HARRIS SEMICONDUCTOR

RFD20N03, RFD20N03SM

20A, 30V, 0.025 Ohm, N-Channel Power MOSFET

November 1997

Features

- 20A, 30V
- $r_{DS(ON)} = 0.025\Omega$
- *Temperature Compensating* PSPICE Model
- *Thermal Impedance* SPICE Model
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- 175°C Operating Temperature
- Related Literature
  - TB334 "Guidelines for Soldering Surface Mount Components to PC Boards"

Ordering Information

PART NUMBER	PACKAGE	BRAND
RFD20N03	TO-251AA	F20N03
RFD20N03SM	TO-252AA	F20N03

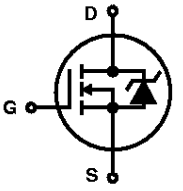
NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-252AA variant in tape and reel, e.g., RFD20N03SM9A.

Description

The RFD20N03 and RFD20N03SM N-Channel power MOSFETs are manufactured using the MegaFET process. This process which uses feature sizes approaching those of LSI integrated circuits, gives optimum utilization of silicon, resulting in outstanding performance. They were designed for use in applications such as switching regulators, switching converters, motor drivers, and relay drivers. These transistors can be operated directly from integrated circuits.

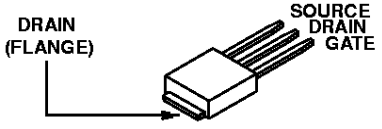
Formerly developmental type TA49235.

Symbol

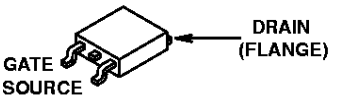


Packaging

JEDEC TO-251AA



JEDEC TO-252AA



CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper ESD Handling Procedures.

File Number **4350**

Absolute Maximum Ratings $T_C = 25^oC$, Unless Otherwise Specified

Drain to Source Voltage (Note 1)	V_{DSS}	30	V
Drain to Gate Voltage (R_{GS} = 20kΩ) (Note 1)	V_{DGR}	30	V
Gate to Source Voltage	V_{GS}	±20	V
Drain Current			
Continuous (Figure 2)	I_D	20	A
Pulsed Drain Current	I_{DM}	Figure 5	
Pulsed Avalanche Rating	E_{AS}	Figures 6, 14,15	
Power Dissipation (Figure 4)	P_D	90	W
Derate Above 25^oC (Figure 1)		0.60	$W/^oC$
Operating and Storage Temperature	T_J, T_{STG}	-55 to 175	^oC
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 150^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 = 250μA, V_{GS} = 0V (Figure 11)		30	-	-	V
Gate to Source Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250μA (Figure 10)		2	-	4	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V		-	-	1	μA
		V_{DS} = 30V, V_{GS} = 0V, $T_C = 150^oC$		-	-	50	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20V		-	-	100	nA
Drain to Source On Resistance	$r_{DS(ON)}$	I_D = 20A, V_{GS} = 10V (Figure 9)		-	0.022	0.025	Ω
Turn-On Time	t_{ON}	V_{DD} = 15V, $I_D \cong$ 20A, R_L =0.75Ω, V_{GS} = 10V, R_{GS} = 9.1Ω (Figures 18,19)		-	-	60	ns
Turn-On Delay Time	$t_{d(ON)}$			-	10	-	ns
Rise Time	t_r			-	30	-	ns
Turn-Off Delay Time	$t_{d(OFF)}$			-	12	-	ns
Fall Time	t_f			-	32	-	ns
Turn-Off Time	t_{OFF}			-	-	66	ns
Total Gate Charge	$Q_{g(TOT)}$	V_{GS} = 0V to 20V	V_{DD} = 15V, $I_D \cong$ 20A, R_L = 0.75Ω $I_{g(REF)}$ = 1.0mA (Figures 13,16,17)	-	60	75	nC
Gate Charge at 10V	$Q_{g(10)}$	V_{GS} = 0V to 10V		-	28	40	nC
Threshold Gate Charge	$Q_{g(TH)}$	V_{GS} = 0V to 2V		-	2.4	2.9	nC
Input Capacitance	C_{ISS}	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz (Figure 12)		-	1150	-	pF
Output Capacitance	C_{OSS}			-	550	-	pF
Reverse Transfer Capacitance	C_{RSS}			-	110	-	pF
Thermal Resistance Junction to Case	$R_{\theta JC}$	(Figure 3)		-	-	1.66	$^oC/W$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	TO-251, TO-252		-	-	100	$^oC/W$

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage	V_{SD}	I_{SD} = 20A	-	-	1.25	V
Reverse Recovery Time	t_{rr}	I_{SD} = 20A, dI_{SD}/dt = 100A/μs	-	-	70	ns
Reverse Recovered Charge	Q_{RR}	I_{SD} = 20A, dI_{SD}/dt = 100A/μs	-	-	145	nC