FAIRCHILD
SEMICONDUCTOR ™

BUZ11

30A, 50V, 0.040 Ohm, N-Channel Power MOSFET

This 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.

Formerly developmental type TA9771.

Ordering Information

| PART NUMBER	PACKAGE	BRAND
BUZ11	TO-220AB	BUZ11

NOTE: When ordering, use the entire part number.

Features

- 30A, 50V
- $r_{DS(ON)} = 0.040\Omega$
- SOA is Power Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device
- Related Literature
  - TB334 "Guidelines for Soldering Surface Mount Components to PC Boards"

Symbol
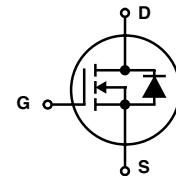
Packaging

JEDEC TO-220AB
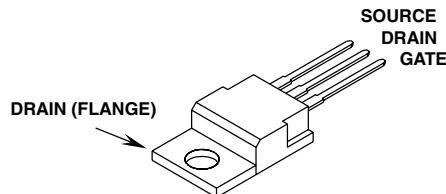
Absolute Maximum Ratings $T_C = 25^oC$, Unless Otherwise Specified

	BUZ11	UNITS
Drain to Source Breakdown Voltage (Note 1) . . . . V_{DS}	50	V
Drain to Gate Voltage ($R_{GS} = 20k\Omega$) (Note 1) . . . . V_{DGR}	50	V
Continuous Drain Current $T_C = 30^oC$. . . . . I_D	30	A
Pulsed Drain Current (Note 3) . . . . I_{DM}	120	A
Gate to Source Voltage . . . . V_{GS}	±20	V
Maximum Power Dissipation . . . . P_D	75	W
Linear Derating Factor	0.6	W/^oC
Operating and Storage Temperature . . . . T_J, T_{STG}	-55 to 150	^oC
DIN Humidity Category - DIN 40040	E	
IEC Climatic Category - DIN IEC 68-1	55/150/56	
Maximum Temperature for Soldering		
Leads at 0.063in (1.6mm) from Case for 10s. . . . . T_L	300	^oC
Package Body for 10s, See Techbrief 334 . . . . T_{pkg}	260	^oC

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

1. $T_J = 25^oC$ to 125^oC.

Electrical Specifications $T_C = 25^oC$, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Drain to Source Breakdown Voltage	BV_{DSS}	$I_D = 250\mu A$, $V_{GS} = 0V$	50	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$, $I_D = 1mA$ (Figure 9)	2.1	3	4	V
Zero Gate Voltage Drain Current	I_{DSS}	$T_J = 25^oC$, $V_{DS} = 50V$, $V_{GS} = 0V$	-	20	250	μA
		$T_J = 125^oC$, $V_{DS} = 50V$, $V_{GS} = 0V$	-	100	1000	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = 20V$, $V_{DS} = 0V$	-	10	100	nA
Drain to Source On Resistance (Note 2)	$r_{DS(ON)}$	$I_D = 15A$, $V_{GS} = 10V$ (Figure 8)	-	0.03	0.04	Ω
Forward Transconductance (Note 2)	g_{fs}	$V_{DS} = 25V$, $I_D = 15A$ (Figure 11)	4	8	-	S
Turn-On Delay Time	$t_{d(ON)}$	$V_{CC} = 30V$, $I_D \approx 3A$, $V_{GS} = 10V$, $R_{GS} = 50\Omega$, $R_L = 10\Omega$	-	30	45	ns
Rise Time	t_r		-	70	110	ns
Turn-Off Delay Time	$t_{d(OFF)}$		-	180	230	ns
Fall Time	t_f		-	130	170	ns
Input Capacitance	C_{ISS}	$V_{DS} = 25V$, $V_{GS} = 0V$, $f = 1MHz$ (Figure 10)	-	1500	2000	pF
Output Capacitance	C_{OSS}		-	750	1100	pF
Reverse Transfer Capacitance	C_{RSS}		-	250	400	pF
Thermal Resistance Junction to Case	$R_{\theta JC}$			≤ 1.67		^oC/W
Thermal Resistance Junction to Ambient	$R_{\theta JA}$			≤ 75		^oC/W

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Continuous Source to Drain Current	I_{SD}	$T_C = 25^oC$	-	-	30	A
Pulsed Source to Drain Current	I_{SDM}	$T_C = 25^oC$	-	-	120	A
Source to Drain Diode Voltage	V_{SD}	$T_J = 25^oC$, $I_{SD} = 60A$, $V_{GS} = 0V$	-	1.7	2.6	V
Reverse Recovery Time	t_{rr}	$T_J = 25^oC$, $I_{SD} = 30A$, $dI_{SD}/dt = 100A/\mu s$, $V_R = 30V$	-	200	-	ns
Reverse Recovery Charge	Q_{RR}		-	0.25	-	μC

NOTES:

2. Pulse Test: Pulse width $\leq 300ms$, duty cycle $\leq 2\%$.

3. Repetitive rating: pulse width limited by maximum junction temperature. See Transient Thermal Impedance curve (Figure 3).

