

/ Descriptions

TO-220 N MOS N-CHANNEL MOSFET in a TO-220 Plastic Package.

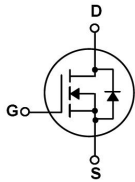
/ Features

Low gate charge, Low Crss , Fast switching.

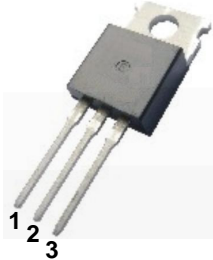
/ Applications

It is very suitable for various AC/DC power conversion in switching mode operation for system miniaturization and higher efficiency.

/ Equivalent Circuit



/ Pinning



PIN1 G PIN 2 D PIN 3 S

/ h_{FE} Classifications & Marking

See Marking Instructions.

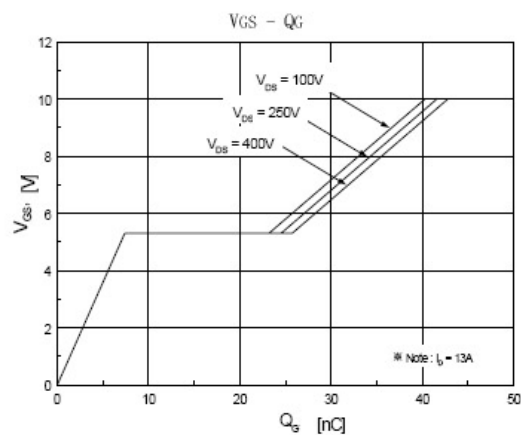
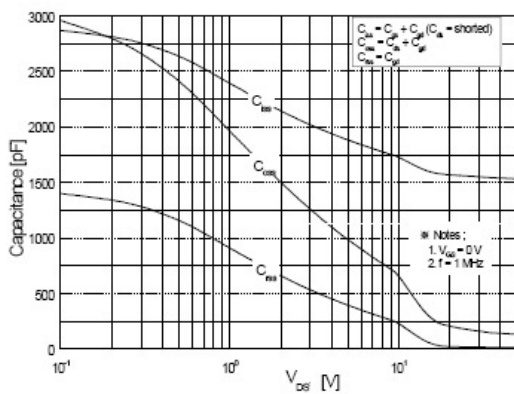
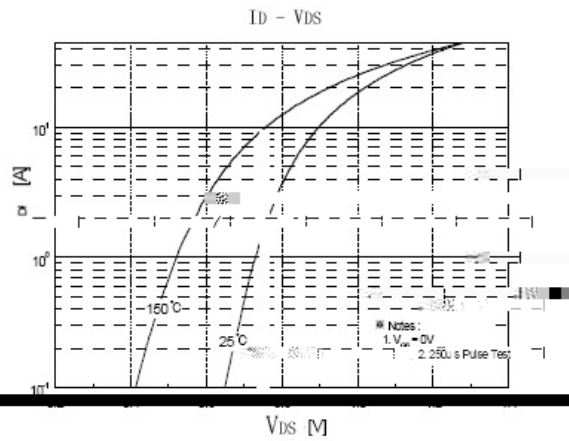
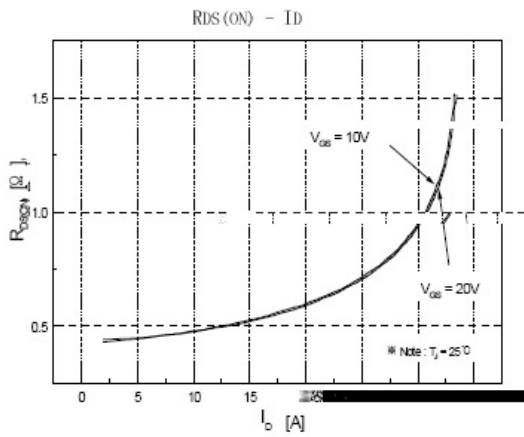
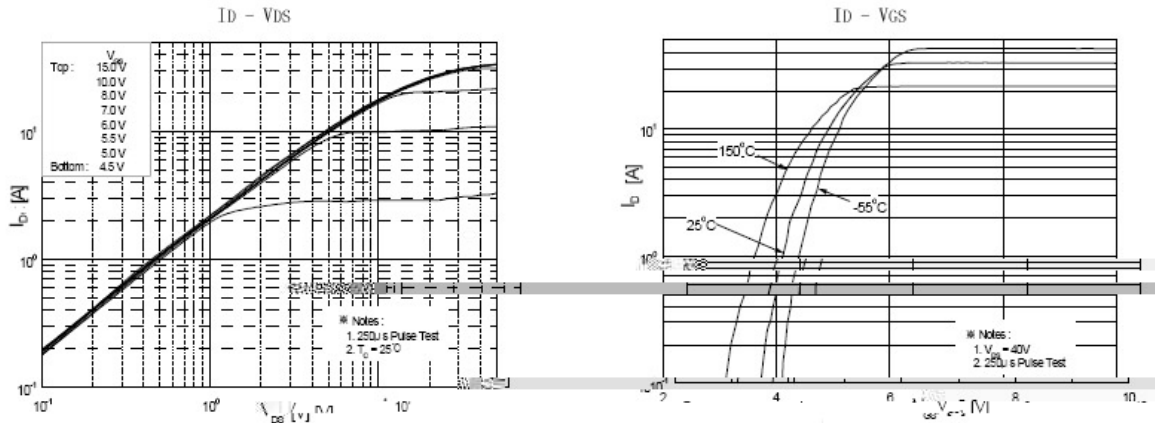
/ Absolute Maximum Ratings(Ta=25)

