



Low Capacitance, Low Charge Injection, 4- / 8-Channel, Triple SPDT, ± 5 V / 12 V / 5 V / 3 V Analog Multiplexers

DESCRIPTION

The DGQ4051E, DGQ4052E, and DGQ4053E are high precision CMOS analog multiplexers. The DGQ4051E is an 8-channel multiplexer, the DGQ4052E is a dual 4-channel multiplexer, and the DGQ4053E is a triple 2-channel multiplexer or triple SPDT.

The DGQ4051E, DGQ4052E, and DGQ4053E feature low leakage, parasitic capacitance, and low charge injection of 0.3 pC over the full voltage range. These devices are ideal for high precision signal switching and multiplexing.

Designed to operate from a 3 V to 16 V single supply or from a ± 3 V to ± 8 V dual supplies, the DGQ4051E, DGQ4052E, and DGQ4053E are fully specified at 3 V, 5 V, 12 V and ± 5 V. All control logic inputs have guaranteed 2 V logic high limit when operating from 5 V or ± 5 V supplies and 1.4 V when operating from a 3 V supply.

All switches conduct equally well in both directions, offering rail to rail analog signal switching and can be used both as multiplexers as well as de-multiplexers.

The DGQ4051E, DGQ4052E, and DGQ4053E operating temperature is specified from -40 °C to +125 °C and are available in 16 pin TSSOP package.

BENEFITS

- Wide operation voltage range
- Low charge injection
- Low parasitic capacitance
- Compact package option

FEATURES

- Automotive product AEC-Q100 qualified (Grade 1)
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- 3 V to 16 V single supply or ± 3 to ± 8 V dual supply operation
- Low parasitic capacitance:
 - $C_{D(ON)}$: 8.5 pF / typ. (DGQ4053E)
 - $C_{S(OFF)}$: 2.0 pF / typ. (DGQ4053E)
- Less than 0.3 pC charge injection over the full signal swing range
- Low leakage: < 50 pA, typ.
- Fast switching t_{ON} : 35 ns, typ.
- 3 V logic compatible for control
- Bi-directional rail to rail signal switching
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

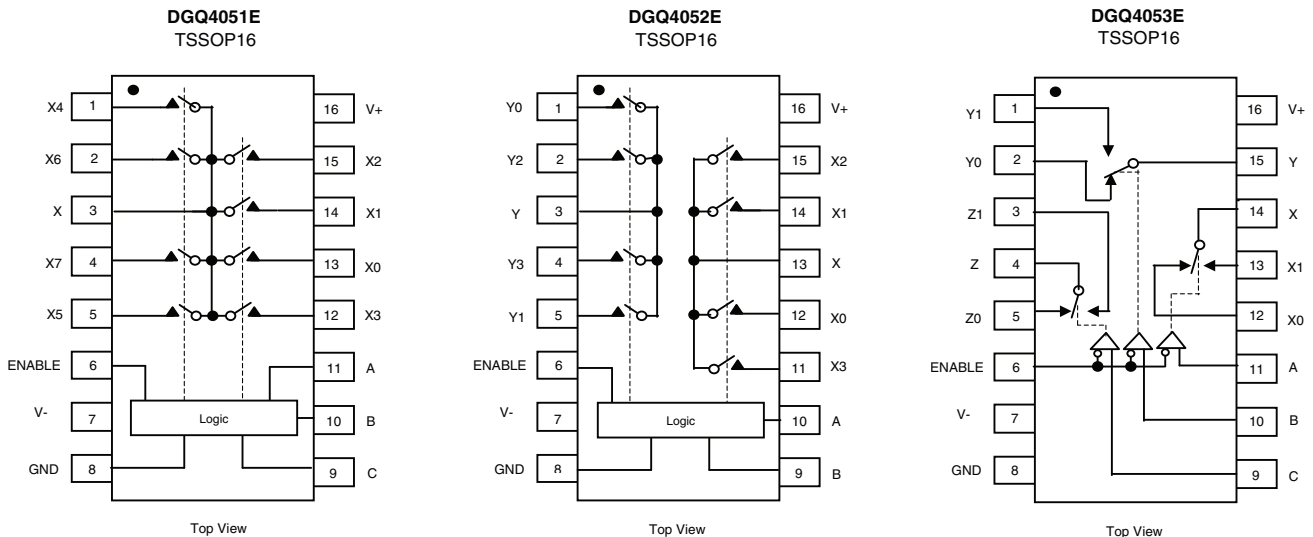


RoHS COMPLIANT

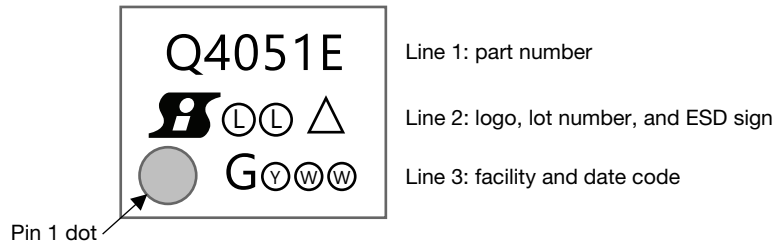
APPLICATIONS

- Automotive battery management systems
- Automotive infotainment and telematics
- Automotive analog and digital signal multiplexing / demultiplexing

FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



ENABLE = LO, all switches are controlled by addr pins.
ENABLE = HI, all switches are off.

MARKING INFORMATION


TRUTH TABLE						
ENABLE INPUT	SELECT INPUTS			ON SWITCHES		
	C	B	A	DGQ4051E	DGQ4052E	DGQ4053E
H	X	X	X	All switches open	All switches open	All switches open
L	L	L	L	X to X0	X to X0, Y to Y0	X to X0, Y to Y0, Z to Z0
L	L	L	H	X to X1	X to X1, Y to Y1	X to X1, Y to Y0, Z to Z0
L	L	H	L	X to X2	X to X2, Y to Y2	X to X0, Y to Y1, Z to Z0
L	L	H	H	X to X3	X to X3, Y to Y3	X to X1, Y to Y1, Z to Z0
L	H	L	L	X to X4	X to X0, Y to Y0	X to X0, Y to Y0, Z to Z1
L	H	L	H	X to X5	X to X1, Y to Y1	X to X1, Y to Y0, Z to Z1
L	H	H	L	X to X6	X to X2, Y to Y2	X to X0, Y to Y1, Z to Z1
L	H	H	H	X to X7	X to X3, Y to Y3	X to X1, Y to Y1, Z to Z1

ORDERING INFORMATION					
ORDERING PART NUMBER	CONFIGURATION	MARKING	TEMPERATURE RANGE	PACKAGE	MIN. ORDER / PACKAGING QUANTITY
DGQ4051EEQ-T1-GE4	8:1 x 1	Q4051E	-40 °C to +125 °C ^a	16-pin TSSOP	Tape and reel 3000 units
DGQ4052EEQ-T1-GE4	4:1 x 2	Q4052E			
DGQ4053EEQ-T1-GE4	2:1 x 3	Q4053E			

Note

a. -40 °C to +85 °C datasheet limits apply

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)			
PARAMETER	LIMIT		UNIT
V ₊ to V ₋	-0.3 to +18		V
GND to V ₋	-18		
Digital inputs ^a , V _S , V _D	(V ₋) - 0.3 to (V ₊) + 0.3 or 30 mA, whichever occurs first		
Continuous current (any terminal)	30		mA
Peak current, S or D (pulsed 1 ms, 10 % duty cycle)	100		
Storage temperature	-65 to +150		°C
Power dissipation ^b	16-pin TSSOP ^c		mW
Thermal resistance ^b	16-pin TSSOP ^c		°C/W
ESD human body model (HBM); per AEC-Q100-002	2000		V
ESD charged device model (CDM), per AEC-Q100-011	750		V
Latch up current, per AEC-100-004 (JEDEC [®] class II)	100		mA

Notes

- Signals on SX, DX, or INX exceeding V₊ or V₋ will be clamped by internal diodes. Limit forward diode current to maximum current ratings
- All leads welded or soldered to PC board
- Derate 5.6 mW/°C above 70 °C

Stresses beyond 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 beyond 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.



