

December 1995

45A, 60V, Avalanche Rated N-Channel Enhancement-Mode Power MOSFETs

Features

- 45A, 60V
- $r_{DS(ON)} = 0.028\Omega$
- *Temperature Compensating* PSPICE Model
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- +175°C Operating Temperature

Description

The RFG45N06, RFP45N06, RF1S45N06, RF1S45N06SM 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, relay drivers and emitter switches for bipolar transistors. These transistors can be operated directly from integrated circuits.

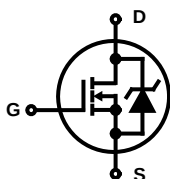
PACKAGE AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RFG45N06	TO-247	RFG45N06
RFP45N06	TO-220AB	RFP45N06
RF1S45N06	TO-262AA	F1S45N06
RF1S45N06SM	TO-263AB	F1S45N06

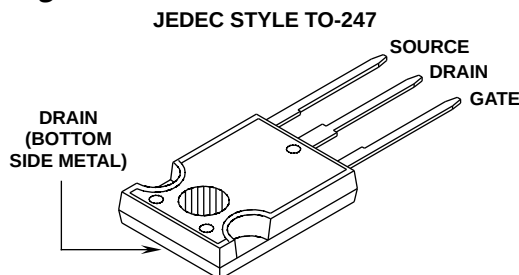
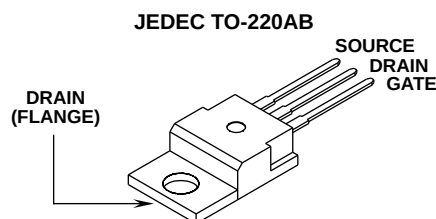
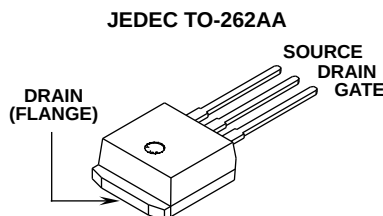
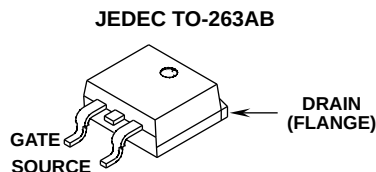
NOTE: When ordering, use the entire part number. Add the suffix, 9A, to obtain the TO-263AB variant in tape and reel, i.e. RF1S45N06SM9A.

Formerly developmental type TA49028.

Symbol



Packages



Absolute Maximum Ratings $T_C = +25^\circ\text{C}$

Drain Source Voltage	V_{DS}
Drain Gate Voltage	V_{DGR}
Gate Source Voltage	V_{GS}
Drain Current	
RMS Continuous	I_D
Pulsed Drain Current	I_{DM}
Pulsed Avalanche Rating	E_{AS}
Maximum Avalanche Current	I_{AM}
Power Dissipation	
$T_C = +25^\circ\text{C}$	P_D
Derate above $+25^\circ\text{C}$	P_T
Operating and Storage Temperature	T_{STG}, T_J

RFG45N06, RFP45N06 RF1S45N06, RF1S45N06SM	UNITS
60	V
60	V
± 20	V
45	A
Refer to Peak Current Curve	
Refer to UIS Curve	
125	A
131	W
0.877	W/°C
-55 to +175	°C

Specifications RFG45N06, RFP45N06, RF1S45N06, RF1S45N06SM

Electrical Specifications $T_C = +25^{\circ}\text{C}$, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Drain-Source Breakdown Voltage	BV _{DSS}	I _D = 250μA, V _{GS} = 0V		60	-	-	V
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250μA		2	-	4	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60V, V _{GS} = 0V	T _C = +25°C	-	-	1	μA
			T _C = +150°C	-	-	50	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} = ±20V		-	-	100	nA
On Resistance	r _{DS(ON)}	I _D = 45A, V _{GS} = 10V		-	-	0.028	Ω
Turn-On Time	t _{ON}	V _{DD} = 30V, I _D = 45A R _L = 0.667Ω, V _{GS} = +10V R _{GS} = 3.6Ω		-	-	120	ns
Turn-On Delay Time	t _{D(ON)}			-	12	-	ns
Rise Time	t _R			-	74	-	ns
Turn-Off Delay Time	t _{D(OFF)}			-	37	-	ns
Fall Time	t _F			-	16	-	ns
Turn-Off Time	t _{OFF}			-	-	80	ns
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 0 to 20V	V _{DD} = 48V, I _D = 45A, R _L = 1.07Ω	-	125	150	nC
Gate Charge at 10V	Q _{G(10)}	V _{GS} = 0 to 10V		-	67	80	nC
Threshold Gate Charge	Q _{G(TH)}	V _{GS} = 0 to 2V		-	3.7	4.5	nC
Input Capacitance	C _{ISS}	V _{DS} = 25V, V _{GS} = 0V f = 1MHz		-	2050	-	pF
Output Capacitance	C _{OSS}			-	600	-	pF
Reverse Transfer Capacitance	C _{RSS}			-	200	-	pF
Thermal Resistance Junction to Case	R _{θJC}			-	-	1.14	°C/W
Thermal Resistance Junction to Ambient	R _{θJA}			-	-	80	°C/W

