

General Description

The MAX338/MAX339 are monolithic, CMOS analog multiplexers (muxes). The 8-channel MAX338 is designed to connect one of eight inputs to a common output by control of a 3-bit binary address. The dual, 4channel MAX339 is designed to connect one of four inputs to a common output by control of a 2-bit binary address. Both devices can be used as either a mux or a demux. On-resistance is 400Ω max, and the devices conduct current equally well in both directions.

These muxes feature extremely low off leakages (less than 20pA at +25°C), and extremely low on-channel leakages (less than 50pA at +25°C). The new design offers guaranteed low charge injection (1.5pC typ) and electrostatic discharge (ESD) protection greater than 2000V, per method 3015.7. These improved muxes are pin-compatible upgrades for the industry-standard DG508A and DG509A. For similar Maxim devices with lower leakage and charge injection but higher on-resistance, see the MAX328 and MAX329.

The MAX338/MAX339 operate from a single +4.5V to +30V supply or from dual supplies of ±4.5V to ±20V. All control inputs (whether address or enable) are TTL compatible (+0.8V to +2.4V) over the full specified temperature range and over the ±4.5V to ±18V supply range. These parts are fabricated with Maxim's 44V silicon-gate process.

Applications

Data-Acquisition Systems Test Equipment Military Radios Guidance and Control Systems Sample-and-Hold Circuits Heads-Up Displays Communications Systems PBX, PABX

Features

- ♦ On-Resistance, <400Ω max
- ♦ Transition Time, <500ns
- ♦ On-Resistance Match, <10Ω
- ♦ NO-Off Leakage Current, <20pA at +25°C</p>
- ♦ 1.5pC Charge Injection
- ♦ Single-Supply Operation (+4.5V to +30V) Bipolar-Supply Operation (±4.5V to ±20V)
- ♦ Plug-In Upgrade for Industry-Standard DG508A/DG509A
- ♦ Rail-to-Rail Signal Handling
- **♦ TTL/CMOS-Logic Compatible**
- ♦ ESD Protection >2000V, per Method 3015.7

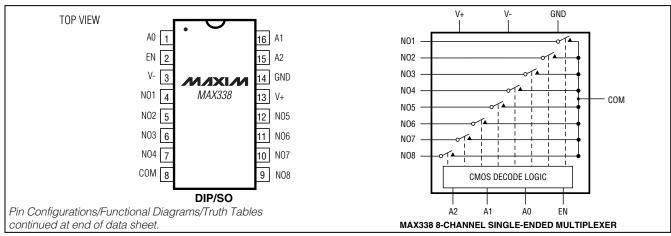
Ordering Information

PART	TEMP RANGE	PIN-PACKAGE
MAX338CPE	0°C to +70°C	16 Plastic DIP
MAX338CSE	0°C to +70°C	16 Narrow SO
MAX338C/D	0°C to +70°C	Dice*
MAX338ETE	-40°C to +85°C	16 Thin QFN (5mm x 5mm)
MAX338EPE	-40°C to +85°C	16 Plastic DIP
MAX338ESE	-40°C to +85°C	16 Narrow SO
MAX338EJE	-40°C to +85°C	16 CERDIP
MAX338MJE	-55°C to +125°C	16 CERDIP**

Ordering Information continued at end of data sheet.

- *Contact factory for dice specifications.
- **Contact factory for availability.

Pin Configurations/Functional Diagrams/Truth Tables



MIXIM

Maxim Integrated Products 1

ABSOLUTE MAXIMUM RATINGS

Voltage Referenced to V-
V+0.3V, 44V
GND0.3V, 25V
Digital Inputs, NO, COM (Note 1)(V 2V) to (V+ + 2V) or
30mA (whichever occurs first)
Continuous Current (any terminal)30mA
Peak Current, NO or COM
(pulsed at 1ms, 10% duty cycle max)100mA

Continuous Power Dissipation (TA = +70°C)
Plastic DIP (derate 10.53mW/°C above +70°C)842mW
Narrow SO (derate 8.70mW/°C above +70°C)696mW
16-Pin TQFN (derate 21.3mW/°C above +70°C)1702mW
CERDIP (derate 10.00mW/°C above +70°C)800mW
Operating Temperature Ranges
MAX33_C0°C to +70°C
MAX33_E40°C to +85°C
MAX33_MJE55°C to +125°C
Storage Temperature Range65°C to +150°C
Lead Temperature (soldering, 10sec)+300°C

Note 1: Signals on NO, COM, EN, A0, A1, or A2 exceeding V+ or V- are clamped by internal diodes. Limit forward current to maximum current ratings.

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.

ELECTRICAL CHARACTERISTICS—Dual Supplies

 $(V+ = +15V, V- = -15V, GND = 0V, V_{AH} = +2.4V, V_{AL} = +0.8V, T_{A} = T_{MIN}$ to T_{MAX} , unless otherwise noted.)