SPECIFICATIONS FOR DUAL SUPPLIES											
PARAMETER	SYMBOL	TEST CONDITIONS UNLESS OTHERWISE SPECIFIED V+ = 5 V, V- = -5 V VIN(A, B, C, and enable) = 2 V, 0.8 V ^a	TEMP. ^b	TYP. ^c	-40 °C to +125 °C		-40 °C to +85 °C		UNIT		
					MIN. ^d	MAX. ^d	MIN. ^d	MAX. ^d			
Analog Switch											
Analog signal range ^e	V _{ANALOG}		Full	-	-5	5	-5	5	V		
On-resistance	R _{ON}	I _S = 1 mA, V _D = -3 V, 0 V, 3 V	Room	68	-	78	-	78	Ω		
			Full	-	-	106	-	97			
On-resistance match	ΔR _{ON}	I _S = 1 mA, V _D = ± 3 V	Room	0.91	-	6	-	6	Ω		
			Full	-	-	6	-	6			
On-resistance flatness	R _{FLATNESS}	I _S = 1 mA, V _D = -3 V, 0 V, 3 V	Room	10	-	17	-	17	Ω		
			Full	-	-	20	-	19			
Switch off leakage current	I _{S(off)}	V+ = 5.5 V, V- = -5.5 V, V _D = ± 4.5 V, V _S = ∓ 4.5 V	Room	± 0.05	-1	1	-1	1	nA		
			Full	-	-50	50	-5	5			
	I _{D(off)}		Room	± 0.05	-1	1	-1	1			
			Full	-	-50	50	-5	5			
Channel on leakage current	I _{D(on)}	V+ = 5.5 V, V- = -5.5 V, V _S = V _D = ± 4.5 V	Room	± 0.05	-1	1	-1	1			
			Full	-	-50	50	-5	5			
Digital Control											
Input current, V _{IN} low	I _{IL}	V _{IN} (A, B, C, and enable) under test = 0.6 V	Full	0.02	-1	1	-1	1	μA		
Input current, V _{IN} high	I _{IH}	V _{IN} (A, B, C, and enable) under test = 2 V	Full	0.02	-1	1	-1	1			
Input capacitance ^e	C _{IN}	f = 1 MHz	Room	3.4	-	-	-	-	pF		
Dynamic Characteristics											
Off isolation ^e	OIRR	R _L = 50 Ω, C _L = 1 pF	f = 100 kHz	Room	-106	-	-	-	-	dB	
			f = 10 MHz	Room	-68	-	-	-	-		
			f = 100 MHz	Room	-49	-	-	-	-		
Channel-to-channel crosstalk ^e	X _{TALK}		f = 100 kHz	Room	-105	-	-	-	-		
			f = 10 MHz	Room	-62	-	-	-	-		
			f = 100 MHz	Room	-51	-	-	-	-		
Bandwidth, 3 dB	BW	R _L = 50 Ω	DGQ4051E	Room	308	-	-	-	-	MHz	
			DGQ4052E	Room	353	-	-	-	-		
			DGQ4053E	Room	930	-	-	-	-		
Transition time	t _{TRANS}	R _L = 300 Ω, C _L = 35 pF see Fig. 1, 2, 3	Room	72	-	112	-	112	ns		
			Full	-	-	139	-	131			
Enable turn-on time	t _{ON}		Room	35	-	75	-	75			
			Full	-	-	86	-	80			
Enable turn-off time	t _{OFF}		Room	48	-	88	-	88			
			Full	-	-	97	-	95			
Break-before-make time delay	t _D		Room	-	1	-	1	-			
			Full	-	-	-	-	-			
Charge injection ^e	Q		V _g = 0 V, R _g = 0 Ω, C _L = 1 nF	Room	0.38	-	-	-		-	pC
Source off capacitance ^e	C _{S(off)}		f = 1 MHz	DGQ4051E	Room	2.2	-	-		-	-
		DGQ4052E		Room	2.1	-	-	-	-		
		DGQ4053E		Room	2	-	-	-	-		
Drain off capacitance ^e	C _{D(off)}	f = 1 MHz	DGQ4051E	Room	9.2	-	-	-	-		
			DGQ4052E	Room	4.8	-	-	-	-		
			DGQ4053E	Room	3.1	-	-	-	-		
Channel on capacitance ^e	C _{D(on)}	f = 1 MHz	DGQ4051E	Room	14.9	-	-	-	-		
			DGQ4052E	Room	10	-	-	-	-		
			DGQ4053E	Room	8.5	-	-	-	-		
Total harmonic distortion ^e	THD	Signal = 5 V _{RMS} , 20 Hz to 20 kHz, R _L = 600 Ω	Room	0.065	-	-	-	-	%		



SPECIFICATIONS FOR DUAL SUPPLIES									
PARAMETER	SYMBOL	TEST CONDITIONS UNLESS OTHERWISE SPECIFIED V+ = 5 V, V- = -5 V VIN(A, B, C, and enable) = 2 V, 0.8 V ^A	TEMP. ^b	TYP. ^c	-40 °C to +125 °C		-40 °C to +85 °C		UNIT
					MIN. ^d	MAX. ^d	MIN. ^d	MAX. ^d	
Power Supplies									
Power supply current	I+	V+ = 5 V, V- = -5 V VIN(A, B, C, and enable) = 0 V or 5 V	Room	0.05	-	1	-	1	μA
			Full	-	-	10	-	10	
Negative supply current	I-		Room	-0.05	-1	-	-1	-	
			Full	-	-10	-	-10	-	
Ground current	IGND		Room	-0.05	-1	-	-1	-	
			Full	-	-10	-	-10	-	

