

钍地半导体
Tudi Semiconductor

Product Specification

TUDI-ADM3202/ADM3222/ADM1385

Low Power, 3.3 V, RS-232 Line Drivers/Receivers

网址 www.sztdbdt.com

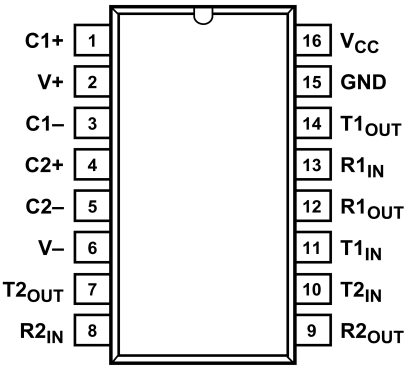
用芯智造·卓越品质

semiconductor device manufacturer

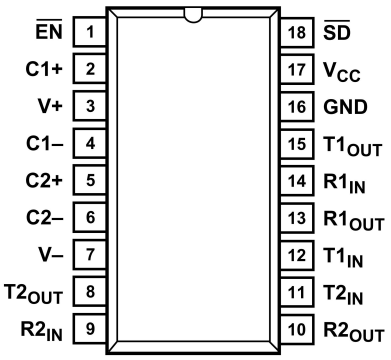
- Design
- research and development
- production
- and sales

FEATURES

- 460 kbps data rate
- Specified at 3.3 V
- Meets EIA-232E specifications
- 0.1 µF charge pump capacitors
- Low power shutdown (ADM3222 and ADM1385)
- PDIP, SOIC_N, SOIC_W, SSOP, and TSSOP options
- Upgrade for MAX3222/MAX3232 and LTC1385
- ESD protection to IEC 1000-4-2 (801.2) on RS-232 pins (ADM3202 only)
- ±8 kV: contact discharge
- ±15 kV: air gap discharge



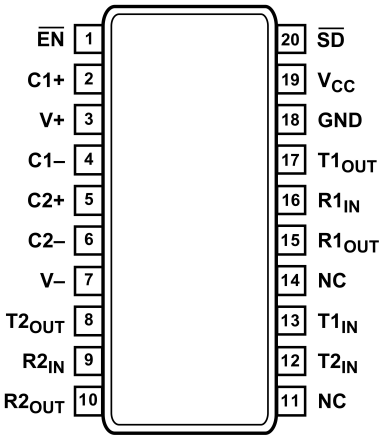
ADM3202
SOP16/DIP16/
TSSOP16/SMD16



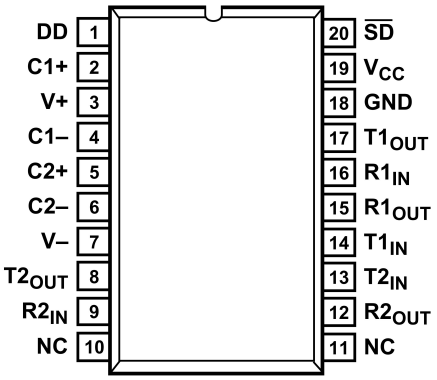
ADM3222 SOP18

APPLICATIONS

- General-purpose RS-232 data link
- Portable instruments
- Printers, palmtop computers, PDAs



ADM3222
TSSOP20



ADM1385
SSOP20

DESCRIPTION

The ADM3202/ADM3222/ADM1385 transceivers are high speed, 2-channel RS-232/V.28 interface devices that operate from a single 3.3 V power supply. Low power consumption and a shutdown facility (ADM3222/ADM1385) make them ideal for battery-powered portable instruments.
The ADM3202/ADM3222/ADM1385 parts conform to the EIA-232E and CCITT V.28 specifications and operate at data rates up to 460 kbps.
Four external 0.1 µF charge pump capacitors are used for the voltage doubler/inverter, permitting operation from a single 3.3 V supply.

The ADM3222 contains additional enable and shutdown circuitry. The EN input can be used to three-state the receiver outputs. The SD input is used to power down the charge pump and transmitter outputs, reducing the quiescent current to less than 0.5 µA. The receivers remain enabled during shutdown unless disabled using EN.

The ADM3202 is available in a 16-lead PDIP, SOIC_W, and SOIC_N, as well as a space-saving 16-lead TSSOP. The ADM3222 is available in 18-lead PDIP and SOIC_W and in 20-lead SSOP and TSSOP. The ADM1385 is available in a 20-lead SSOP, which is pin-compatible with the LTC1385 CG.

ABSOLUTE MAXIMUM RATINGS

T_A= 25°C, unless otherwise noted.

Table 1.

Parameter	Rating
Vcc	-0.3V to+6V
V+	(Vcc-0.3V)to+14V
V-	+0.3V to-14V
Input Voltages	
T_{IN}	-0.3V to(V+,+0.3V)
R_{IN}	±30V
Output Voltages	
T_{OUT}	±15V
R_{OUT}	-0.3V to(Vcc+0.3V)
Short-Circuit Duration	
T_{OUT}	Continuous
Power Dissipation (Derates 6mW/ above 50)	450 mW
Thermal Impedance,θ_{JA}	
N-16/N-18(2-Layer Test Board)	117 /W
RW-16/RW-18(4-Layer Test Board)	56 /W
R-16(4-Layer Test Board)	81 /W
RU-16(4-Layer Test Board	113 /W
RU-20(4-Layer Test Board)	110 /W
RS-20(4-Layer Test Board)	83 /W
Operating Temperature Range	
Industrial (A Version)	-40 to +85
Storage Temperature Range	-65 to +150
Lead Temperature	JEDEC industry
(Soldering,10 sec)	standard J-STD-020

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

FUNCTION DESCRIPTIONS

Table 2. Pin Function Descriptions

Mnemonic	Description
Vcc	Power Supply Input(3.3V±0.3V).
V+	Internally Generated Positive Supply(+6Vnominal).
V-	Internally Generated Negative Supply(-6Vnominal).
GND	Ground Pin.Must be connected to OV.
C1+,C1-	External Capacitor 1 is connected between these pins.A 0.1 μF capacitor is recommended but larger capacitors upto 47μFFcan be used.
C2+,C2-	External Capacitor 2 is connected between these pins.A 0.1 μF capacitor is recommended but larger capacitors upto 47μFcan be used.
T_{XIN}	Transmitter(Driver)Inputs.These inputs accept TTL/CMOS levels.
T_{XOUT}	Transmitter(Driver)Outputs.These are RS-232 signal levels(typically±9V).
R_{XIN}	Receiver Inputs.These inputs accept RS-232 signal levels.An internal 5kQ pull-down resistor to GND is connected on each input
R_{XOUT}	Receiver Outputs.These are CMOS output logic levels.
EN	(ADM3222 only)Receiver Enable.Active low.When low,the receiver outputs are enabled.When high,they are three-stated.
SD	(ADM3222 only)Shutdown Control.Active low.When low,the charge pump is shut down and the transmitter outputsare disabled.
SD	(ADM1385 only)Shutdown Control.When low,the charge pumpis shut down andall transmitters and receivers are disabled.
DD	(ADM1385only)Driver Disable.When low,the charge pump is turned off and the transmitters are disabled.The receiversremain active.
NC	No Connect.