## Typical Performance Curves Unless Otherwise Specified
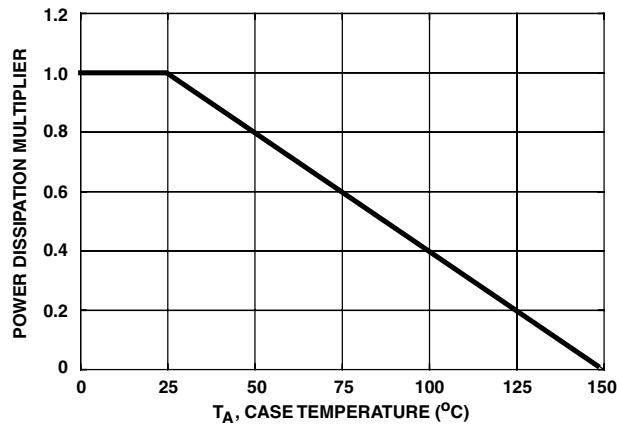
**FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE**
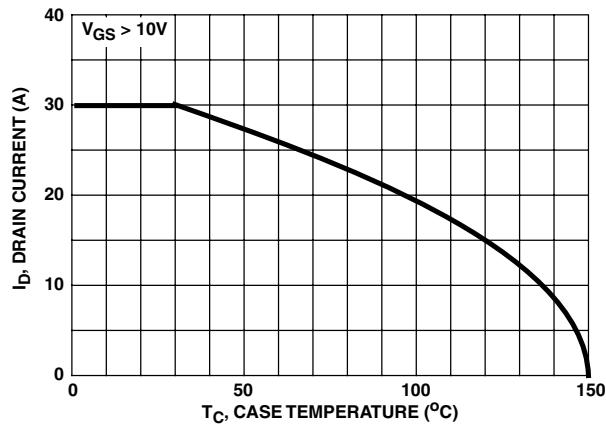
**FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE**

