

# DG180-191

## High-Speed Driver With Junction FET Switches

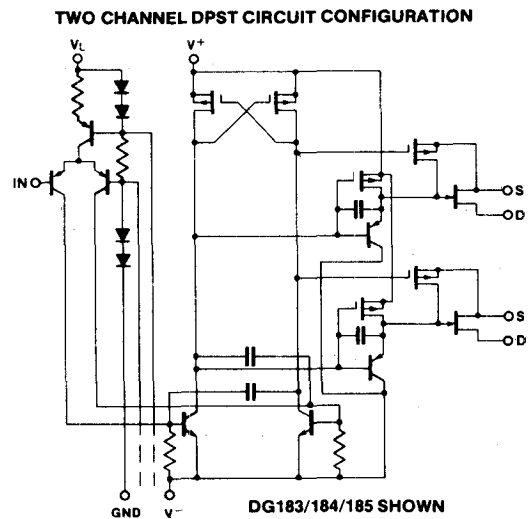
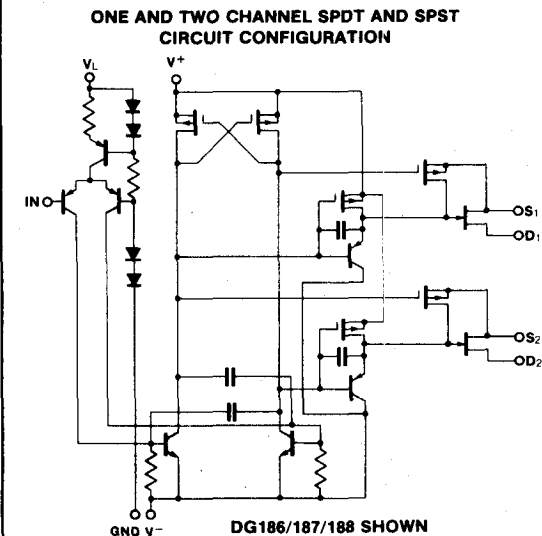
### FEATURES

- Constant ON-resistance for signals to  $\pm 10V$  (DG182, 185, 188, 191), to  $\pm 7.5V$  (all devices)
- $\pm 15V$  power supplies
- $< 2nA$  leakage from signal channel in both ON and OFF states
- TTL, DTL, RTL direct drive compatibility
- $t_{on}, t_{off} < 150ns$ , break-before-make action
- Cross-talk and open switch isolation  $> 50dB$  at 10MHz (75 $\Omega$  load)

### GENERAL DESCRIPTION

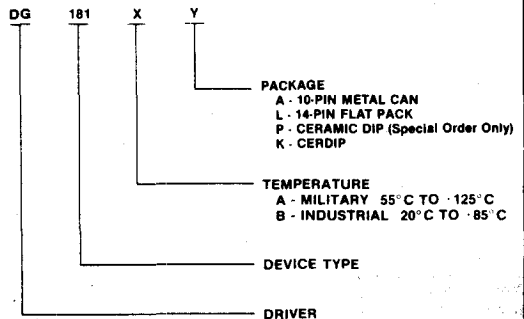
The DG180 thru DG191 series of analog gates consists of 2 or 4 N-channel junction-type field-effect transistors (J-FET) designed to function as electronic switches. Level-shifting drivers enable low-level inputs (0.8 to 2V) to control the ON-OFF state of each switch. The driver is designed to provide a turn-off speed which is faster than turn-on speed, so that break-before-make action is achieved when switching from one channel to another. In the ON state, each switch conducts current equally well in both directions. In the OFF condition, the switches will block voltages up to 20V peak-to-peak. Switch-OFF input-output feedthrough is  $> 50dB$  down at 10MHz, because of the low output impedance of the FET-gate driving circuit.

### SCHEMATIC DIAGRAM (Typical Channel)



### ORDERING INFORMATION

PART NUMBER	TYPE	$r_{DS(on)}$ (MAX)
DG180	Dual SPST	10
DG181	Dual SPST	30
DG182	Dual SPST	75
DG183	Dual DPST	10
DG184	Dual DPST	30
DG185	Dual DPST	75
DG186	SPDT	10
DG187	SPDT	30
DG188	SPDT	75
DG189	Dual SPDT	10
DG190	Dual SPDT	30
DG191	Dual SPDT	75



**MAXIMUM RATINGS**

V <sup>+</sup> -V <sup>-</sup> .....	36V	V <sub>L</sub> -V <sub>IN</sub> .....	8V
V <sup>+</sup> -V <sub>D</sub> .....	33V	V <sub>L</sub> -GND .....	8V
V <sub>D</sub> -V <sup>-</sup> .....	33V	V <sub>IN</sub> -GND .....	8V
V <sub>D</sub> -V <sub>S</sub> .....	±22V	GND-V <sup>-</sup> .....	27V
V <sub>L</sub> -V <sup>-</sup> .....	36V	GND-V <sub>IN</sub> .....	2V
Lead Temperature (Soldering, 10 sec) .....	300°C		

Current (S or D) See Note 3 ..... 200mA  
 Storage Temperature ..... -65°C to +150°C  
 Operating Temperature ..... -55°C to +125°C  
 Power Dissipation\* ..... 450 (TW), 750 (FLAT), 825 (DIP) mW  
 \*Device mounted with all leads welded or soldered to PC board. Derate 6mW/°C (TW); 10mW/°C (FLAT); 11mW/°C (DIP) above 75°C.

