

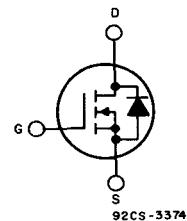
## N-Channel Enhancement-Mode Power Field-Effect Transistors

4.5 A, 500 V  
 $r_{DS(on)} = 1.5 \Omega$

### Features:

- SOA is power-dissipation limited
- Nanosecond switching speeds
- Linear transfer characteristics
- High input impedance
- Majority carrier device

N-CHANNEL ENHANCEMENT MODE

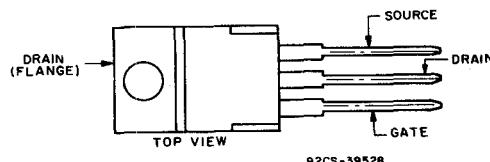


The BUZ 41 A is an n-channel enhancement-mode silicon-gate power field-effect transistor designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors requiring high speed and low gate-drive power. This type can be operated directly from integrated circuits.

The BUZ 41 A is supplied in the JEDEC TO-220AB plastic package.

TERMINAL DIAGRAM

TERMINAL DESIGNATION



JEDEC TO-220AB

### MAXIMUM RATINGS, Absolute-Maximum Values ( $T_c = 25^\circ C$ ):

DRAIN-SOURCE VOLTAGE .....	$V_{DSS}$	500	V
DRAIN-GATE VOLTAGE, $R_{DS} = 20 \text{ k}\Omega$ .....	$V_{DG}$	500	V
GATE-SOURCE VOLTAGE .....	$V_{GS}$	$\pm 20$	V
DRAIN CURRENT, RMS Continuous $T_c = 35^\circ C$ .....	$I_D$	4.5	A
Pulsed $T_c = 25^\circ C$ .....	$I_{DM}$	18	A
POWER DISSIPATION @ $T_c = 25^\circ C$ .....	$P_T$	75	W
OPERATING AND STORAGE TEMPERATURE .....	$T_j, T_{stg}$	-55 to +150	$^\circ C$
DIN HUMIDITY CATEGORY — DIN 40040 .....		E	
IEC CLIMATIC CATEGORY — DIN IEC 68-1 .....		55/150/56	

ELECTRICAL CHARACTERISTICS At Case Temperature ( $T_C$ ) = 25°C Unless Otherwise Specified

CHARACTERISTIC	TEST CONDITIONS	LIMITS			UNITS
		MIN.	TYP.	MAX.	
Drain-Source Breakdown Voltage $BV_{DSS}$	$V_{GS} = 0 \text{ V}$ $I_D = 0.25 \text{ mA}$	500	—	—	V
Gate-Threshold Voltage $V_{GTH}$	$V_{GS} = V_{GS}$ $I_D = 1 \text{ mA}$	2.1	3	4	
Zero-Gate Voltage Drain Current $I_{DS(0)}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $V_{DS} = 500 \text{ V}, V_{GS} = 0 \text{ V}$	—	20 100	250 1000	$\mu\text{A}$
Gate-Source Leakage Current $I_{GSS}$	$V_{GS} = 20 \text{ V}$ $V_{DS} = 0 \text{ V}$	—	10	100	
Drain-Source On Resistance $r_{DS(on)}$	$V_{GS} = 10 \text{ V}$ $I_D = 2.5 \text{ A}$	—	1.4	1.5	$\Omega$
Forward Transconductance $g_{fs}$	$V_{DS} = 25 \text{ V}$ $I_D = 2.5 \text{ A}$	1.5	2.5	—	S
Input Capacitance $C_{iss}$	$V_{GS} = 0 \text{ V}$	—	1500	2000	pF
Output Capacitance $C_{oss}$	$V_{DS} = 25 \text{ V}$	—	110	170	
Reverse Transfer Capacitance $C_{trs}$	$f = 1 \text{ MHz}$	—	40	70	
Turn-On Time $t_{on}$ ( $t_{on} = t_{d(on)} + t_r$ )	$t_{d(on)}$ $t_r$	$V_{CC} = 30 \text{ V}$ $I_D = 2.6 \text{ A}$	30 40	45 60	ns
Turn-Off Time $t_{off}$ ( $t_{off} = t_{d(off)} + t_r$ )	$t_{d(off)}$ $t_r$	$V_{GS} = 10 \text{ V}$ $R_{GS} = 50 \Omega$	110	140	
Thermal Resistance, Junction-to-Case $R_{\thetaJC}$			—	1.67	
Thermal Resistance, Junction-to-Ambient $R_{\thetaJA}$			—	≤ 75	

