

General Description

The WSF45P10 is the highest performance trench P-Ch MOSFET with extreme high cell density, which provide excellent $R_{DS(on)}$ and gate charge for most of the small power switching and load switch applications.

The WSF45P10 meet the RoHS and Green Product requirement with full function reliability approved.

Features

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

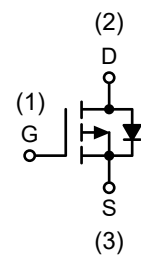
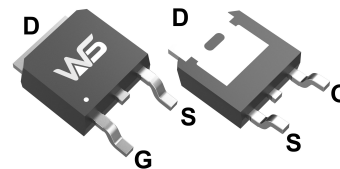
Product Summary

| BV_{DSS} | $R_{DS(on)}$ | I_D |
|------------|--------------|-------|
| -100V | 44mΩ | -40A |

Applications

- Inverters

TO-252-2L Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit |
|--|--|--------------------------------|---------------------------|
| Common Ratings ($T_C=25^\circ\text{C}$ Unless Otherwise Noted) | | | |
| V_{DSS} | Drain-Source Voltage | -100 | V |
| V_{GSS} | Gate-Source Voltage | ± 20 | |
| T_J | Maximum Junction Temperature | 175 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 175 | $^\circ\text{C}$ |
| I_S | Diode Continuous Forward Current | $T_C=25^\circ\text{C}$ -40 | A |
| Mounted on Large Heat Sink | | | |
| I_{DM} | Pulsed Drain Current * | -120** | A |
| I_D | Continuous Drain Current | $T_C=25^\circ\text{C}$ -40 | A |
| | | $T_C=100^\circ\text{C}$ -26 | |
| P_D | Maximum Power Dissipation | $T_C=25^\circ\text{C}$ 136 | W |
| | | $T_C=100^\circ\text{C}$ 68 | |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | 1.1 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance-Junction to Ambient | 62.5 | |
| Avalanche Ratings | | | |
| E_{AS} | Avalanche Energy, Single Pulsed | $L=0.5\text{mH}$ 308*** | mJ |

Note : * Repetitive rating ; pulse width limited by junction temperatur

** Drain current is limited by junction temperature

*** $V_D=-80\text{V}$

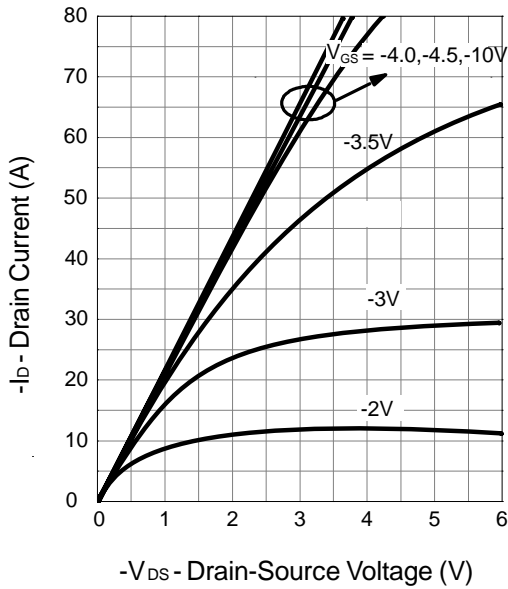
Electrical Characteristics ($T_C=25^\circ\text{C}$ Unless Otherwise Noted)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------------------------|----------------------------------|--|------|------|-----------|-----------|
| Static Characteristics | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_{DS}=-250\mu A$ | -100 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=-100V, V_{GS}=0V$ $T_J=85^\circ\text{C}$ | - | - | -1 | μA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_{DS}=-250\mu A$ | -1 | -2 | -3 | V |
| I_{GSS} | Gate Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| $R_{DS(ON)}^*$ | Drain-Source On-state Resistance | $V_{GS}=-10V, I_{DS}=-20A$ | - | 44 | 55 | $m\Omega$ |
| $R_{DS(ON)}^*$ | Drain-Source On-state Resistance | $V_{GS}=-4.5V, I_{DS}=-20A$ | - | 47 | 58.5 | $m\Omega$ |
| Diode Characteristics | | | | | | |
| V_{SD}^* | Diode Forward Voltage | $I_{SD}=-20A, V_{GS}=0V$ | - | -0.8 | -1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_{SD}=-20A, dI_{SD}/dt=-100A/\mu s$ | - | 70 | - | ns |
| Q_{rr} | Reverse Recovery Charge | | - | 90 | - | nC |
| Dynamic Characteristics | | | | | | |
| R_G | Gate Resistance | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$ | - | 2 | - | Ω |
| C_{iss} | Input Capacitance | $V_{GS}=0V,$ $V_{DS}=-20V,$ Frequency=1.0MHz | - | 5720 | - | pF |
| C_{oss} | Output Capacitance | | - | 790 | - | |
| C_{riss} | Reverse Transfer Capacitance | | - | 450 | - | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}=-50V, R_G=6\Omega,$ $I_{DS}=-20A, V_{GS}=-10V,$ | - | 30 | - | ns |
| T_r | Turn-on Rise Time | | - | 79 | - | |
| $t_{d(OFF)}$ | Turn-off Delay Time | | - | 69 | - | |
| T_f | Turn-off Fall Time | | - | 82 | - | |
| Gate Charge Characteristics | | | | | | |
| Q_g | Total Gate Charge | $V_{DS}=-80V, V_{GS}=-10V,$ $I_{DS}=-20A$ | - | 125 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 21 | - | |
| Q_{gd} | Gate-Drain Charge | | - | 45 | - | |