SPECIFICATIONS FOR UNIPOLAR SUPPLIES									
PARAMETER	SYMBOL	TEST CONDITIONS UNLESS OTHERWISE SPECIFIED V+ = 12 V, V- = 0 V VIN(A, B, C, AND ENABLE) = 2 V, 0.8 V ^A	TEMP. ^b	TYP. ^c	-40 °C to +125 °C		-40 °C to +85 °C		UNIT
					MIN. ^d	MAX. ^d	MIN. ^d	MAX. ^d	
Analog Switch									
Analog signal Range ^e	V _{ANALOG}		Full	-	0	12	0	12	V
On-resistance	R _{ON}	I _S = 1 mA, V _D = 0.7 V, 11.3 V	Room	85	-	103	-	103	Ω
			Full	-	-	133	-	125	
On-resistance match	ΔR _{ON}	I _S = 1 mA, V _D = 11.3 V	Room	1.24	-	8	-	8	Ω
			Full	-	-	8	-	8	
On-resistance flatness	R _{FLATNESS}	I _S = 1 mA, V _D = 0.7 V, 11.3 V	Room	27	-	37	-	37	Ω
			Full	-	-	44	-	43	
Switch off leakage current	I _{S(off)}	V+ = 13.2 V, V- = 0 V V _D = 1 V / 12.2 V, V _S = 12.2 V / 1 V	Room	± 0.05	-1	1	-1	1	nA
			Full	-	-50	50	-5	5	
	I _{D(off)}		Room	± 0.05	-1	1	-1	1	
			Full	-	-50	50	-5	5	
Channel on leakage current	I _{D(on)}	V+ = 13.2 V, V- = 0 V V _D = V _S = 1 V / 12.2 V	Room	± 0.05	-1	1	-1	1	nA
			Full	-	-50	50	-5	5	
Digital Control									
Input current, V _{IN} low	I _L	V _{IN} (A, B, C, and enable) under test = 0.8 V	Full	0.02	-1	1	-1	1	μA
Input current, V _{IN} high	I _H	V _{IN} (A, B, C, and enable) under test = 2 V	Full	0.02	-1	1	-1	1	
Dynamic Characteristics									
Transition time	t _{TRANS}	R _L = 300 Ω, C _L = 35 pF see Fig. 1, 2, 3	Room	43	-	83	-	83	ns
			Full	-	-	95	-	90	
Enable turn-on ime	t _{ON}		Room	22	-	62	-	62	
			Full	-	-	71	-	67	
Enable turn-off time	t _{OFF}		Room	47	-	87	-	87	
			Full	-	-	94	-	93	
Break-before-make time delay	t _D		Room	25	1	-	1	-	pC
			Full	-	-	-	-	-	
Charge injection ^e	Q	V _g = 0 V, R _g = 0 Ω, C _L = 1 nF	Full	-	-	-	-	-	pC
Off isolation ^e	O _{IRR}	R _L = 50 Ω, C _L = 1 pF f = 100 kHz	Room	-	-	-	-	-	dB
Channel-to-channel crosstalk ^e	X _{TALK}		Room	-	-	-	-	-	



SPECIFICATIONS FOR UNIPOLAR SUPPLIES										
PARAMETER	SYMBOL	TEST CONDITIONS UNLESS OTHERWISE SPECIFIED V ₊ = 12 V, V ₋ = 0 V V _{IN(A, B, C, AND ENABLE)} = 2 V, 0.8 V ^A	TEMP. ^b	TYP. ^c	-40 °C to +125 °C		-40 °C to +85 °C		UNIT	
					MIN. ^d	MAX. ^d	MIN. ^d	MAX. ^d		
Dynamic Characteristics										
Source off capacitance ^e	C _{S(off)}	f = 1 MHz	DGQ4051E	Room	-	-	-	-	-	pF
			DGQ4052E	Room	-	-	-	-	-	
			DGQ4053E	Room	-	-	-	-	-	
Drain off capacitance ^e	C _{D(off)}	f = 1 MHz	DGQ4051E	Room	-	-	-	-	-	
			DGQ4052E	Room	-	-	-	-	-	
			DGQ4053E	Room	-	-	-	-	-	
Channel on capacitance ^e	C _{D(on)}	f = 1 MHz	DGQ4051E	Room	-	-	-	-	-	
			DGQ4052E	Room	-	-	-	-	-	
			DGQ4053E	Room	-	-	-	-	-	
Power Supplies										
Power supply current	I ₊	V _{IN(A, B, C, and enable)} = 0 V or 5 V	Room	0.05	-	1	-	1	μA	
			Full	-	-	10	-	10		
Negative supply current	I ₋		Room	-0.05	-1	-	-1	-		
			Full	-	-10	-	-10	-		
Ground current	I _{GND}		Room	-0.05	-1	-	-1	-		
			Full	-	-10	-	-10	-		

SPECIFICATIONS FOR UNIPOLAR SUPPLIES										
PARAMETER	SYMBOL	TEST CONDITIONS UNLESS OTHERWISE SPECIFIED V ₊ = 5 V, V ₋ = 0 V V _{IN(A, B, C, and enable)} = 2 V, 0.8 V ^A	TEMP. ^b	TYP. ^c	-40 °C to +125 °C		-40 °C to +85 °C		UNIT	
					MIN. ^d	MAX. ^d	MIN. ^d	MAX. ^d		
Analog Switch										
Analog signal range ^e	V _{ANALOG}		Full	-	0	5	0	5	V	
On-resistance	R _{ON}	I _S = 1 mA, V _D = 0 V, 3.5 V	Room	125	-	147	-	147	Ω	
			Full	-	-	176	-	168		
On-resistance match	ΔR _{ON}	I _S = 1 mA, V _D = 3.5 V	Room	1.3	-	8	-	8		
			Full	-	-	8	-	8		
On-resistance flatness	R _{FLATNESS}	I _S = 1 mA, V _D = 0 V, 3 V	Room	21	-	31	-	31		
			Full	-	-	25	-	29		
Switch off leakage current	I _{S(off)}	V ₊ = 5.5 V, V ₋ = 0 V V _D = 1 V / 4.5 V, V _S = 4.5 V / 1 V	Room	± 0.03	-1	1	-1	1	nA	
			Full	-	-50	50	-5	5		
	I _{D(off)}		Room	± 0.03	-1	1	-1	1		
			Full	-	-50	50	-5	5		
Channel on leakage current	I _{D(on)}	V ₊ = 5.5 V, V ₋ = 0 V V _D = V _S = 1 V / 4.5 V	Room	± 0.03	-1	1	-1	1		
			Full	-	-50	50	-5	5		
Digital Control										
Input current, V _{IN} low	I _L	V _{IN(A, B, C, and enable)} under test = 0.6 V	Full	0.02	-1	1	-1	1	μA	
Input current, V _{IN} high	I _H	V _{IN(A, B, C, and enable)} under test = 2 V	Full	0.02	-1	1	-1	1		



