

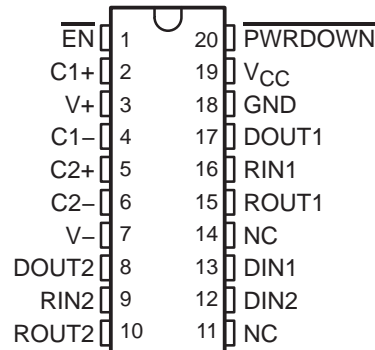
# MAX3222

## 3-V TO 5.5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER WITH $\pm 15$ -kV ESD PROTECTION

SLLS408G – JANUARY 2000 – REVISED MARCH 2004

- RS-232 Bus-Pin ESD Protection Exceeds  $\pm 15$  kV Using Human-Body Model (HBM)
- Meets or Exceeds the Requirements of TIA/EIA-232-F and ITU v.28 Standards
- Operates With 3-V to 5.5-V  $V_{CC}$  Supply
- Operates Up To 250 kbit/s
- Two Drivers and Two Receivers
- Low Standby Current . . . 1  $\mu$ A Typical
- External Capacitors . . .  $4 \times 0.1 \mu$ F
- Accepts 5-V Logic Input With 3.3-V Supply
- Alternative High-Speed Pin-Compatible Device (1 Mbit/s)
  - SNx5C3222
- Applications
  - Battery-Powered Systems, PDAs, Notebooks, Laptops, Palmtop PCs, and Hand-Held Equipment

DB, DW, OR PW PACKAGE  
(TOP VIEW)



NC – No internal connection

### description/ordering information

The MAX3222 consists of two line drivers, two line receivers, and a dual charge-pump circuit with  $\pm 15$ -kV ESD protection pin to pin (serial-port connection pins, including GND). The device meets the requirements of TIA/EIA-232-F and provides the electrical interface between an asynchronous communication controller and the serial-port connector. The charge pump and four small external capacitors allow operation from a single 3-V to 5.5-V supply. The device operates at data signaling rates up to 250 kbit/s and a maximum of 30-V/ $\mu$ s driver output slew rate.

### ORDERING INFORMATION

TA	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–0°C to 70°C	SOIC (DW)	Tube of 25	MAX3222CDW	MAX3222C
		Reel of 2000	MAX3222CDWR	
	SSOP (DB)	Tube of 70	MAX3222CDB	MA3222C
		Reel of 2000	MAX3222CDBR	
	TSSOP (PW)	Tube of 70	MAX3222CPW	MA3222C
		Reel of 2000	MAX3222CPWR	
–40°C to 85°C	SOIC (DW)	Tube of 25	MAX3222IDW	MAX3222I
		Reel of 2000	MAX3222IDWR	
	SSOP (DB)	Tube of 70	MAX3222IDB	MB3222I
		Reel of 2000	MAX3222IDBR	
	TSSOP (PW)	Tube of 70	MAX3222IPW	MB3222I
		Reel of 2000	MAX3222IPWR	

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



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 **TEXAS  
INSTRUMENTS**

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**MAX3222**  
**3-V TO 5.5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER**  
**WITH ±15-kV ESD PROTECTION**  
SLLS408G – JANUARY 2000 – REVISED MARCH 2004

**description/ordering information (continued)**

The MAX3222 can be placed in the power-down mode by setting  $\overline{\text{PWRDOWN}}$  low, which draws only 1  $\mu\text{A}$  from the power supply. When the device is powered down, the receivers remain active while the drivers are placed in the high-impedance state. Also, during power down, the onboard charge pump is disabled;  $V_+$  is lowered to  $V_{CC}$ , and  $V_-$  is raised toward GND. Receiver outputs also can be placed in the high-impedance state by setting  $\overline{\text{EN}}$  high.

