

**MULTIPLE RS-232 DRIVERS AND RECEIVERS****AZ75232****General Description**

The AZ75232 combines three drivers and five receivers, which conform to the EIA/TIA-232-F and ITU v.28 standards. Each receiver converts EIA/TIA-232-F inputs to 5-V TTL/CMOS levels and each driver converts TTL/CMOS input levels into EIA/TIA-232-F levels.

The flow-through pinout facilitates simple non-cross-over board layout. The AZ75232 provides a one-chip solution for the common 9-pin serial RS-232 interface between data terminal and data communications equipment.

The AZ75232 is available in SOIC-20, SSOP-20 and TSSOP-20 packages.

**Features**

- Single Chip with Easy Interface between UART and Serial-Port Connector
- Meet the Requirement of EIA/TIA-232-F and ITU v.28 Standards
- Designed to Support Data Rates up to 120kbit/s
- 3 Drivers and 5 Receivers
- Flow-through Pinout

**Applications**

- Mother Board
- Peripheral Equipment



Figure 1. Package Types of AZ75232

**Pin Configuration**

M/GS/G Package  
(SOIC-20/SSOP-20/TSSOP-20)

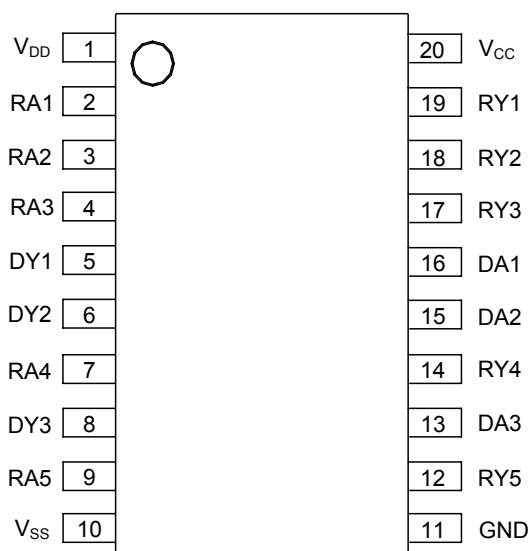


Figure 2. Pin Configuration of AZ75232 (Top View)

**Pin Description**

Pin Number	Pin Name	Function	Pin Number	Pin Name	Function
1	V <sub>DD</sub>	Positive Supply Voltage for Driver	11	GND	Ground
2	RA1	Receiver Input	12	RY5	Receiver Output
3	RA2	Receiver Input	13	DA3	Driver Input
4	RA3	Receiver Input	14	RY4	Receiver Output
5	DY1	Driver Output	15	DA2	Driver Input
6	DY2	Driver Output	16	DA1	Driver Input
7	RA4	Receiver Input	17	RY3	Receiver Output
8	DY3	Driver Output	18	RY2	Receiver Output
9	RA5	Receiver Input	19	RY1	Receiver Output
10	V <sub>SS</sub>	Negative Supply Voltage for Driver	20	V <sub>CC</sub>	Supply Voltage for Receiver



**MULTIPLE RS-232 DRIVERS AND RECEIVERS**

**AZ75232**

**Functional Block Diagram**

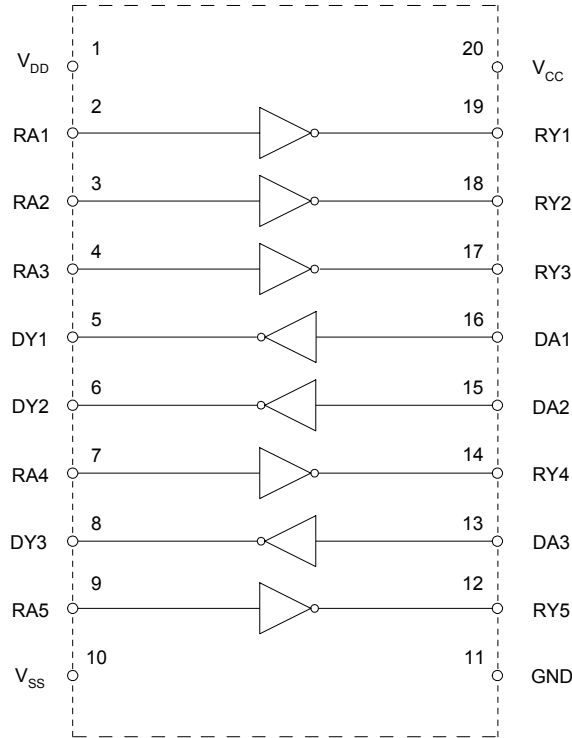
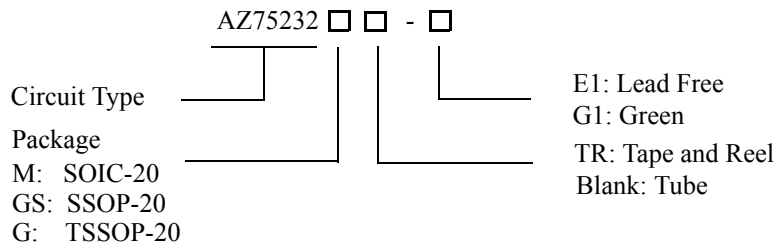


