FAIRCHILD
A Schlumberger Company

2N6769/2N6770
N-Channel Power MOSFETs, 12 A, 450 V/500 V

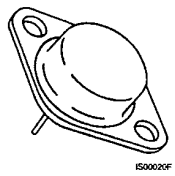
Power And Discrete Division T-39-13

Description

These devices are n-channel, enhancement mode, power MOSFETs designed especially for high voltage, high speed applications, such as off-line switching power supplies, UPS, AC and DC motor controls, relay and solenoid drivers.

- **V_{GS} Rated at ±20 V**
- **Silicon Gate for Fast Switching Speeds**
- **I_{DSS}, $V_{DS(on)}$, SOA and $V_{GS(th)}$ Specified at Elevated Temperature**
- **Rugged**

TO-204AA



2N6769
2N6770

Maximum Ratings

Symbol	Characteristic	Rating 2N6770	Rating 2N6769	Unit
V_{DSS}	Drain to Source Voltage	500	450	V
V_{DGR}	Drain to Gate Voltage R_{GS} = 1.0 MΩ	500	450	V
V_{GS}	Gate to Source Voltage	±20	±20	V
T_J, T_{stg}	Operating Junction and Storage Temperatures	−55 to +150	−55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purposes, 1/16" From Case for 10 s	300	300	°C
Maximum On-State Characteristics				
$R_{DS(on)}$	Static Drain-to-Source On Resistance	0.4	0.5	Ω
I_D	Drain Current			A
	Continuous at T_C = 25°C	12	11	
	Continuous at T_C = 100°C	4.75	7.0	
I_{DM}	Pulsed	25[2]	20[2]	
Maximum Thermal Characteristics				
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.83	0.83	°C/W
P_D	Total Power Dissipation			W
	at T_C = 25°C	150	150	
	at T_C = 100°C	60	60	
	Linear Derating Factor	1.2	1.2	W/°C

Notes
All values are JEDEC registered except as noted. For information concerning connection diagram and package outline, refer to Section 7.

Electrical Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
$V_{(BR)DSS}$	Drain Source Breakdown Voltage[1]			V	V_{GS} = 0 V, I_D = 4 mA
	2N6770	500[2]			
	2N6769	450[2]			
I_{DSS}	Zero Gate Voltage Drain Current		1	mA	V_{DS} = Rated V_{DSS}, V_{GS} = 0 V
			4		V_{DS} = Rated V_{DSS}, V_{GS} = 0 V, T_C = 125°C
I_{GSS}	Gate-Body Leakage Current		±100	nA	V_{GS} = ±20 V, V_{DS} = 0 V
On Characteristics					
$V_{GS(th)}$	Gate Threshold Voltage	2.0	4.0	V	I_D = 1 mA, V_{DS} = V_{GS}
$R_{DS(on)}$	Static Drain-Source On-Resistance[1]			Ω	V_{GS} = 10 V
	2N6770		0.4		I_D = 7.75 A
	2N6769		0.5		I_D = 7.0 A
	2N6770		0.88		I_D = 7.75 A, T_C = 125°C
	2N6769		1.10		I_D = 7.0 A, T_C = 125°C
$V_{DS(on)}$	Drain-Source On-Voltage[1]			V	V_{GS} = 10 V
	2N6770		6.0		I_D = 12 A
	2N6769		6.0		I_D = 11 A
g_{fs}	Forward Transconductance	8.0	24	S (℧)	V_{DS} = 15 V, I_D = 7.75 A
Dynamic Characteristics					
C_{iss}	Input Capacitance	1000	3000	pF	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz
C_{dss}	Output Capacitance	200	600	pF	
C_{rss}	Reverse Transfer Capacitance	50	200	pF	
Switching Characteristics (T_C = 25°C, *Figures 9, 10*)					
$t_{d(on)}$	Turn-On Delay Time		35	ns	V_{DD} = 210 V, I_D = 7.75 A, V_{GS} = 10 V, R_{GEN} = 4.7 Ω, R_{GS} = 4.7 Ω
t_r	Rise Time		50	ns	
$t_{d(off)}$	Turn-Off Delay Time		150	ns	
t_f	Fall Time		70	ns	
Q_g	Total Gate Charge		120[2]	nC	V_{GS} = 10 V, I_D = 16 A, V_{DD} = 400 V

Electrical Characteristics (Cont.) (T_C = 25°C unless otherwise noted)

Symbol	Characteristic	Min	Typ	Max	Unit	Test Conditions
Source-Drain Diode Characteristics						
I_S	Continuous Source Current 2N6770 2N6769			 12[2] 11[2]	A	
I_{SM}	Pulsed Source Current 2N6770 2N6769			 25[2] 20[2]	A	
V_{SD}	Diode Forward Voltage 2N6770	 0.80		 1.6	V	V_{GS} = 0 V I_S = 12 A
	2N6769	0.75		1.5		I_S = 11 A
t_{rr}	Reverse Recovery Time		1300[2]		ns	V_{GS} = 0 V, T_J = 150°C $I_F = I_{SM}$, dI_F/dt = 100 A/μs
Q_{RR}	Reverse Recovery Charge		7.4[2]		μC	V_{GS} = 0 V, T_J = 150°C $I_F = I_{SM}$, dI_F/dt = 100 A/μs

Notes
1. Pulse test: Pulse width ≤ 300 μs, Duty cycle ≤ 1%
2. Non-JEDEC registered value.