SPECIFICATIONS FOR UNIPOLAR SUPPLIES										
PARAMETER	SYMBOL	TEST CONDITIONS UNLESS OTHERWISE SPECIFIED V+ = 5 V, V- = 0 V VIN(A, B, C, and enable) = 2 V, 0.8 V ^a		TEMP. ^b	TYP. ^c	-40 °C to +125 °C		-40 °C to +85 °C		UNIT
						MIN. ^d	MAX. ^d	MIN. ^d	MAX. ^d	
Dynamic Characteristics										
Transition time	t _{TRANS}	R _L = 300 Ω, C _L = 35 pF see Fig. 1, 2, 3		Room	95	-	135	-	135	ns
				Full	-	-	169	-	148	
Enable turn-on time	t _{ON}			Room	56	-	96	-	96	
				Full	-	-	117	-	107	
Enable turn-off time	t _{OFF}			Room	55	-	95	-	95	
				Full	-	-	110	-	103	
Break-before-make time delay	t _D			Room	-	12	-	12	-	
				Full	-	-	-	-	-	
Charge injection ^e	Q	V _g = 0 V, R _g = 0 Ω, C _L = 1 nF		Null	0.32	-	-	-	-	pC
Off isolation ^e	OIRR	R _L = 50 Ω, C _L = 1 pF f = 100 kHz		Room	-86	-	-	-	-	dB
Channel-to-channel crosstalk ^e	X _{TALK}			Room	-105	-	-	-	-	
Source off capacitance ^e	C _{S(off)}	f = 1 MHz	DGQ4051E	Room	2.4	-	-	-	-	pF
			DGQ4052E	Room	2.4	-	-	-	-	
			DGQ4053E	Room	2.3	-	-	-	-	
Drain off capacitance ^e	C _{D(off)}	f = 1 MHz	DGQ4051E	Room	10.1	-	-	-	-	
			DGQ4052E	Room	5.3	-	-	-	-	
			DGQ4053E	Room	3.4	-	-	-	-	
Channel on capacitance ^e	C _{D(on)}	f = 1 MHz	DGQ4051E	Room	15.9	-	-	-	-	
			DGQ4052E	Room	10.6	-	-	-	-	
			DGQ4053E	Room	8.9	-	-	-	-	
Power Supplies										
Power supply current	I+	VIN(A, B, C, and enable) = 0 V or 5 V		Room	0.05	-	1	-	1	μA
				Full	-	-	10	-	10	
Negative supply current	I-			Room	-0.05	-1	-	-1	-	
				Full	-	-10	-	-10	-	
Ground current	I _{GND}			Room	-0.05	-1	-	-1	-	
				Full	-	-10	-	-10	-	



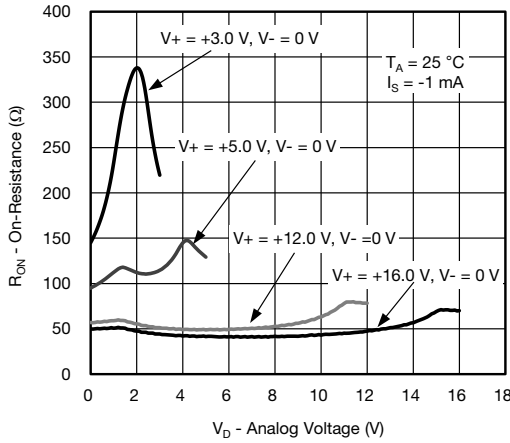
SPECIFICATIONS FOR UNIPOLAR SUPPLIES											
PARAMETER	SYMBOL	TEST CONDITIONS UNLESS OTHERWISE SPECIFIED V+ = 3 V, V- = 0 V VIN(A, B, C, and enable) = 1.4 V, 0.6 V ^a	TEMP. ^b	TYP. ^c	-40 °C to +125 °C		-40 °C to +85 °C		UNIT		
					MIN. ^d	MAX. ^d	MIN. ^d	MAX. ^d			
Analog Switch											
Analog signal range ^e	V _{ANALOG}		Full	-	0	3	0	3	V		
On-resistance	R _{ON}	I _S = 1 mA, V _D = 1.5 V	Room	221	-	-	-	-	Ω		
			Full	-	-	-	-				
Switch off leakage current	I _{S(off)}	V+ = 3.3 V, V- = 0 V V _D = 0.3 V / 3 V, V _S = 3 V / 0.3 V	Room	± 0.02	-1	1	-1	1	nA		
			Full	-	-50	50	-5	5			
	I _{D(off)}		Room	± 0.02	-1	1	-1	1			
			Full	-	-50	50	-5	5			
Channel on leakage current	I _{D(on)}	V+ = 3.3 V, V- = 0 V V _D = V _S = 0.3 V / 3 V	Room	± 0.02	-1	1	-1	1			
			Full	-	-50	50	-5	5			
Digital Control											
Input current, V _{IN} Low	I _L	V _{IN(A, B, C, and enable)} under test = 0.6 V	Full	0.02	-1	1	-1	1	μA		
Input current, V _{IN} High	I _H	V _{IN(A, B, C, and enable)} under test = 1.4 V	Full	0.02	-1	1	-1	1			
Dynamic Characteristics											
Transition time	t _{TRANS}	R _L = 300 Ω, C _L = 35 pF see Fig. 1, 2, 3	Room	200	-	-	-	-	ns		
			Full	-	-	-	-				
Enable turn-on time	t _{ON}		Room	130	-	-	-	-			
			Full	-	-	-	-				
Enable turn-off time	t _{OFF}		Room	78	-	-	-	-			
			Full	-	-	-	-				
Break-before-make time delay	t _D		Room	130	-	-	-	-			
			Full	-	-	-	-				
Charge injection ^e	Q		V _g = 0 V, R _g = 0 Ω, C _L = 1 nF	Room	0.34	-	-	-		-	pC
Off isolation ^e	OIRR		R _L = 50 Ω, C _L = 1 pF f = 100 kHz	Room	-88	-	-	-		-	dB
Channel-to-channel crosstalk ^e	X _{TALK}	Room		-105	-	-	-	-			
		Room		-105	-	-	-	-			
Source off capacitance ^e	C _{S(off)}	f = 1 MHz	DGQ4051E	Room	2.6	-	-	-	-		
			DGQ4052E	Room	2.6	-	-	-	-		
			DGQ4053E	Room	2.5	-	-	-	-		
Drain off capacitance ^e	C _{D(off)}	f = 1 MHz	DGQ4051E	Room	10.7	-	-	-	-		
			DGQ4052E	Room	5.7	-	-	-	-		
			DGQ4053E	Room	3.6	-	-	-	-		
Channel on capacitance ^e	C _{D(on)}	f = 1 MHz	DGQ4051E	Room	16.4	-	-	-	-		
			DGQ4052E	Room	10.9	-	-	-	-		
			DGQ4053E	Room	9.1	-	-	-	-		
Power Supplies											
Power supply current	I+	V _{IN(A, B, C, and enable)} = 0 V or 3 V	Room	0.05	-	1	-	1	μA		
			Full	-	-	10	-	10			
Negative supply current	I-		Room	-0.05	-1	-	-1	-			
			Full	-	-10	-	-10	-			
Ground current	I _{GND}		Room	-0.05	-1	-	-1	-			
			Full	-	-10	-	-10	-			

Notes

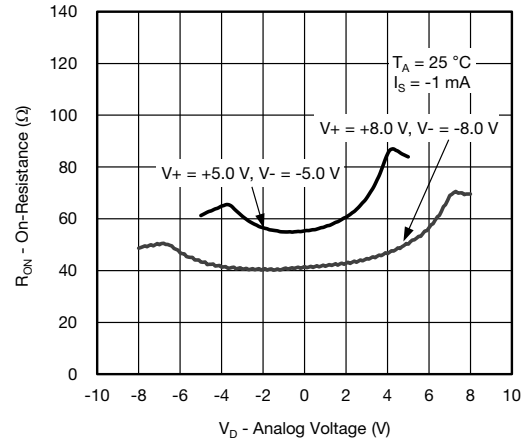
- a. V_{IN} = input voltage to perform proper function
- b. Room = 25 °C, full = as determined by the operating temperature suffix
- c. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing
- d. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this datasheet
- e. Guaranteed by design, not subject to production test



