▦ HARRIS

BUZ21

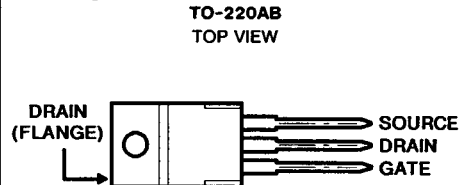## N-Channel Enhancement-Mode Power Field-Effect Transistor

Features

- 19A, 100V
- $r_{DS(on)}$ = 0.1Ω
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

Description

The BUZ21 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.
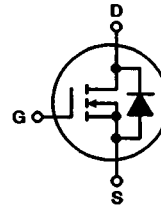
The BUZ21 is supplied in the JEDEC TO-220AB plastic package.

Package

TO-220AB
TOP VIEW

DRAIN (FLANGE)
SOURCE
DRAIN
GATE

Terminal Diagram

N-CHANNEL ENHANCEMENT MODE

D

G

S

Absolute Maximum Ratings (T_C = +25°C), Unless Otherwise Specified

		BUZ21	UNITS
Drain-Source Voltage	V_{DS}	100	V
Drain-Gate Voltage (R_{GS} = 20kΩ)	V_{DGR}	100	V
Continuous Drain Current			
T_C = +55°C	I_D	19	A
Pulsed Drain Current			
T_C = +25°C	I_{DM}	75	A
Single Pulse Avalanche Energy*, EAS		230	mj
Gate-Source Voltage	V_{GS}	±20	V
Maximum Power Dissipation			
T_C = +25°C	P_D	75	W
Operating and Storage Junction Temperature Range	T_J, T_{STG}	−55 to +150	°C
DIN Humidity Category – DIN 40040		E	
IEC Climatic Category – DIN IEC 68-1		55/150/56	

*V_{DD} = 25V, starting T_j = 25°C, L = 440μHy, R_{gs} = 50Ω, Ipeak = 28A, see Figures 14 and 15.

File Number 2420

ELECTRICAL CHARACTERISTICS *At Case Temperature (T$_C$) = 25^{0}C unless otherwise specified.*

CHARACTERISTICS		TEST CONDITIONS	LIMITS			UNITS
			MIN.	TYP.	MAX.	
Drain-Source Breakdown Voltage	BVDSS	VGS = 0 V ID = 0.25 mA	100	–	–	V
Gate-Threshold Voltage	VGS(th)	VDS = VGS ID = 1 mA	2.1	3	4	
Zero-Gate Voltage Drain Current	IDSS	Tj = 25^{0}C Tj = 125^{0}C VDS = 100 V, VGS = 0 V	– –	20 100	250 1000	µA
Gate-Source Leakage Current	IGSS	VGS = 20 V VDS = 0 V		10	100	nA
Drain-Source on Resistance	rDS(on)	VGS = 10 V ID = 9 A	–	0.09	0.1	Ω
Forward Transconductance	gfs	VDS = 25 V ID = 9 A	4	8	–	S
Input Capacitance	Ciss	VGS = 0 V	–	1500	2000	pF
Output Capacitance	Coss	VDS = 25 V	–	450	700	
Reverse Transfer Capacitance	Crss	f = 1 MHZ	–	150	240	
Turn-On Time ton	td(on)	Vcc = 30 V	–	30	45	ns
(ton = td(on) + tr)	tr	ID = 3 A	–	50	75	
Turn-Off Time toff	td(off)	VGS = 10 V	–	170	220	
(toff = td(off) = tr)	tr	RGS = 50 Ω	–	80	110	
Thermal Resistance, Junction-to-Case	RθJC		≤ 1.67			^{0}C/W
Thermal Resistance, Junction-to-Ambient	RθJA		≤ 75			

*VDD = 25 V, starting Tj = 25^{0}C, L = 440 µHy, Rgs = 50 Ω, Ipeak = 28 A, see figure 14 & 15.