**Function Tables**

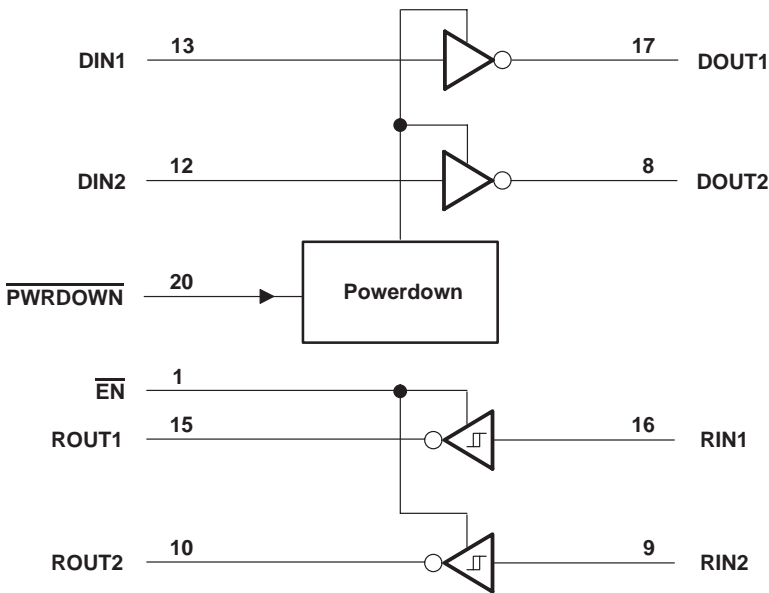
EACH DRIVER		
INPUTS		OUTPUT DOUT
DIN	$\overline{\text{PWRDOWN}}$	
X	L	Z
L	H	H
H	H	L

H = high level, L = low level, X = irrelevant,  
Z = high impedance

EACH RECEIVER		
INPUTS		OUTPUT ROUT
RIN	$\overline{\text{EN}}$	
L	L	H
H	L	L
X	H	Z
Open	L	H

H = high level, L = low level, X = irrelevant,  
Z = high impedance (off), Open = input  
disconnected or connected driver off

**logic diagram (positive logic)**



# MAX3222

## 3-V TO 5.5-V MULTICHANNEL RS-232 LINE DRIVER/RECEIVER WITH $\pm 15$ -kV ESD PROTECTION

SLLS408G – JANUARY 2000 – REVISED MARCH 2004

### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

Supply voltage range, $V_{CC}$ (see Note 1)	–0.3 V to 6 V
Positive output supply voltage range, $V+$ (see Note 1)	–0.3 V to 7 V
Negative output supply voltage range, $V-$ (see Note 1)	0.3 V to –7 V
Supply voltage difference, $V+ - V-$ (see Note 1)	13 V
Input voltage range, $V_I$ : Drivers, $\overline{EN}$ , $\overline{PWRDOWN}$	–0.3 V to 6 V
Receivers	–25 V to 25 V
Output voltage range, $V_O$ : Drivers	–13.2 V to 13.2 V
Receivers	–0.3 V to $V_{CC} + 0.3$ V
Package thermal impedance, $\theta_{JA}$ (see Notes 2 and 3): DB package	70°C/W
DW package	58°C/W
PW package	83°C/W
Operating virtual junction temperature, $T_J$	150°C
Storage temperature range, $T_{stg}$	–65°C to 150°C

<sup>†</sup> 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 under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltages are with respect to network GND.

2. Maximum power dissipation is a function of  $T_J(\max)$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_J(\max) - T_A)/\theta_{JA}$ . Operating at the absolute maximum  $T_J$  of 150°C can affect reliability.

3. The package thermal impedance is calculated in accordance with JEDEC 51-7.

### recommended operating conditions (see Note 4 and Figure 5)

			MIN	NOM	MAX	UNIT
Supply voltage	$V_{CC} = 3.3$ V		3	3.3	3.6	V
	$V_{CC} = 5$ V		4.5	5	5.5	
$V_{IH}$ Driver and control high-level input voltage	$DIN, \overline{EN}, \overline{PWRDOWN}$	$V_{CC} = 3.3$ V	2			V
		$V_{CC} = 5$ V	2.4			
$V_{IL}$ Driver and control low-level input voltage	$DIN, \overline{EN}, \overline{PWRDOWN}$				0.8	V
$V_I$ Driver and control input voltage	$DIN, \overline{EN}, \overline{PWRDOWN}$		0		5.5	V
$V_I$ Receiver input voltage			–25		25	V
$T_A$ Operating free-air temperature	MAX3222C		0		70	°C
	MAX3222I		–40		85	

