Data Sheet | October 1998 | File Number 1629.2

10A, 450V and 500V, 0.600 Ohm, N-Channel Power MOSFETs

These are N-Channel enhancement mode silicon gate power field effect transistors 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. These types can be operated directly from integrated circuits.

Formerly developmental type TA17435.

Ordering Information

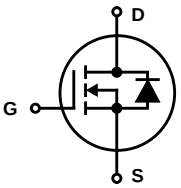
PART NUMBER	PACKAGE	BRAND
RFH10N45	TO-218AC	RFH10N45
RFH10N50	TO-218AC	RFH10N50

NOTE: When ordering, include the entire part number.

Features

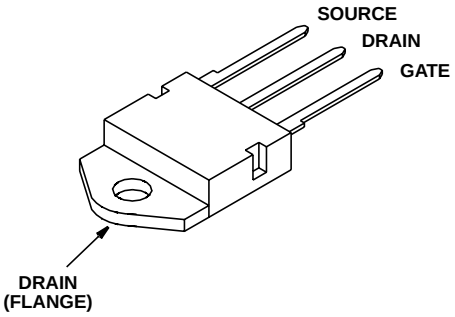
- 10A, 450V and 500V
- $r_{DS(ON)} = 0.600\Omega$
- Related Literature
  - TB334 “Guidelines for Soldering Surface Mount Components to PC Boards”

Symbol



Packaging

JEDEC TO-218AC



CAUTION: These devices are sensitive to electrostatic discharge; follow proper IC Handling Procedures.
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Absolute Maximum Ratings $T_C = 25^oC$, Unless Otherwise Specified

		RFH10N45	RFH10N50	UNITS
Drain to Source Voltage (Note 1)	V_{DSS}	450	500	V
Drain to Gate Voltage (R_{GS} = 1MΩ) (Note 1)	V_{DGR}	450	500	V
Continuous Drain Current	I_D	10	10	A
Pulsed Drain Current (Note 3)	I_{DM}	20	20	A
Gate to Source Voltage	V_{GS}	±20	±20	V
Maximum Power Dissipation	P_D	150	150	W
Linear Derating Factor		1.2	1.2	W/^{o}C
Operating and Storage Temperature	T_J, T_{STG}	-55 to 150	-55 to 150	^{o}C
Maximum Temperature for Soldering				
Leads at 0.063in (1.6mm) from Case for 10s	T_L	300	300	^{o}C
Package Body for 10s, See TB334	T_{pkg}	260	260	^{o}C

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 = 250μA, V_{GS} = 0V				
RFH10N45			450			V
RFH10N50			500			V
Gate to Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$, I_D = 250μA (Figure 8)	2	-	4	V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS} = Rated BV_{DSS}	-	-	1	μA
		V_{DS} = 0.8 x Rated BV_{DSS}, TC = 125^oC	-	-	25	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
Drain to Source On Voltage (Note 2)	$V_{DS(ON)}$	I_D = 10A, V_{GS} = 10V	-	-	6.0	V
Drain to Source On Resistance (Note 2)	$r_{DS(ON)}$	I_D = 10A, V_{GS} = 10V (Figures 6, 7)	-	-	0.600	Ω
Turn-On Delay Time	$t_{d(ON)}$	$I_D \approx$ 5A, V_{DS} = 250V, R_G = 50Ω, R_L = 50Ω, V_{GS} = 10V (Figures 10, 11, 12)	-	26	60	ns
Rise Time	t_r		-	50	100	ns
Turn-Off Delay Time	$t_{d(OFF)}$		-	525	900	ns
Fall Time	t_f		-	105	180	ns
Input Capacitance	C_{ISS}	V_{GS} = 0V, V_{DS} = 25V f = 1MHz (Figure 9)	-	-	3000	pF
Output Capacitance	C_{OSS}		-	-	600	pF
Reverse Transfer Capacitance	C_{RSS}		-	-	200	pF
Thermal Resistance, Junction to Case	$R_{\theta JC}$		-	-	0.83	^{o}C/W

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage (Note 2)	V_{SD}	I_{SD} = 10A	-	-	1.4	V
Diode Reverse Recovery Time	t_{rr}	I_{SD} = 10A, dI_{SD}/dt = 100A/μs	-	950	-	ns

NOTES:

2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3. Repetitive rating: pulse width is limited by maximum junction temperature.