Typical Performance Curves

Figure 1 Output Characteristics

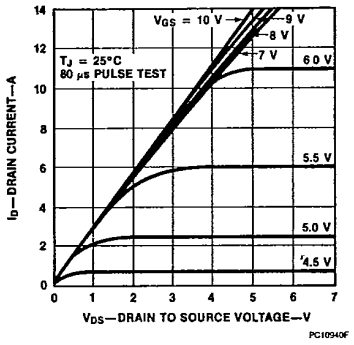
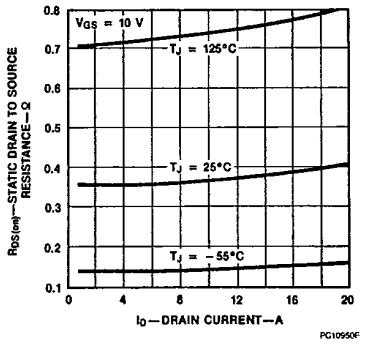


Figure 2 Static Drain to Source Resistance vs Drain Current



Typical Performance Curves (Cont.)

Figure 3 Transfer Characteristics

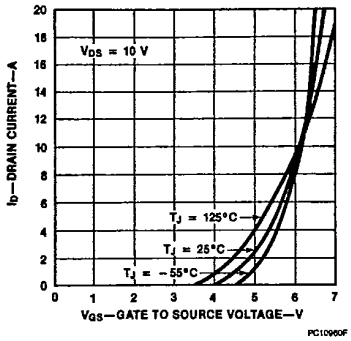


Figure 4 Temperature Variation of Gate to Source Threshold Voltage

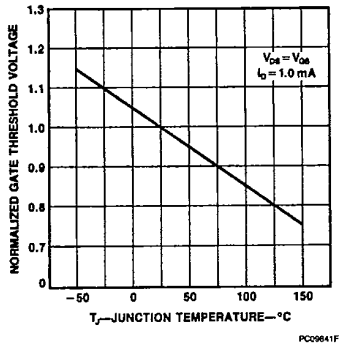


Figure 5 Capacitance vs Drain to Source Voltage

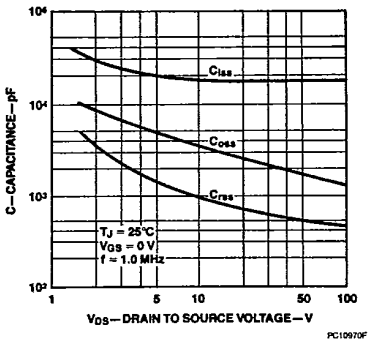


Figure 6 Gate to Source Voltage vs Total Gate Charge

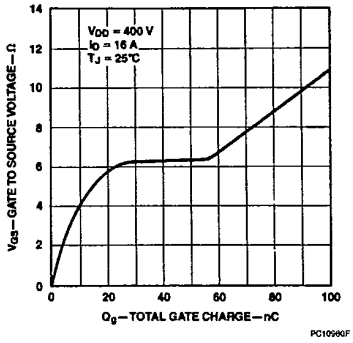


Figure 7 Forward Biased Safe Operating Area

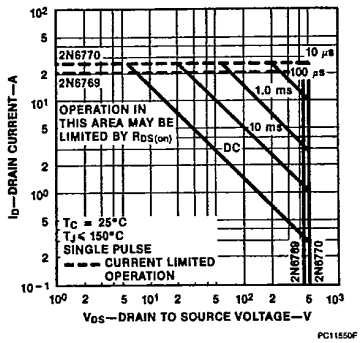
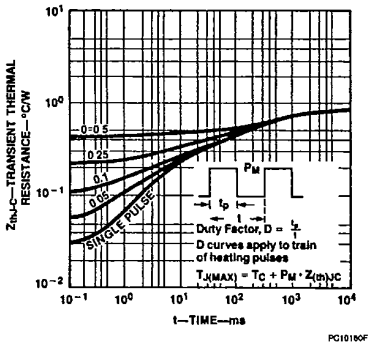


Figure 8 Transient Thermal Resistance vs Time



Typical Electrical Characteristics

Figure 9 Switching Test Circuit

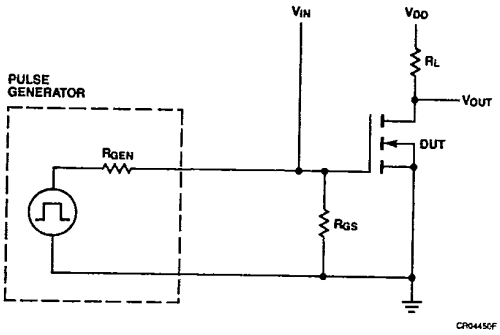


Figure 10 Switching Waveforms