SPECIFICATIONS

V_{CC}= 3.3 V ± 0.3 V, C1 to C4 = 0.1 µF. All specifications T_{MIN} to T_{MAX}, unless otherwise noted.

Table 3.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
DC CHARACTERISTICS					
Operating Voltage Range	3.0	3.3	5.5	V	
Vcc Power Supply Current		1.3	3	mA	No load
		8	12	mA	R_L=3kΩ to GND
Shutdown Supply Current		0.01	0.5	µA	
LOGIC					
Input Logic Threshold Low,V_{INL}			0.8	V	T_{IN}
Input Logic Threshold High,V_{INH}	2.0			V	T_{IN}
CMOS Output Voltage Low,V_{OL}			0.4	V	I_{OUT}=1.6 mA
CMOS Output Voltage High,V_{OH}	Vcc-0.6			V	I_{OUT}=-1 mA
Logic Pull-Up Current		5	10	µA	T_{IN}=GND to Vcc
Output Leakage Current			±10	µA	Receivers disabled
RS-232 RECEIVER					
EIA-232 Input Voltage Range	-30		+30	V	
EIA-232 Input Threshold Low	0.6	1.2		V	
EIA-232 Input Threshold High		1.6	2.4	V	
EIA-232 Input Hysteresis		0.4		V	
EIA-232 Input Resistance	3	5	7	kΩ	
RS-232 TRANSMITTER					
Output Voltage Swing(RS-232)	±5.0	±5.2		V	Vcc=3.3 V,alltransmitter outputs loaded with 3 kΩ to ground
Output Voltage Swing(RS-562)	±3.7			V	Vcc=3.0V
Transmitter Output Resistance	300			Ω	Vcc=0V,V_{OUT}=±2V
RS-232 Output Short-Circuit Current		±15		mA	
Output Leakage Current			±25	µA	SD=low,V_{OUT}=12V

SPECIFICATIONS(continued)

V_{CC}= 3.3 V ± 0.3 V, C1 to C4 = 0.1 µF. All specifications T_{MIN} to T_{MAX}, unless otherwise noted.

Table 3.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
TIMING CHARACTERISTICS					
Maximum Data Rate	460			kbps	Vcc=3.3V,R_L=3kΩ to 7 kΩ,C_L=50 pF to 1000pF,one Tx switching
Receiver Propagation Delay					
TPHL		0.4	1	µs	
TPLH		0.4	1	µs	
Transmitter Propagation Delay		0.3	1.2	µs	R_L=3kΩ,C_L=1000 pF
Receiver Output Enable Time		200		ns	
Receiver Output Disable Time		200		ns	
Transmitter Skew		30		ns	
Receiver Skew		300		ns	
Transition Region Slew Rate	5.5	10	30	V/µs	Measured from +3V to-3V or -3V to+3V,Vcc=+3.3V;R_L=3kΩ,C_L=1000 pF, T_A=25

1.ADM1385: Input leakage current typically -10 µA when T_{IN}= GND.

GENERAL DESCRIPTION

The ADM3202/ADM3222/ADM1385 are RS-232 line drivers/ receivers. Step-up voltage converters coupled with level-shifting transmitters and receivers allow RS-232 levels to be developed while operating from a single 3.3 V supply.
CMOS technology is used to keep the power dissipation to an absolute minimum, allowing maximum battery life in portable applications.
The ADM3202/ADM3222/ADM1385 are modifications, enhancements, and improvements of the AD230 to AD241 family and derivatives. They are essentially plug-in compatible and do not have any materially different applications.

CIRCUIT DESCRIPTION

The internal circuitry consists of these main sections:
- A charge pump voltage converter
- 3.3 V logic to EIA-232 transmitters
- EIA-232 to 5 V logic receivers

Charge Pump DC to DC Voltage Converter

The charge pump voltage converter consists of a 200 kHz oscillator and a switching matrix. The converter generates a ±6.6 V supply from the input 3.3 V level. This is done in two stages by using a switched capacitor technique as illustrated in Figure 4 and Figure 5. First, the 3.3 V input supply is doubled to 6.6 V by using Capacitor C1 as the charge storage element. The +6.6 V level is then inverted to generate 6.6 V using C2 as the storage element. C3 is shown connected between V+ and VCC but is equally effective if connected between V+ and GND.
Capacitors C3 and C4 are used to reduce the output ripple. Their values are not critical and can be increased, if desired. Capacitor C3 is shown connected between V+ and V_{CC}. It is also acceptable to connect this capacitor between V+ and GND.
If desired, larger capacitors (up to 10 µF) can be used for Capacitors C1 to C4.

HIGH BAUD RATE

The ADM3202/ADM3222 feature high slew rates permitting data transmission at rates well in excess of the EIA/RS-232E specifications. RS-232 voltage levels are maintained at data rates up to 460 kbps even under worst-case loading conditions. This allows high speed data links between two terminals and is suitable for the new generation ISDN modem standards that require data rates of 230 kbps. The slew rate is internally controlled to less than 30 V/µs to minimize EMI interference.

Transmitter (Driver) Section

The drivers convert 3.3 V logic input levels into RS-232 output levels. With VCC= 3.3 V and driving an RS-232 load, the output voltage swing is typically ±6 V.

Receiver Section

The receivers are inverting level-shifters that accept RS-232 input levels and translate them into 3 V logic output levels. The inputs have internal 5 kΩ, pull-down resistors to ground and are protected against overvoltages up to ±30 V. Unconnected inputs are pulled to 0 V by the internal 5 kΩ, pull-down resistor. This results in a Logic 1 output level for unconnected inputs or for inputs connected to GND.

