
- 6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.
- 7.Package limitation current is 100A.

Typical Characteristics

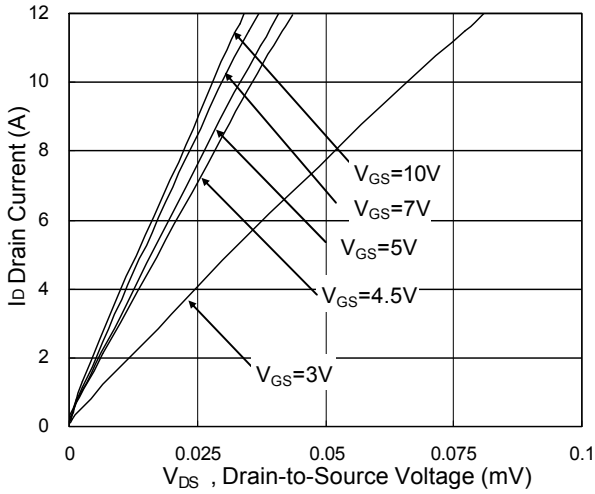


Fig.1 Typical Output Characteristics

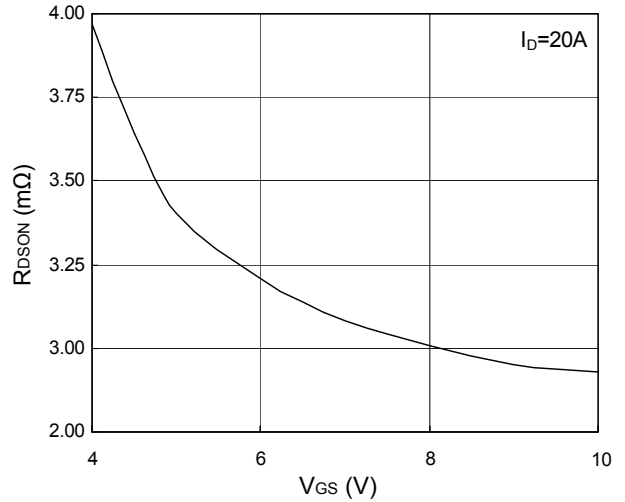


Fig.2 On-Resistance v.s Gate- Source

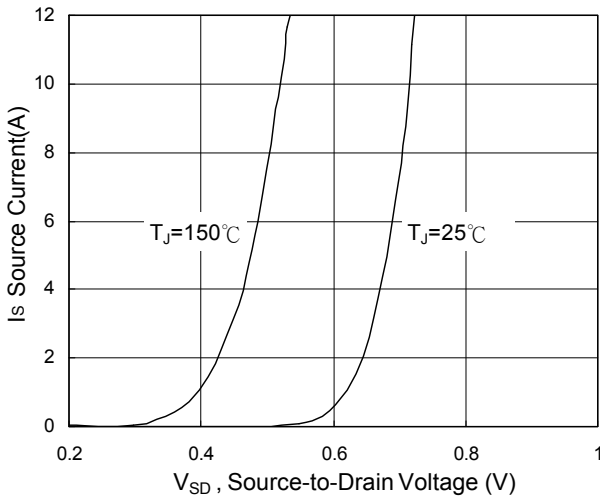


Fig.3 Forward Characteristics of Reverse

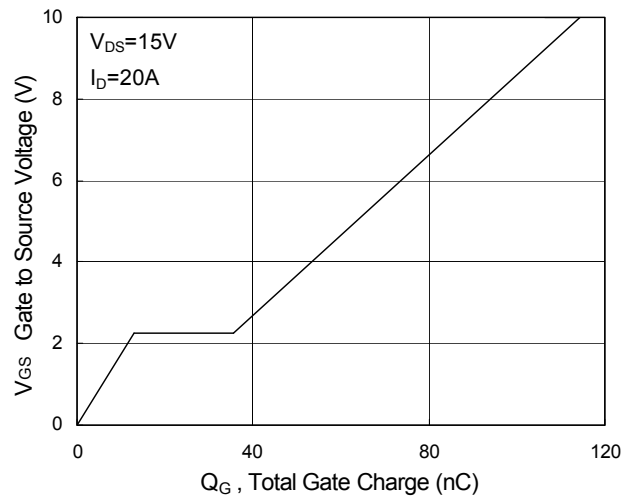