Figure 3. Functional Block Diagram of AZ75232

**Ordering Information**



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
SOIC-20	-40 to 85°C	AZ75232M-E1	AZ75232M-G1	AZ75232M-E1	AZ75232M-G1	Tube
		AZ75232MTR-E1	AZ75232MTR-G1	AZ75232M-E1	AZ75232M-G1	Tape & Reel
SSOP-20	-40 to 85°C	AZ75232GS-E1	AZ75232GS-G1	AZ75232GS-E1	AZ75232GS-G1	Tube
		AZ75232GSTR-E1	AZ75232GSTR-G1	AZ75232GS-E1	AZ75232GS-G1	Tape & Reel
TSSOP-20	-40 to 85°C	AZ75232G-E1	AZ75232G-G1	232GE	232GG	Tube
		AZ75232GTR-E1	AZ75232GTR-G1	232GE	232GG	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green packages.

**MULTIPLE RS-232 DRIVERS AND RECEIVERS****AZ75232****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value		Unit
Supply Voltage	$V_{DD}$	15		V
	$V_{SS}$	-15		
	$V_{CC}$	7		
Input Voltage Range	$V_I$	Driver	-15 to 7	V
		Receiver	-30 to 30	
Power Dissipation ( $T_A=25^{\circ}\text{C}$ )	$P_D$	SOIC-20	1340	mW
		SSOP-20	1210	
		TSSOP-20	1100	
Driver Output Voltage Range	$V_O$	-15 to 15		V
Receiver Low-Level Output Current	$I_{OL}$	20		mA
Operating Junction Temperature	$T_J$	150		$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65 to 150		$^{\circ}\text{C}$
Lead Temperature (Soldering, 10sec)	$T_{LEAD}$	260		$^{\circ}\text{C}$

Note 1: Stresses greater than 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 Ratings" for extended periods may affect device reliability.

**Recommended Operating Conditions**

Parameter	Symbol	Min	Max	Unit
Supply Voltage	$V_{DD}$	7.5	15	V
	$V_{SS}$	-15	-7.5	
	$V_{CC}$	4.5	5.5	
High-Level Input Voltage (Driver Only)	$V_{IH}$	1.9		V
Low-Level Input Voltage (Driver Only)	$V_{IL}$		0.8	V
High-Level Output Current	Driver		-6	mA
	Receiver		-0.5	
Low-Level Output Current	Driver		6	mA
	Receiver		16	
Operating Temperature Range	$T_A$	-40	85	$^{\circ}\text{C}$