The receivers have Schmitt-trigger inputs with a hysteresis level of 0.4 V. This ensures error-free reception for both noisy inputs and for inputs with slow transition times.

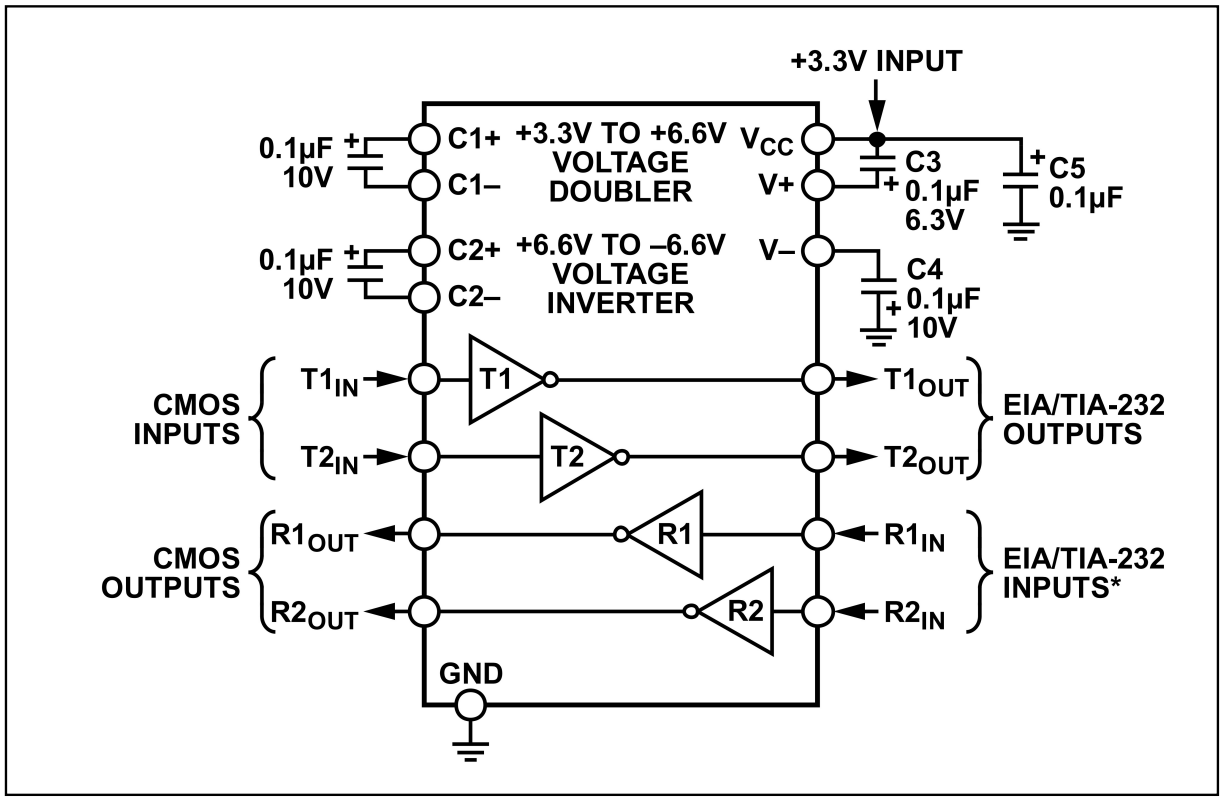


Figure 1. ADM3202 Typical Operating Circuit

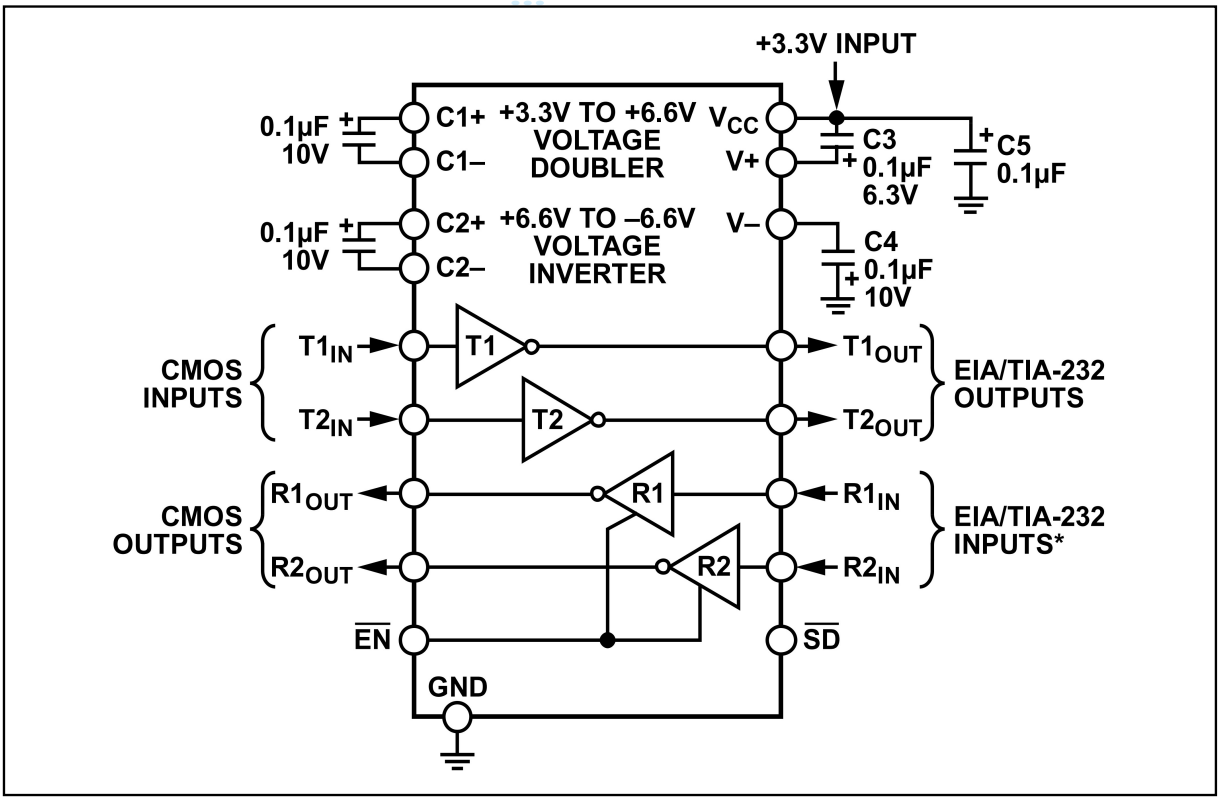


Figure 2. ADM3222 Typical Operating Circuit

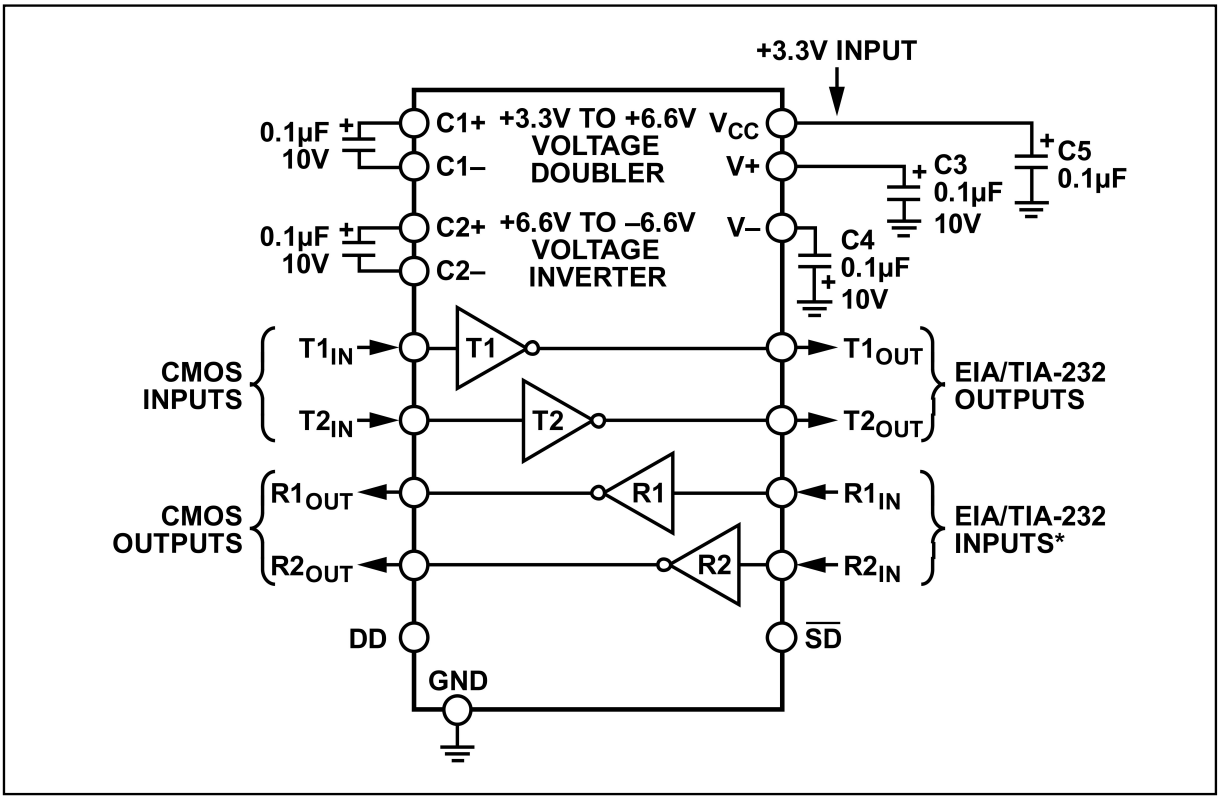


Figure 3. ADM1385 Typical Operating Circuit

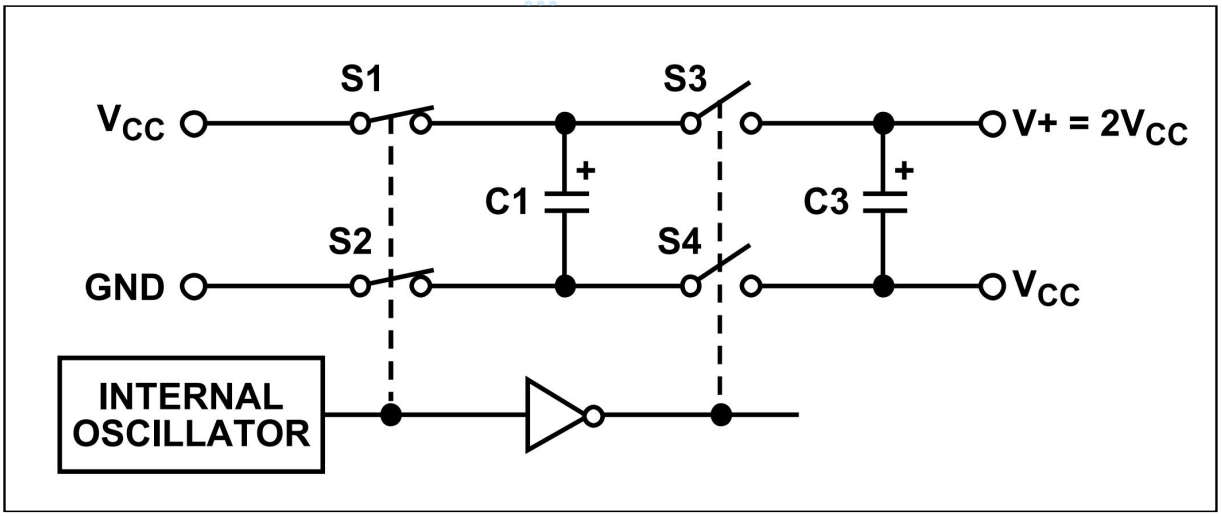


Figure 4. Charge Pump Voltage Doubler

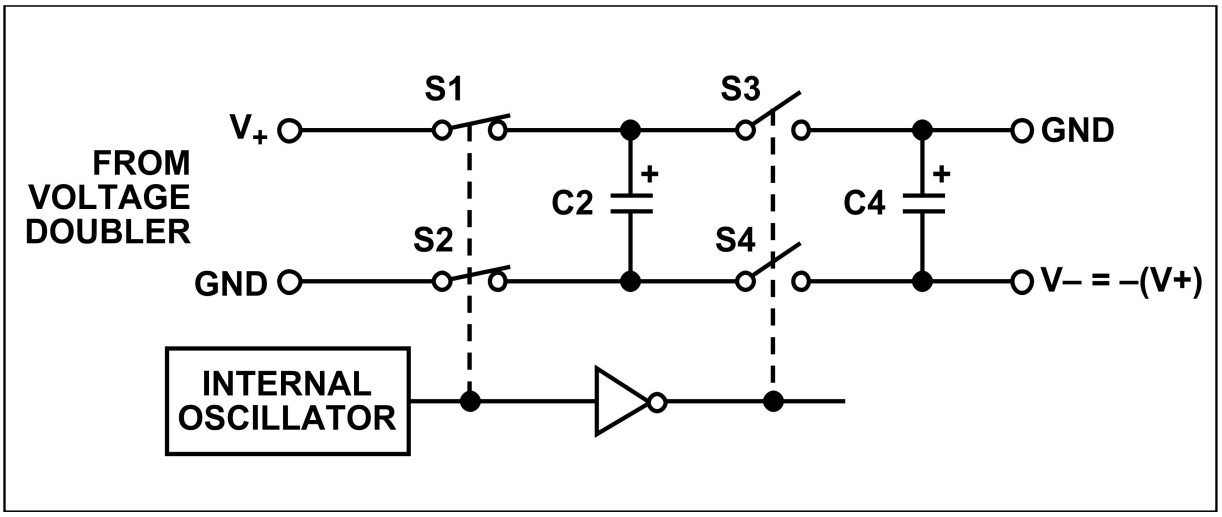


Figure 5. Charge Pump Voltage Inverter