Fig.4 Gate-Charge Characteristics

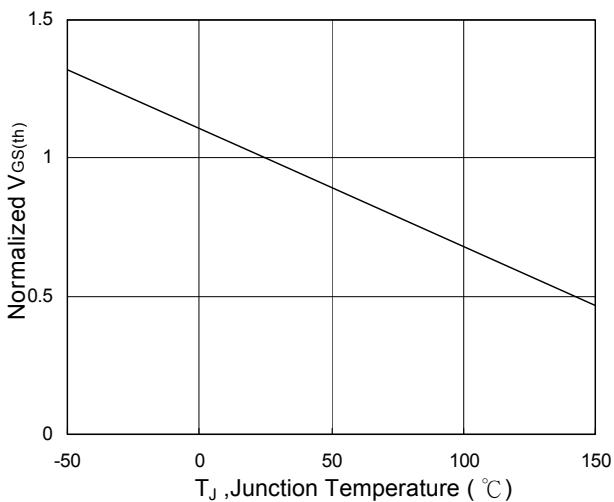


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

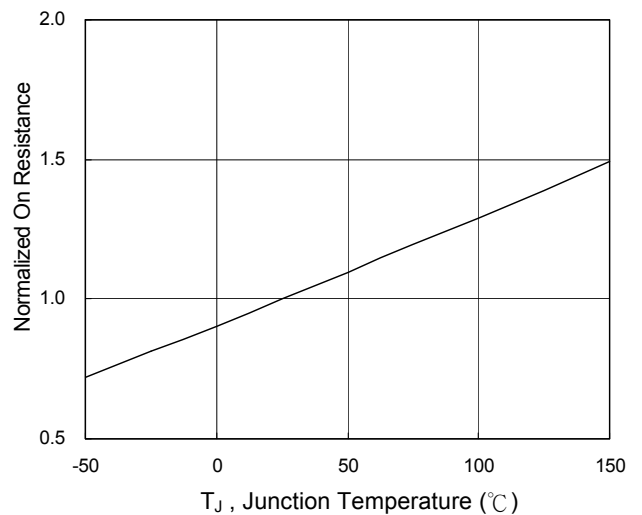


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

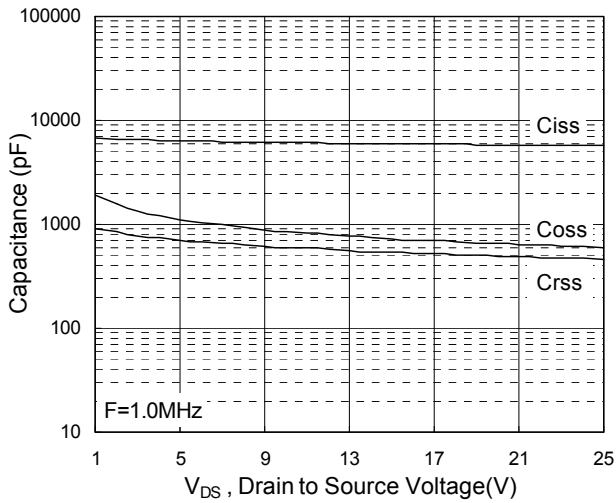


Fig.7 Capacitance

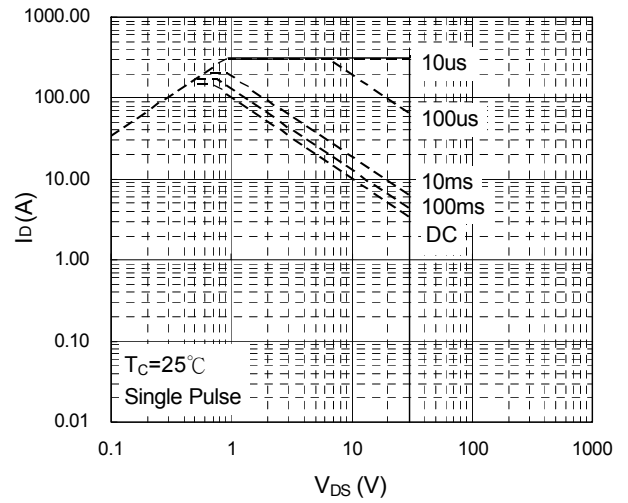


Fig.8 Safe Operating Area

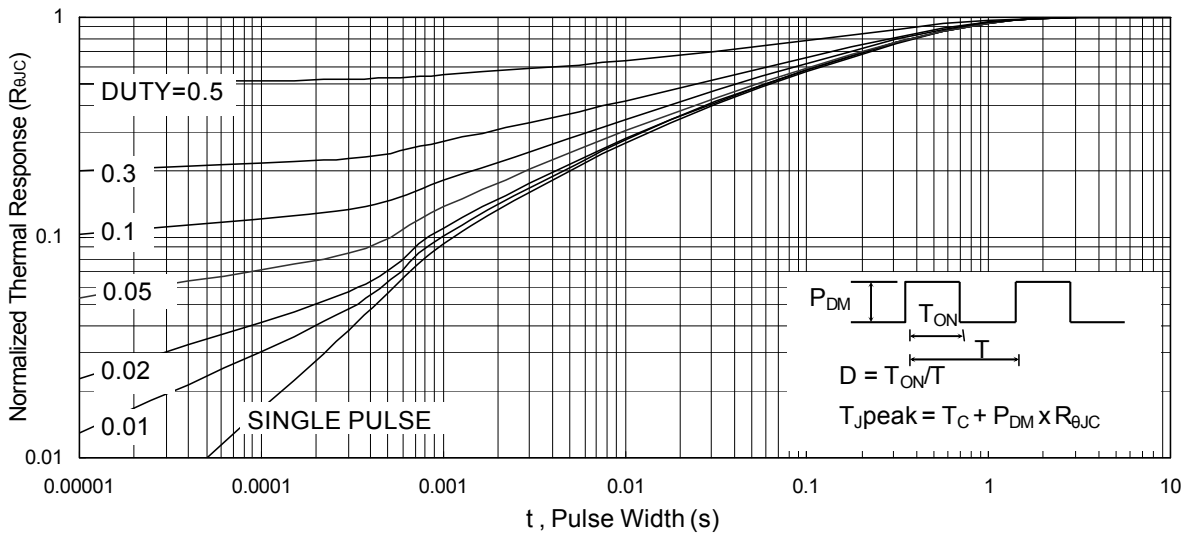


