

3469674 FAIRCHILD SEMICONDUCTOR

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FAIRCHILD

A Schlumberger Company

2N6767/2N6768
N-Channel Power MOSFETs,
15 A, 350 V/400 V

Power And Discrete Division

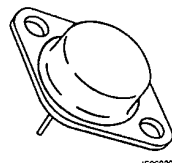
T-39-13

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} , $R_{DS(on)}$ Specified at Elevated Temperature
- Rugged
- Low Drive Requirements
- Ease of Paralleling

TO-204AA

2N6767
2N6768**Maximum Ratings**

Symbol	Characteristic	Rating 2N6768	Rating 2N6767	Unit
V_{DSS}	Drain to Source Voltage	400	350	V
V_{DGR}	Drain to Gate Voltage $R_{GS} = 1.0 \text{ M}\Omega$	400	350	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	$^{\circ}\text{C}$
T_L	Maximum Lead Temperature for Soldering Purposes, 1/16" From Case for 10 s	300	300	$^{\circ}\text{C}$

Maximum On-State Characteristics

$R_{DS(on)}$	Static Drain-to-Source On Resistance	0.3	0.4	Ω
I_D	Drain Current Continuous at $T_C = 25^{\circ}\text{C}$ Continuous at $T_C = 100^{\circ}\text{C}$	14 9.0	12 7.75	A
I_{DM}	Pulsed	25 ²	20 ²	

Maximum Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.83	0.83	$^{\circ}\text{C/W}$
P_D	Total Power Dissipation at $T_C = 25^{\circ}\text{C}$ at $T_C = 100^{\circ}\text{C}$	150 60	1.50 60	W
	Linear Derating Factor	1.2	1.2	W/ $^{\circ}\text{C}$

Notes

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

Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
$V_{(BR)DSS}$	Drain Source Breakdown Voltage ¹			V	$V_{GS} = 0\text{ V}$, $I_D = 1.0\text{ mA}$
	2N6768	400 ²			
	2N6767	350 ²			
I_{DSS}	Zero Gate Voltage Drain Current		1	mA	$V_{DS} = \text{Rated } V_{DSS}$, $V_{GS} = 0\text{ V}$
			4		$V_{DS} = \text{Rated } V_{DSS}$, $V_{GS} = 0\text{ V}$, $T_C = 125^\circ\text{C}$
I_{GSS}	Gate-Body Leakage Current		± 100	nA	$V_{GS} = \pm 20\text{ V}$, $V_{DS} = 0\text{ V}$
On Characteristics					
$V_{GS(th)}$	Gate Threshold Voltage	2.0	4.0	V	$I_D = 1\text{ mA}$, $V_{DS} = V_{GS}$
$R_{DS(on)}$	Static Drain-Source On-Resistance			Ω	$V_{GS} = 10\text{ V}$
	2N6768		0.3		$I_D = 9.0\text{ A}$
	2N6767		0.4		$I_D = 7.75\text{ A}$
	2N6768		0.66		$I_D = 9.0\text{ A}$
	2N6767		0.88		$I_D = 7.75\text{ A}$
$V_{DS(on)}$	Drain-Source On-Voltage			V	$V_{GS} = 10\text{ V}$
	2N6768		5.6		$I_D = 14\text{ A}$
	2N6767		5.4		$I_D = 12\text{ A}$
g_{fs}	Forward Transconductance	8.0	24	S (Ω)	$V_{DS} = 15\text{ V}$, $I_D = 9.0\text{ A}$
Dynamic Characteristics					
C_{iss}	Input Capacitance	1000	3000	pF	$V_{DS} = 25\text{ V}$, $V_{GS} = 0\text{ V}$ $f = 1.0\text{ MHz}$
C_{dss}	Output Capacitance	200	600	pF	
C_{rss}	Reverse Transfer Capacitance	50	200	pF	
Switching Characteristics ($T_C = 25^\circ\text{C}$, Figures 9, 10)					
$t_{d(on)}$	Turn-On Delay Time		35	ns	$V_{DD} = 180\text{ V}$, $I_D = 9.0\text{ A}$ $V_{GS} = 10\text{ V}$, $R_{GEN} = 4.7\text{ }\Omega$ $R_{GS} = 4.7\text{ }\Omega$
t_r	Rise Time		65	ns	
$t_{d(off)}$	Turn-Off Delay Time		150	ns	
t_f	Fall Time		75	ns	
Q_g	Total Gate Charge		120 ²	nC	$V_{GS} = 10\text{ V}$, $I_D = 16\text{ A}$ $V_{DD} = 400\text{ V}$

Electrical Characteristics (Cont.) ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Characteristic	Min	Typ	Max	Unit	Test Conditions
Source-Drain Diode Characteristics						
I_S	Continuous Source Current 2N6768 2N6767			14 12	A	
I_{SM}	Pulsed Source Current 2N6768 2N6767			25 ² 20 ²	A	
V_{SD}	Diode Forward Voltage 2N6768 2N6767	0.85		1.7	V	$V_{GS} = 0\text{ V}$ $I_S = 14\text{ A}$
		0.8		1.6		$I_S = 12\text{ A}$
t_{rr}	Reverse Recovery Time		1000 ²		ns	$V_{GS} = 0\text{ V}$, $T_J = 150^\circ\text{C}$ $I_F = I_{SM}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$
Q_{RR}	Reverse Recovery Charge		25 ²		μC	$V_{GS} = 0\text{ V}$, $T_J = 150^\circ\text{C}$ $I_F = I_{SM}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$