PARAMETER	SYMBOL		CONDI	MIN	TYP (Note 2)	MAX	UNITS			
SWITCH	1									
Analog Signal Range	V _{NO} , V _{COM}	(Note 3)				-15		15	V	
On-Resistance	Ron	$I_{NO} = 0.2 mA$,		T _A = +25°C			220	400	Ω	
On-mesistance	ITON	$V_{COM} = \pm 10V$		T _A = T _{MIN} to	o T _{MAX}			500	32	
On-Resistance Matching	ΔRON	$I_{NO} = 0.2 mA$,		T _A = +25°C			4	10	Ω	
Between Channels	ANON	$V_{COM} = \pm 10V$ ((Note 4)	TA = TMIN to	о Тмах			15] 52	
		V _{COM} = ∓10V,		T _A = +25°C	;	-0.02	0.001	0.02		
NO-Off Leakage Current (Note 5)	INO(OFF)	$V_{NO} = \pm 10V$,		T _A = T _{MIN}	C, E	-1.25		1.25	nA	
(11010 0)		$V_{EN} = 0V$		to T _{MAX}	М	-20		20		
		$V_{NO} = \pm 10V,$		T _A = +25°C		-0.05	0.005	0.05		
		V _{COM} = ∓10V	MAX338	T _A = T _{MIN}	C, E	-3.25		3.25		
COM-Off Leakage Current	ICOM/OFF)	VEN = 0V		to T _{MAX}	М	-40		40	nA	
(Note 5)	ICOM(OFF)	V _{NO} = ∓10V,	MAX339	T _A = +25°C		-0.05	0.005	0.05		
		$V_{COM} = \pm 10V$,		T _A = T _{MIN}	C, E	-1.65		1.65		
		V _{EN} = 0V		to T _{MAX}	М	-20		20		
				T _A = +25°C		-0.05	0.006	0.05		
COM-On Leakage Current (Note 5)		$V_{COM} = \pm 10V$,	MAX338	T _A = T _{MIN}	C, E	-3.25		3.25		
	loon(on)	V _{NO} = ±10V, sequence		to T _{MAX}	М	-40		40	nA	
	ICOM(ON)	each switch		T _A = +25°C		-0.05	0.008	0.05] ''^	
		on	MAX339	TA = TMIN	C, E	-1.65		1.65]	
				to T _{MAX}	М	-20		20	1	

ELECTRICAL CHARACTERISTICS—Dual Supplies (continued)

(V+ = +15V, V- = -15V, GND = 0V, VAH = +2.4V, VAL = +0.8V, TA = TMIN to TMAX, unless otherwise noted.)

