

650V 0.037Ω Super Junction Power MOSFET

Description

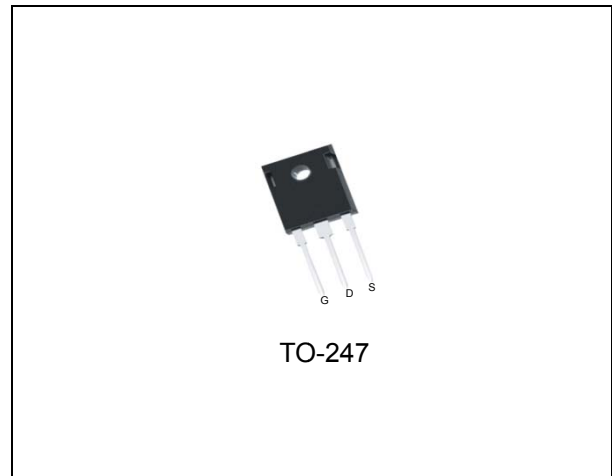
WMOS™ F2 is Wayon's 2nd generation super junction MOSFET family with fast body diode. F2 series provide all benefits of a fast switching SJ-MOSFET while offering an extremely fast body diode. WMOS™ F2 makes especially resonant switching applications more reliable.

Features

- $V_{DS} = 700V @ T_{j,max}$
- Typ. $R_{DS(on)} = 0.037\Omega$
- 100% UIS tested
- Pb-free plating, Halogen free

Applications

LED Lighting, Charger, Adapter, PC, LCD TV, Server



Absolute Maximum Ratings

| Parameter | Symbol | WMJ80N65F2 | Unit |
|---------------------------------------------------------------|------------------|-------------|------|
| Drain-source voltage | V_{DSS} | 650 | V |
| Continuous drain current ¹⁾ ($T_C = 25^\circ C$) | I_D | 80 | A |
| ($T_C = 100^\circ C$) | | 45 | A |
| Pulsed drain current ²⁾ | I_{DM} | 245 | A |
| Gate-source voltage | V_{GS} | ± 30 | V |
| Avalanche energy, single pulse ³⁾ | E_{AS} | 850 | mJ |
| Avalanche energy, repetitive ²⁾ | E_{AR} | 1.2 | mJ |
| Avalanche current, repetitive ²⁾ | I_{AR} | 6 | A |
| Power dissipation ($T_C = 25^\circ C$) | P_D | 410 | W |
| - Derate above $25^\circ C$ | | 3.28 | W/°C |
| Operating and storage temperature range | T_{j}, T_{stg} | -55 to +150 | °C |
| Continuous diode forward current | I_S | 80 | A |
| Diode pulse current | $I_{S,pulse}$ | 245 | A |

Thermal Characteristics

| Parameter | Symbol | WMJ80N65F2 | Unit |
|-----------------------------------------|-----------------|------------|------|
| Thermal resistance, junction-to-case | $R_{\theta JC}$ | 0.35 | °C/W |
| Thermal resistance, junction-to-ambient | $R_{\theta JA}$ | 62 | °C/W |

