

40A, 100V, 0.040 Ohm, N-Channel Power MOSFETs

These are N-Channel power MOSFETs 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, relay drivers and emitter switches for bipolar transistors. These transistors can be operated directly from integrated circuits.

Formerly developmental type TA9846

Ordering Information

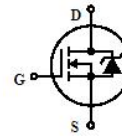
PART NUMBER	PACKAGE	BRAND
RFG40N10	TO-247	RFG40N10
RFP40N10	TO-220AB	RFP40N10
RF1S40N10SM	TO-263AB	F1S40N10

NOTE: When ordering, use the entire part number. Add the suffix, 9A, to obtain the TO-263AB variant in tape and reel, i.e. RF1S40N10SM9A.

Features

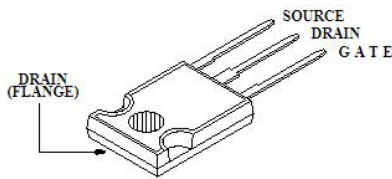
- 40A, 100V
- $r_{DS(ON)} = 0.040\Omega$
- UIS Rating Curve
- SOA is Power Dissipation Limited
- 175°C Operating Temperature
- Related Literature
 - TB334 "Guidelines for Soldering Surface Mount Components to PC Boards"

Symbol

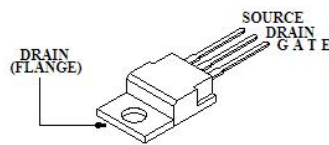


Packaging

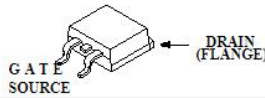
JEDEC STYLE TO-247



JEDEC TO-220AB



JEDEC TO-263AB



RFG40N10, RFP40N10, RF1S40N10SM

Absolute Maximum Ratings TC = 25°C, Unless Otherwise Specified

	RFG40N10, RFP40N10, RF1S40N10SM	UNITS
Drain to Source Breakdown Voltage (Note 1)	100	V
Drain to Gate Voltage (RGS = 1MΩ) (Note 1)	100	V
Gate to Source Voltage	±20	V
Drain Current		
Continuous (Figure 2)	40	A
Pulsed Drain Current (Note 2)	100	A
Pulsed Avalanche Rating	Figures 4, 12, 13	
Power Dissipation	160	W
Derate Above 25°C	1.07	W / °C
Operating and Storage Temperature	-55 to 175	°C
Maximum Temperature for Soldering		
Leads at 0.063in (1.6mm) from case for 10s	300	°C
Package Body for 10s, see Techbrief 334	260	°C

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

NOTES:

1. TJ = 25 °C to 150°C.
2. Repetitive Rating: pulse width limited by maximum junction temperature.

Electrical Specifications TC = 25°C, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Drain to Source Breakdown Voltage	B VDSS	ID = 250μA, VGS = 0V (Figure 9)	100	-	-	V
Gate Threshold Voltage	VGS(TH)	VGS = VDS, ID = 250μA (Figure 8)	2	-	4	V
Zero Gate Voltage Drain Current	IDSS	VDS = 80V, VGS = 0V	TC = 25°	-	1	μA
			TC = 150°	-	50	μA
Gate to Source Leakage Current	IGSS	VGS = ±20V	-	-	±100	nA
Drain to Source On Resistance	rDS(ON)	ID = 40A, VGS = 10V (Figure 7)	-	-	0.040	Ω
Turn-On Time	tON	VDD = 50V, ID = 20A, RL = 2.5Ω, VGS = 10V, RGS = 4.2 Ω (Figure 11)	-	-	80	ns
Turn-On Delay Time	td(ON)		- 1	7	-	ns
Rise Time	tr		- 3	0	-	ns
Turn-Off Delay Time	td(OFF)		- 4	2	-	ns
Fall Time	tf		- 2	0	-	ns
Turn-Off Time	tOFF		-	-	100	ns
Total Gate Charge	Qg(TOT)	VGS = 0V to 20V	-	-	300	nC
Gate Charge at 10V	Qg(10)	VGS = 0V to 10V	-	-	150	nC
Threshold Gate Charge	Qg(TH)	VGS = 0V to 2V	-	-	7.5	nC
Thermal Resistance Junction to Case	RθJC		-	-	0.94	°C/W
Thermal Resistance Junction to Ambient	RθJA	TO-247	-	-	30	°C/W
		TO-220AB and TO-263AB	-	-	62	°C/W

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage	VSD	ISD = 40A	-	-	1.5	V
Reverse Recovery Time	trr	ISD = 40A, dISD/dt = 100A/μs	-	-	200	ns