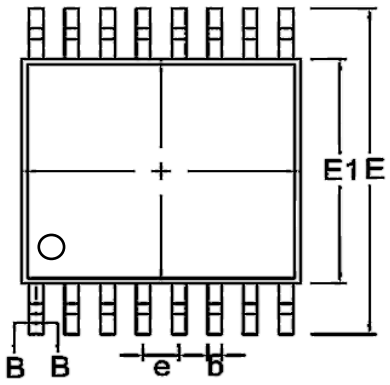
Order information

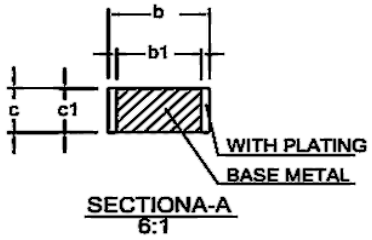
Order Number	Package	Package Quantity	Marking On The park	Temperature
ADM3202ANZ-TUDI	DIP16	Tube,25,A box of 1000	ADM3202ANZ	−40°C to +85°C
ADM3202ARNZ-REEL-TUDI	SOP16	Tape,Reel,4000	ADM3202ARNZ	
ADM3202ARUZ-REEL-TUDI	TSSOP16	Tape,Reel,4000	ADM3202A	
ADM3202ARWZ-REEL-TUDI	SMD16	Tape,Reel,2000	ADM3202ARWZ	
ADM3222ARSZ-REEL-TUDI	SSOP20	Tape,Reel,2000	ADM3222ARSZ	
ADM3222ARUZ-REEL-TUDI	TSSOP20	Tape,Reel,4000	ADM3222ARUZ	
ADM3222ARWZ-REEL-TUDI	SOP18	Tape,Reel,2000	ADM3222ARWZ	
ADM1385ARSZ-REEL-TUDI	SSOP20	Tape,Reel,2000	ADM1385ARSZ	