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

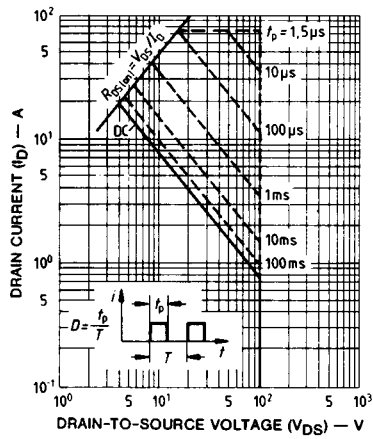| CHARACTERISTICS		TEST CONDITIONS	LIMITS			UNITS
			MIN.	TYP.	MAX.	
Continuous Reverse Drain Current	IDR	Tc = 25^{0}C	–	–	19	A
Pulsed Reverse Drain Current	IDRM		–	–	75	
Diode Forward Voltage	VSD	IF = 2 x IDR VGS = 0 V, Tj = 25^{0}C	–	1.5	2.1	V
Reverse Recovery Time	trr	Tj = 25^{0}C, IF = IDR	–	200	–	ns
Reverse Recovered Charge	QRR	dIF/dt = 100 A/µs, VR = 30 V	–	0.25	–	µC

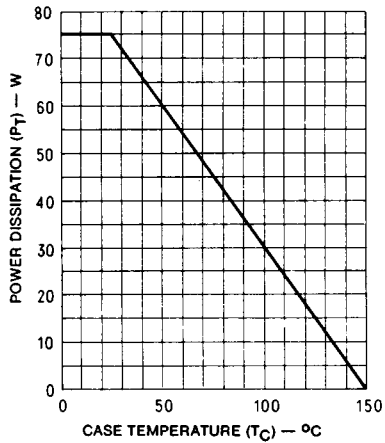Figure 1 - Maximum safe operating areas for all types.

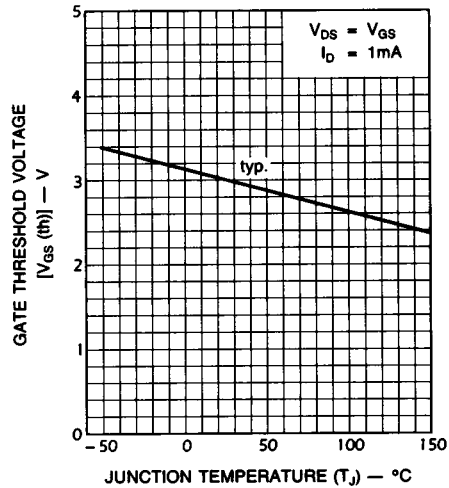Figure 2 - Power vs temperature derating curve for all types.

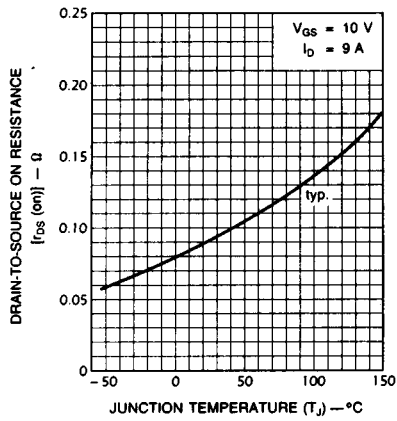Figure 3 - Normalized gate threshold voltage as a function of junction temperature for all types.

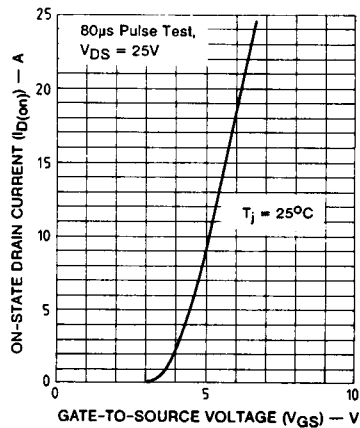Figure 4 - Normalized drain-to-source on resistance to junction temperature for all types.

Figure 5 - Typical transfer characteristics for all types.

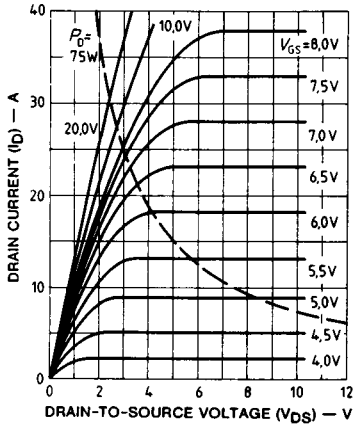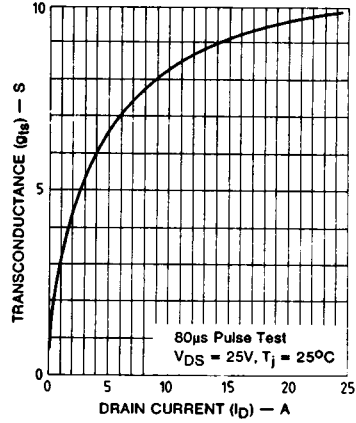Figure 6 - Typical output characteristics.
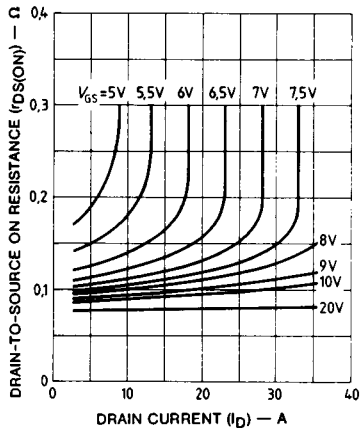