Input Current with Input Voltage High Input Voltage Low Input Voltage	PARAMETER	SYMBOL		CONDI	TIONS	MIN	TYP (Note 2)	MAX	UNITS		
Input Voltage High	INPUT								1		
Input Voltage Low IAL VA = 0V IAB V	Input Current with Input Voltage High	I _{AH}	V _A = 2.4V or 15V	,		-1.0	0.001	1.0	μΑ		
Positive Supply Current Positive Supply	Input Current with Input Voltage Low	I _{AL}		,		-1.0		1.0	μΑ		
Positive Supply Current $I + \frac{1}{1 +$	SUPPLY		L								
Positive Supply Current Positive Supply Su	Power-Supply Range					±4.5		±20	V		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			\/ \/- O\/		T _A = +25°C		50	100			
VEN = 2.4V, VA(ALL) = 2.4V TA = TMIN to TMAX 600 μA	Positivo Cumply Current	1.	VEN = VA = UV		TA = TMIN to TMAX			150	μΑ		
Negative Supply Current I. $VEN = 0V \text{ or } 2.4V$, $VEN = 0V \text{ or } 2.4V \text{ or } 5V$, $VEN = 0.4V \text{ or }$	Positive Supply Current	1+	$V_{EN} = 2.4V$,		T _A = +25°C		290	500			
DYNAMIC Tall a companies			$V_{A(ALL)} = 2.4V$		TA = TMIN to TMAX			600	μΑ		
VA(ALL) = 0V, 2.4V of sV TA = 1MIN to 1MAX -10 10 10 10 10 10 10 1	Ven = 0V or 2.4V,				T _A = +25°C	-1		1			
	rvegative Supply Current	I-	$V_{A(ALL)} = 0V, 2.4$	V or 5V	TA = TMIN to TMAX	-10		10	μΑ		
Break-Before-Make Interval ToPEN Figure 4 Ta = +25°C 10 140 ns	DYNAMIC					•					
Enable Turn-On Time t _{ON(EN)} Figure 3 TA = +25°C 160 500 ns Enable Turn-Off Time t _{OFF(EN)} Figure 3 TA = +25°C 100 500 ns Charge Injection (Note 3) Q V _O = 0V, Rs = 0Ω, Figure 6 TA = +25°C 1.5 5 pC Off Isolation (Note 6) VISO VEN = 0V, Rs = 0Ω, Figure 6 TA = +25°C -75 dB Crosstalk Between Channels VCT VEN = 0V, Rs = 100kHz, VGEN = 1.40, Figure 7 TA = +25°C -75 dB Logic Input Capacitance CIN f = 1MHz, VEN = VND = 0V, Figure 8 TA = +25°C 2 pF NO-Off Capacitance CNO(OFF) F = 1MHz, VEN = 0.8V, VCM = 0V, Figure 8 TA = +25°C 3 pF COM-Off Capacitance CCOM(OFF) MAX338, VEN = 0.8V, VCM = 0V, Figure 8 TA = +25°C 6 11 COM-On Capacitance CCOM(ON) MAX338, VEN = 2.4V, VCM = 0V, VCM	Transistion Time	ttrans	Figure 2		T _A = +25°C		200	500	ns		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Break-Before-Make Interval	topen	Figure 4		T _A = +25°C	10	140		ns		
Enable Turn-Off Time $t_{OFF(EN)}$ Figure 3 $T_{A} = T_{MIN} to T_{MAX}$ 750 Charge Injection (Note 3) $T_{A} = T_{MIN} to T_{MAX}$ 750 Charge Injection (Note 3) $T_{A} = T_{MIN} to T_{MAX}$ 750 Charge Injection (Note 3) $T_{A} = T_{MIN} to T_{MAX}$ 750 The standard of the standar	Enable Turn On Time	tonychi) Figure 3			T _A = +25°C		160	500	no		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Ellable Tulli-Oli Tillie	iON(EN)	Figure 3		$T_A = T_{MIN}$ to T_{MAX}			750	115		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Enable Turn Off Time	torr/FND	Eiguro 2		T _A = +25°C		100	500	ns		
Charge injection (Note 3) $ \begin{array}{ccccccccccccccccccccccccccccccccccc$	Enable fulfi-Off fillie	iOFF(EN)	Figure 3		$T_A = T_{MIN}$ to T_{MAX}			750	115		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Charge Injection (Note 3)	Q	$V_{NO} = 0V$,	6	T _A = +25°C		1.5	5	рС		
Crosstalk Between Channels V_{CT} $f = 100 \text{kHz}, V_{GEN} = 1 \text{VP-P}, R_L = 1 \text{k}\Omega, \text{Figure 7}$ $T_A = +25^{\circ}\text{C}$ -92 $D_{COM-Off}$ Capacitance C_{IN} $f = 100 \text{kHz}, V_{GEN} = 1 \text{VP-P}, R_L = 1 \text{k}\Omega, \text{Figure 7}$ $T_A = +25^{\circ}\text{C}$ $D_{COM-Off}$ $T_A = +25^{\circ}\text{C}$ $D_{COM-Off}$	Off Isolation (Note 6)	Viso	$R_L = 1k\Omega$,		T _A = +25°C		-75		dB		
NO-Off Capacitance $C_{NO(OFF)}$ $C_{NO(OFF$	Crosstalk Between Channels	V _{CT}	f = 100kHz, V _{GEN} = 1V _{P-P} ,	7	T _A = +25°C		-92		dB		
NO-Off Capacitance $C_{NO(OFF)}$ $V_{EN} = V_{NO} = 0V$, $V_{EN} = 0.8V$, $V_{EN} = 0.8V$, $V_{COM} = 0V$, $V_{COM} = 0V$, $V_{EN} = 0.8V$	Logic Input Capacitance	CIN	f = 1MHz		T _A = +25°C		2		pF		
COM-Off Capacitance $\begin{pmatrix} C_{COM(OFF)} \end{pmatrix}$ $\begin{pmatrix} V_{EN} = 0.8V, \\ V_{COM} = 0V, \\ Figure 8 \end{pmatrix}$ $\begin{pmatrix} V_{EN} = 0.8V, \\ V_{COM} = 0V, \\ Figure 8 \end{pmatrix}$ $\begin{pmatrix} T_{A} = +25^{\circ}C \end{pmatrix}$	NO-Off Capacitance	CNO(OFF)	$V_{EN} = V_{NO} = 0V$,		TA = +25°C		3		pF		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	COM-Off Capacitance	DM-Off Capacitance $\begin{vmatrix} C_{COM(OFF)} \\ V_{COM} = 0.8V, \\ V_{COM} = 0.0V \end{vmatrix}$ $T_A = +25^{\circ}C$		T _A = +25°C		11		pF			
COM-On Capacitance $V_{EN} = 2.4V$, $V_{COM} = 0V$, $V_{COM} $,	33.7(017)	Figure 8	MAX339			6		1-		
$V_{\text{COM}} = VV, V_{\text{COM}} = VV$	COM-On Capacitance	$V_{EN} = 2.4V$,	MAX338	T _Δ = +25°C		16		nF			
	SS On Sapaonarios			MAX339	.,, = 120 0		9		Ρ'		

ELECTRICAL CHARACTERISTICS—Single Supply

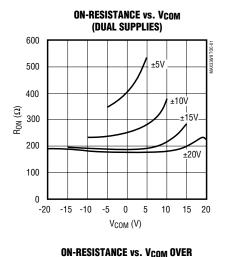
(V+ = +12V, V- = 0V, GND = 0V, VAH = +2.4V, VAL = +0.8V, TA = TMIN to TMAX, unless otherwise noted.)

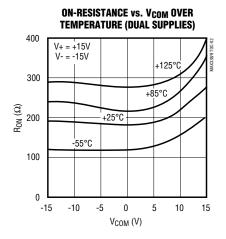
PARAMETER	SYMBOL	COI	NDITIONS	MIN	TYP (Note 2)	MAX	UNITS
SWITCH	'			'			
Analog Signal Range	Vno, Vcom	(Note 3)		0		12	V
On-Resistance	Ron	I _{NO} = 0.2mA V _{COM} = 3V or 10V	T _A = +25°C		460	650	Ω
DYNAMIC				'			•
Transition Time (Note 3)	ttrans	V _{NO1} = 8V, V _{NO8} = 0V, V _{IN} = 2.4V, Figure 1	T _A = +25°C		210	500	ns
Enable Turn-On Time (Note 3)	tON(EN)	V _{INH} = 2.4V, V _{INL} = 0V, V _{NO1} = 5V, Figure 3	T _A = +25°C		280	500	ns
Enable Turn-Off Time (Note 3)	toff(EN)	V _{INH} = 2.4V, V _{INL} = 0V, V _{NO1} = 5V, Figure 3	T _A = +25°C		110	500	ns
Charge Injection (Note 3)	Q	$C_L = 100 pF,$ $V_{NO} = 0V,$ $R_S = 0\Omega$	T _A = +25°C		1.8	5	рС