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## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	TEST CONDITIONS	LIMITS			UNITS
		MIN.	TYP.	MAX.	
Continuous Reverse Drain Current $I_{DR}$	$T_C = 25^\circ\text{C}$	—	—	4.5	A
Pulsed Reverse Drain Current $I_{DRM}$		—	—	18	
Diode Forward Voltage $V_{SD}$	$I_F = 2 \times I_{DR}$ $V_{GS} = 0 \text{ V}, T_j = 25^\circ\text{C}$	—	1.1	1.5	V
Reverse Recovery Time $t_r$	$T_j = 25^\circ\text{C}, I_F = I_{DR}$	—	1200	—	ns $\mu\text{C}$
Reverse Recovered Charge $Q_{RR}$		$dI_F/dt = 100 \text{ A}/\mu\text{s}, V_R = 100 \text{ V}$	—	6	

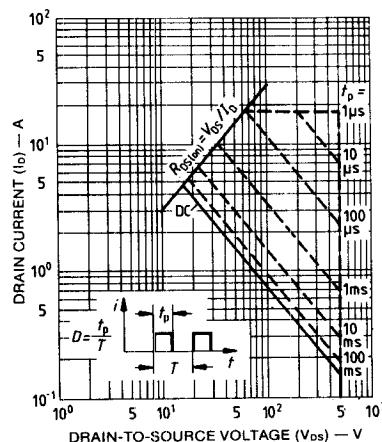


Fig. 1 - Maximum safe operating areas for all types.

## BUZ 41 A

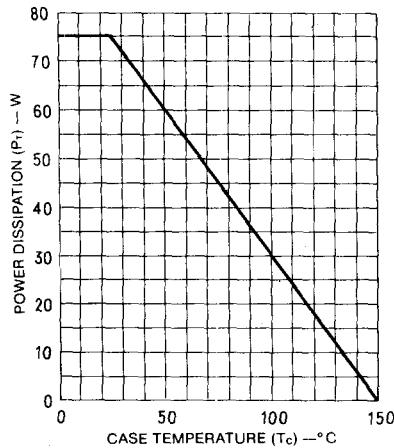


Fig. 2 - Power vs. temperature derating curve for all types.

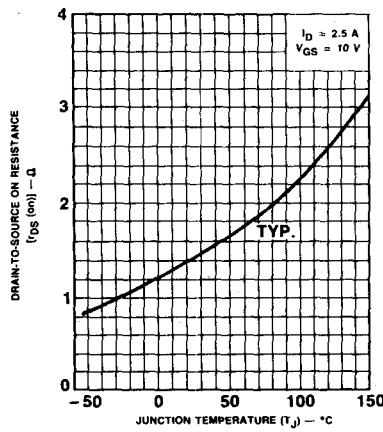


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

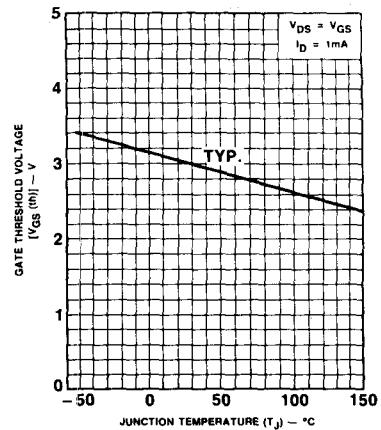


Fig. 3 - Normalized gate threshold voltage as a function of junction temperature for all types.

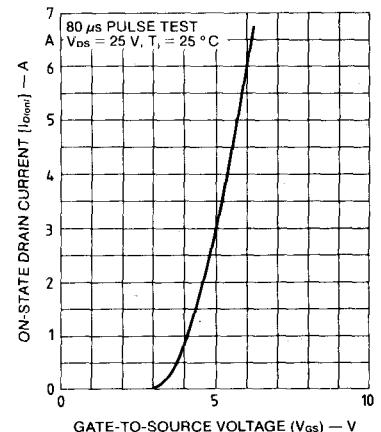


Fig. 5 - Typical transfer characteristics for all types.

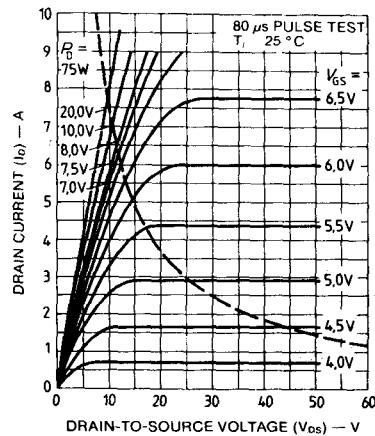


Fig. 6 - Typical output characteristics.