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**ELECTRICAL CHARACTERISTICS** (V<sup>+</sup> = +15V, V<sup>-</sup> = -15V, V<sub>L</sub> = 5V, Unless Noted)

PARAMETER	DEVICE	A SERIES			B SERIES			UNITS	TEST CONDITIONS (Note 1)	
		-55°C	+25°C	+125°C	-20°C	+25°C	+85°C			
S W I T C H I <sub>S(off)</sub>	DG181, 182, 184, 185 187, 188, 190, 191 (DG180, 183, 186, 189)		1	100		5	100	nA	V <sub>S</sub> = 10V, V <sub>D</sub> = -10V, V <sup>+</sup> = 10V/ V <sup>-</sup> = -20V, V <sub>IN</sub> = "OFF"	
	DG181, 184, 187, 190 (DG180, 183, 186, 189)		1	100		5	100	nA	V <sub>S</sub> = 7.5V, V <sub>D</sub> = -7.5V V <sub>IN</sub> = "OFF"	
	DG182, 185, 188, 191		1	100		5	100	nA	V <sub>S</sub> = 10V, V <sub>D</sub> = -10V V <sub>IN</sub> = "OFF"	
	DG181, 182, 184, 185 187, 188, 190, 191 (DG180, 183, 186, 189)		1	100		5	100	nA	V <sub>S</sub> = 10V, V <sub>D</sub> = -10V, V <sup>+</sup> = 10V/ V <sup>-</sup> = -20V, V <sub>IN</sub> = "OFF"	
I <sub>D(off)</sub>	DG181, 184, 187, 190 (DG180, 183, 186, 189)		1	100		5	100	nA	V <sub>S</sub> = 7.5V, V <sub>D</sub> = -7.5V V <sub>IN</sub> = "OFF"	
	DG182, 185, 188, 191		1	100		5	100	nA	V <sub>S</sub> = 10V, V <sub>D</sub> = -10V V <sub>IN</sub> = "OFF"	
I <sub>D(on)</sub> + I <sub>S(on)</sub>	DG180, 181, 183, 184 186, 187, 189, 190		-2	-200		-10	-200	nA	V <sub>D</sub> = V <sub>S</sub> = -7.5V, V <sub>IN</sub> = "ON"	
	DG182, 185, 188, 191		-2	-200		-10	-200	nA	V <sub>D</sub> = V <sub>S</sub> = -10V, V <sub>IN</sub> = "ON"	
I <sub>N</sub>	I <sub>NL</sub>	ALL	-250	-250	-250	-250	-250	μA	V <sub>IN</sub> = 0V	
	I <sub>NH</sub>	ALL		10	20		10	20	μA	V <sub>IN</sub> = 5V
D Y N A M I C	t <sub>on</sub>	10f Switches		300			350	ns	See switching time test circuit	
		30f Switches		150			180			
		75f Switches		250			300			
	t <sub>off</sub>	10f Switches		250			300	ns	See switching time test circuit	
		30f and 75f Switches		130			150			
	C <sub>S(off)</sub>	DG181, 182, 184, 185, 187, 188, 190, 191	9 typical (21 typical)						pF	V <sub>S</sub> = -5V, I <sub>D</sub> = 0, f = 1MHz V <sub>D</sub> = +5V, I <sub>S</sub> = 0, f = 1MHz V <sub>D</sub> = V <sub>S</sub> = 0, f = 1MHz
	C <sub>D(off)</sub>	6 typical (17 typical)								
C <sub>D(on)</sub> + C <sub>S(on)</sub>	DG180, 183, 186, 189	14 typical (17 typical)								
OFF Isolation		Typically >50dB at 10MHz (See Note 2)							R <sub>L</sub> = 75Ω, C <sub>L</sub> = 3pF	
S U P P L Y	I <sup>+</sup>	DG180, 181, 182, 189 190, 191		1.5			1.5	mA	V <sub>IN</sub> = 5V	
		DG183, 184, 185		0.1			0.1			
		DG186, 187, 188		0.8			0.8			
	I <sup>-</sup>	DG180, 181, 182, 189, 190, 191		-5.0			-5.0			
		DG183, 184, 185		-4.0			-4.0			
		DG186, 187, 188		-3.0			-3.0			
	I <sub>L</sub>	DG180, 181, 182, 183, 184, 185, 189, 190, 191		4.5			4.5			
		DG186, 187, 188		3.2			3.2			
	I <sub>GND</sub>	ALL		-2.0			-2.0			
	I <sup>+</sup>	DG180, 181, 182, 189, 190, 191		1.5			1.5		V <sub>IN</sub> = 0V	
		DG183, 184, 185		3.0			3.0			
		DG186, 187, 188		0.8			0.8			
	I <sup>-</sup>	DG180, 181, 182, 189, 190, 191		-5.0			-5.0			
		DG183, 184, 185		-5.5			-5.5			
		DG186, 187, 188		-3.0			-3.0			
	I <sub>L</sub>	DG180, 181, 182, 183, 184, 185, 189, 190, 191		4.5			4.5			
		DG186, 187, 188		3.2			3.2			
	I <sub>GND</sub>	ALL		-2.0			-2.0			

Note 1: See Switching State Diagrams for V<sub>IN</sub> "ON" and V<sub>IN</sub> "OFF" Test Conditions.

Note 2: Off Isolation typically >55dB at 1MHz for DG180, 183, 186, 189.

Note 3: Saturation Drain Current for DG180, 183, 186, 189 only, typically 300mA (2msec Pulse Duration). Maximum Current on all other devices (any terminal) 30mA.