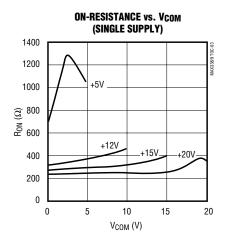
- **Note 2:** The algebraic convention where the most negative value is a minimum and the most positive value a maximum is used in this data sheet.
- Note 3: Guaranteed by design.
- **Note 4:** $\Delta R_{ON} = R_{ON(MAX)} R_{ON(MIN)}$.
- Note 5: Leakage parameters are 100% tested at the maximum rated hot temperature and guaranteed by correlation at +25°C.
- **Note 6:** Worst-case isolation is on channel 4 because of its proximity to the drain pin. Off isolation = $20log V_{COM}/V_{NO}$, where V_{COM} = output and V_{NO} = input to off switch.

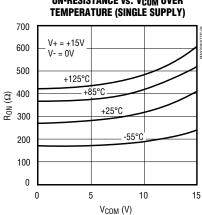
Typical Operating Characteristics

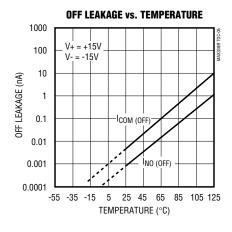
 $(T_A = +25^{\circ}C, \text{ unless otherwise noted.})$

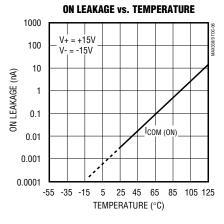


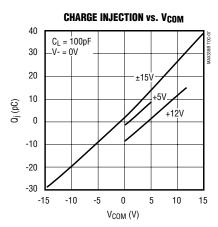


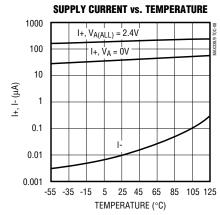


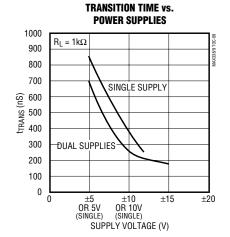












Pin Description

	PI	N			
MAX	(338	MAX	X339	NAME	FUNCTION
DIP/SO	THIN QFN	DIP/SO	THIN QFN		
1, 15, 16,	15, 14, 13	1	_	A0, A2, A1	Address Inputs
_	_	1, 16	15, 14	A0, A1	Address Inputs
2	16	2	16	EN	Enable
3	1	3	1	V-	Negative-Supply Voltage Input
4–7	2–5	_	_	NO1-NO14	Analog Inputs—Bidirectional
_	_	4–7	2–5	NO1A-NO4A	Analog Inputs—Bidirectional
8	6	ı	_	COM	Analog Output—Bidirectional
_	_	8, 9	6, 7	COMA, COMB	Analog Outputs—Bidirectional
9–12	7–10	ı	_	NO8-NO5	Analog Inputs—Bidirectional
_	_	10–3	8–11	NO4B-NO1B	Analog Inputs—Bidirectional
13	11	14	12	V+	Positive-Supply Voltage Input
14	12	15	13	GND	Ground
_	EP	_	EP	Exposed Pad	Exposed Pad. Connect to V+.

_Applications Information

Operation with Supply Voltages Other than 15V

Using supply voltages less than ±15V will reduce the analog signal range. The MAX338/MAX339 switches operate with ±4.5V to ±20V bipolar supplies or with a +4.5V to +30V single supply. Connect V- to GND when operating with a single supply. Both device types can also operate with unbalanced supplies such as +24V and -5V. The *Typical Operating Characteristics* graphs show typical on-resistance with 20V, 15V, 10V, and 5V supplies. (Switching times increase by a factor of two or more for operation at 5V.)

Overvoltage Protection

Proper power-supply sequencing is recommended for all CMOS devices. Do not exceed the absolute maximum ratings, because stresses beyond the listed ratings may cause permanent damage to the devices. Always sequence V+ on first, then V-, followed by the logic inputs NO and COM. If power-supply sequencing is not possible, add two small signal diodes in series with supply pins for overvoltage protection (Figure 1). Adding diodes reduces the analog signal range to 1V below V+ and 1V above V-, but does not affect the devices' low switch resistance and low leakage characteristics. Device operation is unchanged, and the difference between V+ and V- should not exceed 44V.