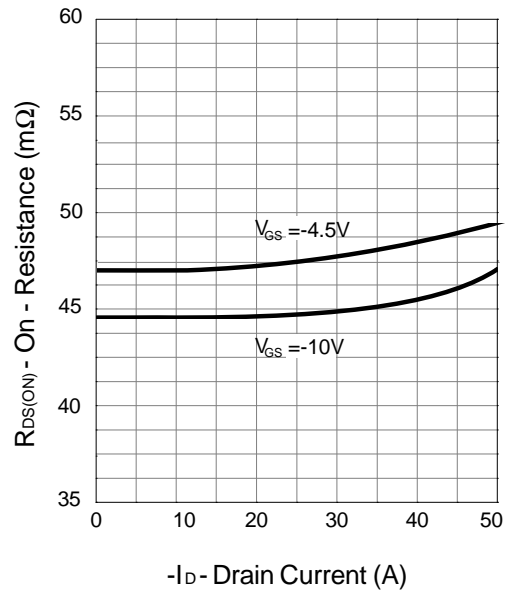
Note * : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

Typical Characteristics

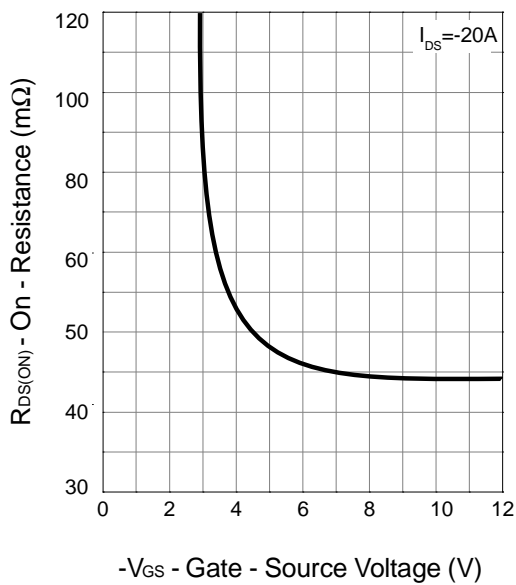
Output Characteristics



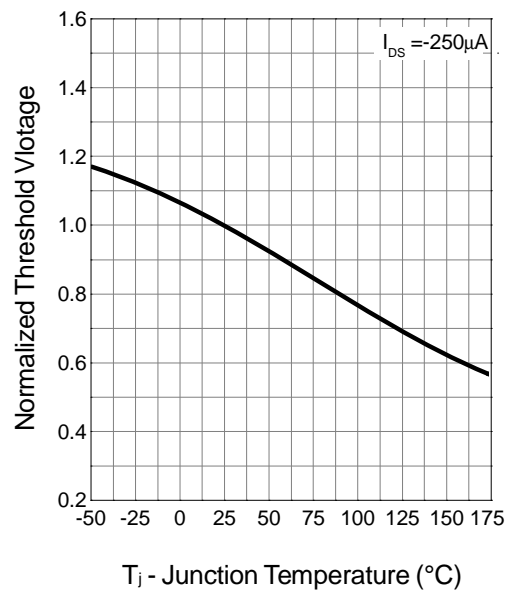
Drain-Source On Resistance



Drain-Source On Resistance

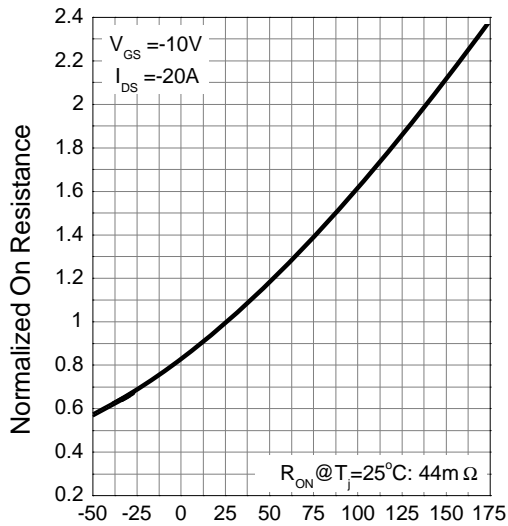