| Parameter | Symbol | Rating | Unit |
|---|----------------|------------|------|
| Drain-Source Voltage | V_{DSS} | 500 | V |
| Drain Current | $I_D(T_C=25)$ | 13 | A |
| Drain Current | $I_D(T_C=100)$ | 8 | A |
| Drain Current - Pulsed | I_{DM} | 52 | A |
| Gate-Source Voltage | V_{GSS} | ±30 | V |
| Single Pulsed Avalanche Energy | E_{AS} | 860 | mJ |
| Repetitive Avalanche Energy | E_{AR} | 19.5 | mJ |
| Avalanche Current | I_{AR} | 13 | A |
| Power Dissipation | $P_D(T_C=25)$ | 195 | W |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | |

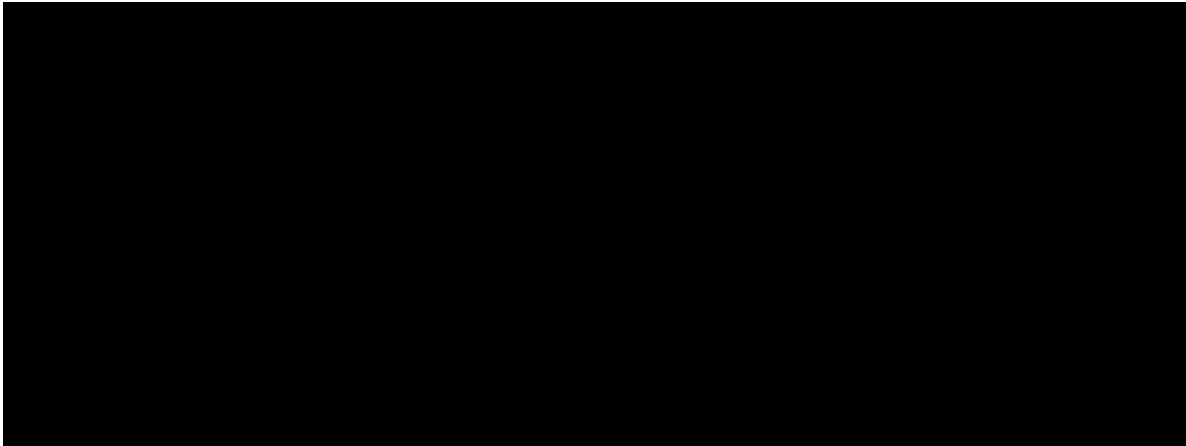
/ Electrical Characteristics(Ta=25)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|------------------------------------|--------------|--|-----|------|------|---------|
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V$ $I_D=250\mu A$ | 500 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=500V$ $V_{GS}=0V$ | | | 1.0 | μA |
| | | $V_{DS}=400V$ $T_C=125$ | | | 10 | μA |
| Gate-Body Leakage Current, Forward | I_{GSS} | $V_{GS}=\pm 30V$ $V_{DS}=0V$ | | | ±0.1 | μA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}$ $I_D=250\mu A$ | 2.0 | | 4.0 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=10V$ $I_D=6.5A$ | | 0.39 | 0.48 | |