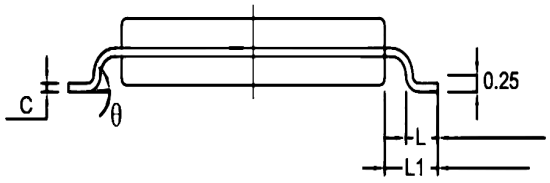
Revision history

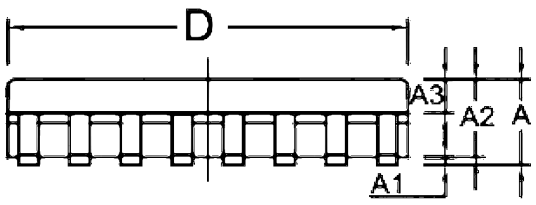
	Date	Revision	Page
V1.0	2023/1	New	1-12
V1.1	2026/2	Update model and PDF template	1-19

Package TSSOP16



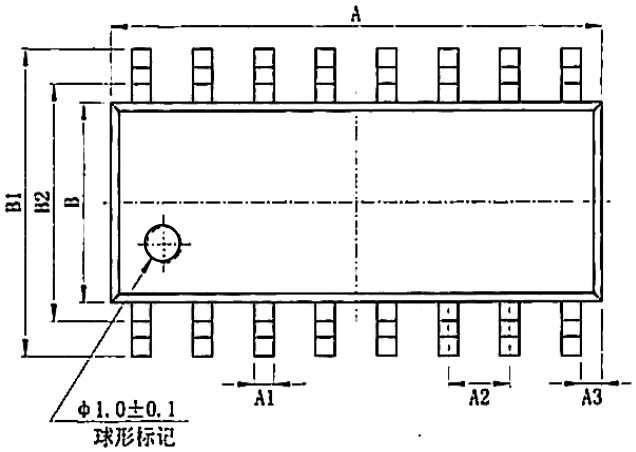


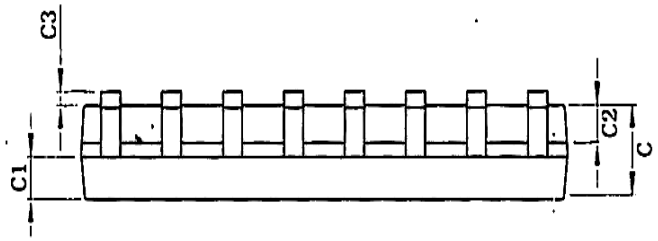


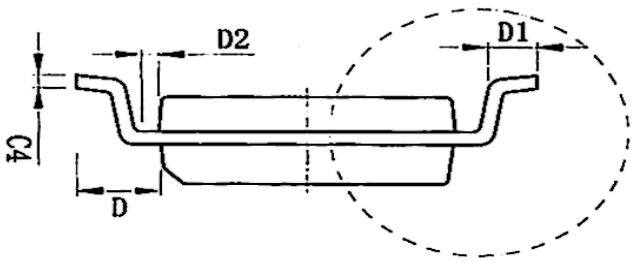


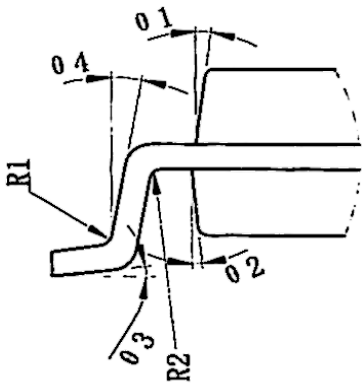
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A1	0.05		0.15
A2	0.90	1.00	1.05
b	0.20	--	0.30
b1	0.19	0.22	0.25
C	0.110	0.127	0.145
cl	0.12	0.13	0.14
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00BSC		
	0°	--	8°

