

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|-------|------------------|---------------------|----------------|
| BUZ21 | 100 V | 0.1 Ω | 19 A |

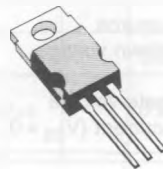
- 100 VOLTS - FOR DC/DC CONVERTERS
- HIGH CURRENT
- RATED FOR UNCLAMPED INDUCTIVE SWITCHING (ENERGY TEST) ♦
- ULTRA FAST SWITCHING
- EASY DRIVE - FOR REDUCED COST AND SIZE

INDUSTRIAL APPLICATIONS:

- UNINTERRUPTABLE POWER SUPPLIES
- MOTOR CONTROLS

N - channel enhancement mode POWER MOS field effect transistor. Easy drive and very fast switching times make this POWER MOS transistor ideal for high speed switching applications.

Typical applications include DC/DC converters, UPS, battery chargers, secondary regulators servo control, audio power amplifiers and robotics.


TO-220
**INTERNAL SCHEMATIC
DIAGRAM**

ABSOLUTE MAXIMUM RATINGS

| | | | |
|------------------|--|------------|----|
| V _{DS} | Drain-source voltage (V _{GS} = 0) | 100 | V |
| V _{DGR} | Drain-gate voltage (R _{GS} = 20 KΩ) | 100 | V |
| V _{GS} | Gate-source voltage | ±20 | V |
| I _D | Drain current (continuous) T _c = 30°C | 19 | A |
| I _{DM} | Drain current (pulsed) | 75 | A |
| P _{tot} | Total dissipation at T _c < 25°C | 75 | W |
| T _{stg} | Storage temperature | -55 to 150 | °C |
| T _j | Max. operating junction temperature | 150 | °C |
| | DIN humidity category (DIN 40040) | E | |
| | IEC climatic category (DIN IEC 68-1) | 55/150/56 | |

♦ Introduced in 1988 week 44

THERMAL DATA

| | | | | |
|------------------|-------------------------------------|-----|------|------|
| $R_{thj - case}$ | Thermal resistance junction-case | max | 1.67 | °C/W |
| $R_{thj - amb}$ | Thermal resistance junction-ambient | max | 75 | °C/W |

ELECTRICAL CHARACTERISTICS ($T_j = 25^\circ\text{C}$ unless otherwise specified)

| Parameters | Test Conditions | Min. | Typ. | Max. | Unit |
|------------|-----------------|------|------|------|------|
|------------|-----------------|------|------|------|------|

OFF

| | | | | | | |
|----------------|--|--|---------------------------|-----|-------------|--------------------------------|
| $V_{(BR) DSS}$ | Drain-source breakdown voltage | $I_D = 250 \mu\text{A}$ | $V_{GS} = 0$ | 100 | | V |
| I_{DSS} | Zero gate voltage drain current ($V_{GS} = 0$) | $V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$ | $T_j = 125^\circ\text{C}$ | | 250 1000 | μA μA |
| I_{GSS} | Gate-body leakage current ($V_{DS} = 0$) | $V_{GS} = \pm 20 \text{ V}$ | | | ± 100 | nA |

ON

| | | | | | | | |
|---------------|-----------------------------------|-------------------------|----------------------|-----|--|-----|----------|
| $V_{GS (th)}$ | Gate threshold voltage | $V_{DS} = V_{GS}$ | $I_D = 1 \text{ mA}$ | 2.1 | | 4 | V |
| $R_{DS (on)}$ | Static drain-source on resistance | $V_{GS} = 10 \text{ V}$ | $I_D = 9 \text{ A}$ | | | 0.1 | Ω |

ENERGY TEST

| | | | | | | | |
|-----------|--|--|-----------------------|----|--|--|---|
| I_{UIS} | Unclamped inductive switching current (single pulse) | $V_{DD} = 30 \text{ V}$ starting $T_j = 25^\circ\text{C}$ | $L = 100 \mu\text{H}$ | 19 | | | A |
|-----------|--|--|-----------------------|----|--|--|---|

DYNAMIC

| | | | | | | | |
|-----------|------------------------------|---|---------------------|-----|--|------|-----|
| g_{fs} | Forward transconductance | $V_{DS} = 25 \text{ V}$ | $I_D = 9 \text{ A}$ | 4.0 | | | mho |
| C_{iss} | Input capacitance | $V_{DS} = 25 \text{ V}$ $V_{GS} = 0$ | $f = 1 \text{ MHz}$ | | | 2000 | pF |
| C_{oss} | Output capacitance | | | | | 700 | pF |
| C_{rss} | Reverse transfer capacitance | | | | | 240 | pF |

SWITCHING

| | | | | | | | |
|-------------|---------------------|---|-------------------------|--|--|-----|----|
| $t_d (on)$ | Turn-on time | $V_{DD} = 30 \text{ V}$ $R_{GS} = 50 \Omega$ | $I_D = 3 \text{ A}$ | | | 45 | ns |
| t_r | Rise time | | $V_{GS} = 10 \text{ V}$ | | | 75 | ns |
| $t_d (off)$ | Turn-off delay time | | | | | 220 | ns |
| t_f | Fall time | | | | | 110 | ns |