Source-Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Forward Voltage	V_{SD}	$I_{SD} = 45\text{A}$	-	-	1.5	V
Reverse Recovery Time	t_{RR}	$I_{SD} = 45\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	125	ns

Typical Performance Curves

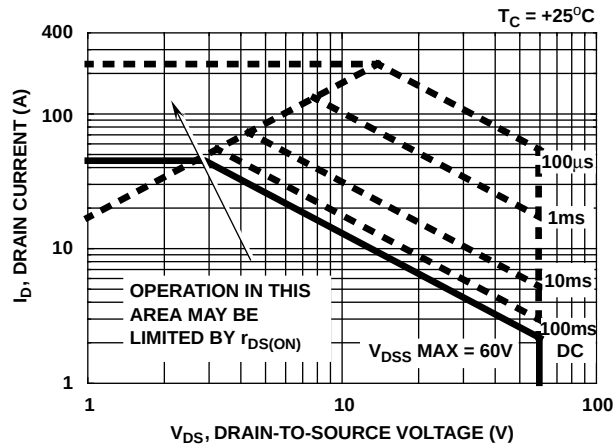


FIGURE 1. SAFE- OPERATING AREA CURVE

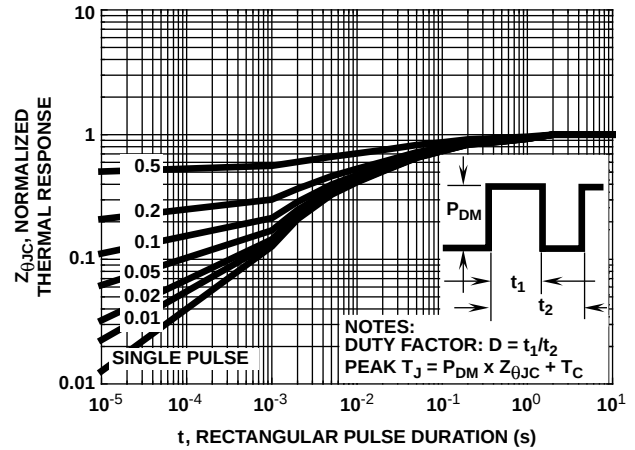


FIGURE 2. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

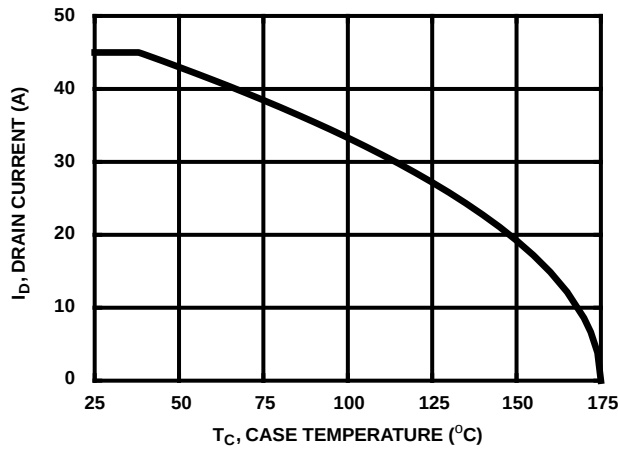


FIGURE 3. MAXIMUM CONTINUOUS DRAIN CURRENT vs TEMPERATURE

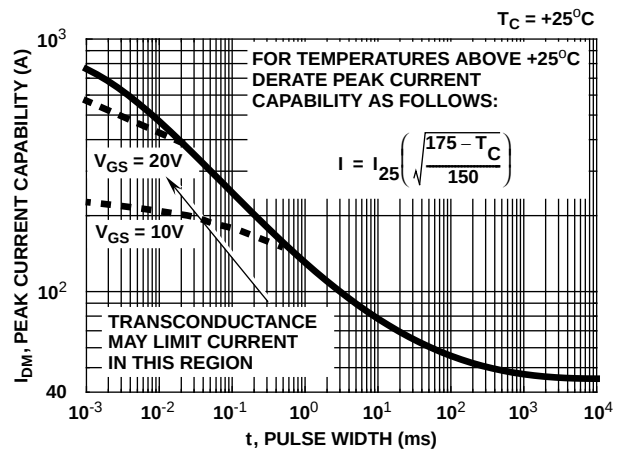


FIGURE 4. PEAK CURRENT CAPABILITY

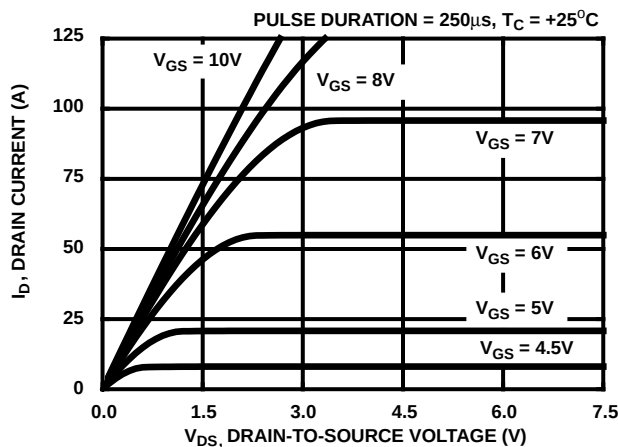


FIGURE 5. TYPICAL SATURATION CHARACTERISTICS

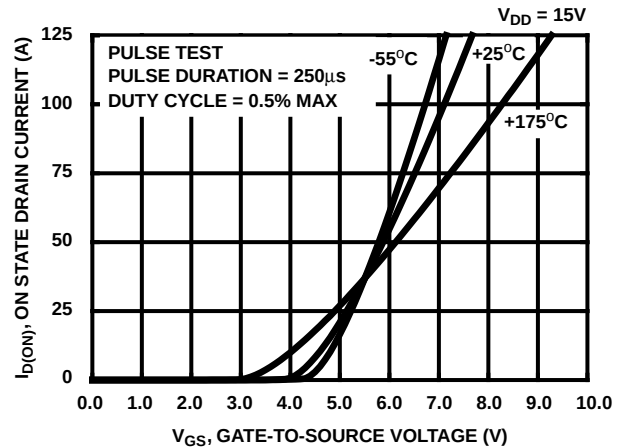


FIGURE 6. TYPICAL TRANSFER CHARACTERISTICS

Typical Performance Curves (Continued)