NOTES:
DUTY FACTOR: $D = t_1/t_2$
PEAK $T_J = P_{DM} \times Z_{\theta JC} + T_C$
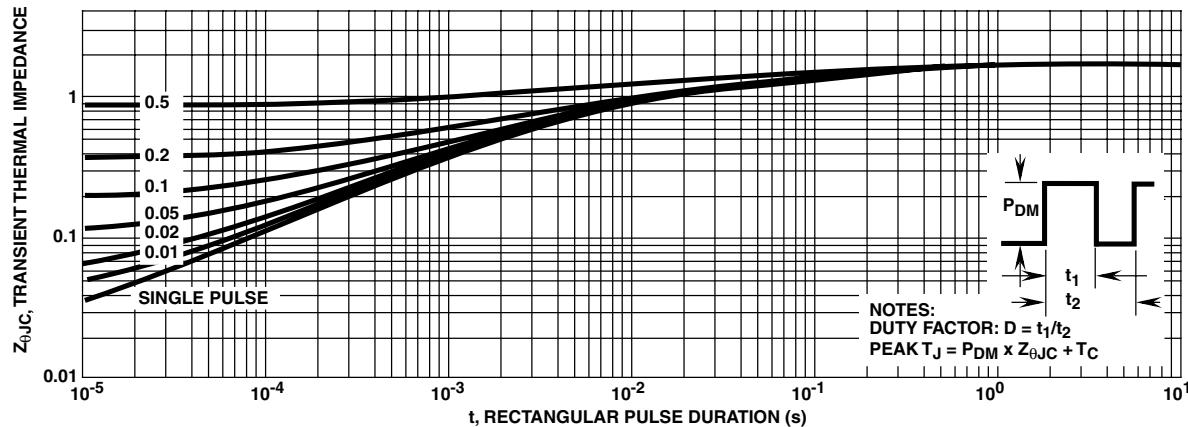
FIGURE 3. MAXIMUM TRANSIENT THERMAL IMPEDANCE
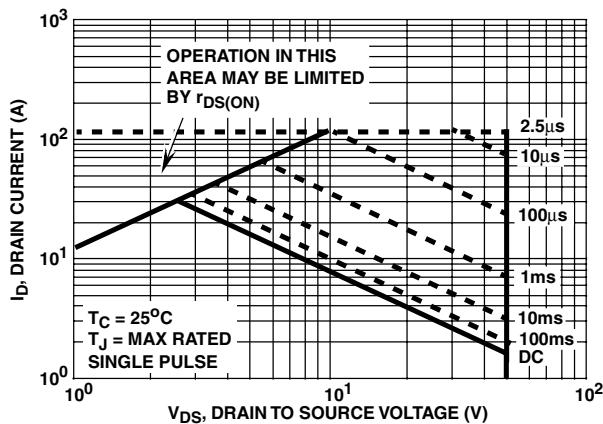
FIGURE 4. FORWARD BIAS SAFE OPERATING AREA
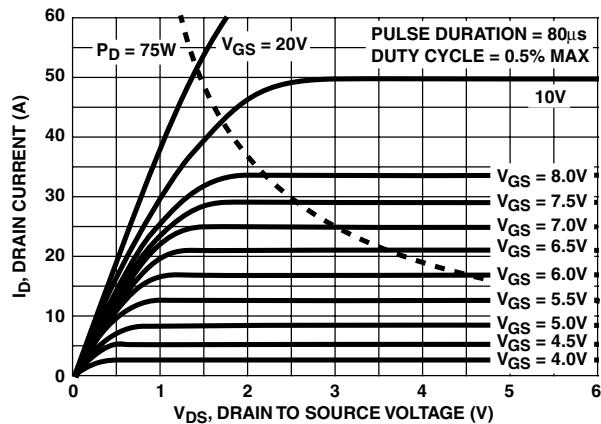
FIGURE 5. OUTPUT CHARACTERISTICS