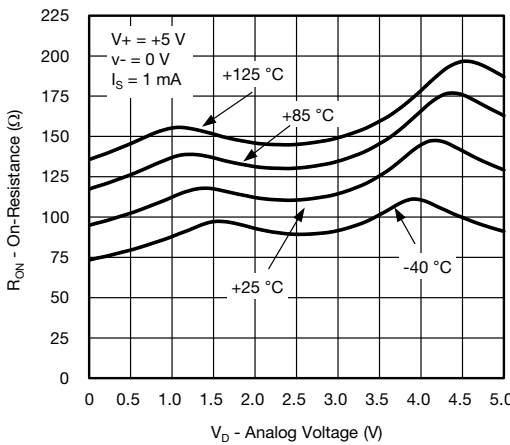
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



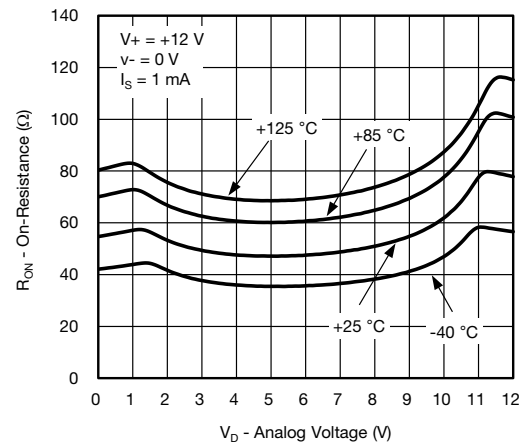
On-Resistance vs. Analog Voltage (Single Supply)



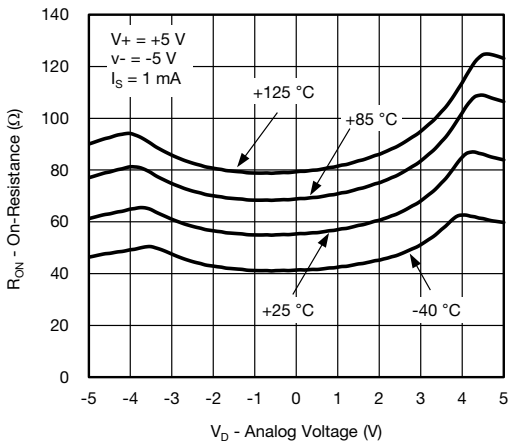
On-Resistance vs. Analog Voltage (Dual Supply)



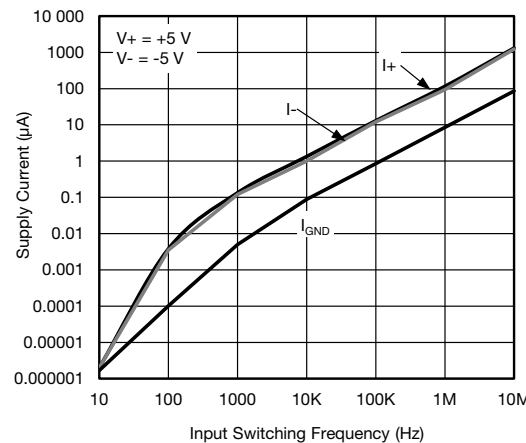
On-Resistance vs. Analog Voltage (Temperature)



On-Resistance vs. Analog Voltage (Temperature)



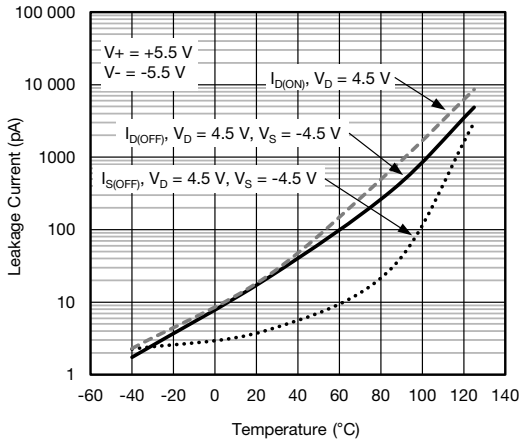
On-Resistance vs. Analog Voltage (Temperature)



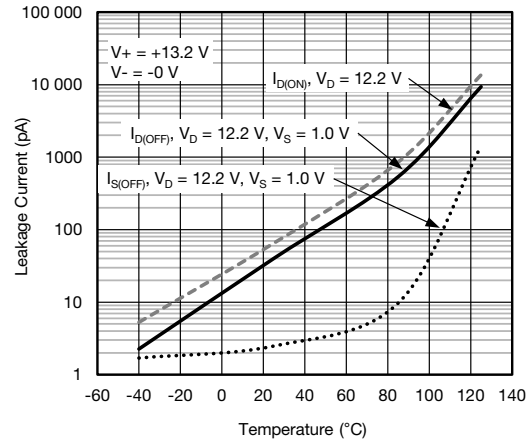
Supply Current vs. Input Switching Frequency



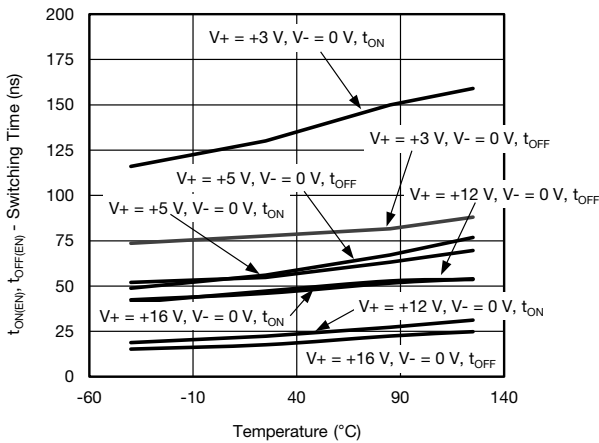
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