**MULTIPLE RS-232 DRIVERS AND RECEIVERS**

**AZ75232**

**Electrical Characteristics**

(T<sub>A</sub>=25°C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
<b>VOLTAGE SUPPLY SECTION (V<sub>CC</sub>=5V, V<sub>DD</sub>=9V, V<sub>SS</sub>=-9V, unless otherwise specified)</b>							
Supply Current from V <sub>DD</sub>	I <sub>DD</sub>	All inputs at 1.9V, no load	V <sub>DD</sub> =9V, V <sub>SS</sub> =-9V			15	mA
			V <sub>DD</sub> =12V, V <sub>SS</sub> =-12V			19	
			V <sub>DD</sub> =15V, V <sub>SS</sub> =-15V			25	
		All inputs at 0.8V, no load	V <sub>DD</sub> =9V, V <sub>SS</sub> =-9V			4.5	
			V <sub>DD</sub> =12V, V <sub>SS</sub> =-12V			5.5	
			V <sub>DD</sub> =15V, V <sub>SS</sub> =-15V			9	
Supply Current from V <sub>SS</sub>	I <sub>SS</sub>	All inputs at 1.9V, no load	V <sub>DD</sub> =9V, V <sub>SS</sub> =-9V			-15	mA
			V <sub>DD</sub> =12V, V <sub>SS</sub> =-12V			-19	
			V <sub>DD</sub> =15V, V <sub>SS</sub> =-15V			-25	
		All inputs at 0.8V, no load	V <sub>DD</sub> =9V, V <sub>SS</sub> =-9V			-3.2	
			V <sub>DD</sub> =12V, V <sub>SS</sub> =-12V			-3.2	
			V <sub>DD</sub> =15V, V <sub>SS</sub> =-15V			-3.2	
Supply Current from V <sub>CC</sub>	I <sub>CC</sub>	All inputs at 5V, no load, V <sub>CC</sub> =5V			30	mA	
<b>DRIVER SECTION (V<sub>CC</sub>=5V, V<sub>DD</sub>=9V, V<sub>SS</sub>=-9V, unless otherwise specified)</b>							
High-Level Output Voltage	V <sub>OH</sub>	V <sub>IL</sub> =0.8V, R <sub>L</sub> =3kΩ	6	7.5		V	
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>IH</sub> =1.9V, R <sub>L</sub> =3kΩ		-7.5	-6	V	
High-Level Input Current	I <sub>IH</sub>	V <sub>I</sub> =5V			10	μA	
Low-Level Input Current	I <sub>IL</sub>	V <sub>I</sub> =0V			-1.6	mA	
High-Level Short-Circuit Output Current	I <sub>OS(H)</sub>	V <sub>IL</sub> =0.8V, V <sub>O</sub> =0V	-4.5	-12	-19.5	mA	
Low-Level Short-Circuit Output Current	I <sub>OS(L)</sub>	V <sub>IH</sub> =2V, V <sub>O</sub> =0V	4.5	12	19.5	mA	
Output Resistance	r <sub>O</sub>	V <sub>CC</sub> =V <sub>DD</sub> =V <sub>SS</sub> =0, V <sub>O</sub> =-2V to 2V	300			Ω	
<b>DRIVER SECTION (V<sub>CC</sub>=5V, V<sub>DD</sub>=12V, V<sub>SS</sub>=-12V, unless otherwise specified)</b>							
Propagation Delay Time Low to High Level Output	t <sub>PLH</sub>	R <sub>L</sub> =3kΩ to 7kΩ, C <sub>L</sub> =15pF		315	500	ns	
Propagation Delay Time High to Low Level Output	t <sub>PHL</sub>	R <sub>L</sub> =3kΩ to 7kΩ, C <sub>L</sub> =15pF		75	175	ns	
Transition Time Low to High Level Output	t <sub>TLH</sub>	R <sub>L</sub> =3kΩ to 7kΩ	C <sub>L</sub> =15pF		60	100	ns
			C <sub>L</sub> =2500pF (Note 2)		1.7	2.5	μs
Transition Time High to Low Level Output	t <sub>THL</sub>	R <sub>L</sub> =3kΩ to 7kΩ	C <sub>L</sub> =15pF		40	75	ns
			C <sub>L</sub> =2500pF (Note 2)		1.5	2.5	μs