Electrical Characteristics $T_c = 25^\circ\text{C}$, unless otherwise noted

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|--------------------------------------|---------------|---------------------------------------------------------------------------------------------------|------|-------|-------|---------------|
| Static characteristics | | | | | | |
| Drain-source breakdown voltage | BV_{DSS} | $V_{GS}=0\text{ V}, I_D=1\text{ mA}$ | 650 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=0.25\text{mA}$ | 2 | 3 | 4 | V |
| Drain cut-off current | I_{DSS} | $V_{DS}=650\text{ V}, V_{GS}=0\text{V},$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | - | - | 80 | μA |
| Gate leakage current, forward | I_{GSSF} | $V_{GS}=20\text{V}, V_{DS}=0\text{V}$ | - | - | 500 | nA |
| Gate leakage current, reverse | I_{GSSR} | $V_{GS}=-20\text{V}, V_{DS}=0\text{V}$ | - | - | -500 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=10\text{ V}, I_D=20\text{A}$ $T_j = 25^\circ\text{C}$ | - | 0.037 | 0.044 | Ω |
| Dynamic characteristics | | | | | | |
| Input capacitance | C_{iss} | $V_{DS}= 100\text{V}, V_{GS}= 0\text{V},$ | - | 6070 | - | pF |
| Output capacitance | C_{oss} | $f = 1\text{ MHz}$ | - | 220 | - | |
| Reverse transfer capacitance | C_{rss} | | - | 3.5 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 300\text{V}, I_D = 30\text{A}$ | - | 64 | - | ns |
| Rise time | t_r | $R_G = 25\Omega, V_{GS}=10\text{V}$ | - | 69 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 307 | - | |
| Fall time | t_f | | - | 56 | - | |
| Gate charge characteristics | | | | | | |
| Gate to source charge | Q_{gs} | $V_{DD}=480\text{V}, I_D=30\text{A},$ | - | 26.2 | - | nC |
| Gate to drain charge | Q_{gd} | $V_{GS}=0\text{ to }10\text{V}$ | - | 30.1 | - | |
| Gate charge total | Q_g | | - | 103.0 | - | |
| Gate plateau voltage | $V_{plateau}$ | | - | 5.0 | - | V |
| Reverse diode characteristics | | | | | | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=20\text{A}$ | - | - | 1.2 | V |
| Reverse recovery time | t_{rr} | $V_R=50\text{V}, I_F=30\text{A},$ | - | 190 | - | ns |
| Reverse recovery charge | Q_{rr} | $di_f/dt=100\text{A}/\mu\text{s}$ | - | 3.5 | - | μC |
| Peak reverse recovery current | I_{rrm} | | - | 32 | - | A |

Notes:

- Limited by $T_{j\text{max}}$. Maximum duty cycle $D=0.5$.
- Repetitive rating: pulse width limited by maximum junction temperature.
- $I_{AS} = 6\text{ A}, V_{DD} = 50\text{V}, R_G = 25\Omega$, starting $T_j = 25^\circ\text{C}$.