Figure 7 - Typical transconductance vs drain current.

Figure 8 - Typical on-resistance vs drain current.

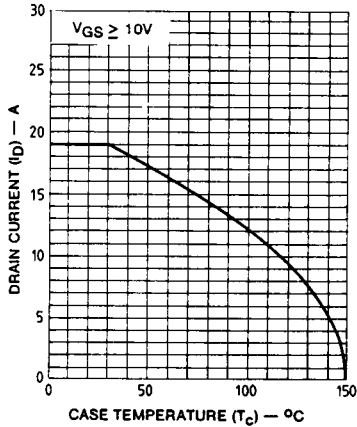Figure 9 - Typical capacitance vs drain-to-source voltage.

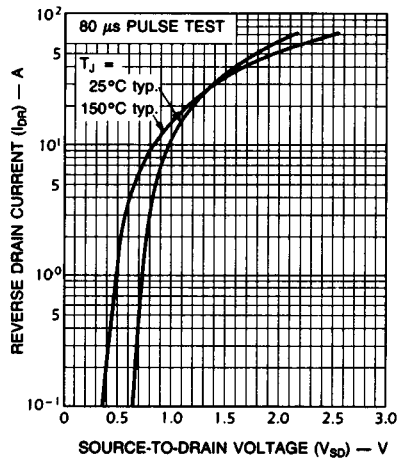Figure 10 - Maximum drain current vs case temperature.

Figure 11 - Typical source-drain diode forward voltage.
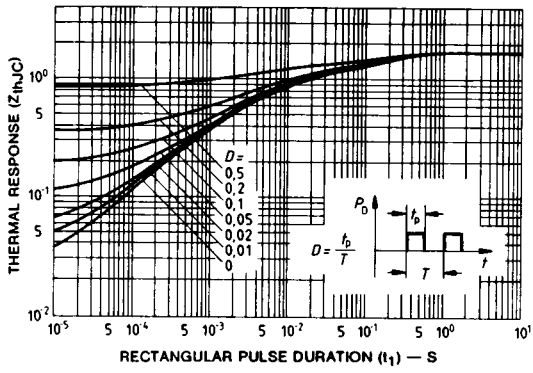
Figure 12 - Maximum effective transient thermal impedance, junction-to-case vs pulse duration
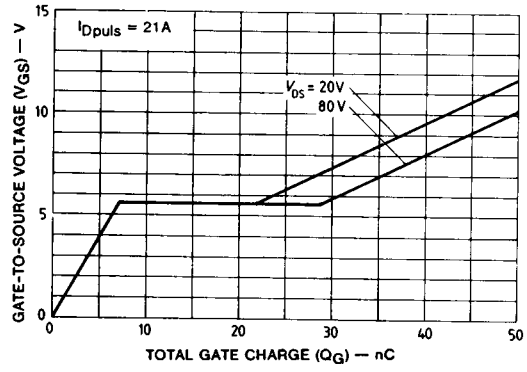

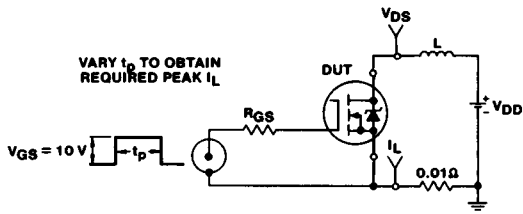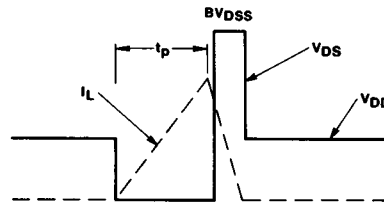Figure 13 - Typical gate charge vs gate-to-source voltage.

Figure 14 - Unclamped energy test circuit.

Figure 15 - Unclamped energy test waveforms.