**MULTIPLE RS-232 DRIVERS AND RECEIVERS**

**AZ75232**

**Electrical Characteristics (Continued)**

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
<b>RECEIVER SECTION (<math>V_{CC}=5\text{V}</math>, <math>V_{DD}=9\text{V}</math>, <math>V_{SS}=-9\text{V}</math>, unless otherwise specified)</b>							
Positive-Going Input Threshold Voltage	$V_{IT+}$		1.75	1.9	2.3	V	
		$T_A = -40$ to $85^{\circ}\text{C}$	1.55		2.3	V	
Negative-Going Input Threshold Voltage	$V_{IT-}$		0.75	0.97	1.25	V	
Input Hysteresis Voltage	$V_{HYS}$		0.5			V	
High-Level Output Voltage	$V_{OH}$	$I_{OH}=-0.5\text{mA}$	$V_{IH}=0.75\text{V}$	2.6	4	5	V
			Input Open	2.6			
Low-Level Output Voltage	$V_{OL}$	$I_{OL}=10\text{mA}$ , $V_I=3\text{V}$		0.2	0.45	V	
High-Level Input Current	$I_{IH}$	$V_I=25\text{V}$	3.6		8.3	mA	
		$V_I=3\text{V}$	0.43				
Low-Level Input Current	$I_{IL}$	$V_I=-25\text{V}$	-3.6		-8.3	mA	
		$V_I=-3\text{V}$	-0.43				
Short-Circuit Output Current	$I_{OS}$	$V_I=0.8\text{V}$		-3.4	-12	mA	
<b>RECEIVER SECTION (<math>V_{CC}=5\text{V}</math>, <math>V_{DD}=12\text{V}</math>, <math>V_{SS}=-12\text{V}</math>, unless otherwise specified)</b>							
Propagation Delay Time Low to High Level Output	$t_{PLH}$	$R_L=5\text{k}\Omega$ , $C_L=50\text{pF}$		105	250	ns	
		$R_L=1.5\text{k}\Omega$ , $C_L=15\text{pF}$		100	160		
Propagation Delay Time High to Low Level Output	$t_{PHL}$	$R_L=5\text{k}\Omega$ , $C_L=50\text{pF}$		60	150	ns	
		$R_L=1.5\text{k}\Omega$ , $C_L=15\text{pF}$		42	100		
Transition Time Low to High Level Output	$t_{TLH}$	$R_L=5\text{k}\Omega$ , $C_L=50\text{pF}$		170	350	ns	
		$R_L=1.5\text{k}\Omega$ , $C_L=15\text{pF}$		90	175		
Transition Time High to Low Level Output	$t_{THL}$	$R_L=5\text{k}\Omega$ , $C_L=50\text{pF}$		16	60	ns	
		$R_L=1.5\text{k}\Omega$ , $C_L=15\text{pF}$		15	50		

Note 2: Measured between -3V and 3V points of the output waveform (EIA/TIA-232-F conditions); all unused inputs are tied either high or low.