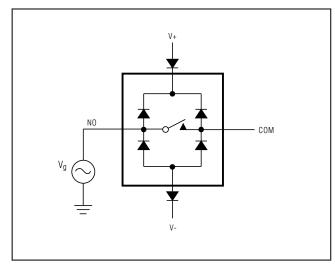


Figure 1. Overvoltage Protection Using External Blocking Diodes

Test Circuits/Timing Diagrams

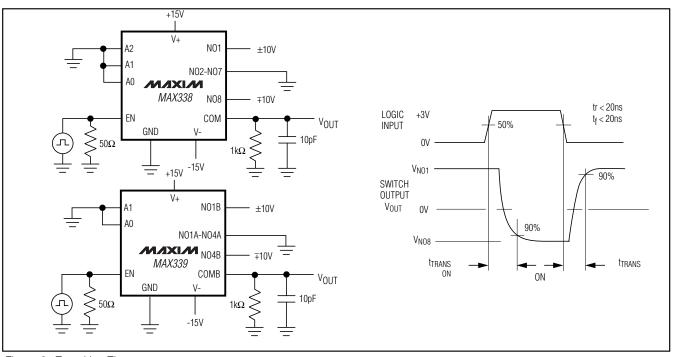


Figure 2. Transition Time

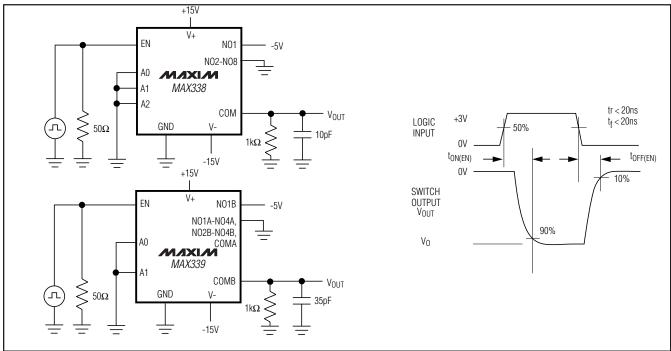


Figure 3. Enable Switching Time

Test Circuits/Timing Diagrams (continued)

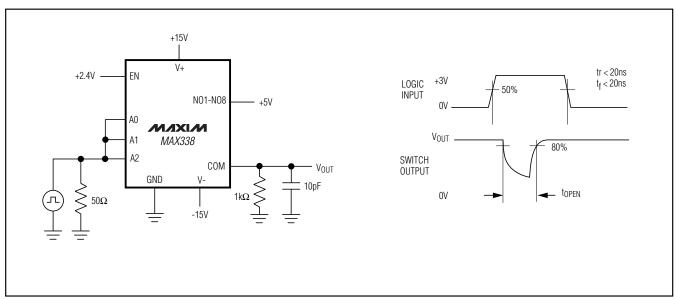


Figure 4. Break-Before-Make Interval

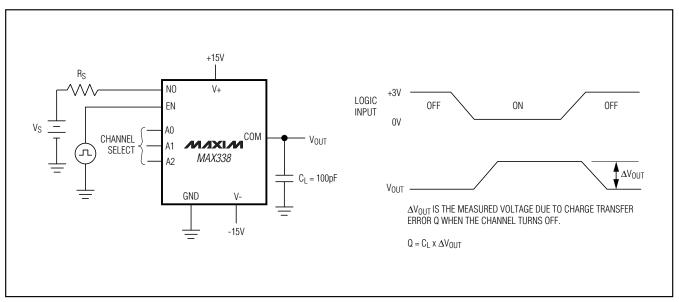


Figure 5. Charge Injection

Test Circuits/Timing Diagrams (continued)

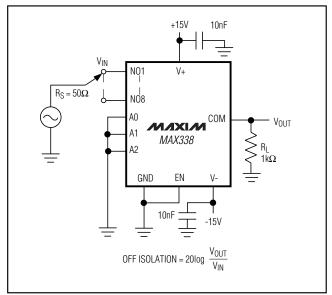


Figure 6. Off-Isolation

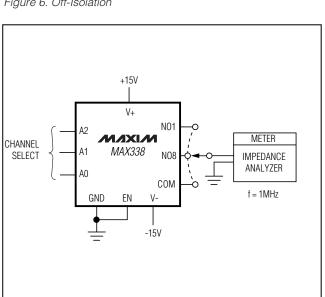


Figure 8. NO/COM Capacitance

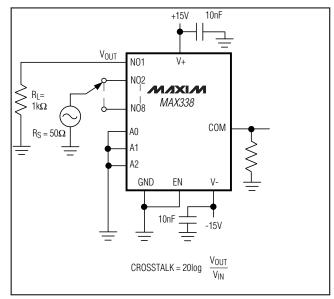
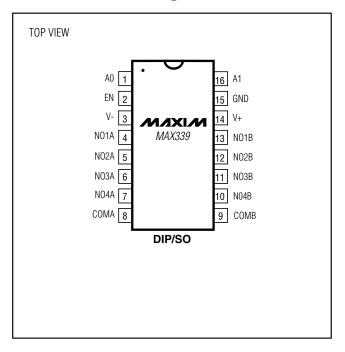
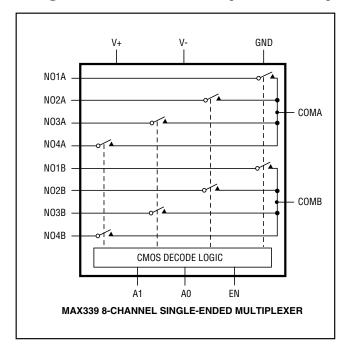


Figure 7. Crosstalk

Pin Configurations/Functional Diagrams/Truth Tables (continued)





