

650V N-CHANNEL ENHANCEMENT MODE MOSFET

MAIN CHARACTERISTICS

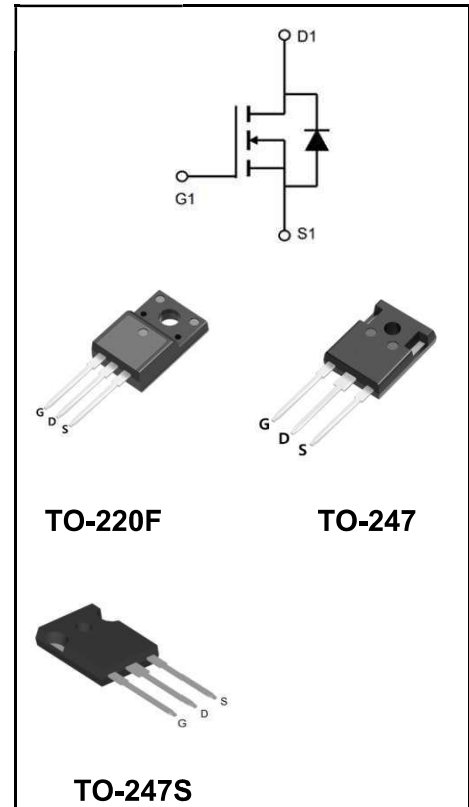
| | |
|--|---------------------|
| I_D | 20A |
| V_{DSS} | 650V |
| R_{DS(on)-typ(@V_{GS}=10V)} | <0.5Ω (Type:0.37 Ω) |

Features

- ◆Fast Switching
- ◆Low ON Resistance
- ◆Low Gate Charge
- ◆100% Single Pulse avalanche energy Test
- ◆LeadfreeincomplywithEURoHS2011/65/EUdirectives

Mechanical Data

- ◆Case: Molded plastic
- ◆Mounting Position: Any
- ◆Molded Plastic: UL Flammability Classification Rating 94V-0
- ◆Solder bath temperature275℃maximum,10s per JESD22-106



Product Specification Classification

| Part Number | Package | Marking | Pack |
|-------------|---------|--------------------|------------|
| YFW20N65AF | TO-220F | YFW 20N65AF XXXXX | 50PCS/Tube |
| YFW20N65AP | TO-247 | YFW 20N65AP XXXXX | 30PCS/Tube |
| YFW20N65APS | TO-247S | YFW 20N65APS XXXXX | 30PCS/Tube |

Maximum Ratings at Tc=25°C unless otherwise specified

| Characteristics | Symbols | Value | | Units |
|---|------------------------|-------------|----------|-------------|
| | | 220F | 247/247S | |
| Drain-Source Voltage | V_{DS} | 650 | | V |
| Gate-Source Voltage | V_{GS} | ±30 | | V |
| Continue Drain Current | I_D | 20 | | A |
| -Continuous (TC = 100°C) | | 13 | | |
| Pulsed Drain Current (Note1) | I_{DM} | 80 | | A |
| Power Dissipation | P_D | 85 | 230 | W |
| -Derate above 25°C | | 0.65 | 0.58 | W/°C |
| Single Pulse Avalanche Energy (Note2) | E_{AS} | 1250 | | mJ |
| Avalanche Current (Note 1) | I_{AR} | 20 | | A |
| Repetitive Avalanche Energy (Note 1) | E_{AS} | 37 | | mJ |
| Operating Temperature Range | T_J | 150 | | °C |
| Storage Temperature Range | T_{STG} | -55 to +150 | | °C |
| Thermal Resistance, Junction to Case | R_{θJC} | 1.47 | 0.5 | °C/W |
| Thermal Resistance, Junction to Ambient | R_{θJA} | 62.5 | 48.5 | °C/W |