NOTE 4: Test conditions are C1–C4 = 0.1  $\mu$ F at  $V_{CC} = 3.3$  V  $\pm$  0.3 V; C1 = 0.047  $\mu$ F, C2–C4 = 0.33  $\mu$ F at  $V_{CC} = 5$  V  $\pm$  0.5 V.

### electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 5)

PARAMETER		TEST CONDITIONS	MIN	TYP <sup>‡</sup>	MAX	UNIT
I <sub>I</sub> Input leakage current ( $\overline{EN}$ , $\overline{PWRDOWN}$ )				±0.01	±1	μA
I <sub>CC</sub>	Supply current	No load, $\overline{PWRDOWN}$ at V <sub>CC</sub>		0.3	1	mA
	Supply current (powered off)	No load, $\overline{PWRDOWN}$ at GND		1	10	μA

<sup>‡</sup> All typical values are at  $V_{CC} = 3.3$  V or  $V_{CC} = 5$  V, and  $T_A = 25^\circ\text{C}$ .

NOTE 4: Test conditions are C1–C4 = 0.1  $\mu$ F at  $V_{CC} = 3.3$  V  $\pm$  0.3 V; C1 = 0.047  $\mu$ F, C2–C4 = 0.33  $\mu$ F at  $V_{CC} = 5$  V  $\pm$  0.5 V.



## DRIVER SECTION

**electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 5)**

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
$V_{OH}$ High-level output voltage	DOOUT at $R_L = 3\text{ k}\Omega$ to GND, DIN = GND	5	5.4		V
$V_{OL}$ Low-level output voltage	DOOUT at $R_L = 3\text{ k}\Omega$ to GND, DIN = $V_{CC}$	–5	–5.4		V
$I_{IH}$ High-level input current	$V_I = V_{CC}$		$\pm 0.01$	$\pm 1$	$\mu\text{A}$
$I_{IL}$ Low-level input current	$V_I$ at GND		$\pm 0.01$	$\pm 1$	$\mu\text{A}$
$I_{OS}$ Short-circuit output current‡	$V_{CC} = 3.6\text{ V}$ , $V_O = 0\text{ V}$		$\pm 35$	$\pm 60$	mA
	$V_{CC} = 5.5\text{ V}$ , $V_O = 0\text{ V}$				
$r_o$ Output resistance	$V_{CC}$ , $V_+$ , and $V_- = 0\text{ V}$ , $V_O = \pm 2\text{ V}$	300	10M		$\Omega$
$I_{off}$ Output leakage current	$\overline{\text{PWRDOWN}} = \text{GND}$ , $V_{CC} = 3\text{ V to } 3.6\text{ V}$ , $V_O = \pm 12\text{ V}$			$\pm 25$	$\mu\text{A}$
	$\overline{\text{PWRDOWN}} = \text{GND}$ , $V_{CC} = 4.5\text{ V to } 5.5\text{ V}$ , $V_O = \pm 10\text{ V}$			$\pm 25$	

† All typical values are at  $V_{CC} = 3.3\text{ V}$  or  $V_{CC} = 5\text{ V}$ , and  $T_A = 25^\circ\text{C}$ .

‡ Short-circuit durations should be controlled to prevent exceeding the device absolute power-dissipation ratings, and not more than one output should be shorted at a time.

NOTE 4: Test conditions are  $C_1\text{--}C_4 = 0.1\text{ }\mu\text{F}$  at  $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ ;  $C_1 = 0.047\text{ }\mu\text{F}$ ,  $C_2\text{--}C_4 = 0.33\text{ }\mu\text{F}$  at  $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ .

**switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 5)**

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
Maximum data rate	$C_L = 1000\text{ pF}$ , $R_L = 3\text{ k}\Omega$ , One DOOUT switching, See Figure 1	150	250		kbit/s
$t_{sk(p)}$ Pulse skew§	$C_L = 150\text{ pF to } 2500\text{ pF}$ , $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ , See Figure 2		300		ns
$SR(tr)$ Slew rate, transition region (See Figure 1)	$R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ , $V_{CC} = 3.3\text{ V}$		$C_L = 150\text{ pF to } 1000\text{ pF}$	6	V/ $\mu\text{s}$
			$C_L = 150\text{ pF to } 2500\text{ pF}$	4	

† All typical values are at  $V_{CC} = 3.3\text{ V}$  or  $V_{CC} = 5\text{ V}$ , and  $T_A = 25^\circ\text{C}$ .

§ Pulse skew is defined as  $|t_{pLH} - t_{pHL}|$  of each channel of the same device.

NOTE 4: Test conditions are  $C_1\text{--}C_4 = 0.1\text{ }\mu\text{F}$  at  $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ ;  $C_1 = 0.047\text{ }\mu\text{F}$ ,  $C_2\text{--}C_4 = 0.33\text{ }\mu\text{F}$  at  $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ .

## RECEIVER SECTION

**electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 5)**

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V <sub>OH</sub> High-level output voltage	I <sub>OH</sub> = -1 mA	V <sub>CC</sub> - 0.6 V	V <sub>CC</sub> - 0.1 V		V
V <sub>OL</sub> Low-level output voltage	I <sub>OL</sub> = 1.6 mA			0.4	V
V <sub>IT+</sub> Positive-going input threshold voltage	V <sub>CC</sub> = 3.3 V		1.5	2.4	V
	V <sub>CC</sub> = 5 V		1.8	2.4	
V <sub>IT-</sub> Negative-going input threshold voltage	V <sub>CC</sub> = 3.3 V	0.6	1.2		V
	V <sub>CC</sub> = 5 V	0.8	1.5		
V <sub>hys</sub> Input hysteresis (V <sub>IT+</sub> - V <sub>IT-</sub> )			0.3		V
I <sub>off</sub> Output leakage current	$\overline{\text{EN}} = V_{CC}$		$\pm 0.05$	$\pm 10$	$\mu\text{A}$
r <sub>i</sub> Input resistance	V <sub>I</sub> = $\pm 3$ V to $\pm 25$ V	3	5	7	k $\Omega$

† All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V, and T<sub>A</sub> = 25°C.

NOTE 4: Test conditions are C1–C4 = 0.1  $\mu\text{F}$  at V<sub>CC</sub> = 3.3 V  $\pm$  0.3 V; C1 = 0.047  $\mu\text{F}$ , C2–C4 = 0.33  $\mu\text{F}$  at V<sub>CC</sub> = 5 V  $\pm$  0.5 V.

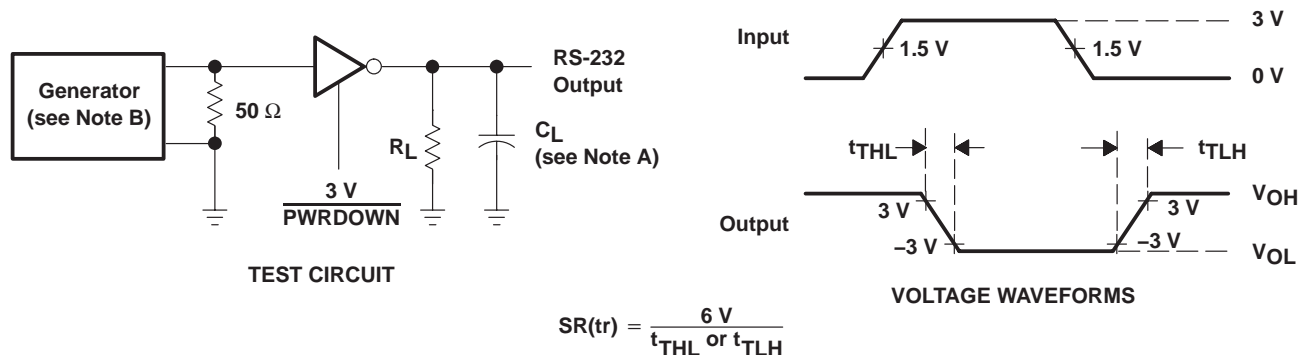
**switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4)**