**Typical Performance Characteristics**

**Driver Section**

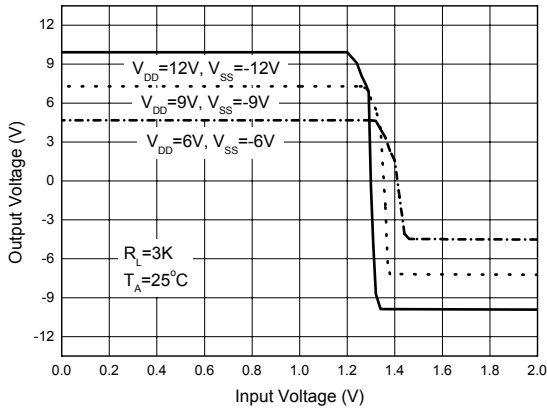


Figure 4. Voltage Transfer Characteristics

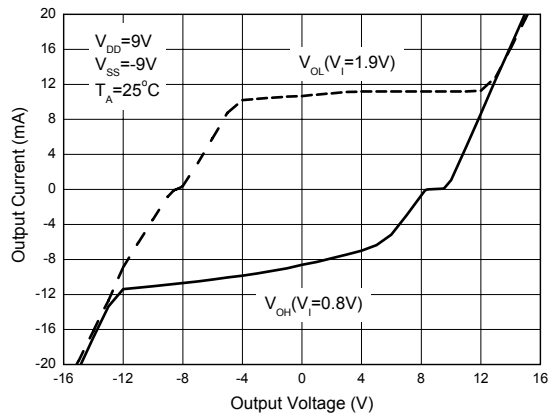


Figure 5. Output Current vs. Output Voltage

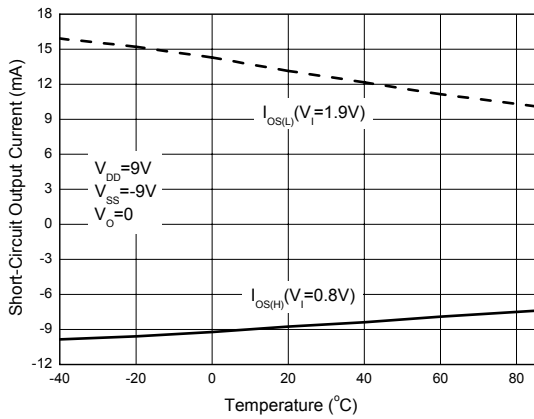


Figure 6. Short-Circuit Output Current vs. Temperature

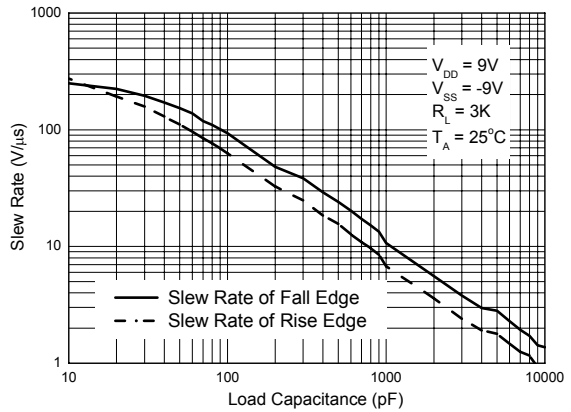


Figure 7. Slew Rate vs. Load Capacitance



**Typical Performance Characteristics (Continued)**

**Receiver Section**

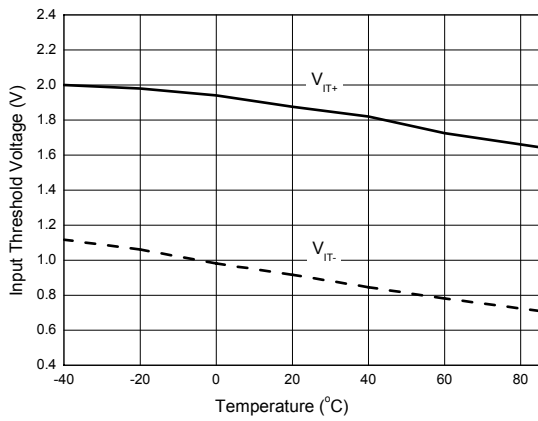