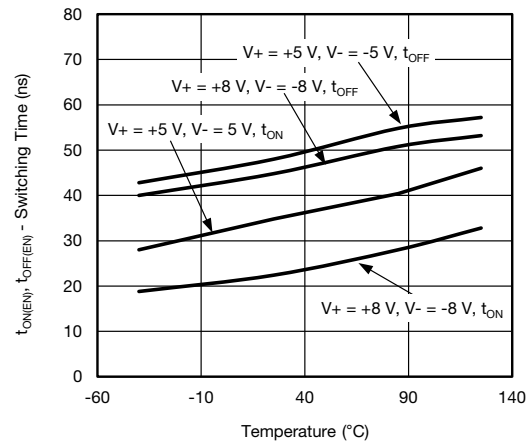
Leakage Current vs. Temperature



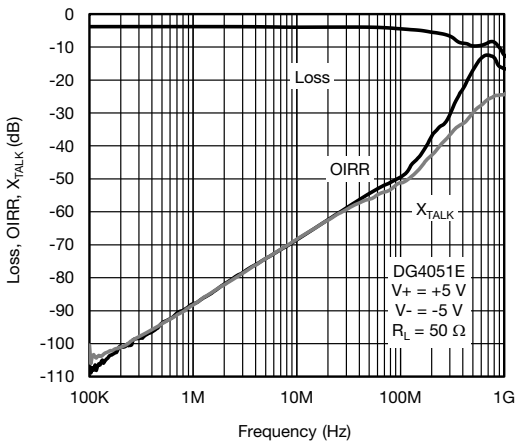
Leakage Current vs. Temperature



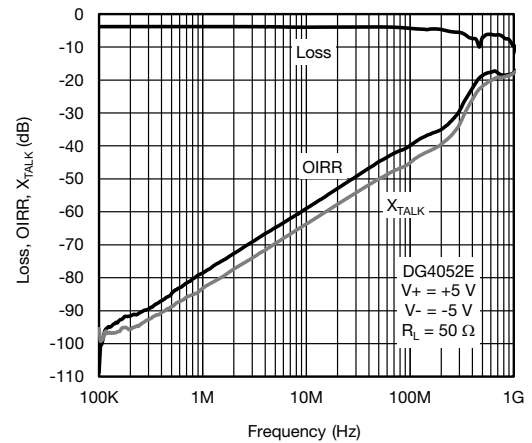
Switching Time vs. Temperature (Single Supply)



Switching Time vs. Temperature (Dual Supply)



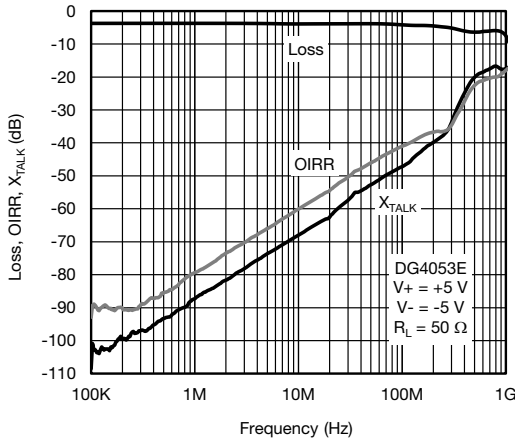
DGQ4051E Insertion Loss, Off-Isolation, Crosstalk vs. Frequency



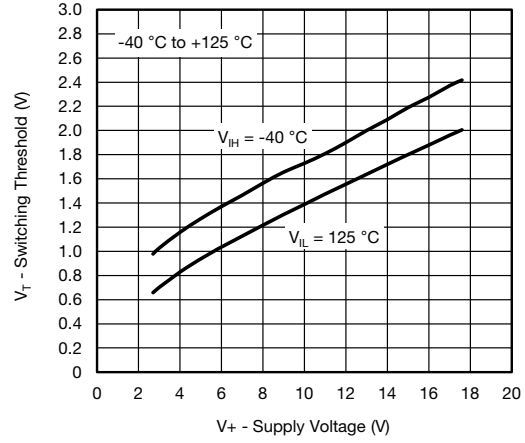
DGQ4052E Insertion Loss, Off-Isolation, Crosstalk vs. Frequency



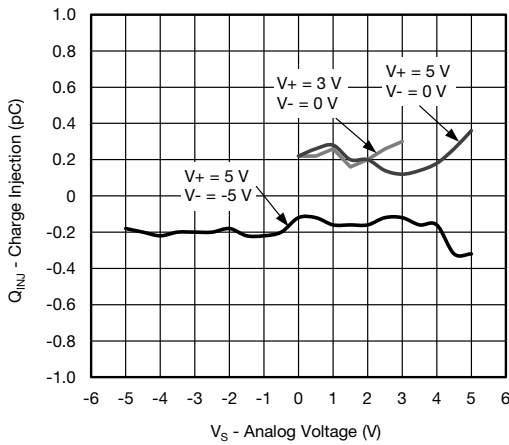
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



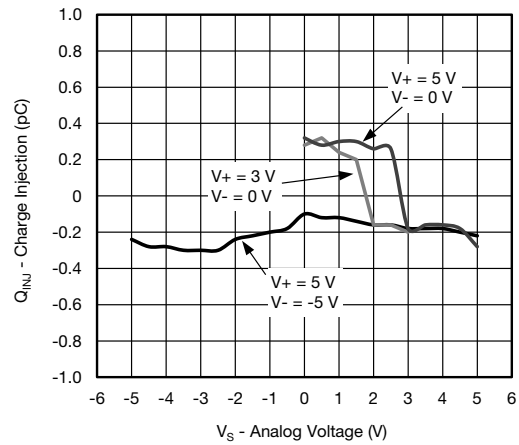
DGQ4053E Insertion Loss, Off-Isolation, Crosstalk vs. Frequency



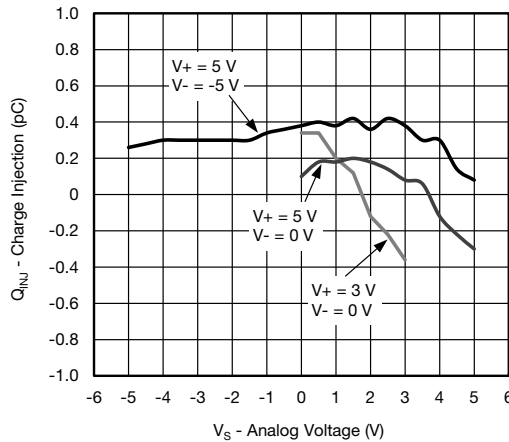
Switching Threshold vs. V+ Supply Voltage