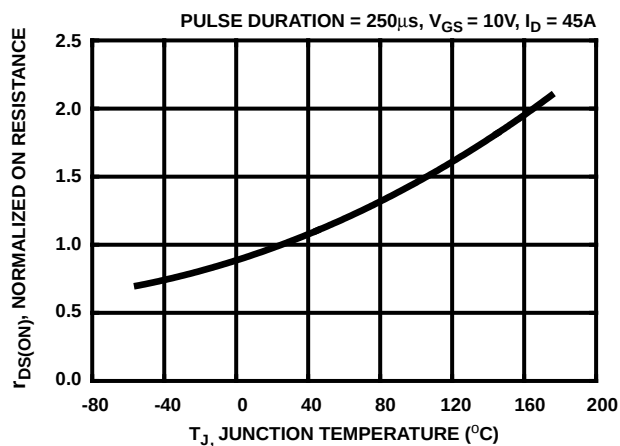


FIGURE 7. NORMALIZED $r_{DS(on)}$ vs JUNCTION TEMPERATURE

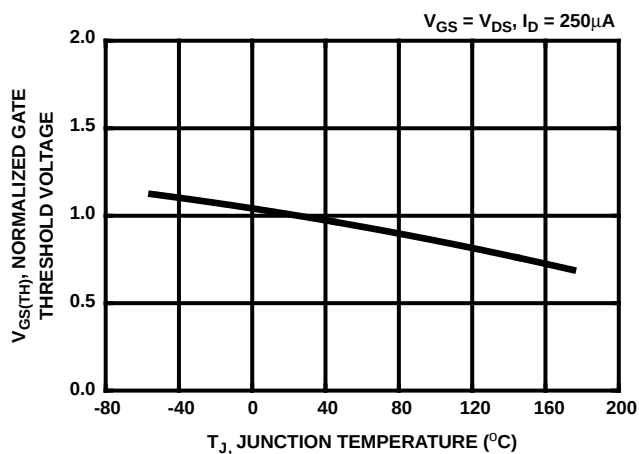


FIGURE 8. NORMALIZED GATE THRESHOLD VOLTAGE vs TEMPERATURE

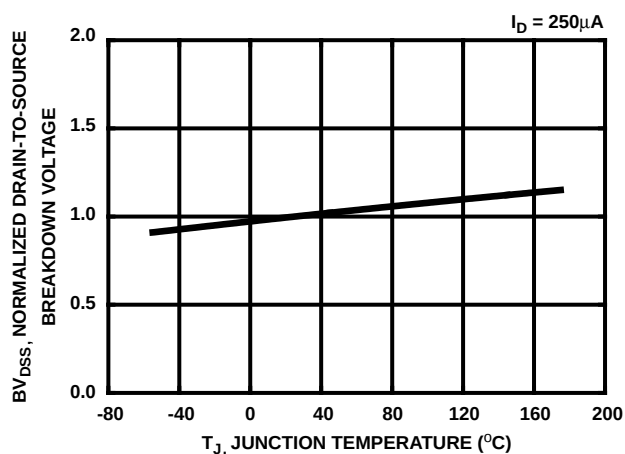


FIGURE 9. NORMALIZED DRAIN SOURCE BREAKDOWN VOLTAGE vs TEMPERATURE