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
t <sub>PLH</sub> Propagation delay time, low- to high-level output	C <sub>L</sub> = 150 pF, See Figure 3		300		ns
t <sub>PHL</sub> Propagation delay time, high- to low-level output	C <sub>L</sub> = 150 pF, See Figure 3		300		ns
t <sub>en</sub> Output enable time	C <sub>L</sub> = 150 pF, R <sub>L</sub> = 3 k $\Omega$ , See Figure 4		200		ns
t <sub>dis</sub> Output disable time	C <sub>L</sub> = 150 pF, R <sub>L</sub> = 3 k $\Omega$ , See Figure 4		200		ns
t <sub>sk(p)</sub> Pulse skew‡	See Figure 3		300		ns

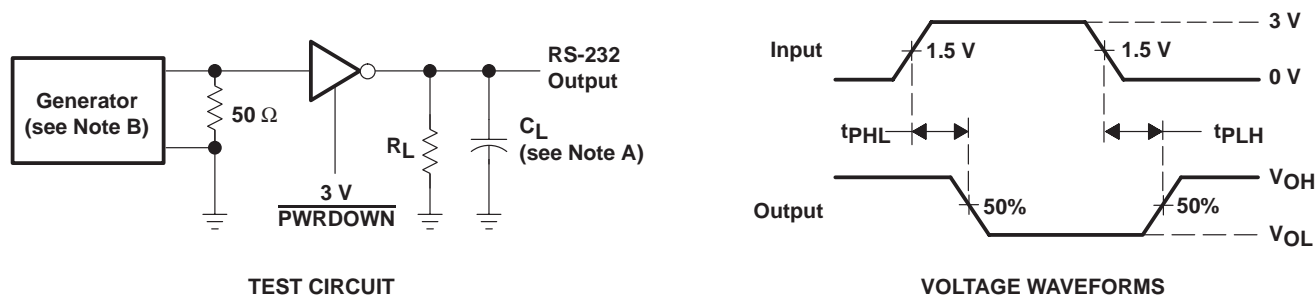
† All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V, and T<sub>A</sub> = 25°C.

‡ Pulse skew is defined as |t<sub>PLH</sub> - t<sub>PHL</sub>| of each channel of the same device.

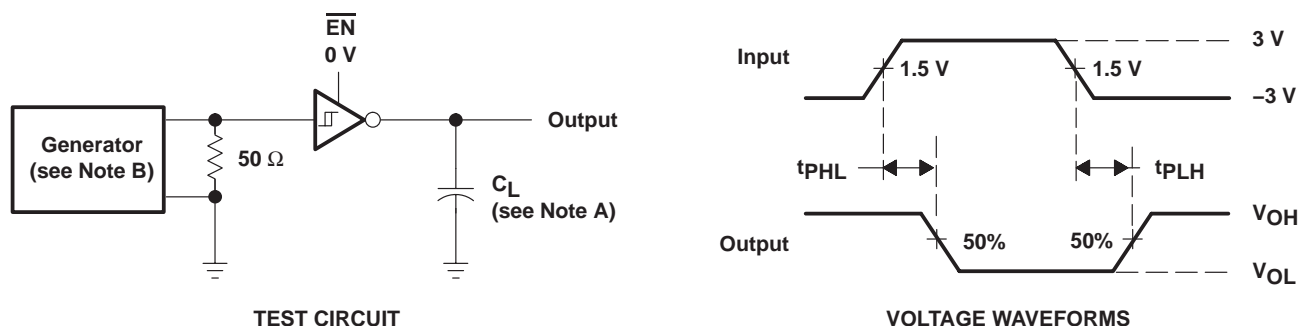
NOTE 4: Test conditions are C1–C4 = 0.1  $\mu\text{F}$  at V<sub>CC</sub> = 3.3 V  $\pm$  0.3 V; C1 = 0.047  $\mu\text{F}$ , C2–C4 = 0.33  $\mu\text{F}$  at V<sub>CC</sub> = 5 V  $\pm$  0.5 V.