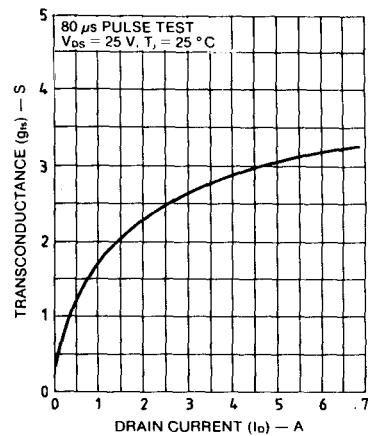


Fig. 7 - Typical transconductance vs. drain current.

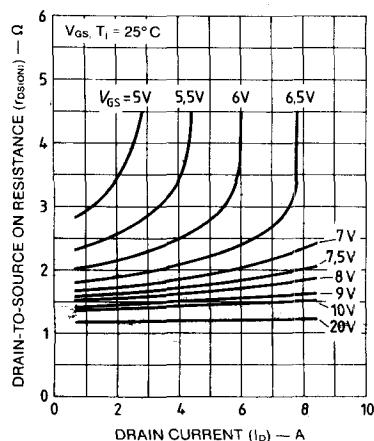


Fig. 8 - Typical on-resistance vs. drain current.

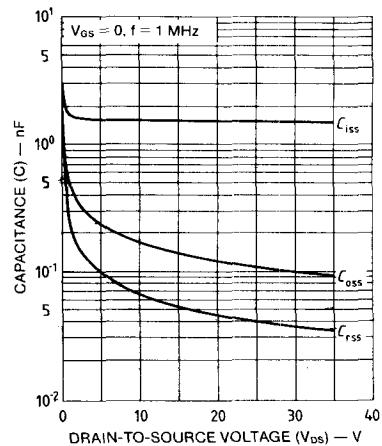


Fig. 9 - Typical capacitance vs. drain-to-source voltage.

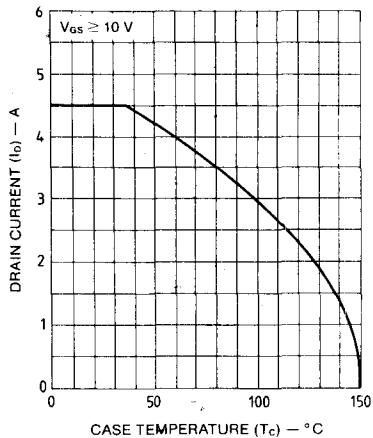


Fig. 10 - Maximum drain current vs. case temperature.

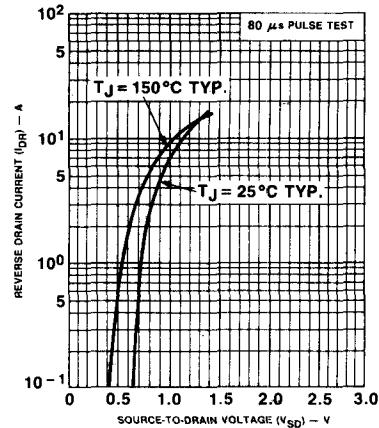


Fig. 11 - Typical source-drain diode forward voltage.

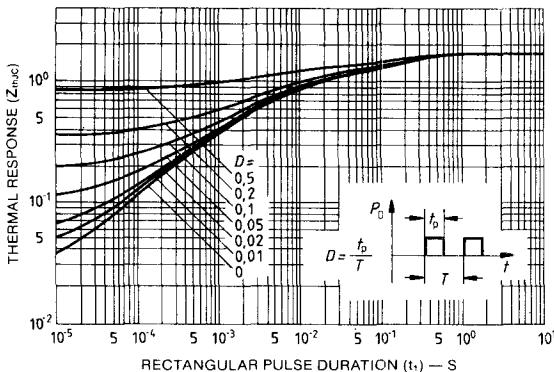


Fig. 12 - Maximum effective transient thermal impedance, junction-to-case vs. pulse duration.

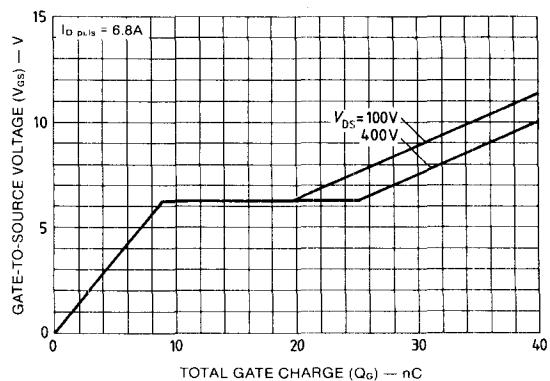


Fig. 13 - Typical gate charge vs. gate-to-source voltage.