Typical Performance Curves

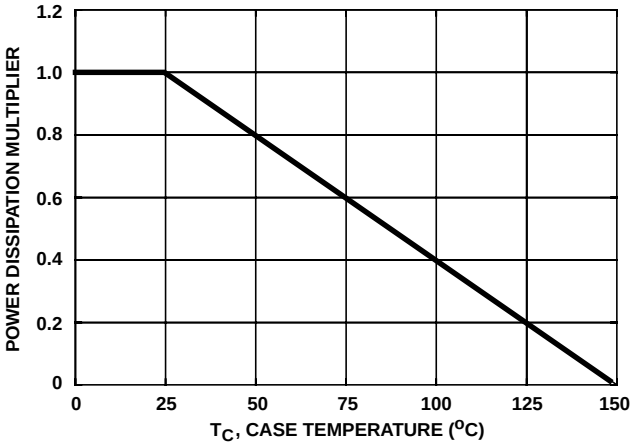


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

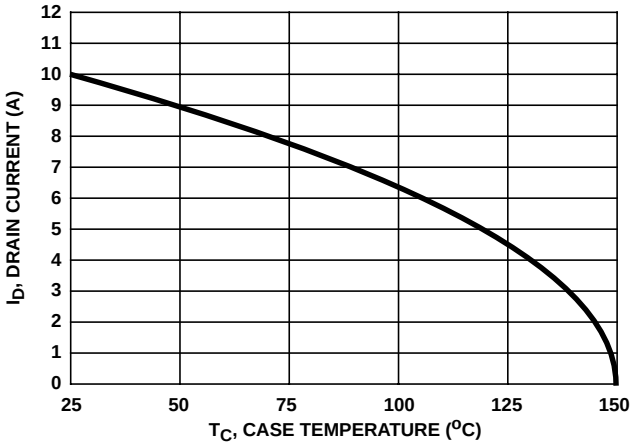


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

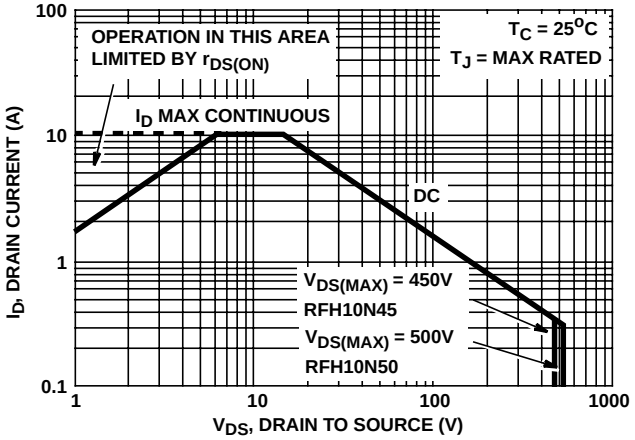


FIGURE 3. FORWARD BIAS SAFE OPERATING AREA

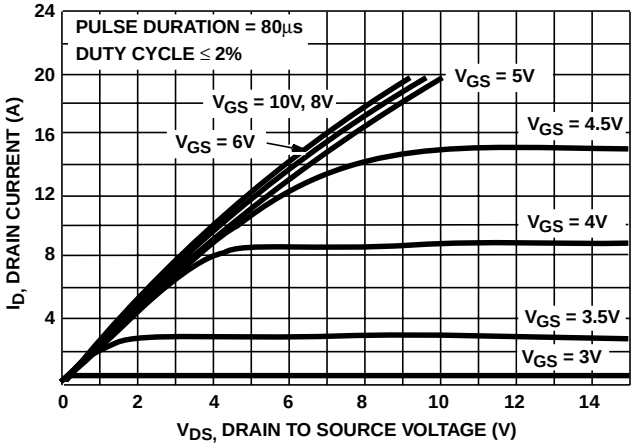


FIGURE 4. SATURATION CHARACTERISTICS

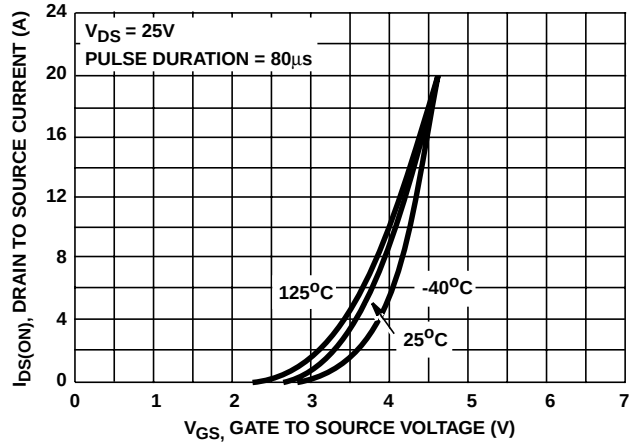