Χ			EN	SWITCH
_ ^	Χ	Х	0	None
0	0	0	1	1
0	0	1	1	2
0	1	0	1	3
0	1	1	1	4
1	0	0	1	5
1	0	1	1	6
1	1	0	1	7
1	1	1	1	8
		МАХЗ	38	

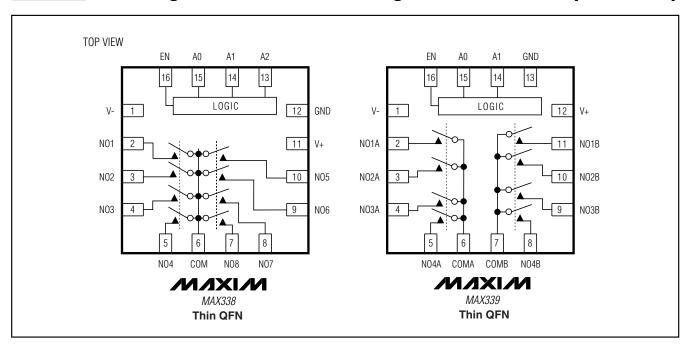
	A 1	A0	EN	ON SWITCH
	Χ	Х	0	None
	0	0	1	1
	0	1	1	2
	1	0	1	3
	1	1	1	4
		N	1AX33	9
LOGIC	"0" V	ΔL ≤ 0.8	BV, LO	GIC "1" V

Ordering Information (continued)

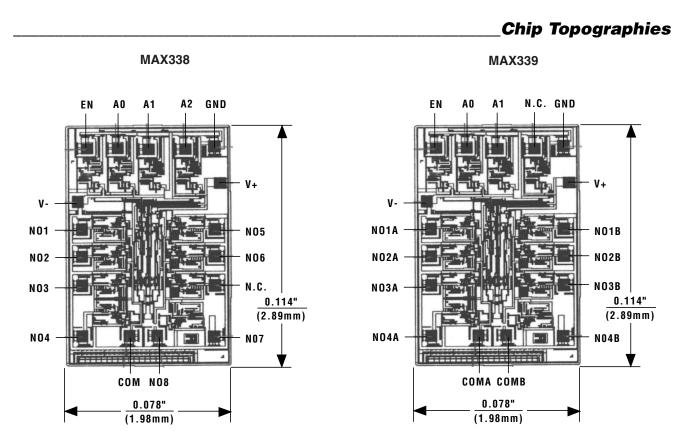
PART	TEMP RANGE	PIN-PACKAGE
MAX339CPE	0°C to +70°C	16 Plastic DIP
MAX339CSE	0°C to +70°C	16 Narrow SO
MAX339C/D	0°C to +70°C	Dice*
MAX339ETE	-40°C to +85°C	16 Thin QFN (5mm x 5mm)
MAX339EPE	-40°C to +85°C	16 Plastic DIP
MAX339ESE	-40°C to +85°C	16 Narrow SO
MAX339EJE	-40°C to +85°C	16 CERDIP
MAX339MJE	-55°C to +125°C	16 CERDIP**

^{*}Contact factory for dice specifications.

Pin Configurations/Functional Diagrams/Truth Tables (continued)



^{**} Contact factory for availability.



N.C. = NO INTERNAL CONNECTION

TRANSISTOR COUNT: 224

SUBSTRATE IS INTERNALLY CONNECTED TO V+

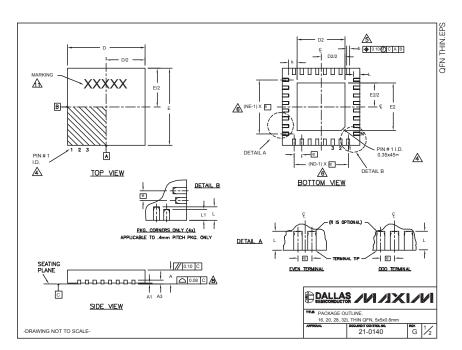
Note: On Thin QFN packages connect exposed pad to V+.

TRANSISTOR COUNT: 224

SUBSTRATE IS INTERNALLY CONNECTED TO V+

Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to www.maxim-ic.com/packages.)



1. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14, 3M-1994. 2. ALL DIMENSIONS ARE IN MILLIMETERS. ANOLES ARE IN DEGREES. 3. N IS THE TOTAL NUMBER OF TERMINALS. △ THE TERMINAL #1 IDENTIFIER AND TERMINAL NUMBERING CONVENTION SHALL CONFORM 10 JSS 99 4: 1997-702. DETAILS OF TERMINAL #1 IDENTIFIER RAY OF THOMAL, BUT MUST BE LOCATED WITHIN THE ZONE INDICATED. THE TERMINAL #1 IDENTIFIER ARE OPTIONAL, BUT MUST BE LOCATED WITHIN THE ZONE INDICATED. THE TERMINAL #1 IDENTIFIER ARE OPTIONAL, BUT MUST BE LOCATED WITHIN THE ZONE INDICATED. THE TERMINAL #1 IDENTIFIER AND TERMINAL PROME TERMINAL AND IS MEASURED BETWEEN 0.25 mm AND 0.30 mm FROM TERMINAL TP. △ NO AND NE REFER TO THE NUMBER OF TERMINALS ON EACH D AND E SIDE RESPECTIVELY. 7. DEPOPULATION IS POSSIBLE IN A SYMMETRICAL FASHION. △ COPLANARITY APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS. 9. BRAWING CONFORMS TO JEDEC MOZOL EXCEPT EXPOSED PAD DIMENSION FOR T2855-1, T2855-3 AND T2855-6.				С	OMM	ON DI	IMENS	SIONS								EXF	POSED	PAD	VARIA	ATIONS	6		
A 0.70 0.75 0.80 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.75 0.80 0.75 0.80 0.75 0.85 0.85 0.85 0.85 0.85 0.85 0.85 0.8	PKG.	1	6L 5x	5	2	20L 5:	x5	2	8L 5x	:5	3	32L 5>	(5		PKG		D2		E2			L	DOWN
A1 0 0 0.02 0.05 0 0.02 0 0.05	SYMBOL	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.		CODES	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	±0.15	BONDS ALLOWED
A3 0 20 REF. 0.20 REF. 0.2	Α	0.70	0.75	0.80	0.70	0.75	0.80	0.70	0.75	0.80	0.70	0.75	0.80		T1655-1	3.00	3.10	3.20	3.00	3.10	3.20	**	NO
AS 0.20 REF. 0.20 REF. 0.20 REF. 0.20 REF. 1 0.20 REF.	A1	0	0.02	0.05	0	0.02	0.05	0	0.02	0.05	0	0.02	0.05									_	YES
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D 4,90 5.00 5.10 4.90 5.00 5.10 5.90 5.10 4.90 5.00 5.10	b	0.25	0.30	0.35	0.25	0.30	0.35	0.20	0.25	0.30	0.20	0.25	0.30					_	0.00		0.20		NO
E	D	4.90	5.00	5.10	4.90	5.00	5.10	4.90	5.00	5.10	4.90	5.00	5.10						0.00		0.20	**	YES
E 0.90 BSC. 0.56 BSC. 0.50 BSC. 0.5	Е	4.90	5.00	5.10	4.90	5.00	5.10	4.90	5.00	5.10	4.90	5.00	5.10				-	_		-			NO
R	е	0	.80 BS	SC.	0	.65 B	SC.	0	.50 BS	SC.	0	.50 BS	SC.				0			0.20		0.40	Y
L1 0.30 0.40 0.50 0.45 0.55 0.65 0.45 0.55 0.65 0.30 0.40 0.50 L1	k	0.25	-	-	0.25	-	T -	0.25	-	-	0.25	-	-							0.20	0.00		NO
L1		0.30	0.40	0.50	_	0.55	0.65	0.45	0.55	0.65	_	0.40	0.50						_				NO
N 16 20 28 32 ND 4 5 5 7 8 NE 4 5 7 8 JEDEC WHHB WHHC WHHD-1 WHHD-2 11. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14 5M-1994. 2. ALL DIMENSIONING & TOLERANCING CONFORM TO ASME Y14 5M-1994. 2. ALL DIMENSIONING AS TOLERANCING CONFORM TO ASME Y14 5M-1994. 2. ALL DIMENSIONING AS TOLERANCING CONFORM TO ASME Y14 5M-1994. 3. NIS THE TOTAL NUMBER OF TERMINAL. THE FRAMMAL IN IDENTIFIER AND TERMINAL HUMBERING CONVENTION SHALL CONFORM TO LESS DIS 1 5 9 7 3 5 1 5 1 5 2 5 3 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5	11	-	-	-		-	-	-			-	-	-		. = 0 0 0		0.20			0.20	0.00	_	YES
ND 4 5 7 8	NI.		16	_	-	20	_		28	_		32	_			_	_	_	_	_	_		YES
NE															.=000								NO
JEDEC	NE		4			5			7			8			. = 0 0 0								NO YES
TES: 1. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M-1994. 1. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M-1994. 1. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M-1994. 1. DIMENSIONING ARE NOT LEFER AND LEFE AND LE	JEDEC	,	WHHE	3		WHH	С	١	VHHD	-1	V	VHHD	-2									_	Y
1. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14 &M-1994. 2. ALL DIMENSIONING & TOLERANCING CONFORM TO ASME Y14 &M-1994. 3. N IS THE TOTAL NUMBER OF TERMINALS. 3. N IS THE TOTAL NUMBER OF TERMINAL NUMBERING CONVENTION SHALL CONFORM TO 1580 95+ 199-702. DETAILS OF TERMINAL #1 IDENTIFIER AND TERMINAL #1 IDENTIFIER AND TERMINAL #1 IDENTIFIER AND TERMINAL #1 IDENTIFIER MIND 1580 95+ 199-702. DETAILS OF TERMINAL #1 IDENTIFIER ARE OPTIONAL, BUT NUST BE LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER ARE OPTIONAL BUT NUST BE LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED WITHIN THE ZONE MOLGATED. 3. NO AND NE PEFER TO THE NUMBER OF TERMINAL SONE AND LOCATED WITHIN THE ZONE MOLGATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED. THE TERMINAL #1 IDENTIFIER MY BE LOCATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED. THE TERMINAL #1 IDENTIFIER MY BE EITHER AND LOCATED. THE TERMINAL #1 IDENTIFIER MY BE LOCATED. THE TERMINAL #1 IDENTIFIE																							N