Maximum Ratings at Tc=25°C unless otherwise specified

| Characteristics | Test Condition | Symbols | Min | Typ | Max | Units |
|----------------------------------|---|---------------------------|-----|------|------|-----------|
| Drain-Source Breakdown Voltage | V _{GS} = 0 V, I _D = 250 μA | BV_{DSS} | 650 | - | - | V |
| Drain-Source Leakage Current | V _{DS} = 650 V, V _{GS} = 0 V | I_{DSS} | - | - | 1 | uA |
| | V _{DS} = 520 V, T _c = 125°C | | - | - | 10 | |
| Gate Leakage Current | V _{GS} = ± 30 V, V _{DS} = 0 V | I_{GSS} | - | - | ±100 | nA |
| Gate-Source Threshold Voltage | V _{DS} = V _{GS} , I _D = 250 μA | V_{GS(th)} | 2 | - | 4 | V |
| Drain-Source On-State Resistance | V _{GS} = 10 V, I _D = 10A | R_{DS(on)} | - | 0.37 | 0.5 | Ω |
| Forward Transconductance | V _{DS} = 40 V, I _D = 10 A | g_{fs} | - | 18 | - | S |
| Input Capacitance | V _{GS} = 0 V, V _{DS} = 25 V, f = 1MHz | C_{iss} | - | 2567 | - | pF |
| Output Capacitance | | C_{oss} | - | 290 | - | |
| Reverse Transfer Capacitance | | C_{rss} | - | 20 | - | |
| Turn-on Delay Time | I _D = 20, V _{DD} = 325V, R _G =10Ω(Note3,4) | td(ON) | - | 39 | - | nS |
| Rise Time | | tr | - | 80 | - | |
| Turn-Off Delay Time | | td(OFF) | - | 94 | - | |
| Fall Time | | tf | - | 63 | - | |
| Total Gate Charge | I _D =20 A, V _{DD} = 520 V, V _{GS} = 10 V(Note3,4) | Q_G | - | 65 | - | nC |
| Gate to Source Charge | | Q_{GS} | - | 14 | - | |
| Gate to Drain Charge | | Q_{GD} | - | 24 | - | |

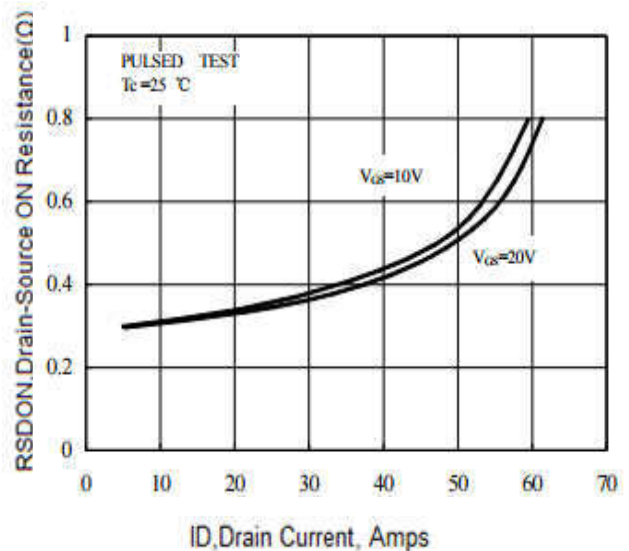
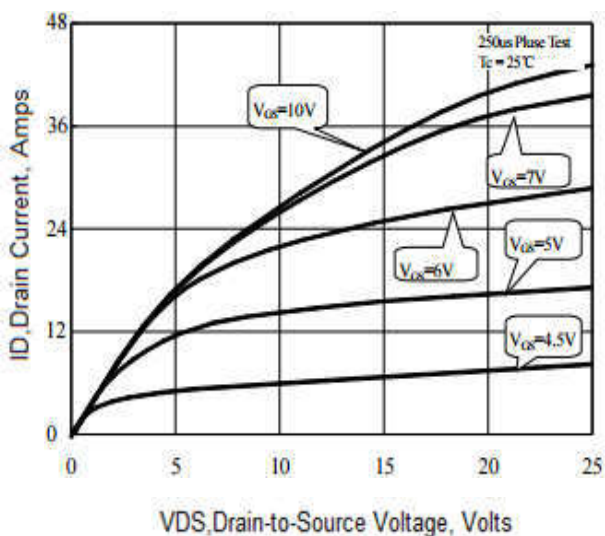
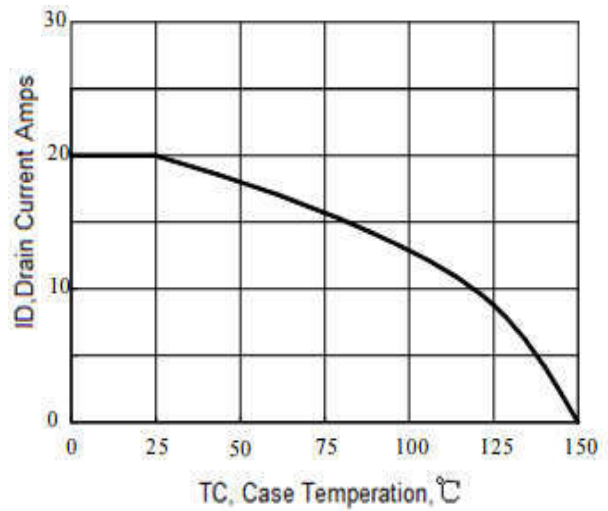
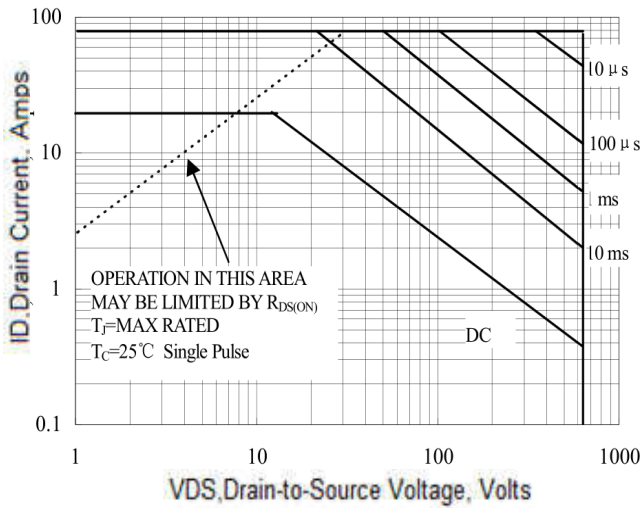
Source-Drain Diode Characteristics at Ta=25°C unless otherwise specified