Notes

1. Pulse test: Pulse width $\leq 300\text{ }\mu\text{s}$, Duty cycle $\leq 2\%$
2. Non-JEDEC registered value.

Typical Performance Curves

Figure 1 Output Characteristics

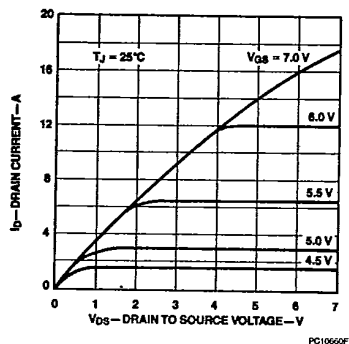
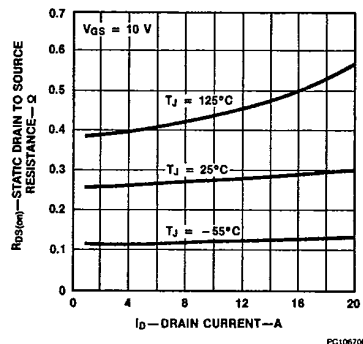


Figure 2 Static Drain to Source On Resistance vs Drain Current



Typical Performance Curves (Cont.)

Figure 3 Transfer Characteristics

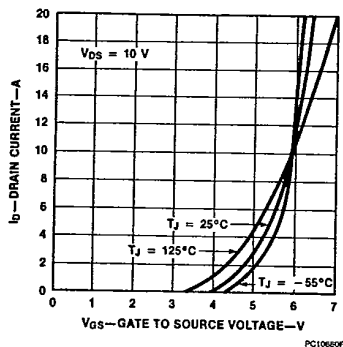


Figure 4 Temperature Variation of Gate to Source Threshold Voltage

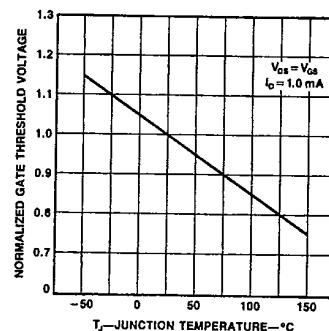


Figure 5 Capacitance vs Drain to Source Voltage

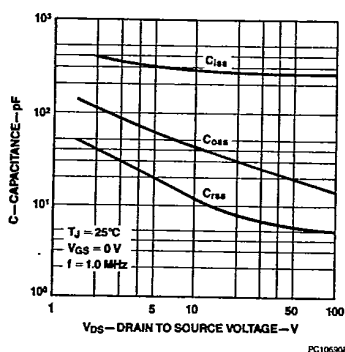


Figure 6 Gate to Source Voltage vs Total Gate Charge

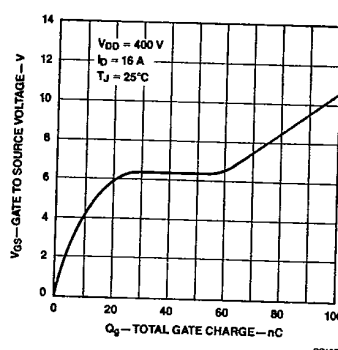


Figure 7 Forward Biased Safe Operating Area

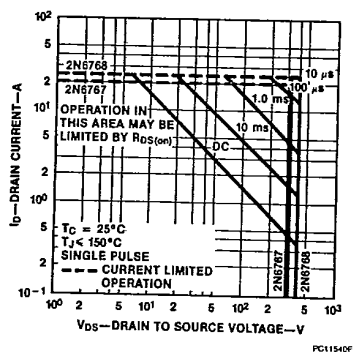
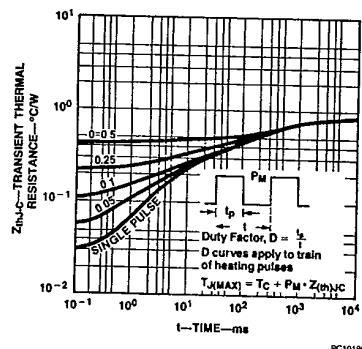


Figure 8 Transient Thermal Resistance vs Time



Typical Electrical Characteristics

Figure 9 Switching Test Circuit

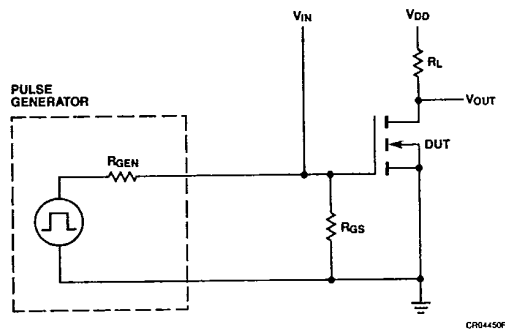
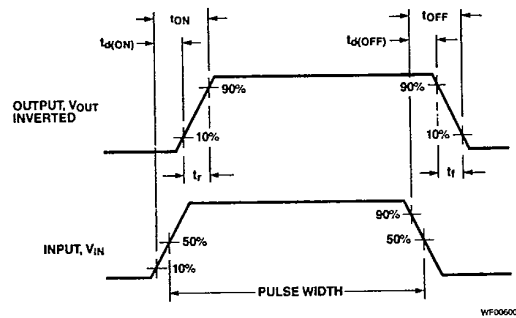


Figure 10 Switching Waveforms



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