**PARAMETER MEASUREMENT INFORMATION**

 NOTES: A.  $C_L$  includes probe and jig capacitance.

 B. The pulse generator has the following characteristics: PRR = 250 kbit/s,  $Z_O = 50\ \Omega$ , 50% duty cycle,  $t_r \leq 10\text{ ns}$ ,  $t_f \leq 10\text{ ns}$ .

**Figure 1. Driver Slew Rate**

 NOTES: A.  $C_L$  includes probe and jig capacitance.

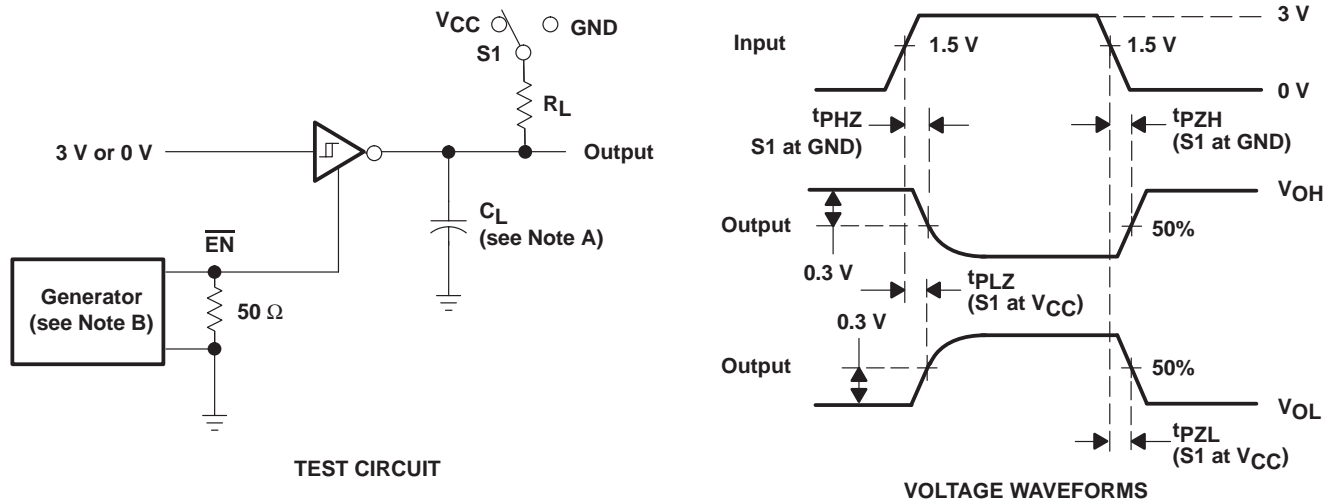
 B. The pulse generator has the following characteristics: PRR = 250 kbit/s,  $Z_O = 50\ \Omega$ , 50% duty cycle,  $t_r \leq 10\text{ ns}$ ,  $t_f \leq 10\text{ ns}$ .

**Figure 2. Driver Pulse Skew**

 NOTES: A.  $C_L$  includes probe and jig capacitance.

 B. The pulse generator has the following characteristics:  $Z_O = 50\ \Omega$ , 50% duty cycle,  $t_r \leq 10\text{ ns}$ ,  $t_f \leq 10\text{ ns}$ .