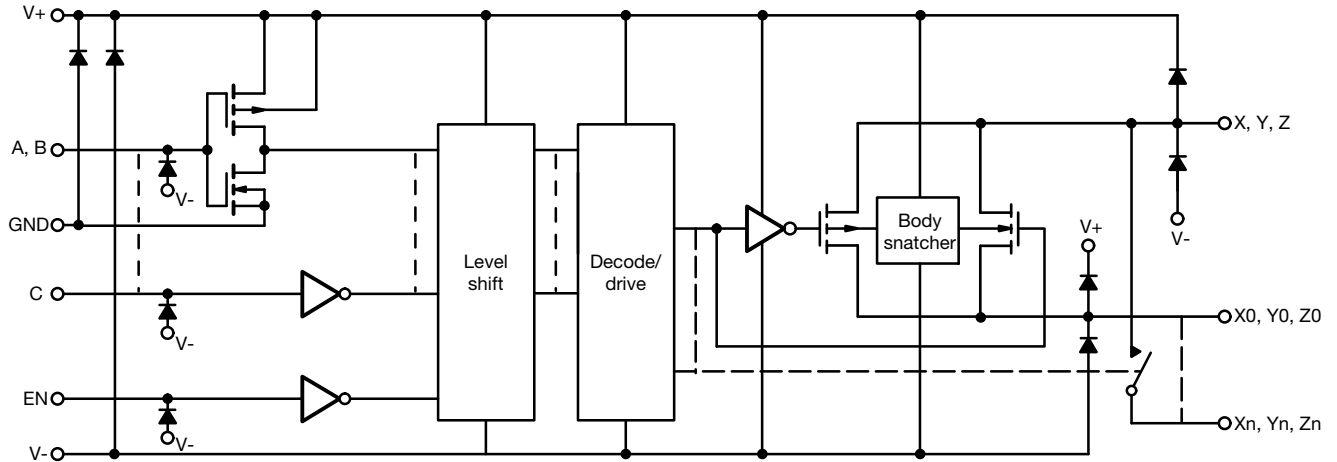
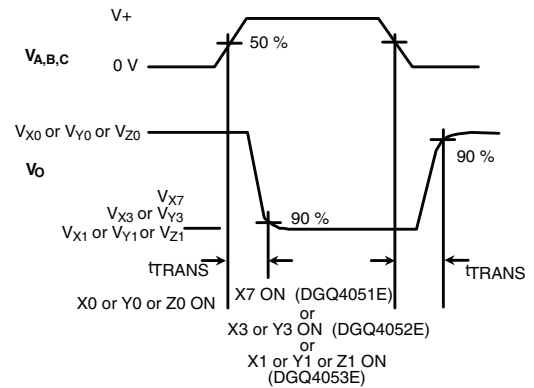
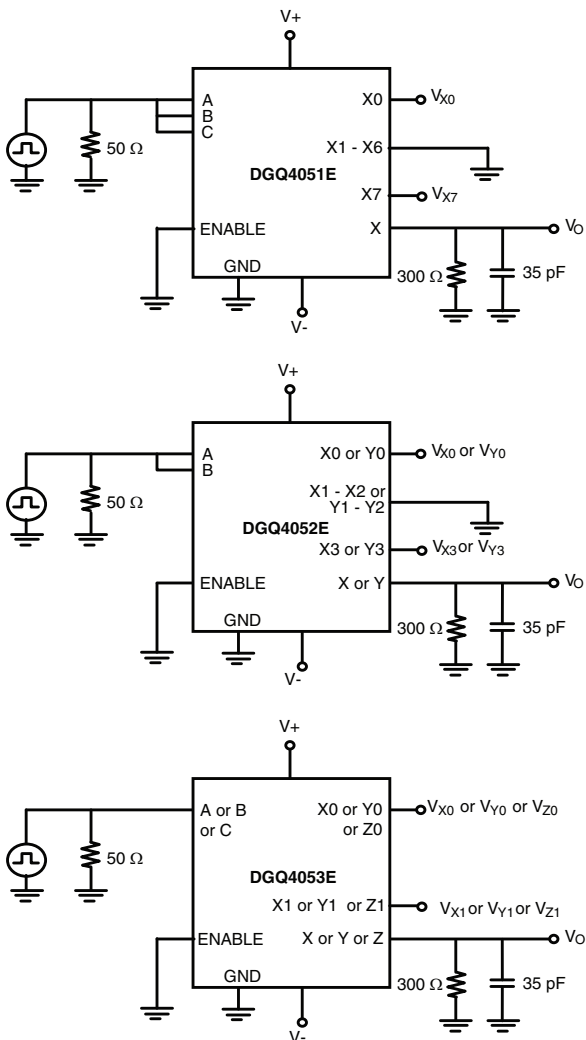
DGQ4051E Charge Injection vs. Analog Voltage



DGQ4053E Charge Injection vs. Analog Voltage



DGQ4052E Charge Injection vs. Analog Voltage

SCHEMATIC DIAGRAM (Typical Channel)

TEST CIRCUITS

Fig. 1 - Transition Time

TEST CIRCUITS

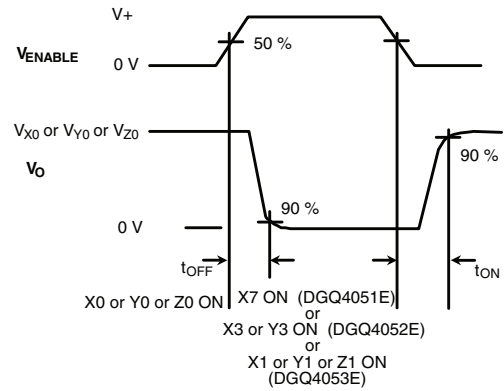
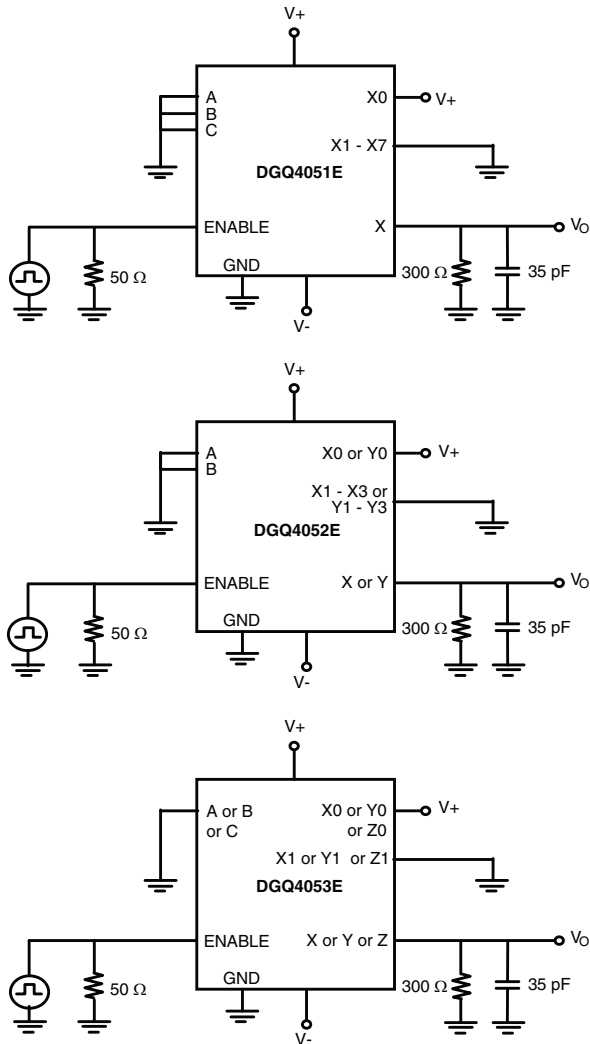