Package SOP16



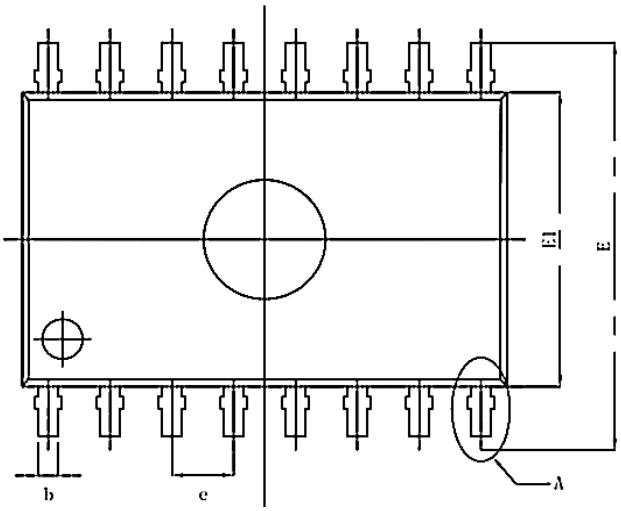


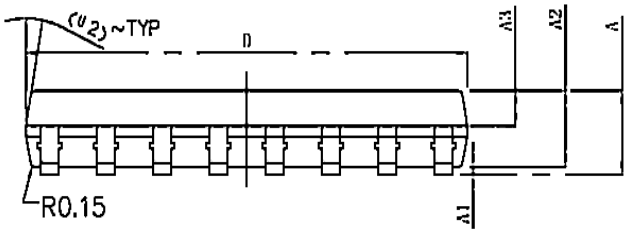


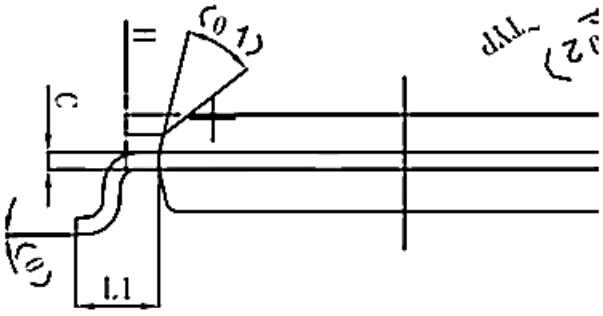


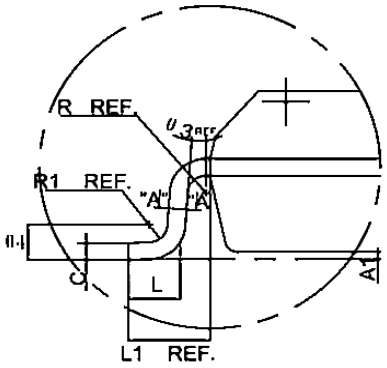
SIZE / SYMBOL	MIN./mm	MAX./mm
A	9.80	10.00
A1	0.356	0.456
A2	1.27TYP	
A3	0.302TYP	
B	3.85	3.95
B1	5.84	6.24
B2	5.00 TYP	
C	1.40	1.60
C1	0.61	0.71
C2	0.54	0.64
C3	0.05	0.25
C4	0.203	0.233
D	1.05 TYP	
D1	0.40	0.70
D2	0.15	0.25
R1	0.20TYP	
R2	0.20TYP	
01	8°~12°TYP4	
02	8°~12°TYP4	
03	0°~8°	
04	4°~12°	

Package SMD16



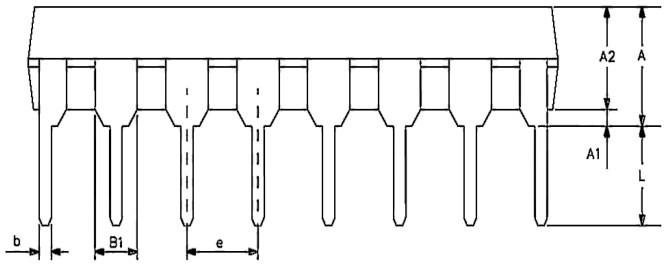


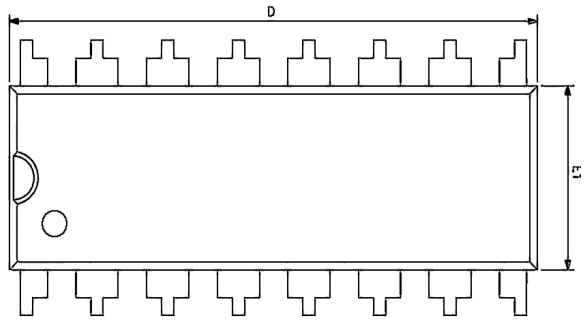


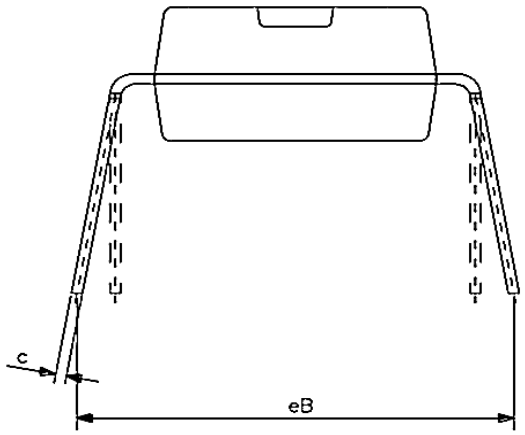


SIZE / SYMBOL	MIN./mm	MAX./mm
A	_	2.65
A1	0.10	0.30
A2	2.25	2.35
A3	0.97	1.07
D	10.10	10.50
E	10.26	10.60
E1	7.30	7.70
e	1.27BSC	
L	0.55	0.85
L1	1.4BSC	
H	0.345	0.365
R	0.20TYP	
R1	0.30TYP	
θ	0°	8°
θ1	45° TYP	
02	12° TYP	
03	0°	8°
04	0°	10°