**Figure 3. Receiver Propagation Delay Times**

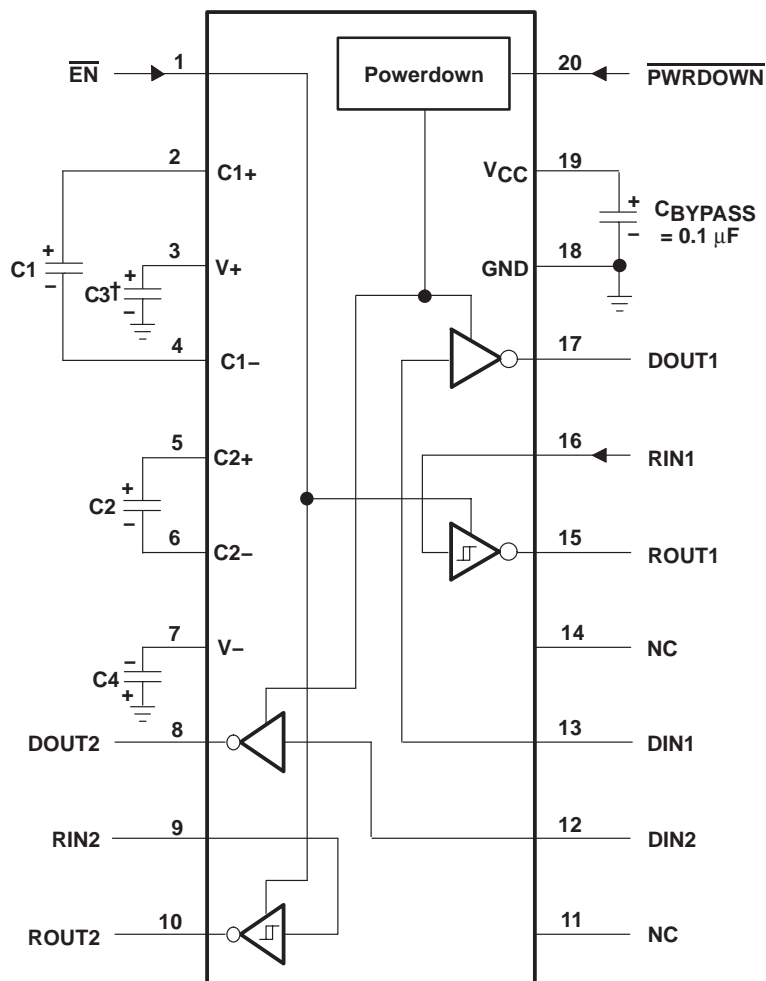
## PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. The pulse generator has the following characteristics:  $Z_O = 50\ \Omega$ , 50% duty cycle,  $t_r \leq 10\text{ ns}$ ,  $t_f \leq 10\text{ ns}$ .

**Figure 4. Receiver Enable and Disable Times**

## APPLICATION INFORMATION



† C3 can be connected to V<sub>CC</sub> or GND.

NOTES: A. Resistor values shown are nominal.

B. NC – No internal connection

C. Nonpolarized ceramic capacitors are acceptable. If polarized tantalum or electrolytic capacitors are used, they should be connected as shown.

V<sub>CC</sub> vs CAPACITOR VALUES

V <sub>CC</sub>	C1	C2, C3, and C4
3.3 V $\pm$ 0.3 V	0.1 $\mu$ F	0.1 $\mu$ F
5 V $\pm$ 0.5 V	0.047 $\mu$ F	0.33 $\mu$ F
3 V to 5.5 V	0.1 $\mu$ F	0.47 $\mu$ F

Figure 5. Typical Operating Circuit and Capacitor Values



**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
MAX3222CDB	ACTIVE	SSOP	DB	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDBE4	ACTIVE	SSOP	DB	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDBG4	ACTIVE	SSOP	DB	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CDWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CPW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CPWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CPWG4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CPWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CPWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222CPWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDB	ACTIVE	SSOP	DB	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDBE4	ACTIVE	SSOP	DB	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDBG4	ACTIVE	SSOP	DB	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
MAX3222IDWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IDWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IPW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IPWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IPWG4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IPWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IPWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
MAX3222IPWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBsolete:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