## *Typical Performance Curves* Unless Otherwise Specified **(Continued)**
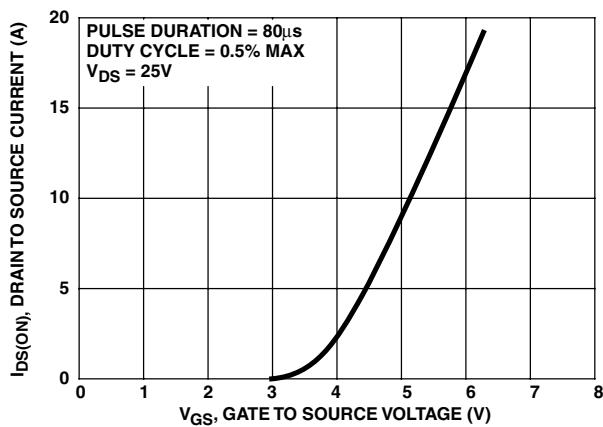
FIGURE 6. TRANSFER CHARACTERISTICS
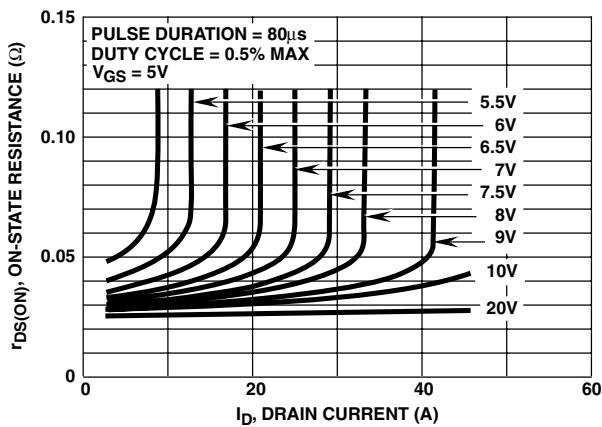
FIGURE 7. DRAIN TO SOURCE ON RESISTANCE vs GATE VOLTAGE AND DRAIN CURRENT
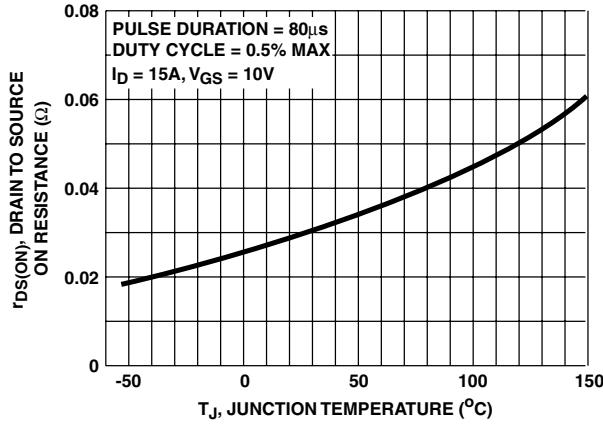
FIGURE 8. DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE
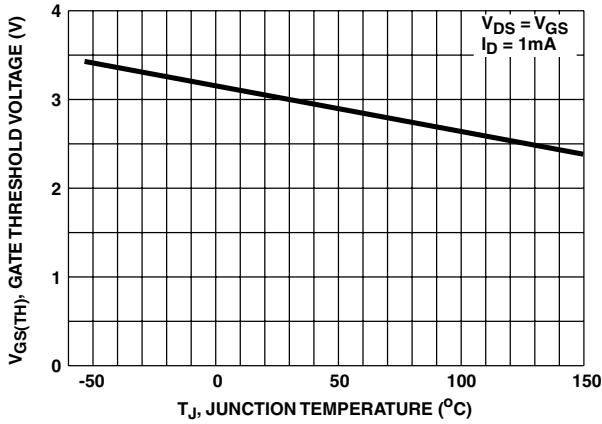
FIGURE 9. GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE
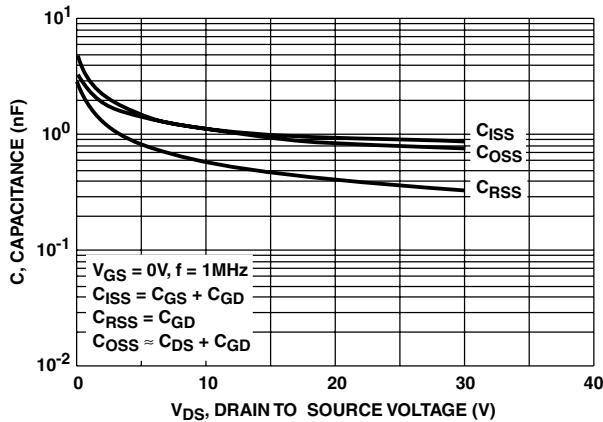
**FIGURE 10. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE**
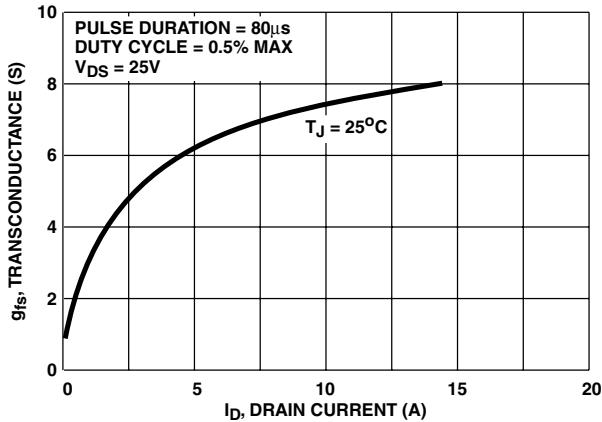
FIGURE 11. TRANSCONDUCTANCE vs DRAIN CURRENT

Typical Performance Curves Unless Otherwise Specified **(Continued)**
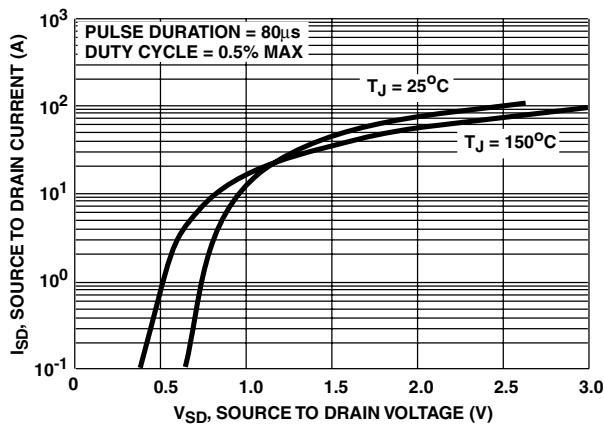
**FIGURE 12. SOURCE TO DRAIN DIODE VOLTAGE**
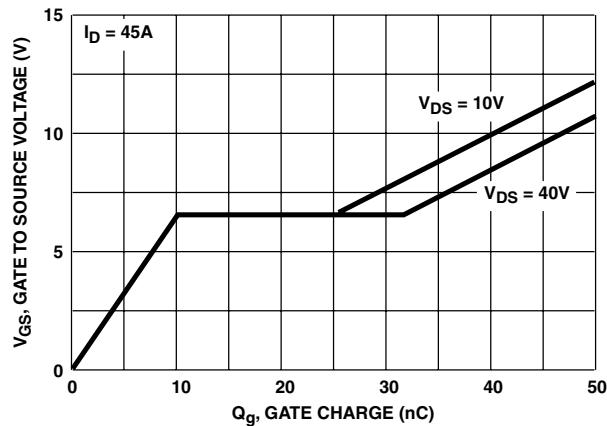
FIGURE 13. GATE TO SOURCE VOLTAGE vs GATE CHARGE