RFG40N10, RFP40N10, RF1S40N10SM

Typical Performance Curves Unless Otherwise Specified

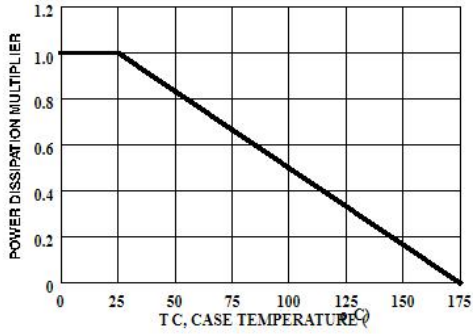


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

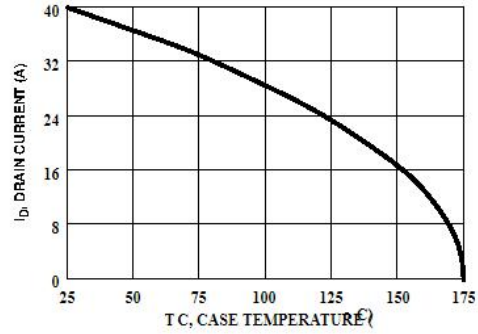


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

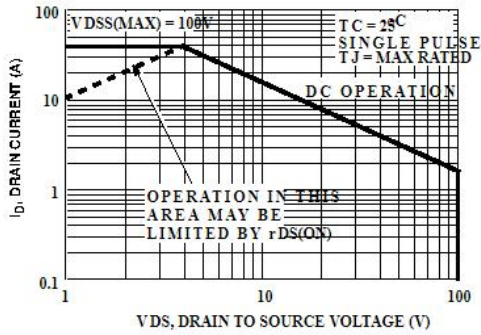
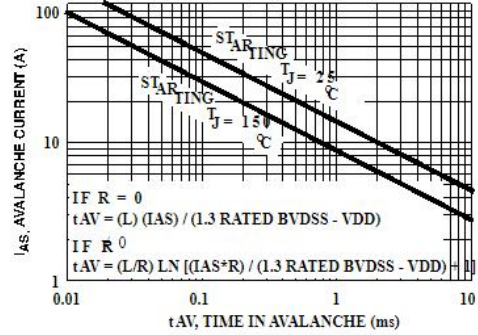


FIGURE 3. FORWARD BIAS SAFE OPERATING AREA



NOTE: Refer to Intersil application notes AN9321 and AN9322.

FIGURE 4. UNCLAMPED INDUCTIVE SWITCHING CAPABILITY

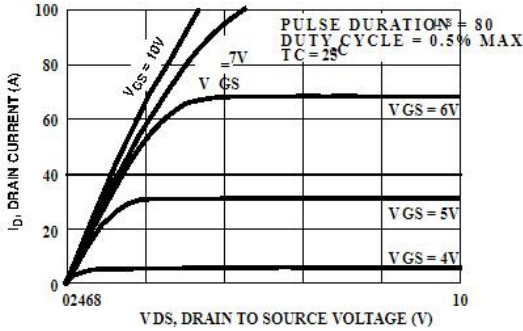


FIGURE 5. SATURATION CHARACTERISTICS

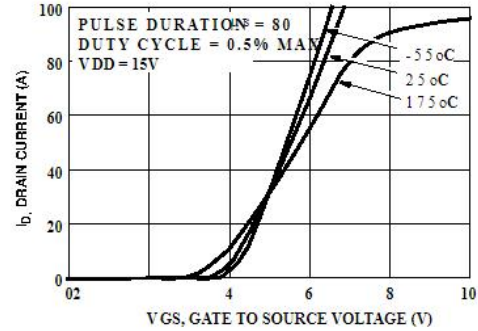


FIGURE 6. TRANSFER CHARACTERISTICS

RFG40N10, RFP40N10, RF1S40N10SM

Typical Performance Curves Unless Otherwise Specified (Continued)