| Forward Transconductance | g_{FS} | $V_{DS}=40V$ $I_D=6.5A$ | | 15 | | S |
| Drain-Source Diode Forward Voltage | V_{SD} | $V_{GS}=0V$ $I_S=13A$ | | | 1.4 | V |
| Input Capacitance | C_{iss} | $V_{DS}=25V$ $V_{GS}=0V$ $f=1.0MHz$ | | 1580 | 2055 | pF |
| Output Capacitance | C_{oss} | | | 180 | 235 | pF |
| Reverse Transfer Capacitance | C_{rss} | | | 20 | 25 | pF |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}=300V$ $I_D=13A$ $R_G=25$ | | 25 | 60 | ns |
| Turn-On Rise Time | t_r | | | 100 | 210 | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 130 | 270 | ns |
| Turn-Off Fall Time | t_f | | | 100 | 210 | ns |

/ Electrical Characteristic Curve

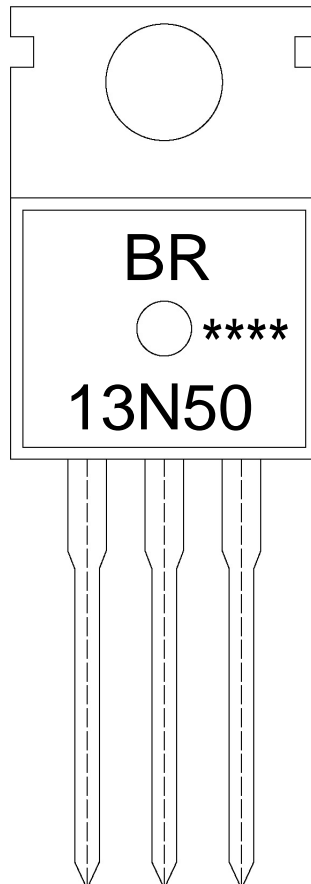


/ Package Dimensions



| Symbol | Dimensions in Millimeters | | Symbol | Dimensions in Millimeter | |
|-----------------|---------------------------|------|---------------|--------------------------|-----|
| | Min. | Max | | Min. | Max |
| Δ | 9.8 | 10.2 | C | 1.2 | 1.4 |
| $\phi 5.6$ | 5.6 | 5.6 | 3.6 ± 0.1 | 3.6 | 3.7 |
| 9.4 | | 15.7 | 16.1 | B10 | 9.5 |
| 2.6 | | 12.6 | 13.6 | C1 | 2.2 |
| 0.9 | | b1 | 10.6 | d1 | 0.7 |
| 1.25 ± 0.02 | | 1.25 | 1.25 | 0.4 | 0.4 |
| 1.45 | | 1.45 | 0.2 | | |