Figure 8. Input Threshold Voltage vs. Temperature

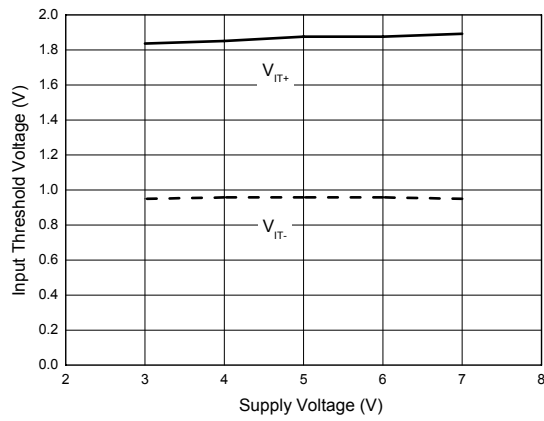


Figure 9. Input Threshold Voltage vs. Supply Voltage

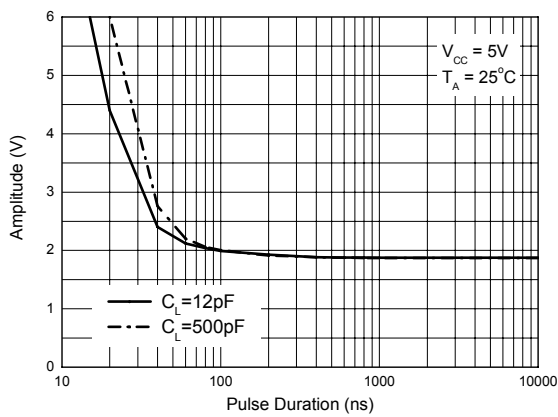


Figure 10. Noise Rejection



**Typical Application**

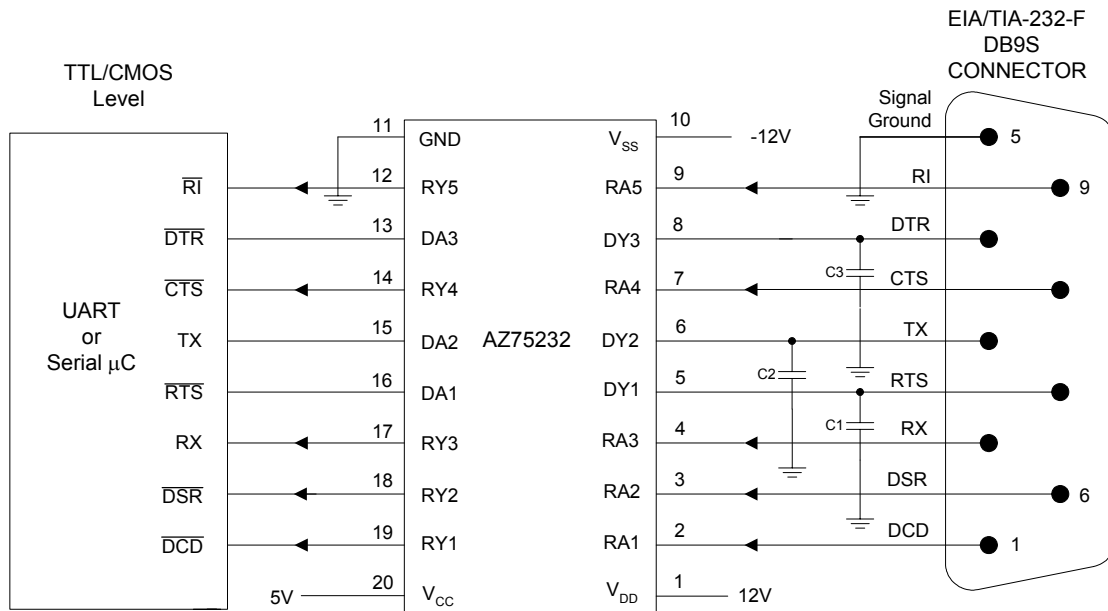


Figure 11. Typical Application of AZ75232



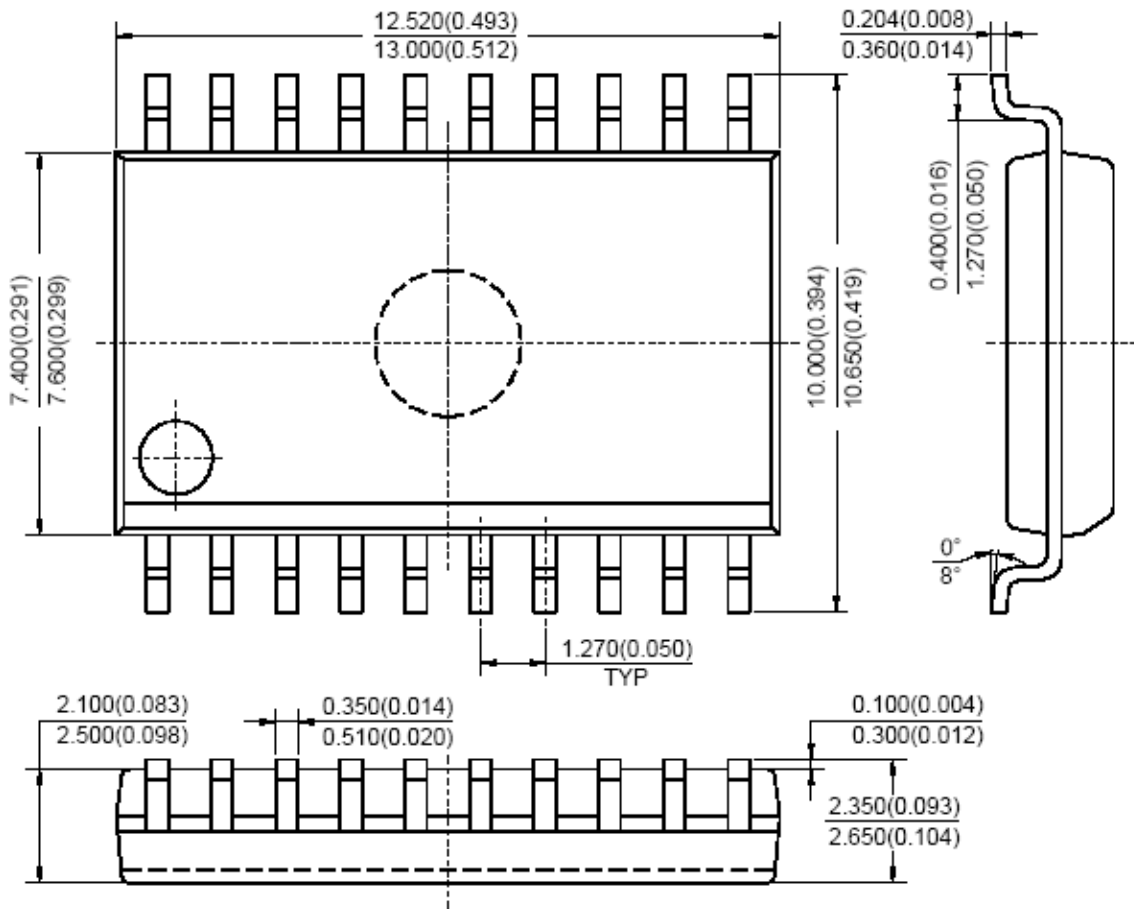
**MULTIPLE RS-232 DRIVERS AND RECEIVERS**

**AZ75232**

**Mechanical Dimensions**

**SOIC-20**

**Unit: mm(inch)**



Note: Eject hole, oriented hole and mold mark is optional.