Fig. 2 - Enable Switching Time

TEST CIRCUITS

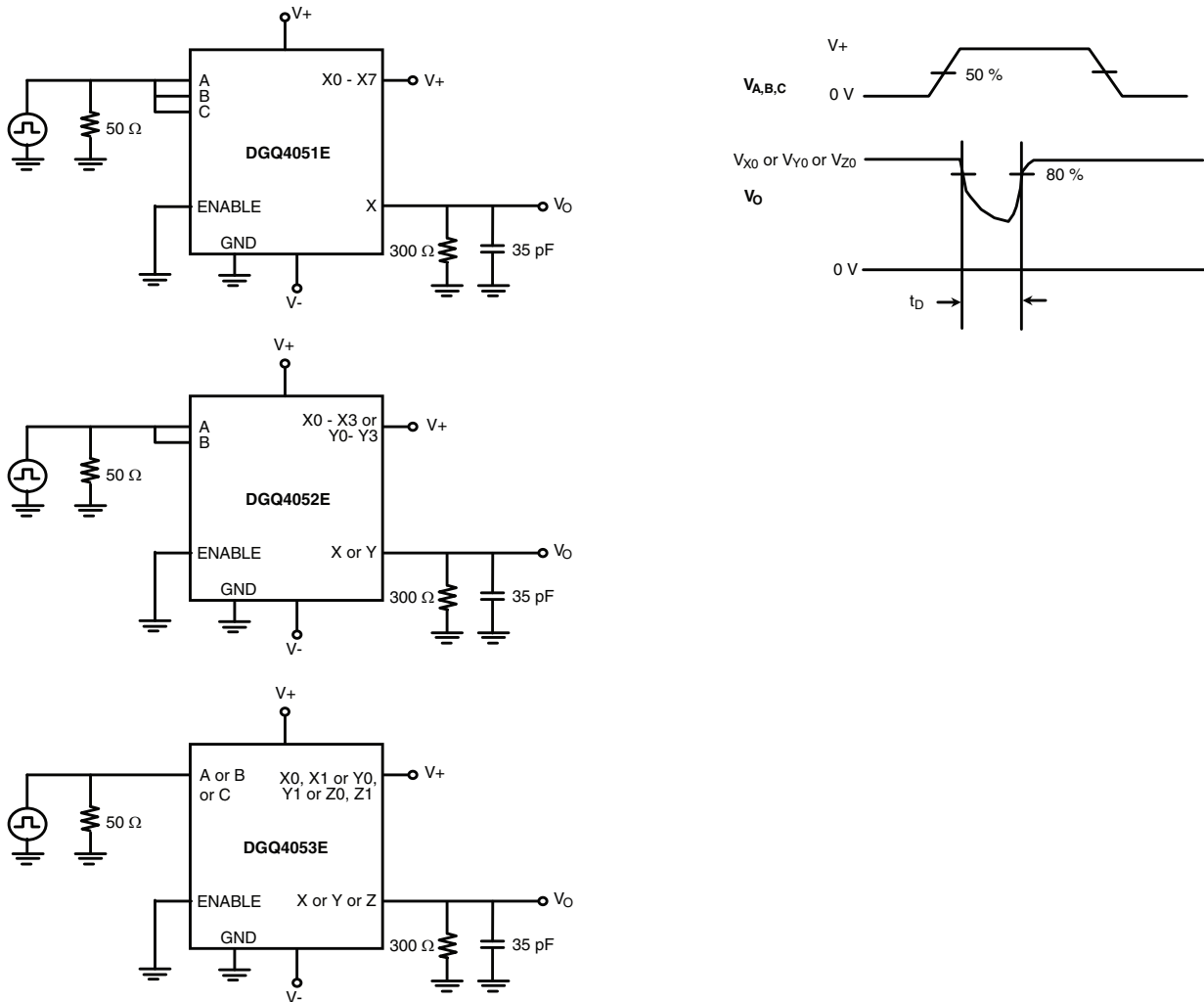


Fig. 3 - Break-Before-Make

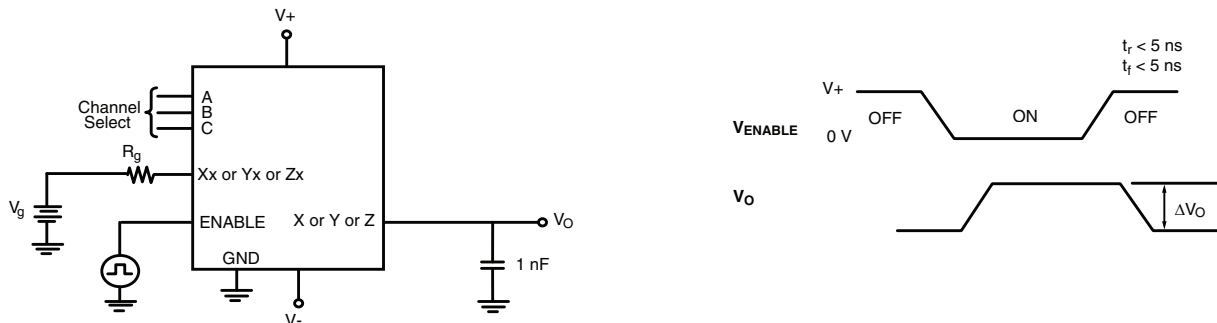
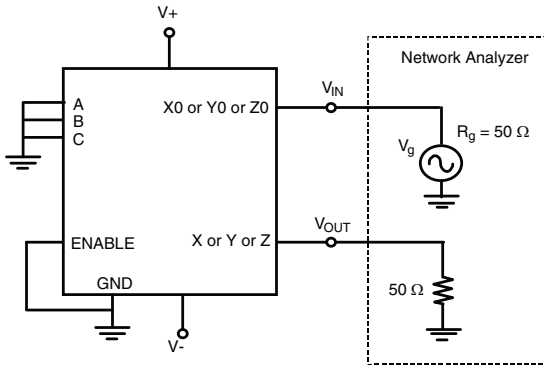


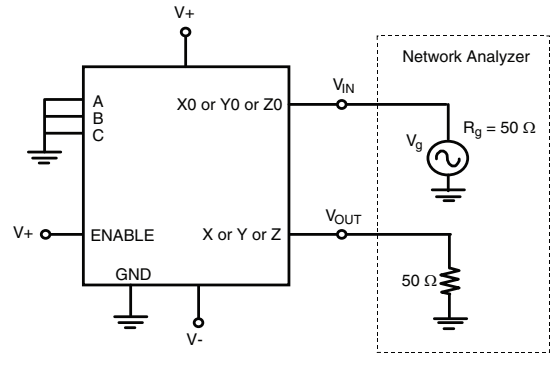
Fig. 4 - Charge Injection

TEST CIRCUITS



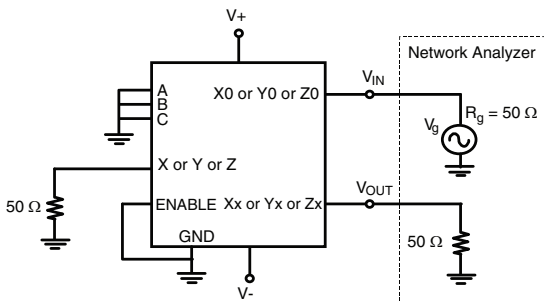
$$\text{Insertion Loss} = 20 \log \frac{V_{\text{OUT}}}{V_{\text{IN}}}$$

Fig. 5 - Insertion Loss



$$\text{Off Isolation} = 20 \log \frac{V_{\text{OUT}}}{V_{\text{IN}}}$$

Fig. 7 - Off Isolation



$$\text{Crosstalk} = 20 \log \frac{V_{\text{OUT}}}{V_{\text{IN}}}$$

Fig. 6 - Crosstalk

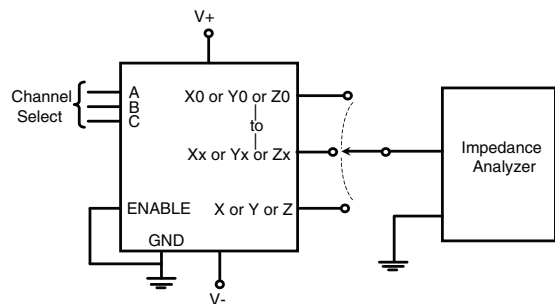


Fig. 8 - Source, Drain Capacitance

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