Fig.9 Normalized Maximum Transient Thermal

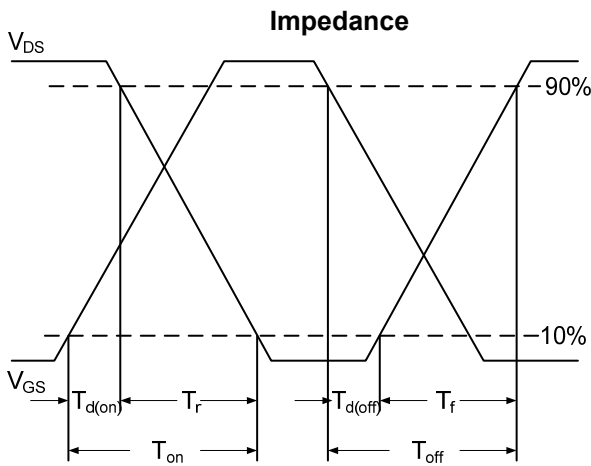


Fig.10 Switching Time Waveform

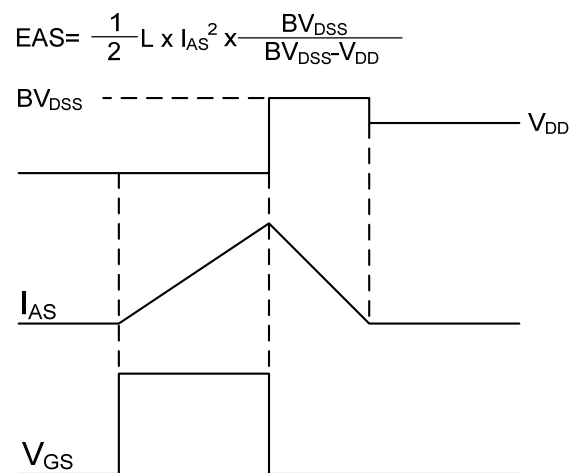
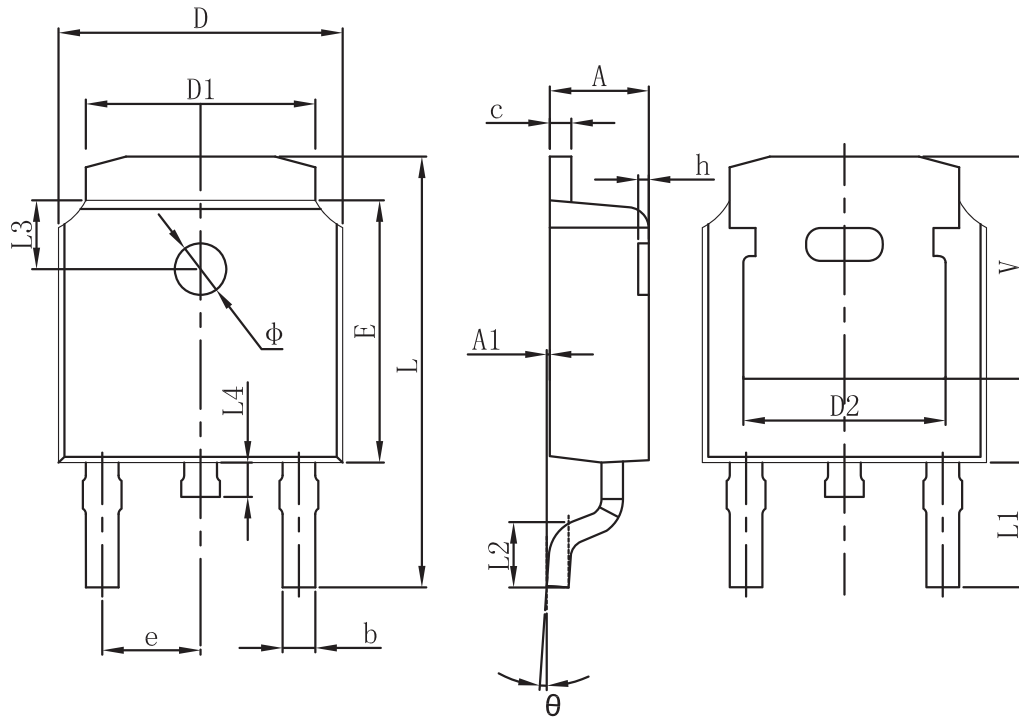


Fig.11 Unclamped Inductive Waveform

Packaging information


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.635 | 0.770 | 0.025 | 0.030 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 4.830 REF. | | 0.190 REF. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.712 | 10.312 | 0.382 | 0.406 |
| L1 | 2.900 REF. | | 0.114 REF. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600 REF. | | 0.063 REF. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| Φ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.250 REF. | | 0.207 REF. | |



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