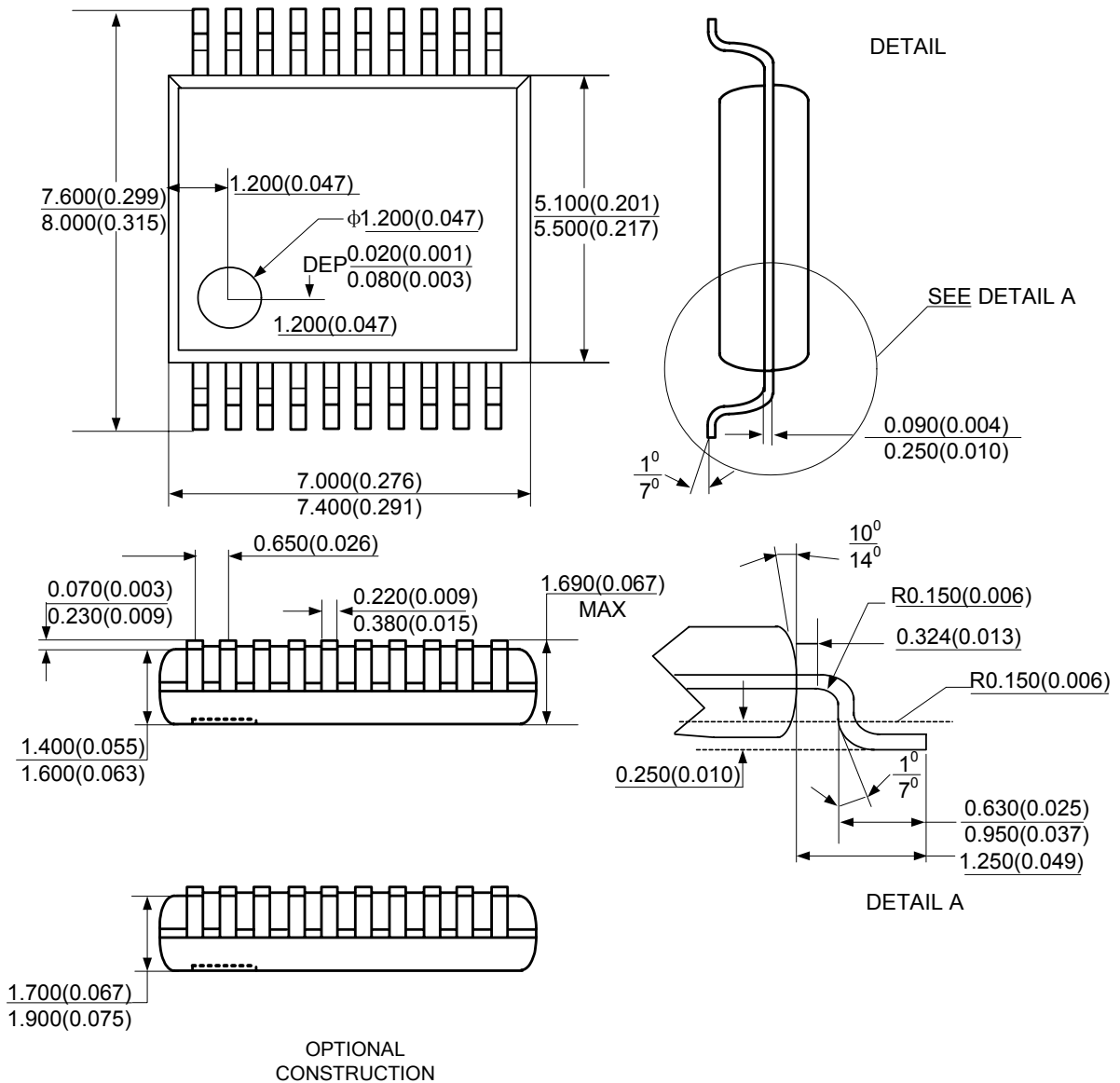
**MULTIPLE RS-232 DRIVERS AND RECEIVERS**