Package DIP16

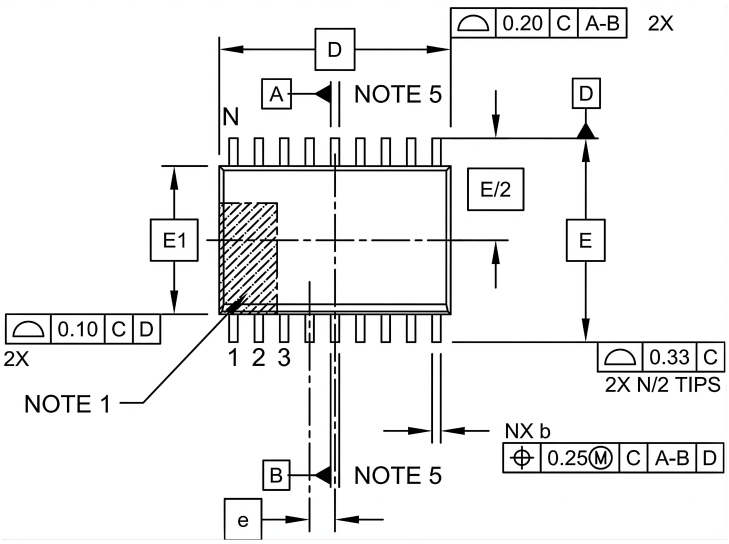


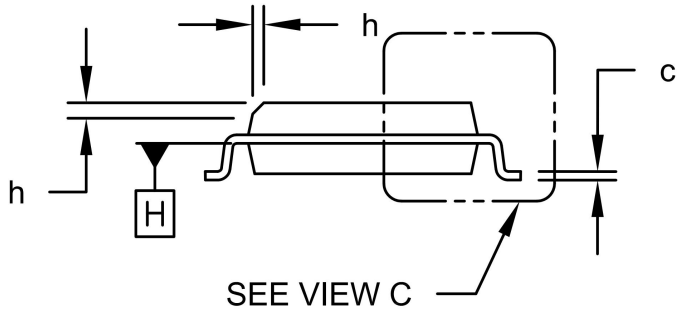


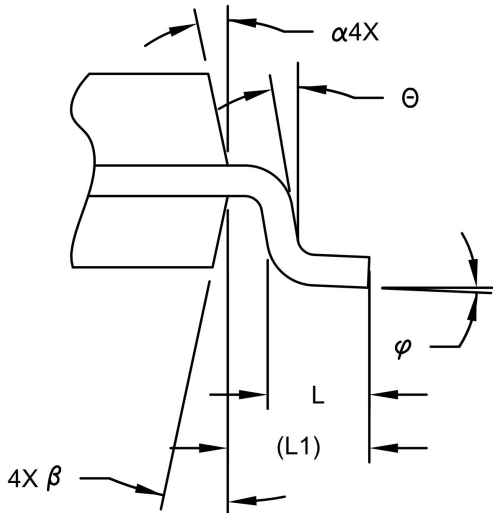


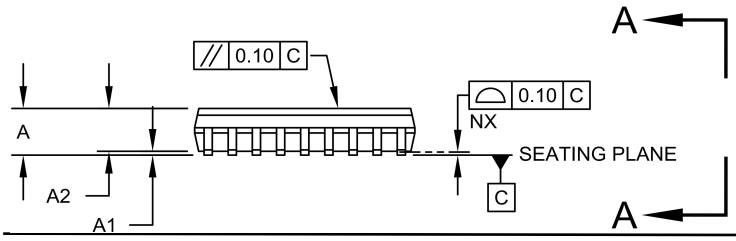
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A1	0.51	___
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
C	0.20	0.36
eB	7.62	9.30
R	0.20TYP	
R1	0.30TYP	
θ	0°	8°
θ1	45°TYP	
02	12°TYP	
03	0°	8°
04	0°	10°