/ Marking Instructions



BR

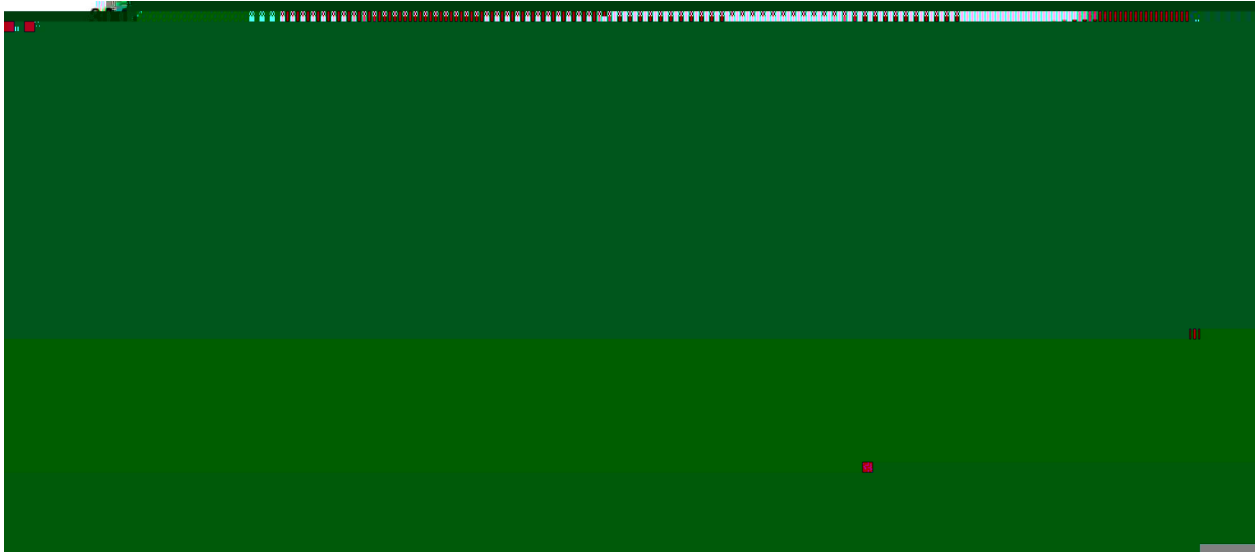
Note:

BR: Company Code

13N50: Product Type.

****: Lot No. Code, code change with Lot No.

() / Temperature Profile for Dip Soldering(Pb-Free)



- | | | | | | |
|---|-----|-----|----|----------|---|
| 1 | 25 | 150 | 60 | 90sec; | Note: |
| 2 | 255 | 5 | 5 | 0.5sec; | 1.Preheating:25~150 , Time:60~90sec. |
| 3 | | | 2 | 10 /sec. | 2.Peak Temp.:255 5 , Duration:5 0.5sec. |
| | | | | | 3. Cooling Speed: 2~10 /sec. |

/ Resistance to Soldering Heat Test Conditions

270 5 10 1 sec. Temp.:270±5 Time:10±1 sec

/ Packaging SPEC.

/ BULK

| Package Type | Units | | | | | Dimension (unit mm ³) | | |
|--------------|----------------|---------------------|----------------------|----------------------------|----------------------|-----------------------------------|-------------|-------------|
| | Units/Bag / | Bags/Inner Box / | Units/Inner Box / | Inner Boxes/Outer Box / | Units/Outer Box / | Bag | Inner Box | Outer Box |
| TO-220/F | 200 | 10 | 2,000 | 5 | 10,000 | 135×190 | 237×172×102 | 560×245×195 |

/ TUBE

| Package Type | Units | | | | | Dimension (unit mm ³) | | |
|--------------|-----------------|----------------------|----------------------|----------------------------|----------------------|-----------------------------------|------------|-------------|
| | Units/Tube / | Tubes/Inner Box / | Units/Inner Box / | Inner Boxes/Outer Box / | Units/Outer Box / | Tube | Inner Box | Outer Box |
| TO-220/F | 50 | 20 | 1,000 | 5 | 5,000 | 532×31.4×5.5 | 555×164×50 | 575×290×180 |

/ Notices