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3. N IS THE TOTAL NUMBER OF TERMINALS. THE TERMINAL #1 IDENTIFIER AND TERMINAL NUMBERING CONVENTION SHALL CONFORM TO JESS 95 - 199-70. DETAILS OF TERMINAL #1 IDENTIFIER AND TERMINAL															T3255-3	3.00	3.10	3.20	3.00	3.10	3.20	**	YES
A THE TERMINAL #1 IDENTIFIER AND TERMINAL NUMBERING CONVENTION SHALL COMPORAT DE LSO DES 196 196 702. DETAILS OF TERMINAL #1 IDENTIFIER PARE OPTIONAL. BUT MILTS DE LOCATED WITHIN THE ZONE NOLOCATED. THE TERMINAL #1 IDENTIFIER MY DE ETHER A NOLO OF MARKED FATURE. DIMENSION IS APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.25 mm AND 0.30 mm FROM TERMINAL THE NO AND NE REFER TO THE NUMBER OF TERMINALS ON EACH D AND E SIDE RESPECTIVELY. TO BEPOPULATION IS POSSIBLE IN A SYMMETRICAL FASHION. COPLANABITY APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS. DRAWING CON-PORMS TO JEDEC MO220, EXCEPT EXPOSED PAD DIMENSION FOR T2855-1, T2855 AND T2855 AND T2855 D. D. D. VARPAGE SHALL NOT EXCEED 0.10 mm.	ALL DII	MENSI	ONS A	RE IN I	MILLIM	ETERS	S. ANG	LES AR	E IN D	EGRE	ES.				T3255-4	3.00	3.10	3.20	3.00	3.10	3.20	**	NO
CONFORM TO JESD 98-1 SPP-012. DETAILS OF TERMINAL #1 IDENTIFIER ARE OPTIONAL BUT MUST BE LOCATED WITHIN THE ZONE MOIGATED. THE TERMINAL #1 IDENTIFIER MAY BE ENTIFER A MOLD OR MARKED FEATURE. DIMENSION 5 APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.25 mm AND 0.30 mm FROM TERMINAL TIP. NO AND NE REFER TO THE NUMBER OF TERMINALS ON EACH D AND E SIDE RESPECTIVELY. 7. DEPOPULATION IS POSSIBLE IN A SYMMETRICAL FASHION. OPLANABITY APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS. 9. DRAWING CONFORMS TO JEDEC MO220, EXCEPT EXPOSED PAD DIMENSION FOR T2855-1, T2855-3 AND T2855-6. 0. WARPAGE SHALL NOT EXCEED 0.10 mm.	N IS TH	HE TOT	AL NU	MBER	OF TE	RMINA	LS.								T3255N-1	3.00	3.10	3.20	3.00	3.10	3.20	**	NO
7. DEPOPULATION IS POSSIBLE IN A SYMMETRICAL FASHION. ⚠ COPLANARITY APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS. 9. DRAWING CONFORMS TO JEDEC MO220, EXCEPT EXPOSED PAD DIMENSION FOR T2855-1, T285-3 AND T2855-6. 10. WARPAGE SHALL NOT EXCEED 0.10 mm.	CONFO OPTIO IDENTI	ORM TO NAL, B IFIER N SION b	O JESE UT MU MAY BE APPLI	95-1 S ST BE EITHE ES TO	SPP-01 LOCA R A M	12. DE TED W NOLD C	TAILS (ITHIN T OR MAR	OF TER THE ZO KED F	MINAL NE INE EATUR	#1 IDE DICATE E.	NTIFIE D. THE	ER ARE	≣ ∕IINAL ‡	m ANE	O 0.30 mm				••	SEE CO	MMON E	DIMENSIO	ONS TABLE
COPLANARITY APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS. 9. DRAWING CONFORMS TO JEDEC M0220, EXCEPT EXPOSED PAD DIMENSION FOR T2855-1, T2855-AIN T	A ND AN	D NE R	EFER	то тн	E NUM	IBER C	F TER	MINALS	ON E	ACH D	AND E	SIDE	RESPE	VELY.									
9. DRAWING CONFORMS TO JEDEC MO220, EXCEPT EXPOSED PAD DIMENSION FOR T2855-1, T2855-3 AND T2855-8. T2855-3 AND T2855-8. WARPAGE SHALL NOT EXCEED 0.10 mm.	7. DEPOR	PULATI	ON IS	POSSIE	BLE IN	A SYN	METR	ICAL F	ASHIO	٧.													
T2855 3 AND T2855-6. 0. WARPAGE SHALL NOT EXCEED 0.10 mm.		NARIT	Y APPI	LIES TO) THE	EXPO:	SED HE	EAT SIN	NK SLU	G AS	WELL A	AS THE	TERM	S.									
0. WARPAGE SHALL NOT EXCEED 0.10 mm.	8 COPLA				JEDE	C MO2	20, EX	CEPT E	XPOS	ED PAI	D DIME	NSION	I FOR	5-1,			P	DAI	LA	S A		113	<i>C</i> <i>A</i>
MADKING IS FOR PACKAGE ORIENTATION REFERENCE ONLY	9. DRAW		ALL N	OT EX	CEED (0.10 m	m.											SEMICO	NDUCTO	OR 🖋			
	9. DRAWI T2855-	AGE SH															7778						
2. NUMBER OF LEADS SHOWN ARE FOR REFERENCE ONLY. 16, 20, 28, 32, 11Hin QFN, 5x5x0.8mm 17000MBCT 05x1100, 48.	9. DRAWI T2855- 0. WARPA		OR PA	ACKAG	E ORIE	ENTAT	ION RE	FEREN	ICF OF	ILY.													

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