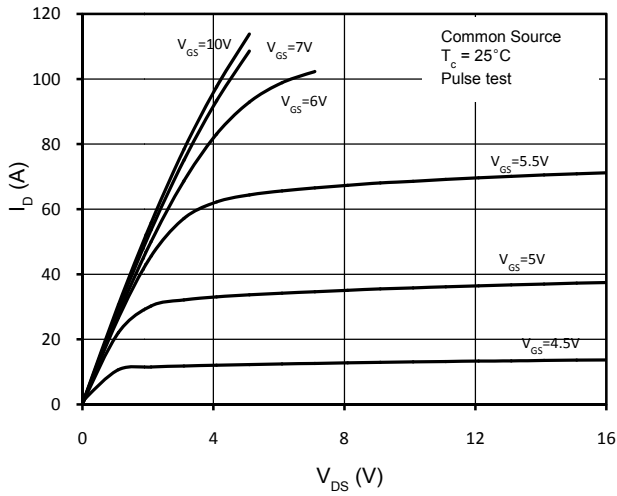


Figure 1. On-Region Characteristics

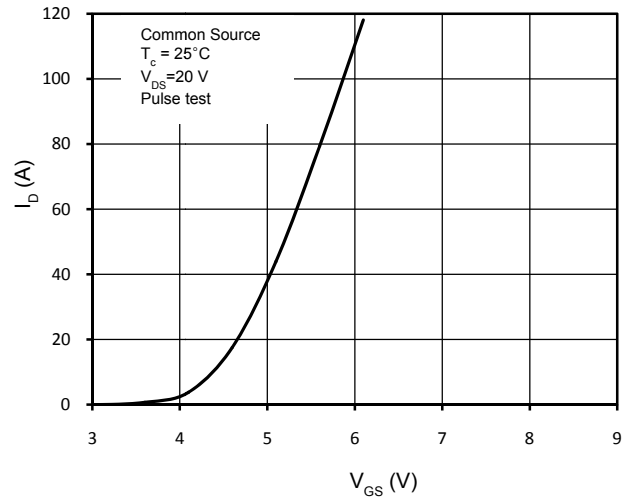


Figure 2. Transfer Characteristics

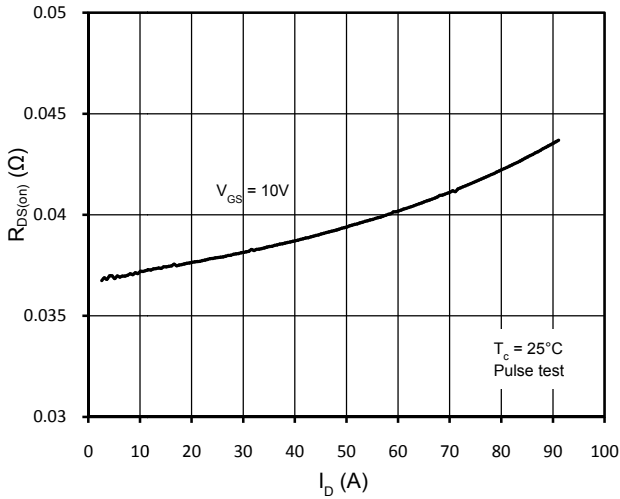


Figure 3. Static Drain-Source On Resistance

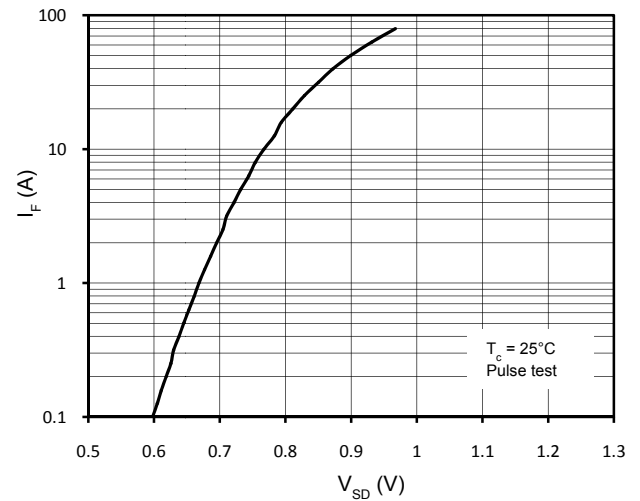


Figure 4. Body-Diode Forward Characteristics