Gate Threshold Voltage



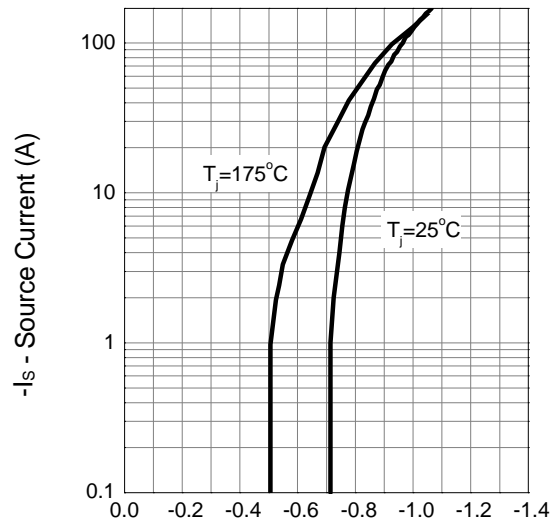
Typical Characteristics

Drain-Source On Resistance



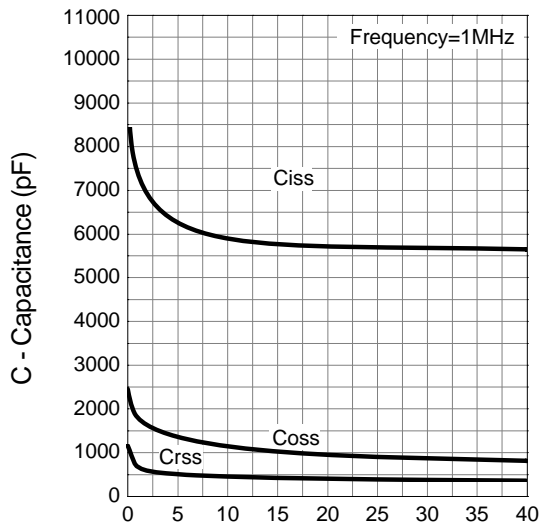
T_j - Junction Temperature (°C)

Source-Drain Diode Forward



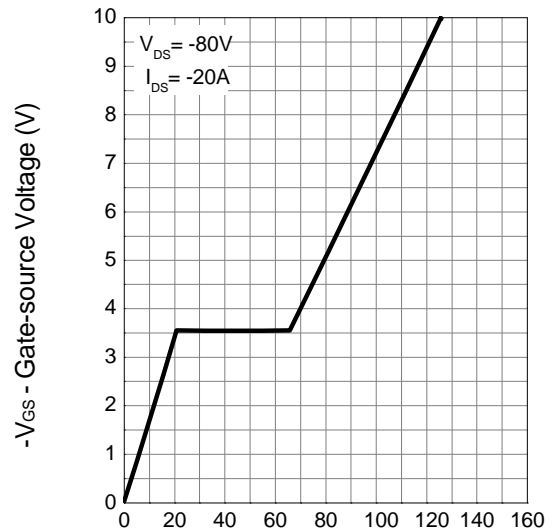
$-V_{SD}$ - Source-Drain Voltage (V)