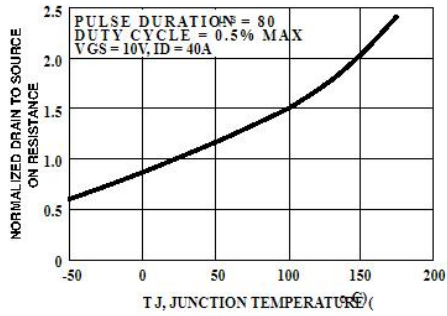


FIGURE 7. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

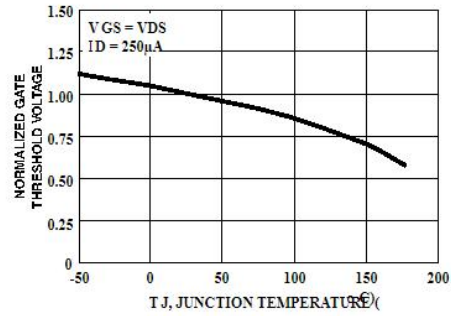


FIGURE 8. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

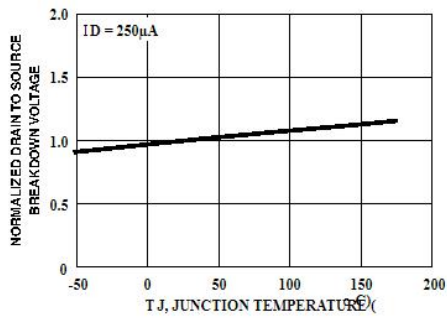


FIGURE 9. NORMALIZED DRAIN TO SOURCE BREAKDOWN VOLTAGE vs JUNCTION TEMPERATURE

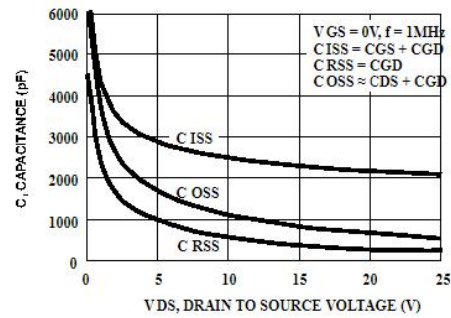
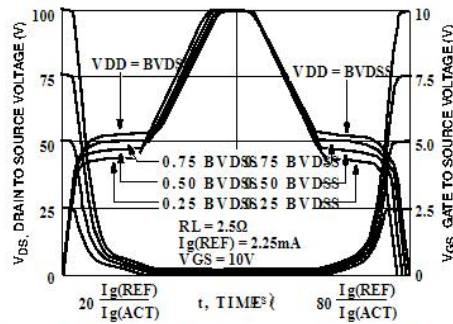


FIGURE 10. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Intersil Application Notes AN7254 and AN7260.

FIGURE 11. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT

Test Circuits and Waveforms

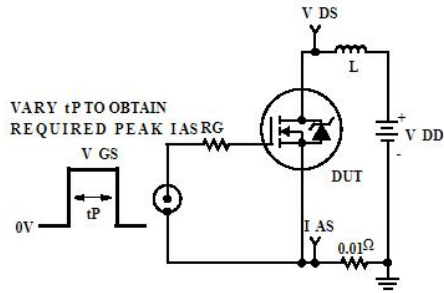


FIGURE 12. UNCLAMPED ENERGY TEST CIRCUIT

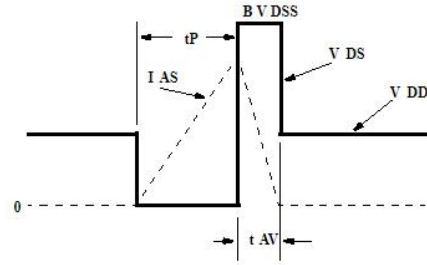


FIGURE 13. UNCLAMPED ENERGY WAVEFORMS

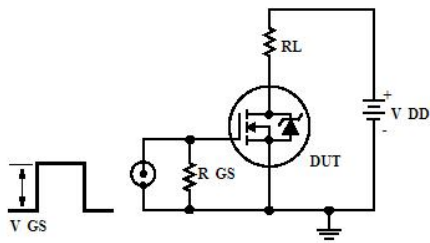


FIGURE 14. SWITCHING TIME TEST CIRCUIT

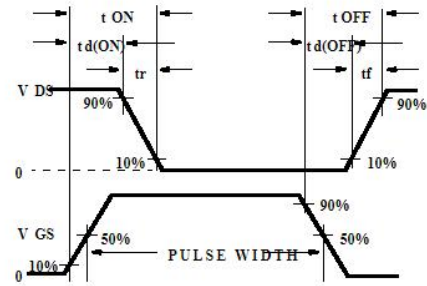


FIGURE 15. RESISTIVE SWITCHING WAVEFORMS

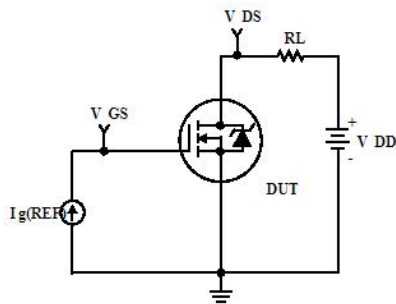


FIGURE 16. GATE CHARGE TEST CIRCUIT

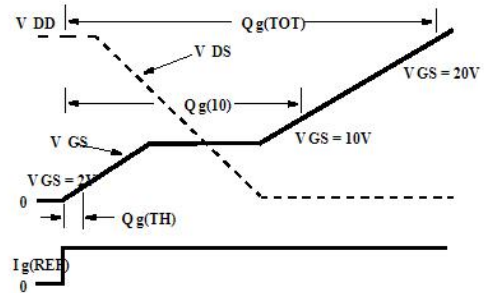


FIGURE 17. GATE CHARGE WAVEFORMS