Figure 5. Normalized BV_{DS} vs. Temperature

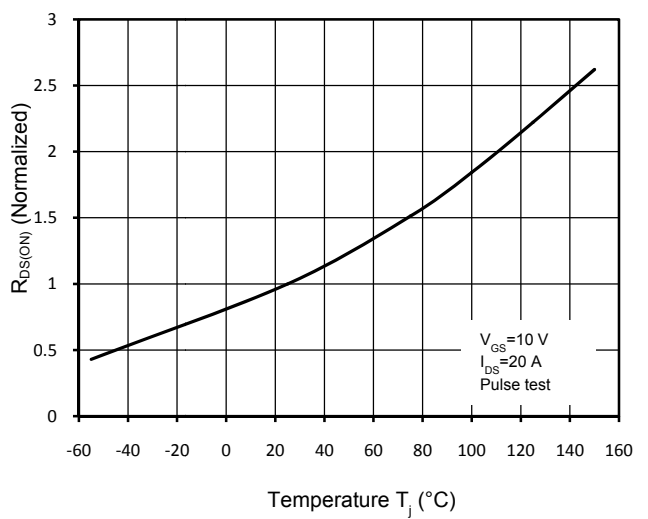


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

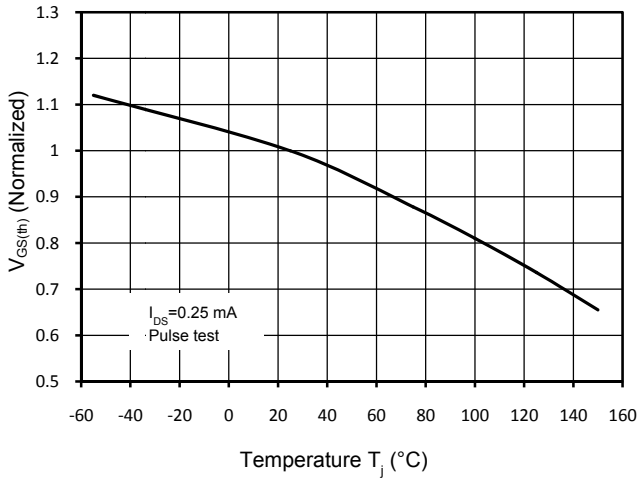


Figure 7. Threshold Voltage vs. Temperature

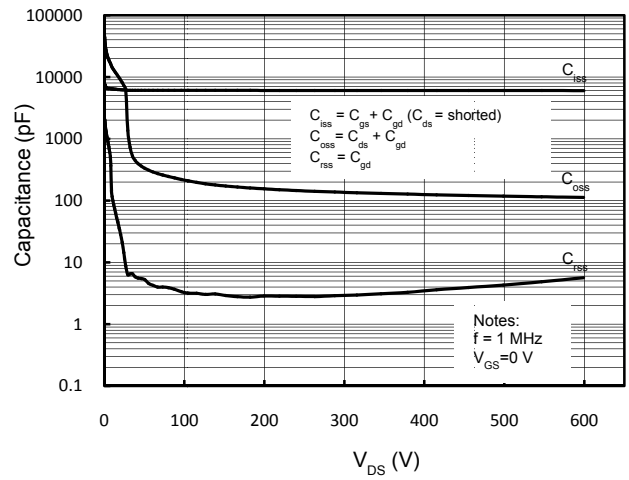


Figure 8. Capacitance Characteristics