Capacitance



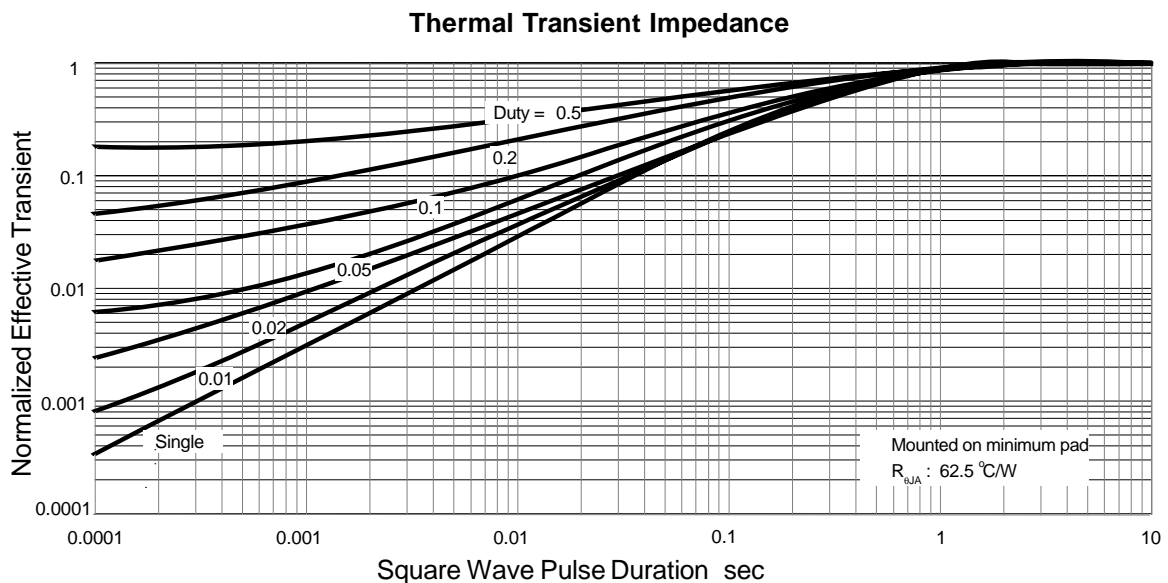
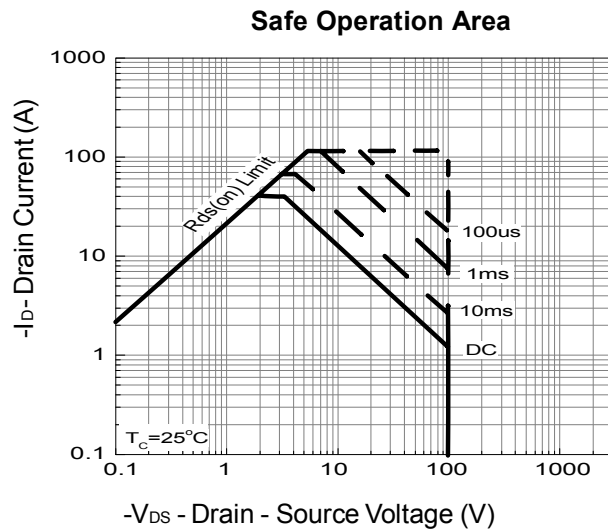
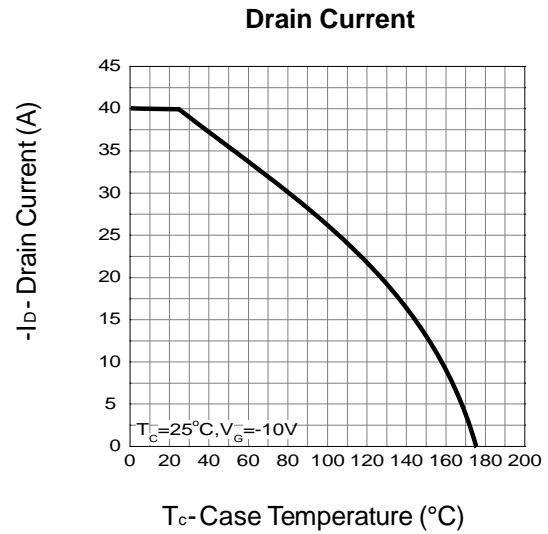
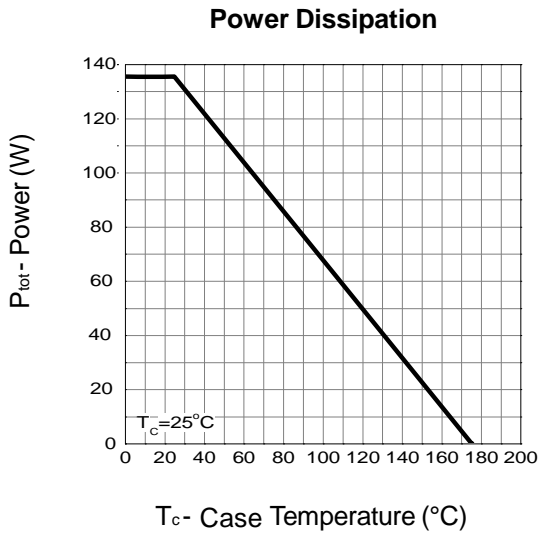
$-V_{DS}$ - Drain - Source Voltage (V)