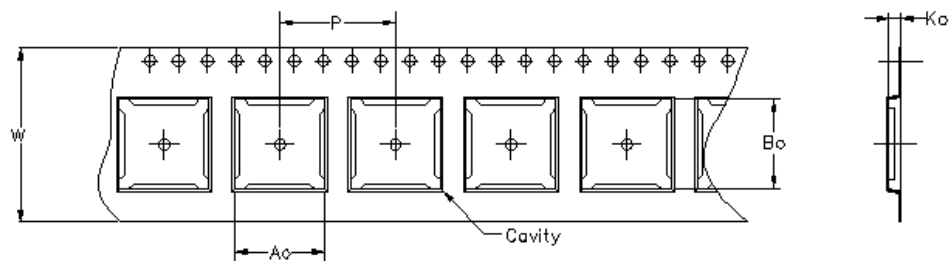
**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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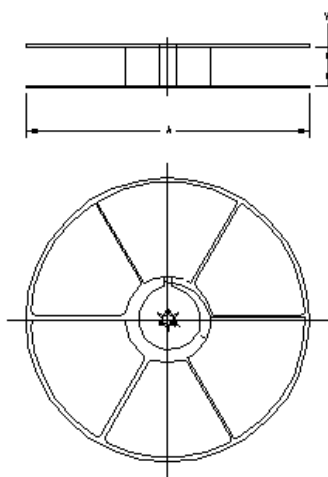
Carrier tape design is defined largely by the component length, width, and thickness.

$A_0$ = Dimension designed to accommodate the component width.
$B_0$ = Dimension designed to accommodate the component length.
$K_0$ = Dimension designed to accommodate the component thickness.
$W$ = Overall width of the carrier tape.
$P$ = Pitch between successive cavity centers.



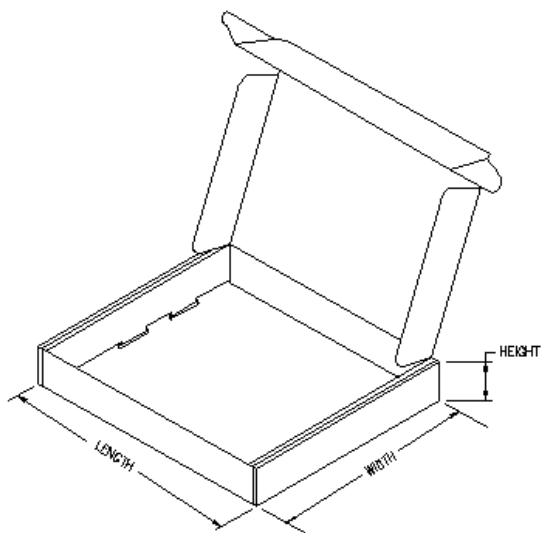
## TAPE AND REEL INFORMATION

Device	Package	Pins	Site	Reel Diameter (mm)	Reel Width (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
MAX3222CDBR	DB	20	MLA	330	16	8.2	7.5	2.5	12	16	Q1
MAX3222CDWR	DW	20	MLA	330	24	10.8	13.0	2.7	12	24	Q1
MAX3222CPWR	PW	20	MLA	330	16	6.95	7.1	1.6	8	16	Q1
MAX3222IDBR	DB	20	MLA	330	16	8.2	7.5	2.5	12	16	Q1
MAX3222IDWR	DW	20	MLA	330	24	10.8	13.0	2.7	12	24	Q1
MAX3222IPWR	PW	20	MLA	330	16	6.95	7.1	1.6	8	16	Q1



## TAPE AND REEL BOX INFORMATION

Device	Package	Pins	Site	Length (mm)	Width (mm)	Height (mm)
MAX3222CDBR	DB	20	MLA	346.0	346.0	33.0
MAX3222CDWR	DW	20	MLA	333.2	333.2	31.75
MAX3222CPWR	PW	20	MLA	346.0	346.0	33.0
MAX3222IDBR	DB	20	MLA	346.0	346.0	33.0
MAX3222IDWR	DW	20	MLA	333.2	333.2	31.75
MAX3222IPWR	PW	20	MLA	346.0	346.0	33.0



## DW (R-PDSO-G20)

## PLASTIC SMALL-OUTLINE PACKAGE



4040000-4/F 06/2004

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-013 variation AC.

## DB (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-150

## PW (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-153



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