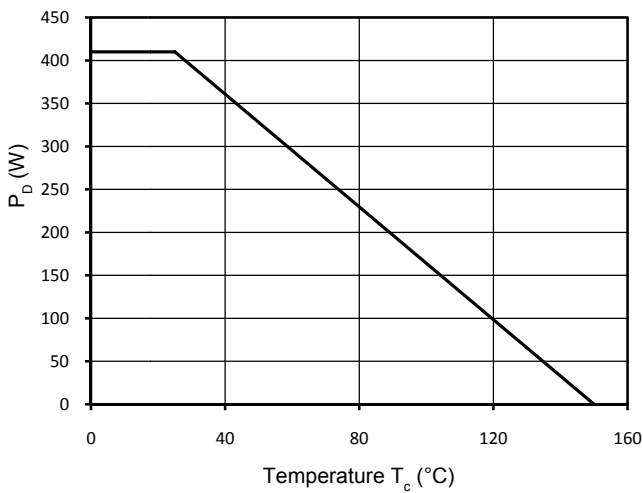


Figure 9. Power Dissipation

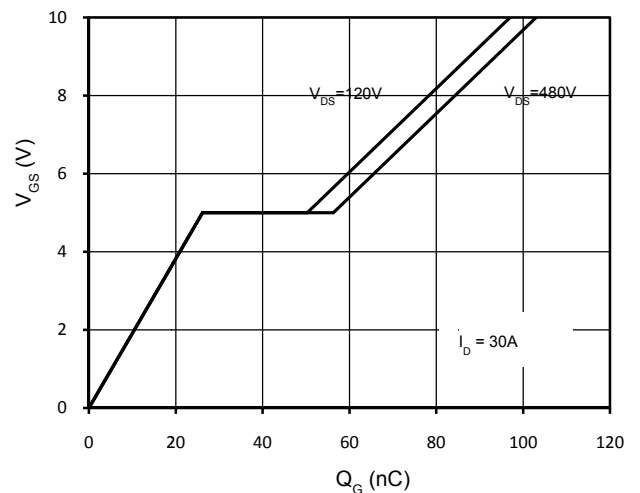


Figure 10. Gate Charge Characteristics

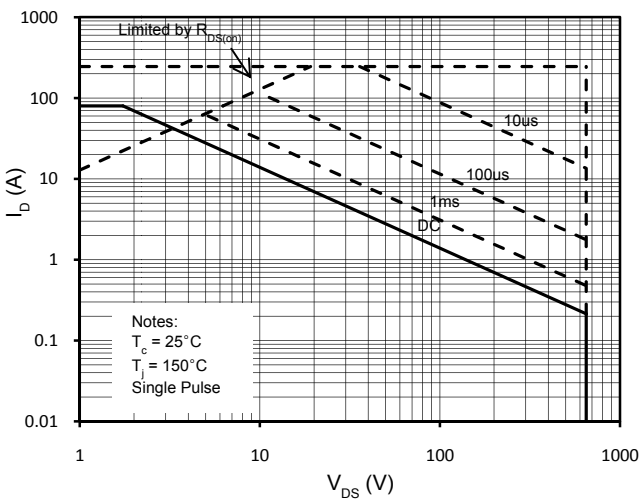


Figure 11. Maximum Safe Operating Area

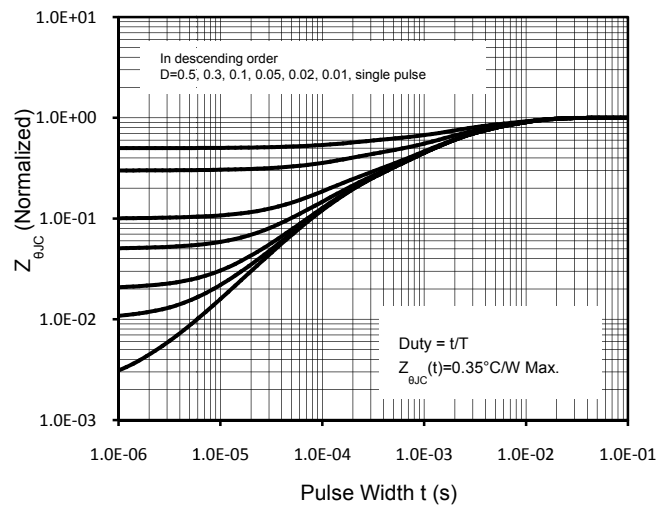
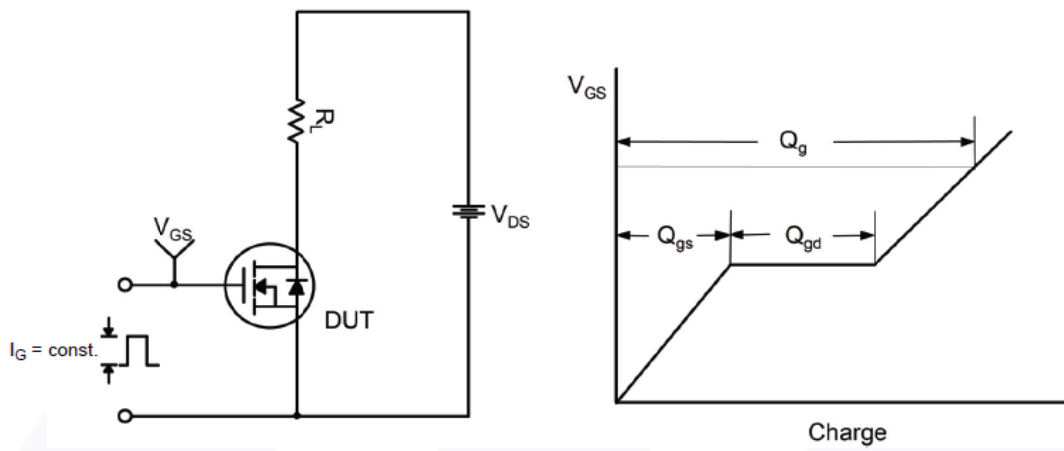