| Characteristics | Test Condition | Symbols | Min | Typ | Max | Units |
|---------------------------------------|---|-----------------------|-----|-----|-----|-----------|
| Maximun Body-Diode Continuous Current | | I_S | - | - | 20 | A |
| Maximun Body-Diode Pulsed Current | | I_{SM} | - | - | 80 | A |
| Drain-Source Diode Forward Voltage | I _{SD} = 20A | V_{SD} | - | - | 1.4 | V |
| Reverse Recovery Time | I _{SD} = 20A, V _{GS} = 0 V, | trr | - | 630 | - | nS |
| Reverse Recovery Charge | dI _F / dt = 100 A/μs(Note3) | Qrr | - | 7.4 | - | uC |

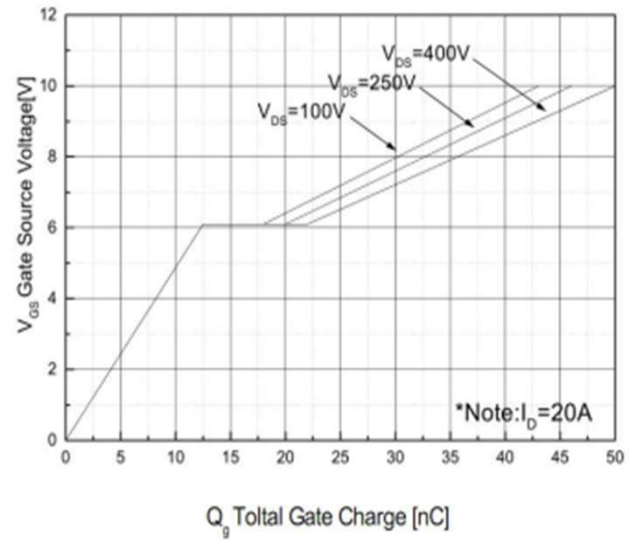
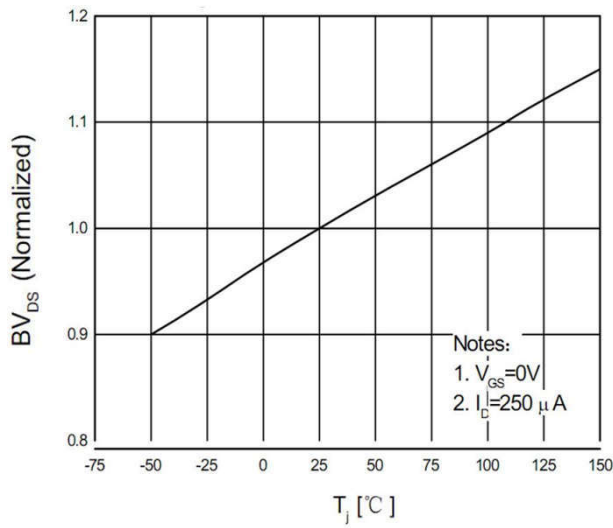
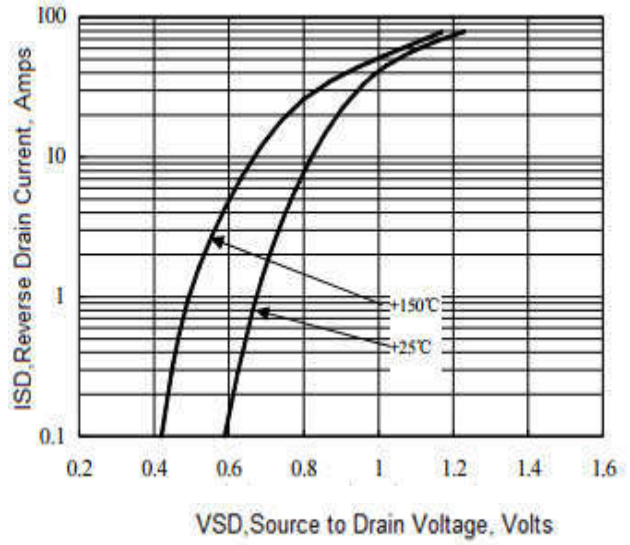
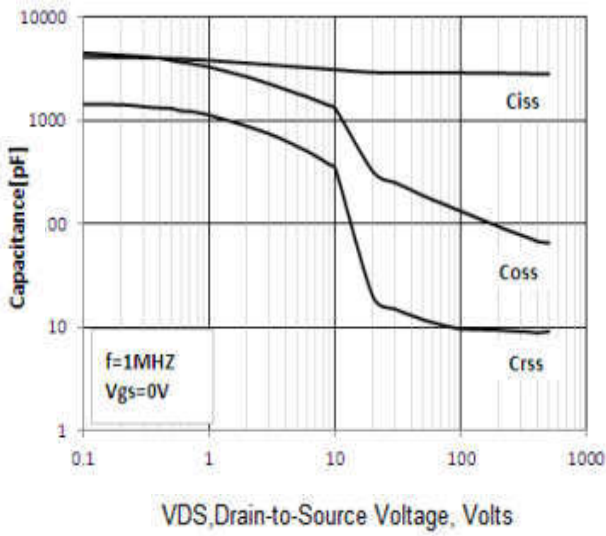
Note:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. IAS = 20A, VDD = 50 V, L = 6mH, RG = 25Ω, starting TJ = 25°C.
3. ulse test: Pulse Width ≤ 300 μ s, Duty Cycle ≤ 2%.
4. Essentially Independent of Operating Temperature.