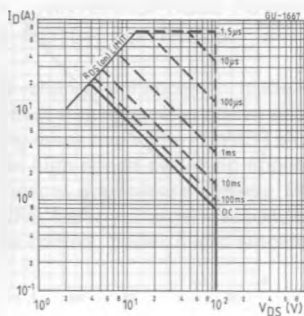
ELECTRICAL CHARACTERISTICS (Continued)

| Parameters | Test Conditions | Min. | Typ. | Max. | Unit |
|------------|-----------------|------|------|------|------|
|------------|-----------------|------|------|------|------|

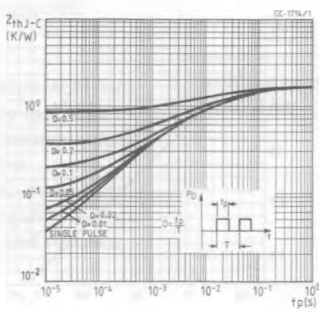
SOURCE DRAIN DIODE

| | | | | | |
|-----------------------|--|--------------------------|------------------------------------|-------------|---------------------|
| I_{SD} I_{SDM} | Source-drain current Source-drain current (pulsed) | $T_c = 25^\circ\text{C}$ | | 19 75 | A A |
| V_{SD} | Forward on voltage | $I_{SD} = 38\text{ A}$ | $V_{GS} = 0$ | 2.1 | V |
| t_{rr} Q_{rr} | Reverse recovery time Reverse recovered charge | $I_{SD} = 19\text{ A}$ | $di/dt = 100\text{ A}/\mu\text{s}$ | 200 0.25 | ns μC |

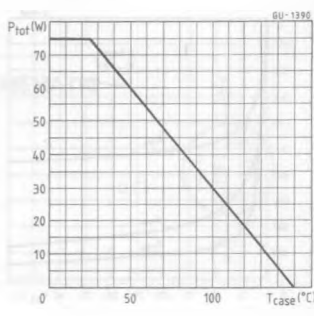
Safe operating areas



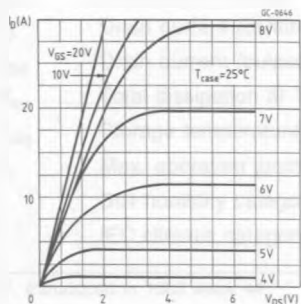
Thermal impedance



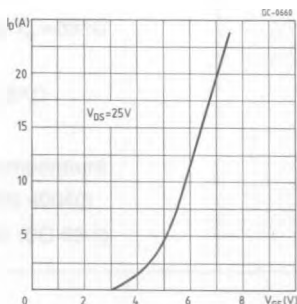
Derating curve



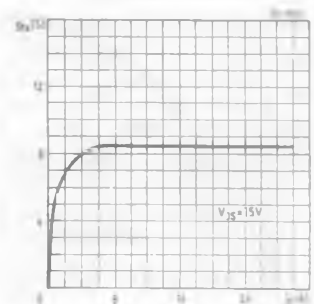
Output characteristics



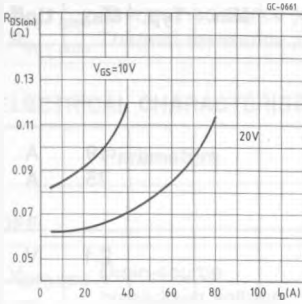
Transfer characteristics



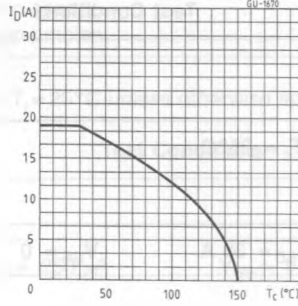
Transconductance



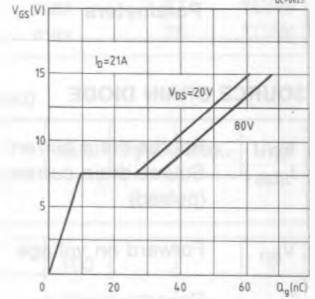
Static drain-source on resistance



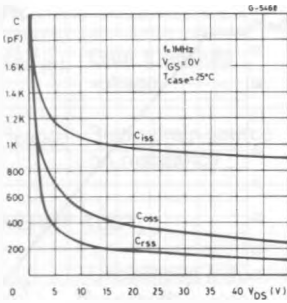
Maximum drain current vs temperature



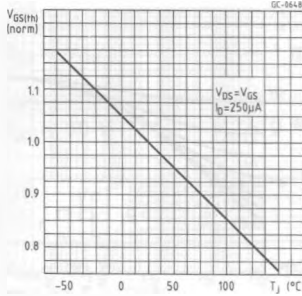
Gate charge vs gate-source voltage



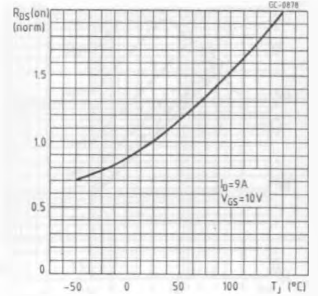
Capacitance variation



Gate threshold voltage vs temperature



Drain-source on resistance vs temperature



Source-drain diode forward characteristics