Figure 12. Transient Thermal Response Curve

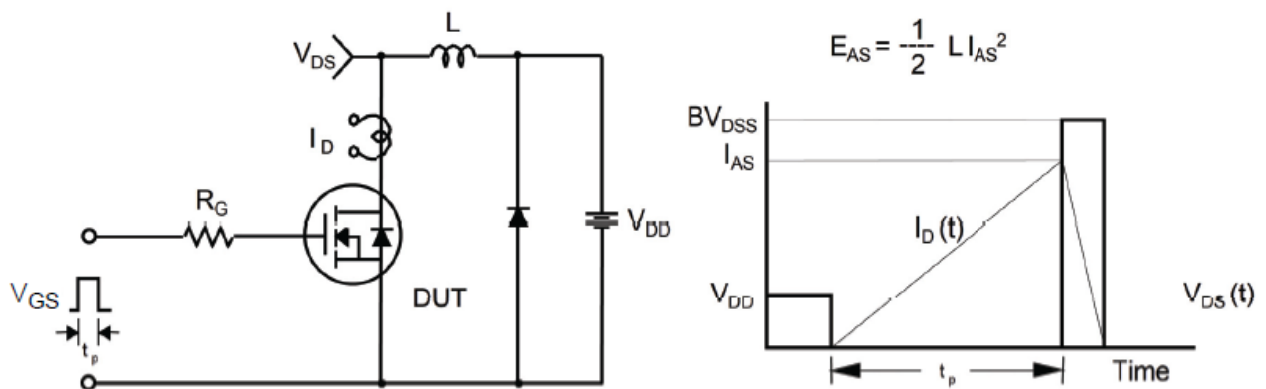
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms

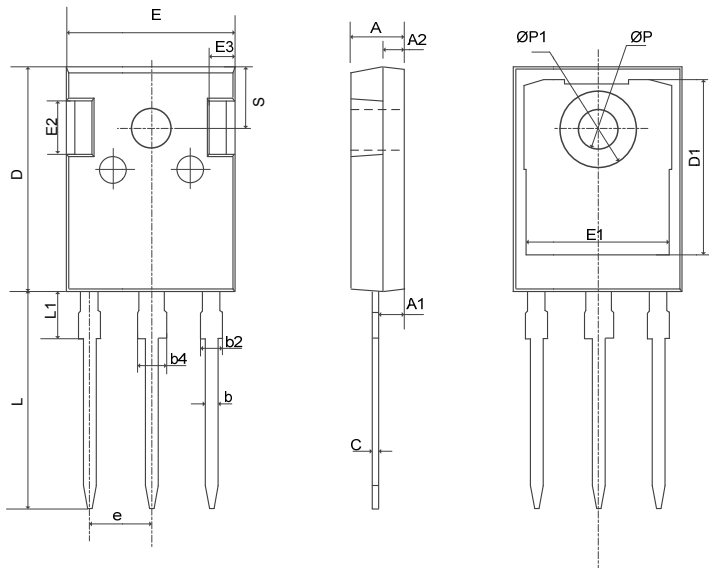


Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for TO-247

COMMON DIMENSIONS

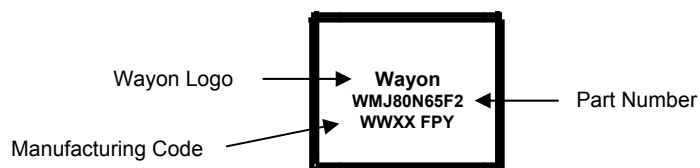


| SYMBOL | MM | |
|--------|---------|-------|
| | MIN | MAX |
| A | 4.80 | 5.21 |
| A1 | 2.21 | 2.61 |
| A2 | 1.85 | 2.16 |
| b | 1.07 | 1.36 |
| b2 | 1.91 | 2.41 |
| b4 | 2.87 | 3.38 |
| c | 0.51 | 0.75 |
| D | 20.70 | 21.30 |
| D1 | 16.25 | 17.65 |
| E | 15.50 | 16.13 |
| E1 | 12.38 | 13.60 |
| E2 | 3.68 | 5.20 |
| E3 | 1.00 | 2.70 |
| e | 5.44BSC | |
| L | 19.62 | 20.32 |
| L1 | — | 4.40 |
| ØP | 3.40 | 3.80 |
| ØP1 | — | 7.30 |
| S | 6.15BSC | |

Ordering Information

| Part | Package | Marking | Packing method |
|------------|---------|------------|----------------|
| WMJ80N65F2 | TO-247 | WMJ80N65F2 | Tube |

Marking Information




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