FIGURE 5. TRANSFER CHARACTERISTICS

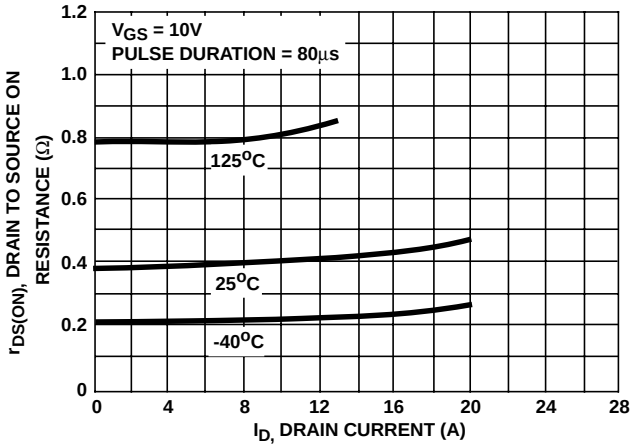


FIGURE 6. DRAIN TO SOURCE ON RESISTANCE vs DRAIN CURRENT

Typical Performance Curves (Continued)

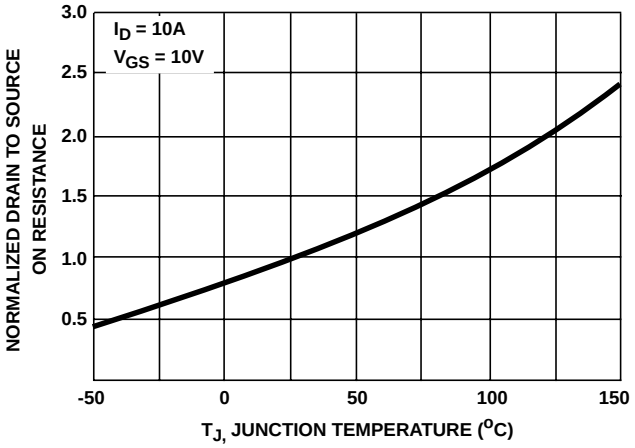


FIGURE 7. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

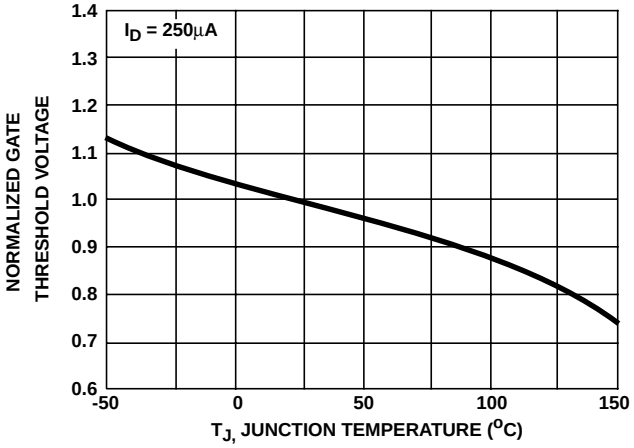


FIGURE 8. NORMALIZED GATE TO THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