**AZ75232**

**Mechanical Dimensions (Continued)**

**SSOP-20**

**Unit: mm(inch)**



Note: Eject hole, oriented hole and mold mark is optional



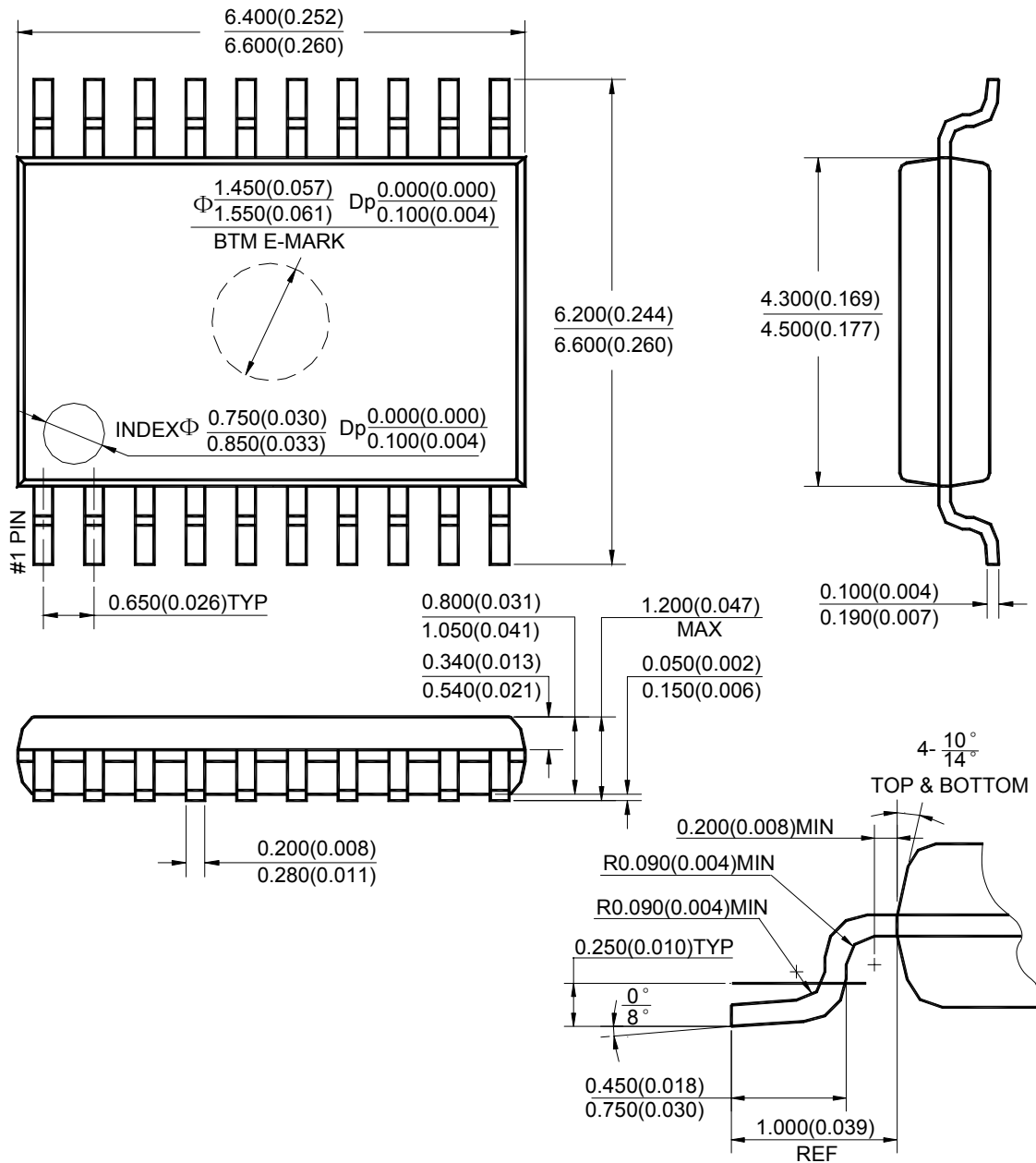
**MULTIPLE RS-232 DRIVERS AND RECEIVERS**

**AZ75232**

**Mechanical Dimensions**

**TSSOP-20**

**Unit: mm(inch)**



Note: Eject hole, oriented hole and mold mark is optional.



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