Package SOP18





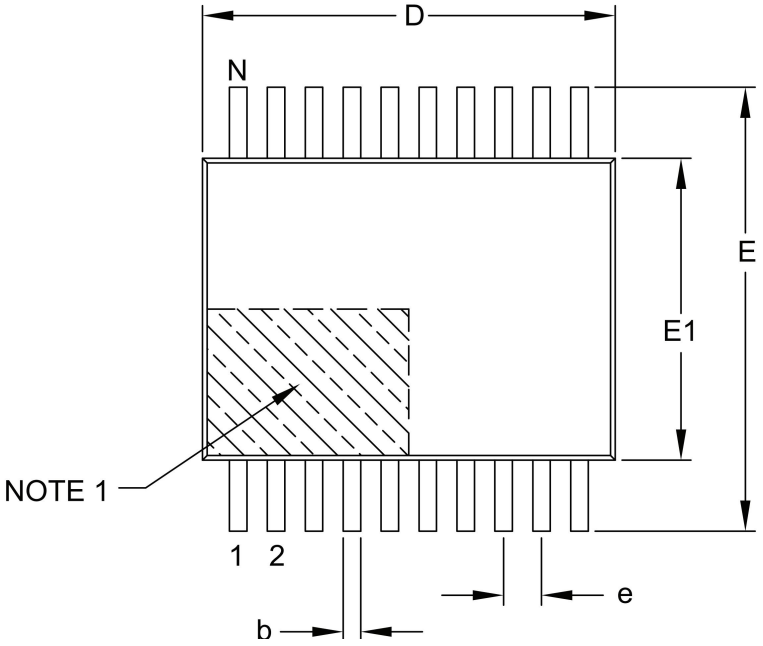


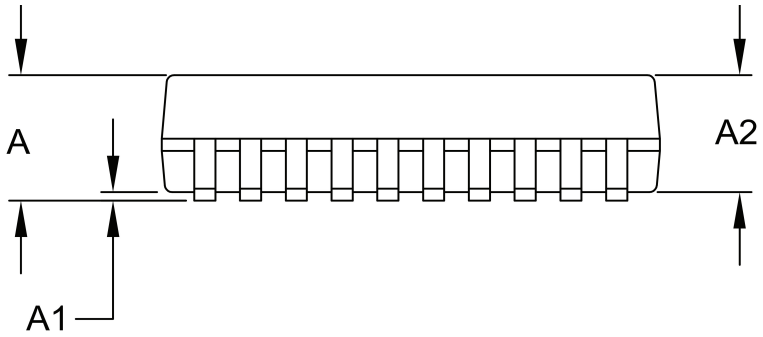


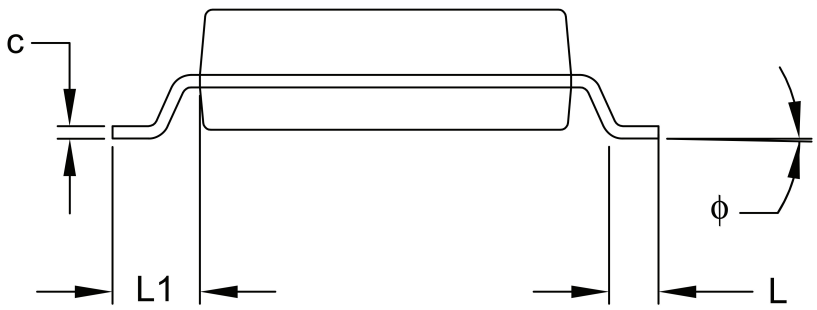
Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		18	
Pitch	e		1.27 BSC	
Overall Height	A	-	-	2.65
Molded Package Thickness	A2	2.05	-	-
Standoff §	A1	0.10	-	0.30
Overall Width	E		10.30 BSC	
Molded Package Width	E1		7.50 BSC	
Overall Length	D		11.55 BSC	
Chamfer (Optional)	h	0.25	-	0.75
Foot Length	L	0.40	-	1.27
Footprint	L1		1.40 REF	
Lead Angle	Θ	0°	-	
Foot Angle	4	0°	-	8°
Lead Thickness	C	0.20	-	0.33
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

Notes:
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2.§ Significant Characteristic.
3. Dimension D does not include mold flash, protrusions or gate burrs, which shallnot exceed 0.15 mm per end. Dimension E1 does not include interlead flashor protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF:Reference Dimension, usually without tolerance, for information purposes only.
5. Datums A&B to be determined at Datum H.

Package SSOP20



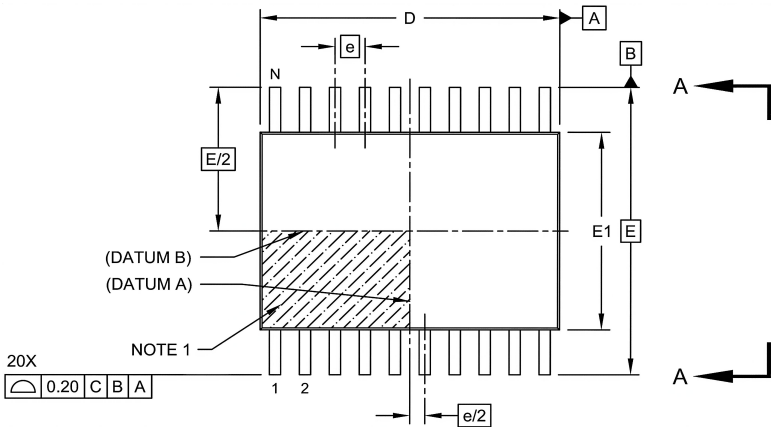


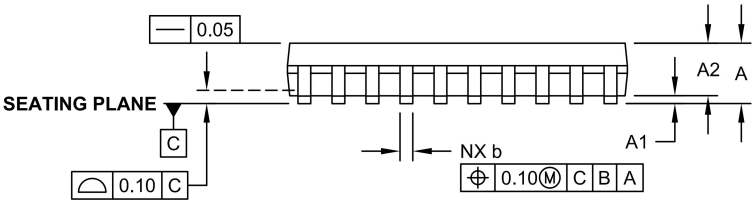


Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		20	
Pitch	e		0.65 BSC	
Overall Height	A	—	—	2.00
Molded Package Thickness	A2	1.65	1.75	1.85
Standoff	A1	0.05	—	—
Overall Width	E	7.40	7.80	8.20
Molded Package Width	E1	5.00	5.30	5.60
Overall Length	D	6.90	7.20	7.50
Foot Length	L	0.55	0.75	0.95
Footprint	L1		1.25 REF	
Lead Thickness	C	0.09	—	0.25
Foot Angle	φ	0°	4°	8°
Lead Width	b	0.22	—	0.38

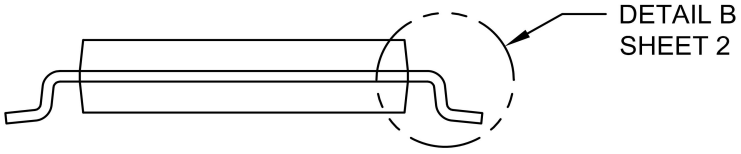
Notes:
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.20 mm per side. 3. Dimensioning and tolerancing per ASME Y14.5M.
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.

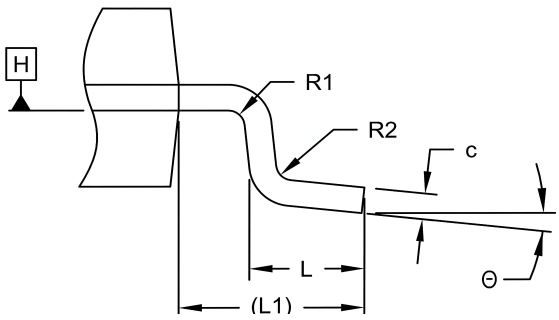
Package TSSOP20





Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		20	
Pitch	e		0.65 BSC	
Overall Height	A	-	-	1.20
Molded Package Thickness	A2	0.80	1.00	1.05
Standoff	A1	0.05	-	0.15
Overall Width	E		6.40 BSC	
Molded Package Width	E1	4.30	4.40	4.50
Molded Package Length	D	6.40	6.50	6.60
Foot Length	L	0.45	0.60	0.75
Footprint	L1		1.00 REF	
Foot Angle	θ	0°	-	8°
Lead Width	b	0.19	-	0.30
Lead Thickness	C	0.09	-	0.20
Bend Radius	R1	0.09	-	-
Bend Radius	R2	0.09	-	-





Notes:
1. Pin 1 visual index feature may vary,but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash orprotrusions shall not exceed 0.15mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF:Reference Dimension, usually without tolerance , for information purposes only.

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