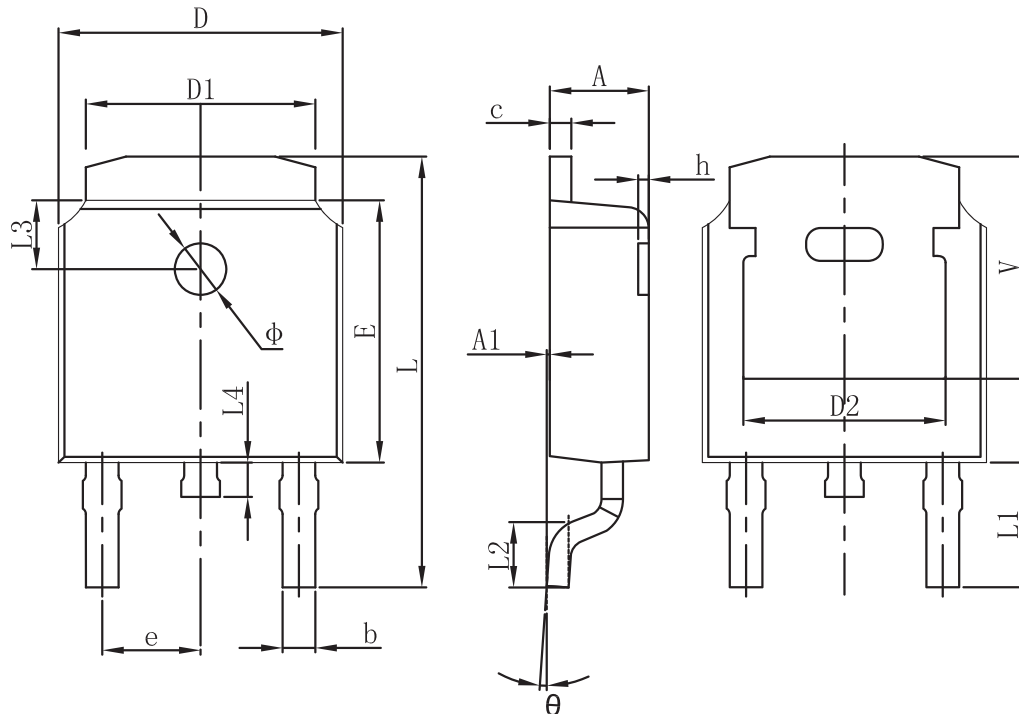
Gate Charge



Q_G - Gate Charge (nC)

Typical Characteristics



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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