Ratings and Characteristic Curves



Ratings and Characteristic Curves



Package Outline Dimensions Millimeters

TO-220F

| | | | |
|------------------------------|------|----------|-------|
| | Dim. | Min. | Max. |
| | A | 9.95 | 10.25 |
| | B | 2.95 | 3.25 |
| | C | 1.25 | 1.45 |
| | D | 12.95 | 13.25 |
| | E | 0.50 | 0.65 |
| | F | 3.1 | 3.3 |
| | G | 1.30 | 1.45 |
| | H | Typ 2.54 | |
| | I | Typ 5.08 | |
| | J | 4.60 | 4.75 |
| | K | 2.50 | 2.65 |
| | L | 6.35 | 6.55 |
| | M | 15.4 | 16.0 |
| | N | 2.75 | 3.05 |
| O | 0.48 | 0.52 | |
| P | 0.76 | 0.84 | |
| All Dimensions in millimeter | | | |

TO-247

| | | | |
|------------------------------|----------|------|------|
| | Dim. | Min. | Max. |
| | A | 15 | 16 |
| | B | 20 | 21 |
| | C | 41 | 42 |
| | D | 5 | 6 |
| | E | 4 | 5 |
| | F | 2.5 | 3.5 |
| | G | 1.75 | 2.5 |
| | H | 3 | 3.5 |
| | I | 8 | 10 |
| | J | 4.9 | 5.1 |
| | K | 1.9 | 2.1 |
| | L | 3.5 | 4 |
| | M | 4.75 | 5.25 |
| | N | 2 | 3 |
| O | 0.55 | 0.75 | |
| P | Typ 5.08 | | |
| Q | 1.2 | 1.3 | |
| All Dimensions in millimeter | | | |

Package Outline Dimensions Millimeters

TO-247S

| | | | |
|------------------------------|----------|------|------|
| | Dim. | Min. | Max. |
| | A | 15 | 16 |
| | B | 19.5 | 20.5 |
| | C | 33.5 | 35.5 |
| | D | 5 | 6 |
| | E | 3.5 | 4.5 |
| | F | 2.5 | 3.5 |
| | G | 1.75 | 2.5 |
| | H | 3 | 4 |
| | I | 9 | 11 |
| | J | 4.9 | 5.1 |
| | K | 1 | 1.3 |
| | L | 3.75 | 4.25 |
| | M | 4.75 | 5.25 |
| | N | 1.8 | 2.2 |
| O | 0.45 | 0.6 | |
| P | Typ 5.08 | | |
| Q | 1.2 | 1.3 | |
| All Dimensions in millimeter | | | |