## *Test Circuits and Waveforms*
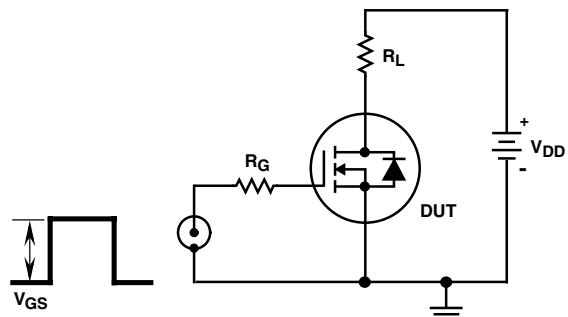
**FIGURE 14. SWITCHING TIME TEST CIRCUIT**
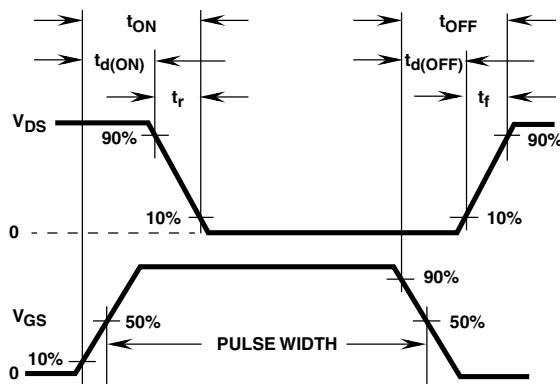

FIGURE 15. RESISTIVE SWITCHING WAVEFORMS
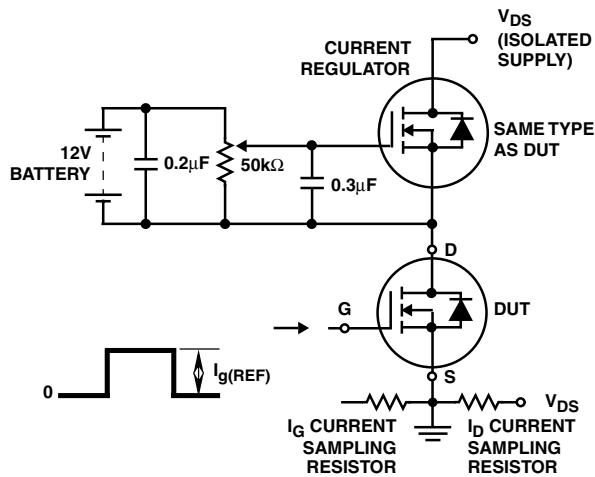
**FIGURE 16. GATE CHARGE TEST CIRCUIT**
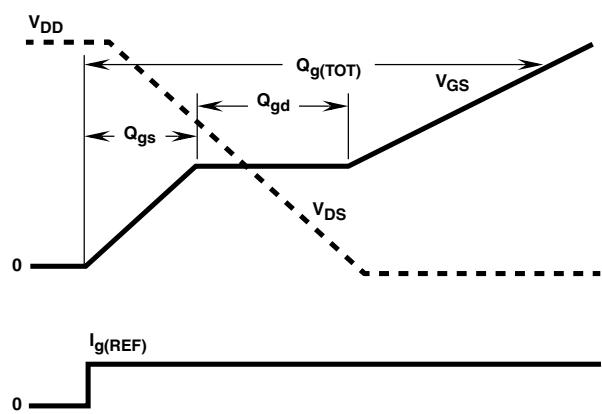
FIGURE 17. GATE CHARGE WAVEFORMS

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