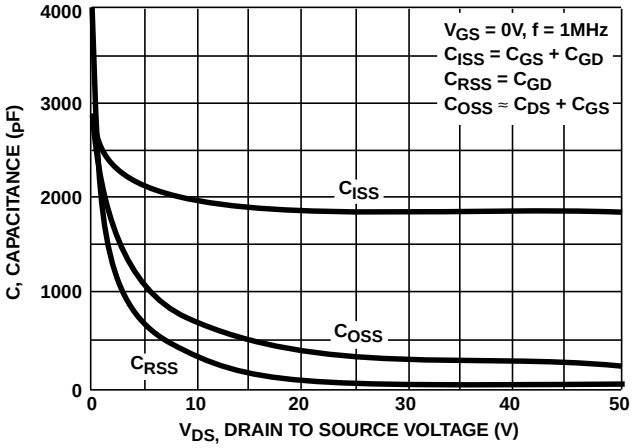
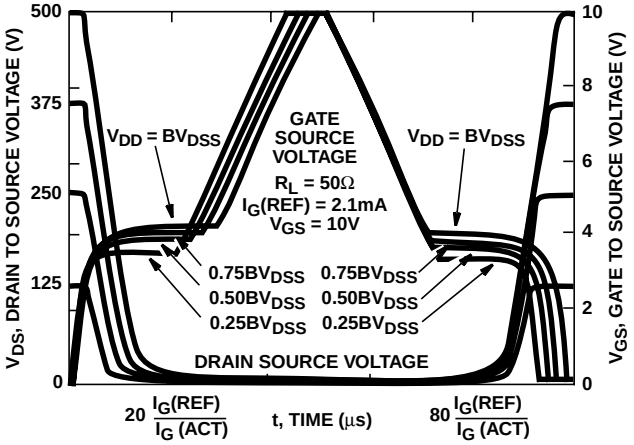


FIGURE 9. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Harris Applications Notes AN7254 and AN7260.

FIGURE 10. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT

Test Circuits and Waveforms

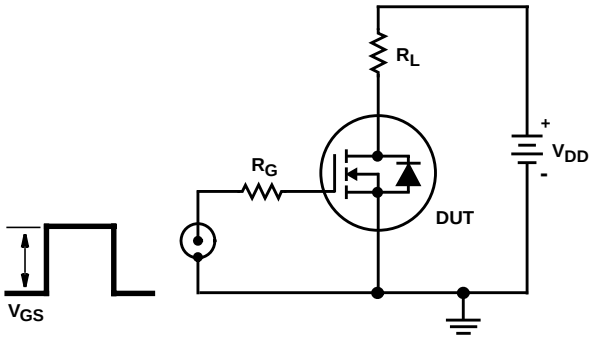


FIGURE 11. SWITCHING TIME TEST CIRCUIT

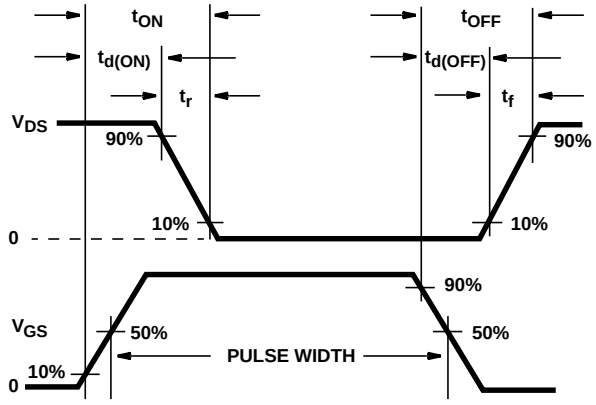


FIGURE 12. RESISTIVE SWITCHING WAVEFORMS