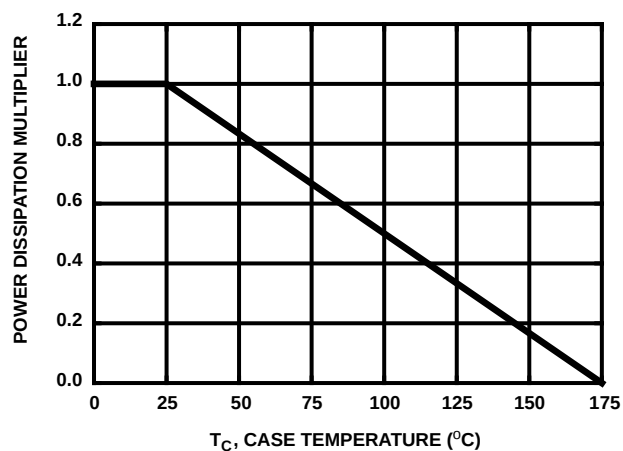


FIGURE 10. NORMALIZED POWER DISSIPATION vs TEMPERATURE DERATING CURVE

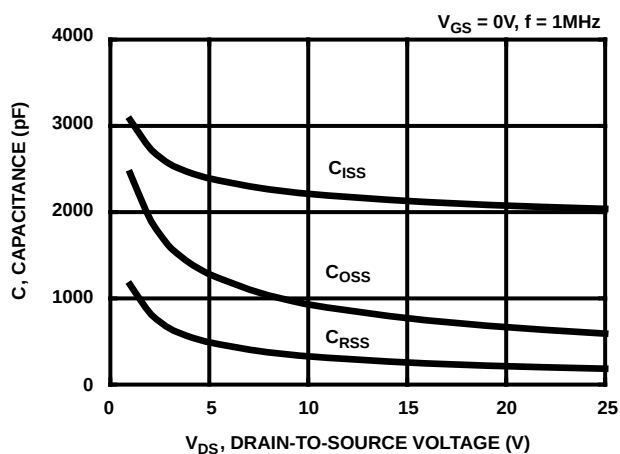


FIGURE 11. TYPICAL CAPACITANCE vs VOLTAGE

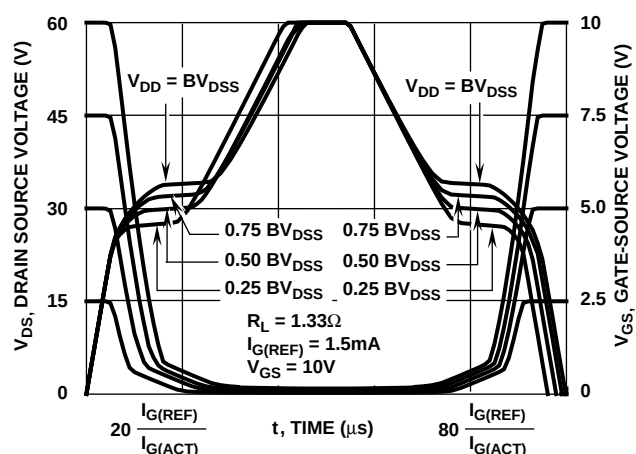


FIGURE 12. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT. REFER TO APPLICATION NOTE AN7254 AND AN7260

